Gulfstream G280
AIRPLANE FLIGHT MANUAL

Revision No.: 10
Issue Date: 9 May 2022 Manual No.:

REVISION HIGHLIGHTS

Pages which have been added, revised or deleted are outlined below together with the highlights of the revision. Remove and insert the affected pages as listed.

Page No.	Action	Description
Intro-xliv	Replace	Log of Revisions
Intro-xlvii through Intro-xcii	"	Log of Effective Pages
V-xvi through V-xxiv	"	Repagination of Table of Contents
V-280 through V-431	"	Updated Performance Tables Flaps 20, Wet Runway
V-598 through V-749	"	Updated Performance Tables Flaps 10, Wet Runway
X-5-86 through X-5-147	"	Updated Performance Tables Flaps 0, Wet Runway

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GULFSTREAM
G280

AIRPLANE FLIGHT MANUAL

Issue 1
15 Apr 2015

This Airplane Flight Manual is FAA approved for U.S. registered airplanes in accordance with the provision of CFR Section 21.29, and as required by FAA Type Certificate Data Sheet No. A61NM.

This Airplane Flight Manual is approved by the Civil Aviation Authority of Israel (CAAI) on behalf of the European Aviation Safety Agency (EASA), using the working arrangement between the CAAI and the EASA. This signature page is provided as CAAI statement of compliance with EASA requirements applicable to this project.

Mfr Serial No._____ Registration No._____ Manual No._____

Civil Aviation Authority רשות התעופה האזרחית משרד אוירי

DATE 15 Apr 2015

CAAI
Oren Eshet
Test Pilot
AE-277

For/Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Gulfstream

Gulfstream G280
AIRPLANE FLIGHT MANUAL

CAAI APPROVED
16 Mar 2017

Gulfstream G280
AIRPLANE FLIGHT MANUAL

This Airplane Flight Manual is approved by the Civil Aviation Authority of Israel (CAAI) on behalf of Civil Aviation Authority of China (CAAC). This Airplane Flight Manual was prepared in accordance with CAAC requirements.

_____ DATE 16 Mar 2017

Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

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INTRODUCTION

GENERAL

This Airplane Flight Manual (AFM) has been approved by the Civil Aviation Authority of Israel (CAAI) and must be in the aircraft at all times. Part 2, is not CAAI approved but it contains essential and valuable information. The loading instructions in the Weight and Balance sections, however, are accepted by CAAI. (See FOREWORD, Section VI.) The AFM in the aircraft at the time of delivery contains information applicable only to that particular aircraft.

This issue of AFM is intended for use on aircraft which have installed the MOD G25-10032 or the associated Service Bulletin 280-31-106 complied with for the incorporation of the Avionics Suite 3.6.

This issue of AFM is intended for use on aircraft which do not have installed the MOD G25-10044 or the associated Service Bulletin 280-76-128 "ECU Hardware and FADEC Software Update V2G".

If the aircraft is not compliant to the above revert to previous issue of the Airplane Flight Manual.

Every effort is made to keep the manual current through a periodic revision service. Continual research, review conference with operating personnel, and a constant review of operations and flight test data, ensure inclusion of the latest data in the manual.

It is the responsibility of the owner/operator to ensure that this AFM is current.

(Continued)

REVISIONS

This AFM must be maintained in accordance with the Log of Effective Pages, herein. As new data and procedures are developed and approved (requiring changes, additions or deletions), appropriate, periodic revisions will be issued to all registered owners. Each revision will include a Revision Notice, describing the action to be taken, and a new Log of Effective Pages, listing all current pages.

A black, vertical, revision bar, in the outer margin of a page, indicates adjacent text has been changed, added or deleted.
A pointing finger (☞) - when used in conjunction with a revision bar - highlights the changed area of a page. When used adjacent to the page number, it indicates a new or extensively revised page; in this case, revision bars will not appear on page.

SUPPLEMENTS

A supplement need not be retained in the AFM unless it pertains to specified equipment installed and applicable to the aircraft or operation necessary for mission.

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DEFINITIONS

NOTES, CAUTIONS and WARNINGS, used throughout this manual, are intended to emphasize specific procedures, instructions or information in general accord with the following:

NOTE : An operating procedure, technique, etc., which is considered important to emphasize.

CAUTION : An operating procedure, technique, etc., relative to safety matters of a secondary order or not immediately imminent which may result in damage to equipment if not carefully followed.

WARNING : An operating procedure, technique, etc., relative to safety matters of a primary order or immediately imminent which may result in personal injury or loss of life if not carefully followed.

LIMITATIONS

A system, component, structural or procedural limit that must be adhered to.

EMERGENCY PROCEDURES

An emergency procedure is one requiring the use of special systems and/or regular systems in order to protect the occupants and the aircraft from serious or critical harm. These procedures usually require immediate and precise action.

ABNORMAL PROCEDURES

An abnormal procedure is one requiring the use of special systems and/or the alternate use of regular systems, the use of which may be expected to maintain an acceptable level of airworthiness or reduce operational risk resulting from a failure condition.

NORMAL PROCEDURES

A normal procedure involves routine operations of a day-to-day nature. It is also concerned with peculiarities of the aircraft's design and operating features encountered in connection with routine operations, including malfunction cases not considered to be an emergency or abnormal condition (i.e., not considered to degrade or affect safety).

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NOTE

The operating procedures contained in this manual have been developed with specific regard for the design features and operating characteristics of this aircraft and have been approved by the CAAI for guidance in identifying acceptable procedures for safe operation. Observance of these procedures is not intended to prohibit or discourage development and use of improved or equivalent alternate procedures based on operational experience with the aircraft. When alternate procedures are used, full responsibility for compliance with applicable airworthiness safety standards rests with the operator.

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SUPPLEMENTS COMPATIBILITY

The following table provides a comprehensive cross-reference of supplements and does not imply that supplements listed are approved by every authority and are applicable to every operator. This table must be consulted prior to the use of any supplement.

NOTE

For listing of approved supplements refer to page X-i.

Supplement Compatibility Table

Supp No	Subject	May be used with:

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ABBREVIATIONS AND ACRONYMS

(Sheet 1 of 25)

Special Characters	
Δ P	Delta P = Differential Pressure
A	
A/C	Air Conditioning
A/D	Analog/Digital
A/D	Analog to Digital
A/I	Anti Ice
A/T	Auto throttle
ACARS	Airborne Communication Addressing and Reporting System. A digital data link system for transmission of short messages between aircraft and ground stations via radio or satellite
ACAS	Airborne Collision Avoidance System
ACCUM	Accumulator
ACP	Audio Control Panel
ACS	Air Conditioning System
ACT	Aircraft Configuration Table
ADF	Automatic Direction Finder
ADI	Attitude Direction Indicator
ADM	Automatic Descent Mode
ADS	Air Data System

ABBREVIATIONS AND ACRONYMS

(Sheet 2 of 25)

ADS-C	Automatic Dependent Surveillance - Contract
ADV	Advance
AFCS	Automatic Flight Control System
AFD	Adaptive Flight Display
AFDX	Avionics Full Duplex Switched Ethernet
AFM	Airplane Flight Manual
AFU	Artificial Feel Unit
AGL	Above Ground Level
AHRS	Attitude Heading Reference System
AHS	Aircraft Heading System
AIL	Aileron
AIRMET	Airman's Meteorological Information
ALM	Application License Manager
ALSA	Altitude Limit Switch Assembly
ALTN	Alternate
AOA	Angle of Attack
AOC	Airline Operational Control
AOP	Audio Option Panel

ABBREVIATIONS AND ACRONYMS

(Sheet 3 of 25)

AP	Autopilot
APM	Aircraft Personality Module
APMT	Aircraft Personality Module Table
APR	Automatic Power Reserve
APU	Auxiliary Power Unit
APU SC	APU Starter Contactor
ARINC	Aeronautical Radio, Inc.
ARTCC	Air-Route Traffic Control Center
A/T	Auto Throttle
ATA	Airline Transport Association
ATC	Transponder
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Services
ATSCV	Air Turbine Start Control Valve
ATT	Attitude
AV	Avionics
B	

ABBREVIATIONS AND ACRONYMS

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B/C	Back Course
BAG	Baggage
BARO	Barometric
BARO MIN	Barometric Minimum
BAS	Bleed Air System
BATT	Battery
BCS	Brake Control System
BCU	Brake Control Unit
BCV	Brake Control Valve
BIT	Built in Test
BLC	Battery Line Contactor
BRG	Bearing
BRK	Brake
BTC	Bus Tie Contactor
BTL	Bottle
C	
CAS	Crew Alerting System
CB	Circuit Breaker
CCD	Cursor Control Device
CCM	Common Computing Module

ABBREVIATIONS AND ACRONYMS

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CDU	Control Display Unit
CH	Channel
CKLST	Checklist
CM	Configuration Manager
CMD	Command
CMPT	Compartment
CONFIG	Configuration
CPCS	Cabin Pressurization Control System
CPDLC	Controller Pilot Data link Communications
CPLT	Copilot
CPN	Rockwell Collins Part Number

ABBREVIATIONS AND ACRONYMS

(Sheet 6 of 25)

CRS	Course
CRT	Cathode Ray Tube
CRZ	Cruise: an engine power rating
CTR	Center
CTRL	Control
CVR	Cockpit Voice Recorder
D	
DCM	Data Concentration Module
DCP	Display Control Panel
DCU	Data Concentration Unit
DDP	Display Dimmer Panel
DGCU	Auxiliary Generator Control Unit
DGRAD	Degraded
DHM	Display Head Module
DIFF	Differential Pressure
DISC	Disconnect
DISTR	DIstribution

ABBREVIATIONS AND ACRONYMS

(Sheet 7 of 25)

DLCA	Datalink Communications Application
DLGWX	Data Link Graphical Weather Application
DMC	Data Concentration Module Cabinet
DME	Distance Measuring Equipment
DSP	Display Select Panel
DU	Display Unit
E	
ECL	Electronic Checklist
ECA	Electronic Charts Application
E-Charts	Enroute charts and terminals charts – IPS modules software
ECS	Environmental Control System
ECU	Electronic Control Unit; External Compensation Unit
EDP	Engine Driven Pump
EER	Entertainment Equipment Rack
EFIS	Electronic Flight Instrument System
EGPWS	Enhanced Ground Proximity Warning System
EGT	Exhaust Gas Temperature
EHSV	Electro-Hydraulic Servo Valve
EICAS	Engine Indicating and Crew Alert System

ABBREVIATIONS AND ACRONYMS

(Sheet 8 of 25)

ELT	Emergency Locator Transmitter
E-Maps	Enhanced Maps – Part of the IPS modules software
EMER	Emergency
EMP	Electric Motor Pump
EPC	External Power Contactor
EPM	External Power Monitor
EPS	Electrical Power System
ET	Elapsed Time
ETP	Equal Time Point
EVS	Enhanced Vision System
EXEC	Execute
EXT	External
F	
FADEC	Full Authority Digital Engine Controller
FANS	Future Air Navigation System
FAV	Fan Air Valve
FBW	Fly-by-Wire

ABBREVIATIONS AND ACRONYMS

(Sheet 9 of 25)

FCECU	Flight Control Electronics Control Unit
FCP	Flight Control Panel
FCS	Flight Control System
FCS MON	Flight Control System Monitors – Part of the IPS modules software
FCSA	Flight Control System Application
FD	Flight Director
FDR	Flight Data Recorder
FG	Flight Guidance
FL	Flight Level
FLC	Flight Level Change
FLIR	Forward-Looking Infrared
FLPN	Flight Plan
FLT REF	Flight Reference
FMA	Flight Mode Annunciation Field
FMS	Flight Management System
FMSA	Flight Management System Application
FPA	Flight Path Angle

ABBREVIATIONS AND ACRONYMS

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FPCU	Fire Protection Control Unit
FPS	Fire Protection System
FPTA	Flight Plan Target Altitude
FPV	Flight Path Vector
FQMS	Fuel Quantity Measurement System
FTU	Feel Trim Unit (see RFTU)
FWD	Forward
G	
GA	Go-Around
GADC	General Aviation Digital Controller (environmental)
GCS	Ground Clutter Suppression
GCU	Generator Control Unit
GFP	Graphical Flight Planning
GLC	Generator Line Contactor
GLS	GPS/GNSS Landing System
GND	Ground
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GS	Glideslope

ABBREVIATIONS AND ACRONYMS

(Sheet 11 of 25)

GWX	Graphical Weather System
	H
HDPH	Headphone
HF	High Frequency
HI	High
HOPS	Hydraulic Override Protection System
hPa	HectoPascals
HPL	Horizontal Protection Limit
HSI	Horizontal Situation Indicator
HSTA	Horizontal Stabilizer Trim Actuator
HSU	Heading Sensor Unit
HSV	High Stage Valve
HT	Heat
HUD	Head-Up Display
	I
IAS	Indicated Airspeed
ID	Identification
IDX	Index
IF	Intermediate Frequency
IFIS	Integrated Flight Information System
IFR	Instrument Flight Rules
IGN	Ignition

ABBREVIATIONS AND ACRONYMS

(Sheet 12 of 25)

ILS	Instrument Landing System
IMA	Integrated Modular Architecture
IMS	Information Management System
IN	Inches of Mercury
INBD	Inboard
INOP	Inoperative
INPH	Interphone
INTER	Interconnect
IPC	Integrated Processing Cabinets
IPPS	Integrated Power Plant System
IPS	Integrated Processing System
IR	Infrared
IRS	Inertial Reference System
ISA	International Standard Atmosphere
ISI	Integrated Standby Instrument
ISOL	Isolation
ITT	Interstage Turbine Temperature
ITU	International Telecommunications Union
J	
JETT	Jettison

ABBREVIATIONS AND ACRONYMS

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K	
L	
LAN	Local Area Network
LCD	Liquid Crystal Display
LCV	Load Control Valve
LEB	Left Emergency Bus
LFE	Landing Field Elevation
LH	Left Hand
LNAV	Lateral Navigation
LO	Low
LOC	Localizer
LPV	Localizer Performance with Vertical guidance
LRC	Long Range Cruise
LRN	Long Range Navigation
LRU	Line Replaceable Unit
LSB	Lower SideBand
LSK	Line Select Key
LTD	Long Term Dispatch
LTG	Lighting

ABBREVIATIONS AND ACRONYMS

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LVDT	Linear Variable Differential Transducer
LVL	Level
LWAIV	Left Wing Anti-Ice Valve
LX	Lightning
M	
MAINT	Maintenance
MB	Marker Beacon
MC	Master Caution
MCT	Maximum Continuous Thrust
MCU	Motor Control Unit
MDA	Minimum Descent Altitude
MED	Main Entry Door
METAR	Meteorological Aviation Report
MFD	Multi Function Display – Center AFD
MFS	Multi Function Spoiler Panel
MFSA	Multi Function Spoiler Actuator
MFW	Mutli Function Window
mg/L	Milligrams per Liter
MKR	Marker Beacon
MLG	Main Landing Gear
MLW	Maximum Landing Weight

ABBREVIATIONS AND ACRONYMS

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M_{MO}	Maximum Mach Number Operating
MOD	Modified; Modification
MOD FREQ	Modulation Frequency
MON	Monitor
MPR	Manual Power Reserve (engine) - Activated by pressing APR push button with throttle in take-off position with all engines operating.
MPRSOV	Manifold Pressure Regulator Shutoff Valve
MSG	Message
MSL	Mean Sea Level
MSV	Mode Select Valve, component of the elevator servo actuator
MW	Master Warning
N	
N_1	Low pressure rotor speed (AKA fan speed)
N_2	High pressure rotor speed (AKA core speed)
NACA Duct/Vent	The **NACA duct** or **NACA scoop** is a common form of low-drag intake design
NAV	Navigation
NAVAID	Navigational Aid
ND	Nose Down
NDB	Non-Directional Beacon
NDO	Network Data Objects
NEXRAD	Next-Generation Radar
NM	Nautical Mile

ABBREVIATIONS AND ACRONYMS

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NU	Nose Up
NUC	Non-Uniformity Correction
NWS	Nose Wheel Steering
O	
OAT	Outside Air Temperature
ODL	Onboard Data Loader
OEI	One Engine Inoperative
OEM	Original Equipment Manufacturer
OFV	OutFlow Valve
OHP	Overhead Panel
OHU	Overhead Unit
OMS	Onboard Maintenance System
OTBD or OUTBD	Outboard
OXY	Oxygen
P	
PA	Public Address
PADS	Pilot Authority Disconnect Switch, part of the ailerons/spoilers control system

ABBREVIATIONS AND ACRONYMS

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PBE	Portable Breathing Equipment
PDA	Premature Descent Alert
PDL	Pedal
PDU	Power Drive Unit, a flaps control system component
PEM	Power Environment Module. One of the Integrated Processing System Cabinets (IPC) modules
PERF	Performance
PIV	Pack Inlet Valve
PM	Protocol Manager – Part of the IPS modules software
PNR	Point of No Return
POC	Passenger Oxygen Controller
POS	Position
PPH	Pounds Per Hour
PPM	Parts per million
PREV	Previous
PROX	Proximity
PRSOV	Pressure Regulating Shutoff Valve

ABBREVIATIONS AND ACRONYMS

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PS	Ambient (static) pressure measurement – the first of a series of pressure measurement points related to engine observations
PSA	Preselect Altitude
psia	Pound(s) per Square Inch, Absolute (psi + local atmospheric pressure)
psid	Pound(s) per Square Inch, Differential (difference between two pressures, ΔP)
psig	Pound(s) per Square Inch, Gage; unit of pressure relative to atmospheric pressure at sea level
Pt	Pitot Port Pressure
PT	Pressure Transducer; Power Turbine
PTT	Push-To-Talk
PWR	Power
Q	
QTY	Quantity
R	
RA	Resolution Advisory
RAD ALT	Radar Altimeter
RADS	Roll Assist Disconnect Switch
RAIM	Receiver Autonomous Integrity Monitoring

ABBREVIATIONS AND ACRONYMS

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RALT	Radio Altimeter
RAM	Random Access Memory
RCCB	Remote Controlled Circuit Breaker
RDL	Remote Data Load
RDP	Refuel Defuel Panel
REB	Right Emergency Bus
REV	Reverser
RF	Radio Frequency
RH	Right Hand
RIU	Radio Interface Unit
RNP	Required Navigation Performance
ROLC	Remote Oil Level Controller
ROLS	Remote Oil Level Sensor, APU and engine sensors for the FQMS
RPFA	Rudder Pedal Feedback Actuator
RPI	Rear Panel Input
RPM	Revolutions Per Minute
RSA	Rudder Servo Actuator
RSE	Remote Sensor Electronics

ABBREVIATIONS AND ACRONYMS

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RSS	Radio Sensor System
RTA	Required Time of Arrival
RTO	Rejected Takeoff, an engine power rating
RTSA	Radio Tuning System Application: software that allows radio tuning through the AFD.
RUD	Rudder
RVDT	Rotary Voltage Differential Transducer
RVSM	Reduced Vertical Separation Minimum
RWAIV	Right Wing Anti-Ice Valve
RWS	Reactive Windshear
S	
SAT	Static Air Temperature
SATCOM	Satellite Communications
SBAS	Satellite Based Augmentation System
SEC	Secondary
SELCAL	Selective Call
SEN	Sensor
SENSR	Sensor
SFC	Specific Fuel Consumption

ABBREVIATIONS AND ACRONYMS

(Sheet 21 of 25)

SG	Starter Generator
SHCM	Water and Waste System
SID	Standard Instrument Departure
SIGMET	Significant Meteorological Information
SL	Sea Level
SMC	Standby Multifunction Controller
SOV	Shut Off Valve
SP	Stick Pusher
SPD	Speed
SPKR	Speaker
SPLR	Spoilers
SPS	Stall Protection System
SS	Stick Shaker
SSEC	Static Source Error Correction
ST	Side Tone

ABBREVIATIONS AND ACRONYMS

STAR	Standard Terminal Arrival Route
STC	Supplemental Type Certificate
SVO	Starter Valve Open
SVS	Synthetic Vision System
SW	Switch
T	
T/R	Thrust Reverse
TA	Traffic Advisory
TAS	True Airspeed
TAT	Total Air Temperature
TAV	Trim Air Valve
TAWS	Terrain Awareness and Warning System
TC	Type Certificate
TCAS	Traffic Alert and Collision Avoidance System
TCM	Thrust Compensation Unit
TDOWN	Touchdown
TDR	Transponder
TFR	Temporary Flight Restriction
THRST	Thrust
TLA	Thrust Lever Angle
TO	Take Off, an engine power rating

ABBREVIATIONS AND ACRONYMS

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TOGA	Takeoff/Go-Around
TPM	TAWS Processing Module
TPMA	Terrain Processing Module Application
TQA	Throttle Quadrant Assembly
TR	Thrust Reverser
TSO	Technical Standard Orders
TSS	Traffic Surveillance System
TT_2	Nacelle Inlet Temperature
TTG	Time To Go
TUN	Tune
U	
UHF	Ultra High Frequency
UNAVL	Unavailable
UTC	Universal Time Coordinated
UTIL	Utilities
UV	Upper Sideband Voice
V	
VAH	Variable Air brake Handle
VCO	Voltage-Controlled Oscillator

ABBREVIATIONS AND ACRONYMS

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VDL	VHF Datalink
VHF	Very High Frequency
VLV	Valve
VNAV	Vertical Navigation
VOR	VHF Omni-directional Range
VOR/LOC	VHF Omnidirectional Radio Range/Localizer
VOX	Voice
VS	Vertical Speed
VSD	Vertical Situation Display
VWS	Vacuum Waste System
W	
w/	… with …
WAAS	Wide Area Augmentation System
WAI	Wing Anti-Ice
WAIV	Wing Anti-Ice Valve
WCU	Waste Control Unit
WDIC	Windshield De-Ice Controller
WM	Windows Manager
WS	Windshield

ABBREVIATIONS AND ACRONYMS

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WSU	Wheel Speed Up
WWIP	Water & Waste Indication and Control Panel
WWS	Water Waste System
WX or WXR	Weather Radar system
X	
XFLOW	Cross Flow
XM GWX	XM Graphical Weather
Y	
YD	Yaw Damper
Z	

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LOG OF MODIFICATIONS

Aircraft modification (MOD) numbers which affect the operation of certain airplanes or subsystems, are listed below. Text and procedures affected by these MODs are identified by the respective MOD numbers appearing in the margin of each affected page, adjacent to the applicable text.

NOTE

It is the pilot's responsibility to check this list and the airplane log to determine MOD applicability.

LOG OF MODIFICATIONS
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MOD Number	Description	Airplane S/N Effectivity			Pages Affected By MOD	Mark ✓ if Inst'd
		In Prod.	In Service			
		From - To	Method	From - To		
G25-20113	IPPS -T/R Inner Duct Skin - Addition of Titanium Heatshields	2106 & Subs	SB 280-78-30-002	2001 - 2105	IV-40, IV-65, IV-80	❑
G25-20093	LH Distribution bus – new logic (for dual generator fail)	2114 & Subs			IIIA-124, IIIA-128	❑
G25-10066	Access to baggage compartment above 44,000 feet	2153 & subs	SB 280-11-252	2001 - 2152	I-16, IIIA-59, IIIB-29, X-7-8	❑

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MOD Number	Description	Airplane S/N Effectivity			Pages Affected By MOD	Mark ✓ if Inst'd
		In Prod.	In Service			
		From - To	Method	From - To		
G25-10074	RC Avionics Suite 3.6.1	2230 & subs	Service Bulletins 280-34-273; 280-34-290; 280-34-291; 280-34-292	2001 - 2229	I-17, I-27, I-27, IIIA-30, IIIA-31, IIIA-50, IIIA-57, IIIA-71, IIIA-75, IIIA-78, IIIA-94, IIIA-231, IIIB-3, IIIB-16, IIIB-17, IIIB-26, IIIB-28, IIIB-38, IIIB-39, IIIC-2, IIIC-4, IIIC-6, IIIC-9, IV-107, IV-108, X-ii, X-4-2, X-4-5, X-4-6, X-4-10, X-4-14, X-4-15, X-4-16,	❑

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MOD Number	Description	Airplane S/N Effectivity			Pages Affected By MOD	Mark ✓ if Inst'd
		In Prod.	In Service			
		From - To	Method	From - To		
G25-10074	RC Avionics Suite 3.6.1	2230 & subs	Service Bulletins 280-34-273; 280-34-290; 280-34-291; 280-34-292	2001 - 2229	XI-i, XI-4-3, XI-4-11, XI-5-1, XI-5-2, XI-5-17, XI-5-18	❑

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LOG OF REVISIONS

LOG OF REVISIONS

Revision	Description	Signature/date
1	Updated Sections I, II, IIIA, IIIB, IV, V, IX and X.	29 Oct 2015
2	Updated Sections I, IIIA, IIIB, IV, V, Supplement 7 (EASA)	25 Oct 2016
3	Updated Sections I, II, IIIA, IV, V. Added new OIS 6	8 Feb 2018
4	Added MOD G25-10066 Updated Sections I, IIIA, IIIB, IV and Supplement 7 (EASA)	7 Oct 2018
5	Updated Sections I and IV	13 Dec 2018
6	Updated Sections I, III, IV, VI, Supplement 4 and Operational Information Supplements 2. Added new Operational Supplement No. 7	2 Feb 2020
7	Updated Sections I, II, III, IV and V. Updated Supplements 7 (EASA) and 10 (ANAC). Updated Appendix 1 and OIS 4.	16 Dec 2020

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Revision	Description	Signature/date
8	Added MOD G25-10074 Updated Sections I, II, III and IV Updated Supplement 4 Updated OIS 4 and OIS 5 Added new Supplement 15 and Supplement 16	 21 Jan 2020
9	Added Radio Altimeter Flight Restrictions (as required by FAA AD 2021-23-12)	 15 Dec 2021
10	Updated Section V and Supplement 5 (Performance Tables: Wet Runway Flaps 20, Wet Runway Flaps 10, Wet Runway Flaps 0)	 9 May 2022

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1	Engine Quality Added Performance Corrections (Section V, Supplement 5, Supplement 8)		25 Oct 2016

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X-8-142	15 Apr 2015	X-8-180	15 Apr 2015
X-8-143	15 Apr 2015	X-8-181	15 Apr 2015
X-8-144	15 Apr 2015	X-8-182	15 Apr 2015
X-8-145	15 Apr 2015	X-8-183	15 Apr 2015
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X-8-149	15 Apr 2015	X-8-187	15 Apr 2015
X-8-150	15 Apr 2015	X-8-188	15 Apr 2015
X-8-151	15 Apr 2015	X-8-189	15 Apr 2015
X-8-152	15 Apr 2015	X-8-190	15 Apr 2015
X-8-153	15 Apr 2015	X-8-191	15 Apr 2015
X-8-154	15 Apr 2015	X-8-192	15 Apr 2015
X-8-155	15 Apr 2015	X-8-193	15 Apr 2015
X-8-156	15 Apr 2015	X-8-194	15 Apr 2015
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X-8-159	15 Apr 2015	X-8-197	15 Apr 2015
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X-8-537	15 Apr 2015	X-8-575	15 Apr 2015
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X-8-539	15 Apr 2015	X-8-577	15 Apr 2015
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1-00-00: GENERAL

1-00-10: CONDITIONS OF OPERATION

THE OPERATIONAL LIMITATIONS ARE PART OF THE CONDITIONS OF THE TYPE CERTIFICATE AND AIRWORTHINESS CERTIFICATE, AND MUST BE COMPLIED WITH AT ALL TIMES, IRRESPECTIVE OF THE TYPE OF OPERATION BEING CONDUCTED.

THE PERFORMANCE LIMITATIONS AND THE INFORMATION PRESENTED IN THE AIRPLANE FLIGHT MANUAL SHOW COMPLIANCE WITH CIVIL AVIATION AUTHORITY REGULATION.

THIS AIRPLANE IS TO BE OPERATED IN ACCORDANCE WITH THE LOADING SCHEDULE PROVIDED IN THE WEIGHT AND BALANCE SECTIONS.

1-01-00: AIRCREW AND OCCUPANTS

1-01-10: MINIMUM FLIGHT CREW

Minimum flight crew required is pilot and copilot.

1-01-20: MAXIMUM NUMBER OF OCCUPANTS

19 Maximum - limited by emergency exit requirements. Carriage of passengers is permitted only when an approved seating arrangement is installed and compliance has been demonstrated to all passenger-related regulations.

1-02-00: DEPARTURE / ARRIVAL AIRPORT

1-02-10: RUNWAY, SLOPE, AND WIND CONDITIONS

SLOPE

Maximum slope approved for takeoff and landing operations are +2% (uphill) and -2% (downhill).

WIND CONDITIONS

Maximum tailwind component approved for takeoff and landing is 10 knots.

For demonstrated crosswind, see DEMONSTRATED CROSSWIND, page V-5-13.

CONTAMINATED RUNWAYS

For Contaminated Runway Operations, see Contaminated Runway Operations, page X-8-1.

1-02-20: HIGH ELEVATION AIRPORT OPERATIONS

Maximum approved airport pressure altitude for takeoff or landing is 10,000 ft field elevation.

1-03-00: PERFORMANCE

1-03-10: TYPES OF AIRPLANE OPERATIONS PERMITTED

1. Transport category - land.
2. Instrument and night flying.
3. Category 1 and 2 approach operations.
4. Flight into known icing.
5. Extended overwater flight.
6. Required Navigation Performance 10 (RNP-10) operations.
7. Basic RNAV (BRNAV or RNAV 5) operations.
8. Remote Oceanic Required Navigation Performance 4 (RNP-4) operations.
9. Precision RNAV (P-RNAV) or Required Navigation Performance 1 (RNAV 1) Operations.
10. RNAV 2 / RNAV 1 operations as defined in FAA Advisory Circular (AC) 90-100A.
11. Flight within North Atlantic Track-Minimum Navigation Performance Specifications (NAT-MNPS) Airspace In accordance with the criteria of AC 91-49 and AC 120-33, provided at least two FMSs are operating and receiving usable data from any combination of two GPSs and/or Inertial Reference Sensors (IRSs), or one FMS and one GPS and/or IRS for those routes requiring only one Long Range Navigation (LRN) sensor.
12. RNP 0.3 RNAV approaches.
13. Airplane complies with RNP RNAV as defined in RTCA / DO-236B and DO-283.
14. RNAV approaches to localizer performance with Vertical Guidance (LPV) minima.
15. Reduced Vertical Separation Minimums (RVSM) airspace operations. This does not constitute operational approval.
16. Extended Squitter transmission has been demonstrated for proper operation per EASA AMC 20-24 for broadcast of ADS-B (DO-260A) related position information.
17. Radius-to-fix legs.

1-03-20: MINIMUM / MAXIMUM OPERATING TEMPERATURE

The operator shall comply with COLD WEATHER OPERATIONS starting on page IV-87 any time the airplane has been exposed to temperatures colder than -20°C on the ground for more than 10 hours. Maximum temperature on ground is ISA+35°C. See Figure 5-32, Approved Altitude/Temperature Envelope, page V- 90.

1-03-30: OPERATING ALTITUDES

OPERATING ALTITUDE

Maximum operating altitude is 45,000 ft
Minimum operating altitude is -1400 ft

LANDING GEAR EXTENDED / OPERATION

Maximum operating altitude for extending landing gear or flying with landing gear extended is 20,000 ft MSL

FLAPS EXTENDED:

Maximum operating altitude for extending flaps or flying with flaps extended is 20,000 ft MSL

1-03-40: AIRSPEED LIMITATIONS

FLAPS EXTENDED SPEEDS (V_{FE})

10°	-	250 KIAS
20°	-	220 KIAS
LND	-	180 KIAS

MINIMUM CONTROL SPEEDS (V_{MC}); ISA; SEA LEVEL

Minimum control speed air (V_{MCA})	-	98 KIAS at flap configuration 10° and 20°
Minimum control speed landing (V_{MCL})	-	98 KIAS at flap configuration 10°, 20° and LND
Minimum control speed ground (V_{MCG})	-	95 KIAS at flap configuration 10° and 20°

For V_{MC} variations with altitude and temperature, see 5-33, page V-91 and 5-35, page V-93.

NOTE

Minimum control speeds VMCA, VMCL and VMCG in Flap 0° configuration (abnormal configuration for takeoff and landing) was not established since it is lower than the airspeed at Stick Pusher activation in this configuration and is never a limiting factor for selection of takeoff and landing speeds.

MANEUVERING SPEED (V_A)

Maximum deflection of flight controls, as well as maneuvers that involve angles of attack near the stall AOA, should be confined to speeds as follows:

S.L to 20,000 ft	-	215-225 KIAS
20,000 to 35,000 ft	-	225-264 KIAS
35,000 to 39,000 ft	-	264 KIAS
39,000 to 45,000 ft	-	0.85 M_i

(Continued)

Avoid rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g., large sideslip angles), as they may result in structural failures at any speed, including below VA.

LANDING GEAR OPERATION SPEEDS (V_{LO})

Normal Operation:

Do not lower or raise landing gear at speeds in excess of 195 KIAS.

LANDING GEAR EXTENDED SPEED (VLE):

Do not exceed 195 KIAS with landing gear extended (gear doors open or closed).

EMERGENCY LANDING GEAR EXTENSION

Do not extend the landing gear utilizing the emergency system at speeds in excess of 175 KIAS.

After landing gear is down and locked, speed can be increased up to 195 KIAS.

MAXIMUM TIRE SPEED:

Maximum main landing gear tire ground speed is 195 kt.

Maximum nose landing gear tire ground speed is 182 kt.

TURBULENCE PENETRATION SPEED (V_{RA})

S.L. to 13,000 ft	-	230 KIAS
13,000 to 20,000 ft	-	250 KIAS
20,000 to 35,000 ft	-	270 KIAS
35,000 to 45,000ft	-	0.80 M_i

MINIMUM HOLDING SPEED

The minimum holding speed in icing conditions is 185 KIAS.

For optimal holding speed, see Section VIII - Operational Planning Manual.

YAW DAMPER INOPERATIVE SPEED

Maximum speed	-	250 KIAS
Maximum altitude	-	25,000 ft

MACH TRIM INOPERATIVE SPEED

With Mach trim functions inoperative, the maximum operating limit speed is 340 KIAS / 0.77 M_i.

ALTERNATE STABILIZER TRIM

See 1-27-11: MACH TRIM FUNCTION, page I-19

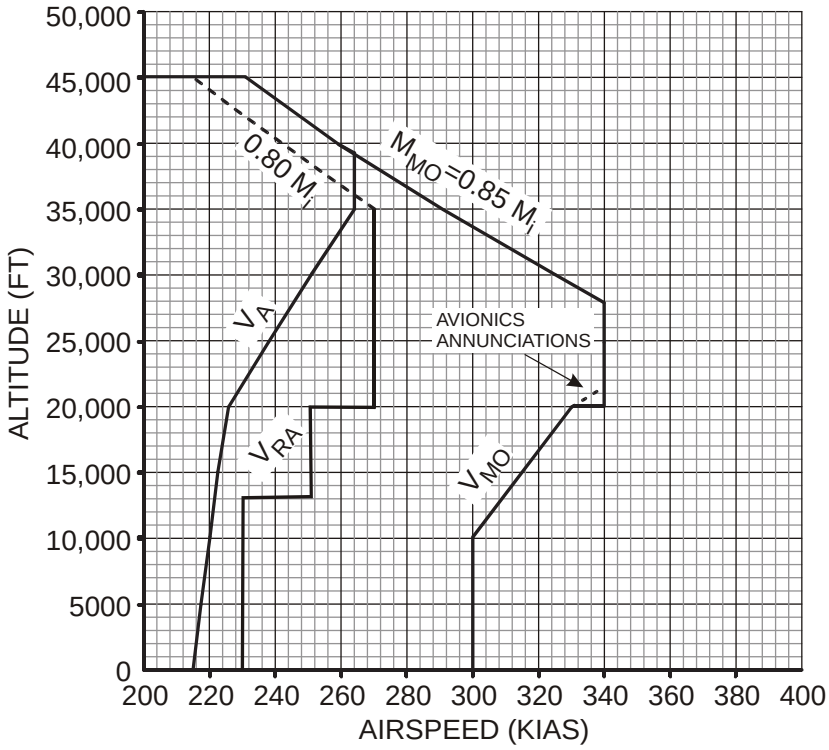
M_{MO} = 0.77 M_i

MAXIMUM OPERATING LIMIT SPEED (VMO / MMO)

Maximum operating limit speed shall not be deliberately exceeded in any regime of flight (climb, cruise, or descent).

See Figure 1-1, page I-9

S.L to 10,000ft	-	300 KCAS
10,000 to 20000	-	300-330 KCAS
20,000 to 28,000	-	340 KCAS
28,000 to 45,000	-	0.85 M_i



NOTE

V_{MO}/M_{MO} is annunciated on PFD and aural clacker.

Figure 1-1. Airspeed Limits

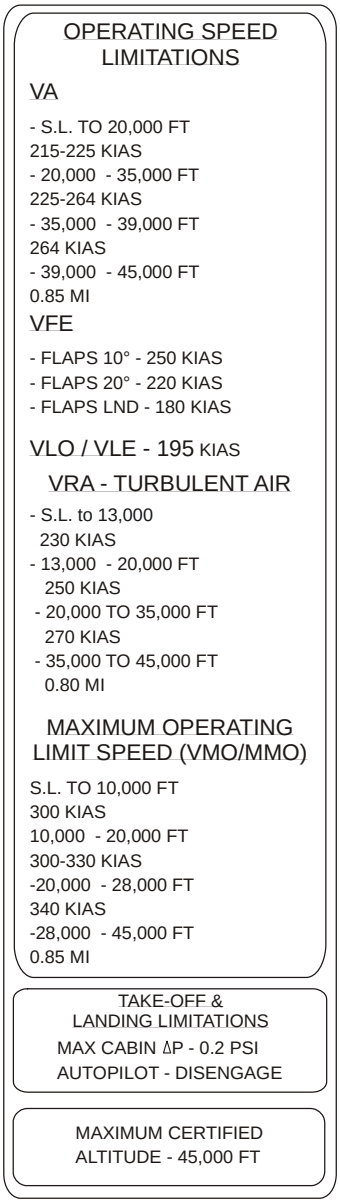


Figure 1-2. Placards

1-03-50: MANEUVERING FLIGHT LOAD FACTORS

Flaps up: -1.0 G to 2.6 G for all weights up to maximum takeoff weight.
Flaps down: 0.0 G to 2.0 G for all weights up to maximum takeoff weight

1-03-60: WEIGHTS

	Maximum certificated	
	lb	**kg**
Zero Fuel	28,200	12,791
Landing	32,700	14,833
Takeoff	39,600	17,962
Ramp	39,750	18,030
Min. Flight	23,000	10,433

NOTE

1. Maximum takeoff weight, unless restricted by climb performance, brake energy, or tire speed for approved altitudes and ambient temperature or by field length.
2. Maximum landing weight, unless restricted by climb requirements.

BAGGAGE COMPARTMENT LOADING:

Maximum 1980 lb / 900 kg
Floor load 120 lb/ft^2 / 615 kg/m^2

1-03-70: CENTER OF GRAVITY

The allowable Center of Gravity (CG) range is a function of weight as shown in the zero fuel weight center of gravity envelope chart that follows. Zero fuel weight CG must be within the allowable zero fuel weight CG envelope. The fueled airplane CG will then be within limits for all fuel loads.

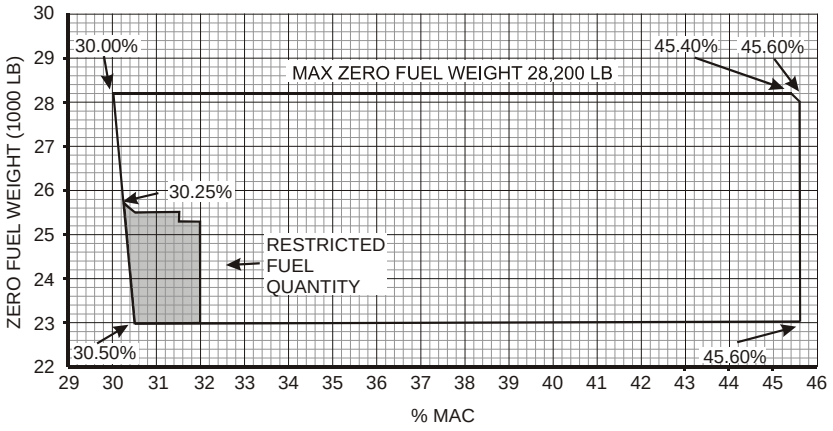


Figure 1-3. Zero Fuel Weight (ZFW) Envelope

Aft CG limit for ground handling during any stage of ground handling operations is 50% MAC.

1-03-80: FUEL LOAD BALANCING

Maximum wing fuel imbalance for takeoff is 450 lb / 204 kg
Maximum wing fuel imbalance in flight, approach and landing is 900 lb / 408 kg.

1-12-00: AIRCRAFT SERVICING

1-12-10: HYDRAULIC FLUIDS

Preferred fluid: SKYDROL LD IV - Monsanto Co.
Hydraulic fluids conforming to the G280 Aircraft Maintenance Manual:
Fluid: Fire Resistance Phosphate Ester SAE1421 type IV class 1.

1-21-00: AIR CONDITIONING AND BLEED AIR

1-21-10: CABIN PRESSURIZATION CONTROL

Maximum cabin pressure differential permitted is 9.2 psi.
Maximum cabin pressure differential permitted for taxi, takeoff or landing is 0.2 psi.

1-21-20: INTERNAL BAGGAGE DOOR

Pre MOD G25-10066

Internal baggage door must be closed during taxi, takeoff and landing. In flight, access to the baggage compartment above 40,000 ft is prohibited except by flight crew members for emergency purposes only.

Post MOD G25-10066

Internal baggage door must be closed during taxi, takeoff and landing. In flight, access to the baggage compartment above 44,000 ft is prohibited except by flight crew members for emergency purposes only

1-22-00: AUTO FLIGHT

1-22-30: AUTOPILOT

Minimum engage height is 200 ft.
Minimum disengage height is 80 ft for approaches with vertical guidance (ILS and LPV; LNAV when VNAV is used, Post MOD G25-10074 - LP when VNAV is used.)
Minimum disengage height is 50 ft below MDA for approaches with lateral guidance only.
Maximum demonstrated altitude loss for coupled go-around is 61 ft.
CAT II operation is not approved for single engine operations

1-24-00: ELECTRICAL POWER

1-24-10: ENGINE GENERATOR LIMITATIONS

Ground and flight operations - 100% maximum continuous

1-24-20: APU STARTER/GENERATOR LIMITATIONS

Ground and flight operations - 100% maximum continuous

1-24-30: BATTERY LIMITATIONS

Maximum indicated battery charge current for takeoff:
APU GEN Available: 20A
APU GEN Unavailable: 8A

NOTE

APU Generator available means it is operable, if needed, and not deferred per MEL. The APU does not have to be running to be considered available.

1-27-00: FLIGHT CONTROL SYSTEM (FCS)

1-27-11: MACH TRIM FUNCTION

If Mach trim is inoperative:
M_{MO} is reduced to 0.77 M_i.

1-27-20: TAKEOFF FLAPS SETTING

The selected takeoff flaps setting must be confirmed by both pilots as the takeoff flaps setting for which takeoff performance has been calculated.

WARNING

FAILURE TO VERIFY THE FLAP SETTING FOR TAKEOFF MAY RESULT IN TAKEOFF ROTATION AT AN INCORRECT V_R SPEED WITH POTENTIAL LOSS OF CONTROLLED FLIGHT.

1-28-00: FUEL

1-28-10: USABLE FUEL CAPACITIES

The usable fuel capacities are:

Total usable fuel volume	2179.1 US gallons	8248.5 liters
Total usable fuel weight	14,620 lb at 6.7 lb/US gallon	6631.5 kg at 0.8028 kg/liter
Total usable fuel weight when gravity refueling	9,760 lb at 6.7 lb/US gallon	4,427 kg at 0.8028 kg/liter

NOTE

Gravity refueling only fills the wing and feed tanks and can take a significantly longer time.

1-28-20: FUEL TANK TEMPERATURE

Flight is prohibited when indicated fuel tank temperature is outside the minimum or maximum specified below:

Fuel Type	Minimum Temperature	Maximum Temperature
Jet A	-38°C	57°C
Jet A-1 and JP8	-46°C	57°C

1-29-00: HYDRAULICS

1-29-10: HYDRAULIC SERVICING

Left and right brake accumulator pre-charge pressure:
700 ± 30 psi @ 70°F/21°C ± 25 psi for each increment of 10°F/5°C

Emergency gear bottle pre-charge pressure:
2600 psi to 3000 psi @ 70°F/21°C ± 25 for each increment of 10°F/5°C

1-29-20: HYDRAULIC PRESSURE LIMITATIONS

Normal operation	-	2700 to 3250 psi
Maximum	-	3500 psi

1-29-30: HYDRAULIC TEMPERATURE LIMITATIONS

Maximum hydraulic temperature	-	95°C

Electrical Motor Pump (EMP) operation above 39,000 ft is limited to 10 minutes.

1-30-00: ICE AND RAIN PROTECTION

1-30-10: GENERAL

Icing conditions exist when Static Air Temperature (SAT) on the ground or Total Air Temperature (TAT) in flight is 10°C or below and SAT is above -40°C and visible moisture is present in any form (such as clouds, fog with visibility of one mile or less, rain, snow, sleet and ice crystals). The use of wing anti-ice above 10°C TAT or below -40°C SAT is not recommended.

The use of nacelle anti-ice when SAT on the ground or TAT in flight is above 10°C (50°F) or SAT is below -40°C (-40°F) is not recommended.

Icing conditions also exist when the SAT on the ground and for takeoff is 10°C (50°F) or below when operating on ramps, taxiways or runways where surface snow, ice, standing water, or slush may be ingested by the engines or freeze on engines, nacelles, or engine sensor probes. Takeoff is prohibited with frost, ice, snow, or slush adhering to the wings, horizontal and vertical stabilizer, control surfaces, engine inlets, or other critical surfaces (top of the fuselage as well should be clean may accrete a lot of ice).

A visual and tactile (hand on surface) check of the wing leading edge and the wing upper surface must be performed to ensure the wing is free from frost, ice, snow, or slush when the outside air temperature is less than 10°C (50°F), or if it cannot be ascertained that the wing fuel temperature is above 0°C (32°F) and if any of the following conditions exist:

- There is visible moisture (rain, drizzle, sleet, snow, fog, etc.) present
- Water is present on the wing
- The difference between the dew point and the outside air temperature is 3°C (5°F) or less
- The atmospheric conditions have been conducive to frost formation
- When frost or ice is present on lower surface of either wing
- After completion of de-icing

(Continued)

The ice detectors are primary except during takeoff, approach and landing.

1-30-20: WING ANTI-ICING

Operation of wing anti-icing is required if icing conditions are imminent, or immediately upon detection of ice formation on wings, winglets or windshield edges. The icing envelope is defined as +10°C TAT to -40°C SAT with visible moisture present. The use of wing anti-ice above 10°C TAT or below -40°C SAT is not recommended.

Operation of Wing Anti Ice system above 26,000 ft with a single bleed source is prohibited

TAKEOFF INTO KNOWN OR FORECAST ICING CONDITIONS

Wing anti-ice must be on for takeoff if in icing conditions or icing conditions are anticipated.

WARNING

MINUTE AMOUNTS OF ICE OR OTHER CONTAMINATION ON THE LEADING EDGES OR WING UPPER SURFACES CAN RESULT IN A STALL WITHOUT WARNING, LEADING TO LOSS OF CONTROL ON TAKEOFF.

1-30-21: PROBE HEAT

Probe Heat operation in OVRD mode on ground for more than 30 seconds is prohibited.

1-30-30: ENGINE ANTI ICE

Engine anti ice is required for taxi and takeoff when Static Air Temperature (SAT) on the ground or Total Air Temperature (TAT) in flight is 10°C (50°F) or below and SAT is above -40°C and visible moisture in any form is present such as clouds, fog with visibility of one mile or less, rain, snow, sleet and ice crystals.

The use of engine anti-ice when SAT on the ground or TAT in flight is above 10°C (50°F) or SAT is below -40°C (-40°F) is not recommended.

1-30-40: USE OF FLAPS

Use of flaps in icing conditions is restricted to takeoff, approach and landing only.

Holding in icing conditions is limited to 0° flaps only.

1-31-00: INDICATION AND RECORDING SYSTEMS

1-31-10: CAS AURAL INHIBIT

The use of CAS aural inhibit to disable CAS aural alert is prohibited unless called for through specific AFM abnormal procedure related to failure of the crew alerting system itself.

1-31-20: UNIVERSAL SERIAL BUS (USB) DATA LOADING

1. Access to universal serial bus (USB) data loading port is limited to flight crew and other authorized personnel only.
2. USB port data loading actions limited to dedicated computer(s) that are isolated from the internet, and dedicated USB memory stick(s).

1-34-00: NAVIGATION

1-34-41: RADIO ALTIMETER

Radio Altimeter Flight Restrictions
(Required by FAA AD 2021-23-12)

When operating in U.S. airspace, the following operations requiring radio altimeter are prohibited in the presence of 5G C-Band wireless broadband interference as identified by NOTAM (NOTAMs will be issued to state the specific airports where the radio altimeter is unreliable due to the presence of 5G C-Band wireless broadband interference):

- Instrument Landing System (ILS) Instrument Approach Procedures (IAP) SA CAT I, SA CAT II, CAT II and CAT III
- Required Navigation Performance (RNP) Procedures with Authorization Required (AR), RNP AR IAP
- Automatic Landing operations
- Manual Flight Control Guidance System operations to landing / head-up display (HUD) to touchdown operation
- Use of Enhanced Flight Vision System (EFVS) to touchdown under 14 CFR 91.176(a)

1-34-43: TERRAIN AWARENESS WARNING SYSTEM (TAWS)

NOTE

Obstacles that are less than 1000 ft AGL are not displayed as obstacle symbols on the MAP display. These obstacles are included as part of the terrain display.

The terrain awareness display feature shall be selected OFF (TERRAIN INHIBIT switch - ON) when within 15 nm of landing at an airport when:

- The airport has no published instrument approach procedure
- The longest runway is less than 3500 ft in length
- The airport is not in the database

- QFE altimeter settings are used for approach and landing on subsequent takeoff without the availability of geometric altitude

1-34-60: FLIGHT MANAGEMENT SYSTEM (FMS)

Vspeeds and performance data is advisory and must be verified against the performance data contained in Section V - Performance.

The flight crew is required to verify FMS calculated takeoff and landing weights before posting the VSpeeds using the SMC display for fuel quantity data.

FMS Holding Entry (Pre MOD G25-10074)

When entering a holding pattern via a direct entry that requires greater than 180 degrees of turn, select the Heading mode (HDG) immediately after sequencing the hold fix to turn to the outbound leg. Once established on the outbound leg, FMS lateral guidance (LNAV) can be re-selected.

FMS Holding Exit (Pre MOD G25-10074)

When exiting a hold with a course reversal that is not part of a published procedure the aircraft may turn in a direction opposite the turning arrow. Therefore, pilot is required to monitor the turning direction of the aircraft or manually fly the turn after the exit.

APPR Mode for LOC approaches:

APPR mode for LOC approaches should be selected only when within 60° of approach course. See SUPPLEMENT No. 4 for more FMS limitations.

ETP (Equal Time Point Function) (Pre MOD G25-10074)

Use of ETP function in the FMS for calculation of the Equal Time Point is prohibited.

FMS Datalink Flight Plans

Do not send a FPLN RECALL request in flight within 10 NM of the TO waypoint.

Do not select INSERT MOD for a FANS flight plan uplink while the TO waypoint is flashing during waypoint sequencing.

1-34-130: ELECTRONIC CHECKLIST

Electronic checklist normal procedures only are approved for operational use.

1-35-00: OXYGEN SYSTEM

1-35-10: OXYGEN SYSTEM

The following airplane certification requirements are in addition to the requirements of applicable operating rules. The most restrictive requirements (certification or operating) must be observed.

Hats and “earmuff” type headsets must be removed prior to donning crew oxygen masks.

NOTE

1. Headsets and eyeglasses worn by crew members may interfere with quick-donning capabilities.
2. Crew and passenger oxygen masks are not approved for use above 40,000 ft cabin altitude.

WARNING

PROLONGED OPERATION ABOVE 25,000 FT CABIN ALTITUDE WITH PASSENGERS ON BOARD IS NOT RECOMMENDED.

1-45-00: ENGINE INSTRUMENTS AND CREW ALERTING SYSTEM (EICAS)

1-45-00: OMS

Operation of OMS (Onboard Maintenance System) in flight is limited to altitudes at or above 10,000 ft.

1-45-10: GENERAL EICAS RANGE MARKINGS COLORS

Normal range values:	-	white
Caution range values: amber	-	inverse video
Warning range values: red	-	inverse video

1-45-20: POWERPLANT EICAS INDICATIONS

See values in: 1-71-00: POWERPLANT, page I-1-33

Normal range values:	-	white
Caution range values: amber	-	inverse video
Warning range values: red	-	inverse video

1-45-30: FUEL EICAS INDICATIONS

FUEL TANK TEMPERATURE INDICATIONS

See values in: 1-73-00: ENGINE FUEL AND CONTROL SYSTEMS, page I-1-35

Normal range values:	-	white
Abnormal values	-	inverse video
Low temperature	-	amber

1-45-40: APU EICAS INDICATIONS

APU RPM

106% and above:	-	red digits
104% to 105%:	-	amber digits
0% to 103%:	-	white digits

1-45-50: CAS MESSAGES

Amber CAS messages are normally DO NOT DISPATCH messages as the systems that generate these messages are required for flight. Cyan maintenance messages allow dispatch as the systems that generate these messages are fault tolerant. Referencing to the AFM procedure may provide a solution to the system problem, but if any message remains, reference the MEL for dispatch.

1-49-00: AUXILIARY POWER UNIT (APU)

1-49-10: APU OPERATION

The APU can be operated on the ground, during takeoff, in flight and during landing. In flight, it is an essential source of electrical power through the APU generator.

1. Maximum altitude for APU start is 35,000 ft
2. Maximum altitude for APU operation is 40,000 ft
3. Do not operate APU if right fire extinguisher has been activated
4. APU is approved for unattended operations
5. Allow 2 minutes cooldown periods between APU starts or between shutdown and next APU start. After 3 consecutive starts, allow 30 minutes cool down period
6. Operate APU only if right standby fuel pump is operative or right engine is operative
7. Approved fuels - (same as main engine)
8. Approved oils - (same as main engine)
9. When ground aircraft de-icing is in progress, APU must be off with door closed
10. Maximum altitude for APU bleed air use is 20,000 ft

APU GENERATOR LOAD LIMITS

On ground and In flight	-	100%

MAXIMUM PERMISSIBLE EGT

Start	-	See note below
Running	-	718°C
Bleed air in use	-	666°C

MAXIMUM ROTOR SPEED

All conditions	-	108%

NOTE

Maximum transient EGT during APU start, below 50% RPM is 974°C.

1-71-00: POWERPLANT

Manufacturer	No. of Engines	Model & Type	Takeoff and Maximum Continuous Thrust Rating, Static, ISA
Honeywell	2	(HTF7250G) AS-907-2-1G	Maximum Continuous - 7240 lb Takeoff - 7624 lb

1-71-10: ENGINE GROUND START

Maximum crosswind component for engine start - 20 kt
Maximum tailwind component for engine start - 15 kt

Maximum ITT during ground start:
N_2 at or below 40% - 650°C
N_2 above 40% - 950°C

1-71-20: ENGINE GROUND OPERATIONS

N_1 is limited to 50% if tailwind component is more than 15 kt.
Note that when motoring is required, it shall commence within 3 minutes after shutdown is commanded (fuel control switch to STOP).

If landing with use of thrust reversers causes ITT to exceed limits, see ENGINE MOTORING IN HOT WEATHER CONDITIONS (PRE MOD G25-20113), page IV-65

1-71-30: ENGINE IN FLIGHT OPERATIONS

Maximum N_1, N_2 and ITT values:

	Max Continuous	TO	APR	Transient (20 sec. max)
N_1 [%]	96.5	96.8	96.8	98.0
N_2 [%]	98.0	98.0	98.5	99.9
ITT [°C]	950	955	955	970

Takeoff thrust is limited to 5 minutes with all engines operating (AEO). APR is limited to 10 minutes with an inoperative engine (OEI).

Any APR or MPR activation must be logged for maintenance.

1-73-00: ENGINE FUEL AND CONTROL SYSTEMS

1-73-10: ENGINE FUEL TEMPERATURE

Minimum fuel temperature at the fuel filter is 3°C.

1-73-20: PRIMARY ACCEPTABLE FUEL TYPES

(Sheet 1 of 2)

Organization or Country	Specification and Type or Grade			
	Jet A	**Jet A-1**	**JP-8***	**JP-5***
Honeywell	EMS53111, Type A	EMS53112, Type A-1	EMS53112, Grade JP-8	EMS53116, Grade JP-5
U.S. Military			MIL-DTL-83133, Grade JP-8	MIL-DTL-5624, Grade JP-5
U.S. Commercial	ASTM D1655, Grade Jet A	ASTM D1655, Grade Jet A-1		
International Air Transport Association (IATA)	Guidance Material, Grade Jet A	Guidance Material, Grade Jet A-1		
Joint Fueling Inspection Group		Bulletin 19, (AFQRJOS) Issued October 24, 2008, Grade Jet A-1		
Canada	CAN/CGSB-3.23-2009, Grade Jet A	CAN/CGSB-3.23-2009 Grade Jet A-1	CAN/CGSB-3.24-2008, Grade F-34	CAN/CGSB-3.24-2008, Grade F-44
United Kingdom		DEF STAN 91-91, Grade Jet A-1	DEF STAN 91- 87, Grade F-34	DEF STAN 91- 86, Grade F-44
France		A. 3405, or DCSEA 134/C, Grade F-35**	AIR 3405. or DCSEA 134/C, Grade F-34	AIR. 3404. or DCSEA 144/B, Grade F-44

1-73-20: PRIMARY ACCEPTABLE FUEL TYPES

(Sheet 2 of 2)

Organization or Country	Specification and Type or Grade			
	Jet A	**Jet A-1**	**JP-8***	**JP-5***
Russia		GOST R 52050-2006 Grade Jet A-1		
Brazil		CN.78-QAV-1 Grade Jet A-1		
China (PRC)		GB6537-2006, No. 3 Jet Fuel		
North Atlantic Treaty Organization (NATO) Code		F-35**	F-34	F-44

* With fuel system icing inhibitor.
** Without fuel system icing inhibitor.

NOTE

Use of the thermal stability improver additive is approved for all Honeywell engines. Therefore JP-8+100 per MIL-DTL-83133 (NATO Code F-37) is also a primary acceptable fuel. Likewise, thermal stability additives can be added to all listed primary, alternate, or other acceptable fuels at the concentration listed herein.

1-73-22: OTHER ACCEPTABLE TYPE FUELS

Organization or Country	Specification and Grade Low-Flash-Point. Low-Freeze-Point Kerosene
Russia (CIS)	IGOST 10227-86, Grades TS-1 and RT
IATA	Guidance Material, Grade TS-1
Ukraine	GSTU 320.00149943.011-99 Grade TS-1
Ukraine	GSTU 320.00149943.007-97 Grade RT

Sustainable Aviation Fuel

Aviation turbine fuel containing synthesized hydrocarbons, also commonly known as Sustainable Aviation Fuel (SAF), manufactured, certified, and released to all the requirements of Table 1 of ASTM D7566 as well as the applicable Annexes therein, meets the requirements of ASTM D1655 and shall be regarded as Specification D1655 turbine fuel, fully fungible with all other D1655 turbine fuel. When ASTM D7566 jet fuels are re-identified as ASTM D1655 fuel, they meet all the specification requirements of ASTM D1655 fuel and are therefore approved for use.

1-73-30: ANTI-STATIC ADDITIVES

Brand	Comments	Concentration
STADIS 450 (a), (b), (c)	Total accumulated at manufacture Cumulative total when redoping	5 mg/L* maximum 5 mg/L* maximum
Sigbol [Russian (CIS)]	Total accumulated percent by weight	0.0005% maximum

NOTE

a. Automatically blended into JP-4 and JP-8.
b. Although some major manufacturers of civil aviation fuels automatically blend this additive, it is not required by the ASTM D1655 specification for Jet A, Jet A-1 or Jet B.
c. If an anti-static additive is used, electrical conductivity will conform to the requirements in the applicable fuel specification or the following values:
   1. EMS53112 Jet A-1: 50 to 450 pS/M; JP-8: 200 to 600 pS/M
   2. EMS53111 Jet A: 50 to 450 pS/M
   3. EMS53113 Jet B: 50 to 450 pS/M; JP-4: 200 to 600 pS/M

* 5 mg/L is equivalent to 5 PPM

1-73-40: EGME-BASED FUEL ICING INHIBITORS

EGME-Based Fuel Icing Inhibitors*	Concentration Percent by Volume
MIL-DTL-27686	0.10 to 0.15
AL-31 per DERD 2451	0.10 to 0.15
NATO Code S-748	0.10 to 0.15
Methyl Cellosolve	0.10 to 0.15

* By raising the fuel temperature above 0°C. The fuel heater ensures that the engine fuel system will not be affected by ice accumulation whenever the oil temperature is above 27°C.

1-73-50: DiEGME-BASED FUEL ICING INHIBITORS

Diethylene Glycol Monomethyl Ether (DiEGME) Based Fuel Icing Inhibitors	Concentration Percent by Volume
ASTM D4171, Type III	0.10 to 0.15
MIL-DTL-85470*	0.10 to 0.15
AL-41 per DEF STAN 68-252 (DERD 2451)	0.10 to 0.15
NATO Code S-1745	0.10 to 0.15
Prist (PPG) Hi-Flash A/I**	0.10 to 0.15

* Automatically blended into military JP-1. JP-5. and JP-8 fuel.

** Manufactured by Prist Aerospace Products under the name of “Prist Hi-Flash”.

1-73-60: RUSSIAN (CIS) FUEL SYSTEM ICING INHIBITORS

Russian (CIS) Fuel System Icing Inhibitors			
Brand	**Blend With**	**Comments**	**Concentration**
1 per GOST 8313-88 Ethylene glycol monoethyl ether (Ethyl Cellosolve. Type A)	GOST 10227-86	Total accumulated percent by volume	0.10 to 0.30%*
TGF per GOST 17477-86 Tetrahydrofurfuryl alcohol	GOST 10227-86	Total accumulated percent by volume	0.10 to 0.30%*
I-M per GOST TU-6-10-1458-79 (50/50 mixture by weight of fuel and methanol)	GOST 10227-36	Total accumulated percent by volume	0.10 to 0.30%*
TGF-M (GOST TU-6-10 1457-79) (50/50 mixture by weight of TGF and methanol	GOST 10227-86	Total accumulated percent by volume	0.10 to 0.30%*
* Standard concentration 0.10% to 0.20% by volume except for extreme cold conditions (below 40°F).			

CAUTION

DO NOT ADD MICROBIOCIDES TO JP-4, JP-5, JP-8, OR NATO CODE F-34. F-40, AND F-44 FUELS. OR ANY FUELS WHERE FUEL SYSTEM ICING INHIBITORS HAVE BEEN ADDED.

1-73-70: FUNGICIDE/BIOCIDE INHIBITORS

Brand	Comments	Concentration
Biobor JF	Intermittent (kill) treatment	Not to exceed 270 ppmw (20 ppm maximum of elemental boron)
KATHON FP 1.5	Intermittent (kill) treatment	100 ppnv
Methyl Cellosolve (EGME) or Prist (DiEGME)	Continuous use	0.15% by volume

1-73-80: ANTI-CORROSION ADDITIVES

Brand	Minimum Dosage*	Maximum Dosage
Innospec DCI-4A	9 mg/L	23 mg/L
Hitec 580	15 mg/L	23 mg/L
Nalco 5403	12 mg/L	23 mg/L
* The minimum dosage is to ensure that sufficient additive is available for lubricity aid.		

1-78-00: ENGINE EXHAUST

1-78-10: THRUST REVERSERS

1. Cancellation of reverse thrust should be initiated so as to be at the reverse idle position by 40 KIAS.
2. Use of thrust reverser(s) for power back is not approved.

1-79-00: ENGINE OIL

1-79-20: OIL INLET TEMPERATURE

1. Before engine start: -40°C minimum.
2. For continuous operation above ground idle: 5°C minimum.
3. Operation above climb thrust: 15°C minimum
4. Steady state operation: 138°C maximum.
5. Transient operation not to exceed 2 minutes: 154°C maximum.

1-79-30: APPROVED OILS

1. Lubricating oil conforming to MIL-PRF-23699 (Type II) or its commercial equivalent. is approved for use with a low temperature limit corresponding to an oil viscosity of not more than 13,000 centistokes (which occurs typically at approximately -40°C/-40°F). Where operation at a lower temperature is required, engine pre-heating may be required for starting.

CAUTION

USE OF MIL-L-7808 IS NOT PERMITTED.

2. Approved engine lubrication system oils - All engine oils listed in this section are fully approved for flight operation.

Approved oils:

BP Turbo Oil 2197 (Exxon Turbo Oil 2197)
BP Turbo Oil 2380 (Exxon Turbo Oil 2380)
Mobil Jet II
Mobil Jet 254

NOTE

1. Mixing of MIL-PRF-23699 approved oil brands is permissible per guidelines in the engine LMM.

In cases where oils approved by Honeywell are not available and other oils must be substituted. Consult with: Honeywell Aerospace, 111 S. 34TH St. Phoenix, AZ 85072.USA, Attention: AS907-2, Customer Support Engineering

1-79-40: OIL PRESSURE

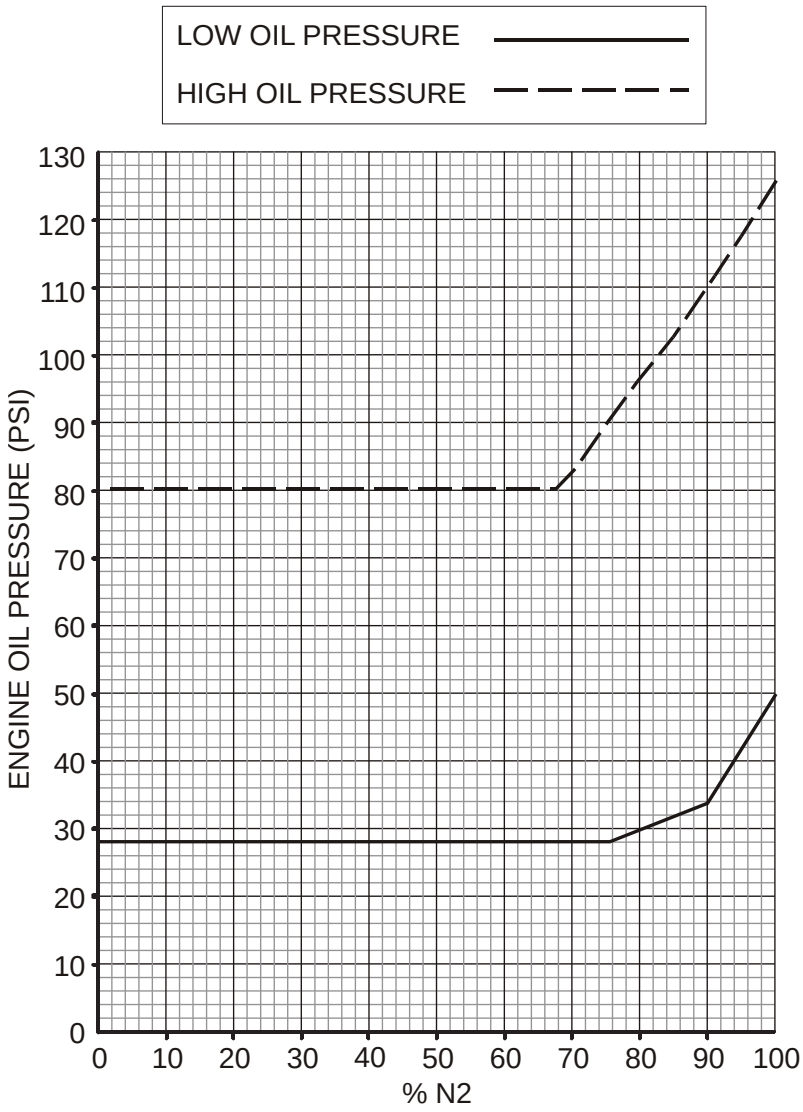


Figure 1-4. Engine Oil Pressure

1-80-00: ENGINE STARTING

1-80-10: STARTER DUTY

DO NOT EXCEED STARTER DUTY CYCLE:

- Three consecutive start cycles, followed by cooling period of 15 minutes prior to additional starts and motoring
- Engine motoring for a maximum of 5 minutes, followed by cooling period of 15 minutes prior to additional starts and motoring.

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EICAS WARNING MESSAGES

Following is a ready-reference guide which briefly outlines the message meaning and action to be taken when a message illuminated. It also refers to subject, section and page where more detailed information and procedures are found.

Procedures are grouped by actions. There can be separate procedures for Left (L) system failure, Right (R) system failure and both (L-R) systems failure, or one procedure for both left or right or both system failure as follows:
L/R - (L) or (R)
L-R - (L and R)
L/R/L-R - (L) or (R) or (L and R)

COLLECTOR CAS MESSAGE

If a major failure causes failures of other systems, in order to minimize crew workload and direct the crew to the exact identification of the main failure, it will be marked with (C) as for a collector CAS message. When a collector CAS come on, it may have SA (situational awareness) CAS associated below it in the EICAS window. The collector procedure is designed to take the crew through all action down to landing and include implications of masked and SA CAS message.

SA (SITUATIONAL AWARENESS) CAS MESSAGE

When a collector CAS message comes on, most of the failures that are caused or derived from this failure are masked. Failures that are regarded as important for crew situational awareness will be marked with a caret (**>**) on its left. These SA CAS messages are intended to notify the crew that the collector failure causes a degradation in: flight envelope, pressurization control, environmental control, flight and ground control, and loss of annunciation or alert capabilities.

(Continued)

NOTE

1. On ground, with any warning message on, takeoff is prohibited.
2. MASTER WARNING lights (pilot and copilot) illuminate any time a warning (red) message is initially displayed.
3. When any message comes on, check appropriate switches and circuit breakers.

. Messages having ◀ symbol are accompanied by aural alert.

GENERAL GUIDANCE:

The action part of a step is defined as the system status (i.e. ON, OFF, MAN, AUTO) followed by the physical switch or pushbutton position in parenthesis (i.e. IN, OUT).

Should any abnormal event occur, the following shall apply:

- Maintain control of the airplane
- Other than retracting the landing gear and silencing aural warnings, take no action until above 400 ft AGL.
- If a warning (red) or caution (amber) CAS message occurs between the FAF and the runway, the crew should consider a go around to allow time to read and perform the appropriate procedure prior to landing unless conditions dictate otherwise.
- Resetting tripped circuit breakers or cycling circuit breakers to recover or reboot systems should be done only if the system is required for continued safe flight and landing, and if required by the emergency or abnormal procedure.

Landing urgency consideration:

Land as soon as possible – Land without delay where a safe approach and landing is assured.

Land at nearest suitable airport – Extended flight beyond the nearest approved airport is not recommended.

Land as soon as practicable – The landing site and duration of the flight are at the discretion of the pilot.

WARNING MESSAGES (RED)

(Sheet 1 of 9)

Message	**Cause(s)**	**Corrective Action**
Aircraft CONFIG-Brake ◀	PARK BRAKE lever is not stowed and aircraft on ground, TLA is above max CRZ OR PARK BRAKE lever is not stowed and aircraft on ground and ground speed is above 30 kt	Check PARK BRAKE lever position
Aircraft CONFIG-Flaps ◀	Aircraft on ground and TLA is above Max CRZ or Wheel speed is above 30 kt and: TAWS/FLAP OVRD is pressed or Flaps position is greater than 22°	1. TAWS/FLAP OVRD - OFF 2. Configure flaps position for takeoff 3. Verify takeoff performance and Vspeeds

WARNING MESSAGES (RED)

(Sheet 2 of 9)

Message	Cause(s)	Corrective Action
Aircraft CONFIG-MED ◀	Aircraft on ground, main entry door not closed/locked, one engine is running, Parking Brake OFF and TLA above Max CRZ	1. Thrust Levers - IDLE 2. Main Entry Door (MED) - VERIFY CLOSED *If door is verified closed and locked:* 3. DOOR ACK - PRESS NOTE: Message changes to white as acknowledgement switch is pressed. NOTE: In case of a miscompare between the CAS message and the synoptic page, act according to the CAS message
Aircraft CONFIG-SPLR ◀	Aircraft on Ground, thrust lever above MAX CRZ or Wheel speed is above 30 kt and any of the following: GND SPLR pushbutton is inhibited SPEED BRAKE lever is not stowed Any of spoiler panels are not at retract position	1. GND SPLRS - OFF 2. SPEED BRAKE lever - RETRACT *If message is still displayed:* 3. Spoiler panels position - CHECK VISUALLY

WARNING MESSAGES (RED)

(Sheet 3 of 9)

Message	Cause(s)	Corrective Action
Aircraft CONFIG-Trim ◀	Aircraft on ground, thrust lever above MAX CRZ or Wheel speed is above 30 kt, and any trim is outside green band	Configure trims for takeoff
APU Bleed Leak	Leak or rupture in APU bleed air ducts	1. APU Bleed Air - OFF *If message persists - Shut down APU* 2. APU STOP - PRESS 3. APU MASTER - OFF *If message persists after APU shut down:* 4. Land as soon as possible
APU Fire ◀	APU fire; APU performs automatic shutdown	1. APU FIRE - PRESS 2. Perform APU FIRE, page II-30
Baggage Smoke	Smoke detected in aft baggage compartment.	Perform AIRCRAFT INTERIOR FIRE / SMOKE / FUMES, Page II-31
Bleed Air Leak, L Bleed Air Leak, R Bleed Air Leak, L-R	Bleed air leak detected. (Includes pylon and ATS)	See BLEED AIR LEAK, Page II-23

WARNING MESSAGES (RED)

(Sheet 4 of 9)

Message	Cause(s)	Corrective Action
Cabin Altitude 15000 ◀	Cabin altitude above 15,000 ft. Triggered by altitude limit switch. Cabin pressure controller malfunction	Perform CABIN UNDERPRESSURIZATION, page II-18
Cabin Altitude High ◀	Cabin altitude above 10,000 ft (or 14,750 ft when departure or landing field elevation is above 8000 ft)	Perform CABIN UNDERPRESSURIZATION, Page II-18
DIFF High - Pack to Off	Cabin differential pressure increasing above 9.55 psi	1. PACK - OFF 2. Perform CABIN OVER PRESSURIZATION, page II-25
ENG Oil PRESS Low, L ENG Oil PRESS Low, R ENG Oil PRESS Low, L-R	Indicated engine oil pressure is low with engine running	1. Affected engine - IDLE 2. See ENGINE OIL PRESSURE LOW, Page II-76

WARNING MESSAGES (RED)

(Sheet 5 of 9)

Message	**Cause(s)**	**Corrective Action**
ENG Oil TEMP Low, L ENG Oil TEMP Low, R ENG Oil TEMP Low, L-R	On ground only: Indicated engine not running: OIL TEMP lower than - 40°C; or Indicated engine running: Oil TEMP lower than 5°C (with throttle above idle), or less than 15°C (with throttle below climb thrust)	CAUTION: DO NOT START THE ENGINE(S) WHEN THE OIL TEMPERATURE IS BELOW -40°C) 1. Warm up oil before start/crank attempt CAUTION: IF THE ENGINE(S) IS (ARE) RUNNING AND THE OIL TEMPERATURE IS BELOW 5°C - DO NOT ADVANCE THROTTLE(S) ABOVE IDLE. IF THE ENGINE(S) IS (ARE) RUNNING AND THE OIL TEMPERATURE IS BELOW 15°C - THROTTLES MUST REMAIN BELOW CLIMB THRUST

WARNING MESSAGES (RED)

(Sheet 6 of 9)

Message	Cause(s)	Corrective Action
Engine Exceedance, L Engine Exceedance, R Engine Exceedance, L-R	Indicated engine has exceeded a speed (N_1, N_2) or temperature limit (ITT)	1. Affected engine - REDUCE THRUST CAUTION: DO NOT ATTEMPT FURTHER STARTS. 2. See ENGINE EXCEEDANCE, Page II-56
Engine Fail (C), L Engine Fail (C), R Engine Fail (C), L-R	Indicated engine has flamed out	See ENGINE FAILURE DURING TAKEOFF ABOVE V1, Page II-53 or, SINGLE ENGINE FAILURE IN FLIGHT, Page II-55
Engine Fire, L Engine Fire, R Engine Fire, L-R	Indicated engine fire detected	1. On ground: see ENGINE FIRE ON GROUND, Page II-28 2. In flight: see ENGINE FIRE IN FLIGHT, Page II-29

WARNING MESSAGES (RED)

(Sheet 7 of 9)

Message	Cause(s)	Corrective Action
Feed Fuel LVL Low, L-R	Fuel quantity in the left and right feed tank is 280 lb or less	1. XFLOW valve - OPEN 2. Both STBY PUMP - ON 3. Land as soon as possible CAUTION: AVOID EXTREME NOSE HIGH OR NOSE LOW ATTITUDES, EXCESSIVE FORWARD ACCELERATION AND UNCOORDINATED FLIGHT MANEUVERS
Fuel Pressure Low, L Fuel Pressure Low, R Fuel Pressure Low, L-R	Indicated fuel pressure low while engine running (less than 4.5 psi) - with aircraft above 25,250 ft. Can cause engine to flame out	See FUEL PRESSURE LOW, Page II-49
GND Spoiler Extended	Uncommanded ground spoiler deployment occurs	1. GND SPLRS - INHIB 2. Use manual speed brakes during landing 3. Increase landing distance by 25%
STALL	Stall protection system recognized approach to stall	1. AOA - DECREASE 2. Throttles - MAX THRUST

WARNING MESSAGES (RED)

(Sheet 8 of 9)

Message	Cause(s)	Corrective Action
Thrust REV Unlock, L Thrust REV Unlock, R Thrust REV Unlock, L-R	Indicated thrust reverser unsafe	See THRUST REVERSER UNLOCKED OR DEPLOYED DURING TAKEOFF, Page II-77 or, THRUST REVERSER UNLOCKED OR DEPLOYED IN FLIGHT, Page II-79 or, LANDING WITH THRUST REVERSER DEPLOYED, Page II-81

WARNING MESSAGES (RED)

(Sheet 9 of 9)

Message	**Cause(s)**	**Corrective Action**
WAI Bleed Leak, L WAI Bleed Leak, R WAI Bleed Leak, L-R	Indicated wing anti ice (WAI) duct or common duct bleed air leak detected	1. Both WING ANTI ICE - OFF 2. Bleed air / anti-ice synoptic page - DISPLAY 3. Depart icing conditions CAUTION: 1. FOR ANY WING ANTI ICE FAILURE, IF ICING CONDITIONS WERE MET WHILE WINGS ARE COLD, USE V_{REF}. + 20 KT FOR APPROACH AND LANDING AND INCREASE LANDING DISTANCE BY 40%. 2. DO NOT EXCEED TIRE SPEED LIMITATIONS (182 KT GROUNDSPEED). *If failure persists:* 4. Land as soon as possible

<<END>>

PFD (ADI AND HSI) WARNING SYMBOLS AND FLAGS (RED)

ADI Warning Flags

(Sheet 1 of 3)

Symbol/Flag	Meaning	Initial Action/Reference
Chevron (in pitch field)	Excessive pitch	Initiate pitch correction in indicated direction.
RA X.XXNM/ ±XX↑/↓	No bearing resolution advisory with traffic's (relative or absolute) altitude (in 100's ft) and altitude trend.	Initiate altitude correction as indicated by resolution advisory pitch steering guidance on PFD.
TRAFFIC	Resolution advisory alert	Check for resolution advisory steering and traffic information on PFD and MAP
Red square with associated 2 or 3 digit number and up/down arrow	Resolution advisory symbol at bearing/distance of traffic, with traffic's (relative or absolute) altitude (in 100's ft) and altitude trend.	Initiate altitude correction as indicated by resolution advisory pitch steering guidance on PFD.
Pair of opposing vertically oriented trapezoids in pitch field	Resolution advisory pitch steering guidance	Set pitch as steering guidance indicated (into the green box) and climb/descent to avoid traffic.
X in blank CAS field	No CAS Indications	CAS message annunciations are not available.

PFD (ADI AND HSI) WARNING SYMBOLS AND FLAGS (RED)

ADI Warning Flags

(Sheet 2 of 3)

AP1 (flashing) AP2 ←	Autopilot disengage flag	Take manual control of aircraft. Re-engage Autopilot if available according to pilot's discretion.
IAS	Indicated side airspeed failure flag.	Revert to cross side airdata (SMC-SENSR-ADS) or use ISI.
ALT	Indicated side altitude failure flag.	Revert to cross side airdata (SMC-SENSR-ADS) or use ISI.
ATT	Indicated side attitude failure flag.	Revert to cross side attitude (SMC-SENSR-AHS) or use ISI.
FD	Indicated flight director guidance failure flag.	Revert to cross-side AFCS (SMC-SENSR-AFCS).
FPV	Flight path data failure flag.	Verify selected FD command bar style is VBAR or XPTR. (SMC-ADI)
FMS	FMS lateral deviation data failure flag.	Use valid (cross-side or 3rd if installed) FMS as navigation source (SMC-NAV)
GS	Glideslope failure flag.	Revert to other NAV Source (SMC-NAV)

PFD (ADI AND HSI) WARNING SYMBOLS AND FLAGS (RED)

ADI Warning Flags

(Sheet 3 of 3)

LOC	Localizer deviation failure flag.	Revert to other NAV Source (SMC-NAV). Check NAV radio frequency.
MACH	Indicated side Mach failure flag.	Revert to cross side airdata (SMC-SENSR-ADS) or use ISI.
PULL UP	TAWS detect excessive descent rate or rapidly rising terrain (TAWS mode 1 and 2A).	Execute TAWS ESCAPE PROCEDURE, Page X-1-10.
RA	Radio altimeter failure flag.	Altimeter is unavailable. Revert to adequate minima. Expect A/T Retard Inhibit caution CAS message.
SVS	SVS failure flag.	Deselect SVS (SMC-ADI).
V N V	VNAV deviation failure flag. Vertical deviation is exceeding operating limitations or VNAV data is missing from FMS.	Perform manual vertical commands on FCP. Check FMS Flight plan.
VS	Indicated side vertical speed failure flag.	Revert to cross side airdata (SMC-SENSR-ADS) or use ISI.
WINDSHEAR	TAWS detects a severe wind shear condition (performance reduces)	Execute WINDSHEAR ESCAPE PROCEDURE, Page X-1-12.

PFD (ADI AND HSI) WARNING SYMBOLS AND FLAGS (RED)

HSI Warning Flags

Symbol/Flag	Meaning	Initial Action/Reference
FMS1 FMS2	Indicated FMS lateral deviation data failure flag.	Use valid (cross-side or 3rd if installed) FMS as navigation source (SMC-NAV)
HDG	Heading data failure flag.	Revert to cross side heading (SMC-SENSR-AHS) or use ISI.

ATA 21 - AIR CONDITION AND PRESSURIZATION

RAPID DECOMPRESSION

1. Crew oxygen masks.....DON,100%
2. Crew communications..... ESTABLISH
3. PASSENGER OXYGEN selector.....BYPASS
4. Passengers ..... ENSURE RECEIVING OXYGEN (GREEN LIGHT)
5. SEAT BELT and NO SMOKE pushbuttons .....ON

NOTE

CABIN ALTITUDE HIGH CAS message is expected to come on if cabin altitude climbs above 10,000 ft.

CAUTION

ADM WILL DESCEND TO 15,000 FT MSL. DISCONNECT ADM IF A HIGHER ALTITUDE IS REQUIRED TO AVOID TERRAIN.

NOTE

It is recommended that the emergency descent be flown manually in order to achieve maximum descent rate.

As long as ADM is active, pilot commands to change selected heading/track, vertical mode, autothrottle mode and ALT SEL are ignored, including use of the PUSH SYNC pushbutton.

(Continued)

If autopilot was not engaged prior to decompression or ADM is overridden by autopilot disconnect:

6. Thrust levers ..... IDLE
7. Speed brakes ..... DEPLOY FULLY
8. Airspeed ..... MAINTAIN M_{MO} / V_{MO}

If structural integrity is in doubt, limit speed as much as possible and avoid high maneuvering loads.

9. Airways ..... LEAVE AT 90° OFF ROUTE
10. ATC ..... DECLARE EMERGENCY
11. Transponder 7700
12. EXT LTS ..... ON ALL
13. Descend to 15,000 ft or MEA whichever is higher

<<END>>

CABIN UNDERPRESSURIZATION

Cabin Altitude 15000 or Cabin Altitude High warning message on indicates insufficient cabin pressure.

NOTE

The messages are triggered by different logic circuits in the controller and are mutually exclusive.

1. Crew oxygen masks.....DON, 100%
2. Crew communication..... ESTABLISH
3. PASSENGER OXYGEN switch.....BYPASS
4. Passengers ..... ENSURE RECEIVING OXYGEN (GREEN LIGHT)
5. CPCS MODE .....MAN
6. CABIN ALT selector..... DESCEND

CAUTION

ADM WILL DESCEND TO 15,000 FT MSL. DISCONNECT ADM IF A HIGHER ALTITUDE IS REQUIRED TO AVOID TERRAIN.

NOTE

As long as ADM is active, any autopilot mode change will be ignored, including use of the PUSH SYNC pushbutton.

(Continued)

If message remain on:

7. Descend to 15,000 ft or MEA which ever is higher

CAUTION

1. IF HIGHER ALTITUDE THAN 15,000 FT IS REQUIRED FOR SAFE FLIGHT - SEE FIGURES 2-1 AND 2-2 FOR OXYGEN PRESSURE AND DURATION).
2. PRESSURIZATION LEAK MAY OCCUR FROM BAGGAGE COMPARTMENT. ONLY IF HIGH ALTITUDE IS ESSENTIAL FOR SAFETY OF FLIGHT - CHECK THAT NO PASSENGERS ARE IN THE BAGGAGE COMPARTMENT AND CLOSE THE DOOR. AFTER INTERNAL BAGGAGE DOOR IS CLOSED - MOVE BAGGAGE SMOKE HANDLE TO SMOKE EVAC POSITION.

<<END>>

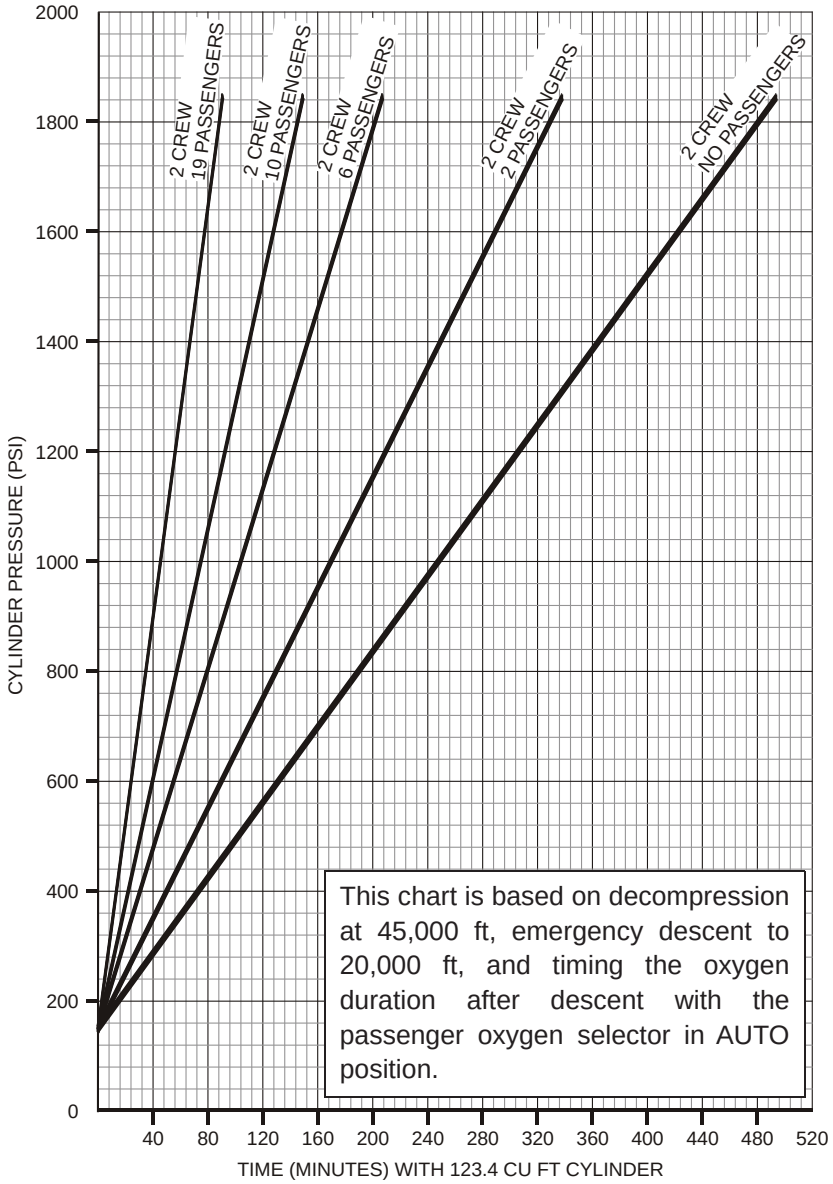


Figure 2-1. Oxygen Duration; 123.4 CU FT

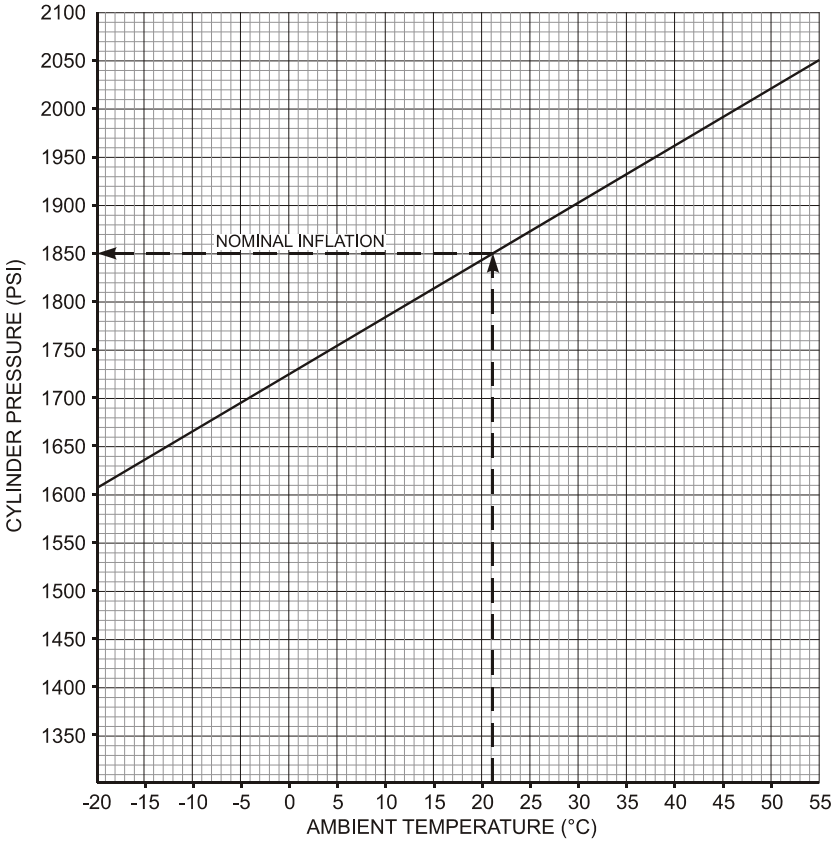


Figure 2-2. Oxygen Pressure Versus Temperature

EMERGENCY DESCENT

NOTE

It is recommended that the emergency descent be flown manually in order to achieve maximum descent rate.

1. Thrust levers ..... IDLE
2. Speed brakes ..... DEPLOY FULLY
3. Airspeed ..... MAINTAIN M_{MO} / V_{MO}

If structural integrity is in doubt, limit speed as much as possible and avoid high maneuvering loads.

4. Airways..... LEAVE AT 90 ° OFF ROUTE
5. ATC ..... DECLARE EMERGENCY
6. Transponder 7700
7. EXT LTS ..... . ALL ON
8. Descend to 15,000 ft or MEA whichever is higher

<<END>>

BLEED AIR LEAK

Bleed Air Leak, L-R warning messages come on when a dual bleed air leak is detected or a common bleed air tube is ruptured.

DUAL FAILURE

1. Diversion is required
2. Thrust ..... REDUCE TO MINIMUM FOR SAFE FLIGHT
3. If in icing conditions:
   a. Wing anti ice ..... OFF
   b. Exit icing conditions.

CAUTION

1. FOR ANY WING ANTI ICE FAILURE, IF ICING CONDITIONS WERE MET WHILE WINGS ARE COLD, USE V_{REF}. + 20 KT FOR APPROACH AND LANDING AND INCREASE LANDING DISTANCE BY 40%.
2. DO NOT EXCEED TIRE SPEED LIMITATIONS (182 KT GROUNDSPEED).

4. Bleed/anti ice synoptic page ..... MONITOR

If message persists:

5. Oxygen masks ..... DON, 100%
6. Passenger oxygen ..... DEPLOY MANUALLY
7. Both ENG BLEED ..... OFF
8. BLEED AIR ISOLATION ..... VERIFY CLOSED
9. PACK ..... OFF
10. Perform EMERGENCY DESCENT, Page II-22

NOTE

In this state no bleed source is available. Cabin altitude will climb due to normal fuselage air leakage until ambient altitude is reached.

11. Land at nearest suitable airport

SINGLE FAILURE

Bleed Air Leak, L or Bleed Air Leak, R warning message comes on when a single bleed air leak is detected or one side bleed air tube is ruptured.

1. Diversion is required
2. Affected engine thrust .....REDUCE
3. Bleed/anti ice synoptic page .....OBSERVE

If message persists:

4. Affected ENG BLEED AIR.....OFF
5. BLEED AIR ISOLATION..... VERIFY CLOSED

If message persists, shutdown the affected engine:

6. Both WAI switches .....OFF

NOTE

If WAI activation is required proceed to - WING ANTI ICE OPERATION ON SINGLE SOURCE, Page IIIA-188

7. Perform ENGINE SHUTDOWN IN FLIGHT, page II-57

<<END>>

CABIN OVER PRESSURIZATION

DIFF High - Pack to Off warning message on indicates that cabin over pressurization DIFF light is illuminated on the overhead panel.

1. PACK ..... OFF
2. CPCS MODE ..... MAN
3. CABIN ALT selector ..... CLIMB

If outflow valve is responding:

4. PACK ..... ON
5. CABIN ALT selector ..... AS REQUIRED

If differential cabin pressure (ΔP) cannot be reduced:

6. Descend until ΔP display turns green

CAUTION

DO NOT DESCEND BELOW MEA (MINIMUM ENROUTE ALTITUDE)

7. Both ENG BLEED AIR ..... OFF
8. Thrust lever ..... IDLE

If differential cabin pressure (ΔP) remains at or above 9.55:

9. DUMP ..... ON
10. LAND AS SOON AS PRACTICABLE

<<END>>

ATA 22 - AUTO FLIGHT

AUTOMATIC DESCENT MODE (ADM)

If a high cabin altitude is detected, the aircraft activates an automatic descent mode function. This protects the aircraft occupants by descending as quickly as possible to an altitude where there is a greater concentration of oxygen.

Triggered when:

- Aircraft altitude is above 34,000 ft
- Autopilot engaged
- Cabin altitude above 10,000 ft

NOTE

Autopilot disengagement can be used at all time to exit ADM mode. Flight crew may override any of the AFCS functions using normal input to controls. As long as ADM is active, any autopilot mode change will be ignored, including use of the PUSH SYNC pushbutton.

Mode functions:

1. ADM red annunciation is provided on FMA.
2. 5 seconds after ADM triggered the transponder code resets to 7700.
3. Lateral mode changes to HDG and selected HDG changes to 90° left of original course.
4. Autothrottle will engage If not engaged before. Thrust levers will move to idle
5. Altitude selector resets to 15,000 ft
6. Airspeed target changes to M_{MO} then V_{MO} in concert with the airspeed automatic transition
7. Aircraft starts descent

(Continued)

8. On reaching 15,000 ft, AFCS captures the altitude and airspeed command changes to 225 kt. Autothrottle remains engaged
9. Autopilot establishes left orbit at 15,000 ft and 225 kt
10. ADM Complete advisory message comes on

NOTE

When ADM is active HSI will switch to 120° arc map format, range 10 NM and WXR overlay will de-selected automatically.

<<END>>

ATA 26 - FIRE PROTECTION

ENGINE FIRE ON GROUND

Engine Fire, L, Engine Fire, R or Engine Fire, L-R warning message is on when a fire is detected in the affected engine(s). Affected side N_1 dial has FIRE annunciator and FUEL CONTROL switch is illuminated.

1. Aircraft ..... STOP
2. PARK BRAKE ..... SET
3. Both engines thrust levers ..... IDLE
4. Both engines FUEL CONTROL switches ..... OFF
5. Affected engine ..... IDENTIFY/CONFIRM
6. Affected engine FIRE handle ..... PULL, ROTATE TO DISCH 1 (OUTBOARD POSITION)

NOTE

Allow minimum 30 seconds between each discharge.

7. APU MASTER ..... OFF
8. Emergency Evacuation:
   a. ATC ..... ADVISE
   b. Main entry door / emergency exit ..... OPEN AS REQUIRED
   c. Passengers evacuation ..... INITIATE

9. If fire warning indications persist for more than 30 seconds, Affected engine FIRE handle ..... ROTATE TO DISCH 2 (INBOARD POSITION)
10. Both batteries ..... OFF
11. STBY BATT ..... OFF

<<END>>

ENGINE FIRE IN FLIGHT

Engine Fire, L, Engine Fire, R or Engine Fire, L-R warning message is on when a fire is detected in the affected engine(s). Affected side N1 dial has FIRE annunciator and FUEL CONTROL switch is illuminated.

1. Affected engine ..... IDENTIFY/CONFIRM
2. Affected engine thrust lever ..... IDLE
3. Affected engine FUEL CONTROL switch..... OFF
4. Affected engine FIRE handle ..... PULL
5. Time Hack..... 10 SECONDS

If fire is extinguished and no fire system failures are annunciated, continue to step 8

6. Engine FIRE handle..... ROTATE TO DISCH 1 (OUTBOARD POSITION)

NOTE

Allow minimum 30 seconds between each discharge.

*If warning indications persist for more than 30 seconds or fire system indicates a failure (*FIRE LOOP *or* SQUIB FAIL*):*

7. Affected engine FIRE handle ..... ROTATE TO DISCH 2 (INBOARD POSITION)
8. Affected fuel STBY PUMP ..... NOT ARM AND OFF
9. Affected ENG BLEED AIR ..... OFF
10. Fuel balance ..... MONITOR
11. TCAS .....VERIFY TA ONLY
12. Land at nearest suitable airport
13. PERFORM SINGLE-ENGINE APPROACH AND LANDING, page II-66

<<END>>

APU FIRE

Overhead APU FIRE light in pushbutton and APU Fire warning message illuminates when the fire detection system has detected a fire or overheat in the APU compartment.

NOTE

An automatic APU shutdown is expected.

1. APU FIRE pushbutton.....PRESS

NOTE

The green ARM/EMPTY light in pushbutton illuminates.

2. APU BLEED AIR .....OFF

If fire persists:

3. ARM / EMPTY.....PRESS

CAUTION

ONLY ONE FIRE BOTTLE (#1) IS AVAILABLE FOR FIGHTING AN ENGINE FIRE FOLLOWING AN APU FIRE.

When RPM is below 5%:

4. APU MASTER.....OFF
5. Land at nearest suitable airport

CAUTION

DO NOT RESTART APU AFTER SHUTDOWN DUE TO A FIRE.

After landing:

6. Aircraft..... STOP
7. PARKING BRAKE.....SET
8. Evacuate passengers as soon as practical. See EMERGENCY EVACUATION, page II-87

<<END>>

AIRCRAFT INTERIOR FIRE / SMOKE / FUMES

1. Crew oxygen masks and smoke goggles ..... DON, 100%

WARNING

1. CONSIDER ALL SMOKE AND / OR FUMES TO BE TOXIC.
2. DO NOT DELAY DESCENT OR DIVERSION TO FIND THE SMOKE SOURCE. REGARDLESS OF WHETHER A FIRE HAS BEEN EXTINGUISHED OR SMOKE HAS CLEARED, CONSIDERATION SHOULD BE GIVEN TO LANDING THE AIRCRAFT WITHOUT DELAY.

WARNING

EXERCISE EXTREME CAUTION WHEN USING OXYGEN NEAR OPEN FLAME.

2. Crew communication ..... ESTABLISH
3. NO SMOKE / SEAT BELT ..... ON

(Continued)

4. Passenger Oxygen Mask.....BYPASS; VERIFY MASKS DEPLOYED

NOTE

Visually confirm that an oxygen mask has deployed for each passenger. Advise passengers to DON oxygen masks.

CAUTION

ONCE DUMP SELECTED AND CABIN ALTITUDE CLIMBS ABOVE 10,000 FT, AND AIRCRAFT IS AT OR ABOVE 34,000 FT, ADM MODE WILL BE TRIGGERED. TO OVERRIDE ADM MODE - DISCONNECT AUTOPILOT AND SELECT OTHER MODE(S) AS DESIRED.

5. DUMP.....ON

NOTE

1. Stop the cabin altitude rise before 10,000 ft if smoke, clears by deselecting DUMP.
2. The following messages display: CPCS Dump Selected caution message Cabin Altitude High warning message will be displayed once cabin altitude exceeds 10,000ft.

6. ATC .....DECLARE EMERGENCY
7. Transponder.....VERIFY 7700
8. All UTILITY pushbuttons .....OFF

(Continued)

If flight level is not critical:

9. Emergency descent .....INITIATE

NOTE

Use of autopilot and autothrottles is recommended. Set altitude preselector to desired safe altitude.

a. Thrust Levers..... .IDLE
b. Airspeed.....ACCELERATE TO M_{MO} / V_{MO}
c. Speed brakes.....DEPLOY FULLY
d. Airways .....TURN 90 DEGREES OFF ROUTE
e. EXT LTS..... ALL ON
f. Descend to 25,000 Ft or lower or MEA which ever is higher.

Proceed to the appropriate section to complete checklist:

- SECTION A: FIRE / SMOKE / FUMES IN COCKPIT, CABIN, OR BAGGAGE COMPARTMENT, Page II-34
- SECTION B: SMOKE FROM AIR CONDITIONING OUTLETS (POSSIBLE BLEED AIR SOURCE), Page II-36
- SECTION C: ELECTRICAL FIRE / SMOKE SOURCE UNKNOWN, Page II-38

(Continued)

SECTION A: FIRE / SMOKE / FUMES IN COCKPIT, CABIN, OR BAGGAGE COMPARTMENT

1. PBE (Portable Breathing Equipment), headset, hand mic, and portable extinguisher (investigating crew member). DON / CARRY
2. Fire / smoke / fumes..... LOCATE / EXTINGUISH / ELIMINATE

If source of fire / smoke / fumes is in the baggage compartment and is suspected to be electrical (unidentified smoke source or smoke from behind baggage compartment liners), go to step 14, page II-41

If the fire or smoke is in baggage compartment and appears to be limited and may be extinguishable (door open or through door eyelet if door closed):

3. Crew communication..... RE-ESTABLISH (Plug a hand mic and headset into the aft radio rack. Select CAB on the ACP and use PTT.)
4. Fire / smoke / fumes..... LOCATE / EXTINGUISH / ELIMINATE

If the fire or smoke are moderate / intense:

5. Interior baggage door.....CLOSE
6. SMOKE EVAC selector ..... SMOKE EVAC

NOTE

The following caution messages come on: BAG Dump Valve Open, BAG ISO Valve Closed and BAG CMPT PRESS Low.

7. Time hack.....2 MINUTES MINIMUM

After at least 2 minutes, if fire is reduced or eliminated (verify through door eyelet)

8. SMOKE EVAC selector ..... BAG PRESS

(Continued)

When BAG CMPT PRESS Low *caution message is no longer*

displayed, open the baggage interior door:

9. Fire / smoke / fumes ..... LOCATE / EXTINGUISH / ELIMINATE
10. SMOKE EVAC selector ..... AUTO

NOTE

This action re-arms baggage compartment pressure leak detection.

11. Land at nearest suitable airport

NOTE

If smoke/fire is eliminated and crew decides to deselect DUMP to regain auto cabin pressurization schedule, verify first that baggage pressurization is activated using SMOKE EVAC knob in BAG PRESS position.

SECTION B: SMOKE FROM AIR CONDITIONING OUTLETS (POSSIBLE BLEED AIR SOURCE)

NOTE

Allow sufficient time between bleed air source selection to determine source of smoke / fumes. If the smoke / fumes clear, maintain bleed air source in its last position.

1. L ENG BLEED.....OFF

NOTE

BAS Off, L caution message comes on.

If smoke / fumes still persist:

2. L ENG BLEED.....ON
3. R ENG BLEED.....OFF

NOTE

BAS Off, R caution message comes on.

If smoke / fumes still persist:

4. R ENG BLEED.....ON
5. ALTN PRESS.....ON

NOTE

PACK indicates OFF and the following caution messages come on: Pack Off, and ALTN PRESS Selected.

If smoke / fumes still persist:

6. ALTN PRESS.....OFF

If smoke / fumes clear - land at nearest suitable airport.

(Continued)

If smoke / fumes still persist, its source does NOT originate from the bleed air system:

7. Fire / smoke / fumes ..... LOCATE / EXTINGUISH / ELIMINATE

If required, continue with SECTION A: FIRE / SMOKE / FUMES IN COCKPIT, CABIN, OR BAGGAGE COMPARTMENT, Page II-34*, or* SECTION C: ELECTRICAL FIRE / SMOKE SOURCE UNKNOWN, Page II-38

8. LAND AS SOON AS POSSIBLE

(Continued)

SECTION C: ELECTRICAL FIRE / SMOKE SOURCE UNKNOWN

WARNING

WARNING: DO NOT DELAY LANDING AT THE NEAREST SUITABLE AIRPORT IN AN ATTEMPT TO COMPLETE THE CHECKLIST.

1. Dome light ..... BRT
2. Fire / smoke / fumes..... LOCATE AND REMOVE POWER FROM SYSTEM

If smoke / fumes clear - land at nearest suitable airport.

NOTE

For the following steps, allow a minimum of 30 seconds between each step to allow time for a difference in the level of smoke or fumes to be obtained before proceeding to the next step.

If smoke / fumes originate from the overhead panel, proceed to step 3*.*

If smoke / fumes originate from the forward wall of the baggage compartment, proceed to step 14*.*

3. R DISTR CB (B12) ..... PULL

NOTE

Q-Feel and AUTO pressurization will not be available and DISTR Bus Fail (C), R caution message comes on.

If smoke / fumes clear, land at nearest suitable airport. continue with R DISTRIBUTION BUS FAIL, Page IIIA-122

4. R DISTR CB (B12) ..... RESET
5. Autopilot ..... DISCONNECT

(Continued)

6. L DISTR CB (B2)..... PULL

NOTE

Pedal feedback, AP and SP are not available and DISTR Bus Fail (C), L caution message comes on.

If smoke / fumes clear, land at nearest suitable airport. continue with L DISTRIBUTION BUS FAIL, Page IIIA-120

7. L DISTR CB (B2)..... RESET
8. STBY BATT..... OFF

NOTE

AP 1-2 Fail, A/T 1-2 Fail, Stick Pusher Fail, Mach Trim Fail caution messages come on.

If smoke / fumes clear, land at nearest suitable airport. continue with STBY BUS FAILURE, Page IIIA-135

(Continued)

9. STBY BATT.....ON

CAUTION

1. THE NEXT STEPS ARE DESIGNED TO ISOLATE THE EMERGENCY BUSES AS A SOURCE OF SMOKE / FUMES. EMERGENCY BUS POWER OFF CAUSES A CHANGE IN HANDLING QUALITIES AND REQUIRES CLOSE ATTENTION BY THE PILOTS.
2. AFTER THE NEXT STEP, THE FOLLOWING SYSTEMS WILL BE INOPERATIVE:
   - Flaps, normal and alternate
   - Inboard spoilers
   - Inboard brakes
   - Q-Feel
   - ALTN STAB
   - NWS
   - APU Start

10. REB PWR - FEED CB (A18).....PULL

NOTE

For the next step, EMER Bus Fail (C), R caution message comes on.

If smoke / fumes clear, land at nearest suitable airport. continue with R EMERGENCY BUS FAIL, Page IIIA-106.

(Continued)

11. REB PWR - FEED CB (A18)..... RESET

CAUTION

AFTER THE NEXT STEP, THE FOLLOWING SYSTEMS WILL BE INOPERATIVE:

- DU 1
- STAB Trim
- Ground Spoilers
- Outboard Spoilers
- Outboard Brakes
- Left Stick Shaker
- Pack

12. LEB PWR - FEED CB (A8) ..... PULL

NOTE

EMER Bus Fail (C), L caution message comes on.

If smoke / fumes clear, land at nearest suitable airport. continue with L EMERGENCY BUS FAIL, Page IIIA-102*.*

13. LEB PWR - FEED CB (A8) ..... RESET

If smoke / fumes do NOT clear, LAND AS SOON AS POSSIBLE while investigating other sources of fire / smoke / fumes.

If smoke / fumes originate from the baggage compartment and are suspected to be electrical proceed with step 14.

14. Interior baggage door..... CLOSE
15. SMOKE EVAC selector..... SMOKE EVAC

NOTE

The following caution messages come on: BAG Dump Valve Open, BAG ISO Valve Closed and BAG CMPT PRESS Low.

(Continued)

16. L and R MAIN TIE CBs (A2, A12) .....PULL

NOTE

Q-Feel and auto pressurization will not be available and Main Bus Fail (C), R caution message comes on.

17. R GEN.....OFF
18. R BATT.....OFF

If smoke / fumes clear, land at nearest suitable airport. continue with R MAIN BUS FAIL, Page IIIA-116*.*

19. R BATT.....ON
20. R GEN.....ON

NOTE

Pedal feedback, AP and SP will not be available and Main Bus Fail (C), L caution message comes on.

21. GEN .....OFF
22. L BATT .....OFF

If smoke / fumes clear, land at nearest suitable airport. continue with L MAIN BUS FAIL, Page IIIA-114*.*

23. L BATT .....ON
24. L GEN .....ON
25. L and R MAIN TIE CBs (A2, A12) .....RESET
26. LAND AS SOON AS POSSIBLE

NOTE

If smoke/fire is eliminated and crew decides to deselect DUMP to regain auto cabin pressurization schedule - verify first that baggage pressurization is activated by selecting the SMOKE EVAC switch to BAG PRESS position.

<<END>>

RIGHT AFT RADIO RACK HOT

AFT Radio Rack Hot, R caution message comes on when right aft radio rack overheats. The radio rack is located in the right aft side of the lavatory and covered by removable wall covers.

1. CABIN TEMP CONTROL..... MAN / FULL COLD
2. EER cover panels ..... REMOVE AND CHECK FOR HOT COMPONENTS
3. Hot component(s) .....PULL COMPONENT POWER CIRCUIT BREAKER(S)
4. Land as soon as practicable

NOTE

The right aft radio rack contains the following units:

- ECS Cockpit duct.
- Fuel Quantity Measurement Computer (FQMC)
- Remote Oil Calibration System (ROLS)
- FCECU 2
- DCU 2
- Aft LTS EMER BATT
- SATCOM - Iridium (Option)
- APU ECU

<<END>>

ATA 27 - FLIGHT CONTROLS

Stall Recovery

Stall indications (either one):

- STALL warning CAS displayed and triple chime.
- Stick shaker operating.
- Stick pusher triggered.

1. Thrust Levers .....MAX THRUST
2. Pitch Attitude .....DECREASE AS PRACTICABLE (CONSIDER GROUND PROX)
3. Speedbrakes ..... VERIFY RETRACTED
4. Roll attitude .....WINGS LEVEL

If flaps are LND:

5. Flaps 20

After airspeed increasing and stall warning extinguished:

6. Pitch attitude ..... AS DESIRED
7. Thrust Levers ..... AS DESIRED

<<END>>

ATA 28 - FUEL

FUEL LEAK

Fuel leak indications:

- An increasing difference in fuel quantity between wing tanks indicated by Fuel Imbalance caution message
- An increasing difference between FMS predicted fuel quantity (higher) and FQMC measured fuel quantity (lower)
- A steady Fuel Pressure Low, L or Fuel Pressure Low, R warning message with an operating standby pump (STBY Pump On, L or STBY Pump On, R caution message)
- STBY Pump On, L or STBY Pump On, R caution message may indicate fuel leak in the motive flow line between the engine and the feed tank jet pump. (check for difference between FMS predicted fuel and FQMC measured fuel)
- Abnormally high fuel flow or fuel flow out of range indication on one of the engines
- Visible from flight deck or cabin windows or external report
- Fuel odor in the cabin
- Fuel Transfer Fault caution message comes on, combined with one of the above messages

In order to determine an actual fuel leak, compare the following:

- Total fuel quantity change Vs. flight planed fuel
- One engine fuel flow higher then the other

1. Diversion may be required
2. FUEL JETT ..... VERIFY OFF
3. FUEL X FLOW ..... CLOSE
4. FUEL INTERCONNECT ..... CLOSE

If fuel leak is not visible go to step 13

A. FUEL LEAKAGE IS VISIBLE OR SUSPECTED FROM WING / FUSELAGE

If fuel is leaking from one of the fuselage tanks (forward, center or aft):

5. Continue flight. Evaluate fuel loss and monitor fuel reserves for destination

If fuel leak is identified to be from a wing tank:

6. Affected side STBY FUEL pump .....ON

NOTE

STBY Pump On, L or STBY Pump On, R caution message will come on.

7. FUEL XFLOW .....OPEN

NOTE

Fuel XFLOW Valve Open status message will come on.

CAUTION

LANDING HANDLING QUALITIES MUST BE CHECKED PRIOR TO LANDING IF FUEL IMBALANCE IS ABOVE DEMONSTRATED VALUE (ABOVE 900 LB BETWEEN WING TANKS).

CONSIDERATION SHOULD BE GIVEN TO THE FOLLOWING:

- Climb to altitude in order to achieve greater range
- Maximum transfer of fuel to non leaking tank versus lateral controllability
- Affected side engine may flameout due to fuel starvation
- Two engines versus Single engines cruise performance.

(Continued)

NOTE

Transfer fuel from a leaking wing if needed, to reach destination with one engine operating and without exceeding the unbalance limitations for flight / landing.

When fuel balance not required any more:

8. FUEL XFLOW ..... CLOSE
9. Leaking tank FUEL STBY PUMP ..... OFF

Prior to final approach:

10. Aircraft landing configuration ..... ESTABLISH
11. Aircraft controllability and handling characteristics ..... CHECK

CAUTION

IF ENGINE FLAMED OUT OR FAILED, PERFORM ENGINE SHUTDOWN IN FLIGHT, Page II-57.

12. Perform BEFORE LANDING, Page IV-37

B. FUEL LEAKAGE IS NOT VISIBLE AND ONE OF THE FOLLOWING IS SUSPECTED:

- Engine Internal fuel leak (abnormally high fuel flow, feed tank leak)

13. Single engine performance / range ..... COMPUTE

WARNING

1. THIS PROCEDURE WILL RESULT IN ENGINE SHUT DOWN. TERRAIN CLEARANCE AND AIRCRAFT SINGLE ENGINE PERFORMANCE MUST BE TAKEN INTO CONSIDERATION.
2. TRANSFER OF FUEL FROM LEAKING FEED TANK SHOULD BE PERFORMED ONLY AS A LAST RESORT AND MAY CAUSE THE FUEL LEAK TO RESUME.

NOTE

The APU is fed by fuel pressure from the right engine manifold only. If the fuel leak is suspected to be from the Right fuel system, APU performance may be erratic, and/or not meet maximum altitude APU starting performance. Consider APU shutdown.

If engine flamed out:

14. Continue with ENGINE SHUTDOWN IN FLIGHT, page II-57

<<END>>

FUEL PRESSURE LOW

Fuel Pressure Low, L, Fuel Pressure Low, R or Fuel Pressure Low, L-R warning message indicates that fuel pressure is low when aircraft is ABOVE 25,250 ft.

Fuel Pressure Low, L, Fuel Pressure Low, R or Fuel Pressure Low, L-R caution message indicates that the fuel pressure is low when aircraft is BELOW 25,250 ft, or on the ground with engine running.

WARNING

LOW FUEL PRESSURE MAY CAUSE AN ENGINE FLAMEOUT ABOVE FL 250.

CAUTION

1. AVOID ABRUPT THRUST LEVER MOVEMENTS.
2. LOW FUEL PRESSURE MAY INDICATE A FUEL LEAK IN THE MOTIVE FLOW LINE. FUEL QUANTITY AND BALANCE SHOULD BE MONITORED CAREFULLY.

NOTE

In case of a miscompare between the CAS message and the synoptic page, act according to the CAS message.

If a fuel leak is suspected, see FUEL LEAK, page II-45

1. Affected side STBY FUEL PUMP pushbutton.....VERIFY ON

If message persists:

2. Affected side thrust lever- IDLE
3. Descend to FL 250 or below
4. LAND AS SOON AS PRACTICABLE

<<END>>

ATA 32 - LANDING

BLOWN TIRE DURING TAKEOFF

Indications:

1. If a main gear tire blows, the aircraft will veer toward the blown tire
2. Loud or muffled noise caused by initial tire destruction
3. Continuous rumble or vibration caused by flat tire

NOTE

A blown nose wheel tire may cause engine FOD. Nose blown tire may damage the nose gear doors or nosewheel well equipment. A blown main gear tire may damage the flaps, and/or brake lines.

If decision is made to stop:

1. Takeoff.....ABORT

CAUTION

DO NOT TAXI WITH FLAT TIRE.

If takeoff is continued:

2. Landing gear ..... DO NOT RETRACT
3. Flaps .....DO NOT CHANGE CONFIGURATION
4. Aircraft weight .....REDUCE;
   (Consider FUEL JETTISON, Page IIIA-164 or Burn off fuel)

(Continued)

For landing:

5. Runway ..... LONGEST AND WIDEST AVAILABLE
6. Use all means available to maintain directional control
7. Plan to land on opposite side of the runway from the blown main tire (aircraft would veer toward the blown tire)
8. Thrust reversers ..... USE MAX REVERSE THRUST

NOTE

Expect that blown tire brake might not build braking pressure. Adjacent brake on same strut shall compensate for anti skid use.

<<END>>

ATA 72-80 - ENGINE

TAKEOFF ABORT

1. Thrust levers ..... IDLE
2. Wheel brakes ..... MAXIMUM BRAKING
3. Thrust reversers ..... AS REQUIRED
4. Ground spoilers ..... VERIFY EXTENDED

When stopped:

5. Tower ..... NOTIFY
6. Passengers ..... ADVISE / EVACUATE AS NECESSARY; see EMERGENCY EVACUATION, Page II-87

<<END>>

ENGINE FAILURE DURING TAKEOFF ABOVE V1

Continue takeoff:

1. Thrust levers ..... MAXIMUM THRUST
2. APR.....VERIFY ON; press APR pushbutton if required

After lift-off and positive rate of climb established

3. LANDING GEAR..... UP
4. Airspeed.....CLIMB AT V_2 TO V_2 + 10 KT

At safe altitude / minimum 1500ft AGL:

5. Airspeed..... V_2 + 15 KT
6. Flaps ..... UP
7. Airspeed..... V_{SE}
8. Operating Engine ..... ADJUST THRUST AS NECESSARY

NOTE

APR thrust may be maintained for 10 minutes during single-engine operations.

9. Failed engine thrust lever..... IDLE
10. Failed engine FUEL CONTROL ..... OFF
11. Failed ENG BLEED AIR..... OFF
12. Fuel Balance..... MONITOR
13. Affected side HYDRAULIC EMP.....VERIFY ON
14. TCAS ..... TA ONLY
15. Consider APU start as a backup source of electrical power

(Continued)

If no apparent reason exists for engine failure / flameout:

16. Affected engine ..... CONSIDER START

NOTE

See ENGINE RESTART IN FLIGHT, Page II-59

Single Engine Approach and Landing:

17. Autobrakes ..... AS REQUIRED
18. Flaps ..... 20°
19. Landing gear ..... DOWN / 3 GREEN
20. TAWS FLAP OVRD ..... ON
21. Approach speed ..... V_{REF} FOR 20° FLAPS + 5 KT
    For Flaps 20° landing performance see Figure 5-289
22. EXT LTS ..... AS REQUIRED

After landing:

23. Reverse thrust ..... AS REQUIRED ON AVAILABLE ENGINE
24. If required, see EMERGENCY EVACUATION, Page II-87

<<END>>

SINGLE ENGINE FAILURE IN FLIGHT

Engine Fail (C), L or Engine Fail (C), R warning message indicates that the affected engine has flamed out and is inoperative.

1. Affected engine .....IDENTIFY AND CONFIRM
2. Operating engine thrust lever..... SET CLIMB
3. Inoperative engine thrust lever..... IDLE
4. Affected engine parameters..... MONITOR

NOTE

The auto-throttle will disengage; it is possible to re-engage and use the auto-throttle during single engine operations.

If a re-start can be attempted:

Perform ENGINE RESTART IN FLIGHT, page II-59

If a re-start cannot be attempted:

perform ENGINE SHUTDOWN IN FLIGHT, page II-57

<<END>>

ENGINE EXCEEDANCE

Engine Exceedance, L, Engine Exceedance, R or Engine Exceedance, L-R warning message indicates that N_1, N_2 or ITT parameters exceeded maximum value.

1. Affected engine thrust lever ..... IDENTIFY AND CONFIRM
2. Affected engine thrust lever ..... REDUCE THRUST TO MAINTAIN ENGINE PARAMETER(S) WITHIN LIMITS
3. Engine Event ..... PRESS

If engine parameters CANNOT be controlled within limits:

4. Shut down the affected engine - perform ENGINE SHUTDOWN IN FLIGHT, Page II-57

If engine parameters CAN be controlled within limits:

5. Flight ..... CONTINUE
6. Affected engine parameters ..... MONITOR

<<END>>

ENGINE SHUTDOWN IN FLIGHT

CAUTION

FOR TRAINING/FLIGHT TEST PURPOSES, THE SHUT-DOWN ENGINE SHOULD BE RE-STARTED AS SOON AS PRACTICABLE (TO AVOID THERMAL SHOCKS).

1. Thrust lever ..... ADJUST AS NECESSARY

NOTE

The autothrottle disengages due to the engine failure. It is possible to re-engage and use the autothrottle in single engine operation.

2. Affected engine .....IDENTIFY AND CONFIRM

CAUTION

FOR TRAINING PURPOSES ONLY, SET ENGINE THRUST LEVER TO IDLE FOR 3 MINUTES MINIMUM PRIOR TO SHUT DOWN.

3. Affected engine thrust lever ..... IDLE
4. Affected engine GEN ..... OFF
5. Both WAI switches ..... OFF
6. Affected ENG BLEED ..... OFF
7. Affected HYDRAULIC EMP ..... ON
8. Engine FUEL CONTROL ..... OFF

NOTE

The APU may be used as an alternate source of electrical power, if desired. See APU START (IN FLIGHT), Page IV-12.

(Continued)

9. Affected engine FUEL STBY PUMP.....OFF
10. TCAS..... TA ONLY
11. Fuel synoptic page.....DISPLAY
12. Fuel load balance.....MONITOR
13. If WAI activation is required proceed to - WING ANTI ICE OPERATION ON SINGLE SOURCE, Page IIIA-188
14. Perform SINGLE-ENGINE APPROACH AND LANDING, Page II-66

<<END>>

ENGINE RESTART IN FLIGHT

WARNING

AN AIR START SHOULD NOT BE ATTEMPTED FOLLOWING AN ENGINE FAILURE ACCOMPANIED BY INDICATIONS THAT INTERNAL DAMAGE HAS OCCURRED. SUCH ATTEMPT MAY RESULT IN AN ENGINE FIRE OR FURTHER DAMAGE.

CAUTION

FOR TRAINING/FLIGHT TEST PURPOSES, THE SHUT-DOWN ENGINE SHOULD BE RE-STARTED AS SOON AS PRACTICABLE (TO AVOID THERMAL SHOCKS).

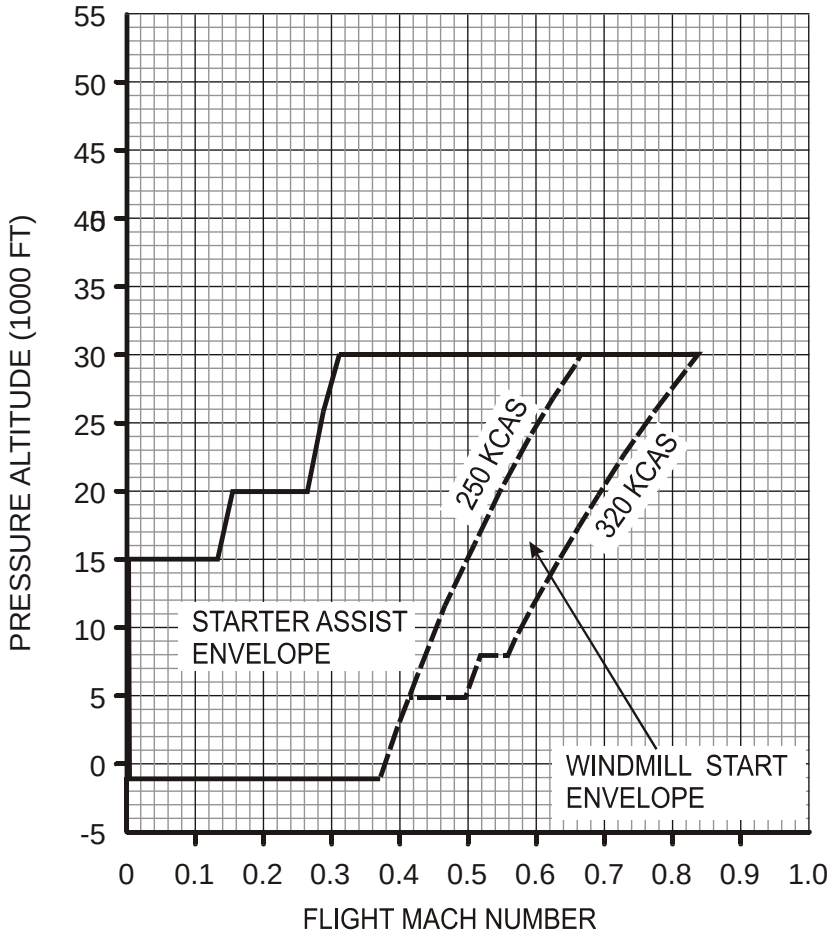


Figure 2-3. Engine Start Envelope

A. STARTER-ASSIST AIR-START (CROSS-BLEED)

CAUTION

IMMEDIATELY ABORT START BY SELECTING THE FUEL CONTROL SWITCH TO OFF IF:

A, LIGHT-OFF DOES NOT OCCUR WITHIN 45 SECONDS.

B, OIL PRESSURE IS NOT INDICATED BY 30% N_2.

C, ITT EXCEEDS LIMITS.

D, WAIT 10 SECONDS BEFORE ATTEMPTING ANOTHER START. NO MORE THAN 3 CONSECUTIVE STARTER-ASSIST AIR STARTS SHOULD BE ATTEMPTED.

E, IF RESTART IS ATTEMPTED AFTER COLD SOAK, WINDMILLING, LOW FUEL TEMPERATURES MAY RESULT IN ENGINE FUEL FILTER BLOCKAGE DUE TO ICING PRIOR TO ENGINE ATTAINING NORMAL OPERATING TEMPERATURE.

F, AN AIR START HAS A POTENTIAL TO RESULT IN AN ITT EXCEEDANCE, IF N_2 IS BELOW 40% AND ITT IS ABOVE 450°C AND RISING.

(Continued)

1. Affected engine FUEL CONTROL.....OFF
2. Affected engine thrust lever .....IDLE
3. Affected ENG BLEED .....OFF
4. ISOLATION valve.....OPEN
5. Bleed air pressure.....VERIFY 32 PSI MINIMUM
6. Affected engine FUEL STBY PUMP.....ON
7. Affected engine FUEL CONTROL.....RUN
8. Affected engine START/CRANK .....PRESS

NOTE

Pack Off caution message comes on during start sequence.

9. Affected Engine parameters and starting sequence .....MONITOR

NOTE

Approximately halfway through the restart, the ITT drops rapidly before increasing again.

If re-start is successful, continue to step 35 *(*D. AFTER START*)*

If re-start is unsuccessful (No N_2, no ITT rise indication) within 50 seconds after start:

10. Affected Engine FUEL CONTROL switch .....OFF
11. Attempt another air-start or see ENGINE SHUTDOWN IN FLIGHT, page II-57

B. WINDMILLING AIR-START

CAUTION

IMMEDIATELY ABORT START BY SELECTING THE FUEL CONTROL SWITCH TO OFF IF:

A, LIGHT-OFF DOES NOT OCCUR WITHIN 45 SECONDS.
B, OIL PRESSURE IS NOT INDICATED BY 30% N_2.
C, ITT EXCEEDS LIMITS.
D, WAIT 10 SECONDS BEFORE ATTEMPTING ANOTHER START.
E, NO MORE THAN 3 CONSECUTIVE STARTER-ASSIST AIR STARTS SHOULD BE ATTEMPTED.
F, AN AIR START HAS A POTENTIAL TO RESULT IN AN ITT EXCEEDANCE, IF N_2 IS BELOW 40% AND ITT IS ABOVE 450°C AND RISING.

12. Affected engine FUEL CONTROL..... OFF
13. Airspeed / altitude ..... 250-320 KCAS / BELOW 30,000 ft
14. Affected engine thrust lever ..... IDLE
15. Affected ENG BLEED ..... OFF
16. Affected engine FUEL STBY PUMP ..... ON
17. N_2..... 8.2% MIN
18. Affected engine FUEL CONTROL..... RUN

(Continued)

19. Affected engine parameters and starting sequence..... MONITOR

NOTE

During Windmill engine start, monitor N_2 constant rise until it stabilizes at idle. Restart may take up to two minutes.

If re-start is successful, continue to step 35 *(*D. AFTER START*)*

If re-start is unsuccessful (no N_2, ITT rise indication):

20. Affected engine FUEL CONTROL.....OFF
21. Attempt another air-start or refer to ENGINE SHUTDOWN IN FLIGHT, Page II-57

C. APU-ASSIST AIR-START (BELOW 15,000 FT)

22. Affected engine FUEL CONTROL.....OFF
23. Right engine FUEL STBY PUMP .....ON
24. APU MASTER.....ON
25. APU START .....PRESS
26. Both ENG BLEED .....VERIFY OFF
27. APU BLEED ..... ON; VERIFY ISOLATION OPEN
28. Bleed pressure..... 22 PSI MIN AT 15,000 FT
29. Affected engine FUEL STBY PUMP.....ON
30. Affected engine FUEL CONTROL..... RUN
31. Affected engine START/CRANK .....PRESS
32. Engine parameters and starting sequence ..... MONITOR

If re-start is successful, continue to step 35 (D - AFTER START).

If re-start is unsuccessful (No N_2, no ITT rise indication) within 50 seconds after start:

33. Engine FUEL CONTROL .....OFF
34. Attempt another air-start or refer to ENGINE SHUTDOWN IN FLIGHT, Page II-57

D. AFTER START

CAUTION

IF CONDITIONS PERMIT, MAINTAIN RE-STARTED ENGINE AT IDLE FOR ONE (1) MINUTE.

35. Restarted engine thrust lever ..... ADVANCE AS REQUIRED
36. ISOLATION valve..... CLOSE
37. Affected ENG BLEED ..... ON
38. Affected engine GEN ..... ON
39. APU BLEED ..... OFF
40. Affected engine FUEL STBY PUMP ON..... OFF
41. Affected engine FUEL STBY PUMP OFF/ARM ... NOT ARM THEN ARM
42. Affected engine HYD EMP..... VERIFY OFF AND ARM
43. Fuel balance ..... MONITOR
44. APU..... AS REQUIRED

<<END>>

SINGLE-ENGINE APPROACH AND LANDING

NOTE

The auto-throttle disengages. It is possible to re-engage and use the auto-throttle during single engine operations.

1. Affected side HYDRAULIC EMP ..... VERIFY ON

Before Descent:

2. Fuel quantity and balance ..... CHECK
3. WING and ENG ANTI-ICE ..... AS REQUIRED
4. ATIS ..... RECEIVED
5. FMS ..... ARRIVAL AND APPROACH SET
6. MDA / DA ..... SET
7. Landing data ..... COMPUTE AND SET
8. V_{REF} ..... SET
   For Flaps 20° landing performance see Figure 5-289
9. Approach briefing ..... COMPLETE

Descent transition:

10. Altimeters ..... SET
11. Landing field elevation ..... CONFIRM
12. Engine Instruments ..... MONITOR
13. CPCS ..... MONITOR
14. Cockpit / cabin / EXT LTS ..... AS REQUIRED

(Continued)

Before landing:

15. Autobrakes ..... AS REQUIRED
16. Flaps ..... 20°
17. Landing gear ..... DOWN / 3 GREEN
18. TAWS FLAP OVRD ..... ON
19. Approach speed ..... V_{REF} FOR 20° FLAPS + 5 KT
20. EXT LTS ..... AS REQUIRED

After landing:

21. Reverse thrust ..... AS REQUIRED ON AVAILABLE ENGINE
22. If required, see EMERGENCY EVACUATION, Page II-87

<<END>>

SINGLE ENGINE GO-AROUND

1. TO/GA button ..... SELECT

NOTE

The A/T system, if engaged, automatically advances to T/O thrust, and the autopilot, if engaged, will remain engaged and execute an automatic go-around. Target speed selection is based upon flap handle position (AUTO mode) or speed bug (MAN mode). Missed approach is activated on FMS and NAV source automatically swaps to FMS if automatic swap from FMS to NAV occurred at beginning of the approach.

2. Thrust lever .....MAXIMUM THRUST (VERIFY APR); press APR pushbutton if required
3. Airspeed ..... V_{REF}
4. Flaps ..... 20°

Once go-around attitude and positive rate of climb are established:

5. Landing gear ..... RETRACT

At safe altitude:

6. Airspeed ..... V_{REF}+20 KT
7. Flaps ..... UP
8. Airspeed ..... V_{REF}+30 KT
9. Thrust ..... AS REQUIRED

NOTE

APR thrust may be maintained for 10 minutes during single-engine operations as needed. Thrust should then be reduced to CLB thrust.

<<END>>

DUAL ENGINE FAILURE

Engine Fail (C), L-R warning message indicates that both engines have flamed-out and are inoperative.

1. Divert to the nearest suitable landing site
2. Crew oxygen masks..... DON, 100%
3. Crew communication .....ESTABLISH
4. Passenger oxygen masks..... SELECT BYPASS

NOTE

With both engines out, there is a diminished hydraulic power to the flight controls. Use STAB trim as necessary to maintain required airspeed.

5. Airspeed..... V_{MO} / 0.77M_i UNTIL WITHIN AIR START ENVELOPE AND CAB ALT BELOW 15,000 FT;
   See Figure 2-3., Engine Start Envelope, Page II-60

CAUTION

1. DUTCH ROLL MAY DEVELOP ABOVE 25,000 FT / 250 KCAS / 0.70 M_i. COUNTER ACT USING CONTROL WHEEL. IF HYDRAULIC IS RESTORED - VERIFY YAW DAMPER ENGAGED.
2. MACH TRIM IS INOPERATIVE. MAINTAIN BELOW 0.77 M_i.

6. Inhibit R CDU tuning ..... SMC-UTIL-TUNE REV - R CDU
7. Transponder.....SELECT ATC 2, SET 7700
8. ATC ..... DECLARE EMERGENCY
9. Both HYDRAULIC EMP ..... OFF AND NOT ARM
10. Both Engine GEN..... OFF
11. Both ENG BLEED ..... OFF

(Continued)

12. If engines remains failed:
    a. Engine FUEL CONTROL .....OFF
    b. Both fuel STBY PUMPS..... OFF AND NOT ARM

CAUTION

THE FOLLOWING APPLY FOR BATTERY - ONLY OPERATION:

- USE OF BOTH FUEL STBY PUMPS IS LIMITED TO 11 MINUTES.
- USE OF SINGLE HYDRAULIC EMP IS LIMITED TO 4 MINUTES.
- USE OF PROBE HEAT (OVRD) IS LIMITED TO 7 MINUTES.

NOTE

If during the procedure one generator becomes operative - no time restriction for FUEL STBY PUMPs and HYDRAULIC EMPs.

13. Consider APU Start (Below 35,000)

CAUTION

PERFORM A MAXIMUM OF 3 APU START ATTEMPTS. ADDITIONAL ATTEMPTS WILL REDUCE BATTERY-ONLY OPERATING TIME.

14. If APU GEN is online:
    a. Both HYDRAULIC EMP .....ON
    b. Yaw damper ..... VERIFY ON

If windmill start is not an option or unsuccessful, and APU unavailable. proceed to step 40

(Continued)

Below 30,000 and altitude permits - accelerate above 250 KCAS, and attempt windmill starts:

15. Airspeed / Altitude ..... 250-320 KCAS / BELOW 30,000 ft
16. Both thrust levers ..... IDLE
17. Both engines FUEL STBY PUMP ..... ON
18. N_2 ..... 8.2% MINIMUM
19. Both engines FUEL CONTROL ..... RUN

CAUTION

IMMEDIATELY ABORT START BY SELECTING THE FUEL CONTROL SWITCH TO OFF IF:

- LIGHT-OFF DOES NOT OCCUR WITHIN 45 SECONDS.
- OIL PRESSURE IS NOT INDICATED BY 30% N_2.
- ITT EXCEEDS LIMITS.
- WAIT 10 SECONDS BEFORE ATTEMPTING ANOTHER START.

NOTE

During windmilling engine start, monitor N_2 constant rise until it stabilizes at idle. Restart may take up to two minutes.

If only one engine started successfully:

20. Engine GEN ..... ON
21. Both HYDRAULIC EMPs ..... ARM
22. ENG BLEED ..... ON
23. Start second engine, using cross bleed air start; perform ENGINE RESTART IN FLIGHT, Page II-59

(Continued)

If Both engine started successfully:

24. Both engines GEN .....ON
25. Both HYDRAULIC EMPs .....ARM
26. Both FUEL STBY PUMPs .....OFF AND ARM
27. Both ENG BLEED .....ON
28. APU BLEED .....OFF
29. Land at nearest suitable airport.

If engines start was unsuccessful and APU is running - below 15,000 ft. perform APU starter-assisted air start:

First engine:

30. Fuel STBY PUMP.....ON
31. Engine FUEL CONTROL .....RUN
32. Engine START/CRANK.....PRESS
33. Engine Parameters .....MONITOR

If engine restart is successful:

34. Engine GEN .....ON
35. Both HYDRAULIC EMPs .....ARM
36. ENG BLEED .....ON
37. Start second engine, using cross bleed air start; perform ENGINE RESTART IN FLIGHT, Page II-59

If restart of BOTH engines is unsuccessful:

38. Maintain best glide speed .....160 KCAS FOR 27,000 LB GW
    ADD 3 KT FOR EVERY 1000 LB
39. Both engines FUEL CONTROL.....OFF
40. Both fuel STBY PUMPS.....OFF
    (LEAVE R FUEL STBY PUMP ON IF APU OPERATING)
41. BOTH HYDRAULIC EMP.....OFF

NOTE

If APU GEN is online, leave EMPs on.

42. Perform DUAL ENGINE FAILURE EMERGENCY LANDING, Page II-73

<<END>>

DUAL ENGINE FAILURE EMERGENCY LANDING

Use this procedure only if no option to perform an air start. Otherwise see DUAL ENGINE FAILURE, Page II-69.

1. Airspeed ..... 160 KCAS FOR 27,000 LB GROSS WEIGHT; ADD 3 KT FOR EVERY 1000 LB
2. ATC ..... NOTIFY

If ditching is to be performed – see DITCHING, page II-85

3. Diversion ..... SELECT SUITABLE SITE
4. EMER BUS ..... BATT ON

NOTE

Windmilling N_2 rpm as low as 6% provides sufficient flight control power for safe flight. If engine(s) was shut down using the FIRE handle, it is necessary to reset the handle to restore hydraulic power. Prior to resetting the FIRE handle, the associated FUEL CONTROL switch must be OFF to prevent fuel from being introduced into the engine.

5. Passengers ..... BRIEFED and PREPARED
6. CAS aural messages ..... INHIBIT IF DESIRED (SMC - TEST)
7. Field ELEV ..... SET 8000 ft (SMC-UTIL-CPCS-MAN)

(Continued)

Reference flameout landing pattern figure below for target altitudes, airspeeds and flaps settings.

8. Enter landing pattern ..... ESTABLISH 3,000 ft AGL DIRECTLY ABOVE INTENDED POINT OF TOUCHDOWN

NOTE

Perform 180 degree turns using 30 degree bank angle.

CAUTION

IF APU GEN IS FAILED OR INOPERATIVE - OPERATING L EMP LONGER THAN REQUIRED WILL DECREASE BATTERY POWER.
FLAPS EXTENSION TIME IS DOUBLED DUE TO LOAD SHEDDING LOGIC OF THE FLAPS CONTROLLER. EXPECT 60 SECONDS FROM ZERO (0) FLAPS TO LND POSITION.

9. L HYDRAULIC EMP ..... ON; EXTEND FLAPS: OFF

NOTE

If APU GEN is online, leave EMP on.

10. R HYDRAULIC EMP ..... ON; EXTEND LG; OFF

NOTE

If APU GEN is online, leave EMP on.

(Continued)

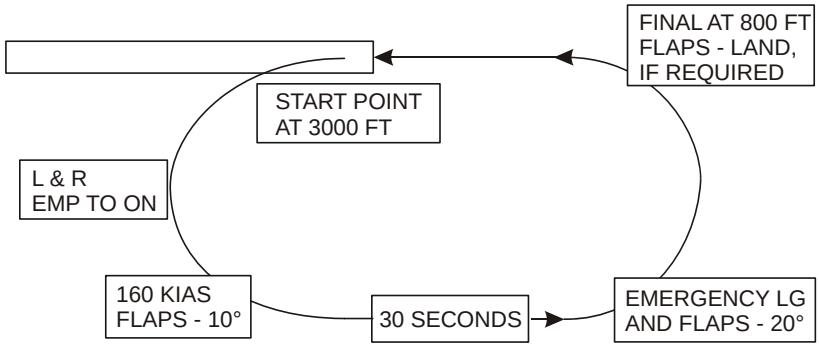
If emergency landing gear extension is not required, proceed to step 12

11. Landing gear ..... EMERGENCY EXTENSION BEFORE TURNING TO FINAL
    a. Landing Gear Lever ..... DOWN
    b. EMERGENCY GEAR DOWN Handle ... RELEASE, TURN AND LIFT
12. Landing Gear ..... VERIFY DOWN / 3 GREEN
13. Airspeed ..... V_{REF} + 10 KT
14. R HYDRAULIC EMP ..... VERIFY ON HYDRAULIC PRESSURE FOR NWS AND WHEEL BRAKES
15. Plan to touchdown within first third of runway.

After Touch-Down:

16. Wheel brakes ..... APPLY AS REQUIRED
17. Perform EMERGENCY EVACUATION, Page II-87

Flameout landing pattern:



<<END>>

ENGINE OIL PRESSURE LOW

If ENG Oil PRESS Low, L, ENG Oil PRESS Low, R or ENG Oil PRESS Low, L-R warning message indicates that oil pressure is below limit.

1. Affected engine thrust lever ..... IDLE
2. Affected engine oil temperature ..... MONITOR

If message goes out and oil pressure and temperature are within limits:

3. Land at nearest suitable airport
4. See SINGLE-ENGINE APPROACH AND LANDING, page II-66

If the message does not go out or indicated oil pressure is below limits or indicated oil temperature is high:

5. Affected Engine..... SHUTDOWN; see ENGINE SHUTDOWN IN FLIGHT, page II-57

CAUTION

ONCE AN ENGINE HAS BEEN SHUT DOWN DUE TO LOW OIL PRESSURE, IT SHOULD NOT BE RESTARTED.

<<END>>

THRUST REVERSER UNLOCKED OR DEPLOYED DURING TAKEOFF

Thrust REV Unlock, L, Thrust REV Unlock, R or Thrust REV Unlock, L-R warning message indicates that a thrust reverser is unsafe or deployed in flight.

Below V_1:

1. Abort takeoff

Above V_1:

2. Affected engine thrust lever ..... IDLE
3. Affected thrust reverser lever ..... VERIFY STOWED
4. Unaffected engine thrust ..... APR / VERIFY APR ON
5. Auto-throttles ..... DISCONNECT
6. At V_R ..... ROTATE
7. Positive rate ..... GEAR UP
8. Airspeed ..... DO NOT EXCEED 200 KCAS

If message does not go out or other indications of thrust reverser deployment are present (buffeting, excessive pitch, roll, yaw), T/R buckets are believed to be actually deployed.

CAUTION

1. IN ANY SITUATION WHERE A REVERSER DOES NOT STOW, THE AFFECTED ENGINE SHOULD BE SHUT DOWN ONLY IF REQUIRED TO MAINTAIN LEVEL FLIGHT AND ABOVE 400FT AGL ONLY.
   UNDER CERTAIN GROSS WEIGHT AND ATMOSPHERIC CONDITIONS, A SUCCESSFUL GO-AROUND MAY NOT BE POSSIBLE.

(Continued)

9. Affected engine ..... IDENTIFY AND CONFIRM
10. Affected thrust lever ..... IDLE
11. Affected engine FUEL CONTROL..... OFF
12. Affected ENG BLEED ..... OFF
13. LAND AS SOON AS POSSIBLE
14. PERFORM LANDING WITH THRUST REVERSER DEPLOYED, page II-81

<<END>>

THRUST REVERSER UNLOCKED OR DEPLOYED IN FLIGHT

Thrust REV Unlock, L, Thrust REV Unlock, R or Thrust REV Unlock, L-R warning message indicates that a thrust reverser is unsafe or deployed in flight.

1. Affected engine thrust lever ..... IDLE
2. Thrust reverser levers ..... VERIFY STOWED
3. Auto-throttles..... DISCONNECT
4. Airspeed..... BELOW 200 KCAS
5. Flaps .....LIMIT TO 20°
6. Calculate landing performance according to APPROACH AND LANDING - ABNORMAL FLAP SETTINGS

Flaps position	Performance figures: Landing Weight Limitation / V_{REF} / Actual Landing Distance
0°	Figure 5-297
10°	Figure 5-293
20°	Figure 5-289

7. TAWS/FLAPS OVRD .....ON

If failure clears:

8. Land at nearest suitable airport
9. Thrust reversers.....DO NOT USE

(Continued)

If message does not go out or other indications of thrust reverser deployment are present (buffeting, excessive pitch, roll, yaw), T/R buckets are believed to be actually deployed.

CAUTION

1. IN ANY SITUATION WHERE A REVERSER DOES NOT STOW, THE AFFECTED ENGINE SHOULD BE SHUT DOWN ONLY IF REQUIRED TO MAINTAIN LEVEL FLIGHT AND ABOVE 400FT AGL ONLY.
   UNDER CERTAIN GROSS WEIGHT AND ATMOSPHERIC CONDITIONS, A SUCCESSFUL GO-AROUND MAY NOT BE POSSIBLE.

10. Affected engine ..... IDENTIFY AND CONFIRM
11. Affected thrust lever ..... IDLE
12. Affected engine FUEL CONTROL..... OFF
13. Affected ENG BLEED ..... OFF
14. LAND AS SOON AS POSSIBLE
15. PERFORM LANDING WITH THRUST REVERSER DEPLOYED, page II-81

<<END>>

LANDING WITH THRUST REVERSER DEPLOYED

Thrust REV Unlock, L, Thrust REV Unlock, R or Thrust REV Unlock, L-R warning message indicates that a thrust reverser is unsafe or deployed in flight.

NOTE

Prefer to land with a crosswind from the unaffected side.

Before landing:

1. PARK BRAKE ..... OFF
2. Auto-brakes ..... HIGH
3. Flaps ..... 20°
4. Calculate landing performance according to APPROACH AND LANDING - ABNORMAL FLAP SETTINGS

Flaps position	Performance figures: Landing Weight Limitation / V_{REF} / Actual Landing Distance
0°	Figure 5-297
10°	Figure 5-293
20°	Figure 5-289

5. Landing gear ..... DOWN / 3 GREEN
6. Airspeed ..... V_{REF} FOR FLAPS - 20°, + 5 KT
7. Autopilot ..... DISCONNECT

After touch down and aircraft nose lowered:

8. Wheel brakes ..... AS REQUIRED
9. Available engine thrust reverser ..... USE AT IDLE

<<END>>

MISCELLANEOUS

IMMEDIATE RETURN FOR LANDING

If an immediate return to the departure airport is required for any reason, the landing should be accomplished using 39° flaps (if available) and the longest runway available.

NOTE

If less than 39° flaps are to be used for landing, the flight crew should consider runway length requirements, brake energy requirements and tire speed limitations. If there is any doubt, the flight crew should consider diversion to an airport with a longer runway or delaying landing until a lower landing weight is attained. Use fuel jettison as practicable,

1. Runway .....USE LONGEST AVAILABLE

If landing with flaps less than 39°:

2. TAWS FLAP OVRD.....ON
3. Final approach speed..... V_{REF} + 5 KT
4. Touchdown .....FIRST 1000 FT OF RUNWAY
5. Sink rate / crab angle ..... MINIMIZE PRIOR TO TOUCHDOWN
6. Reverse thrust..... USE MAXIMUM AVAILABLE PRIOR TO USING BRAKES
7. Brakes temperature..... MONITOR

NOTE

Log for maintenance if overweight landing was performed.

<<END>>

FORCED LANDING OVER LAND

Preparations:

1. Communication ..... "MAYDAY" X 3
2. Transponder 7700
3. ATC 2 ..... SELECT (CDU - TUNE - ATC/TCAS PAGE)
4. ELT switch ..... ON
5. FUEL JETTISON ..... USE TO REDUCE TO MINIMUM WEIGHT
6. Passengers ..... BRIEFED AND PREPARED
7. Cabin luggage ..... SECURED
8. Seat belts, shoulder harnesses ..... FASTENED
9. Both ENG BLEED ..... OFF BELOW 13,000 FT
10. Field ELEV ..... SET 8000 ft (SMC-UTIL-CPCS-MAN)
11. TAWS/FLAPS OVRD ..... ON
12. TAWS/VOICE OVRD ..... ON
13. TERR INIHIBIT ..... PRESS
14. CAS aural messages ..... INHIBIT IF DESIRED (SMC - TEST)

Approach:

15. EMER LTS ..... ON
16. CPCS DUMP ..... SELECT BELOW 2000 FT
17. FUEL JETTISON ..... OFF
18. Landing gear ..... AS DESIRED
    (based on available landing surface)
19. Flaps ..... LND
20. Airspeed bug ..... V_{REF}

Final:

21. Final approach ..... TOWARDS FLAT TERRAIN
22. Descent rate ..... APPROXIMATELY 200 FT PER MINUTE
23. Touchdown ..... NOSE UP SLIGHTLY, MINIMUM FORWARD SPEED AND MINIMUM SINK RATE. WINGS LEVELED

After airplane has stopped:

24. APU Master ..... OFF
25. Both Fuel Controls ..... OFF
26. Both Fire Handles ..... PULL
27. Both BATT ..... OFF

28. STBY BATT ..... OFF
29. Emergency escape window ..... OPEN
30. Main entry door ..... AS REQUIRED
31. Passengers evacuation ..... INITIATE

<<END>>

DITCHING

Preparations:

1. Communication ..... "MAYDAY" X 3
2. Transponder 7700
3. ATC 2 ..... SELECT (CDU - TUNE - ATC/TCAS PAGE)
4. ELT switch ..... ON
5. FUEL JETTISON..... USE TO REDUCE TO MINIMUM WEIGHT
6. Passengers ..... BRIEFED AND PREPARED
7. Cabin luggage ..... SECURED
8. Life vests, shoulder harness ..... FASTENED

WARNING

INFLATE LIFE-VESTS ONLY AFTER EXITING AIRCRAFT.

9. Both ENG BLEED ..... OFF BELOW 13,000 FT
10. Field ELEV ..... SET 8000 ft (SMC-UTIL-CPCS-MAN)
11. TAWS/FLAPS OVRD ..... ON
12. TAWS/VOICE OVRD ..... ON
13. TERR INIHIBIT ..... PRESS
14. CAS aural messages ..... INHIBIT IF DESIRED (SMC - TEST)

Approach:

15. EMER LTS ..... ON
16. DITCH ..... SELECT BELOW 2000 FT
17. FUEL JETTISON..... OFF
18. Landing gear ..... UP
19. Flaps ..... LND
20. Airspeed bug ..... V_{REF}

Final:

21. Final approach ..... PARALLEL TO SWELL
22. Descent rate..... APPROXIMATELY 200 FT PER MINUTE
23. Touchdown..... NOSE UP SLIGHTLY, MINIMUM FORWARD SPEED AND MINIMUM SINK RATE. WINGS LEVELED

(Continued)

After Ditching:

24. Both fire handles ..... PULL

CREW DUTIES DURING DITCHING:

TRAINED CABIN CREWMEMBER (IF ABOARD)

1. If time permits, gather first aid kit, blankets, food, garbage bags, etc., to supply life rafts.
2. Retrieve all Life Rafts from stowed positions.
3. Secure life raft mooring lines to fastened seat belts near the emergency exit.

When directed by the Captain:

4. Follow mooring line to board Life Raft..
5. Direct evacuation from inside airplane. Assist passengers.

FIRST OFFICER

1. Emergency Locator Transmitter (ELT) .....ON
2. Life Rafts ..... REMOVE FROM STOWED POSITION
   Tie life raft mooring line to a fastened seat belt at emergency exit..
3. Emergency Exit Window ..... REMOVE AND DEPLOY LIFE RAFT OUT WINDOW
4. Follow mooring line to board Life Raft.
5. Direct and assist passengers with following mooring lines to board Life Rafts.

CAPTAIN

1. Any remaining life rafts..... REMOVE FROM STOWED POSITION
   Tie life raft mooring line to fastened seat belt at emergency exit.
2. Emergency Exit Window (if still closed) .. REMOVE AND DEPLOY LIFE RAFT OUT WINDOW
3. Direct passengers to follow mooring line to Life Rafts.
4. Verify all passengers have disembarked the airplane prior to boarding the Life Raft.

<<END>>

EMERGENCY EVACUATION

1. ATC ..... ADVISE
2. PARK BRAKE ..... SET
3. Speed brake..... VERIFY RETRACTED
4. Both FUEL CONTROL ..... OFF
5. APU MASTER (If running) ..... OFF
6. EMER LTS ..... ON
7. Main entrance door / emergency exit ..... OPEN AS REQUIRED

If engine fire is suspected:

8. Both fire handles ..... PULL
9. Affected engine fire handles ..... ROTATE FULLY TO DISCH 1 / DISCH 2

NOTE

To discharge fire bottles into both engines, rotate both handles in the same direction (either both left or both right).

10. Both BATTs ..... OFF
11. STBY BATT ..... OFF
12. Passengers evacuation..... INITIATE

If engine fire is not suspected:

13. Both BATT ..... OFF
14. STBY BATT ..... OFF
15. Passengers evacuation..... INITIATE

<<END>>

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EICAS CAUTION MESSAGES

Following is a ready-reference guide which briefly outlines the message meaning and action to be taken when a message comes on. It also refers to subject, section and page where more detailed information and procedures are found.

Procedures are grouped by actions. There can be separate procedures for Left (L) system failure, Right (R) system failure and both (L-R) systems failure, or one procedure for both left or right or both system failure as follows:
L/R - (L) or (R)
L-R - (L and R)
L/R/L-R - (L) or (R) or (L and R)

COLLECTOR CAS MESSAGE

If a major failure causes failures of other systems, in order to minimize crew workload and direct the crew to the exact identification of the main failure, it will be marked with (C) as for a collector CAS message. When a collector CAS come on, it may have SA (situational awareness) CAS associated below it in the EICAS window. The collector procedure is designed to take the crew through all action down to landing and include implications of masked and SA CAS message.

SA (SITUATIONAL AWARENESS) CAS MESSAGE

When a collector CAS message comes on, most of the failures that are caused or derived from this failure are masked. Failures that are regarded as important for crew situational awareness will be marked with a caret (**>**) on its left and have no associated checklist box. These SA CAS messages are intended to notify the crew that the collector failure causes a degradation in: flight envelope, pressurization control, environmental control, flight and ground control, and loss of annunciation or alert capabilities.

(Continued)

NOTE

1. Takeoff is prohibited unless relief for the Caution CAS message is provided by an approved MEL.
2. MASTER CAUTION lights (pilot and copilot) illuminate when any caution (amber) message is initially displayed.
3. When any message comes on, check appropriate switches and circuit breakers.
4. Some caution messages are automatically inhibited from 80 kt on takeoff, and some are inhibited automatically from thrust lever above 70% N_1. The inhibit function ends when aircraft passes 400 ft AGL or 30 seconds after liftoff.
5. Messages having ◄ symbol are accompanied by aural alert.

The action part of a step is defined as the system status (i.e. ON, OFF, MAN, AUTO) followed by the physical switch or pushbutton position in parenthesis (i.e. IN, OUT).

GENERAL GUIDANCE

Should any abnormal event occur, the following shall apply:

- Maintain control of the airplane
- Other than retracting the landing gear and silencing aural warnings, take no action until above 400 ft AGL.
- If a warning (red) or caution (amber) CAS message occurs between the FAF and the runway, the crew should consider a go around to allow time to read and perform the appropriate procedure prior to landing unless conditions dictate otherwise.
- Resetting tripped circuit breakers or cycling circuit breakers to recover or reboot systems should be done only if the system is required for continued safe flight and landing, and if required by the emergency or abnormal procedure.

Landing urgency consideration:

Land as soon as possible – Land without delay where a safe approach and landing is assured.

Land at nearest suitable airport – Extended flight beyond the nearest approved airport is not recommended.

Land as soon as practicable – The landing site and duration of the flight are at the discretion of the pilot.

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
A/T 1-2 Fail	Both autothrottles have failed	Control throttles manually
A/T 1-2 Fail-TQA	Throttle Quadrant Assembly does not respond to autothrottle commands	1. Control throttles manually 2. Check TQA CB (O1)
A/T Retard Inhibit	Autothrottle retard function is not available	***If dual Radar ALT installation:*** 1. RADALT - REVERT TO OTHER SYSTEM OR COUPLE TO OPERATING SIDE. (SMC- SNSR- AFCS) ***If failure persist or single RADALT installation:*** 2. At 100 ft AGL - DISCONNECT AUTOTHROTTLE 3. Retard thrust levers as required
ACP 1-2 Fail ACP 1-2-3 Fail	Indicated Audio Control Panel (ACP) has failed	Select emergency mode (EMER) **NOTE:** Selecting EMER mode on the AOP connects directly to the on-side VHF only

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
ACS Air Flow Low	Low flow condition detected in pack	1. Thrust - INCREASE ***If message persists:*** 2. ALTN PRESS - ON NOTE: PACK valve will close automatically 3. See ALTERNATE PRESSURIZATION OPERATION, Page IIIA-91
ACS Fail	Air Conditioning System (ACS) has failed	1. ECS synoptic - DISPLAY 2. GADC 2 cb (K8) - CYCLE 3. ALTN PRESS - ON 4. Continue with ALTERNATE PRESSURIZATION OPERATION, Page IIIA-91
ACS Pack TEMP Low	Pack temperature is below 30°F for 1 minute	See ACS PACK TEMPERATURE LOW, Page IIIA-239
ACS Pack Turbine Hot	Pack outlet is above 160°F or compressor outlet is above 450°F for more than 2 seconds	1. ALTN PRESS - ON **NOTE:** PACK Valve will close automatically 2. ECS synoptic - MONITOR 3. See ALTERNATE PRESSURIZATION OPERATION, Page IIIA-91

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
ADC 1 Fail ADC 2 Fail	Air Data Computer (ADC) has failed (on ground)	***On ground:*** Do not dispatch ***In flight:*** Confirm switch over to cross-side ADC
ADC 1-2 Fail	Air Data Computers (ADC) have failed	***On ground:*** Do not dispatch ***In flight:*** See DUAL ADC FAILURE, Page IIIA-221
ADS 1 Probe Heat Fail ADS 2 Probe Heat Fail ADS 1-2 Probe Heat FL	Indicated pitot tube heater elements failed	See PROBE HEAT FAILURE, Page IIIA-191
ADS-B Out Fail	Transponders are unable to transmit ADS-B OUT information to ground control	Advise ATC of ADS-B failure.

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
AFCS Disconnect Bar	Automatic flight control system function disabled by FCP disconnect bar	1. AFCS DISCON bar position - VERIFY NOTE: AT, AP, YD, mach trim and Stick Pusher are inoperative ***If failure persists:*** 2. Aircraft - DESCEND BELOW 25,000 ft / 250 KCAS / 0.70 M
AFT Radio Rack Hot, R	Right aft radio rack temperature overheats	See RIGHT AFT RADIO RACK HOT, Page II-43
AHS 1 Fail AHS 2 Fail AHS 3 Fail	Indicated AHRS has suffered critical failure on ground	1. Re-enter Present Position to FMS (CDU-INDEX-POS INIT) NOTE: AP and AHS should revert automatically to cross side. 2. AFCS and AHS reversion - VERIFY 3. If AHRS 3 available - SELECT FOR FAILED SIDE (SMC-SNSR) 4. See MMEL

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
AHS 1 Excessive Motion AHS 2 Excessive Motion AHS 3 Excessive Motion AHS 1-2 Excessive Motion AHS 1-3 Excessive Motion AHS 2-3 Excessive Motion AHS Excessive Motion	Ground only: When the AHRS or IRS was undergoing stationary alignment, an excessive motion condition was detected	Taxi below 30 KT until alignment completes NOTE: If the motion continues and GPS groundspeed exceeds 30 kt, the AHS or IRS automatically transition to align in motion
AHS 1-2 Fail AHS 1-2-3 Fail	Indicated AHRS have suffered critical failure	1. Re-enter Present Position to FMS (CDU-INDEX-POS INIT) 2. If AHRS 3 available -.SELECT (SMC-SNSR) ***If AHRS 3 not available:*** 3. Continue with DUAL AHS FAILURE, Page IIIA-228

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
AHS 1-3 Fail AHS 2-3 Fail	Indicated AHRS critical failure has occurred	1. Re-enter Present Position to FMS (CDU-INDEX-POS INIT) 2. Verify valid AHS is selected (SMC-SNSR) 3. Failed AHS cb's - CYCLE NOTE: AHS 1 Cb's - M6, M9 AHS 2 Cb's - M5, M15 AHS 3 Cb's - M4, M14 4. Continue with AHS ALIGNMENT IN FLIGHT, Page IIIA-233
AIL Mistrim ROL Left	Autopilot aileron trim out of left trim	1. Autopilot - DISENGAGE 2. Ailerons - TRIM LEFT 3. Autopilot - ENGAGE
AIL Mistrim ROL Right	Autopilot aileron trim out of right trim	1. Autopilot - DISENGAGE 2. Ailerons - TRIM RIGHT 3. Autopilot - ENGAGE
Aileron Trim Fail	Aileron trim actuator has failed	1. AILERON TRIM cb (F5) - CYCLE 2. Monitor fuel imbalance
Airstairs SOV Open	Airstairs shutoff valve is not fully closed. Door cannot be opened	1. Do not taxi. Wait 60 seconds ***If failure persists:*** 2. Left Engine - SHUT DOWN 3. Left hydraulic EMP - OFF 4. Maintenance action required

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Alternate Flaps Fail	Flaps alternate channel is not available, or alternate channel was selected and flaps have not achieved flaps lever commanded position for 30 seconds	***If primary flaps are usable:*** 1. ALTN FLAPS - OFF ***If primary flaps are not usable:*** 2. Move lever to previous detent (verify in detent position), then move to desired position ***If failure persists:*** 3. See ABNORMAL FLAPS CONFIGURATION LANDING, Page IIIA-147
Alternate STAB Arm	Alternate stabilizer trim channel is selected	1. ALTN STAB - AS REQUIRED 2. Airspeed - BELOW 270 KCAS / 0.80M_i
Alternate STAB Fail	Alternate channel has failed	***If PRIM STAB cannot be reselected:*** PerformJAMMED HORIZONTAL STABILIZER, Page IIIA-140
ALTN PRESS Fail Close	Alternate pressurization valve failed closed	***If ALTN BLEED is needed and no other bleed source are available:*** Perform CABIN UNDERPRESSURIZATION, Page II-18

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
ALTN PRESS Fail Open	Alternate pressurization valve failed open	***If ALTN BLEED is not required:*** 1. L ENG BLEED - VERIFY ON 2. R ENG BLEED - OFF 3. ISOLATION valve - VERIFY CLOSED 4. ECS synoptic - MONITOR
ALTN PRESS Selected	Alternate pressurization selected ON	See ALTERNATE PRESSURIZATION OPERATION, Page IIIA-91
Anti-skid Fail	Loss of more than one wheel speed transducer. Braking system operates without Anti skid protection.	See ANTI-SKID FAILURE, Page IIIA-196
AOA Miscompare	Angle Of Attack (AOA) indications have gross miscompare. NOTE: This message may occur during high side slip maneuvers and crosswind landings. Message is inhibited on ground	See AOA (ANGLE OF ATTACK) MISCOMPARE, Page IIIA-217

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
AOA Probe Fail, L AOA Probe Fail, R	AOA probe sensor failed (on ground)	Do not dispatch
AOA Probe Fail, L-R	Both AOA probe sensors failed	***On ground*** Do not dispatch ***In air*** Proceed to AOA (ANGLE OF ATTACK) MISCOMPARE, Page IIIA-217
AP 1-2 Fail	Both autopilot (AP) systems have failed	See AUTOPILOT FAILURE, Page IIIA-93 **NOTE**: In case of erratic airspeed indications of two or three airspeed indicators, proceed to UNRELIABLE AIRSPEED INDICATION, Page IIIA-218
AP 1-2 Fail - AIL SRVO	Aileron servo failure. Autopilot unavailable	See AUTOPILOT FAILURE, Page IIIA-93 **NOTE**: In case of erratic airspeed indications of two or three airspeed indicators, proceed to UNRELIABLE AIRSPEED INDICATION, Page IIIA-218

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
AP 1-2 Fail - ELEV SRVO	Elevator servo failure. Autopilot unavailable	See AUTOPILOT FAILURE, Page IIIA-93 **NOTE**: In case of erratic airspeed indications of two or three airspeed indicators, proceed to UNRELIABLE AIRSPEED INDICATION, Page IIIA-218
AP 1-2 Fail - FCP	FCP failure. Autopilot unavailable	1. TAKE MANUAL CONTROL OF AIRCRAFT 2. Descend below 25,000 ft / 250 KCAS /0.70Mi 3. FCP A and B cb's (P1, P11) - CYCLE ***If failure persists:*** 4. Proceed to AUTOPILOT FAILURE, Page IIIA-93. 5. ATC - ADVISE (UNABLE RVSM) NOTE: 1. AP, YD, MT and SP are unavailable 2. BARO correction - SELECT VIA HSI MENU - BARO SET

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
AP Roll Axis Only (C)	A double hydraulic failure has occurred and the autopilot is operating but is only able to provide control in the roll axis	***If yaw damper inoperative:*** 1. Engage autopilot in order to minimize dutch roll 2. Descend to altitude of 25,000 ft / 250 KCAS / 0.70M_i or below 3. Use STAB trim for pitch control (STAB trim will not disengage AP in this mode) NOTE: Autopilot in this mode will not disconnect for Stick shaker event.
AP STAB Trim Fail	STAB trim did not respond to autopilot trim command	1. Mach trim is inoperative - MAINTAIN BELOW 0.77 M 2. See AUTOPILOT FAILURE, page IIIA-93
APM Miscompare	APM (Aircraft Personality Module) settings are mismatched	Maintenance action is required before dispatch
APU Bleed Loop Fail	Failure of one or both bleed loop sensors in the APU bleed leak detection zone	Do not operate APU unless essential
APU Bleed Valve Open	APU load control valve failed to close	1. APU BLEED - ON then OFF ***If failure persists:*** 2. APU - SHUT DOWN

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
APU Door Fail Open	APU door indicates it is open when commanded to close	APU MASTER - Cycle ON; wait for APU Ready advisory message; then OFF NOTE: In case of a miscompare between the CAS message and the synoptic page, act according to the CAS message
APU Essential	APU operating in flight, and an essential mode fault is detected	See APU FAILURES, Page IIIA-242
APU Exceedance	APU RPM or EGT exceedance	See APU EXCEEDANCE, Page IIIA-240
APU Fail	Automatic APU protective shutdown was performed	***When APU RPM less than 5%:*** 1. APU MASTER - OFF ***If no other abnormal indications are present and APU is required:*** 2. Attempt another start
APU Fire Loop Fail	Both loops of the APU fire detection system have failed	Do not operate APU unless essential.

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
APU Fuel SOV Fail	APU fuel shutoff valve failed or not in commanded position or valve data invalid	See APU FUEL SOV FAILURE, Page IIIA-241
APU GCU Fail	APU generator control unit has failed	1. ELECTRICAL synoptic - DISPLAY 2. Electrical RESET - PRESS ***If failure persists:*** 3. APU GCU cb (B19) - RESET (wait 10 seconds between pull and reset) 4. Electrical RESET - PRESS ***If message persists:*** 5. APU GEN - OFF
APU GEN Overload	APU electrical load is exceeded	1. ELECTRICAL synoptic - DISPLAY ***If APU GEN is necessary:*** 2. Electrical loads - REDUCE (CABIN, GALLEY, 60HZ, R WINDSHIELD HEAT) ***If APU GEN is not required:*** 3. APU GEN - OFF

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
APU Generator Fail	APU generator has failed	1. ELECTRICAL synoptic - DISPLAY 2. Electrical RESET - PRESS ***If failure persists:*** 3. APU GCU cb (B19) - RESET (wait 10 seconds between pull and reset) 4. Electrical RESET - PRESS ***If message persists:*** 5. APU GEN- OFF
APU Oil Pressure Low	APU is in ESSENTIAL mode and low oil pressure has been detected. In NON ESSENTIAL mode (on ground) APU automatically shuts down	See APU FAILURES, Page IIIA-242
APU Oil TEMP High	APU is in essential mode and oil temperature is high. In non essential mode (on the ground) APU automatically shuts down	See APU FAILURES, Page IIIA-242

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
APU Starter Engage	APU starter engaged after scheduled starter drop out RPM	***In flight:*** 1. APU STOP - PRESS ***On ground:*** 1. APU STOP - PRESS 2. EXT PWR - SELECT ON ***if message persists:*** 3. Call maintenance to disconnect right battery
ATC 1 Fail ATC 2 Fail	Indicated transponder is selected and has failed.	Select other transponder
ATC 1-2/TCAS Fail	Indicated transponder and Traffic Alert and Collision Avoidance System (TCAS) have failed	***On ground*** Refer to MMEL ***In air*** Notify ATC about Transponder and TCAS failure
Auto APR Inhibit	Auto APR has disarmed	Auto APR Inhibit - AS REQUIRED
AUTO TEMP Fail-Cabin	Cabin automatic temperature control system has failed	CABIN TEMP CONTROL - MAN
AUTO TEMP Fail-CKPT	Cockpit automatic temperature control has failed	COCKPIT TEMP CONTROL - MAN
Autobrake Fail	Auto brakes are not available	Apply manual braking

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Avionics CONFIG Fault	Invalid Avionics configuration	Check MAINT MGR - system configuration
BAG CMPT PRESS Low	Low pressure in baggage compartment	1. Verify no passengers/crew in baggage compartment 2. Baggage door - VERIFY CLOSED **NOTE:** Once there is a differential pressure between cabin and baggage compartment larger than 0.3 psi - BAG ISO Valve Closed caution message comes on. 3. Descent to maintain DP less than 5.5 psi and cabin altitude less than 7000 ft **CAUTION:** Excessive time with DP above 5.5 psi with no pressurization in baggage compartment may cause structure (bulkhead) deformation.

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
BAG Dump Valve Open	Baggage dump valve is open	1. Verify no passenger is in the baggage compartment 2. Baggage door - VERIFY CLOSED 3. Cabin Altitude - MONITOR **NOTE**: Expect BAG CMPT PRESS Low caution message to come on.
BAG ISO Valve Closed	Baggage isolation valve is closed	**NOTE:** The isolation valve closes when a differential pressure between cabin and baggage compartment is larger than 0.3 psi. 1. Verify no passengers / crew in baggage compartment 2. Internal baggage door - VERIFY CLOSED 3. Cabin altitude - MONITOR ***If*** BAG CMPT PRESS Low ***message comes on:*** 4. Descent to maintain DP less than 5.5 psi and cabin altitude less than 7000 ft **CAUTION:** Excessive time with DP above 5.5 psi with no pressurization in baggage compartment may cause structure (bulkhead) deformation.

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
BAG Smoke DET Fail	Baggage compartment smoke detector has failed	1. Altitude - below 40,000 ft. 2. Keep interior baggage door open
BAS Fail, L-R	Both BLEED AIR Systems (BAS) have failed	See BLEED AIR SYSTEM (BAS) FAILURE, Page IIIA-234
BAS Fail, L BAS Fail, R	Indicated Bleed Air System (BAS) has failed	1. Affected ENG BLEED - CYCLE OFF THEN ON ***If failure persists:*** 2. Affected ENG BLEED - OFF 3. Both WAI - OFF 4. If WAI activation is required - proceed to WING ANTI ICE OPERATION ON SINGLE SOURCE, page IIIA-188
BAS Off, L BAS Off, R BAS Off, L-R	Bleed Air System (BAS) is selected OFF with engine running, parking brake released and APU bleed air not on	1. Indicated ENG BLEED - ON 2. Both WAI - OFF 3. If WAI activation is required - proceed to WING ANTI ICE OPERATION ON SINGLE SOURCE, page IIIA-188

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
BATT Switch Off, L BATT Switch Off, R BATT Switch Off, L-R	Battery or batteries are switched off on ground	Affected BATT - ON
Battery Discharge, L Battery Discharge, R Battery Discharge, L-R	Battery or batteries current is less than -5A	***On ground:*** 1. Check for valid external power ***In flight:*** 1. Electrical synoptic - DISPLAY 2. Land as soon as practicable
Battery Cold, L Battery Cold, R Battery Cold, L-R	Indicated battery temperature is at or below 0°C	***On ground:*** 1. Heat batteries 2. Connect external power 3. Do not start APU when OAT is less than -33°C ***In flight:*** 1. BATT HT cb (A4, A14) - CYCLE; Continue flight

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Battery Fail, L Battery Fail, R Battery Fail, L-R	Indicated BATTERY switch is ON but battery contactor positions are open. Battery voltage is less than 20V or more than 30V	1. Electrical synoptic - VERIFY VOLTAGE ***On ground:*** 2. External power - CONNECT ***In flight:*** 3. Land as soon as practicable CAUTION: IN FLIGHT, IF RIGHT BATT FAILS, APU START IS NOT POSSIBLE.
Battery Hot, L Battery Hot, R Battery Hot, L-R	Battery or batteries temperature is at or above 60°C	1. Indicated BATT - OFF 2. Indicated BATT HT cb (A4/A14) - PULL ***If both batteries are hot:*** 3. Land at nearest suitable airport
Bleed Air Hot, L Bleed Air Hot, R Bleed Air Hot, L-R	Indicated precooler inlet temperature exceeds 750°F, or Indicated precooler outlet temperature exceeds 525°F	See BLEED TEMPERATURE / PRESSURE HIGH, Page IIIA-237

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Bleed Configuration	Both engine bleeds are ON with isolation valve open or APU bleed is ON with at least one engine bleed ON	***If APU is ON:*** 1. APU BLEED AIR - OFF ***If ISOLATION valve is open:*** 2. ISOLATION valve - CLOSE
Bleed Leak CH A Fail	Fire protection controller fault	1. Bleed / anti-ice synoptic - MONITOR 2. Open internal baggage door and fly below 40,000 ft 3. Land as soon as practical
Bleed Leak CH B Fail	Fire protection controller fault	1. Bleed / anti-ice synoptic - MONITOR 2. Land as soon as practical
Bleed Loop Fail, L Bleed Loop Fail, R Bleed Loop Fail, L-R	Bleed air duct sensor has failed	1. Bleed / anti ice synoptic - MONITOR 2. Affected ENG BLEED - OFF 3. If both bleed loops fail - land at nearest suitable airport
Bleed PRESS High, L Bleed PRESS High, R Bleed PRESS High, L-R	Bleed air pressure has exceeded 75 psi	See BLEED TEMPERATURE / PRESSURE HIGH, Page IIIA-237

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Bleed PRESS Low, L Bleed PRESS Low, R Bleed PRESS Low, L-R	Indicated bleed pressures is below 5 psi for more than 10 seconds	See BLEED PRESSURE LOW, Page IIIA-235
Brake CTRL Unit Fail	Both Brake Control Unit (BCU) channels have failed. Brake By Wire is inoperative	See BRAKE CONTROL UNIT FAILURE, Page IIIA-197
Brake Overheat	One or more Brake Temperature Measuring System (BTMS) signals higher than 450°C	See BRAKE OVERHEAT, Page IIIA-194
Brakes Fail,L Brakes Fail, R	Indicated side outboard and inboard braking pedals have failed. Only opposite side pedal braking is available	See NO BRAKING ON ONE STRUT, Page IIIA-199
BTL 1 ENG Squibs Fail	Both squibs of fire bottle 1 have failed	***On ground:*** Do not dispatch ***In flight:*** Do not operate APU unless essential

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
BTL 1 L ENG Squib FL	Left engine squib of fire bottle 1 has failed (on ground only)	Do not dispatch
BTL 1 R ENG Squib FL	Right engine squib of fire bottle 1 has failed (on ground only)	Do not dispatch
BTL 2 APU Squib Fail	APU squib of fire bottle 2 has failed.	***On ground:*** Do not dispatch ***In flight:*** Do not operate APU unless essential
BTL 2 ENG Squibs Fail	Left and right engine squibs of fire bottle 2 have failed	***On ground:*** Do not dispatch ***In flight:*** Do not operate APU unless essential
BTL 2 L ENG Squib FL	Left engine squib of fire bottle 2 has failed (on ground only)	Do not dispatch
BTL 2 R ENG Squib FL	Right engine squib of fire bottle 2 has failed (on ground only)	Do not dispatch

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Cabin Duct TEMP HI	Cabin duct air temperature exceeds 225°F for 10 seconds	1. CABIN TEMP CONTROL - MAN 2. Cabin temperature - REDUCE ***If message persists after 60 seconds:*** 3. Engine thrust - REDUCE 4. If failure persists - Land at the nearest suitable airport
Calibrate RSE	RSE (STBY Instrument Remote Sensor) needs to be calibrated	Do not dispatch
Check Fuel Quantity	Loss of fuel tank quantity indication in any tank	See FUEL MEASUREMENT DEGRADED, Page IIIA-168
Check SMC - Airdata	Miscompare detected between the airspeed or altitude data of the ISI and the PFD	See CHECK SMC AIRDATA, Page IIIA-215

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Check SMC - Attitude	Miscompare detected between the pitch or roll or yaw data of the ISI and PFD	1. Compare ISI against PFDs 2. Decide which display failed ***If ISI is failed (no attitude display):*** 3. See ISI (Integrated Standby Instrument) Failure, Page IIIA-216 ***If PFD Attitude is failed:*** 4. See AHS 1 Fail, Page IIIB-4, AHS 2 Fail, Page IIIB-4 or AHS 3 Fail, Page IIIB-4 (for respective side
Check SMC - Heading	Standby heading has failed or a miscomparison is detected between the standby sensor data of the ISI and the PFD	1. Compare RSE heading against both PFD heading indications ***If RSE heading displayed on the SMC miscompares with PFD heading indications:*** 2. Select Fast Erect for the standby system ***If ISI heading still miscompares after fast erect alignment:*** 3. HSU CB (P14) - PULL 4. Deselect RSE as heading source on ISI menu

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Cockpit Duct TEMP HI	Cockpit duct air temperature exceeds 225°F for 10 seconds	1. COCKPIT TEMP CONTROL - MAN 2. COCKPIT temperature - REDUCE ***If failure persists after 60 seconds:*** 3. Engine thrust - REDUCE ***If failure persists:*** 4. Land at nearest suitable airport
Control Sweep REQD	On ground only, elevator jam monitor test not completed	1. Perform elevator control sweep
CPCS Air Flow Low	Cabin altitude increases when outflow valve is fully closed	1. Engine thrust - INCREASE ***If failure persists:*** 2. ALTN PRESS - ON **NOTE:** Pack valve automatically closes 3. Cabin altitude - MONITOR
CPCS Ditch Selected	PRESSURIZATION DITCH pushbutton is selected	DITCH - AS REQUIRED
CPCS Dump Selected	PRESSURIZATION DUMP pushbutton is selected	DUMP - AS REQUIRED

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
CPCS Fail Select MAN	Cabin automatic pressure control malfunction	See AUTOMATIC CABIN PRESSURIZATION FAILURE, Page IIIA-92
CPCS Manual Mode	Cabin pressurization controller is switched to manual control	CPCS MODE - AS REQUIRED
CPLT BRK PDL Fail	Copilot (right seat) brake controller has failed	Use pilot (left seat) brake pedals only. Auto brakes available
CPLT L BRK PDL Fail CPLT R BRK PDL Fail	Copilot (right seat) indicated brake pedal failure	Use pilot (left seat) brake pedals only. Auto brakes available
CPLT STAB Trim Fail	Copilot stabilizer trim switch has failed	Use pilot (left seat) trim switch
Dataload Switch On	Post MOD G25-10074 Dataload Switch is ON	1. Switch should be in Off position unless for required maintenance. 2. RSE cannot align while switch in on position.
DCU 1 Fail DCU 2 Fail	Indicated DCU has failed	See DCU FAILURE (DATA CONCENTRATION UNIT), Page IIIA-224
DCU 1 Channel A Fail	Post MOD G25-10074 DCU 1 Channel A failed	See DCU CHANNEL FAILURE (DATA CONCENTRATION UNIT), Page IIIA-231

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
DCU 1 Channel B Fail	Post MOD G25-10074 DCU 1 Channel B failed	See DCU CHANNEL FAILURE (DATA CONCENTRATION UNIT), Page IIIA-231
DCU 2 Channel A Fail	Post MOD G25-10074 DCU 2 Channel A failed	See DCU CHANNEL FAILURE (DATA CONCENTRATION UNIT), Page IIIA-231
DCU 2 Channel B Fail	Post MOD G25-10074 DCU 2 Channel B failed	See DCU CHANNEL FAILURE (DATA CONCENTRATION UNIT), Page IIIA-231
DIFF 9.35	Cabin differential pressure has reached 9.35 psi	**NOTE:** High rate of climb may cause short time exceedances in cabin differential pressure. 1. CPCS MODE pushbutton - MAN 2. CABIN ALT selector - CLIMB 3. When below 9.2 psi - AUTO ***If DIFF continues to rise:*** 4. Aircraft Altitude - DESCEND 5. PACK - OFF 6. CABIN altitude - MONITOR

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
DISTR Bus Fail (C), L	Indicated distribution DC bus has failed	See L DISTRIBUTION BUS FAIL,page IIIA-120 **NOTE:** Collector message
DISTR Bus Fail (C), R	Indicated distribution DC bus has failed	See R DISTRIBUTION BUS FAIL, page IIIA-122 **NOTE:** Collector message
DISTR Bus Fail (C), L-R	Both distribution DC bus have failed	See L-R (DUAL) DISTRIBUTION BUS FAILURE, Page IIIA-118 **NOTE:** Collector message
DU 1-2 Fail DU 1-3 Fail DU 2-3 Fail	Indicated DUs are failed	Reset DU switches if persist proceed to DUAL / ALL DU OVERHEAT, Page IIIA-227
DU 1 Overheat DU 2 Overheat DU 3 Overheat	Indicated DU is hot	Switch the indicated display off to save it for critical phases of flight
DU 1-2 Overheat DU 1-3 Overheat DU 2-3 Overheat DU 1-2-3 Overheat	Indicated DUs are hot	See DUAL / ALL DU OVERHEAT, Page IIIA-227

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
EDP Pressure Low L EDP Pressure Low R EDP Pressure Low L-R	Message indicates loss of Hydraulic Engine Driven Pump. This CAS is inhibited by Engine Fail (C), Engine Off (C) and HYD SYS Fail (C).	***On ground:*** 1. Refer to MMEL. ***In air:*** 1. Hydraulic synoptic – DISPLAY 2. Onside EMP – ON 3. Descent below 39,000 ft. 4. Hydraulic system oil level and temperature – MONITOR 5. Land at nearest suitable airport. **NOTE**: EMP operation is limited to 10 minutes above 39,000 ft. as per AFM
ELEV Mistrim Nose DN	Autopilot elevator is out of trim in the nose down direction.	1. Hold control wheel firmly, then disengage AP 2. STAB trim - TRIM UP 3. AP - ENGAGE
ELEV Mistrim Nose UP	Autopilot elevator is out of trim in the nose up direction.	1. Hold control wheel firmly, then disengage AP 2. STAB Trim - TRIM DOWN 3. AP - ENGAGE
Elevator Disconnect	Left and right elevators are disconnected	1. See JAMMED ELEVATOR, Page IIIA-136 2. Land at nearest suitable airport **NOTE:** Autopilot is not available

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Elevator HOPS Fail	On ground only, Hard Over Protection System (HOPS) failure	Do not dispatch
Elevator HYD INOP, L Elevator HYD INOP, R	Indicated elevator hydraulic power disconnected due to hard over protection	**NOTE:** Expect small increase in pitch forces. 1. Airspeed - BELOW V_A 2. Perform normal approach and landing 3. Land as soon as practicable
Elevator HYD INOP, L-R	Both elevators hydraulic power disconnected due to hard over protection	**NOTE:** Elevators are in manual reversion and have limited authority. 1. Airspeed - BELOW V_A 2. Use STAB trim to compensate for high pitch forces 3. Land at nearest suitable airport
ELT Transmitting	Emergency locator transmitter (ELT) is on	1. Verify ELT switch position - ARM 2. If ELT is transmitting when selected ARM - Pull ELT cb (K11)

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
EMER Bus ALT Feed, L EMER Bus ALT Feed, R	Indicated emergency bus is not fed from its normal source	NOTE: Do not reset or pull the following cb's: A7, A8, A17 and A18. 1. Electrical synoptic - DISPLAY 2. Land as soon as practicable
EMER Bus Fail (C), L	Left emergency bus has failed	See L EMERGENCY BUS FAIL, Page IIIA-102 NOTE: Collector message

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
EMER Bus Fail (C), L-R	Both emergency buses have failed	1. ALTN STAB - ARM 2. ALTN PRESS - ON 3. Airspeed/altitude - MAINTAIN BELOW 250 KCAS / 0.70M_i / 25,000 ft 4. Land at nearest suitable airport. CAUTION: 1. AVOID LARGE ATTITUDE CHANGE OR HIGH BANK ANGLES. 2. MACH TRIM AND YAW DAMPER ARE NOT AVAILABLE 3. DEPART/AVOID ICING CONDITIONS. 4. Review R EMERGENCY BUS FAIL, Page IIIA-106 and L EMERGENCY BUS FAIL, Page IIIA-102 prior to landing. **NOTE:** Collector message.
EMER Bus Fail (C), R	Right emergency bus has failed	See R EMERGENCY BUS FAIL, Page IIIA-106 **NOTE:** Collector message

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Emergency BATT On	EMER BUS pushbutton is selected to BATT ON. Only L and R emergency buses are powered	EMER BUS - AS REQUIRED
Emergency Exit Window	Cabin emergency escape window release handle unlocked	1. Inspect emergency windows and latch 2. Verify positive DP
Emergency Light SW	Switch is not in ARM position or switch is in ON position	Verify EMER LTS position
EMP HYD PRESS Low, L EMP HYD PRESS Low, R EMP HYD PRESS Low, L-R	Indicated hydraulic pressure is below 900 psi when EMP is either on or armed	1. Indicated HYDRAULIC EMP - ON ***If hydraulic pressure remain low Continue with:*** LEFT HYDRAULIC SYSTEM FAILURE, Page IIIA-176 or, RIGHT HYDRAULIC SYSTEM FAILURE, Page IIIA-173 or, LEFT AND RIGHT (DUAL) HYDRAULIC SYSTEMS FAILURE, Page IIIA-179

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
EMP HYD Pump Hot, L EMP HYD Pump Hot, R EMP HYD Pump Hot, L-R	Indicated hydraulic Electric Motor Pump (EMP) overheated	**NOTE:** If failure clears and continued use of EMP is required - descend below 39,000 ft 1. Indicated HYDRAULIC EMP - VERIFY OFF 2. Hydraulic synoptic - MONITOR TEMP
EMP HYD Pump Not Arm, L EMP HYD Pump Not Arm, R EMP HYD Pump Not Arm, L-R	Indicated HYDRAULIC EMP pushbutton not in either ARMED or ON positions	1. HYD EMP OFF/ARM – ARM AS REQUIRED ***In air:*** *If EMP CTRL CB (F1, F11) has popped:* 2. Reset CB only if required for safety of flight. 3. Continue flight. **NOTE:** EMP operation is not possible when circuit breaker out.
ENG A/I PRESS High, L, ENG A/I PRESS High, R ENG A/I PRESS HI, L-R	Excessive pressure condition exists within the indicated engine anti-ice system	1. Affected engine - REDUCE THRUST 2. Affected ENG ANTI ICE selector - OFF 3. Avoid icing conditions

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
ENG A/I Fail On, L ENG A/I Fail On, R ENG A/I Fail On, L-R	Indicated engine anti-ice is operating uncommanded. Indicated engine bleed air is ON and A/I command is not active	1. Bleed / anti Ice synoptic - DISPLAY 2. Prior to landing recalculate landing performance ***On ground:*** 1. See MMEL
ENG Anti-ice Fail, L ENG Anti-ice Fail, R ENG Anti-ice Fail, L-R	Indicated engine anti-ice failed	**NOTE:** Moving the ENG A/I switches from AUTO to ON or ON to AUTO when the Ice Detected message is displayed may cause the ENG Anti-Ice Fail Caution message to display. 1. Affected system – OFF for a minimum of 3 seconds and then ON ***If failure persists:*** 2. Affected system – OFF 3. Do not fly into known or forecast icing conditions
ENG Fuel Filter, L-R	Both left and right engines detected an impending fuel filter bypass. Very high risk of fuel contamination	1. Monitor BOTH engines parameters and fuel synoptic 2. Land at nearest suitable airport

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
ENG Fuel SOV Closed, L ENG Fuel SOV Closed, R ENG Fuel SOV CLSD, L-R	Indicated engine fuel shut off valve (SOV) is closed	1. Indicated Fire Handle position - AS REQUIRED
ENG Fuel SOV Fail, L ENG Fuel SOV Fail, R ENG Fuel SOV Fail, L-R	Indicated engine fuel shutoff valve failed or, valve data invalid	***In flight:*** 1. See SINGLE ENGINE FAILURE IN FLIGHT, Page II-55 ***On ground:*** 1. To shut down engine, pull on-side fire handle - DO NOT ROTATE
ENG Fuel TEMP Low, L-R	Fuel temperature dropped below acceptable value. Fuel freezing may occur	See ENG FUEL TEMP LOW (L-R), Page IIIA-250
ENG Oil PRESS High, L ENG Oil PRESS High, R ENG Oil PRESS HI, L-R	Indicated engine oil pressure above limit	1. Reduce thrust on affected engine to maintain oil pressure within limits. 2. Monitor engine parameters 3. Land as soon as practicable

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
ENG Oil TEMP High, L ENG Oil TEMP High, R ENG Oil TEMP HIGH, L-R	Indicated engine oil temperature above limit	1. Reduce thrust on affected engine to maintain oil temperature within limits. 2. Monitor engine parameters 3. Land as soon as practicable
ENG Oil TEMP Low, L ENG Oil TEMP Low, R ENG Oil TEMP Low, L-R	Indicated engine: oil temperature less than 5°C (with thrust lever at Idle), or less than 15°C (when thrust lever at between idle and climb thrust)	CAUTION: IF OIL TEMPERATURE IS BELOW 5°C - DO NOT ADVANCE THROTTLE(S) ABOVE IDLE. IF OIL TEMPERATURE IS BELOW 15°C - THROTTLES MUST REMAIN BELOW CLIMB THRUST
ENG Oil Level Check, L ENG Oil Level Check, R ENG Oil Level CHK, L-R	Engine oil quantity low (message on ground only with engine not running)	Check engine oil quantity between five (5) and thirty (30) minutes after shutdown. (see AMM for servicing instructions). CAUTION: DO NOT SERVICE OIL WITH A COLD ENGINE

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Engine Exceedance, L Engine Exceedance, R Engine Exceedance, L-R	Engine exceeded thrust time limit: In TO above 4:45 minutes or, In APR/MPR above 9:45 minutes	1. Reduce thrust 2. Log for maintenance
Engine Vibration, L Engine Vibration, R Engine Vibration, L-R	Engine(s) vibration level is high	1. Affected engine thrust lever - RETARD UNTIL INDICATIONS RETURN TO NORMAL LEVEL See ENGINE VIBRATION, Page IIIA-256
Engine Fault, L Engine Fault, R Engine Fault, L-R	On ground only: engine control system functional failure	Do not dispatch
Engine Mach-Hold Fail	Mach hold function automatically disengaged due to: Failed ARINC input, or, Mach error exceeds 0.04 mach and engine reaches its authority limit of ±3% N_1 for 90 seconds	1. Press on Mach-Hold LSK in SMC THRST page twice. First to deselect the mode and second press to reselect it **NOTE:** If function cycled on SMC THRST page, and Mach hold is no longer available, expect Mach-hold Disengaged advisory CAS to come on.

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Engine Off (C), L Engine Off (C), R Engine Off (C), L-R	Engine shutdown by fire handle, or by FUEL CONTROL switch	Confirm FUEL CONTROL switch at desired position **NOTE:** Collector CAS message
External Baggage Door	On ground: external baggage door unlocked and one engine is running and acknowledge switch not activated. In flight: external baggage door unsafe	***On ground:*** 1. Secure door ***In flight:*** see EXTERNAL BAGGAGE DOOR UNSAFE, Page IIIA-245
FADEC Fail, L FADEC Fail, R FADEC Fail, L-R	Affected engine FADEC has failed	1. Monitor Engine parameters 2. Avoid rapid thrust lever movements
FCECU 1 Fail (C)	Flight Controls Electronic Control Unit (FCECU) 1 has failed	See FCECU 1 FAILURE, Page IIIA-142 **NOTE:** Collector message

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
FCECU 1-2 Fail (C)	Left and Right Flight Controls Electronic Control Unit (FCECU) 1 and 2 primary channels have failed	1. See FCECU 1 FAILURE, Page IIIA-142 and FCECU 2 FAILURE, Page IIIA-144 2. Land at nearest suitable airport NOTE: Collector message
FCECU 2 Fail (C)	Flight Controls Electronic Control Unit (FCECU) 2 primary channel has failed	See FCECU 2 FAILURE, Page IIIA-144 NOTE: Collector message
FCECU Fail Safe Value	differences between the airspeed values is more than 40 kt	CAUTION: LIMIT FLIGHT ENVELOPE TO 250 KCAS / 0.70 M_I NOTE: Rudder, HSTA, Spoilers and Q-Feel systems will default to fail safe values **NOTE**: In case of erratic airspeed indications of two or three airspeed indicators, proceed to UNRELIABLE AIRSPEED INDICATION, Page IIIA-218
FCECU Rig Switch On	Rigging switch is on	If rigging mode is not required turn RIG switch to OFF. (R AFT radio rack, on smoke EVAC panel)

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
FD Drop AP Basic Mode	AFCS is unable to fly the active mode and changed to basic pitch and / or roll mode. Can be caused by AFCS reversion, discontinuity in flight plan, or last waypoint over flown	Select AP and AT modes as required **NOTE:** The message will self clear on ground after 4 seconds
Feed Fuel LVL Low, L Feed Fuel LVL Low, R	Fuel level in indicated feed tank is 280 lb or less	***If there is no evidence of fuel leak or abnormal fuel flow:*** 1. XFLOW valve - OPEN 2. Unaffected side STBY Pump - ON 3. Land at the nearest suitable airport **CAUTION:** AVOID EXCESSIVE NOSE HIGH OR NOSE LOW PITCH ATTITUDES
Fire BTL 1 Discharge Fire BTL 2 Discharge Fire BTL 1-2 DISCH	On ground only: Indicated fire bottle(s) discharged either intentionally or by rupture of the thermal relief fuse	Maintenance action is required. If fire bottle 2 is discharged, shut down APU unless required for emergency

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Fire Loop Fail, L Fire Loop Fail, R Fire Loop Fail, L-R	Indicated engine fire detection loop channel A and B have failed	Do not dispatch
Fire SYS CH A Fail	On ground only: Loss of FPS Channel A. No ARINC output	1. See MMEL **NOTE:** FIRE and OVERHEAT warning or caution CAS messages will not come on (fire handles and fuel cutoff switches will illuminate)
Fire SYS CH B Fail	On ground only: Loss of FPS Channel B. No Fire discrete available, No single loop B failure detection	1. See MMEL **NOTE:** FIRE and OVERHEAT warning or caution CAS messages will come on (fire handles and fuel cutoff switches will not illuminate)
Flaps Asymmetry	Flaps position asymmetry greater than 3° is detected	**CAUTION:** DO NOT ATTEMPT FURTHER MOVEMENT OF FLAPS. 1. Aileron trim - AS REQUIRED 2. See ABNORMAL FLAPS CONFIGURATION LANDING, Page IIIA-147

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Flaps Command Invalid	Flaps lever is not in a detent position for more than 5 seconds or flaps lever position sensors are invalid	1. FLAPS lever - VERIFY IN DETENT 2. FLAPS lever - Move to previous position, then reset to desired position ***If failure persists:*** 3. ALTN Flaps - ON ***If failure persists:*** 4. See ABNORMAL FLAPS CONFIGURATION LANDING, Page IIIA-147
Flaps Jam	Flaps are jammed	1. See FLAPS JAM, Page IIIA-146.
Flaps/STAB SYNC Fail	Flaps and stabilizer are out of synchronization	1. FLAPS lever - Move to previous position, then reset to desired position ***If failure persists:*** 2. Manually trim STAB to reduce pitch forces

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
FQMC Channel Fail, L-R	Both fluid quantity measurement computer channels have failed	NOTE: The following are unavailable: • All fuel quantity, temperature and pressure CAS messages • Fuel temperature • Engine and APU oil level (on the ground) • Fuel synoptic • jettison auto Stop function • Total fuel and gross weight displays • Interconnect and XFLOW 1. Fuel Flow - CHECK ON EICAS OR FMS (ENGINE/FUEL page) 2. Monitor Fuel management and Flight Range. 3. Avoid fuel jettison 4. Land at nearest suitable airport
Fuel Imbalance	Fuel imbalance between wing tanks of more than 450 lb on ground or 900 lb in flight	See FUEL IMBALANCE, page IIIA-161

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Fuel INTER Valve Fail	Fuel interconnect valve is failed, not in commanded position or valve data invalid	See FUEL INTERCONNECT VALVE FAILURE, Page IIIA-163
Fuel JETT On, L Fuel JETT On, R Fuel JETT On, L-R	Fuel jettison commanded ON (indicated fuel standby pumps are operating)	1. Fuel Quantity - MONITOR **NOTE:** Fuel jettison stops automatically when fuel quantity reaches 800 lb on the respective side
Fuel Level Low, L Fuel Level Low, R Fuel Level Low	Fuel quantity in the respective side(s) is less than 580 lb	1. Fuel Quantity - MONITOR 2. Both STBY PUMPS - ON 3. Land at nearest suitable airport **CAUTION:** AVOID EXCESSIVE NOSE HIGH OR NOSE LOW PITCH ATTITUDES
Fuel Pressure Low, L Fuel Pressure Low, R Fuel Pressure Low, L-R	Indicated fuel pressure low with engine running when aircraft is below 25,250 ft	1. Do not climb above 25,000 ft 2. See FUEL PRESSURE LOW, Page II-49

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Fuel Pump Not Arm, L Fuel Pump Not Arm, R Fuel Pump Not Arm, L-R	Pre MOD G25-10074 Indicated fuel standby pump(s) not in ON or ARM position	1. Fuel STBY pump(s) OFF/ARM – ARM AS REQUIRED ***In air:*** If PUMP PWR or PUMP CTRL CB (H1, H11, I7, I17) has popped: 1. Reset CB only if required for safety of flight. 2. Select FUEL STBY PUMP to ON whenever required. 3. Continue flight. **NOTE**: If PUMP CTRL has popped - no Fuel STBY operation is possible. If PUMP PWR has popped - manual override and jettison will activate the STBY fuel pump.
Fuel Tank TEMP Low	Fuel tank temperature too low for the selected fuel type	See FUEL TANK TEMPERATURE LOW, Page IIIA-160
Fuel Transfer Fault	Fuel transfer sequence is interrupted from forward, center or aft fuel tank	See FUEL TRANSFER FAULT, Page IIIA-169

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Fuel XFLOW Valve Fail	Fuel cross flow valve is failed, not in commanded position or valve data invalid	***If fuel XFLOW valve remains open:*** 1. Fuel synoptic - DISPLAY 2. Fuel balance - MONITOR 3. Use FUEL INTERCONNECT as necessary to balance fuel required
Fuel XFLOW Valve Open	Fuel cross flow valve between the standby pumps is open for more than 5 minutes	1. Fuel Balance - MONITOR ***When fuel balancing is finished:*** 2. Fuel XFLOW valve - CLOSE
GCU Fail, L-R	Both GCUs failed	1. Electrical synoptic - MONITOR LOADS ***If indicated generators load is 0%:*** 2. Both GCU cb's (A13, A3) - VERIFY IN ***If failure persists and the generator load is low:*** 3. See L-R (DUAL) GENERATOR FAILURE (PRE MOD G25-20093), Page IIIA-124

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
GCU Fail, L GCU Fail, R	Indicated GCU failed	1. Electrical synoptic - Display ***If indicated generator's load is 0%:*** 2. Indicated GCU cb's (A13, A3) - VERIFY IN ***If failure persists and generator load is low:*** 3. See SINGLE GENERATOR FAILURE, Page IIIA-133
Gear BTL PRESS Low	Emergency landing gear extension pneumatic bottle pressure is less than 2700 psi on ground	***On ground:*** Service emergency extension bottle ***If failure persists:*** Log for maintenance ***In flight:*** Continue flight
Gear Not Down	One or more of the landing gears are not down and locked with flaps position greater than 25°, or one of TLA less than 10° and radio altimeter less than 400 ft, or if invalid, then IAS less than 145 kt	1. Landing gear - EXTEND ***If failure persists:*** 2. See LANDING GEAR DOWNLOCK FAILURE / UNSAFE INDICATION, Page IIIA-207

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Message	Triggered by	Corrective Action
GEN Overload, L GEN Overload, R GEN Overload, L-R	Indicated generator(s) load exceed 100%	See GENERATOR OVERLOAD, Page IIIA-134
Generator Fail, L-R	Both generators have failed	See L-R (DUAL) GENERATOR FAILURE (PRE MOD G25-20093), Page IIIA-124
Generator Fail, L Generator Fail, R	Indicated generator failed	See SINGLE GENERATOR FAILURE, Page IIIA-133
GND Spoiler Auto Fail	Ground spoiler automatic deployment function has failed	***For Takeoff:*** See MMEL ***For Landing:*** Use manual SPEED BRAKE for landing. Apply 25% increase in actual landing distance.

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
GPS 1-2 Fail	Both Global Positioning Satellite (GPS) navigation systems failed	1. GPS cb's (M17, M18) - RESET 2. Monitor GNSS CTRL page on CDU 3. Monitor RNP values on HSI ***If failure persists:*** 4. Advise ATC if unable to maintain required RNP
Ground Spoiler INHIB	Ground spoilers inhibit selected	1. GND SPLRS - AS REQUIRED
Ground Spoilers Fail	Ground spoilers deployment failure	Add 5% to landing distance
HYD Reservoir Hot, L HYD Reservoir Hot, R HYD Reservoir Hot, L-R	Indicated hydraulic reservoir(s) temperature above 95ºC	See HYDRAULIC RESERVOIR HOT / HYDRAULIC PRESSURE HIGH, Page IIIA-184
HYD Level High, L HYD Level High, R HYD Level High, L-R	Indicated bootstrap hydraulic level(s): L HYD level above 78% R HYD level above 58% (message on ground only)	Service hydraulic fluid before dispatch

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
HYD Level Low, L HYD Level Low, R HYD Level Low, L-R	Hydraulic level(s) below 15%	***On ground:*** Service hydraulic fluid before dispatch ***In flight:*** 1. Hydraulic synoptic - MONITOR 2. Indicated HYD EMP - VERIFY OFF
HYD Pressure High, L HYD Pressure High, R HYD Pressure High, L-R	Indicated hydraulic pressure(s) above 3500 psi	See HYDRAULIC RESERVOIR HOT / HYDRAULIC PRESSURE HIGH, Page IIIA-184 /
HYD Pressure Low, L HYD Pressure Low, R HYD Pressure Low, L-R	Indicated hydraulic pressure(s) below 1300 psi and engine(s) are running	1. Hydraulic synoptic - MONITOR 2. Indicated HYD EMP - ON ***If failure persists:*** prepare for indicated hydraulic system failure
HYD QTY Refill, L HYD QTY Refill, R HYD QTY Refill, L-R	Indicated bootstrap hydraulic level(s): L HYD level below 47% R HYD level below 30% (message on ground only)	Service hydraulic fluid before dispatch

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
HYD SYS Fail (C), L-R	Left and right hydraulic systems have failed	See LEFT AND RIGHT (DUAL) HYDRAULIC SYSTEMS FAILURE, Page IIIA-179 **NOTE:** Collector message
HYD System Fail (C), L	Left hydraulic system has failed	See LEFT HYDRAULIC SYSTEM FAILURE, Page IIIA-176 **NOTE:** Collector message
HYD System Fail (C), R	Right hydraulic system has failed	See RIGHT HYDRAULIC SYSTEM FAILURE, Page IIIA-173 **NOTE:** Collector message

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Ice Detected, L Ice Detected, R Ice Detected, L-R	Ice detected by probe. (Inhibited on ground), ENG and WAI command automatically ON if switches are in AUTO position and aircraft is above 1500 ft AGL (takeoff) or below 35,000 ft Post MOD G25-10074 Ice detected by probe and engine and wings are not protected	1. Check EICAS and Bleed/Anti-Ice Synoptic to verify Engine and Wing Anti-ice systems are operating. ***If the systems are ON (operating normally):*** 2. Keep switches in current position. ***If a system is not operating:*** 3. Inoperative Anti-ice system switch(s) – ON **NOTE**: Moving the ENG A/I switches from AUTO to ON or ON to AUTO when the Ice Detected message is displayed may cause the ENG Anti-Ice Fail Caution message to display.
Ice Detector Fail, L Ice Detector Fail, R Ice Detector Fail, L-R	Indicated ice detection system probe has failed	*See* ICE DETECTOR FAILURE, Page IIIA-192

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Ignition Fail, L Ignition Fail, R Ignition Fail, L-R	Indicated engine ignition failure	1. CONT IGN - ON 2. Avoid icing, turbulence, and/or heavy rain 3. Monitor engine parameters
INBD Brake ACCUM Low	Inboard system brake accumulator pressure is low (less than 1200 psi)	Hydraulic synoptic - MONITOR
INBD Brake Fail	Left and right inboard brake failed	See SINGLE CHANNEL BRAKE FAILURE, Page IIIA-200
INBD Brake Fail, L INBD Brake Fail, R	Indicated inboard brake control valve is has failed. (Indicated side outboard brake is still usable)	Continue use of both brake pedals. **NOTE:** Anticipate 15% increase in landing distance. Auto brakes mode unavailable
INBD Roll Assist Fail	Control wheel sensors of Inboard spoilers failed. Roll assist DISC pushbutton is not selected	Do not Dispatch
INBD Spoilers Fail	Inboard spoiler panels failure.	***On Ground***: Do not Dispatch ***In flight***: Log for maintenance. **NOTE:**:Speed brake effectiveness is reduced. There is no landing distance penalty.

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Internal Baggage Door	Internal baggage door is open above 39,500 ft or below 9,500 ft, or, Aircraft on ground and one engine is running and parking brake is off	**PRE MOD G25-10066:** Verify baggage compartment unoccupied and close the door **POST MOD G25-10066:** 1. If the aircraft is below 9,500 feet verify baggage compartment unoccupied and close the door 2. If aircraft is above 40,000 **a. If above 44,000 feet verify baggage compartment unoccupied and close the door** a. If at or below 44,000 feet minimize access to baggage compartment. Close the door when access completed.
IPC 1 Fail (C) IPC 2 Fail (C)	IPC 1 or 2 has failed on ground only	See IPC (INTEGRATED PROCESSING CABINET) 1 OR 2 OR BOTH FAILURES, Page IIIA-222
JETT AUTO Stop INOP	Jettison automatic stop is inoperative	See JETTISON AUTO STOP INOPERATIVE, Page IIIA-167

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
JETT Valve Fail, L JETT Valve Fail, R JETT Valve Fail, L-R	Affected jettison valve failed or not in commanded position or invalid data	See JETTISON VALVE FAILURE, Page IIIA-165

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Lavatory Flush Open	Toilet Assembly Flush Valve fails to reach closed position within 6 seconds after flush activation.	1.Flush Pushbutton - PRESS **NOTE**: Repeat as necessary, up to 3 activations. **If message does not clear:** 2.Flush Valve - CLOSE MANUALLY **NOTE:** Access Flush Valve handle by removing trim panel in front of toilet assembly. Grasp each end of trim panel and pull sharply toward center aisle to release retaining clips. 3.Flush Valve Handle - ROTATE to actuate Flush Valve **If message does not clear:** ***In flight:*** 4.Cabin Pressurization - MONITOR **NOTE:** Descend as required to maintain cabin pressurization. If unable to descend and cabin pressure cannot be maintained, a cushion may be used to block the drain opening. ***On ground:*** 4.See MMEL, Section 2
Mach Trim Fail	Mach trim has failed	NOTE: Maximum mach number with mach trim inoperative is 0.77 M_i

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Main Bus Fail (C), L	Left main DC bus failed	See L MAIN BUS FAIL, Page IIIA-114 NOTE: Collector message
Main Bus Fail (C), L-R	Both Main bus failed.	See L-R (DUAL) MAIN BUS FAIL, Page IIIA-110 NOTE: Collector message
Main Bus Fail (C), R	Right main DC bus failed	See R MAIN BUS FAIL, Page IIIA-116 NOTE: Collector message
Main Entry Door	Door not closed/locked AND One engine or more is running AND PARK BRAKE is OFF AND Acknowledge switch not pressed	See MAIN ENTRY DOOR UNSAFE, Page IIIA-243

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Nose Temperature High	Nose avionics compartment temperature exceeds 140°F for more than the time limited operation (30 minutes)	***On Ground:*** 1. Select off (use cb's) unnecessary electronic / avionics equipment in nose compartment: WX, DU2, IPC 3, NAV 2,3, ADF, GPS2, DME 2. 2. See MMEL ***In flight:*** 1. Select off (use cb's) unnecessary electronic / avionics equipment in nose compartment: WX, DU2, IPC 3, NAV 2,3, ADF, GPS2, DME 2. 2. Land at nearest suitable airport NOTE: Following capabilities will also be lost depending on the cb's selected off: No NAV 2, 3, No CAT II capability; No GPS 2, No WAAS; No IPCs, No SVS, EGPWS and TAWS alerts.
NWS INOP	Nose wheel steering is inoperative (gear is down and locked)	1. NWS switch - CHECK / RESET ***If failure persists:*** 2. Use differential braking

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
NWS Oversteer	Nose landing gear is over-steered during towing	Do not Dispatch
OTBD Roll Assist Fail	Control wheel sensors of outboard spoilers failed. Roll assist DISC pushbutton is not selected	Do not Dispatch
OTBD Spoilers Fail	Outboard spoiler panels failure.	***On Ground***: Do not Dispatch ***In flight***: Log for maintenance. **NOTE:** Speed brake effectiveness is reduced. There is no landing distance penalty.
OUTBD Brake ACCUM Low	Outboard brake system accumulator pressure is below 1200 psi	Hydraulic synoptic - MONITOR
OUTBD Brake Fail	Left and right outboard brake failed	See SINGLE CHANNEL BRAKE FAILURE, Page IIIA-200
OUTBD Brake Fail, L OUTBD Brake Fail, R	Indicated outboard brake control valve failed	Continue using both brake pedals **NOTE:** Anticipate 15% increase in landing distance. Auto brakes mode unavailable

CAUTION MESSAGES (AMBER)

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Message	Triggered by	Corrective Action
Outflow Valve Fail	Automatic control of outflow valve has failed	1. Bleed/anti-Ice synoptic - MONITOR OFV POSITION 2. CPCS mode pushbutton - MAN 3. CABIN ALT - CONTROL MANUALLY
OXY Masks PRESS Low	Oxygen pressure to crew or to Passenger Oxygen Controller (POC) is below 50 psi	1. Oxygen shutoff valve - CHECK ON 2. Oxygen pressure - CHECK SUMMARY /SECONDARY EICAS PAGE ***If failure persists*** 3. Descend to 14,000 ft or below
Oxygen Quantity Low	Oxygen bottle pressure is less than 800 psi	See Figure 2-1, Oxygen Duration; 123.4 CU FT, Page II-20, Oxygen Duration; 123.4 CU FT, page II-20
Pack Bleed Leak	Leak or rupture in the pack bleed air duct detected	1. CABIN TEMP control - MAN / MAX COLD ***If failure persists:*** 2. ALTN PRESS - ON NOTE: Pack closes automatically. See ALTERNATE PRESSURIZATION OPERATION, Page IIIA-91 ***If failure persists:*** 3. Land at nearest suitable airport

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Message	Triggered by	Corrective Action
Pack Bleed Loop Fail	Pack bleed air duct sensor has failed	1. Consider use of ALTERNATE PRESSURIZATION OPERATION, page IIIA-91 2. Land as soon as practicable
Pack Off	Pack valve is closed. May be displayed when ALTN BLEED selected, or PACK selected off, or during ATS engine start as long as ATS valve is open	1. PACK - AS REQUIRED
Parking Brake	Pressure in emergency lines is more than 200 psi and aircraft in flight	PARK BRAKE lever - STOW
Pilot Aileron DISC	Aileron disconnect handle is pulled	1. Aileron disconnect Handle - AS REQUIRED NOTE: Reduced roll authority - pilot can operate only roll spoilers, co-pilot can operate only ailerons
Pilot BRK PDL Fail	Pilot (left seat) brake controller has failed	Use copilot (right seat) brake pedals only. Auto brakes available
Pilot L BRK PDL Fail Pilot R BRK PDL Fail	Pilot (left seat) indicated brake pedal failure	Use copilot (right seat) brake pedals only. Auto brakes available

CAUTION MESSAGES (AMBER)

(Sheet 64 of 81)

Message	Triggered by	Corrective Action
Pilot STAB Trim Fail	Pilot stabilizer trim switch failed	Use copilot (right seat) trim switch. **NOTE:** Pilot trim switch may work if ALTN STAB selected, but autopilot will be unavailable
PRIM STAB Trim Fail	Primary stabilizer trim channel failed	**CAUTION:** AFTER NEXT ACTION AP WILL DISENGAGE. TAKE MANUAL CONTROL OF THE AIRCRAFT. 1. ALTN STAB - ON 2. Airspeed - BELOW 0.77M (MACH TRIM INOP) **NOTE:** Autopilot and flaps / stabilizer synchronization are unavailable. Stabilizer trim at reduced rate. 3. ATC - Advise 4. Land as soon as practicable
Primary Flaps Fail	Flaps have not achieved flaps lever commanded position for 30 seconds, or flaps lever not in valid detent position for more than 5 seconds, or, flaps are inoperative	1. FLAPS lever - Move to previous position, then reset to desired position ***If failure persists:*** 2. ALTN FLAPS - ON ***If failure persists:*** 3. See ABNORMAL FLAPS CONFIGURATION LANDING, Page IIIA-147

CAUTION MESSAGES (AMBER)

(Sheet 65 of 81)

Message	Triggered by	Corrective Action
Q-Feel Fail	Q-feel (artificial feel system) failure	See Q-FEEL FAILURE, Page IIIA-154
RIU 1 Fail RIU 2 Fail RIU 1-2 Fail	Indicated RIU failed. On-side CDU not inhibited	See RIU (RADIO INTERFACE UNIT) FAILURES, Page IIIA-96
RIU 1B Fail RIU 2B Fail	Indicated RIU channel failed and cross side tuning not inhibited	***On ground:*** Log for maintenance ***In flight:*** See RIU (RADIO INTERFACE UNIT) FAILURES, Page IIIA-96
Roll Assist DISC	ROLL ASSIST Disconnect Switch (RADS) has been selected or switch failed	1. ROLL ASSIST - AS REQUIRED
Roll Assist Fail	Control wheel sensors have failed and spoilers roll assist unavailable	NOTE: Roll rate is reduced. 2. Consider reducing landing weight 3. Select runway with minimum crosswind 4. Plan for a wide approach 5. Use flaps 20° for approach and landing 6. Approach speed - V_{REF}+20 KT NOTE: See V_{REF} For Abnormal Flaps Configurations, Page IIIA-148 for Flaps 20°

CAUTION MESSAGES (AMBER)

(Sheet 66 of 81)

Message	Triggered by	Corrective Action
RSE Heading Fail	Standby heading is failed after more than 2 minutes from power up.	***If ISI is failed (no attitude display):*** 1. See ISI (Integrated Standby Instrument) Failure, Page IIIA-216 ***If ISI is not failed:*** 2. FAST ERECT - PERFORM (SMC - MENU - FAST ERECT) ***If failure persist:*** 3. HSU CB (P14) - CYCLE ***If failure persist:*** 4. HSU CB (P14) - PULL 5. ISI HDG SOURCE - SELECT HDG1 or HDG2 or HDG3 (if IRS3 is installed) (SMC - MENU - HDG SRC).
RSE SSEC Disabled	Static Source Error Correction (SSEC) to the SMC is disabled	NOTE: STBY altimeter accuracy does not meet RVSM requirements

CAUTION MESSAGES (AMBER)

(Sheet 67 of 81)

Message	Triggered by	Corrective Action
RUD Fail Safe Value	ADC 1 & 2 airspeeds deviate more then 40 knots from the airspeed value arriving from the RSE (all 3 sources are valid)	NOTE: Rudder is limited to high speed gains above 250 KCAS or according to flaps position. Maximum crosswind for landing - 7 kt **NOTE**: In case of erratic airspeed indications of two or three airspeed indicators, proceed to UNRELIABLE AIRSPEED INDICATION, Page IIIA-218
Rudder Fail	Rudder control is not operating	See RUDDER FAILURE, Page IIIA-149
Rudder Pedal CMD Fail	Rudder pedal sensors failure	See RUDDER PEDAL COMMAND FAILURE, Page IIIA-151
Side Window Fail, L Side Window Fail, R Side Window Fail, L-R	Side window controller or sensors failed or overheated	Check system's cb's: L side window - D1, D1 R side window - D11, D12
Single Rudder	One rudder control channel is unavailable	Do not dispatch

CAUTION MESSAGES (AMBER)

(Sheet 68 of 81)

Message	Triggered by	Corrective Action
SMC 1-2 Fail	Both Integrated Standby Multifunction Controllers (SMC) have failed	NOTE Loss of STBY ISI Most SMC actions can be performed by CCD 1. Land as soon as practicable
SMC 1 Overheat SMC 2 Overheat SMC 1-2 Overheat	Standby Multifunction Controller(s) (SMC) overheated	1. Pull the following cb's: SMC 1 - P2, P3 (DCP1, DSP1) SMC 2 - P12,P13 (DCP2, DSP2) NOTE: All SMC actions can be performed by CCD ***If both SMCs overheated:*** 2. Land as soon as practicable
SP/Shaker Fail	Stall protection system failed	See STALL PROTECTION SYSTEM FAILURE, Page IIIA-155
Speed Brakes Extended	Pre MOD G25-10074 Speed brakes are deployed with a throttle above idle (in flight only)	Retract speed brakes or reduce thrust as desired

CAUTION MESSAGES (AMBER)

(Sheet 69 of 81)

Message	Triggered by	Corrective Action
SSEC 1 Disabled	No. 1 Static Source Error Correction (SSEC) to Air Data System (ADS) has been disabled	**NOTE:** ADS 1 altitude accuracy does not meet RVSM requirement 1. ADS - REVERT TO ADS 2. (SMC - SNSR - ADS) 2. Verify Flight Director is coupled to valid system
SSEC 1-2 Disabled	Both Static Source Error Corrections (SSEC) to Air Data System (ADS) have been disabled	1. Check SSEC switch on right forward radio rack 2. Leave RVSM airspace
SSEC 2 Disabled	No. 2 Static Source Error Correction (SSEC) to Air Data System (ADS) has been disabled	**NOTE:** ADS 2 altitude accuracy does not meet RVSM requirement 1. ADS - REVERT TO ADS 1. (SMC - SNSR - ADS) 2. Verify Flight Director is coupled to valid system
Stabilizer Jam	Horizontal stabilizer jam is detected	See JAMMED HORIZONTAL STABILIZER, Page IIIA-140
Start Aborted, L Start Aborted, R Start Aborted, L-R	Indicated engine start sequences aborted	Reconfigure for a restart or secure the engine

CAUTION MESSAGES (AMBER)

(Sheet 70 of 81)

Message	Triggered by	Corrective Action
Starter Fail On, L Starter Fail On, R Starter Fail On, L-R	No starter cutout indicated on indicated engine (s)	See START VALVE FAILS TO CLOSE DURING ENGINE START, Page IIIA-252
Starter Fail, L Starter Fail, R Starter Fail, L-R	Indicated engine starter(s) failed	Maintenance action is required
STBY BATT Discharge	Standby battery is not being charged	1. STBY INT PWR cb (A1) - VERIFY IN 2. Consider landing within less than 60 minutes. For possible future failure - see STBY BUS FAILURE, Page IIIA-135 CAUTION: SMC HAS 60 MINUTES SUPPLY ON EMERGENCY POWER
STBY BATT Fail	Standby Battery failed	See STBY BUS FAILURE, Page IIIA-135
STBY Probe Heat Fail	STBY pitot tube failed	See PROBE HEAT FAILURE, Page IIIA-191

CAUTION MESSAGES (AMBER)

(Sheet 71 of 81)

Message	Triggered by	Corrective Action
STBY Pump INOP, L STBY Pump INOP, R STBY Pump INOP, L-R	Indicated STBY PUMP(S) is on and the pump(s) is not operating, or Indicated STBY PUMP(S) is ARM but not operating with low fuel pressure or FUEL JETTISON is on and the pump(s) not operating	See FUEL STANDBY PUMP INOPERATIVE, Page IIIA-157
STBY Pump On, L STBY Pump On, R STBY Pump On, L-R	Indicated fuel pressure drops and STBY FUEL PUMP(S) is armed or STBY FUEL PUMP(S) is off and FUEL JETTISON is on	See STANDBY PUMP ON, Page IIIA-158
Stick Pusher Fail	Stick pusher failed	See STALL PROTECTION SYSTEM FAILURE, Page IIIA-155 NOTE: Stick shakers are operative
Stick Pusher Off	STICK PUSHER OFF pushbutton selected	STICK PUSHER OFF - AS REQUIRED

CAUTION MESSAGES (AMBER)

(Sheet 72 of 81)

Message	Triggered by	Corrective Action
Stick Shaker Fail, L-R	Both control column shakers failed	**NOTE**: Stick pusher is operative
TAT Probe Heat Fail	Total Air Temperature (TAT) sensor heater failed	See PROBE HEAT FAILURE, page IIIA-191
TCAS Fail	TCAS system has failed. Pre-MOD G25-10074: The message will display until AHRS 1 is aligned on power up. Post MOD G25-10074: The message is masked on ground until AHRS is aligned and parking brake is released.	Notify ATC of TCAS failure **NOTE:** Message will display when PFD is in Unusual Attitude mode.
TDOWN PROTECT UNAVL	Touchdown protection unavailable	**CAUTION**: ENSURE NO BRAKE APPLICATION UNTIL AFTER POSITIVE TOUCHDOWN
Throttle CONFIG, L Throttle CONFIG, R Throttle CONFIG, L-R	Indicated thrust lever(s) not positioned at idle during engine start	Thrust lever(s) - IDLE

CAUTION MESSAGES (AMBER)

(Sheet 73 of 81)

Message	Triggered by	Corrective Action
Thrust REV Fail, L Thrust REV Fail, R Thrust REV Fail, L-R	Indicated thrust reverser not available	1. See MMEL 2. Do not use affected thrust reverser
Thrust REV Fault, L Thrust REV Fault, R Thrust REV Fault, L-R	Indicated thrust reverser not available due to internal fault	1. See MMEL 2. Do not use affected thrust reverser

CAUTION MESSAGES (AMBER)

(Sheet 74 of 81)

Message	Triggered by	Corrective Action
TO/GA Switch Stuck	System detected TO/GA switch stuck. **NOTE:** Pilot selection of the TO/GA is unavailable	***On ground:*** Log for Maintenance ***In air:*** 1. Select manually TO Thrust mode prior to final approach (SMC-THRST). *If missed approach is performed:* 2. Verify speed brakes retracted. When missed approach from ILS/LOC approach, after landing gear retract: 3. NAV source – SELECT ONSIDE FMS 4. Required lateral mode – SELECT. NOTE: 1) Speed brakes can be automatically retracted only when throttles will be advanced to above CLB detent. 2) TO thrust mode can be selected only manually in air. 3) During missed approach – no NAV to NAV transfer.

CAUTION MESSAGES (AMBER)

(Sheet 75 of 81)

Message	Triggered by	Corrective Action
TRs Stow Above 20 KTS	Indicated thrust reverser stowing operation depends on WST faulty signal	1. Reversers - STOW ABOVE 20 KT NOTE: Wheel speed signal drops at 20 kt and prevents reversers from stowing. ***If failed reverser(s) is stuck open:*** 2. Affected engine - SHUT DOWN
Ucommanded A/T Mode	Post MOD G25-10074 The throttle has been incorrectly commanded to RETARD mode	1. A/T – Disconnected 2. Thrust lever – As required NOTE: This CAS may appear momentarily if thrust levers are retarded abruptly above 50 feet RA.
Uncommanded Brake	Residual brake pressure in the system (parking brake is not set, pedals are not depressed)	See UNCOMMANDED BRAKING, Page IIIA-202

CAUTION MESSAGES (AMBER)

(Sheet 76 of 81)

Message	Triggered by	Corrective Action
Uncommanded Flaps	Uncommanded flaps motion is detected	CAUTION: DO NOT ATTEMPT FURTHER MOVEMENT OF FLAPS. 1. Maintain speed for flaps limits 2. See ABNORMAL FLAPS CONFIGURATION LANDING, Page IIIA-147
Uncommanded STAB Trim	Uncommanded stabilizer motion has been detected	See STABILIZER TRIM RUNAWAY, Page IIIA-152
Underspeed	Airspeed decelerated below normal operating regime. If deceleration continues, stall warning will occur.	1. Airspeed: Check. If airspeed lower than desired : 2. Throttles - Advance and accelerate to target speed. 3. Level wings if in turning flight.
VHF COM 1 Fail	VHF communications radio failed on ground	VHF 1 cb (L16) - CYCLE
VHF COM 1-2 Fail VHF COM 1-3 Fail	Indicated VHF communications radios failed on ground	Use available VHF radio for voice communications only

CAUTION MESSAGES (AMBER)

(Sheet 77 of 81)

Message	Triggered by	Corrective Action
VHF COM 1-2-3 Fail	All VHF communication radios failed on ground	1. Establish communications via HF / SATCOM 2. Follow no communications procedure
WAI Loop Fail, L WAI Loop Fail, R WAI Loop Fail, L-R	Indicated Wing Anti-Ice (WAI) bleed air duct sensor failure	***If wing anti ice is required:*** 1. Wing Anti Ice temperatures - MONITOR ***If wing anti ice is not required:*** 2. Indicated WING ANTI ICE - OFF 3. Avoid icing conditions
WAI System Fail	Both wings anti ice systems failed or WAI Crossover valve is in the wrong position	*See* L-R WAI SYSTEM FAIL, Page IIIA-186
WAI System Fail, L WAI System Fail, R	Indicated wing anti-ice system failed	*See* WING ANTI ICE OPERATION ON SINGLE SOURCE, Page IIIA-188
WAI XOVER Fail Close	The message indicates that the WAI Cross-Over valve has failed in the closed position.	*See* WAI XOVER Fail Close, Page IIIA-189

CAUTION MESSAGES (AMBER)

(Sheet 78 of 81)

Message	Triggered by	Corrective Action
WAI XOVER Fail Open	The message indicates that the WAI Cross-Over valve has failed in the Open position with 2 Bleeds and 2 WAI systems operating.	*See* WAI XOVER Fail Open, Page IIIA-190
Wheel Despin Fail	One or more wheels are spinning during or after landing gear retraction	1. Landing gear - DOWN 2. PARK BRAKE lever - PULL 500 PSI CAUTION: DO NOT EXCEED 195 KCAS WITH GEAR DOWN. 3. Landing gear - RETRACT
Windshield Fail, L Windshield Fail, R Windshield Fail, L-R	Indicated windshield heat failed or overheated	1. Affected WINDSHIELD HEAT - OFF then ON ***If failure persists:*** 2. Affected WINDSHIELD HEAT - OFF

CAUTION MESSAGES (AMBER)

(Sheet 79 of 81)

Message	Triggered by	Corrective Action
Wing Hot, L Wing Hot, R Wing Hot, L-R	Indicated wing anti-ice air distribution duct temperature is greater than 180°F	1. Both WAI - OFF 2. Bleed air / anti-ice synoptic - DISPLAY 3. Depart icing conditions CAUTION: 1. FOR ANY WING ANTI ICE FAILURE, IF ICING CONDITIONS WERE MET WHILE WINGS ARE COLD, USE V_{REF}. + 20 KT FOR APPROACH AND LANDING AND INCREASE LANDING DISTANCE BY 40%. 2. DO NOT EXCEED TIRE SPEED LIMITATIONS (182 KT GROUNDSPEED).

CAUTION MESSAGES (AMBER)

(Sheet 80 of 81)

Message	Triggered by	Corrective Action
Wing TEMP Low, L Wing TEMP Low, R Wing TEMP Low, L-R	Indicated wing anti-ice air distribution duct indicates under-temperature after 2 minutes of operation with L-R Wing AI ON	***On ground:*** 1. Engine thrust - INCREASE 2. Wing temperature - MONITOR ***If failure persists:*** 3. Both WAI - OFF 4. Refer to MMEL ***In air:*** 1. Engine thrust - INCREASE 2. Wing temperature - MONITOR *If wing temperatures indicate an increasing trend, continue to monitor temperatures. Ice will start to melt when wing temperatures are above 32°F/0°C. If wing temperature are not increasing:* 3. Both WAI - OFF 4. Depart icing condition CAUTION: 1. FOR ANY WING ANTI ICE FAILURE, IF ICING CONDITIONS WERE MET WHILE WINGS ARE COLD, ADD 40% TO LANDING DISTANCE AND 20 KT TO V_{REF}. 2. DO NOT EXCEED TIRE SPEED LIMITATIONS (182 KT GS).

CAUTION MESSAGES (AMBER)

(Sheet 81 of 81)

Message	Triggered by	Corrective Action
WOW Miscompare	Miscomparison between left and right Weight On Wheel (WOW) signals	See WOW MISCOMPARE, Page IIIA-203
Yaw Damper 1-2 Fail	Both yaw damper channels have failed	Flight envelope - Below 25,000 ft, 0.70 M_i / 250 KCAS See YAW DAMPER FAILURE, Page IIIA-94 **NOTE**: In case of erratic airspeed indications of two or three airspeed indicators, proceed to UNRELIABLE AIRSPEED INDICATION, Page IIIA-218
Yaw Damper Off	Yaw damper is off	YD - ON

<<END>>

PFD (ADI AND HSI) CAUTION SYMBOLS AND FLAGS (AMBER)

ADI Caution Flags

(Sheet 1 of 5)

Symbol/Flag	Meaning	Initial Action/Reference
TA X.XXNM/ ±XX↑/↓	No bearing resolution advisory with traffic's (relative or absolute) altitude (in 100's ft) and altitude trend.	Be alert for potential conflicting traffic.
ADS1 **ADS2**	Air data system common source annunciation.	No action required.
AHS1 **AHS2**	AHS system common source annunciation.	No action required.
ALT	Indicated altitude Miscompare flag	Monitor altitude indications. Determine correct source by ISI vote. Verify reversion to correct ADS. Use ISI on failed side if required. If only one ALT indication is suspected as unreliable – See EQUIPMENT LOSS IN RVSM AIRSPACE, Page IIIA-229.
AOA	AOA data is failed.	Use ISI on failed side if required.
AT1 **AT2**	Respective autothrottle is disengaged.	Auto throttle – As required

PFD (ADI AND HSI) CAUTION SYMBOLS AND FLAGS (AMBER)

ADI Caution Flags

(Sheet 2 of 5)

Symbol/Flag	Meaning	Initial Action/Reference
ATT **ROL** **PIT**	Indicated attitude comparator flag. ROL is shown when roll data is out of limits. PIT is shown when pitch data is out of limits. ATT is shown when both pitch and roll data is out of limits.	Monitor attitude data. Determine correct source by ISI vote. Verify reversion to correct AHS. Use ISI on failed side if required.
CAT2	Category 2 approach comparator flag.	Below 600 ft RA – Go around. Above 600 ft RA – Continue to CAT1 minima.
DH	The set decision height differs between DU1 and DU3.	Check DH setting on each SMC-FLT REF
ENG	A miscompare condition exists between either N1, ITT, or N2.	Monitor engine parameters.
FD	Flight director miscompare flag during an ILS approach.	Monitor pilot and copilot flight director commands.

PFD (ADI AND HSI) CAUTION SYMBOLS AND FLAGS (AMBER)

ADI Caution Flags

(Sheet 3 of 5)

Symbol/Flag	Meaning	Initial Action/Reference
FD1 **FD2**	Non-coupled side is not yet independent, despite presence of glideslope annunciation. FD1 is shown on copilot side PFD. FD2 is shown on pilot side PFD.	Use appropriate minima for the approach with a single flight director.
FPV	Flight Path Vector miscompare flag.	Monitor pilot and copilot FPV information. Consider uncaging FPV if caged to see miscompare.
GND PROX	EGPWS terrain threat exist.	Initiate climb to avoid terrain warning.
GS	Glideslope miscompare flag.	Monitor pilot and copilot glideslope deviation information.
FMS	FMS lateral deviation flag during approach.	Monitor pilot and copilot lateral deviation information.

PFD (ADI AND HSI) CAUTION SYMBOLS AND FLAGS (AMBER)

ADI Caution Flags

(Sheet 4 of 5)

Symbol/Flag	Meaning	Initial Action/Reference
IAS	Indicated airspeed Miscompare flag	Monitor IAS indications. Determine correct source by ISI vote. Verify reversion to correct ADS. Use ISI on failed side if required. If only one IAS indication is suspected as unreliable – See EQUIPMENT LOSS IN RVSM AIRSPACE, Page IIIA-229. If both indications are unreliable - See UNRELIABLE AIRSPEED INDICATION, Page IIIA-218.
LOC	LOC lateral deviation flag during approach.	Monitor pilot and copilot Localizer deviation information.
MACH	MACH comparator flag.	Monitor pilot and copilot Mach data.
RA	Radar altimeter comparator flag. (Requires dual installation).	Monitor pilot and copilot radio altitude data. **NOTE:** Flag at bank angles greater than 20 degrees is expected
RA1 **RA2**	Radar altimeter common source annunciation.	No action required.

PFD (ADI AND HSI) CAUTION SYMBOLS AND FLAGS (AMBER)

ADI Caution Flags

(Sheet 5 of 5)

Symbol/Flag	Meaning	Initial Action/Reference
SYNC	AP SYNC button is pushed and the AP is unable to sync to current attitude.	No action required.
VSPD	Vspeed comparator flag. Vspeeds reference values shown on ADI may differ, or, removed from ADI.	Check pilot and copilot Vspeed data.
WINDSHEAR	Windshear threat exist.	Attention to nearby weather. The amber windshear icon indicates increasing performance

<<END>>

PFD (ADI AND HSI) CAUTION SYMBOLS AND FLAGS (AMBER)

HSI Caution Flags

Symbol/Flag	Meaning	Initial Action/Reference
Yellow circle with associated 2 or 3 digit number	Traffic advisory symbol at bearing/distance of traffic, with traffic's (relative or absolute) altitude and altitude trend.	Check for possible conflicting traffic at indicated bearing and altitude.
HDG	Heading miscompare flag.	Monitor pilot and copilot heading deviation information. Use ISI on failed side if required.
MAP	No flight plan is programmed.	Check FMS flight plan.
TCAS FAIL	TCAS system is failed.	TCAS warning not available.
TERRAIN FAIL	Terrain Awareness Warning System (TAWS) overlay display is failed.	Check GPS reception.
TURB FAIL		
WX FAIL	Weather radar overlay is selected and the weather radar is not reporting information.	No action required.
WX FAULT	Weather radar reporting itself as failed. Weather picture may be degraded.	No action required.

<<END>>

ATA 21 - AIR CONDITIONING SYSTEM

ALTERNATE PRESSURIZATION OPERATION

Pressing ALTN PRESS pushbutton closes the pack inlet valve and opens the alternate pressurization valve which directs airflow that bypasses the pack and enters the plenum.
ALTN PRESS Selected and Pack Off caution messages come on.

Options for alternate pressurization airflow sources:

- R ENG BLEED AIR
- L ENG BLEED AIR and Isolation Valve open
- APU BLEED AIR

1. Bleed/anti ice synoptic ..... DISPLAY
2. ECS synoptic ..... DISPLAY
3. Cabin and cockpit temperatures and cabin altitude ..... MONITOR

NOTE

Temperature is controlled directly by thrust lever position. There is no option to set a fixed temperature.

If Cabin Duct TEMP HI *or* Cockpit Duct TEMP HI *caution message comes on:*

4. Airspeed..... INCREASE (AT 40,000 FT AND HIGHER - 0.75 M_i MINIMUM)
5. COCKPIT/CABIN TEMP control ..... MAN

<<END>>

AUTOMATIC CABIN PRESSURIZATION FAILURE

CPCS Fail Select MAN *caution* message indicates that cabin pressure control system AUTO channel has failed.

1. CPCS MODE ..... MAN

NOTE

CPCS Manual Mode *caution* message will come on. Amber M will display adjacent to cabin altitude reading, and cabin altitude reading is amber.

2. CABIN ALT selector..... SET DESIRED CABIN ALTITUDE
   See Figure 4-1, Cabin Altitude Schedule, Page IV-33, CABIN ALTITUDE / PRESSURE SCHEDULE, Page IV-33

NOTE

During Climb:

Maintain Cabin altitude of Takeoff Field elevation until reaching 30,000 ft.
Above 30,000 ft - Set differential pressure to 9.0 - 9.2 psid.

During Cruise:

Set OFV position according to Figure 4-1. CABIN ALTITUDE / PRESSURE SCHEDULE, Page IV-33,
Above 30,000 ft - Verify differential pressure at 9.0 - 9.2 psid.

Descent:

When descending through 30,000 ft, set cabin altitude to Landing Field Elevation and maintain it until 2,000 ft AGL.
Descending through 2,000 ft AGL, open OFV fully

3. Cabin Altitude ..... MONITOR

<<END>>

ATA 22 - AUTO FLIGHT

AUTOPILOT FAILURE

Any of the following CAS messages indicate that the autopilot has failed:

Caution messages:

AP 1-2 Fail
AP 1-2 Fail - FCP
AP 1-2 Fail - AIL SRVO
AP 1-2 Fail - ELEV SRVO

NOTE

In case of AP 1-2 Fail - ELEV SRVO failure, Stick pusher is inoperative.

1. Aircraft.....FLY MANUALLY

If AP 1-2 Fail - AIL SRVO or AP 1-2 Fail - ELEV SRVO caution *message is displayed:*

2. AP AIL SERVO (O3) and
   AP ELEV SRVO (O4) cb's .....CHECK / CYCLE

If none of the above CAS messages is displayed:

3. Autopilot..... ATTEMPT TO RECONNECT

If autopilot fails to reconnect or fails again:

4. ATC.....ADVISE (UNABLE RVSM)

If AP SRVO OVRD Fail message comes on and autopilot is engaged - autopilot cannot be overridden by pilot force and can be disconnected only by AP quick disengage switch on yoke or AFCS DISCON bar.

<<END>>

YAW DAMPER FAILURE

Yaw Damper 1-2 Fail caution message indicates the loss of both yaw dampers. Dutch Roll may develop above 25,000 ft / 250 KCAS / 0.70 M_i.

Above 25,000 ft:

1. Speed Brakes.....DEPLOY PARTIALLY

NOTE

Deploying half Speed brakes has a positive effect on Dutch Roll damping.

2. Autopilot .....ENGAGE

NOTE

Engaging Auto Pilot in any lateral mode will dampen Dutch Roll significantly:

If Autopilot engaged successfully, Go to step 6.

If Autopilot cannot be engaged:

3. SMC - SENSOR ..... SELECT OTHER AFCS
4. Autopilot .....ENGAGE
5. Yaw damper .....ENGAGE

If Yaw damper cannot be engaged:

6. Check which DCU channel l (Pre MOD G25-10074: Advisory CAS message; Post MOD G25-10074: Caution CAS message) is failed and pull its CB's:
   If DCU 1 Channel A Fail is displayed..... Pull P6 and P8 CBs
   If DCU 1 Channel B Fail is displayed..... Pull P7 and P9 CBs
   If DCU 2 Channel A Fail is displayed.... Pull P16 and P18 CBs
   If DCU 2 Channel B Fail is displayed.... Pull P17 and P19 CBs
7. SMC - SENSOR ..... SELECT OTHER AFCS

NOTE

Sensor selection to another AFCS may not be possible in all cases.

(Continued)

8. Yaw damper ..... ENGAGE
9. Autopilot (if not engaged) ..... ENGAGE
10. Speed Brakes ..... AS REQUIRED
11. Reselect flight director lateral and vertical modes.

If failure persists:

12. Altitude ..... DESCEND BELOW 25,000 ft
13. Airspeed. ..... MAINTAIN BELOW 250 KCAS / 0.70 M_i
14. Landing ..... PERFORM NORMAL LANDING

<<END>>

Yaw Damper 1 Fail or Yaw Damper 2 Fail advisory messages indicates failure of the indicated autopilot yaw damper channel. The AFCS system reverts to cross-side yaw damper. No corrective action is required.

If a single yaw damper failure is active and AFCS did not revert:

1. SMC - SENSOR ..... SELECT OTHER AFCS

NOTE

FD Drop AP Basic Mode caution message may come on. Reselect flight director modes.

2. Yaw damper ..... ON

<<END>>

ATA 23 - COMMUNICATION

RIU (RADIO INTERFACE UNIT) FAILURES

If any of the following messages is displayed, it indicates Radio Interface Unit (RIU) failure:

RIU 1 Fail *caution message indicates RIU 1 failed*

Loss of primary and secondary tuning of VHF1 and NAV 1. Datalink 1 is unavailable.

1. Inhibit left CDU and right CDU from tuning; CDU Tune Inhib, L-R status message comes on
2. Use DU TUNE page and C CDU
3. Use datalink 2

RIU 1A Fail *advisory message indicates RIU 1A channel failed*

Loss of secondary left radios tuning. loss one channel of aural alert and #1 data link system.

1. No corrective action

RIU 1B Fail *caution message indicates RIU 1B failed*

Loss of primary left CDU radios tuning.

1. Inhibit L CDU and use R CDU to tune the #1 Radios. CDU Tune Inhib, L status message comes on

RIU 2 Fail *caution message indicates RIU 2 failed*

Loss of primary and secondary right CDU tuning of right radios.

1. Inhibit left CDU and right CDU from tuning the #2 radios; CDU Tune Inhib, L-R status message comes on

Loss of primary and secondary Right CDU tuning of right radios.

2. Use DU tune page and C CDU to tune the #2 Radios

(Continued)

RIU 2A Fail *advisory message indicates RIU 2A failed*

Loss of data link #2.

1. No corrective action.

RIU 2B Fail *caution message indicates RIU 2B failed*

Loss of primary right CDU radios tuning.

1. Inhibit R CDU and use L CDU to tune the #2 radios. CDU Tune Inhib, R status message comes on

RIU 1-2 Fail *caution message indicates RIU 1 and RIU 2 failed.*

Loss of primary and secondary left and right CDU tuning of radios.

1. Inhibit left CDU and right CDU. CDU Tune Inhib, L-R status message comes on
2. Use DU tune page and C CDU to tune the #1 radios

<<END>>

TUNING INOPERATIVE MESSAGE ON CDU TUNE PAGE AND/OR DU TUNE WINDOW

Loss of a CDU or failures within the RTSA may result in loss of tuning capability through the CDU and DU.

If LEFT-SIDE TUNING INOPERATIVE *message is displayed on the CDU tune page and DU tune window:*

Inhibit left CDU tuning:

1. On SMC select UTIL, tune REV, left CDU inhibit

or

1. On HSI menu select tune REV, left CDU Inhibit

NOTE

CDU Tune Inhib, L status message comes on and normal tuning is restored.

If RIGHT-SIDE TUNING INOPERATIVE *message is displayed on the CDU tune page and DU tune window:*

Inhibit Right CDU Tuning:

1. On SMC select UTIL, tune REV, right CDU inhibit

or

1. On HSI menu select tune REV, right CDU inhibit

NOTE

CDU Tune Inhib, R status message comes on and normal tuning is restored.

(Continued)

If LEFT-SIDE TUNING INOPERATIVE *and* RIGHT SIDE TUNING INOPERATIVE *messages are displayed on the CDU tune page and* DU TUNING INOPERATIVE *is displayed in the DU tune window:*

Inhibit both left and right CDU tuning:

1. On SMC select UTIL, tune REV, Left CDU inhibit & right CDU inhibit

or

2. On HSI menu select tune REV, left CDU inhibit & right CDU inhibit

NOTE: L-R CDU Tune Inhibit CAS shall come on and normal tuning is restored.

NOTE

CDU Tune Inhib, L-R status message comes on and normal tuning is restored.

<<END>>

INABILITY TO TUNE COM/NAV RADIOS OR UNEXPECTED TUNING BEHAVIOUR

Failures within the RTSA may result in the COM/NAV radios not responding to inputs through the CDU or DU. Unexpected tuning behavior may include uncommanded toggling between frequencies, an amber frequency display when a valid frequency is entered or the RTSA not accepting the input of a valid frequency.

If a CDU has failed or LEFT-SIDE TUNING INOPERATIVE *and/or* RIGHT-SIDE TUNING INOPERATIVE *message is displayed on the CDU tune page and DU tune window, perform CDU failure or* TUNING INOPERATIVE MESSAGE ON CDU TUNE PAGE AND/OR DU TUNE WINDOW, Page IIIA-98*.*

Attempt to restore normal operations by inhibiting DU and CDU tuning individually, one at time, in the following order: DUs, center CDU (if installed), Right CDU, Left CDU.

To inhibit DU tuning:

1. On SMC select UTIL, tune REV, all DUs inhibit

or

2. On HSI menu select tune REV, all DUs inhibit

NOTE

DU Tune Inhibited status message comes on.

If normal operations are not restored, un-inhibit the DU tuning and inhibit each CDU individually, one at a time.

(Continued)

To inhibit CDU tuning:

1. On SMC select UTIL, tune REV, C or R or L CDU inhibit

or

2. On HSI menu select tune REV, C or R or L CDU inhibit

NOTE

CDU Tune Inhib, L, CDU Tune Inhib, C *or* CDU Tune Inhib, R status messages come on with each corresponding inhibit selection.

3. If normal operations are not restored by inhibiting the DUs or CDUs individually, attempt various combinations of inhibiting the DUs and CDUs simultaneously to restore normal operation

NOTE

Inhibiting the left or right CDU may render all left or right COM/NAV radios inoperative, respectively. Determine if losing all left or right radios is more desirable than the original problem before leaving the respective CDUs inhibited.

<<END>>

ATA 24 - ELECTRICAL POWER

L EMERGENCY BUS FAIL

EMER Bus Fail (C), L caution message indicates that left emergency bus voltage is below 19V for 7 seconds or below 5V for 1 second.

NOTE

The message is a collector CAS message.

The following messages come on

Caution messages:

L EMER Bus Fail (C)	> Aileron Trim Fail
Stick Pusher Fail	> FCECU 1 Fail
APU Fail	> OUTBD Brake Fail
L ENG A/I Fail On	> L BAS Fail
> PRIM STAB Trim Fail	> ACS Fail
> Flaps/STAB Trim Fail	> Ground Spoilers Fail
Yaw Damper 1-2 Fail	> OUTBD Spoilers Fail
> Bleed Leak CH B Fail	STBY Probe Heat Fail

Advisory messages:

APU Maintenance REQD	ACP 1 Fail
APU Door Failed Close	L-R ENG Thrust Fault
ATC/TCAS STBY	L CCD Fail
DU Cross Talk Fail	AP SRVO OVRD Fail
Rudder TCM Fail	

(Continued)

NOTE

Thrust Reversers are not available for landing.

CAUTION

EXPECT SIGNIFICANT PITCH FORCES WITH AUTOPILOT DISENGAGEMENT. HOLD YOKE FIRMLY AT DISCONNECTION.

1. Autopilot ..... DISENGAGE
2. ALTN STAB ..... ON

NOTE

Slower STAB trim rate at low speed. Trim bar changes to amber indicating that ALTN STAB is selected.

3. Airspeed/Altitude ..... MAINTAIN BELOW 250 KCAS / 0.70 M_i / 25,000 FT
4. R ENG BLEED ..... VERIFY ON
5. ALTN BLEED ..... ON
6. Cabin TEMP (cockpit TEMP INOP) ..... MAN
7. Electrical synoptic ..... MONITOR

(Continued)

If failure persists:

8. Leave RVSM airspace
9. Avoid Icing conditions
10. Land at nearest suitable airport
11. Landing Performance ..... CALCULATE

NOTE

1. Landing distance is increased due to loss of ground and outboard spoilers. Add 5% to landing distance.
2. Only INBD brakes are available with anti skid protection. Anticipate 66% increase in landing distance.

12. Landing gear ..... IF POSSIBLE
    HAVE TOWER CONFIRM GEAR POSITION.

NOTE

Only right and nose landing gear position indications available.

After touch down and aircraft nose lowered:

13. Wheel brakes ..... AS REQUIRED

(Continued)

SYSTEMS affected by the failure:

Brakes	-	Outboard brakes failure. No Autobrake.
Landing Gear indications	-	Left LG - amber. White light in LG lever
Bleed Air / Anti Ice	-	L WAI is inoperative
	-	Inability to shut off PACK Valve
	-	ACS system failure
	-	L ENG A/I failed on
ECS	-	DEFOG remains in last position
Electrical	-	APU unavailable
Fuel	-	L jettison inoperative
	-	L STBY Pump inoperative
Fire System Failures	-	Bleed Loops - L ENG, L WAI
	-	No cyan and amber CAS messages (CH B)
Hydraulic System	-	No ability to close Left HYD FIRE SOV
	-	No left HYD pressure indications
COMM	-	ACP 1, RIU1B FAIL
NAV	-	NAV 1, ADF 1, FMS 1, CCD 1
ADC 1 Fail	-	Auto reversion to ADC 2
CVR and FDR	-	RECORDER 1 failed
Displays	-	DU2 reverts to ADI and HSI

<<END>>

R EMERGENCY BUS FAIL

EMER Bus Fail (C), R caution message indicates that right emergency bus voltage is below 19V for more than 7 seconds, or less than 5V for more than 1 second.

NOTE

The message is a collector CAS message.

The following messages come on

Caution messages:

R EMER Bus Fail (C)
L-R ENG Oil Level CHK
> Q Feel Fail
R ENG A/I Fail On
> PRIM Flaps Fail
> Flaps/STAB Trim Fail
FCECU 2 Fail
> Bleed Leak CH A Fail
> INBD Brake Fail
> R BAS Fail
BTL 2 ENG Squibs Fail
Autobrakes Fail
STBY Probe Heat Fail

Advisory messages:

> INBD Spoilers Fail
Windshear Fail
Ground PROX Fail
R BAS Default Mode
VHF COM 1 Fail
TCM Fail
ACP 2 Fail
L-R ENG Thrust Fault
Exceedance Record
FPS Maintenance REQD

(Continued)

The following systems are inoperative:

- Nose wheel steering
- Fire loops: R ENG, PACK, R WAI, APU, fire bottle 2
- Left and right thrust reversers
- Inboard brakes
- APU start
- If FCECU 2 has failed FCECU 2 Fail (C) caution message comes on
    - Flaps - normal and alternate
    - Inboard spoilers
    - Alternate STAB trim
    - Q-Feel (anticipate lighter elevator control forces above 200 kt)

If after takeoff with flaps extended:

1. Flaps .....Leave in last position (no flaps indications)
2. Airspeed..... Maintain below flap speed limitation
3. Continue to step 6

If flaps are retracted:

4. FLAPS.....DO NOT EXTEND
5. Airspeed/Altitude..... MAINTAIN BELOW 250 KCAS / 0.70 M_i / 25,000 FT
6. Avoid icing conditions
7. Proceed to nearest suitable airport
8. L ENG BLEED. .....VERIFY ON
9. Cockpit TEMP selector (cabin TEMP INOP)..... MAN
10. Inhibit L CDU tuning .....SMC - UTIL- TUNE REV
11. Electrical synoptic ..... MONITOR

(Continued)

If failure persists:

12. Leave RVSM airspace
13. Landing performance ..... CALCULATE

Flaps position	Performance figures: Landing Weight Limitation / V_{REF} / Actual Landing Distance
0°	Figure 5-297
10°	Figure 5-293
20°	Figure 5-289

NOTE

Only OUTBD brakes are available with anti skid protection. Anticipate 66% increase in landing distance.

If landing configuration is Flap 0°, reduce to minimum landing weight.

14. TAWS/FLAP OVRD.....ON

NOTE

Selecting TAWS/FLAPS OVRD to ON prevents nuisance “TOO LOW FLAPS” aural alert.

15. VOICE OVRD.....ON

NOTE

Select VOICE OVRD to ON prevents nuisance “TOO LOW GEAR” aural alert.

16. Landing Gear .....If possible have tower confirm gear position

NOTE

Only left landing gear position is available. Indication for nose landing gear down-lock is an operative taxi light.

(Continued)

17. V_{REF} ..... SET FOR FLAP CONFIGURATION

NOTE

See V_{REF} For Abnormal Flaps Configurations, Page IIIA-148.

After touch down and aircraft nose lowered:

18. Wheel brakes ..... Apply
19. Directional control ..... Use rudder and differential braking

The following systems are inoperative:

Brakes	-	Inboard brakes failure. No autobrake.
Landing Gear indications	-	Right and Nose LG - amber
Nose Wheel Steering	-	Inoperative (No CAS display)
Bleed Air / Anti Ice	-	Isolation valve closed
	-	R WAI is inoperative
	-	R ENG Anti Ice failed on.
ECS	-	Manual cabin pressure control disabled
	-	Baggage Isolation Valve fails in last position.
Fuel	-	R jettison inoperative
	-	R STBY pump inoperative
	-	XFLOW valve fails in last position
Fire System Failures	-	Bleed loops - PACK, APU, R ENG, R WAI
	-	Smoke Detectors - Baggage, Lavatory
	-	No red light in fire handles
Hydraulic System	-	No ability to close R HYD SOV
	-	No right HYD pressure indications
COMM	-	VHF 1, ACP 2, ATC 2, CDU 1, PA
NAV	-	GPS 1
AoA	-	R AOA invalid

L-R (DUAL) MAIN BUS FAIL

Main Bus Fail (C), L-R caution message indicates that both main buses voltage is less than 19V for more than 5 seconds, or less than 5V for more than 1 second.
Total loss of electrical power supply, except for SMC's (STBY BUS) and emergency buses.

NOTE

1. This message is a collector CAS message.
2. Numerous messages come on as result of the loss of generated power including DISTR Bus Fail (C), L-R, STBY BATT Discharge and Battery Discharge, L-R.

The following messages come on

Caution messages:

> STBY Probe Heat Fail
> CPCS Fail Select MAN (C)
> Q-Feel Fail
> Stick Pusher Off
> A/T 1-2 Fail – TQA
> A/T 1-2 Fail
> AP 1-2 Fail
> ADS 1-2 Probe HT FL
> Mach Trim Fail
> Yaw Damper 1-2 Fail
> TAT Probe Heat Fail

Advisory messages:

> Windshear Fail
> Ground PROX Fail
> R AOA Heat Fail
> Rudder TCM Fail

(Continued)

Possible reason for Failure

- One generator failure AND a short circuit on the cross side main bus
- Short circuits on each main bus

1. Take manual control of the aircraft.
2. Airspeed / Altitude ..... MAINTAIN BELOW 250 KCAS / 0.70 M_i / 25,000 FT

CAUTION

IF DUTCH ROLL DEVELOPS, COUNTERACT USING YOKE. IF REQUIRED EXTEND HALF SPEED BRAKES.

NOTE

Above 200 KCAS, anticipate lighter than normal elevator control forces due to loss of Q-Feel.

3. CPCS MODE ..... MAN
4. Exit / avoid icing conditions
5. Both MAIN TIE CB's (A12 and A2)..... PULL
6. Both GEN..... OFF
7. ELECTRICAL RESET ..... PRESS
8. Both GEN..... ON

If power is restored to both main buses - leave main bus tie CBs pulled and land at nearest suitable airport.

If power is restored to only one bus - proceed to the indicated bus failure procedure. See L MAIN BUS FAIL, Page IIIA-114, *or* R MAIN BUS FAIL, Page IIIA-116

If failure persists on both buses:

9. Electrical Synoptic..... MONITOR ELECTRICAL LOADS

(Continued)

10. Both MAIN TIE CB's (A12 and A2).....RESET

CAUTION

ONLY TWO APU START ATTEMPTS ARE POSSIBLE ON BATT POWER. APU CANNOT BE STARTED IF EMER BUS WAS SELECTED TO BATT ON.

11. Start APU below 35,000 ft
12. APU MASTER.....ON
13. APU START .....PRESS
14. APU GEN..... ON; MONITOR LOADS

NOTE

APU operation limited to 40,000 ft.

If APU GEN available and powers aircraft - Continue to L-R (DUAL) DISTRIBUTION BUS FAILURE, Page IIIA-118

15. Inhibit R AND C CDU from tuning .....SMC-UTIL-TUNE REV
16. Pull the following circuit breakers for load shedding:

NOTE

Step a and b will turn off R SMC and inhibit SMC menu operation.

a. DSP 2 (P12)
b. DCP 2 (P13)
c. DU 1.....Switch off for 20 minutes; consider switching on for approach and landing.

17. ATC 2 .....SELECT; SET 7700 L CDU - TUNE - ATC
18. EMER BUS .....BATT ON

NOTE

Emergency BATT On caution message comes on.

19. Land at nearest suitable airport
20. Perform normal landing

If EMER BATT is selected - the following systems are inoperative:

Flight Controls	-	Q Feel, Rudder Pedal Feedback, AP 1-2, AT TQA, YD 1-2
	-	R Stick shaker, Stick Pusher
ECS	-	AUTO Cabin PRESS CTRL and ALTN PRESS
	-	Equipment cooling (AFT R/R, R Nose, DU's)
	-	Cabin and Cockpit MAN TEMP CTRL
	-	L-R W/S and S/W Heat
	-	L-R Ice Detectors
Instruments	-	ADC 2
Navigation	-	FMS 2, NAV 2-3, DME 1-2, GPS 2
Displays	-	DU 2-3, CDU 2-3, CCD 2
Communication	-	VHF 2-3, HF 1-2, SATCOM, ACP 3, ATC 1
Alerts	-	TCAS, RADALT TAWS 1-2, (Windshear, Terrain)

<<END>>

L MAIN BUS FAIL

Main Bus Fail (C), L caution message indicates that left main bus voltage is below 19V for more than 5 seconds, or less than 5V for more than 1 second.

NOTE

The message is a collector CAS message.

The following messages come on

Caution messages:

> STBY Probe Heat Fail
> Yaw Damper 1-2 Fail
> CPCS Fail Select MAN
> Stick Pusher Off
> A/T 1-2 Fail – TQA
> A/T 1-2 Fail
> AP 1-2 Fail
> Mach Trim Fail
> TAT Probe Heat Fail
> ADS 1 Probe HT FL

Advisory messages:

> L AOA Heat Fail
> Windshear Fail
> Ground PROX Fail
> Rudder TCM Fail

(Continued)

1. Take manual control of aircraft.
2. If yaw Damper is failed - revert to other AFCS cabinet (SMC-SENSOR)
3. Electrical synoptic ..... Monitor electrical loads
4. L BATT ..... VERIFY ON
5. Avoid icing conditions.
6. ATC ..... SELECT ATC 2 (CDU -TUNE - ATC)
7. Land as soon as practicable

Systems affected by the failure:

Electrical	-	Distribution, 60HZ Inverter
Flight Controls	-	TCM or Rudder Trim
No Stick Shaker/Pusher	-	Maintain speed margins.
Autopilot	-	Inoperative
AT TQA	-	Manual Throttle control
Hydraulics	-	L EMP Inoperative
ECS	-	L Ice Detector
	-	Equipment cooling (L Nose, DU, FWD R/R)
	-	Cockpit MAN TEMP CTRL
	-	L W/S and S/W Heat
ADC 1 Fail	-	Automatic reversion to ADC 2 should occur
Communication	-	HF1, VHF 3, SATCOM (Opt)
NAV	-	FMS 3 (Opt), NAV 3 (Opt)
Display	-	DU 2 fails
WX	-	Failed
Alerts and Annunciations	-	TCAS, TAWS, Windshear, RAD ALT

<<END>>

R MAIN BUS FAIL

Main Bus Fail (C), R caution message indicates that right main bus voltage is less than 19V for more than 5 seconds, or less than 5V for more than 1 second.

NOTE

The message is a collector CAS message.

The following messages come on

Caution messages:

> Yaw Damper 1-2 Fail
> Q Feel Fail
> Stick Pusher Fail
> Mach Trim Fail
> CPCS Fail Select MAN
> ADS 1 Probe HT FL

Advisory messages:

> Rudder TCM Fail
> L AOA Heat Fail

1. Electrical Synoptic.....MONITOR ELECTRICAL LOADS
2. If yaw damper is failed .....revert to other AFCS cabinet (SMC-SENSOR)

3. R BATT.....VERIFY ON
4. CPCS MODE .....MAN
5. Airspeed / Altitude .....MAINTAIN BELOW 250 KCAS / 0.70 M_i

NOTE

Above 200 KCAS, anticipate lighter than normal elevator control forces.

(Continued)

6. Avoid Icing conditions.
7. Inhibit R CDU Tuning ..... SMC - UTIL - TUNE REV
8. Land as soon as practicable.

SYSTEM affected by the failure:

Electrical	-	R Distribution, Cabin, Galley
Flight controls	-	Q Feel and R Stick Shaker
Fuel	-	R STBY fuel pump INOP - XFLOW valve for balancing and jettisoning if needed
Hydraulic	-	R EMP fails
Anti icing	-	R Main windshield and R side window
ECS	-	AUTO Cabin PRESS CTRL and ALTN PRESS
	-	Equipment cooling (AFT R/R, R Nose, DU's)
	-	Cabin MAN TEMP CTRL
	-	R Ice Detector
ADC 2 Fail	-	Automatic reversion to ADC 1 should occur.
COMM	-	VHF 2, HF 2, ACP 3(Opt)
NAV	-	GPS 2, FMS 2, NAV 2, DME 2, ADF 2(Opt)
CVR and FDR	-	RECORDER 2
Displays	-	DU 3 fails
IPC 2	-	FMS2 / MAP2 / GFP2 Fail, IFIS2 Fail (Opt)
Alerts and Annunciations	-	TCAS 2, TAWS 2(Opt), Windshear 2 (Opt), RAD ALT (Opt)

<<END>>

L-R (DUAL) DISTRIBUTION BUS FAILURE

DISTR Bus Fail (C), L-R caution message indicates that both left and right distribution bus voltage is less than 19V for more than 5 seconds, or less than 5V for more than 1 second.

If Generator Fail, L-R *caution message is on:*

1. Perform L-R (DUAL) GENERATOR FAILURE (PRE MOD G25-20093), page IIIA-124 or L-R (DUAL) GENERATOR FAILURE (POST MOD G25-20093), Page IIIA-128

NOTE

This message is a collector CAS message.

The following messages come on

Caution messages:

L-R DISTR Bus FL (C)
> CPCS Fail Select MAN (C)
> Q-Feel Fail
> Stick Pusher Fail
> A/T 1-2 Fail
> AP 1-2 Fail
> ADS 1-2 Probe HT FL
> Mach Trim Fail
> Yaw Damper 1-2 Fail
> TAT Probe Heat Fail

Advisory messages:

> Windshear Fail
> Ground PROX Fail
> RUD PDL Feedback Fail

(Continued)

1. Take manual control of aircraft
2. Airspeed / Altitude ..... MAINTAIN BELOW 250 KCAS / 0.70 M_i / 25,000 FT

CAUTION

IF DUTCH ROLL DEVELOPS - COUNTERACT USING YOKE. IF REQUIRED EXTEND HALF SPEED BRAKES.

NOTE

Above 200 KCAS, anticipate lighter than normal elevator control forces due to loss of Q-Feel.

3. Electrical synopticMonitor electrical loads
4. Both batteries ..... VERIFY ON
5. CPCS MODE ..... MAN
6. Exit Icing conditions
7. Land at nearest suitable airport

Systems affected by the failure:

Flight Controls	-	Q Feel, Rudder Pedal Feedback, AP 1-2, AT 1-2, YD 1-2,
	-	R Stick shaker, Stick Pusher
ECS	-	AUTO PRESS CTRL and ALTN PRESS
	-	Cabin and Cockpit MAN TEMP CTRL
Anti-Ice	-	L-R W/S + S/W heat
	-	L-R Ice detectors
Instruments	-	ADC 2, AHRS 2
NAV	-	FMS 2-3, NAV 2-3, DME 1-2, GPS 2
Displays	-	DU 2-3, CDU 2-3
COM	-	VHF 2-3, HF 1-2, SATCOM, ACP 3 ATC1 / TCAS
Alerts	-	TCAS1-2, RADALT 1-2, TAWS 1-2, (windshear, terrain), ELT

<<END>>

L DISTRIBUTION BUS FAIL

DISTR Bus Fail (C), L caution message indicates that left distribution bus voltage is less than 19V for more than 5 seconds, or less than 5V for more than 1 second.

NOTE

This message is a collector CAS message.

The following messages come on

Caution messages:

L DISTR Bus Fail (C)
> Yaw Damper Off
> CPCS Fail Select MAN
> Stick Pusher Fail
> A/T 1-2 Fail
> AP 1-2 Fail
> Mach Trim Fail
> TAT Probe Heat Fail
> ADS 1 Probe HT FL

Advisory messages:

> Windshear Fail
> Ground PROX Fail

(Continued)

1. Take manual control of aircraft
2. If yaw damper is failed ..... Revert to other AFCS cabinet (SMC-SENSOR)
3. Electrical Synoptic..... Monitor electrical loads
4. L BATT .....VERIFY ON
5. Avoid Icing conditions
6. ATC ..... SELECT ATC 2 (CDU -TUNE - ATC)
7. Land as soon as practicable.

Systems affected by the failure:

Flight Controls	-	Rudder Pedal Feedback, AP 1-2, AT TQA, YD 2, Stick Pusher
ECS	-	Equipment cooling (L Nose, DU, FWD R/R)
	-	Cockpit MAN TEMP CTRL
Anti Ice	-	L Ice Detector, TAT Heat, L WS Heat, Side window Heat
ADC 1 Fail	-	Automatic reversion to ADC 2 should occur
COMM	-	HF1, VHF 3, SATCOM (optional)
NAV	-	FMS 3, NAV 3
Display	-	DU 2
Alerts and Annunciations	-	TCAS, TAWS, Windshear, RAD ALT 1

<<END>>

R DISTRIBUTION BUS FAIL

DISTR Bus Fail (C), R caution message indicates that the right distribution bus voltage is less than 19V for more than 5 seconds, or less than 5V for more than 1 second.

NOTE

This message is a collector CAS message.

The following messages come on

Caution messages:

> Yaw Damper 1-2 Fail
> Q Feel Fail
> Stick Pusher Fail
> Mach Trim Fail
> CPCS Fail Select MAN
> ADS 1 Probe HT FL

Advisory messages:

> Rudder TCM Fail
> L AOA Heat Fail

1. Electrical synoptic ..... Monitor electrical loads
2. If yaw damper is failed ..... Revert to other AFCS cabinet (SMC-SENSOR)
3. R BATT.....VERIFY ON
4. CPCS MODE .....MAN

NOTE

CPCS Manual Mode caution message comes on.

(Continued)

5. Airspeed / altitude ..... MAINTAIN BELOW 250 KCAS/0.70M_i

NOTE

Above 200 KCAS, anticipate lighter than normal elevator control forces.

6. Avoid icing conditions
7. Inhibit R CDU tuning ..... SMC - UTIL - TUNE REV
8. Land as soon as practicable

Systems affected by the failure:

Flight Controls	- Q Feel fail
ECS	AUTO PRESS CTRL and ALTN PRESS
	- Equipment cooling (AFT R/R, R Nose, DUs)
	- Cabin MAN TEMP CTRL
Anti Ice	- R Ice Detector, R Pitot Heat, R WS Heat.
ADC 2 Fail	- Automatic reversion to ADC 1 should occur.
COMM	- VHF 2, HF 2 (Opt), ACP 3(Opt)
NAV	- GPS 2, FMS 2, NAV 2, DME 2, ADF 2 (opt)
Display	- CCD 2, DU 3
IPC 2	- IFIS2 Fail (FMS2 / MAP2 / GFP2 Fail)
Alerts and Annunciations	- TCAS 2(Opt), TAWS 2(Opt), Windshear 2 (Opt), RAD ALT 2 (Opt)

<<END>>

L-R (DUAL) GENERATOR FAILURE (PRE MOD G25-20093)

Generator Fail, L-R caution message indicates that a dual generator failure has occurred. Electrical power is by batteries only or by APU if available.

Caution messages:

L-R DISTR Bus FL (C)
> CPCS Fail Select MAN (C)
> Q-Feel Fail
> Stick Pusher Fail
> A/T 1-2 Fail
> AP 1-2 Fail
> ADS 1-2 Probe HT FL
> Mach Trim Fail
> Yaw Damper 1-2 Fail
> TAT Probe Heat Fail

Advisory messages:

> Windshear Fail
> Ground PROX Fail
> RUD PDL Feedback Fail

CAUTION

MAXIMUM DESCENT TIME TO APU START ENVELOPE SHALL NOT EXCEED 20 MINUTES.

(Continued)

NOTE

Steps 1 through 13 are designed to reset system and provide alternate power supply.

1. Take manual control of aircraft
2. Dome light (at night)..... BRT
3. Airspeed / Altitude ..... MAINTAIN BELOW 250 KCAS / 0.70 M_i / 25,000 FT

CAUTION

IF DUTCH ROLL DEVELOPS DUE TO LOSS OF YAW DAMPER - COUNTERACT USING YOKE, DEPLOY HALF SPEED BRAKES.

NOTE

Above 200 KCAS, anticipate lighter than normal elevator control forces due to loss of Q-Feel

4. L and R GCU cb (A3,A13).....VERIFY IN
5. ELECTRICAL RESET ..... PRESS

NOTE

If generator(s) reset is successful, the following CAS messages will remain active: Q-Feel Fail caution message and Rudder TCM FAIL + Rudder MAINT REQD advisory messages.

6. CPCS MODE ..... MAN
7. Inhibit R AND C CDU from tuning .....SMC-UTIL-TUNE REV
8. DSP 2 and DCP 2 cb's (P12, P13) ..... PULL

NOTE

This action will turn off R SMC, inhibit SMC menu operation and shed load. STBY BUS to enable SMC 1 for 60 minutes.

(Continued)

9. Exit / avoid icing conditions

CAUTION

1. OPERATION OF PROBE OVRD IS PERMITTED FOR 7 MINUTES MAXIMUM.
2. CAUTION: ONLY THREE APU START ATTEMPTS ARE POSSIBLE ON BATT POWER. APU CANNOT BE STARTED IF EMER BUS WAS SELECTED TO BATT ON.

10. Start APU below 35,000 ft
11. APU MASTER.....ON
12. APU START .....PRESS
13. APU GEN..... ON; MONITOR LOADS

NOTE

APU operation limited to 40,000 ft.

If APU GEN is available and powers aircraft - Continue to L-R (DUAL) DISTRIBUTION BUS FAILURE, Page IIIA-118

If APU or APU GEN has failed:

14. ATC 2 .....SELECT, SET 7700 (l CDU - TUNE - ATC)

CAUTION

IF ENGINE START IS REQUIRED, PERFORM THE START PRIOR TO SELECTING EMER BUS TO BATT ON. SELECTING EMER BUS TO BATT ON WILL PREVENT FUEL STBY PUMPS FROM OPERATING.

(Continued)

15. EMER BUS ..... BATT ON

NOTE

The following caution messages come on: Emergency BATT On, Main Bus Fail (C), L-R, DISTR Bus Fail (C), L-R, Stick Pusher Fail.

16. Land at nearest suitable airport
17. Perform normal landing

If EMER BATT was selected - the following systems are inoperative:

Flight Controls	-	Q Feel, Rudder Pedal Feedback, AP 1-2, AT TQA, YD 1-2, R stick shaker, stick pusher
ECS	-	AUTO Cabin PRESS CTRL and ALTN PRESS
	-	Equipment cooling (AFT R/R, R Nose, DUs)
	-	Cabin and cockpit MAN TEMP CTRL
Anti-ice	-	L-R W/S and S/W Heat
	-	L-R ice detectors
Instruments	-	ADC 2
Navigation	-	FMS 2, NAV 2-3, DME 1-2, GPS 2
Displays	-	DU 2-3, CDU 2-3, CCD 2
Communication	-	VHF 2-3, HF 1-2, SATCOM, ACP 3, ATC 1
Alerts	-	TCAS, RADALT TAWS 1-2, (windshear, terrain)

Automatic load-shed items:

- L-R DISTR bus
- L-R windshield heat (windshield heat OVRD will NOT recover the system even with APU GEN ON).
- Baggage compartment heat
- Utilities - 60H_Z inverter, galley, cabin
- Water heaters and waste system

<<END>>

L-R (DUAL) GENERATOR FAILURE (POST MOD G25-20093)

Generator Fail, L-R caution message indicates that a dual generator failure has occurred. Electrical power is by batteries only or by APU if available. When APU is started according to this procedure, the aircraft can attain a positive rate of climb as long as APU GEN is within limits.

Caution messages:

>L-R DISTR Bus FL (C)
>L-R Generator Fail
L-R Battery Discharge
> Stick Pusher Fail
STBY BAT Discharge
> A/T 1-2 Fail
> AP 1-2 Fail
> ADS 1-2 Probe HT FL
> Mach Trim Fail
> Yaw Damper 1-2 Fail
> TAT Probe Heat Fail
> Q-Feel Fail
> CPCS Fail Select MAN

Advisory messages:

TCAS STBY
RUDDER TCM FAIL
R WAI Default Mode
EFIS Comparator Fail
R AOA Heat Fail;

CAUTION

MAXIMUM DESCENT TIME TO APU START ENVELOPE SHALL NOT EXCEED 20 MINUTES.

(Continued)

NOTE

Steps 1 through 13 are designed to reset system and provide alternate power supply.

1. Take manual control of aircraft
2. Dome light (at night)..... BRT
3. Airspeed / Altitude ..... MAINTAIN BELOW 250 KCAS / 0.70 M_i / 25,000 FT

CAUTION

IF DUTCH ROLL DEVELOPS DUE TO LOSS OF YAW DAMPER - COUNTERACT USING YOKE, DEPLOY HALF SPEED BRAKES.

NOTE

Above 200 KCAS, anticipate lighter than normal elevator control forces due to loss of Q-Feel

4. L and R GCU cb (A3,A13).....VERIFY IN
5. ELECTRICAL RESET ..... PRESS

NOTE

If generator(s) reset is successful, the following CAS messages will remain active: Q-Feel Fail caution message and Rudder TCM FAIL + Rudder MAINT REQD advisory messages.

6. CPCS MODE ..... MAN
7. Inhibit R AND C CDU from tuning .....SMC-UTIL-TUNE REV
8. DSP 2 and DCP 2 cb's (P12, P13) ..... PULL

NOTE

This action will turn off R SMC, inhibit SMC menu operation and shed load. STBY BUS to enable SMC 1 for 60 minutes.

(Continued)

9. Exit / avoid icing conditions

CAUTION

1. OPERATION OF PROBE OVRD IS PERMITTED FOR 7 MINUTES MAXIMUM.
2. CAUTION: ONLY THREE APU START ATTEMPTS ARE POSSIBLE ON BATT POWER. APU CANNOT BE STARTED IF EMER BUS WAS SELECTED TO BATT ON.
3. APU CANNOT BE STARTED IF EMER BUS WAS SLECTED TO BATT ON.

10. Start APU below 25,000 ft

NOTE

APU GEN Overload message might come on momentarily when APU GEN is the only source. If the message stays longer than 10 seconds descend to increase APU load capability.

11. APU MASTER.....ON
12. APU START .....PRESS
13. APU GEN..... ON; MONITOR LOADS

NOTE

APU operation limited to 40,000 ft.

If APU GEN is available and powers the aircraft

14. Autopiot, Auto-throttle and YAW damper..... RE-ENGAGE
15. DCP2 and SDSP2 CBs (P12, P13).....RESET

(Continued)

NOTE

Once APU GEN is online main batteries are charging and L DISTR BUS is powered. CAS messages will reduce to reflect the loss of R DISTR BUS only. APU GEN load will start high and decrease gradually to a stable value once battery charging is completed after about 20 minutes. After the load is stable and YAW DAMPER is engaged, on pilot's discretion, it is allowable to climb up to APU operating envelope limits, as long as APU GEN load is below 100%.

A climb rate of about 1000 ft/min can keep APU load below 100% up to APU envelope limit of 40,000 ft. If APU load is approaching 100% load, level off to reduce load.

16. *Continue to* R DISTRIBUTION BUS FAIL, Page IIIA-122

If APU or APU GEN has failed:

17. ATC 2 .....SELECT, SET 7700 (l CDU - TUNE - ATC)

CAUTION

IF ENGINE START IS REQUIRED, PERFORM THE START PRIOR TO SELECTING EMER BUS TO BATT ON. SELECTING EMER BUS TO BATT ON WILL PREVENT FUEL STBY PUMPS FROM OPERATING.

(Continued)

18. EMER BUS .....BATT ON

NOTE

The following caution messages come on: Emergency BATT On, Main Bus Fail (C), L-R, DISTR Bus Fail (C), L-R, Stick Pusher Fail.

19. Land at nearest suitable airport
20. Perform normal landing

If EMER BATT was selected - the following systems are inoperative:

Flight Controls	-	Q Feel, Rudder Pedal Feedback, AP 1-2, AT TQA, YD 1-2, R stick shaker, stick pusher
ECS	-	AUTO Cabin PRESS CTRL and ALTN PRESS
	-	Equipment cooling (AFT R/R, R Nose, DUs)
	-	Cabin and cockpit MAN TEMP CTRL
Anti-ice	-	L-R W/S and S/W Heat
	-	L-R ice detectors
Instruments	-	ADC 2
Navigation	-	FMS 2, NAV 2-3, DME 1-2, GPS 2
Displays	-	DU 2-3, CDU 2-3, CCD 2
Communication	-	VHF 2-3, HF 1-2, SATCOM, ACP 3, ATC 1
Alerts	-	TCAS, RADALT TAWS 1-2, (windshear, terrain)

Automatic load-shed items:

- L-R DISTR bus (Left side recovered with APU GEN ON automatically)
- L-R windshield heat (Left side recovered with windshield heat OVRD selected, APU GEN ON).
- Baggage compartment heat
- Utilities - $60H_Z$ inverter, galley, cabin
- Water heaters and waste system

<<END>>

SINGLE GENERATOR FAILURE

Generator Fail, L or Generator Fail, R caution message indicates engine electrical generator failure.

Electrical load of the failed generator is automatically transferred to the operating generator except for the following automatic load-shed items:

- Windshield heat
- Baggage compartment heat
- 60HZ Inverter
- Galley
- Water heaters
- Cabin non-essential loads

1. Electrical loads ..... Monitor electrical loads

NOTE

If there are voltage indications but load is 0%, check synoptic for open line contactor (no reset possible).

2. ELECTRICAL RESET ..... PRESS

If failure persists:

3. Failed generator ..... OFF
4. Failed GCU cb (A3 for L GCU OR A13 for R GCU) ..... CYCLE
5. Failed Generator ..... ON
6. ELECTRICAL RESET ..... PRESS

NOTE

Consider APU start. See APU START (IN FLIGHT), Page IV-12.

If unable to avoid Icing Conditions and failure persists:

7. WINDSHIELD HEAT OVRD ..... OVRD

<<END>>

GENERATOR OVERLOAD

GEN Overload, L or GEN Overload, R caution message indicates that one engine electrical generator load exceeds 100%.

NOTE

There is no automatic load shedding for this failure. The GCU will perform protective trip as function of overload level.

1. Electrical synoptic .....MONITOR ELECTRICAL LOADS

NOTE

Consider APU start. See APU START (IN FLIGHT), Page IV-12.

2. Load reduction items for consideration:
   - **a. GALLEY..... OFF**
   - d. $60H_Z$ INVERTER.....OFF
   - e. CABIN .....OFF
   - f. WINDSHIELD HEAT - RH.....OFF

If failure persists:

3. APU.....START (BELOW 35,000 FT)
4. APU GEN.....ON
5. Affected GEN .....OFF

If failure persists:

6. For further load shedding, affected DISTR BUS CB (L-B2, R-B12) .....PULL
7. Land at nearest suitable airport
8. Continue with affected distribution bus failure procedure: L DISTRIBUTION BUS FAIL, Page IIIA-120 or R DISTRIBUTION BUS FAIL, Page IIIA-122

<<END>>

STBY BUS FAILURE

NOTE

This procedure only applies when no generated power (from the engines or APU) is being provided to the electrical system (battery power only condition) and STBY battery has failed.

Following CAS messages and indications display:

FCP A Fail - Altitude preselector, BARO setting change from HSI menu

SMC 1-2 Fail
CPCS Fail Select MAN
Yaw Damper 1-2 Fail
AP 1-2 Fail - FCP
A/T 1-2 Fail
CPCS Maintenance REQD
CPCS LFE Fail
AP SRVO OVRD Fail
AP STAB Trim Fail
Mach Trim Fail

FD - red flag on PFD

CAUTION

DO NOT FOLLOW FLIGHT DIRECTOR AS IT IS AT LAST COMMAND PRIOR TO FAILURE.

1. Take manual control of the aircraft
2. Airspeed / altitude ..... MAINTAIN BELOW: 250 KCAS / 0.70 M_i / 25,000 FT

CAUTION

IF DUTCH ROLL DEVELOPS DUE TO LOSS OF YAW DAMPER - COUNTERACT USING YOKE, DEPLOY HALF SPEED BRAKES.

3. ATC ..... ADVISE UNABLE RVSM
4. Land as soon as practicable.

<<END>>

ATA 27 - FLIGHT CONTROLS

JAMMED ELEVATOR

NOTE

1. If the elevators are jammed, pitch control may be regained and maintained by disconnecting the left and right yokes. The crew needs to determine which side is not jammed and transfer flight control to that side.
2. If the right side is jammed, the stick pusher, autopilot pitch control and the Q-feel are unavailable.

1. Stabilizer Trim .....USE FOR PITCH CONTROL
2. Airspeed ..... 220 - 240 KCAS;

(Continued)

3. Autopilot ..... VERIFY DISCONNECTED

CAUTION

1. A LARGE PITCH TRANSIENT FORCE LEADING TO EXCEEDING AIRCRAFT LOAD FACTOR LIMITS IS POSSIBLE AT THE MOMENT OF ELEVATOR DISCONNECT IF ABOVE 250 KCAS. ATTEMPT TO MINIMIZE CONTROL COLUMN MOVEMENT AS THE DISCONNECT BREAKS FREE. TIME PERMITTING, ADVISE PASSENGERS TO REMAIN SEATED WITH SEAT BELTS FASTENED PRIOR TO DISCONNECT.
2. TO DISCONNECT, PUSH OR PULL BOTH ELEVATOR CONTROL COLUMNS SIMULTANEOUSLY IN THE SAME DIRECTION (95 LB OF FORCE) WHILE SLIGHTLY TRIMMING IN THE OPPOSITE DIRECTION.

4. Elevator controls ..... DISCONNECT

NOTE

1. To disconnect, push or pull BOTH elevator control columns simultaneously in the same direction. (95 lb of force).
2. Elevator Disconnect caution message comes on.

5. Pilot flying..... DECLARE
(BASED ON FREE ELEVATOR CONTROL)
6. Land at nearest suitable airport

(Continued)

Landing:

NOTE

1. It is recommended to perform a shallower approach to reduce use of elevators during touch down.
2. Calculate Landing distance according to V_{REF} +10 kts.

7. Maintain thrust for V_{REF} + 5 to 10 kts down to touch down.
8. Auto-throttles..... DISCONNECT at 100 ft AGL; (to prevent auto throttle retard at 50 ft)
9. Thrust Levers .....IDLE AT 30 ft.
10. Thrust reversers..... AS REQUIRED

<<END>>

JAMMED ROLL CONTROL

NOTE

1. Roll control jam may be caused by jammed ailerons or a jammed control wheel yoke.
2. Roll control may be regained and maintained by disconnecting the left and right yokes.

1. Autopilot ..... DISCONNECT
2. Ailerons disconnect lever (pilot yoke only) ..... PULL

NOTE

1. It is recommended to disconnect ailerons with centered yokes.
2. Pilot Aileron DISC caution message comes on.
3. Autopilot is not available when ailerons are disconnected.
4. If pilot yoke is in control, expect light and constant lateral control wheel forces without positive yoke centering.

3. Pilot flying ..... DECLARE
(BASED ON FREE YOKE AND AIRPLANE RESPONSE)

Which pilot has aircraft control?
PILOTGo to step 5
COPILOTGo to step 4

4. Roll Assist Disconnect ..... DISC

NOTE

Roll Assist DISC caution message will come on.

5. Land at nearest suitable airport

(Continued)

NOTE

Prior to landing, a controllability check is recommended at a safe altitude. Aircraft should be incrementally configured for landing and controllability verified for each configuration change. Airspeed should be gradually reduced to approach speed in accordance with the configuration changes.

6. Landing runway ..... SELECT WIDEST RUNWAY AVAILABLE WITH MINIMUM CROSSWIND COMPONENT
7. Autobrakes ..... HIGH
8. Normal landing ..... PERFORM

<<END>>

JAMMED HORIZONTAL STABILIZER

Stabilizer Jam caution message comes on when the stabilizer is jammed.

WARNING

DO NOT USE STAB TRIM, ALTERNATE STAB OR AUTOPILOT.

NOTE

Flaps/STAB compensation and speed brakes/STAB compensation are inoperative.

1. Airspeed ..... MAINTAIN CURRENT SPEED

NOTE

AP STAB Trim Fail caution message may be displayed.

2. Autopilot ..... DISCONNECT
3. Aircraft configuration ..... DO NOT CHANGE

NOTE

Excessive pitch force may occur.

(Continued)

4. Land at nearest suitable airport

Approach

5. Use flaps 20° or LND according to elevator control force.

NOTE

- If nose down control force is required, use flap LND.
- If nose up control force is required, use Flap 20°.
- if excessive nose up control force is required, consider Flaps 10° or 0°.

6. Landing performance.....Recalculate according to flaps setting (see ABNORMAL FLAPS CONFIGURATION LANDING, Page IIIA-147)
7. Plan a long final
8. Aircraft control.....BY COPILOT

NOTE

High force application (95 lb) on pilot yoke will disconnect the elevators.

9. TAWS/FLAP OVRD..... ON (IF FLAPS NOT LND)
10. Auto-brakes..... HIGH

Landing

NOTE

1. It is recommended to perform a shallower approach to reduce use of elevators during touch down.
2. Calculate Landing distance according to V_{REF} +10 kts.

11. Maintain thrust for V_{REF} + 5 to 10 kts down to touch down
12. Auto-throttles..... DISCONNECT at 100 ft AGL;
    ..... (to prevent auto throttle retard at 50 ft)
13. Thrust Levers..... IDLE AT 30 ft.
14. Thrust reversers..... AS REQUIRED

<<END>>

FCECU 1 FAILURE

FCECU 1 Fail (C) caution message indicates that FCECU 1 (Flight Control Electronic Control Unit) has failed.

NOTE

This message is a collector CAS message.
The following CAS come on:

Caution messages:
FCECU 1 Fail (C)
> Ground Spoilers Fail
> Flaps/STAB SYNC Fail
> OTBD Spoilers Fail

Advisory messages:
AP SRVO OVRD Fail

The following systems are inoperative:

- Primary stabilizer trim
- Ground spoilers
- Outboard spoilers
- Elevator - loss of HOPS
- Aileron Trim - loss of trim and indications to EICAS
- STAB trim indicators, until ALTN STAB is selected

The following systems are affected:

- Rudder – Operated by the lower actuator at a reduced rate
- Synoptic - failed surfaces are crossed out.
- Inboard spoilers will open normally as ground spoilers on touch down

NOTE

AP STAB Trim Fail caution message comes on if airspeed or pitch is changed.

1. Take manual control of aircraft

(Continued)

2. ALTN STAB ..... ARM

NOTE

Reduced stabilizer trim rate at low airspeed. Alternate STAB Arm caution message comes on. AP Engage Inhibit advisory message comes on

3. ATC ..... ADVISE (unable RVSM)
4. Land at nearest suitable airport
5. Calculate landing performance according to flaps position and apply for the following penalties:
   a. Calculate landing performance according to APPROACH AND LANDING - ABNORMAL FLAP SETTINGS

Flaps position	Performance figures: Landing Weight Limitation / V_{REF} / Actual Landing Distance	Increase ALD per flap position by
0°	Figure 5-297	8%
10°	Figure 5-293	10%
20°	Figure 5-289	15%
LDN	Figure 5-278	25%

FCECU 2 FAILURE

FCECU 2 Fail (C) caution message indicates that FCECU 2 (Flight Control Electronic Control Unit) has failed.

NOTE

This message is a collector CAS message.
The following CAS come on:

Caution messages:

FCECU 2 Fail (C)
> Q-Feel Fail
> Primary Flaps Fail
> Flaps/STAB SYNC Fail
> INBD Spoilers fail

The following systems are inoperative:

- Q-feel
- Inboard spoilers
- Primary flaps
- Elevator – Loss of HOPS

The following systems are affected:

- Rudder – Operated by the upper actuator at a reduced rate

CAUTION

1. EXPECT SENSITIVE PITCH CONTROL AT AIRSPEEDS OF MORE THAN 150 KCAS.
2. IF AUTOPILOT IS INOPERATIVE, MAINTAIN AIRSPEED BELOW 200 KCAS / 0.75M_i.

(Continued)

1. Autopilot. ..... ENGAGE

NOTE

Flight envelope is not limited when using the autopilot.

2. FLAPS lever ..... MATCH FLAPS POSITION
3. ALTN FLAP ..... ON
4. Land at nearest suitable airport.
5. Increase landing distance by 10% due to loss of inboard spoilers. (for any flaps positions)

If Alternate Flaps Fail *caution message is on, ALTN flaps is inoperative and Flaps can not move:*

6. Landing performance ..... RECALCULATE
7. Perform ABNORMAL FLAPS CONFIGURATION LANDING, page IIIA-147

<<END>>

FLAPS JAM

Did the Flaps Jam ***message appear during flap retraction and flaps indication is between 0° and 10°?***

YES — ***GO TO STEP*** 1

NO — ***GO TO STEP*** 9

1. Airspeed ..... 200 KIAS OR LESS
2. Attitude .....WINGS LEVEL
3. Altitude ..... MAINTAIN CURRENT ALTITUDE IF PRACTICAL
4. FLAP LEVER .....SET 10°

Did flaps extend to 10° and Flaps Jam ***message clear?***

YES — ***GO TO STEP*** 5

NO — ***GO TO STEP*** 9

5. FLAP Lever ..... UP

Did flaps retract and Flaps Jam ***message clear?***

YES — ***GO TO STEP*** 6

NO — ***GO TO STEP*** 9

6. Flight ..... CONTINUE
7. Flaps .....AFTER LANDING PERFORM FULL CYCLE
8. Flaps Jam event.....LOG FOR MAINTENANCE

<<END>>

If Flaps Jam ***message remains or flaps do not retract***

9. FLAP LEVER ..... DO NOT MOVE
10. Airspeed and Altitude .....REMAIN WITHIN LIMITS FOR INDICATED FLAP SETTING
11. If flap indication is not 0° ..... LAND AT NEAREST SUITABLE AIRPORT
12. PERFORM ABNORMAL FLAPS CONFIGURATION LANDING, Page IIIA-147

<<END>>

ABNORMAL FLAPS CONFIGURATION LANDING

1. V_{REF} ..... SET FOR FLAPS CONFIGURATION
   Figure 5-289 for flaps - 20°
   Figure 5-293 for flaps - 10°
   Figure 5-297 for flaps - 0°
2. Landing distance ..... CALCULATE ACCORDING TO FLAPS CONFIGURATION
   Figure 5-289 for flaps - 20°
   Figure 5-293 for flaps - 10°
   Figure 5-297 for flaps - 0°
3. Maximum landing weight
   allowable by tire speed limit ..... CALCULATE
   Figure 5-289 for flaps - 20°
   Figure 5-293 for flaps - 10°
   Figure 5-297 for flaps - 0°
4. TAWS/FLAP OVRD ..... ON

NOTE

Select TAWS/FLAPS OVRD pushbutton to ON prevents nuisance "*TOO LOW FLAPS*" aural alert.

If landing configuration is Flap 0°, reduce to minimum landing weight

5. Fuel jettison ..... AS REQUIRED
6. AIRSPEED ..... CONTROL IN MAN SPD MODE (FCP-MAN)

NOTE

In Flaps 0° configuration, the AUTO SPEED mode will slow aircraft to Vref when entering terminal airspace.

(Continued)

CAUTION

1. IF NO FLAPS LANDING IS DUE TO THE LOSS OF LEFT HYDRAULIC SYSTEM (LEFT HYDRAULIC SYSTEM FAILURE, page IIIA-176), THE FOLLOWING SYSTEMS WILL BE UNAVAILABLE:
   - Ground spoilers
   - Outboard spoilers
   - OUTBOARD BRAKES
   - Left T/R
2. ROLL ASSIST AND SPEED BRAKES OPERATION IS DEGRADED.

V_{REF} For Abnormal Flaps Configurations

Gross Weight (LB)	Flaps 20°	Flaps 10°	Flaps 0°
39,000	145	151	191
38,000	142	149	188
37,000	140	147	185
36,000	138	145	183
35,000	136	143	180
34,000	134	141	177
33,000	132	138	174
32,000	130	136	171
31,000	128	134	169
3,0000	126	132	166
29,000	124	130	163
28,000	122	127	160
27,000	120	125	157
26,000	118	123	154
25,000	115	121	151

NOTE

The V_{REF} values in the table above refer to sea level landing field elevation.
For each 1000 ft above MSL add 1 kt.

<<END>>

RUDDER FAILURE

Rudder Fail caution message indicates a complete loss of rudder operation.

NOTE

1. Yaw Damper is inoperative. dutch roll may be experienced.
2. TCM is not available.

1. Autopilot ..... ENGAGE
2. Altitude ..... DESCEND BELOW 25,000 FT
3. Airspeed ..... MAINTAIN BELOW 250 KCAS / 0.7 M_i
4. Land at nearest suitable airport
5. Use longest and widest runway available

CAUTION

MAXIMUM CROSSWIND IS 7 KT.

6. Fuel balance ..... MAINTAIN
7. Flight controls synoptic ..... VERIFY RUDDER POSITION (ZERO)
8. Auto brakes ..... HIGH
9. Perform BEFORE LANDING, Page IV-37
10. Upon touchdown ..... LOWER NOSE TO RUNWAY

(Continued)

11. Directional control:
    a. Maintain using NWS (NWS through rudder pedal steering still available)

CAUTION

MINIMIZE TILLER INPUTS AT HIGH SPEED TO AVOID OVER CONTROL, PIO AND POSSIBLE LOSS OF CONTROL.

g. Use differential braking if required

NOTE

Applying brakes will disconnect the auto brakes

<<END>>

RUDDER PEDAL COMMAND FAILURE

Rudder Pedal CMD Fail caution message indicates the loss of more than two rudder pedal sensors. Rudder pedal command inputs will not activate the rudder surface.

NOTE

1. Rudder control is available by rudder trim switch up to approximately 1/3 of maximum rudder displacement.
2. NWS and TCM mode are operative.

1. Land as soon as practicable
2. Use longest and widest runway available

CAUTION

MAXIMUM CROSSWIND IS 7 KT.

3. Fuel balance ..... MAINTAIN
4. Auto brakes..... HIGH
5. Perform BEFORE LANDING, Page IV-37
6. Upon Touchdown ..... LOWER NOSE TO RUNWAY
7. Runway directional control:
   a. Maintain using NWS

CAUTION

MINIMIZE TILLER INPUTS AT HIGH SPEED TO AVOID OVER CONTROL, PIO AND POSSIBLE LOSS OF CONTROL

h. Use differential braking if required

<<END>>

STABILIZER TRIM RUNAWAY

NOTE

Pilot or co-pilot's STAB trim switch command is stuck.

1. Take manual control of the aircraft
2. Pilot STAB trim switch ..... .TRIM OPPOSITE TO RUNAWAY
3. ALTN STAB ..... ARM

If failure persists:

4. ALTN STAB ..... OFF
5. STAB position..... DETERMINE
   (0° to -3° for cruise or below -4° for landing)
6. STAB MCU and ALTN STAB cb (F7, F17) ..... PULL

Approach and Landing:

7. Airspeed..... MAINTAIN MINIMUM OF V_{REF} + 10 KT FOR FLAPS SETTING
8. Select the longest available runway
9. Aircraft CG ..... CONSIDER SHIFTING ACCORDING TO CONTROL FORCES
10. Flaps configuration:
    a. Consider flaps position according to elevator control force tendency:
    If pushing forward on the yoke - use LND flaps
    If pulling aft on the yoke - use Flaps 20°;
    if excessive pull forces are required - consider flaps 10° or 0°
11. Landing performance ..... CALCULATE

Flaps position	Performance figures: Landing Weight Limitation / V_{REF} / Actual Landing Distance
0°	Figure 5-297
10°	Figure 5-293
20°	Figure 5-289

(Continued)

12. Perform BEFORE LANDING, Page IV-37
13. TAWS/FLAP OVRD..... ON (IF NOT FLAPS LND)
14. Auto brakes..... HIGH
15. Final ..... V_{REF}+10 KT FOR FLAPS SETTING

Landing

16. Avoid large or abrupt pitch attitude and thrust changes

<<END>>

Q-FEEL FAILURE

NOTE

If Q-feel fails, the FCECU defaults to Q-feel gains set for a speed below 200 kt.

IF FAILURE OCCURRED ABOVE 200 KCAS (UP TO V_{MO}/M_{MO}):

1. Autopilot. .....ENGAGE

NOTE

Flight envelope is not limited when using the autopilot

2. Q-Feel cb (G12) ..... VERIFY IN

CAUTION

WHEN FLYING WITH MANUAL CONTROLS AT SPEEDS ABOVE 200 KCAS WITH A Q-FEEL SET AT DEFAULT GAINS, THE AIRCRAFT MAY BE SENSITIVE TO SMALL ELEVATOR INPUTS.

3. Airspeed.....REDUCE BELOW 200 KCAS WHEN PRACTICAL
4. Landing .....PERFORM NORMAL LANDING

If speed is below 200 KCAS:

5. Airspeed..... MAINTAIN BELOW 200 KCAS
6. Land at nearest suitable airport

<<END>>

STALL PROTECTION SYSTEM FAILURE

SP/Shaker Fail or Stick Pusher Fail caution messages not associated with takeoff indicate a lost of stall protection.

.

CAUTION

DURING FAILURE OF THE SP/STICK SHAKER, THERE WILL BE NO ARTIFICIAL WARNING BEFORE THE ACTUAL STALL. DO NOT EXCEED 0.66 NORMALIZED AOA.

If the Stick Pusher Fail caution message appears during takeoff:

Stick Pusher Fail caution message during takeoff indicates a temporary voltage drop to the AP Elevator Servo as both EMPs are activated when the thrust levers are advanced to takeoff power. The takeoff can be reattempted using the following procedure:

At least 10 seconds before takeoff

1. Both EMPs ..... ON

If the Stick Pusher Fail caution message does not come on or comes on and then goes off:

2. Normal Takeoff ..... PERFORM

After Takeoff

3. Both EMPs ..... OFF and ARM

If the Stick Pusher Fail caution message comes on and remains on:

4. Both EMPs ..... OFF and ARM
5. Do not Dispatch.

(Continued)

If the Stick Pusher Fail *caution message appears in flight:*

1. Respect the PLI (pitch limit indicator)
2. AP AIL SERVO (O3), AP ELEV SRVO (O4) cb's ..... CHECK

If AOA Miscompare *caution message is on:*

3. See AOA (ANGLE OF ATTACK) MISCOMPARE, page IIIA-217

NOTE

If AOA Probe Fail, L-R caution message comes on until leaving Icing conditions. The system will self-reset when outside of icing conditions

If stall protection system failure persists with no other related CAS message:

4. STICK PUSHER.....OFF

NOTE

Stick Pusher Off caution message is displayed

5. Approach..... V_{REF} + 10 KT

<<END>>

ATA 28 - FUEL

FUEL STANDBY PUMP INOPERATIVE

STBY Pump INOP, L, STBY Pump INOP, R *or* STBY Pump INOP, L-R *caution messages comes on when:*

- Fuel STBY PUMP is selected ON and the pump does not operate
- Fuel STBY PUMP is armed with low fuel pressure and the pump does not operate. (When engines generators are on line)
- Fuel Jettison is ON and the pump does not operate

NOTE

In case of a miscompare between the CAS message and the synoptic page, act according to the CAS message.

If standby fuel pump is not on:

1. Indicated STBY FUEL PUMP.....OFF

NOTE

Fuel Pump Not Arm, L *or* Fuel Pump Not Arm, R *or* Fuel Pump Not Arm, L-R caution message will come on.

2. Indicated STBY FUEL PUMP.....ON

If both, L and R stby pump failed, STBY Pump INOP, L-R *caution messages comes on:*

NOTE

Fuel Jettison is not available. Fuel XFLOW is not available.

(Continued)

If single failure - STBY Pump INOP, L *or* STBY Pump INOP, R. *caution message comes on.*

NOTE

Fuel Jettison of both sides is available through Interconnect Valve only, with slower jettisoning rate. Fuel XFLOW - not available.

<<END>>

STANDBY PUMP ON

STBY Pump On, L, STBY Pump On, R or STBY Pump On, L-R caution message comes on when fuel STBY pump comes on:

- The STBY FUEL PUMP selected ARM position and the fuel pressure dropped below 4.5 psi
- The STBY FUEL PUMP selected OFF and the on-side FUEL JETTISON is OFF but the pump operates

NOTE

In case of a miscompare between the CAS message and the synoptic page, act according to the CAS message.

If a fuel leak is suspected, see FUEL LEAK, page II-45

If Fuel Pressure Low, L-R, Fuel Pressure Low, L *or* Fuel Pressure Low, R *warning message or* Fuel Pressure Low, L-R, Fuel Pressure Low, L *or* Fuel Pressure Low, R *caution message is on*

CAUTION

LOW FUEL PRESSURE MAY CAUSE ENGINE FLAMEOUT ABOVE 25,000 FT. AVOID ABRUPT THRUST LEVER MOVEMENTS.

1. Affected side STBY FUEL PUMP .....ON

(Continued)

NOTE

. The message changes to STBY Pump On, L-R, STBY Pump On, L *or* STBY Pump On, R status message

If Fuel Pressure Low, L-R, Fuel Pressure Low, L *or* Fuel Pressure Low, R *warning message or* Fuel Pressure Low, L-R, Fuel Pressure Low, L *or* Fuel Pressure Low, R *caution message* persist - *see* FUEL PRESSURE LOW, Page II-49

If fuel pressure is normal and the STBY PUMP is ON regardless of the command, suspect an inoperative jet pump.

NOTE

Active balancing using Fuel XFLOW to the respective side is not available.

<<END>>

FUEL TANK TEMPERATURE LOW

Fuel Tank TEMP Low caution message comes on when the fuel tank temperature is approaching the minimum temperature for the selected fuel type.

NOTE

Fuel tank minimum temperatures:

- Jet A -38°C

For Jet A type fuel, the caution message comes on at -36°C. Continue monitoring the temperatures closely.

- Jet A1 -46°C
- JP-8 -46°C

1. Fuel synoptic DISPLAY
2. Fuel type ..... VERIFY (SMC-UTIL-FUEL or SEC EICAS)
3. Fuel tank temperature ..... MONITOR

If the indicated fuel temperature reaches the limits listed in 1-28-20: FUEL TANK TEMPERATURE, Page I-20

4. Perform steps 5 and/ or 6 as suitable to increase fuel tank temperature above limits.
5. Descend to altitude where SAT is above -60°C
6. Airspeed ..... .MAINTAIN ABOVE 0.8M_i
7. Fuel tank temperature ..... CONTINUE MONITORING
8. Mission performance ..... RE-CALCULATE OR CONSIDER DIVERSION

<<END>>

FUEL IMBALANCE

Fuel Imbalance caution message comes on when the FQMC has detected a fuel imbalance between wing tanks of more than 450 lb on the ground, or 900 lb in flight.

CAUTION

FUEL IMBALANCE MAY INDICATE A FUEL LEAK.

If fuel quantity in each wing tank is above 300 lb and there is no evidence of high fuel flow or fuel leak:

1. FUEL INTERCONNECT ..... OPEN

NOTE

Fuel INTER Valve Open status message will come on.

2. Fuel asymmetry ..... MONITOR

NOTE

Use a small sideslip if needed (slowly add rudder to the heavy wing side and bank towards the light wing).

When fuel balance is achieved:

3. FUEL INTERCONNECT ..... CLOSE

If fuel quantity in any wing tank is below 300 lb, or fuel balance is not achieved:

4. FUEL XFLOW ..... OPEN

NOTE

Fuel XFLOW Valve Open status message will come on. CAS will change to Fuel XFLOW Valve Open caution message 5 minutes after valve has been selected open.

(Continued)

5. “Heavy” tank FUEL STBY PUMP .....ON

NOTE

STBY Pump On, L or STBY Pump On, R status message will come on

When fuel balance is achieved:

6. FUEL XFLOW .....CLOSE
7. “Heavy” tank FUEL STBY PUMP .....OFF

<<END>>

FUEL INTERCONNECT VALVE FAILURE

Fuel INTER Valve Fail caution messages comes on when fuel interconnect valve has failed. Pilot commanded the valve to open position and it is closed, or pilot commanded the valve to close and it is open, or valve data in valid.

1. Fuel synoptic ..... DISPLAY

If the valve has failed closed and fuel balancing is required:

2. Fuel X FLOW ..... OPEN

NOTE

Fuel XFLOW Valve Open status message will come on. CAS will change to Fuel XFLOW Valve Open caution message 5 minutes after valve has been selected open.

3. "Heavy" wing FUEL STBY PUMP ..... ON
   STBY Pump On, L or STBY Pump On, R status message will come on

When fuel balance is achieved:

4. FUEL X FLOW ..... CLOSE
5. "Heavy" wing FUEL STBY PUMP ..... OFF

If the valve has failed open:

6. Fuel imbalance ..... MONITOR
7. AVOID SIDE SLIPS

<<END>>

FUEL JETTISON

NOTE

Avoid fuel jettisoning in the vicinity of lightning.

Normal jettison operation:

1. Both FUEL JETTISON .....ON

NOTE

message comes on. Verify FUEL JETT light illuminate in pushbuttons.

2. Fuel JETT On, L-R caution message.....VERIFY ON
3. Fuel synoptic.....DISPLAY
4. Fuel quantity and balance.....MONITOR

NOTE

1. Fuel jettison will stop automatically when fuel quantity reaches 800 lb on the respective side.
2. Jettisoned fuel is not included in the FUEL USED data on the FMS DATA page or FMS calculations.

When aircraft weight is sufficiently reduced:

5. Both FUEL JETTISON .....OFF
6. Fuel JETT On, L-R caution message.....VERIFY OFF

<<END>>

JETTISON VALVE FAILURE

JETT Valve Fail, L, JETT Valve Fail, R or JETT Valve Fail, L-R caution message comes on when:

- The valve was commanded to open and stays closed, and left fuel quantity (feed + wing tanks) is above 800 lb, or:
- The valve was commanded to close and stayed open, or:
- Valve data is invalid

If the valve failed close and affected side fuel jettison is required:

1. Fuel synoptic ..... DISPLAY
2. Opposite side FUEL JETT ..... ON

NOTE

Fuel JETT On, L or Fuel JETT On, R caution message will come on

3. FUEL INTERCONNECT ..... OPEN

NOTE

Fuel INTER Valve Open status message will come on

4. Fuel quantity ..... MONITOR CLOSELY

When the required fuel quantity is reached:

5. FUEL JETT ..... OFF

When fuel balanced is achieved:

6. FUEL INTERCONNECT ..... OFF

If the valve failed open (fuel jettisoning did not stop. JETT AUTO Stop INOP *caution message comes on:*

7. Fuel quantity ..... MONITOR
8. FUEL JETT ..... CYCLE ON THEN OFF
9. L and R JETTISON cb's (I8, I18) ..... CYCLE

(Continued)

If fuel jettison does not stop:

10. Affected FUEL STBY PUMP OFF/ARM .....NOT ARM

NOTE

Fuel Pump Not Arm, L *or* Fuel Pump Not Arm, R caution message will come on.

11. LAND AT NEAREST SUITABLE AIRPORT

NOTE

1. Gravity jettison stops when approximately 300 lb of fuel remain in each wing.
2. FQMC disables the jettison function (closes valve) if the affected side fuel quantity (wing + feed tanks) drops below 800 lb.

<<END>>

JETTISON AUTO STOP INOPERATIVE

JETT AUTO Stop INOP caution message *comes on for either of the following:*

- The automatic stopping of the fuel Jettison is inoperative
- The left or right wing fuel quantity is unavailable
- Different jettisons commands from FQMC1 and FQMC2
- Two wing fuel probes or one feed fuel probe have failed
- No fuel jettison has been commanded and the jettison valve is open

If fuel jettison is active and not required:

1. Both FUEL JETT .....CYCLE ON, THEN OFF

If failure persists:

2. L and R JETTISON cb's (I8, I18) ..... CYCLE
3. Fuel quantity ..... MONITOR

NOTE

1. Activating the fuel jettison with auto-stop feature inoperative is not recommended.
2. Consider using the SMC utilities clock alarm or other means to remind the crew to check fuel jettison status when auto-stop feature is inoperative.

If failure persists and fuel jettisoning continues:

4. Respective FUEL STBY PUMP OFF/ARM .....NOT ARM

NOTE

Fuel Pump Not Arm, L *or* Fuel Pump Not Arm, R caution message will come on.

5. Land at nearest suitable airport

NOTE

1. Gravity jettison will stop at approximately 300 lb remaining in each wing.
2. FQMC disables the jettison function (closes valve) in case the relevant side (wing + feed tanks) quantity drops below 800 lb.

<<END>>

FUEL MEASUREMENT DEGRADED

Check Fuel Quantity caution messages comes on when fuel tank quantity is lost in any of the tanks.

NOTE

Fuel transfer sequence (tanks depletion sequence):

- FWD (to wings)
- AFT (to wings)
- CTR (to wings)
- Wings (to feed tanks)
- Feed tanks

1. CDU - IDX - ENGINE/FUEL page ..... CHECK TOTAL AND WINGS QUANTITY
2. Fuel synoptic ..... DISPLAY
3. Determine which of the fuel tanks readings have failed
4. Fuel transfer sequence ..... MONITOR
5. Fuel management and flight range ..... MONITOR

<<END>>

FUEL TRANSFER FAULT

Fuel Transfer Fault caution message come on when fuel transfer sequence is failed.

Fuel transfer sequence (tanks depletion sequence):

- FWD (to wings)
- AFT (to wings)
- CTR (to wings)
- Wings (to feed tanks)
- Feed tanks

1. Fuel synoptic..... DISPLAY
2. Determine in which tank the fuel is trapped

NOTE

Amber feed lines between the tanks indicate wrong transfer sequence.

- FWD should be empty when total fuel is less than 13,000 lb
- AFT should be empty when total fuel is less than 12,000 lb
- CTR should be empty when total fuel is less than 9200 lb

If fuel is trapped in FWD tank:

1. Recalculate range without trapped fuel in FWD tank.

NOTE

Max fuel loss is 1710 lb.

(Continued)

If fuel is trapped in CTR tank:

2. Recalculate range without trapped fuel in CTR tank

NOTE

1. Max fuel loss of 2080 lb.
2. If the CTR tank is not feeding, fuel may also be trapped in the FWD and AFT tank increasing the maximum fuel loss to as much as 4830 lb.

If fuel is trapped in aft tank:

3. Recalculate range without trapped fuel in aft tank

NOTE

1. Max fuel loss of 1040 lb.
2. If the aft tank is not feeding, fuel may also be trapped in the forward tank increasing the maximum fuel loss to as much as 2750 lb.

4. Recalculate cg for landing weight. Consider shifting passengers forward
5. For extreme aft cg, consider flaps 20°/10° configuration for landing
6. Recalculate landing distance according to flaps setting selected

<<END>>

ATA 29 - HYDRAULIC

HYDRAULIC SYSTEM/COMPONENT AVAILABILITY PER FAILURE

(Sheet 1 of 2)

SYSTEM / COMPONENT	HYD System Fail (C), L	HYD System Fail (C), R	HYD SYS Fail (C), L-R
Elevators			Only manual
Q Feel		Low speed gains	Low speed gains
Ground Spoilers	Inoperative		Inoperative
Inboard Spoilers		Inoperative	Inoperative
Outboard Spoilers	Inoperative		Inoperative
Roll Assist	Degraded	Degraded	Inoperative
Air Brakes	Degraded	Degraded	Inoperative
Rudder	Single (not degraded)	Single (not degraded)	Inoperative (1)
Flaps	Inoperative		
HOPS	Inoperative	Inoperative	Inoperative
Landing Gear		Pneumatic accumulator (2)	Pneumatic accumulator (2)
Nose Wheel Steering		Inoperative	Inoperative
Inboard Brakes	Accumulator (3)		Accumulator (3)
Outboard Brakes		Accumulator (3)	Accumulator (3)
Parking			Accumulator (3)
L Thrust Reverser	Inoperative		Inoperative

HYDRAULIC SYSTEM/COMPONENT AVAILABILITY PER FAILURE

(Sheet 2 of 2)

SYSTEM / COMPONENT	HYD System Fail (C), L	HYD System Fail (C), R	HYD SYS Fail (C), L-R
R Thrust Reverser		Inoperative	Inoperative
Main Entrance Door	Inoperative		Inoperative

(1) Rudder trim, TCM and YD function are inoperative.

(2) Backup pneumatic accumulator for one time emergency extension of landing gear

(3) Hydraulic accumulator for brake operation. When braking on accumulator pressure it is recommended to perform one long pedal brake application down to full stop. Repeating pedal press will deplete brake's accumulator rapidly.

RIGHT HYDRAULIC SYSTEM FAILURE

HYD System Fail (C), R caution message indicates system pressure is below 1300 psi.

NOTE

This is a Collector (C) message. Flight control (SA) messages may be displayed.

1. Airspeed.....BELOW 250 KCAS / 0.7M_i
2. R HYD EMP ON.....PRESS ON

Did HYD System Fail (C) caution message clear?

YES:
- Maintain 39,000 ft or below
- Land as soon as practicable

NO: **<<END>>**

3. Hydraulic synoptic..... DISPLAY
4. R HYD EMP ..... DEPRESS NOT ARM & OFF
5. Right hydraulic reservoir temperature..... MONITOR

NOTE

EMP HYD Pump Not Arm, R caution message will come on

The following systems will be affected as follows:.

SYSTEM	STATUS	RESULTS
L & R Inboard Spoilers	Inoperative	
Q-Feel	Low speed gains	Low pitch forces at high airspeed
Right T/R	Inoperative	Use only left T/R at idle
Inboard wheel brakes	Accumulator only	No auto-brakes. Anti Skid is operative
Elevators	Single actuator for each elevator	Not significant
Rudder	Single rudder	Not significant
Nose Wheel Steering	Inoperative	Use differential braking
Landing Gear Extension	Pneumatic accumulator backup only	EMERGENCY EXTENSION

(Continued)

CAUTION

AS Q FEEL FAILS, PITCH FORCES ARE MUCH LIGHTER AT AIRSPEED ABOVE 200 KTS G LOAD LIMITS SHOULD BE MONITORED.

Is HYD Reservoir Hot, R *caution message on?*

YES:
- Perform engine shutdown:

R Engine thrust lever ..... IDLE
R Engine FUEL CONTROL..... OFF

NO:
- Continue step 6.

CAUTION

DO NOT ROTATE RIGHT ENGINE FIRE HANDLE

R Engine FIRE handle ..... PULL ONLY

6. Land at the nearest suitable airport
7. Landing performance ..... Increase Landing Distance by 10%
8. Fuel Jettison..... USE TO REDUCE LANDING WEIGHT

CAUTION

EXTENDED LANDING GEAR CANNOT BE RETRACTED.

(Continued)

NOTE

1. Allow sufficient time to perform emergency gear extension before start of approach.
2. Roll response is degraded below 200 KCAS.
3. Configure aircraft for landing early.
4. In case of single engine approach with R hydraulic failure – landing gear cannot be retracted for a go around.

9. Perform emergency landing gear extension:
   a. Flaps 20º
   i. Airspeed ..... BELOW 175 KCAS
   j. Landing gear lever ..... DOWN
   k. Emergency gear handle ..... RELEASE, TURN, AND LIFT
   l. Landing gear ..... VERIFY DOWN AND LOCKED
10. NWS ..... DISCONNECT

NOTE

NWS INOP caution message comes on.

Before Landing:

11. Parking brakes ..... VERIFY OFF
12. Auto brakes ..... OFF
13. Flaps ..... SET
14. Landing gear ..... DOWN / 3 GREEN

Was R engine shut down during this procedure?

YES:
- Flaps ..... 20°
- TAWS FLAP OVRD ..... ON
- Approach speed ..... V_{REF} FOR 20° FLAPS + 5 KT

NO:
- Flaps ..... LND
- Airspeed ..... V_{REF} + 5 KT

After touch down and aircraft nosewheel on ground:

15. Brakes (pedals) ..... AS REQUIRED
16. Use rudder and differential braking for directional control
17. Left T/R ..... AS REQUIRED

<<END>>

LEFT HYDRAULIC SYSTEM FAILURE

HYD System Fail (C), L caution messages indicate that system pressure is below 1300 psi.

NOTE

This is a collector (C) message. Flight control SA messages may be displayed.

1. EMP ..... PRESS ON

Did HYD System Fail (C), L *caution message clear?*

YES:
- Maintain 39,000 ft or below
- Land as soon as practicable

NO:
- Go to step 2

2. Hydraulic synoptic ..... DISPLAY
3. L HYD EMP ..... DEPRESS NOT ARM & OFF

NOTE

EMP HYD Pump Not Arm, L caution message will come on

The following systems will be affected as follows:.

SYSTEM	STATUS	RESULTS
Flaps	Inoperative	Abnormal landing configuration
L & R ground spoilers	Inoperative	Landing distance penalty
L & R Outboard Spoilers	Inoperative	
Left T/R	Inoperative	Use only right T/R at idle
Outboard wheel-brakes	Accumulator Only	No Auto-Brakes. Anti skid is available
Elevators	Single piston in each actuator	Not significant
Rudder	Single rudder	Not significant
Main entrance door up-motion	Inoperative	Manual operation

(Continued)

Is HYD Reservoir Hot, L *caution message on?*

YES:

- Perform engine shutdown:

L Engine thrust lever ..... IDLE
L Engine FUEL CONTROL ..... OFF

CAUTION

DO NOT ROTATE RIGHT ENGINE FIRE HANDLE

L Engine FIRE handle ..... PULL ONLY

NO:

- Continue step 4.

4. Land at nearest suitable airport.
5. Calculate landing performance according to flaps position and apply the following penalties:

Flaps position	Performance figures: Landing Weight Limitation / Vref / Actual landing distance	Increase ALD per flap position by
0°	Figure 5-297	8%
10°	Figure 5-293	10%
20°	Figure 5-289	15%
LND	Figure 5-284	25%

6. ATC ..... Advise & request long runway and wide approach
7. Fuel jettison ..... CONSIDER FOR LOWER LANDING WEIGHT

(Continued)

Before Landing:

8. Parking brakes ..... VERIFY OFF
9. Auto-brakes ..... OFF
10. TAWS/FLAPS OVRD ..... AS REQUIRED
11. Flaps ..... LAST CONFIGURATION
12. Landing gear lever ..... DOWN; 3 GREEN
13. Airspeed ..... APPROPRIATE TO CONFIGURATION
14. Autopilot ..... DISCONNECT
15. Autothrottle ..... AS REQUIRED

On final:

:

WARNING

IF GO AROUND IS REQUIRED, APPLY THRUST GRADUALLY

16. Glide path ..... AS REQUIRED TO MAINTAIN Vref
17. Touch-down ground speed ..... 182 KCAS MAXIMUM
18. Minimize float . Plan early touchdown to reduce the use of ailerons
19. Wheel brakes ..... AS REQUIRED
20. Right thrust reverser ..... AS REQUIRED

<<END>>

LEFT AND RIGHT (DUAL) HYDRAULIC SYSTEMS FAILURE

HYD SYS Fail (C), L-R caution message indicate both left and right hydraulic system pressures are below 1300 psi.

NOTE

The message is a collector CAS message. Flight control SA messages may be displayed.

1. Autopilot ..... ENGAGE (FOR ROLL AXIS)

NOTE

1. AP Roll Axis Only (C) caution message will come on. Pitch mode is not controlled by this Autopilot mode and STAB trim can be used as required. This mode controls only the roll axis to damp the Dutch roll oscillations that may develop if above 25,000 ft / 0.7M_i / 250 kt. This mode compensates for loss of yaw damper function due to loss of rudder.
2. Autopilot in this mode will not disconnect for Stick Shaker event.

2. Controllability:
   a. Use STAB trim to compensate for high pitch forces

NOTE

When flying in manual reversion, pitch force is higher and pitch response is sluggish. Aircraft maneuverability is degraded.

m. Do not exceed 30° bank angle

(Continued)

3. Both HYD EMP ON ..... PRESS ON

Did HYD SYS Fail (C), L-R *caution message clear?*

YES:
- Maintain 39,000 ft or below
- Land at nearest suitable airport

NO:
- If one system is restored, proceed to the procedure associated with the displayed failure message. Go to HYD System Fail (C), L or HYD System Fail (C), R.
- If both system remain failed — Go to step 4.

4. Hydraulic synoptic ..... DISPLAY
5. Both HYD EMP ..... DEPRESS NOT ARM & OFF

NOTE

EMP HYD Pump Not Arm, L-R caution message will come on.

The following systems will be affected as follows:.

SYSTEM	STATUS	RESULTS
Elevators	Degraded Power	Manual reversion control. (Use STAB trim to aid in pitch control). Refer to OIS 3 ELEVATORS MANUAL REVERSION if time permits
Q-Feel	Defaults to low speed forces	Low pitch forces. Avoid abrupt pitch inputs which can overload aircraft.
Rudder	Inoperative	Crosswind limit - 7 kt
Flaps	Inoperative	Abnormal flaps configuration
Both Inboard spoilers	Inoperative	Roll rate and authority significantly reduced.
Both Outboard spoilers	Inoperative	
Landing gear extension	Inoperative	Emergency extension
Nose Wheel System	Inoperative	Use differential braking
Normal Wheel brakes	Use Accumulators	No Autobrake
Thrust reversers	Inoperative	Unable contaminated runways.

(Continued)

6. Land at the nearest suitable airport
7. Calculate landing performance according to flaps position and apply for the following penalties:
   a. Calculate landing performance according to flaps position and apply the following penalties:

Flaps position	Performance figures: Landing Weight Limitation / Vref / Actual landing distance	Increase ALD per flap position by
0°	Figure 5-297	15%
10°	Figure 5-293	20%
20°	Figure 5-289	30%
LND	Figure 5-284	50%

8. ATC ..... Advise & request long runway and wide approach and aircraft will require shut down on runway.
9. Fuel jettison..... CONSIDER FOR LOWER LANDING WEIGHT

CAUTION

ONCE EXTENDED, LANDING GEAR CANNOT BE RETRACTED.

NOTE

1. Allow sufficient time to perform emergency gear extension before beginning approach.
2. Handling qualities are affected when flying at speed below 200 KCAS.

10. Perform EMERGENCY LANDING GEAR EXTENSION:
    a. Airspeed .....BELOW 175 KCAS
    n. Landing gear lever .....DOWN
    o. Emergency gear extension handle .....RELEASE, TURN, AND LIFT
    p. Landing gear .....VERIFY DOWN AND LOCKED

(Continued)

11. NWS ..... DISCONNECT

NOTE

NWS INOP caution message comes on.

Before Landing:

12. Parking brakes ..... VERIFY OFF
13. Auto brakes ..... OFF
14. Landing gear ..... DOWN/ 3 GREEN
15. Airspeed ..... V_{REF} + 10, APPROPRIATE TO CONFIGURATION
16. Autopilot ..... DISCONNECT
17. Auto throttles ..... DISCONNECT

CAUTION

FLARELESS LANDING - USE STAB TRIM TO REDUCE PITCH FORCE FOR FLARE. OVER TRIMMING CAN CAUSE BALLOONING EFFECT.

NOTE

Retard thrust gradually when ground effect is felt (approximately 30 ft).

(Continued)

After Touch down and aircraft nose lowered:

CAUTION

MINIMIZE ANY WHEEL BRAKES APPLICATIONS PRIOR TO TOUCHDOWN AS IT DEPLETES HYDRAULIC BRAKING ACCUMULATORS

18. Wheel brakes .. CONTINUOUS BRAKING DOWN TO FULL STOP

NOTE

It is recommended to use about half brake pedal deflection during braking in order to minimize any possible skids that may increase hydraulic braking accumulators depletion.

19. Directional control ..... USE AILERONS TO KEEP WINGS LEVEL

<<END>>

HYDRAULIC RESERVOIR HOT / HYDRAULIC PRESSURE HIGH

HYD Reservoir Hot, R, HYD Reservoir Hot, L or HYD Reservoir Hot, L-R caution message indicates that the respective hydraulic fluid temperature is (are) above limit.

HYD Pressure High, L, HYD Pressure High, R or HYD Pressure High, L-R caution message indicates the respective hydraulic pressure is (are) above the 3500 psi limit.

1. HYD synoptic ..... DISPLAY
2. L and R HYD system fluid quantity..... CHECK
3. HYD reservoirs temperature ..... MONITOR
4. Demand of affected HYD system..... DECREASE
5. Affected side(s) HYDRAULIC EMP (OFF/ARM & ON)..... NOT ARM & OFF

NOTE

EMP HYD Pump Not Arm, L *and / or* EMP HYD Pump Not Arm, R caution message will come on.

If temperature is high on both hydraulic systems:

6. Land at nearest suitable airport

WARNING

PERFORM THE FOLLOWING STEPS FOR ONE ENGINE ONLY.

If temperature continues to rise:

7. Corresponding engine thrust..... IDLE

If temperature is at or above 135°C (275°F):

NOTE

If both systems reach 135°C, right engine shutdown is recommended.

(Continued)

8. Affected engine FUEL CONTROL.....OFF

CAUTION

DO NOT ROTATE FIRE HANDLE DURING THE NEXT STEP

9. Affected engine FIRE handle.....PULL ONLY
10. Proceed to the indicated hydraulic system failure procedure, RIGHT HYDRAULIC SYSTEM FAILURE, page IIIA-173 or LEFT HYDRAULIC SYSTEM FAILURE, page IIIA-176

<<END>>

ATA 30 - ICE/RAIN PROTECTION SYSTEM

L-R WAI SYSTEM FAIL

WAI System Fail *CAS message indicates that:*

- BOTH WAI (Wing Anti Ice) systems have failed, or
- The WAI Cross-Over valve is not in the correct position.

On Ground:

If WAI System Fail *caution CAS message appeared when WAI system is not operating (engines are running):*

1. L and R WAI switches .....ON

If the failure clears and wings warm up as required (No WAI System Fail *caution CAS come-on), flight into icing condition is approved only with both engine bleed and both WAI systems operating.*

NOTE

WAI System Fail caution CAS message reappear when the WAI system is turned OFF.

2. L and R WAI switches ..... AS REQUIRED

If WAI System Fail *caution CAS message remains or comes on after WAI system activation:*

3. Flight into icing condition is prohibited
4. L and R WAI switches .....OFF

in air:

1. Depart icing condition
2. L and R WAI switches .....OFF

(Continued)

CAUTION

1. FOR ANY WING ANTI ICING FAILURE, IF ICING CONDITIONS WERE MET WHILE WINGS ARE COLD, USE VREF +20 KT FOR APPROACH AND LANDING, AND INCREASE LANDING DISTANCE BY 40%.
2. DO NOT EXCEED TIRE SPEED LIMITATIONS (182KT GROUND SPEED).

<<END>>

WING ANTI ICE OPERATION ON SINGLE SOURCE

Use this procedure when either one WAI system or one Engine Bleed system is failed.

1. Altitude ..... BELOW 26,000

CAUTION

WING ANTI ICE OPERATION ON SINGLE BLEED SOURCE IS NOT APPROVED ABOVE 26,000 FT.

2. Non-operating side:
   a. ENG Bleed ..... OFF
   q. WAI Switch ..... OFF
3. Operating side:
   a. ENG Bleed ..... ON
   r. WAI Switch ..... ON
4. Isolation valve ..... CLOSED
5. Bleed/Anti Ice synoptic ..... DISPLAY
6. Wing Anti Ice temperatures ..... MONITOR

CAUTION

1. FOR ANY WING ANTI ICING FAILURE, IF ICING CONDITIONS WERE MET WHILE WINGS ARE COLD, USE VREF +20 KT FOR APPROACH AND LANDING, AND INCREASE LANDING DISTANCE BY 40%.
2. DO NOT EXCEED TIRE SPEED LIMITATIONS (182KT GROUND SPEED).

<<END>>

WAI XOVER Fail Close

WAI XOVER Fail Close CAS message indicates that the WAI Cross-Over valve has failed in the closed position.

NOTE

This CAS message is accompanied by the WAI System Fail CAS message.

WARNING

IN CASE OF WAI CROSS-OVER VALVE BEING FAILED CLOSED, WING ANTI-ICE OPERATION IS PROHIBITED IF ONLY ONE BLEED OR ONLY ONE WAI SYSTEM IS OPERATIVE (NO "SINGLE-SOURCE" CROSS-HEATING CAPABILITY). FLIGHT INTO ICING CONDITION IS ALLOWED ONLY WITH BOTH ENGINE BLEEDS AND BOTH WAI SYSTEMS OPERATING.

If the WAI system is not active:

1. L and R WAI switches ..... ON
2. WAI System and XOVER Failures Messages .... VERIFY EXTINGUISHED
3. L and R WAI switches ..... AS REQUIRED

NOTE

WAI XOVER Fail Close and WAI System Fail CAS message will reappear if WAI switches are turned OFF.

If the WAI system was active prior to WAI failure messages in SINGLE source (Single Engine, Single Bleed or Single WAI system available):

4. Operating Side WAI switch ..... OFF
5. DEPART ICING CONDITIONS

<<END>>

WAI XOVER Fail Open

WAI XOVER Fail Open CAS message indicates that the Wing Anti Ice Cross-over valve failed in the Open position with both Bleeds and both WAI systems operating.

NOTE

This CAS message is accompanied by the WAI System Fail CAS message.

If malfunction appears below 26,000 ft:

1. Left ENG Bleed ..... OFF
2. Left WAI switch..... OFF
3. Thrust Levers ..... AS REQUIRED
4. Descent below 26,000 ft or depart icing condition.

NOTE

1. WAI XOVER Fail Open and WAI System Fail CAS message will not display when one ENG Bleed is selected OFF.
2. BAS Off, L CAS message will come on after selecting ENG Bleed to OFF.

When out of Icing Conditions:

5. Left ENG Bleed ..... ON
6. Thrust Levers ..... AS REQUIRED

<<END>>

PROBE HEAT FAILURE

ADS 1 Probe Heat Fail *caution message is on, indicates loss of electrical power to L PITOT*

1. Circuit breaker D4 ..... RESET ONCE or CYCLE ONCE

ADS 2 Probe Heat Fail *caution message is on, indicates loss of electrical power to R PITOT*

1. Circuit breaker D14 ..... RESET ONCE or CYCLE ONCE

ADS 1-2 Probe Heat FL *caution message is on, indicates loss of electrical power to L AND R PITOT.*

1. Circuit breaker D4, D14 ..... RESET ONCE or CYCLE ONCE

STBY Probe Heat Fail *caution message is on, indicates loss of electrical power to: STBY PITOT*

1. Circuit breaker E6 ..... RESET ONCE or CYCLE ONCE

TAT Probe Heat Fail *caution message is on, indicates loss of electrical power to: Total Air Temperature (TAT).*

1. Circuit breaker E3 ..... RESET ONCE or CYCLE ONCE

AOA Heat Fail, L *or* AOA Heat Fail, R *advisory message is on, indicates loss of electrical power to L AOA or R AOA.*

1. Circuit breaker D5, D16 ..... RESET ONCE or CYCLE ONCE

If CB did not trip or recycle failed:

NOTE

When cb has tripped, OVRD function is disabled.

2. PROBES HEAT ..... OVRD
3. Avoid icing conditions.

If Icing conditions are unavoidable

4. ADS..... SELECT SMC-SNSR-ADS - NON AFFECTED SIDE

(Continued)

NOTE

Air data flag will display on PFDs indicating single source data.

5. ATC .....Advise NON-RVSM

After landing:

6. PROBES HEAT ..... AUTO

<<END>>

ICE DETECTOR FAILURE

Ice Detector Fail, L, Ice Detector Fail, R or Ice Detector Fail, L-R caution message is displayed.

CAUTION

DO NOT USE AUTO ANTI ICE MODES. REMAINING ICE DETECTOR IS ADVISORY ONLY. DEFINE ICING CONDITIONS ACCORDING TO VISUAL QUES (VISIBLE MOISTURE AND TAT BELOW 10°C).

If not in Icing Conditions:

1. Both ENG ANTI ICE .....OFF
2. Both WING ANTI ICE .....OFF

If icing conditions are encountered:

1. Both ENG ANTI ICE .....ON
2. Both WING ANTI ICE .....ON

<<END>>

ATA 31 - INDICATION AND RECORDING SYSTEMS

CONTINUOUS NUISANCE AURAL WARNING

If continuous nuisance aural waning occurs:

1. CAS AURAL INHIBIT ..... SELECT (SMC-TEST)

CAUTION

MONITOR THE FOLLOWING SYSTEMS AS ALL AURAL ALERTS ARE INHIBITED: AFCS DISENGAGEMENTS, NEW CAS MESSAGE, ALTITUDE ALERTS.

2. Cockpit must be manned by both pilots
3. Increase monitoring of AFCS modes and altitude, and CAS window.

<<END>>

ATA 32 - LANDING GEAR AND BRAKES

BRAKE OVERHEAT

Brake Overheat caution message comes on when wheel brakes temperature exceeds 450ºC.

NOTE

In case of a miscompare between the CAS message and the synoptic page, act according to the CAS message.

On ground:

1. Brakes synoptic ..... DISPLAY
2. Overheated brake(s) ..... DETERMINE AND AVOID USE
3. Reverse thrust ..... AS REQUIRED

NOTE

Minimize taxi while attempting to park with a isolated hot brake. Parking into the wind is preferred.

4. Aircraft ..... STOP/CHOCK

CAUTION

DO NOT SET PARKING BRAKE.

(Continued)

5. Brake temperatures ..... MONITOR TREND

WARNING

STAY CLEAR OF THE MAIN LANDING GEAR AREA FOR A MINIMUM 30 MINUTES; DO NOT STAND IN FRONT OR BEHIND TIRES.

CAUTION

IF TEMPERATURE CONTINUES TO RISE OR REMAIN ABOVE OVERHEAT LIMIT FOR MORE THAN 5 MINUTES, EXPECT WHEEL FUSE PLUGS TO RELEASE.

If temperature continues to rise or remain above overheat limit for more than 5 minutes:

6. PERFORM EMERGENCY EVACUATION, page II-87

After Brake Overheat *caution message is off:*

7. All brake(s), wheel(s) and tire(s) ..... INSPECT

CAUTION

FOR SUBSEQUENT TAKEOFF THERE MAY NOT BE SUFFICIENT BRAKE KINETIC ENERGY AVAILABLE IN THE EVENT OF A REJECTED TAKEOFF. ALSO, TIRE FAILURE MAY OCCUR ON TAKEOFF ROLL.

<<END>>

ANTI-SKID FAILURE

Anti-skid Fail caution message indicates that anti-skid system is not available.

CAUTION

1. EXCEEDING BRAKES SKID LIMIT MIGHT CAUSE SEVERE DAMAGE OR BLOWN TIRES. DO NOT EXCEED 600 PSI BRAKE PRESSURE.
2. DECREASE BRAKE PRESSURE AS AIRPLANE DECELERATES TO PREVENT SKIDDING, BLOWING TIRES AND/OR ABRUPT STOPPING.

NOTE

Auto brakes are unavailable.

1. Brakes system synoptic ..... DISPLAY
2. Calculate landing distance

NOTE

Add 50% penalty to actual landing distance with anti-skid inoperative.

3. Normal landing ..... PERFORM
4. Thrust reversers ..... MAXIMUM REVERSE THRUST
5. Wheel brakes ..... APPLY

<<END>>

BRAKE CONTROL UNIT FAILURE

Brake CTRL Unit Fail caution messages indicate that normal braking system is not available (loss of brake by wire).

1. Brakes synoptic..... DISPLAY
2. INBD BRKS and OUTBD BRKS cb's (G6, G16)..... CYCLE

If failure persists:

3. Landing performance .....Increase Landing Distance by 60%

CAUTION

1. ANTI-SKID PROTECTION IS NOT AVAILABLE.
2. GROUND SPOILERS WILL NOT OPEN UPON TOUCHDOWN DUE TO LOSS OF WHEEL SPEED TRANSDUCERS (WST) SIGNALS.

After touchdown:

4. If GND Spoiler Auto Fail caution message is on .....EXTEND SPEED BRAKE ON TOUCHDOWN.
5. Thrust Reversers ..... USE MAX REVERSE THRUST

CAUTION

1. ABRUPT LEVER PULL WILL BLOW TIRES.
2. DO NOT EXCEED 600 PSI BRAKE PRESSURE (SKID LIMIT) WHEN PULLING PARKING BRAKE HANDLE.
3. DO NOT APPLY NORMAL BRAKES WHILE USING PARK BRAKE LEVER.

(Continued)

6. PARK BRAKE ..... PULL AS REQUIRED

CAUTION

DECREASE BRAKE PRESSURE AS AIRPLANE DECELERATES TO PREVENT SKIDDING, BLOWING TIRES AND/OR ABRUPT STOPPING.

<<END>>

NO BRAKING ON ONE STRUT

Brakes Fail,L or Brakes Fail, R caution message indicates that two brakes on the same strut are not available.

NOTE

1. Anti-skid not available.
2. Anticipate a 100% increase in landing distance.

1. Brakes synoptic..... DISPLAY

If pressure is available for affected side (check with gear down and PARK BRAKE handle applied), see BRAKE CONTROL UNIT FAILURE, Page IIIA-197, *step* 4

2. Normal landing..... PERFORM
3. Thrust Reversers ..... USE MAX REVERSE THRUST
4. Operative wheel brake ..... AS REQUIRED
5. Directional control .....MAINTAIN USING RUDDER AND NWS

CAUTION

1. EXPECT OPERATIVE BRAKE TO OVERHEAT. IF BRAKE FIRE IS NOTICED - EVACUATE PASSENGERS THROUGH THE SIDE OPPOSITE OF THE FIRE.
2. DO NOT EXCEED 600 PSI BRAKE PRESSURE (SKID LIMIT) WHEN USING THE AVAILABLE BRAKE.

<<END>>

SINGLE CHANNEL BRAKE FAILURE

OUTBD Brake Fail or INBD Brake Fail caution messages indicates that one braking channel not available.

NOTE

1. Anti-skid function available on operative channel.
2. Anticipate 35% increase in actual landing distance.

1. Brakes synoptic ..... DISPLAY
2. Affected circuit breakers
   (INBD BRKS -G16 or OUTBD BRKS -G6) ..... CYCLE
3. Normal landing ..... PERFORM
4. Thrust reveres ..... MAX / AS REQUIRED
5. Wheel brakes ..... APPLY AS REQUIRED
6. After landing ..... MONITOR BRAKES TEMPERATURE

<<END>>

SINGLE WHEEL SPEED TRANSDUCER (WST) FAILURE

OUTBD Brake Degrade, L, OUTBD Brake Degrade, R or INBD Brake Degrade, L or INBD Brake Degrade, R advisory message indicate loss of a single WST (Wheel Speed Transducer). The brake control unit will command 50% braking pressure (up to a limit of 600 psi) of adjacent brake on same strut.
Affected brake pressure indication on the brake synoptic is cyan.

NOTE

1. Anti Skid available.
2. Auto brakes are unavailable.
3. Anticipate increase of 11% in Actual landing distance.

1. Normal landing ..... PERFORM
2. Thrust reveres ..... AS REQUIRED
3. Wheel brakes ..... APPLY AS REQUIRED
4. After landing ..... MONITOR BRAKES TEMPERATURE

<<END>>

UNCOMMANDED BRAKING

Uncommanded Brake caution message indicates that pressure detected when PARK BRAKE not set and pedals not depressed.

During takeoff below V_1:

1. Takeoff.....ABORT

Before landing:

WARNING

EXPECT TIRE TO BLOW UP OR DEFLATE SHORTLY AFTER TOUCHDOWN.

2. Brake synoptic.....DISPLAY
3. INBD and OUTBD brakes cb's (G6,G16).....CYCLE

If failure persists:

4. Jettison fuel as required to reduce landing weight
5. Select longest runway available with minimal crosswind
6. Perform normal landing
7. Directional control .....MAINTAIN

<<END>>

WOW MISCOMPARE

WOW Miscompare caution message indicates that either nose left or right main landing gear Weight On Wheel (WOW) signal has failed to shift to appropriate mode or is invalid.

NOTE

1. Expect LG Maintenance REQD and BCS Maintenance REQD advisory messages to come on.
2. When BCS Maintenance REQD advisory messages is on, auto brakes are disabled.

1. Flight controls synoptic .....DISPLAY; CHECK WOW STATUS
2. Thrust reversers.. MUST STOW ABOVE 20 KT GROUND SPEED

NOTE

Expect TRs Stow Above 20 KTS caution message after touchdown. TR remains deployed if not stowed above 20 kt and maintenance action will be required.

If right WOW displays G *in flight:*

3. Activate the right side window defog manually, using the OVRD pushbutton
4. No automatic cabin load shedding in emergency

If right WOW displays A *on ground:*

5. Disable right side window defogging; pull D3 cb

If left WOW displays G *in flight:*

6. If required, activate the left side window defog manually, using the OVRD pushbutton
7. If LG retraction is required:
   a. LG DOWNLOCK OVERRIDE ..... DEPRESS AND HOLD
   s. Landing gear lever ..... UP
8. No automatic inverter load shedding if generator fails

(Continued)

9. Expect APU Maintenance REQD advisory messages to come on

If left WOW displays A *on ground:*

CAUTION

LANDING GEAR LEVER CAN BE EASILY MOVED TO UP POSITION.

10. Landing gear pins..... IN
11. Do not leave APU unattended as APU FIRE horn will not operate
12. Expect APU Maintenance REQD advisory messages to come on
13. Disable left side window defogging; pull D12 cb

If nose wheel WOW displays A *on ground:*

NOTE

Expect NWS INOP caution message when aircraft on ground / touchdown.

14. NWS.....OFF
15. Maintain directional control using rudder and differential braking
16. Disable pitot heat ..... Pull D4, D14 cb's

If nose wheel WOW displays G *in flight:*

17. Pitot heat is inhibited. Use OVRD pushbutton to heat probes and static hole as required
18. Check ATC 1, ATC 2 and TCAS status
19. Trend vector is not displayed

<<END>>

LANDING GEAR FAILURE TO RETRACT

1. Airspeed ..... BELOW 195 KCAS

Is Landing Gear lever at full UP position?

YES - Go to Step 4.
NO - *Can Landing Gear lever be moved from the DOWN position?*
YES - Go to Step 4.
NO - Can Landing Gear stay down for remainder of flight?
YES - Go to Step 7.
NO - Continue with Step 2.

2. DOWNLOCK OVERRIDE pushbutton ..... PRESS & HOLD
3. Landing Gear lever ..... UP

NOTE

If WOW Miscompare caution message is displayed, proceed to WOW MISCOMPARE, Page IIIA-203 AFTER landing gear unsafe indications are resolved.

Did Landing gear retract normally?
YES - Continue flight - END OF PROCEDURE
NO - Go to Step 7.

4. Landing Gear lever ..... DOWN
5. Landing Gear indications ..... VERIFY 3 DOWN
6. Landing Gear lever ..... UP

Did Landing gear retract normally?
YES - Continue flight - END OF PROCEDURE
NO - Go to Step 7.

7. Landing Gear lever ..... DOWN

(Continued)

Did landing gear extend normally - landing gear indications show 3 DOWN?

YES - Land as soon as practicable - END OF PROCEDURE

NO - Go to EMERGENCY LANDING GEAR EXTENSION, Page IIIA-209

NOTE

If weight is above maximum landing weight - consider fuel jettison

<<END>>

LANDING GEAR DOWNLOCK FAILURE / UNSAFE INDICATION

If, during landing gear extension, IN TRANSIT *indication is persistent for more than 12 seconds and* DN *indication does not appear:*

1. Verify landing gear lever is at full extent of travel in the DOWN position
2. Flaps lever .....20°
3. Airspeed..... REDUCE TO MINIMUM FOR CURRENT AIRCRAFT CONFIGURATION (V_{REF} for Flaps 20° + 5 KT)
4. Flight controls synoptic ..... DISPLAY
5. Right hydraulic pressure .....CHECK

If pressure indication is 1200 psi or below, proceed to EMERGENCY LANDING GEAR EXTENSION, page IIIA-209*:*

6. Landing gear lever ..... UP; MONITOR INDICATION CHANGES

After 30 seconds minimum:

7. Landing gear lever ....DOWN; MONITOR INDICATION CHANGES

NOTE

1. If any DN indication is still off or in transit, it may indicate landing gear failure to lock down.
2. For Nose gear positive downlock indication - select TAXI light pushbutton to ON and ask tower to observe taxi light. The taxi light only comes on if the nose gear is down and locked.

(Continued)

***If only Nose landing gear downlock indication is unsafe**:*

8. Landing Gear Lever - MOVE UP ABOUT ONE INCH FOR 10 SECONDS OR UNTIL NOSE GEAR INDICATES DOWN THEN MOVE LEVER FULL DOWN.

NOTE

- R hydraulic pressure reading will drop when handle is moved up.
- Do not move lever more than half way up since landing gear will start to retract.

If downlock indications are still abnormal:

9. Perform ABNORMAL LANDING GEAR CONFIGURATIONS, page IIIA-210

<<END>>

EMERGENCY LANDING GEAR EXTENSION

CAUTION

1. LANDING GEAR LEVER MUST STAY IN DOWN POSITION.
2. ONCE EXTENDED, LANDING GEAR CANNOT BE RETRACTED.

1. Flaps lever .....20°
2. Airspeed..... BELOW 175 KCAS
3. Landing gear lever .....DOWN
4. EMERGENCY GEAR DOWN handle RELEASE, TURN AND LIFT
5. Landing gear .....DOWN, 3 GREEN

If downlock indications are still abnormal:

6. Attempt to release or lower by applying positive 'g' loading not to exceed 2.0 g with flaps down (2.6 g with flaps up)

If downlock indications are still abnormal:

7. Perform ABNORMAL LANDING GEAR CONFIGURATIONS, page IIIA-210

<<END>>

ABNORMAL LANDING GEAR CONFIGURATIONS

Perform LANDING GEAR DOWNLOCK FAILURE / UNSAFE INDICATION, page IIIA-207, and EMERGENCY LANDING GEAR EXTENSION, page IIIA-209 procedures, if not already completed, prior to performing this procedure.

1. Passengers ..... BRIEFED AND PREPARED
2. Cabin baggage..... SECURED
3. Select long runway with minimal crosswind
4. Aircraft weight .....REDUCE

On approach (below 3000f t AGL):

5. Do not arm auto brakes for landing
6. TAWS VOICE OVRD.....ON
7. APU.....OFF
8. PACK.....OFF
9. DUMP.....ON
10. Flaps .....LND
11. Both hydraulic EMPs.....ON
12. Sink rate .....MINIMIZE AT TOUCHDOWN
13. For recommendation of landing technique see:
    NOSE GEAR UNSAFE, BOTH MAIN GEARS DOWN AND LOCKED, Page IIIA-211,
    ONE MAIN GEAR UNSAFE, NOSE GEAR DOWN AND LOCKED, AND ONE MAIN GEAR DOWN AND LOCKED, Page IIIA-212,
    NOSE AND ONE MAIN GEAR UNSAFE, ONE MAIN DOWN AND LOCKED, Page IIIA-212,
    BOTH MAIN GEARS UNSAFE, NOSE GEAR DOWN AND LOCKED, Page IIIA-213.
    ALL GEAR UP LANDING, Page IIIA-213

<<END>>

NOSE GEAR UNSAFE, BOTH MAIN GEARS DOWN AND LOCKED

1. Touchdown.....RUNWAY CENTERLINE
2. Speed brakes..... .AS REQUIRED
3. Nose..... .FLY THE NOSE GENTLY TO THE GROUND .....BUT DO NOT TRY TO HOLD IT OFF
4. Thrust reversers.....USE MAX
5. Directional control ..... MAINTAIN
6. Engine FUEL CONTROLS.....OFF
7. After stopping, perform EMERGENCY EVACUATION, Page II-87 if required.

If nose landing gear has not collapsed but still indicates unsafe:

8. Do not taxi off the runway.

If nose landing gear indicates down and locked after landing:

9. Pin the landing gear before attempting taxing.
10. Perform AFTER LANDING procedures.

<<END>>

ONE MAIN GEAR UNSAFE, NOSE GEAR DOWN AND LOCKED, AND ONE MAIN GEAR DOWN AND LOCKED

NOTE

NWS and ground spoilers are unavailable in this configuration due to loss of WOW feedback after touchdown.

1. Touchdown ..... OFF CENTER TOWARD THE LOCKED GEAR
2. Speed brakes ..... EXTEND
3. Wings level ..... MAINTAIN UNSAFE GEAR WING IN THE AIR UNTIL LOSS OF AILERON EFFECTIVENESS
4. Directional control ..... MAINTAIN
5. Do not use thrust reversers unless stopping distance is critical
6. Engine FUEL CONTROLS ..... OFF
7. After stopping, perform EMERGENCY EVACUATION, Page II-87 if required

If main landing gear has not collapsed but still indicates unsafe:

8. Do not taxi off the runway.

If main landing gear indicates down and locked after landing:

9. Pin the landing gear before attempting taxing.
10. Perform AFTER LANDING procedures.

<<END>>

NOSE AND ONE MAIN GEAR UNSAFE, ONE MAIN DOWN AND LOCKED

RETRACT GEAR and perform an all gear up landing. Proceed to ALL GEAR UP LANDING, Page IIIA-213

<<END>>

BOTH MAIN GEARS UNSAFE, NOSE GEAR DOWN AND LOCKED

If unable to extend and lock down both main gear, retract gear and perform all gear up landing. Proceed to ALL GEAR UP LANDING, Page IIIA-213

<<END>>

ALL GEAR UP LANDING

NOTE

Do not deploy speed brakes during this procedure.

1. Landing fuel ..... 1000 LB MAXIMUM
2. Final approach configuration..... FLAPS 39° / V_{REF}
   Use final approach speed of V_{REF} or as slow as possible at all Planned wheels up landing weights and fly a very shallow approach angle
3. Sink rate.....TARGET LOW AT TOUCHDOWN
   Flap segments are likely to break clean away from the wing at touchdown
4. Touchdown.....RUNWAY CENTERLINE
5. When aft fuselage contacts runway surface, immediately shut down both engines using Engine FUEL CONTROL switches
6. Directional Control .....MAINTAIN WITH RUDDER
   Pull control column to the full aft position during the remainder of the ground run to maintain a nose high attitude
7. When airplane stopped:
   a. Both FIRE handles.....PULL
   t. Both BATT's and STBY BATT.....OFF
8. Passengers/crew ..... EVACUATE AIRCRAFT

<<END>>

OVERWEIGHT LANDING

IF landing at a weight in excess of maximum landing weight is unavoidable:

1. Runway ..... USE LONGEST AVAILABLE

CAUTION

MAIN LANDING GEAR MAXIMUM TIRE SPEED IS 195 KT GROUND SPEED. NOSE LANDING MAXIMUM TIRE SPEED IS 182 KT GROUND SPEED.

NOTE

See APPROACH AND LANDING - FLAPS - 39°, Page V-763.

2. Sink rate and crab ..... MINIMIZE AT TOUCHDOWN
3. Reverse thrust..... USE MAXIMUM AVAILABLE PRIOR TO USING BRAKES
4. brakes ..... AS REQUIRED

When stopped:

5. BTMS ..... MONITOR
6. Log Overweight Landing for maintenance

<<END>>

ATA 34 - NAVIGATION SYSTEM

CHECK SMC AIRDATA

Check SMC - Airdata caution message indicates detection of a miscomparison between ADC 1, ADC 2 and RSE. The miscompare may be caused by RSE failure. If the RSE has failed, the ISI attitude display is black and the FCS Interface MAINT advisory message will also be displayed.

NOTE

Airspeed data is not reliable and rudder limiter function might default to FCECU default values which limit rudder according to flaps configuration.

If ISI attitude display is black proceed to ISI (Integrated Standby Instrument) Failure, Page IIIA-216

If one of the airspeed indications is frozen:

1. Compare airspeed indicator with cross side and ISI to determine correct
2. Land as soon as practicable

On approach

3. AOA ..... MAINTAIN 0.62 UNITS (V_{REF} + 5 KT):
4. Airspeed ..... USE RELIABLE AIRSPEED INDICATOR; MONITOR AOA - DO NOT EXCEED 0.66 UNITS
5. Perform BEFORE LANDING, Page IV-37
6. Landing ..... NORMAL LANDING

<<END>>

ISI (Integrated Standby Instrument) Failure

RSE has failed and the ISI attitude display is black. Red ATT and FPV flags may be displayed on ISI. Red IAS and ALT flags may be displayed if air data was lost.

1. Fast Erect.....PERFORM
   (Press STBY MENU pushbutton on DSP, than select Fast Erect on DCP)

If failure persists:

2. RSE CB (P15).....CYCLE
   (ISI realignment may take a minute.) FCS Interface MAINT advisory CAS may display when RSE CB is pulled.

If failure persists:

3. Select on side HDG source for ISI
   (HDG1 for L ISI and HDG2 for R ISI or HDG3 if IRS3 is installed).
4. Continue flight.

NOTE

If L and R airspeed indications on PFD's reliability is questioned - consider selecting Probe Heat to Override, monitor NAoA and continue to CHECK SMC AIRDATA, Page IIIA-215 procedure, step 3. If airspeed indications on PFDs are declared as unreliable - continue to UNRELIABLE AIRSPEED INDICATION, Page IIIA-218 procedure.

<<END>>

AOA (ANGLE OF ATTACK) MISCOMPARE

If AOA Miscompare caution message is on, it indicates that the Angle Of Attack (AOA) indicators has a difference of more then 4° in normal operation, or more then 7° with anti-icing operating (icing conditions).

CAUTION

STICK PUSHER IS UNAVAILABLE.

NOTE

1. AOA Miscompare caution message may come on during high side slip maneuvers and crosswind landings. Message is inhibited on ground.
2. The left PFD AOA displays the left AOA and the right PFD displays the right AOA.

If SP/Shaker Fail *caution message comes on, continue with* STALL PROTECTION SYSTEM FAILURE*,* page IIIA-155

1. Airspeed.....ABOVE 200 KCAS
2. Perform AOA comparison by gently changing attitude (5° up and 5° down) and determine the reliable indicator
3. Failed AOA circuit breaker (L AOA E5 or R AOA E16) ..... PULL

NOTE

AOA Probe Fail, L or AOA Probe Fail, R advisory message comes on accordingly.

The stall protection system is now re initialized and operable based on a single AOA probe. The AOA displays on both PFDs are based on single AOA probe.

<<END>>

UNRELIABLE AIRSPEED INDICATION

Unreliable airspeed indication can result from blocking of damaged pitot/static system (freezing, bird strike, radom damage).
This procedure intends to advise the pilot the approximate pitch attitude for each flight maneuver.

The following alerts may be displayed and activated during this event:
AP 1-2 Fail
Yaw Damper 1-2 Fail
RUD Fail Safe Value
FCECU Fail Safe Value
AOA Miscompare
IAS Flag
Overspeed warning

1. Return aircraft to target attitude and thrust setting for the flight regime; for starting point use UNRELIABLE AIRSPEED INDICATION TABLE, Page IIIA-219
2. Use ground speed from PFD or FMS (IDX-PROG-Page 2, or, GNSS status)
3. ATC ..... DECLARE EMERGENCY; REQUEST ALTITUDE FOLLOWING IF AVAILABLE
4. Consult AOA if reliable
5. FD ..... SELECT OFF
6. FPV ..... SELECT ON (SMC - PFD - ADI)
7. Transponder 7700
8. Perform ILS approach if available. Establish landing configuration early on final approach. Adjust thrust to maintain ground speed while maintaining glideslope
9. Landing ..... AIM TO TOUCH-DOWN 1000-1500 FT BEYOND THRESHOLD
10. Auto brakes ..... HIGH

(Continued)

When setting the pitch attitude and the corresponding thrust – aircraft performs according to flight phase and airspeed indicated in the following table.

Example – weight of 30,000 lb at altitude of 30,000 ft – set 75.2% N_1 and maintain 2.5° pitch attitude to cruise at 250 KCAS..

UNRELIABLE AIRSPEED INDICATION TABLE

ISA, ECS ON

(Sheet 1 of 2)

	Weight at Altitude (LB)	Altitude (FT)	Climb Speed (KCAS)	FLAPS	%N_1	Pitch Attitude (°)	NAOA
Climb	39600	1000	250	0	87.5	12.9	0.40
	38500	35000	250	0	93.0	5.4	0.70
	38500	40000	250	0	93.1	4.3	0.75
	30000	1000	250	0	87.5	15.5	0.30
	29500	35000	250	0	93.0	5.2	0.56
	29000	40000	250	0	93.1	4.0	0.66
Cruise	38000	30000	250	0	77.0	3.5	0.63
	35000	30000	250	0	76.3	3.1	0.58
	30000	30000	250	0	75.2	2.5	0.49
	38000	40000	0.76	0	83.9	4.6	0.79
	35000	40000	0.76	0	82.4	4.1	0.75
	30000	40000	0.76	0	80.3	3.4	0.69
	35000	45000	0.76	0	87.6	5.5	0.86
	30000	45000	0.76	0	83.8	4.6	0.79

UNRELIABLE AIRSPEED INDICATION TABLE
ISA, ECS ON

(Sheet 2 of 2)

	Weight at Altitude (LB)	Altitude (FT)	Climb Speed (KCAS)	FLAPS	%N_1	Pitch Attitude (°)	NAOA
Descent and Approach	32700	20000	250	0	46.6	-1.1	0.44
	32700	1000	250	0	36.0	-1.6	0.33
	28000	20000	250	0	46.6	-2.1	0.37
	28000	1000	250	0	36.0	-2.6	0.28
	32700	20000	200	10	45.6	-0.1	0.53
	32700	1000	200	10	35.0	-0.4	0.41
	28000	20000	200	10	45.6	-1.0	0.47
	28000	1000	200	10	35.0	-1.3	0.36
	32700	20000	160	20	44.7	0.8	0.59
	32700	1000	160	20	34.7	0.6	0.47
	28000	20000	160	20	44.7	-0.4	0.52
	28000	1000	160	20	34.7	-0.6	0.41
	32700	20000	140	39	44.2	-4.0	0.77
	32700	1000	140	39	34.5	-4.1	0.66
	28000	20000	140	39	44.2	-6.0	0.66
	28000	1000	140	39	34.5	-6.2	0.59

<<END>>

DUAL ADC FAILURE

ADC 1-2 Fail caution message comes on to indicate dual failure of pitot static system. Only standby instruments system is available.

NOTE

Affected systems:

- Pilot and copilots PFD with no airdata
- Autopilot
- Yaw Damper
- Rudder limiter defaults according to flaps configuration
- AUTO CPCS mode

1. Take Manual control of the aircraft
2. Fly according to ISI
3. Aircraft..... DESCEND BELOW 25,000 / 250 KCAS / 0.7M_i
4. CPCS mode ..... MAN
5. ATC ..... ADVISE (mode C inoperative)
6. Avoid icing conditions
7. Land at nearest suitable airport

<<END>>

IPC (INTEGRATED PROCESSING CABINET) 1 OR 2 OR BOTH FAILURES

IPC 1 Fail (C) or IPC 2 Fail (C) caution message indicate loss of Integrated Processing Cabinet (IPC) 1 or 2.

NOTE

This is a collector CAS message.

The following systems are inoperative:

- Indicated FMS - Navigation and CDU FMS pages
- Indicated IFIS (datalink graphical weather, echarts, emaps, terminal charts, satellite weather)
- Graphical Flight Planning (GFP) is limited to available FMS
- Onboard Maintenance System (OMS) - only when IPC 1 fails

NOTE

Expect loss of MAP as FMS fails, if FMS 3 is not available as alternate NAV source.

1. AFCS..... VERIFY REVERSION AND RE-ENGAGE

NOTE

If both IPC 1 and IPC 2 failed, and no FMS 3, then autopilot can be engaged in basic modes only.

2. NAV source ..... SELECT VALID SOURCE

If aircraft has two FMSs:

3. MAP display can be shown on one display only.

(Continued)

INTEGRATED PROCESSING CABINET (IPC) 3 FAILURE

IPC 3 Fail (C) advisory messages indicated loss of Integrated Processing Cabinet (IPC) 3.

NOTE

This CAS is a collector CAS message. > WINDSHEAR FAIL and > GROUND PROX FAIL situation awareness advisory messages come on.

The following systems are inoperative:

- Indicated TAWS (Terrain Avoidance Warning System) - ground proximity system and windshear warning module
- Indicated FMS - if available as option
- Graphical Flight Planning (GFP) is limited to available FMS

1. AFCS ..... VERIFY REVERSION AND RE-ENGAGE
2. FMS NAV source ... SET ACCORDING TO REMAINING SOURCE
3. In turbulence approach conditions - Monitor airspeed changes for any sign of windshear

<<END>>

DCU FAILURE (DATA CONCENTRATION UNIT)

DCU 1 Fail or DCU 2 Fail caution message indicates loss of two DCU channels of the same cabinet.

CAUTION

ALWAYS REFER TO CAS WINDOW AS PRIMARY INDICATION OF FAILURE.

NOTE

1. This failure results in loss of systems sensors dashes are displayed ("----") to indicate invalid data on synoptics. Brakes, electrical, bleed air, hydraulic synoptic pages will not be full.
2. Avionics functionality is degraded - only two synoptic pages may be displayed simultaneously.
3. On-side stick shaker will not operate (left stick shaker for DCU 1 failure, right stick shaker for DCU 2 failure). The opposite stick shaker will still be felt residually through the hard linkages. No stick shaker fail CAS message will be displayed.

DCU 1

If AP disengaged - select (XFR) AFCS 2 and re-engage

1. CPCS mode ..... MAN
2. Cabin ALT ..... CONTROL MANUALLY ACCORDING TO SCHEDULE
3. Transponder ..... SELECT ATC 2, 7600
4. Avoid Icing conditions

(Continued)

NOTE

Flight control synoptic page will show left gear in transition when retracted. When landing gear is extended - all three gear are displayed as down. All three green lights in landing gear panel are operating as required.

DCU 2

If AP disengaged - select (XFR) AFCS 1 and re-engage

1. Transponder..... ATC 1, 7600
2. AOP ..... SELECT 121.5
3. Advice controller of communication failure
4. Avoid Icing conditions

NOTE

Flight control synoptic page shows right main and nose gear in transition when retracted. When landing gear is extended - all three gear are displayed as down. All three green lights in landing gear panel are operating as required.

<<END>>

LOSS OF CAS WINDOW ON EICAS

Possible cause - loss of all three IPCs, or DCU dual failure.

1. Take manual control of the aircraft
2. Aircraft.....DESCEND TO 25,000 FT / 250 KCAS / 0.7M_i

NOTE

Deploying speed brakes will damp dutch roll. Counteract dutch roll using rudder or ailerons.

3. Transponder..... NO MODE C, ADVISE ATC
4. EICAS ..... ENGINE DATA BACKUP ON CDU IS AVAILABLE
5. CPCS mode .....MAN
6. Avoid icing conditions

Affected instruments:

a. FCP..... WINDOWS BLANKED; SPD BUG IS AVAILABLE

u. ISI.....OPERATING

NOTE

Switch off on side DU in order to be able to change NAV source and BRG needles using the ISI MENU button. Switch on DU again after this operation to enable ADI.

v. ADI ..... AIRDATA AND ATTITUDE VALID
w. HSI .....HDG VALID
x. Trims .....NO INDICATIONS BUT ALL THREE (3) ARE OPERABLE
y. NAV sources ..... NAV / ADF / GPS (USE CDU-PPOS page)
z. MAP display ..... INOPERATIVE

7. Land at nearest suitable airport

<<END>>

DUAL / ALL DU OVERHEAT

1. Flight director (FD) ..... COUPLE TO OPERATING SIDE
2. Affected DUs ..... TURN OFF;
   (IF TRIPLE FAILURE, LEAVE DU 1 ON UNTIL FAILS)
3. Autopilot / autothrottle ..... ENGAGE

If available DU fails:

4. Other DU ..... SWITCH ON

If all DUs fail:

5. Revert to ISI
6. Switch DU to off and then select on-side NAV source on ISI
7. Autopilot is available in basic mode. Use SYNC to change attitude

<<END>>

DUAL AHS FAILURE

AHS 1-2 Fail or AHS 1-2-3 Fail caution message indicates that all AHRS have failed.

The following systems are inoperative:

- Both PFDs
- AHS 1-2 fail
- AT 1-2 fail
- AP 1-2 fail
- Terrain fail
- WX fail
- Fuel tank DGRD
- EFIS comparator fail

If AHS 3 is available:

1. Revert to AHS 3 ..... SMC - SENSR
2. Autopilot ..... RE-ENGAGE
3. Failed AHS Cb's ..... CYCLE
4. Proceed to AHS ALIGNMENT IN FLIGHT, Page IIIA-233

If AHS 3 is not available:

5. Take manual control of the aircraft
6. Fly using ISI
7. Aircraft ..... DESCEND TO 25,000 FT / 250 KCAS / 0.7M_i
8. Use CDU for navigation
9. ATC ..... ADVISE
10. AHS 1 cb (M6, M9) and AHS 2 cb (M15, M5) ..... CYCLE
11. Proceed to AHS ALIGNMENT IN FLIGHT, Page IIIA-233

<<END>>

EQUIPMENT LOSS IN RVSM AIRSPACE

These additional requirements apply to operations in RVSM airspace:

LOSS OF ONE (1) AUTOMATED FLIGHT CONTROL SYSTEM (AFCS) IN RVSM AIRSPACE:

1. Normal flight..... CONTINUE
2. ATC .....ADVISE

LOSS OF BOTH AFCS's IN RVSM AIRSPACE:

1. ATC .....ADVISE
2. Yaw damper inoperative .... MAXIMUM 250 KCAS AND 25,000 FT
3. Mach trim inoperative..... MAXIMUM 340 KCAS /0.77M_i
4. RVSM airspace ..... .EXIT

LOSS OF ONE (1) AIR DATA SYSTEM (ADS) IN RVSM AIRSPACE:

1. Normal flight..... CONTINUE
2. ATC .....ADVISE

LOSS OF BOTH TRANSPONDERS AND/OR BOTH ADS AND/OR ALL TRANSPONDER ALTITUDE SOURCES IN RVSM AIRSPACE:

1. ATC .....ADVISE
2. RVSM airspace ..... EXIT
3. Primary altimeter / standby altimeter .....CROSS CHECK PERIODICALLY / RECORD
4. If primary altimeter and standby altimeter disagree by more than 200 ft - depart RVSM airspace

(Continued)

ALTIMETER MISCOMPARE IN RVSM AIRSPACE:

1. L PFD / R PFD / ISI altitude ..... COMPARE / RECORD DATA

If the miscompare is less than 200 ft:

2. Normal cruise ..... MAINTAIN

If the miscompare is more than 200 ft:

3. ATC ..... ADVISE
4. RVSM Airspace ..... EXIT (IF REQUIRED BY ATC)

<<END>>

DCU CHANNEL FAILURE (DATA CONCENTRATION UNIT)

DCU 1 Channel A Fail, DCU 1 Channel B Fail, DCU 2 Channel A Fail or DCU 2 Channel B Fail (Pre MOD G25-10074: Advisory; Post MOD G25-10074: Caution) advisory message comes on indicates single DCU channel failure.

NOTE

1. FD or/and RA flags may come on
2. Single DCU channel failure cause the corresponding AFCS to fail, hence an autoreversion is expected if AFCS coupled to the failed side. FD Drop AP Basic Mode caution CAS will come on when reversion occurs.
3. In high altitude/Mach regime, the Speed Command may change to 0.75M during an AFCS reversion. It is resettable.
4. When either channel A fails, Wheel Despin Fail caution CAS and BCS Maintenance REQD advisory CAS come on.
5. Expect a combination of the following advisory CAS messages:
   AP 1 Fail or AP 2 Fail
   A/T 1 Fail or A/T 2 Fail
   FCS Interface MAINT
   BAS Default Mode, R or BAS Default Mode, L
   WAI Default Mode, R or WAI Default Mode, L
   ACS Default Mode
   ENG Thrust Fault, L-R
   FDR 1 Fail
   Rudder TCM FAIL
   Check OMS
   CAS Miscompare

1. Autopilot and autothrottle .....CHECK

(Continued)

If AFCS disengaged and did not auto revert:

2. AFCS..... SWAP TO OPERATING SYSTEM (SMC - SENSR).

NOTE

FD flag should disappear and RA may remain.

3. Autopilot, autothrottle and yaw damper..... RE-ENGAGE

If Yaw Damper Off *caution message comes on - reset using YD pushbutton on AFCP.*

4. FMS NAV source..... AS REQUIRED

If ALT *flag comes on and there is a split in air data display (*Check SMC - Airdata*caution message comes on):*

5. SMC - SENSOR page..... ADC
   If failure on DCU 2 CH A - revert to ADC1
   If failure on DCU 1 CH A - revert to ADC2

<<END>>

AHS ALIGNMENT IN FLIGHT

AHS 1 Aligning, AHS 2 Aligning, AHS 1-2 Aligning, AHS 3 Aligning or AHS 2-3 Aligning advisory message is displayed. AHS flag is on top of PFD.

1. SMC - SENSR page .....SELECT CROSS SIDE AHS

NOTE

AHS flag comes on, indicating cross side is selected.

2. Compare PFD's attitude to ISI
3. Maintain straight and level flight for up to 60 seconds or until red ATT flag is cleared.

After AHS ATT MODE *advisory message comes on and CDU message* SET MAG HDG*:*

4. Perform a HDG change of 45°. Maintain straight and level flight
5. AP can be engaged in basic mode

If IRS is installed, and SET MAG HDG *message comes on CDU:*

6. FMS - INDEX - IRS CTRL... ENTER CURRENT MAGNETIC HDG (LSK6)

NOTE

Enter MAG HDG every 15 minutes, if CDU SET MAG HDG message is still in view.

When AHS ATT MODE *advisory message goes out:*

7. Continue flight with no restrictions
8. AHS ..... RE-SELECT AS REQUIRED

<<END>>

ATA 36 - PNEUMATICS

BLEED AIR SYSTEM (BAS) FAILURE

BAS Fail, L-R caution messages indicate that both bleed air systems have failed.

NOTE

Cabin altitude leak rate is about 1000 ft / min.

1. Bleed/anti ice synoptic ..... MONITOR
2. Both ENG BLEED ..... CYCLE OFF AND ON

If failure persists:

3. Both ENG BLEED ..... OFF
4. Oxygen masks ..... DON IF CAB ALT LEAKS AND APPROACHES 10,000FT
5. Exit icing conditions
6. To utilize APU bleed air - descend to 20,000 ft if possible

If below 35,000 ft - start APU:

7. APU MASTER ..... ON
8. APU START ..... PRESS

At 20,000 ft or Below:

CAUTION

DO NOT OPERATE WING ANTI ICE ON APU BLEED.

9. APU BLEED ..... ON

NOTE

APU Bleed will come on 90 seconds after APU start completed. Isolation valve will open automatically with APU bleed selection.

10. Land as soon as practicable

<<END>>

BLEED PRESSURE LOW

DUAL FAILURE

Bleed PRESS Low, L-R caution message comes on to indicate that both bleed pressures are selected and are below 5 psi for more than 10 seconds.

1. Engines thrust .....INCREASE
2. Bleed / Anti Ice Synoptic ..... MONITOR

If message persists:

3. Both ENG BLEED .....OFF
4. BLEED AIR ISOLATION ..... VERIFY CLOSED
5. Oxygen masks .....DON IF CAB ALT LEAKS AND APPROACHES 10,000 FT
6. Exit icing conditions.
7. To utilize APU bleed air - descend to 20,000 ft if possible

Below 35,000 ft:

8. APU MASTER.....ON
9. APU START .....PRESS

At 20,000 ft:

CAUTION

DO NOT OPERATE WING ANTI ICE ON APU BLEED.

10. APU BLEED .....ON

NOTE

APU bleed will come on 90 seconds after APU start completed. Isolation valve will open automatically with APU bleed selection.

11. Land as soon as practicable

<<END>>

SINGLE FAILURE

Bleed PRESS Low, L or Bleed PRESS Low, R caution message comes on to indicate that both bleed pressures are selected and are below 5 psi for more than 10 seconds.

1. Bleed/anti ice synoptic ..... MONITOR
2. Affected engine thrust ..... INCREASE

If message persists:

3. Affected ENG BLEED AIR ..... OFF
4. Both WAI ..... OFF
5. Affected WAI ..... OFF
6. ISOLATION valve ..... OPEN
7. If WAI activation is required - proceed to WING ANTI ICE OPERATION ON SINGLE SOURCE, Page IIIA-188

<<END>>

BLEED TEMPERATURE / PRESSURE HIGH

DUAL FAILURE

Bleed Air Hot, L-R or Bleed PRESS High, L-R caution messages indicate that both precooler inlets or outlets are hot or manifolds pressure is high.

CAUTION

IF DURING THE FOLLOWING PROCEDURE, IF CABIN ALTITUDE CLIMBS TO 10,000 FT OR MORE, CONTINUE TO THE HIGHER PRIORITY PROCEDURE.

1. Thrust levers ..... REDUCE TO MINIMUM FOR SAFE FLIGHT
2. Bleed/anti ice synoptic ..... MONITOR

If failure persists:

3. Both ENG BLEED ..... OFF
4. Affected WAI ..... OFF
5. BLEED AIR ISOLATION ..... VERIFY CLOSED
6. Cabin altitude ..... MONITOR
7. OXYGEN MASKS ..... DON IF CAB ALT LEAKS AND APPROACHES 10,000FT
8. Exit icing conditions.
9. To utilize APU bleed air - descend to 20,000 ft if possible

When below 35,000 ft - start APU:

10. APU MASTER ..... ON
11. APU START ..... PUSH

At 20,000 ft:

CAUTION

DO NOT OPERATE WING ANTI ICE ON APU BLEED.

(Continued)

12. APU BLEED .....ON

NOTE

APU Bleed will come on 90 seconds after APU start completed. Isolation valve will open automatically with APU bleed selection.

13. Land as soon as practicable

SINGLE FAILURE

Bleed Air Hot, L, Bleed Air Hot, R or Bleed PRESS High, L or Bleed PRESS High, R caution message indicate that the affected pre-cooler inlet or outlet is hot

1. Bleed/anti ice synoptic ..... MONITOR
2. Affected thrust lever ..... IDLE
3. Affected ENG BLEED AIR..... OFF
4. ISOLATION ..... VERIFY CLOSED
5. Both WAI ..... OFF
6. If WAI activation is required - proceed to WING ANTI ICE OPERATION ON SINGLE SOURCE, Page IIIA-188

<<END>>

ACS PACK TEMPERATURE LOW

ACS Pack TEMP Low caution message indicates that pack temperature is below 30°F for 1 minute during operation.

1. TEMP selectors..... MAX COLD
2. Both WING ANTI ICE selectors .....ON

If failure persists:

3. ALTN PRESS.....ON

NOTE

Pack valve closes automatically.

4. ECS synoptic ..... MONITOR

<<END>>

ATA 49 - APU

APU EXCEEDANCE

APU Exceedance caution message indicates that APU EGT and/or RPM exceed the limits.

NOTE

if RPM exceeds 108%, the APU performs protective shut down.

If parameters are out of limits and the APU is not required for the remainder of flight:

1. APU MASTER.....OFF

If the APU is required:

2. APU EGT and RPM .....MONITOR
3. Shut down APU as soon as practicable in flight or after landing.

<<END>>

APU FUEL SOV FAILURE

APU Fuel SOV Fail caution message indicates that the APU fuel shut-off valve has failed, or not in commanded position or valve data invalid.

During APU start:

1. APU MASTER.....CYCLE OFF/ON

If APU Fuel SOV Fail caution message clears, resume normal operation.

If failure persists - the APU is unavailable:

2. Dispatch with reference to the MEL

During APU shutdown:

1. APU MASTER.....CYCLE ON/OFF

If failure persists:

2. APU FUEL SOV cb (H14) ..... PULL
3. Log for maintenance.

<<END>>

APU FAILURES

APU Essential caution message indicates that APU is running in flight, and a fault is detected which would cause APU to shutdown if not in the ESSENTIAL mode.

APU Oil Pressure Low caution message indicates that APU is in ESSENTIAL mode and low oil pressure has been detected. In NON ESSENTIAL mode (on ground) APU will automatically shutdown.

NOTE

An APU start in the air with an APU Oil Pressure Low indication may be continued to 100% speed for a period of 30 seconds. If message is indicated beyond the period of 100% speed plus 30 seconds, it is recommended the flight crew stop APU operation and attempt an APU re-start. No damage to the APU will occur within these parameters. No special inspection criteria will be required if APU operation within these parameters are maintained.

APU Oil TEMP High caution message indicates that APU is in ESSENTIAL mode and high oil temperature has been detected. In NON ESSENTIAL mode (on ground) APU will automatically shutdown.

If APU is not required for remainder of flight or after landing:

1. APU MASTER ..... OFF

If APU is required:

2. APU EGT and RPM ..... MONITOR

NOTE

APU will continue to operate in essential mode for 15 minutes after landing.

<<END>>

ATA 52 - DOORS

MAIN ENTRY DOOR UNSAFE

Main Entry Door caution message on indicates that main entry door is not locked or a micro-switch has failed.

NOTE

In case of a miscompare between the CAS message and the synoptic page, act according to the CAS message.

On ground:

NOTE

1. Conditions on ground - Main Entry Door (MED) is not closed/locked, one engine is running and PARK BRAKE is not set.
2. If MED Maintenance REQD advisory message is displayed, a Miscompare between MED limit switch and handle positions exists.

1. Check that both door locks and stops are in place and handle is secured
2. ACK DOOR.....PRESS

Verify that Main Entry Door status message *comes on.*

3. Dispatch airplane according to MMEL

In flight:

Below 15,000 ft:

1. Cabin Pressure Control System (CPCS) depressurizes the cabin at a rate of 1000 fpm
   .....LAND AS SOON AS PRACTICABLE

Above 15,000 ft:

If cabin pressurization is normal and door appears to be secured:

2. Flight ..... CONTINUE

If main entry door does not appear to be secure:

3. Aircraft..... LAND AT NEAREST SUITABLE AIRPORT

<<END>>

EXTERNAL BAGGAGE DOOR UNSAFE

External Baggage Door caution message on indicates that external baggage door is not locked, not secured or door micro-switch has failed. The door is accessible from baggage compartment.

NOTE

In case of a miscompare between the CAS message and the synoptic page, act according to the CAS message.

On ground:

NOTE

External baggage door is open, one engine is running.
After message is triggered - it is latched until engines are shut down for door external inspection, or Acknowledge switch is pressed (located at the inner upper frame of main entry door).

1. Check that external baggage door locks and stops are in place and handle is secured
2. ACK DOOR.....PRESS

NOTE

Verify that External Baggage Door status message comes on.

3. Dispatch airplane according to MMEL

In flight:

Below 15,000 ft:

1. Cabin Pressure control System (CPCS) depressurizes the cabin at a rate of 1000 fpm
   .....LAND AS SOON AS PRACTICABLE

(Continued)

Above 15,000 ft:

If cabin pressurization is normal and door appears to be secured:

2. Flight ..... CONTINUE
3. Interior Baggage Door..... CLOSE

If external baggage door does not appear to be secure:

4. Aircraft..... LAND AT NEAREST SUITABLE AIRPORT

<<END>>

ATA 56 - WINDOWS

CRACKED WINDSHIELD OR SIDE WINDOW

If any ply is cracked:

1. WINDSHIELD HEAT ..... OFF
2. If left side window is cracked .....PULL CIRCUIT BREAKER (D3)
3. Cabin pressure..... REDUCE TO 7 PSI WITHIN 15 MINUTES
4. Airspeed..... 0.72 M_i / 250 KCAS (200 KCAS BELOW 8000 FT)
5. Oxygen mask .....DON (ONE PILOT IF ABOVE 10,000 FT)
6. Icing conditions ..... AVOID

<<END>>

ATA 73-80 - ENGINE

ENGINE SLOW RESPONSE

A slow engine response may indicate possible ice contamination of engine sensor probes. The FADEC has reverted to conservative acceleration/deceleration schedule to mitigate the risk of engine surge/stall and potential associated engine damage.

1. ENG ANTI ICE selector.....ON (ONE AT A TIME)

NOTE

Operation of ENG ANTI ICE above 35,000 ft decreases rate of climb to assigned flight level, if higher.

2. Engine SYNC.....OFF
3. Thrust levers .....OPERATE INDIVIDUALLY

NOTE

Monitor engine response to check if it returns to normal operation after activating engine anti-ice.

(Continued)

If engine response returns to normal:

4. Continue flight

When clear of Icing conditions:

5. Engine ANTI ICE ..... OFF

If engine response remains slow:

6. Engine Indications ..... MONITOR

NOTE

Anticipate slower than normal response to thrust lever inputs when speed control is required during approach to landing operations. Go around decision should be made early.

<<END>>

ENG FUEL TEMP LOW (L-R)

ENG Fuel TEMP Low, L-R caution message is on when both left and right engines fuel temperatures are below limit (+3°C).

WARNING

FUEL ICING AND ENGINE FLAMEOUT MAY OCCUR AT VERY LOW ENGINE FUEL TEMPERATURES.

1. Fuel synoptic ..... DISPLAY
2. Engines fuel temperatures ..... MONITOR
3. Engines parameters ..... MONITOR
4. Both FUEL STBY PUMP ..... ON
5. Thrust levers ..... ADVANCE AS PRACTICABLE TO INCREASE INDICATED MACH NUMBER (ABOVE 0.8M_i)

If failure persists:

6. Altitude ..... DESCEND TO ALTITUDE WHERE SAT IS -50°C OR WARMER
7. Maintain lower altitude and high speed until message goes out
8. Mission performance ..... RECALCULATE

If failure persists:

9. Land at nearest suitable airport

<<END>>

HOT START

Hot start is observed if ITT exceeds limitations. Engine Exceedance, L or Engine Exceedance, R warning message may appear.

NOTE

Maximum ITT during engine start:

N_2 < 40% - 650°C

N_2 > 40% - 950°C

NOTE

Start Aborted, L or Start Aborted, R caution message will be on if FADEC auto aborts engine start.

1. Affected engine FUEL CONTROL.....OFF
2. CRANK .....ON
3. Affected engine START.....PRESS

After 30 seconds:

4. CRANK .....OFF

If additional start attempt is not desired or Engine Exceedance, L *or* Engine Exceedance, R warning message *is on, consult maintenance before attempting additional start*

<<END>>

START VALVE FAILS TO CLOSE DURING ENGINE START

Starter Fail On, L or Starter Fail On, R caution message indicates that Air Turbine Starter (ATS) valve has failed to close on indicated engine.

On Ground:

1. APU BLEED AIR ..... OFF
2. EXTERNAL AIR (if applicable) ..... DISCONNECT
3. BLEED AIR ISOLATION ..... CLOSE
4. Both ENG BLEED AIR ..... OFF
5. Bleed air pressure ..... MONITOR

When bleed air pressure reaches minimum value:

6. Affected engine FUEL CONTROL ..... OFF
7. ENGINE SHUT-DOWN checklist, page IV-44 ..... PERFORM

CAUTION

CONSULT WITH MAINTENANCE BEFORE ATTEMPTING ANOTHER START SEQUENCE.

In flight:

1. Affected ENG BLEED ..... OFF
2. APU BLEED AIR (if applicable) ..... OFF
3. BLEED AIR ISOLATION ..... CLOSE

(Continued)

Did affected engine Starter Fail On *message go out?*

YES:
- NO ADDITIONAL PILOT ACTION - END OF PROCEDURE

NO:
- GO TO STEP 4 FOR AFFECTED ENGINE.

If Starter Fail On, R message is displayed – aircraft cannot be pressurized:

4. Crew / Passenger oxygen..... AS REQUIRED
5. Descent..... AS REQUIRED
6. Aircraft.....LAND AS SOON AS PRACTICABLE

If Starter Fail On, L message is displayed – alternate pressurization is available:

4. ALTN PRESS..... ON, AS REQUIRED
5. ECS Synoptic..... DISPLAY
6. Cabin and cockpit temperatures and pressurization..... MONITOR

NOTE

Cabin and cockpit temperature is controlled directly by right engine thrust setting. Temperature is not adjustable using ECS panel.

7. Aircraft.....LAND AS SOON AS PRACTICABLE

<<END>>

START VALVE FAILS TO OPEN DURING ENGINE START

1. Affected engine FUEL CONTROL.....OFF
2. APU air / external air.....VERIFY ON / CONNECTED
3. Bleed air pressure.....CHECK (32 psi minimum)

If bleed air pressure is available and adequate:

4. Affected engine FUEL CONTROL.....RUN
5. Engine START.....PRESS AGAIN

If start valve fails to open, abort engine start:

6. Affected engine FUEL CONTROL.....OFF

CAUTION

CONSULT WITH MAINTENANCE BEFORE ATTEMPTING ANOTHER START SEQUENCE.

<<END>>

ENGINE OIL PRESSURE LOW INDICATIONS WITHOUT ENGINE OIL PRESSURE LOW CAUTION MESSAGE

If only oil pressure digits are red and no ENG Oil PRESS Low, L *or* ENG Oil PRESS Low, R *warning message is on:*

NOTE

If ENG MAINT LTD message is on, a discrepancy in oil pressure sensing is suspected.

1. Oil Pressure and EICAS ..... MONITOR
2. Continue flight.

<<END>>

ENGINE VIBRATION

Engine Vibration, L, Engine Vibration, R or Engine Vibration, L-R caution message comes on when an engine has an abnormal vibration level.

CAUTION

ENGINE SHUT DOWN BASED SOLELY ON HIGH VIBRATION LEVELS, WITHOUT ABNORMAL INDICATIONS ON OTHER PRIMARY ENGINE PARAMETERS IS NOT RECOMMENDED.

NOTE

1. Failure of a fan blade in one engine will be felt by pilot as unusual vibrations and may also produce unusual fluctuations in engine instruments.
2. Vibration level may vary around the recommended airspeed and altitude. Maintain airspeed and altitude in which vibrations are minimal.

1. Affected engine thrust lever ..... RETARD UNTIL INDICATIONS RETURN TO NORMAL LEVEL
2. If in icing conditions..... INCREASE THRUST

(Continued)

If severe vibration persists:

3. Land at nearest suitable airport
4. Affected engine FUEL CONTROL..... OFF
5. According to aircraft altitude:
   If above 30000 ft -
   Decelerate to 200 KCAS at constant altitude; continue constant speed descent to 30,000 ft then maintain 30000 ft / 0.55M_i
   If below 30,000 ft -
   Decelerate and maintain 0.55 M_i
   If below 20,000ft -
   Decelerate and maintain 0.50 M_i
6. Inoperative engine GEN..... OFF
7. Inoperative ENG BLEED..... OFF
8. Affected HYDRAULIC EMP ..... VERIFY ON
9. Affected engine FUEL STBY PUMP..... OFF
10. TCAS ..... TA ONLY

NOTE

The APU may be used as an alternate source of electrical power, if desired. See APU START (ON GROUND), Page IV-10.

WARNING

DO NOT RESTART THE AFFECTED ENGINE.

(Continued)

When further descent is required:

11. Descend while maintaining 0.55 M_i until reaching 20,000 ft;
    at 20,000 ft decelerate to 0.50 M_i;
    descend while maintaining 0.50 M_i until reaching 10,000 ft

CAUTION

HIGH VIBRATIONS ARE EXPECTED DURING DECELERATION. DECELERATION MUST BE PERFORMED AS FAST AS POSSIBLE.

12. When necessary, descend to 5000 ft or below at 250-270 KCAS

When descent to approach is required:

13. Airspeed ..... REDUCE TO 175 KCAS AS QUICKLY AS POSSIBLE; USE SPEED BRAKES AS REQUIRED
14. Flaps ..... .20°
15. Landing gear ..... DOWN
16. NWS ..... INOP

At final approach leg:

17. REDUCE TO V_{REF} + 5 KT AS QUICKLY AS POSSIBLE
18. Perform SINGLE-ENGINE APPROACH AND LANDING, Before landing:, page II-67

<<END>>

ENGINE SURGE OR COMPRESSOR STALL

Conditions and Indications

One or more of the following occur:

- Engine ITT changes rapidly or erratically without corresponding change in Thrust Lever position, including rapid increases in ITT that approach or exceed limits
- Engine emits unusual noises, possibly with a few “popping” sounds
- A sudden change occurs in engine vibration levels which can possibly be felt in the airframe a momentary Engine Vibration, L or Engine Vibration, R CAS message.
- Engine responds only to Thrust Lever retard, engine thrust cannot be increased or increases in engine thrust occur more slowly than expected
- Flames are reported coming from engine exhaust or inlet with no associated fire system warning.

Corrective Actions

1. Affected engine Thrust Lever.....IDENTIFY AND CONFIRM
2. Affected engine Thrust Lever..... REDUCE THRUST UNTIL ENGINE PARAMETERS ARE WITHIN LIMITS, OR THRUST LEVER IS AT IDLE

NOTE

Engine FADEC provides protection for surge and compressor stall events. Engine response to thrust lever advancement is reduced for several seconds, but reductions in thrust are not changed. The engine should respond to thrust lever inputs normally within several seconds, once the surge or compressor stall clears. Engine response and performance after a surge or compressor stall depends on the amount of damage that occurred within the engine during the event.

(Continued)

3. Engine EVENT pushbutton .....PRESS
4. Affected engine Parameters
   (N1, N2, ITT, VIB and Oil Pressure) ..... MONITOR

After 60 seconds from event start:

5. Are affected engine parameters CONTROLLABLE and STABLE within limits, and does engine OPERATE SMOOTHLY at IDLE OR HIGHER thrust setting:?
   YES: .....Affected engineSHUTDOWN
   ..... (Go to ENGINE SHUTDOWN IN FLIGHT, Page II-57)
   NO: .....Go to Step 6.

6. Are affected engine parameters CONTROLLABLE and STABLE within limits, and does engine OPERATE SMOOTHLY at IDLE OR HIGHER thrust setting:
   YES:
   A. Affected Thrust Lever....ADVANCE SLOWLY AS REQUIRED
   B. If engine acceleration is NORMAL..... OPERATE ENGINE NORMALLY OR AT REDUCED THRUST SETTING THAT IS FREE OF SURGE OR STALL

   CAUTION

   DO NOT CONTINUE TO ADVANCE THRUST LEVER IF INDICATIONS OF SURGE OR COMPRESSOR STALL RETURN. GO TO ENGINE SHUTDOWN IN FLIGHT, Page II-57

   C. Land as soon as practicable
   D. Event.....LOG FOR MAINTENANCE

<<END>>

NO:
A. If engine acceleration is ABNORMAL ...: THRUST LEVER AT IDLE

(Continued)

B. LAND AT NEAREST SUITABLE AIRPORT

NOTE

It is recommended to leave affected engine operating at idle, if possible, to provide electrical and hydraulic power and motive flow for fuel balancing. However, the affected engine may require shutdown if engine parameters are exceeded. The following steps prepare for such an occurrence or minimal thrust available from the engine.

C. APU .....CONSIDER START

NOTE

The APU may be used as an alternate source of electrical power, if desired. See APU START (IN FLIGHT), Page IV-12.

D. TCAS ..... TA ONLY
E. FUEL BALANCE ..... MONITOR
F. Perform SINGLE-ENGINE APPROACH AND LANDING, Page II-66.

<<END>>

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EICAS ADVISORY MESSAGES

Following is a ready-reference guide which briefly outlines the message meaning and action to be taken when a message comes on. It also refers to subject, section and page where more detailed information and procedures are found.

Procedures are grouped by actions. There can be separate procedures for Left (L) system failure, Right (R) system failure and both (L-R) systems failure, or one procedure for both left or right or both system failure as follows:
L/R - (L) or (R)
L-R - (L and R)
L/R/L-R - (L) or (R) or (L and R)

SA (SITUATIONAL AWARENESS) CAS MESSAGE

When a collector CAS message come on, most of the failures that are caused or derived from this failure are masked. Failures that are regarded as important for crew situational awareness will be marked with a caret (**>**) on its left and have no procedure associated with it. These SA CAS messages are intended to report to the crew that the collector failure causes a degradation in: flight envelope, pressurization control, environmental control, flight and ground control, and loss of annunciation or alert capabilities.

NOTE

1. The advisory CAS messages flash for 5 seconds when first displayed and then become steady.
2. When any message comes on, check appropriate switches and circuit breakers.
3. All advisory messages are automatically inhibited from TLA above 70% N_1. The inhibit ends when the aircraft is at more than 400 ft or 30 seconds above the ground.
4. Log for maintenance action, any advisory CAS message that has been displayed during flight, when not triggered by pilot action.

ADVISORY MESSAGES (CYAN)

(Sheet 1 of 40)

Message	Cause(s)	Corrective Action
A/T 1 Fail A/T 2 Fail	Autothrottle failed	Verify A/T reversion (cross side A/T green annunciation on PFD)
AC Inverter Fail	AC inverter has failed.	Log for maintenance.
ACP 1 Fail ACP 2 Fail	Audio Control Panel (ACP) failed	Log for maintenance. Use ACP 3 if available
ACP 3 Fail ACP 1-3 Fail ACP 2-3 Fail	Audio Control Panel (ACP) failed	Log for maintenance
ACS Default Mode	Air Conditioning System fault(s) detected. Air Conditioning System (ACS) has reverted to default mode due to airflow measurement fault. Flow is controlled per default altitude value (30,000 ft)	Log for maintenance
ACS Maintenance REQD	ACS has fault(s) detected	Log for maintenance
ADF 1 Fail ADF 2 Fail ADF 1-2 Fail	Indicated directional finder (ADF) failed. (Dual installation)	Log for maintenance
ADF Fail	Automatic directional finder (ADF) failed	Log for maintenance

ADVISORY MESSAGES (CYAN)

(Sheet 2 of 40)

Message	Cause(s)	Corrective Action
ADM Complete	Autopilot has captured 15,000 ft target, 225 KIAS target, and left orbit completing the Automatic Descent Mode (ADM) profile	1. Autopilot - DISCONNECT NOTE: Message will clear 2. Autopilot - AS DESIRED
AFT EMER LTG BATT On	Pre MOD G25-10074: Aft emergency lighting battery is on OR the battery is not being charged	Verify proper position of EMER LTS switches and check R EMER circuit breaker (C11) **NOTE** Message will display when there is no power to the Distributions Buses even when the EMER LTG BATT is not On and not discharging.
AFT EQUIP Fan Fail	Aft radio rack equipment cooling fan failed	Log for maintenance
AFT Fuel QTY DGRAD	A probe in the indicated fuel tank failed and the fuel quantity data is degraded	1. Fuel Synoptic - DISPLAY 2. Fuel parameters - MONITOR

ADVISORY MESSAGES (CYAN)

(Sheet 3 of 40)

Message	Cause(s)	Corrective Action
AHS 1 Fail AHS 2 Fail AHS 3 Fail AHS Fail	Attitude Heading Source (AHS) or Inertial Reference System (IRS) critical failure has occurred	NOTE: Auto reversion to cross side sensor expected. 1. SMC - SENSOR - Verify source 2. Circuit breaker - CYCLE: For AHS 1 - M9 (AHS1B), M6 (AHS1A) For AHS 2 - M15 (AHS2B) M5 (AHS2A) For AHS 3 - M14 (AHS3B), M4 (AHS3A) 3. When AHS 1 Aligning / AHS 2 Aligning/ AHS 3 Aligning advisory message comes on, continue with AHS ALIGNMENT IN FLIGHT, page IIIA-233

ADVISORY MESSAGES (CYAN)

(Sheet 4 of 40)

Message	Cause(s)	Corrective Action
AHS 1 SEC PWR Fail AHS 2 SEC PWR Fail AHS 3 SEC PWR Fail AHS 1-2 SEC PWR Fail AHS 1-3 SEC PWR Fail AHS 2-3 SEC PWR Fail AHS SEC Power Fail	Secondary power is not available to the AHS or IRS	Log for maintenance

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
AHS 1 Secondary Power AHS 2 Secondary Power AHS 3 Secondary Power AHS 1-2 Secondary PWR AHS 1-3 Secondary PWR AHS 2-3 Secondary PWR AHS 1-2-3 SEC Power	Attitude Heading Source (AHS) or Inertial Reference System (IRS) is operating on secondary power.	Log for maintenance

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
AHS 1 ATT Mode AHS 2 ATT Mode AHS 3 ATT Mode AHS 1-2 ATT Mode AHS 1-3 ATT Mode AHS 2-3 ATT Mode AHS 1-2-3 ATT Mode	AHS is operating in Attitude mode	AHS provides minimum attitude reference. If AHS 1 Aligning / AHS 2 Aligning/ AHS 3 Aligning advisory message comes on as well, See AHS ALIGNMENT IN FLIGHT, page IIIA-233
AHS 1 POS Entry AHS 2 POS Entry AHS 3 POS Entry AHS 1-2 POS Entry AHS 1-3 POS Entry AHS 2-3 POS Entry AHS 1-2-3 POS Entry	AHS or IRS has completed its alignment phase, but has did not receive an initial position either from GPS, FMS, or AHS, or IRS failed an alignment test possibly due to an invalid initialization position entry	1. Enter position in CDU - INDEX - POS INIT 2. Verify FMS are in SYNC mode

ADVISORY MESSAGES (CYAN)

(Sheet 7 of 40)

Message	Cause(s)	Corrective Action
AHS 1 Aligning AHS 2 Aligning AHS 1-2-3 Aligning AHS 1-2 Aligning AHS 3 Aligning AHS 2-3 Aligning AHS 1-3 Aligning	AHS or IRS has not yet completed its alignment phase during stationary alignment, or AHS or IRS power was momentarily interrupted resulting in alignment in motion during flight	On ground: Do not taxi. NOTE: Wait until the stationary alignment is completed before starting taxi or departure. In flight only, see AHS ALIGNMENT IN FLIGHT, page IIIA-233
AOA Heat Fail, L AOA Heat Fail, R AOA Heat Fail, L-R	AOA sensor vane heater failed	See PROBE HEAT FAILURE, Page IIIA-191
AOA Probe Fail, L AOA Probe Fail, R	AOA probe failed in flight	NOTE: Failed AOA display is generated by the operational AOA. Log for maintenance

ADVISORY MESSAGES (CYAN)

(Sheet 8 of 40)

Message	Cause(s)	Corrective Action
AP 1 Fail AP 2 Fail	Autopilot (AP) system failed	*On Ground:* NOTE: AFCS does not auto revert on ground. 1. Switch AFCS to operating system. (SMC-SNSR-AFCS) *In Air:* NOTE: AFCS auto reverts to operating side. 2. Log for maintenance
AP CTRL SW Stuck	Autopilot ON/OFF switch is stuck	NOTE: If AP is not engaged and AP CTRL switch is stuck in off OFF position, AP is unavailable. *To disconnect AP, use the following options:* 1. AP DISC switch on yoke 2. AFCS disconnect bar 3. ALTN STAB - ON

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
AP Engage Inhibit	Attempt to engage autopilot under any of following conditions: Autopilot disconnect button active; TOGA switch active; Stick shaker is active; Sync switch is active; Trim up / down switch active; ALTN STAB selected	*Unless in ALTN STAB mode:* Autopilot - RE-ENGAGE
AP SRVO OVRD Fail	The autopilot force override system has failed or has been disabled.	Revert to opposite AFCS system. NOTE: Force override AP disconnect will not occur, in case of dual Hydraulic Failure.
APM 1 Fail APM 2 Fail APM 1-2 Fail	Indicated APM (Aircraft Personality Module) failed	Log for maintenance

ADVISORY MESSAGES (CYAN)

(Sheet 10 of 40)

Message	Cause(s)	Corrective Action
APU Door Fail Close	APU door failed to open and MASTER pushbutton is ON	1. APU MASTER - CYCLE OFF THEN ON *If message clears:* 2. Continue normal operation *If failure persists:* 3. APU MASTER - OFF NOTE: In case of a miscompare between the CAS message and the synoptic page, act according to the CAS message
APU Fire Loop A Fail	APU fire detector failed	Log for maintenance
APU Fire Loop B Fail	APU fire detector failed	Log for maintenance
APU Fuel Valve Fault	APU fuel solenoid fault (fuel solenoid in transit or open) detected during APU shutdown	Maintenance action is required
APU Maintenance REQD	APU ECU detected faults	Log for maintenance
APU Master On	APU MASTER is selected ON and APU is off for more then 5 minutes	APU MASTER - AS REQUIRED

ADVISORY MESSAGES (CYAN)

(Sheet 11 of 40)

Message	Cause(s)	Corrective Action
APU Oil Level Low	APU oil level low	Service APU oil
APU Ready	APU ready for start attempt	Start APU if required
ATC 1 Fail	Indicated transponder has failed but is not selected.	Log for maintenance.
ATC 2 Fail	Indicated transponder has failed but is not selected.	Log for maintenance.
Autobrake Disarmed	Autobrake selector knob selected to OFF position during landing / taxi, or, during landing when auto brakes were armed and pedal position exceeded 25% or throttle advanced beyond idle or when landing gear is retracted after takeoff with RTO set for takeoff	Autobrake - AS REQUIRED
Avionics CONFIG DGRAD	Only one APM detected and being used by the system	Log for maintenance
BAS Default Mode, L BAS Default Mode, R BAS Default Mode, L-R	Indicated Bleed Air System (BAS) has reverted to default bleed selection (high stage valve)	Bleed/anti-ice synoptic page - MONITOR

ADVISORY MESSAGES (CYAN)

(Sheet 12 of 40)

Message	Cause(s)	Corrective Action
BAS MAINT REQD, L BAS MAINT REQD, R BAS MAINT REQD, L-R	Bleed Air System (BAS) maintenance is required	Log for maintenance
BATT Feeder Fail, L BATT Feeder Fail, R BATT Feeder Fail, L-R	Battery switch selected on and indicated battery line contactor open	1. Electrical synoptic page - MONITOR NOTE: If R FEEDER fails (amber line on synoptic) - attempt APU Start only under emergency condition or after landing. NOTE: In dual failure - battery power is available for emergency flight only
BCS Maintenance REQD	Indicated Brake Control System (BCS) maintenance required	Log for maintenance
Bleed Configuration	On ground, APU air is ON with engines operating and bleed air pushbuttons are OFF	On ground, APU air is ON and engine bleed air pushbuttons are selected OFF.
Cabin Call	Toggled by cabin / galley / interphone or telephone	Select CAB on ACP. Use PTT to call cabin

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
CAS Miscompare	CAS mismatch between DCU channels (lasting for more than 20 seconds)	Monitor aircraft parameters and systems
CCD Fail, L CCD Fail, R CCD Fail, L-R	Cursor Control Device (CCD) failed	Use the SMC as appropriate
Check OMS	Faults are active and recorded by the OMS. Message is active only prior to first taxi with parking brake on, and after landing when engine are off.	Log for maintenance
Checklist Mismatch	Different checklist installed in DCU 1 and DCU 2	Do not use Electronic Checklist (ECL)
Cities Fail	Cities overlay is not available	Use other means of information
Clock Alarm Expired, L Clock Alarm Expired, R	DCP alarm clock timer has expired	Set as required
CPCS LFE Fail	FMS and SMC inputs to CPCS are invalid	1. FMS Flight Plan - CHECK VALID DEST *If required:* 2. Select LFE manually through SMC (SMC UTIL – CPCS)

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
CPCS LFE Miscompare	Difference between selected LFE and the computed LFE exceeds 100 ft	Select LFE manually - SMC UTIL - CPCS
CPCS Maintenance REQD	CPCS maintenance is required	Log for maintenance
CPCS Monitor Fail	Malfunction in cabin pressure controller monitor channel	1. BARO setting - CHECK 2. Monitor cabin altitude
CPCS Warning Set High	Cabin pressure low warning was set to 14,750 ft instead of 10,000 ft	Check ORIGIN and DEST in flight plan
CTR Fuel QTY DGRAD	A probe in the indicated fuel tank failed and the fuel quantity in that tank is degraded	1. Fuel Synoptic - DISPLAY 2. Fuel parameters - MONITOR
CTRLD Airspace Fail	Controlled airspace overlay is not available	Use other means of information
CVR 1-2 Fail CVR 1 Fail CVR 2 Fail	Cockpit Voice Recorder (CVR) failed	Log for maintenance
Datalink 1-2 REC Fail Datalink 1 REC Fail Datalink 2 REC Fail	Affected CVR Datalink function has failed	1. Check RECORDER and RIU circuit breakers 2. Log for Maintenance

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
Datalink COM In Voice	The datalink system does not have a Very High Frequency (VHF) radio in DATA mode	Select one of the VHF COM radios to DATA
Datalink MSG Received	The datalink system has received an ACARS message	Review datalink message
Datalink SELCAL	Datalink VHF radio has incoming selective call	Check messages
Dataload Error	Attempted dataload failed	Log for maintenance
Dataload In Progress	Displayed when a dataload is in progress	No action required
DCU 1 Channel A Fail	Pre MOD G25-10074: DCU 1 Channel A failed	See DCU CHANNEL FAILURE (DATA CONCENTRATION UNIT). page IIIA-231
DCU 1 Channel B Fail	Pre MOD G25-10074: DCU 1 Channel B failed	See DCU CHANNEL FAILURE (DATA CONCENTRATION UNIT). page IIIA-231
DCU 1 Fan Fail DCU 1-2 Fan Fail DCU 2 Fan Fail	Fan on indicated DCU failed	Log for maintenance
DCU 2 Channel A Fail	Pre MOD G25-10074: DCU 2 Channel A failed	See DCU CHANNEL FAILURE (DATA CONCENTRATION UNIT). page IIIA-231

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
DCU 2 Channel B Fail	Pre MOD G25-10074: DCU 2 Channel B failed	See DCU CHANNEL FAILURE (DATA CONCENTRATION UNIT). page IIIA-231
DL GWX Fail	Graphical weather system failed	Log for maintenance
DME 1 Fail DME 2 Fail DME 1-2 Fail	Indicated Distance Measuring Equipment (DME) failed	NAV position accuracy - MONITOR
DU 1 Fail DU 2 Fail DU 3 Fail	Indicated DU failed	1. Affected DU switch - RESET (OFF THEN ON) **NOTE:** SMC MEM function is not operative. If MEM is selected, "Function not Available" message will be displayed on the SMC.

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
DU 1 Fan Fail DU 2 Fan Fail DU 3 Fan Fail DU 1-2 Fan Fail DU 1-3 Fan Fail DU 2-3 Fan Fail DU 1-2-3 Fan Fail	Fan on indicated DU failed	Log for maintenance
Dual Aural Alert Fail	Radio Interface Unit (RIU) conflict	1. RIU 2A CB (L11) - CYCLE *If failure persists and sound quality is degraded:* 2. Both RIU 2 cb's (L11, L12) - PULL 3. See RIU (RADIO INTERFACE UNIT) FAILURES, Page IIIA-96
ECHARTS Fail	ECHARTS overlay is not available	Use other means of information
EFIS Comparator Fail	EFIS comparator system malfunctions	NOTE: Potential loss of crosstalk between the displays. 1. Monitor instruments for difference
Elevator HOPS Fail	In flight only, hard over protection system failed	Log for maintenance

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
Elevator MAINT REQD	Elevator maintenance required	Log for maintenance
EMAPS Fail (C)	Entire EMAPS overlays are not available: TFR, SUA, CTRLD Airspace, Political Boundaries, Obstacles and Cities	Use other means of information
ENG Fuel Filter, L ENG Fuel Filter, R	Engine fuel filter bypassed (contamination)	Monitor affected engine and fuel parameters
ENG Fuel TEMP Low, L ENG Fuel TEMP Low, R	Fuel temperature dropped below acceptable value. Fuel icing may occur	1. Descend and increase airspeed 2. Monitor engine and fuel temperatures
ENG Oil Chip, L ENG Oil Chip, R ENG Oil Chip, L-R	Metal debris detected in indicated engine(s) lubrication systems	1. Monitor engine parameters. 2. Land at nearest suitable airport
ENG Oil Bypass, L ENG Oil Bypass, R ENG Oil Bypass, L-R	Oil filter bypass	1. Log for maintenance *If failure is for both L and R oil systems:* 2. Land at nearest suitable airport

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
ENG Thrust Fault, L ENG Thrust Fault, R ENG Thrust Fault, L-R	FADEC failure resulting in minor changes in thrust	Monitor engine parameters.
ENG Vibration Fail, L ENG Vibration Fail, R ENG VIB Fail, L-R	Engine vibrations indicator failed	1. Log for maintenance. 2. If accompanied by abnormal engine vibrations and abnormal engine indication, See ENGINE VIBRATION, page IIIA-256
Engine Fault, L Engine Fault, R Engine Fault, L-R	In-flight only message. Engine control system functional failure which may prevent dispatch after next landing and has no impact on continued safe flight	Log for maintenance
Engine IGN Fault, L Engine IGN Fault, R Engine IGN Fault, L-R	Engine has no Ignition system redundancy	*If Icing conditions, Turbulence, and/or heavy rain are expected:* 1. CONT IGN - ON

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
Engine MAINT LTD, L Engine MAINT LTD, R Engine MAINT LTD, L-R	Engine has minor fault (not affecting engine performance).	See MMEL
ENG Minor Fault, L ENG Minor Fault, R ENG Minor Fault, L-R	Indicated FADEC failed in such way that a short term dispatch situation exists	Log for maintenance
Engine SYNC Fail	Engines synchronization (SYNC) function failed (N_1 or N_2)	Log for maintenance
EPS MAINT REQD	Electrical power system maintenance required	Log for maintenance
Exceedance Record	OMS has automatically recorded an exceedance	Log for maintenance
EXT Power Fail	External DC power source available and EXT PWR pushbutton selected ON but contactor is open	ELECTRICAL RESET - PUSH AND HOLD FOR 10 SECONDS

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
EXT Power Overload	External DC power load greater than 100%	Reduce electrical load NOTE: After 60 seconds of overload of more than 400A a line contactor will open. The message comes on after 30 seconds of overload
External Baggage Door	On ground only – External baggage door is not locked and both engines are off, or PARK brake is on with engines running	External baggage door - CLOSE
FADEC Download	A download of the FADEC maintenance data is recommended.	Log for maintenance
FCP A Fail	FCP channel A failed	Log for maintenance
FCP B Fail	FCP channel B failed	Log for maintenance

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
FCS Interface MAINT	Altitude difference between pilot and co-pilot PFD greater than 1000 ft. OR DCU ARINC 429 I/O failure detected. Possible RSE failure, OR Possible TQA RVDT and idle discrete mismatch. (will latch if triggered in flight)	*On ground:* 1. Set Pilot and Co-pilot altimeters to the same value. If message does not clear: 2. Aircraft - Power off (60 seconds) and on 3. If failure reoccurs - log for maintenance *In flight:* 1. Continue flight **NOTE**: Aircraft electrical reset after landing clears latched failure.
FDR 1 Fail FDR 2 Fail FDR 1-2 Fail	Indicated Flight Data Recorder (FDR) failed	Log for maintenance
FDR Interface MAINT	Displayed when either Co-Pilot Wheel sensor failure, Pilot Column sensor failure, Co-Pilot Column sensor failure	Log for maintenance

ADVISORY MESSAGES (CYAN)

(Sheet 23 of 40)

Message	Cause(s)	Corrective Action
FIRE BTL 1 Discharge FIRE BTL 2 Discharge	Fire bottle has been discharged (in flight only)	1. Log for maintenance 2. If Bottle 2 discharged, consider APU operation in emergency only
Fire Loop A Fail, L Fire Loop A Fail, R	Indicated engine fire detection loop A failed	Log for maintenance
Fire Loop B Fail, L Fire Loop B Fail, R	Indicated engine fire detection loop B failed	Log for maintenance
Fire SYS CH A Fail	In flight only: Loss of FPS Channel A. No ARINC output	1. Fire system test - PERFORM *If fire handles and fuel control switch do not illuminate - CH B failed as well:* 2. Land at the nearest suitable airport NOTE: FIRE and OVERHEAT warning or caution CAS messages will not come on (fire handles and fuel cutoff switches will illuminate)

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
Fire SYS CH B Fail	In flight only: Loss of FPS Channel B. No fire discrete available, No single loop B failure detection	Log for maintenance NOTE: FIRE and OVERHEAT warning or caution CAS messages will come on (fire handles and fuel cutoff switches will not illuminate)
Flap Maintenance REQD	Flaps maintenance is required	Log for maintenance
FMS 1 Fail FMS 2 Fail FMS 3 Fail FMS 1-2 Fail FMS 1-3 Fail FMS 2-3 Fail FMS 1-2-3 Fail	Navigation computer failed	1. NAV source - SELECT NOTE: Performing WAAS LPV approach is not authorized with only one FMS operating or selected as NAV Source.
FPS Maintenance REQD	Fire protection system maintenance required	Log for maintenance
FQMC Channel Fail, L FQMC Channel Fail, R	Fuel Quantity Measurement Computer (FQMC) channel failed	Log for maintenance

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
FQMS Maintenance REQD	Fuel Quantity Measurement System (FQMS) maintenance required	Log for maintenance
Fuel QTY COMP Fail	Fuel quantity compensation is failed (both compensators)	Log for maintenance
FWD EMER LTG BATT On	Pre MOD G25-10074: Forward emergency lighting battery is on OR the battery is not being charged.	Verify proper position of EMER LTS switches and check L EMER circuit breaker (C1) **NOTE** Message will display when there is no power to the Distribution Buses even when the EMER LTG BATT is not On and not discharging.
FWD EQUIP Fan Fail, R	Indicated forward radio rack equipment cooling fan failure	1. CKPT TEMP CONTROL - MAN 2. CKPT TEMP - FULL COLD
FWD Fuel QTY DGRAD	A probe in forward fuel tank failed and the fuel quantity data is degraded	1. Fuel synoptic - DISPLAY 2. Monitor fuel quantities and transfer
Gear Bottle PRESS Low	Emergency landing gear extension bottle pressure is less than 2150 psi in flight	Monitor gear bottle pressure on HYD/ground services synoptic page

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
GFCI Fault	Alternating current power (AC PWR) inverter Ground Fault Control Interrupter has been tripped	1. 60 HZ - OFF Do not attempt GFCI reset unless reason for the trip is identified and removed. 2. Log for maintenance
GPS 1 Fail GPS 2 Fail	Indicated Global Positioning Satellite (GPS) system failed	1. Circuit breaker M17 or M18 - CYCLE 2. Consider how failure affects mission
Ground PROX Fail	GPWS function failed	NOTE: Radio altimeter-based alerts not functional (Gear Not Down, Flaps, GS)
HF 1 Fail HF 2 Fail HF 1-2 Fail	High Frequency (HF) radio(s) failed	Log for maintenance
HF 1 SELCAL HF 2 SELCAL HF 1-2 SELCAL	High Frequency (HF) radio(s) incoming Selective Call (SELCAL) message	Call controller on HF COM
HYD Filter MAINT, L HYD Filter MAINT, R HYD Filter MAINT, L-R	Hydraulic filter partially clogged	*On ground:* Refer to MMEL *In flight:* Continue flight
HYD Maintenance REQD	Hydraulic system maintenance required	Log for maintenance

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
HYD TEMP SEN Fail, L HYD TEMP SEN Fail, R HYD TEMP SEN Fail, L-R	Indicated hydraulic system(s) temperature sensor(s) failed	*On ground:* Log for maintenance *In flight:* Continue flight
Ice Detected, L Ice Detected, R Ice Detected, L-R	Post MOD G25-10074: Ice detected by indicated ice detector while both EAI and WAI are operating and engines and wings are protected.	No action required
IMS Fail	Information Management System (IMS) failed Post MOD G25-10074: On ground only.	Log for maintenance
INBD Brake Degrade, L INBD Brake Degrade, R	Indicated Wheel Speed Transducer (WST) failed	See SINGLE WHEEL SPEED TRANSDUCER (WST) FAILURE, Page IIIA-201
INBD Roll Assist Fail	Control wheel sensors have failed and FCECU 2 is not receiving valid roll assist command	*On ground:* Do not dispatch. *In flight:* 1. ROLL ASSIST - OFF 2. Maximum Crosswind - 7 kt

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
Internal Baggage Door	Internal baggage compartment door is open between 24,500 ft and 39,500 ft, or, on ground and one engine is running and PARK brake is on	If message is displayed with door closed, log for maintenance.
IPC 1 Fan Fail IPC 2 Fan Fail IPC 3 Fan Fail IPC 1-2 Fan Fail IPC 1-3 Fan Fail IPC 2-3 Fan Fail IPC 1-2-3 Fan Fail	Indicated IPC fan failed	30 minutes to operate the IPC provided aircraft reaches 20,000 ft within 30 minutes
IPC 3 Fail (C)	Indicated IPC channel failed	See INTEGRATED PROCESSING CABINET (IPC) 3 FAILURE, page IIIA-223
Lavatory Call	Toggled by lavatory call	Answer call

ADVISORY MESSAGES (CYAN)

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Message	Cause(s)	Corrective Action
Lavatory Rinse Open	Toilet Assembly Rinse Valve fails to reach closed position.	***In flight:*** 1. Log for maintenance ***On ground:*** 1. Manual shutoff valve - CLOSE 2. Water / Waste System Control and Indication Panel (WWCIP) - PERFORM SYSTEM RESET according to instructions on Page 4 of the panel. ***If message does not clear:*** See MMEL, Section 2
LG Maintenance REQD	Maintenance required for Radio Altimeter or for LG LRUs minor fault (single WOW, or lock indication that does not affect system or tire overspeed) **NOTE:** If Flight Control Synoptic indicates G with an amber background on all three WOW indications, check the PFD for Radar Altimeter read out. If there is no Radar Altimeter value displayed, suspect cause is RA error.	Log for maintenance

ADVISORY MESSAGES (CYAN)

(Sheet 30 of 40)

Message	Cause(s)	Corrective Action
Mach-hold Disengaged	Mach hold not available	Mach hold mode - RE-ENGAGE
Main Entry Door	Aircraft on ground and door not closed/locked and engines off, or PARK BRAKE ON with engines running	CAUTION: DO NOT TAXI OR TOW AIRCRAFT. NOTE: In case of a miscompare between the CAS message and the synoptic page, act according to the CAS message 1. MED - AS REQUIRED *If door closed:* 2. MED - INSPECT *If failure persists:* 3. See MAIN ENTRY DOOR UNSAFE, Page IIIA-243
MED Maintenance REQD	Miscomparison between MED limit switch and handle positions	1. Inspect door before departure 2. Refer to MMEL
NAV 1 Fail NAV 2 Fail NAV 3 Fail NAV 1-2 Fail NAV 1-3 Fail NAV 2-3 Fail NAV 1-2-3 Fail	VHF navigation radio(s) failed	1. Use other navigation sensors 2. Disable indicated VOR/DME in FMS

ADVISORY MESSAGES (CYAN)

(Sheet 31 of 40)

Message	Cause(s)	Corrective Action
New Database AVAIL	New databases are available for load, on ground only	Log for maintenance
No DU X / FMS Y GFP	No interface between indicated MAP and the indicated FMS for graphical flight planning. X Y range is between 1 and 3	Log for maintenance
Nose Fan Fail, L Nose Fan Fail, R Nose Fan Fail, L-R	Nose equipment cooling fan failure	Log for maintenance
Nose Temperature High	Nose compartment temperature exceeds 140° F	*On Ground:* 1. Check nose blowers 2. Climb to 20,000 ft within 30 minutes of message appearance *If above 20,000 ft:* 1. Select off (use cb's) unnecessary electronic / avionics equipment in nose compartment: WX, DU2, IPC 3, NAV 2,3, ADF, GPS2, DME 2. 2. Land at nearest suitable airport

ADVISORY MESSAGES (CYAN)

(Sheet 32 of 40)

Message	Cause(s)	Corrective Action
Obstacle Fail	Obstacle overlay is not available	1. Use other means of information 2. Log for maintenance
OMS Fail	OMS failed	Log for maintenance
OTBD Roll Assist Fail	Control wheel sensors failed and FCECU 2 is not receiving valid roll assist command	Log for maintenance
OUTBD Brake Degrade, L OUTBD Brake Degrade, R	Indicated Wheel Speed Transducer (WST) failed	See SINGLE WHEEL SPEED TRANSDUCER (WST) FAILURE, Page IIIA-201
PC Load Letter	Printer out of paper	Load paper
POL Boundaries Fail	Political boundaries overlay is not available	Use other means of information
Printer Fault	Printer fault detected	Log for maintenance

ADVISORY MESSAGES (CYAN)

(Sheet 33 of 40)

Message	Cause(s)	Corrective Action
RAD ALT 1 Fail RAD ALT 2 Fail RAD ALT 1-2 Fail	Indicated radar altimeter has failed (dual installation)	1. Revert to operating RADALT. (SMC - SENSOR - RAD ALT) *If unable to revert system:* 2. Verify Flight Director is coupled to valid RADALT side NOTE: AT will not retard on landing if coupled to failed RADALT side *If both systems failed:* 3. AT will not retard on landing - see A/T Retard Inhibit, Page IIIA-4 NOTE: 1. Systems utilizing Radio Altimeter data are not available: Windshear Fail, Ground PROX Fail, TCAS Fail 2. The following callouts will not be available: Gear Not Down, Flaps, Glide slope, Altitude Callouts

ADVISORY MESSAGES (CYAN)

(Sheet 34 of 40)

Message	Cause(s)	Corrective Action
RAD ALT Fail	Radar altimeter failed (single installation)	Log for maintenance NOTE: 1. AT will not retard on landing - see A/T Retard Inhibit, Page IIIA-4 2. Systems utilizing Radio Altimeter data are not available: Windshear Fail, Ground PROX Fail, TCAS Fail 3. The following callouts will not be available: Gear Not Down, Flaps, Glide slope, Altitude Callouts
RIU 1 Fail RIU 2 Fail RIU 1-2 Fail	RIU failed and on-side CDU has been inhibited	See RIU (RADIO INTERFACE UNIT) FAILURES, Page IIIA-96
RIU 1A Fail RIU 2A Fail	Loss of secondary tuning of indicated radios, loss of one channel of aural alerts and lost of single data link system	See RIU (RADIO INTERFACE UNIT) FAILURES, Page IIIA-96
RIU 1B Fail RIU 2B Fail	Indicated RIU failed and on-side CDU has been inhibited	See RIU (RADIO INTERFACE UNIT) FAILURES, Page IIIA-96
RUD PDL Feedback Fail	Rudder pedal feedback actuator failed	Log for maintenance

ADVISORY MESSAGES (CYAN)

(Sheet 35 of 40)

Message	Cause(s)	Corrective Action
Rudder MAINT REQD	System failure that has no Impact on flight	Log for maintenance
Rudder TCM FAIL	Rudder thrust compensation function failed	*If one engine fails:* Use rudder pedal or rudder trim for manual directional compensation
Rudder Trim SW Fail	Manual trim switch failed	Log for maintenance
SATCOM Cabin Call	Incoming satellite communications call	Answer call
SATCOM Cockpit Call	Incoming satellite communications call	Answer call
Service Door	One of the following service doors is not closed: • L/R Avionics Bay • Refuel Access/Control • Hydraulic Service • R BATT/Water Service • Lavatory Service • ATS Access • Tail Compartment • L BATT/EXT Power • APU service	*On ground:* Verify doors closed *In flight* Log for maintenance
Single Rudder	One rudder control channel unavailable	Log for maintenance

ADVISORY MESSAGES (CYAN)

(Sheet 36 of 40)

Message	Cause(s)	Corrective Action
SMC 1 Fail SMC 2 Fail	Integrated Standby Multifunction Controller (SMC) failed	*If DCP shows a menu page:* 1. DU 2 - TURN OFF, UNTIL ISI FORMAT IS DISPLAYED ON INDICATED DCP, AND THEN TURN ON DU 2 AGAIN *If DCP blanked or displays ISI:* 2. No action available NOTE: ISI should come on the indicated DCP. No ability to change the display on DCP any more
SMC 1 Fan Fail SMC 2 Fan Fail SMC 1-2 Fan Fail	Indicated Standby Multifunction Controller (SMC) detected one or both fans failure	Log for maintenance
Speed Brake Degraded	Speed brake lever sensors have failed (only one set of speed brakes panels is available)	Log for maintenance
Speed Brake Fail	Speed brake lever sensors have failed (loss of manual speed brakes)	*In flight only:* Speed brake lever - Retract position
Spoiler MAINT REQD	Spoiler maintenance required	Log for maintenance

ADVISORY MESSAGES (CYAN)

(Sheet 37 of 40)

Message	Cause(s)	Corrective Action
SPS Test Complete	Stick shaker relays tested successfully	No actions required
STAB Maintenance REQD	Stabilizer maintenance is required	Log for maintenance
Stick Shaker Fail, L Stick Shaker Fail, R	Control column shaker failed	NOTE: Cross side stick shaker is still operative, and stick pusher is functional
SXM GWX Fail	Post MOD G25-10074 XM graphical weather is not available	Log for maintenance
TAWS Fail	TAWS system failed	NOTE: • No Terrain Display and NO Terrain aural alerts • All radio altimeter-based alerts and callouts Not available • No Windshear Alert
TCAS STBY	Aircraft is in flight and the TCAS is in standby	1. Select the ATC/TCAS system away from STBY
TERM Charts Fail	Terminal charts are not available	Use other means of information
TERM Charts 1 Fail TERM Charts 2 Fail TERM Charts 1-2 Fail	Terminal charts are not available from indicated IFIS. (Dual installation)	1. Paperless charts dispatch is not authorized 2. Use other information

ADVISORY MESSAGES (CYAN)

(Sheet 38 of 40)

Message	Cause(s)	Corrective Action
Terrain Fail	TAWS terrain function failed	NOTE: No terrain display and no terrain aural alerts. RADALT based alerts are available (GEAR NOT DOWN, FLAPS, GS, ALT Callouts)
TFR Fail	Pre MOD G25-10074: TFR overlay is not available	Use other means of information
Thrust REV Fault, L Thrust REV Fault, R Thrust REV Fault, L-R	Thrust reverser system functional failure that may cause affected thrust reverser to fail upon landing. MMEL relief may be required for dispatch after next landing.	1. Log for maintenance 2. See MMEL for operational planning.
VHF 1 SELCAL VHF 2 SELCAL VHF 3 SELCAL	Indicated VHF radio has incoming selective call	Answer call
VHF COM 1 Fail VHF COM 2 Fail VHF COM 3 Fail	Indicated VHF communications radio failed or radio is OFF in flight	Use other VHF radio

ADVISORY MESSAGES (CYAN)

(Sheet 39 of 40)

Message	Cause(s)	Corrective Action
VHF COM 1-2 Fail VHF COM 2-3 Fail VHF COM 1-3 Fail	VHF communications radios have failed or radios are OFF in flight	Use other VHF radio
WAI Default Mode, L WAI Default Mode, R WAI Default Mode, L-R	WAI valve will open to a default position during the first 60 seconds.	Log for maintenance
WAI MAINT REQD, L WAI MAINT REQD, R WAI MAINT REQD, L-R	Wing anti-ice system requires maintenance	Log for maintenance
Windshear Fail	Windshear function failed	NOTE: No Windshear Alerts
Wing Fuel QTY DGRAD, L Wing Fuel QTY DGRAD, R	A probe in the indicated fuel tank failed and the fuel quantity data in that tank is degraded	1. Fuel synoptic - DISPLAY 2. Monitor fuel quantities and transfer
WWS Maintenance REQD	Water waste system maintenance required	1. Log for maintenance 2. Purge when required
WX Fail	Weather Radar (WX) failed	Log for maintenance

ADVISORY MESSAGES (CYAN)

(Sheet 40 of 40)

Message	Cause(s)	Corrective Action
XM GWX Fail	XM graphical weather is not available	Log for maintenance
Yaw Damper 1 Fail Yaw Damper 2 Fail	Indicated yaw damper channel of autopilot failed	Verify reversion to operating system

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EICAS STATUS MESSAGES

NOTE

1. Status CAS messages are not inhibited.
2. When any message illuminates, check appropriate switches and circuit breakers.
3. Status (white) messages do not cause the MASTER CAUTION light to illuminate.
4. White messages are status in nature and normally will not require corrective action.

STATUS MESSAGES (WHITE)

(Sheet 1 of 9)

Message	Cause(s)	Corrective Action
Advisory CAS Inhibit	New advisory CAS messages Inhibited	CAUTION: DO NOT SELECT ADVISORY CAS INHIBIT BELOW 10,000FT. 1. SMC - TEST
Alternate Flaps On	Alternate flaps channel active	
APU Door Open	Post MOD G25-10074: APU Door indicates it is open while aircraft on ground and APU Master not selected on.	This message should clear within 50 seconds of APU Master selection to Off.
APU GEN Switch Off	APU GEN off	
Auto APR Inhibit	Auto APR disarmed and acknowledged	
Autobrake High	Auto brakes in high position	
Autobrake Low	Auto brakes in low position	
Autobrake MED	Auto brakes in MED position	
Autobrake RTO	Auto brakes in RTO position	

STATUS MESSAGES (WHITE)

(Sheet 2 of 9)

Message	Cause(s)	Corrective Action
BATT Switch Off, L BATT Switch Off, R BATT Switch Off, L-R	Indicated BATT switch is off	
CAS Aurals Inhibit	Inhibits the aural alerts associated with all CAS messages	See CONTINUOUS NUISANCE AURAL WARNING, page IIIA-193 NOTE: CAS aural inhibit will be cancelled as aircraft descends through 18,000 ft and every 60 minutes of selection. CAS aural inhibit function can be reselected after auto inhibit cancellation.

STATUS MESSAGES (WHITE)

(Sheet 3 of 9)

Message	Cause(s)	Corrective Action
CDU Tune Inhib, L-C-R CDU Tune Inhib, L-R CDU Tune Inhib, C-R CDU Tune Inhib, L-C CDU Tune Inhib, L CDU Tune Inhib, C CDU Tune Inhib, R	Control Display Unit (CDU) tune is inhibited	
CONT Ignition On, L CONT Ignition On, R CONT Ignition On, L-R	Continuous ignition is selected on	
CPCS LFE Manual	CPCS Landing Field Elevation (LFE) is selected manually	Verify correct landing field elevation entered or, select FMS
Dataload Switch On	Pre MOD G25-10074: Data load switch is on	NOTE 1. Switch should be in Off position unless for required maintenance. 2. RSE cannot align while switch in on position.

STATUS MESSAGES (WHITE)

(Sheet 4 of 9)

Message	Cause(s)	Corrective Action
DU Tune Inhibited	All display units tune is inhibited	*To cancel selection:* SMC - TEST - Tune REV
EMP HYD Pump On, L EMP HYD Pump On, R EMP HYD Pump On, L-R	The message indicates the EMP HYD pump is ON and pressure above 900 psi.	HYD EMP – AS REQUIRED
ENG A/I Test OK, L-R	engine anti-ice aircraft wiring and electrical components were tested for operation/ continuous and operate properly	
ENG Anti-Ice On, L ENG Anti-Ice On, R ENG Anti-Ice On, L-R	Engine anti ice is selected to auto and activated, or, on and is operating normally	
Event Record	Engine EVENT pushbutton pressed	
External Baggage Door	On ground - external baggage door unlocked, and either engine is running and ACK DOOR switch is pressed	

STATUS MESSAGES (WHITE)

(Sheet 5 of 9)

Message	Cause(s)	Corrective Action
FADEC MAINT Switch On	FADEC maintenance switch is on. Switch is located in the radio rack behind the pilot	
Fire/Bleed In Test	Fire and bleed system test in progress	
Fire/Bleed Test OK	Fire and bleed system test passed ok	
Fuel INTER Valve Open	Fuel interconnect valve open	
Fuel Pump Not Arm, L Fuel Pump Not Arm, R Fuel Pump Not Arm, L-R	Post MOD G25-10074 Indicated fuel standby pump(s) not in ON or ARM position	1. Fuel STBY pump(s) OFF/ARM – ARM AS REQUIRED ***In air:*** If PUMP PWR or PUMP CTRL CB (H1, H11, I7, I17) has popped: 1. Reset CB only if required for safety of flight. 2. Select FUEL STBY PUMP to ON whenever required. 3. Continue flight. **NOTE**: If PUMP CTRL has popped - no Fuel STBY operation is possible. If PUMP PWR has popped - manual override and jettison will activate the STBY fuel pump.

STATUS MESSAGES (WHITE)

(Sheet 6 of 9)

Message	Cause(s)	Corrective Action
Fuel XFLOW Valve Open	Fuel X flow (cross flow) valve open less than 5 minutes	
GEN Switch OFF, L GEN Switch OFF, R GEN Switch OFF, L-R	Indicated generator switch is off	
Ground Spoiler INHIB	In flight only. ground spoilers inhibit selected or switch failed	1. Use manual speed brakes for landing 2. Anticipate increase of 25% in actual landing distance
GND Spoilers Deployed	Ground spoilers deployed as required upon landing. The Ground spoilers self retract below 50 kts GS.	
Ice Detector Test OK	Ice detector test passed ok	
Isolation Valve Open	Isolation valve is open	

STATUS MESSAGES (WHITE)

(Sheet 7 of 9)

Message	Cause(s)	Corrective Action
Main Entry Door	On ground: main entry door not closed or locked, and, either engine running, and, PARK BRAKE off, and, airspeed below 80 kt, and, ACK DOOR switch pressed	
Maintenance Intercom	Maintenance intercom jack is in use. (nose or baggage)	
Master Crank On	Engine master crank is on	
Parking Brake	On ground: PARK BRAKE lever not in off or full travel position, or, above 200 psi in emergency lines	Verify parking brake lever position
Parking Brake On	On ground: PARK BRAKE lever at full travel and above 700 psi in emergency lines	
Rudder TCM OVRD	Rudder thrust compensation function deselected	TCM pushbutton - AS REQUIRED

STATUS MESSAGES (WHITE)

(Sheet 8 of 9)

Message	Cause(s)	Corrective Action
Speed Brakes Extended	Speed brakes are extended	
Speed Brakes Retracted	Speed brakes handle is in extend position and speed brakes have retracted (TOGA press or Thrust lever above MAX CLB position).	Speed brakes Handle – AS REQUIRED
STBY Pump On, L STBY Pump On, R STBY Pump On, L-R	The message indicates the Fuel STBY pump is ON and pressure above 900 psi.	FUEL STBY – AS REQUIRED
TAWS Flap Override	TAWS flap override is selected	NOTE: No flap aural alerts.
TAWS GS Cancel	Terrain Awareness Warning System (TAWS) glideslope cancel is selected	NOTE: No glideslope aural alerts
TAWS RAD ALT Override	Terrain Awareness Warning System (TAWS) radar altimeter override is selected	NOTE: No radar altitude callouts
TAWS Voice Override	Terrain Awareness Warning System (TAWS) voice override is selected	NOTE: No TAWS aural alerts

STATUS MESSAGES (WHITE)

(Sheet 9 of 9)

Message	Cause(s)	Corrective Action
Terrain Inhibit	Terrain Awareness Warning System (TAWS) terrain inhibit (data overlay on MAP) is selected	NOTE: No terrain data overlay on MAP display
Thrust REV DEACT, L Thrust REV DEACT, R Thrust REV DEACT, L-R	Indicated reverser(s) manually pinned/locked	NOTE: Thrust reverser(s) are not operational
Wing Anti Ice On, L Wing Anti Ice On, R Wing Anti Ice On, L-R	Associated wing anti-ice is on	*If out of icing conditions:* Both WAI selectors - OFF

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PRE-FLIGHT

FIRST FLIGHT OF THE DAY

Whenever a thruflight item box appears within a procedure step (a framed procedure step number such as [24]), this step must be performed on the second flight of the day.
The following criteria defines events of first flight of the day when the full procedure must be performed:

1. Change in flight crew personnel
2. New date entered into the flight log
3. Maintenance action other than routine line servicing
4. More than five (5) hours elapsed between engine shut-down and engine start
5. Extreme weather conditions such as: heavy rain, snow, ground icing and extremely cold temperature

FUEL DRAIN VALVE AND DUMP VALVE DRAINING

The seven (7) fuel drain valves should be drained until all traces of water or other contaminants are no longer evident in the sampled fuel. Procedures for draining these valves is found in the G280 Airplane Maintenance Manual and may be performed by maintenance personnel or appropriately trained flight crew. Draining procedures are to be accomplished prior to the first flight of the day when departing a maintenance base or at intervals not to exceed 10 days, whichever occurs first.

COCKPIT PRE-FLIGHT INSPECTION

Preflight inspection to be accomplished before each flight.
Insure that fuel type in the aircraft matches that selected in the avionics system (refuel/defuel panel or SMC-FUEL or summary page).

1. Certificates ..... CHECK (AVAILABILITY AND VALIDITY)
2. Flight log, flight manual, trip books and charts ..... CHECK
3. Weight and Balance ..... CALCULATE
4. Safety equipment check:
   a. Cockpit and cabin portable fire extinguisher ..... CHARGED & SECURED
   b. First aid kit ..... SECURED
   c. Crash axe (if installed) ..... SECURED

Cockpit

[5]. Circuit breakers ..... CHECKED; ALL IN
[6]. LANDING GEAR lever ..... DOWN
[7]. STBY BATT ..... ON;

NOTE

Pushbutton is not lit. Both DCP and DSP come on. If the DCP and DSP do not come on, check CB-1 is pushed in on the front of the emergency battery located in the left hand forward avionics rack behind the waste and water control panel.

8. EMER BUS ..... BATT ON
   ..... (wait 10 seconds until Left DU is fully powered up)
9. EMER BUS ..... OFF
[10]. Both BATT ..... ON

(Continued)

[11]. Overhead panel and pedestal pushbuttons .....ALL OFF (OUT) except:
- a. Both BATT, STBY BATT, both ENG GEN and APU GEN
- b. UTILITY..... ALL ON
- c. PACK .....ON
- d. TEMP CONTROL - COCKPIT and CABIN. ..... AUTO
- e. CPCS MODE ..... MAN
- f. COCKPIT LTS MASTER.....ON

[12]. Fuel..... CHECK QTY, DISTRIBUTION AND TYPE

NOTE

Extended running of the APU on the ground without engines running, may reduce right feed tank to below maximum level.

[13]. PARK BRAKE ..... SET
OPERATE LEFT EMP IF BOTH BRAKE ACCUMULATOR PRESSURES ARE BELOW 1300 PSI

NOTE

Parking Brake On status message comes on when lever is latched.

[14]. GUST LOCK ..... UNLOCKED

[15]. APU..... AS REQUIRED
(SEE APU START (ON GROUND), page IV-10)

<<END>>

EXTERIOR INSPECTION

NOTE

1. If any items are missing on preflight inspection, refer to Configuration Deviation List (CDL).
2. Prior to flight in RVSM airspace, the flight crew shall review the maintenance log for any repairs on and around the static port area since the last flight in RVSM airspace.
3. Inspect Pitot Static drains in the nose compartments if the airplane has been exposed to heavy rain

1. Ensure ground area is free of foreign objects
2. Check condition of fuselage, all surfaces, lights and antennas during walk-around
3. Inspect for evidence of leaks: fuel, oil and hydraulic

Left Forward Fuselage:

4. Door entrance light ..... CHECK
5. Main entry door view port..... CHECK
6. Main entry door / seal ..... CHECK CONDITION
7. L angle of attack (AOA) vane ..... COVER REMOVED / CHECK
8. L pitot, L ice detector and TAT probes..... COVER REMOVED/ CHECK

NOTE

Examine for evidence of FOD and/or physical blockage of the probe by foreign material.

9. Side window / windshield ..... CHECK
10. L nose avionics door ..... CLOSED
11. Radome / EVS window ..... CHECK

(Continued)

12. Nose landing gear doors ..... CHECK CONDITION AND ACTUATING RODS
13. Nose landing gear .....CHECK (HARNESSES, HOSES, STRUCTURE, TAXI LTS)
14. Nose wheels and tires..... CHECK CONDITION
15. Nose landing gear safety pin .....REMOVED
16. Nose landing gear strut extension ..... AS REQUIRED
17. Tow bar adapter .....SECURED

NOTE

Verify that the shear pin and cotter pin are properly installed, undamaged and in place.

18. Oxygen discharge indicator .....CHECK
19. Nose compartment ventilation inlets & outlets .....CHECK CLEAR

Right Forward Fuselage:

20. R angle of attack (AOA) vane .....COVER REMOVED / CHECK
21. R pitot, R ice detector probes .....COVER REMOVED / CHECK
22. STBY pitot cover .....COVER REMOVED / CHECK
23. Side window / windshield .....CHECK
24. R nose avionics door ..... CLOSED
25. Outflow valve .....CHECK OPEN / CLEAR OF OBSTRUCTIONS
26. R static ports and rvsm region .....COVER REMOVED / CHECK
27. Window emergency releases / windows .....SECURE / CHECK
28. R ice inspection light ..... CHECK CONDITION
29. Antennas.....CHECK
30. Refuel defuel panels (RDP) .....CHECK / CLOSED
31. Forward emergency lights (above and below wing).....CHECK

(Continued)

Right Wing Area

32. R landing light ..... CHECK
33. Wing leading edge ..... CHECK
34. Wing fuel vent ..... CLEAR
35. Gravity fueling filler cap access panel ..... SECURED
36. NAV / Strobe Lights ..... CHECK
37. Winglet and aileron static wicks ..... CHECK
38. Aileron surface and tab ..... CHECK ALIGNMENT
39. Fuel jettison port ..... CLEAR
40. Aileron / aileron gear tab / flaps / spoilers ..... CHECK
    Check surfaces for damage, security of attach points, condition of all actuators, aileron tab gear free play, plumbing and cables forward of the flaps. Check condition of flap rollers.
41. Main landing gear (MLG) fairing door / strut ..... CHECK
    Check Alignment within red band, and actuating rods
42. MLG brake wear indicator (inboard / outboard) ..... CHECK
43. MLG WOW ..... CHECK
44. MLG strut extension ..... 1 INCH MINIMUM
45. MLG tires / brakes / plugs ..... CHECK
46. MLG uplock ..... CHECK

CAUTION

IF ANY LANDING GEAR UPLOCK IS NOT OPEN, THAT LANDING GEAR WILL NOT LOCK UP AFTER RETRACTION.

47. MLG wheel well area ..... CHECK
48. MLG safety pin ..... REMOVE

(Continued)

Right Aft Fuselage:

49. Emergency exit .....SECURED
50. Dorsal fin air scoop ..... CLEAR
51. Hydraulic accumulators / pneumatic bottle pre charge .....CHECK
52. HYD MAINT / R BATT / WATER and WASTE service doors..... CLOSED
53. Engine:
    a. Intake ground cover .....REMOVED
    b. Nacelle intake + probes ..... CLEAR
    c. Fan blades ..... CHECK CONDITION
    d. Cowling & latches .....SECURED
    e. Exhaust ground cover .....REMOVED
    f. Exhaust..... CLEAR
    g. Rear turbine blades ..... CHECK CONDITION
54. Heat exchanger outlet..... CLEAR
55. AIR conditioning unit outlet ..... CLEAR
56. Pre-cooler exhaust..... CLEAR
57. APU inlet door..... CHECK CONDITION

Tail Area:

58. Empennage ..... CHECK CONDITION
59. Battery vents ..... CLEAR
60. Tail Compartment Door ..... CLOSED
61. Horizontal stabilizer..... CHECK CONDITION
62. Static wicks .....CHECK
63. Rudder .....CHECK
64. Tail position + logo lights ..... CHECK CONDITION
65. APU tailpipe .....CHECK
66. APU service door ..... CLOSED
67. APU generator inlet..... CLEAR

(Continued)

Left Aft Fuselage:

68. Engine:
    a. Intake ground cover ..... REMOVED
    b. Nacelle intake + probes ..... CLEAR
    c. Fan blades ..... CHECK CONDITION
    d. Cowling & latches ..... SECURED
    e. Exhaust ground cover ..... REMOVED
    f. Exhaust ..... CLEAR
    g. Rear turbine blades ..... CHECK CONDITION
69. Air turbine starter door ..... AS REQUIRED
70. Baggage door ..... SECURE

NOTE

Recommend door not be locked prior to flight. If locked, the baggage door cannot be opened from inside the aircraft in an emergency.

71. L BATT / EXT PWR doors ..... CLOSED / AS REQUIRED

Left Wing Area:

72. Main landing gear (MLG) fairing door / strut ..... CHECK
    Check Alignment within red band, and actuating rods
73. MLG brake wear indicator (inboard / outboard) ..... CHECK
74. MLG WOW ..... CHECK
75. MLG strut extension ..... 1 INCH MINIMUM
76. MLG tires / brakes / plugs ..... CHECK
77. MLG Up-lock ..... CHECK

CAUTION

IF ANY LANDING GEAR UPLOCK IS NOT OPEN, THAT LANDING GEAR WILL NOT LOCK UP AFTER RETRACTION.

(Continued)

78. MLG wheel well area .....CHECK
79. MLG safety pin.....REMOVE
80. Fuel jettison port ..... CLEAR

81. Aileron / aileron gear tab / flaps / spoilers.....CHECK
    Check surfaces for damage, security of attach points, condition of all actuators, aileron gear tab free play, plumbing and cables forward of the flaps. Check condition of flap rollers.

NOTE

To determine if the gear tab is normal, move the aileron manually with one hand and, while holding the gear tab with other hand, observe if there is any free play. A normally-operating gear tab will not exhibit any free play when the aileron is moved.

82. Aileron surface and tab .....CHECK ALIGNMENT
83. Winglet and aileron static wicks .....CHECK
84. NAV / strobe lights .....CHECK
85. Gravity fueling filler cap access panel.....SECURED
86. Wing fuel vent ..... CLEAR
87. Wing leading edge .....CHECK
88. L landing light.....CHECK

Left Forward Fuselage:

89. Windows ..... CHECK (INTACT AND CLEAN)
90. L ice inspection light..... CHECK CONDITION
91. L Static ports and RVSM region..... CLEAR
92. Emergency lights .....CHECK
93. Landing gear safety pins / pitot probe covers ..... STOWED

<<END>>

APU OPERATIONS

APU START (ON GROUND)

1. Both BATT.....ON (22-27 V);
2. NAV light .....ON
3. FIRE SYS TEST.....PRESS

NOTE

Verify red light in fire handles, fuel control switches, and APU FIRE pushbutton and illumination of APU ARM / EMPTY pushbutton.
Verify that Fire/Bleed Test OK status message is displayed within 11 seconds.

4. R STBY pump (If right engine is off).....ON
5. APU MASTER.....ON

NOTE

1. The APU START switch may be pressed to START immediately after pressing MASTER switch to ON without waiting for the READY annunciation.
2. Verify that READY annunciation on APU synoptic (or SMC) comes on after 25 seconds.

6. APU START .....PRESS
7. APU GEN..... VERIFY ON WHEN 28V; CHECK LOAD

(Continued)

8. APU BLEED AIR ..... AS REQUIRED

NOTE

The APU GEN and bleed air are deactivated during the APU start even if left in the ON position. The GEN will come on line 4 seconds after the start sequence is completed (95% RPM) and bleed air after 90 seconds if left on.

<<END>>

APU START (IN FLIGHT)

1. R STBY pump (If right engine is off).....ON
2. APU MASTER.....ON

NOTE

1. The APU START switch may be pressed to START immediately after pressing MASTER switch to ON without waiting for the READY annunciation.
2. Verify that READY annunciation on APU synoptic (or SMC) comes on after 25 seconds.

3. APU START .....PRESS
4. APU GEN.....VERIFY ON WHEN 28V; CHECK LOAD
5. APU BLEED AIR .....AS REQUIRED, BELOW 20,000 FT

NOTE

If APU BLEED AIR is required in flight, it will be available immediately on single engine, and after 90 seconds after start sequence is completed if both engine operating.

<<END>>

APU SHUTDOWN (GROUND OR FLIGHT)

1. APU STOP ..... PRESS
2. APU RPM and EGT ..... MONITOR

When APU RPM less than 5%:

3. APU MASTER ..... OFF

NOTE

1. APU RPM and EGT indications are displayed for 5 minutes after the APU RPM drops to less than 5% and the APU MASTER pushbutton is off, provided that the APU ECU is powered.
2. At any time, if the APU MASTER pushbutton is pressed OFF, the APU immediately shuts down.

4. R STBY PUMP ..... AS REQUIRED
5. APU BLEED AIR ..... OFF

<<END>>

ENGINE STARTING

BEFORE STARTING ENGINES

[1]. Circuit breakers ..... CHECKED ALL IN
[2]. Preflight checks ..... COMPLETE
[3]. Electrical power ..... AS REQUIRED
APU GEN / EXT PWR / BATT
4. Hydraulic accumulators ..... CHECK

NOTE

If hydraulic accumulators pressure is less than 1300 psi, operate associated EMPs until pressure is 2900 psi

[5]. PARK BRAKE lever ..... SET

NOTE

Parking Brake On status message comes on when lever is latched.

Overhead Panel Checks and Setting

6. ANN LTS ..... PRESS / CHECK LTS
7. Both ENG ANTI-ICE ..... AUTO

(Continued)

[8]. ICE DETECT TEST.....PRESS

NOTE

1. Ice Detector Test OK and ENG A/I Test OK, L-R status messages come on when test is completed successfully.
2. If ENG A/I Test OK, L-R status message does not appear, automatic engine anti-ice should be treated as failed. Dispatch into known icing conditions is still allowed if engine anti-ice is verified operational with the selector in the ON position after engine start. To verify manual engine anti-ice operation - after engine start, rotate both ENG ANTI-ICE selectors to ON position, confirm green A/I symbol in N_1 dials, ITT increase on both engines and the ENG Anti-Ice On, L-R status message appears.

[9]. FIRE SYS TEST (If not performed before APU start) .....PRESS

NOTE

Verify red light in fire handles, fuel control switches, and APU FIRE pushbutton and illumination of APU ARM / EMPTY pushbutton.
Verify that Fire/Bleed Test OK status message is displayed within 11 seconds.

10. FUEL INTERCONNECT .....CYCLE AND CLOSE

NOTE

Fuel INTER Valve Open status message is displayed.

(Continued)

11. FUEL XFLOW ..... CYCLE AND CLOSE

NOTE

Fuel XFLOW Valve Open status message is displayed.

12. Both STBY PUMPS.....OFF

NOTE

Leave R STBY PUMP on if APU is running.

[13]. CPCS MODE .....AUTO
14. WING and ENG ANTI-ICE .....AUTO
[15]. PROBE HEAT .....OVRD (15 seconds max.); then - AUTO

NOTE

Verify no CAS messages come on.

16. EMER LTS ON .....ON / CHECK / OFF
[17]. EMER LTS OFF/ARM .....ARM
[18]. SEAT BELT and NO SMOKE .....ON

Panels and Pedestal Checks and Setting

19. Autopilot ..... CHECK

NOTE

Engage Autopilot. Check the disconnect switches on both yokes and check FMA annunciations.

[20]. PASSENGER OXYGEN.....AUTO
21. THERAPEUTIC OXYGEN .....OFF
[22]. OXYGEN SHUTOFF.....ON
23. OXYGEN PRESSURE ....CHECK
24. Crew oxygen masks.....CHECK Condition, Operation and Boom
25. Emergency landing gear handle ..... STOWED
26. FIRE handles ..... IN
27. LANDING GEAR lever .....DOWN / 3 GREEN

(Continued)

[28]. Thrust levers ..... .IDLE
[29]. GUST LOCK ..... AS REQUIRED

NOTE

Thrust levers must be in idle prior to engaging the gust lock.

30. ALTN FLAPS.....CHECK

NOTE

Select ALTN FLAPS pushbutton. Alternate Flaps On status CAS will come on and pushbutton illuminated. Deselect pushbutton and CAS will clear.

31. Engine FUEL CONTROL ..... OFF
32. SPEED BRAKES ..... RETRACT
33. NWS..... DISCONNECT
34. AILERON DISCONNECT handle..... STOWED
[35]. STAB TRIM (ALTN, PRIM).....CHECK

(Continued)

[36]. AILERON TRIM..... CHECK / SET 0°
37. RUDDER TRIM. ..... CHECK / SET 0°
38. SMC:
[a].STALL TEST .....TEST
b. TCAS TEST .....TEST
c. TAWS TEST.....TEST
39. SENSR page..... AS REQUIRED

Avionics and Instruments:

[40]. Altimeters .....SET
[41]. FMS..... INITIALIZED and PROGRAMMED
[42]. Landing field elevation ..... SET (SMC-UTIL-CPCS)
[43]. Performance.....CALCULATE
[44]. Vspeeds ..... CHECKED / SET

NOTE

If Vspeeds are displayed, any change of flaps setting causes the Vspeeds to be deselected from display.

45. Crew briefing ..... ACCOMPLISH

The takeoff briefing should include the normal callouts during the acceleration phase to V1 and VR, runway and departure SID (if Know), ATC clearance (if know), takeoff configuration, climb performance and Go/No-Go criteria should be addressed, including specific duties during and aborted takeoff.

<<END>>

ENGINE START

NOTE

If engine restarts are required between 15 and 180 minutes following an engine shutdown, dry motoring is required prior to initiating a normal start sequence in order to reduce thermal binding of the LP rotor. See ENGINE DRY CRANKING, page IV-63. Wait a minimum of 3 minutes before engine start. If the engine is not started within 40 minutes of Dry Cranking, and it has been less than 180 minutes since engine shutdown, Engine Dry Cranking must be repeated prior to engine start.

1. Cockpit displays ..... SET FOR ENGINE START
2. Start clearance ..... REQUEST
3. BCN LTS ..... ON
4. PARK BRAKE ..... SET
5. APU BLEED ..... ON

CAUTION

Recommended indicated Bleed Air pressure to initiate engine start is approximately 32 PSI below 10,000' MSL and approximately 26 PSI above 10,000' MSL. The engine can be started with pressures lower than these but the possibility of a hot start increases. Monitor ITT closely during the engine start.

(Continued)

First engine start:

6. Thrust levers ..... IDLE
7. Engine FUEL CONTROL ..... RUN
8. FUEL STBY PUMP ..... ON

NOTE

STBY Pump On, L or STBY Pump On, R status message comes on.

9. HYDRAULIC EMP..... ON

NOTE

EMP HYD Pump On, L or EMP HYD Pump On, R status message comes on.

10. Danger areas ..... CLEAR

(Continued)

CAUTION

ABORT THE START BY TOGGLING THE FUEL CONTROL SWITCH TO OFF POSITION IF:

1. NO N_2 ROTATION.
2. N_2 FAILS TO REACH IDLE SPEED WITHIN ENGINE START TIME LIMITATIONS.
3. NO N_1 ROTATION BY 25 PERCENT N_2.
4. LIGHT-OFF DOES NOT OCCUR WITHIN 30 SECONDS OF START INITIATION.
5. N_1 OR N_2 STOPS ACCELERATING TO IDLE (HUNG START).
6. NO POSITIVE INDICATION OF OIL PRESSURE BY 30 PERCENT N_2.
7. ITT rises rapidly through maximum start limit of 650°C up to 40% N_2.
8. ANY UNUSUAL NOISE OR VIBRATION.
9. ATS VALVE FAILS TO CLOSE (SVO) SYMBOL IS ON AFTER ENGINE REACHED IDLE AND/OR Starter Fail On, L or Starter Fail On, R CAUTION MESSAGE DISPLAYED).
10. IF ANOTHER START IS ATTEMPTED –
    A. CLEAR ENGINE OF FUEL AND VAPOR BY ENGINE DRY CRANKING, page IV-63 PRIOR TO ATTEMPTING ANOTHER START.

(Continued)

B. DO NOT EXCEED STARTER DUTY CYCLE OF:

- THREE CONSECUTIVE START CYCLES, FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS AND MOTORING.
- A MAXIMUM OF 5 MINUTES, FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS OR MOTORING.

NOTE

The engine start cycle incorporates an overtemperature start protection function that terminates a ground start if ITT limit is exceeded for 5 seconds.

(Continued)

11. START/CRANK ..... PRESS ONE SECOND
12. Engine indications ..... MONITOR

NOTE

Observe proper engine start sequence on the primary EICAS display, as follows:

- SVO (Starter Valve Open) symbol is on.
- N_2 rotation.
- IGN green symbol is on.
- Fuel flow increase.
- N_1 rotation.
- IGN symbol is off.
- Make sure N_1 rotation is indicated before N_2 reaches 25%
- Make sure the oil pressure indication is provided before N_2 reaches 30%.
- N_1, N_2, FF and ITT indications are rising and stabilized at ground idle (N_1 is stabilized between 20% and 25%).
- Verify the hydraulic pressure in corresponding system is rising (expected at 12%-15% N_2).
- IGN symbol is cleared before N_2 reaches 50%
- SVO symbol is cleared before engine stabilized at ground idle.

When engine at idle:

13. FUEL STBY PUMP ..... OFF then ARM

NOTE

STBY Pump On, L or STBY Pump On, R status message clears.

(Continued)

14. HYDRAULIC EMP..... OFF then ARM

NOTE

EMP HYD Pump On, L / EMP HYD Pump On, R status message clears.

15. ENG ANTI-ICE ..... AS REQUIRED

NOTE

If OAT is less than 10°C and visible moisture select ENG ANTI-ICE to ON.

Second engine start:

16. Repeat steps 6 through 15 for second engine

When both engines at idle:

17. Hydraulic pressures ..... CHECK (3000 PSI)
18. Both generators..... VERIFY ON (LOAD, VOLTS)

NOTE

A/C S/N 2001 - 2011: if second generator does not come on-line after engine start and GEN FAIL caution message comes on, deselect APU GEN, and then press RESET

(Continued)

19. Both ENG BLEED AIR .....ON

NOTE

ENG BLEED pushbutton illuminates OFF if APU bleed is selected to ON - on ground.

20. APU / APU BLEED ..... AS REQUIRED
21. WING ANTI-ICE ..... AS REQUIRED
22. EXT PWR (If used) ..... DISCONNECT

NOTE

When connected - AVAIL light is on.

<<END>>

AFTER START

1. Cockpit displays ..... SET FOR TAXI
2. Flaps ..... SET FOR TAKEOFF (10° or 20°)
3. Flight controls / speed brakes ..... CHECK / RETRACT
4. Trims ..... SET

NOTE

The STAB trim should be set according to the tables in Figure 5-45 for flaps – 20, Figure 5-46 for flaps – 10, and Figure 10-5-2 for flaps – 0. When programmed with the correct ZFWCG and fuel load, the FMS Takeoff Performance page will provide the correct STAB trim setting from the AFM. If the resulting STAB trim setting is slightly outside the green band, move the setting just inside the green band.

5. NWS ..... CONNECT
6. Taxi clearance ..... RECEIVED
7. Chocks ..... REMOVED
8. PARK BRAKE ..... OFF
9. TAXI LTS ..... ON
10. Doors ..... ALL CLOSED

<<END>>

TAXI/BEFORE TAKEOFF

1. Transponder ..... AS REQUIRED
2. Brakes and steering ..... CHECK
3. Thrust reversers ..... CHECK

NOTE

T/R green symbol display in N_1 dial when thrust reverser is open.

4. Flight Instruments / NAV sensors ..... CHECK / SET
5. ENG and WING ANTI-ICE ..... CHECK / AS REQUIRED
6. If wing anti-ice is required - Using synoptic, verify wing anti-ice temperatures are 130°F ± 10° and both wings green prior to takeoff

WARNING

MINUTE AMOUNTS OF ICE OR OTHER CONTAMINATION ON THE LEADING EDGES OR WING UPPER SURFACES CAN RESULT IN A STALL WITHOUT WARNING, LEADING TO LOSS OF CONTROL ON TAKEOFF.

7. Thrust mode ..... VERIFY T/O, CHECK POINTERS, CONFIRM RATING
8. Flaps ..... SET / (10° or 20°) / VERIFY; both pilots verify that the flaps set for takeoff is the setting for which the takeoff performance has been calculated.

WARNING

THE TAKEOFF WARNING SYSTEM (TOWS) DOES NOT CROSS-REFERENCE TAKEOFF REFERENCE SPEEDS. THE TOWS WILL NOT ALERT THE CREW FOR FLAP SETTINGS LESS THAN 22°. CONFIRM THAT THE ACTUAL FLAPS POSITION THAT IS REQUIRED FOR TAKEOFF IS APPROPRIATE FOR THE CALCULATED REFERENCE TAKEOFF SPEEDS.

(Continued)

9. Vspeeds ..... CONFIRM
10. FCP and flight directors..... SET / CONFIRM
11. Autobrakes ..... AS REQUIRED

NOTE

Autobrake RTO, status message comes on when RTO mode selected.

12. Crew briefing .....COMPLETED

NOTE

Accomplish takeoff briefing if not previously accomplished. Brief changes to runway, departure SID, ATC clearance, etc as required.

13. Battery charge current..... CHECK

NOTE

If charge current is above limitation, monitor amps and verify decreasing. If amps do not decrease, dispatch not authorized.

14. Cockpit displays ..... SET FOR TAKEOFF

NOTE

EICAS should be displayed on both DU 1 and DU 3 for takeoff/landing phase of flight – Stacked EICAS or 1/4 window EICAS per pilot's discretion.

<<END>>

LINE UP

1. GUST LOCK ..... VERIFY UNLOCKED
2. Controls..... VERIFY FREE MOVEMENT
3. T/O box ..... CONFIRM
4. WX radar..... AS REQUIRED
5. ENG and WING ANTI-ICE ..... AS REQUIRED
6. WINDSHIELD HEAT ..... AS REQUIRED
7. LDG and STROBE LTS ..... ON
8. Transponder..... AS REQUIRED
9. EICAS ..... CHECKED

When Cleared for takeoff:

10. Runway heading ..... CONFIRM
11. PROBE HEAT ..... OVRD IF ICING CONDITIONS EXIST

WARNING

Failure to select PROBES HEAT to OVRD when icing conditions exist can result in loss of any or all airspeed indications at any time during the takeoff roll. If airspeed indication is lost due to ice contamination with the PROBES HEAT in AUTO, normal indications should return shortly after becoming airborne.

(Continued)

NOTE

Limit the use of OVRD to thirty (30) seconds on the ground.

Icing conditions on the ground and for takeoff exist when the Static Air Temperature (SAT) is 10°C (50°F) or below, and visible moisture in any form is present (such as clouds, fog with visibility of one mile or less, rain, snow, sleet and ice crystals). Icing conditions also exist when the SAT is 10°C (50°F) or below when operating on ramps, taxiways or runways where surface snow, ice, standing water, or slush are present.

Probe Heat operation in OVRD mode onground for more than 30 seconds may result in the following:

– ISA/SAT/TAT will quickly rise to out of range indications and following messages will occur
– TCAS Fail CAS message
– TCAS FAIL appears on HSI and MAP
– ACS Default Mode CAS message
– Windshear Fail CAS message
– TURB FAIL appears on HSI and MAP
– L-R ENG Minor Fault CAS message

<<END>>

IN FLIGHT

CLIMB

1. Landing gear lever ..... UP

NOTE

If landing gear is intentionally left extended, smoothly pull the parking brake handle up momentarily when safely airborne to manually command wheel despin. Failure to stop the wheels after lift off may result in a Thrust REV Fail caution message.

At V_{SE} – 10 minimum and accelerating:

2. Flaps ..... UP
3. Climb thrust ..... SET (green CLB symbol)
4. Autopilot ..... AS REQUIRED
5. EXT LTS ..... AS REQUIRED
6. WING and ENG ANTI-ICE ..... AS REQUIRED

NOTE

Moving the ENG A/I switches from AUTO to ON or ON to AUTO when the Ice Detected message is displayed may cause the ENG Anti-Ice Fail Caution message to display.

7. PROBE HEAT ..... AUTO
8. CPCS ..... MONITOR

NOTE

Post MOD G25-10074: The Rate indication on the display units is filtered to avoid showing small, rapid changes. Therefore, it may lag the actual rate change. The Rate display on the SMC - UTILTIES - Cabin Pressure page is not filtered and shows the actual, instantaneous value.

(Continued)

At transition altitude:

9. Altimeters ..... STD
10. Windshield Heat ..... ON
11. LDG LTS ..... AS REQUIRED
12. APU ..... AS REQUIRED

<<END>>

CRUISE

1. Autopilot ..... AS DESIRED
2. Baggage interior door ..... CLOSED ABOVE 40,000 FT
3. Panel sweep ..... COMPLETE

<<END>>

CABIN ALTITUDE / PRESSURE SCHEDULE

The following charts present the automatic cabin altitude schedule for climb and cruise. It does not represent the descent schedule which is based on the Landing Field Elevation (LFE):

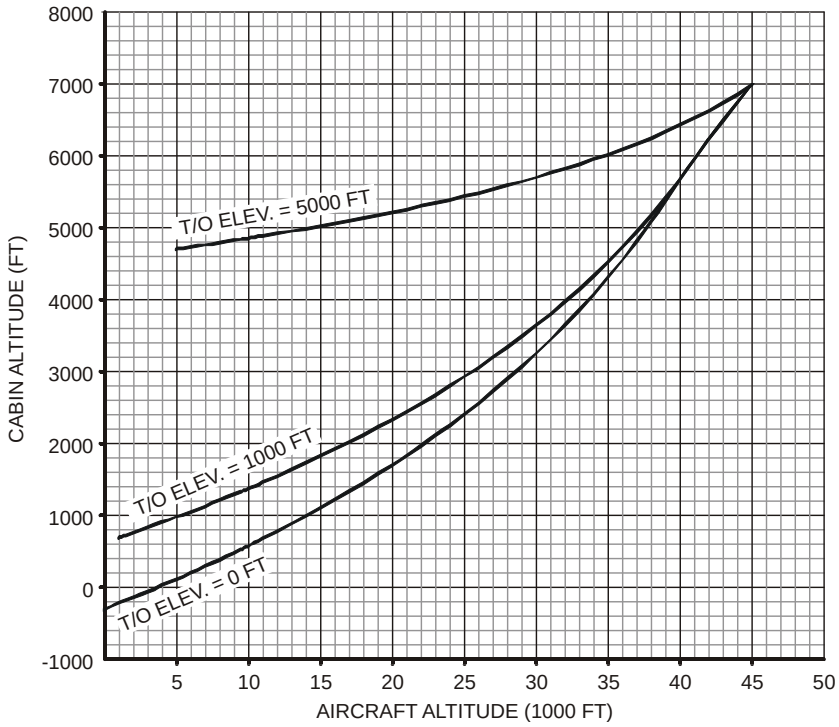

Figure 4-1. Cabin Altitude Schedule

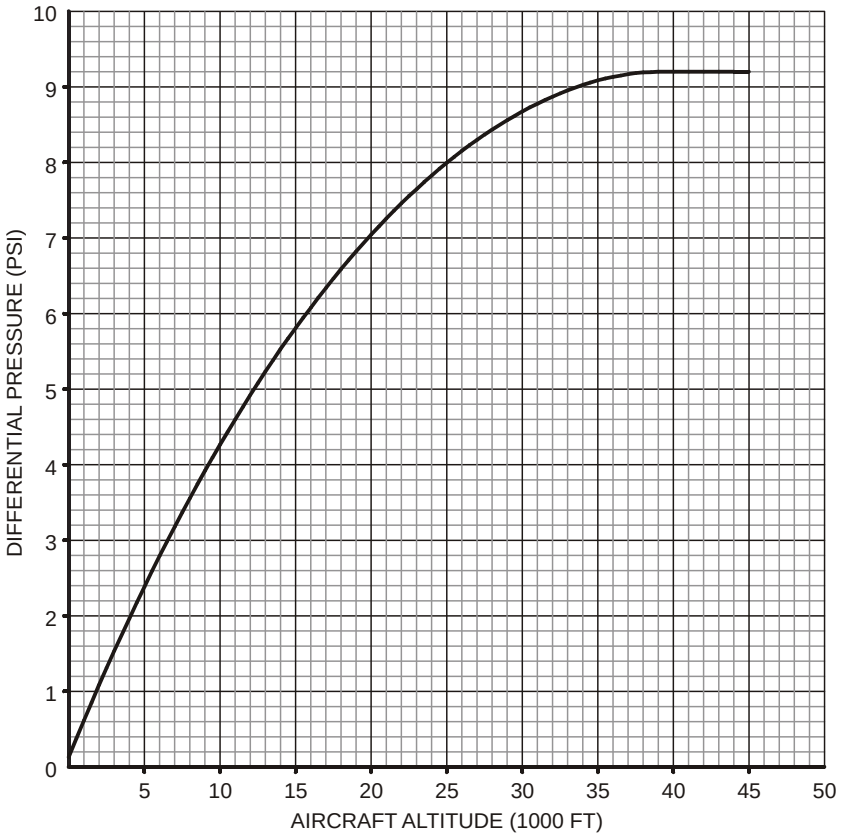

Figure 4-2. Cabin Differential Pressure Schedule

BEFORE DESCENT

1. Fuel quantity & balance .....CHECK
2. WING and ENG ANTI-ICE ..... AS REQUIRED

NOTE

Moving the ENG A/I switches from AUTO to ON or ON to AUTO when the Ice Detected message is displayed may cause the ENG Anti-Ice Fail Caution message to display.

3. Landing field elevation .....CHECK
4. ATIS .....RECEIVED
5. FMS .....ARRIVAL AND APPROACH SET
6. MDA / DA ..... SET
7. Landing data .....COMPUTE AND SET
8. V_{REF} ..... SET
9. Approach briefing..... COMPLETE

<<END>>

DESCENT TRANSITION

1. Altimeters ..... SET
2. WING and ENG ANTI-ICE ..... .AS REQUIRED

NOTE

Moving the ENG A/I switches from AUTO to ON or ON to AUTO when the Ice Detected message is displayed may cause the ENG Anti-Ice Fail Caution message to display.

NOTE

Evaluate Weather conditions at the airport with emphasis on the possibility of encountering icing conditions during the approach and missed-approach. If icing conditions are expected, ensure that Engine/Wing Anti-Ice are selected ON and the wings are verified as green (100°F minimum) on the Bleed/Anti-Ice synoptic prior to deploying flaps.

3. Engine instruments ..... MONITOR
4. CPCS ..... MONITOR
5. WINDSHIELD HEAT ..... AS REQUIRED
6. Cockpit/cabin/EXT LTS ..... AS REQUIRED

NOTE

LND lights switch on automatically when descending through 18,000 ft if remained ON during climb.

<<END>>

BEFORE LANDING

1. Cockpit displays ..... SET FOR LANDING

NOTE

EICAS should be displayed on both DU 1 and DU 3 for takeoff/landing phase of flight – Stacked EICAS or 1/4 window EICAS per pilot's discretion.

2. PARK BRAKE ..... OFF
3. Autobrakes ..... AS REQUIRED
4. Landing gear ..... DOWN / 3 GREEN
5. Flaps ..... LND
6. Airspeed ..... V_{REF} + 5 KT

NOTE

When winds are greater than 10 knots or wind gusts are reported, add half the steady headwind component plus full gust value up to a maximum of 20 kt to V_{REF}.
Landing distance calculations are based on crossing the threshold at V_{REF}. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10-knot overspeed.

7. EXT LTS ..... AS REQUIRED

<<END>>

GO AROUND (TWO-ENGINE)

1. TO/GA Button.....PRESS

NOTE

The A/T system, if engaged, automatically advances to T/O thrust, and the autopilot, if engaged, remains engaged and executes an automatic go-around. Target speed selected upon flaps lever position (AUTO mode) or speed bug (MAN mode). Missed approach is activated on FMS and NAV source automatically swaps to FMS if automatic swap from FMS to NAV occurred at beginning of the approach.

2. Airspeed.....V_{REF}
3. Thrust.....GO-AROUND THRUST (IF REQUIRED)

NOTE

If a go-around is performed due to balked landing (after touchdown), verify that speed brakes lever is retracted.

4. Flaps ..... 20°

Once go-around attitude and positive rate of climb are both established with flaps at 20°:

5. Landing gear .....RETRACT

NOTE

Only if aircraft touched down during a rejected landing - If landing gear is intentionally left extended, smoothly pull the parking brake handle up momentarily when safely airborne to manually command wheel despin. Failure to stop the wheels after lift off may result in a THRUST REV FAIL caution message.

At safe altitude:

6. Airspeed ..... V_{REF}+20 KT
7. Flaps ..... UP
8. Airspeed ..... V_{REF}+30 KT
9. Thrust ..... AS REQUIRED

<<END>>

AFTER LANDING

1. Cockpit/cabin EXT LTS ..... AS REQUIRED
2. Weather radar ..... STBY
3. Transponder ..... AS REQUIRED
4. WINDSHIELD HEAT ..... OFF
5. PROBES HEAT ..... AUTO
6. WING and ENG ANTI-ICE ..... AS REQUIRED
7. APU ..... AS REQUIRED
8. Flaps ..... AS DESIRED

NOTE

If icing conditions are encountered during the approach phase of flight with the flaps extended, do not raise the flaps above 10 degrees without a visual inspection for ice build up on the leading edge of the flaps. Ice build up on the leading edge of the flaps can interfere with raising the flaps to zero degrees and possibly cause a Flaps Jam caution CAS message.

When the flaps are set to 10 or UP after landing, the FCECU will initiate a post flight bit causing the Yaw Damper Off caution CAS message to display momentarily.

9. BTMS ..... MONITOR

After 3 minutes minimum with engine at idle:

Post MOD G25-20113: . END OF PROCEDURE

Pre MOD G25-20113:

10. Engine ITT vs. OAT limit for shutdown ..... CHECK

(Continued)

After 3 minutes minimum with engine at idle:

11. Engine ITT vs. OAT limit for shutdown.....CHECK

NOTE

Check ITT vs. OAT using the table below:

OAT (°C)	≤ 35	> 35 but ≤ 40	>40 but ≤ 45	>45
MAX ITT (°C)	638	620	604	589

CAUTION

IF ITT IS GREATER THAN THE VALUES LISTED AFTER 3 MINUTES WITH ENGINE AT IDLE, TURN OFF ENGINE GENERATOR IF THE APU IS RUNNING WITH THE APU GENERATOR ON AND ALLOW ENGINE TO IDLE FOR AN ADDITIONAL 3 MINUTES. IF ITT IS STILL ABOVE LIMITS, DRY MOTORING OF ENGINE FOR 3 MINUTES MUST BEGIN WITHIN 3 MINUTES AFTER ENGINE SHUTDOWN. SEE ENGINE DRY CRANKING PROCEDURE.

If ITT exceeds the limit.

12. APU BLEED AIR.....ON
13. Both ENG BLEED AIR.....OFF
14. Engines..... STABILIZE AT IDLE FOR 3 MINUTES MINIMUM
15. ITT..... MONITOR

(Continued)

If ITT does not decrease below the limit:

16. Affected engine(s) ....PERFORM ENGINE DRY CRANKING, page IV-63, page IV-63 FOR 3 MINUTES AFTER ENGINE SHUTDOWN

CAUTION

DRY MOTORING OF EACH ENGINE MUST BE PERFORMED WITHIN 3 MINUTES OF ITS RESPECTIVE SHUT-DOWN.

<<END>>

QUICK TURN

The Quick Turn checklist can be used instead of the ENGINE SHUT-DOWN checklist and the BEFORE STARTING ENGINES checklist when the airplane will remain on Engine Generator, APU, or External Electrical Power between flights.

("Respective" refers to one or both engines planned for shutdown.)

1. PARK BRAKE lever ..... SET
2. NWS..... DISCONNECT
3. Respective ENG BLEED AIR..... OFF
4. Thrust Levers ..... IDLE

NOTE

Idle for 3 minutes before shut-down (including taxi time)

5. Respective Engine FUEL CONTROLS..... OFF
6. Respective FUEL STBY PUMPs..... OFF & NOT ARM (R ON FOR APU)
7. Respective HYDRAULIC EMPs..... OFF & NOT ARM
8. BCN LTS .....OFF (if both engines shutdown)
9. SEAT BELT and NO SMOKE..... AS DESIRED

Before Engine Start:

10. Exterior..... DOORS SECURE AND GEAR PINS OUT
11. Electrical Power ..... AS REQUIRED
12. Fuel..... CHECK QTY, DISTRIBUTION & TYPE
13. STAB TRIM ..... SET
14. AILERON and RUDDER TRIM ..... SET 0
15. Altimeters..... SET
16. FMS .....INITIALIZED & PROGRAMMED
17. Landing Field Elevation..... SET
18. Performance / Weight and Balance ..... CALCULATE
19. Vspeeds.....CHECKED / SET
20. Crew Briefing ..... ACCOMPLISH
21. SEAT BELT and NO SMOKE.....ON

Proceed to ENGINE START Checklist

ENGINE SHUT-DOWN

1. PARK BRAKE lever ..... SET
2. NWS ..... DISCONNECT
3. EMERGENCY LTS OFF/ARM ..... NOT ARM
4. Both ENG BLEED AIR ..... OFF

NOTE

Idle for 3 minute before shut-down (including taxi time).

5. Thrust levers ..... IDLE
6. GUST LOCK ..... LOCKED

NOTE

Thrust levers must be in idle prior to engaging the gust lock.

7. Engine FUEL CONTROLS ..... OFF
8. BCN ..... OFF
9. Fuel STBY pump ..... OFF and NOT ARM

NOTE

Leave R STBY PUMP ON, if APU is running

10. Both HYD EMP ..... OFF and NOT ARM
11. WING and ENG ANTI-ICE ..... OFF
12. Oxygen shutoff ..... OFF
13. Passenger oxygen control supply ..... AS DESIRED
14. Therapeutic oxygen ..... OFF
15. Chocks ..... IN PLACE
16. PARK BRAKE ..... AS REQUIRED
17. APU STOP ..... PRESS
18. APU EGT and RPM ..... MONITOR

(Continued)

When APU RPM less than 5%:

19. APU MASTER ..... OFF

NOTE

1. APU EGT and RPM indications are displayed for 5 minutes after the APU RPM is less than 5% and the APU MASTER pushbutton is selected OFF, provided the APU ECU has a source of power.

2. At any time, if the APU MASTER pushbutton is selected OFF, APU immediately shuts down.

20. R FUEL STBY PUMP..... OFF
21. EXT LTS..... OFF

NOTE

The STBY BATT and both BATT switches must be ON to check oil quantity on the refuel-defuel panel. If it has been between five (5) and thirty (30) minutes since engine shutdown, leave the STBY BATT and both BATT ON and check the Oil Quantity before turning the STBY BATT and both BATT OFF.

22. APU Door..... VERIFY CLOSED
23. Oil Quantity .....CHECK

NOTE

Oil quantity can be checked on the Ground Services Synoptic or the refuel-defuel panel. Indications will appear two minutes after engine shutdown. The STBY BATT and both BATT switches must be ON to check oil quantity on the refuel-defuel panel.

(Continued)

24. Both BATT ..... OFF
25. STBY BATT ..... OFF
26. Aircraft ..... SECURE

NOTE

If the airplane will be un-powered greater than 48 hours, pulling CB-1 on the front of the emergency battery located in the left hand avionics rack behind the waste and water control panel will prevent battery depletion.

<<END>>

ALTERNATE NORMAL PROCEDURES

BLEED AIR OFF TAKEOFF

CAUTION

BLEED OFF TAKEOFF IS PROHIBITED DURING ICING CONDITIONS WHEN WING ANTI-ICE IS REQUIRED.

NOTE

At 1500 ft AGL both ENG bleed turn on automatically, then, Bleed Configuration caution message comes on until APU BLEED is selected to OFF.

Conditions:

1. FMS - PERF - TAKEOFF, ENG BLEED ..... SELECT OFF
2. APU BLEED AIR ..... ON

NOTE

When APU bleed is selected, the isolation valve opens and the both bleed air MPRSOV (Manifold Pressure Regulator Shut Off Valve) close, and indicate OFF although the pushbuttons are selected ON.

3. Both ENG BLEED AIR ..... ON (INDICATING OFF)
4. BLEED AIR ISOLATION ..... VERIFY OPEN

(Continued)

At 1500 ft AGL Bleed Configuration caution message comes on:

5. APU BLEED AIR ..... OFF
6. Both ENG BLEED AIR ..... VERIFY ON
7. BLEED AIR ISOLATION valve ..... VERIFY CLOSED
8. APU ..... AS REQUIRED

<<END>>

BEFORE STARTING ENGINES / ENGINE START - BATTERY POWER ONLY

Use this checklist in situations where the only electrical source available is the airplane's batteries and an air source is available from either the APU or an external air cart.

Accomplish this checklist immediately after the COCKPIT PRE-FLIGHT INSPECTION checklist.

If the APU is the source for engine start, expedite steps between APU start and starting of the first engine to reduce drain on the batteries.

1. Circuit breakers ..... CHECKED; ALL IN
2. Electrical Power ..... BOTH BATT and STBY BATT
3. Hydraulic Accumulators ..... CHECK
4. PARK BRAKE ..... SET
5. FIRE SYS TEST ..... PRESS

NOTE

Verify red light in fire handles, fuel control switches, and APU FIRE pushbutton and illumination of APU ARM / EMPTY pushbutton.

Verify that Fire/Bleed Test OK status message is displayed within 11 seconds.

6. FIRE Handles ..... IN
7. Engine FUEL CONTROLS ..... OFF

(Continued)

If the APU is used for engine start perform APU START (ON GROUND) *checklist.*

8. BCN LTS ..... ON
9. APU BLEED AIR or External Air ..... ON

CAUTION

RECOMMENDED INDICATED BLEED AIR PRESSURE TO INITIATE ENGINE START IS APPROXIMATELY 32 PSI BELOW 10,000 FT MSL AND APPROXIMATELY 26 PSI ABOVE 10,000 MSL. THE ENGINE CAN BE STARTED WITH PRESSURES LOWER THAN THESE BUT THE POSSIBILITY OF HOT START INCREASES.

MONITOR ITT CLOSELY DURING THE ENGINE START

10. Thrust Levers ..... IDLE
11. R engine FUEL CONTROL ..... ON
12. R FUEL STBY PUMP ..... ON

NOTE

STBY Pump On, R status message displays

13. R EMP HYD EMP ..... ON

NOTE

EMP HYD Pump On, R status message displays

14. Danger Areas ..... CLEAR

(Continued)

CAUTION

ABORT THE START BY TOGGLING THE FUEL CONTROL SWITCH TO OFF POSITION IF:

1. NO N_2 ROTATION.
2. N_2 FAILS TO REACH IDLE SPEED WITHIN ENGINE START TIME LIMITATIONS.
3. NO N_1 ROTATION BY 25 PERCENT N_2.
4. LIGHT-OFF DOES NOT OCCUR WITHIN 30 SECONDS OF START INITIATION.
5. N_1 OR N_2 STOPS ACCELERATING TO IDLE (HUNG START).
6. NO POSITIVE INDICATION OF OIL PRESSURE BY 30 PERCENT N_2.
7. ITT rises rapidly through maximum start limit of 650°C up to 40% N_2.
8. ANY UNUSUAL NOISE OR VIBRATION.
9. ATS VALVE FAILS TO CLOSE (SVO) SYMBOL IS ON AFTER ENGINE REACHED IDLE AND/OR Starter Fail On, L or Starter Fail On, R CAUTION MESSAGE DISPLAYED).
10. IF ANOTHER START IS ATTEMPTED –
    A. CLEAR ENGINE OF FUEL AND VAPOR BY ENGINE DRY CRANKING, page IV-63 PRIOR TO ATTEMPTING ANOTHER START.

(Continued)

B. DO NOT EXCEED STARTER DUTY CYCLE OF:

- THREE CONSECUTIVE START CYCLES, FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS AND MOTORING.
- A MAXIMUM OF 5 MINUTES, FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS OR MOTORING.

15. R ENG START/CRANK.....PRESS ONE SECOND
16. Engine Indications..... MONITOR

NOTE

As engine stabilizes at idle the right generator will come on line.

When engine is at idle:

17. R GEN..... VERIFY ON (LOAD, VOLT)
18. R FUEL STBY PUMP.....OFF, THEN ARM
19. R HYD EMP .....OFF,THEN ARM
20. R ENG ANTI-ICE ..... AS REQUIRED
21. Before Starting Engines Checklist ..... COMPLETE PRIOR TO STARTING SECOND ENGINE
22. Start the Left engine using the appropriate procedure.

<<END>>

ENGINE CROSS START ON GROUND

CAUTION

INSUFFICIENT BLEED AIR PRESSURE DURING ENGINE CROSS START MAY RESULT IN DAMAGE TO THRUST REVERSER SYSTEM OR HOT START. DO NOT INITIATE START UNLESS SPECIFIED BLEED AIR PRESSURE IS INDICATED AND STABLE. READ ENTIRE PROCEDURE BEFORE PERFORMING.

1. PARK BRAKE ..... SET
2. ENG BLEED AIR (Engine To Be Started) ..... OFF
3. ENG BLEED AIR (Operating Engine) ..... ON
4. ISOLATION Valve..... OPEN
5. FUEL CONTROL (Engine To Be Started) ..... RUN
6. Thrust Lever (Engine To Be Started)..... IDLE
7. FUEL STBY PUMP (Engine To Be Started) ..... ON
8. HYDRUALIC EMP (Engine To Be Started) ..... ON
9. Danger Areas ..... VERIFY CLEAR OF OTHER AIRCRAFT, EQUIPMENT OR PERSONNEL
10. Thrust Lever (Operating Engine)..... ADVANCE TO 85% N2

After 30 seconds:

11. Bleed Air Pressure:
    Below 10000 ft ..... VERIFY 32 PSI OR GREATER AND STABLE
    10000 ft or higher .... VERIFY 26 PSI OR GREATER AND STABLE

(Continued)

CAUTION

CLOSELY MONITOR ENGINE INDICATIONS AND BLEED AIR PRESSURE DURING START. BLEED AIR PRESSURE WILL DECREASE WHEN STARTER IS ENGAGED. ADVANCE OPERATING ENGINE THRUST LEVER IF REQUIRED TO MAINTAIN AT LEAST 22 PSI DURING START. IMMEDIATELY ABORT START WITH FUEL CUTOFF SWITCH IF ENGINE INDICATIONS ARE NOT NORMAL OR IF BLEED PRESSURE CANNOT BE MAINTAINED. IF START IS ABORTED, PERFORM ENGINE DRY CRANKING PROCEDURE PRIOR TO ANY SUBSEQUENT START ATTEMPT.

NOTE

The cyan L-R Engine Thrust Fault CAS message will appear during the cross start and will extinguish once the start is completed.

CAUTION

ABORT THE START BY TOGGLING THE FUEL CONTROL SWITCH TO OFF POSITION IF:

1. NO N_2 ROTATION.
2. N_2 FAILS TO REACH IDLE SPEED WITHIN ENGINE START TIME LIMITATIONS.
3. NO N_1 ROTATION BY 25 PERCENT N_2.

(Continued)

4. LIGHT-OFF DOES NOT OCCUR WITHIN 30 SECONDS OF START INITIATION.

5. N_1 OR N_2 STOPS ACCELERATING TO IDLE (HUNG START).

6. NO POSITIVE INDICATION OF OIL PRESSURE BY 30 PERCENT N_2.

7. ITT RISES RAPIDLY THROUGH MAXIMUM START LIMIT OF 650°C UP TO 40% N_2.

8. ANY UNUSUAL NOISE OR VIBRATION.

9. ATS VALVE FAILS TO CLOSE (SVO) SYMBOL IS ON AFTER ENGINE REACHED IDLE AND/OR Starter Fail On, L or Starter Fail On, R CAUTION MESSAGE DISPLAYED).

10. IF ANOTHER START IS ATTEMPTED –

A. CLEAR ENGINE OF FUEL AND VAPOR BY ENGINE DRY CRANKING, page IV-63 PRIOR TO ATTEMPTING ANOTHER START.

B. DO NOT EXCEED STARTER DUTY CYCLE OF:

- THREE CONSECUTIVE START CYCLES, FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS AND MOTORING.
- A MAXIMUM OF 5 MINUTES, FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS OR MOTORING.

(Continued)

12. START/CRANK (Engine To Be Started).....PRESS ONE SECOND

NOTE

Observe proper engine start sequence on the primary EICAS display, as follows:

- SVO (Starter Valve Open) symbol is on.
- N_2 rotation.
- IGN green symbol is on.
- Fuel flow increases
- N_1 rotation.
- IGN symbol is off.
- Make sure that N_1 rotation is indicated before N_2 reaches 25%.
- Make sure that oil pressure indication is provided before N_2 reaches 30%.
- N_1, N_2, FF and ITT indications are rising and stabilized at ground idle (N_1 is stabilized between 20% and 25%).
- Verify that hydraulic pressure in corresponding system is rising (expected at 12% - 15% N_2).
- IGN symbol is cleared before N_2 reaches 50%.
- SVO symbol is cleared before engine stabilized at ground idle.

13. Engine Indications..... MONITOR
14. Bleed Air Pressure ..... MONITOR
(Advance operating engine thrust lever if required to maintain at least 22 PSI while starter is engaged)

(Continued)

When engine start is complete:

15. Thrust Levers ..... IDLE
16. ISOLATION Valve..... CLOSE
17. ENG BLEED AIR..... BOTH ON
18. FUEL STBY PUMP ..... BOTH OFF AND ARM
19. HYDRUALIC EMP..... BOTH OFF AND ARM
20. Hydraulic Pressures ..... CHECK
21. Generators ..... VERIFY BOTH ON (LOADS, VOLTS)

Proceed to AFTER START Checklist.

<<END>>

ENGINE START USING GROUND AIR SOURCE

NOTE

If engine restarts are required between 15 and 180 minutes following an engine shutdown, dry motoring is required prior to initiating a normal start sequence in order to reduce thermal binding of the LP rotor. See ENGINE DRY CRANKING, page IV-63. Wait a minimum of 3 minutes before engine start. If the engine is not started within 40 minutes of Dry Cranking, and it has been less than 180 minutes since engine shutdown, Engine Dry Cranking must be repeated prior to engine start.

1. Cockpit displays ..... SET FOR ENGINE START
2. Start clearance ..... REQUEST
3. BCN LTS ..... ON
4. PARK BRAKE ..... SET
5. ENG and APU BLEED AIR ..... OFF

NOTE

PACK may be deselected in order to prevent unwanted air cart odors from entering the cabin.

6. PACK ..... AS REQUIRED
7. ISOLATION valve ..... OPEN

First engine:

8. Engine FUEL CONTROL ..... RUN
9. FUEL STBY PUMP ..... ON

NOTE

STBY Pump On, L or STBY Pump On, R status message comes on.

(Continued)

10. HYDRAULIC EMP ON .....ON

NOTE

STBY Pump On, L or STBY Pump On, R status message comes on.

11. Thrust levers .....IDLE
12. Ground air source hose attached to ATS inlet ..... VERIFY BLEED AIR 32 PSI MIN.
13. Danger Areas .....CLEAR

CAUTION

ABORT THE START BY TOGGLING THE FUEL CONTROL SWITCH TO OFF POSITION IF:

1. NO N_2 ROTATION.
2. N_2 FAILS TO REACH IDLE SPEED WITHIN ENGINE START TIME LIMITATIONS.
3. NO N_1 ROTATION BY 25 PERCENT N_2.
4. LIGHT-OFF DOES NOT OCCUR WITHIN 30 SECONDS OF START INITIATION.
5. N_1 OR N_2 STOPS ACCELERATING TO IDLE (HUNG START).
6. NO POSITIVE INDICATION OF OIL PRESSURE BY 30 PERCENT N_2.
7. ITT rises rapidly through maximum start limit of 650°C up to 40% N_2.
8. ANY UNUSUAL NOISE OR VIBRATION.

(Continued)

9. ATS VALVE FAILS TO CLOSE (SVO) SYMBOL IS ON AFTER ENGINE REACHED IDLE AND/OR Starter Fail On, L or Starter Fail On, R CAUTION MESSAGE DISPLAYED).

10. IF ANOTHER START IS ATTEMPTED –

A. CLEAR ENGINE OF FUEL AND VAPOR BY ENGINE DRY CRANKING, page IV-63 PRIOR TO ATTEMPTING ANOTHER START.

B. DO NOT EXCEED STARTER DUTY CYCLE OF:

- THREE CONSECUTIVE START CYCLES, FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS AND MOTORING.
- A MAXIMUM OF 5 MINUTES, FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS OR MOTORING.

NOTE

The engine start cycle incorporates an overtemperature start protection function that terminates a ground start if ITT limit is exceeded for 5 seconds.

(Continued)

14. START/CRANK .....PRESS ONE SECOND

NOTE

Observe proper engine start sequence on the primary EICAS display, as follows:

- SVO (Starter Valve Open) symbol is on.
- N_2 rotation.
- IGN green symbol is on.
- Fuel flow increases
- N_1 rotation.
- IGN symbol is off.
- Make sure that N_1 rotation is indicated before N_2 reaches 25%.
- Make sure that oil pressure indication is provided before N_2 reaches 30%.
- N_1, N_2, FF and ITT indications are rising and stabilized at ground idle (N_1 is stabilized between 20% and 25%).
- Verify that hydraulic pressure in corresponding system is rising (expected at 12% - 15% N_2).
- IGN symbol is cleared before N_2 reaches 50%.
- SVO symbol is cleared before engine stabilized at ground idle.

15. Engine indications ..... MONITOR

When engine at idle:

16. FUEL STBY PUMP ON ..... OFF

NOTE

STBY Pump On, L / STBY Pump On, R status message - out.

17. FUEL STBY PUMP OFF/ARM ..... ARM

(Continued)

18. HYDRAULIC EMP ON ..... OFF

NOTE

EMP HYD Pump On, L or EMP HYD Pump On, R status message - out.

19. HYDRAULIC EMP OFF/ARM ..... ARM
20. ENG ANTI-ICE ..... AS REQUIRED

NOTE

If OAT is less than 10°C and visible moisture select ENG ANTI-ICE to ON.

Second engine:

21. Repeat steps 8 through 20 for second engine.

When both engines at idle:

22. Hydraulic pressures ..... CHECK (3000 PSI)
23. PACK ..... AS REQUIRED
24. Both generators ..... VERIFY ON (LOAD, VOLTS)
25. Ground air source ..... DISCONNECT
26. ISOLATION valve ..... CLOSE
27. Both ENG BLEED AIR ..... ON

NOTE

ENG BLEED pushbutton illuminates OFF if APU bleed is selected to ON – on ground.

<<END>>

APU START USING EXTERNAL POWER

1. Preflight/Exterior Inspection ..... ACCOMPLISHED
2. EXT PWR .....ON
3. NAV light .....ON
4. FIRE SYS TEST.....PRESS (IF ENGINES OFF)

NOTE

Verify red light in fire handles, fuel control switches, and APU FIRE pushbutton and illumination of APU ARM / EMPTY pushbutton.
Verify that Fire/Bleed Test OK status message is displayed within 11 seconds.

5. R STBY PUMP ON.....ON
6. APU MASTER.....ON
7. APU START .....PRESS
8. APU GEN..... VERIFY ON, CHECK LOAD
9. BOTH BATT .....ON
10. APU BLEED AIR ..... AS REQUIRED

NOTE

APU bleed air is available 90 seconds after APU start is completed.

11. EXT PWR..... AS REQUIRED
12. Proceed to BEFORE STARTING ENGINES, page IV-14

<<END>>

ENGINE DRY CRANKING

WARNING

DO NOT PERFORM DRY CRANKING WITH THE AIRCRAFT'S FUEL PYLON ISOLATION VALVE CLOSED. THE FIRE HANDLES MUST BE IN.

CAUTION

DO NOT EXCEED THE AIR TURBINE STARTER DUTY CYCLE (1-80-10).

- THREE CONSECTIVE START CYCLES FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS OR CRANKING
- A MAXIMUM OF 5 MINUTES FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS OR CRANKING
- CRANK SEQUENCE IS LIMITED BY THE FADEC TO 300 SECONDS AND STOPS AUTOMATICALLY UNLESS STOPPED MANUALLY BY PILOT.

NOTE

Ground air source, APU or cross bleed air source can be used for dry cranking.

1. Fire Handles.....IN
2. Bleed air source.....SELECT ON
3. BLEED AIR ISOLATION.....OPEN
4. HYD EMP.....ON
5. Engine FUEL CONTROL.....OFF
6. ENGINE CRANK.....ON
7. Required Crank Time..... DETERMINE PER TABLE BELOW

(Continued)

Purpose	Time	Remarks
Before engine start to reduce thermal binding of the LP rotor.	Until N_2 reaches 21% or after 15 seconds, whichever comes first	Required before engine start if engine was previously shut down between 15 and 180 minutes ago. Engine can be started between 3 and 40 minutes after cranking.
After aborted engine start prior to next start attempt.	30 seconds	Required to clear engine of fuel and vapors.
Cool engine exhaust area after landing in hot weather conditions	3 minutes	Perform within 3 minutes of engine shut down. If both engines require cranking, keep one engine running until motoring is complete on the first engine, then shut down and motor the remaining engine.

8. Engine START/CRANK ..... START

After required crank time is achieved:

9. ENGINE CRANK ..... DEPRESS TO STOP
10. BLEED AIR ISOLATION ..... AS REQUIRED
11. HYD EMP ..... OFF

<<END>>

ENGINE MOTORING IN HOT WEATHER CONDITIONS (PRE MOD G25-20113)

This procedure applies to all landings, with or without thrust reversers operation, upon which ITT exceeded the temperature indicated in the table below:

After 3 minutes minimum with engine at idle:

1. Engine ITT vs. OAT limit for shutdown.....CHECK

NOTE

Check ITT vs. OAT using the table below:

OAT (°C)	≤ 35	> 35 but ≤ 40	>40 but ≤ 45	>45
MAX ITT (°C)	638	620	604	589

CAUTION

IF ITT IS GREATER THAN THE VALUES LISTED AFTER 3 MINUTES WITH ENGINE AT IDLE, TURN OFF ENGINE GENERATOR IF THE APU IS RUNNING WITH THE APU GENERATOR ON AND ALLOW ENGINE TO IDLE FOR AN ADDITIONAL 3 MINUTES. IF ITT IS STILL ABOVE LIMITS, DRY MOTORING OF ENGINE FOR 3 MINUTES MUST BEGIN WITHIN 3 MINUTES AFTER ENGINE SHUTDOWN. SEE ENGINE DRY CRANKING PROCEDURE.

If ITT exceeds limit:

2. APU BLEED AIR.....ON
3. Both ENG BLEED AIR.....OFF
4. Engines..... STABILIZE AT IDLE FOR 3 MINUTES MINIMUM
5. ITT ..... MONITOR

(Continued)

If ITT does not decrease below the limit:

CAUTION

DRY MOTORING OF EACH ENGINE MUST BE PERFORMED WITHIN 3 MINUTES OF ITS RESPECTIVE SHUT-DOWN.

6. Affected engine(s) .....PERFORM NORMAL SHUT-DOWN; see ENGINE SHUT-DOWN, page IV-44
7. Affected engine(s) ..... PERFORM DRY CRANKING FOR 3 MINUTES; see ENGINE DRY CRANKING, page IV-63
8. Complete ENGINE SHUT-DOWN procedure, page IV-44

<<END>>

OPERATING AT AN AIRPORT NOT IN FMS DATABASE

1. TERRAIN INHIBIT.....ON

NOTE

Failing to inhibit TAWS alerts triggers misleading ground proximity warnings before landing and after takeoff.

2. Manual Landing Field Elevation (LFE) ..... SET (SMC - UTIL - Cabin Pressure)

NOTE

CPCS LFE Manual status message comes on

Before takeoff:

3. Altimeter reading ..... Within 75 ft of runway elevation

<<END>>

HIGH ELEVATION AIRPORT OPERATION (ABOVE 8000 FT MSL)

The CPCS Warning Set High advisory message is set according to the following conditions:

The high-cabin altitude warning is set to 14,750 ft when aircraft altitude is below 25,000 feet and one of the following conditions exist:

1. In ground mode (ground, verify, takeoff, takeoff abort, or landing)
2. In climb mode and takeoff altitude above 8000 ft
3. In descent mode and landing altitude above 8000 ft

At this setting, the maximum limit for automatic passenger oxygen drop is 14,750 ft (instead of 13,500 ft for non high altitude airport operations).

NOTE

High elevation airport operation is relevant for the following scenarios:

1. Takeoff and landing field elevations above 8000 ft.
   Upon lift-off the cabin altitude descends until it reaches the climb auto schedule. The Cabin Pressure Controller (CPCS) maintains the cabin altitude at a maximum of 7000 ±100 ft until the aircraft descends more than 500 ft and aircraft altitude is less than 25,000 ft. Once this occurs, the system enters descent mode, where it ascends the cabin altitude to the landing field elevation.
2. Takeoff elevation above 8000 ft and landing at or below 8000 ft.
   In this case the controller descends the cabin altitude to 8000 ft and then descend the cabin altitude at a slower rate to the climb schedule, limiting the maximum cabin altitude to 7000±100 ft, until descent is detected.
   Once descent is detected the cabin climbs or descends to the landing field elevation if it is not already there.

(Continued)

3. Takeoff elevation at or below 8000 ft and landing above 8000 ft. In this case the controller allows the cabin altitude to correspond to the calculated climb schedule altitude until descent of 500 ft is detected, at which point the cabin rates to 7850 ft. The cabin altitude will then be maintained at 7850 ft until the aircraft altitude drops below 25,000 ft, at which point the cabin l continues to rate up to the selected landing altitude.

Takeoff:

NOTE

Use of oxygen by the flight crew while performing high-elevation operations at high-elevation airports or at elevations for which the flight crew is not acclimated is highly recommended. For operations at field elevations at and above 10,000 ft, use of oxygen is recommended.

1. Preferential runways, slope, head/tail wind conditions ..... CONSIDER
2. Acceleration ..... Expect slower than normal acceleration

Climb:

3. Desired cabin altitude for flight level ..... Verify cabin is pressurizing to desired cabin altitude
4. The cockpit crew shall use oxygen until the cabin altitude rate of change is zero and below 10,000 ft

Descent (LFE above 8000 ft):

1. Crew oxygen ..... AS REQUIRED

When the landing field elevation is greater than 9500 ft, one pilot shall use oxygen from the top of descent until landing and shutdown checklist is completed.

(Continued)

On approach, landing and rollout:

2. True Airspeed / groundspeed..... MONITOR

CAUTION

BE AWARE OF NOSE AND MAIN LANDING GEAR GROUND SPEED LIMITATION. GROUND SPEED AMPLIFIED BY TAILWIND CONDITIONS COULD EXCEED MAXIMUM TIER SPEED ON LANDING.

3. Thrust reverser spool-up times .....Expect slower than normal

<<END>>

SINGLE ENGINE GROUND OPERATIONS

Single engine ground operations may be performed using either engine for electrical and hydraulic power and opposite HYDRAULIC EMP for hydraulic power. APU operation is recommended for increased ECS performance, electrical back-up and as the source of bleed air for starting the opposite engine during taxi. Three procedures are available: SINGLE ENGINE TAXI BEFORE TAKEOFF, for departing the parking area on one engine for flight or for repositioning the aircraft on the airfield; TAXI ENGINE START, for starting the remaining engine prior to takeoff after departing the parking area and SINGLE ENGINE TAXI AFTER LANDING, which is for use after landing to facilitate to a quick turn or for flight termination. “Respective” in these procedures indicates an engine that is to be started or shut down.

NOTE

If engine dry motoring due to thermal binding from previous shutdown is required, it is recommended that the ENGINE DRY CRANKING procedure is accomplished prior to beginning single engine taxi operations.

CAUTION

IF APU IS NOT AVAILABLE FOR ENGINE START, ENGINE CROSS START ON GROUND OR ENGINE DRY CRANKING PROCEDURE IS TO BE ACCOMPLISHED WITH PARK BRAKE SET IN A LOCATION WHERE HIGH ENGINE POWER SETTINGS CAN BE SAFELY CONDUCTED. ENSURE AREA BEHIND AIRCRAFT IS CLEAR BEFORE ADVANCING POWER FOR CROSS-BLEED START OR DRY MOTORING.

SINGLE ENGINE TAXI BEFORE TAKEOFF

1. Desired engine for taxi ..... OPERATING

NOTE

If APU will be used with right engine shutdown, right FUEL STBY PUMP must remain ON until right engine is started. STBY Pump On, R status message is displayed.

2. Operating engine FUEL STBY PUMP ..... OFF then ARM

NOTE

STBY Pump On, L or STBY Pump On, R (unless APU is operating with right engine shut down) status message clears.

3. Operating engine HYDRAULIC EMP ..... OFF then ARM

NOTE

EMP HYD Pump On, L or EMP HYD Pump On, R status message clears.

4. Operating ENG ANTI-ICE ..... AS REQUIRED

NOTE

If OAT is 10°C or below and visible moisture in any form is present, select ENG ANTI-ICE to ON.

5. APU (if available) ..... OPERATING
   a. APU GEN ..... ON
   b. APU BLEED AIR ..... ON
6. Operating engine generator ..... VERIFY ON (LOAD, VOLTS)
7. Non-operating ENG BLEED ..... OFF
8. DOORS ..... ALL CLOSED
9. Cockpit displays ..... SET FOR TAXI

(Continued)

10. Non-operating engine HYDRAULIC EMP ..... ON

NOTE

EMP HYD Pump On, L or EMP HYD Pump On, R status message comes on.

11. Both hydraulic system pressures ..... CHECK (3000 PSI)

NOTE

Do not check flight controls or deploy speed brakes if flaps are in transit using only left HYDRAULIC EMP.

12. NWS ..... CONNECT
13. TAXI LTS ..... ON
14. Transponder ..... AS REQUIRED
15. Brakes and steering ..... CHECK
16. Fuel balance ..... MONITOR

NOTE

If there is fuel in the center tank and the wing tanks are not full, right engine start may be required to balance fuel if APU and left engine are operating.

(Continued)

If fuel balance is required:

a. FUEL XFLOW ..... OPEN

NOTE

Fuel XFLOW Valve Open status message will come on. CAS will change to Fuel XFLOW Valve Open caution message 5 minutes after valve has been selected open.

b. "Heavy" tank FUEL STBY PUMP ..... ON

NOTE

STBY Pump On, L or STBY Pump On, R (already on if APU is operating with right engine shut down) status message comes on.

When fuel balance is achieved:

c. FUEL XFLOW ..... CLOSE

d. "Heavy" tank FUEL STBY PUMP ..... OFF and ARM

NOTE

STBY Pump On, L or **STBY Pump On, R** (unless APU is operating with right engine shut down) status message clears.

When ready to start second engine:

GO TO ..... TAXI ENGINE START

<<END>>

TAXI ENGINE START

NOTE

Start respective engine to allow at least 3 minutes for sufficient warm-up and system checks before takeoff.

NOTE

If APU is not available for engine start, perform ENGINE CROSS START ON GROUND procedure.

CAUTION

IF ENGINE CROSS START ON GROUND PROCEDURE IS REQUIRED, ACCOMPLISH PROCEDURE WITH PARKING BRAKE SET IN A LOCATION THAT IS SAFE TO ADVANCE OPERATING ENGINE POWER TO APPROXIMATELY 65% N1. VERIFY THAT AREA BEHIND AIRPLANE IS CLEAR BEFORE INCREASING THRUST ON THE RUNNING ENGINE. COORDINATION WITH ATC MAY BE REQUIRED.

For respective engine:

1. Thrust lever ..... IDLE
2. Engine FUEL CONTROL ..... RUN
3. FUEL STBY PUMP ..... ON

NOTE

STBY Pump On, R or STBY Pump On, L status message is displayed.

(Continued)

4. Bleed air pressure.....CHECK

CAUTION

RECOMMENDED INDICATED BLEED AIR PRESSURE TO INITIATE ENGINE START IS APPROXIMATELY 32 PSI BELOW 10,000' MSL AND APPROXIMATELY 26 PSI ABOVE 10,000' MSL. THE ENGINE CAN BE STARTED WITH PRESSURES LOWER THAN THESE BUT THE POSSIBILITY OF A HOT START INCREASES. MONITOR ITT CLOSELY DURING ENGINE START.

5. Danger areas..... CLEAR

CAUTION

ABORT THE START BY TOGGLING THE FUEL CONTROL SWITCH TO OFF POSITION IF:

1. N_2 FAILS TO REACH IDLE SPEED WITHIN ENGINE START TIME NO N_2 ROTATION.
2. LIMITATIONS.
3. NO N1 ROTATION BY 25 PERCENT N_2.
4. LIGHT-OFF DOES NOT OCCUR WITHIN 30 SECONDS OF START INITIATION.
5. N_1 OR N_2 STOPS ACCELERATING TO IDLE (HUNG START)
6. NO POSITIVE INDICATION OF OIL PRESSURE BY 30 PERCENT N_2.
7. ITT RISES RAPIDLY THROUGH MAXIMUM START LIMIT OF 650°C UP TO 40% N_2.

(Continued)

8. ANY UNUSUAL NOISE OR VIBRATION.
9. ATS VALVE FAILS TO CLOSE (SVO SYMBOL IS ON AFTER ENGINE REACHED IDLE AND / OR Starter Fail On, L OR Starter Fail On, R CAUTION MESSAGE DISPLAYED).
10. IF ANOTHER START IS ATTEMPTED –
    a. CLEAR ENGINE OF FUEL AND VAPOR BY ENGINE DRY CRANKING, page IV-63 PRIOR TO ATTEMPTING ANOTHER START.
    b. DO NOT EXCEED STARTER DUTY CYCLE OF:
       - THREE CONSECUTIVE START CYCLES, FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS AND MOTORING.
       - A MAXIMUM OF 5 MINUTES, FOLLOWED BY A COOLING PERIOD OF 15 MINUTES PRIOR TO ADDITIONAL STARTS OR MOTORING.

NOTE

The engine start cycle incorporates an overtemperature start protection function that terminates a ground start if ITT limit is exceeded for 5 seconds.

(Continued)

6. START /CRANK ..... PRESS ONE SECOND
7. Engine indications ..... MONITOR

NOTE

Observe proper engine start sequence on the primary EICAS display, as follows:

- **SVO** (Starter Valve Open) symbol is on.
- N_2 rotation.
- **IGN** green symbol is on.
- Fuel flow increase.
- N_1 rotation.
- **IGN** symbol is off.
- Make sure N_1 rotation is indicated before N_2 reaches 25%.
- Make sure the oil pressure indication is provided before N_2 reaches 30%.
- N_1, N_2, FF and ITT indications are rising and stabilized at ground idle (N_1 is stabilized between 20% and 25%).
- Verify the hydraulic pressure in corresponding system is rising (expected at 12% -15% N_2).
- **IGN** symbol is cleared before N_2 reaches 50%.
- **SVO** symbol is cleared before engine stabilized at ground idle.

When engine is at idle:

8. FUEL STBY PUMP ..... OFF then ARM

NOTE

STBY Pump On, L or STBY Pump On, R status message clears.

9. HYDRAULIC EMP ..... OFF then ARM

NOTE

EMP HYD Pump On, L or EMP HYD Pump On, R status message clears.

(Continued)

10. Hydraulic system pressures ..... CHECK (3000 PSI)
11. ENG ANTI-ICE ..... AS REQUIRED

NOTE

If OAT is 10°C or below and visible moisture in any form is present, select ENG ANTI-ICE to ON.

12. Engine generator..... VERIFY ON (LOAD, VOLTS)

NOTE

A/C S/N 2001 – 2011: If second generator does not come on-line after engine start and **GEN FAIL** caution message comes on, deselect APU GEN and then press RESET.

13. Both ENG BLEED AIR .....ON

NOTE

ENG BLEED pushbutton illuminate OFF if APU bleed is selected to ON – on ground.

14. APU / APU BLEED AIR ..... AS REQUIRED
15. FLAPS.....SET FOR TAKEOFF (10° or 20°)
16. Flight controls / speed brakes ..... CHECK / RETRACT
17. Trims .....SET

NOTE

The STAB trim should be set according to the tables in Figure 5-45 for flaps – 20, Figure 5-46 for flaps – 10, and Figure 10-5-2 for flaps – 0. When programmed with the correct ZFWCG and fuel load, the FMS Takeoff Performance page will provide the correct STAB trim setting from the AFM. If the resulting STAB trim setting is slightly outside green band, move the setting just inside the green band.

(Continued)

18. Thrust reversers.....CHECK
19. Flight instruments / NAV sensors.....CHECK

GO TO..... TAXI/BEFORE TAKEOFF CHECKLIST

<<END>>

SINGLE ENGINE TAXI AFTER LANDING

1. AFTER LANDING checklist..... COMPLETE
2. APU (if available) ..... START
   a. APU BLEED AIR ..... ON (when available)

NOTE

APU BLEED AIR is not available until 90 seconds after APU start. Selecting APU BLEED AIR ON before it is available will cause the Bleed Configuration caution CAS message to come on.

For respective engine:

3. ENG BLEED AIR.....OFF
4. Thrust Lever .....IDLE

After 3 minutes minimum with engine at idle:

Post MOD G25-20113: Proceed to Step 6

Pre MOD G25-20113:

5. Engine ITT vs. OAT limit for shutdown ..... CHECK

NOTE

Check ITT vs. OAT using the table below:

OAT (°C)	≤ 35	> 35 but ≤ 40	>40 but ≤ 45	>45
MAX ITT (°C)	638	620	604	589

(Continued)

CAUTION

IF ITT IS GREATER THAN OR EQUAL TO THE VALUES LISTED AFTER 3 MINUTES WITH ENGINE AT IDLE, TURN OFF ENGINE GENERATOR AND ALLOW ENGINE TO IDLE FOR AN ADDITIONAL 3 MINUTES. IF ITT IS STILL ABOVE LIMITS, DRY MOTORING OF ENGINE FOR 3 MINUTES MUST BEGIN WITHIN 3 MINUTES AFTER ENGINE SHUTDOWN. SEE ENGINE DRY CRANKING PROCEDURE.

NOTE

Single engine taxi is not recommended if ITT is greater than or equal to the values listed because of dry motoring requirement within 3 minutes of shutdown.

6. HYDRAULIC EMP .....ON

NOTE

EMP HYD Pump On, L or EMP HYD Pump On, R status message comes on.

7. Engine FUEL CONTROL ..... OFF

NOTE

If APU is to be operated with right engine shut down, right FUEL STBY PUMP must remain operating. STBY Pump On, R is displayed.

8. FUEL STBY PUMP .....OFF and NOT ARM

(Continued)

When taxi is complete:

9. PARK BRAKE ..... SET
10. NWS ..... DISCONNECT
11. HYDRAULIC EMP (on shut down engine) ..... OFF and NOT ARM
12. SEAT BELT / NO SMOKE ..... AS DESIRED
13. MED ..... CLEAR / OPEN

WARNING

- DO NOT ALLOW PASSENGERS OR OTHER PERSONNEL TO ENTER OPERATING ENGINE DANGER AREAS.
- DO NOT OPEN EXTERNAL BAGGAGE DOOR WITH LEFT ENGINE OPERATING.

14. Engine dry motoring ..... WITHIN 3 MINUTES OF SHUTDOWN IF REQUIRED

Will one engine remain operating?

YES ..... GO TO QUICK TURN CHECKLIST
NO ..... GO TO ENGINE SHUT-DOWN OR QUICK TURN CHECKLIST

<<END>>

TRAFFIC PATTERN

TAXI BACK

1. LDG and STROBE LTS ..... OFF
2. Flaps ..... SET FOR TAKEOFF (10° or 20°)
3. Brake temps ..... CHECK
4. Transponder ..... SET
5. FMS PERF INIT ..... SET
6. FMS Takeoff data ..... SET
7. Vspeeds ..... CHECKED/SET

NOTE

If Vspeeds are displayed, any change of flap setting causes the Vspeeds to be deselected from display.

8. Trims (3) ..... SET

NOTE

The STAB trim should be set according to the tables in Figure 5-45 for flaps – 20, Figure 5-46 for flaps – 10, and Figure 10-5-2 for flaps – 0. When programmed with the correct ZFWCG and fuel load, the FMS Takeoff Performance page will provide the correct STAB trim setting from the AFM. If the resulting STAB trim setting is slightly outside the green band, move the setting just inside the green band.

9. Thrust mode ..... VERIFY T/O, CHECK POINTERS, CONFIRM RATING
10. Flight Instruments ..... CHECK / SET
11. FCP and flight directors ..... SET/CONFIRM

(Continued)

12. Autobrakes ..... RTO

NOTE

Autobrake RTO status message comes on when RTO mode selected.

13. Forward pocket door (if installed)..... VERIFY LATCHED OPEN
14. Crew briefing .....COMPLETED

NOTE

Accomplish takeoff briefing if not previously accomplished. Brief changes to runway, departure SID, ATC clearance, etc as required.

LINEUP

1. GUST LOCK ..... VERIFY UNLOCKED
2. Controls.....VERIFY FREE MOVEMENT
3. T/O box ..... CONFIRM
4. WX radar ..... AS REQUIRED
5. ENG and WING ANTI-ICE ..... AS REQUIRED
6. LDG and STROBE LTS.....ON
7. EICAS ..... CHECKED

When cleared for takeoff:

8. Runway heading ..... CONFIRM
9. PROBE HEAT ..... OVRD IF ICING CONDITIONS EXIST

WARNING

Failure to select PROBES HEAT to OVRD when icing conditions exist can result in loss of any or all airspeed indications at any time during the takeoff roll. If airspeed indication is lost due to ice contamination with the PROBES HEAT in AUTO, normal indications should return shortly after becoming airborne.

(Continued)

NOTE

Icing conditions on the ground and for takeoff exist when the Static Air Temperature (SAT) is 10°C (50°F) or below, and visible moisture in any form is present (such as clouds, fog with visibility of one mile or less, rain, snow, sleet and ice crystals). Icing conditions also exist when the SAT is 10°C (50°F) or below when operating on ramps, taxiways or runways where surface snow, ice, standing water, or slush are present. Limit the use of OVRD to thirty (30) seconds on the ground.

Probe Heat operation in OVRD mode on ground for more than 30 seconds may result in the following:

- SA/SAT/TAT will quickly rise to out of range indications
- ACS Default Mode CAS message
- TCAS FAIL appears on HSI and MAP
- Windshear Fail CAS message
- TCAS Fail CAS message
- TURB FAIL appears on HSI and MAP.

If an airspeed indication is lost during takeoff roll, airspeed may still be valid on the other PFD or ISI. Accurate ground speed (GS) will still be displayed on both PFDs.

AFTER TAKEOFF

1. Landing gear lever ..... UP

At V_{SE}-10 minimum and accelerating:

2. Flaps ..... AS REQUIRED
3. Climb thrust ..... SET(green CLB symbol)
4. TAXI light ..... OFF
5. PROBE HEAT ..... AUTO

TRAFFIC PATTERN

1. Landing data ..... COMPUTE AND SET
2. AUTOBRAKES ..... AS REQUIRED
3. Forward pocket door (if installed) ..... VERIFY LATCHED OPEN
4. Crew briefing ..... COMPLETED

BEFORE LANDING

1. Landing gear ..... DOWN/3 GREEN
2. Flaps ..... LAND
3. Landing clearance / TAXI Light ..... RECEIVED/ON

COLD WEATHER OPERATIONS

COLD WEATHER OPERATION REQUIRES FORETHOUGHT AND CAREFUL PREPARATION. PRIOR TO PERFORM THE FOLLOWING COLD WEATHER CHECK-LIST, THE PILOT SHOULD REVIEW THE COLD WEATHER OPERATIONS BRIEFING HEREIN AND THE GENERAL GUIDANCE BELOW.

General guidance for preparing the airplane for flight after a prolonged cold soak in temperatures less than -20 degrees C:

1. Use a GPU to assist the batteries for APU start.
2. Use of preheat capability if available to warm the avionics in the nose compartment.
3. Warm the cabin to +15 deg C temperature with the APU and Pack running and MED closed.

WARNING

If closing the MED to assist in heating or cooling the aircraft interior, verify the OFV valve is open and clear of obstruction.

4. Once everything is warmed up, if spurious indications, faults or failures have occurred, during power up, shut down to a "black" airplane and power back up to reboot and clear these spurious indications, faults or failures.

A. PRE-FLIGHT

1. All protection covers..... REMOVED
2. Wheels..... CHOCKED
3. PARK BRAKE ..... OFF
4. All surfaces ..... CHECK FREE FROM FROST, ICE OR SNOW
5. Heavy accumulation of snow ..... MANUALLY REMOVE

(Continued)

NOTE

Check control balance cavities for drainage after snow removal as puddles of water may refreeze in flight.

6. APU and engine inlet .....CHECK CLEAR OF IMPACTED ICE OR SNOW
7. Fuel tank vents..... CHECK FREE OF ICE OR SNOW
8. Pitot heads and static ports and AOA vanes .....CLEAR OF ICE
9. Landing gear (including proximity switches) ..... CHECKED
10. Nose strut service ..... CHECK
11. Air conditioning inlets and exits.....CLEAR OF ICE
12. Batteries.....VERIFY INSTALLED
13. Complete all checks up to ENGINE START, page IV-19 prior to deicing to prevent time loss after deicing completed

B. DE-ICING PROCEDURE

WARNING

1. DE-ICING FLUID MAKES ALL SURFACES SLIPPERY. WORK CAUTIOUSLY TO AVOID PERSONNEL INJURY.

2. IF IN DOUBT, PERFORM A VISUAL INSPECTION AND IF NECESSARY, REPEAT THE DE-ICING PROCEDURE PRIOR TO TAKEOFF.

CAUTION

1. ANY TIME THE RECOMMENDED HOLD-OVER TIME IS EXCEEDED, A PRE-TAKEOFF INSPECTION IS REQUIRED.

2. REFER TO HOLD-OVER TIME(S) TABLES FOR TYPE I, II, III AND TYPE IV FLUIDS. THE TIME OF PROTECTION WILL BE SHORTENED IN HEAVY WEATHER CONDITIONS.

(Continued)

3. HEAVY PRECIPITATION RATES OR HIGH MOISTURE CONTENT, HIGH WIND VELOCITY OR JET BLAST MAY REDUCE HOLDOVER TIME BELOW THE LOWEST TIME STATED IN THE RANGE. HOLDOVER TIME MAY BE REDUCED WHEN AIRPLANE SKIN TEMPERATURE IS LOWER THAN AMBIENT TEMPERATURE.
4. TYPE I, II, III AND IV FLUIDS ARE NOT COMPATIBLE AND MAY NOT BE MIXED. ADDITIONALLY, MOST MANUFACTURERS PROHIBIT MIXING OF BRANDS WITHIN A TYPE.
5. CARE MUST BE EXERCISED TO ENSURE THAT ALL MELTED PRECIPITATION IS REMOVED FROM THE AIRCRAFT TO PREVENT RE-FREEZING.
6. USE TYPE II, III AND IV ANTI-ICING FLUIDS WITH EXTREME CAUTION NEAR ENGINE INTAKES AND EXHAUSTS TO AVOID ACCUMULATIONS WHICH COULD BE INGESTED AND IGNITED WHEN STARTING ENGINES.
7. IF ACCUMULATION IS EVIDENT, REMOVE BEFORE STARTING.
8. NEVER RISK DAMAGE TO THE AIRCRAFT BY SCRAPING OR CHIPPING ICE. EXERCISE CAUTION WHEN BRUSHING AROUND ANTENNAS, WINDOWS, FLIGHT CONTROLS, PROBES, VANES AND SIMILAR OBSTRUCTIONS.

(Continued)

NOTE

If brakes are covered with snow or ice, use hot air; avoid chemical de-icing fluid.

1. STAB trim ..... UP 12º
2. PARK BRAKE ..... ON
3. Both Engine Bleeds ..... OFF

NOTE

If operational requirements dictate operation of the engines during the de-icing process, it is recommended the engines be operated at ground idle thrust with the engine bleeds turned off. Additionally, take actions to ensure de-icing fluid is not directed at the engine inlet area.

4. APU ..... OFF
5. APU Door ..... VERIFY CLOSED

NOTE

De-icing and anti-icing fluids are not intended for use in removing snow deposit. Snow is best removed by mechanically sweeping or brushing it from the aircraft structure.

6. DITCH ..... ON (outflow valve closed)
7. All doors ..... CLOSED
8. Communication with ground crew (“Snow-Man”) ..... ESTABLISH
9. De-Icing ..... INITIATE

(Continued)

10. De-Icing procedure parameters ..... NOTE

a. Type of procedure: Deicing only ____ Anti-Icing only ____
De-icing AND Anti-icing ____
b. Type of fluid used: De-Icing: TYPE I ____
Anti-Icing: TYPE II ____ TYPE III ____ TYPE IV ____
c. Mixture ratio%: ____/____
d. Time since last de-icing procedure: _____ GMT
or - Anti-icing started: _____ GMT
e. OAT _____ °C
f. Type of precipitation:
Active frost ____ Rain on cold soaked wing ____
Freezing fog ____ Freezing rain ____ Light freezing rain ____
Snow/snow grains ____ Other ____
g. Remarks: _____
h. Holdover time CALCULATE

NOTE

Hold-over Time: _____ /
Expiration Time: _____ GMT

11. Expiration Time ..... NOTIFY TOWER

C. SYSTEMS START

1. APU ..... START
2. DITCH ..... OFF
3. APU BLEED AIR ..... ON

NOTE

Avoid powering up systems if cockpit temperature is below 10°C.

(Continued)

D. ENGINES START

1. Engine oil temperature ..... CHECK ABOVE -40°C

CAUTION

1. DO NOT START THE ENGINE(S) WHEN THE OIL TEMPERATURE IS BELOW -40°C). WARM UP OIL PRIOR TO ENGINE START.

2. N_1 rotation ..... CHECK MANUALLY
3. Perform ENGINE STARTING, page IV-14

E. AFTER ENGINES START

1. DO NOT ADVANCE THRUST LEVER UNTIL OIL TEMPERATURE REACHES ABOVE +5°C
2. Engine Oil Pressure ..... CHECK

NOTE

During cold weather starts, oil pressure may temporarily exceed maximum pressure limits until oil temperature rises. At low ambient temperatures, a temporary high pressure above maximum limits may be tolerated but takeoff should be delayed until pressure drops within normal limits.

3. Engines anti-ice..... CHECK / AS REQUIRED

NOTE

On selection, observe A/I green label in ITT dials, ENG Anti-Ice ON status message is displayed and ITT rise.

4. APU BLEED AIR ..... OFF
5. Flaps ..... CHECK FOR NORMAL OPERATION THEN RETRACT
6. PERFORM AFTER START (page IV-26) PROCEDURE

F. TAXI

CAUTION

1. DO NOT TAKE OFF WITH BRAKE TEMPERATURE BELOW 10°C ON CONTAMINATED RUNWAYS. TAXI AT SLOWEST POSSIBLE SPEED; AVOID PUDDLES AND SLUSH AS MUCH AS POSSIBLE; USE NWS. SMOOTHLY; INCREASE DISTANCE BEHIND PRECEDING AIRPLANE.
2. AVOID SETTING THE PARKING BRAKE FOR ANY LENGTH OF TIME.
3. AVOID USING IDLE REVERSE THRUST DURING TAXI ON SNOW OR SLUSH COVERED TAXIWAYS.
4. TAXIWAYS AND RUNWAYS LIGHTS MAY BE COVERED WITH SNOW AND POORLY VISIBLE.
5. RIDE THE BRAKES DURING TAXI IN ORDER TO WARM THE BRAKES TO 10° - 90°. THIS PREVENTS ICE ACCUMULATION ON THE BRAKES.

NOTE

When stopped, perform several maximum brake applications.

(Continued)

As soon as possible after engine start:

1. Taxi ..... INITIATE
2. NWS ..... EXERCISE IN BOTH DIRECTIONS
3. Brakes ..... OPERATE TO BUILD UP HEAT
4. Perform TAXI/BEFORE TAKEOFF (page IV-27)

In freezing fog conditions:

5. PERFORM ICE SHEDDING ON GROUND, page IV-98

G. BEFORE TAKEOFF

WARNING

IF IN DOUBT, THE PIC MUST CONDUCT A HANDS-ON INSPECTION 5 MINUTES MAXIMUM PRIOR TO TAKEOFF OR HAVE THE AIRCRAFT DE-ICED AGAIN PRIOR TO TAKEOFF.

CAUTION

1. FLAPS SHOULD BE EXTENDED PRIOR TO LINE UP TO AVOID SNOW AND ICE ACCUMULATION DURING TAXI.
2. DO NOT TAKE OFF WITH BRAKE TEMPERATURE BELOW 10° ON CONTAMINATED RUNWAYS.

1. Flaps ..... EXTEND AS REQUIRED
2. Flight controls sweep ..... PERFORM
3. ENG ANTI-ICE ..... CHECK / AS REQUIRED

NOTE

On selection observe A/I green label in N_1 dials, ENG Anti-Ice On, L status message is displayed and ITT rises.

4. WING ANTI-ICE ..... CHECK / AS REQUIRED
5. Perform final ice inspection
6. PERFORM TAXI/BEFORE TAKEOFF, page IV-27
7. PERFORM LINE UP, page IV-29

H. DESCENT (Below 30,000 ft)

1. WATER SYSTEM..... PURGE
   a. Water and Waste Panel (WWIP) - Main page (1/3) - PURGE STATE..... VERIFY AVAILABLE
   b. PURGE WATER SYS .....SELECT
   c. CONFIRMATION QUESTION.....SELECT YES
   d. PURGE STATE .....VERIFY PURGING (FLASHING)

NOTE

1. During purge cycle the hot water heater will be in state “OFF”, and its soft button will not be displayed.
2. At any time “STOP WATER PURGE” can be selected to stop the purging. Confirmation question for canceling the purging will be displayed for 30 seconds, before returning to MAIN PAGE if there is no user action.
3. PURGE STATE will show PURGING for additional 30 seconds after water level displays empty.

   e. When Purging completed - PURGE STATE.....VERIFY AVAILABLE

NOTE

1. If water tank is empty - Heaters will be OFF and option to turn heaters to on is no longer available.
2. If water tank is greater than 10% heaters will be ON.

2. WATER level .....VERIFY EMPTY

I. AFTER LANDING

1. If WATER SYSTEM was not purged in flight and forecasted temperature during layover is below freezing .....PURGE WATER

NOTE

Water can be purged through WWIP or Manually through WWS Panel. For WWIP operation see H. DESCENT (Below 30,000 ft), page IV-96.

<<END>>

BACK
TOC Local
TOC Main

ICE SHEDDING ON GROUND

NOTE

1. This procedure ensures that no ice is present on engine compressor 1ST stage and guide vanes through ice-shedding, when the ground temperature is below -6°C
2. Freezing fog (FZFG on METAR) is defined by a ground temperature below 0°C and horizontal visibility less than 1000 m.

Ground operations and taxiing:

CAUTION

BEWARE OF JET BLAST BEHIND AIRCRAFT.

As practicable, but at intervals of no more than 30 minutes:

1. Both thrust lever(s) (one at a time).....ADVANCE TO 70% N_1 FOR 10 SECONDS MINIMUM
2. Engine parameters.....MONITOR
3. Thrust lever(s).....IDLE

NOTE

Vibration and rumbling noises may occur when ice sheds.

(Continued)

Before takeoff (at hold-short or lined-up on runway if possible):

4. Thrust levers (both).... ADVANCE TO 70% N_1 FOR 10 SECONDS MINIMUM
5. Engine parameters..... MONITOR
6. Thrust levers ..... IDLE

NOTE

Vibration and rumbling noises may occur when ice sheds.

<<END>>

ICE SHEDDING IN FLIGHT

If engine vibration/rumbling noise if felt due to icing and if ice-shedding appears to be necessary:

1. Right engine thrust lever .....SET MAX CRUISE
2. Left engine thrust lever..... RETARD QUICKLY TO IDLE FOR 5 SECONDS

NOTE

TCM compensates for asymmetric thrust.

3. Left engine thrust lever.....ADVANCE TO 90% N_1
4. Left engine thrust lever.....SET CRUISE THRUST
5. Repeat steps 1 through 4 for right engine
6. Both engines .....THRUST AS REQUIRED

<<END>>

ICING CONDITIONS ABOVE 35,000 FT

ICING GENERAL

A. Icing conditions exist when either:

- TAT is 10°C or below and SAT is above -40°C and visible moisture is present in any form

OR

- Visible cues (icing on wings leading edges, winglets, windshields) are present

OR

- Ice Detected, L or Ice Detected, L-R (Pre MOD G25-10074: Caution; Post MOD G25-10074: Caution or Advisory) message is displayed

If any of the icing conditions are encountered above 35,000ft:

1. L and R WING ANTI-ICE.....ON
2. L and R ENG ANTI-ICE.....ON

CAUTION

AVAILABLE THRUST IS REDUCED WITH THE WING ANTI-ICE SYSTEM OPERATING ABOVE 35,000 FT. THIS MAY PREVENT CONTINUED FLIGHT AT CURRENT ALTITUDE. MONITOR AIRSPEED AND ANGLE OF ATTACK TO DETERMINE IF A DESCENT IS NECESSARY.

3. Airspeed.....MAINTAIN AT OR ABOVE $0.8M_i$

If AOA increases above 0.45 and/or Mach decreases below $0.75M_i$:

4. Descend and accelerate to decrease AOA below 0.45

If Icing conditions persist and airplane performance is decreasing:

5. Continue descent to a lower altitude
6. Exit icing conditions as soon as practical if aircraft performance continues to deteriorate

When out of icing conditions:

7. Both WING ANTI-ICE.....OFF
8. Both ENG ANTI-ICE..... AS REQUIRED

<<END>>

TURBULENCE PENETRATION / SEVERE GUST ENCOUNTER

Turbulence penetration procedure apply to flying at altitude and should not be confused with the low altitude wind shear precautions recommended for takeoff, traffic pattern and approach phase of the flight.

WARNING

DO NOT FLY INTO AREAS OF KNOWN SEVERE TURBULENCE WITH A FAILED YAW DAMPER.

When encountering severe gust turbulence:

1. Avoid rapid thrust changes, if possible
2. CONT IGN ..... ON (verify both IGN symbols)
3. Auto-throttles..... DISENGAGE
4. Turbulence Penetration Speed (V_{RA}):
   - S.L. to 13,000 ft - 230 KIAS
   - 13,000 to 20,000 ft - 250 KIAS
   - 20,000 to 35,000 ft - 270 KIAS
   - 35,000 to 45,000 ft - 0.80 M_i
5. A minimum speed of 1.5 V_S is recommended to maintain adequate buffer margins.

NOTE

Severe turbulence will cause large and often rapid variations in the indicated airspeed.

6. Attitude ..... MAINTAIN DESIRED PITCH ATTITUDE AND WINGS LEVEL
7. Avoid sudden control and thrust changes
8. SEAT BELT / NO SMOKE ..... ON
9. ATC ..... ADVISE

(Continued)

If autopilot is ON:

10. Autopilot ..... USE BASIC ATTITUDE AND HDG MODES
11. Avoid use of flight director VERTICAL modes
12. Pilots inputs should be made using the HDG bug
13. Severe condition may cause autopilot to disengage

If autopilot is OFF or disengaged:

14. Hand fly the aircraft
15. Pitch and roll attitudes may best be controlled with the control yoke only

<<END>>

VOLCANIC ASH ENCOUNTER

Volcanic ash can be recognized by the following conditions:

- Static discharge around the windshield, or bright glow in the engine inlets
- Smoke or dust in the cockpit
- An acrid odor

NOTE

1. Encountering volcanic ash can cause abnormal system reactions:

   - Engine malfunctions (high ITT, stall, flameout)
   - Decrease or loss of airspeed indications
   - Equipment cooling failure

WARNING

VOLCANIC ASH ENCOUNTER MAY LEAD TO SINGLE OR DUAL ENGINE FLAMEOUT. UPON COMPLETION OF THIS PROCEDURE, REVIEW SINGLE ENGINE FAILURE IN FLIGHT, page II-55 AND DUAL ENGINE FAILURE, Page II-69.

1. REVERSE / CHANGE COURSE TO EXIT VOLCANIC CLOUD IN SHORTEST TIME
2. Oxygen masks ..... DON (100%)
3. Crew Communications .....ESTABLISH, SELECT MASK ON ACP
4. Autothrottle..... DISCONNECT
5. Thrust setting ..... LOW (IDLE PREFERRED)
6. ATC ..... ISSUE “PAN” CALL 3 TIMES, ADVISE INTENTIONS

When below 35,000 ft - start APU:

7. APU MASTER.....ON
8. APU START ..... START

(Continued)

If static discharge is observed:

9. L/ R WINDSHIELD HEAT.....OFF

If engines have flamed out, failed or stalled:

10. Thrust levers .....IDLE
11. Land at nearest suitable airport
12. Plan for IFR approach if windshield is obscured
13. Continue with ENGINE RESTART IN FLIGHT, Page II-59

<<END>>

RNAV (GPS/GNSS) APPROACH

1. Published Approach.....REVIEW
2. Approach.....SELECT FROM DATA BASE AND EXECUTE
3. FMS - ARRIVAL DATA.....REVIEW

Arrival Data \ Approach Type	LPV	LP	LNAV/VNAV or LNAV
APPR MODE	LPV	LP	RNP
RNP FAF - MAP	ANG	ANG	0.30
GP MODE	SBAS PROVIDER	BARO	BARO

NOTE

When the only published minimums for an approach are LP, the LP GP MODE will display the SBAS PROVIDER; however, the GP MODE (vertical navigation) is always based on BARO altitude for LP approaches.

4. MDA/DA minima.....SET
5. FMS .....VERIFY IN SYNC MODE
6. NAV Source for LPV Approaches ....BOTH SIDES DO NOT HAVE THE SAME FMS SELECTED

7. When cleared for the approach:

a. For DA/DDA.....Select APPR and VNAV mode on the FCP if VGP desired

b. For MDA..... Select LNAV and VNAV mode if VPATH desired, OR,
Select LNAV and VS or FPA if vertical navigation not desired

(Continued)

NOTE

- When advisory VNAV is provided (i.e. not an LPV), the primary barometric altimeter should be used as the primary reference for compliance with all altitude restrictions that are associated with the instrument approach procedure, including compliance with step-down fixes.
- VGP will not ARM unless APPR is selected.
  - When VGP is the active vertical mode, the airplane will not level off at the FCP selected altitude
- Any vertical mode other than VGP will level off at the selected altitude.
  - The FCP selected altitude must be set below the current altitude to descend in any vertical mode other than VGP

8. When within 2 nm of the FAF (Final Approach Fix), verify appropriate FMS approach mode displayed on the PFD

Approach Type	LPV	LP	LNAV/VNAV or LNAV
HSI Message	LPV APPR	LP APPR	RNP APPR

(Continued)

CAUTION

DO NOT CONTINUE THE APPROACH IF:

- **APPROPRIATE APPROACH MODE IS NOT DISPLAYED, OR**
- **THE AMBER FMS FLAG APPEARS ABOVE THE LATERAL DEVIATION BAR ON THE PFD**

NOTE

- If Amber FMS Flag appears, verify both sides of the cockpit are not using the same NAV source. If the flag appears after passing the FAF, it cannot be cleared and the approach should be discontinued. The flag may clear if still outside the FAF by changing the NAV source so both sides of the cockpit are not using the same source or by selecting the APPR MODE to RNP on the FMS ARRIVAL DATA page.
- If reverting to RNP approach, reset MDA/DA minimums for the appropriate approach being flown.
- If the NAV source is changed on the XFR side, the FD Drop AP Basic Mode caution message will appear. Immediately reselect the desired FCP Vertical and LNAV or APPR modes.

At FAF / GP Intercept:

9. Desired vertical mode ..... VERIFY (VGP or VPATH) or SELECT (VS or FPA)

<<END>>

POLAR NAVIGATION

POLAR REGION DEFINITIONS

Polar latitude thresholds: north of 82° latitude and south of -82° latitude.
North polar keyhole region: between -80° and -170° (west) longitude and north of 73.125° north latitude, at all altitudes.
South polar keyhole region: between 120° and 160° (east) longitude and south of -60° latitude, at all altitudes.

FMS NAVIGATION

The system will automatically switch source to true heading when entering the polar region. When exiting the polar region, manual selection to switch back to source magnetic heading is required. Manual switching between true and magnetic heading can be done manually through the CDU. From page 2 of the CDU index page, select “FMS CTL”. This page will have a control for switching between true and magnetic heading.

STBY INSTRUMENT

In polar region, the SFIS will continue to output a magnetic heading and the ISI will be forced to select source for the SFIS heading; however it is recommended the SFIS heading not be used when north of 70° latitude or south of 70° latitude due to the magnetic fields near the Earth's poles. In addition, operation is also not authorized in the following two regions: north of 65° north latitude between longitude 75°W and 120°W (Northern Canada). South of 55° south latitude between longitude 120° E and 165°E (south of Australia).
If magnetic heading is not failed, the ISI will source true heading only when AHS 3 is the selected heading source on the ISI. If AHS 3 is selected and true heading is the selected mode on the FMS CTL CDU page, the ISI will have a “true” annunciation to the right of the heading readout.
Check SMC - Heading caution message may appear when magnetic deviation high is magnetic SFIS heading and AHS heading difference is exceeding 13°.

Polar region entry:

1. Select true heading (CDU Index page 2 - FMS CTL)
2. Flight director ..... RESELECT DESIRED MODES

NOTE

FMS shows a dashed out position calculation for each AHRS 1 and 2. IRS 3 shows correct position if available.

3. Verify True legend displayed on HSI
4. Verify no HDG flags on HSI
5. Monitor latitude.

When exiting polar region:

6. Select MAG heading (CDU index page 2 - FMS CTL).
7. Verify no HDG flags on HSI
8. Verify that true legend on HSI is removed

<<END>>

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Temporary Revision 1

TEMPORARY REVISION NO. 1

SUBJECT: ENGINE QUALITY ADDER PERFORMANCE CORRECTIONS FOR SECTION V "PERFORMANCE WET AND DRY"

PLEASE INSERT PAGES TR-V-i TRHOUGH TR-V-18 INTO YOUR AIRPLANE FLIGHT MANUAL IN FRONT OF SECTION V UNTIL NEXT REVISION REPLACES THE AFFECTED PAGES.

Affected pages: V-62 through V-77, V-114 through V-117, V-274 through V-277, V-120 through V-236, V-241, V-243 through V-271, V-280 through V-428, V-431, V-434 through V-437, V-440 through V-586, V-589, V-592 through V-595, V-598 through V-746, V-749, V-755, V-758, V-759, V-760, V-762, V-765, V-766 through V-768

CAAI APPROVED
25 Oct 2016

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Temporary Revision 1

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25 Oct 2016

ENGINE QUALITY ADDER PERFORMANCE CORRECTIONS

GENERAL

This supplement contains information on takeoff and landing performance correction for the G280 airplane.
The following corrections are to be applied when performing the specified performance calculations using the AFM and the FMS.
Correction charts are provided for the following performance parameters:

- TAKEOFF WEIGHT LIMITATION (AS PREMITTED BY CLIMB REQUIREMENTS)
- TAKEOFF FIELD LENGTH (TOFL)
- TAKEOFF CLIMB GRADIENT - AVAILABLE 2nd SEGMENT CLIMB GRADIENT (GR2) AND FINAL SEGMENT CLIMB GRADIENT
- NET TAKEOFF FLIGHT PATH TRANSITION SEGMENT
  LEVEL FLIGHT ACCELERATION
  HORIZONTAL DISTANCE TRAVELED
- ENROUTE CLIMB GRADIENTS
- APPROACH CLIMB GRADIENTS
- LANDING CLIMB GRADIENTS
- LANDING WEIGHT LIMITATIONS
  (AS PERMITTED BY CLIMB REQUIREMENTS)

These corrections cover all performance calculations available, i.e. for performance using sections V (performance on dry and wet runways), performance using section X-5 (Flaps 0° performance) and section X-8 (contaminated runways performance), and performance given for all abnormal procedures.

USAGE OF TEMPORARY REVISION CORRECTION CHARTS

Calculating the corrected performance values using the following figures is performed in a similar manner for all correction charts.
Enter the correction chart with the calculated AFM/FMS performance value (figure X axis) and find corrected value (figure Y axis) at the intersection with the compatible correction line (see example on Figure TR1-V-1).

EXAMPLES

1. Determine the Takeoff field length required at the following runway conditions:
   - Gross Weight: 38,000 lb
   - Dry Runway
   - Flaps Setting: 20°
   - Pressure altitude: 1,000 ft
   - Ambient temperature: -5°C
   - Engine bleed setting: ECS-ON, Engine and Wing Anti-ice OFF
   - No Wind
   - Runway Slope: +2%

Result:
From Figure 5-69 we find an uncorrected TOFL of 4,320 ft.
Using Figure 5-99 no wind component correction is required, thus the corrected TOFL for the runway slope is 5,950 ft.
Correct the TOFL using Figure TR1-V-3 and receive 6,350 ft.

2. For the same conditions as example 1, Determine the Available 2nd segment climb gradient:

Result:
From Figure 5-69 we find an uncorrected GR2 of 6.2%.
No wind component correction is required.
Correct GR2 using Figure TR1-V-4 and receive 5.95%.

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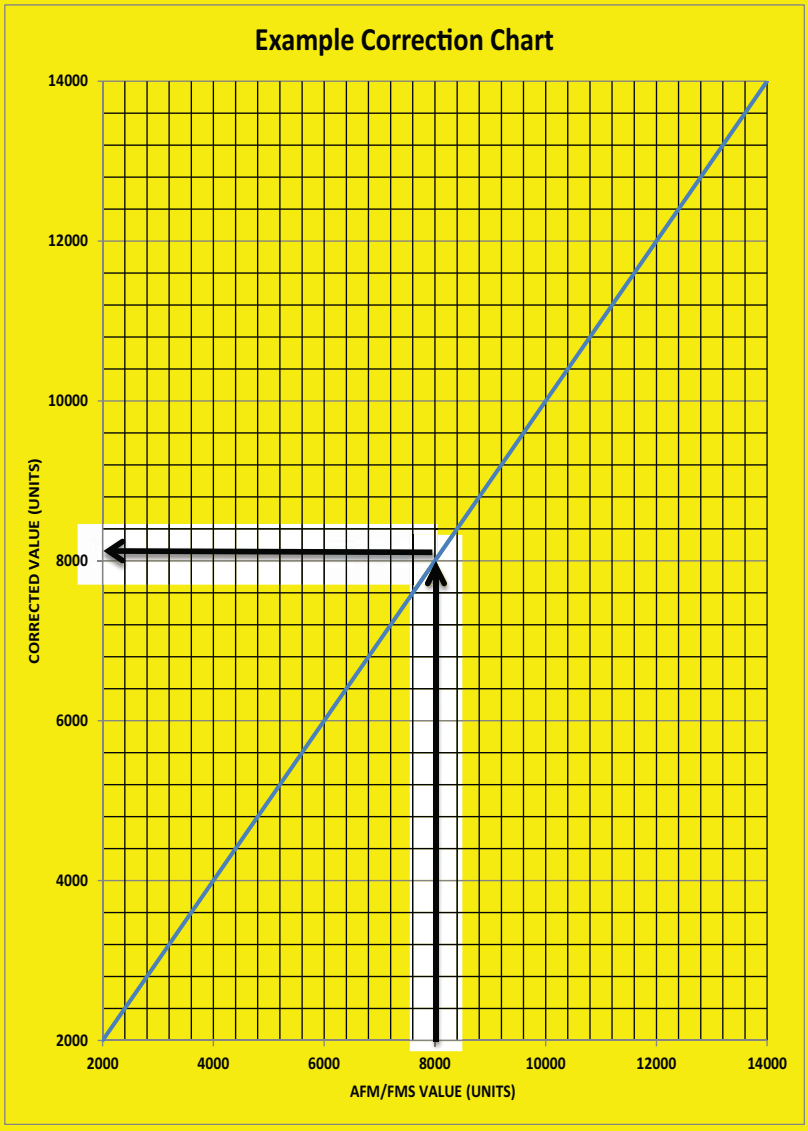

Figure TR1-V-1. Example Correction Chart

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N1 SETTINGS

For Static thrust, No N1 Settings correction is required.
Lower expected N1 Setting value by 0.47% when the aircrafts speed is above 80 KCAS.
These corrections are applicable for:

Figure	Description	Page
5-4 through 5-7	STATIC TAKEOFF THRUST ECS-OFF EAI-OFF WAI-OFF; ECS-ON EAI-OFF WAI-OFF; ECS-ON EAI-ON WAI-OFF; ECS-ON EAI-ON WAI-ON	V-62 through V-65
5-8 through 5-11	MAX CLIMB THRUST (180 KCAS) ECS-OFF EAI-OFF WAI-OFF; ECS-ON EAI-OFF WAI-OFF; ECS-ON EAI-ON WAI-OFF; ECS-ON EAI-ON WAI-ON	V-66 through V-69
5-12 through 5-15	ENROUTE CLIMB THRUST (180 KCAS) ECS-OFF EAI-OFF WAI-OFF; ECS-ON EAI-OFF WAI-OFF; ECS-ON EAI-ON WAI-OFF; ECS-ON EAI-ON WAI-ON	V-70 through V-73
5-16 through 5-19		V-74 through V-77

TAKEOFF WEIGHT LIMITATION (AS PREMITTED BY CLIMB REQUIREMENTS)

Use Figure TR1-V-2 to correct the takeoff weight limitation as permitted by climb requirements.
This correction chart is applicable for:

Figure	Description	Page
5-48 through 5-51 5-101 through 5-104	Takeoff Weight limitation (limited by climb gradients) RUNWAY DRY AND WET; FLAPS 20°; ECS-OFF EAI-OFF WAI-OFF; ECS-ON EAI-OFF WAI-OFF; ECS-ON EAI-ON WAI-OFF; ECS-ON EAI-ON WAI-ON	V-114 through V-117 V-274 through V-277
5-154 through 5-157 5-207 through 5-210	Takeoff Weight limitation (limited by climb gradients) RUNWAY DRY AND WET; FLAPS 10°; ECS-OFF EAI-OFF WAI-OFF; ECS-ON EAI-OFF WAI-OFF; ECS-ON EAI-ON WAI-OFF; ECS-ON EAI-ON WAI-ON	V-434 through V-437 V-592 through V-595

NOTE

Calculate the maximum allowable takeoff weight (weight at brake release) as described Section V — TAKEOFF PERFORMANCE (Page V-18).

TAKEOFF FIELD LENGTH

Use Figure TR1-V-3 to correct the takeoff field length.
Figure TR1-V-3 presents correction lines applicable for takeoff on dry, wet and runways contaminated with compacted snow, ice or dry snow. The correction charts contains correction lines for different runway slopes. These corrections are to be used in addition to the TOFL Runway slope correction charts presented in the AFM. First calculate the TOFL from the AFM/FMS including Wind component, Runway slope and Thrust reverser effect, and then apply the appropriate correction according to the existing runway slope.

Figure TR1-V-3 is applicable for:

Figure	Description	Page
5-54 through 5-83 5-86 through 5-100 and 5-85	TOFL FLAPS 20°; DRY RUNWAY ALL ENGINE BLEED SETTINGS	V-120 through V-236 V-243 through V-271 and V-241
5-107 through 5-151 and 5-153	TOFL FLAPS 20°; WET RUNWAY ALL ENGINE BLEED SETTINGS	V-280 through V-428 and V-431
5-160 through 5-204 and 5-206	TOFL FLAPS 10°; DRY RUNWAY ALL ENGINE BLEED SETTINGS	V-440 through V-586 and V-589
5-213 through 5-257 and 5-259	TOFL FLAPS 10°; DRY RUNWAY ALL ENGINE BLEED SETTINGS	V-598 through V-746 and V-749

* For flaps 0°, TOFL and V1 with engine bleed settings ECS-ON EAI-OFF WAI-OFF, ECS-ON EAI-ON WAI-ON or OFF, see instructions in Supplement 5: TAKEOFF CHARTS AND TABLES (X-5-12);
First apply the climb gradients reductions due to bleed, and after that apply the correction of Figure TR1-V-3.

TAKEOFF CLIMB GRADIENTS

Use Figure TR1-V-4 to correct both the takeoff available 2nd segment climb gradient and the takeoff final segment climb gradient (same correction line applies for both parameters).
The correction chart is applicable to:

Figure	Description	Page
5-54 through 5-83 5-86 through 5-100 and 5-85, 5-263	GR2; FLAPS 20°; DRY RUNWAY ALL ENGINE BLEED SETTINGS	V-120 through V-236 V-243 through V-271 and V-241, V-755
5-107 through 5-151 and 5-263	GR2; FLAPS 20°; WET RUNWAY ALL ENGINE BLEED SETTINGS	V-280 through V-428 and V-755
5-160 through 5-204 and 5-263	GR2; FLAPS 10°; DRY RUNWAY ALL ENGINE BLEED SETTINGS	V-440 through V-586 and V-755
5-213 through 5-257 and 5-263	GR2; FLAPS 10°; WET RUNWAY ALL ENGINE BLEED SETTINGS	V-598 through V-746 and V-755
5-269	FINAL SEGMENT GRADIENT	V-760

* For flaps 0°, second segment gradient with engine bleed settings ECS-ON EAI-OFF WAI-OFF, ECS-ON EAI-ON WAI-ON or OFF, see instructions in Supplement 5: TAKEOFF CHARTS AND TABLES (X-5-12, X-5-13);
First apply the climb gradients reductions due to bleed, and after that apply the correction of Figure TR1-V-4.

NET TAKEOFF FLIGHT PATH TRANSITION SEGMENT

Use Figure TR1-V-5 to correct the Net Takeoff Flight Path Transition Segment Horizontal Distance Traveled.
The correction chart is applicable for:

Figure	Description	Page
5-267	Horizontal distance-transition segment FLAPS 20°	V-758
5-268	Horizontal distance-transition segment FLAPS 10°	V-759

ENROUTE CLIMB GRADIENTS

Use Figure TR1-V-6 to correct the Enroute Climb gradient.
Correction applies for all engine bleed settings.
The correction chart is applicable for:

Figure	Description	Page
5-271	Enroute Climb Gradient CLEAN CONFIGURATION	V-762

APPROACH CLIMB GRADIENTS

Use Figure TR1-V-7 to correct the approach climb gradient. Correction applies for approach climb in all engine bleed settings. The Correction chart is applicable for:

Figure	Description	Page
5-272	Approach Climb Gradient FLAPS 20°; GEAR UP	V-765

LANDING CLIMB GRADIENTS

Use Figure TR1-V-8 to correct the Landing climb gradient. Correction applies for Landing Climb in all engine bleed settings. The Correction chart is applicable for:

Figure	Description	Page
5-272	Landing Climb Gradient FLAPS 39°; GEAR DOWN	V-765

LANDING WEIGHT LIMITATIONS (AS PERMITTED BY CLIMB REQUIREMENTS)

Use Figure TR1-V-9 to correct the Landing weight limitation as permitted by climb requirements.
This correction chart is applicable for:

Figure	Description	Page
5-273 through 5-275	Landing Weight Limitation RUNWAY DRY AND WET; ECS-ON EAI-OFF WAI-OFF; ECS-ON EAI-ON WAI-OFF; ECS-ON EAI-ON WAI-ON	V-766 through V-768

NOTE

Calculate the maximum allowable Landing weight as described in Section V FINAL APPROACH AND LANDING PERFORMANCE (Page V-50)

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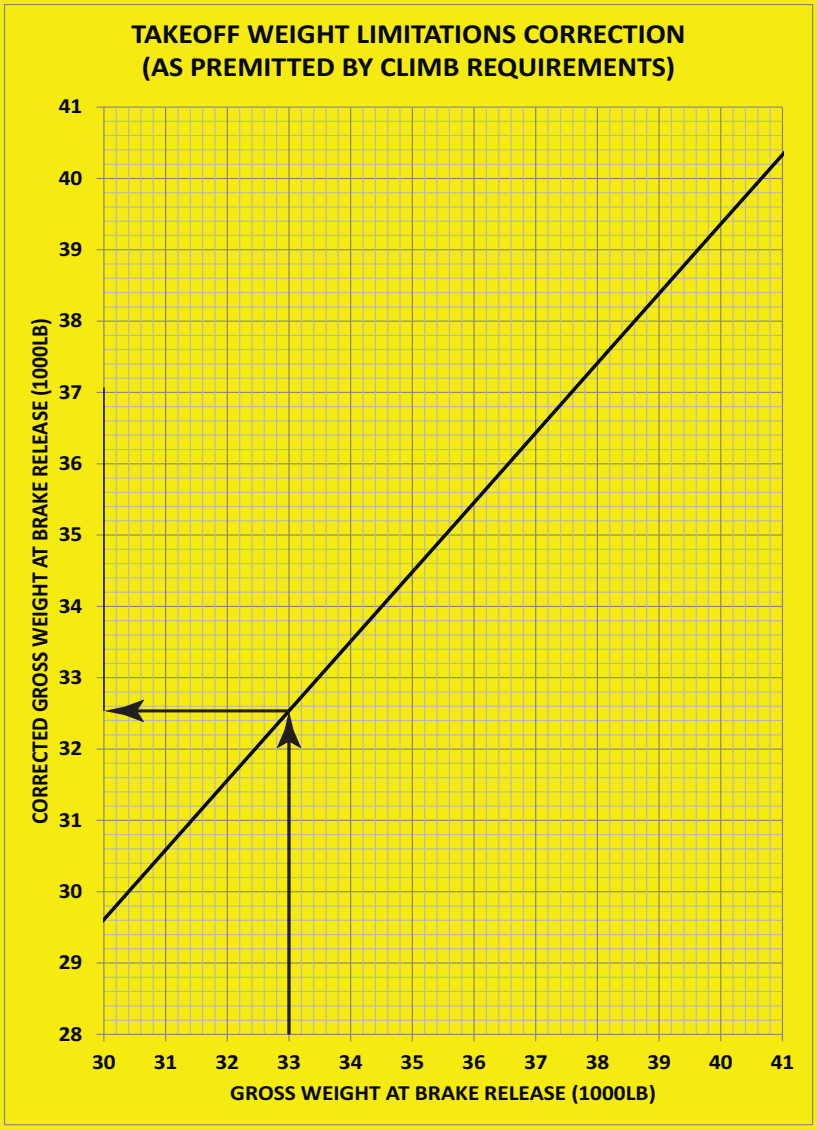

Figure TR1-V-2. Takeoff Weight Limitations Correction
(As Permitted by Climb Requirements)

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TAKEOFF FIELD LENGTH CORRECTION
DRY AND WET RUNWAYS
AND RUNWAYS CONTAMINATED BY:
COMPACTED SNOW, ICE OR DRY SNOW

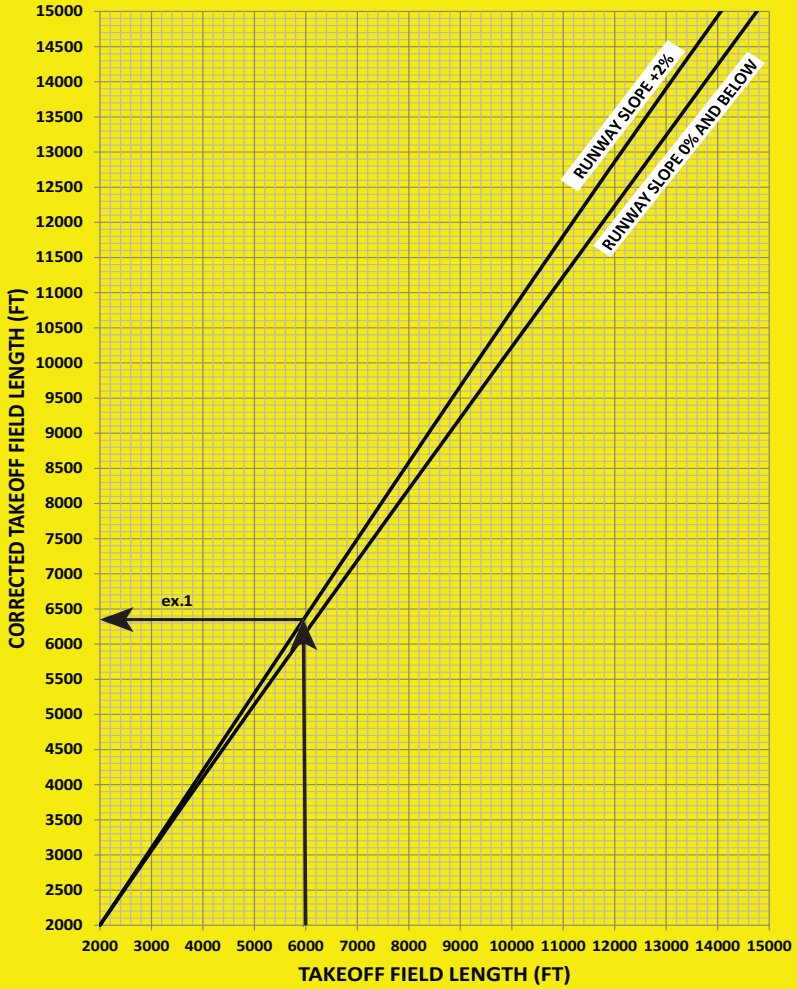

Figure TR1-V-3. Takeoff Field Length Correction Dry and Wet Runways And Runways Contaminated By: Compacted Snow, Ice or Dry Snow

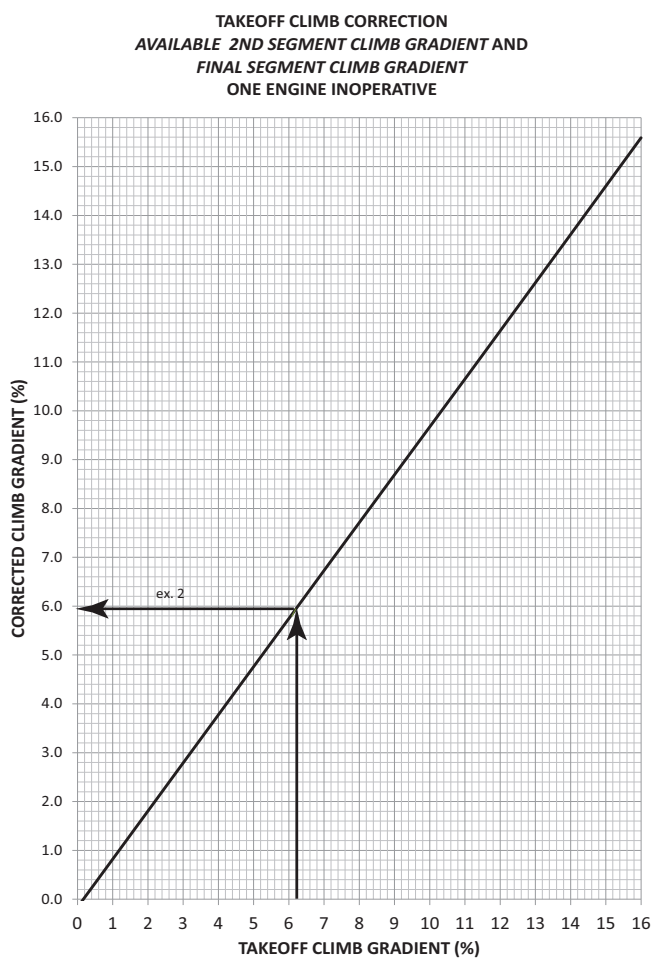

Figure TR1-V-4. Takeoff Climb Correction Available 2nd Segment Climb Gradient And Final Segment Climb Gradient

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NET TAKEOFF FLIGHT PATH TRANSITION SEGMENT
LEVEL FLIGHT ACCELERATION CORRECTION
ONE ENGINE INOPERATIVE

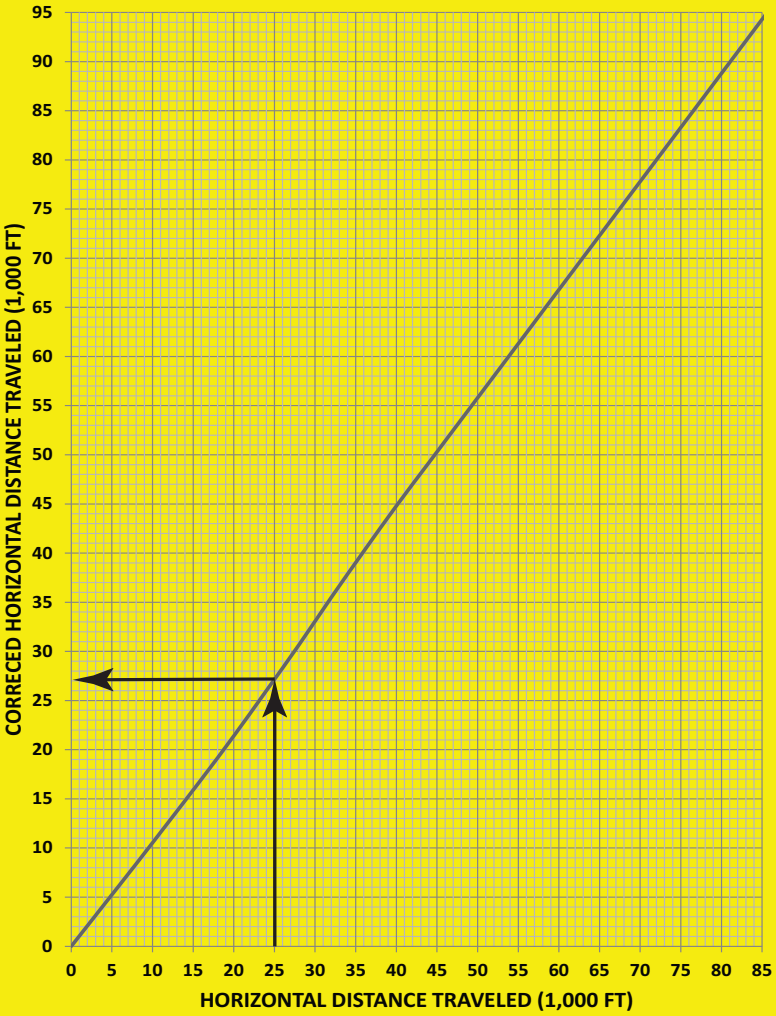

Figure TR1-V-5. Net Takeoff Flight Path Transition Segment Correction

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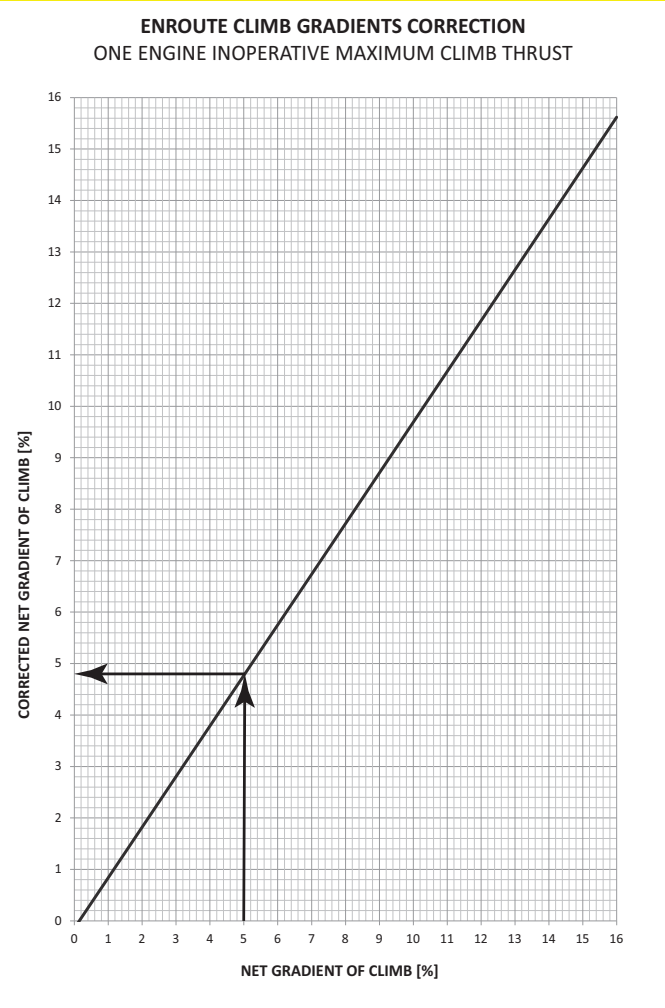

Figure TR1-V-6. Enroute Climb Gradients Correction

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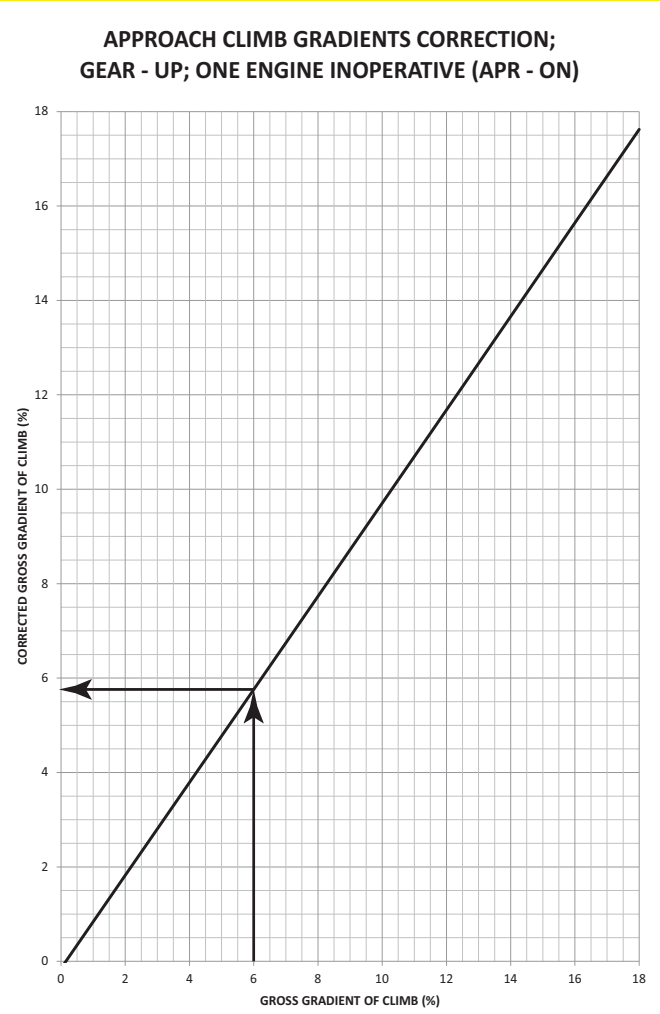

Figure TR1-V-7. Approach Climb Gradients Correction

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LANDING CLIMB GRADIENTS CORRECTION
GEAR - DOWN; BOTH ENGINES OPERATIVE:
TAKEOFF THRUST

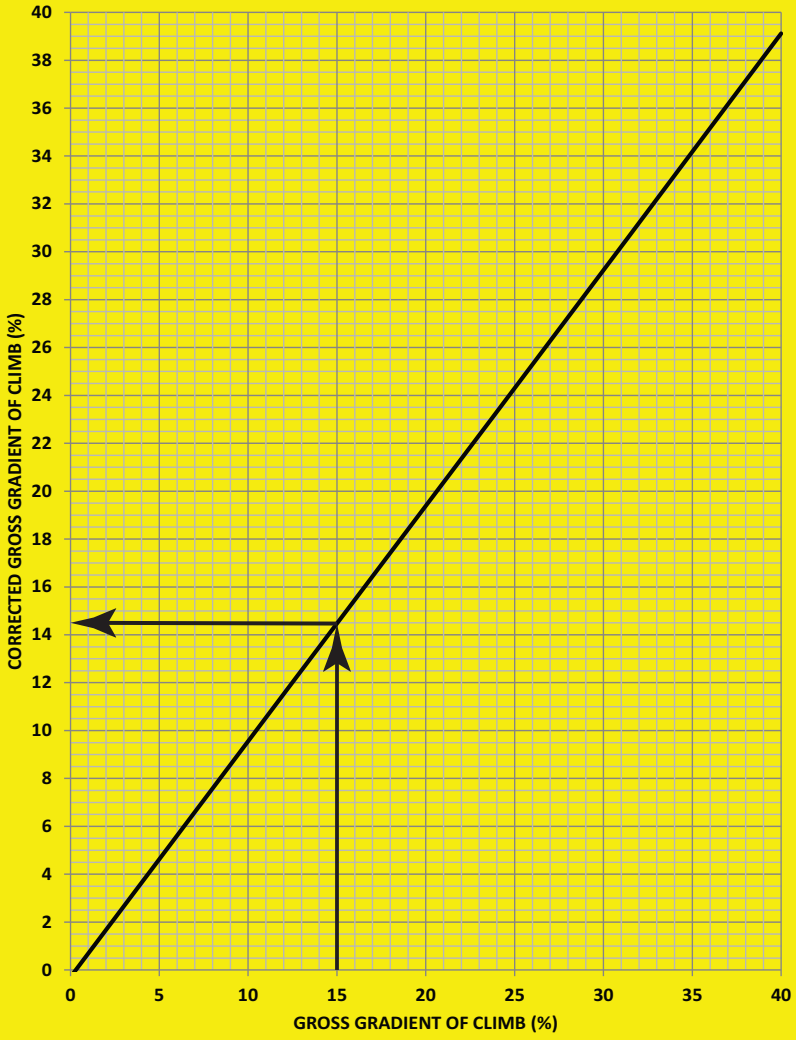

Figure TR1-V-8. Landing Climb Gradients Correction

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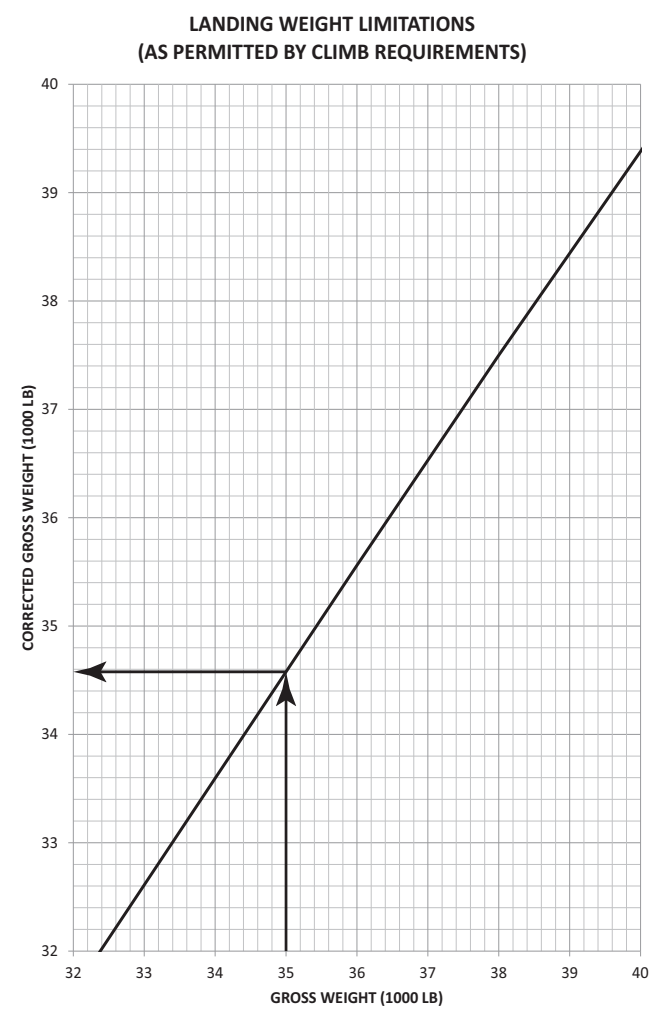

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ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF V-598

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GENERAL INFORMATION

COMPLIANCE

Information in this section complies with appropriate performance criteria and certification requirements.

STANDARD PERFORMANCE CONDITIONS

All performance data in this section are based upon flight test data and the following conditions:

1. Approved engine thrust ratings are based on a minimum engine including allowances for installation, air-bleed, and accessory items.
2. Takeoff thrust is available for a maximum time of 10 minutes for emergency, engine-out operations and is used through the takeoff, second segment climb, and acceleration to V_{SE} at level-off height AGL. The takeoff thrust setting is also used for the evaluation of approach climb capability
3. Full temperature accountability within the operational limits for which the aircraft is certified.
4. Go-Around Thrust is used for computing the all-engines operating landing climb capability.
5. Maximum continuous thrust is used for computing enroute climb capability.
6. Full temperature accountability within the operational limits, except for landing distance which is based on standard day.

NOTE

If ambient temperature is below lowest temperature shown on performance charts, use performance of lowest temperature shown.

7. Humidity effect on engine thrust has been considered in performance data.

(Continued)

8. Flaps position:
   a. Takeoff - 20° or 10°
   b. Approach - 20°
   c. Landing - 39°
   d. Enroute - 0°
9. Altitude and field elevations are pressure altitudes unless stated otherwise.
10. Takeoff and landing performance based upon smooth, dry or wet, hard-surfaced runway surface.
11. Takeoff distances are defined up to the height of 35 ft AGL on a dry runway or 15 ft AGL on a wet runway.
12. Wet runway takeoff performance accounts for the use of thrust reversers down to 40 kt, followed by idle reverse down to a complete stop.
13. Takeoff performance data is presented for takeoff weights of and above 26,000 lb. For takeoff weight less than 26,000 lb, use takeoff performance for 26,000 lb.
14. For negative pressure altitudes, correct V_1 and V_R as defined in note 2 on page V-25. For V_2, Balanced Field Length (TOFL) and Second Segment Gradient (GR2) use sea level data.
15. The Primary Flight Display (PFD) shows values of calibrated airspeed, Mach number, and pressure altitude, which have been corrected for in-flight position errors within the Air Data Computer (ADC).

VARIABLE FACTORS AFFECTING PERFORMANCE

Performance data is presented for the following engine bleed configurations:

1. Bleed off
2. ECS bleed on, engine anti-ice and wing anti-ice off
3. ECS bleed on, engine anti-ice on and wing anti-ice off
4. ECS bleed on, engine anti-ice and wing anti-ice on

For configuration: ECS bleed and wing anti-ice off, engine anti-ice on, use performance data from configuration 4.

Winds, for which graphical correction is presented, are to be understood as the headwind or tailwind components of the actual winds at 10 meters above the runway surface (tower winds). Wind corrections are calculated as required by CFR 14, Part 25 (includes conservatism factors: 50% headwind or 150% tailwind).

DEFINITIONS

GENERAL

Instrument Error - Difference between actual and indicated values.

Position Error - Error resulting from location of static source

ISA - International Standard Atmosphere.

Takeoff Weight - Weight at brake release at start of takeoff roll.

Maximum Brake Energy - The brake energy with maximum effort braking at weights associated with the takeoff brake energies shown on the takeoff weight limits charts. Distances expressed on the takeoff field length charts are achieved if the takeoff is aborted at V_1. However, after the stop, wheel fuse plugs may release and brake and tire damage will occur.

Maximum Landing Brake Energy - The brake energy with maximum effort braking at weights associated with the landing brake energies shown on the landing weight limits charts. Landings in which brake energy is kept below this value can be accomplished without wheel fuse plug release or tire damage. Maximum effort stops in which brake energy exceeds this value may cause excessive brake wear, and after the stop, may cause wheel fuse plug release and damage tires.

(Continued)

APR - The APR (automatic power reserve) rating is the maximum thrust certified for takeoff operation within established engine limits for specific ambient conditions. It is obtained automatically (without pilot action) when the APR system has been armed for takeoff and the system senses the failure of one engine. APR may also be selected by pressing the APR ON pushbutton on the center instrument panel.
Activation of APR thrust imposes a penalty on life limited components within the engine. APR thrust is limited to emergency operation (one engine inoperative, windshear, etc.) for a time limit of ten minutes.

AOA - Angle of attack.

ADC - Air data computer.

RSE - Remote standby equipment (backup air data source).

ATMOSPHERIC

Ambient Temperature- Static air temperature (SAT) obtained either from ground meteorological sources or from in-flight SAT readings

Field Elevation - Pressure altitude at airport.

Pressure Altitude - Altimeter reading when set to a barometric pressure of 1013.2 mb (29.92 in. Hg) and corrected for static source position error and instrument error.

Wind - Wind velocities, recorded as variables on charts of this section, are headwind (+) or tailwind (-) components of actual winds at 10 meters above runway surface (tower winds).

AIRSPEEDS

All airspeed numbers in this manual, unless stated otherwise, are indicated values and assume zero instrument error.

IAS - Indicated Airspeed
Airspeed indicator reading, as installed in aircraft.

CAS - Calibrated Airspeed
Airspeed indicator reading, corrected for static source position error and instrument error.

EAS - Equivalent Airspeed
Airspeed indicator reading, corrected for instrument error, position error and compressibility effects.

TAS - True Airspeed
Airspeed of an aircraft relative to undisturbed air.

M_i - Indicated Mach Number
Machmeter reading corrected for instrument error

M - True Mach Number (ratio of true airspeed to speed of sound).

(Continued)

V_{MCG} - Minimum Control Speed - Ground (altitude dependent)
Minimum speed on the ground at which control can be maintained using aerodynamic controls alone and wings level, when one engine suddenly becomes inoperative and the remaining engine is operating at APR thrust.

V_{MCA} - Minimum Control Speed - Air (altitude dependent)
The minimum flight speed during takeoff at which the airplane is controllable with up to 5° of bank when one engine suddenly becomes inoperative and the remaining engine is operating at APR thrust.

V_{MCL} - Minimum Control Speed - Landing (altitude dependent).
The minimum flight speed during landing at which the airplane is controllable with up to 5° of bank when one engine suddenly becomes inoperative and the remaining engine is operating at APR thrust.

V_{EF} - speed at which critical engine is assumed to fail during takeoff.

V_1 - Decision speed
Speed at which, due to engine failure at V_{EF} or other causes, pilot can elect to stop or to continue takeoff. Distance to continue takeoff to height of 35 ft (15 ft on wet runway) or to bring aircraft to full stop, will not exceed scheduled takeoff distance
In the event of an engine failure, this speed takes into account of the pilot recognition and reaction time of 1.0 second, including the pilot's first action after recognizing the engine failure. For an all-engine rejected takeoff, this is the speed at which the pilot performs his first action to abort.
V_1 must not be less than V_1 (V_{MCG}), or greater than V_R.

(Continued)

$V_1(V_{MCG})$ - Minimum V_1 speed allowed by V_{MCG}.

V_R - Rotation speed.
Speed at which rotation to lift-off attitude is initiated during takeoff.

V_{LOF} - Lift-off Speed
Speed at which aircraft first becomes airborne.

V_2 - Takeoff Safety Speed.
The target speed to be attained at the 35 foot height following an engine failure. If an engine failure should occur after passing V_2 on takeoff, it is recommended that the speed at the time of engine failure (up to V_2 + 10 kt) be maintained to ensure that the climb gradient is at or near the maximum climb gradient available.

V_{SE} - Enroute climb speed
the recommended airspeed for single-engine climb in the enroute (clean) configuration.

V_A - Maneuvering speed
Maximum speed at which application of full available aileron, rudder, or elevator will not overstress aircraft.

V_{SR} - Reference stall speed.
In accordance with 1G stall speed criteria, the reference stall speed for aircraft equipped with a stall identification system must not be less than the greater of 2 knots or 2 percent above the speed at which the device activates.

V_{SR1} - Reference stall speed in takeoff, enroute and approach configuration.

V_{SRO} - Reference stall speed in landing configuration (landing gear down, flaps 39°).

V_{APP} - Approach recommended speed based on V_{REF} + 5 KCAS.

V_{REF} - Landing reference speed
Target speed at 50 ft above runway surface during normal landing. This speed is equal to 1.29 V_{SR} (landing configuration).

DISTANCES

Takeoff data presented in this section is based upon smooth, dry or wet, hard-surfaced runway.

Accelerate-Stop Distance - The accelerate-stop distance is the greater of the two following distances:

1. The horizontal distance required to accelerate with both engines operating to V_1 and come to full stop when aborting takeoff at V_1.
2. The horizontal distance required to accelerate and come to a full stop when the pilots rejects takeoff at V_1 following one engine failure at V_{EF}.

Engine-Out Accelerate-Go Distance - The horizontal distance from brake release to the point at which the airplane attains a height of 35 ft (15 ft for wet and contaminated runways) above the runway surface, on a takeoff during which one engine fails at V_{EF}, recognition occurs at V_1 and the pilot elects to continue.

(Continued)

Takeoff Field Length (TOFL)

- The takeoff field length given for each combination of airplane weight, atmospheric temperature, altitude, wind, and runway slope is the greatest of the following:

1. 115% of the all-engine takeoff distance from start to a height of 35 feet above the runway surface.
2. The engine-out accelerate-go distance.
3. The accelerate-stop distance with one engine failed at V_{EF}.
4. The accelerate-stop distance with all engines operating.

No specific identification is made on the charts as to which of the above distances governs a specific case. V_1 is normally selected to balance the accelerate-stop distance with the engine-out accelerate-go distance, when possible

Balanced Field Length (TOFL)- Distance obtained by choosing engine failure speed (V_{EF}), so that takeoff distance and accelerate-stop distance are identical. This distance must not exceed available runway length.

Unbalanced Field Length - When V_{EF} is assumed so that takeoff distance and accelerate-stop distance are not equal.

Dry Runway - In addition to runways which are not “Wet” or “Contaminated”, according to the definitions below, this include runways which have been specially prepared with grooves or porous pavement and maintained to retain “effectively dry” braking action, even when moisture is present.

Wet Runway - Runway is wet with no significant standing water (less than 3 mm).

(Continued)

Contaminated Runway - A runway surface is considered contaminated when more than 25% of the runway surface area is covered with standing water, slush, loose snow (dry wet), compacted snow or ice.

Actual Landing Distance - The actual landing distances presented in this section are based on a smooth, paved runway. The actual landing distance is equal to the horizontal distance from a point 50 feet above the touchdown point on the runway surface to the point at which the airplane would come to a full stop on the runway.

Factored Landing Distance - The factored dry landing distances presented in this section are equal to the actual landing distance divided by 0.60 (multiplied by 1.67). The wet landing distance is the factored dry landing distance multiplied by 1.15.

GRADIENT OF CLIMB

1. Gradient of Climb
   The ratio of the change in height during a portion of the climb to the horizontal distance traversed in the same time interval.
2. Gross Gradient of Climb
   The climb gradient that the airplane can actually achieve given ideal conditions
3. GR2
   Second segment gross climb gradient.
4. Net Gradient of Climb
   The gross climb gradient reduced by 0.8% during the takeoff phase and 1.1% enroute.

HEIGHT

1. Gross Height
   Geometric height attained using gross climb gradient in a specified time period. Gross height is used to calculate actual pressure altitude, at level-off heights.

2. Net Height
   Geometric height attained using net climb gradients in a specified time period.
   Net height is used to determine a net flight path which will clear any obstacles by at least 35 ft to comply with regulations.

ICING

Icing conditions exist when OAT is 10°C or below, and visible moisture in any form is present (such as: clouds, fog with visibility of one mile or less, rain, snow, sleet and ice crystals).

PERFORMANCE CONFIGURATIONS

Configurations in charts correspond to following settings (APR - ON for single engine operation):

Configuration	Number of Engines Operating	Thrust	Flaps Position	Gear
1st and 2nd Segment T/O Climb	1	T/O	20° or 10°	DOWN then UP
3rd Segment - Acceleration	1	T/O	20° to 0°	UP
Final Segment Climb	1	Max Climb	0°	UP
Enroute Climb	1	Max Climb	0°	UP
Approach Climb	1	T/O	20°	UP
Landing Climb	2	T/O	39°	DOWN

DEMONSTRATED CROSSWIND

The maximum demonstrated crosswind component for takeoff and landing is 25 knots.

NOISE LEVELS

The following noise levels comply with part 36, appendix B, Stage 5 maximum noise level requirements and were obtained by analysis of approved data from noise tests conducted under the provisions of part 36, Amendment 31. The noise measurement and evaluation procedures used to obtain these noise levels are considered by the FAA to be equivalent to the Chapter 14 noise levels required by the International Civil Aviation Organization (ICAO) in Annex 16, Volume 1, Aircraft Noise, Seventh Edition, July 2014, Amendment 11-B, applicable January 1, 2015.

Lateral	89.5
Flyover	75.2
Approach	90.5

No determination has been made by the CAAI that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

No determination has been made by the Civil Aviation Authority of Israel that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

No determination has been made by the European Aviation Safety Agency that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

Lateral and flyover noise levels were obtained at the maximum takeoff weight (MTOM) of 39,600 lb, takeoff flaps - 10° and anti-ice system off. Thrust reduction in accordance with FAR Part 36 and ICAO Annex 16 was used to determine flyover noise level.

Approach noise levels were established on a 3° glide-slope, with landing gear down, flaps - 39°, APU - on, at the maximum landing weight of 32,700 lb.

PITOT-STATIC POSITION ERROR CALIBRATION

The pilot, copilot and RSE airspeed, Mach and altitude data is corrected by the ADCs, using static source error correction tables.

For altitudes below 27,350 ft, the ADC static source error correction tables are based on AOA data, and no residual correction is required.

For altitudes at and above 27,350 ft, residual error corrections for pilot, copilot and RSE pitot-static system must be added to the indicated displayed information in order to obtain correct values (i.e. CAS = IAS + Airspeed Residual Error).
These residual error corrections are included in figures 5-20 through 5-22.

NOTE

When crossing 27,350 ft, crew may encounter a momentary shift (up or down) in indication of airspeed, mach and altitude due to change in methods of automatic correction.

PITOT-STATIC POSITION ERROR CALIBRATION WITH FAILED AOA READING

If both AOA readings have failed, the ADC and RSE corrections at and below 27,350 ft automatically revert to a default correction table. Residual errors are included in figures 5-23 through 5-31.

ENGINE PERFORMANCE

Aircraft take off, climb and landing performances are based on obtaining proper engine thrust as shown in charts. Performance is based on obtaining proper engine thrust as shown in charts, Static Takeoff Thrust - N_1 Setting, and Maximum Continuous Thrust - N_1 Setting (Figures 5-4 through 5-19). N_1 settings less than those shown are cause for investigation. If pressurization is on during takeoff, correction noted on applicable chart must be applied.

Enter charts with ambient temperature; move up to pressure altitude, then across, to read N_1.

Example:

Assume the following takeoff conditions:

1. Runway elevation - 2000 ft
2. OAT - 0°C
3. Engine anti-ice - off
4. Wing anti-ice - off
5. ECS - off

Required: Static takeoff thrust

From Figure 5-4:

N_1 = 87.6%

NOTE

The same information can be extracted from takeoff performance tables for the appropriate field elevation (for the given example, use Figure 5-56).

APPROVED FLIGHT ENVELOPE

The approved altitude / temperature flight envelope is presented in Figure 5-32

REFERENCE STALL SPEEDS - IDLE THRUST

Variations of reference stall speeds, V_{SR}, with weight and altitude for speed brakes retracted are shown for all flap positions setting in Figure 5-36 through Figure 5-39.

The reference stall speed increases resulting from speed brakes extended are not uniform and cannot be shown as singular values for each flap setting. Hence, separate charts are presented for speed brakes fully extended in Figure 5-40 through Figure 5-43.

The reference stall speeds presented in this section were developed in accordance with 1G stall speed criteria for airplanes equipped with a stall identification system, which states “the reference stall speed used to determine the minimum operating speeds must not be less than the greater of 2 knots or 2 percent above the speed at which the device activates”.

Example: determine the reference stall speed

Given:
Flaps - 20°
Speed brakes - Retracted
Pressure altitude - 5000 ft
Gross weight - 38.000 lb

Stall speed = 119 KCAS

TAKEOFF PERFORMANCE

MAXIMUM ALLOWABLE TAKEOFF WEIGHT

The maximum allowable takeoff weight (weight at brake release) is lowest value determined by each of following requirements:

1. Field length weight limitation.
2. Climb weight limitation.
3. Tire speed weight limitation.
4. Maximum brake energy weight limitation.
5. Takeoff flight path weight limitation (obstacle clearance).
6. Maximum structural takeoff weight.

Figure 5-1 provides a schematic definition of the takeoff weight determination procedure.

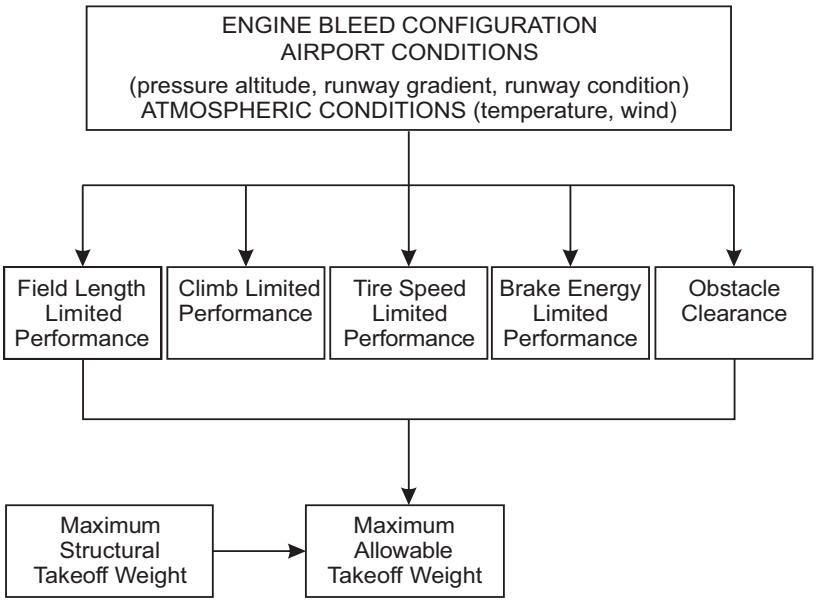


Figure 5-1. Determination Of Maximum Allowable Takeoff Weight

(Continued)

Takeoff performance charts are presented for flaps 10° and 20°. Takeoff with flaps 20° results in a shorter takeoff distance for a given weight, or higher takeoff weight for a given field length. It is also less restricted by brake energy or tire limits. Takeoff with flaps 10° results in higher climb gradients, and will permit higher takeoff weights when climb limited or obstacle clearance limited. If the takeoff weight determination procedure with flaps 20° shows that the weight is restricted by climb performance or obstacle clearance requirements, the procedure should be repeated for takeoff flaps 10°. This could allow a higher takeoff weight.

Once the scheduled takeoff weight is determined, the corresponding takeoff speeds (V_1, V_R and V_2) can be calculated considering applicable speed limitations.

The following paragraphs provide more information on each takeoff weight limitation.

MAXIMUM TAKEOFF WEIGHT AS PERMITTED BY CLIMB GRADIENT REQUIREMENTS

Figure 5-48 through Figure 5-51 flaps - 20° and Figure 5-154 through Figure 5-157 flaps - 10° present the information necessary to determine the maximum allowable takeoff weight as limited by gross climb performance limits. The maximum takeoff weight is determined for airport pressure altitude and reported ambient temperature.
Separate charts are presented for various engine bleed configurations.

The charts do not specify the limiting climb segment, only that any one or a combination of the climb segments (first, second) that are limiting. Final segment is never a limiting factor.

The charts are repeated for convenience on Figure 5-101 through Figure 5-104 (for flaps - 20°) and Figure 5-207 through Figure 5-210 (for flaps - 10°) for wet runway conditions.

MAXIMUM TAKEOFF WEIGHT AS PERMITTED BY BRAKE ENERGY LIMITATIONS

Figure 5-52 (for flaps - 20°) and Figure 5-158 (for flaps - 10°) present the information necessary to determine the maximum allowable takeoff weight as limited by the maximum braking energy at a rejected takeoff. Corrections for the reported wind and field slope are presented.
The charts are repeated for convenience on Figure 5-105 (for flaps - 20°) and Figure 5-211 (for flaps - 10°) for wet runway conditions.

MAXIMUM TAKEOFF WEIGHT AS PERMITTED BY TIRE SPEED LIMITATIONS

Figure 5-53 (for flaps - 20°) and Figure 5-159 (for flaps - 10°) present the information necessary to determine the maximum allowable takeoff weight as permitted by the tire speed limitation. Correction for the reported wind is included.

Between the two conditions (V_{LOF} may not exceed the main wheel tire limit speed of 195 knots, and V_R may not exceed the nose wheel tire limit speed of 182 knots) the nose wheel limitation is a restricting factor.
The charts are repeated for convenience on Figure 5-106 (for flaps - 20°) and Figure 5-212 (for flaps - 10°) for wet runway conditions.

TAKEOFF FIELD LENGTH

The takeoff field length and takeoff airspeeds tables and charts in this manual are presented for flap settings 20° and 10° flap setting and show the takeoff distance and speeds as a function of altitude, temperature, and weight.
Corrections to the takeoff distances for reported wind and runway slope are also provided.

Different tables are provided for the various engine bleed configurations.

Distances and speeds are presented separately for dry and wet runways.

Care must be taken that the correct tables are used. The runway condition is noted in the table headings.
The presented wet runway takeoff data is based on the use of thrust reversers for rejected takeoff. The basic data assume that both thrust reversers are available at dispatch. For dispatch with one or both thrust reversers inoperative, use the included corrections for V1 and TOFL

TAKEOFF SPEEDS (V_1, V_R, V_2)

The following takeoff speeds are presented in the tables:
V_1 = Takeoff decision speed
V_R = Takeoff rotation speed
V_2 = Takeoff safety speed

V_1 must be further corrected for runway slope and wind.

The decision speed, V_1, is basically selected so that takeoff distance is equal to accelerate stop distance; this is the balanced field length condition and allows the highest takeoff weight for given conditions.

However, V_1 may not be selected so that the speed at which the engine is assumed to fail (V_{EF}) is less than V_{MCG} or higher than rotation speed V_R. When these limitations on V_1 arise, an unbalanced field length situation exists. When V_1 is limited by V_{MCG} the accelerate-stop distance is longer than the takeoff distance (this situation may occur at light gross weight, low altitude conditions). When V_1 is limited by V_R, takeoff distance following failure of one engine is the longer one.(this situation may occur at high gross weight, high altitude and/or high temperature conditions).

For determination of the minimum V_1 allowed by V_{MCG} ($V_1(V_{MCG})$) as a function of takeoff field elevation and temperature refer to figure Figure 5-34. Figure 5-33 presents the ground minimum control speed (same for both takeoff flaps settings) - V_{MCG} as a function of takeoff field elevation and temperature.

V_1 corrections for reported wind and runway slope are presented separately for 20° and 10° flaps settings in Figure 5-84 (for flaps - 20°) and Figure 5-205 (for flaps - 10°) for dry runways and in Figure 5-152 (for flaps - 20°) and Figure 5-258 (for flaps - 10°) for wet runways.
(correction for the number of thrust reversers available at dispatch is also included).
If the corrected V_1 is less than $V_1(V_{MCG})$, use $V_1=V_1(V_{MCG})$.
If the corrected V_1 greater than V_R, use $V1=V_R$.

MINIMUM CONTROL SPEED - AIR (V_{MCA})

For variation of minimum control speed in the air ($V_{MCA)}$ as a function of takeoff field elevation and temperature refer to Figure 5-35.(same for both takeoff flaps settings).

TAKEOFF CHARTS AND TABLES

Takeoff data is provided for field elevations from sea level to 14,000 ft. Each field elevation data has two tables as follows:
Part A - For OAT between -54°C and -5°C
Part B - For OAT between 0°C and 50°C

Pilot may interpolate performance between adjacent elevation and temperature values.

Tables to determine V_1, V_R, V_2, second segment climb gradient (GR2) and takeoff field length (TOFL) for zero wind, zero runway gradient conditions:

For flaps - 20°, dry runways:

ECS	Engine Anti ice	Wing Anti ice	Figures
OFF	OFF	OFF	Fig 5-54 through Fig 5-68
ON	OFF	OFF	Fig 5-69 through Fig 5-83
ON	ON	ON or OFF	Fig 5-86 through Fig 5-100

For wet runways (with both thrust reversers operative at dispatch):

ECS	Engine Anti ice	Wing Anti ice	Figures
OFF	OFF	OFF	Fig 5-107 through Fig 5-121
ON	OFF	OFF	Fig 5-122 through Fig 5-136
ON	ON	ON or OFF	Fig 5-137 through Fig 5-151

For flaps - 10°, dry runways:

ECS	Engine Anti ice	Wing Anti ice	Figures
OFF	OFF	OFF	Fig 5-160 through Fig 5-174
ON	OFF	OFF	Fig 5-175 through Fig 5-189
ON	ON	ON	Fig 5-190 through Fig 5-204

For wet runways:

ECS	Engine Anti ice	Wing Anti ice	Figures
OFF	OFF	OFF	Fig 5-213 through Fig 5-227
ON	OFF	OFF	Fig 5-228 through Fig 5-242
ON	ON	ON	Fig 5-243 through Fig 5-257

The following figures are used to determine V_1, and takeoff field length corrections for wind and runway slope:
For dry runways, use Figure 5-84 for V_1 correction and Figure 5-85 for takeoff field length correction.
For wet runways, use Figure 5-152 V_1 correction and Figure 5-153 for takeoff field length correction (corrections for the number of thrust reversers available at dispatch is also included).

NOTE

1. The wet runway takeoff field length cannot be smaller than the dry runway takeoff field length for the same conditions. If the wet runway takeoff field length is smaller than the dry runway field length, use the dry runway field length.

2. For negative pressure altitudes:
   - Add 1 kt to V_1 at Sea Level for each 1000 ft below Sea Level;
   - If V_R is less than the corrected V1 use $V_R=V_1$;
   - For V_2, TOFL and GR2 use Sea Level data.

Definition Of Takeoff Data Example

Define the maximum allowable takeoff weight and takeoff speeds for the following conditions:
Flaps - 20°
Airport pressure altitude: 12,000 ft
Ambient temperature: 0°C
Engine bleeds: OFF
Wind: 10 knots (headwind)
Runway condition: Dry
Runway slope: minus (-)1% (downhill)
Available takeoff field length: 8000 ft

1. From Figure 5-48 determine the maximum allowable takeoff weight as permitted by climb gradient: 38,500 lb
2. From Figure Figure 5-53 determine the maximum allowable takeoff weight as permitted by tire speed limitations, corrected for 10 kt headwind: 40,400 lb
3. From Figure Figure 5-52 determine the maximum allowable takeoff weight as permitted by braking energy, corrected for 1% downhill runway slope and 10 kt headwind: 39,200 lb
4. Between the first three limitations limitation 1 is most restrictive.
5. From Figure 5-65 for takeoff weight found in step 4 determine the uncorrected required field length: 10910 ft.
6. From Figure 5-99 for takeoff weight found in step 4 and uncorrected TOFL found in step 5 determine the required field length corrected for runway slope and headwind: 9,910 ft.
   If this required length is greater than the available Takeoff field length, Takeoff with weight of 38,500 lb can not be accomplished from the available runway, and the takeoff weight must be reduced.
7. Repeat steps 5 and 6 in an iterative manner until required takeoff field length will be equal to available for the defined conditions.
   The corresponding takeoff weight is 35,860 lb.

V_1 = 130 kt
V_R = 134 kt
V_2 = 140 kt

HORIZONTAL STABILIZER TRIM SETTING FOR TAKEOFF

Horizontal stabilizer trim setting for takeoff is defined for each of the flaps settings as a function of the aircraft zero-fuel longitudinal center of gravity location, fuel quantity and field pressure altitude:

1. Figure 5-45 (for flaps - 20°)
2. Figure 5-46 (for flaps - 10°).

TAKEOFF PROCEDURES

Takeoff data is based on a non-rolling takeoff. The following takeoff procedure was assumed for the determination of takeoff performance data and should be used in actual takeoffs:

1. Before takeoff:
   - Check flaps, horizontal stabilizer trim and engine thrust settings.
   - Verify takeoff speeds and that APR and ground spoilers are not inhibited.
2. Line up on runway.
3. Apply wheel brakes to prevent aircraft movement.
4. Advance power and engage autothrottles if desired, or manually set thrust levers to T/O position. Monitor takeoff N1 before brake release. N1 will change during takeoff run but no correction is required after setting Thrust Levers to T/O position.
5. When takeoff thrust has been established, release brakes.

Normal Takeoff:

1. During a normal takeoff (all engines operating), rotate the airplane at V_R with an average rate of 3 to 4 degrees per second to an initial pitch attitude of 13 to 15 degrees (may vary according to gross weight, field elevation and ambient temperature). Adjust the pitch attitude to obtain the desired climb out speed and flight path, but limit pitch attitude to 25º maximum.
2. Retract landing gear when positive rate of climb is established.
3. Retract flaps no lower than 400 ft above runway and no slower than 10 knots below V_{SE} (V_{SE} -10 kt) as aircraft accelerates.

Rejected Takeoff:

1. If engine failure is recognized or if takeoff is aborted for other reasons before attaining V_1, retard power levers to idle. If RTO is armed the autobrake system will automatically apply maximum wheel braking. Maximum manual braking may be used if needed. Use thrust reversers and nose-wheel steering as required to stop the aircraft on the remaining runway.

(Continued)

NOTE

Credit for thrust reverser use in accelerate-stop distance for an aborted takeoff is taken on wet and contaminated runways and is not taken on dry runway.

Engine Failure After V1 (Continued Takeoff):

1. If engine failure occurs after V_1 but prior to V_R, continue acceleration to V_R, then rotate the airplane with an average rate of 3 to 4 degrees per second to an initial pitch attitude of 9 to 11 degrees (may vary according to gross weight, field elevation and ambient temperature.)
2. Verify that APR is ON. If APR is not ON, ensure operating engine thrust lever is pushed to the forward limit of travel and press the APR pushbutton.
3. Initiate gear retraction immediately when positive rate of climb is reached.
4. Adjust the airplane's pitch attitude to maintain V_2 to a height required for obstacle clearance (level-off height).
   - If engine failure occurs after V_2 but less than V_2 + 10 kt, maintain airspeed reached at time of engine failure.
   - If engine failure occurs at V_2 + 10 kt or higher, increase pitch to reduce airspeed. Maintain V_2 + 10 kt.

NOTE

The Flight Director is designed to command the pitch attitude that is required in order to achieve the target airspeeds that were described in this procedure.

5. Upon reaching a safe level-off height (as determined in this chapter), reduce pitch to maintain altitude while allowing the aircraft to accelerate with operating engine in APR mode.
6. Initiate flap retraction when aircraft accelerates through V2+15 kt.
7. Set maximum continuous thrust on operating engine.
8. Resume climb when aircraft reaches V_{SE}.

(Continued)

9. Climb at V_{SE} to desired altitude.
10. Perform ENGINE FAILURE DURING TAKEOFF ABOVE V1 checklist when clear of obstacles as workload permits.

CAUTION

APR operation longer than 9 minutes, 45 seconds with an engine failed will cause the Engine Exceedance caution message to come on.

<<END>>

TAKEOFF FLIGHT PATH (ONE ENGINE INOPERATIVE)

The takeoff flight path is divided into segments defined by changes in the airplane configuration. The terms used in flight path plotting are illustrated in Figure 5-2 and Figure 5-3. Different takeoff profiles are required according to the gross level-off height above the runway. If the gross level-off height is lower than 1,500 feet, then a final segment climb is required.

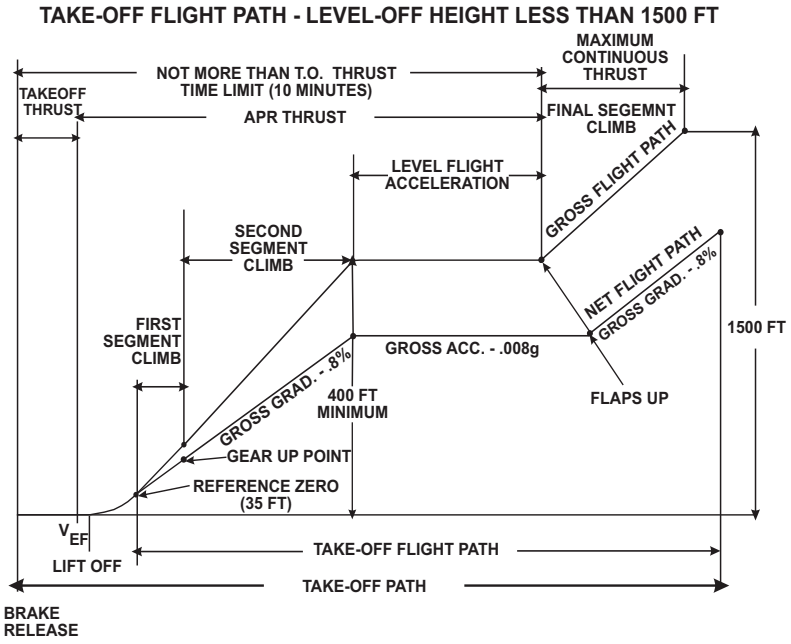


Figure 5-2. Takeoff Flight path (Level-off <1,500 ft)

(Continued)

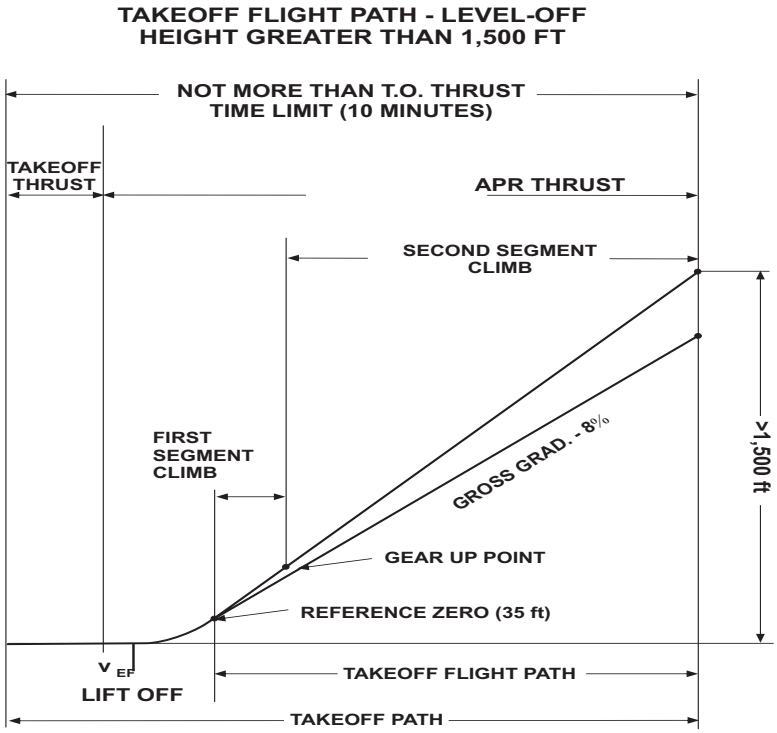


Figure 5-3. Takeoff Flight path (Level-off > 1,500 ft)

Reference Zero is the point along the runway where the aircraft attains a height of 35 ft for dry runway operations or 15 ft for wet runway operations.

The gross flight path represents the actual climb and acceleration performance of the airplane. The net flight path is obtained by reducing the gross climb performance by a climb gradient of 0.8% and by reducing the gross acceleration, during the level flight acceleration segment, by 0.008g. The net takeoff flight path must clear all obstacles by a minimum of 35 ft.

(Continued)

Use of the obstacle clearance data in this section will ensure that obstacles will be cleared by a minimum of 35 ft for dry runway takeoff. For wet runway takeoff, 20 ft must be added to heights read from the charts to assure 35 feet minimum clearance.

The takeoff flight path is divided into the following segments defined by changes in the airplane configuration:

1. First Segment extends from the 35 ft height at the end of the takeoff distance to the height at the end of gear retraction. It is flown at V2 speed with the operating engine at APR thrust.
2. Second segment begins at the end of gear retraction (end of first segment) and continues to level-off height at V_2 speed. The airplane is in takeoff flaps configuration, gear UP, and the operating engine is at APR thrust.
3. Transition segment (level flight acceleration) begins at the end of second segment and represents the acceleration at level-off height. It includes the acceleration from V_2 to flaps retraction speed, flaps retraction, and continued acceleration to final segment / enroute climb speed V_{SE}. The operating engine is at APR thrust during this segment.
4. Final Segment begins at the end of the transition segment and ends at 1500 ft above the runway. Final segment climb is based on gear - up, flaps - up, operating engine at maximum continuous thrust and V_{SE}.

The gross level-off height is selected before takeoff. It must not be less than 400 ft above airport elevation and not greater than the maximum gross level-off height. The maximum gross level-off height is attained when the takeoff thrust time limit (10 minutes) expires at the end of the acceleration segment (see Figure 5-2 and Figure 5-3). In addition, the pressure altitude corresponding to the gross level-off height must not exceed 20,000 ft, which is the maximum altitude for flight with flaps extended.

(Continued)

Takeoff Path Charts

The performance charts data in this section include the following information:

1. Available second segment gross climb gradients.
   a. Uncorrected values (GR2) at 400 ft above the runway are provided in the Takeoff tables for flaps settings 20° and 10°, runway condition dry and wet, and for engine bleed settings:
      ECS-OFF, EAI-OFF, WAI-OFF
      ECS-ON, EAI-OFF, WAI-OFF
      ECS-ON, EAI-ON, WAI-OFF or ON.
   b. Wind component correction charts for flaps settings 20° and 10°, see Figure 5-263 and Figure 5-264.
   c. Gross second segment climb gradient correction for level-off higher than 1,500 ft above airport elevation, see Figure 5-265 (same for both takeoff flap settings).
2. Required gross climb gradients for close-in and distant obstacle, see Figure 5-260 and Figure 5-261 respectively (same for both takeoff flaps settings).
3. Conversion from geometric height to pressure altitude increment, see Figure 5-262.
4. Horizontal acceleration distances of transition segment, see Figure 5-267.
5. Final segment gross climb gradient and corresponding speed, V_{SE}, see Figure 5-269.
6. Chart for determination of the pressure altitude for initiation of V2 increase for level-off height greater than 1,500 above airport elevation, Figure 5-266. (See further explanations on V2 below.)

(Continued)

Determination of Takeoff Flight Path for Obstacle Clearance

When flight path planning for obstacle clearance is desired, the following procedure may be used:

1. From the applicable takeoff weight limits charts, determine the highest takeoff weight as permitted by other limitations (takeoff field length, climb gradient, tire speed and brake energy). This weight is the first trial takeoff gross weight for obstacle clearance analysis.
2. Determine the horizontal distance of the obstacle from reference zero and obstacle height above airport elevation.
3. From the applicable takeoff flight path chart, depending on where the critical obstacle is located (close or distant obstacle), determine the required reference gross climb gradient for obstacle clearance.
   The gross level-off height is also determined at this stage. For most obstacle clearance cases, best performance is obtained by selecting a gross level-off height that ensures that all obstacles are cleared during the first or second segments.
4. From the Takeoff tables, determine the aircraft gross climb gradient available at 400 ft above the runway (GR2).

   To obtain the actual available climb gradient apply following corrections:
   a. Correction for wind (Headwind increases the available gradient, while tailwind decreases) Figure 5-263 and Figure 5-264.

(Continued)

b. Correction for gross level-off height:
This correction accounts for climb gradient reduction with pressure altitude between the point at 400 ft above the airport elevation and the level-off altitude. Different methods are used for determination of this correction depending on the level-off height.
For Level-off height less than 1,500 ft above airport elevation;
For each 500 ft level-off height above 400 ft reduce the reference gross climb gradient by 0.1%.
For Level-off height greater than 1,500 ft above airport elevation;
Use the Gross second segment climb gradient correction chart (Figure 5-265).

NOTE

The reference climb gradient obtained from the chart in Figure 5-265 represents an averaged gross second segment climb gradient. The actual gross climb gradient decreases with altitude, and at the level-off altitude it will be less than the reference gradient. To assure that the actual climb gradient during the entire second segment will always be above the 2.4% limit required by regulations, the reference climb gradient should be above the limiting line presented in the chart.

(Continued)

5.
   a. If the Reference climb gradient performance is more than the reference required climb gradient, obstacle clearance is satisfactory.
   b. If the Reference climb gradient performance is less than the Reference required climb gradient, obstacle clearance is unsatisfactory and procedures must be repeated using a lower weight.

When weight is reduced to achieve obstacle clearance, note that the horizontal distance between the obstacle and reference zero increases, since the takeoff field length is less. Consequently, an iterative process is required to find the exact minimum gradient and maximum weight for obstacle clearance.

NOTE

For non-standard temperature conditions, the indicated altitude when obstacle clearance has been achieved may be determined from Figure 5-262.

When Level-off height is less than 1,500 ft above airport elevation:

6. From Figure 5-267 determine the distance required to accelerate from V_2 to final segment climb speed.
   This distance is added to that determined at the end of second segment. The takeoff final speeds (V_{SE}) are presented in the takeoff distances tables as a function of takeoff gross weight and takeoff pressure altitude.
7. From Figure 5-269 determine the gross final segment climb gradient using correction for wind component and the appropriate engine bleed configuration. Calculated the gross final segment climb gradient as an average of the gradient at the start and at the end of the final segment.

(Continued)

Second Segment Climb Speed

Certification regulations require that the takeoff safety speed V2 must provide certain margins from the stall speed (1.13VSR) and from the stall warning (ability to perform a 30-deg bank maneuver free of stall warning). The V2 speeds presented in the takeoff tables provide these margins up to pressure altitude of at least 1,500 ft above the runway elevation. If second segment climb is extended to higher altitudes while maintaining the initial V2 the stall speed and maneuver margins can decrease below the required levels. Therefore increase of the climb speed with altitude may be required.

NOTE

Gradual increase of airspeed command during climb is possible only when MAN SPEED is selected for takeoff and increased manually during the climb. AUTO SPEED mode does not support extended second segment operation.

Chart for determination of the pressure altitude for initiation of V2 increase is presented in Figure 5-266. Starting from this altitude, speed should be gradually increased during climb by 2 KCAS per each 1,000 ft pressure altitude up to the level-off altitude.

The following procedure should be used for definition of the required V2 schedule for level-off height greater than 1,500 ft above airport elevation:

1. From takeoff tables determine initial V2 for the corresponding takeoff conditions (takeoff weight, flap configuration, airport elevation, ambient temperature, engine bleed configuration).
2. Determine pressure altitude at which V2 should be increased as the greater between the two following values:
   - Pressure altitude found from figure 5-266, and
   - 1,500 ft above the airport elevation

   For convenience, the found pressure altitude can be rounded to the closest 500 ft.

(Continued)

3. The resulting V_2 schedule is then determined as follows.
   - The initial V_2 is maintained up to the altitude found at step 2.
   - Starting from this altitude, V_2 should be gradually increased with pressure altitude by 2 knots per 1,000 ft up to level-off altitude.

NOTE

If level-off pressure altitude is lower than the pressure altitude for V_2 increase initiation, than V_2 should be kept constant during second segment climb.

(Continued)

Takeoff flight Path Examples

Example 1 – Level-off height less than 1,500 ft AGL

Determine whether the given obstacle is cleared and define the takeoff flight path up to 1500 ft above the runway

Given:
Airport ambient temperature - 37°C (ISA+26°C)
Airport Pressure Altitude - 2000 ft
Flaps - 20°
Takeoff gross weight - 32,000 lb
Headwind - 10 kt
ECS bleed - on
Engine and Wing Anti-ice - off
Obstacle height above departure end of runway. - 630 ft
Distance from reference zero - 16,000 ft.

Solution:

1. Locate the obstacle on Figure 5-261 with horizontal distance from reference zero = 16,000 ft and obstacle height above the takeoff surface = 630 ft. Determine the obstacle clearance reference gross climb gradient required to be 5.3%, and the minimum level-off height of 800 ft AGL.
2. Enter Takeoff tables with Flaps 20°, airport pressure altitude of 2,000 ft, engine bleed setting of ECS ON EAI and WAI OFF, and dry runway (Figure 5-71).
   For airport ambient temperature of 37°C and takeoff weight of 32,000 lb read GR2 value of 7.2% and V2 of 122 KCAS.
3. Introduce the following corrections:
   a. +0.3% - for the 10 kt head wind
   b. -0.08% - for higher than 400 ft gross level-off altitude:
      0.1*(800-400)/500 = 0.08%

   The resulting available reference gross second segment climb gradient is: 7.2%+0.3%-0.08% =7.42%

(Continued)

4. Since the available gross climb gradient (7.42%) is greater than the required gross climb gradient (5.3%), obstacle clearance is satisfactory.
5. For a gross level-off height of 800 ft at ISA + 26°C, the pressure height of 730 ft above the airport is obtained from Figure 5-262.

   Since the airport pressure altitude is 2,000 ft, the level-off pressure altitude is: 2,000 ft + 730 ft = 2,730 ft
6. Assuming gross climb gradient of 7.42%, Figure 5-261 can be used to determine the second segment distance at level-off height of 800 ft. In this case it is 11,000 ft.
7. From Figure 5-267 with the level-off pressure altitude (2,730 ft), determine the net acceleration distance. In this case it is 13,500 ft.
8. Since the gross level-off height is less than 1,500 ft, a final segment is required. The final segment gross climb gradient is determined as follows:
   a. Using Figure 5-269 with ECS on and 10 kt headwind corrections determine final segment gross climb gradient at the pressure altitude of the level-off height (2,730 ft) – 7.5%.
   b. Using correction chart of Figure 5-262 for a gross height of 1,500 ft, the pressure height above the airport is found to be 1,400 ft for an ISA + 26°C day, which gives the overall pressure altitude at this point of 3,400 ft
   c. Using Figure 5-269 determine final segment gross climb gradient at the pressure altitude of 3,400 ft is 7.2%
   d. Determine average gross climb gradient between the level-off and final altitudes: (7.5+7.2)/2 = 7.35%
   e. The final segment distance is calculated as follows:
      Final Segment Distance = (delta gross height / average gross climb gradient) = (1,500 - 800) / 7.35% = 9,524 ~9,530 ft
9. The total distance from reference zero becomes:
   11,000 ft + 13,500 ft + 9,530 ft = 34,030 ft (distance to level-off height + transition + final segment)
10. Since the level-off height is below 1,500 ft, constant V_2 of 122 KCAS should be maintained up to level-off altitude.

Example 2 – Level-off height greater than 1,500 ft AGL, with no V2 increase required during climb

Determine whether the given obstacle is cleared and find the associated level-off altitude and V_2 speed at level-off height.

Given:
Airport ambient temperature -13°C (ISA -20°C)
Airport Pressure Altitude – 4,000 ft
Flaps - 20°
Takeoff gross weight - 33,000 lb
Engine bleed: ECS ON, EAI ON and WAI ON
Tailwind -10 kt
Obstacle height above the takeoff surface – 3,000 ft
Distance from reference zero - 72,000 ft

Solution:

1. Locate the obstacle on Figure 5-261 with horizontal distance from reference zero = 72,000 ft and obstacle height above the takeoff surface = 3,000 ft. Determine the obstacle clearance gross climb gradient required to be 5.0%, and the minimum level-off height of 3,600 ft AGL.
2. Enter Takeoff tables with Flaps 20°, airport pressure altitude of 3,000 ft, engine bleed setting of ECS ON EAI ON and WAI ON, and dry runway (Figure 5-89).

   For airport ambient temperature of -13°C and takeoff weight of 33,000 lb read GR2 value of 7.6%, and V2 speed of 124 KCAS.
3. Introduce climb gradient correction for wind component (Figure 5-263): -0.8% for the -10 kt tailwind.
   The resulting wind corrected available gross second segment climb gradient is: 7.6% - 0.8%=6.8%
4. Determine the Reference available 2nd segment climb gradient to level-off height of 3,600 ft AGL using Figure 5-265, as 5.8%.
5. Since the available gross climb gradient (5.8%) is greater than the required gross climb gradient (5.0%), obstacle clearance is satisfactory.

(Continued)

6. For a gross level-off height of 3,600 ft at ISA -20°C, the pressure height of 3,900 ft above the airport is obtained from Figure 5-261.

   Since the airport pressure altitude is 3,000 ft, the level-off pressure altitude is: 3,000 ft + 3,900 ft = 6,900 ft.

7. Determine pressure altitude at which V_2 is required to be gradually increased, as the greater between:
   - 4,000 + 1,500 = 5,500 ft, and
   - 8,500 ft as found for Flaps 20° and GWT of 33,000 lb using Figure 5-265.

   The resulting altitude is 8,500 ft.

   Since the found pressure altitude at which V_2 is required to be gradually increased (8,500 ft) is greater than the level-off pressure altitude (6,900 ft), constant V_2 of 124 KCAS is maintained during climb.

Example 3 – Level-off height greater than 1,500 ft AGL with V2 increase during climb

Determine whether the given obstacle is cleared and find the associated level-off altitude and V_2 speed up to level-off height.

Given:
Airport ambient temperature -25°C (ISA -20°C)
Airport Pressure Altitude – 6,000 ft
Wet Runway
Flaps - 10°
Takeoff gross weight - 35,000 lb
Engine bleed: ECS OFF, EAI and WAI OFF
Headwind +20 kt
Obstacle height above the takeoff surface – 3,280 ft
Distance from reference zero - 81,000 ft

Solution:

1. Locate the obstacle on Figure 5-261 with horizontal distance from reference zero = 81,000 ft and obstacle height above the takeoff surface = 3,300 ft (3,280 ft +20 ft for wet runway height above reference zero correction). Determine the obstacle clearance gross climb gradient required to be 5.0%, and the minimum level-off height of 4,000 ft AGL.
2. Enter Takeoff tables with Flaps 10°, airport pressure altitude of 6,000 ft, engine bleed setting of ECS OFF EAI OFF and WAI OFF, and wet runway (Figure 5-219).

   For airport ambient temperature of -25°C and takeoff weight of 35,000 lb read GR2 value of 7.4%, and V_2 speed of 139 KCAS.

   Correct climb gradient for wind component (Figure 5-264): +0.3% for the +20 kt headwind. The resulting wind corrected available gross second segment climb gradient is: 7.4% + 0.3%=7.7%.

(Continued)

3. Determine the Reference available 2nd segment climb gradient to level-off height of 4,000 ft AGL using Figure 5-265, as 6.5%
4. Since the Reference available gross climb gradient (6.5%) is greater than the Reference required gross climb gradient (5.0%), obstacle clearance is satisfactory.
5. For a gross level-off height of 4,000 ft at ISA -20°C, the pressure altitude of 4,300 ft above the airport elevation is obtained from Figure 5-262.

   Since the airport pressure altitude is 6,000 ft, the level-off pressure altitude is: 6,000 ft + 4,300 ft = 10,300 ft
6. Determine V_2 increase initiation pressure altitude:
   a. Using Figure 5-266 for Flaps 10° and GWT of 35,000 lb, determine pressure altitude at which V_2 is required to be gradually increased as 5,000 ft.
   b. Calculate pressure altitude at a height of 1,500 ft above the airport elevation: 6,000 + 1,500 = 7,500 ft
   c. The resultant V2 increase initiation pressure altitude is 7,500 ft - the greater between a) and b)

      V2 climb speed increment to level-off altitude is:
      (10,300-7,500)*2/1000=5.6 KCAS ~ 6 KCAS

      The following climb speed profile should be followed:
      139 KCAS 7,500 ft MSL
      141 KCAS between 7,500 and 8,500 ft MSL
      143 KCAS between 8,500 and 9,500 ft MSL
      145 KCAS between 9,500 and 10,300 ft MSL (level-off altitude)

ENROUTE CLIMB

Charts are presented for choosing the enroute climb speed (V_{SE}) and for determining the net enroute climb gradient (Figure 5-270 and Figure 5-271 respectively).

The enroute climb speeds were established as 1.23 V_{SR} to provide adequate maneuver margins, and are effective for all engine bleed configurations. The gradient data shown have been reduced by a gradient of 1.1% as specified by CFR 14, Part 25. The gradient of climb read from the chart should be used directly.

NOTE

During and following prolonged flight in icing conditions, when ice accretions are suspected on unprotected surfaces, decrease the enroute climb gradient by 1.1%.

Conditions for enroute climb:

1. Landing Gear retracted
2. Flaps - 0°
3. Critical engine inoperative
4. Operating engine at Maximum Continuous Thrust
5. ECS bleed - on (ECS off not applicable for enroute climb)

Example: Find the enroute climb speed and the resulting gradient.

Given:
Ambient temperature: 5°C
Gross weight: 35,000 lb
Pressure altitude: 25,000 ft
Engine and wing anti-ice: on
Tailwind: 10 kt

Solution:

1. Enter Figure 5-270 with the pressure altitude of 25,000 ft. Proceed right to 35,000 lb, then read down to a climb speed of 189 KCAS.
2. Enter Figure 5-271 with the temperature of 5°C. Proceed up to 15,000 ft, right to 35,000 lb, then continue with anti-ice bleed and wind corrections, to read a Net Gradient of 1.3%.

BUFFET BOUNDARY

Buffet boundary data are presented as a function of speed, weight and load factor in Figure 5-47.
For speeds below approximately 0.75 Mach, the buffet boundary is based on shaker onset (low speed buffet) while natural buffet (high speed buffet) is limiting above this speed.

Example: determine the load factor at the defined flight conditions

Given:
Mach No: 0.75
Altitude: 37,000 ft.
Gross weight: 30,000 lb.

Solution:
Under the above conditions, buffet can be expected at 2.0 g load factor

APPROACH AND LANDING PERFORMANCE

APPROACH CLIMB GRADIENTS (ONE ENGINE INOPERATIVE)

Figure 5-272 presents the approach climb gradients as a function of the gross weight, pressure altitude and ambient temperature. Corrections for wind component and anti-ice condition are also provided. The presented gradients are achieved at the recommended final approach speed VAPP which is equal to V_{REF} + 5 kt (where V_{REF} is the threshold speed) and is presented in the landing charts of Figure 5-278).

The approach climb gradient may not be less than 2.1%.

Conditions for approach climb:
1. Landing gear retracted
2. Flaps - 20°
3. Critical engine inoperative
4. Operating engine at Takeoff Thrust
5. Bank angle not to exceed 5°
6. ECS bleeds - on (ECS off not applicable for approach Climb)

NOTE

During and following prolonged flight in icing conditions, when ice accretions are suspected on unprotected surfaces, decrease climb gradient by 0.7%.

LANDING CLIMB GRADIENTS (BOTH ENGINES OPERATIVE)

Figure 5-272 presents the landing climb gradients as a function of the gross weight, pressure altitude and ambient temperature. Corrections for wind component and anti-ice condition are also provided. The presented gradients are achieved at V_{REF} which is presented in the landing charts of Figure 5-278.The landing climb gradient may not be less than 3.2%.

Conditions for landing climb:

1. Landing gear extended
2. Flaps - 39°
3. Both engine at thrust available eight (8) seconds after movement of the thrust levers from high idle to go-around position
4. ECS bleed - on (ECS off not applicable for all engine landing climb)

NOTE

During and following prolonged flight in icing conditions, when ice accretions are suspected on unprotected surfaces, decrease landing climb gradient by 0.7%.

FINAL APPROACH AND LANDING PERFORMANCE

This section includes information for landing in normal and abnormal landing conditions.

NORMAL LANDING CONDITIONS

Normal landings are performed with flaps 39° setting and must be made within the limitations of the allowable landing weight as defined below.

EYE-TO-WHEEL HEIGHT

Maximum Eye-to-Wheel Height with unloaded main landing gear in the landing altitude relative to the ground (6° Nose Up) is 12.6 feet (3.83 meters).

Maximum allowable landing weight

The maximum allowable landing weight is limited by the most restrictive of the following:

1. The maximum approved landing weight (design structural limit for landing) of 32700 lb.

NOTE

Landing above the established maximum structural landing weight is permitted for immediate return landing conditions only.

(Continued)

2. The maximum landing weight limited by climb requirements for varying conditions of airport pressure altitude and temperature, see Figures 5-273, 5-274 and 5-275.

3. The maximum landing weight as permitted by the landing braking energy limitation, see Figure 5-276

NOTE

1. Normal landings are restricted by the braking energy not exceeding the blow-out plug energy limit of 29.7 MFP plus braking energy required for quick turn-around procedures as defined by regulations.

2. During immediate return landings, braking energy may exceed the blow-out plug energy and is no longer a limiting factor for maximum allowable landing weight. However, after the stop, wheel fuse plugs may release and brake and tire damage will occur.

4. The maximum landing weight as restricted by the tire speed limitation, see Figure 5-277.

APPROACH AND LANDING SPEEDS

The threshold speed (V_{REF}) for landing distance is based on 1.23 V_{SR} in the landing configuration (flaps 39°). Final approach speeds V_{APP} are computed as the landing threshold speed plus appropriate speed margins. The final approach speed margin must not be greater than that which can be bled off before the point of crossing the runway threshold. A final approach speed margin of 5 KCAS is recommended but not mandatory.

The approach and landing speeds are presented in a tabulated form in Figure 5-278 together with the corresponding landing distance. These speeds are effective throughout the certified weight, temperature and altitude range of the aircraft.

NOTE

When winds are greater than 10 knots or wind gusts are reported, add half the steady headwind component plus full gust value up to a maximum of 20 kt to V_{REF}.
Landing distance calculations are based on crossing the threshold at V_{REF}. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10-knot overspeed.

CAUTION

TIRE SPEED LIMITATIONS WILL BE EXCEEDED IF TOUCHDOWN IS MADE IN EXCESS OF 195 KT GROUND SPEED OR IF NOSE WHEEL IS LOWERED IN EXCESS OF 182 KT GROUND SPEED.

(Continued)

ACTUAL LANDING DISTANCE

Landing distance represents the horizontal distance required to land and to come to a complete stop from a point at a height of 50 ft above the runway surface.

Figure 5-278 presents the actual landing distances (ALD) for normal flaps setting (39°) as a function of landing gross weight and airport pressure altitude. Corrections for wind components are provided in Figure 5-279.

Landing distance is based on the following conditions:

1. Smooth, level, dry and hard-surfaced runway surface.
2. A 3° glide path at 50 ft and on a steady sink rate of 6 fps at touchdown.

NOTE

1. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10-knot overspeed.
2. The actual landing distance presented is based on ISA temperature and zero runway slope conditions. Corrections are provided for reported wind conditions and possible speed increase to the threshold speed V_{REF}.

Applicable regulations do not require actual landing distance to be corrected for temperature and runway slope effects. If required, the operator may use the following ALD temperature and runway slope corrections:

ALD Temperature Corrections:

Increase dry ALD by 3% for every 10°C above ISA.
Decrease dry ALD by 2% for every 10°C below ISA.

ALD Runway Slope Corrections:

Increase dry ALD by 16% for every 1% DOWNHILL runway slope.
Decrease dry ALD by 5% for every 1% UPHILL runway slope.

Landing Procedure:

1. Establish V_{REF} by 50 ft above the runway surface with thrust necessary to maintain 3° flight path.
2. At 50 ft reduce thrust of both engines to idle.
3. Perform moderate flare at approximately 20 ft above the runway surface to reduce the sink rate to approximately 6 fps.
4. Immediately after touchdown, the nose is lowered and full brakes applied. Auto ground spoilers are extended at main gear touchdown by wheel speed spin-up.
5. Deploy thrust reversers as required. Note that reverse thrust credit is not shown in the landing distance charts, but the use of thrust reverse will result in a shorter distance and will improve brakes wear.

(Continued)

Example: determine the maximum allowable landing weight for the defined conditions and determine landing distance for this weight.

Given:
Airport Pressure Altitude: 7000 ft
Airport Ambient Temperature: 31°C
Runway Slope: -1% (downhill)
Tailwind: 10 kt
Solution:
Maximum allowable landing weight:

1. BKE limited landing weight: 32,000 lb
2. Tire speed limited landing weight: 39400 lb
3. Maximum structural landing weight (MLW): 32,700 lb

The resulting maximum allowable landing weight is 32,000 lb
Landing Distance:

1. From Figure 5-278 determine the actual uncorrected landing distance to be 3560 ft
2. From Figure 5-279 determine the landing distance corrected for the reported wind to be 3800 ft.
3. For 10°C (ISA+20°C) the temperature correction is 3*(20/10) = +6.0%
4. For 1% downhill slope the correction is 16%
5. The resulting actual landing distance is 3800 * 1.060 * 1.16 = 4670 ft
6. Determine the factored landing distance for intended or alternate destination:

Dry runway: 4670 /0.6 = 7780 ft
Wet runway: 1.15 * 7780 = 8950 ft

LANDING DISTANCE USING AUTOBRAKES

The autobrakes system provides selection of three levels of deceleration: LOW, MED and HIGH. Use of the autobrakes system is optional. The pilot selects an autobrake setting which ensures that the aircraft will stop safely within the available runway length. The use of reverse thrust allows the autobrakes system to reduce the brake pressure to the minimum level associated with the selected deceleration level, thus, minimizing brake and tire wear and keeping the brake temperature to a minimum level. Normal pilot braking can be resumed at any time during the landing roll, by brake pedal application.

The following data presents the actual distance from touchdown to full stop, with the autobrake system in use during normal landing and is provided as guidance information. This performance information is based on a threshold speed of V_{REF}.

Tables presented in Figure 5-280 (HIGH), Figure 5-282 (MED) and Figure 5-284 (LOW) provide for each of the autobrake setting the following information as a function of the landing gross weight and airport pressure altitude at ISA, zero-wind conditions:

- Recommended approach speed - V_{APP}
- Threshold speed - V_{REF}
- Air distance from a point at a height of 50 ft above the runway surface to touchdown
- Actual landing ground roll landing distance from touchdown to full stop as a function of the landing gross weight and airport pressure altitude, for ISA, zero-wind conditions.
- Actual landing distance (a sum of the air and ground roll distances)
- For determination of wind correction of the actual landing distance for each of the autobrake settings use Figure 5-281 (HIGH), Figure 5-283 (MED) and Figure 5-285 (LOW).

(Continued)

NOTE

1. HIGH autobrakes setting does not correspond to maximum braking.
2. Any of the autobrake settings can be used on wet runways, however, the LOW setting distance information in Figure 5-284 must be used when determining the landing distance using autobrakes.

Example: determine the ground roll distance and actual landing distance with autobrakes for the defined conditions.

Given:
Landing weight: 32,000 lb
Airport pressure altitude: 7000 ft
Airport ambient temperature: ISA
Tailwind: 10 kt
Autobrakes = MED

Solution:
1. From Figure 5-282 determine the ground roll distance to be 4010 ft and the actual uncorrected landing distance to be 5180 ft
2. From Figure 5-283 determine the landing distance corrected for the reported wind to be 5,900 ft

ABNORMAL LANDING CONDITIONS

Landing with flaps settings other than normal landing setting of 39° is allowed only when the normal landing flaps setting is unavailable.

Maximum Allowable Landing Weight

The maximum allowable landing weight is limited by the most restrictive of the following:

1. The maximum approved landing weight (design structural limit for landing) of 32,700 lb.

NOTE

Landing weight above the established maximum structural landing weight is permitted for immediate return landing conditions only.

2. The maximum landing weight as permitted by the maximum brake energy limit, as a function of the airport pressure altitude and reported ambient temperature with correction for the reported wind and runway slope.
   Figure 5-288 for flaps 20°, Figure 5-292 for flaps 10°, Figure 5-296 for flaps 0°

NOTE

During landing in abnormal configurations, brake energy may exceed the wheel fuse plugs blow-out limit. After the stop, wheel fuse plugs may release and brakes and tires damage will occur.

3. The maximum landing weight as restricted by the tire speed limit as a function of the airport pressure altitude and reported ambient temperature with correction for the reported wind. Figure 5-287 for flaps 20°, Figure 5-291 for flaps 10°, Figure 5-295 for flaps 0°

NOTE

Maximum allowable landing weight in abnormal configurations is never restricted by climb gradient requirements.

Landing Speeds and Distances

Recommended final approach speed V_{APP}, threshold speed V_{REF} and corresponding actual landing distance as a function of the landing gross weight and airport pressure altitude at ISA, zero-wind conditions are presented in a tabulated form in Figure 5-289 for flaps 20°, Figure 5-293 for flaps 10°, Figure 5-297 for flaps 0°.

Correction for the reported wind:

Figure 5-290 for flaps 20°, Figure 5-294 for flaps 10°, Figure 5-298 for flaps 0°.

NOTE

1. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10-knot overspeed.
2. The actual landing distance is based on ISA temperature and zero runway slope conditions. Corrections are provided for reported wind conditions and possible speed increase to the threshold speed, V_{REF}. Applicable regulations do not require actual landing distance to be corrected for temperature and runway slope effects. If required, the operator may use the following ALD temperature and runway slope corrections: ALD temperature corrections:
   Increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA. ALD runway slope corrections:
   Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.

OPERATING RULES FOR COMMERCIAL OPERATORS

The following operating rule applies to all commercial operators, required to observe the regulations of CFR 14, Part 121 or Part 135:

1. Intended destination and alternate airports, dry runways: no airplane shall takeoff at weight in excess of that which, in accordance with landing distances shown in this AFM for the airport elevation and wind conditions anticipated there at the time of landing, would allow full stop landing within 60% of the effective length of the runway from a point 50 ft directly above the intersection of obstruction clearance plane and the runway.
2. Intended destination and alternate airports, wet runways: no airplane shall takeoff when appropriate weather reports and forecasts, or a combination thereof, indicate that runways may be wet or slippery at the estimated time of arrival unless effective wet runway length is at least 115% of the dry runway length. Note that wet runway distances are valid only for 0.125 in (3 mm) or less of standing water.

When operating under other than Part 121 or Part 135 rules, other operational factors may be required. If desired, Figure 5-286 provides a chart to convert the actual landing distance to a factored landing distance as a function of the applicable operational factor.

PERFORMANCE CHARTS

STATIC TAKEOFF THRUST - N_1 SETTING
APR - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF; ECS - OFF

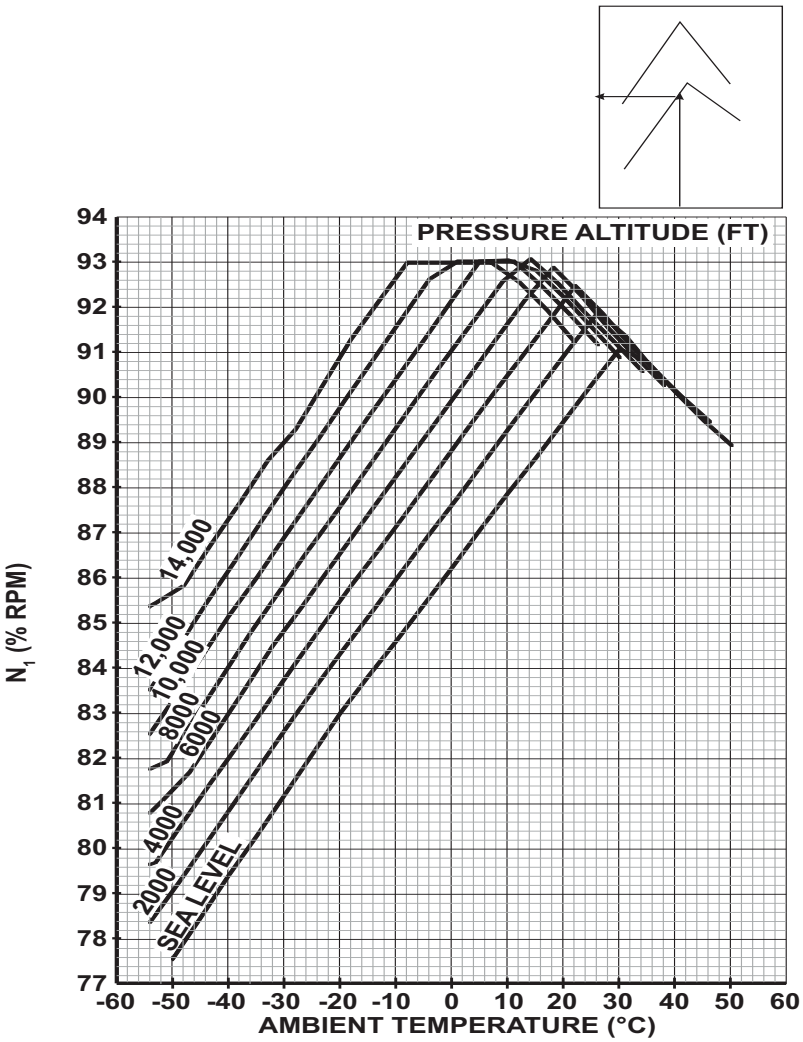


Figure 5-4. Static Takeoff Thrust - N_1 Setting; APR - Off; Engine Anti-ice - Off; Wing Anti-ice - Off; ECS - Off

STATIC TAKEOFF THRUST - N_1 SETTING
APR - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF; ECS - ON

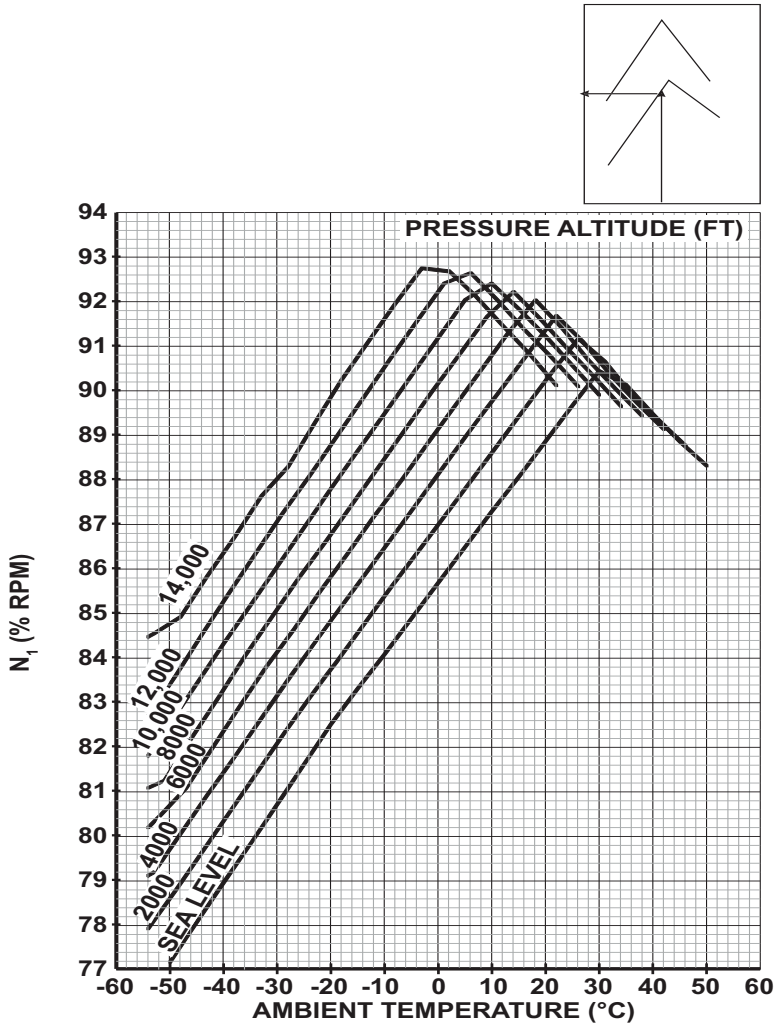


Figure 5-5. Static Takeoff Thrust - N_1 Setting; APR - Off; Engine Anti-ice - Off; Wing Anti-ice - Off; ECS - On

STATIC TAKEOFF THRUST - N_1 SETTING
APR - OFF; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - OFF; ECS - ON

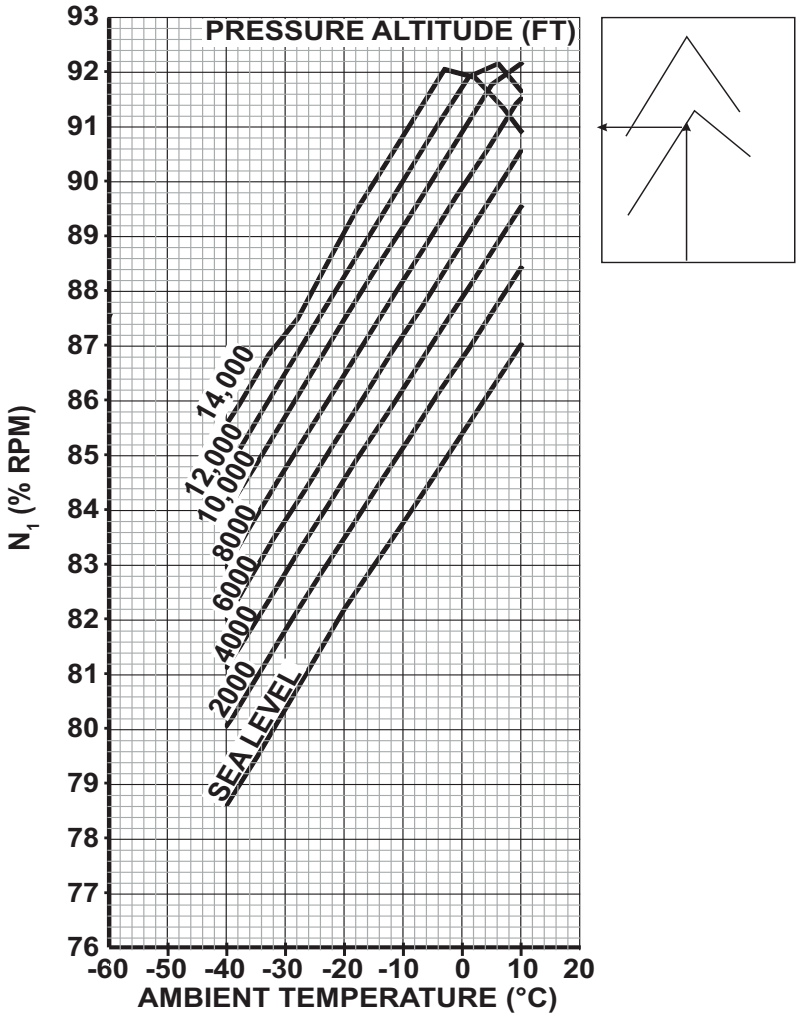


Figure 5-6. Static Takeoff Thrust - N_1 Setting; APR - Off; Engine Anti-ice - On; Wing Anti-ice - Off; ECS - On

STATIC TAKEOFF THRUST - N_1 SETTING
APR - OFF; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON; ECS - ON

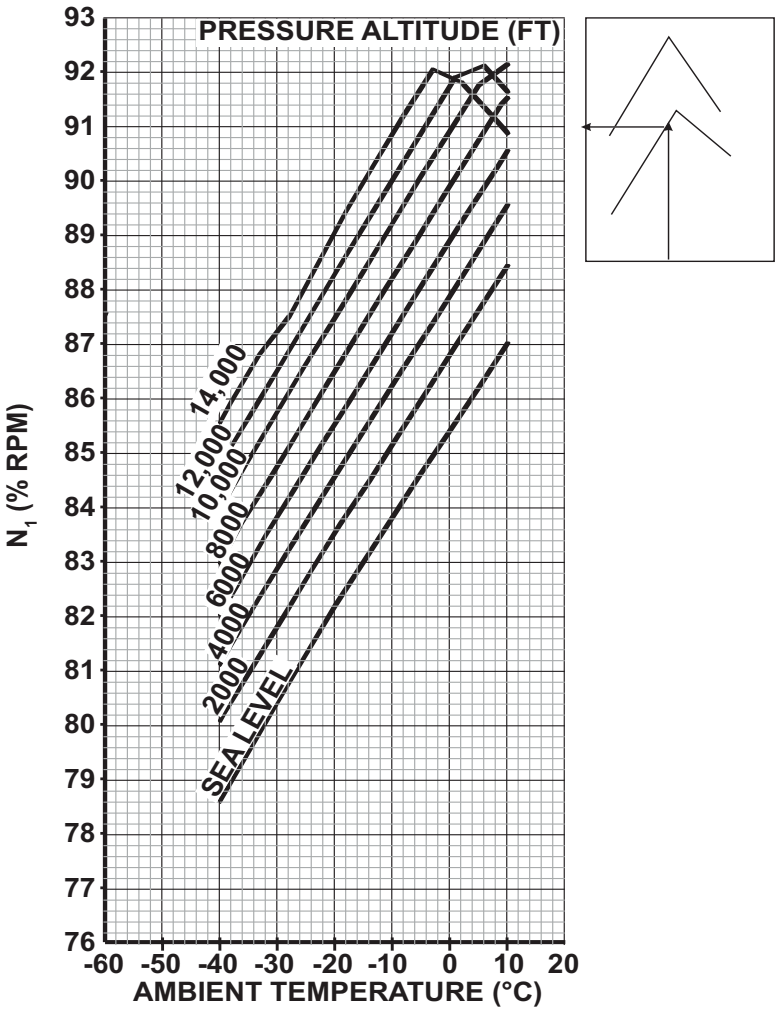


Figure 5-7. Static Takeoff Thrust - N_1 Setting; APR - Off; Engine Anti-ice - On; Wing Anti-ice - On; ECS - On

MAXIMUM CLIMB THRUST N_1 SETTING
FINAL SEGMENT - ONE ENGINE INOPERATIVE
AIRSPEED - 180 KCAS; APR - OFF;
ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; ECS - OFF

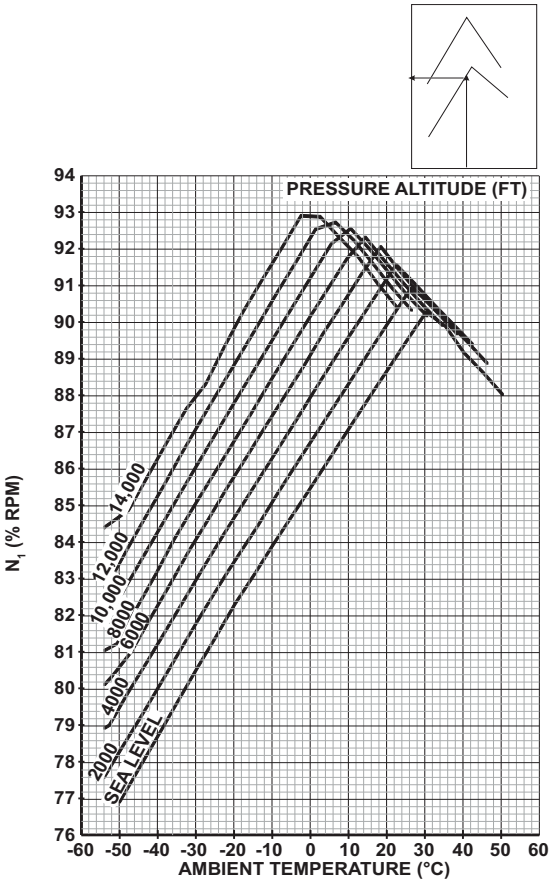


Figure 5-8. Maximum Climb Thrust - N_1 Setting; Final Segment; Engine Anti-ice - Off; Wing Anti-ice - Off; ECS - Off

MAXIMUM CLIMB THRUST N_1 SETTING
FINAL SEGMENT - ONE ENGINE INOPERATIVE
AIRSPEED - 180 KCAS; APR - OFF;
ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; ECS - ON

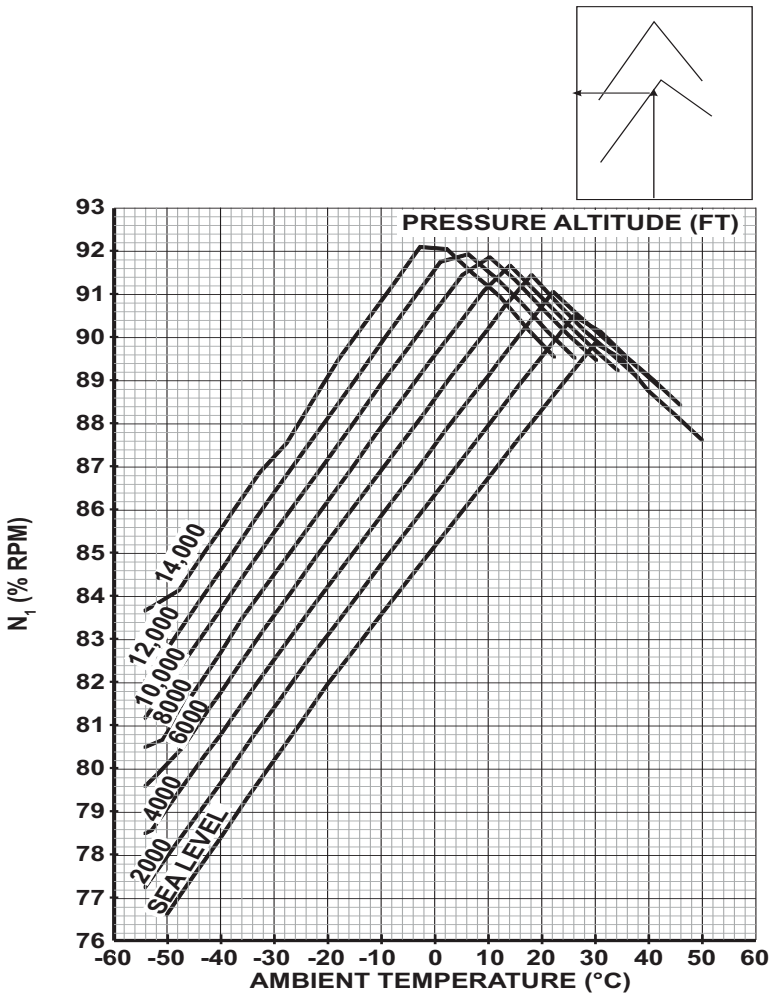


Figure 5-9. Maximum Climb Thrust - N_1 Setting; Final Segment; Engine Anti-ice - Off; Wing Anti-ice - Off; ECS - On

MAXIMUM CLIMB THRUST N_1 SETTING
FINAL SEGMENT - ONE ENGINE INOPERATIVE
AIRSPEED - 180 KCAS; APR - OFF;
ENGINE ANTI-ICE - ON; WING ANTI-ICE - OFF; ECS - ON

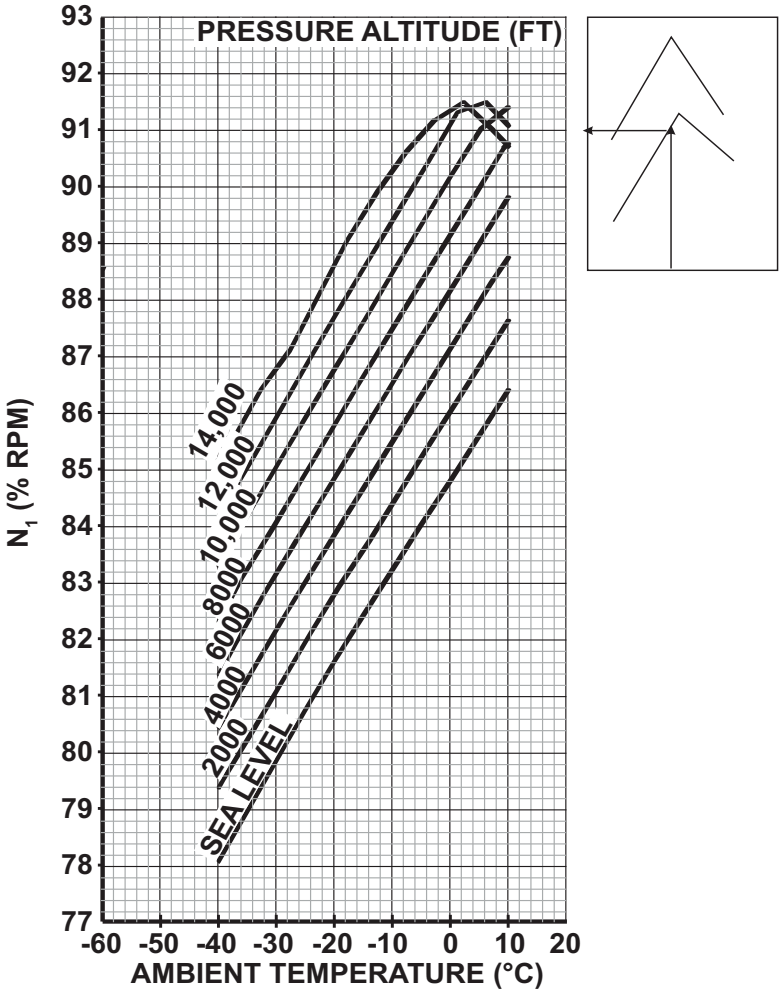


Figure 5-10. Maximum Climb Thrust - N_1 Setting; Final Segment; Engine Anti-ice - On; Wing Anti-ice - Off; ECS - On

MAXIMUM CLIMB THRUST N_1 SETTING
FINAL SEGMENT - ONE ENGINE INOPERATIVE
AIRSPEED - 180 KCAS; APR - OFF;
ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON; ECS - ON

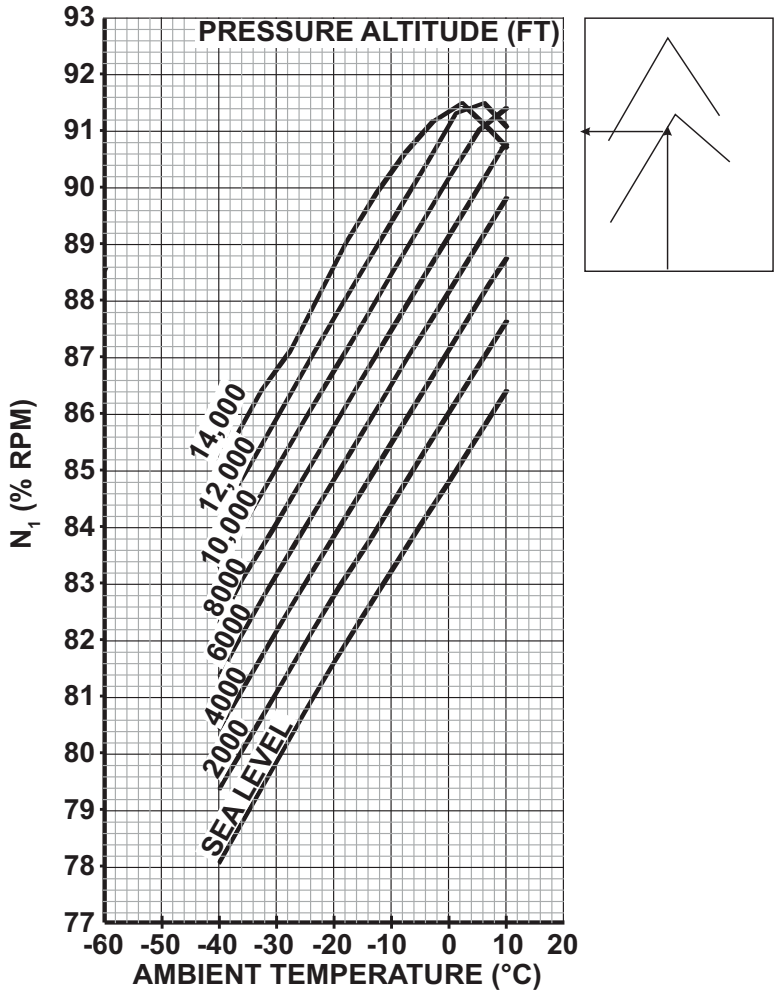


Figure 5-11. Maximum Climb Thrust - N_1 Setting; Final Segment; Engine Anti-ice - On; Wing Anti-ice - On; ECS - On

ENROUTE CLIMB THRUST N_1 SETTING
ONE ENGINE INOPERATIVE
AIRSPEED - 180 KCAS; APR - OFF;
ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; ECS - OFF

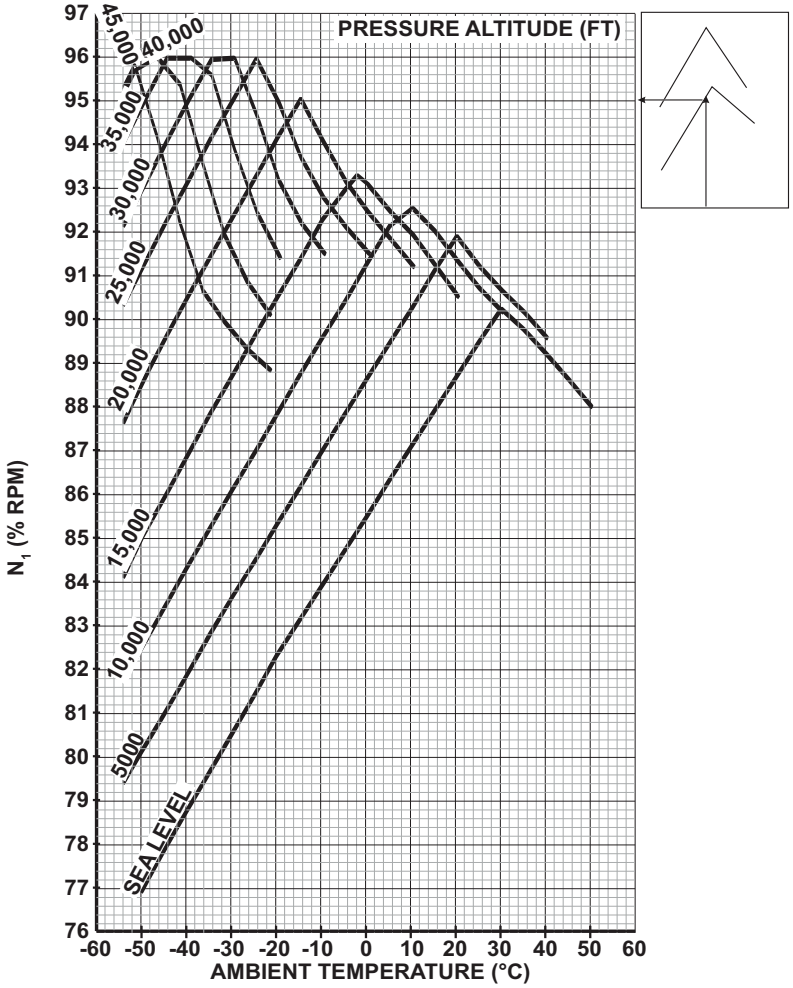


Figure 5-12. Enroute Climb Thrust - N_1 Setting; Engine Anti-ice - Off; Wing Anti-ice - Off; ECS - Off

ENROUTE CLIMB THRUST N_1 SETTING
ONE ENGINE INOPERATIVE
AIRSPEED - 180 KCAS; APR - OFF;
ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; ECS - ON

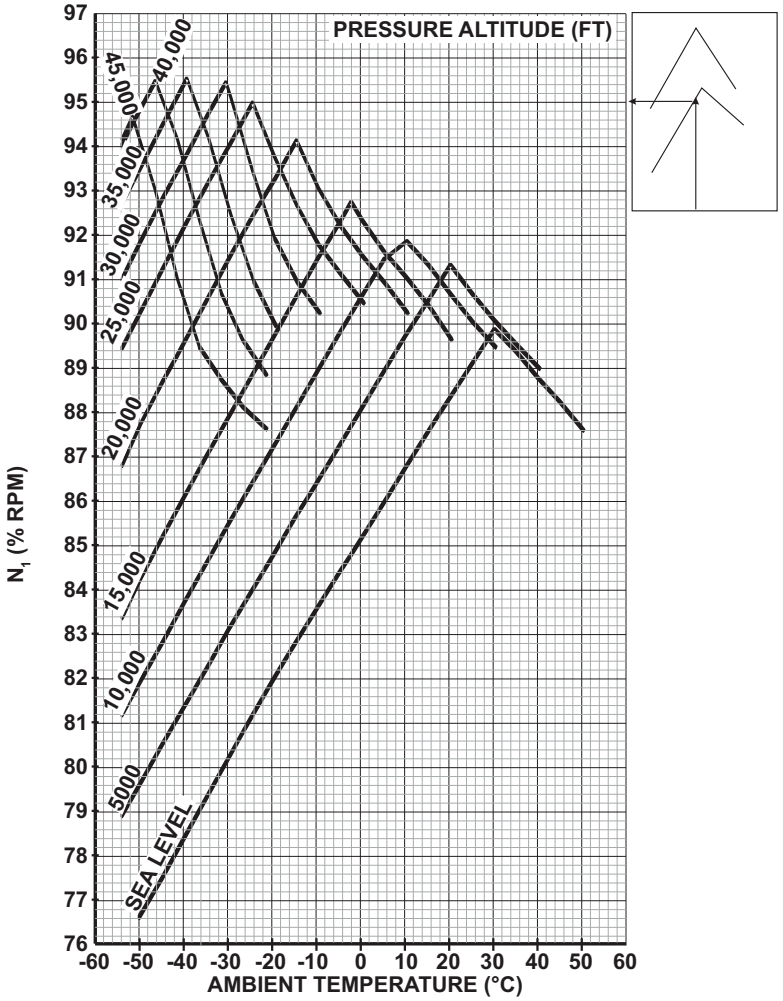


Figure 5-13. Enroute Climb Thrust - N_1 Setting; Engine Anti-ice - Off; Wing Anti-ice - Off; ECS - On

ENROUTE CLIMB THRUST N_1 SETTING
ONE ENGINE INOPERATIVE
AIRSPEED - 180 KCAS; APR - OFF;
ENGINE ANTI-ICE - ON; WING ANTI-ICE - OFF; ECS - ON

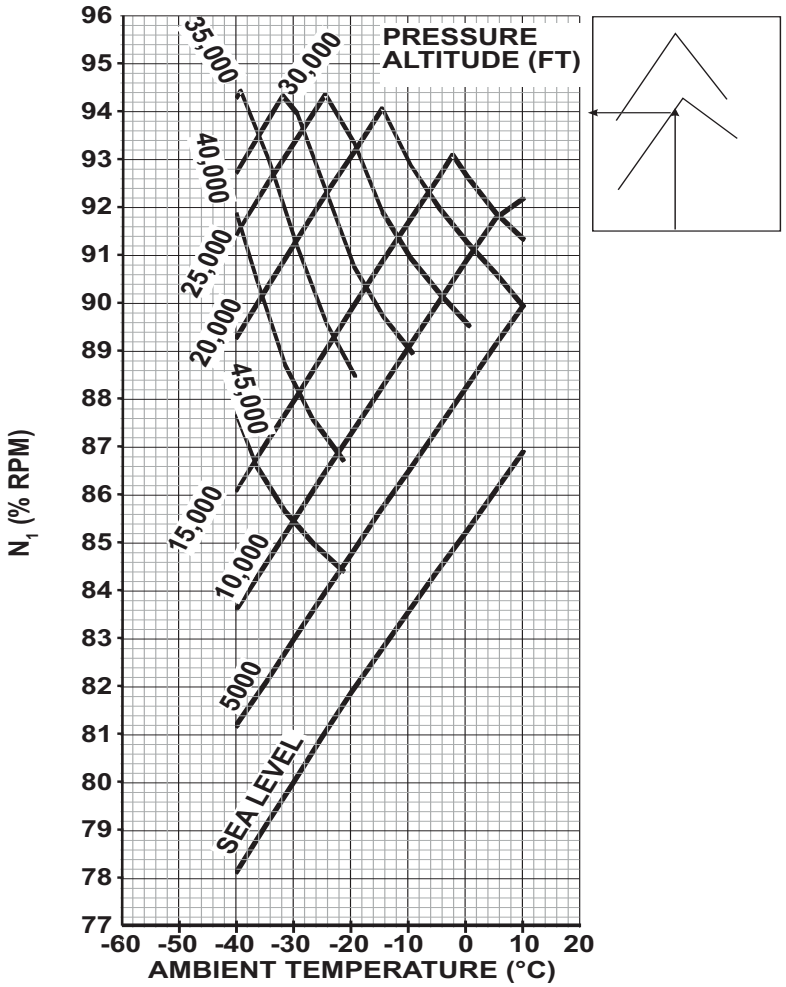


Figure 5-14. Enroute Climb Thrust - N_1 Setting; Engine Anti-ice - On; Wing Anti-ice - Off; ECS - On

ENROUTE CLIMB THRUST N_1 SETTING
ONE ENGINE INOPERATIVE
AIRSPEED - 180 KCAS; APR - OFF;
ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON; ECS - ON

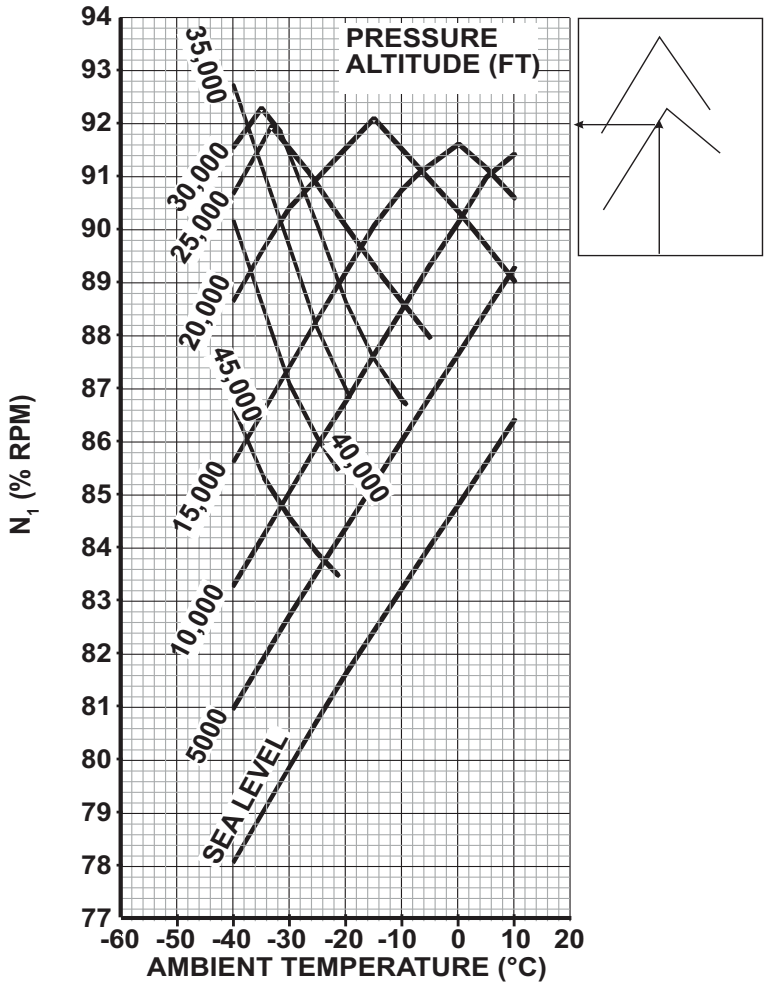


Figure 5-15. Enroute Climb Thrust - N_1 Setting; Engine Anti-ice - On; Wing Anti-ice - On; ECS - On

BALKED LANDING / APPROACH CLIMB THRUST
N_1 SETTING; ONE ENGINE INOPERATIVE
AIRSPEED - 120 KCAS; APR - OFF;
ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; ECS - OFF

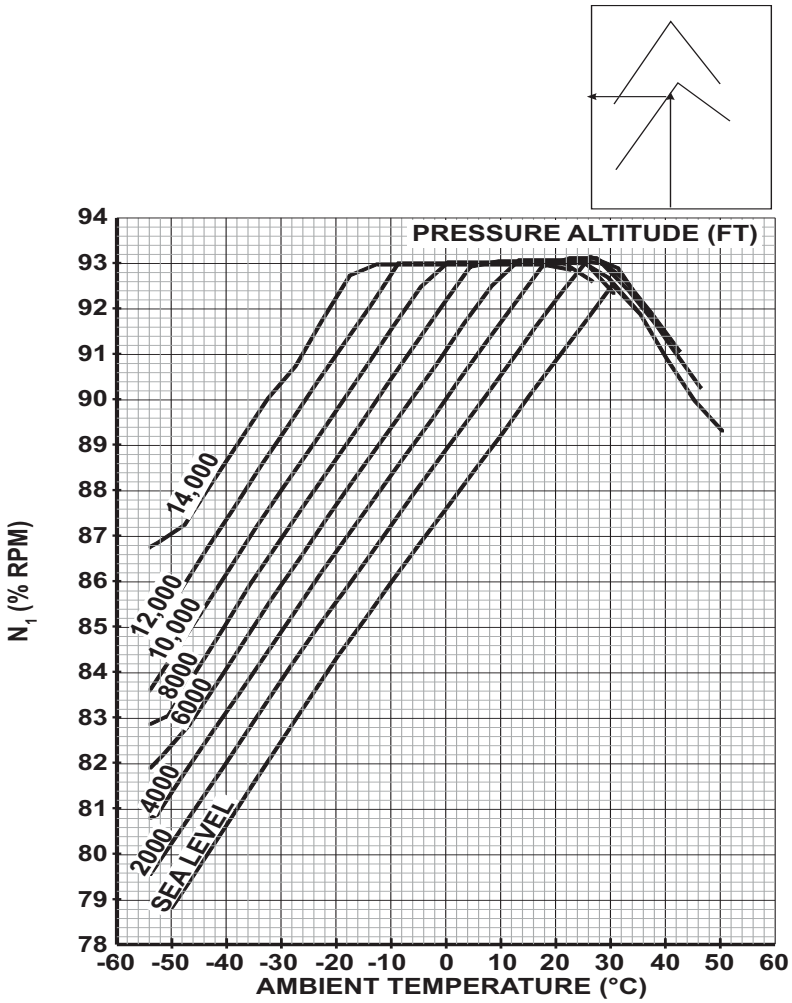


Figure 5-16. Balked Landing / Approach Climb - N_1 Setting; Engine Anti-ice - Off; Wing Anti-ice - Off; ECS - Off

BALKED LANDING / APPROACH CLIMB THRUST
N_1 SETTING; ONE ENGINE INOPERATIVE
AIRSPEED - 120 KCAS; APR - ON;
ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; ECS - ON

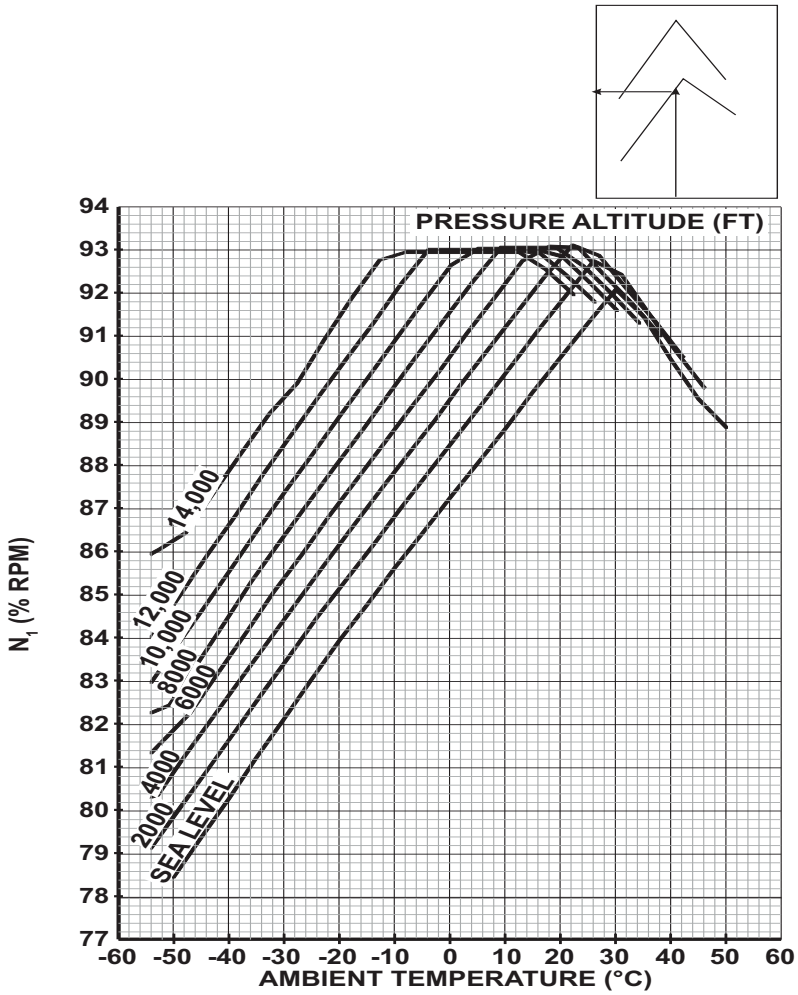


Figure 5-17. Balked Landing / Approach Climb - N_1 Setting; Engine Anti-ice - Off; Wing Anti-ice - Off; ECS - On

BALKED LANDING / APPROACH CLIMB THRUST
N_1 SETTING; ONE ENGINE INOPERATIVE
AIRSPEED - 120 KCAS; APR - ON;
ENGINE ANTI-ICE - ON; WING ANTI-ICE - OFF; ECS - ON

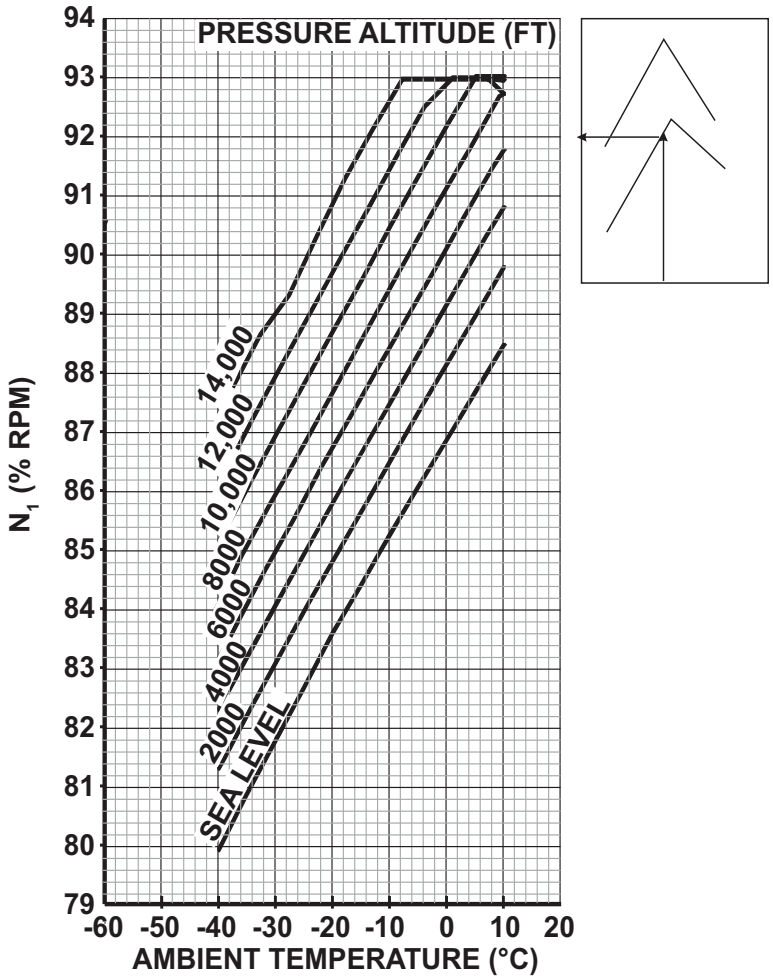


Figure 5-18. Balked Landing / Approach Climb - N_1 Setting; Engine Anti-ice - On; Wing Anti-ice - Off; ECS - On

BALKED LANDING / APPROACH CLIMB THRUST
N_1 SETTING; ONE ENGINE INOPERATIVE
AIRSPEED - 120 KCAS; APR - ON;
ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON; ECS - ON

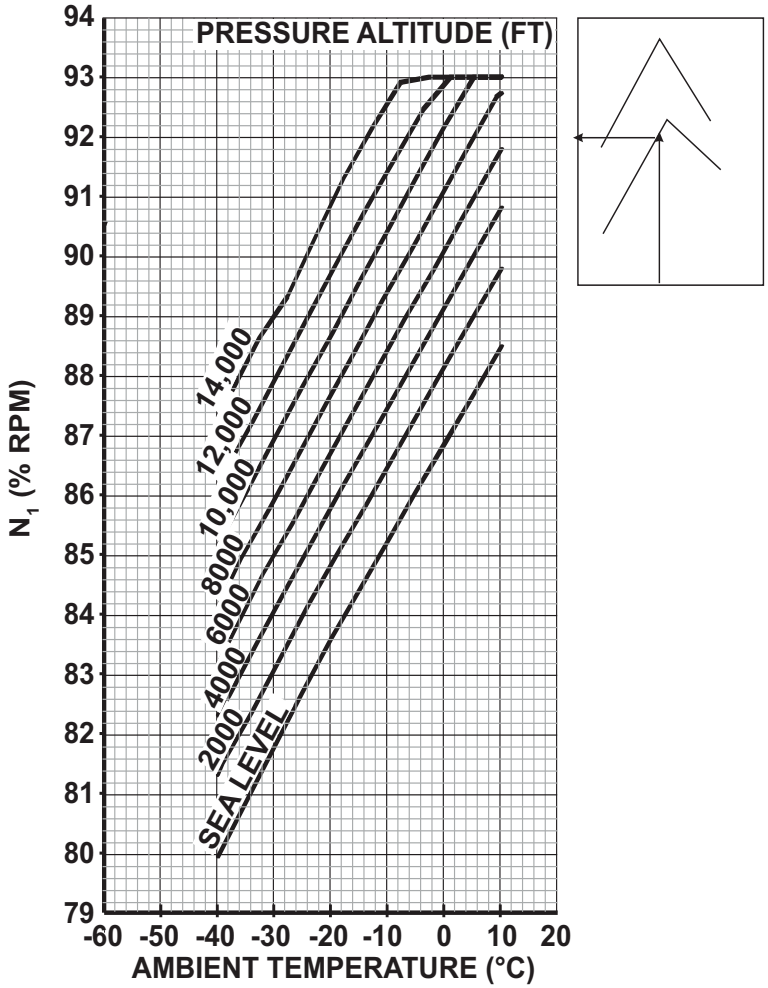


Figure 5-19. Balked Landing / Approach Climb - N_1 Setting; Engine Anti-ice - On; Wing Anti-ice - On; ECS - On

AIRSPEED RESIDUAL ERROR CORRECTION;
CLEAN CONFIGURATION
ABOVE INDICATED ALTITUDE OF 27,350 FT
CAS = IAS + AIRSPEED RESIDUAL ERROR

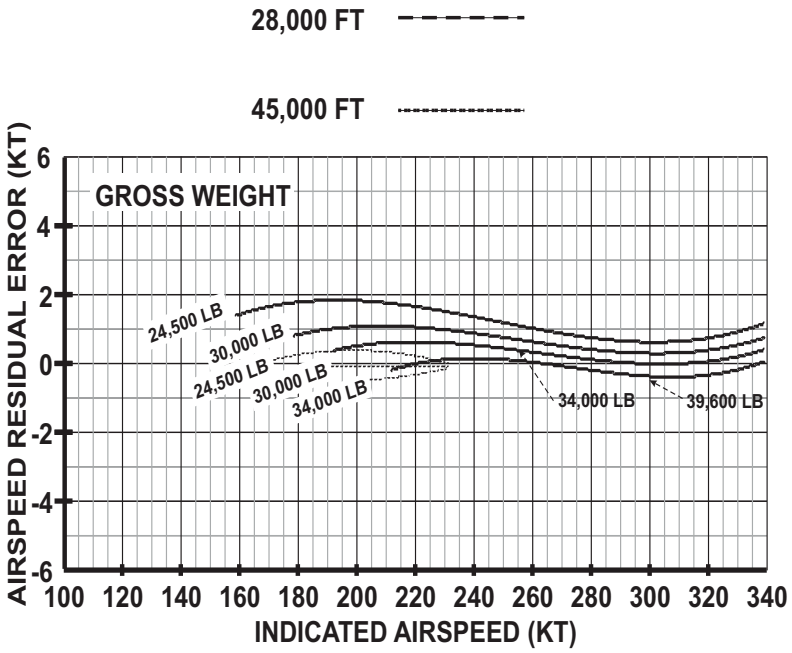


Figure 5-20. Airspeed Residual Error Correction Clean Configuration

ALTIMETER RESIDUAL ERROR CORRECTION;
CLEAN CONFIGURATION

ABOVE INDICATED ALTITUDE OF 27,350 FT
PRESSURE ALTITUDE = INDICATED ALTITUDE + ALTIMETER RESIDUAL ERROR

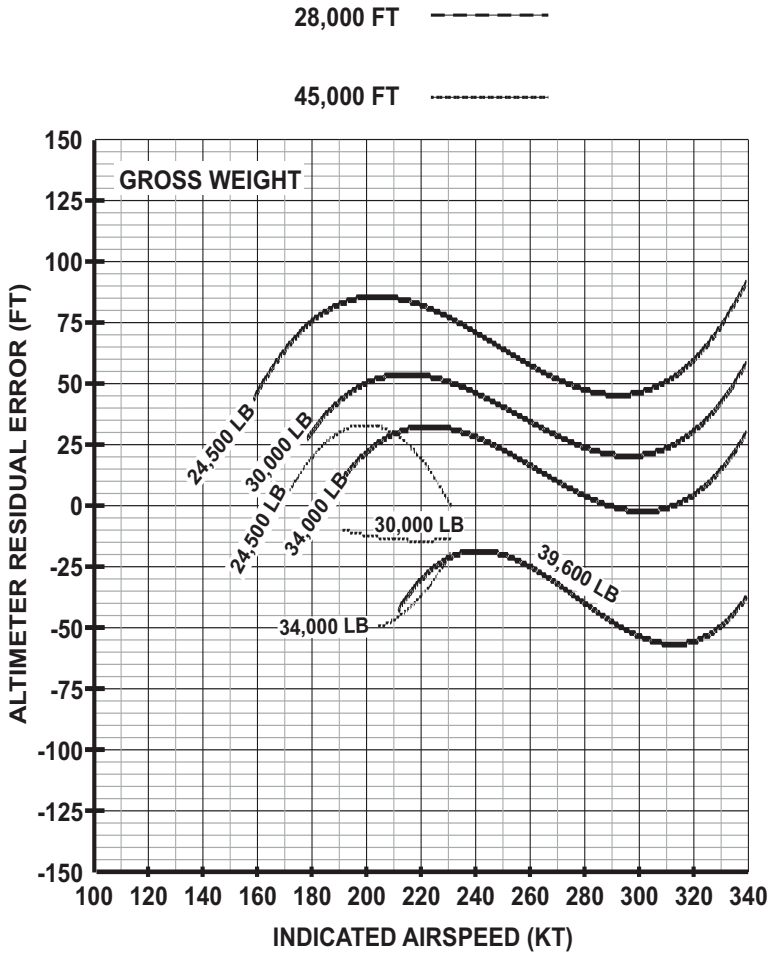


Figure 5-21. Altimeter Residual Error Correction; Clean Configuration

MACHMETER RESIDUAL ERROR CORRECTION;
CLEAN CONFIGURATION
ABOVE INDICATED ALTITUDE OF 27,350 FT
TRUE MACH NO. = INDICATED MACH + MACHMETER RESIDUAL ERROR

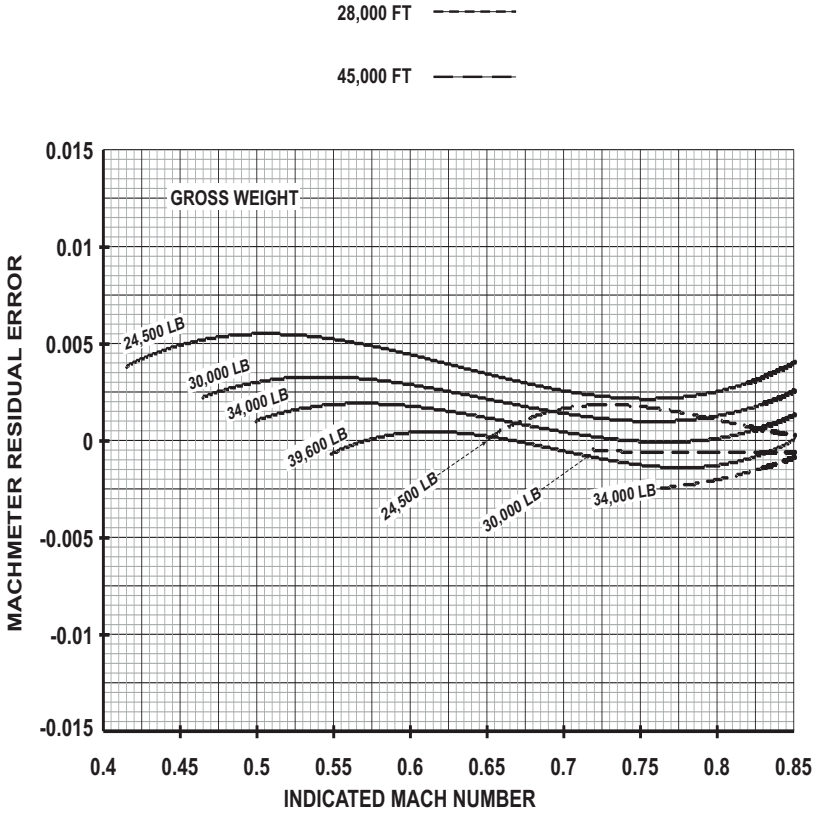


Figure 5-22. Machmeter Residual Error Correction; Clean Configuration

AIRSPEED RESIDUAL ERROR CORRECTION; BOTH AOA FAILED
CLEAN CONFIGURATION
BELOW INDICATED ALTITUDE OF 27,350 FT
CAS = IAS + AIRSPEED RESIDUAL ERROR

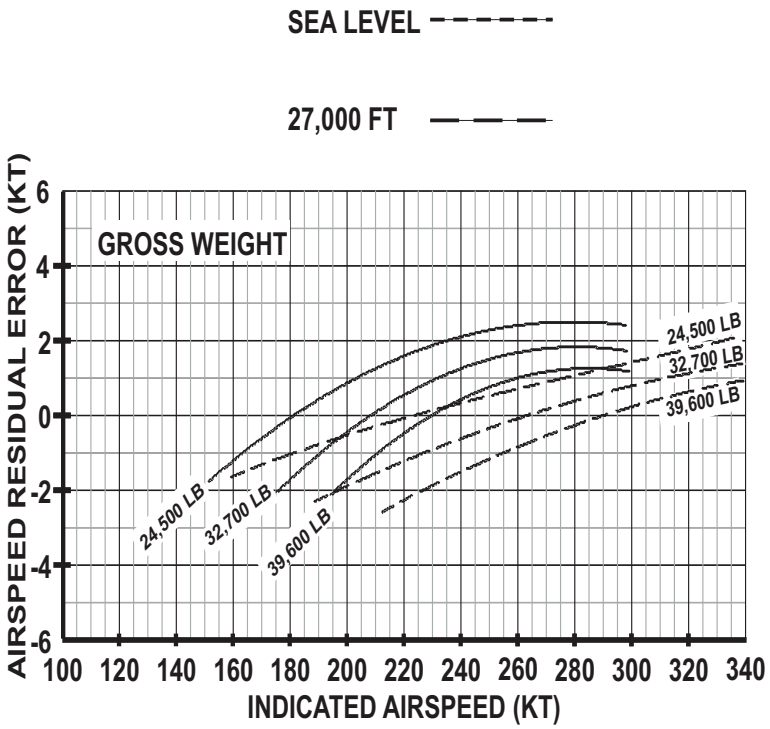


Figure 5-23. Airspeed Residual Error Correction; Both AOA Failed; Clean Configuration

AIRSPEED RESIDUAL ERROR CORRECTION; BOTH AOA FAILED
FLAPS - 10°
BELOW INDICATED ALTITUDE OF 27,350 FT
CAS = IAS + AIRSPEED RESIDUAL ERROR

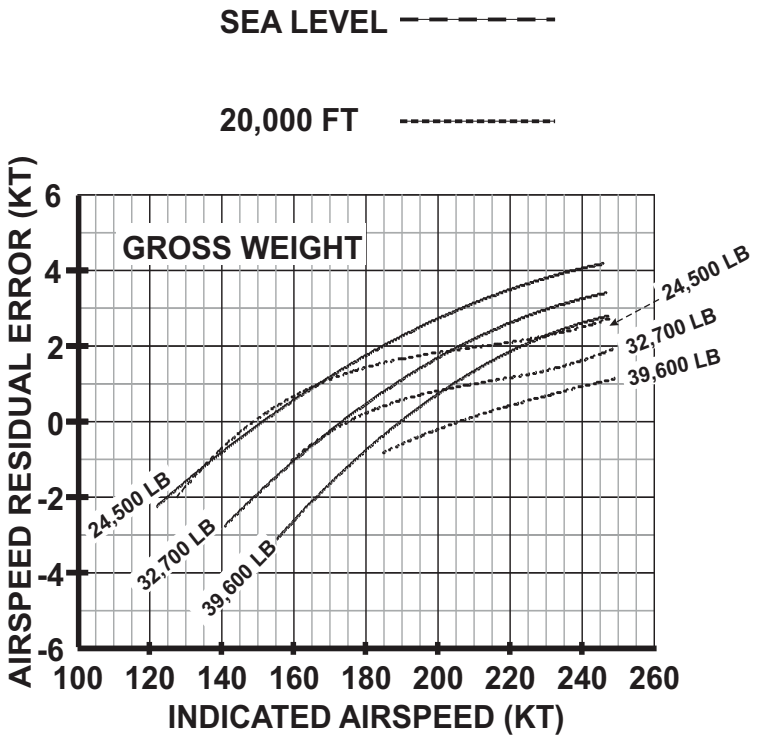


Figure 5-24. Airspeed Residual Error Correction; Both AOA Failed; Flaps - 10°

AIRSPEED RESIDUAL ERROR CORRECTION; BOTH AOA FAILED
FLAPS - 20°
BELOW INDICATED ALTITUDE OF 27,350 FT
CAS = IAS + AIRSPEED RESIDUAL ERROR

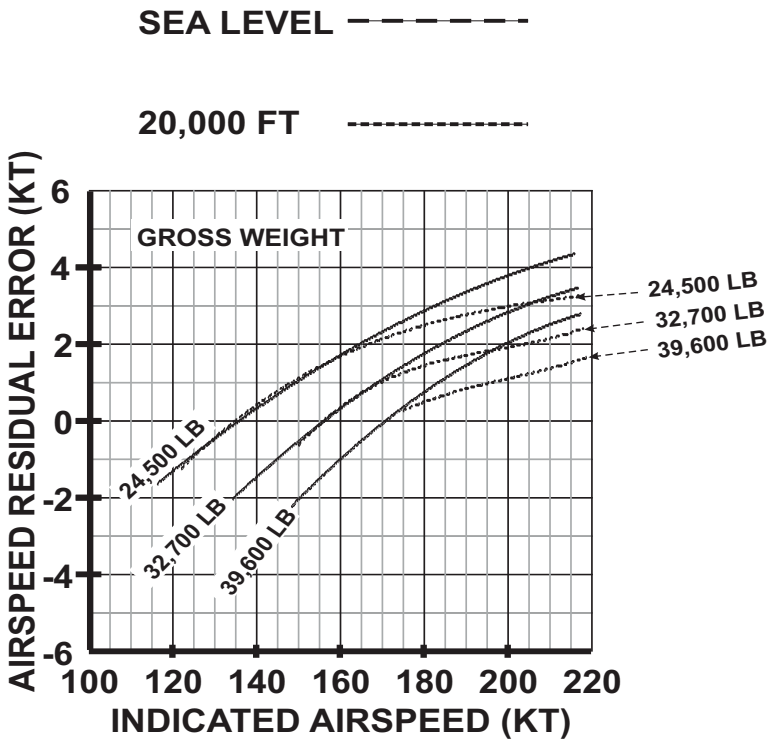


Figure 5-25. Airspeed Residual Error Correction; Both AOA Failed; Flaps - 20°

AIRSPEED RESIDUAL ERROR CORRECTION; BOTH AOA FAILED
FLAPS - 39°
BELOW INDICATED ALTITUDE OF 20,000 FT
CAS = IAS + AIRSPEED RESIDUAL ERROR

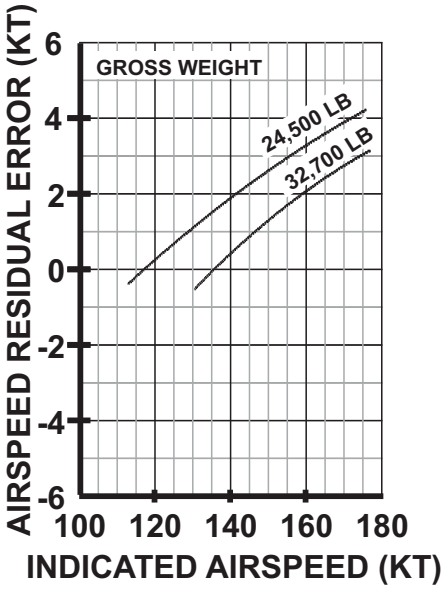


Figure 5-26. Airspeed Residual Error Correction; Both AOA Failed; Flaps - 39°

MACHMETER RESIDUAL ERROR CORRECTION;
BOTH AOA FAILED;
CLEAN CONFIGURATION

BELOW INDICATED ALTITUDE OF 27,350 FT
TRUE MACH NO. = INDICATED MACH + MACHMETER RESIDUAL ERROR

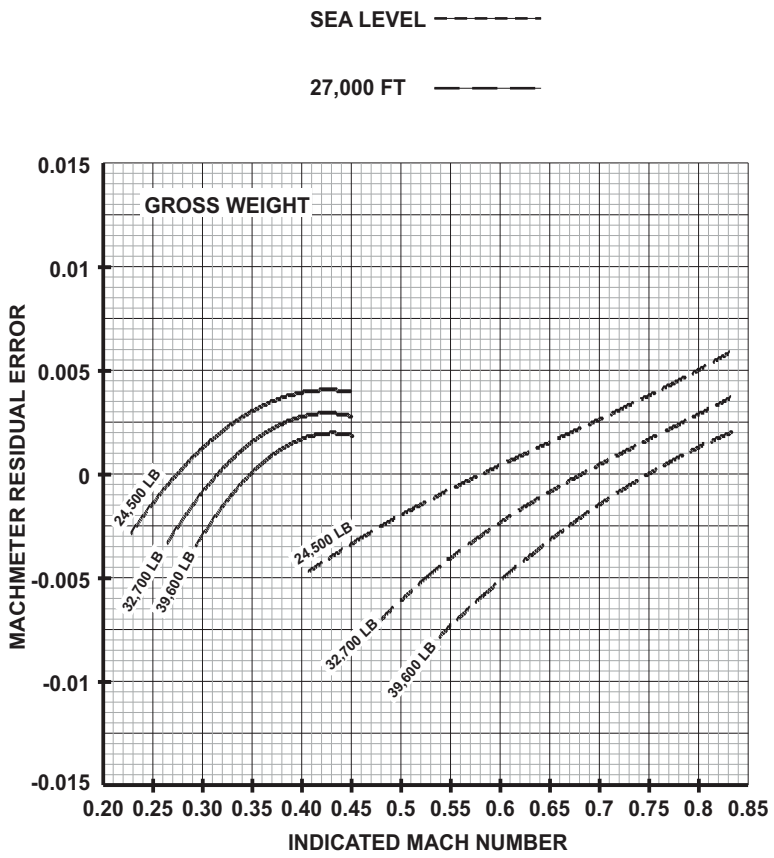


Figure 5-27. Machmeter Residual Error Correction; Both AOA Failed; Clean Configuration

ALTIMETER RESIDUAL ERROR CORRECTION;
BOTH AOA FAILED;
CLEAN CONFIGURATION

BELOW INDICATED ALTITUDE OF 27,350 FT
PRESSURE ALTITUDE = INDICATED ALTITUDE + ALTIMETER RESIDUAL ERROR

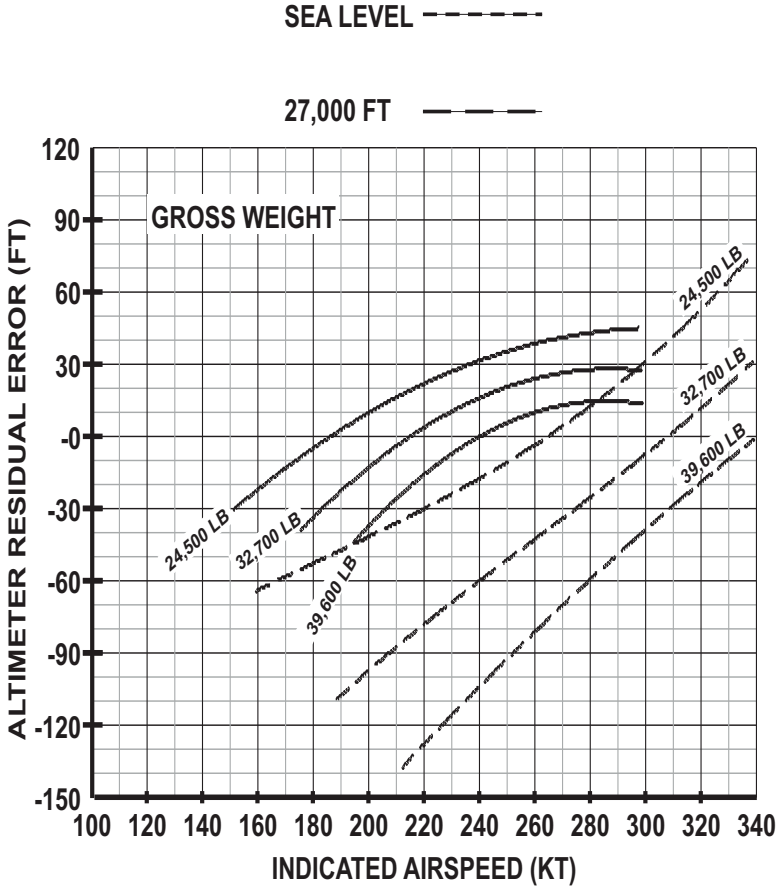


Figure 5-28. Altimeter Residual Error Correction; Both AOA Failed; Clean Configuration

ALTIMETER RESIDUAL ERROR CORRECTION;
BOTH AOA FAILED;
FLAPS - 10°

BELOW INDICATED ALTITUDE OF 27,350 FT
PRESSURE ALTITUDE = INDICATED ALTITUDE + ALTIMETER RESIDUAL ERROR

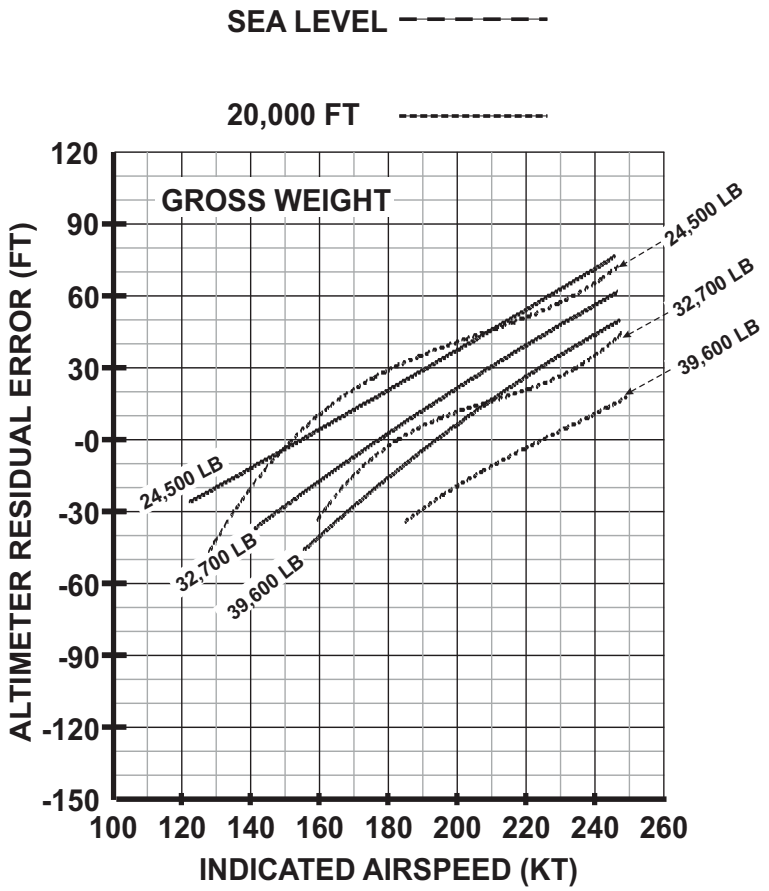


Figure 5-29. Altimeter Residual Error Correction; Both AOA Failed; Flaps - 10°

ALTIMETER RESIDUAL ERROR CORRECTION;
BOTH AOA FAILED;
FLAPS - 20°

BELOW INDICATED ALTITUDE OF 27,350 FT
PRESSURE ALTITUDE = INDICATED ALTITUDE + ALTIMETER RESIDUAL ERROR

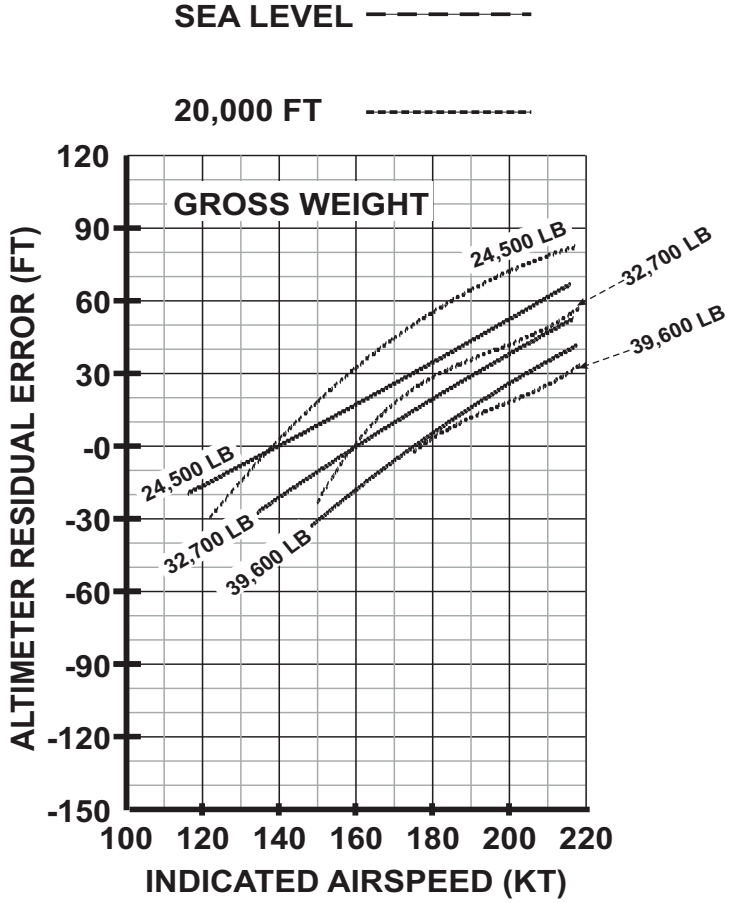


Figure 5-30. Altimeter Residual Error Correction; Both AOA Failed; Flaps - 20°

ALTIMETER RESIDUAL ERROR CORRECTION;
BOTH AOA FAILED;
FLAPS - 39°

BELOW INDICATED ALTITUDE OF 20,000 FT
PRESSURE ALTITUDE = INDICATED ALTITUDE + ALTIMETER RESIDUAL ERROR

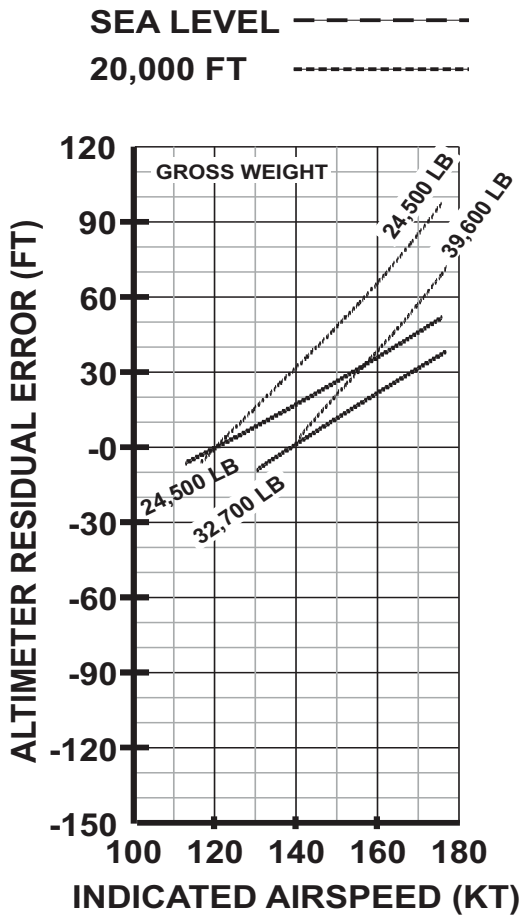


Figure 5-31. Altimeter Residual Error Correction; Both AOA Failed; Flaps - 39°

APPROVED ALTITUDE/TEMPERATURE ENVELOPE

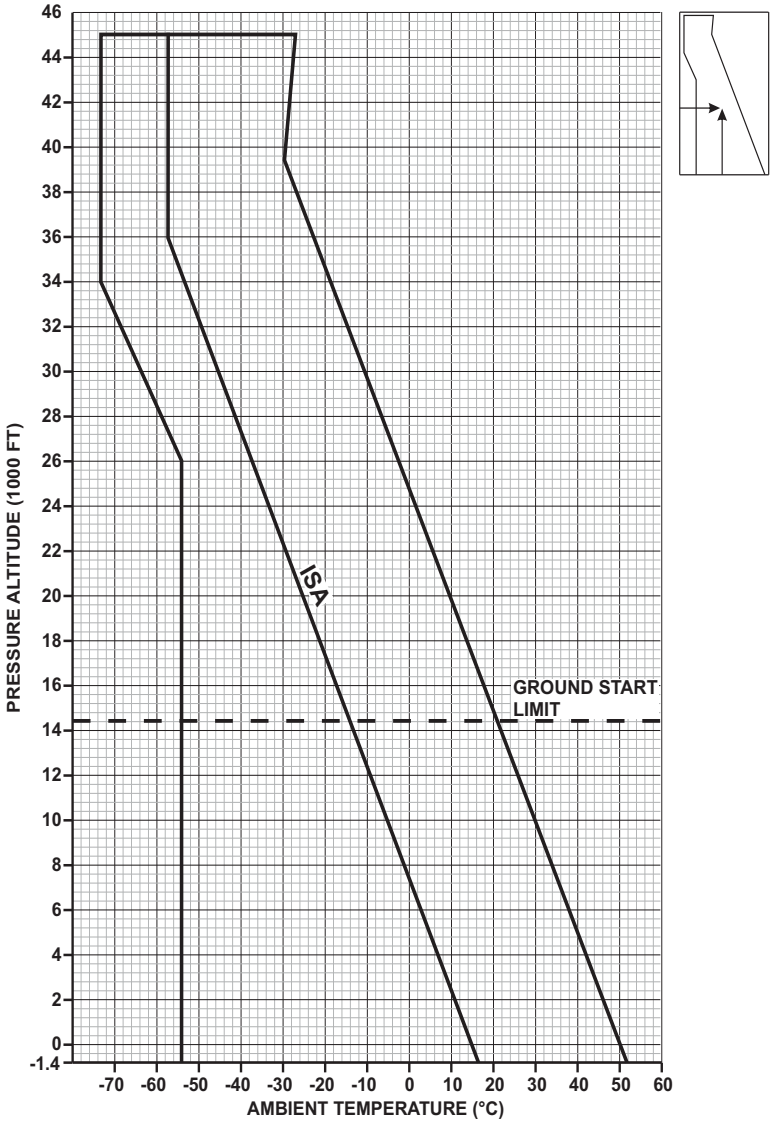


Figure 5-32. Approved Altitude/Temperature Envelope

MINIMUM CONTROL SPEED - GROUND (V_{MCG}) FLAPS 10° AND FLAPS 20°

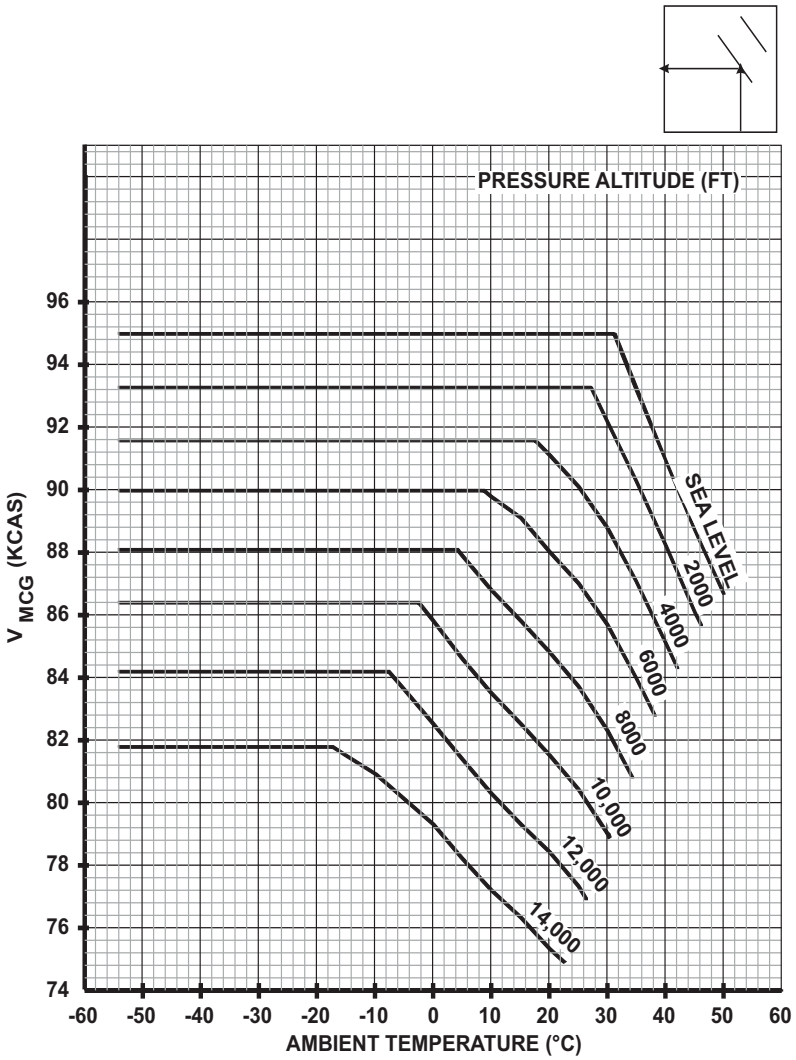


Figure 5-33. Minimum Control Speed - Ground (V_{MCG}) Flaps 10° and Flaps 20°

MINIMUM V_1 SPEED ALLOWED BY V_{MCG}; FLAPS 10° AND FLAPS 20°

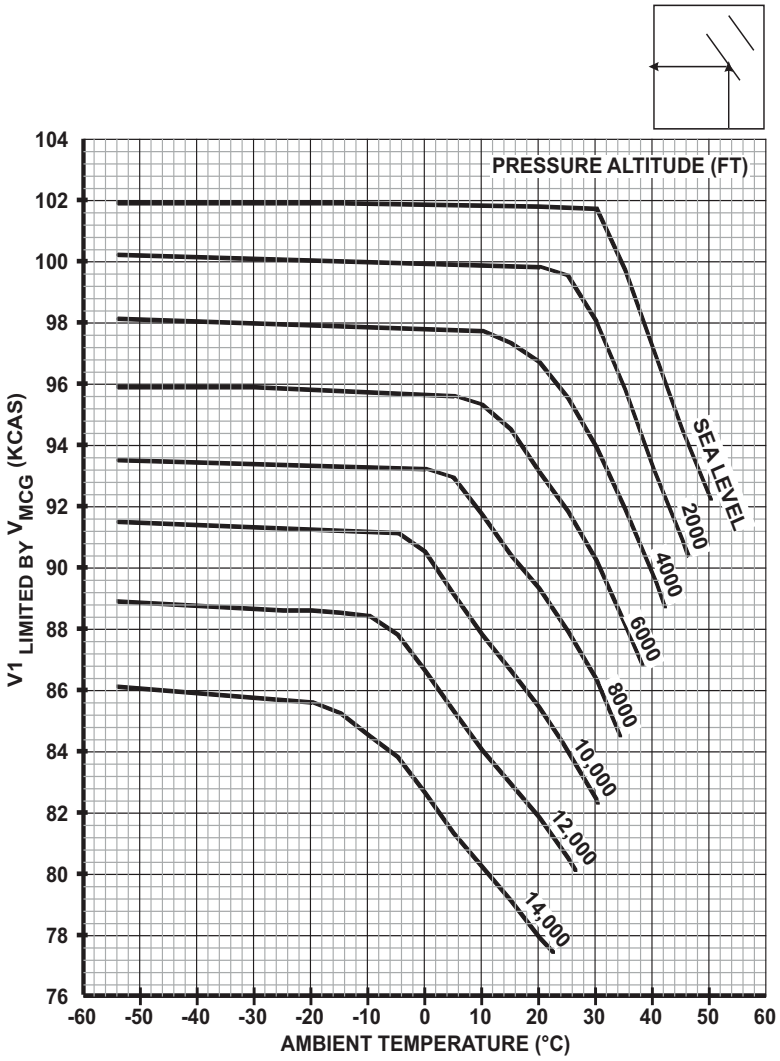


Figure 5-34. Minimum V_1 Speed Allowed by V_{MCG} Flaps 10° and Flaps 20°

MINIMUM CONTROL SPEED - AIR (V_{MCA}) FLAPS 10° AND FLAPS 20°

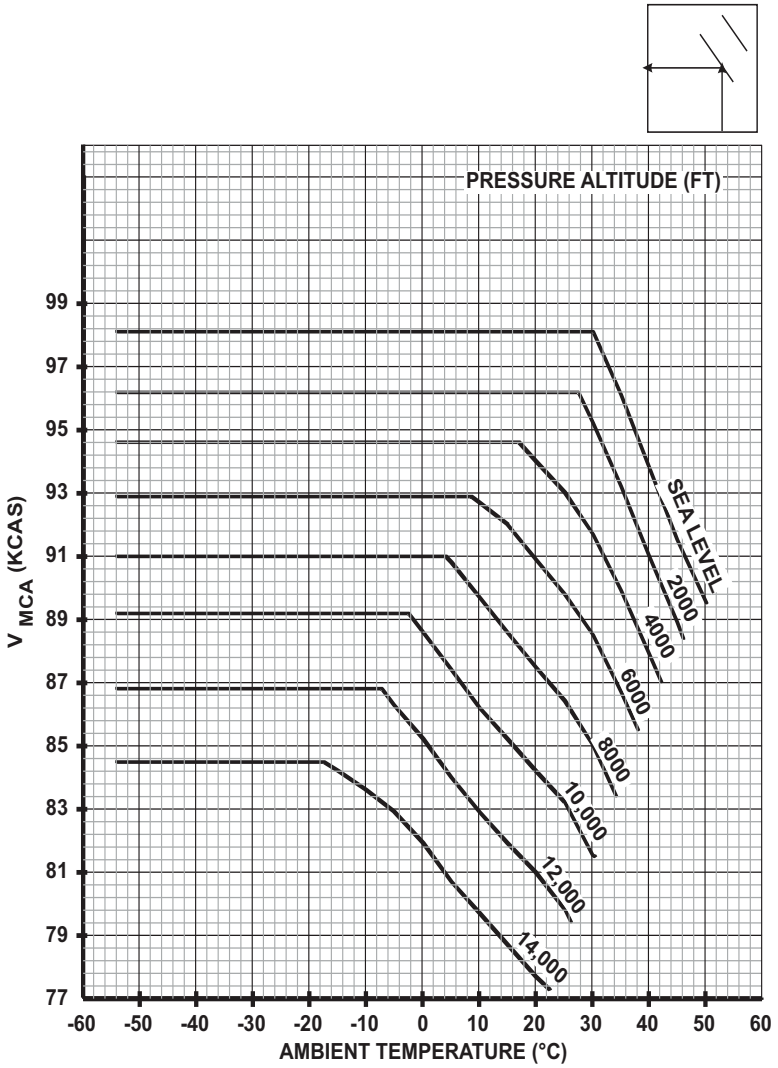


Figure 5-35. Minimum Control Speed - Air (V_{MCA}), Flaps 10° and Flaps 20°

REFERENCE STALL SPEEDS
IDLE THRUST; SPEED BRAKES RETRACTED;
FLAPS - 0°

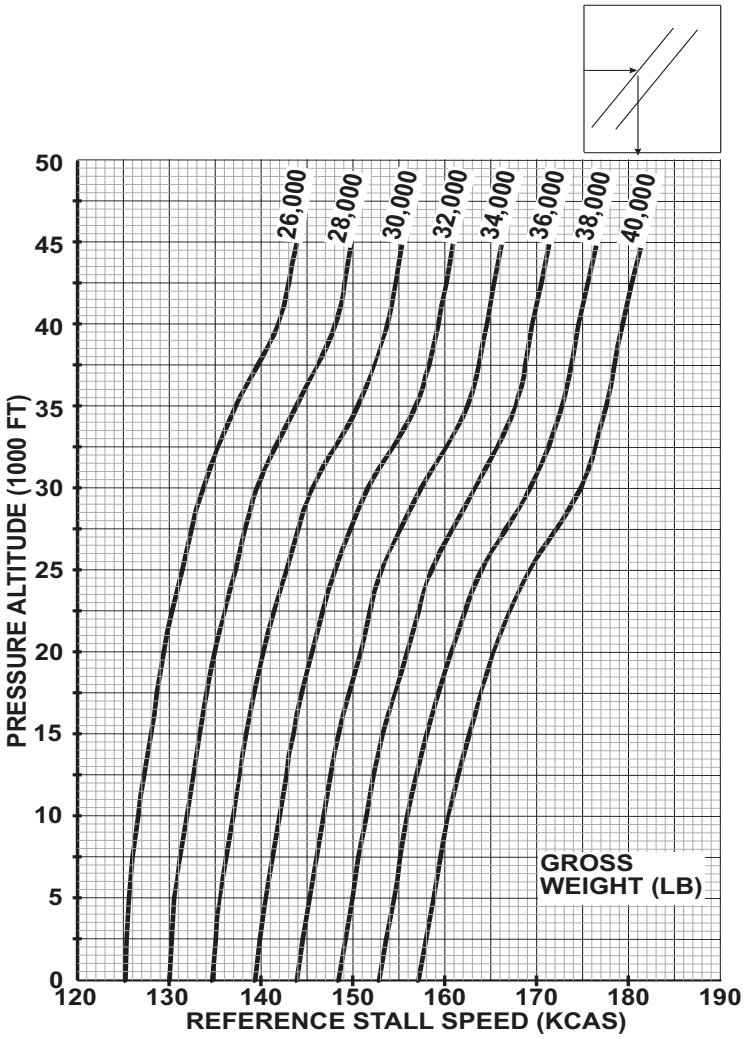


Figure 5-36. Reference Stall Speeds Idle Thrust; Speed Brakes Retracted; Flaps - 0°

REFERENCE STALL SPEEDS
IDLE THRUST; SPEED BRAKES RETRACTED;
FLAPS - 10°

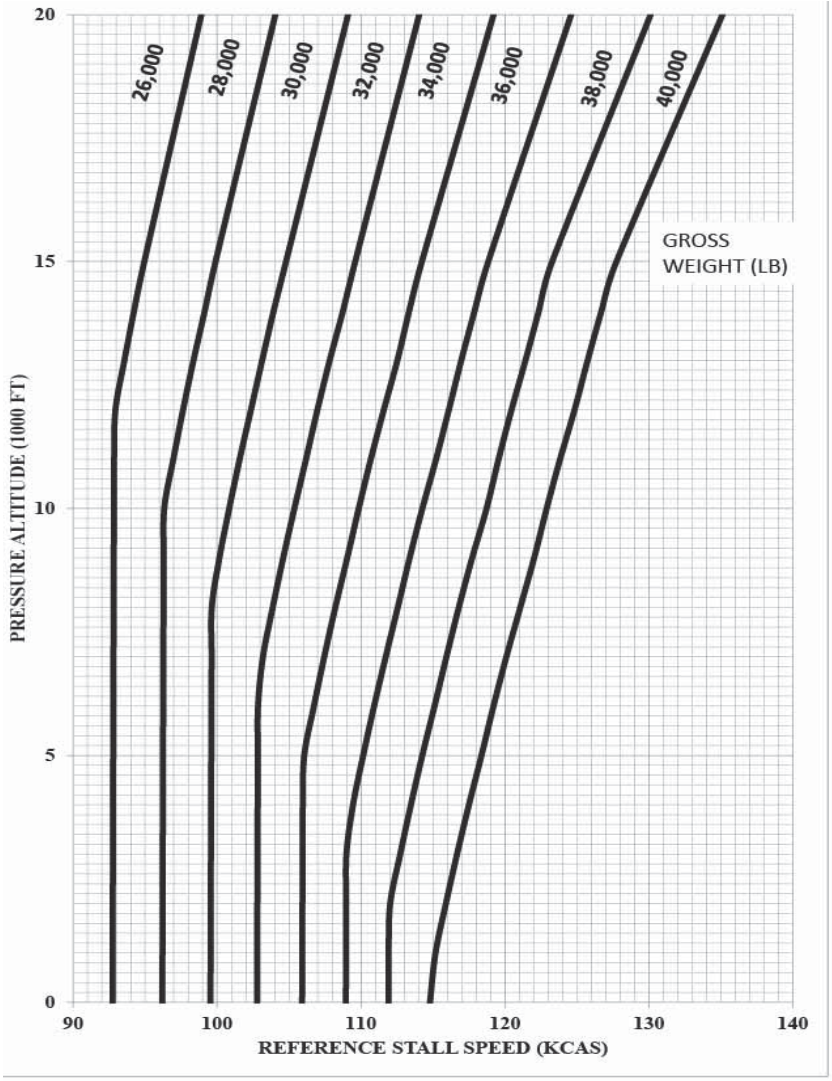


Figure 5-37. Reference Stall Speeds Idle Thrust; Speed Brakes Retracted; Flaps - 10°

REFERENCE STALL SPEEDS
IDLE THRUST; SPEED BRAKES FULLY RETRACTED;
FLAPS - 20°

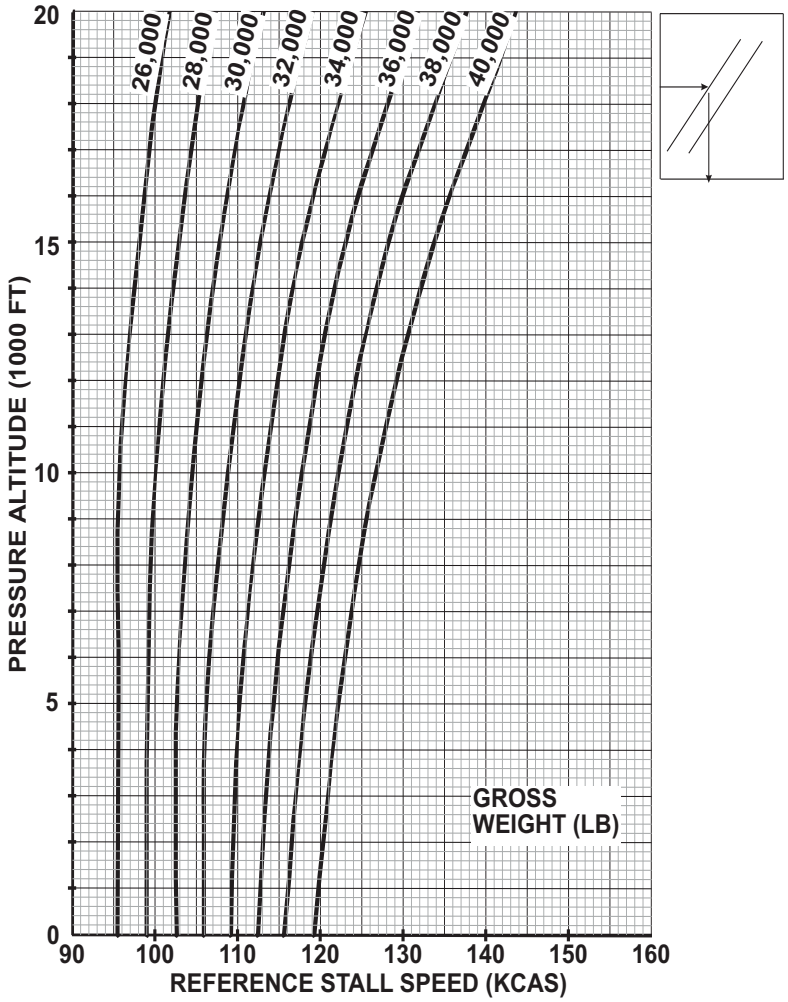


Figure 5-38. Reference Stall Speeds Idle Thrust; Speed Brakes Retracted; Flaps - 20°

REFERENCE STALL SPEEDS
IDLE THRUST; SPEED BRAKES RETRACTED;
FLAPS - 39°

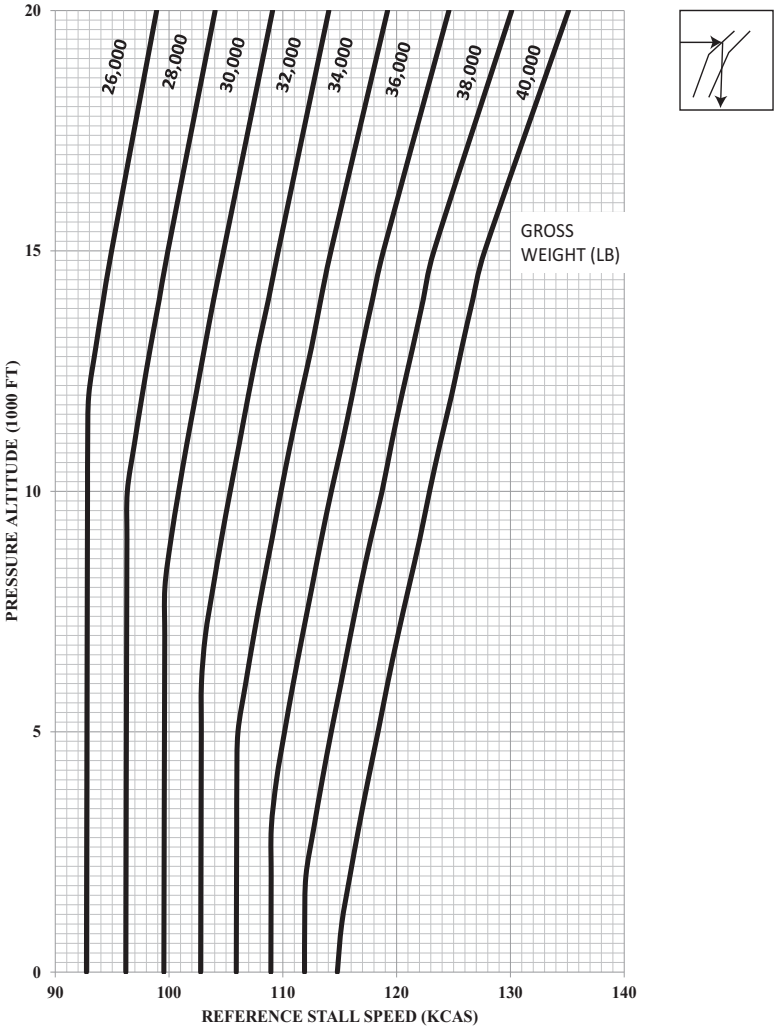


Figure 5-39. Reference Stall Speeds Idle Thrust; Speed Brakes Retracted; Flaps - 39°

REFERENCE STALL SPEEDS
IDLE THRUST; SPEED BRAKES FULLY EXTENDED;
FLAPS - 0°

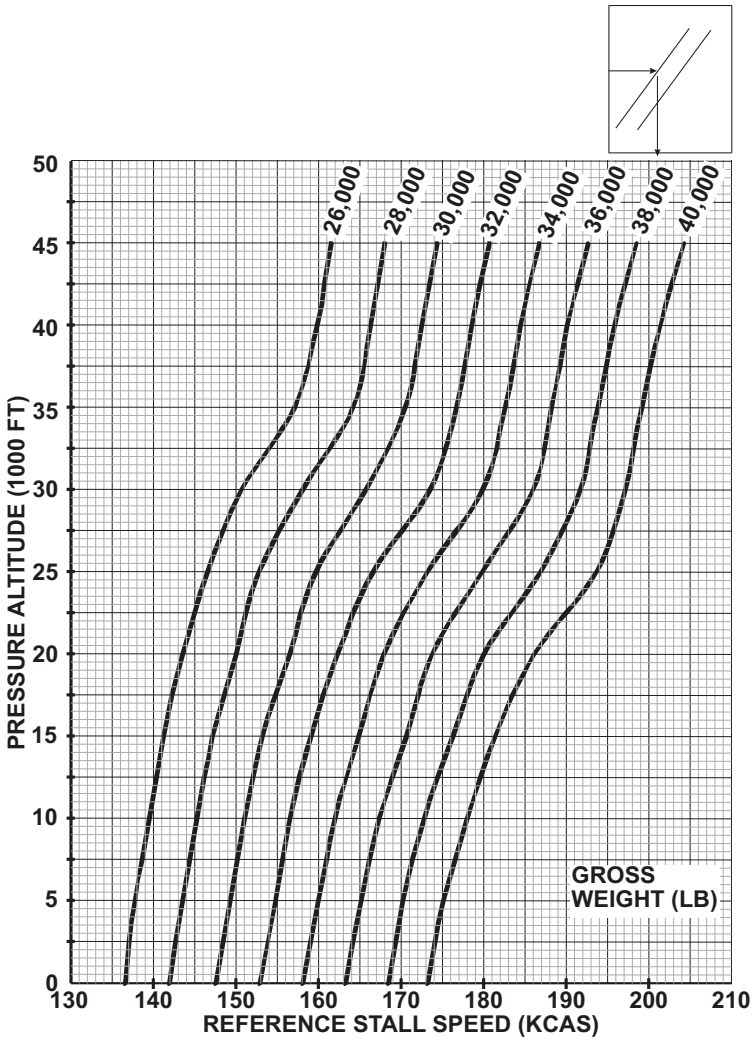


Figure 5-40. Reference Stall Speeds Idle Thrust; Speed Brakes Fully Extended; Flaps - 0°

REFERENCE STALL SPEEDS
IDLE THRUST; SPEED BRAKES FULLY EXTENDED;
FLAPS - 10°

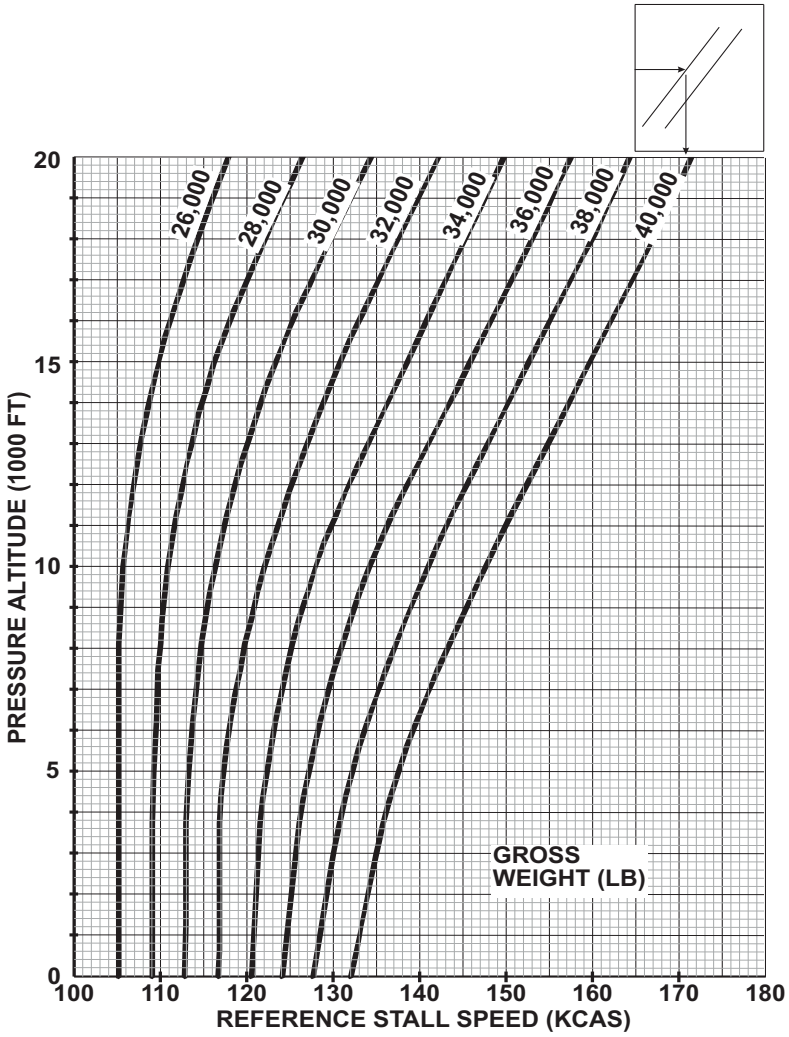


Figure 5-41. Reference Stall Speeds Idle Thrust; Speed Brakes Fully Extended; Flaps - 10°

REFERENCE STALL SPEEDS
IDLE THRUST; SPEED BRAKES FULLY EXTENDED;
FLAPS - 20°

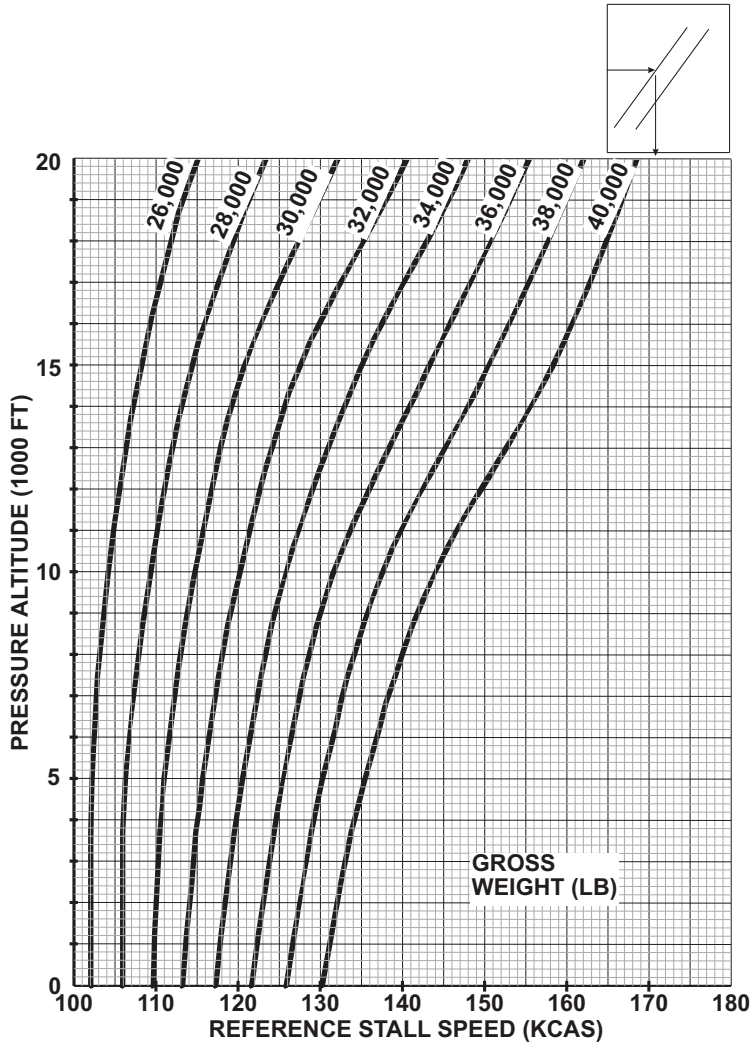


Figure 5-42. Reference Stall Speeds Idle Thrust; Speed Brakes Fully Extended; Flaps - 20°

REFERENCE STALL SPEEDS
IDLE THRUST; SPEED BRAKES FULLY EXTENDED;
FLAPS - 39°

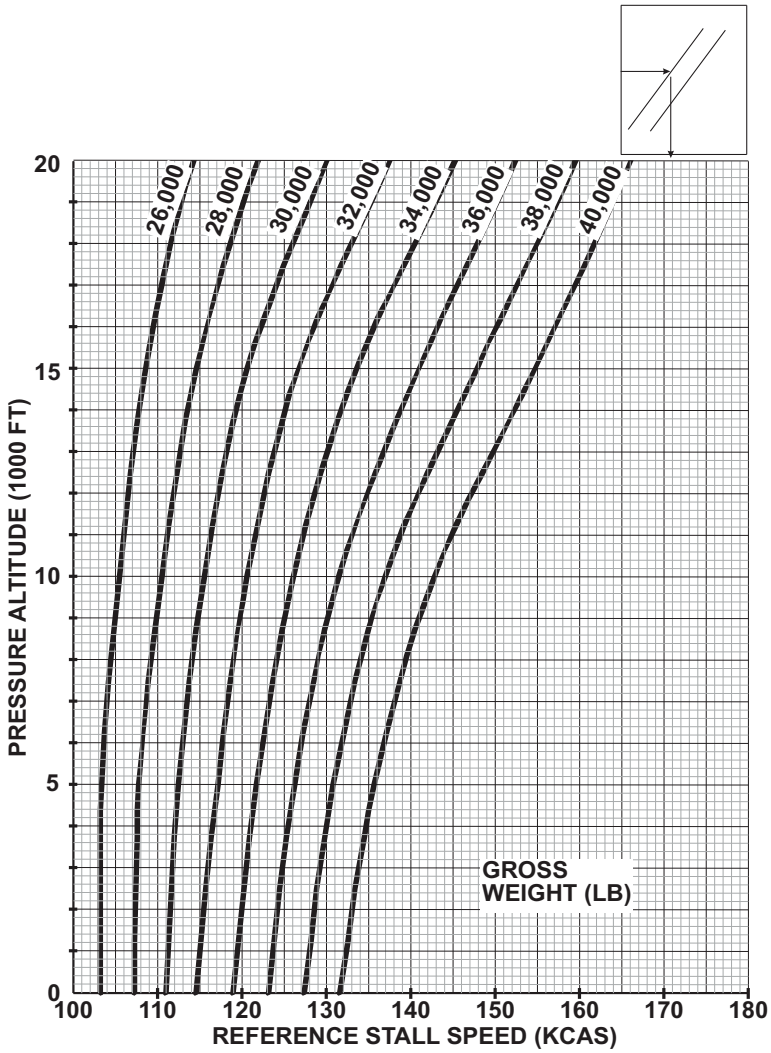


Figure 5-43. Reference Stall Speeds Idle Thrust; Speed Brakes Fully Extended; Flaps - 39°

DETERMINATION OF GROSS WEIGHT LONGITUDINAL CENTER OF GRAVITY LOCATION

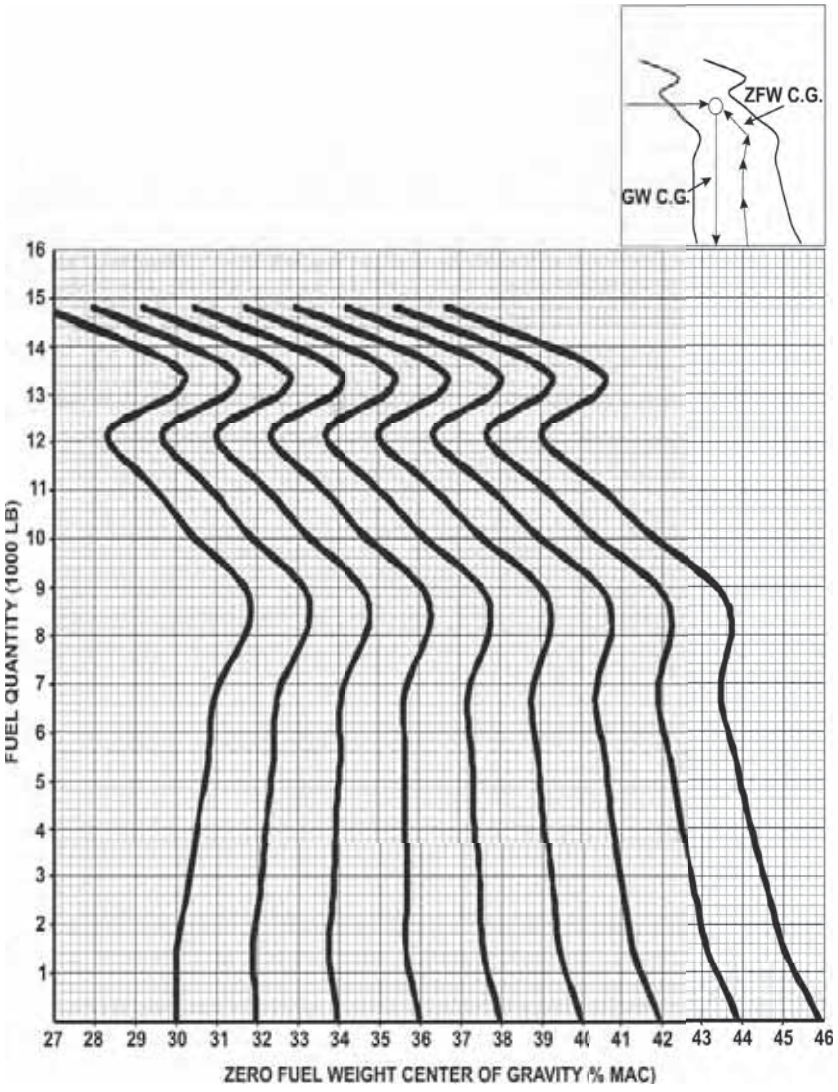


Figure 5-44. Determination of Overall Longitudinal Center of Gravity Location

Figure 5-45. Horizontal Stabilizer Trim Setting for Takeoff; Flaps - 20°
(Sheet 1 of 4)

PRESSURE ALTITUDE BELOW 2,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)															
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14,600	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.6	-6.4	-6.1	-5.9
14,000	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.6	-6.4	-6.1	-5.9	-5.7	-5.5	-5.3	-5.0
13,000	-6.8	-6.8	-6.8	-6.8	-6.8	-6.9	-6.7	-6.5	-6.2	-6.0	-5.7	-5.5	-5.3	-5.1	-4.8	-4.6
12,000	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.7	-6.5	-6.3	-6.0	-5.8	-5.5	-5.3	-5.1
11,000	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.5	-6.3	-6.0	-5.8	-5.5	-5.3	-5.1	-4.8	-4.6
10,000	-6.8	-6.8	-6.8	-6.8	-6.9	-6.6	-6.4	-6.1	-5.9	-5.6	-5.4	-5.1	-4.9	-4.6	-4.4	-4.1
9,000	-6.8	-6.8	-6.9	-6.7	-6.4	-6.2	-5.9	-5.7	-5.4	-5.1	-4.9	-4.6	-4.4	-4.1	-3.9	-3.6
8,000	-6.8	-6.8	-6.9	-6.7	-6.4	-6.1	-5.8	-5.6	-5.3	-5.1	-4.8	-4.5	-4.3	-4.0	-3.7	-3.5
7,000	-6.8	-6.8	-7.0	-6.8	-6.6	-6.3	-6.0	-5.7	-5.5	-5.2	-4.9	-4.7	-4.4	-4.1	-3.9	-3.6
6,000	-6.8	-6.8	-6.8	-6.9	-6.6	-6.3	-6.1	-5.8	-5.5	-5.2	-4.9	-4.7	-4.4	-4.1	-3.8	-3.5
5,000	-6.8	-6.8	-6.8	-6.9	-6.6	-6.3	-6.1	-5.8	-5.5	-5.2	-4.9	-4.6	-4.3	-4.0	-3.7	-3.4
4,000	-6.8	-6.8	-6.8	-6.9	-6.7	-6.4	-6.1	-5.8	-5.5	-5.1	-4.8	-4.5	-4.2	-3.9	-3.6	-3.3
3,000	-6.8	-6.8	-6.8	-6.8	-6.7	-6.4	-6.1	-5.7	-5.4	-5.1	-4.8	-4.5	-4.2	-3.9	-3.5	-3.2
2,000	-6.8	-6.8	-6.8	-6.8	-6.7	-6.4	-6.1	-5.7	-5.4	-5.1	-4.8	-4.4	-4.1	-3.8	-3.5	-3.1
1,000	-6.8	-6.8	-6.8	-6.8	-6.7	-6.4	-6.0	-5.7	-5.4	-5.0	-4.7	-4.4	-4.0	-3.7	-3.3	-3.0
0	-6.8	-6.8	-6.8	-6.8	-6.7	-6.3	-6.0	-5.6	-5.3	-4.9	-4.6	-4.2	-3.9	-3.5	-3.2	-2.8

Figure 5-45. Horizontal Stabilizer Trim Setting for Takeoff; Flaps - 20°
(Sheet 2 of 4)

PRESSURE ALTITUDE: 2,000 - 6,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)															
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14,600	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.0	-5.9	-5.7	-5.5	-5.3
14,000	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.1	-5.9	-5.7	-5.5	-5.3	-5.2	-5.0	-4.8	-4.6
13,000	-6.2	-6.2	-6.2	-6.2	-6.2	-6.1	-6.0	-5.8	-5.6	-5.4	-5.2	-5.0	-4.8	-4.6	-4.5	-4.3
12,000	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.0	-5.8	-5.6	-5.4	-5.2	-5.0	-4.9	-4.7
11,000	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.0	-5.8	-5.6	-5.4	-5.2	-5.0	-4.9	-4.7	-4.5	-4.3
10,000	-6.2	-6.2	-6.2	-6.2	-6.1	-5.9	-5.7	-5.5	-5.3	-5.1	-4.9	-4.7	-4.5	-4.3	-4.1	-3.9
9,000	-6.2	-6.2	-6.2	-6.0	-5.8	-5.5	-5.3	-5.1	-4.9	-4.7	-4.5	-4.3	-4.1	-3.9	-3.7	-3.5
8,000	-6.2	-6.2	-6.2	-5.9	-5.7	-5.5	-5.3	-5.1	-4.9	-4.6	-4.4	-4.2	-4.0	-3.8	-3.6	-3.4
7,000	-6.2	-6.2	-6.2	-6.1	-5.9	-5.6	-5.4	-5.2	-5.0	-4.8	-4.5	-4.3	-4.1	-3.9	-3.7	-3.4
6,000	-6.2	-6.2	-6.2	-6.1	-5.9	-5.7	-5.4	-5.2	-5.0	-4.8	-4.5	-4.3	-4.1	-3.8	-3.6	-3.4
5,000	-6.2	-6.2	-6.2	-6.1	-5.9	-5.7	-5.4	-5.2	-5.0	-4.7	-4.5	-4.3	-4.0	-3.8	-3.6	-3.3
4,000	-6.2	-6.2	-6.2	-6.2	-5.9	-5.7	-5.4	-5.2	-5.0	-4.7	-4.5	-4.2	-4.0	-3.7	-3.5	-3.3
3,000	-6.2	-6.2	-6.2	-6.2	-6.0	-5.7	-5.4	-5.2	-4.9	-4.7	-4.4	-4.2	-3.9	-3.7	-3.4	-3.2
2,000	-6.2	-6.2	-6.2	-6.2	-6.0	-5.7	-5.4	-5.2	-4.9	-4.7	-4.4	-4.1	-3.9	-3.6	-3.4	-3.1
1,000	-6.2	-6.2	-6.2	-6.2	-6.0	-5.7	-5.4	-5.1	-4.9	-4.6	-4.3	-4.1	-3.8	-3.5	-3.2	-3.0
0	-6.2	-6.2	-6.2	-6.2	-5.9	-5.6	-5.4	-5.1	-4.8	-4.5	-4.2	-3.9	-3.7	-3.4	-3.1	-2.8

Figure 5-45. Horizontal Stabilizer Trim Setting for Takeoff; Flaps - 20°
(Sheet 3 of 4)

PRESSURE ALTITUDE: 6,000 - 10,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)															
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14,600	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.4	-5.2	-5.1	-4.9	-4.8
14,000	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.4	-5.2	-5.1	-4.9	-4.8	-4.7	-4.5	-4.4	-4.2
13,000	-5.5	-5.5	-5.5	-5.5	-5.5	-5.4	-5.3	-5.2	-5.0	-4.8	-4.7	-4.5	-4.4	-4.3	-4.1	-4.0
12,000	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.3	-5.2	-5.0	-4.9	-4.7	-4.6	-4.4	-4.3
11,000	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.3	-5.2	-5.0	-4.9	-4.7	-4.6	-4.4	-4.3	-4.1	-3.9
10,000	-5.5	-5.5	-5.5	-5.5	-5.4	-5.3	-5.1	-4.9	-4.8	-4.6	-4.5	-4.3	-4.1	-4.0	-3.8	-3.7
9,000	-5.5	-5.5	-5.5	-5.3	-5.1	-5.0	-4.8	-4.6	-4.5	-4.3	-4.1	-4.0	-3.8	-3.6	-3.5	-3.3
8,000	-5.5	-5.5	-5.5	-5.3	-5.1	-4.9	-4.8	-4.6	-4.4	-4.3	-4.1	-3.9	-3.7	-3.6	-3.4	-3.2
7,000	-5.5	-5.5	-5.5	-5.4	-5.2	-5.1	-4.9	-4.7	-4.5	-4.3	-4.2	-4.0	-3.8	-3.6	-3.5	-3.3
6,000	-5.5	-5.5	-5.5	-5.4	-5.3	-5.1	-4.9	-4.7	-4.5	-4.4	-4.2	-4.0	-3.8	-3.6	-3.4	-3.3
5,000	-5.5	-5.5	-5.5	-5.4	-5.3	-5.1	-4.9	-4.7	-4.5	-4.3	-4.1	-3.9	-3.8	-3.6	-3.4	-3.2
4,000	-5.5	-5.5	-5.5	-5.5	-5.3	-5.1	-4.9	-4.7	-4.5	-4.3	-4.1	-3.9	-3.7	-3.5	-3.3	-3.1
3,000	-5.5	-5.5	-5.5	-5.5	-5.3	-5.1	-4.9	-4.7	-4.5	-4.3	-4.1	-3.9	-3.7	-3.5	-3.3	-3.1
2,000	-5.5	-5.5	-5.5	-5.5	-5.3	-5.1	-4.9	-4.7	-4.5	-4.3	-4.1	-3.8	-3.6	-3.4	-3.2	-3.0
1,000	-5.5	-5.5	-5.5	-5.5	-5.3	-5.1	-4.9	-4.7	-4.4	-4.2	-4.0	-3.8	-3.6	-3.4	-3.1	-2.9
0	-5.5	-5.5	-5.5	-5.5	-5.3	-5.1	-4.8	-4.6	-4.4	-4.2	-3.9	-3.7	-3.5	-3.3	-3.0	-2.8

Figure 5-45. Horizontal Stabilizer Trim Setting for Takeoff; Flaps - 20°
(Sheet 4 of 4)

PRESSURE ALTITUDE ABOVE 10,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)															
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14,600	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.7	-4.6	-4.5	-4.4	-4.3
14,000	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.7	-4.6	-4.5	-4.4	-4.3	-4.2	-4.1	-4.0	-3.8
13,000	-4.8	-4.8	-4.8	-4.8	-4.8	-4.7	-4.6	-4.5	-4.4	-4.3	-4.2	-4.1	-4.0	-3.9	-3.8	-3.6
12,000	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.7	-4.5	-4.4	-4.3	-4.2	-4.1	-4.0	-3.9
11,000	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.7	-4.6	-4.4	-4.3	-4.2	-4.1	-4.0	-3.9	-3.8	-3.6
10,000	-4.8	-4.8	-4.8	-4.8	-4.7	-4.6	-4.5	-4.4	-4.3	-4.1	-4.0	-3.9	-3.8	-3.7	-3.5	-3.4
9,000	-4.8	-4.8	-4.8	-4.6	-4.5	-4.4	-4.3	-4.1	-4.0	-3.9	-3.8	-3.7	-3.5	-3.4	-3.3	-3.2
8,000	-4.8	-4.8	-4.8	-4.6	-4.5	-4.4	-4.2	-4.1	-4.0	-3.9	-3.7	-3.6	-3.5	-3.4	-3.2	-3.1
7,000	-4.8	-4.8	-4.8	-4.7	-4.6	-4.5	-4.3	-4.2	-4.1	-3.9	-3.8	-3.7	-3.5	-3.4	-3.3	-3.2
6,000	-4.8	-4.8	-4.8	-4.7	-4.6	-4.5	-4.3	-4.2	-4.1	-3.9	-3.8	-3.7	-3.5	-3.4	-3.3	-3.1
5,000	-4.8	-4.8	-4.8	-4.7	-4.6	-4.5	-4.3	-4.2	-4.1	-3.9	-3.8	-3.6	-3.5	-3.4	-3.2	-3.1
4,000	-4.8	-4.8	-4.8	-4.8	-4.6	-4.5	-4.3	-4.2	-4.1	-3.9	-3.8	-3.6	-3.5	-3.3	-3.2	-3.0
3,000	-4.8	-4.8	-4.8	-4.8	-4.6	-4.5	-4.3	-4.2	-4.0	-3.9	-3.7	-3.6	-3.4	-3.3	-3.1	-3.0
2,000	-4.8	-4.8	-4.8	-4.8	-4.7	-4.5	-4.3	-4.2	-4.0	-3.9	-3.7	-3.6	-3.4	-3.3	-3.1	-2.9
1,000	-4.8	-4.8	-4.8	-4.8	-4.6	-4.5	-4.3	-4.2	-4.0	-3.8	-3.7	-3.5	-3.4	-3.2	-3.0	-2.9
0	-4.8	-4.8	-4.8	-4.8	-4.6	-4.5	-4.3	-4.1	-4.0	-3.8	-3.6	-3.5	-3.3	-3.1	-3.0	-2.8

Figure 5-46. Horizontal Stabilizer Trim Setting for Takeoff; Flaps - 10°
(Sheet 1 of 4)

PRESSURE ALTITUDE BELOW 2,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)															
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14,600	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.3	-6.1	-5.9	-5.6	-5.4
14,000	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.3	-6.1	-5.9	-5.6	-5.4	-5.2	-5.0	-4.8	-4.5
13,000	-6.5	-6.5	-6.5	-6.5	-6.5	-6.4	-6.2	-6.0	-5.7	-5.5	-5.2	-5.0	-4.8	-4.6	-4.3	-4.1
12,000	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.2	-6.0	-5.8	-5.5	-5.3	-5.0	-4.8	-4.6
11,000	-6.5	-6.5	-6.5	-6.5	-6.5	-6.5	-6.3	-6.0	-5.8	-5.5	-5.3	-5.0	-4.8	-4.6	-4.3	-4.1
10,000	-6.5	-6.5	-6.5	-6.5	-6.4	-6.1	-5.9	-5.6	-5.4	-5.1	-4.9	-4.6	-4.4	-4.1	-3.9	-3.6
9,000	-6.5	-6.5	-6.4	-6.2	-5.9	-5.7	-5.4	-5.2	-4.9	-4.6	-4.4	-4.1	-3.9	-3.6	-3.4	-3.1
8,000	-6.5	-6.5	-6.4	-6.2	-5.9	-5.6	-5.3	-5.1	-4.8	-4.6	-4.3	-4.0	-3.8	-3.5	-3.2	-3.0
7,000	-6.5	-6.5	-6.5	-6.3	-6.1	-5.8	-5.5	-5.2	-5.0	-4.7	-4.4	-4.2	-3.9	-3.6	-3.4	-3.1
6,000	-6.5	-6.5	-6.5	-6.4	-6.1	-5.8	-5.6	-5.3	-5.0	-4.7	-4.4	-4.2	-3.9	-3.6	-3.3	-3.0
5,000	-6.5	-6.5	-6.5	-6.4	-6.1	-5.8	-5.6	-5.3	-5.0	-4.7	-4.4	-4.1	-3.8	-3.5	-3.2	-2.9
4,000	-6.5	-6.5	-6.5	-6.4	-6.2	-5.9	-5.6	-5.3	-5.0	-4.6	-4.3	-4.0	-3.7	-3.4	-3.1	-2.8
3,000	-6.5	-6.5	-6.5	-6.5	-6.2	-5.9	-5.6	-5.2	-4.9	-4.6	-4.3	-4.0	-3.7	-3.4	-3.0	-2.7
2,000	-6.5	-6.5	-6.5	-6.5	-6.2	-5.9	-5.6	-5.2	-4.9	-4.6	-4.3	-3.9	-3.6	-3.3	-3.0	-2.6
1,000	-6.5	-6.5	-6.5	-6.5	-6.2	-5.9	-5.5	-5.2	-4.9	-4.5	-4.2	-3.9	-3.5	-3.2	-2.8	-2.5
0	-6.5	-6.5	-6.5	-6.5	-6.2	-5.8	-5.5	-5.1	-4.8	-4.4	-4.1	-3.7	-3.4	-3.0	-2.7	-2.3

Figure 5-46. Horizontal Stabilizer Trim Setting for Takeoff; Flaps - 10°
(Sheet 2 of 4)

PRESSURE ALTITUDE: 2,000 - 6,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)															
	30	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
14,600	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.3	-5.1	-4.9	-4.8	-4.6
14,000	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.3	-5.1	-4.9	-4.8	-4.6	-4.5	-4.3	-4.1	-4.0
13,000	-5.4	-5.4	-5.4	-5.4	-5.4	-5.3	-5.2	-5.0	-4.8	-4.7	-4.5	-4.3	-4.1	-4.0	-3.8	-3.6
12,000	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.2	-5.0	-4.9	-4.7	-4.5	-4.3	-4.2	-4.0
11,000	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4	-5.2	-5.0	-4.9	-4.7	-4.5	-4.3	-4.2	-4.0	-3.8	-3.6
10,000	-5.4	-5.4	-5.4	-5.4	-5.3	-5.1	-4.9	-4.8	-4.6	-4.4	-4.2	-4.0	-3.8	-3.7	-3.5	-3.3
9,000	-5.4	-5.4	-5.4	-5.2	-5.0	-4.8	-4.6	-4.4	-4.2	-4.0	-3.8	-3.7	-3.5	-3.3	-3.1	-2.9
8,000	-5.4	-5.4	-5.4	-5.2	-4.9	-4.8	-4.6	-4.4	-4.2	-4.0	-3.8	-3.6	-3.4	-3.2	-3.0	-2.8
7,000	-5.4	-5.4	-5.4	-5.3	-5.1	-4.9	-4.7	-4.5	-4.3	-4.1	-3.9	-3.7	-3.5	-3.3	-3.1	-2.9
6,000	-5.4	-5.4	-5.4	-5.3	-5.1	-4.9	-4.7	-4.5	-4.3	-4.1	-3.9	-3.7	-3.5	-3.3	-3.0	-2.8
5,000	-5.4	-5.4	-5.4	-5.3	-5.1	-4.9	-4.7	-4.5	-4.3	-4.1	-3.8	-3.6	-3.4	-3.2	-3.0	-2.8
4,000	-5.4	-5.4	-5.4	-5.4	-5.2	-4.9	-4.7	-4.5	-4.3	-4.0	-3.8	-3.6	-3.4	-3.2	-2.9	-2.7
3,000	-5.4	-5.4	-5.4	-5.4	-5.2	-4.9	-4.7	-4.5	-4.3	-4.0	-3.8	-3.6	-3.3	-3.1	-2.9	-2.6
2,000	-5.4	-5.4	-5.4	-5.4	-5.2	-5.0	-4.7	-4.5	-4.3	-4.0	-3.8	-3.5	-3.3	-3.0	-2.8	-2.6
1,000	-5.4	-5.4	-5.4	-5.4	-5.2	-4.9	-4.7	-4.4	-4.2	-4.0	-3.7	-3.5	-3.2	-3.0	-2.7	-2.5
0	-5.4	-5.4	-5.4	-5.4	-5.2	-4.9	-4.6	-4.4	-4.1	-3.9	-3.6	-3.3	-3.1	-2.8	-2.6	-2.3

Figure 5-46. Horizontal Stabilizer Trim Setting for Takeoff; Flaps - 10°
(Sheet 3 of 4)

PRESSURE ALTITUDE: 6,000 - 10,000 FT

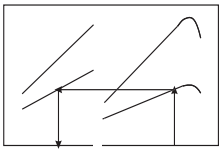
FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)															
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14,600	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7
14,000	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7	-3.6	-3.5	-3.4	-3.3
13,000	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.1	-4.0	-3.9	-3.8	-3.6	-3.5	-3.4	-3.3	-3.2	-3.1
12,000	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7	-3.6	-3.5	-3.3
11,000	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7	-3.6	-3.5	-3.3	-3.2	-3.1
10,000	-4.2	-4.2	-4.2	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7	-3.6	-3.5	-3.4	-3.2	-3.1	-3.0	-2.9
9,000	-4.2	-4.2	-4.2	-4.1	-4.0	-3.8	-3.7	-3.6	-3.5	-3.4	-3.2	-3.1	-3.0	-2.9	-2.8	-2.7
8,000	-4.2	-4.2	-4.2	-4.1	-3.9	-3.8	-3.7	-3.6	-3.5	-3.3	-3.2	-3.1	-3.0	-2.9	-2.7	-2.6
7,000	-4.2	-4.2	-4.2	-4.1	-4.0	-3.9	-3.8	-3.6	-3.5	-3.4	-3.3	-3.2	-3.0	-2.9	-2.8	-2.7
6,000	-4.2	-4.2	-4.2	-4.2	-4.0	-3.9	-3.8	-3.7	-3.5	-3.4	-3.3	-3.2	-3.0	-2.9	-2.8	-2.6
5,000	-4.2	-4.2	-4.2	-4.2	-4.0	-3.9	-3.8	-3.7	-3.5	-3.4	-3.2	-3.1	-3.0	-2.9	-2.7	-2.6
4,000	-4.2	-4.2	-4.2	-4.2	-4.1	-3.9	-3.8	-3.7	-3.5	-3.4	-3.2	-3.1	-3.0	-2.8	-2.7	-2.6
3,000	-4.2	-4.2	-4.2	-4.2	-4.1	-3.9	-3.8	-3.6	-3.5	-3.4	-3.2	-3.1	-2.9	-2.8	-2.6	-2.5
2,000	-4.2	-4.2	-4.2	-4.2	-4.1	-3.9	-3.8	-3.6	-3.5	-3.3	-3.2	-3.0	-2.9	-2.8	-2.6	-2.5
1,000	-4.2	-4.2	-4.2	-4.2	-4.1	-3.9	-3.8	-3.6	-3.5	-3.3	-3.2	-3.0	-2.9	-2.7	-2.6	-2.4
0	-4.2	-4.2	-4.2	-4.2	-4.1	-3.9	-3.7	-3.6	-3.4	-3.3	-3.1	-2.9	-2.8	-2.6	-2.5	-2.3

Figure 5-46. Horizontal Stabilizer Trim Setting for Takeoff; Flaps - 10°
(Sheet 4 of 4)

PRESSURE ALTITUDE ABOVE 10,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)															
	30	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
14,600	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.9	-2.8
14,000	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.9	-2.8	-2.8	-2.8	-2.7	-2.7
13,000	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.8	-2.8	-2.8	-2.7	-2.7	-2.7	-2.6
12,000	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.8	-2.8	-2.8	-2.7	-2.7
11,000	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.8	-2.8	-2.8	-2.7	-2.7	-2.7	-2.6
10,000	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.9	-2.8	-2.8	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5
9,000	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.8	-2.8	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4
8,000	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.8	-2.8	-2.7	-2.7	-2.6	-2.6	-2.6	-2.5	-2.5	-2.4
7,000	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.8	-2.8	-2.8	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4
6,000	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.9	-2.8	-2.8	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4
5,000	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.9	-2.8	-2.8	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4
4,000	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.8	-2.8	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4
3,000	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.8	-2.8	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4
2,000	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.9	-2.8	-2.8	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4
1,000	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.8	-2.8	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.3
0	-3.0	-3.0	-3.0	-3.0	-3.0	-2.9	-2.8	-2.8	-2.7	-2.7	-2.6	-2.5	-2.5	-2.4	-2.4	-2.3

BUFFET BOUNDARY
CLEAN CONFIGURATION



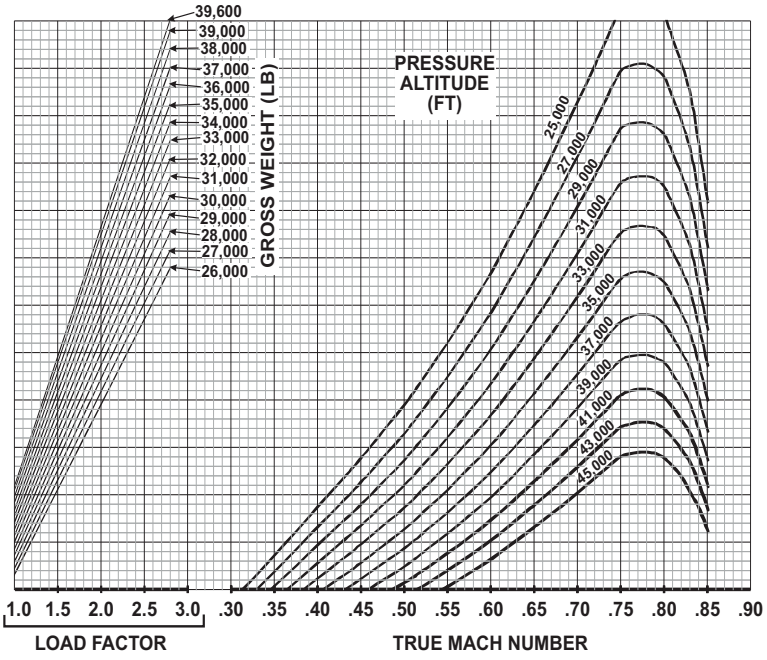


Figure 5-47. Buffet Boundary; Clean Configuration

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TAKEOFF CHARTS AND TABLES; FLAPS - 20°; DRY RUNWAY

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 20°
ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF

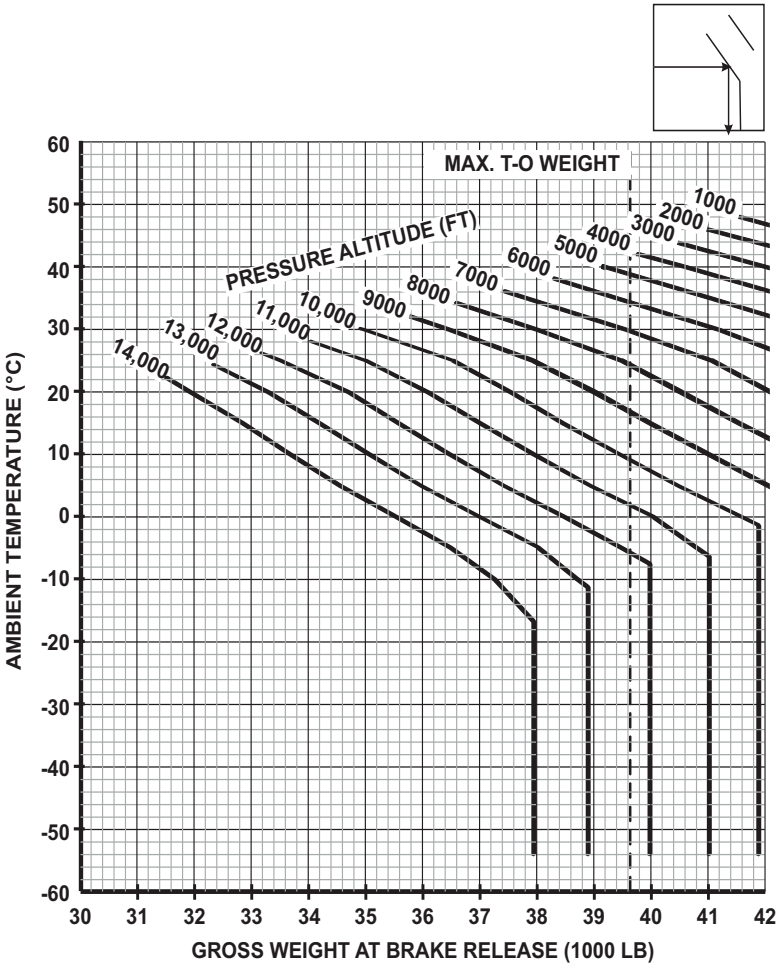

Figure 5-48. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 20°; ECS - Off; Engine Anti-ice - Off; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 20°
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF

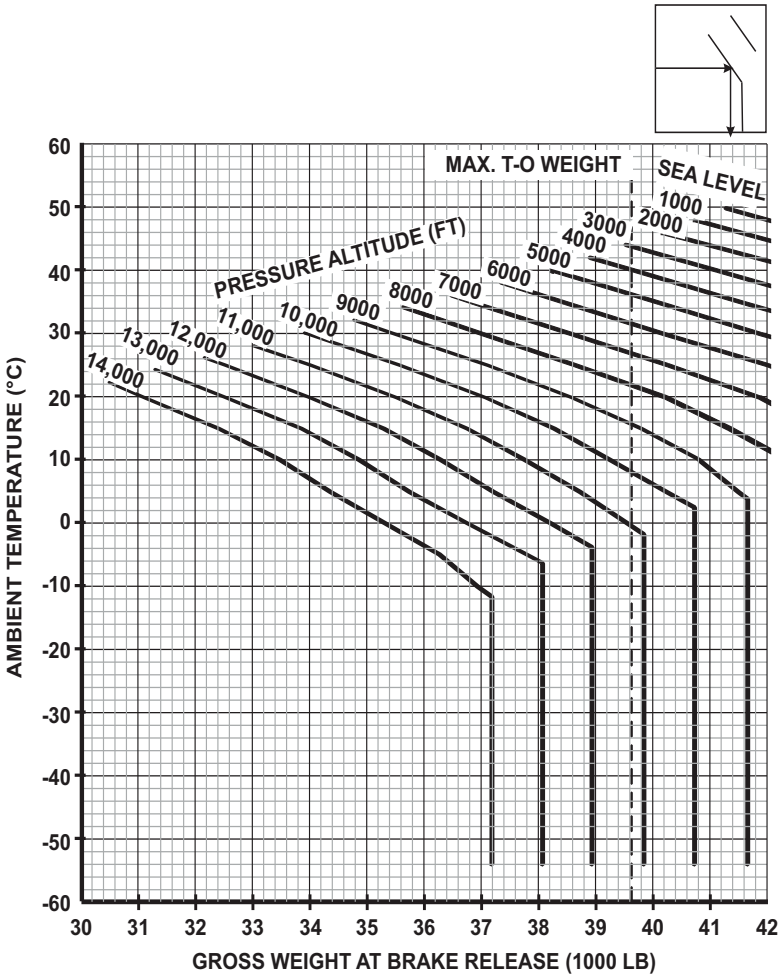

Figure 5-49. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 20°; ECS - On; Engine Anti-ice - Off; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 20°
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - OFF

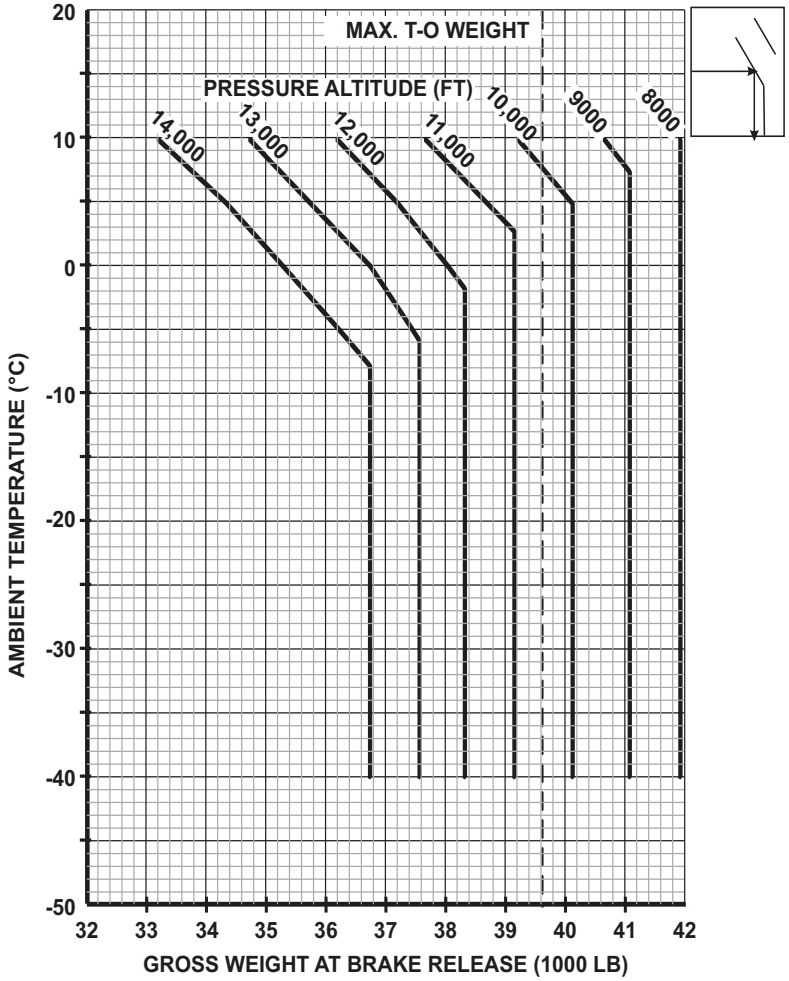

Figure 5-50. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 20°; ECS - On; Engine Anti-ice - On; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS;
(AS PERMITTED BY CLIMB REQUIREMENTS);
FLAPS - 20°;
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON

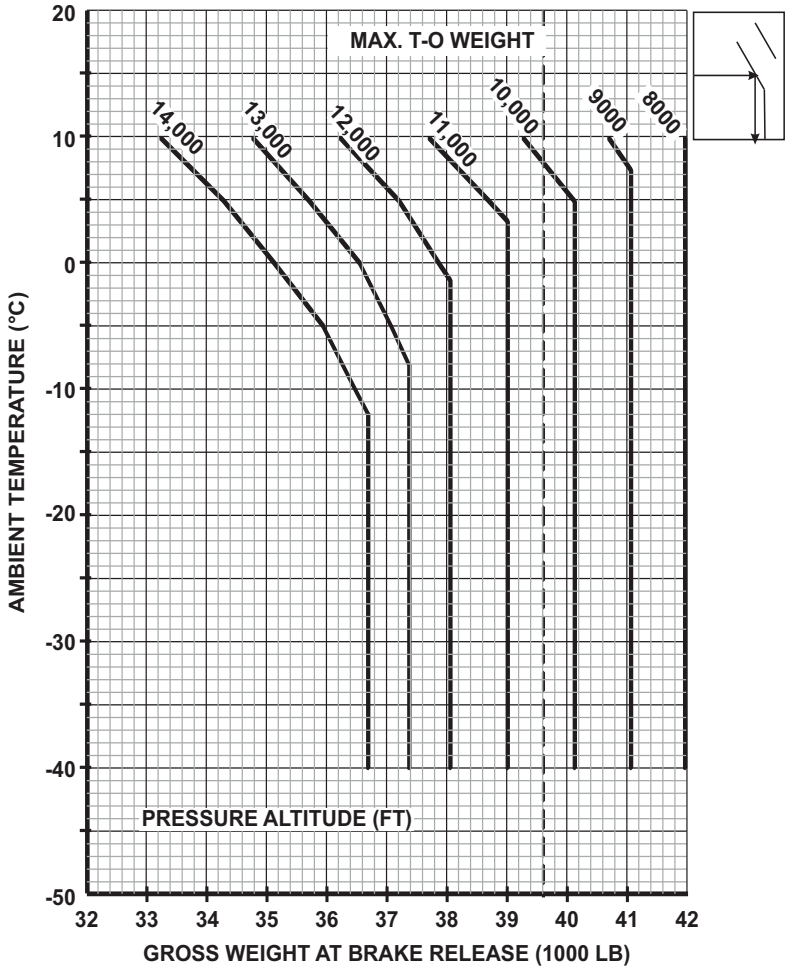

Figure 5-51. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 20°; ECS - On; Engine Anti-ice - On; Wing Anti-ice - On

TAKEOFF WEIGHT LIMITATIONS (AS PERMITTED BY BRAKE ENERGY); FLAPS - 20°; DRY RUNWAY

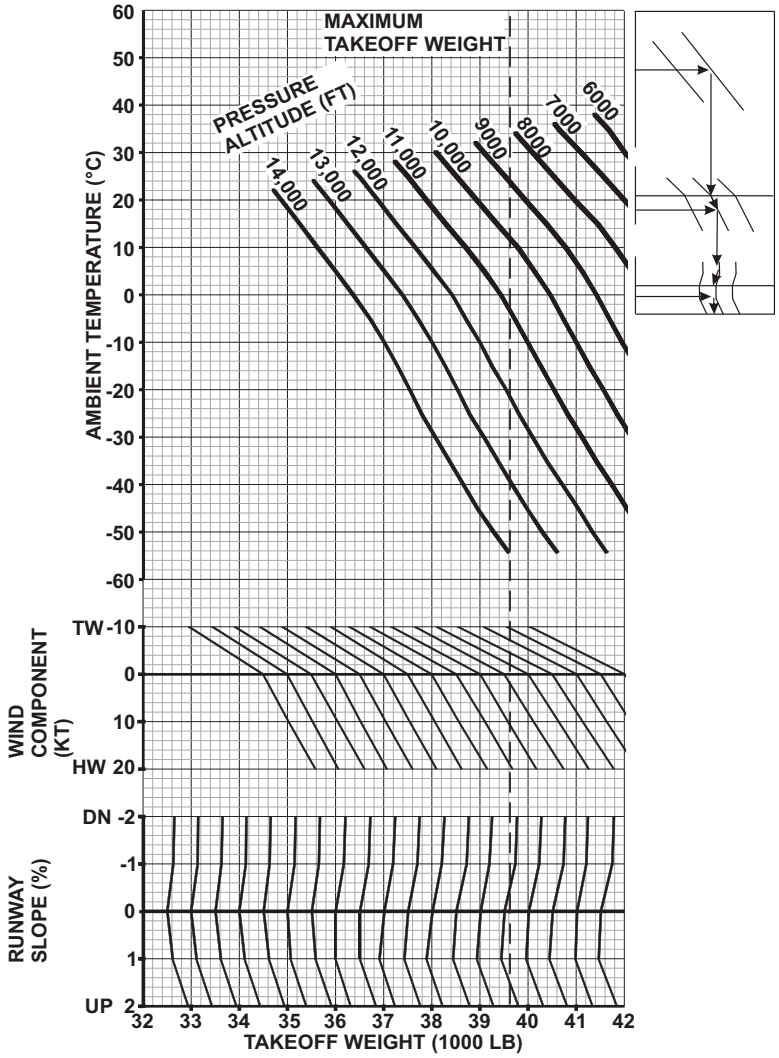

Figure 5-52. Takeoff Weight Limitations (As Permitted By Brake Energy); Flaps - 20°

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY TIRE SPEED LIMIT)
FLAPS - 20°;

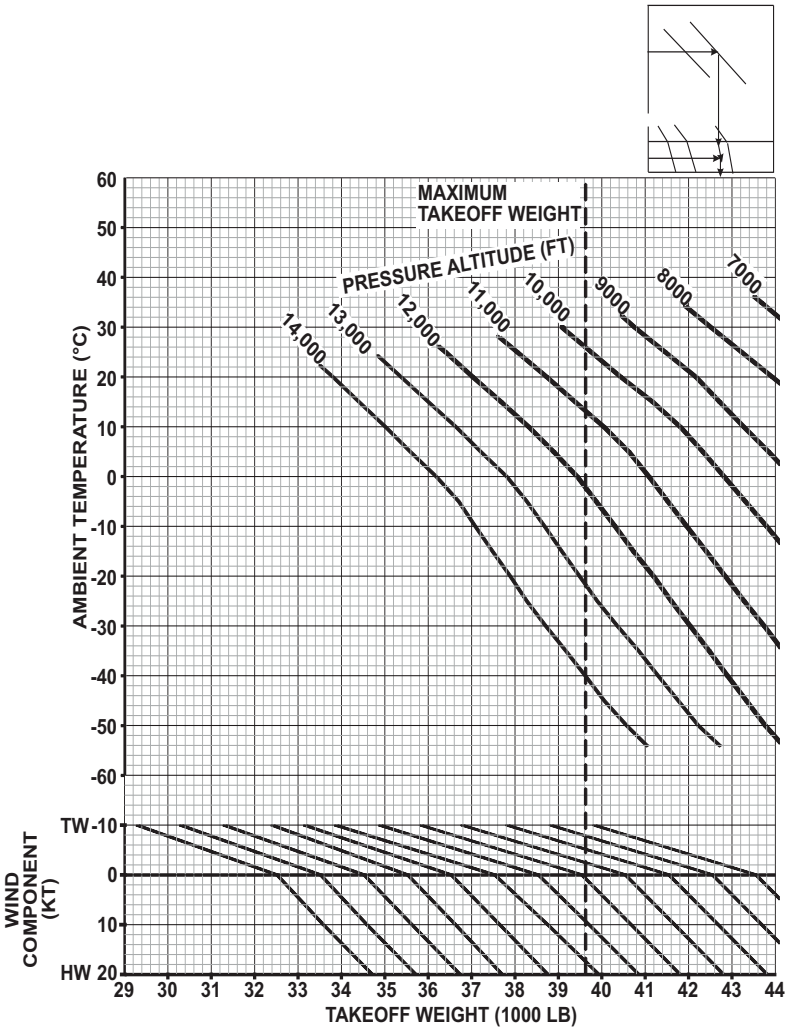

Figure 5-53. Takeoff Weight Limitations (As Permitted By Tire Speed Limit); Flaps - 20°;

FIGURE 5-54. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
39600	TOFL	3790	3840	3900	3970	4020	4080	4140	4180	4260	4330	4390	139	192
	V1	125	125	125	125	125	124	124	124	124	124	124		
	VR	129	129	128	128	128	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.9	5.9	5.9	6	6	6	6.1	6.1	6.1	6.1	6.1		
39000	TOFL	3660	3710	3770	3820	3880	3930	3990	4040	4100	4170	4230	138	191
	V1	123	123	123	123	123	122	122	122	122	122	122		
	VR	127	127	127	127	127	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	6.1	6.1	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3		
38000	TOFL	3440	3490	3550	3600	3660	3710	3770	3820	3880	3950	4010	136	188
	V1	120	120	120	120	120	119	119	119	119	119	119		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.5	6.5	6.5	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7		
37000	TOFL	3280	3330	3380	3440	3490	3540	3600	3650	3710	3770	3820	135	185
	V1	118	118	117	117	117	117	117	117	117	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	132	132	132	132		
	GR2	6.9	6.9	6.9	7	7	7	7.1	7.1	7.1	7.1	7.1		
36000	TOFL	3140	3180	3230	3290	3340	3380	3430	3480	3540	3600	3650	133	182
	V1	115	115	115	115	115	115	115	115	114	114	114		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.3	7.4	7.4	7.4	7.4	7.5	7.5	7.6	7.6	7.6	7.6		
35000	TOFL	2990	3030	3080	3130	3180	3230	3270	3320	3370	3420	3480	131	180
	V1	113	113	113	113	113	113	112	112	112	112	112		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.8	7.8	7.8	7.9	7.9	7.9	8	8	8	8	8		
34000	TOFL	2850	2890	2940	2990	3030	3080	3130	3170	3220	3270	3320	129	177
	V1	111	111	111	111	110	110	110	110	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.3	8.3	8.3	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
33000	TOFL	2740	2780	2820	2870	2910	2960	3000	3040	3090	3140	3190	127	174
	V1	109	109	109	109	109	108	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.8	8.8	8.9	8.9	8.9	9	9	9.1	9.1	9.1	9.1		
32000	TOFL	2630	2660	2710	2750	2800	2840	2880	2930	2970	3020	3060	125	171
	V1	107	107	107	107	107	107	107	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.4	9.4	9.4	9.4	9.5	9.5	9.6	9.6	9.6	9.6	9.6		
31000	TOFL	2530	2570	2610	2650	2690	2730	2780	2820	2860	2900	2950	123	168
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.9	10	10	10	10.1	10.1	10.2	10.2	10.2	10.2	10.2		

FIGURE 5-54. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
30000	TOFL	2440	2470	2510	2550	2590	2630	2670	2710	2750	2790	2830	121	166
	V1	104	104	104	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.6	10.6	10.6	10.7	10.7	10.8	10.8	10.9	10.9	10.9	10.9		
29000	TOFL	2350	2380	2420	2460	2490	2530	2570	2610	2650	2690	2730	119	163
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.3	11.3	11.3	11.4	11.4	11.4	11.5	11.6	11.6	11.6	11.6		
28000	TOFL	2290	2330	2370	2410	2460	2500	2540	2590	2630	2670	2710	117	160
	V1	101	101	101	101	101	102	102	102	102	102	102		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12	12	12	12.1	12.1	12.2	12.2	12.3	12.3	12.3	12.3		
27000	TOFL	2280	2310	2350	2390	2440	2480	2520	2570	2600	2640	2680	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.8	12.8	12.8	12.9	12.9	12.9	13	13.1	13.1	13.1	13.1		
26000	TOFL	2260	2290	2330	2370	2420	2460	2500	2540	2580	2620	2660	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	102	102	102	103	103	103	103	103	103	103		
	V2	118	118	118	118	119	119	119	119	119	119	119		
	GR2	13.6	13.6	13.6	13.7	13.7	13.8	13.8	13.9	13.9	13.9	13.9		

FIGURE 5-54. TAKE-OFF DISTANCE; FLAPS - 20°; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
39600	TOFL	4460	4530	4600	4660	4730	4800	4870	5170	5630	6090	6560	139	192
	V1	124	124	124	123	123	123	123	125	128	131	133		
	VR	128	128	128	128	128	128	128	129	131	133	135		
	V2	137	137	137	137	137	137	137	137	138	139	140		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.5	4.9	4.3	3.7		
39000	TOFL	4300	4370	4430	4500	4560	4630	4690	4980	5410	5860	6310	138	191
	V1	122	122	122	122	121	121	121	123	126	129	131		
	VR	126	126	126	126	126	126	126	127	129	131	133		
	V2	135	135	135	135	135	135	135	136	137	138	138		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	5.8	5.1	4.4	3.9		
38000	TOFL	4070	4130	4190	4250	4310	4370	4440	4670	5060	5490	5910	136	188
	V1	119	119	119	119	119	119	119	120	123	125	128		
	VR	124	124	124	124	124	124	124	124	126	128	130		
	V2	133	133	133	133	133	133	133	133	134	135	135		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.1	5.4	4.8	4.2		
37000	TOFL	3880	3940	4000	4060	4110	4170	4230	4420	4760	5140	5540	135	185
	V1	117	117	116	116	116	116	116	117	119	122	124		
	VR	122	122	122	122	122	122	122	122	123	125	127		
	V2	132	132	132	132	132	132	132	132	132	132	133		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.5	5.8	5.1	4.5		
36000	TOFL	3700	3760	3820	3870	3930	3980	4040	4210	4480	4830	5200	133	182
	V1	114	114	114	114	114	114	114	115	116	119	121		
	VR	120	120	120	120	120	120	120	120	121	122	124		
	V2	130	130	130	130	130	130	130	130	130	130	131		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	6.9	6.2	5.5	4.9		
35000	TOFL	3530	3580	3630	3680	3740	3790	3840	4010	4240	4540	4870	131	180
	V1	112	112	112	112	112	112	112	113	114	116	118		
	VR	118	118	118	118	118	118	118	118	119	120	121		
	V2	129	129	129	129	129	129	129	128	128	128	128		
	GR2	8	8	8	8	8	8	8	7.4	6.6	5.9	5.3		
34000	TOFL	3370	3420	3470	3520	3570	3620	3670	3810	4040	4270	4560	129	177
	V1	110	110	110	110	110	110	110	110	112	113	115		
	VR	116	116	116	116	116	116	116	116	117	117	118		
	V2	127	127	127	127	127	127	127	126	126	126	126		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	7.8	7.1	6.3	5.7		
33000	TOFL	3230	3280	3330	3380	3420	3470	3520	3630	3830	4040	4270	127	174
	V1	108	108	108	108	108	108	108	108	109	110	112		
	VR	114	114	114	114	114	114	114	114	115	115	116		
	V2	125	125	125	125	125	125	125	125	124	124	124		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	8.4	7.5	6.8	6.1		
32000	TOFL	3110	3150	3200	3240	3290	3330	3380	3480	3630	3840	4040	125	171
	V1	106	106	106	106	106	106	106	106	107	108	109		
	VR	112	112	112	112	112	112	112	112	112	113	113		
	V2	124	124	124	124	124	124	124	123	122	122	122		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	8.9	8	7.3	6.5		
31000	TOFL	2990	3030	3070	3120	3160	3200	3240	3330	3470	3630	3820	123	168
	V1	105	104	104	104	104	104	104	104	105	105	107		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	122	121	120	120		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	9.5	8.6	7.8	7		

FIGURE 5-54. TAKE-OFF DISTANCE; FLAPS - 20°; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
30000	TOFL	2870	2910	2950	3000	3040	3080	3120	3200	3310	3450	3610	121	166
	V1	103	103	103	103	103	102	102	103	103	103	104		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	121	120	119	118		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.1	9.2	8.3	7.6		
29000	TOFL	2770	2810	2850	2890	2930	2970	3010	3070	3170	3290	3420	119	163
	V1	101	101	101	101	101	101	101	101	101	101	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	121	121	121	121	121	121	121	120	119	118	117		
	GR2	11.6	11.6	11.6	11.6	11.6	11.6	11.6	10.8	9.8	8.9	8.1		
28000	TOFL	2750	2780	2820	2860	2900	2940	2980	2950	3040	3140	3250	117	160
	V1	101	101	101	101	101	101	101	99	99	99	100		
	VR	106	106	106	106	106	106	106	106	105	105	105		
	V2	120	120	120	120	120	120	120	119	118	116	115		
	GR2	12.3	12.3	12.3	12.3	12.3	12.3	12.3	11.5	10.5	9.6	8.7		
27000	TOFL	2720	2760	2800	2840	2880	2920	2950	2920	2910	3000	3100	115	157
	V1	102	102	102	102	102	101	101	99	97	97	98		
	VR	104	104	104	104	104	104	104	104	104	103	103		
	V2	119	119	119	119	119	119	119	118	117	115	114		
	GR2	13.1	13.1	13.1	13.1	13.1	13.1	13.1	12.2	11.2	10.3	9.4		
26000	TOFL	2700	2740	2780	2810	2850	2890	2930	2900	2850	2870	2960	113	154
	V1	102	102	102	102	102	102	102	100	97	96	96		
	VR	103	103	103	103	103	103	103	102	102	102	102		
	V2	119	119	119	119	119	119	119	117	115	114	113		
	GR2	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13	12	11	10.1		

FIGURE 5-55. TAKE-OFF DISTANCE; FLAPS - 20°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.8	78.2	79.2	80.1	81.0	81.9	82.8	83.6	84.4	85.3	86.1		
39600	TOFL	4020	4080	4140	4210	4280	4340	4400	4460	4540	4610	4680	139	193
	V1	127	127	126	126	126	126	126	126	125	125	125		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
39000	TOFL	3880	3920	3990	4060	4120	4180	4240	4300	4370	4440	4510	138	191
	V1	125	125	124	124	124	124	124	124	124	123	123		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	136	136	136		
	GR2	6	6	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1		
38000	TOFL	3640	3690	3750	3810	3870	3930	3990	4040	4110	4170	4240	136	188
	V1	121	121	121	121	121	121	120	120	120	120	120		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.5	6.5	6.5	6.5		
37000	TOFL	3430	3480	3540	3600	3660	3710	3770	3820	3880	3950	4010	135	185
	V1	118	118	118	118	118	118	117	117	117	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	132	132	132	132	132	132	132		
	GR2	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9		
36000	TOFL	3260	3300	3360	3410	3470	3520	3580	3630	3690	3740	3800	133	183
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	130	130	130	130	130		
	GR2	7.1	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	3100	3150	3200	3250	3300	3350	3400	3450	3520	3570	3620	131	180
	V1	113	113	113	113	113	113	112	112	112	112	112		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
34000	TOFL	2960	3000	3050	3100	3150	3200	3240	3290	3340	3400	3450	129	177
	V1	111	111	111	111	110	110	110	110	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.1	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2		
33000	TOFL	2830	2870	2920	2970	3020	3060	3110	3160	3210	3260	3310	127	174
	V1	109	109	109	109	108	108	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.8	8.8	8.8	8.8		
32000	TOFL	2720	2760	2810	2850	2900	2940	2980	3030	3080	3130	3170	125	171
	V1	107	107	107	107	107	107	106	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.1	9.1	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3		
31000	TOFL	2620	2660	2700	2750	2790	2840	2880	2920	2970	3010	3060	123	169
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.7	9.8	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 5-55. TAKE-OFF DISTANCE; FLAPS - 20°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.8	78.2	79.2	80.1	81.0	81.9	82.8	83.6	84.4	85.3	86.1		
30000	TOFL	2520	2560	2600	2640	2680	2720	2760	2810	2850	2890	2930	121	166
	V1	104	104	104	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.5		
29000	TOFL	2430	2460	2500	2540	2580	2620	2660	2700	2740	2780	2820	119	163
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11	11	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2		
28000	TOFL	2340	2370	2420	2460	2500	2550	2590	2630	2680	2720	2760	117	160
	V1	100	100	100	100	101	101	101	101	101	101	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	120	120	120	120	120	120	120	120	120		
	GR2	11.7	11.8	11.8	11.8	11.8	11.9	11.9	11.9	11.9	11.9	11.9		
27000	TOFL	2320	2360	2400	2440	2480	2530	2570	2610	2650	2690	2730	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	119	119	119	119	119	119	119		
	GR2	12.5	12.5	12.5	12.6	12.6	12.6	12.7	12.7	12.7	12.7	12.7		
26000	TOFL	2300	2340	2380	2420	2460	2510	2550	2590	2630	2670	2710	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	118	118	118	118	118	118		
	GR2	13.3	13.3	13.4	13.4	13.4	13.4	13.5	13.5	13.5	13.5	13.5		

FIGURE 5-55. TAKE-OFF DISTANCE; FLAPS - 20°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
39600	TOFL	4750	4830	4900	4970	5050	5120	5290	5690	6160	6650	6940	139	193
	V1	125	125	125	125	125	125	126	128	131	133	134		
	VR	129	129	129	129	129	129	130	132	133	135	136		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.1	4.5	3.9	3.5		
39000	TOFL	4580	4650	4720	4790	4860	4930	5100	5470	5920	6390	6690	138	191
	V1	123	123	123	123	123	123	124	126	129	131	132		
	VR	128	128	128	128	128	128	128	130	132	133	134		
	V2	136	136	136	136	136	136	137	137	138	139	140		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	5.9	5.3	4.7	4.1	3.7		
38000	TOFL	4300	4370	4430	4500	4560	4630	4780	5120	5540	5980	6270	136	188
	V1	120	120	120	120	120	120	120	123	125	128	129		
	VR	125	125	125	125	125	125	125	127	128	130	131		
	V2	134	134	134	134	134	134	134	135	135	136	137		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.3	5.7	5	4.4	4.1		
37000	TOFL	4070	4130	4190	4250	4320	4380	4500	4800	5180	5590	5850	135	185
	V1	117	117	117	117	117	117	117	119	122	124	125		
	VR	122	122	122	122	122	122	122	124	125	127	128		
	V2	132	132	132	132	132	132	132	132	133	134	134		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.6	6.1	5.4	4.8	4.4		
36000	TOFL	3860	3920	3980	4030	4090	4150	4260	4500	4840	5220	5470	133	183
	V1	114	114	114	114	114	114	115	116	118	121	122		
	VR	120	120	120	120	120	120	120	121	122	124	125		
	V2	130	130	130	130	130	130	130	130	130	131	131		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.1	6.4	5.8	5.1	4.7		
35000	TOFL	3680	3730	3790	3840	3900	3950	4050	4260	4550	4890	5120	131	180
	V1	112	112	112	112	112	112	112	113	115	117	119		
	VR	118	118	118	118	118	118	118	119	120	121	122		
	V2	128	128	128	128	128	128	128	128	128	128	129		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.5	6.9	6.2	5.5	5.1		
34000	TOFL	3500	3550	3610	3650	3710	3760	3860	4050	4290	4590	4790	129	177
	V1	110	110	110	110	110	110	110	111	112	114	116		
	VR	116	116	116	116	116	116	116	116	117	118	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8	7.3	6.6	5.9	5.5		
33000	TOFL	3350	3400	3450	3500	3550	3600	3680	3840	4060	4300	4490	127	174
	V1	108	108	108	108	108	108	108	108	110	111	112		
	VR	114	114	114	114	114	114	114	114	115	116	116		
	V2	125	125	125	125	125	125	125	124	124	124	124		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.5	7.8	7.1	6.3	5.9		
32000	TOFL	3220	3260	3310	3360	3410	3450	3530	3650	3840	4060	4200	125	171
	V1	106	106	106	106	106	106	106	106	107	108	109		
	VR	112	112	112	112	112	112	112	112	113	113	114		
	V2	124	124	124	124	124	124	124	123	122	122	122		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.1	8.3	7.5	6.8	6.3		
31000	TOFL	3100	3150	3190	3240	3280	3330	3390	3490	3640	3840	3960	123	169
	V1	105	104	104	104	104	104	104	104	105	106	107		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	121	120	120	120		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.6	8.9	8.1	7.3	6.8		

FIGURE 5-55. TAKE-OFF DISTANCE; FLAPS - 20°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
30000	TOFL	2980	3020	3060	3110	3150	3190	3250	3350	3470	3620	3740	121	166
	V1	103	103	103	103	103	102	102	103	103	103	104		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	121	120	119	118	118		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.3	9.5	8.6	7.8	7.3		
29000	TOFL	2860	2900	2940	2980	3020	3060	3120	3210	3320	3440	3530	119	163
	V1	101	101	101	101	101	101	101	101	101	101	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	121	121	121	121	121	121	120	119	118	117	116		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	10.9	10.2	9.3	8.4	7.9		
28000	TOFL	2800	2840	2880	2920	2960	3000	3020	3080	3180	3280	3350	117	160
	V1	100	100	100	100	100	100	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	105	105	105		
	V2	120	120	120	120	120	120	119	118	117	116	115		
	GR2	11.9	11.9	11.9	11.9	11.9	11.9	11.6	10.8	9.9	9	8.5		
27000	TOFL	2770	2810	2850	2890	2930	2970	2990	2960	3040	3130	3200	115	157
	V1	101	101	101	100	100	100	100	98	97	97	98		
	VR	104	104	104	104	104	104	104	104	104	103	103		
	V2	119	119	119	119	119	119	118	117	116	114	114		
	GR2	12.7	12.7	12.7	12.7	12.7	12.7	12.4	11.6	10.6	9.7	9.2		
26000	TOFL	2750	2790	2830	2870	2900	2940	2960	2930	2910	2990	3050	113	154
	V1	101	101	101	101	101	101	100	98	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	118	118	118	118	118	118	117	116	115	113	113		
	GR2	13.5	13.5	13.5	13.5	13.5	13.5	13.2	12.4	11.4	10.4	9.9		

FIGURE 5-56. TAKE-OFF DISTANCE; FLAPS - 20°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.3	79.0	79.9	80.8	81.7	82.6	83.4	84.3	85.1	85.9	86.8		
39600	TOFL	4240	4320	4400	4460	4540	4610	4680	4760	4840	4920	5000	140	193
	V1	128	128	128	128	128	127	127	127	127	127	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	4090	4160	4230	4310	4370	4440	4510	4590	4660	4740	4810	139	191
	V1	126	126	126	126	126	125	125	125	125	125	125		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.9	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	3840	3900	3970	4040	4110	4170	4230	4300	4380	4450	4510	137	189
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
37000	TOFL	3610	3660	3730	3790	3860	3920	3980	4040	4110	4170	4240	135	186
	V1	119	119	119	119	119	119	119	118	118	118	118		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	3400	3450	3520	3580	3640	3690	3750	3810	3870	3940	4000	133	183
	V1	116	116	116	116	116	116	115	115	115	115	115		
	VR	121	121	121	120	120	120	120	120	120	120	120		
	V2	129	130	130	130	130	130	130	130	130	130	130		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
35000	TOFL	3210	3260	3320	3370	3430	3480	3550	3600	3660	3720	3780	131	180
	V1	113	113	113	113	113	113	113	113	113	112	112		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	128	128	128	128	128		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	3060	3110	3160	3220	3270	3320	3370	3430	3480	3540	3600	129	177
	V1	111	111	111	111	110	110	110	110	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
33000	TOFL	2930	2970	3020	3070	3120	3170	3220	3270	3320	3380	3430	127	175
	V1	109	109	109	108	108	108	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
32000	TOFL	2810	2850	2900	2950	3000	3050	3090	3140	3190	3240	3290	125	172
	V1	107	107	107	107	107	106	106	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9	8.9	8.9	8.9	8.9	8.9	9	9	9	9	9		
31000	TOFL	2710	2750	2790	2840	2890	2930	2980	3030	3070	3120	3170	123	169
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6		

FIGURE 5-56. TAKE-OFF DISTANCE; FLAPS - 20°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.3	79.0	79.9	80.8	81.7	82.6	83.4	84.3	85.1	85.9	86.8		
30000	TOFL	2600	2640	2690	2730	2780	2820	2860	2910	2950	3000	3040	121	166
	V1	104	104	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.2	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		
29000	TOFL	2500	2540	2580	2620	2670	2710	2750	2790	2840	2880	2920	119	163
	V1	102	102	102	102	102	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9		
28000	TOFL	2410	2440	2480	2520	2560	2600	2650	2690	2730	2770	2810	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.6	11.5	11.5	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6		
27000	TOFL	2380	2410	2450	2490	2540	2580	2620	2660	2710	2750	2790	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3		
26000	TOFL	2360	2390	2430	2470	2510	2560	2600	2640	2680	2720	2760	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1		

FIGURE 5-56. TAKE-OFF DISTANCE; FLAPS - 20°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.6	88.4	89.2	90.1	90.9	91.7	91.5	90.8	90.1	89.5	89.4		
39600	TOFL	5070	5150	5230	5310	5390	5470	5790	6250	6740	7260	7370	140	193
	V1	127	127	127	127	127	127	128	131	133	135	136		
	VR	131	131	131	131	131	131	132	134	136	137	138		
	V2	139	139	139	139	139	139	140	141	142	142	143		
	GR2	5.7	5.7	5.7	5.7	5.7	5.6	5.3	4.7	4.1	3.5	3.4		
39000	TOFL	4890	4960	5040	5110	5190	5270	5570	6010	6480	6980	7090	139	191
	V1	125	125	125	125	125	125	126	129	131	133	134		
	VR	129	129	129	129	129	129	130	132	134	135	136		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	5.9	5.9	5.9	5.9	5.9	5.8	5.5	4.9	4.3	3.7	3.6		
38000	TOFL	4580	4650	4730	4800	4870	4940	5210	5620	6060	6540	6650	137	189
	V1	121	121	121	121	121	121	123	125	128	130	130		
	VR	126	126	126	126	126	126	127	129	131	132	133		
	V2	135	135	135	135	135	135	136	136	137	138	138		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	5.8	5.3	4.6	4	3.9		
37000	TOFL	4300	4370	4430	4500	4560	4630	4880	5250	5660	6110	6210	135	186
	V1	118	118	118	118	118	118	119	122	124	126	127		
	VR	123	123	123	123	123	123	124	126	127	129	129		
	V2	132	132	132	132	132	132	133	133	134	135	135		
	GR2	6.6	6.6	6.6	6.6	6.6	6.5	6.2	5.6	5	4.3	4.2		
36000	TOFL	4060	4120	4180	4240	4300	4360	4570	4910	5280	5700	5790	133	183
	V1	115	115	115	115	115	115	116	118	121	123	123		
	VR	120	120	120	120	120	120	121	123	124	126	126		
	V2	130	130	130	130	130	130	130	131	131	132	132		
	GR2	7	7	7	7	7	6.9	6.6	6	5.3	4.7	4.6		
35000	TOFL	3830	3890	3950	4010	4060	4120	4300	4580	4920	5310	5390	131	180
	V1	112	112	112	112	112	112	113	115	117	119	120		
	VR	118	118	118	118	118	118	118	119	121	123	123		
	V2	128	128	128	128	128	128	128	128	129	129	129		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7	6.4	5.7	5.1	4.9		
34000	TOFL	3650	3700	3760	3810	3870	3920	4080	4310	4610	4960	5040	129	177
	V1	110	110	110	110	110	110	110	112	114	116	117		
	VR	116	116	116	116	116	116	116	117	118	120	120		
	V2	126	126	126	126	126	126	126	126	126	127	127		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.5	6.8	6.1	5.4	5.3		
33000	TOFL	3480	3530	3580	3630	3680	3740	3880	4070	4330	4640	4710	127	175
	V1	108	108	108	108	108	108	108	109	111	113	113		
	VR	114	114	114	114	114	114	114	114	115	117	117		
	V2	125	125	125	125	125	125	125	124	124	124	125		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8	7.3	6.6	5.8	5.7		
32000	TOFL	3340	3390	3440	3490	3540	3580	3690	3860	4070	4340	4400	125	172
	V1	106	106	106	106	106	106	106	107	108	110	110		
	VR	112	112	112	112	112	112	112	112	113	114	114		
	V2	123	123	123	123	123	123	123	122	122	122	122		
	GR2	9	9	9	9	9	8.9	8.5	7.8	7	6.3	6.1		
31000	TOFL	3210	3260	3310	3360	3400	3450	3530	3670	3860	4070	4120	123	169
	V1	104	104	104	104	104	104	104	104	105	107	107		
	VR	111	111	111	111	111	111	110	110	111	111	112		
	V2	122	122	122	122	122	122	122	121	120	120	120		
	GR2	9.6	9.6	9.6	9.6	9.6	9.5	9.1	8.3	7.5	6.8	6.6		

FIGURE 5-56. TAKE-OFF DISTANCE; FLAPS - 20°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.6	88.4	89.2	90.1	90.9	91.7	91.5	90.8	90.1	89.5	89.4		
30000	TOFL	3090	3130	3180	3220	3270	3310	3400	3510	3640	3830	3870	121	166
	V1	103	103	103	103	103	102	102	102	103	104	104		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	119	118	118	118		
	GR2	10.2	10.2	10.2	10.2	10.2	10.1	9.7	8.9	8.1	7.3	7.1		
29000	TOFL	2960	3010	3050	3090	3130	3180	3260	3360	3470	3620	3650	119	163
	V1	101	101	101	101	101	101	101	101	101	101	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	118	117	116	116		
	GR2	10.9	10.9	10.9	10.9	10.9	10.8	10.3	9.5	8.7	7.8	7.7		
28000	TOFL	2850	2890	2940	2980	3020	3050	3120	3220	3320	3430	3460	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	105	105	105	105		
	V2	119	119	119	119	119	119	118	117	116	115	114		
	GR2	11.6	11.6	11.6	11.6	11.6	11.5	11	10.2	9.3	8.4	8.3		
27000	TOFL	2830	2870	2910	2950	2990	3020	3030	3080	3170	3280	3290	115	157
	V1	100	100	100	100	99	99	98	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	103	103	103		
	V2	118	118	118	118	118	118	117	116	115	114	113		
	GR2	12.3	12.3	12.3	12.3	12.3	12.2	11.8	10.9	10	9.1	8.9		
26000	TOFL	2800	2840	2880	2920	2960	3000	3000	2980	3030	3130	3150	113	154
	V1	100	100	100	100	100	100	98	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	116	115	114	113	112		
	GR2	13.1	13.1	13.1	13.1	13.1	13	12.5	11.7	10.8	9.8	9.6		

FIGURE 5-57. TAKE-OFF DISTANCE; FLAPS - 20°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.4	82.3	83.2	84.1	84.9	85.7	86.6	87.4		
39600	TOFL	4510	4600	4690	4780	4860	4940	5030	5110	5190	5280	5360	141	193
	V1	130	130	130	130	130	129	129	129	129	129	129		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	141	141	141	141	141	141	140	140	140	140	140		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
39000	TOFL	4330	4430	4520	4600	4680	4760	4830	4920	5000	5080	5160	140	192
	V1	128	128	128	128	127	127	127	127	127	127	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	139	139	139	139	139	139	139	139	139	139		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
38000	TOFL	4070	4160	4230	4310	4390	4460	4530	4610	4680	4760	4830	137	189
	V1	124	124	124	124	124	124	124	124	124	123	123		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	6.1	5.9	5.9	5.9	5.9	6	6	6	6	6	6		
37000	TOFL	3810	3890	3970	4040	4110	4180	4240	4320	4390	4460	4530	135	186
	V1	121	121	121	121	120	120	120	120	120	120	120		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
36000	TOFL	3580	3650	3720	3790	3850	3920	3980	4050	4110	4180	4240	133	183
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
35000	TOFL	3370	3430	3500	3570	3630	3690	3740	3810	3870	3930	3990	131	181
	V1	114	114	114	114	114	114	114	114	113	113	113		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.3	7.1	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2		
34000	TOFL	3190	3250	3310	3360	3430	3490	3550	3600	3660	3720	3770	129	178
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
33000	TOFL	3040	3090	3150	3200	3260	3310	3360	3420	3470	3530	3580	127	175
	V1	109	109	109	109	109	108	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
32000	TOFL	2910	2960	3010	3070	3120	3170	3220	3270	3320	3380	3430	125	172
	V1	107	107	107	107	107	107	106	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.8	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
31000	TOFL	2800	2850	2900	2950	3000	3050	3100	3150	3190	3240	3290	123	169
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		

FIGURE 5-57. TAKE-OFF DISTANCE; FLAPS - 20°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.4	82.3	83.2	84.1	84.9	85.7	86.6	87.4		
30000	TOFL	2700	2740	2790	2840	2880	2930	2980	3020	3070	3120	3170	121	166
	V1	104	104	104	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
29000	TOFL	2590	2630	2680	2720	2770	2810	2860	2900	2940	2990	3030	119	163
	V1	102	102	102	102	102	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.5		
28000	TOFL	2490	2530	2570	2610	2660	2700	2740	2790	2830	2870	2910	117	160
	V1	100	100	100	100	100	100	100	100	100	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.1	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2		
27000	TOFL	2430	2460	2500	2540	2590	2630	2670	2720	2760	2800	2840	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		
26000	TOFL	2410	2440	2480	2520	2560	2610	2650	2690	2730	2770	2810	113	154
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7		

FIGURE 5-57. TAKE-OFF DISTANCE; FLAPS - 20°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
39600	TOFL	5450	5530	5620	5710	5790	5950	6380	6890	7410	7880		141	193
	V1	129	129	129	129	129	129	131	134	136	137			
	VR	133	133	133	133	133	133	135	137	138	139			
	V2	140	140	140	140	140	140	142	142	143	144			
	GR2	5.4	5.4	5.4	5.4	5.4	5.2	4.8	4.3	3.7	3.2			
39000	TOFL	5240	5320	5410	5490	5570	5720	6140	6610	7130	7570		140	192
	V1	127	127	127	127	127	127	129	131	134	135			
	VR	131	131	131	131	131	131	133	135	136	137			
	V2	139	139	139	139	139	139	140	141	141	142			
	GR2	5.6	5.6	5.6	5.6	5.6	5.4	5	4.5	3.9	3.4			
38000	TOFL	4910	4990	5060	5140	5220	5360	5740	6190	6670	7090		137	189
	V1	123	123	123	123	123	124	126	128	130	132			
	VR	128	128	128	128	128	128	130	132	133	134			
	V2	136	136	136	136	136	136	137	138	139	139			
	GR2	6	6	6	6	5.9	5.7	5.4	4.8	4.2	3.7			
37000	TOFL	4600	4670	4740	4810	4880	5010	5370	5780	6230	6630		135	186
	V1	120	120	120	120	120	120	122	125	127	129			
	VR	125	125	125	125	125	125	127	128	130	131			
	V2	133	133	133	133	133	133	134	135	136	137			
	GR2	6.3	6.3	6.3	6.3	6.3	6.1	5.7	5.1	4.5	4			
36000	TOFL	4310	4370	4440	4510	4570	4690	5010	5390	5810	6180		133	183
	V1	116	116	116	116	116	117	119	121	123	125			
	VR	122	122	122	122	122	122	123	125	127	128			
	V2	131	131	131	131	131	131	132	132	133	134			
	GR2	6.7	6.7	6.7	6.7	6.7	6.5	6.1	5.5	4.9	4.4			
35000	TOFL	4050	4110	4180	4240	4300	4400	4670	5030	5410	5750		131	181
	V1	113	113	113	113	113	113	115	117	120	122			
	VR	119	119	119	119	119	119	120	122	123	125			
	V2	128	128	128	128	128	128	129	130	130	131			
	GR2	7.2	7.2	7.1	7.1	7.1	6.9	6.5	5.9	5.3	4.7			
34000	TOFL	3830	3890	3950	4000	4060	4150	4380	4680	5030	5350		129	178
	V1	111	111	110	110	110	111	112	114	116	118			
	VR	116	116	116	116	116	116	117	119	120	121			
	V2	126	126	126	126	126	126	126	127	127	128			
	GR2	7.6	7.6	7.6	7.6	7.6	7.3	6.9	6.3	5.6	5.1			
33000	TOFL	3630	3700	3750	3800	3860	3940	4130	4380	4690	4980		127	175
	V1	108	108	108	108	108	108	109	110	113	114			
	VR	114	114	114	114	114	114	115	116	117	118			
	V2	124	124	124	124	124	124	124	124	125	125			
	GR2	8.1	8.1	8.1	8.1	8	7.8	7.4	6.7	6.1	5.5			
32000	TOFL	3480	3530	3580	3630	3690	3760	3920	4120	4390	4650		125	172
	V1	106	106	106	106	106	106	107	108	109	111			
	VR	112	112	112	112	112	112	112	113	114	115			
	V2	123	123	123	123	123	123	123	122	122	123			
	GR2	8.6	8.6	8.6	8.6	8.6	8.3	7.9	7.2	6.5	5.9			
31000	TOFL	3340	3390	3440	3490	3540	3600	3720	3890	4110	4330		123	169
	V1	104	104	104	104	104	104	104	105	106	108			
	VR	111	111	111	111	111	111	111	111	111	112			
	V2	122	122	122	122	122	122	121	120	120	120			
	GR2	9.2	9.2	9.2	9.2	9.2	8.9	8.4	7.7	7	6.4			

FIGURE 5-57. TAKE-OFF DISTANCE; FLAPS - 20°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
30000	TOFL	3210	3260	3310	3350	3400	3460	3560	3700	3880	4050		121	166
	V1	103	103	103	103	103	103	102	103	104	105			
	VR	109	109	109	109	109	109	109	109	109	110			
	V2	121	121	121	121	121	121	120	119	118	118			
	GR2	9.8	9.8	9.8	9.8	9.8	9.5	9	8.3	7.5	6.9			
29000	TOFL	3080	3120	3170	3210	3260	3310	3420	3520	3660	3820		119	163
	V1	101	101	101	101	101	101	101	101	101	102			
	VR	107	107	107	107	107	107	107	107	107	107			
	V2	120	120	120	120	120	120	119	117	116	116			
	GR2	10.5	10.5	10.5	10.5	10.4	10.1	9.6	8.9	8.1	7.4			
28000	TOFL	2950	3000	3040	3080	3120	3170	3270	3370	3480	3600		117	160
	V1	99	99	99	99	99	99	99	99	99	100			
	VR	106	106	106	106	106	106	106	105	105	105			
	V2	119	119	119	119	119	118	118	116	115	114			
	GR2	11.2	11.2	11.2	11.2	11.1	10.8	10.3	9.5	8.7	8			
27000	TOFL	2880	2920	2970	3010	3040	3060	3130	3220	3330	3410		115	157
	V1	99	99	98	98	98	98	97	97	97	98			
	VR	104	104	104	104	104	104	104	104	103	103			
	V2	118	118	118	118	118	117	117	115	114	113			
	GR2	11.9	11.9	11.9	11.9	11.9	11.5	11	10.2	9.4	8.6			
26000	TOFL	2860	2900	2940	2980	3010	3030	3040	3080	3170	3260		113	154
	V1	99	99	99	99	99	98	96	95	96	96			
	VR	102	102	102	102	102	102	102	102	102	102			
	V2	117	117	117	117	117	116	115	114	113	112			
	GR2	12.7	12.7	12.7	12.7	12.6	12.3	11.8	11	10.1	9.3			

FIGURE 5-58. TAKE-OFF DISTANCE; FLAPS - 20°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
39600	TOFL	4850	4950	5050	5140	5230	5320	5410	5500	5590	5680	5780	142	194
	V1	132	132	132	132	131	131	131	131	131	131	131		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	4660	4760	4850	4940	5030	5110	5200	5290	5380	5470	5550	141	192
	V1	130	130	130	129	129	129	129	129	129	129	129		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	4370	4460	4550	4630	4710	4790	4870	4950	5040	5120	5200	138	189
	V1	126	126	126	126	126	126	126	126	125	125	125		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	4090	4180	4260	4330	4410	4480	4560	4630	4710	4780	4860	136	187
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	127	127	127	127	127	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	3830	3910	3980	4050	4120	4190	4260	4330	4400	4470	4540	133	184
	V1	119	119	119	119	119	119	118	118	118	118	118		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	3590	3660	3730	3790	3860	3920	3990	4050	4120	4180	4250	131	181
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
34000	TOFL	3380	3440	3500	3560	3620	3680	3750	3810	3870	3930	3990	129	178
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	3190	3250	3310	3370	3420	3490	3550	3600	3660	3720	3770	127	175
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	125	125	125	125	125	125		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
32000	TOFL	3030	3090	3150	3200	3250	3310	3360	3420	3470	3520	3580	125	172
	V1	107	107	107	107	107	107	107	107	107	107	106		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
31000	TOFL	2910	2960	3010	3070	3120	3170	3220	3270	3320	3380	3430	123	169
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	121	121	121	121	121	121	121	121	121	121		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 5-58. TAKE-OFF DISTANCE; FLAPS - 20°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
30000	TOFL	2800	2840	2890	2940	2990	3040	3090	3140	3190	3240	3290	121	166
	V1	104	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	120	120	120	120	120	120	120	120	120	120		
	GR2	9.6	9.4	9.4	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	2690	2730	2780	2830	2880	2920	2970	3020	3060	3110	3160	119	163
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
28000	TOFL	2580	2620	2670	2710	2760	2800	2850	2890	2930	2980	3020	117	160
	V1	100	100	100	100	100	100	100	100	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
27000	TOFL	2480	2520	2560	2600	2640	2680	2730	2770	2810	2850	2890	115	157
	V1	98	98	98	98	98	98	98	98	98	98	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.6	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		
26000	TOFL	2450	2480	2520	2570	2610	2650	2700	2740	2780	2820	2870	113	154
	V1	99	98	98	98	98	98	98	98	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.4	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3		

FIGURE 5-58. TAKE-OFF DISTANCE; FLAPS - 20°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
39600	TOFL	5870	5960	6050	6150	6250	6570	7070	7610	8200	8440		142	194
	V1	131	131	131	131	131	132	134	136	138	139			
	VR	135	135	135	135	135	136	138	139	141	141			
	V2	142	142	142	142	142	142	143	144	145	145			
	GR2	5.2	5.2	5.2	5.2	5	4.8	4.3	3.8	3.3	3			
39000	TOFL	5640	5730	5820	5910	6010	6310	6800	7320	7880	8130		141	192
	V1	129	129	129	129	129	130	132	134	136	137			
	VR	133	133	133	133	133	134	136	137	139	139			
	V2	140	140	140	140	140	141	142	142	143	143			
	GR2	5.4	5.4	5.4	5.4	5.2	4.9	4.5	4	3.5	3.2			
38000	TOFL	5280	5360	5450	5530	5620	5910	6350	6840	7370	7610		138	189
	V1	125	125	125	125	125	127	129	131	133	134			
	VR	130	130	130	130	130	131	132	134	136	136			
	V2	137	137	137	137	137	138	139	140	140	141			
	GR2	5.7	5.7	5.7	5.7	5.6	5.3	4.9	4.4	3.8	3.5			
37000	TOFL	4940	5010	5090	5170	5260	5520	5930	6390	6890	7110		136	187
	V1	122	122	122	122	122	123	125	127	130	130			
	VR	126	126	126	126	126	128	129	131	132	133			
	V2	135	135	135	135	135	135	136	137	138	138			
	GR2	6.1	6.1	6.1	6.1	5.9	5.6	5.2	4.7	4.1	3.9			
36000	TOFL	4610	4680	4750	4820	4910	5150	5540	5960	6420	6630		133	184
	V1	118	118	118	118	118	119	122	124	126	127			
	VR	123	123	123	123	123	124	126	128	129	130			
	V2	132	132	132	132	132	132	133	134	135	135			
	GR2	6.5	6.5	6.5	6.5	6.3	6	5.6	5.1	4.4	4.2			
35000	TOFL	4320	4380	4450	4510	4590	4800	5160	5550	5970	6160		131	181
	V1	115	115	115	115	115	116	118	120	122	123			
	VR	120	120	120	120	120	121	123	124	126	126			
	V2	129	129	129	129	129	129	130	131	132	132			
	GR2	6.9	6.9	6.9	6.9	6.7	6.4	6	5.4	4.8	4.6			
34000	TOFL	4050	4110	4170	4240	4300	4490	4800	5160	5550	5730		129	178
	V1	112	112	111	111	111	112	114	117	119	120			
	VR	117	117	117	117	117	118	119	121	122	123			
	V2	127	127	127	127	127	127	127	128	129	129			
	GR2	7.3	7.3	7.3	7.3	7.1	6.8	6.4	5.8	5.2	4.9			
33000	TOFL	3830	3890	3950	4000	4070	4210	4470	4790	5150	5320		127	175
	V1	109	109	109	109	109	109	111	113	115	116			
	VR	115	115	115	115	115	115	116	118	119	120			
	V2	125	125	125	125	125	125	125	125	126	126			
	GR2	7.8	7.8	7.8	7.8	7.6	7.2	6.8	6.2	5.6	5.3			
32000	TOFL	3630	3690	3740	3800	3870	3990	4180	4460	4790	4940		125	172
	V1	106	106	106	106	107	107	108	109	112	113			
	VR	113	113	113	113	113	113	113	114	116	117			
	V2	123	123	123	123	123	123	123	123	123	124			
	GR2	8.3	8.3	8.3	8.3	8.1	7.7	7.2	6.7	6	5.7			
31000	TOFL	3480	3530	3580	3630	3690	3800	3960	4170	4460	4590		123	169
	V1	105	105	104	104	104	105	105	106	108	109			
	VR	111	111	111	111	111	111	111	112	113	114			
	V2	121	121	121	121	121	121	121	121	121	121			
	GR2	8.9	8.9	8.9	8.9	8.6	8.3	7.8	7.1	6.5	6.2			

FIGURE 5-58. TAKE-OFF DISTANCE; FLAPS - 20°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
30000	TOFL	3340	3390	3430	3480	3540	3620	3750	3940	4160	4280		121	166
	V1	103	103	103	103	103	103	103	104	105	106			
	VR	109	109	109	109	109	109	109	109	110	111			
	V2	120	120	120	120	120	120	119	119	119	119			
	GR2	9.5	9.5	9.5	9.5	9.2	8.8	8.3	7.7	6.9	6.7			
29000	TOFL	3200	3250	3300	3340	3390	3470	3580	3720	3910	3990		119	163
	V1	101	101	101	101	101	101	101	101	102	103			
	VR	108	108	108	108	108	107	107	107	107	108			
	V2	119	119	119	119	119	118	118	117	117	116			
	GR2	10.1	10.1	10.1	10.1	9.9	9.5	8.9	8.3	7.5	7.2			
28000	TOFL	3070	3110	3160	3200	3250	3320	3430	3540	3680	3760		117	160
	V1	99	99	99	99	99	99	99	99	100	100			
	VR	106	106	106	106	106	106	106	105	105	105			
	V2	118	118	118	118	118	117	117	115	114	115			
	GR2	10.8	10.8	10.8	10.8	10.6	10.1	9.6	8.9	8.1	7.7			
27000	TOFL	2940	2980	3020	3060	3110	3180	3280	3380	3490	3550		115	157
	V1	97	97	97	97	97	97	97	97	98	98			
	VR	104	104	104	104	104	104	104	104	103	103			
	V2	117	117	117	117	117	116	115	114	113	113			
	GR2	11.5	11.5	11.5	11.5	11.3	10.8	10.3	9.5	8.7	8.4			
26000	TOFL	2910	2950	2990	3030	3050	3060	3130	3230	3330	3370		113	154
	V1	98	98	98	98	97	96	95	96	96	96			
	VR	102	102	102	102	102	102	102	102	102	101			
	V2	116	116	116	116	116	115	114	113	112	111			
	GR2	12.3	12.3	12.3	12.3	12	11.6	11	10.3	9.4	9.1			

FIGURE 5-59. TAKE-OFF DISTANCE; FLAPS - 20°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.0	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5		
39600	TOFL	5200	5280	5380	5490	5580	5680	5780	5880	5980	6080	6180	143	194
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	5	5	4.9	4.9	4.9	5	5	5	5	5	5		
39000	TOFL	5000	5080	5180	5270	5370	5460	5560	5650	5740	5840	5930	142	193
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	141	141	141	141	141	141		
	GR2	5.2	5.2	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	4680	4750	4840	4930	5020	5110	5200	5280	5370	5460	5550	139	190
	V1	128	128	128	128	127	127	127	127	127	127	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	4370	4440	4530	4610	4690	4770	4860	4940	5020	5100	5180	137	187
	V1	124	124	124	124	124	124	124	124	123	123	123		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.9	5.9	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	4090	4150	4230	4310	4380	4460	4530	4610	4680	4760	4840	134	184
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	3820	3880	3950	4020	4090	4160	4230	4300	4370	4440	4510	132	181
	V1	117	117	117	117	117	116	116	116	116	116	116		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	3570	3630	3690	3760	3820	3890	3950	4020	4080	4150	4210	129	178
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7.1	7.1	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1		
33000	TOFL	3360	3420	3490	3540	3610	3660	3730	3790	3850	3910	3970	127	176
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	125	125	125	125	125	125	125	125	125	125		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
32000	TOFL	3180	3220	3280	3340	3400	3450	3510	3570	3620	3690	3750	125	173
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	123	123	123	123		
	GR2	8.1	8	8	8	8	8	8	8	8	8	8		
31000	TOFL	3030	3070	3130	3180	3230	3290	3340	3400	3450	3500	3560	123	170
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.6	8.6	8.5	8.5	8.5	8.6	8.6	8.6	8.6	8.6	8.6		

FIGURE 5-59. TAKE-OFF DISTANCE; FLAPS - 20°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.0	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5		
30000	TOFL	2900	2940	2990	3050	3100	3150	3200	3250	3300	3350	3410	121	167
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
29000	TOFL	2790	2830	2880	2920	2970	3020	3070	3120	3170	3220	3270	119	164
	V1	102	102	102	102	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.8	9.7	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
28000	TOFL	2670	2710	2760	2810	2850	2900	2950	2990	3040	3080	3130	117	161
	V1	100	100	100	100	100	100	100	100	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.5	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
27000	TOFL	2570	2600	2650	2690	2740	2780	2820	2870	2910	2960	3000	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.2	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.2		
26000	TOFL	2500	2540	2580	2620	2670	2710	2760	2800	2840	2890	2930	113	154
	V1	98	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 5-59. TAKE-OFF DISTANCE; FLAPS - 20°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	104.25			
	N1 (%)	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
39600	TOFL	6270	6380	6480	6570	6710	7230	7790	8380	8990	9000		143	194
	V1	133	133	133	133	133	135	137	139	141	141			
	VR	137	137	137	137	137	139	140	142	143	143			
	V2	143	143	143	143	143	144	145	146	146	146			
	GR2	5	5	5	4.9	4.6	4.3	3.9	3.4	2.9	2.9			
39000	TOFL	6030	6130	6220	6320	6450	6950	7490	8060	8650	8670		142	193
	V1	131	130	130	130	131	133	135	137	139	139			
	VR	135	135	135	135	135	136	138	140	141	141			
	V2	141	141	141	141	141	142	144	144	145	145			
	GR2	5.2	5.2	5.2	5.1	4.8	4.5	4.1	3.6	3	3			
38000	TOFL	5640	5730	5820	5910	6020	6490	6990	7520	8100	8120		139	190
	V1	127	127	127	127	127	129	131	133	135	135			
	VR	131	131	131	131	131	133	135	136	138	138			
	V2	139	139	139	139	139	139	141	141	142	142			
	GR2	5.5	5.5	5.5	5.5	5.1	4.8	4.5	3.9	3.4	3.3			
37000	TOFL	5260	5350	5430	5510	5620	6050	6520	7020	7570	7580		137	187
	V1	123	123	123	123	123	126	128	130	132	132			
	VR	128	128	128	128	128	130	131	133	135	135			
	V2	136	136	136	136	136	136	137	138	139	139			
	GR2	5.9	5.9	5.9	5.8	5.5	5.2	4.8	4.3	3.7	3.7			
36000	TOFL	4910	4990	5060	5140	5250	5650	6070	6540	7060	7070		134	184
	V1	120	120	120	120	120	122	124	126	129	129			
	VR	125	125	125	125	125	127	128	130	131	131			
	V2	133	133	133	133	133	134	135	135	136	136			
	GR2	6.2	6.2	6.2	6.2	5.8	5.5	5.2	4.6	4	4			
35000	TOFL	4580	4650	4720	4790	4890	5260	5650	6080	6560	6570		132	181
	V1	116	116	116	116	116	118	121	123	125	125			
	VR	121	121	121	121	121	123	125	126	128	128			
	V2	130	130	130	130	130	131	132	133	133	133			
	GR2	6.6	6.6	6.6	6.6	6.2	5.9	5.5	5	4.4	4.3			
34000	TOFL	4280	4350	4410	4480	4560	4890	5260	5650	6090	6100		129	178
	V1	113	112	112	112	113	115	117	119	121	121			
	VR	118	118	118	118	118	120	121	123	125	125			
	V2	127	127	127	127	127	128	129	130	130	130			
	GR2	7.1	7.1	7.1	7	6.6	6.3	5.9	5.3	4.7	4.7			
33000	TOFL	4030	4090	4150	4210	4290	4540	4880	5240	5650	5660		127	176
	V1	110	110	110	110	110	111	113	115	118	118			
	VR	115	115	115	115	115	116	118	120	121	121			
	V2	125	125	125	125	125	125	126	127	127	127			
	GR2	7.5	7.5	7.5	7.4	7.1	6.7	6.3	5.8	5.1	5.1			
32000	TOFL	3810	3860	3920	3980	4050	4250	4520	4860	5230	5240		125	173
	V1	107	107	107	107	107	108	109	112	114	114			
	VR	113	113	113	113	113	113	115	116	118	118			
	V2	123	123	123	123	123	123	123	124	124	125			
	GR2	8	8	8	7.9	7.5	7.2	6.8	6.2	5.5	5.5			
31000	TOFL	3610	3660	3720	3780	3850	4010	4210	4500	4840	4850		123	170
	V1	105	105	105	105	105	105	106	108	110	110			
	VR	111	111	111	111	111	111	111	113	114	115			
	V2	121	121	121	121	121	121	121	121	122	122			
	GR2	8.6	8.6	8.6	8.5	8.1	7.7	7.2	6.6	5.9	5.9			

FIGURE 5-59. TAKE-OFF DISTANCE; FLAPS - 20°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	104.25			
	N1 (%)	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
30000	TOFL	3460	3510	3560	3610	3680	3810	3980	4200	4490	4500		121	167
	V1	103	103	103	103	103	103	104	105	107	107			
	VR	109	109	109	109	109	109	109	110	111	111			
	V2	120	120	120	120	120	119	119	119	119	119			
	GR2	9.1	9.1	9.1	9.1	8.6	8.2	7.8	7.1	6.4	6.4			
29000	TOFL	3310	3360	3410	3460	3520	3630	3760	3950	4180	4180		119	164
	V1	101	101	101	101	101	101	101	102	103	103			
	VR	107	107	107	107	107	107	107	107	108	108			
	V2	119	119	119	119	118	118	117	117	117	117			
	GR2	9.8	9.8	9.8	9.7	9.3	8.8	8.4	7.7	6.9	6.9			
28000	TOFL	3180	3220	3270	3320	3370	3470	3580	3720	3910	3920		117	161
	V1	99	99	99	99	99	99	99	100	100	100			
	VR	106	106	106	106	106	106	105	105	106	106			
	V2	118	118	118	118	117	116	116	115	115	115			
	GR2	10.4	10.4	10.4	10.4	9.9	9.5	9	8.3	7.5	7.5			
27000	TOFL	3040	3090	3130	3170	3220	3320	3420	3540	3670	3670		115	157
	V1	97	97	97	97	97	97	97	97	98	98			
	VR	104	104	104	104	104	104	104	103	103	103			
	V2	117	117	117	117	116	115	114	113	112	112			
	GR2	11.2	11.2	11.2	11.1	10.6	10.2	9.6	8.9	8.1	8.1			
26000	TOFL	2970	3020	3060	3090	3080	3170	3270	3370	3480	3480		113	154
	V1	97	97	97	97	95	95	95	95	96	96			
	VR	102	102	102	102	102	102	102	102	102	102			
	V2	116	116	116	116	115	114	113	112	111	111			
	GR2	11.9	11.9	11.9	11.9	11.4	10.9	10.4	9.6	8.8	8.7			

FIGURE 5-60. TAKE-OFF DISTANCE; FLAPS - 20°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.3	82.0	83.0	83.9	84.8	85.6	86.5	87.4	88.2	89.1		
39600	TOFL	5560	5710	5860	5960	6050	6150	6260	6370	6480	6590	6690	144	195
	V1	136	136	136	136	136	135	135	135	135	135	135		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.8	4.7	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	5350	5480	5630	5720	5810	5910	6020	6120	6220	6320	6430	143	193
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	5	4.9	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	5000	5130	5260	5350	5440	5520	5620	5720	5810	5910	6010	140	190
	V1	130	130	130	130	130	130	129	129	129	129	129		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	4670	4790	4910	5000	5080	5160	5250	5340	5430	5520	5600	138	187
	V1	126	126	126	126	126	126	126	126	126	126	125		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.8	5.6	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	4360	4470	4580	4660	4730	4810	4890	4970	5060	5140	5220	135	185
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	127	127	127	127	127	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6.1	6	5.9	5.9	5.9	6	6	6	6	6	6		
35000	TOFL	4060	4160	4270	4340	4410	4480	4560	4630	4710	4780	4860	133	182
	V1	119	119	119	119	118	118	118	118	118	118	118		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.4		
34000	TOFL	3790	3880	3980	4040	4100	4170	4240	4310	4380	4450	4520	130	179
	V1	115	115	115	115	115	115	115	114	114	114	114		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.9	6.8	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	3540	3620	3710	3770	3830	3890	3950	4020	4080	4150	4210	127	176
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	7.4	7.2	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
32000	TOFL	3340	3420	3490	3550	3610	3660	3730	3790	3850	3910	3970	125	173
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.9	7.7	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
31000	TOFL	3160	3220	3290	3350	3400	3460	3520	3580	3640	3690	3750	123	170
	V1	106	106	106	106	106	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.4	8.2	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 5-60. TAKE-OFF DISTANCE; FLAPS - 20°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.3	82.0	83.0	83.9	84.8	85.6	86.5	87.4	88.2	89.1		
30000	TOFL	3010	3060	3120	3180	3230	3280	3330	3390	3440	3500	3550	121	167
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.9	8.8	8.7	8.7	8.7	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	2880	2930	2990	3040	3090	3140	3190	3240	3290	3340	3390	119	164
	V1	102	102	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.6	9.4	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
28000	TOFL	2770	2810	2870	2910	2960	3010	3060	3110	3160	3200	3250	117	161
	V1	100	100	100	100	100	100	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.3	10.1	9.9	10	10	10	10	10	10	10	10		
27000	TOFL	2650	2700	2750	2790	2840	2880	2930	2980	3020	3070	3110	115	158
	V1	98	98	98	98	98	98	98	98	98	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	11	10.8	10.6	10.7	10.7	10.7	10.7	10.7	10.8	10.8	10.8		
26000	TOFL	2560	2580	2630	2680	2720	2760	2810	2850	2900	2940	2990	113	155
	V1	97	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.7	11.5	11.4	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 5-60. TAKE-OFF DISTANCE; FLAPS - 20°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.3				
39600	TOFL	6810	6910	7030	7160	7480	8080	8680	9300	9700			144	195
	V1	135	135	135	135	136	138	140	142	143				
	VR	139	139	139	139	140	142	143	144	144				
	V2	145	145	145	145	145	146	147	147	148				
	GR2	4.7	4.7	4.7	4.5	4.2	3.9	3.5	2.9	2.6				
39000	TOFL	6530	6640	6740	6870	7180	7750	8340	8950	9340			143	193
	V1	133	133	133	133	134	136	138	140	141				
	VR	137	137	137	137	138	140	141	142	143				
	V2	143	143	143	143	143	144	145	146	146				
	GR2	4.9	4.9	4.8	4.7	4.3	4	3.6	3.1	2.8				
38000	TOFL	6100	6200	6300	6420	6700	7220	7790	8380	8760			140	190
	V1	129	129	129	129	130	133	135	136	137				
	VR	133	133	133	133	134	136	138	139	140				
	V2	140	140	140	140	140	141	142	143	143				
	GR2	5.2	5.2	5.2	5	4.7	4.4	4	3.4	3.1				
37000	TOFL	5690	5790	5880	5990	6250	6730	7250	7820	8180			138	187
	V1	125	125	125	126	127	129	131	133	134				
	VR	130	130	130	130	131	133	134	136	137				
	V2	137	137	137	137	137	138	139	140	141				
	GR2	5.6	5.6	5.5	5.3	5	4.7	4.3	3.8	3.4				
36000	TOFL	5300	5390	5470	5580	5820	6260	6750	7280	7630			135	185
	V1	122	122	122	122	123	125	127	129	131				
	VR	126	126	126	127	127	129	131	132	133				
	V2	134	134	134	134	134	135	136	137	138				
	GR2	6	6	5.9	5.7	5.4	5.1	4.6	4.1	3.7				
35000	TOFL	4940	5010	5090	5190	5420	5830	6270	6760	7090			133	182
	V1	118	118	118	118	119	121	123	126	127				
	VR	123	123	123	123	124	126	127	129	130				
	V2	131	131	131	131	131	133	133	134	135				
	GR2	6.3	6.3	6.3	6.1	5.7	5.4	5	4.4	4.1				
34000	TOFL	4590	4660	4740	4830	5030	5410	5820	6270	6580			130	179
	V1	114	114	114	114	115	118	120	122	123				
	VR	120	120	120	120	120	122	124	126	127				
	V2	128	128	128	128	128	130	131	131	132				
	GR2	6.8	6.8	6.7	6.5	6.1	5.8	5.4	4.8	4.4				
33000	TOFL	4280	4340	4410	4490	4670	5020	5400	5810	6090			127	176
	V1	111	111	111	111	112	114	116	118	120				
	VR	116	116	116	116	117	119	121	122	123				
	V2	125	125	125	125	125	126	128	128	129				
	GR2	7.2	7.2	7.1	6.9	6.5	6.2	5.8	5.2	4.8				
32000	TOFL	4030	4090	4150	4230	4360	4650	5000	5380	5640			125	173
	V1	108	108	108	108	108	110	112	114	116				
	VR	114	114	114	114	114	115	117	119	120				
	V2	123	123	123	123	123	124	125	125	126				
	GR2	7.7	7.7	7.6	7.3	7	6.6	6.2	5.6	5.2				
31000	TOFL	3810	3870	3920	3990	4110	4310	4610	4970	5210			123	170
	V1	105	105	105	105	106	106	108	111	112				
	VR	111	111	111	111	111	112	113	115	116				
	V2	121	121	121	121	121	121	122	122	123				
	GR2	8.2	8.2	8.1	7.8	7.4	7.1	6.6	6	5.6				

FIGURE 5-60. TAKE-OFF DISTANCE; FLAPS - 20°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.3				
30000	TOFL	3600	3660	3710	3780	3880	4050	4270	4580	4800			121	167
	V1	103	103	103	103	103	104	105	107	108				
	VR	109	109	109	109	109	109	110	112	113				
	V2	119	119	119	119	119	119	119	119	120				
	GR2	8.8	8.8	8.7	8.4	8	7.6	7.1	6.5	6.1				
29000	TOFL	3440	3490	3550	3600	3700	3840	4020	4250	4440			119	164
	V1	101	101	101	101	101	101	102	103	105				
	VR	107	107	107	107	107	107	108	108	109				
	V2	118	118	118	118	118	117	117	117	117				
	GR2	9.4	9.4	9.3	9	8.6	8.2	7.7	7	6.6				
28000	TOFL	3300	3350	3400	3450	3530	3640	3800	3980	4120			117	161
	V1	99	99	99	99	99	99	100	100	101				
	VR	106	106	106	106	106	105	105	106	106				
	V2	117	117	117	117	116	115	115	115	115				
	GR2	10	10	10	9.7	9.2	8.8	8.3	7.6	7.1				
27000	TOFL	3160	3200	3250	3300	3370	3470	3590	3740	3860			115	158
	V1	97	97	97	97	97	97	97	98	98				
	VR	104	104	104	104	104	104	103	103	104				
	V2	116	116	116	116	115	114	113	113	113				
	GR2	10.8	10.7	10.7	10.4	9.9	9.4	8.9	8.2	7.7				
26000	TOFL	3030	3070	3110	3160	3220	3320	3420	3540	3620			113	155
	V1	96	96	95	96	95	95	95	96	96				
	VR	102	102	102	102	102	102	102	102	102				
	V2	115	115	115	115	114	113	112	111	111				
	GR2	11.5	11.5	11.4	11.1	10.6	10.2	9.6	8.8	8.3				

FIGURE 5-61. TAKE-OFF DISTANCE; FLAPS - 20°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.3	81.7	82.5	83.4	84.4	85.3	86.2	87.0	87.9	88.7	89.6		
39600	TOFL	6020	6230	6370	6470	6560	6680	6800	6920	7040	7150	7280	145	195
	V1	138	138	138	138	138	138	138	138	138	138	137		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4.6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
39000	TOFL	5780	5970	6110	6210	6300	6410	6530	6640	6750	6870	6980	144	193
	V1	136	136	136	136	136	136	135	135	135	135	135		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.8	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	5390	5580	5700	5790	5880	5980	6090	6190	6300	6400	6510	141	191
	V1	132	132	132	132	132	132	132	132	132	132	131		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	5.1	4.9	4.9	4.9	5	5	5	5	5	5	5		
37000	TOFL	5040	5200	5320	5400	5490	5580	5680	5770	5870	5970	6060	139	188
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	4690	4850	4960	5040	5110	5200	5290	5380	5470	5560	5650	136	185
	V1	125	125	125	125	124	124	124	124	124	124	124		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.9	5.7	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
35000	TOFL	4370	4510	4610	4680	4750	4830	4920	5000	5080	5160	5250	134	182
	V1	121	121	121	121	120	120	120	120	120	120	120		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.3	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
34000	TOFL	4060	4200	4290	4350	4420	4490	4570	4640	4720	4800	4870	131	179
	V1	117	117	117	117	117	117	116	116	116	116	116		
	VR	122	122	122	122	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.7	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
33000	TOFL	3780	3900	3980	4050	4100	4170	4250	4320	4390	4460	4530	128	176
	V1	113	113	113	113	113	113	113	113	113	112	112		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7.1	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
32000	TOFL	3540	3640	3710	3770	3830	3890	3960	4020	4090	4150	4220	126	173
	V1	110	110	110	109	109	109	109	109	109	109	109		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.4	7.4	7.4		
31000	TOFL	3330	3410	3480	3540	3590	3650	3710	3780	3840	3900	3960	123	170
	V1	107	107	107	106	106	106	106	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.1	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.9		

FIGURE 5-61. TAKE-OFF DISTANCE; FLAPS - 20°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.3	81.7	82.5	83.4	84.4	85.3	86.2	87.0	87.9	88.7	89.6		
30000	TOFL	3140	3210	3270	3330	3380	3430	3500	3560	3620	3670	3730	121	167
	V1	104	104	104	104	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.6	8.4	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	2990	3050	3110	3160	3210	3260	3310	3370	3420	3480	3530	119	164
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	117	117	117	117	117	117	117	117	117	117		
	GR2	9.2	8.9	8.9	8.9	9	9	9	9	9	9	9		
28000	TOFL	2870	2930	2980	3030	3080	3130	3180	3230	3280	3330	3380	117	161
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	116	116	116	116	116	116	116	116	116	116		
	GR2	9.9	9.6	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
27000	TOFL	2750	2800	2860	2900	2950	3000	3050	3090	3140	3190	3240	115	158
	V1	98	98	98	98	98	98	98	98	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	115	115	115	115	115	115	115	115	115	115		
	GR2	10.6	10.3	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
26000	TOFL	2640	2690	2740	2780	2820	2870	2920	2960	3010	3060	3100	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	114	114	114	114	114	114	114	114	114	114		
	GR2	11.3	11	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 5-61. TAKE-OFF DISTANCE; FLAPS - 20°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
39600	TOFL	7390	7520	7650	7840	8370	8990	9650					145	195
	V1	137	137	137	138	140	141	143						
	VR	141	141	141	141	143	144	145						
	V2	147	147	146	146	147	148	149						
	GR2	4.4	4.4	4.3	4	3.7	3.4	3						
39000	TOFL	7090	7210	7340	7520	8020	8630	9280	9940	10100			144	193
	V1	135	135	135	136	137	139	141	142	143				
	VR	139	139	139	139	141	142	143	144	145				
	V2	145	145	145	145	145	146	147	147	147				
	GR2	4.6	4.6	4.5	4.2	3.9	3.6	3.2	2.7	2.5				
38000	TOFL	6610	6720	6840	7010	7470	8060	8670	9310	9450			141	191
	V1	131	131	131	132	134	136	138	139	139				
	VR	136	136	136	136	137	139	140	141	141				
	V2	142	142	141	141	142	143	144	145	145				
	GR2	5	5	4.8	4.5	4.2	3.9	3.5	3	2.8				
37000	TOFL	6160	6260	6380	6540	6960	7500	8090	8700	8840			139	188
	V1	128	128	128	128	130	132	134	136	136				
	VR	132	132	132	132	134	135	137	138	138				
	V2	139	139	138	138	139	140	141	142	142				
	GR2	5.3	5.3	5.2	4.8	4.5	4.2	3.8	3.3	3.1				
36000	TOFL	5740	5830	5930	6080	6470	6970	7540	8100	8240			136	185
	V1	124	124	124	124	126	128	130	132	133				
	VR	129	129	129	129	130	132	134	135	135				
	V2	136	136	135	135	136	137	138	139	139				
	GR2	5.7	5.7	5.5	5.2	4.9	4.6	4.1	3.6	3.5				
35000	TOFL	5330	5410	5510	5650	6010	6470	6980	7540	7660			134	182
	V1	120	120	120	120	122	124	127	129	129				
	VR	125	125	125	125	127	128	130	132	132				
	V2	133	133	132	132	133	134	135	136	136				
	GR2	6.1	6.1	5.9	5.6	5.2	4.9	4.5	3.9	3.8				
34000	TOFL	4950	5030	5120	5250	5580	6000	6470	6980	7110			131	179
	V1	116	116	116	117	118	121	123	125	125				
	VR	121	121	121	122	123	125	127	128	129				
	V2	130	130	129	129	130	131	132	133	133				
	GR2	6.5	6.5	6.3	5.9	5.6	5.3	4.8	4.3	4.2				
33000	TOFL	4600	4670	4750	4870	5170	5560	5990	6460	6580			128	176
	V1	112	112	112	113	115	117	119	121	122				
	VR	118	118	118	118	120	121	123	125	125				
	V2	127	127	126	126	127	128	129	130	130				
	GR2	6.9	6.9	6.7	6.3	6	5.7	5.2	4.7	4.5				
32000	TOFL	4280	4350	4420	4520	4790	5140	5540	5970	6080			126	173
	V1	109	109	109	109	111	113	115	117	118				
	VR	115	115	115	115	116	118	119	121	121				
	V2	124	124	124	124	124	125	126	127	127				
	GR2	7.4	7.3	7.1	6.8	6.4	6.1	5.7	5.1	4.9				
31000	TOFL	4020	4080	4150	4240	4430	4750	5110	5510	5610			123	170
	V1	106	106	106	106	107	109	111	113	114				
	VR	112	112	112	112	112	114	116	118	118				
	V2	122	122	121	121	121	122	123	124	124				
	GR2	7.8	7.8	7.6	7.2	6.9	6.6	6.1	5.5	5.3				

FIGURE 5-61. TAKE-OFF DISTANCE; FLAPS - 20°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
30000	TOFL	3770	3830	3910	3990	4150	4390	4710	5070	5160			121	167
	V1	103	103	103	103	104	105	107	109	110				
	VR	109	109	109	109	110	111	112	114	114				
	V2	119	119	119	119	119	119	120	121	121				
	GR2	8.4	8.4	8.1	7.8	7.4	7	6.5	5.9	5.8				
29000	TOFL	3580	3630	3690	3770	3900	4090	4340	4660	4740			119	164
	V1	101	101	101	101	101	102	103	106	106				
	VR	107	107	107	107	107	108	109	110	111				
	V2	117	117	117	117	117	117	117	118	118				
	GR2	9	9	8.7	8.3	7.9	7.5	7	6.4	6.2				
28000	TOFL	3440	3490	3540	3600	3710	3850	4050	4310	4380			117	161
	V1	99	99	99	99	99	99	100	102	102				
	VR	106	106	106	106	105	105	106	107	107				
	V2	116	116	116	116	115	115	115	115	115				
	GR2	9.6	9.6	9.4	9	8.5	8.1	7.6	6.9	6.8				
27000	TOFL	3280	3330	3380	3440	3540	3650	3800	4010	4060			115	158
	V1	97	97	97	97	97	97	98	99	99				
	VR	104	104	104	104	104	103	103	104	104				
	V2	115	115	115	115	114	114	113	113	113				
	GR2	10.3	10.3	10.1	9.6	9.2	8.8	8.2	7.5	7.3				
26000	TOFL	3150	3190	3240	3290	3380	3480	3590	3740	3790			113	155
	V1	96	96	95	95	95	95	95	96	96				
	VR	102	102	102	102	102	102	101	101	102				
	V2	114	114	114	114	113	112	111	111	111				
	GR2	11.1	11.1	10.8	10.4	9.9	9.4	8.8	8.1	7.9				

FIGURE 5-62. TAKE-OFF DISTANCE; FLAPS - 20°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.7	82.1	83.0	84.0	84.9	85.8	86.7	87.5	88.4	89.3	90.1		
39600	TOFL	6560	6800	6920	7030	7150	7280	7410	7540	7670	7790	7920	147	195
	V1	141	141	141	141	141	140	140	140	140	140	140		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	148	148		
	GR2	4.3	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
39000	TOFL	6290	6520	6630	6730	6840	6970	7090	7220	7340	7470	7590	145	194
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	142	142	142	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4.5	4.3	4.3	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
38000	TOFL	5870	6080	6180	6280	6380	6500	6610	6730	6840	6950	7070	142	191
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.8	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
37000	TOFL	5470	5660	5760	5850	5940	6050	6150	6260	6370	6470	6580	140	188
	V1	131	131	131	130	130	130	130	130	130	130	130		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.2	5	5	5	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
36000	TOFL	5090	5270	5360	5440	5530	5630	5720	5820	5920	6020	6120	137	185
	V1	127	127	127	127	126	126	126	126	126	126	126		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
35000	TOFL	4730	4900	4980	5060	5140	5230	5320	5410	5500	5590	5680	135	183
	V1	123	123	123	123	123	123	122	122	122	122	122		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.9	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
34000	TOFL	4390	4550	4620	4690	4770	4850	4930	5020	5100	5180	5260	132	180
	V1	119	119	119	119	119	119	119	118	118	118	118		
	VR	124	124	124	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.4	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
33000	TOFL	4080	4220	4290	4350	4420	4500	4570	4650	4730	4800	4880	129	177
	V1	115	115	115	115	115	115	115	114	114	114	114		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.8	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
32000	TOFL	3790	3910	3980	4040	4100	4170	4240	4310	4380	4450	4520	127	174
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	7.2	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
31000	TOFL	3540	3640	3700	3760	3820	3890	3950	4020	4080	4140	4210	124	171
	V1	108	108	108	108	107	107	107	107	107	107	107		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.7	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		

FIGURE 5-62. TAKE-OFF DISTANCE; FLAPS - 20°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.7	82.1	83.0	84.0	84.9	85.8	86.7	87.5	88.4	89.3	90.1		
30000	TOFL	3310	3400	3460	3510	3570	3630	3690	3750	3810	3870	3930	121	168
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8.2	7.9	8	8	8	8	8	8	8.1	8.1	8.1		
29000	TOFL	3130	3200	3250	3310	3360	3420	3490	3530	3600	3640	3710	119	165
	V1	102	102	102	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.8	8.5	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	2980	3040	3090	3150	3200	3250	3300	3360	3410	3460	3520	117	161
	V1	100	100	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.4	9.1	9.2	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3		
27000	TOFL	2860	2920	2970	3020	3070	3120	3170	3220	3270	3320	3370	115	158
	V1	98	98	98	98	98	98	98	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.1	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
26000	TOFL	2750	2800	2840	2890	2940	2990	3030	3080	3130	3180	3220	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.9	10.6	10.6	10.6	10.7	10.7	10.7	10.7	10.7	10.7	10.7		

FIGURE 5-62. TAKE-OFF DISTANCE; FLAPS - 20°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.6					
39600	TOFL	8060	8200	8370	8690	9330	10000						147	195
	V1	140	140	140	141	143	144							
	VR	144	144	144	144	146	147							
	V2	148	148	148	148	149	150							
	GR2	4.2	4.1	3.9	3.5	3.3	3							
39000	TOFL	7720	7840	8020	8320	8950	9610	10320					145	194
	V1	138	138	138	139	141	142	144						
	VR	141	141	141	142	144	145	146						
	V2	147	146	146	146	147	148	149						
	GR2	4.4	4.3	4	3.7	3.4	3.1	2.7						
38000	TOFL	7190	7310	7470	7750	8350	8980	9650	10230				142	191
	V1	134	134	134	135	137	139	140	141					
	VR	138	138	138	138	140	142	143	143					
	V2	143	143	143	143	144	145	146	146					
	GR2	4.7	4.7	4.4	4	3.8	3.4	3	2.6					
37000	TOFL	6690	6800	6950	7210	7770	8370	9020	9550				140	188
	V1	130	130	130	131	133	135	137	138					
	VR	134	134	134	135	137	138	140	140					
	V2	140	140	140	140	141	142	143	143					
	GR2	5.1	5	4.7	4.4	4.1	3.8	3.3	2.9					
36000	TOFL	6210	6320	6460	6710	7210	7790	8390	8920				137	185
	V1	126	126	126	127	129	131	133	135					
	VR	131	131	131	131	133	135	136	137					
	V2	137	137	137	137	138	139	140	141					
	GR2	5.4	5.4	5	4.7	4.4	4.1	3.6	3.2					
35000	TOFL	5770	5870	6000	6230	6690	7210	7790	8290				135	183
	V1	122	122	122	123	125	127	130	131					
	VR	127	127	127	128	129	131	133	134					
	V2	134	134	134	134	135	136	137	138					
	GR2	5.8	5.7	5.4	5.1	4.8	4.4	4	3.5					
34000	TOFL	5350	5440	5560	5770	6200	6670	7210	7690				132	180
	V1	118	118	119	119	122	124	126	128					
	VR	123	123	123	124	126	127	129	130					
	V2	131	131	131	131	132	133	134	135					
	GR2	6.2	6.1	5.8	5.4	5.1	4.8	4.3	3.9					
33000	TOFL	4950	5040	5150	5340	5740	6170	6670	7110				129	177
	V1	114	114	115	116	118	120	122	124					
	VR	120	120	120	120	122	124	126	127					
	V2	128	128	127	127	129	130	131	131					
	GR2	6.6	6.6	6.2	5.8	5.5	5.2	4.7	4.2					
32000	TOFL	4590	4670	4770	4950	5310	5710	6150	6560				127	174
	V1	110	110	111	112	114	116	118	120					
	VR	116	116	116	117	119	120	122	123					
	V2	125	125	124	124	126	127	128	128					
	GR2	7.1	7	6.6	6.2	5.9	5.6	5.1	4.6					
31000	TOFL	4280	4340	4430	4570	4900	5260	5680	6040				124	171
	V1	107	107	107	108	110	112	114	116					
	VR	113	113	113	113	115	117	118	120					
	V2	122	122	122	122	123	124	125	125					
	GR2	7.5	7.4	7.1	6.7	6.3	6	5.5	5					

FIGURE 5-62. TAKE-OFF DISTANCE; FLAPS - 20°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.6					
30000	TOFL	3990	4050	4130	4260	4520	4840	5220	5560				121	168
	V1	104	104	104	104	106	108	110	112					
	VR	110	110	110	110	111	113	115	116					
	V2	120	119	119	119	119	121	122	122					
	GR2	8	8	7.6	7.2	6.8	6.5	6	5.5					
29000	TOFL	3760	3810	3900	4000	4200	4460	4790	5100				119	165
	V1	101	101	101	102	102	104	106	108					
	VR	107	107	107	107	108	109	111	112					
	V2	117	117	117	117	117	118	118	119					
	GR2	8.6	8.5	8.1	7.7	7.3	6.9	6.5	5.9					
28000	TOFL	3570	3620	3700	3770	3930	4130	4400	4670				117	161
	V1	99	99	99	99	99	100	102	104					
	VR	105	105	105	105	105	106	107	109					
	V2	116	116	116	115	115	115	115	116					
	GR2	9.2	9.1	8.7	8.3	7.9	7.5	7	6.4					
27000	TOFL	3420	3470	3530	3600	3710	3860	4080	4310				115	158
	V1	97	97	97	97	97	97	99	100					
	VR	104	104	104	104	103	103	104	105					
	V2	115	115	114	113	113	113	113	113					
	GR2	9.9	9.8	9.4	8.9	8.5	8.1	7.5	6.9					
26000	TOFL	3270	3320	3380	3440	3540	3660	3800	3990				113	155
	V1	96	96	96	96	95	95	96	97					
	VR	102	102	102	102	102	101	101	102					
	V2	114	114	113	112	112	111	111	111					
	GR2	10.7	10.6	10.1	9.6	9.2	8.7	8.1	7.5					

FIGURE 5-63. TAKE-OFF DISTANCE; FLAPS - 20°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
39600	TOFL	7200	7380	7520	7650	7780	7930	8070	8210	8360	8500	8640	148	196
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	151	151	151	150	150	150	150	150	150	150	150		
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	TOFL	6920	7090	7210	7340	7470	7610	7740	7880	8020	8150	8290	146	194
	V1	141	141	141	141	141	141	141	141	140	140	140		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	TOFL	6440	6600	6710	6830	6950	7070	7200	7330	7450	7580	7700	144	191
	V1	137	137	137	137	137	137	137	137	136	136	136		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	TOFL	5990	6130	6240	6350	6460	6580	6690	6810	6920	7040	7160	141	189
	V1	133	133	133	133	133	133	133	133	133	132	132		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
36000	TOFL	5560	5700	5800	5900	6000	6110	6210	6320	6430	6540	6640	138	186
	V1	129	129	129	129	129	129	129	129	128	128	128		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.2	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
35000	TOFL	5160	5290	5380	5470	5570	5670	5760	5860	5960	6060	6160	136	183
	V1	125	125	125	125	125	125	125	125	124	124	124		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
34000	TOFL	4780	4900	4990	5070	5160	5250	5340	5430	5520	5610	5700	133	180
	V1	121	121	121	121	121	121	121	121	120	120	120		
	VR	126	126	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	132	132	132	132	132	132	132	132		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
33000	TOFL	4430	4540	4610	4690	4770	4850	4940	5020	5100	5180	5270	130	177
	V1	117	117	117	117	117	117	117	117	116	116	116		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.4		
32000	TOFL	4100	4200	4270	4340	4410	4490	4560	4640	4720	4790	4870	127	174
	V1	113	113	113	113	113	113	113	113	112	112	112		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.8	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
31000	TOFL	3810	3890	3960	4020	4090	4160	4230	4300	4370	4440	4510	125	171
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	115	115	115	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3		

FIGURE 5-63. TAKE-OFF DISTANCE; FLAPS - 20°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
30000	TOFL	3540	3620	3680	3740	3800	3870	3930	4000	4060	4130	4190	122	168
	V1	106	106	106	106	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.8		
29000	TOFL	3320	3380	3440	3490	3550	3610	3670	3730	3790	3850	3910	119	165
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	8.4	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
28000	TOFL	3130	3190	3240	3290	3350	3410	3460	3520	3580	3630	3690	117	162
	V1	100	100	100	100	100	100	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
27000	TOFL	2990	3040	3090	3140	3190	3250	3300	3350	3410	3460	3510	115	159
	V1	98	98	98	98	98	98	98	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.6	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
26000	TOFL	2860	2910	2960	3000	3060	3110	3160	3210	3260	3310	3360	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		

FIGURE 5-63. TAKE-OFF DISTANCE; FLAPS - 20°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89					
	N1 (%)	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
39600	TOFL	8790	8960	9220	9730	10420							148	196
	V1	143	143	143	144	146								
	VR	146	146	146	147	148								
	V2	150	150	150	151	151								
	GR2	3.9	3.7	3.4	3.1	2.8								
39000	TOFL	8430	8590	8840	9330	10010	10730						146	194
	V1	140	140	141	142	144	145							
	VR	144	144	144	145	146	147							
	V2	149	148	148	149	150	150							
	GR2	4.1	3.9	3.6	3.3	3	2.7							
38000	TOFL	7830	7990	8220	8700	9340	10030	10760					144	191
	V1	136	136	137	138	140	142	143						
	VR	140	140	140	142	143	144	145						
	V2	145	145	145	145	147	147	148						
	GR2	4.4	4.2	3.9	3.6	3.3	3	2.5						
37000	TOFL	7280	7420	7640	8080	8690	9370	10040	10360				141	189
	V1	132	133	133	135	136	138	140	140					
	VR	137	137	137	138	140	141	142	142					
	V2	142	142	142	142	143	144	145	145					
	GR2	4.8	4.6	4.2	3.9	3.6	3.3	2.8	2.6					
36000	TOFL	6750	6890	7090	7500	8090	8700	9360	9650				138	186
	V1	128	129	129	131	133	135	136	137					
	VR	133	133	133	134	136	138	139	139					
	V2	139	139	139	139	140	141	142	142					
	GR2	5.1	4.9	4.6	4.2	4	3.6	3.2	2.9					
35000	TOFL	6260	6380	6570	6950	7480	8080	8700	8990				136	183
	V1	124	125	125	127	129	131	133	133					
	VR	129	129	129	130	132	134	135	136					
	V2	135	135	135	136	137	138	139	139					
	GR2	5.5	5.3	4.9	4.6	4.3	4	3.5	3.3					
34000	TOFL	5790	5910	6090	6430	6920	7470	8070	8330				133	180
	V1	120	121	121	123	125	127	129	130					
	VR	125	125	126	127	129	130	132	133					
	V2	132	132	132	133	134	135	136	136					
	GR2	5.9	5.6	5.3	4.9	4.7	4.3	3.8	3.6					
33000	TOFL	5360	5460	5630	5940	6390	6890	7460	7710				130	177
	V1	116	117	117	119	121	123	125	126					
	VR	122	122	122	123	125	127	128	129					
	V2	129	129	129	129	130	132	133	133					
	GR2	6.3	6	5.7	5.3	5	4.7	4.2	4					
32000	TOFL	4950	5050	5200	5490	5890	6350	6870	7100				127	174
	V1	112	113	113	115	117	119	121	122					
	VR	118	118	118	119	121	123	125	125					
	V2	126	126	126	126	127	128	129	130					
	GR2	6.7	6.5	6.1	5.7	5.4	5.1	4.6	4.3					
31000	TOFL	4580	4670	4800	5060	5430	5850	6320	6540				125	171
	V1	109	109	109	111	113	115	117	118					
	VR	114	114	115	116	117	119	121	122					
	V2	123	123	123	123	124	125	126	127					
	GR2	7.2	6.9	6.5	6.2	5.8	5.5	5	4.7					

FIGURE 5-63. TAKE-OFF DISTANCE; FLAPS - 20°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89					
	N1 (%)	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
30000	TOFL	4260	4340	4450	4670	4990	5370	5800	6000				122	168
	V1	105	105	106	107	109	111	113	114					
	VR	111	111	111	112	114	115	117	118					
	V2	120	120	120	120	121	122	123	123					
	GR2	7.7	7.4	7	6.6	6.3	5.9	5.4	5.2					
29000	TOFL	3970	4040	4140	4320	4590	4930	5320	5500				119	165
	V1	102	102	102	103	105	107	109	110					
	VR	108	108	108	109	110	112	113	114					
	V2	118	117	117	117	118	119	120	120					
	GR2	8.2	7.9	7.5	7.1	6.8	6.4	5.9	5.6					
28000	TOFL	3740	3820	3910	4040	4250	4520	4860	5030				117	162
	V1	99	99	100	100	101	103	105	106					
	VR	106	106	106	106	107	108	109	110					
	V2	116	116	115	115	115	116	117	117					
	GR2	8.8	8.5	8.1	7.6	7.3	6.9	6.4	6.1					
27000	TOFL	3570	3620	3710	3800	3940	4170	4450	4590				115	159
	V1	97	97	97	97	98	99	101	102					
	VR	104	104	104	103	103	104	106	106					
	V2	114	114	114	113	113	113	113	114					
	GR2	9.5	9.2	8.7	8.2	7.8	7.4	6.9	6.6					
26000	TOFL	3410	3460	3530	3630	3730	3870	4110	4230				113	155
	V1	95	95	95	95	95	96	97	98					
	VR	102	102	102	102	101	101	102	103					
	V2	113	113	112	112	111	111	111	111					
	GR2	10.2	9.9	9.4	8.9	8.5	8	7.5	7.2					

FIGURE 5-64. TAKE-OFF DISTANCE; FLAPS - 20°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.5	83.2	84.1	85.1	86.0	86.9	87.7	88.6	89.5	90.4	91.2		
39600	TOFL	7890	8020	8180	8340	8500	8660	8820	8980	9130	9290	9450	149	196
	V1	146	146	146	146	146	146	146	145	145	145	145		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	152		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		
39000	TOFL	7570	7690	7840	7990	8150	8300	8450	8600	8750	8900	9050	147	194
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.9	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
38000	TOFL	7050	7170	7310	7450	7590	7730	7870	8010	8150	8280	8430	145	192
	V1	140	140	140	139	139	139	139	139	139	139	139		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
37000	TOFL	6550	6650	6790	6910	7040	7170	7300	7430	7550	7680	7810	142	189
	V1	136	136	135	135	135	135	135	135	135	135	135		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.6	4.6	4.6		
36000	TOFL	6080	6170	6290	6410	6530	6650	6770	6880	7000	7120	7230	139	186
	V1	132	132	131	131	131	131	131	131	131	131	131		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
35000	TOFL	5630	5720	5830	5940	6050	6150	6260	6370	6480	6580	6690	137	183
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
34000	TOFL	5210	5290	5390	5490	5590	5690	5790	5890	5990	6080	6180	134	180
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
33000	TOFL	4810	4890	4980	5070	5160	5250	5340	5430	5520	5610	5710	131	177
	V1	119	119	119	119	119	119	119	119	119	118	118		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
32000	TOFL	4440	4510	4590	4670	4760	4840	4930	5010	5090	5170	5260	128	175
	V1	115	115	115	115	115	115	115	114	114	114	114		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
31000	TOFL	4100	4160	4240	4320	4400	4470	4550	4620	4700	4780	4850	126	172
	V1	111	111	111	111	111	111	111	111	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7	6.9	6.9	7	7	7	7	7	7	7	7		

FIGURE 5-64. TAKE-OFF DISTANCE; FLAPS - 20°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.5	83.2	84.1	85.1	86.0	86.9	87.7	88.6	89.5	90.4	91.2		
30000	TOFL	3800	3860	3930	4000	4070	4140	4210	4280	4350	4420	4470	123	168
	V1	107	107	107	107	107	107	107	107	107	107	106		
	VR	113	113	113	113	113	113	113	113	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5		
29000	TOFL	3530	3580	3640	3710	3770	3840	3900	3970	4030	4090	4160	120	165
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	8	7.9	8	8	8	8	8	8	8	8	8		
28000	TOFL	3300	3360	3420	3480	3540	3600	3660	3720	3760	3820	3880	117	162
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	8.6	8.5	8.5	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
27000	TOFL	3130	3180	3230	3290	3340	3400	3460	3510	3570	3620	3680	115	159
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
26000	TOFL	2990	3030	3080	3140	3190	3240	3300	3350	3400	3460	3510	113	156
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 5-64. TAKE-OFF DISTANCE; FLAPS - 20°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	86.4					
	N1 (%)	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
39600	TOFL	9620	9820	10220	10880								149	196
	V1	145	146	146	148									
	VR	149	149	149	150									
	V2	152	152	152	153									
	GR2	3.6	3.3	2.9	2.7									
39000	TOFL	9210	9410	9810	10450	11190							147	194
	V1	143	143	144	146	147								
	VR	146	146	147	148	149								
	V2	150	150	150	151	152								
	GR2	3.8	3.4	3.1	2.8	2.6								
38000	TOFL	8580	8760	9130	9740	10440	11210						145	192
	V1	139	139	140	142	143	145							
	VR	143	143	143	145	146	147							
	V2	147	147	147	148	149	149							
	GR2	4.1	3.7	3.4	3.1	2.8	2.5							
37000	TOFL	7950	8120	8480	9060	9740	10450						142	189
	V1	135	135	136	138	140	141							
	VR	139	139	140	141	143	144							
	V2	144	144	144	145	146	146							
	GR2	4.4	4.1	3.7	3.4	3.2	2.8							
36000	TOFL	7360	7530	7860	8410	9040	9730	10450	10480				139	186
	V1	131	131	132	134	136	137	139	139					
	VR	135	135	136	137	139	140	141	141					
	V2	141	140	140	141	142	143	144	144					
	GR2	4.8	4.4	4.1	3.8	3.5	3.2	2.7	2.6					
35000	TOFL	6810	6970	7270	7770	8380	9040	9720	9750				137	183
	V1	127	127	128	130	132	134	135	135					
	VR	131	131	132	134	135	137	138	138					
	V2	137	137	137	138	139	140	141	141					
	GR2	5.1	4.8	4.4	4.1	3.8	3.5	3	3					
34000	TOFL	6300	6440	6720	7180	7760	8360	9030	9060				134	180
	V1	123	123	124	126	128	130	132	132					
	VR	128	128	128	130	132	133	135	135					
	V2	134	134	134	135	136	137	138	138					
	GR2	5.5	5.1	4.8	4.5	4.2	3.8	3.3	3.3					
33000	TOFL	5810	5940	6210	6630	7140	7730	8340	8370				131	177
	V1	119	119	120	122	124	126	128	128					
	VR	124	124	124	126	128	130	131	131					
	V2	131	130	130	131	133	134	135	135					
	GR2	5.9	5.5	5.2	4.8	4.5	4.2	3.7	3.7					
32000	TOFL	5350	5480	5720	6100	6570	7100	7700	7720				128	175
	V1	114	115	116	118	120	122	124	124					
	VR	120	120	120	122	124	126	127	128					
	V2	127	127	127	128	129	131	132	132					
	GR2	6.3	5.9	5.5	5.2	4.9	4.6	4.1	4					
31000	TOFL	4940	5050	5270	5610	6040	6520	7060	7100				126	172
	V1	110	111	112	114	116	118	120	120					
	VR	116	116	117	118	120	122	124	124					
	V2	124	124	124	124	126	127	128	128					
	GR2	6.8	6.3	6	5.6	5.3	5	4.5	4.4					

FIGURE 5-64. TAKE-OFF DISTANCE; FLAPS - 20°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	86.4					
	N1 (%)	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
30000	TOFL	4570	4660	4860	5160	5540	5980	6480	6500				123	168
	V1	107	107	108	109	112	114	116	116					
	VR	112	113	113	114	116	118	120	120					
	V2	121	121	121	121	122	124	125	125					
	GR2	7.2	6.8	6.4	6.1	5.8	5.4	4.9	4.9					
29000	TOFL	4230	4320	4480	4750	5080	5470	5930	5950				120	165
	V1	103	103	104	106	107	109	112	112					
	VR	109	109	110	111	112	114	116	116					
	V2	118	118	118	118	119	120	121	121					
	GR2	7.8	7.3	6.9	6.5	6.2	5.9	5.3	5.3					
28000	TOFL	3960	4040	4160	4370	4660	5000	5410	5430				117	162
	V1	100	100	100	102	103	105	108	108					
	VR	106	106	106	107	109	110	112	112					
	V2	116	115	115	115	116	117	118	118					
	GR2	8.3	7.8	7.4	7	6.7	6.4	5.8	5.8					
27000	TOFL	3750	3820	3920	4050	4290	4570	4930	4940				115	159
	V1	98	98	98	98	99	101	103	103					
	VR	104	104	104	104	105	106	108	108					
	V2	114	114	113	113	113	114	115	115					
	GR2	9	8.5	8	7.6	7.2	6.9	6.3	6.3					
26000	TOFL	3560	3620	3720	3810	3950	4200	4490	4500				113	156
	V1	96	96	96	96	96	97	99	99					
	VR	102	102	102	102	101	103	104	104					
	V2	113	112	112	111	111	111	112	112					
	GR2	9.6	9.1	8.7	8.2	7.8	7.4	6.8	6.8					

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FIGURE 5-65. AKE-OFF DISTANCE; FLAPS - 20°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.1	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	91.8		
39600	TOFL	8590	8820	8980	9140	9320	9490	9670	9840	10010	10180	10370	150	197
	V1	149	149	149	149	149	149	148	148	148	148	148		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.3		
39000	TOFL	8230	8450	8600	8760	8930	9100	9260	9420	9590	9750	9930	148	195
	V1	146	146	146	146	146	146	146	146	146	146	146		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5		
38000	TOFL	7680	7860	8000	8140	8300	8450	8610	8760	8910	9070	9230	146	192
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	149		
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
37000	TOFL	7120	7310	7440	7580	7720	7860	8000	8140	8280	8420	8570	143	189
	V1	139	139	139	138	138	138	138	138	138	138	138		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4.3	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2		
36000	TOFL	6600	6780	6900	7020	7150	7280	7410	7540	7670	7800	7940	140	187
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
35000	TOFL	6090	6260	6370	6480	6600	6720	6830	6950	7070	7190	7320	138	184
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5	5	5	5	5	5	5	5	5	5	4.9		
34000	TOFL	5630	5780	5880	5980	6090	6200	6310	6420	6520	6630	6750	135	181
	V1	126	126	126	126	126	126	126	125	125	125	125		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.4	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.3		
33000	TOFL	5200	5330	5420	5510	5620	5720	5820	5920	6010	6110	6220	132	178
	V1	122	122	122	121	121	121	121	121	121	121	121		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	132	132		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7		
32000	TOFL	4790	4910	4990	5080	5170	5270	5360	5450	5540	5630	5730	129	175
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1		
31000	TOFL	4410	4520	4600	4670	4760	4840	4920	5010	5090	5170	5260	127	172
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.6		

FIGURE 5-65. AKE-OFF DISTANCE; FLAPS - 20°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.1	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	91.8		
30000	TOFL	4070	4170	4240	4310	4390	4470	4540	4620	4690	4770	4850	124	169
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	122		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		
29000	TOFL	3760	3850	3920	3980	4050	4120	4190	4260	4330	4400	4470	121	166
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.5		
28000	TOFL	3490	3560	3620	3680	3740	3810	3870	3930	3990	4060	4130	118	162
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	8.2	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.1		
27000	TOFL	3280	3340	3400	3460	3520	3570	3630	3690	3750	3810	3870	115	159
	V1	99	99	99	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.8	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.7		
26000	TOFL	3100	3150	3210	3270	3330	3390	3440	3500	3550	3600	3650	113	156
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	112	112		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.3		

FIGURE 5-65. TAKE-OFF DISTANCE; FLAPS - 20°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
39600	TOFL	10580	10920										150	197
	V1	149	149											
	VR	152	152											
	V2	154	154											
	GR2	3.1	2.8											
39000	TOFL	10130	10470	11040									148	195
	V1	146	147	148										
	VR	149	150	150										
	V2	152	152	153										
	GR2	3.3	3	2.7										
38000	TOFL	9420	9740	10290	10960	11750							146	192
	V1	142	143	144	145	146								
	VR	146	146	147	148	149								
	V2	149	149	150	150	151								
	GR2	3.6	3.3	3	2.7	2.4								
37000	TOFL	8750	9040	9560	10210	10940							143	189
	V1	138	139	140	142	143								
	VR	142	142	143	144	145								
	V2	146	146	146	147	148								
	GR2	3.9	3.6	3.3	3	2.7								
36000	TOFL	8100	8380	8870	9470	10170	10930						140	187
	V1	134	135	136	138	139	141							
	VR	138	138	139	141	142	143							
	V2	143	143	143	144	145	145							
	GR2	4.3	3.9	3.6	3.3	3	2.7							
35000	TOFL	7470	7730	8200	8770	9440	10150	10640					138	184
	V1	130	130	132	134	136	137	138						
	VR	134	134	136	137	139	140	140						
	V2	139	139	140	141	142	142	142						
	GR2	4.6	4.3	4	3.7	3.3	3	2.7						
34000	TOFL	6900	7140	7560	8110	8720	9420	9870					135	181
	V1	126	126	128	130	132	133	134						
	VR	130	130	132	133	135	136	137						
	V2	136	136	136	137	138	139	140						
	GR2	5	4.6	4.3	4	3.7	3.3	3						
33000	TOFL	6360	6580	6970	7460	8060	8690	9150					132	178
	V1	121	122	124	126	128	129	131						
	VR	126	126	128	129	131	133	133						
	V2	132	132	133	134	135	136	137						
	GR2	5.4	5	4.7	4.4	4.1	3.7	3.4						
32000	TOFL	5850	6060	6410	6860	7410	8010	8420					129	175
	V1	117	118	119	121	124	126	127						
	VR	122	123	124	125	127	129	130						
	V2	129	129	129	130	132	133	133						
	GR2	5.8	5.4	5.1	4.7	4.4	4.1	3.7						
31000	TOFL	5380	5570	5890	6300	6790	7360	7750					127	172
	V1	113	114	115	117	119	121	123						
	VR	118	119	120	121	123	125	126						
	V2	125	125	126	127	128	129	130						
	GR2	6.2	5.8	5.5	5.1	4.8	4.5	4.1						

FIGURE 5-65. TAKE-OFF DISTANCE; FLAPS - 20°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
30000	TOFL	4950	5120	5410	5770	6210	6720	7100					124	169
	V1	109	109	111	113	115	117	119						
	VR	114	115	116	117	119	121	122						
	V2	122	122	122	123	125	126	127						
	GR2	6.7	6.3	5.9	5.6	5.3	4.9	4.6						
29000	TOFL	4550	4710	4970	5280	5690	6140	6480					121	166
	V1	105	105	107	108	111	113	114						
	VR	111	111	112	113	115	117	118						
	V2	119	119	119	120	121	123	123						
	GR2	7.2	6.7	6.3	6	5.7	5.3	5						
28000	TOFL	4210	4340	4560	4840	5190	5600	5900					118	162
	V1	101	102	103	104	106	108	110						
	VR	107	107	108	110	111	113	114						
	V2	116	116	116	117	118	119	120						
	GR2	7.7	7.2	6.8	6.5	6.2	5.8	5.4						
27000	TOFL	3940	4050	4200	4440	4740	5100	5370					115	159
	V1	98	98	99	100	102	104	106						
	VR	104	105	105	106	107	109	110						
	V2	114	113	113	114	115	116	116						
	GR2	8.3	7.8	7.4	7	6.7	6.3	5.9						
26000	TOFL	3730	3810	3920	4080	4340	4640	4870					113	156
	V1	96	96	96	97	98	100	101						
	VR	102	102	102	102	104	105	106						
	V2	112	112	111	111	111	112	113						
	GR2	8.9	8.4	8	7.6	7.2	6.8	6.5						

FIGURE 5-66. TAKE-OFF DISTANCE; FLAPS - 20°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.5	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.4		
39600	TOFL	9480	9650	9830	10030	10220	10410	10600	10790	10980	11180	11390	151	197
	V1	152	152	152	152	152	152	151	151	151	151	151		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3		
39000	TOFL	9100	9260	9430	9610	9800	9980	10170	10350	10530	10710	10920	150	196
	V1	149	149	149	149	149	149	149	149	149	149	149		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.1		
38000	TOFL	8460	8600	8760	8930	9100	9270	9440	9610	9770	9940	10140	147	193
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5		
37000	TOFL	7850	7990	8140	8290	8450	8610	8760	8920	9070	9230	9410	144	190
	V1	142	142	141	141	141	141	141	141	141	141	141		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	148	148	148		
	GR2	4	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
36000	TOFL	7280	7410	7540	7690	7830	7980	8120	8260	8400	8540	8710	142	187
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.1		
35000	TOFL	6730	6840	6970	7100	7230	7360	7490	7620	7750	7880	8030	139	184
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	141	141		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6	4.7	4.6	4.5		
34000	TOFL	6190	6300	6410	6530	6650	6770	6890	7010	7130	7250	7390	136	181
	V1	129	129	128	128	128	128	128	128	128	128	128		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.1	5.1	5	5	5	5	5	5	5	5	4.8		
33000	TOFL	5710	5800	5910	6020	6130	6240	6340	6450	6560	6670	6800	133	178
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	129	129	129	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.2		
32000	TOFL	5250	5340	5430	5530	5630	5740	5830	5930	6030	6130	6250	130	175
	V1	120	120	120	120	120	120	120	119	119	119	120		
	VR	125	125	125	125	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.6		
31000	TOFL	4830	4910	4990	5090	5180	5270	5360	5450	5540	5630	5740	128	172
	V1	116	116	115	115	115	115	115	115	115	115	115		
	VR	121	121	121	121	121	121	121	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.1		

FIGURE 5-66. TAKE-OFF DISTANCE; FLAPS - 20°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.5	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.4		
30000	TOFL	4430	4500	4580	4670	4750	4830	4920	4980	5080	5150	5260	125	169
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.8	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.5		
29000	TOFL	4080	4150	4220	4300	4370	4450	4520	4600	4670	4750	4820	122	166
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	120		
	GR2	7.3	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7		
28000	TOFL	3760	3820	3880	3950	4020	4090	4160	4230	4290	4360	4440	119	163
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.8	7.8	7.8	7.7	7.7	7.7	7.7	7.7	7.8	7.7	7.5		
27000	TOFL	3470	3530	3590	3650	3720	3780	3840	3900	3970	4030	4100	116	160
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	114		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.1		
26000	TOFL	3260	3300	3370	3430	3480	3540	3600	3660	3720	3770	3840	113	156
	V1	97	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9	9	9	8.9	8.9	8.9	8.9	8.9	9	8.9	8.7		

FIGURE 5-66. TAKE-OFF DISTANCE; FLAPS - 20°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	93.0	93.0	93.0	92.6	92.0	91.3	91.2						
39600	TOFL	11700											151	197
	V1	152												
	VR	154												
	V2	157												
	GR2	2.7												
39000	TOFL	11220	11760										150	196
	V1	149	150											
	VR	152	153											
	V2	155	155											
	GR2	2.8	2.5											
38000	TOFL	10420	10950	11580									147	193
	V1	145	146	148										
	VR	149	149	150										
	V2	152	152	152										
	GR2	3.1	2.8	2.5										
37000	TOFL	9670	10160	10770	11490								144	190
	V1	141	142	144	145									
	VR	145	145	147	147									
	V2	148	148	149	149									
	GR2	3.5	3.1	2.8	2.5									
36000	TOFL	8960	9420	9980	10680	11450							142	187
	V1	137	138	140	141	143								
	VR	141	142	143	144	145								
	V2	145	145	146	146	147								
	GR2	3.8	3.5	3.1	2.9	2.6								
35000	TOFL	8270	8710	9240	9890	10620	11440	11660					139	184
	V1	133	134	136	137	139	140	140						
	VR	137	138	139	140	142	143	143						
	V2	141	141	142	143	144	144	144						
	GR2	4.1	3.8	3.5	3.2	2.9	2.5	2.4						
34000	TOFL	7610	8030	8530	9140	9840	10590	10790					136	181
	V1	129	130	132	133	135	136	137						
	VR	133	134	135	137	138	139	139						
	V2	138	138	139	140	141	141	141						
	GR2	4.5	4.1	3.8	3.5	3.2	2.8	2.7						
33000	TOFL	7010	7380	7850	8430	9070	9800	9980					133	178
	V1	124	126	127	129	131	133	133						
	VR	129	130	131	133	134	136	136						
	V2	134	134	135	136	137	138	138						
	GR2	4.9	4.5	4.2	3.9	3.6	3.2	3.1						
32000	TOFL	6440	6790	7200	7740	8360	9030	9210					130	175
	V1	120	121	123	125	127	129	129						
	VR	125	126	127	129	131	132	132						
	V2	131	131	132	133	134	135	135						
	GR2	5.3	4.9	4.6	4.3	4	3.5	3.4						
31000	TOFL	5920	6230	6600	7080	7660	8300	8460					128	172
	V1	116	117	119	121	123	125	125						
	VR	121	122	123	125	126	128	128						
	V2	127	127	128	129	131	132	132						
	GR2	5.7	5.3	5	4.7	4.3	3.9	3.8						

FIGURE 5-66. TAKE-OFF DISTANCE; FLAPS - 20°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	93.0	93.0	93.0	92.6	92.0	91.3	91.2						
30000	TOFL	5430	5710	6050	6480	6990	7600	7760					125	169
	V1	111	113	114	116	118	121	121						
	VR	117	118	119	121	122	124	125						
	V2	124	124	125	126	127	128	129						
	GR2	6.1	5.7	5.4	5.1	4.8	4.3	4.2						
29000	TOFL	4980	5230	5530	5920	6380	6930	7080					122	166
	V1	107	108	110	112	114	116	117						
	VR	113	114	115	116	118	120	121						
	V2	120	120	121	122	123	125	125						
	GR2	6.6	6.2	5.8	5.5	5.2	4.8	4.7						
28000	TOFL	4550	4790	5040	5400	5820	6300	6430					119	163
	V1	103	104	106	107	110	112	112						
	VR	109	110	111	112	114	116	117						
	V2	117	117	117	119	120	121	121						
	GR2	7.1	6.7	6.3	6	5.7	5.2	5.1						
27000	TOFL	4210	4390	4610	4930	5290	5720	5840					116	160
	V1	99	100	101	103	105	107	108						
	VR	105	106	107	108	110	112	112						
	V2	114	114	114	115	116	118	118						
	GR2	7.6	7.2	6.8	6.5	6.2	5.7	5.6						
26000	TOFL	3920	4060	4230	4480	4810	5190	5300					113	156
	V1	96	97	97	99	101	103	104						
	VR	102	103	103	105	106	108	108						
	V2	111	111	111	111	113	114	114						
	GR2	8.2	7.8	7.4	7	6.7	6.3	6.1						

FIGURE 5-67. TAKE-OFF DISTANCE; FLAPS - 20°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.4	85.0	85.7	86.7	87.6	88.4	89.3	90.2	91.2	92.1	92.9		
39600	TOFL	10320	10580	10870	11090	11310	11550	11800	11970	12140	12360		152	198
	V1	155	155	155	155	155	155	155	155	155	155			
	VR	157	157	158	158	158	158	158	158	158	158			
	V2	160	160	160	160	160	160	160	160	159	159			
	GR2	2.9	2.8	2.8	2.8	2.8	2.8	2.7	2.8	2.8	2.7			
39000	TOFL	9890	10120	10410	10600	10810	11060	11290	11460	11600	11830	12080	151	196
	V1	152	152	152	152	152	152	152	152	152	152	152		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	157	157	157		
	GR2	3.1	3	3	3	3	2.9	2.9	2.9	3	2.9	2.7		
38000	TOFL	9190	9420	9660	9860	10050	10270	10480	10630	10780	10980	11230	148	193
	V1	149	149	149	149	149	149	149	148	148	148	148		
	VR	151	151	151	151	152	152	152	152	152	152	152		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	3.4	3.3	3.3	3.3	3.3	3.3	3.2	3.3	3.3	3.2	3		
37000	TOFL	8520	8710	8950	9130	9310	9510	9700	9840	9970	10160	10380	145	190
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	147	147	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	150	150	150		
	GR2	3.7	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.3		
36000	TOFL	7890	8060	8280	8450	8610	8800	8970	9100	9220	9390	9600	143	187
	V1	140	140	140	140	140	140	140	140	140	140	140		
	VR	143	143	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4.1	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.6		
35000	TOFL	7280	7450	7660	7810	7960	8120	8280	8410	8510	8680	8870	140	185
	V1	136	136	136	136	136	136	136	136	135	135	136		
	VR	139	139	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	143	143	143		
	GR2	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4		
34000	TOFL	6720	6860	7050	7190	7330	7480	7630	7730	7830	7970	8160	137	182
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.8	4.7	4.7	4.7	4.7	4.6	4.7	4.7	4.6	4.3		
33000	TOFL	6170	6300	6470	6600	6730	6870	7000	7100	7180	7310	7480	134	179
	V1	127	127	127	127	127	127	127	127	126	126	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5	5.1	5.1	5	4.7		
32000	TOFL	5670	5790	5950	6060	6180	6310	6430	6520	6590	6710	6870	131	176
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	132	132	132		
	GR2	5.6	5.6	5.5	5.5	5.5	5.5	5.4	5.5	5.5	5.4	5.1		
31000	TOFL	5210	5320	5460	5560	5670	5780	5890	5970	6060	6150	6300	128	173
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	122	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.1	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.5		

FIGURE 5-67. TAKE-OFF DISTANCE; FLAPS - 20°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.4	85.0	85.7	86.7	87.6	88.4	89.3	90.2	91.2	92.1	92.9		
30000	TOFL	4770	4870	5000	5090	5190	5290	5390	5470	5540	5630	5760	126	169
	V1	113	113	114	114	114	114	114	113	113	113	113		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	125	125		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.3	6.4	6.4	6.2	6		
29000	TOFL	4380	4460	4580	4660	4750	4840	4930	4980	5070	5150	5280	123	166
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	114	115	115	115	115	115	115	115	115	115	115		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7	6.4		
28000	TOFL	4020	4100	4200	4280	4350	4440	4520	4580	4650	4710	4830	120	163
	V1	105	105	105	105	105	105	105	105	105	104	105		
	VR	110	110	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	118	118		
	GR2	7.5	7.4	7.4	7.4	7.4	7.3	7.3	7.3	7.3	7.2	6.9		
27000	TOFL	3690	3760	3850	3920	3990	4070	4140	4200	4260	4330	4420	117	160
	V1	101	101	101	101	101	101	101	101	100	100	101		
	VR	106	106	107	107	107	107	107	107	107	107	107		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.1	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.7	7.4		
26000	TOFL	3420	3480	3550	3620	3680	3750	3820	3870	3930	3990	4080	114	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	113	113	113	113	113	113	113	113	113	112	112		
	GR2	8.7	8.6	8.5	8.5	8.5	8.5	8.4	8.5	8.5	8.3	8		

FIGURE 5-67. TAKE-OFF DISTANCE; FLAPS - 20°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	93.0	93.0	93.0	92.4	91.8	91.2							
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	11660												
	V1	149												
	VR	152											148	193
	V2	153												
	GR2	2.7												
37000	TOFL	10810	11460											
	V1	145	146											
	VR	148	149										145	190
	V2	150	151											
	GR2	3	2.7											
36000	TOFL	10000	10620	11270	12100									
	V1	141	142	143	145									
	VR	144	145	146	147								143	187
	V2	147	147	148	149									
	GR2	3.3	3	2.7	2.4									
35000	TOFL	9260	9810	10430	11180	12050								
	V1	137	138	139	141	142								
	VR	140	141	142	143	145							140	185
	V2	143	144	145	145	146								
	GR2	3.7	3.3	3	2.7	2.4								
34000	TOFL	8530	9050	9620	10350	11140	11900							
	V1	132	134	135	137	138	140							
	VR	136	137	138	140	141	142						137	182
	V2	140	140	141	142	143	143							
	GR2	4	3.7	3.3	3.1	2.8	2.4							
33000	TOFL	7840	8330	8860	9530	10270	10980							
	V1	128	129	131	133	134	136							
	VR	132	133	134	136	137	138						134	179
	V2	136	137	138	139	140	140							
	GR2	4.4	4	3.7	3.4	3.1	2.8							
32000	TOFL	7190	7640	8130	8760	9450	10100							
	V1	123	125	127	129	130	132							
	VR	128	129	130	132	134	135						131	176
	V2	132	133	134	135	136	137							
	GR2	4.8	4.4	4.1	3.8	3.5	3.1							
31000	TOFL	6590	7000	7450	8030	8670	9280							
	V1	119	121	122	124	126	128							
	VR	124	125	126	128	130	131						128	173
	V2	129	130	131	132	133	134							
	GR2	5.2	4.8	4.5	4.2	3.8	3.5							

FIGURE 5-67. TAKE-OFF DISTANCE; FLAPS - 20°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	93.0	93.0	93.0	92.4	91.8	91.2							
30000	TOFL	6040	6400	6810	7340	7930	8500						126	169
	V1	115	116	118	120	122	124							
	VR	120	121	122	124	126	127							
	V2	125	126	127	128	129	130							
	GR2	5.6	5.2	4.9	4.6	4.3	3.9							
29000	TOFL	5510	5850	6210	6680	7230	7760						123	166
	V1	110	112	113	115	118	120							
	VR	115	117	118	120	122	123							
	V2	122	122	123	124	126	127							
	GR2	6.1	5.7	5.3	5	4.7	4.3							
28000	TOFL	5040	5320	5650	6080	6560	7060						120	163
	V1	106	107	109	111	113	115							
	VR	111	113	114	116	117	119							
	V2	118	118	120	121	122	123							
	GR2	6.5	6.1	5.8	5.4	5.1	4.8							
27000	TOFL	4610	4860	5140	5520	5960	6390						117	160
	V1	102	103	104	106	109	110							
	VR	107	108	110	111	113	115							
	V2	115	115	116	117	119	120							
	GR2	7.1	6.6	6.3	5.9	5.6	5.3							
26000	TOFL	4230	4440	4680	5020	5400	5780						114	157
	V1	98	99	100	102	104	106							
	VR	104	104	106	107	109	110							
	V2	112	112	113	114	115	116							
	GR2	7.6	7.2	6.8	6.5	6.1	5.8							

FIGURE 5-68. TAKE-OFF DISTANCE; FLAPS - 20°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	85.3	85.6	86.3	87.2	88.2	89.0	89.8	90.8	91.7	92.6	93.0		
39600	TOFL	11380	11750										154	198
	V1	158	158											
	VR	160	161											
	V2	162	162											
	GR2	2.7	2.5											
39000	TOFL	10890	11240	11580	11810	12050	12320	12560	12730	12950	13200		152	197
	V1	156	156	156	156	156	156	156	156	156	156			
	VR	158	158	159	159	159	159	159	159	159	159			
	V2	160	160	160	160	160	160	160	160	160	160			
	GR2	2.8	2.7	2.7	2.7	2.7	2.6	2.6	2.7	2.6	2.5			
38000	TOFL	10100	10430	10740	10960	11180	11440	11640	11800	12000	12240	12590	149	194
	V1	152	152	152	152	152	152	152	152	152	152	152		
	VR	154	154	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	156	156	156		
	GR2	3.2	3	3	3	3	3	3	3	2.9	2.8	2.5		
37000	TOFL	9370	9670	9960	10160	10370	10610	10790	10940	11120	11340	11650	147	191
	V1	148	148	148	148	148	148	148	148	148	148	148		
	VR	150	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	153	153	153	153	153		
	GR2	3.5	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.2	3.1	2.8		
36000	TOFL	8640	8920	9190	9380	9570	9790	9960	10090	10260	10460	10780	144	188
	V1	143	143	143	143	143	143	143	143	143	143	144		
	VR	146	146	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	149	149	149		
	GR2	3.8	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.4	3.2		
35000	TOFL	7980	8230	8470	8640	8810	9010	9170	9280	9430	9620	9910	141	185
	V1	138	139	139	139	139	139	139	139	139	139	139		
	VR	142	142	143	143	143	143	143	143	143	143	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4.2	4.1	4	4	4	4	4	4	3.9	3.7	3.5		
34000	TOFL	7350	7580	7800	7950	8110	8300	8450	8540	8680	8850	9120	138	182
	V1	134	134	135	135	135	135	135	134	134	134	135		
	VR	138	138	138	138	138	138	138	138	138	138	139		
	V2	143	143	143	143	143	143	143	142	142	142	142		
	GR2	4.6	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.1	3.8		
33000	TOFL	6760	6970	7170	7310	7460	7620	7760	7840	7970	8130	8380	135	179
	V1	129	130	130	130	130	130	130	130	130	130	130		
	VR	133	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	138	138	138	138		
	GR2	4.9	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.5	4.2		
32000	TOFL	6200	6390	6580	6710	6840	6990	7120	7190	7310	7440	7690	133	176
	V1	125	125	126	126	126	126	126	125	125	125	126		
	VR	129	130	130	130	130	130	130	130	130	130	130		
	V2	135	135	135	135	135	135	135	135	135	134	134		
	GR2	5.3	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	4.8	4.6		
31000	TOFL	5690	5860	6020	6140	6260	6390	6510	6570	6680	6810	7030	130	173
	V1	120	121	121	121	121	121	121	121	121	121	121		
	VR	125	125	126	126	126	126	126	126	126	126	126		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.6	5.6	5.6	5.6	5.6	5.5	5.6	5.5	5.3	5		

FIGURE 5-68. TAKE-OFF DISTANCE; FLAPS - 20°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	85.3	85.6	86.3	87.2	88.2	89.0	89.8	90.8	91.7	92.6	93.0		
30000	TOFL	5200	5360	5500	5610	5720	5850	5950	6000	6110	6230	6420	127	170
	V1	116	116	116	116	116	116	116	116	116	116	117		
	VR	121	121	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	127	127	127	127		
	GR2	6.2	6.1	6	6	6	6	6	6	5.9	5.7	5.4		
29000	TOFL	4760	4890	5020	5120	5220	5330	5420	5480	5570	5680	5860	124	167
	V1	111	112	112	112	112	112	112	112	112	112	112		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	123	123	123		
	GR2	6.7	6.5	6.5	6.5	6.5	6.5	6.4	6.5	6.4	6.1	5.9		
28000	TOFL	4350	4470	4590	4670	4760	4870	4940	5010	5070	5180	5340	121	164
	V1	107	107	107	107	107	107	107	107	107	107	108		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.2	7	7	7	7	6.9	6.9	7	6.8	6.6	6.3		
27000	TOFL	3980	4090	4190	4270	4350	4440	4500	4570	4630	4730	4850	118	160
	V1	102	103	103	103	103	103	103	103	103	103	103		
	VR	108	109	109	109	109	109	109	109	109	109	109		
	V2	117	117	117	117	117	117	116	116	116	116	116		
	GR2	7.7	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.4	7.1	6.9		
26000	TOFL	3640	3740	3830	3900	3980	4060	4120	4180	4240	4320	4440	115	157
	V1	98	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	105	105	105	105	105	105	105	105	105		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.3	8.1	8.1	8.1	8.1	8.1	8	8.1	7.9	7.7	7.4		

FIGURE 5-68. TAKE-OFF DISTANCE; FLAPS - 20°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	72							
	N1 (%)	93.0	93.0	92.8	92.2	91.5	91.2							
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	12220											147	191
	V1	149												
	VR	151												
	V2	153												
	GR2	2.5												
36000	TOFL	11340	12020										144	188
	V1	145	146											
	VR	148	149											
	V2	149	150											
	GR2	2.8	2.5											
35000	TOFL	10420	11110	11850									141	185
	V1	140	142	143										
	VR	144	145	146										
	V2	146	146	147										
	GR2	3.2	2.8	2.5										
34000	TOFL	9600	10210	10940	11770								138	182
	V1	136	137	139	140									
	VR	139	141	142	143									
	V2	142	143	144	145									
	GR2	3.5	3.2	2.9	2.6									
33000	TOFL	8820	9380	10060	10850	11700	12130						135	179
	V1	132	133	135	137	138	139							
	VR	135	137	138	139	140	141							
	V2	138	139	140	141	142	142							
	GR2	3.9	3.5	3.2	2.9	2.6	2.5							
32000	TOFL	8090	8600	9230	9970	10760	11150						133	176
	V1	127	129	131	133	134	135							
	VR	131	132	134	136	137	137							
	V2	135	135	137	138	139	139							
	GR2	4.3	3.9	3.6	3.3	3	2.8							
31000	TOFL	7410	7890	8450	9110	9890	10240						130	173
	V1	123	124	126	128	130	131							
	VR	127	128	130	131	133	134							
	V2	131	132	133	134	135	136							
	GR2	4.7	4.3	4	3.7	3.3	3.2							

FIGURE 5-68. TAKE-OFF DISTANCE; FLAPS - 20°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	72							
	N1 (%)	93.0	93.0	92.8	92.2	91.5	91.2							
30000	TOFL	6760	7210	7720	8330	9010	9380						127	170
	V1	118	120	122	124	126	127							
	VR	123	124	126	127	129	130							
	V2	127	128	129	131	132	132							
	GR2	5.1	4.7	4.4	4.1	3.8	3.6							
29000	TOFL	6170	6570	7030	7590	8220	8540						124	167
	V1	114	115	117	119	121	122							
	VR	118	120	121	123	125	126							
	V2	124	125	126	127	128	129							
	GR2	5.5	5.2	4.8	4.5	4.2	4							
28000	TOFL	5610	5980	6390	6890	7470	7760						121	164
	V1	109	111	113	115	117	118							
	VR	114	116	117	119	121	121							
	V2	120	121	122	123	125	125							
	GR2	6	5.6	5.3	4.9	4.6	4.4							
27000	TOFL	5120	5420	5800	6250	6770	7030						118	160
	V1	104	106	108	110	112	113							
	VR	110	111	113	115	116	117							
	V2	117	117	118	120	121	122							
	GR2	6.5	6.1	5.8	5.4	5.1	4.9							
26000	TOFL	4660	4920	5250	5650	6120	6350						115	157
	V1	100	102	103	105	108	109							
	VR	106	107	109	110	112	113							
	V2	113	114	115	116	117	118							
	GR2	7	6.6	6.3	5.9	5.6	5.4							

FIGURE 5-69. TAKE-OFF DISTANCE; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	TOFL	3860	3910	3970	4030	4090	4150	4210	4270	4340	4410	4480	139	192
	V1	126	126	126	126	125	125	125	125	125	125	125		
	VR	129	129	129	129	129	129	129	129	129	129	128		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.7	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
39000	TOFL	3720	3770	3830	3890	3940	4010	4060	4110	4180	4250	4310	138	191
	V1	124	124	124	124	123	123	123	123	123	123	123		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	136	136	136	136	136	136		
	GR2	5.9	5.9	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1		
38000	TOFL	3500	3550	3600	3660	3710	3760	3810	3870	3930	4000	4060	136	188
	V1	121	121	121	120	120	120	120	120	119	119	119		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5		
37000	TOFL	3320	3360	3420	3470	3530	3580	3640	3690	3750	3810	3870	135	185
	V1	118	118	118	118	118	117	117	117	117	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	132	132	132	132	132		
	GR2	6.7	6.7	6.7	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	3170	3220	3270	3320	3370	3430	3480	3530	3580	3640	3700	133	182
	V1	116	116	116	116	115	115	115	115	115	115	115		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	130	130	130	130	130	130	130	130	130		
	GR2	7.1	7.1	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	3030	3070	3120	3170	3220	3260	3310	3360	3410	3470	3520	131	180
	V1	114	113	113	113	113	113	113	113	113	113	112		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.6	7.6	7.6	7.6	7.7	7.7	7.8	7.8	7.8	7.8	7.8		
34000	TOFL	2880	2920	2970	3010	3060	3110	3150	3200	3250	3300	3350	129	177
	V1	111	111	111	111	111	111	110	110	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8	8.1	8.1	8.1	8.1	8.2	8.2	8.3	8.3	8.3	8.3		
33000	TOFL	2760	2800	2840	2890	2930	2980	3020	3070	3120	3160	3210	127	174
	V1	109	109	109	109	109	109	109	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	2650	2680	2730	2770	2820	2860	2900	2940	2990	3030	3080	125	171
	V1	107	107	107	107	107	107	107	107	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.1	9.1	9.1	9.2	9.2	9.3	9.3	9.4	9.4	9.4	9.4		
31000	TOFL	2550	2580	2620	2660	2710	2750	2790	2830	2880	2920	2960	123	168
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.7	9.7	9.7	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 5-69. TAKE-OFF DISTANCE; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
30000	TOFL	2450	2480	2520	2560	2600	2640	2680	2720	2760	2810	2850	121	166
	V1	104	104	104	104	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.3	10.3	10.4	10.4	10.4	10.5	10.5	10.6	10.6	10.6	10.6		
29000	TOFL	2360	2390	2430	2470	2510	2540	2580	2620	2660	2700	2740	119	163
	V1	102	102	102	102	102	102	102	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	121	121	121	121	121	121	121	121	121	121		
	GR2	11	11	11	11.1	11.1	11.1	11.2	11.3	11.3	11.3	11.3		
28000	TOFL	2300	2330	2380	2420	2460	2510	2550	2590	2630	2670	2710	117	160
	V1	101	101	101	101	101	101	102	102	102	102	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	120	120	120	120	120	120	120	120		
	GR2	11.7	11.7	11.8	11.8	11.8	11.9	11.9	12	12	12	12		
27000	TOFL	2280	2320	2360	2400	2440	2490	2530	2570	2610	2650	2690	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	119	119	119	119	119	119		
	GR2	12.4	12.5	12.5	12.6	12.6	12.6	12.7	12.7	12.7	12.7	12.7		
26000	TOFL	2260	2300	2340	2380	2420	2460	2510	2550	2590	2630	2670	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	102	102	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	119	119	119	119	119		
	GR2	13.3	13.3	13.3	13.4	13.4	13.5	13.5	13.6	13.6	13.6	13.6		

FIGURE 5-69. TAKE-OFF DISTANCE; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
39600	TOFL	4540	4610	4680	4760	4820	4890	4970	5280	5760	6230	6690	139	192
	V1	124	124	124	124	124	124	124	126	129	132	134		
	VR	128	128	129	129	129	129	129	130	132	134	135		
	V2	137	137	137	137	137	137	137	138	139	139	140		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.3	4.7	4	3.5		
39000	TOFL	4380	4450	4520	4580	4650	4720	4780	5080	5540	5990	6450	138	191
	V1	123	122	122	122	122	122	122	124	127	130	132		
	VR	127	127	127	127	127	127	127	128	130	132	133		
	V2	136	136	136	136	136	136	136	136	137	138	139		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.5	4.8	4.2	3.7		
38000	TOFL	4120	4180	4250	4310	4370	4440	4500	4770	5180	5610	6040	136	188
	V1	119	119	119	119	119	119	119	121	124	126	128		
	VR	124	124	124	124	124	124	124	125	127	129	130		
	V2	133	133	133	133	133	133	133	133	134	135	136		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.4	5.9	5.2	4.6	4		
37000	TOFL	3930	3990	4050	4100	4160	4220	4280	4480	4860	5260	5660	135	185
	V1	117	117	117	117	117	117	117	118	120	123	125		
	VR	122	122	122	122	122	122	122	122	124	126	127		
	V2	132	132	132	132	132	132	132	132	132	133	133		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.2	5.5	4.9	4.3		
36000	TOFL	3750	3810	3860	3920	3980	4030	4090	4270	4570	4940	5320	133	182
	V1	115	115	115	115	115	114	114	115	117	120	122		
	VR	120	120	120	120	120	120	120	120	121	123	125		
	V2	130	130	130	130	130	130	130	130	130	130	131		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	6.7	5.9	5.3	4.7		
35000	TOFL	3570	3630	3680	3730	3790	3840	3890	4070	4310	4630	4980	131	180
	V1	112	112	112	112	112	112	112	113	114	117	119		
	VR	118	118	118	118	118	118	118	118	119	120	122		
	V2	128	128	128	128	128	128	128	128	127	128	129		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.1	6.3	5.6	5		
34000	TOFL	3400	3450	3500	3550	3600	3650	3700	3870	4090	4350	4660	129	177
	V1	110	110	110	110	110	110	110	111	112	113	116		
	VR	116	116	116	116	116	116	116	116	117	117	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	8.2	7.6	6.8	6	5.4		
33000	TOFL	3260	3310	3350	3400	3450	3500	3550	3670	3890	4110	4360	127	174
	V1	108	108	108	108	108	108	108	108	110	111	112		
	VR	114	114	114	114	114	114	114	114	115	115	116		
	V2	125	125	125	125	125	125	125	124	124	124	124		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.1	7.3	6.5	5.8		
32000	TOFL	3130	3170	3220	3260	3310	3350	3400	3510	3680	3890	4100	125	171
	V1	106	106	106	106	106	106	106	106	107	108	109		
	VR	112	112	112	112	112	112	112	112	113	113	113		
	V2	124	124	124	124	124	124	124	123	122	122	122		
	GR2	9.4	9.4	9.3	9.3	9.3	9.3	9.3	8.6	7.8	7	6.3		
31000	TOFL	3010	3050	3090	3140	3180	3220	3270	3360	3500	3680	3870	123	168
	V1	105	105	104	104	104	104	104	104	105	106	107		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	122	121	120	120		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.2	8.3	7.5	6.8		

FIGURE 5-69. TAKE-OFF DISTANCE; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
30000	TOFL	2890	2930	2970	3010	3050	3100	3140	3220	3340	3490	3660	121	166
	V1	103	103	103	103	103	103	102	103	103	103	104		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	121	119	118	118		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.5	9.8	8.9	8	7.3		
29000	TOFL	2780	2820	2860	2890	2930	2970	3010	3090	3200	3320	3450	119	163
	V1	101	101	101	101	101	101	101	101	101	101	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	121	121	121	121	121	121	121	120	118	117	116		
	GR2	11.3	11.3	11.2	11.2	11.2	11.2	11.2	10.4	9.5	8.6	7.8		
28000	TOFL	2750	2790	2830	2870	2910	2950	2990	2960	3060	3160	3280	117	160
	V1	101	101	101	101	101	101	101	99	99	99	100		
	VR	106	106	106	106	106	106	106	106	105	105	105		
	V2	120	120	120	120	120	120	120	119	117	116	115		
	GR2	12	12	12	11.9	11.9	11.9	11.9	11.1	10.2	9.3	8.4		
27000	TOFL	2730	2770	2810	2840	2880	2920	2960	2930	2930	3020	3120	115	157
	V1	102	102	102	101	101	101	101	99	97	98	98		
	VR	104	104	104	104	104	104	104	104	104	103	103		
	V2	119	119	119	119	119	119	119	118	116	115	114		
	GR2	12.7	12.7	12.7	12.7	12.7	12.7	12.7	11.9	10.9	9.9	9.1		
26000	TOFL	2710	2740	2780	2820	2860	2890	2930	2900	2860	2890	2980	113	154
	V1	102	102	102	102	102	102	101	99	97	96	96		
	VR	103	103	103	103	103	103	103	102	102	102	101		
	V2	119	119	119	119	119	119	119	116	115	114	112		
	GR2	13.6	13.6	13.6	13.5	13.5	13.5	13.5	12.7	11.6	10.7	9.8		

FIGURE 5-70. TAKE-OFF DISTANCE; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	TOFL	4090	4150	4220	4290	4360	4420	4480	4550	4630	4700	4780	139	193
	V1	127	127	127	127	127	127	126	126	126	126	126		
	VR	131	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	3950	4000	4070	4140	4200	4260	4320	4390	4460	4530	4600	138	191
	V1	126	125	125	125	125	125	124	124	124	124	124		
	VR	129	129	129	129	128	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	3710	3760	3820	3880	3950	4010	4060	4120	4190	4250	4320	136	188
	V1	122	122	122	122	122	121	121	121	121	121	121		
	VR	126	126	126	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.2		
37000	TOFL	3480	3530	3590	3650	3710	3770	3820	3880	3940	4010	4070	135	185
	V1	119	119	118	118	118	118	118	118	118	118	118		
	VR	123	123	123	123	123	123	122	122	122	122	122		
	V2	131	131	131	131	131	132	132	132	132	132	132		
	GR2	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	3300	3350	3400	3460	3510	3570	3620	3680	3740	3800	3850	133	183
	V1	116	116	116	116	116	115	115	115	115	115	115		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	130	130	130	130	130	130		
	GR2	6.9	6.9	6.9	7	7	7	7	7	7	7	7		
35000	TOFL	3140	3190	3240	3290	3350	3390	3450	3500	3560	3620	3670	131	180
	V1	114	113	113	113	113	113	113	113	113	113	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	128	128	128	128	128	128	128	128	128	128		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
34000	TOFL	2990	3030	3090	3140	3190	3230	3280	3330	3380	3440	3490	129	177
	V1	111	111	111	111	111	111	111	110	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.8	7.8	7.9	7.9	7.9	7.9	7.9	8	8	8	8		
33000	TOFL	2860	2900	2950	2990	3040	3090	3130	3180	3230	3280	3330	127	174
	V1	109	109	109	109	109	109	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.3	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	2740	2780	2830	2870	2920	2960	3010	3050	3100	3150	3200	125	171
	V1	107	107	107	107	107	107	107	107	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	124	124	124	124	124		
	GR2	8.9	8.9	8.9	8.9	8.9	9	9	9	9	9	9		
31000	TOFL	2640	2670	2710	2760	2800	2850	2890	2930	2980	3030	3070	123	169
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.5	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 5-70. TAKE-OFF DISTANCE; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
30000	TOFL	2530	2570	2610	2650	2700	2740	2780	2820	2870	2910	2950	121	166
	V1	104	104	104	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.1	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		
29000	TOFL	2440	2470	2510	2550	2590	2630	2670	2710	2750	2800	2840	119	163
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.7	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9		
28000	TOFL	2350	2380	2420	2470	2510	2550	2600	2640	2680	2720	2760	117	160
	V1	100	100	100	100	100	100	101	101	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
27000	TOFL	2330	2360	2400	2450	2490	2530	2580	2620	2660	2700	2740	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.2	12.2	12.2	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	2310	2340	2380	2430	2470	2510	2550	2600	2640	2680	2720	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13	13	13	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2		

FIGURE 5-70. TAKE-OFF DISTANCE; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
39600	TOFL	4850	4930	5000	5080	5150	5230	5410	5820	6300	6800	7100	139	193
	V1	126	126	126	126	126	126	127	129	132	134	135		
	VR	130	130	130	130	130	130	131	132	134	136	136		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.4	4.9	4.3	3.7	3.3		
39000	TOFL	4670	4750	4820	4890	4960	5040	5210	5590	6060	6550	6830	138	191
	V1	124	124	124	124	124	124	125	127	129	132	133		
	VR	128	128	128	128	128	128	129	130	132	134	135		
	V2	137	137	137	137	137	137	137	138	139	140	139		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.1	4.5	3.9	3.5		
38000	TOFL	4390	4460	4520	4590	4660	4730	4890	5230	5670	6130	6410	136	188
	V1	121	121	121	121	121	121	121	123	126	128	130		
	VR	125	125	125	125	125	125	126	127	129	131	132		
	V2	134	134	134	134	134	134	134	135	136	137	137		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6	5.4	4.8	4.2	3.8		
37000	TOFL	4130	4190	4260	4320	4390	4450	4580	4900	5300	5720	5990	135	185
	V1	118	118	118	117	117	117	118	120	123	125	126		
	VR	122	122	122	122	122	122	123	124	126	128	129		
	V2	132	132	132	132	132	132	132	132	133	134	134		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.4	5.8	5.1	4.5	4.1		
36000	TOFL	3910	3970	4030	4090	4150	4210	4330	4590	4950	5350	5600	133	183
	V1	115	115	115	115	115	115	115	117	119	122	123		
	VR	120	120	120	120	120	120	120	121	123	125	126		
	V2	130	130	130	130	130	130	130	130	130	131	131		
	GR2	7	7	7	7	7	7	6.8	6.2	5.5	4.9	4.5		
35000	TOFL	3730	3780	3840	3890	3950	4010	4110	4340	4650	5010	5250	131	180
	V1	113	113	112	112	112	112	113	114	116	118	120		
	VR	118	118	118	118	118	118	118	119	120	122	123		
	V2	128	128	128	128	128	128	128	128	128	129	129		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.2	6.6	5.9	5.2	4.8		
34000	TOFL	3550	3600	3650	3710	3760	3810	3910	4110	4360	4690	4910	129	177
	V1	110	110	110	110	110	110	110	111	113	115	117		
	VR	116	116	116	116	116	116	116	117	117	119	120		
	V2	127	127	127	127	127	127	126	126	126	126	127		
	GR2	8	8	7.9	7.9	7.9	7.9	7.7	7.1	6.3	5.6	5.2		
33000	TOFL	3380	3430	3480	3530	3580	3630	3720	3890	4120	4390	4590	127	174
	V1	108	108	108	108	108	108	108	109	110	112	113		
	VR	114	114	114	114	114	114	114	114	115	116	117		
	V2	125	125	125	125	125	125	124	124	124	124	124		
	GR2	8.5	8.5	8.5	8.5	8.4	8.4	8.2	7.5	6.8	6	5.6		
32000	TOFL	3240	3290	3340	3390	3440	3480	3560	3690	3900	4130	4290	125	171
	V1	106	106	106	106	106	106	106	107	108	109	110		
	VR	112	112	112	112	112	112	112	112	113	114	114		
	V2	124	124	124	124	124	124	123	122	122	122	122		
	GR2	9	9	9	9	9	9	8.7	8	7.3	6.5	6.1		
31000	TOFL	3120	3160	3210	3250	3300	3340	3410	3530	3690	3890	4030	123	169
	V1	105	104	104	104	104	104	104	104	105	106	107		
	VR	111	111	111	111	111	111	111	111	111	111	112		
	V2	122	122	122	122	122	122	122	121	120	120	120		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.3	8.6	7.8	7	6.5		

FIGURE 5-70. TAKE-OFF DISTANCE; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
30000	TOFL	3000	3040	3080	3130	3170	3210	3270	3370	3510	3680	3790	121	166
	V1	103	103	103	103	103	103	103	103	103	104	105		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	120	119	118	118		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	9.9	9.2	8.3	7.5	7		
29000	TOFL	2880	2920	2960	3000	3040	3090	3140	3240	3340	3480	3580	119	163
	V1	101	101	101	101	101	101	101	101	101	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	119	117	116	116		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.6	9.8	8.9	8.1	7.6		
28000	TOFL	2800	2840	2880	2920	2960	3000	3020	3100	3200	3310	3390	117	160
	V1	100	100	100	100	100	100	99	99	99	99	100		
	VR	106	106	106	106	106	106	106	105	105	105	105		
	V2	119	119	119	119	119	119	119	118	116	115	114		
	GR2	11.6	11.6	11.6	11.6	11.6	11.6	11.3	10.5	9.6	8.7	8.2		
27000	TOFL	2780	2820	2860	2900	2940	2980	2990	2970	3060	3160	3220	115	157
	V1	101	100	100	100	100	100	99	97	97	98	98		
	VR	104	104	104	104	104	104	104	104	104	103	103		
	V2	118	118	118	118	118	118	118	117	115	114	113		
	GR2	12.4	12.4	12.4	12.3	12.3	12.3	12	11.2	10.3	9.4	8.8		
26000	TOFL	2750	2790	2830	2870	2910	2950	2970	2940	2930	3020	3080	113	154
	V1	101	101	101	101	101	100	100	98	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	115	114	113	112		
	GR2	13.2	13.2	13.2	13.1	13.1	13.1	12.8	12	11	10.1	9.5		

FIGURE 5-71. TAKE-OFF DISTANCE; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	TOFL	4340	4400	4480	4570	4640	4720	4790	4870	4950	5030	5110	140	193
	V1	129	129	129	129	129	128	128	128	128	128	128		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
39000	TOFL	4170	4230	4310	4400	4470	4540	4610	4680	4760	4840	4920	139	191
	V1	127	127	127	127	126	126	126	126	126	126	126		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	138	138	138	138	138	138	138	138		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.6	5.6		
38000	TOFL	3920	3980	4050	4120	4190	4260	4320	4400	4470	4540	4610	137	189
	V1	123	123	123	123	123	123	123	123	123	122	122		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
37000	TOFL	3680	3740	3800	3870	3930	3990	4050	4120	4190	4250	4320	135	186
	V1	120	120	120	120	120	119	119	119	119	119	119		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	132	132	132	132	132		
	GR2	6.4	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	3450	3510	3570	3640	3690	3750	3810	3870	3940	4000	4060	133	183
	V1	117	117	117	116	116	116	116	116	116	116	116		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.8	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	3260	3300	3360	3430	3480	3540	3590	3650	3710	3770	3830	131	180
	V1	114	113	113	113	113	113	113	113	113	113	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	128	128	128	128	128	128	128	128		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
34000	TOFL	3100	3140	3200	3260	3310	3360	3410	3480	3530	3590	3640	129	177
	V1	111	111	111	111	111	111	111	111	111	111	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7		
33000	TOFL	2950	3000	3050	3100	3150	3210	3250	3310	3360	3410	3460	127	175
	V1	109	109	109	109	109	108	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
32000	TOFL	2830	2870	2920	2970	3020	3070	3120	3170	3220	3270	3320	125	172
	V1	107	107	107	107	107	107	106	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.7	8.7	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	2720	2760	2810	2860	2900	2950	3000	3050	3090	3140	3190	123	169
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 5-71. TAKE-OFF DISTANCE; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
30000	TOFL	2620	2660	2710	2750	2800	2840	2890	2930	2980	3020	3070	121	166
	V1	104	104	104	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
29000	TOFL	2520	2550	2600	2640	2680	2730	2770	2810	2850	2900	2940	119	163
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
28000	TOFL	2420	2460	2500	2540	2580	2620	2660	2700	2740	2780	2820	117	160
	V1	100	100	100	100	100	100	100	100	100	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
27000	TOFL	2380	2420	2460	2500	2540	2590	2630	2670	2710	2750	2790	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	11.9	11.9	11.9	11.9	12	12	12	12	12	12		
26000	TOFL	2360	2400	2440	2480	2520	2560	2610	2650	2690	2730	2770	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.7	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 5-71. TAKE-OFF DISTANCE; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
39600	TOFL	5190	5270	5360	5440	5520	5600	5930	6400	6900	7430	7550	140	193
	V1	128	128	128	128	128	128	129	132	134	136	136		
	VR	132	132	132	132	132	132	133	135	136	138	138		
	V2	139	139	139	139	139	139	140	141	142	143	143		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.1	4.5	3.9	3.3	3.2		
39000	TOFL	4990	5070	5150	5230	5310	5390	5700	6150	6640	7150	7260	139	191
	V1	126	126	126	126	126	126	127	130	132	134	134		
	VR	130	130	130	130	130	130	131	133	135	136	136		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.3	4.7	4.1	3.5	3.3		
38000	TOFL	4680	4760	4830	4900	4980	5050	5330	5750	6210	6700	6810	137	189
	V1	122	122	122	122	122	122	124	126	128	131	131		
	VR	127	127	127	127	127	127	128	130	131	133	133		
	V2	135	135	135	135	135	135	136	137	137	138	138		
	GR2	6	6	6	6	6	6	5.6	5	4.4	3.8	3.7		
37000	TOFL	4390	4460	4530	4590	4660	4730	4990	5380	5800	6260	6370	135	186
	V1	119	119	119	119	119	119	120	123	125	127	128		
	VR	124	124	124	124	124	124	125	126	128	130	130		
	V2	132	132	132	132	132	132	133	134	135	135	136		
	GR2	6.4	6.4	6.3	6.3	6.3	6.3	6	5.4	4.7	4.1	4		
36000	TOFL	4120	4190	4250	4310	4380	4440	4670	5020	5410	5840	5940	133	183
	V1	116	116	116	116	116	116	117	119	121	124	124		
	VR	121	121	121	121	121	121	122	123	125	127	127		
	V2	130	130	130	130	130	130	130	131	132	132	133		
	GR2	6.8	6.8	6.8	6.7	6.7	6.7	6.4	5.7	5.1	4.4	4.3		
35000	TOFL	3890	3950	4000	4070	4120	4180	4380	4690	5040	5440	5530	131	180
	V1	113	113	113	113	113	113	114	116	118	120	121		
	VR	118	118	118	118	118	118	119	120	122	123	124		
	V2	128	128	128	128	128	128	128	128	129	130	130		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	6.8	6.1	5.4	4.8	4.7		
34000	TOFL	3700	3750	3810	3870	3920	3980	4140	4400	4720	5090	5170	129	177
	V1	110	110	110	110	110	110	111	112	115	117	118		
	VR	116	116	116	116	116	116	116	117	119	120	121		
	V2	126	126	126	126	126	126	126	126	126	127	127		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.2	6.5	5.8	5.2	5		
33000	TOFL	3520	3570	3620	3670	3730	3780	3930	4150	4420	4750	4830	127	175
	V1	108	108	108	108	108	108	109	110	111	114	114		
	VR	114	114	114	114	114	114	114	115	116	117	118		
	V2	124	124	124	124	124	124	124	124	124	125	125		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	7.7	7	6.3	5.6	5.4		
32000	TOFL	3370	3420	3470	3520	3570	3610	3730	3920	4150	4440	4510	125	172
	V1	106	106	106	106	106	106	106	107	109	111	111		
	VR	112	112	112	112	112	112	112	113	113	115	115		
	V2	123	123	123	123	123	123	122	122	122	122	122		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.2	7.5	6.7	6	5.9		
31000	TOFL	3230	3280	3330	3380	3430	3470	3570	3710	3910	4150	4210	123	169
	V1	104	104	104	104	104	104	104	105	106	107	108		
	VR	111	111	111	111	111	111	110	110	111	112	112		
	V2	122	122	122	122	122	122	121	120	120	120	120		
	GR2	9.3	9.3	9.3	9.2	9.2	9.2	8.8	8	7.2	6.5	6.3		

FIGURE 5-71. TAKE-OFF DISTANCE; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
30000	TOFL	3110	3160	3200	3250	3290	3340	3420	3540	3690	3890	3940	121	166
	V1	103	103	103	103	103	103	103	103	103	104	105		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	120	119	118	118	118		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.4	8.6	7.8	7	6.8		
29000	TOFL	2980	3030	3070	3110	3150	3200	3280	3390	3510	3670	3710	119	163
	V1	101	101	101	101	101	101	101	101	101	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	119	118	117	116	116		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10	9.2	8.3	7.5	7.3		
28000	TOFL	2860	2900	2940	2990	3030	3070	3140	3240	3340	3470	3510	117	160
	V1	99	99	99	99	99	99	99	99	99	100	100		
	VR	106	106	106	106	106	106	106	105	105	105	105		
	V2	119	119	119	119	119	119	118	117	115	114	114		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	10.7	9.9	9	8.1	7.9		
27000	TOFL	2830	2870	2920	2960	3000	3040	3040	3100	3200	3300	3320	115	157
	V1	100	99	99	99	99	99	98	97	98	97	98		
	VR	104	104	104	104	104	104	104	104	103	103	103		
	V2	118	118	118	118	118	118	117	116	114	113	113		
	GR2	12	12	12	11.9	11.9	11.9	11.4	10.6	9.7	8.8	8.6		
26000	TOFL	2810	2850	2890	2930	2970	3010	3010	2980	3060	3150	3170	113	154
	V1	100	100	100	100	100	99	98	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	101		
	V2	117	117	117	117	117	117	116	115	113	112	112		
	GR2	12.8	12.8	12.8	12.8	12.8	12.7	12.2	11.3	10.4	9.5	9.3		

FIGURE 5-72. TAKE-OFF DISTANCE; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	TOFL	4610	4700	4800	4890	4970	5060	5140	5230	5320	5410	5490	141	193
	V1	131	131	131	131	130	130	130	130	130	130	130		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	4420	4530	4620	4700	4780	4870	4950	5030	5110	5200	5280	140	192
	V1	129	129	129	128	128	128	128	128	128	128	128		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	4160	4250	4330	4410	4480	4560	4630	4710	4790	4870	4950	137	189
	V1	125	125	125	125	125	125	125	125	125	124	124		
	VR	128	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	136	136	136	136	136	136	136	136		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	3900	3980	4060	4130	4200	4270	4340	4410	4490	4560	4630	135	186
	V1	122	122	122	121	121	121	121	121	121	121	121		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	3650	3730	3800	3860	3930	4000	4060	4130	4200	4260	4330	133	183
	V1	118	118	118	118	118	118	118	118	117	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	3430	3490	3570	3630	3690	3750	3810	3880	3940	4000	4070	131	181
	V1	115	115	115	115	115	114	114	114	114	114	114		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
34000	TOFL	3230	3290	3350	3420	3480	3540	3590	3650	3710	3770	3830	129	178
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	3070	3130	3190	3240	3300	3350	3410	3460	3530	3580	3640	127	175
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	125	125	125		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
32000	TOFL	2940	2990	3040	3090	3150	3200	3250	3300	3350	3410	3460	125	172
	V1	107	107	107	107	107	107	107	107	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
31000	TOFL	2820	2870	2920	2970	3020	3070	3120	3170	3220	3260	3310	123	169
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 5-72. TAKE-OFF DISTANCE; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
30000	TOFL	2710	2760	2810	2850	2900	2950	3000	3040	3090	3140	3190	121	166
	V1	104	104	104	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	2610	2650	2690	2740	2790	2830	2870	2920	2960	3010	3060	119	163
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	119	119	119	119	119	119	119	119	119	119		
	GR2	10.3	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
28000	TOFL	2500	2540	2580	2630	2670	2710	2760	2800	2840	2890	2930	117	160
	V1	100	100	100	100	100	100	100	100	100	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
27000	TOFL	2440	2460	2510	2550	2590	2630	2680	2720	2760	2800	2850	115	157
	V1	99	99	99	99	99	99	99	99	99	99	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.6	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	2420	2440	2490	2530	2570	2610	2650	2700	2740	2780	2820	113	154
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.5	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3		

FIGURE 5-72. TAKE-OFF DISTANCE; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
39600	TOFL	5580	5670	5760	5850	5930	6090	6540	7060	7600	8070		141	193
	V1	130	130	130	130	130	130	132	135	137	138			
	VR	134	134	134	134	134	134	136	137	139	140			
	V2	141	141	141	141	141	141	142	143	144	144			
	GR2	5.2	5.2	5.2	5.2	5.2	5.1	4.6	4	3.4	3			
39000	TOFL	5370	5450	5540	5620	5710	5850	6290	6790	7310	7770		140	192
	V1	128	128	128	128	128	128	130	132	135	136			
	VR	132	132	132	132	132	132	134	135	137	138			
	V2	139	139	139	139	139	139	140	141	142	142			
	GR2	5.4	5.4	5.4	5.4	5.3	5.3	4.8	4.2	3.6	3.2			
38000	TOFL	5030	5100	5180	5260	5340	5480	5880	6350	6850	7270		137	189
	V1	124	124	124	124	124	124	127	129	131	133			
	VR	129	129	129	129	129	129	131	132	134	135			
	V2	136	136	136	136	136	137	137	138	139	140			
	GR2	5.7	5.7	5.7	5.7	5.7	5.6	5.2	4.5	3.9	3.5			
37000	TOFL	4700	4780	4850	4920	5000	5120	5500	5930	6390	6800		135	186
	V1	121	121	121	121	121	121	123	126	128	130			
	VR	125	125	125	125	125	126	127	129	131	132			
	V2	134	134	134	134	134	134	135	135	136	137			
	GR2	6.1	6.1	6.1	6.1	6.1	6	5.5	4.9	4.3	3.8			
36000	TOFL	4400	4470	4540	4600	4670	4790	5130	5530	5960	6350		133	183
	V1	117	117	117	117	117	117	120	122	124	126			
	VR	122	122	122	122	122	122	124	126	127	129			
	V2	131	131	131	131	131	131	132	133	133	134			
	GR2	6.5	6.5	6.5	6.4	6.4	6.3	5.9	5.2	4.6	4.1			
35000	TOFL	4130	4190	4260	4320	4380	4480	4790	5150	5550	5910		131	181
	V1	114	114	114	114	114	114	116	118	121	123			
	VR	119	119	119	119	119	120	121	122	124	125			
	V2	128	128	128	128	128	129	129	130	130	131			
	GR2	6.9	6.9	6.9	6.9	6.8	6.8	6.3	5.6	5	4.5			
34000	TOFL	3890	3940	4000	4060	4120	4210	4470	4800	5160	5490		129	178
	V1	111	111	111	111	111	111	112	115	117	119			
	VR	116	116	116	116	116	117	118	119	121	122			
	V2	126	126	126	126	126	126	127	127	128	128			
	GR2	7.3	7.3	7.3	7.3	7.3	7.2	6.7	6	5.3	4.8			
33000	TOFL	3690	3750	3800	3860	3920	3990	4200	4480	4810	5120		127	175
	V1	109	109	108	108	108	109	110	111	114	116			
	VR	114	114	114	114	114	114	115	116	118	119			
	V2	125	125	125	125	125	125	125	125	125	126			
	GR2	7.8	7.8	7.8	7.8	7.8	7.7	7.1	6.4	5.8	5.2			
32000	TOFL	3510	3560	3620	3670	3720	3790	3980	4200	4490	4770		125	172
	V1	106	106	106	106	106	106	107	108	110	112			
	VR	112	112	112	112	112	112	113	113	115	116			
	V2	123	123	123	123	123	123	123	122	123	123			
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	7.6	6.9	6.2	5.6			
31000	TOFL	3360	3410	3460	3510	3560	3620	3760	3960	4200	4440		123	169
	V1	105	104	104	104	104	104	105	106	107	109			
	VR	111	111	111	111	111	111	111	111	112	113			
	V2	122	122	121	121	121	121	120	120	120	121			
	GR2	8.9	8.9	8.9	8.9	8.9	8.7	8.1	7.4	6.7	6.1			

FIGURE 5-72. TAKE-OFF DISTANCE; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
30000	TOFL	3230	3280	3330	3380	3420	3480	3590	3740	3940	4140		121	166
	V1	103	103	103	103	103	103	103	103	104	106			
	VR	109	109	109	109	109	109	109	109	109	110			
	V2	121	121	121	121	121	120	119	118	118	118			
	GR2	9.5	9.5	9.5	9.5	9.5	9.3	8.7	7.9	7.2	6.6			
29000	TOFL	3100	3150	3190	3230	3280	3330	3440	3560	3720	3880		119	163
	V1	101	101	101	101	101	101	101	101	102	103			
	VR	107	107	107	107	107	107	107	107	107	107			
	V2	119	119	119	119	119	119	118	117	116	116			
	GR2	10.1	10.1	10.1	10.1	10.1	10	9.3	8.5	7.7	7.1			
28000	TOFL	2970	3010	3060	3100	3140	3190	3300	3400	3520	3650		117	160
	V1	99	99	99	99	99	99	99	99	99	100			
	VR	106	106	106	106	106	106	106	105	105	105			
	V2	118	118	118	118	118	118	117	116	115	114			
	GR2	10.8	10.8	10.8	10.8	10.8	10.6	10	9.1	8.3	7.7			
27000	TOFL	2890	2930	2970	3010	3050	3090	3150	3250	3350	3450		115	157
	V1	98	98	98	98	98	98	97	97	97	98			
	VR	104	104	104	104	104	104	104	104	103	103			
	V2	117	117	117	117	117	117	116	115	113	112			
	GR2	11.6	11.5	11.5	11.5	11.5	11.4	10.7	9.8	9	8.3			
26000	TOFL	2860	2900	2940	2980	3020	3050	3050	3100	3200	3280		113	154
	V1	99	99	98	98	98	98	96	96	96	96			
	VR	102	102	102	102	102	102	102	102	102	101			
	V2	116	116	116	116	116	116	115	114	112	111			
	GR2	12.3	12.3	12.3	12.3	12.3	12.1	11.5	10.6	9.7	8.9			

FIGURE 5-73. TAKE-OFF DISTANCE; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	TOFL	4960	5070	5170	5270	5360	5450	5540	5640	5730	5830	5920	142	194
	V1	133	133	133	133	132	132	132	132	132	132	132		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
39000	TOFL	4780	4880	4970	5060	5150	5240	5330	5420	5510	5600	5690	141	192
	V1	131	131	131	130	130	130	130	130	130	130	130		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	140	140	140	140	140		
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
38000	TOFL	4470	4570	4660	4740	4830	4910	4990	5080	5160	5250	5330	138	189
	V1	127	127	127	127	127	127	127	127	127	126	126		
	VR	131	131	131	131	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	4190	4280	4360	4440	4520	4590	4670	4750	4830	4910	4980	136	187
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	3920	4000	4080	4150	4220	4290	4360	4440	4510	4580	4650	133	184
	V1	120	120	120	120	120	120	120	119	119	119	119		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	3660	3740	3810	3880	3940	4010	4080	4140	4210	4280	4350	131	181
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	3420	3510	3570	3630	3690	3750	3820	3880	3940	4000	4070	129	178
	V1	113	113	113	113	113	113	113	113	112	112	112		
	VR	117	118	118	118	118	118	118	118	118	118	118		
	V2	126	127	127	127	127	127	127	127	127	127	127		
	GR2	7.1	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	3230	3290	3370	3410	3480	3540	3600	3650	3710	3770	3830	127	175
	V1	110	110	110	110	110	110	110	110	110	109	109		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	125	125	125	125	125	125		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
32000	TOFL	3070	3120	3180	3240	3290	3340	3400	3460	3510	3580	3630	125	172
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	123	123		
	GR2	8.1	8	8	8	8	8	8	8	8	8	8		
31000	TOFL	2940	2990	3040	3090	3150	3200	3250	3300	3350	3410	3460	123	169
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 5-73. TAKE-OFF DISTANCE; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
30000	TOFL	2820	2870	2920	2960	3020	3070	3110	3160	3210	3260	3310	121	166
	V1	104	104	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
29000	TOFL	2710	2750	2800	2850	2890	2940	2990	3040	3080	3130	3180	119	163
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	108	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
28000	TOFL	2600	2640	2690	2730	2780	2820	2870	2910	2960	3000	3050	117	160
	V1	100	100	100	100	100	100	100	100	100	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
27000	TOFL	2490	2530	2580	2620	2660	2700	2750	2790	2830	2870	2920	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.1		
26000	TOFL	2460	2490	2530	2570	2610	2660	2700	2740	2790	2830	2870	113	154
	V1	98	98	98	98	98	98	98	98	98	98	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 5-73. TAKE-OFF DISTANCE; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
39600	TOFL	6020	6120	6210	6310	6410	6740	7270	7830	8410	8650		142	194
	V1	132	132	132	132	132	133	135	137	139	140			
	VR	136	136	136	136	136	137	138	140	141	141			
	V2	142	142	142	142	142	143	144	145	145	145			
	GR2	4.9	4.9	4.9	4.9	4.9	4.6	4.1	3.6	3	2.8			
39000	TOFL	5780	5880	5970	6060	6160	6470	6980	7510	8090	8330		141	192
	V1	130	130	130	130	130	131	133	135	137	138			
	VR	134	134	134	134	134	135	136	138	139	140			
	V2	140	140	140	140	140	141	142	143	143	144			
	GR2	5.1	5.1	5.1	5.1	5.1	4.8	4.3	3.8	3.2	3			
38000	TOFL	5420	5500	5590	5670	5760	6050	6520	7040	7580	7820		138	189
	V1	126	126	126	126	126	127	130	132	134	135			
	VR	130	130	130	130	130	131	133	135	136	137			
	V2	138	138	138	138	138	138	139	140	141	141			
	GR2	5.5	5.5	5.5	5.4	5.4	5.2	4.7	4.1	3.5	3.3			
37000	TOFL	5060	5140	5220	5300	5380	5650	6090	6570	7080	7310		136	187
	V1	123	123	123	123	123	124	126	128	131	131			
	VR	127	127	127	127	127	128	130	132	133	134			
	V2	135	135	135	135	135	135	136	137	138	138			
	GR2	5.8	5.8	5.8	5.8	5.8	5.5	5	4.4	3.8	3.6			
36000	TOFL	4730	4800	4880	4950	5020	5280	5680	6120	6600	6820		133	184
	V1	119	119	119	119	119	120	123	125	127	128			
	VR	124	124	124	124	124	125	127	128	130	130			
	V2	132	132	132	132	132	133	133	134	135	135			
	GR2	6.2	6.2	6.2	6.2	6.2	5.9	5.3	4.8	4.2	3.9			
35000	TOFL	4410	4480	4550	4620	4690	4920	5290	5700	6140	6340		131	181
	V1	116	116	116	115	115	117	119	121	123	124			
	VR	121	121	121	121	121	122	123	125	127	127			
	V2	129	129	129	129	129	130	131	131	132	132			
	GR2	6.6	6.6	6.6	6.6	6.5	6.3	5.7	5.1	4.5	4.3			
34000	TOFL	4130	4190	4260	4320	4380	4580	4920	5300	5710	5890		129	178
	V1	112	112	112	112	112	113	115	118	120	121			
	VR	118	118	118	118	118	118	120	122	123	124			
	V2	127	127	127	127	127	127	128	128	129	129			
	GR2	7	7	7	7	7	6.7	6.1	5.5	4.9	4.6			
33000	TOFL	3890	3950	4010	4070	4130	4280	4570	4920	5300	5470		127	175
	V1	109	109	109	109	109	110	112	114	116	117			
	VR	115	115	115	115	115	115	117	118	120	121			
	V2	124	124	124	124	124	124	125	126	126	127			
	GR2	7.5	7.5	7.5	7.5	7.4	7.1	6.5	5.9	5.3	5			
32000	TOFL	3680	3740	3800	3850	3910	4040	4270	4570	4920	5080		125	172
	V1	107	107	107	107	107	107	108	110	113	114			
	VR	113	113	113	113	113	113	114	115	117	117			
	V2	123	123	123	123	123	123	123	123	124	124			
	GR2	8	8	8	8	7.9	7.6	7	6.3	5.7	5.4			
31000	TOFL	3510	3560	3610	3670	3720	3830	4030	4270	4580	4730		123	169
	V1	105	105	105	105	105	105	106	107	109	110			
	VR	111	111	111	111	111	111	111	112	114	114			
	V2	121	121	121	121	121	121	121	121	121	121			
	GR2	8.5	8.5	8.5	8.5	8.5	8.1	7.5	6.8	6.1	5.9			

FIGURE 5-73. TAKE-OFF DISTANCE; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
30000	TOFL	3360	3410	3460	3510	3560	3650	3800	4000	4260	4390		121	166
	V1	103	103	103	103	103	103	103	104	106	107			
	VR	109	109	109	109	109	109	109	109	111	111			
	V2	120	120	120	120	120	119	118	118	119	119			
	GR2	9.1	9.1	9.1	9.1	9.1	8.7	8	7.3	6.6	6.3			
29000	TOFL	3220	3270	3320	3370	3410	3490	3620	3780	3970	4080		119	163
	V1	101	101	101	101	101	101	101	102	103	103			
	VR	107	107	107	107	107	107	107	107	108	108			
	V2	119	119	119	119	119	118	117	117	116	116			
	GR2	9.8	9.8	9.8	9.7	9.7	9.3	8.6	7.9	7.1	6.8			
28000	TOFL	3090	3140	3180	3220	3270	3350	3450	3580	3750	3830		117	160
	V1	99	99	99	99	99	99	99	99	100	101			
	VR	106	106	106	106	106	106	105	105	105	106			
	V2	118	118	118	118	118	117	116	115	115	114			
	GR2	10.4	10.4	10.4	10.4	10.4	10	9.3	8.5	7.7	7.4			
27000	TOFL	2960	3000	3040	3090	3130	3200	3300	3410	3530	3590		115	157
	V1	98	97	97	97	97	97	97	97	98	98			
	VR	104	104	104	104	104	104	104	103	103	103			
	V2	117	117	117	117	117	116	115	114	113	112			
	GR2	11.1	11.1	11.1	11.1	11.1	10.7	10	9.1	8.3	8			
26000	TOFL	2910	2950	3000	3040	3070	3090	3150	3250	3360	3410		113	154
	V1	97	97	97	97	97	96	96	96	96	96			
	VR	102	102	102	102	102	102	102	102	101	101			
	V2	116	116	116	116	115	115	114	113	111	111			
	GR2	11.9	11.9	11.9	11.9	11.8	11.4	10.7	9.9	9	8.7			

FIGURE 5-74. TAKE-OFF DISTANCE; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	TOFL	5340	5420	5530	5630	5730	5830	5940	6040	6140	6250	6350	143	194
	V1	135	134	134	134	134	134	134	134	134	134	134		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	5130	5210	5310	5410	5510	5610	5700	5800	5900	6000	6100	142	193
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	4800	4880	4970	5060	5150	5240	5330	5430	5520	5610	5700	139	190
	V1	129	129	129	129	128	128	128	128	128	128	128		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.3	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	4490	4560	4650	4730	4820	4900	4990	5070	5160	5240	5330	137	187
	V1	125	125	125	125	125	125	125	125	125	125	124		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	4190	4260	4340	4420	4500	4570	4650	4730	4810	4890	4970	134	184
	V1	121	121	121	121	121	121	121	121	121	121	121		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6	6	5.9	5.9	5.9	6	6	6	6	6	6		
35000	TOFL	3910	3970	4050	4120	4190	4260	4340	4410	4480	4550	4630	132	181
	V1	118	118	118	118	118	117	117	117	117	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	3650	3710	3780	3850	3910	3980	4050	4110	4180	4250	4320	129	178
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.8	6.8	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	3420	3460	3540	3600	3660	3720	3780	3850	3910	3970	4030	127	176
	V1	111	111	111	111	111	110	110	110	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
32000	TOFL	3240	3270	3340	3390	3450	3510	3580	3630	3690	3750	3810	125	173
	V1	108	108	108	108	108	108	108	108	108	108	107		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
31000	TOFL	3060	3100	3160	3220	3270	3320	3380	3430	3490	3540	3600	123	170
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 5-74. TAKE-OFF DISTANCE; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
30000	TOFL	2930	2970	3020	3070	3130	3180	3230	3280	3330	3390	3440	121	167
	V1	104	104	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	2810	2850	2900	2940	2990	3040	3090	3140	3190	3240	3290	119	164
	V1	102	102	102	102	102	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
28000	TOFL	2690	2730	2780	2830	2870	2920	2970	3010	3060	3110	3160	117	161
	V1	100	100	100	100	100	100	100	100	100	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
27000	TOFL	2580	2620	2660	2710	2750	2800	2840	2890	2930	2980	3020	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	2500	2540	2580	2630	2670	2720	2760	2800	2840	2890	2930	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.6	11.5	11.5	11.5	11.6	11.5	11.5	11.5	11.5	11.5		

FIGURE 5-74. TAKE-OFF DISTANCE; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	104.25			
	N1 (%)	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5	89.5			
39600	TOFL	6450	6560	6660	6770	6880	7430	8030	8620	9230	9240		143	194
	V1	134	134	134	134	134	136	138	140	141	141			
	VR	137	137	137	137	137	139	141	142	143	143			
	V2	144	144	144	144	144	145	146	146	146	146			
	GR2	4.7	4.7	4.7	4.7	4.6	4.2	3.7	3.2	2.6	2.6			
39000	TOFL	6200	6300	6400	6500	6600	7130	7720	8290	8880	8900		142	193
	V1	132	132	132	131	132	134	136	138	139	140			
	VR	135	135	135	135	135	137	139	140	141	141			
	V2	142	142	142	142	142	143	144	144	145	145			
	GR2	4.9	4.9	4.9	4.9	4.8	4.4	3.8	3.3	2.8	2.8			
38000	TOFL	5790	5890	5980	6070	6170	6660	7200	7750	8330	8340		139	190
	V1	128	128	128	128	128	130	132	134	136	136			
	VR	132	132	132	132	132	134	136	137	138	138			
	V2	139	139	139	139	139	140	141	142	142	142			
	GR2	5.2	5.2	5.2	5.2	5.1	4.7	4.2	3.6	3.1	3.1			
37000	TOFL	5410	5500	5580	5670	5760	6210	6710	7230	7790	7800		137	187
	V1	124	124	124	124	124	127	129	131	133	133			
	VR	129	129	129	129	129	131	132	134	135	135			
	V2	136	136	136	136	136	137	138	139	139	139			
	GR2	5.6	5.6	5.6	5.6	5.4	5.1	4.5	4	3.4	3.4			
36000	TOFL	5050	5130	5210	5290	5370	5790	6250	6740	7270	7280		134	184
	V1	121	121	121	121	121	123	125	127	130	130			
	VR	125	125	125	125	125	127	129	131	132	132			
	V2	133	133	133	133	133	134	135	136	137	137			
	GR2	5.9	5.9	5.9	5.9	5.8	5.4	4.9	4.3	3.7	3.7			
35000	TOFL	4700	4780	4850	4920	5000	5390	5820	6270	6760	6770		132	181
	V1	117	117	117	117	117	119	122	124	126	126			
	VR	122	122	122	122	122	124	126	127	129	129			
	V2	130	130	130	130	130	131	132	133	134	134			
	GR2	6.3	6.3	6.3	6.3	6.2	5.8	5.2	4.7	4.1	4.1			
34000	TOFL	4380	4450	4520	4590	4660	5010	5410	5820	6280	6290		129	178
	V1	113	113	113	113	113	116	118	120	122	122			
	VR	119	119	119	119	119	121	122	124	125	125			
	V2	128	128	128	128	128	128	129	130	131	131			
	GR2	6.8	6.8	6.8	6.7	6.6	6.2	5.6	5	4.4	4.4			
33000	TOFL	4100	4160	4220	4280	4350	4650	5020	5400	5820	5830		127	176
	V1	110	110	110	110	110	112	114	116	119	119			
	VR	116	116	116	116	116	117	119	120	122	122			
	V2	125	125	125	125	125	126	126	127	128	128			
	GR2	7.2	7.2	7.2	7.2	7	6.6	6	5.4	4.8	4.8			
32000	TOFL	3870	3930	3980	4040	4110	4330	4640	5000	5390	5400		125	173
	V1	107	107	107	107	107	108	110	113	115	115			
	VR	113	113	113	113	113	114	115	117	119	119			
	V2	123	123	123	123	123	123	123	124	125	125			
	GR2	7.7	7.7	7.7	7.7	7.5	7.1	6.4	5.8	5.2	5.2			
31000	TOFL	3650	3710	3760	3820	3890	4070	4320	4630	4990	5000		123	170
	V1	105	105	105	105	105	105	107	109	111	111			
	VR	111	111	111	111	111	111	112	114	115	115			
	V2	121	121	121	121	121	121	121	121	122	122			
	GR2	8.2	8.2	8.2	8.2	8	7.6	6.9	6.3	5.6	5.6			

FIGURE 5-74. TAKE-OFF DISTANCE; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	104.25			
	N1 (%)	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5	89.5			
30000	TOFL	3490	3540	3590	3640	3700	3850	4050	4300	4630	4630		121	167
	V1	103	103	103	103	103	103	104	106	108	108			
	VR	109	109	109	109	109	109	109	111	112	112			
	V2	119	119	119	119	119	119	119	119	119	119			
	GR2	8.8	8.8	8.8	8.8	8.6	8.1	7.4	6.8	6.1	6.1			
29000	TOFL	3340	3390	3440	3490	3540	3660	3830	4020	4290	4290		119	164
	V1	101	101	101	101	101	101	102	103	104	104			
	VR	107	107	107	107	107	107	107	108	109	109			
	V2	118	118	118	118	118	117	117	116	117	117			
	GR2	9.4	9.4	9.4	9.4	9.2	8.7	8	7.3	6.6	6.6			
28000	TOFL	3200	3250	3290	3340	3390	3500	3620	3790	3980	3990		117	161
	V1	99	99	99	99	99	99	99	100	101	101			
	VR	106	106	106	106	106	106	105	105	106	106			
	V2	117	117	117	117	117	116	115	115	114	114			
	GR2	10.1	10.1	10.1	10.1	9.8	9.4	8.6	7.8	7.1	7.1			
27000	TOFL	3060	3110	3160	3200	3240	3340	3450	3570	3740	3750		115	157
	V1	98	98	97	97	97	97	97	98	98	98			
	VR	104	104	104	104	104	104	103	103	104	104			
	V2	116	116	116	116	116	115	114	113	113	113			
	GR2	10.8	10.8	10.8	10.8	10.5	10.1	9.2	8.5	7.7	7.7			
26000	TOFL	2970	3020	3060	3100	3120	3190	3290	3400	3520	3520		113	154
	V1	97	97	96	96	96	95	95	96	96	96			
	VR	102	102	102	102	102	102	102	102	101	101			
	V2	115	115	115	115	115	114	113	112	111	111			
	GR2	11.5	11.5	11.5	11.5	11.3	10.8	10	9.2	8.4	8.3			

FIGURE 5-75. TAKE-OFF DISTANCE; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	TOFL	5720	5870	6020	6130	6220	6330	6450	6560	6670	6780	6890	144	195
	V1	137	137	137	137	137	137	137	136	136	136	136		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
39000	TOFL	5490	5640	5780	5880	5980	6080	6190	6300	6400	6510	6620	143	193
	V1	135	135	135	135	134	134	134	134	134	134	134		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.8	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	5140	5270	5400	5500	5580	5680	5780	5880	5980	6080	6180	140	190
	V1	131	131	131	131	131	131	131	131	130	130	130		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.1	5	4.9	4.9	4.9	5	5	5	5	5	4.9		
37000	TOFL	4800	4920	5050	5130	5210	5300	5390	5490	5580	5670	5760	138	187
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	130	131	131	131	131	131	131	131	131	131	131		
	V2	137	138	138	138	138	138	138	138	138	138	138		
	GR2	5.5	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	4480	4590	4710	4790	4860	4940	5030	5120	5200	5290	5370	135	185
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	135	135	135	135	135	135	135	135	135	135		
	GR2	5.8	5.7	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
35000	TOFL	4170	4280	4390	4460	4530	4600	4680	4760	4840	4920	5000	133	182
	V1	120	120	120	120	120	119	119	119	119	119	119		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.2	6.1	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
34000	TOFL	3880	3980	4080	4150	4210	4280	4360	4430	4500	4570	4650	130	179
	V1	116	116	116	116	116	116	116	116	116	115	115		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.6	6.5	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5		
33000	TOFL	3620	3710	3800	3860	3920	3980	4050	4120	4190	4250	4320	127	176
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
32000	TOFL	3400	3470	3550	3610	3670	3730	3790	3850	3910	3980	4040	125	173
	V1	109	109	109	109	109	109	109	109	109	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.5	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
31000	TOFL	3200	3270	3330	3400	3460	3510	3570	3630	3690	3740	3800	123	170
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		

FIGURE 5-75. TAKE-OFF DISTANCE; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
30000	TOFL	3040	3090	3160	3210	3260	3310	3370	3420	3480	3530	3590	121	167
	V1	104	104	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.6	8.4	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	2900	2950	3010	3070	3120	3170	3220	3270	3320	3370	3430	119	164
	V1	102	102	102	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.2	9.1	8.9	9	9	9	9	9	9	9	9		
28000	TOFL	2790	2830	2890	2930	2980	3030	3080	3130	3180	3230	3280	117	161
	V1	100	100	100	100	100	100	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.9	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
27000	TOFL	2670	2720	2770	2810	2860	2900	2950	3000	3050	3090	3140	115	158
	V1	98	98	98	98	98	98	98	98	98	98	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.6	10.4	10.3	10.3	10.3	10.4	10.4	10.4	10.3	10.3	10.3		
26000	TOFL	2560	2600	2650	2700	2740	2780	2830	2870	2910	2960	3000	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	11.3	11.1	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 5-75. TAKE-OFF DISTANCE; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
39600	TOFL	7010	7120	7240	7370	7680	8300	8930	9570				144	195
	V1	136	136	136	136	137	139	141	142					
	VR	140	140	140	140	141	142	143	144					
	V2	145	145	145	145	146	147	147	148					
	GR2	4.4	4.4	4.4	4.3	4.1	3.7	3.2	2.7					
39000	TOFL	6730	6830	6940	7070	7370	7970	8590	9200	9610			143	193
	V1	134	134	134	134	135	137	139	140	141				
	VR	138	138	138	138	139	140	142	143	143				
	V2	143	143	143	143	144	145	146	146	146				
	GR2	4.6	4.6	4.6	4.5	4.3	3.9	3.4	2.8	2.5				
38000	TOFL	6280	6380	6480	6590	6870	7440	8020	8620	9000			140	190
	V1	130	130	130	130	131	134	136	137	138				
	VR	134	134	134	134	135	137	138	140	140				
	V2	140	140	140	140	141	142	143	143	143				
	GR2	4.9	4.9	4.9	4.9	4.6	4.2	3.7	3.1	2.8				
37000	TOFL	5860	5950	6040	6150	6410	6920	7490	8050	8420			138	187
	V1	127	126	126	126	127	130	132	134	135				
	VR	131	131	131	131	132	133	135	136	137				
	V2	138	138	138	138	138	139	140	140	141				
	GR2	5.3	5.3	5.3	5.2	5	4.5	4	3.5	3.1				
36000	TOFL	5460	5540	5630	5730	5970	6440	6960	7510	7860			135	185
	V1	123	123	123	123	124	126	128	130	132				
	VR	127	127	127	127	128	130	132	133	134				
	V2	135	135	135	135	135	136	137	138	138				
	GR2	5.7	5.7	5.7	5.6	5.3	4.9	4.3	3.8	3.4				
35000	TOFL	5080	5160	5240	5330	5560	5990	6470	6980	7320			133	182
	V1	119	119	119	119	120	122	125	127	128				
	VR	124	124	124	124	125	126	128	130	131				
	V2	132	132	132	132	132	133	134	135	135				
	GR2	6.1	6.1	6	5.9	5.7	5.3	4.7	4.1	3.8				
34000	TOFL	4720	4800	4870	4950	5160	5570	6000	6470	6790			130	179
	V1	115	115	115	115	116	119	121	123	124				
	VR	120	120	120	120	121	123	125	126	127				
	V2	129	129	129	129	129	130	131	132	132				
	GR2	6.4	6.4	6.4	6.3	6.1	5.7	5.1	4.5	4.1				
33000	TOFL	4390	4460	4520	4600	4790	5160	5570	6000	6290			127	176
	V1	112	112	112	112	113	115	117	119	121				
	VR	117	117	117	117	118	120	121	123	124				
	V2	126	126	126	126	126	127	128	129	129				
	GR2	6.9	6.9	6.9	6.8	6.5	6.1	5.5	4.9	4.5				
32000	TOFL	4100	4160	4230	4290	4440	4770	5150	5550	5810			125	173
	V1	108	108	108	108	109	111	113	116	117				
	VR	114	114	114	114	114	116	118	119	120				
	V2	123	123	123	123	123	124	125	126	126				
	GR2	7.3	7.3	7.3	7.2	6.9	6.5	5.9	5.3	4.9				
31000	TOFL	3860	3920	3980	4040	4170	4420	4760	5130	5370			123	170
	V1	106	105	105	105	106	107	110	112	113				
	VR	111	111	111	111	112	113	114	116	117				
	V2	121	121	121	121	121	121	122	123	123				
	GR2	7.8	7.8	7.8	7.7	7.4	6.9	6.3	5.7	5.3				

FIGURE 5-75. TAKE-OFF DISTANCE; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
30000	TOFL	3640	3700	3750	3810	3920	4120	4390	4730	4950			121	167
	V1	103	103	103	103	103	104	106	108	109				
	VR	109	109	109	109	109	109	111	112	113				
	V2	119	119	119	119	119	119	119	120	120				
	GR2	8.4	8.4	8.4	8.3	7.9	7.4	6.8	6.1	5.7				
29000	TOFL	3480	3530	3580	3630	3730	3890	4090	4380	4580			119	164
	V1	101	101	101	101	101	102	102	104	106				
	VR	107	107	107	107	107	107	108	109	110				
	V2	118	118	118	118	118	117	117	117	117				
	GR2	9	9	9	8.9	8.5	8	7.3	6.6	6.2				
28000	TOFL	3330	3380	3420	3480	3550	3680	3860	4060	4230			117	161
	V1	99	99	99	99	99	99	100	101	102				
	VR	106	106	106	105	105	105	105	106	107				
	V2	117	117	116	116	116	115	115	114	115				
	GR2	9.6	9.6	9.6	9.5	9.1	8.6	7.9	7.2	6.7				
27000	TOFL	3180	3230	3280	3330	3400	3500	3630	3810	3930			115	158
	V1	97	97	97	97	97	97	98	98	99				
	VR	104	104	104	104	104	103	103	104	104				
	V2	115	115	115	115	115	114	113	113	112				
	GR2	10.3	10.3	10.3	10.2	9.8	9.2	8.5	7.8	7.3				
26000	TOFL	3050	3090	3130	3180	3240	3340	3450	3580	3690			113	155
	V1	96	96	96	95	95	95	95	96	96				
	VR	102	102	102	102	102	102	102	102	102				
	V2	114	114	114	114	114	113	112	111	111				
	GR2	11.1	11.1	11.1	10.9	10.6	9.9	9.2	8.4	7.9				

FIGURE 5-76. TAKE-OFF DISTANCE; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	TOFL	6190	6410	6550	6660	6760	6880	7000	7130	7250	7370	7500	145	195
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4.3	4.2	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
39000	TOFL	5940	6150	6290	6390	6490	6600	6720	6840	6960	7080	7190	144	193
	V1	137	137	137	137	137	137	137	137	137	136	136		
	VR	139	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.5	4.3	4.3	4.3	4.3	4.4	4.4	4.3	4.3	4.3	4.3		
38000	TOFL	5550	5740	5870	5960	6050	6160	6270	6380	6490	6600	6710	141	191
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.9	4.7	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
37000	TOFL	5180	5350	5470	5560	5640	5740	5840	5950	6050	6150	6250	139	188
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.2	5	5	5	5	5	5	5	5	5	5		
36000	TOFL	4820	4990	5100	5180	5260	5350	5440	5540	5630	5720	5820	136	185
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.6	5.4	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
35000	TOFL	4490	4640	4740	4820	4890	4980	5060	5150	5230	5320	5410	134	182
	V1	122	122	122	122	122	122	121	121	121	121	121		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6	5.8	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
34000	TOFL	4180	4310	4410	4480	4540	4620	4700	4780	4860	4940	5020	131	179
	V1	118	118	118	118	118	118	118	118	118	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.4	6.2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
33000	TOFL	3880	4010	4090	4160	4220	4290	4360	4440	4510	4580	4660	128	176
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.8	6.6	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
32000	TOFL	3610	3720	3800	3860	3920	3980	4050	4120	4190	4250	4320	126	173
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.2	7	7	7	7	7	7	7	7	7	7		
31000	TOFL	3390	3480	3550	3610	3660	3720	3790	3850	3910	3970	4030	123	170
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.7	7.5	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		

FIGURE 5-76. TAKE-OFF DISTANCE; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
30000	TOFL	3180	3250	3330	3380	3430	3490	3550	3610	3660	3720	3780	121	167
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.3	8	7.9	8	8	8	8	8	8	8	8		
29000	TOFL	3020	3080	3140	3190	3240	3300	3350	3410	3460	3510	3570	119	164
	V1	102	102	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.8	8.6	8.5	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	2890	2950	3000	3050	3100	3150	3210	3260	3310	3360	3410	117	161
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.5	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
27000	TOFL	2770	2830	2880	2930	2970	3020	3070	3120	3170	3220	3270	115	158
	V1	98	98	98	98	98	98	98	98	98	98	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.2	9.9	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
26000	TOFL	2660	2710	2750	2800	2840	2890	2940	2980	3030	3080	3120	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.9	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		

FIGURE 5-76. TAKE-OFF DISTANCE; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
39600	TOFL	7620	7750	7880	8060	8590	9250	9920					145	195
	V1	139	139	139	139	140	142	144						
	VR	142	142	142	142	143	145	146						
	V2	147	147	147	147	148	149	149						
	GR2	4.2	4.2	4.1	4	3.7	3.2	2.7						
39000	TOFL	7310	7430	7550	7730	8250	8890	9530					144	193
	V1	136	136	136	137	138	140	142						
	VR	140	140	140	140	141	143	144						
	V2	145	145	145	145	146	147	147						
	GR2	4.3	4.3	4.3	4.1	3.8	3.4	2.9						
38000	TOFL	6820	6930	7040	7210	7690	8300	8940	9580	9730			141	191
	V1	133	133	133	133	135	137	138	140	140				
	VR	136	136	136	137	138	140	141	142	142				
	V2	142	142	142	142	143	144	144	145	145				
	GR2	4.7	4.7	4.7	4.4	4.2	3.7	3.2	2.7	2.5				
37000	TOFL	6350	6450	6550	6710	7150	7750	8340	8950	9090			139	188
	V1	129	129	129	129	131	133	135	137	137				
	VR	133	133	133	133	135	136	138	139	139				
	V2	139	139	139	139	140	141	142	142	142				
	GR2	5	5	5	4.8	4.5	4	3.5	3	2.8				
36000	TOFL	5910	6000	6100	6240	6650	7190	7770	8360	8500			136	185
	V1	125	125	125	125	127	129	131	133	134				
	VR	129	129	129	130	131	133	134	136	136				
	V2	136	136	136	136	137	138	139	139	139				
	GR2	5.4	5.4	5.4	5.1	4.8	4.3	3.8	3.3	3.2				
35000	TOFL	5490	5580	5670	5800	6170	6670	7210	7770	7900			134	182
	V1	121	121	121	121	123	125	128	130	130				
	VR	126	126	126	126	127	129	131	132	133				
	V2	133	133	133	133	134	135	136	136	136				
	GR2	5.8	5.8	5.7	5.5	5.2	4.7	4.2	3.6	3.5				
34000	TOFL	5100	5180	5260	5390	5730	6190	6680	7220	7350			131	179
	V1	117	117	117	118	119	122	124	126	127				
	VR	122	122	122	123	124	126	127	129	129				
	V2	130	130	130	130	131	132	133	133	134				
	GR2	6.2	6.2	6.1	5.9	5.6	5.1	4.5	4	3.8				
33000	TOFL	4730	4800	4880	4990	5310	5730	6190	6680	6800			128	176
	V1	114	113	113	114	116	118	120	122	123				
	VR	119	119	119	119	120	122	124	126	126				
	V2	127	127	127	127	128	129	130	130	130				
	GR2	6.6	6.6	6.6	6.3	6	5.5	4.9	4.3	4.2				
32000	TOFL	4390	4460	4530	4630	4910	5300	5720	6170	6280			126	173
	V1	110	110	110	110	112	114	116	118	119				
	VR	115	115	115	115	117	119	120	122	122				
	V2	124	124	124	124	125	126	127	127	127				
	GR2	7	7	7	6.7	6.4	5.9	5.3	4.7	4.6				
31000	TOFL	4100	4160	4220	4310	4540	4890	5280	5690	5790			123	170
	V1	107	106	106	107	108	110	112	115	115				
	VR	112	112	112	112	113	115	117	118	119				
	V2	121	121	121	121	122	123	124	124	124				
	GR2	7.5	7.5	7.5	7.2	6.8	6.3	5.7	5.1	5				

FIGURE 5-76. TAKE-OFF DISTANCE; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
30000	TOFL	3840	3900	3950	4040	4220	4510	4860	5240	5330			121	167
	V1	103	103	103	104	104	106	108	111	111				
	VR	109	109	109	109	110	111	113	115	115				
	V2	119	119	119	119	119	120	120	121	121				
	GR2	8	8	8	7.7	7.3	6.8	6.2	5.6	5.4				
29000	TOFL	3620	3680	3730	3810	3950	4170	4470	4810	4900			119	164
	V1	101	101	101	101	101	103	104	107	107				
	VR	107	107	107	107	107	108	109	111	111				
	V2	117	117	117	117	117	117	117	118	118				
	GR2	8.6	8.6	8.6	8.3	7.8	7.3	6.7	6	5.9				
28000	TOFL	3460	3510	3560	3630	3750	3920	4140	4440	4520			117	161
	V1	99	99	99	99	99	100	101	103	104				
	VR	105	105	105	105	105	105	106	108	108				
	V2	116	116	116	115	115	115	115	115	115				
	GR2	9.2	9.2	9.2	8.9	8.4	7.9	7.2	6.5	6.4				
27000	TOFL	3320	3360	3410	3470	3560	3690	3880	4100	4170			115	158
	V1	97	97	97	97	97	97	98	100	100				
	VR	104	104	104	104	103	103	104	105	105				
	V2	115	115	115	114	114	113	113	113	113				
	GR2	9.9	9.9	9.9	9.6	9.1	8.5	7.8	7.1	6.9				
26000	TOFL	3170	3210	3260	3310	3410	3510	3630	3830	3870			113	155
	V1	96	96	96	95	95	95	96	97	97				
	VR	102	102	102	102	102	102	101	102	102				
	V2	114	114	114	113	113	111	110	110	110				
	GR2	10.6	10.6	10.6	10.3	9.8	9.2	8.4	7.7	7.5				

FIGURE 5-77. TAKE-OFF DISTANCE; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	TOFL	6760	7000	7120	7230	7350	7490	7630	7760	7900	8030	8170	147	195
	V1	142	142	142	142	141	141	141	141	141	141	141		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	4	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	TOFL	6480	6720	6840	6950	7060	7190	7320	7450	7580	7710	7840	145	194
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4.2	4	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	TOFL	6040	6260	6370	6470	6580	6700	6820	6940	7060	7180	7300	142	191
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	138	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	TOFL	5630	5830	5930	6030	6120	6240	6350	6460	6570	6680	6790	140	188
	V1	132	132	132	132	131	131	131	131	131	131	131		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.9	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.7	4.7		
36000	TOFL	5240	5430	5520	5610	5690	5800	5900	6010	6110	6210	6310	137	185
	V1	128	128	128	128	128	128	128	127	127	127	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.3	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
35000	TOFL	4870	5050	5130	5210	5290	5390	5480	5580	5670	5760	5860	135	183
	V1	124	124	124	124	124	124	124	124	124	124	123		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.6	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
34000	TOFL	4530	4680	4760	4840	4910	5000	5090	5170	5260	5350	5430	132	180
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
33000	TOFL	4200	4340	4410	4480	4550	4630	4710	4790	4870	4950	5030	129	177
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.4	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
32000	TOFL	3890	4020	4090	4150	4220	4290	4360	4440	4510	4580	4660	127	174
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
31000	TOFL	3620	3730	3790	3850	3910	3980	4050	4110	4180	4250	4310	124	171
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		

FIGURE 5-77. TAKE-OFF DISTANCE; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
30000	TOFL	3380	3480	3530	3590	3650	3710	3770	3830	3890	3960	4020	121	168
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.8	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
29000	TOFL	3160	3250	3310	3360	3410	3470	3530	3590	3640	3700	3760	119	165
	V1	102	102	102	102	102	102	102	102	102	102	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.4	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
28000	TOFL	3000	3070	3120	3170	3220	3280	3330	3380	3440	3490	3550	117	161
	V1	100	100	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	9	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
27000	TOFL	2880	2940	2990	3040	3090	3140	3190	3240	3290	3340	3400	115	158
	V1	98	98	98	98	98	98	98	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.7	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
26000	TOFL	2770	2820	2860	2910	2960	3010	3060	3110	3150	3200	3250	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		

FIGURE 5-77. TAKE-OFF DISTANCE; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
39600	TOFL	8310	8440	8600	8920	9600	10300						147	195
	V1	141	141	141	142	144	145							
	VR	144	144	144	145	146	147							
	V2	149	149	149	149	150	150							
	GR2	3.9	3.9	3.8	3.5	3.2	2.7							
39000	TOFL	7980	8110	8260	8560	9210	9900						145	194
	V1	139	139	139	140	141	143							
	VR	142	142	142	143	144	145							
	V2	147	147	147	147	148	148							
	GR2	4.1	4.1	4	3.7	3.4	2.9							
38000	TOFL	7420	7540	7680	7980	8590	9270	9940					142	191
	V1	135	135	135	136	138	140	141						
	VR	139	139	139	139	141	142	143						
	V2	144	144	144	144	145	146	146						
	GR2	4.4	4.4	4.3	4	3.7	3.2	2.7						
37000	TOFL	6900	7010	7150	7420	8010	8640	9290	9840				140	188
	V1	131	131	131	132	134	136	138	139					
	VR	135	135	135	136	138	139	140	141					
	V2	141	141	141	141	142	143	143	143					
	GR2	4.7	4.7	4.6	4.3	4	3.5	3	2.6					
36000	TOFL	6410	6520	6640	6890	7430	8040	8660	9180				137	185
	V1	127	127	127	128	130	132	134	135					
	VR	131	131	132	132	134	136	137	138					
	V2	138	138	138	138	139	140	140	141					
	GR2	5.1	5.1	5	4.7	4.3	3.8	3.3	2.9					
35000	TOFL	5960	6050	6160	6400	6890	7450	8050	8560				135	183
	V1	123	123	123	124	126	129	131	132					
	VR	128	128	128	129	130	132	133	135					
	V2	134	134	134	134	136	137	137	138					
	GR2	5.5	5.4	5.3	5	4.7	4.2	3.7	3.2					
34000	TOFL	5520	5610	5710	5930	6380	6900	7470	7940				132	180
	V1	119	119	120	120	123	125	127	129					
	VR	124	124	124	125	127	128	130	131					
	V2	131	131	131	131	132	133	134	135					
	GR2	5.9	5.8	5.7	5.4	5.1	4.6	4	3.5					
33000	TOFL	5110	5190	5290	5490	5900	6380	6900	7360				129	177
	V1	116	116	116	117	119	121	123	125					
	VR	121	121	121	121	123	125	126	128					
	V2	128	128	128	128	129	130	131	132					
	GR2	6.3	6.3	6.1	5.8	5.4	4.9	4.4	3.9					
32000	TOFL	4730	4800	4890	5080	5460	5890	6370	6790				127	174
	V1	112	112	112	113	115	117	119	121					
	VR	117	117	117	118	119	121	123	124					
	V2	125	125	125	125	126	127	128	129					
	GR2	6.7	6.7	6.6	6.2	5.8	5.3	4.8	4.3					
31000	TOFL	4380	4450	4530	4690	5030	5430	5870	6260				124	171
	V1	108	108	108	109	111	113	115	117					
	VR	113	113	114	114	116	118	119	121					
	V2	122	122	122	122	123	124	125	126					
	GR2	7.2	7.1	7	6.6	6.3	5.8	5.2	4.7					

FIGURE 5-77. TAKE-OFF DISTANCE; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
30000	TOFL	4080	4140	4220	4350	4640	5000	5400	5750				121	168
	V1	105	105	105	105	107	109	111	113					
	VR	110	110	110	111	112	114	116	117					
	V2	120	120	120	120	120	121	122	122					
	GR2	7.7	7.6	7.5	7.1	6.7	6.2	5.6	5.1					
29000	TOFL	3820	3880	3940	4050	4290	4590	4960	5280				119	165
	V1	101	101	101	102	103	105	107	109					
	VR	107	107	107	108	109	110	112	113					
	V2	117	117	117	117	117	118	119	119					
	GR2	8.2	8.2	8	7.6	7.2	6.7	6.1	5.6					
28000	TOFL	3600	3650	3720	3810	3980	4230	4540	4830				117	161
	V1	99	99	99	99	100	101	103	105					
	VR	105	105	105	105	105	107	108	109					
	V2	115	115	115	115	115	115	116	116					
	GR2	8.8	8.8	8.6	8.2	7.8	7.2	6.6	6					
27000	TOFL	3450	3500	3550	3630	3750	3940	4190	4450				115	158
	V1	97	97	97	97	97	98	100	101					
	VR	104	104	104	103	103	104	105	106					
	V2	114	114	114	114	113	113	113	113					
	GR2	9.5	9.4	9.3	8.9	8.4	7.8	7.1	6.6					
26000	TOFL	3300	3350	3400	3470	3560	3700	3890	4090				113	155
	V1	96	95	95	95	95	96	96	98					
	VR	102	102	102	102	101	101	102	103					
	V2	113	113	113	112	111	111	110	111					
	GR2	10.2	10.2	10	9.6	9.1	8.4	7.7	7.1					

FIGURE 5-78. TAKE-OFF DISTANCE; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	TOFL	7420	7600	7740	7880	8020	8170	8320	8470	8620	8770	8920	148	196
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
39000	TOFL	7120	7300	7430	7560	7700	7840	7990	8130	8270	8410	8560	146	194
	V1	142	142	142	142	142	142	142	142	142	141	141		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
38000	TOFL	6650	6810	6940	7060	7180	7320	7450	7580	7710	7850	7980	144	191
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
37000	TOFL	6180	6330	6450	6550	6670	6800	6920	7040	7160	7280	7400	141	189
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	138	138	138	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
36000	TOFL	5740	5880	5990	6090	6200	6310	6420	6530	6650	6760	6870	138	186
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
35000	TOFL	5330	5460	5560	5650	5750	5850	5960	6060	6160	6260	6370	136	183
	V1	126	126	126	126	126	126	126	126	126	126	126		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
34000	TOFL	4940	5060	5150	5230	5320	5420	5520	5610	5700	5800	5900	133	180
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
33000	TOFL	4570	4680	4760	4840	4920	5010	5100	5190	5270	5360	5450	130	177
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	122	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
32000	TOFL	4220	4330	4400	4470	4550	4630	4710	4790	4870	4950	5030	127	174
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
31000	TOFL	3910	4000	4070	4130	4210	4280	4350	4430	4500	4570	4650	125	171
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8		

FIGURE 5-78. TAKE-OFF DISTANCE; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
30000	TOFL	3630	3710	3770	3830	3900	3970	4030	4100	4170	4240	4300	122	168
	V1	107	107	107	106	106	106	106	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
29000	TOFL	3380	3450	3510	3570	3620	3690	3750	3810	3870	3930	3990	119	165
	V1	103	103	103	103	103	103	103	103	103	103	102		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8		
28000	TOFL	3170	3230	3290	3350	3400	3460	3520	3570	3630	3690	3750	117	162
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	116	116	116	116	116	116	116	116	116	116		
	GR2	8.6	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
27000	TOFL	3010	3060	3110	3160	3220	3270	3320	3380	3430	3490	3540	115	159
	V1	98	98	98	98	98	98	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
26000	TOFL	2890	2930	2980	3030	3080	3140	3190	3240	3290	3340	3390	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 5-78. TAKE-OFF DISTANCE; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89					
	N1 (%)	90.8	91.7	92.5	92.2	91.5	90.9	90.2	90.0					
39600	TOFL	9070	9230	9480	10000	10720							148	196
	V1	144	144	144	145	147								
	VR	147	147	147	148	149								
	V2	151	151	151	151	152								
	GR2	3.6	3.5	3.3	3	2.7								
39000	TOFL	8700	8850	9090	9600	10290	11070						146	194
	V1	141	141	142	143	144	146							
	VR	145	145	145	146	147	148							
	V2	149	149	149	149	150	150							
	GR2	3.8	3.7	3.5	3.2	2.9	2.4							
38000	TOFL	8110	8250	8470	8940	9620	10340						144	191
	V1	138	138	138	139	141	142							
	VR	141	141	141	142	144	145							
	V2	146	146	146	146	147	147							
	GR2	4.1	4.1	3.8	3.5	3.2	2.7							
37000	TOFL	7530	7660	7870	8330	8960	9650	10360					141	189
	V1	134	134	134	136	137	139	140						
	VR	137	137	138	139	140	142	142						
	V2	143	142	142	143	144	145	145						
	GR2	4.5	4.4	4.2	3.9	3.5	3	2.5						
36000	TOFL	6990	7110	7300	7720	8330	8980	9660	9960				138	186
	V1	130	130	130	132	134	135	137	138					
	VR	134	134	134	135	137	138	139	140					
	V2	139	139	139	140	141	142	142	142					
	GR2	4.8	4.7	4.5	4.2	3.8	3.3	2.8	2.6					
35000	TOFL	6470	6580	6760	7150	7730	8350	8990	9270				136	183
	V1	126	126	126	128	130	132	134	134					
	VR	130	130	130	132	133	135	136	136					
	V2	136	136	136	137	138	139	139	139					
	GR2	5.2	5.1	4.9	4.5	4.2	3.7	3.2	2.9					
34000	TOFL	5990	6100	6260	6620	7140	7740	8340	8620				133	180
	V1	122	122	122	124	126	128	130	131					
	VR	126	126	127	128	129	131	133	133					
	V2	133	133	133	133	135	136	136	136					
	GR2	5.6	5.5	5.2	4.9	4.5	4.1	3.5	3.3					
33000	TOFL	5540	5630	5790	6110	6590	7130	7720	7970				130	177
	V1	118	118	118	120	122	124	126	127					
	VR	123	123	123	124	126	128	129	130					
	V2	130	129	129	130	131	132	133	133					
	GR2	6	5.9	5.6	5.3	4.9	4.4	3.9	3.6					
32000	TOFL	5110	5200	5340	5640	6080	6570	7130	7370				127	174
	V1	114	114	114	116	118	120	122	123					
	VR	119	119	119	120	122	124	126	126					
	V2	126	126	126	127	128	129	130	130					
	GR2	6.4	6.3	6	5.7	5.3	4.8	4.3	4					
31000	TOFL	4720	4800	4930	5200	5600	6050	6550	6780				125	171
	V1	110	110	110	112	114	116	118	119					
	VR	115	115	116	117	118	120	122	123					
	V2	123	123	123	124	125	126	127	127					
	GR2	6.8	6.7	6.5	6.1	5.7	5.2	4.6	4.4					

FIGURE 5-78. TAKE-OFF DISTANCE; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89					
	N1 (%)	90.8	91.7	92.5	92.2	91.5	90.9	90.2	90.0					
30000	TOFL	4370	4440	4550	4790	5140	5560	6020	6220				122	168
	V1	106	106	106	108	110	112	114	115					
	VR	112	112	112	113	115	116	118	119					
	V2	120	120	120	121	122	123	123	124					
	GR2	7.3	7.2	6.9	6.6	6.2	5.7	5.1	4.8					
29000	TOFL	4060	4120	4220	4420	4720	5100	5510	5700				119	165
	V1	102	102	103	104	106	108	110	111					
	VR	108	108	108	109	111	113	114	115					
	V2	118	118	118	118	118	119	120	121					
	GR2	7.8	7.7	7.4	7.1	6.7	6.1	5.5	5.2					
28000	TOFL	3800	3870	3940	4090	4350	4660	5040	5210				117	162
	V1	100	100	100	100	102	104	106	107					
	VR	106	106	106	106	107	109	111	111					
	V2	116	116	115	115	115	116	117	117					
	GR2	8.4	8.3	8	7.6	7.2	6.6	6	5.7					
27000	TOFL	3590	3650	3720	3840	4020	4280	4600	4750				115	159
	V1	97	97	97	97	98	100	102	103					
	VR	104	104	103	103	104	105	107	107					
	V2	114	113	113	113	113	113	114	114					
	GR2	9.1	8.9	8.6	8.2	7.7	7.1	6.5	6.2					
26000	TOFL	3440	3490	3550	3650	3770	3970	4230	4360				113	155
	V1	96	96	96	96	96	97	98	99					
	VR	102	102	102	102	101	102	103	104					
	V2	113	113	112	112	111	111	111	111					
	GR2	9.8	9.6	9.3	8.8	8.3	7.7	7.1	6.8					

FIGURE 5-79. TAKE-OFF DISTANCE; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	TOFL	8140	8280	8450	8610	8780	8940	9110	9270	9440	9600	9770	149	196
	V1	147	147	147	147	147	147	147	147	146	146	146		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.4	3.3	3.3	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3		
39000	TOFL	7810	7940	8100	8250	8410	8570	8730	8890	9040	9200	9360	147	194
	V1	145	145	145	144	144	144	144	144	144	144	144		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
38000	TOFL	7280	7400	7550	7690	7840	7980	8130	8280	8420	8570	8710	145	192
	V1	141	141	141	141	141	141	140	140	140	140	140		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	TOFL	6780	6890	7030	7160	7300	7430	7570	7700	7840	7970	8100	142	189
	V1	137	137	137	137	137	137	137	137	137	136	136		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
36000	TOFL	6280	6380	6510	6630	6760	6880	7010	7130	7250	7370	7500	139	186
	V1	133	133	133	133	133	133	132	132	132	132	132		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
35000	TOFL	5820	5910	6030	6140	6260	6370	6490	6600	6710	6830	6940	137	183
	V1	129	129	129	129	129	128	128	128	128	128	128		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
34000	TOFL	5390	5470	5580	5680	5790	5890	6000	6100	6210	6310	6410	134	180
	V1	125	125	125	124	124	124	124	124	124	124	124		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
33000	TOFL	4970	5050	5150	5240	5340	5440	5530	5630	5720	5820	5920	131	177
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
32000	TOFL	4590	4660	4750	4840	4930	5010	5100	5190	5280	5360	5450	128	175
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
31000	TOFL	4230	4290	4380	4450	4530	4610	4690	4770	4850	4930	5010	126	172
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		

FIGURE 5-79. TAKE-OFF DISTANCE; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
30000	TOFL	3910	3970	4050	4120	4190	4270	4340	4410	4480	4560	4630	123	168
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	7	7		
29000	TOFL	3620	3680	3750	3810	3880	3950	4020	4080	4150	4210	4280	120	165
	V1	105	104	104	104	104	104	104	104	104	104	104		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.5		
28000	TOFL	3350	3400	3470	3530	3590	3650	3710	3770	3830	3900	3960	117	162
	V1	101	101	101	101	101	101	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
27000	TOFL	3160	3200	3260	3320	3380	3430	3490	3560	3600	3660	3720	115	159
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	114	113	113	113		
	GR2	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
26000	TOFL	3010	3050	3100	3160	3210	3260	3320	3370	3430	3480	3530	113	156
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 5-79. TAKE-OFF DISTANCE; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	86.4					
	N1 (%)	91.3	92.2	92.6	92.0	91.4	90.8	90.1	90.1					
39600	TOFL	9930	10120	10480	11180								149	196
	V1	146	146	147	148									
	VR	149	149	150	151									
	V2	153	153	153	153									
	GR2	3.3	3.2	2.9	2.6									
39000	TOFL	9520	9700	10060	10740	11530							147	194
	V1	144	144	145	146	147								
	VR	147	147	148	149	150								
	V2	151	151	151	151	152								
	GR2	3.5	3.4	3.1	2.8	2.4								
38000	TOFL	8860	9030	9360	10030	10760							145	192
	V1	140	140	141	143	144								
	VR	144	144	144	145	146								
	V2	148	148	148	148	149								
	GR2	3.8	3.7	3.4	3.1	2.7								
37000	TOFL	8240	8400	8700	9320	10030	10790						142	189
	V1	136	136	137	139	140	142							
	VR	140	140	141	142	143	144							
	V2	145	144	144	145	146	146							
	GR2	4.2	4	3.7	3.4	3	2.5							
36000	TOFL	7630	7770	8080	8660	9340	10050						139	186
	V1	132	132	133	135	137	138							
	VR	136	136	137	138	140	141							
	V2	141	141	141	142	143	143							
	GR2	4.5	4.3	4	3.7	3.3	2.9							
35000	TOFL	7060	7190	7460	8030	8650	9350	10040	10070				137	183
	V1	128	128	129	131	133	135	136	136					
	VR	132	132	133	135	136	137	138	138					
	V2	138	138	138	139	140	141	141	141					
	GR2	4.9	4.7	4.4	4.1	3.7	3.2	2.7	2.6					
34000	TOFL	6520	6650	6900	7410	8010	8660	9330	9350				134	180
	V1	124	124	125	127	129	131	133	133					
	VR	129	129	129	131	133	134	135	135					
	V2	134	134	134	136	137	137	138	138					
	GR2	5.3	5.1	4.7	4.4	4	3.5	3	3					
33000	TOFL	6010	6130	6360	6830	7380	8010	8640	8670				131	177
	V1	120	120	121	123	125	127	129	129					
	VR	125	125	125	127	129	130	132	132					
	V2	131	131	131	132	133	134	135	135					
	GR2	5.7	5.4	5.1	4.8	4.4	3.9	3.3	3.3					
32000	TOFL	5540	5650	5860	6290	6800	7380	7970	8000				128	175
	V1	116	116	117	119	121	123	125	125					
	VR	121	121	121	123	125	127	128	128					
	V2	128	128	128	129	130	131	132	132					
	GR2	6.1	5.8	5.5	5.2	4.8	4.3	3.7	3.7					
31000	TOFL	5090	5190	5390	5780	6240	6770	7340	7370				126	172
	V1	112	112	113	115	117	119	121	121					
	VR	117	117	117	119	121	123	125	125					
	V2	124	124	124	125	127	128	129	129					
	GR2	6.6	6.3	5.9	5.6	5.2	4.7	4.1	4.1					

FIGURE 5-79. TAKE-OFF DISTANCE; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	86.4					
	N1 (%)	91.3	92.2	92.6	92.0	91.4	90.8	90.1	90.1					
30000	TOFL	4700	4780	4960	5310	5720	6210	6730	6750				123	168
	V1	108	108	109	110	113	115	117	117					
	VR	113	113	114	115	117	119	121	121					
	V2	121	121	121	122	123	124	125	125					
	GR2	7	6.7	6.4	6	5.7	5.1	4.5	4.5					
29000	TOFL	4350	4430	4570	4870	5240	5680	6160	6180				120	165
	V1	104	104	105	106	108	111	113	113					
	VR	110	110	110	112	113	115	117	117					
	V2	119	118	118	119	120	121	122	122					
	GR2	7.5	7.2	6.8	6.5	6.1	5.5	4.9	4.9					
28000	TOFL	4020	4090	4230	4480	4800	5190	5620	5640				117	162
	V1	100	100	101	102	104	107	109	109					
	VR	106	106	107	108	109	111	113	113					
	V2	116	115	115	116	117	118	119	119					
	GR2	8.1	7.8	7.3	7	6.6	6	5.4	5.4					
27000	TOFL	3780	3850	3950	4130	4400	4730	5110	5130				115	159
	V1	98	98	98	99	100	102	105	105					
	VR	104	104	104	104	106	107	109	109					
	V2	113	113	113	113	114	114	115	115					
	GR2	8.7	8.4	7.9	7.5	7.1	6.5	5.9	5.9					
26000	TOFL	3590	3660	3730	3850	4040	4330	4650	4660				113	156
	V1	96	96	96	96	97	98	100	100					
	VR	102	102	102	101	102	104	105	105					
	V2	112	112	112	111	111	111	112	112					
	GR2	9.4	9	8.6	8.1	7.7	7.1	6.4	6.4					

FIGURE 5-80. TAKE-OFF DISTANCE; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	TOFL	8880	9100	9270	9450	9630	9810	10000	10180	10360	10540	10730	150	197
	V1	150	150	150	150	150	149	149	149	149	149	149		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1		
39000	TOFL	8530	8740	8900	9070	9250	9420	9600	9770	9940	10120	10290	148	195
	V1	147	147	147	147	147	147	147	147	147	147	147		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
38000	TOFL	7930	8140	8290	8440	8610	8770	8930	9090	9250	9410	9580	146	192
	V1	144	144	144	143	143	143	143	143	143	143	143		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
37000	TOFL	7380	7570	7710	7860	8010	8160	8310	8460	8610	8750	8900	143	189
	V1	140	140	140	140	140	140	140	140	139	139	139		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
36000	TOFL	6850	7030	7150	7280	7430	7560	7700	7840	7970	8110	8250	140	187
	V1	136	136	136	136	136	136	136	135	135	135	135		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	143	143	143	143		
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
35000	TOFL	6330	6500	6620	6740	6870	6990	7120	7240	7370	7490	7620	138	184
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6		
34000	TOFL	5840	6000	6100	6210	6330	6440	6560	6670	6790	6900	7020	135	181
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.2	5	5.1	5.1	5.1	5	5	5	5	5	5		
33000	TOFL	5390	5530	5630	5730	5830	5940	6050	6150	6260	6360	6470	132	178
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.6	5.4	5.4	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
32000	TOFL	4970	5090	5180	5270	5370	5470	5570	5660	5760	5850	5950	129	175
	V1	119	119	119	119	119	118	118	118	118	118	118		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8		
31000	TOFL	4570	4690	4770	4850	4940	5030	5120	5200	5290	5380	5470	127	172
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		

FIGURE 5-80. TAKE-OFF DISTANCE; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
30000	TOFL	4200	4310	4380	4460	4540	4620	4700	4780	4860	4930	5020	124	169
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
29000	TOFL	3880	3980	4040	4110	4190	4260	4330	4400	4480	4550	4610	121	166
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	119		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
28000	TOFL	3580	3670	3730	3790	3860	3930	3990	4060	4120	4180	4260	118	162
	V1	103	103	103	102	102	102	102	102	102	102	102		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	116	116		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
27000	TOFL	3330	3400	3450	3510	3570	3630	3680	3740	3800	3860	3920	115	159
	V1	99	99	99	99	99	99	98	98	98	98	98		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	114	114	114	114	114	114	114	113	113	113	113		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
26000	TOFL	3130	3180	3240	3290	3350	3410	3470	3520	3580	3630	3690	113	156
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.2	9	9.1	9.1	9.1	9.1	9.1	9.1	9	9	9		

FIGURE 5-80. TAKE-OFF DISTANCE; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
39600	TOFL	10920	11210										150	197
	V1	149	150											
	VR	152	152											
	V2	155	155											
	GR2	3	2.7											
39000	TOFL	10480	10760	11310									148	195
	V1	147	148	148										
	VR	150	150	151										
	V2	153	153	153										
	GR2	3.2	2.9	2.6										
38000	TOFL	9750	10020	10550	11300								146	192
	V1	143	144	145	146									
	VR	146	147	147	148									
	V2	150	150	150	151									
	GR2	3.5	3.2	2.9	2.6									
37000	TOFL	9060	9300	9800	10520	11300							143	189
	V1	139	140	141	142	144								
	VR	143	143	144	145	146								
	V2	147	147	147	148	148								
	GR2	3.8	3.5	3.2	2.9	2.5								
36000	TOFL	8400	8640	9090	9790	10510							140	187
	V1	135	136	137	139	140								
	VR	139	139	140	142	143								
	V2	143	143	144	145	145								
	GR2	4.2	3.9	3.5	3.2	2.8								
35000	TOFL	7760	7980	8430	9060	9760	10510						138	184
	V1	131	132	133	135	136	138							
	VR	135	135	137	138	139	140							
	V2	140	140	140	141	142	142							
	GR2	4.5	4.2	3.9	3.6	3.2	2.7							
34000	TOFL	7150	7350	7780	8380	9040	9750	10220					135	181
	V1	127	127	129	131	133	134	135						
	VR	131	131	133	134	136	137	137						
	V2	136	136	137	138	139	139	140						
	GR2	4.9	4.6	4.3	3.9	3.5	3	2.7						
33000	TOFL	6580	6780	7150	7730	8340	9020	9470					132	178
	V1	123	123	125	127	129	131	132						
	VR	127	127	129	130	132	133	134						
	V2	133	133	133	135	136	136	137						
	GR2	5.3	4.9	4.6	4.3	3.9	3.4	3						
32000	TOFL	6060	6240	6580	7100	7690	8320	8750					129	175
	V1	118	119	120	122	125	127	128						
	VR	123	124	125	126	128	130	131						
	V2	130	130	130	131	132	133	134						
	GR2	5.7	5.3	5	4.7	4.3	3.7	3.4						
31000	TOFL	5560	5730	6040	6510	7040	7650	8050					127	172
	V1	114	115	116	118	120	123	124						
	VR	119	120	121	122	124	126	127						
	V2	126	126	126	128	129	130	130						
	GR2	6.1	5.8	5.4	5.1	4.7	4.1	3.8						

FIGURE 5-80. TAKE-OFF DISTANCE; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
30000	TOFL	5090	5260	5540	5960	6450	7010	7390					124	169
	V1	110	110	112	114	116	119	120						
	VR	115	116	117	118	120	122	123						
	V2	123	123	123	124	125	127	127						
	GR2	6.6	6.2	5.8	5.5	5.1	4.5	4.2						
29000	TOFL	4700	4830	5080	5460	5890	6390	6750					121	166
	V1	106	106	108	110	112	114	116						
	VR	112	112	113	114	116	118	119						
	V2	119	119	120	121	122	123	124						
	GR2	7.1	6.7	6.3	6	5.5	5	4.6						
28000	TOFL	4320	4450	4660	4990	5380	5830	6150					118	162
	V1	102	102	104	105	108	110	111						
	VR	108	108	109	111	112	114	115						
	V2	116	116	117	118	119	120	120						
	GR2	7.6	7.2	6.8	6.4	6	5.4	5						
27000	TOFL	4010	4100	4280	4570	4900	5300	5590					115	159
	V1	98	99	100	101	103	106	107						
	VR	105	105	105	107	108	110	111						
	V2	113	113	113	114	115	116	117						
	GR2	8.2	7.7	7.3	7	6.5	5.9	5.5						
26000	TOFL	3750	3830	3970	4190	4470	4820	5070					113	156
	V1	96	96	96	97	99	101	103						
	VR	102	102	102	103	105	106	107						
	V2	111	111	111	111	112	113	113						
	GR2	8.8	8.4	7.9	7.5	7.1	6.4	6						

FIGURE 5-81. TAKE-OFF DISTANCE; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	TOFL	9820	10000	10190	10400	10600	10800	11000	11200	11410	11610	11810	151	197
	V1	153	153	153	153	153	152	152	152	152	152	152		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8		
39000	TOFL	9420	9590	9770	9970	10160	10350	10550	10740	10930	11130	11320	150	196
	V1	150	150	150	150	150	150	150	150	150	150	150		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	155	155	155	155	155		
	GR2	3.1	3	3	3	3	3	3	3	3	3	3		
38000	TOFL	8780	8940	9110	9290	9470	9650	9830	10000	10180	10360	10540	147	193
	V1	147	147	147	147	146	146	146	146	146	146	146		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
37000	TOFL	8150	8300	8460	8620	8790	8950	9120	9280	9440	9610	9780	144	190
	V1	143	143	143	143	143	142	142	142	142	142	142		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6		
36000	TOFL	7570	7700	7840	8000	8150	8300	8450	8600	8750	8910	9060	142	187
	V1	139	139	139	138	138	138	138	138	138	138	138		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4.1	4	4	4	4	4	4	4	4	4	4		
35000	TOFL	7000	7130	7260	7400	7540	7680	7820	7960	8090	8230	8380	139	184
	V1	135	135	134	134	134	134	134	134	134	134	134		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3		
34000	TOFL	6460	6570	6690	6820	6950	7080	7200	7330	7460	7590	7710	136	181
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7		
33000	TOFL	5940	6040	6150	6270	6380	6500	6610	6730	6850	6960	7080	133	178
	V1	126	126	126	126	126	125	125	125	125	125	125		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1		
32000	TOFL	5460	5560	5660	5760	5870	5980	6080	6190	6290	6400	6510	130	175
	V1	121	121	121	121	121	121	121	121	121	121	121		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5		
31000	TOFL	5020	5100	5190	5290	5390	5490	5580	5680	5770	5870	5970	128	172
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.1	6	6	6	6	6	6	6	6	6	5.9		

FIGURE 5-81. TAKE-OFF DISTANCE; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
30000	TOFL	4600	4680	4760	4850	4940	5030	5120	5200	5290	5380	5470	125	169
	V1	113	113	113	113	112	112	112	112	112	112	112		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4		
29000	TOFL	4220	4290	4370	4450	4530	4610	4690	4770	4850	4930	5010	122	166
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7	7	7	7	7	6.9	6.9	6.9	6.9	6.9	6.9		
28000	TOFL	3890	3950	4020	4090	4170	4240	4310	4380	4450	4510	4600	119	163
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4		
27000	TOFL	3570	3630	3690	3760	3820	3890	3960	4020	4090	4150	4220	116	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.1	8.1	8	8	8	8	8	8	8	8	7.9		
26000	TOFL	3310	3360	3420	3480	3550	3610	3660	3730	3790	3850	3910	113	156
	V1	97	97	97	97	97	97	97	97	96	96	96		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		

FIGURE 5-81. TAKE-OFF DISTANCE; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	92.4	93.0	92.4	91.7	91.1	90.4	90.3						
39600	TOFL	12050											151	197
	V1	152												
	VR	155												
	V2	157												
	GR2	2.6												
39000	TOFL	11550	12000										150	196
	V1	150	151											
	VR	153	153											
	V2	155	155											
	GR2	2.8	2.5											
38000	TOFL	10750	11170	11910									147	193
	V1	146	147	148										
	VR	149	150	151										
	V2	152	152	153										
	GR2	3.1	2.8	2.5										
37000	TOFL	9980	10380	11070	11880								144	190
	V1	142	143	144	146									
	VR	146	146	147	148									
	V2	149	149	149	150									
	GR2	3.4	3.1	2.8	2.5									
36000	TOFL	9250	9620	10290	11030								142	187
	V1	138	139	141	142									
	VR	142	142	144	145									
	V2	145	145	146	147									
	GR2	3.7	3.4	3.1	2.8									
35000	TOFL	8550	8890	9520	10240	11010							139	184
	V1	134	135	137	138	140								
	VR	138	138	140	141	142								
	V2	142	142	143	144	144								
	GR2	4.1	3.7	3.4	3.1	2.7								
34000	TOFL	7880	8210	8800	9460	10190	11000						136	181
	V1	130	131	133	134	136	137							
	VR	134	135	136	137	139	140							
	V2	138	138	139	140	141	141							
	GR2	4.4	4.1	3.8	3.4	3	2.5							
33000	TOFL	7230	7540	8100	8730	9430	10170	10360					133	178
	V1	125	126	128	130	132	134	134						
	VR	130	130	132	134	135	136	136						
	V2	135	135	136	137	138	138	138						
	GR2	4.8	4.4	4.1	3.8	3.3	2.8	2.7						
32000	TOFL	6650	6930	7440	8040	8680	9390	9570					130	175
	V1	121	122	124	126	128	130	130						
	VR	126	126	128	130	131	133	133						
	V2	131	131	133	134	135	135	135						
	GR2	5.2	4.8	4.5	4.2	3.7	3.2	3						
31000	TOFL	6100	6350	6810	7360	7980	8640	8810					128	172
	V1	117	118	120	122	124	126	127						
	VR	122	122	124	126	128	129	129						
	V2	128	128	129	130	131	132	132						
	GR2	5.6	5.2	4.9	4.6	4.1	3.6	3.4						

FIGURE 5-81. TAKE-OFF DISTANCE; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	92.4	93.0	92.4	91.7	91.1	90.4	90.3						
30000	TOFL	5590	5820	6230	6720	7290	7920	8080					125	169
	V1	112	113	115	118	120	122	123						
	VR	118	118	120	122	124	125	126						
	V2	124	124	125	127	128	129	129						
	GR2	6.1	5.7	5.3	5	4.5	4	3.8						
29000	TOFL	5120	5320	5700	6130	6640	7240	7400					122	166
	V1	108	109	111	113	115	118	118						
	VR	114	114	116	118	119	121	122						
	V2	121	121	122	123	124	125	126						
	GR2	6.5	6.1	5.8	5.4	5	4.4	4.3						
28000	TOFL	4690	4870	5180	5590	6050	6580	6720					119	163
	V1	104	105	106	109	111	113	114						
	VR	110	110	112	113	115	117	118						
	V2	118	118	118	120	121	122	122						
	GR2	7	6.6	6.3	5.9	5.4	4.8	4.7						
27000	TOFL	4300	4450	4750	5090	5500	5970	6100					116	160
	V1	100	101	102	104	107	109	109						
	VR	106	107	108	109	111	113	113						
	V2	114	114	115	116	117	118	118						
	GR2	7.6	7.1	6.8	6.4	5.9	5.3	5.2						
26000	TOFL	3980	4100	4340	4640	4990	5410	5530					113	156
	V1	96	97	98	100	102	104	105						
	VR	103	103	104	106	107	109	109						
	V2	112	111	112	113	114	115	115						
	GR2	8.2	7.7	7.3	7	6.4	5.8	5.7						

FIGURE 5-82. TAKE-OFF DISTANCE; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
39600	TOFL	10700	10970	11280	11520	11750	12010						152	198
	V1	156	156	156	156	156	156							
	VR	158	158	158	158	158	158							
	V2	160	160	160	160	160	160							
	GR2	2.7	2.6	2.5	2.5	2.5	2.5							
39000	TOFL	10250	10500	10800	11020	11250	11500	11740	11920	12100	12310	12540	151	196
	V1	153	153	153	153	153	153	153	153	153	153	153		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	2.9	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6		
38000	TOFL	9520	9750	10020	10230	10440	10670	10890	11050	11220	11410	11620	148	193
	V1	149	149	149	149	149	149	149	149	149	149	149		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	154	154		
	GR2	3.2	3.1	3	3	3	3	3	3	3	3	2.9		
37000	TOFL	8830	9070	9320	9510	9700	9910	10120	10260	10420	10590	10790	145	190
	V1	146	146	146	146	146	146	146	145	145	145	145		
	VR	148	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	151	151	151	151	151		
	GR2	3.5	3.5	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.2		
36000	TOFL	8170	8380	8620	8790	8970	9170	9360	9490	9630	9800	9970	143	187
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	144	144	144	145	145	145	145	145	145	145	145		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	3.9	3.8	3.7	3.7	3.7	3.7	3.6	3.7	3.7	3.7	3.6		
35000	TOFL	7560	7750	7970	8130	8290	8470	8650	8770	8900	9060	9210	140	185
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.1	4.1	4.1	4	4	4	4	4	3.9		
34000	TOFL	6970	7140	7350	7500	7660	7810	7970	8090	8200	8340	8480	137	182
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	136	136	137	137	137	137	137	137	137	137	137		
	V2	141	141	141	141	141	141	141	141	141	141	140		
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.3		
33000	TOFL	6410	6570	6760	6900	7030	7180	7330	7430	7540	7670	7790	134	179
	V1	129	129	129	129	129	129	129	129	128	128	128		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7		
32000	TOFL	5880	6030	6200	6320	6450	6580	6720	6810	6900	7020	7140	131	176
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	133		
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1		
31000	TOFL	5390	5530	5680	5800	5910	6030	6160	6240	6330	6440	6540	128	173
	V1	120	120	120	120	120	120	120	120	119	119	119		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.8	5.8	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.6	5.5		

FIGURE 5-82. TAKE-OFF DISTANCE; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
30000	TOFL	4940	5060	5200	5310	5410	5520	5630	5710	5790	5890	5980	126	169
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	126	126		
	GR2	6.3	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.9		
29000	TOFL	4520	4630	4750	4850	4940	5040	5140	5210	5270	5370	5470	123	166
	V1	111	111	111	111	111	111	111	111	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.8	6.7	6.6	6.6	6.6	6.6	6.5	6.6	6.6	6.5	6.4		
28000	TOFL	4140	4240	4350	4430	4520	4610	4700	4760	4830	4910	5000	120	163
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.3	7.2	7.1	7.1	7.1	7.1	7	7.1	7.1	7	6.9		
27000	TOFL	3800	3880	3980	4060	4140	4220	4300	4360	4400	4490	4550	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	108	108	108	108	108	108	108	108	108	108		
	V2	116	116	116	116	116	116	116	116	116	116	115		
	GR2	7.8	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
26000	TOFL	3490	3560	3650	3720	3790	3860	3930	3980	4040	4110	4180	114	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.4	8.3	8.2	8.2	8.2	8.2	8.1	8.2	8.2	8.1	7.9		

FIGURE 5-82. TAKE-OFF DISTANCE; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	92.9	92.8	92.2	91.5	90.9	90.3							
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	11940											148	193
	V1	150												
	VR	152												
	V2	154												
	GR2	2.6												
37000	TOFL	11070	11690										145	190
	V1	146	147											
	VR	149	149											
	V2	151	151											
	GR2	2.9	2.6											
36000	TOFL	10250	10840	11650									143	187
	V1	142	143	144										
	VR	145	146	147										
	V2	147	148	149										
	GR2	3.2	2.9	2.6										
35000	TOFL	9470	10010	10790	11600								140	185
	V1	138	139	140	142									
	VR	141	142	143	144									
	V2	144	144	145	146									
	GR2	3.6	3.2	2.9	2.6									
34000	TOFL	8720	9240	9970	10710	11570							137	182
	V1	133	134	136	138	139								
	VR	137	138	139	141	142								
	V2	140	141	142	143	143								
	GR2	3.9	3.6	3.3	2.9	2.5								
33000	TOFL	8020	8510	9180	9890	10660	11430						134	179
	V1	129	130	132	134	135	137							
	VR	133	134	135	137	138	139							
	V2	137	137	139	140	140	140							
	GR2	4.3	4	3.6	3.3	2.8	2.4							
32000	TOFL	7350	7800	8440	9090	9830	10520						131	176
	V1	124	126	128	130	132	133							
	VR	129	130	132	133	134	135							
	V2	133	134	135	136	137	137							
	GR2	4.7	4.3	4	3.7	3.2	2.7							
31000	TOFL	6740	7140	7730	8340	9030	9670						128	173
	V1	120	121	124	126	128	129							
	VR	124	126	128	129	131	132							
	V2	130	130	131	133	133	134							
	GR2	5.1	4.7	4.4	4.1	3.6	3.1							

FIGURE 5-82. TAKE-OFF DISTANCE; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	92.9	92.8	92.2	91.5	90.9	90.3							
30000	TOFL	6160	6530	7050	7630	8270	8870						126	169
	V1	116	117	119	121	123	125							
	VR	120	121	123	125	127	128							
	V2	126	127	128	129	130	131							
	GR2	5.5	5.2	4.8	4.5	4	3.5							
29000	TOFL	5620	5960	6440	6950	7540	8100						123	166
	V1	111	113	115	117	119	121							
	VR	116	117	119	121	123	124							
	V2	123	123	124	126	127	127							
	GR2	6	5.6	5.3	4.9	4.4	3.9							
28000	TOFL	5130	5400	5860	6310	6860	7390						120	163
	V1	107	108	110	112	115	117							
	VR	112	113	115	117	119	120							
	V2	119	119	121	122	123	124							
	GR2	6.5	6.1	5.7	5.4	4.8	4.4							
27000	TOFL	4670	4950	5320	5730	6210	6700						117	160
	V1	102	104	106	108	110	112							
	VR	108	109	111	113	114	116							
	V2	115	116	117	118	119	120							
	GR2	7	6.6	6.2	5.9	5.3	4.8							
26000	TOFL	4280	4510	4830	5200	5630	6050						114	157
	V1	98	99	101	103	105	108							
	VR	104	105	107	108	110	112							
	V2	113	113	114	115	116	117							
	GR2	7.5	7.1	6.8	6.4	5.8	5.3							

FIGURE 5-83. TAKE-OFF DISTANCE; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
39600	TOFL	11710											154	198
	V1	159												
	VR	161												
	V2	163												
	GR2	2.5												
39000	TOFL	11200	11610	12000	12250	12510	12830	13080	13240	13450			152	197
	V1	156	157	157	157	157	157	157	157	157				
	VR	159	159	159	159	159	159	159	159	159				
	V2	161	161	161	161	161	161	161	161	161				
	GR2	2.7	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4				
38000	TOFL	10390	10770	11120	11350	11600	11890	12120	12260	12460	12690	12950	149	194
	V1	152	153	153	153	153	153	153	153	153	153	153		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	3	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.5		
37000	TOFL	9640	9980	10300	10520	10750	11010	11220	11350	11530	11750	11990	147	191
	V1	148	149	149	149	149	149	149	149	149	149	149		
	VR	151	151	152	152	152	152	152	152	152	152	152		
	V2	154	154	154	154	154	154	154	154	154	154	153		
	GR2	3.3	3.2	3.1	3.1	3.1	3	3	3	3	3	2.8		
36000	TOFL	8900	9240	9540	9750	9950	10200	10390	10500	10670	10870	11100	144	188
	V1	144	145	145	145	145	145	145	145	145	145	145		
	VR	147	147	148	148	148	148	148	148	148	148	148		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.6	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.1		
35000	TOFL	8200	8500	8790	8980	9170	9400	9580	9670	9830	10010	10220	141	185
	V1	139	140	140	140	140	140	140	140	140	140	140		
	VR	143	143	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	146	146		
	GR2	4	3.8	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.4		
34000	TOFL	7550	7830	8090	8260	8430	8640	8800	8910	9030	9190	9380	138	182
	V1	135	136	136	136	136	136	136	136	136	136	136		
	VR	138	139	139	140	140	140	140	140	140	140	140		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.3	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4	3.8		
33000	TOFL	6950	7200	7430	7590	7750	7940	8090	8180	8290	8440	8620	135	179
	V1	130	131	132	132	132	132	132	131	131	131	131		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.7	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.1		
32000	TOFL	6380	6610	6820	6960	7110	7290	7420	7500	7600	7740	7900	133	176
	V1	126	127	127	127	127	127	127	127	127	127	127		
	VR	130	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	135	135	135		
	GR2	5.1	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.5		
31000	TOFL	5840	6040	6230	6360	6500	6670	6790	6850	6940	7070	7220	130	173
	V1	121	122	123	123	123	123	123	122	122	122	122		
	VR	126	126	127	127	127	127	127	127	127	127	127		
	V2	132	132	132	132	132	132	132	132	132	132	131		
	GR2	5.6	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	4.9		

FIGURE 5-83. TAKE-OFF DISTANCE; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
30000	TOFL	5340	5530	5700	5820	5940	6090	6190	6260	6340	6460	6590	127	170
	V1	117	117	118	118	118	118	118	118	118	118	118		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.6	5.4		
29000	TOFL	4870	5040	5200	5310	5420	5550	5650	5710	5770	5880	6000	124	167
	V1	112	113	113	113	113	113	113	113	113	113	113		
	VR	117	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	125	125	125	125	125	125	124	124	124		
	GR2	6.5	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	5.8		
28000	TOFL	4450	4590	4730	4830	4930	5050	5140	5190	5250	5350	5460	121	164
	V1	108	108	109	109	109	109	109	109	109	109	109		
	VR	113	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	120	120		
	GR2	6.9	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.3		
27000	TOFL	4070	4190	4310	4400	4490	4600	4680	4730	4800	4880	4960	118	160
	V1	103	104	104	104	104	104	104	104	104	104	104		
	VR	109	109	110	110	110	110	110	110	110	110	110		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.5	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	6.8		
26000	TOFL	3720	3830	3940	4010	4100	4190	4260	4310	4370	4430	4530	115	157
	V1	99	100	100	100	100	100	100	100	100	99	100		
	VR	105	105	106	106	106	106	106	106	106	106	106		
	V2	114	114	114	114	114	114	114	114	114	113	113		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.6	7.3		

FIGURE 5-83. TAKE-OFF DISTANCE; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

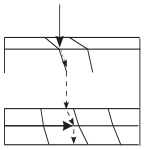
GW (LB)	OAT (°C)	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	72							
	N1 (%)	93.0	92.6	92.0	91.3	90.6	90.3							
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	12490											147	191
	V1	150												
	VR	152												
	V2	153												
	GR2	2.5												
36000	TOFL	11550	12350										144	188
	V1	145	147											
	VR	148	149											
	V2	150	150											
	GR2	2.8	2.5											
35000	TOFL	10670	11410	12280									141	185
	V1	141	143	144										
	VR	144	145	146										
	V2	146	147	148										
	GR2	3.1	2.8	2.5										
34000	TOFL	9790	10530	11330	12220								138	182
	V1	137	138	140	141									
	VR	140	142	143	144									
	V2	143	144	144	145									
	GR2	3.4	3.1	2.8	2.4									
33000	TOFL	9000	9650	10450	11250								135	179
	V1	132	134	136	137									
	VR	136	137	139	140									
	V2	139	140	141	142									
	GR2	3.8	3.5	3.2	2.8									
32000	TOFL	8250	8870	9600	10360	11200	11620						133	176
	V1	128	130	132	133	135	136							
	VR	132	133	135	136	137	138							
	V2	135	137	138	139	139	139							
	GR2	4.2	3.8	3.5	3.1	2.7	2.4							
31000	TOFL	7550	8120	8780	9500	10280	10670						130	173
	V1	123	125	127	129	131	132							
	VR	128	129	131	132	134	134							
	V2	131	133	134	135	136	136							
	GR2	4.6	4.2	3.9	3.5	3	2.8							

FIGURE 5-83. TAKE-OFF DISTANCE; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	72							
	N1 (%)	93.0	92.6	92.0	91.3	90.6	90.3							
30000	TOFL	6880	7420	8020	8670	9430	9780						127	170
	V1	119	121	123	125	127	128							
	VR	123	125	127	128	130	130							
	V2	128	129	130	131	133	133							
	GR2	5	4.7	4.3	3.9	3.4	3.2							
29000	TOFL	6270	6760	7310	7900	8580	8940						124	167
	V1	114	116	118	120	123	124							
	VR	119	121	123	124	126	127							
	V2	124	125	127	128	129	129							
	GR2	5.4	5.1	4.8	4.3	3.8	3.6							
28000	TOFL	5700	6140	6640	7180	7810	8120						121	164
	V1	110	112	114	116	118	119							
	VR	115	116	118	120	122	123							
	V2	120	122	123	124	125	126							
	GR2	5.9	5.5	5.2	4.8	4.3	4							
27000	TOFL	5190	5570	6010	6500	7070	7360						118	160
	V1	105	107	109	111	114	115							
	VR	111	112	114	116	117	118							
	V2	117	118	119	120	122	122							
	GR2	6.4	6	5.7	5.3	4.8	4.5							
26000	TOFL	4720	5050	5440	5880	6390	6650						115	157
	V1	101	102	105	107	109	110							
	VR	106	108	110	111	113	114							
	V2	113	114	116	117	118	118							
	GR2	6.9	6.6	6.2	5.8	5.3	5							

BACK
TOC Local
TOC Main

V_1 CORRECTIONS
FLAPS - 20°
DRY RUNWAY



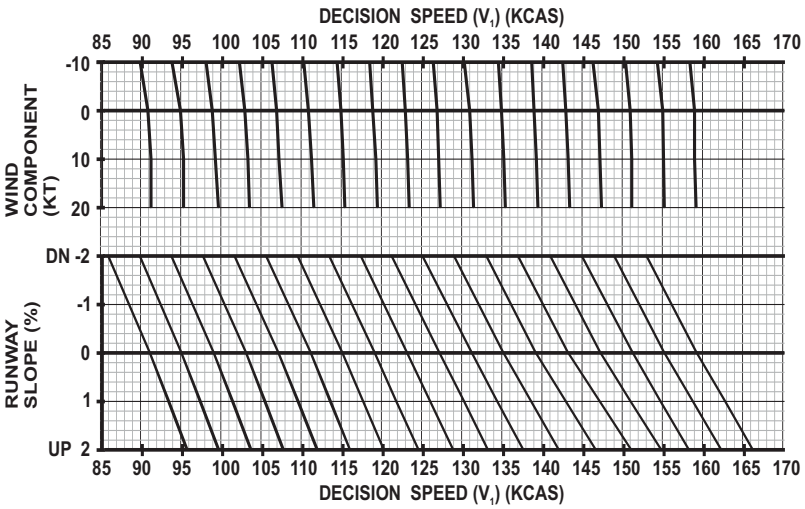


Figure 5-84. V_1 Correction; Flaps - 20°; Dry Runway

TAKEOFF FIELD LENGTH CORRECTIONS
FLAPS 20°
DRY RUNWAY

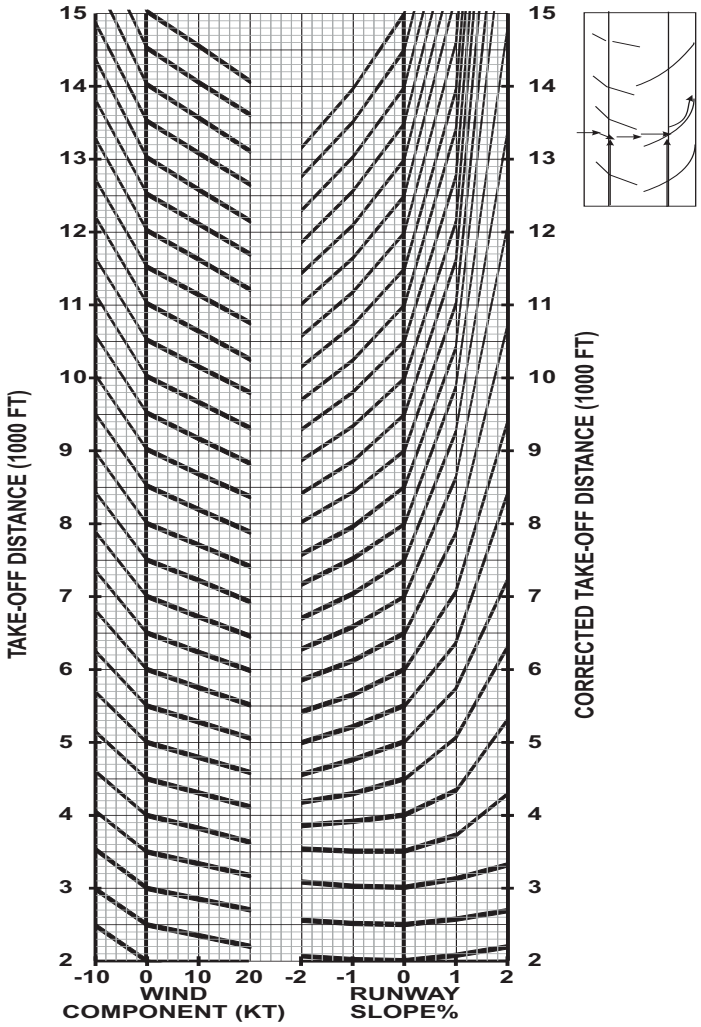


Figure 5-85. Takeoff Field Length Corrections; Flaps-20°; Dry Runway

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FIGURE 5-86. TAKE-OFF DISTANCE; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	4110	4170	4230	4290	4350	4420	4500	4570	4640	4700	4770	139	192
	V1	126	126	126	126	125	125	125	125	125	125	125		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.8		
39000	TOFL	3960	4020	4070	4130	4190	4260	4330	4410	4470	4530	4590	138	191
	V1	124	124	124	124	123	123	123	123	123	123	123		
	VR	128	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	136	136	136	136	136	136	136		
	GR2	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6		
38000	TOFL	3720	3780	3830	3890	3940	4010	4070	4140	4200	4260	4310	136	188
	V1	121	121	120	120	120	120	120	120	120	120	120		
	VR	125	125	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	3520	3570	3630	3680	3730	3800	3860	3920	3980	4040	4090	135	185
	V1	118	118	118	118	117	117	117	117	117	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
36000	TOFL	3360	3410	3470	3520	3570	3630	3690	3740	3800	3860	3910	133	182
	V1	116	116	116	115	115	115	115	115	115	115	115		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	130	130	130	130	130	130	130	130		
	GR2	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.2		
35000	TOFL	3210	3260	3310	3350	3400	3460	3510	3570	3630	3670	3720	131	180
	V1	114	113	113	113	113	113	113	113	113	113	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.4	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.5	7.6	7.6		
34000	TOFL	3050	3100	3150	3190	3240	3290	3340	3390	3450	3500	3540	129	177
	V1	111	111	111	111	110	110	110	110	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.9	7.9	8	8	8.1	8.1	8	8	8	8	8.1		
33000	TOFL	2910	2960	3000	3050	3090	3140	3190	3240	3290	3340	3380	127	174
	V1	109	109	109	109	108	108	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.4	8.5	8.5	8.5	8.6	8.6	8.6	8.5	8.5	8.6	8.6		
32000	TOFL	2790	2840	2880	2920	2970	3010	3060	3110	3160	3200	3240	125	171
	V1	107	107	107	107	107	107	106	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	2680	2720	2770	2810	2850	2900	2940	2980	3030	3070	3110	123	168
	V1	105	105	105	105	105	105	105	105	105	104	104		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	123	123	123	123	123	123	123	123	123		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		

FIGURE 5-86. TAKE-OFF DISTANCE; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
30000	TOFL	2580	2620	2660	2700	2740	2780	2830	2870	2910	2950	2990	121	166
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	122	122	122	122	122	122	122	122		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.4		
29000	TOFL	2480	2520	2560	2600	2630	2670	2720	2760	2800	2830	2870	119	163
	V1	102	102	102	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	121	121		
	GR2	10.8	10.9	10.9	10.9	11	11	11	11	10.9	11	11		
28000	TOFL	2430	2470	2520	2560	2610	2650	2690	2720	2760	2810	2850	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.5	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
27000	TOFL	2410	2450	2500	2540	2580	2620	2660	2700	2740	2780	2820	115	157
	V1	101	102	102	102	102	102	102	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.3	12.3	12.4	12.4	12.5	12.5	12.4	12.4	12.4	12.4	12.5		
26000	TOFL	2390	2430	2480	2520	2560	2600	2640	2680	2710	2760	2800	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.1	13.2	13.2	13.3	13.3	13.3	13.2	13.2	13.3	13.3		

FIGURE 5-87. TAKE-OFF DISTANCE; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	4370	4440	4500	4570	4640	4720	4800	4880	4960	5020	5090	139	193
	V1	128	128	127	127	127	127	127	127	127	127	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	138	138	138	138	138	138	138	138	138		
	GR2	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	4200	4270	4340	4400	4470	4540	4620	4700	4770	4830	4900	138	191
	V1	126	126	125	125	125	125	125	125	125	125	125		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	3950	4010	4080	4130	4200	4270	4340	4410	4480	4540	4600	136	188
	V1	122	122	122	122	122	122	122	121	121	121	121		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6	6	6	6.1	6.1	6.1	6.1	6.1	6	6.1	6.1		
37000	TOFL	3700	3770	3820	3880	3940	4000	4070	4140	4200	4260	4310	135	185
	V1	119	119	119	118	118	118	118	118	118	118	118		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.5		
36000	TOFL	3500	3560	3620	3670	3730	3790	3850	3910	3970	4030	4080	133	183
	V1	116	116	116	116	115	115	115	115	115	115	115		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	130	130	130	130	130	130	130	130	130		
	GR2	6.8	6.8	6.8	6.8	6.9	6.8	6.8	6.8	6.8	6.8	6.9		
35000	TOFL	3330	3390	3430	3490	3550	3600	3660	3720	3780	3830	3880	131	180
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
34000	TOFL	3170	3220	3270	3320	3370	3430	3480	3550	3600	3640	3690	129	177
	V1	111	111	111	111	111	111	111	111	111	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
33000	TOFL	3020	3070	3120	3170	3220	3270	3320	3370	3420	3470	3520	127	174
	V1	109	109	109	109	108	108	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	125	125	125	125	125	125	125	125		
	GR2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.3	8.3		
32000	TOFL	2890	2940	2980	3030	3080	3130	3180	3230	3270	3320	3360	125	171
	V1	107	107	107	107	107	106	106	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	2770	2820	2860	2910	2950	3000	3050	3090	3140	3180	3230	123	169
	V1	105	105	105	105	105	105	105	104	104	104	104		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 5-87. TAKE-OFF DISTANCE; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
30000	TOFL	2670	2710	2760	2800	2840	2880	2930	2970	3020	3060	3100	121	166
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	10	10	10	10	10	10	10	10	10		
29000	TOFL	2570	2610	2650	2690	2730	2770	2810	2860	2900	2940	2980	119	163
	V1	102	102	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.6	10.6	10.6	10.7	10.6	10.6	10.6	10.6	10.6	10.7		
28000	TOFL	2480	2520	2570	2610	2660	2700	2740	2780	2820	2860	2900	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.3	11.3	11.4	11.4		
27000	TOFL	2460	2500	2550	2590	2630	2670	2710	2750	2790	2830	2880	115	157
	V1	101	101	101	101	101	101	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	12	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	2440	2480	2520	2570	2610	2650	2690	2730	2770	2810	2850	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.8	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 5-88. TAKE-OFF DISTANCE; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	4640	4720	4800	4880	4960	5050	5130	5220	5300	5370	5450	140	193
	V1	129	129	129	129	129	129	129	129	129	128	128		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	140	140	140	140	140	140	140	140	140	140		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	TOFL	4470	4550	4620	4690	4770	4860	4940	5020	5100	5170	5240	139	191
	V1	127	127	127	127	127	127	127	127	126	126	126		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.5		
38000	TOFL	4190	4260	4330	4400	4480	4550	4630	4710	4780	4840	4910	137	189
	V1	124	123	123	123	123	123	123	123	123	123	123		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	136	136	136	135	135	135	135	135	135	135	135		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	3930	4000	4060	4130	4200	4270	4340	4410	4480	4540	4600	135	186
	V1	120	120	120	120	120	120	120	120	120	119	119		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
36000	TOFL	3690	3750	3810	3870	3940	4000	4070	4130	4200	4250	4310	133	183
	V1	117	117	117	117	116	116	116	116	116	116	116		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
35000	TOFL	3470	3530	3590	3640	3700	3770	3830	3890	3950	4000	4060	131	180
	V1	114	114	114	113	113	113	113	113	113	113	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
34000	TOFL	3290	3350	3400	3460	3520	3570	3630	3690	3750	3800	3850	129	177
	V1	111	111	111	111	111	111	111	111	111	111	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	126	126	126	126	126	126	126	126		
	GR2	7.4	7.4	7.4	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.5		
33000	TOFL	3130	3190	3240	3290	3340	3400	3450	3510	3570	3610	3660	127	175
	V1	109	109	109	109	108	108	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	125	125	125		
	GR2	7.9	7.9	7.9	8	7.9	7.9	7.9	7.9	7.9	7.9	8		
32000	TOFL	2990	3040	3090	3140	3190	3240	3290	3350	3400	3440	3490	125	172
	V1	107	107	107	106	106	106	106	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
31000	TOFL	2870	2920	2970	3010	3060	3110	3160	3210	3260	3300	3350	123	169
	V1	105	105	105	105	105	105	104	104	104	104	104		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	122	122	122	122	122	122	122	122	122	122		
	GR2	9	9	9	9.1	9.1	9.1	9	9	9	9	9.1		

FIGURE 5-88. TAKE-OFF DISTANCE; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
30000	TOFL	2770	2810	2860	2900	2950	2990	3040	3090	3130	3180	3220	121	166
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.7		
29000	TOFL	2650	2700	2740	2790	2830	2870	2920	2960	3000	3050	3090	119	163
	V1	102	102	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	120	120	120	120	120	120	120	120	120		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	2550	2590	2630	2670	2720	2760	2800	2840	2880	2920	2970	117	160
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11	11	11	11	11	11	11	11	10.9	11	11		
27000	TOFL	2520	2560	2600	2650	2690	2730	2770	2810	2850	2890	2940	115	157
	V1	100	100	100	100	100	100	100	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.8		
26000	TOFL	2500	2540	2580	2620	2660	2700	2740	2780	2820	2870	2910	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5		

FIGURE 5-89. TAKE-OFF DISTANCE; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	4980	5060	5150	5240	5330	5420	5520	5610	5700	5780	5860	141	193
	V1	131	131	131	131	131	131	131	131	131	130	130		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5	5	5	5	5	5	5	5	5	5	5		
39000	TOFL	4780	4870	4960	5040	5130	5220	5300	5400	5480	5560	5630	140	192
	V1	129	129	129	129	129	129	129	129	129	128	128		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	139	139	139	139	139	139	139	139	139	139		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	4480	4560	4640	4720	4800	4890	4970	5050	5130	5200	5270	137	189
	V1	126	125	125	125	125	125	125	125	125	125	125		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
37000	TOFL	4200	4270	4350	4420	4500	4570	4650	4730	4800	4870	4930	135	186
	V1	122	122	122	122	122	122	122	122	122	121	121		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	3930	4000	4070	4130	4200	4280	4350	4420	4490	4550	4610	133	183
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
35000	TOFL	3680	3740	3810	3870	3940	4000	4070	4140	4200	4260	4310	131	181
	V1	115	115	115	115	115	115	115	114	114	114	114		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
34000	TOFL	3460	3520	3580	3640	3700	3760	3820	3880	3940	4000	4050	129	178
	V1	112	112	112	112	112	111	111	111	111	111	111		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
33000	TOFL	3280	3330	3390	3440	3510	3570	3620	3680	3740	3790	3840	127	175
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	3120	3170	3230	3280	3330	3390	3440	3500	3560	3600	3660	125	172
	V1	107	107	107	107	107	107	107	106	106	106	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	123	123	123		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	2990	3040	3090	3140	3190	3240	3290	3340	3390	3440	3490	123	169
	V1	105	105	105	105	105	105	105	105	104	104	104		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.7	8.7		

FIGURE 5-89. TAKE-OFF DISTANCE; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
30000	TOFL	2870	2920	2960	3010	3060	3110	3160	3210	3260	3300	3350	121	166
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.2	9.2	9.3	9.3		
29000	TOFL	2760	2800	2850	2890	2940	2990	3030	3080	3130	3160	3210	119	163
	V1	102	102	102	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	2640	2690	2730	2770	2820	2860	2900	2950	2990	3040	3080	117	160
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.5	10.6	10.6		
27000	TOFL	2570	2610	2650	2700	2740	2780	2820	2860	2900	2950	2990	115	157
	V1	99	99	99	99	99	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
26000	TOFL	2540	2590	2630	2670	2710	2750	2790	2830	2880	2920	2960	113	154
	V1	99	99	99	99	99	99	99	99	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12	12.1	12.1		

FIGURE 5-90. TAKE-OFF DISTANCE; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	5370	5460	5560	5660	5760	5860	5960	6060	6160	6240	6330	142	194
	V1	133	133	133	133	133	133	133	133	133	133	132		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	143	143	143	142	142	142	142	142	142	142	142		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.8	4.8		
39000	TOFL	5160	5250	5340	5440	5530	5630	5720	5820	5920	6000	6080	141	192
	V1	131	131	131	131	131	131	131	131	131	130	130		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5	5	5	5	5	4.9	4.9	4.9	4.9	4.9	5		
38000	TOFL	4830	4920	5000	5090	5180	5270	5360	5450	5540	5610	5690	138	189
	V1	128	127	127	127	127	127	127	127	127	127	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	4520	4600	4680	4760	4850	4930	5010	5100	5180	5250	5320	136	187
	V1	124	124	124	124	124	124	124	124	124	123	123		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.7		
36000	TOFL	4220	4300	4370	4450	4520	4600	4680	4760	4830	4900	4970	133	184
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	124	124	124	124	124	124	124	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
35000	TOFL	3940	4010	4080	4150	4220	4290	4360	4440	4510	4570	4630	131	181
	V1	117	117	117	117	116	116	116	116	116	116	116		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
34000	TOFL	3690	3750	3810	3880	3950	4010	4080	4140	4210	4270	4330	129	178
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	3460	3520	3580	3640	3700	3760	3820	3880	3940	4000	4060	127	175
	V1	110	110	110	110	110	110	110	110	110	109	109		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.3	7.3		
32000	TOFL	3270	3330	3380	3440	3510	3570	3620	3680	3740	3790	3840	125	172
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	123	123	123	123	123	123	123		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
31000	TOFL	3120	3170	3220	3280	3330	3380	3440	3490	3550	3600	3640	123	169
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 5-90. TAKE-OFF DISTANCE; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
30000	TOFL	2990	3040	3090	3140	3190	3240	3290	3340	3390	3440	3490	121	166
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
29000	TOFL	2860	2910	2960	3010	3060	3100	3150	3200	3250	3290	3340	119	163
	V1	102	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
28000	TOFL	2750	2790	2840	2890	2930	2980	3020	3070	3110	3160	3200	117	160
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.2	10.2		
27000	TOFL	2630	2680	2720	2760	2810	2850	2890	2940	2980	3020	3060	115	157
	V1	98	98	98	98	98	98	98	98	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	2590	2630	2670	2720	2760	2800	2840	2880	2930	2970	3020	113	154
	V1	98	98	98	98	98	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.7	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7		

FIGURE 5-91. TAKE-OFF DISTANCE; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	5750	5850	5960	6070	6170	6280	6390	6510	6610	6700	6800	143	194
	V1	135	135	135	135	135	135	135	135	135	134	134		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
39000	TOFL	5520	5630	5720	5830	5930	6040	6140	6250	6350	6440	6530	142	193
	V1	133	133	133	133	133	133	133	132	132	132	132		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
38000	TOFL	5170	5260	5350	5450	5550	5640	5740	5840	5930	6010	6100	139	190
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5	5	5.1		
37000	TOFL	4830	4920	5000	5090	5180	5270	5360	5450	5540	5620	5690	137	187
	V1	126	126	125	125	125	125	125	125	125	125	125		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
36000	TOFL	4510	4590	4670	4750	4840	4920	5000	5090	5170	5240	5310	134	184
	V1	122	122	122	122	122	122	122	122	122	121	121		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.8		
35000	TOFL	4200	4280	4350	4430	4510	4580	4660	4740	4820	4880	4950	132	181
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.2	6.2		
34000	TOFL	3920	3990	4060	4130	4200	4270	4340	4410	4480	4540	4600	129	178
	V1	115	115	114	114	114	114	114	114	114	114	114		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.6	6.6		
33000	TOFL	3660	3720	3780	3850	3920	3980	4050	4110	4180	4230	4290	127	176
	V1	111	111	111	111	111	111	111	111	111	111	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	7	7	7	7	7	7	7	7	6.9	7	7		
32000	TOFL	3440	3500	3560	3620	3680	3740	3800	3860	3930	3980	4030	125	173
	V1	108	108	108	108	108	108	108	108	108	108	107		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	123	123	123	123	123	123	123	123	123	123		
	GR2	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.5		
31000	TOFL	3250	3300	3360	3410	3470	3530	3590	3650	3710	3760	3810	123	170
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	121	121	121	121	121	121		
	GR2	8	8	8	8	8	8	8	7.9	7.9	7.9	8		

FIGURE 5-91. TAKE-OFF DISTANCE; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
30000	TOFL	3100	3150	3210	3260	3310	3360	3420	3470	3520	3570	3620	121	167
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.5	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.6		
29000	TOFL	2970	3020	3070	3120	3170	3220	3270	3320	3370	3420	3460	119	164
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.1	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9.2		
28000	TOFL	2850	2890	2940	2990	3040	3080	3130	3180	3230	3270	3320	117	161
	V1	100	100	100	100	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	2730	2770	2820	2860	2910	2950	3000	3040	3090	3130	3180	115	157
	V1	98	98	98	98	98	98	98	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	2640	2690	2730	2770	2820	2860	2900	2950	2990	3040	3080	113	154
	V1	97	97	97	97	97	97	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.2	11.2	11.3	11.3		

FIGURE 5-92. TAKE-OFF DISTANCE; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	6260	6360	6470	6590	6710	6820	6950	7070	7180	7280	7390	144	195
	V1	138	137	137	137	137	137	137	137	137	137	137		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4.2	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.3		
39000	TOFL	6010	6110	6210	6330	6440	6550	6670	6780	6900	6990	7090	143	193
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.4	4.4	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
38000	TOFL	5610	5700	5800	5900	6010	6120	6220	6330	6430	6520	6620	140	190
	V1	132	131	131	131	131	131	131	131	131	131	131		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.8	4.8		
37000	TOFL	5240	5320	5410	5510	5610	5700	5800	5900	6000	6080	6170	138	187
	V1	128	128	128	128	127	127	127	127	127	127	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
36000	TOFL	4880	4970	5050	5140	5230	5320	5410	5500	5590	5670	5750	135	185
	V1	124	124	124	124	124	124	124	124	124	123	123		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.5		
35000	TOFL	4550	4630	4700	4790	4870	4950	5040	5120	5200	5280	5350	133	182
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.8	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.9		
34000	TOFL	4230	4300	4370	4450	4530	4600	4680	4760	4840	4900	4970	130	179
	V1	117	117	116	116	116	116	116	116	116	116	116		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.3	6.3		
33000	TOFL	3940	4000	4060	4130	4200	4280	4350	4420	4490	4550	4610	127	176
	V1	113	113	113	113	113	113	112	112	112	112	112		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.7	6.7		
32000	TOFL	3660	3720	3780	3850	3910	3980	4040	4110	4170	4230	4290	125	173
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
31000	TOFL	3440	3500	3560	3620	3680	3740	3800	3860	3920	3980	4030	123	170
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		

FIGURE 5-92. TAKE-OFF DISTANCE; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
30000	TOFL	3250	3300	3350	3410	3480	3530	3590	3650	3700	3750	3810	121	167
	V1	104	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.1	8.1	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.2		
29000	TOFL	3090	3140	3190	3250	3300	3350	3410	3460	3510	3560	3610	119	164
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.7	8.8	8.8	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.8		
28000	TOFL	2950	3000	3050	3100	3150	3200	3250	3300	3350	3400	3450	117	161
	V1	100	100	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.4	9.4		
27000	TOFL	2830	2880	2920	2970	3020	3070	3110	3160	3210	3250	3300	115	158
	V1	98	98	98	98	98	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10.1	10.1		
26000	TOFL	2710	2760	2800	2850	2890	2930	2980	3030	3070	3110	3150	113	155
	V1	96	96	96	96	96	96	96	96	96	95	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		

FIGURE 5-93. TAKE-OFF DISTANCE; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	6800	6910	7040	7170	7300	7430	7560	7700	7820	7930	8050	145	195
	V1	140	140	140	140	140	140	140	140	139	139	139		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4	4	4	4	4	4	4	4	4	4	4		
39000	TOFL	6530	6630	6750	6870	7000	7120	7250	7380	7500	7600	7720	144	193
	V1	138	137	137	137	137	137	137	137	137	137	137		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.2	4.2		
38000	TOFL	6090	6180	6300	6410	6530	6640	6760	6880	6990	7090	7190	141	191
	V1	134	134	134	134	134	133	133	133	133	133	133		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
37000	TOFL	5680	5760	5870	5980	6080	6190	6290	6410	6510	6600	6690	139	188
	V1	130	130	130	130	130	130	130	130	130	129	129		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
36000	TOFL	5290	5370	5460	5560	5660	5760	5860	5960	6060	6140	6230	136	185
	V1	126	126	126	126	126	126	126	126	126	126	126		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
35000	TOFL	4920	5000	5080	5170	5260	5360	5450	5540	5630	5710	5790	134	182
	V1	123	122	122	122	122	122	122	122	122	122	122		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.6	5.6		
34000	TOFL	4570	4640	4720	4810	4890	4970	5060	5150	5230	5300	5370	131	179
	V1	119	118	118	118	118	118	118	118	118	118	118		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.9	6	6	6	6	6	5.9	5.9	5.9	5.9	6		
33000	TOFL	4240	4310	4380	4460	4540	4610	4690	4770	4850	4910	4980	128	176
	V1	115	115	115	115	114	114	114	114	114	114	114		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.4	6.4		
32000	TOFL	3930	3990	4060	4130	4200	4270	4350	4420	4490	4550	4610	126	173
	V1	111	111	111	111	111	111	111	111	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
31000	TOFL	3660	3720	3780	3840	3910	3970	4040	4100	4170	4230	4290	123	170
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.3	7.3		

FIGURE 5-93. TAKE-OFF DISTANCE; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
30000	TOFL	3430	3480	3540	3600	3660	3720	3780	3850	3900	3960	4010	121	167
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
29000	TOFL	3220	3270	3330	3380	3450	3490	3560	3620	3670	3720	3760	119	164
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.3	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.4		
28000	TOFL	3070	3120	3170	3230	3280	3330	3380	3440	3490	3540	3590	117	161
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.9	9	9	9	9	9	8.9	8.9	8.9	8.9	9		
27000	TOFL	2940	2990	3040	3090	3140	3190	3240	3290	3340	3390	3440	115	158
	V1	98	98	98	98	98	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.7		
26000	TOFL	2820	2860	2910	2960	3000	3050	3100	3140	3190	3240	3280	113	155
	V1	96	96	96	96	96	96	96	95	95	95	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.3	10.4	10.4		

FIGURE 5-94. TAKE-OFF DISTANCE; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	7380	7510	7650	7790	7930	8080	8220	8370	8510	8630	8770	147	195
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		
39000	TOFL	7090	7210	7350	7480	7620	7760	7890	8040	8170	8280	8420	145	194
	V1	140	140	140	140	140	140	140	140	140	139	139		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
38000	TOFL	6610	6720	6850	6980	7100	7230	7360	7490	7610	7720	7850	142	191
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
37000	TOFL	6160	6260	6380	6490	6610	6730	6840	6970	7080	7180	7300	140	188
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.6	4.5		
36000	TOFL	5730	5820	5930	6040	6140	6250	6360	6470	6580	6670	6780	137	185
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
35000	TOFL	5320	5410	5510	5610	5710	5800	5910	6010	6110	6190	6290	135	183
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	128	128	128	128	128	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.2	5.3	5.3		
34000	TOFL	4940	5020	5110	5200	5290	5380	5480	5570	5660	5740	5830	132	180
	V1	121	121	121	121	120	120	120	120	120	120	120		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.7	5.6		
33000	TOFL	4580	4650	4730	4820	4900	4990	5070	5160	5240	5310	5400	129	177
	V1	117	117	117	117	117	117	116	116	116	116	116		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6.1	6.1		
32000	TOFL	4240	4300	4380	4460	4540	4610	4690	4770	4850	4910	4990	127	174
	V1	113	113	113	113	113	113	112	112	112	112	112		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.5	6.5		
31000	TOFL	3930	3990	4060	4130	4200	4270	4340	4410	4480	4540	4620	124	171
	V1	109	109	109	109	109	109	109	109	109	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.9	7	7	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9		

FIGURE 5-94. TAKE-OFF DISTANCE; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
30000	TOFL	3650	3710	3770	3840	3900	3960	4030	4100	4160	4220	4280	121	168
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.4	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
29000	TOFL	3400	3450	3510	3570	3630	3690	3750	3820	3880	3930	3990	119	165
	V1	102	102	102	102	102	102	102	102	102	101	101		
	VR	107	107	107	107	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8	8	8	8	8	7.9	7.9	7.9	7.9	7.9	7.9		
28000	TOFL	3200	3250	3310	3360	3430	3480	3540	3590	3650	3700	3740	117	161
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5		
27000	TOFL	3060	3110	3160	3210	3260	3310	3370	3420	3470	3520	3570	115	158
	V1	98	97	97	97	97	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	114	114	114	114	114	114	114	113	113	114	114		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
26000	TOFL	2930	2980	3030	3080	3130	3180	3220	3270	3320	3370	3420	113	155
	V1	96	96	96	96	96	96	96	95	95	95	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	10	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 5-95. TAKE-OFF DISTANCE; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	8040	8190	8350	8510	8670	8820	9000	9160	9310	9430	9660	148	196
	V1	145	145	144	144	144	144	144	144	144	144	144		
	VR	147	147	147	147	147	147	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.3		
39000	TOFL	7720	7860	8010	8160	8310	8460	8620	8770	8920	9050	9260	146	194
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5		
38000	TOFL	7200	7340	7480	7620	7750	7890	8030	8180	8310	8430	8630	144	191
	V1	139	139	139	139	139	138	138	138	138	138	138		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	4	4	4	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	TOFL	6710	6830	6960	7090	7220	7350	7480	7620	7740	7850	8040	141	189
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.3	4.2		
36000	TOFL	6220	6340	6450	6570	6690	6810	6930	7060	7170	7270	7450	138	186
	V1	131	131	131	131	131	131	131	131	130	130	131		
	VR	134	134	134	134	134	134	134	134	134	134	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.7	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
35000	TOFL	5770	5880	5990	6100	6200	6310	6420	6540	6650	6740	6900	136	183
	V1	127	127	127	127	127	127	127	127	126	126	127		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5	5	5	5	5	5	5	4.9	4.9	5	4.8		
34000	TOFL	5350	5440	5540	5640	5740	5840	5950	6050	6150	6230	6380	133	180
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.4	5.2		
33000	TOFL	4950	5030	5130	5220	5310	5400	5500	5590	5680	5760	5900	130	177
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.6		
32000	TOFL	4570	4650	4730	4820	4900	4990	5070	5160	5240	5310	5440	127	174
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	119	119	119	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6		
31000	TOFL	4220	4290	4370	4450	4530	4600	4680	4760	4840	4900	5020	125	171
	V1	111	111	111	111	111	111	111	111	110	110	111		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5		

FIGURE 5-95. TAKE-OFF DISTANCE; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
30000	TOFL	3910	3970	4040	4110	4180	4260	4330	4400	4470	4530	4630	122	168
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.9		
29000	TOFL	3630	3690	3750	3820	3880	3950	4010	4080	4140	4200	4290	119	165
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
28000	TOFL	3380	3440	3500	3560	3620	3670	3730	3790	3850	3910	3980	117	162
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8		
27000	TOFL	3180	3240	3290	3350	3400	3470	3510	3570	3620	3670	3750	115	159
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.7	8.8	8.6		
26000	TOFL	3050	3100	3150	3210	3260	3310	3360	3410	3470	3510	3570	113	155
	V1	96	96	96	96	96	96	95	95	95	95	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4	9.5	9.3		

FIGURE 5-96. TAKE-OFF DISTANCE; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	8780	8950	9130	9300	9470	9650	9820	10010	10170	10310	10660	149	196
	V1	147	147	147	147	147	147	147	147	147	147	147		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	3.2	2.9		
39000	TOFL	8430	8600	8760	8930	9100	9260	9430	9610	9770	9900	10240	147	194
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.1		
38000	TOFL	7850	8010	8160	8320	8470	8620	8780	8950	9090	9210	9540	145	192
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	144	144	144	144	144	144	144	144	144	144	145		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.7	3.4		
37000	TOFL	7310	7450	7600	7740	7880	8020	8170	8320	8460	8570	8870	142	189
	V1	137	137	137	137	137	137	137	137	137	137	138		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4	4	4	4	4	4	4	3.9	4	4	3.7		
36000	TOFL	6790	6920	7060	7190	7320	7450	7580	7720	7850	7950	8240	139	186
	V1	133	133	133	133	133	133	133	133	133	133	134		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4		
35000	TOFL	6280	6400	6520	6640	6770	6880	7000	7140	7250	7350	7610	137	183
	V1	129	129	129	129	129	129	129	129	129	129	130		
	VR	133	133	133	133	133	133	133	133	133	133	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.4		
34000	TOFL	5810	5920	6030	6140	6250	6360	6480	6590	6700	6790	7040	134	180
	V1	125	125	125	125	125	125	125	125	125	125	126		
	VR	129	129	129	129	129	129	129	129	129	129	130		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5.1	4.8		
33000	TOFL	5370	5470	5570	5670	5770	5870	5970	6080	6180	6260	6490	131	177
	V1	121	121	121	121	121	121	121	121	121	121	121		
	VR	125	125	125	125	125	125	125	125	125	125	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.1		
32000	TOFL	4950	5040	5130	5220	5320	5410	5500	5600	5690	5770	5980	128	175
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	121	121	121	121	121	121	121	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.5		
31000	TOFL	4550	4640	4720	4810	4890	4980	5060	5150	5240	5300	5490	126	172
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	5.9		

FIGURE 5-96. TAKE-OFF DISTANCE; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
30000	TOFL	4200	4280	4350	4430	4510	4580	4660	4740	4820	4880	5050	123	168
	V1	109	109	109	109	108	108	108	108	108	108	109		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.4		
29000	TOFL	3880	3950	4020	4090	4160	4230	4300	4380	4450	4510	4640	120	165
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	110	110	110	110	110	110	110	110	110	110	111		
	V2	119	119	119	119	119	119	119	119	119	119	118		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	6.9		
28000	TOFL	3590	3660	3720	3790	3850	3910	3980	4050	4110	4160	4290	117	162
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.4		
27000	TOFL	3360	3420	3480	3540	3600	3650	3710	3770	3830	3890	3980	115	159
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	113		
	GR2	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.3	8.3	7.9		
26000	TOFL	3180	3230	3280	3340	3390	3450	3500	3560	3610	3680	3750	113	156
	V1	96	96	96	96	96	95	95	95	95	95	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9	9	9	8.6		

FIGURE 5-97. TAKE-OFF DISTANCE; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	9650	9850	10040	10230	10420	10610	10810	11010	11200	11450		150	197
	V1	150	150	150	150	150	150	150	150	150	150			
	VR	152	152	152	152	153	153	153	153	153	153			
	V2	155	155	155	155	155	155	155	155	155	155			
	GR2	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.7			
39000	TOFL	9270	9450	9640	9820	10000	10190	10380	10570	10740	10990	11540	148	195
	V1	148	148	148	148	148	148	148	148	148	148	149		
	VR	150	150	150	150	150	150	151	151	151	151	151		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.1	3.1	3.1	3.1	3.1	3	3	3	3	2.9	2.6		
38000	TOFL	8650	8820	8990	9160	9330	9500	9680	9860	10020	10250	10760	146	192
	V1	144	144	144	144	144	144	144	144	144	144	145		
	VR	147	147	147	147	147	147	147	147	147	147	148		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.3	3.2	2.9		
37000	TOFL	8040	8190	8350	8510	8670	8830	8990	9150	9300	9520	10020	143	189
	V1	140	140	140	140	140	140	140	140	140	140	141		
	VR	143	143	143	143	143	143	143	143	143	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.5	3.2		
36000	TOFL	7460	7610	7760	7900	8050	8190	8340	8490	8630	8840	9290	140	187
	V1	136	136	136	136	136	136	136	136	136	136	137		
	VR	140	140	140	140	140	140	140	140	140	140	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.1	4.1	4.1	4.1	4.1	4	4	4	4	3.9	3.5		
35000	TOFL	6910	7050	7180	7310	7450	7580	7720	7860	7990	8180	8610	138	184
	V1	132	132	132	132	132	132	132	132	132	132	133		
	VR	136	136	136	136	136	136	136	136	136	136	137		
	V2	140	140	140	140	140	140	140	140	140	140	141		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.2	3.9		
34000	TOFL	6380	6500	6620	6740	6870	6990	7110	7240	7360	7540	7960	135	181
	V1	128	128	128	128	128	128	128	128	128	128	129		
	VR	132	132	132	132	132	132	132	132	132	132	133		
	V2	137	137	137	137	137	137	137	137	137	137	138		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.6	4.3		
33000	TOFL	5880	5990	6100	6220	6330	6440	6550	6670	6780	6940	7320	132	178
	V1	124	124	124	124	124	124	124	124	124	124	125		
	VR	128	128	128	128	128	128	128	128	128	128	129		
	V2	133	133	133	133	133	133	133	133	133	133	134		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	4.9	4.6		
32000	TOFL	5410	5520	5620	5720	5820	5930	6030	6140	6240	6390	6730	129	175
	V1	119	119	119	119	119	119	119	119	119	120	121		
	VR	124	124	124	124	124	124	124	124	124	124	125		
	V2	130	130	130	130	130	130	130	130	130	130	131		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.3	5		
31000	TOFL	4980	5070	5160	5260	5350	5440	5540	5640	5730	5870	6180	127	172
	V1	115	115	115	115	115	115	115	115	115	115	117		
	VR	120	120	120	120	120	120	120	120	120	120	121		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.1	6.1	6.1	6.1	6	6	6	6	5.9	5.8	5.4		

FIGURE 5-97. TAKE-OFF DISTANCE; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
30000	TOFL	4570	4650	4740	4820	4910	4990	5080	5170	5260	5380	5660	124	169
	V1	111	111	111	111	111	111	111	111	111	111	112		
	VR	116	116	116	116	116	116	116	116	116	116	117		
	V2	123	123	123	123	123	123	123	123	123	123	124		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.2	5.9		
29000	TOFL	4210	4280	4360	4440	4510	4590	4670	4750	4830	4940	5170	121	166
	V1	107	107	107	107	107	107	107	107	107	107	108		
	VR	112	112	112	112	112	112	112	112	112	113	113		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7	7	7	7	7	7	6.9	6.9	6.8	6.7	6.3		
28000	TOFL	3880	3950	4020	4090	4160	4230	4300	4370	4450	4540	4760	118	162
	V1	103	103	103	103	103	103	103	103	103	103	104		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.4	7.4	7.2	6.8		
27000	TOFL	3570	3640	3700	3760	3830	3890	3960	4020	4090	4180	4370	115	159
	V1	99	99	99	99	99	99	99	99	99	99	100		
	VR	105	105	105	105	105	105	105	105	105	105	106		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8	8	7.9	7.7	7.3		
26000	TOFL	3330	3390	3460	3510	3560	3620	3680	3740	3810	3880	4010	113	156
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	111	111	111	111	111	111	111	111	111	111	111		
	GR2	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.6	8.5	8.3	7.9		

FIGURE 5-98. TAKE-OFF DISTANCE; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	10650	10870	11080	11290	11510	11730	11950	12170				151	197
	V1	153	153	153	153	153	153	153	153					
	VR	155	155	155	155	155	155	155	155					
	V2	158	158	158	158	157	157	157	157					
	GR2	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.5					
39000	TOFL	10210	10420	10620	10830	11030	11240	11450	11670	11860	12290		150	196
	V1	151	151	151	151	151	151	151	151	151	151			
	VR	153	153	153	153	153	153	153	153	153	154			
	V2	156	156	156	156	156	156	156	156	156	156			
	GR2	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.5			
38000	TOFL	9520	9710	9900	10090	10270	10460	10660	10860	11040	11430	12180	147	193
	V1	147	147	147	147	147	147	147	147	147	147	148		
	VR	150	150	150	150	150	150	150	150	150	150	151		
	V2	153	153	153	153	152	152	152	152	152	152	153		
	GR2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3	3	2.8	2.5		
37000	TOFL	8850	9030	9210	9380	9560	9730	9910	10100	10270	10640	11330	144	190
	V1	143	143	143	143	143	143	143	143	143	144	145		
	VR	146	146	146	146	146	146	146	146	146	147	147		
	V2	149	149	149	149	149	149	149	149	149	149	150		
	GR2	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.3	3.3	3.1	2.8		
36000	TOFL	8210	8370	8530	8700	8860	9020	9180	9360	9520	9860	10530	142	187
	V1	139	139	139	139	139	139	139	139	139	140	141		
	VR	142	142	142	142	142	142	143	143	143	143	144		
	V2	146	146	146	146	146	146	146	146	146	146	147		
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.7	3.6	3.4	3.1		
35000	TOFL	7600	7740	7900	8050	8200	8350	8510	8670	8810	9130	9750	139	184
	V1	135	135	135	135	135	135	135	135	135	136	137		
	VR	138	138	139	139	139	139	139	139	139	139	140		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4	4	3.7	3.4		
34000	TOFL	7020	7160	7290	7430	7560	7700	7840	7990	8130	8430	9010	136	181
	V1	131	131	131	131	131	131	131	131	131	132	133		
	VR	135	135	135	135	135	135	135	135	135	135	137		
	V2	139	139	139	139	139	139	139	139	139	139	140		
	GR2	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.4	4.3	4.1	3.8		
33000	TOFL	6460	6590	6710	6840	6960	7090	7220	7350	7480	7760	8320	133	178
	V1	127	127	127	126	126	126	126	126	126	127	129		
	VR	131	131	131	131	131	131	131	131	131	131	133		
	V2	136	136	136	136	136	136	136	136	136	136	137		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.7	4.4	4.1		
32000	TOFL	5930	6050	6160	6270	6390	6500	6620	6740	6860	7110	7630	130	175
	V1	122	122	122	122	122	122	122	122	122	123	125		
	VR	126	126	126	126	127	127	127	127	127	127	129		
	V2	132	132	132	132	132	132	132	132	132	132	133		
	GR2	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.2	5.1	4.8	4.5		
31000	TOFL	5450	5550	5660	5760	5860	5970	6070	6190	6300	6530	6990	128	172
	V1	118	118	118	118	118	118	118	118	118	119	120		
	VR	122	122	123	123	123	123	123	123	123	123	125		
	V2	129	129	129	129	129	129	129	128	128	128	129		
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.6	5.5	5.3	4.9		

FIGURE 5-98. TAKE-OFF DISTANCE; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
30000	TOFL	4990	5090	5180	5280	5370	5460	5560	5650	5770	5980	6400	125	169
	V1	113	113	113	113	113	113	113	113	113	114	116		
	VR	118	118	119	119	119	119	119	119	119	119	121		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.1	6	5.7	5.3		
29000	TOFL	4570	4660	4740	4830	4910	4980	5090	5160	5270	5460	5840	122	166
	V1	109	109	109	109	109	109	109	109	109	110	112		
	VR	114	114	114	114	114	114	114	114	114	115	117		
	V2	122	122	122	122	122	121	121	121	121	121	121		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6.1	5.8		
28000	TOFL	4200	4280	4360	4430	4490	4590	4650	4750	4810	5000	5310	119	163
	V1	105	105	105	105	105	105	105	105	105	105	107		
	VR	111	111	111	111	111	111	111	111	111	111	113		
	V2	119	118	118	118	118	118	118	118	118	118	119		
	GR2	7.3	7.3	7.2	7.2	7.2	7.2	7.2	7.1	6.9	6.6	6.3		
27000	TOFL	3860	3930	4000	4070	4140	4190	4280	4340	4430	4560	4860	116	160
	V1	101	101	101	101	101	101	101	101	101	101	103		
	VR	107	107	107	107	107	107	107	107	107	107	109		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.6	7.5	7.1	6.8		
26000	TOFL	3550	3610	3670	3730	3780	3860	3910	4000	4060	4190	4450	113	156
	V1	97	97	97	97	97	97	97	97	97	97	99		
	VR	103	103	103	103	103	103	103	103	103	103	105		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.2	8	7.7	7.3		

FIGURE 5-99. TAKE-OFF DISTANCE; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	11330	11570	11830	12090	12280	12460	12720					151	196
	V1	154	154	154	154	154	154	154						
	VR	156	156	157	157	157	157	157						
	V2	158	158	158	158	158	158	158						
	GR2	2.6	2.6	2.5	2.5	2.5	2.5	2.5						
38000	TOFL	10510	10730	10970	11210	11380	11570	11790	12010	12290			148	193
	V1	150	150	150	150	150	150	150	150	150				
	VR	153	153	153	153	153	153	153	153	153				
	V2	155	155	155	155	155	155	155	154	154				
	GR2	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.7	2.5				
37000	TOFL	9770	9970	10190	10410	10570	10740	10940	11150	11410	11980		145	190
	V1	146	146	146	146	146	146	146	146	146	147			
	VR	149	149	149	149	149	149	149	149	149	150			
	V2	152	152	152	152	152	152	151	151	151	151			
	GR2	3.2	3.2	3.2	3.1	3.1	3.2	3.1	3	2.9	2.6			
36000	TOFL	9060	9250	9450	9660	9800	9950	10150	10340	10580	11110	11960	143	187
	V1	142	142	142	142	142	142	142	142	142	143	145		
	VR	145	145	145	145	145	145	145	145	145	146	147		
	V2	148	148	148	148	148	148	148	148	148	148	149		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.3	3.2	2.9	2.6		
35000	TOFL	8370	8550	8730	8920	9060	9190	9350	9540	9770	10290	11060	140	185
	V1	138	138	138	138	138	138	138	138	138	139	141		
	VR	141	141	141	141	141	141	141	141	142	142	143		
	V2	145	145	145	145	145	145	144	144	144	145	146		
	GR2	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.7	3.5	3.2	2.9		
34000	TOFL	7730	7890	8060	8240	8360	8480	8630	8800	9010	9480	10240	137	182
	V1	134	134	134	134	134	134	134	134	134	135	137		
	VR	137	138	138	138	138	138	138	138	138	139	140		
	V2	142	142	142	142	141	141	141	141	141	141	142		
	GR2	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.1	3.9	3.6	3.3		
33000	TOFL	7110	7260	7420	7580	7680	7800	7930	8090	8290	8740	9430	134	179
	V1	129	129	129	129	129	129	129	129	130	131	133		
	VR	133	133	133	133	133	133	133	134	134	135	136		
	V2	138	138	138	138	138	138	137	137	137	138	139		
	GR2	4.7	4.7	4.6	4.6	4.6	4.6	4.6	4.5	4.2	3.9	3.6		
32000	TOFL	6530	6660	6810	6950	7060	7160	7270	7420	7610	8020	8670	131	176
	V1	125	125	125	125	125	125	125	125	125	126	129		
	VR	129	129	129	129	129	129	129	129	130	131	132		
	V2	134	134	134	134	134	134	134	134	134	134	136		
	GR2	5.1	5.1	5	5	5	5	5	4.9	4.6	4.3	4		
31000	TOFL	5980	6100	6230	6360	6460	6550	6650	6790	6960	7350	7950	128	173
	V1	121	121	121	121	120	120	120	120	121	122	124		
	VR	125	125	125	125	125	125	125	125	125	126	128		
	V2	131	131	131	131	131	131	130	130	130	131	132		
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.3	5	4.7	4.4		

FIGURE 5-99. TAKE-OFF DISTANCE; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
30000	TOFL	5480	5590	5700	5820	5910	5990	6090	6210	6370	6710	7270	126	169
	V1	116	116	116	116	116	116	116	116	116	118	120		
	VR	121	121	121	121	121	121	121	121	121	122	124		
	V2	127	127	127	127	127	127	127	127	127	127	128		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.5	5.1	4.8		
29000	TOFL	5000	5100	5210	5320	5390	5470	5550	5670	5810	6140	6620	123	166
	V1	112	112	112	112	112	111	111	111	112	113	115		
	VR	117	117	117	117	117	117	117	117	117	118	120		
	V2	124	124	124	124	124	123	123	123	123	124	125		
	GR2	6.4	6.4	6.4	6.3	6.4	6.4	6.3	6.2	5.9	5.6	5.3		
28000	TOFL	4570	4660	4750	4830	4920	4990	5080	5160	5290	5590	6020	120	163
	V1	107	107	107	107	107	107	107	107	107	109	111		
	VR	113	113	113	113	113	113	113	113	113	114	116		
	V2	120	120	120	120	120	120	120	119	119	120	121		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.7	6.4	6	5.7		
27000	TOFL	4180	4260	4350	4440	4500	4550	4640	4720	4830	5090	5470	117	160
	V1	103	103	103	103	103	103	103	103	103	104	106		
	VR	109	109	109	109	109	109	109	109	109	110	111		
	V2	117	117	117	117	117	116	116	116	116	117	118		
	GR2	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.2	6.9	6.6	6.2		
26000	TOFL	3830	3900	3980	4060	4110	4170	4230	4320	4410	4630	4960	114	157
	V1	99	99	99	99	99	99	98	99	99	100	102		
	VR	105	105	105	105	105	105	105	105	105	106	107		
	V2	113	113	113	113	113	113	113	113	113	113	114		
	GR2	8.1	8	8	8	8	8	7.9	7.8	7.5	7.1	6.8		

FIGURE 5-100. TAKE-OFF DISTANCE; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	11680	11940	12250	12480	12650	12870	13120					149	194
	V1	153	153	153	153	153	153	153						
	VR	156	156	156	156	156	156	156						
	V2	158	158	158	158	158	157	157						
	GR2	2.6	2.6	2.6	2.6	2.6	2.6	2.5						
37000	TOFL	10830	11060	11340	11550	11710	11910	12150	12410	12910			147	191
	V1	149	149	149	149	149	149	149	149	150				
	VR	152	152	152	152	152	152	152	152	153				
	V2	154	154	154	154	154	154	154	154	154				
	GR2	3	3	2.9	2.9	2.9	2.9	2.8	2.7	2.4				
36000	TOFL	10030	10250	10500	10710	10840	11020	11240	11480	11940	12720		144	188
	V1	145	145	145	145	145	145	145	145	146	147			
	VR	148	148	148	148	148	148	148	148	149	150			
	V2	151	151	151	151	151	151	151	150	150	151			
	GR2	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3	2.7	2.4			
35000	TOFL	9270	9470	9720	9910	10020	10190	10390	10610	11030	11750	12630	141	185
	V1	141	141	141	141	141	141	141	141	142	143	144		
	VR	144	144	145	145	145	145	145	145	145	146	147		
	V2	148	148	148	148	147	147	147	147	147	147	148		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.3	3	2.8	2.4		
34000	TOFL	8520	8710	8930	9100	9200	9350	9540	9740	10160	10830	11650	138	182
	V1	137	137	137	137	137	137	137	137	138	139	140		
	VR	140	140	140	140	140	140	140	140	141	142	143		
	V2	144	144	144	144	143	143	143	143	143	144	145		
	GR2	4	4	4	3.9	3.9	3.9	3.9	3.7	3.4	3.1	2.7		
33000	TOFL	7840	8010	8220	8370	8460	8600	8770	8960	9340	9990	10740	135	179
	V1	132	132	132	132	132	132	132	132	133	135	136		
	VR	136	136	136	136	136	136	136	136	137	138	139		
	V2	140	140	140	140	140	140	140	140	140	141	141		
	GR2	4.4	4.4	4.3	4.3	4.3	4.3	4.2	4	3.7	3.5	3.1		
32000	TOFL	7190	7350	7530	7670	7770	7880	8050	8210	8570	9150	9880	133	176
	V1	128	128	128	128	128	128	128	128	129	130	132		
	VR	132	132	132	132	132	132	132	132	133	134	136		
	V2	137	137	137	137	136	136	136	136	136	137	138		
	GR2	4.8	4.8	4.7	4.7	4.7	4.7	4.6	4.4	4.1	3.8	3.5		
31000	TOFL	6590	6730	6900	7030	7100	7210	7350	7510	7840	8380	9030	130	173
	V1	123	123	123	123	123	123	123	124	124	126	128		
	VR	128	128	128	128	128	128	128	128	129	130	131		
	V2	133	133	133	133	132	132	132	132	132	133	134		
	GR2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	4.8	4.5	4.2	3.8		

FIGURE 5-100. TAKE-OFF DISTANCE; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
30000	TOFL	6020	6150	6300	6420	6480	6580	6710	6860	7170	7650	8260	127	170
	V1	119	119	119	119	119	119	119	119	120	122	124		
	VR	124	124	124	124	124	124	124	124	124	126	127		
	V2	129	129	129	129	129	129	129	129	129	130	131		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.3	4.9	4.6	4.2		
29000	TOFL	5490	5610	5750	5860	5910	6000	6120	6250	6530	6980	7520	124	167
	V1	114	114	114	114	114	114	114	114	115	117	119		
	VR	119	119	119	119	119	119	119	120	120	122	123		
	V2	126	126	126	126	125	125	125	125	125	126	127		
	GR2	6.1	6.1	6	6	6	6	5.9	5.7	5.4	5.1	4.7		
28000	TOFL	5000	5110	5230	5330	5370	5460	5560	5680	5940	6340	6840	121	164
	V1	110	110	110	110	110	110	110	110	111	112	115		
	VR	115	115	115	115	115	115	115	115	116	117	119		
	V2	122	122	122	122	121	121	121	121	121	122	123		
	GR2	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.2	5.8	5.5	5.1		
27000	TOFL	4550	4650	4760	4840	4900	4960	5050	5160	5390	5750	6190	118	160
	V1	105	105	105	105	105	105	105	105	106	108	110		
	VR	111	111	111	111	111	111	111	111	112	113	115		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	7.1	7.1	7	7	7	7	6.9	6.7	6.3	6	5.6		
26000	TOFL	4150	4240	4340	4410	4460	4530	4600	4710	4880	5210	5610	115	157
	V1	101	101	101	101	101	101	101	101	101	103	105		
	VR	107	107	107	107	107	107	107	107	107	109	111		
	V2	115	115	115	115	115	115	114	114	114	115	116		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.3	6.9	6.5	6.1		

TAKEOFF CHARTS AND TABLES; FLAPS - 20°; WET RUNWAY

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 20°
ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF

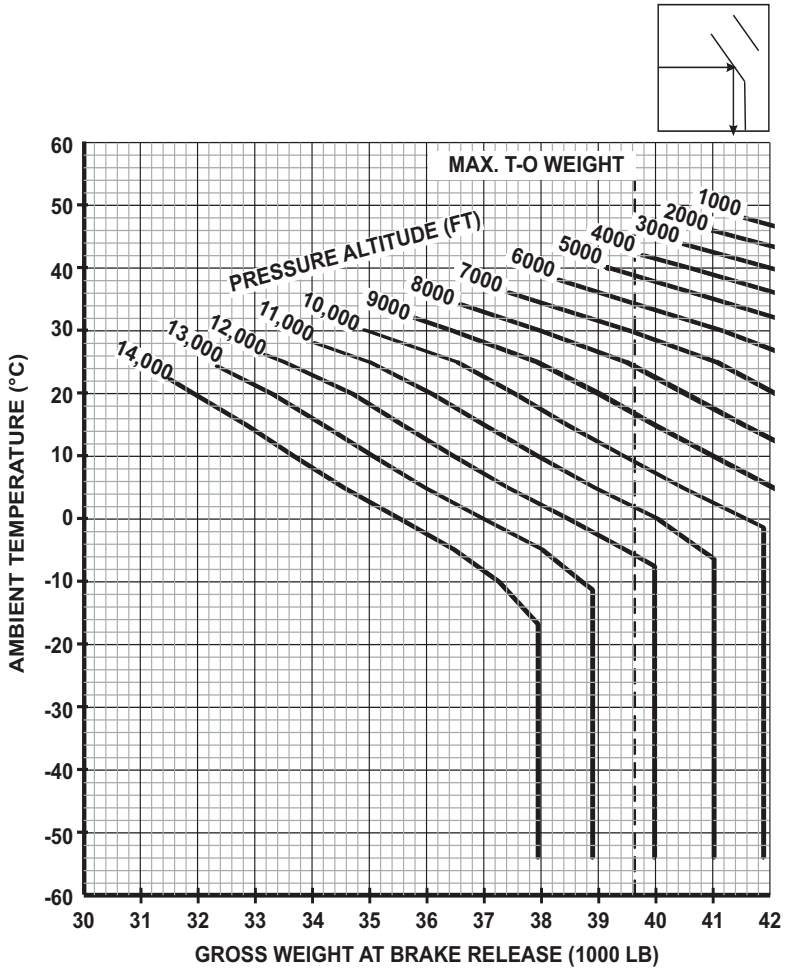


Figure 5-101. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 20°; ECS - Off; Engine Anti-ice - Off; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 20°
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF

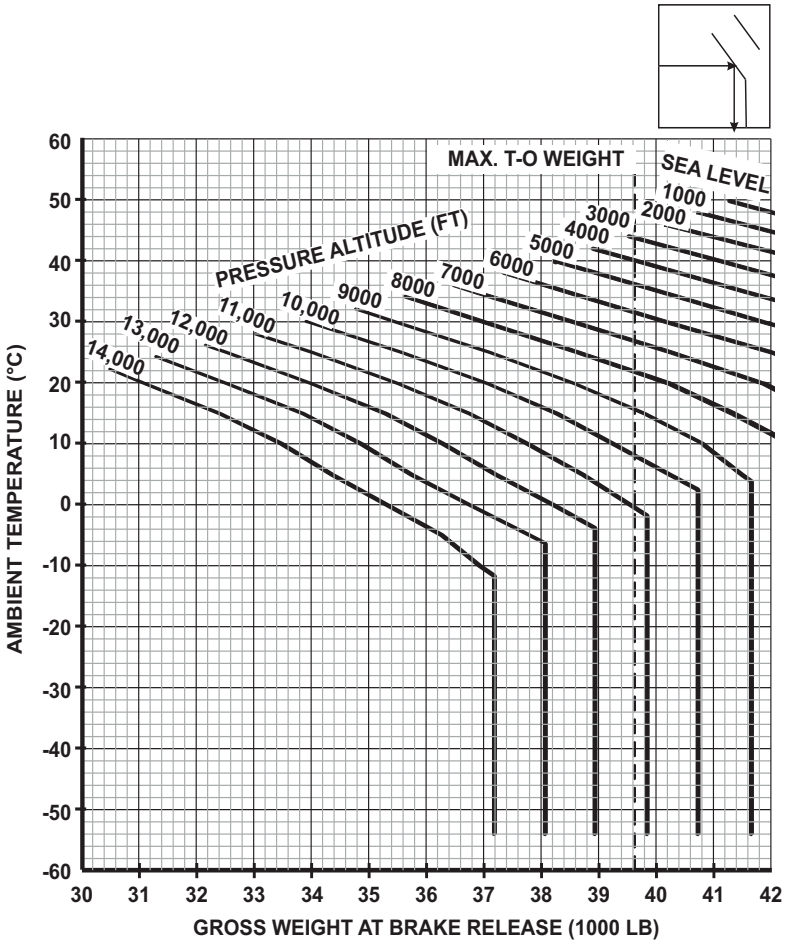


Figure 5-102. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 20°; ECS - On; Engine Anti-ice - Off; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 20°
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - OFF

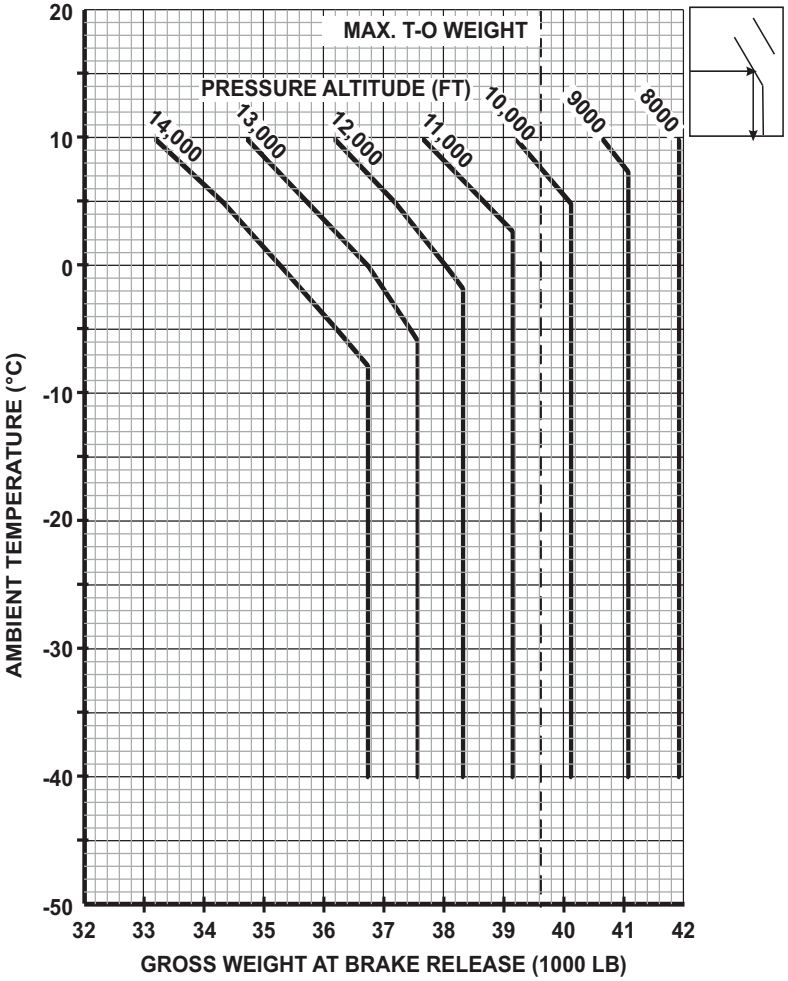


Figure 5-103. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 20°; ECS - On; Engine Anti-ice - On; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS;
(AS PERMITTED BY CLIMB REQUIREMENTS);
FLAPS - 20°;
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON

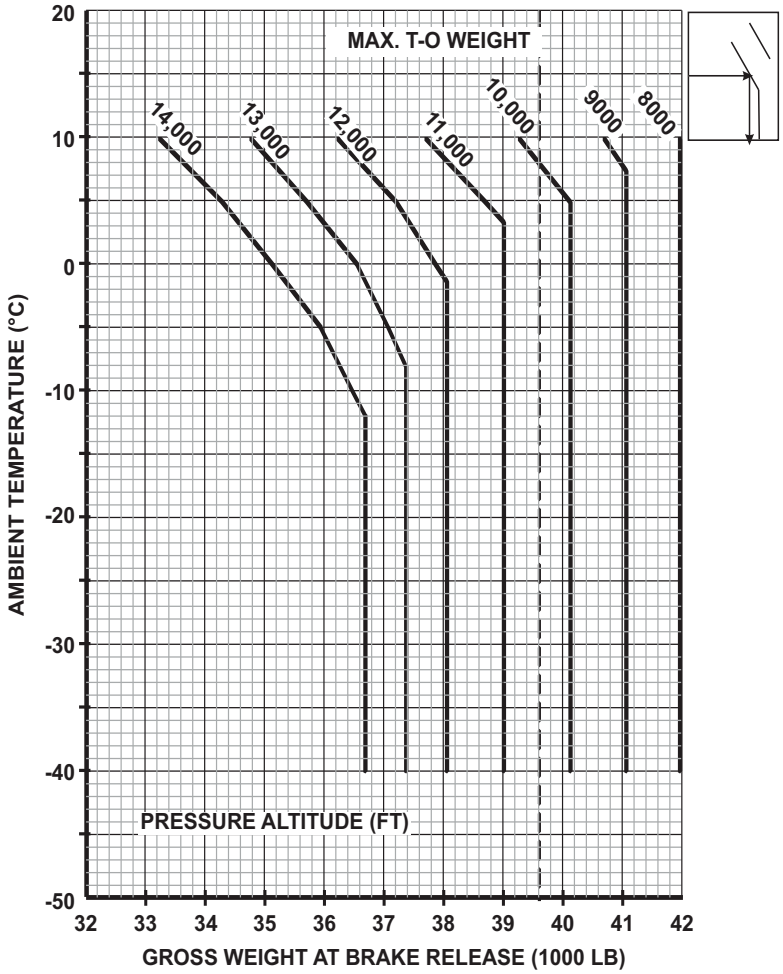


Figure 5-104. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 20°; ECS - On; Engine Anti-ice - On; Wing Anti-ice - On

TAKEOFF WEIGHT LIMITATIONS (AS PERMITTED BY BRAKE ENERGY); FLAPS - 20°

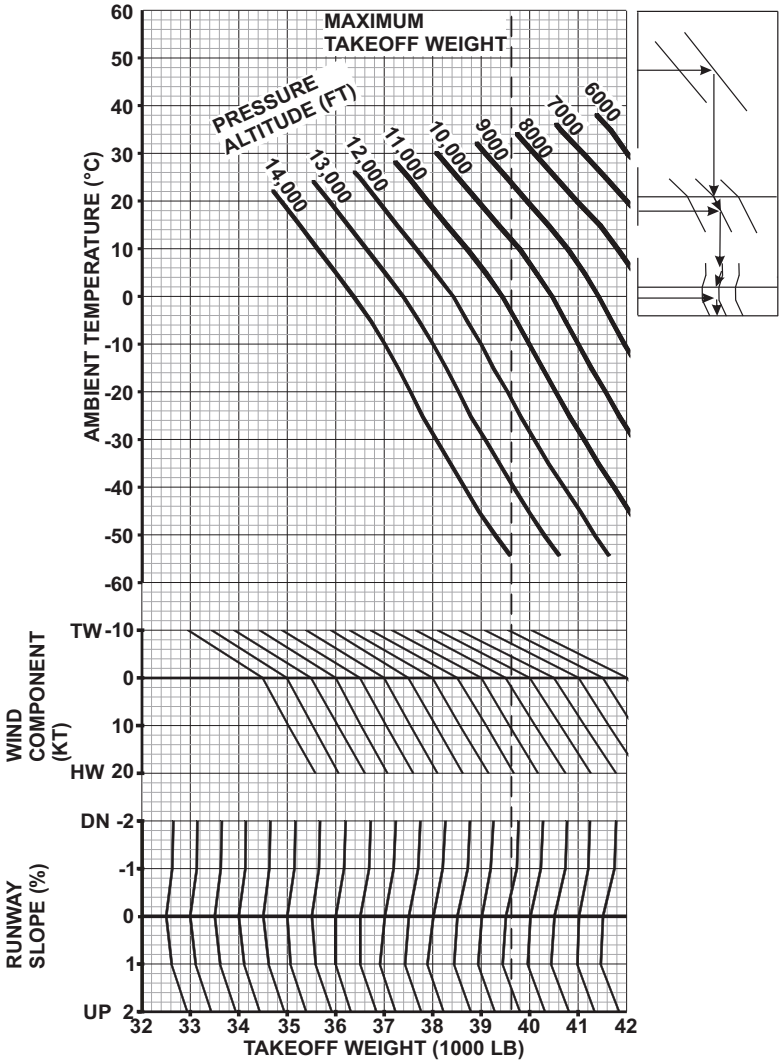


Figure 5-105. Takeoff Weight Limitations (As Permitted By Brake Energy); Flaps - 20°

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY TIRE SPEED LIMIT)
FLAPS - 20°;

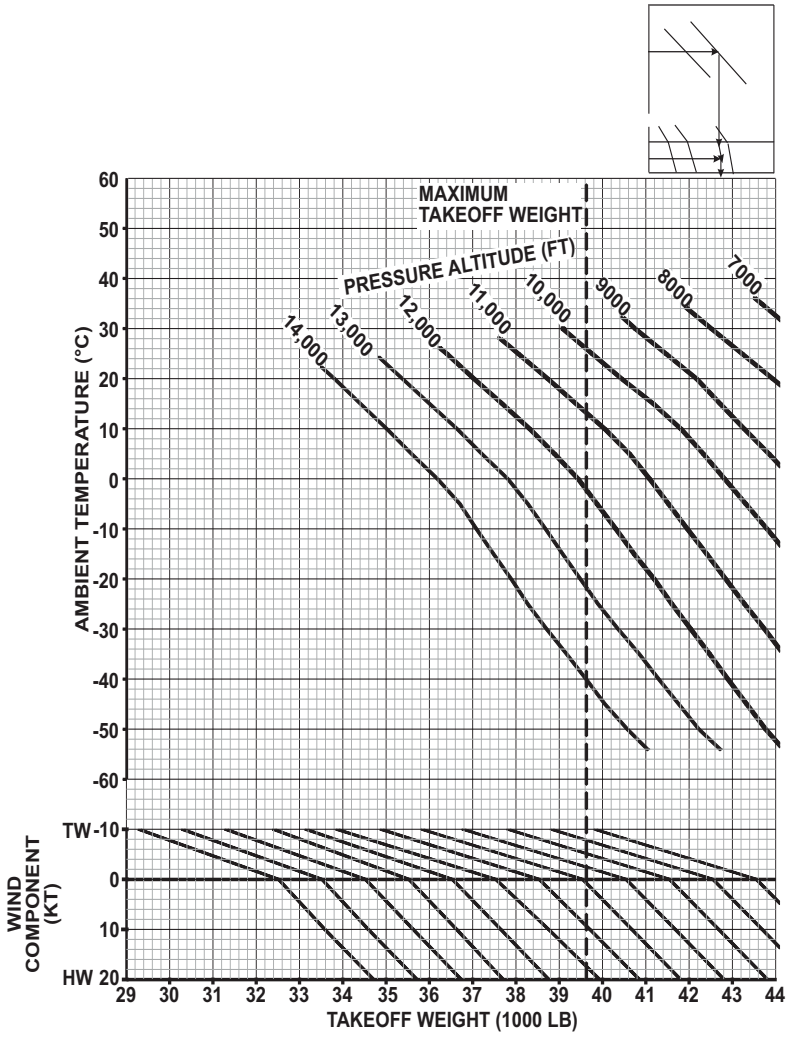


Figure 5-106. Takeoff Weight Limitations (As Permitted By Tire Speed Limit); Flaps - 20°;

FIGURE 5-107. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY
(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
39600	BFL	4170	4230	4300	4370	4440	4510	4580	4640	4730	4810	4890	139	192
	V1	111	111	110	110	110	109	109	109	109	108	108		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.7	5.7	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
39000	BFL	4000	4060	4130	4200	4260	4330	4390	4450	4530	4610	4690	138	191
	V1	109	109	108	108	108	107	107	107	107	106	106		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.9	5.9	5.9	6	6	6.1	6.1	6.1	6.1	6.1	6.1		
38000	BFL	3730	3780	3850	3910	3980	4040	4090	4150	4230	4300	4380	136	188
	V1	106	105	105	105	104	104	104	104	103	103	103		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5		
37000	BFL	3510	3560	3630	3690	3750	3810	3870	3930	4000	4070	4140	135	185
	V1	103	102	102	102	102	101	101	101	101	101	101		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.7	6.7	6.7	6.7	6.8	6.8	6.9	6.9	6.9	6.9	6.9		
36000	BFL	3340	3390	3450	3510	3580	3660	3740	3820	3900	3970	4050	133	182
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.1	7.1	7.1	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3		
35000	BFL	3270	3330	3400	3480	3560	3640	3720	3790	3870	3940	4020	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.5	7.6	7.6	7.6	7.7	7.7	7.8	7.8	7.8	7.8	7.8		
34000	BFL	3250	3310	3380	3460	3530	3620	3690	3770	3840	3910	3980	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	127	127	127	127		
	GR2	8	8	8.1	8.1	8.1	8.2	8.2	8.3	8.3	8.3	8.3		
33000	BFL	3230	3290	3360	3430	3510	3580	3660	3750	3820	3890	3950	127	174
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.5	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8	8.8		
32000	BFL	3210	3260	3340	3410	3480	3560	3640	3710	3780	3860	3930	125	171
	V1	100	100	100	100	100	100	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.1	9.1	9.1	9.2	9.2	9.3	9.3	9.4	9.4	9.4	9.4		

FIGURE 5-107. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY
(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
31000	BFL	3180	3240	3310	3390	3460	3530	3600	3690	3750	3820	3900	123	168
	V1	100	100	100	101	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.7	9.7	9.7	9.8	9.8	9.9	9.9	10	10	10	10		
30000	BFL	3160	3210	3280	3360	3430	3510	3580	3660	3730	3790	3870	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	122	122	122	122	122	122	122	122	122	122		
	GR2	10.3	10.3	10.4	10.4	10.4	10.5	10.5	10.6	10.6	10.6	10.6		
29000	BFL	3140	3190	3260	3340	3400	3470	3550	3620	3700	3770	3830	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	121	121	121	121	121	121	121	121	121		
	GR2	10.9	11	11	11.1	11.1	11.1	11.2	11.3	11.3	11.3	11.3		
28000	BFL	3110	3170	3240	3310	3380	3450	3530	3600	3660	3740	3800	117	160
	V1	101	101	101	101	101	101	101	102	102	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	120	120	120	120	120	120	120	120		
	GR2	11.7	11.7	11.7	11.8	11.8	11.9	11.9	12	12	12	12		
27000	BFL	3090	3150	3220	3290	3360	3420	3490	3560	3640	3710	3760	115	157
	V1	101	101	101	101	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	119	119	119	119	119	119		
	GR2	12.4	12.4	12.5	12.5	12.6	12.6	12.7	12.8	12.8	12.8	12.8		
26000	BFL	3080	3120	3190	3260	3330	3400	3470	3540	3610	3670	3740	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	102	102	102	102	103	103	103	103	103	103		
	V2	117	117	118	118	118	118	118	119	119	119	119		
	GR2	13.2	13.3	13.3	13.4	13.4	13.4	13.5	13.6	13.6	13.6	13.6		

FIGURE 5-107. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	122		
	N1%	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
39600	BFL	4980	5060	5150	5230	5310	5400	5480	5900	6520	7150	7770	139	192
	V1	108	108	108	108	107	107	107	110	113	116	119		
	VR	129	128	128	128	128	128	128	130	132	134	135		
	V2	137	137	137	137	137	137	137	137	138	139	140		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.4	4.7	4.1	3.5		
39000	BFL	4770	4850	4930	5010	5100	5180	5260	5650	6230	6840	7450	138	191
	V1	106	106	106	106	106	105	105	108	111	114	117		
	VR	127	127	127	127	127	127	127	128	130	132	133		
	V2	135	135	135	135	135	135	135	136	137	138	139		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.6	4.9	4.3	3.7		
38000	BFL	4450	4530	4600	4680	4750	4830	4900	5250	5780	6350	6920	136	188
	V1	103	103	103	102	102	102	102	104	108	111	114		
	VR	124	124	124	124	124	124	124	125	127	129	130		
	V2	133	133	133	133	133	133	133	133	134	135	136		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	5.9	5.3	4.6	4		
37000	BFL	4210	4280	4350	4420	4490	4560	4630	4900	5380	5900	6430	135	185
	V1	100	100	100	100	100	100	100	101	104	107	110		
	VR	122	122	122	122	122	122	122	122	124	126	127		
	V2	131	131	131	131	131	131	131	131	131	132	133		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.3	5.6	4.9	4.4		
36000	BFL	4120	4200	4270	4350	4420	4500	4580	4630	5010	5490	5980	133	182
	V1	100	100	100	100	100	100	100	99	101	104	107		
	VR	120	120	120	120	120	120	120	120	121	123	124		
	V2	130	130	130	130	130	130	130	129	129	130	131		
	GR2	7.3	7.3	7.4	7.4	7.4	7.4	7.4	6.7	6	5.3	4.7		
35000	BFL	4090	4160	4240	4310	4390	4460	4540	4490	4690	5100	5550	131	180
	V1	100	100	100	100	100	100	100	98	98	101	104		
	VR	118	118	118	118	118	118	118	118	119	120	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.2	6.4	5.7	5.1		
34000	BFL	4060	4130	4200	4280	4350	4430	4500	4450	4420	4740	5150	129	177
	V1	100	100	100	100	100	100	100	98	98	98	101		
	VR	116	116	116	116	116	116	116	116	117	117	119		
	V2	127	127	127	127	127	127	127	126	126	126	126		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	7.6	6.9	6.1	5.5		
33000	BFL	4020	4100	4170	4240	4310	4390	4460	4410	4340	4450	4770	127	174
	V1	100	100	100	100	100	100	100	98	96	95	97		
	VR	114	114	114	114	114	114	114	114	115	115	116		
	V2	125	125	125	125	125	125	125	124	124	123	123		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.1	7.3	6.6	5.9		
32000	BFL	3990	4060	4130	4210	4280	4350	4430	4380	4300	4230	4450	125	171
	V1	101	100	100	100	100	100	100	98	96	93	94		
	VR	112	112	112	112	112	112	112	112	113	113	113		
	V2	124	124	124	124	124	124	124	123	122	122	121		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	8.7	7.8	7	6.3		

FIGURE 5-107. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	122		
	N1%	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
31000	BFL	3960	4030	4100	4170	4240	4310	4390	4340	4270	4190	4180	123	168
	V1	101	101	101	101	101	101	100	98	96	93	92		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	122	121	120	120		
	GR2	10	10	10	10	10	10	10	9.3	8.4	7.6	6.8		
30000	BFL	3930	4000	4070	4140	4210	4280	4350	4300	4230	4150	4090	121	166
	V1	101	101	101	101	101	101	101	99	96	93	91		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	121	120	119	118		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	9.9	9	8.1	7.3		
29000	BFL	3890	3970	4030	4100	4170	4240	4320	4260	4190	4120	4050	119	163
	V1	101	101	101	101	101	101	101	99	96	94	91		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	121	121	121	121	121	121	121	120	118	117	116		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	10.5	9.6	8.7	7.9		
28000	BFL	3870	3940	4000	4060	4140	4200	4270	4230	4150	4080	4010	117	160
	V1	101	101	101	101	101	101	101	99	96	94	92		
	VR	106	106	106	106	106	106	106	106	105	105	105		
	V2	120	120	120	120	120	120	120	119	117	116	115		
	GR2	12	12	12	12	12	12	12	11.2	10.3	9.3	8.5		
27000	BFL	3840	3910	3960	4030	4100	4170	4240	4190	4120	4050	3990	115	157
	V1	102	102	102	101	101	101	101	99	97	94	92		
	VR	104	104	104	104	104	104	104	104	104	103	103		
	V2	119	119	119	119	119	119	119	118	116	115	114		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12	11	10	9.2		
26000	BFL	3810	3870	3930	3990	4060	4130	4200	4150	4080	4010	3940	113	154
	V1	102	102	102	102	102	102	102	99	97	94	92		
	VR	103	103	103	103	103	103	103	102	102	102	102		
	V2	119	119	119	119	119	119	119	117	115	114	113		
	GR2	13.6	13.6	13.6	13.6	13.6	13.6	13.6	12.8	11.7	10.8	9.9		

FIGURE 5-108. TAKE-OFF DISTANCE; FLAPS - 20° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	77.8	78.2	79.2	80.1	81.0	81.9	82.8	83.6	84.4	85.3	86.1		
39600	BFL	4460	4520	4610	4690	4760	4840	4910	4990	5080	5170	5260	139	193
	V1	112	112	112	112	111	111	111	110	110	110	110		
	VR	131	131	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7		
39000	BFL	4270	4330	4410	4490	4560	4640	4710	4780	4870	4960	5040	138	191
	V1	110	110	110	109	109	109	109	108	108	108	108		
	VR	129	129	129	129	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9		
38000	BFL	3980	4040	4110	4180	4250	4320	4380	4450	4530	4610	4690	136	188
	V1	107	107	106	106	106	106	105	105	105	105	104		
	VR	126	126	126	126	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6.1	6.1	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3		
37000	BFL	3710	3760	3830	3900	3960	4030	4090	4160	4230	4310	4380	135	185
	V1	103	103	103	103	103	102	102	102	102	101	101		
	VR	123	123	123	123	123	123	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7		
36000	BFL	3490	3540	3600	3670	3730	3790	3850	3920	3990	4070	4150	133	183
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.9	6.9	6.9	7	7	7	7	7.1	7.1	7.1	7.1		
35000	BFL	3350	3410	3490	3570	3650	3730	3810	3890	3960	4040	4120	131	180
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.3	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5		
34000	BFL	3330	3390	3470	3540	3630	3700	3790	3860	3930	4010	4080	129	177
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.8	7.8	7.8	7.9	7.9	7.9	8	8	8	8	8		
33000	BFL	3310	3370	3440	3520	3590	3670	3750	3830	3900	3980	4050	127	174
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.3	8.3	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
32000	BFL	3290	3350	3420	3490	3570	3650	3720	3800	3870	3940	4020	125	171
	V1	99	99	99	99	99	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	124	124	124	124	124		
	GR2	8.9	8.9	8.9	8.9	9	9	9	9.1	9.1	9.1	9.1		

FIGURE 5-108. TAKE-OFF DISTANCE; FLAPS - 20° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 77.8	-50 -58 78.2	-45 -49 79.2	-40 -40 80.1	-35 -31 81.0	-30 -22 81.9	-25 -13 82.8	-20 -4 83.6	-15 5 84.4	-10 14 85.3	-5 23 86.1	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3250	3310	3400	3470	3540	3610	3690	3780	3840	3910	3980	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	123	123	123	123	123		
	GR2	9.5	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6		
30000	BFL	3230	3300	3360	3430	3520	3590	3670	3740	3820	3880	3950	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	122	122	122	122		
	GR2	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.3	10.3	10.3	10.3		
29000	BFL	3210	3270	3350	3420	3490	3560	3630	3710	3780	3860	3920	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.7	10.7	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9		
28000	BFL	3190	3250	3320	3390	3460	3540	3610	3690	3750	3830	3880	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
27000	BFL	3170	3220	3280	3360	3430	3510	3580	3660	3710	3790	3850	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.2	12.2	12.2	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4		
26000	BFL	3140	3190	3270	3340	3410	3480	3540	3620	3690	3750	3820	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13	13	13	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2		

FIGURE 5-108. TAKE-OFF DISTANCE; FLAPS - 20° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	118		
	N1%	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
39600	BFL	5350	5440	5530	5630	5720	5810	6040	6570	7210	7880	8300	139	193
	V1	110	109	109	109	109	109	110	113	116	119	121		
	VR	130	130	130	130	130	130	131	132	134	136	136		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.5	5	4.3	3.8	3.4		
39000	BFL	5130	5220	5300	5390	5480	5560	5780	6280	6900	7550	7950	138	191
	V1	108	107	107	107	107	107	108	110	114	117	119		
	VR	128	128	128	128	128	128	129	130	132	134	135		
	V2	136	136	136	136	136	136	136	137	138	139	140		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.2	4.5	3.9	3.6		
38000	BFL	4770	4850	4930	5010	5100	5180	5380	5830	6400	7000	7390	136	188
	V1	104	104	104	104	104	104	104	107	110	113	115		
	VR	125	125	125	125	125	125	126	127	129	131	132		
	V2	134	134	134	134	134	134	134	134	135	136	137		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.1	5.5	4.9	4.3	3.9		
37000	BFL	4460	4530	4610	4680	4760	4830	4990	5400	5920	6480	6840	135	185
	V1	101	101	101	101	101	101	101	104	107	110	112		
	VR	122	122	122	122	122	122	123	124	126	128	129		
	V2	131	131	131	131	131	131	131	132	133	133	134		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.4	5.9	5.2	4.6	4.2		
36000	BFL	4230	4300	4380	4450	4530	4610	4680	5010	5480	6000	6330	133	183
	V1	99	99	99	99	99	99	98	100	103	106	108		
	VR	120	120	120	120	120	120	120	121	123	124	125		
	V2	129	129	129	129	129	129	129	129	130	131	131		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	6.9	6.3	5.6	4.9	4.6		
35000	BFL	4190	4270	4340	4420	4500	4580	4610	4700	5100	5570	5880	131	180
	V1	99	99	99	99	99	99	98	98	100	103	105		
	VR	118	118	118	118	118	118	118	119	120	122	123		
	V2	128	128	128	128	128	128	128	128	128	128	129		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.3	6.7	6	5.3	4.9		
34000	BFL	4160	4230	4310	4380	4460	4540	4580	4530	4740	5160	5440	129	177
	V1	99	99	99	99	99	99	98	96	97	100	101		
	VR	116	116	116	116	116	116	116	117	117	119	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8	8	8	8	8	8	7.8	7.1	6.4	5.7	5.3		
33000	BFL	4120	4200	4270	4340	4420	4500	4530	4490	4450	4790	5040	127	174
	V1	99	99	99	99	99	99	98	96	94	97	98		
	VR	114	114	114	114	114	114	114	114	115	116	117		
	V2	125	125	125	125	125	125	125	124	124	124	124		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.3	7.6	6.8	6.1	5.7		
32000	BFL	4090	4160	4230	4310	4380	4460	4520	4450	4380	4470	4670	125	171
	V1	100	99	99	99	99	99	99	97	94	94	95		
	VR	112	112	112	112	112	112	112	112	113	113	114		
	V2	124	124	124	124	124	124	123	122	122	122	122		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	8.8	8.1	7.3	6.6	6.1		

FIGURE 5-108. TAKE-OFF DISTANCE; FLAPS - 20° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	118		
	N1%	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
31000	BFL	4060	4130	4200	4270	4340	4420	4480	4410	4340	4270	4350	123	169
	V1	100	100	100	100	100	99	99	97	94	92	92		
	VR	111	111	111	111	111	111	111	111	111	111	112		
	V2	123	123	123	123	123	123	122	121	120	120	120		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.4	8.7	7.9	7.1	6.6		
30000	BFL	4020	4090	4160	4230	4310	4380	4430	4370	4300	4230	4180	121	166
	V1	100	100	100	100	100	100	99	97	94	92	91		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	121	120	119	118	118		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10	9.3	8.4	7.6	7.1		
29000	BFL	4000	4060	4130	4200	4270	4340	4400	4330	4260	4190	4150	119	163
	V1	100	100	100	100	100	100	99	97	95	92	91		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	119	118	117	116		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.7	9.9	9	8.2	7.7		
28000	BFL	3960	4020	4090	4160	4230	4300	4330	4290	4230	4150	4120	117	160
	V1	100	100	100	100	100	100	99	97	95	92	91		
	VR	106	106	106	106	106	106	106	105	105	105	105		
	V2	119	119	120	120	120	119	119	118	117	115	115		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.4	10.6	9.7	8.8	8.3		
27000	BFL	3930	3990	4060	4140	4200	4270	4300	4260	4190	4120	4070	115	157
	V1	101	101	100	100	100	100	99	97	95	93	91		
	VR	104	104	104	104	104	104	104	104	104	103	103		
	V2	118	118	118	118	118	118	118	117	115	114	113		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.1	11.3	10.4	9.5	8.9		
26000	BFL	3900	3950	4020	4090	4170	4230	4250	4220	4150	4080	4040	113	154
	V1	101	101	101	101	101	101	100	98	95	93	91		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	116	114	113	112		
	GR2	13.2	13.2	13.2	13.2	13.2	13.2	12.9	12.1	11.1	10.2	9.6		

FIGURE 5-109. TAKE-OFF DISTANCE; FLAPS - 20° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	78.3	79.0	79.9	80.8	81.7	82.6	83.4	84.3	85.1	85.9	86.8		
39600	BFL	4750	4820	4920	5020	5110	5200	5280	5380	5480	5580	5670	140	193
	V1	114	113	113	113	113	112	112	112	112	112	111		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.5	5.5	5.5	5.5	5.5		
39000	BFL	4540	4620	4710	4800	4890	4970	5060	5150	5240	5330	5430	139	191
	V1	111	111	111	111	111	110	110	110	110	109	109		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	137	137	137	137	137	137		
	GR2	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7		
38000	BFL	4220	4290	4380	4460	4540	4620	4700	4790	4870	4960	5050	137	189
	V1	108	108	108	107	107	107	107	106	106	106	106		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
37000	BFL	3930	4000	4070	4150	4220	4300	4370	4450	4530	4610	4690	135	186
	V1	104	104	104	104	104	104	103	103	103	103	103		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
36000	BFL	3670	3730	3800	3870	3940	4010	4080	4150	4220	4290	4370	133	183
	V1	101	101	101	101	100	100	100	100	100	100	99		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
35000	BFL	3450	3510	3590	3670	3750	3830	3910	3990	4070	4140	4220	131	180
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
34000	BFL	3430	3490	3570	3640	3720	3800	3880	3960	4030	4110	4190	129	177
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7		
33000	BFL	3400	3460	3550	3610	3690	3770	3850	3920	4000	4080	4150	127	175
	V1	99	99	99	99	99	99	99	99	99	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.1	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2		
32000	BFL	3390	3450	3510	3590	3660	3750	3820	3890	3970	4040	4120	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.8		

FIGURE 5-109. TAKE-OFF DISTANCE; FLAPS - 20° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 78.3	-50 -58 79.0	-45 -49 79.9	-40 -40 80.8	-35 -31 81.7	-30 -22 82.6	-25 -13 83.4	-20 -4 84.3	-15 5 85.1	-10 14 85.9	-5 23 86.8	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3360	3410	3490	3570	3630	3710	3790	3860	3940	4010	4080	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
30000	BFL	3330	3390	3460	3530	3600	3680	3750	3830	3900	3980	4050	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
29000	BFL	3310	3370	3440	3510	3590	3660	3730	3810	3870	3940	4020	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.5	10.5	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6		
28000	BFL	3290	3330	3400	3470	3550	3630	3690	3780	3850	3910	3980	117	160
	V1	100	100	100	100	100	100	100	100	100	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.2	11.2	11.2	11.2	11.2	11.3	11.3	11.3	11.3	11.3	11.3		
27000	BFL	3260	3320	3390	3460	3520	3590	3660	3740	3820	3880	3960	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11.9	11.9	11.9	12	12	12	12	12	12	12	12		
26000	BFL	3230	3290	3360	3420	3500	3570	3640	3700	3780	3840	3920	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 5-109. TAKE-OFF DISTANCE; FLAPS - 20° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	114		
	N1%	87.6	88.4	89.2	90.1	90.9	91.7	91.5	90.8	90.1	89.5	89.4		
39600	BFL	5770	5870	5970	6070	6170	6270	6690	7300	7990	8710	8870	140	193
	V1	111	111	111	111	111	111	112	115	119	122	122		
	VR	132	132	132	132	132	132	133	135	136	138	138		
	V2	139	139	139	139	139	139	140	141	142	142	142		
	GR2	5.5	5.5	5.5	5.5	5.5	5.4	5.1	4.6	4	3.4	3.3		
39000	BFL	5520	5610	5710	5810	5900	6000	6390	6980	7640	8340	8500	139	191
	V1	109	109	109	109	109	108	110	113	116	119	120		
	VR	130	130	130	130	130	130	131	133	134	136	136		
	V2	137	137	137	137	137	137	138	139	140	141	141		
	GR2	5.7	5.7	5.7	5.7	5.7	5.6	5.3	4.8	4.2	3.5	3.4		
38000	BFL	5130	5220	5310	5390	5480	5570	5930	6470	7080	7750	7890	137	189
	V1	106	106	105	105	105	105	107	110	113	116	117		
	VR	127	127	127	127	127	127	128	130	131	133	133		
	V2	135	135	135	135	135	135	135	136	137	138	138		
	GR2	6	6	6	6.1	6.1	6	5.7	5.1	4.5	3.9	3.7		
37000	BFL	4770	4850	4930	5010	5090	5180	5500	5990	6550	7170	7310	135	186
	V1	102	102	102	102	102	102	103	106	109	112	113		
	VR	124	124	124	124	124	124	125	126	128	130	130		
	V2	132	132	132	132	132	132	133	133	134	135	135		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6	5.4	4.8	4.2	4.1		
36000	BFL	4440	4520	4590	4670	4740	4820	5090	5530	6050	6630	6750	133	183
	V1	99	99	99	99	99	99	100	103	106	109	109		
	VR	121	121	121	121	121	121	122	123	125	126	127		
	V2	130	130	130	130	130	130	130	131	131	132	132		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.4	5.8	5.2	4.5	4.4		
35000	BFL	4300	4380	4460	4540	4620	4690	4730	5120	5580	6110	6230	131	180
	V1	98	98	98	98	98	98	97	99	102	105	106		
	VR	118	118	118	118	118	118	119	120	121	123	124		
	V2	127	127	127	127	127	127	127	128	128	129	129		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	6.8	6.2	5.5	4.9	4.8		
34000	BFL	4260	4340	4420	4500	4580	4650	4660	4760	5170	5650	5760	129	177
	V1	98	98	98	98	98	98	97	96	99	102	102		
	VR	116	116	116	116	116	116	116	117	119	120	121		
	V2	126	126	126	126	126	126	126	126	126	127	127		
	GR2	7.7	7.7	7.7	7.7	7.7	7.6	7.3	6.6	5.9	5.3	5.1		
33000	BFL	4230	4310	4380	4460	4540	4610	4620	4570	4800	5230	5330	127	175
	V1	98	98	98	98	98	98	97	95	96	98	99		
	VR	114	114	114	114	114	114	114	115	116	117	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	7.8	7.1	6.4	5.7	5.5		
32000	BFL	4190	4270	4340	4420	4500	4570	4580	4530	4470	4840	4920	125	172
	V1	99	99	99	98	98	98	97	95	95	95	96		
	VR	112	112	112	112	112	112	112	113	113	114	115		
	V2	123	123	123	123	123	123	123	122	122	122	122		
	GR2	8.8	8.8	8.8	8.8	8.8	8.7	8.3	7.6	6.8	6.1	6		

FIGURE 5-109. TAKE-OFF DISTANCE; FLAPS - 20° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	114		
	N1%	87.6	88.4	89.2	90.1	90.9	91.7	91.5	90.8	90.1	89.5	89.4		
31000	BFL	4160	4230	4310	4380	4460	4530	4540	4490	4490	4490	4560	123	169
	V1	99	99	99	99	99	98	97	95	93	92	92		
	VR	111	111	111	111	111	111	110	110	111	112	112		
	V2	122	122	122	122	122	122	121	120	120	120	120		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	8.8	8.1	7.3	6.6	6.4		
30000	BFL	4120	4200	4270	4340	4420	4490	4500	4450	4380	4300	4290	121	166
	V1	99	99	99	99	99	99	97	95	93	90	90		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	120	119	118	118	118		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.4	8.7	7.9	7.1	6.9		
29000	BFL	4100	4160	4230	4310	4380	4450	4460	4410	4340	4260	4250	119	163
	V1	99	99	99	99	99	99	98	95	93	91	90		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	119	118	117	116	116		
	GR2	10.6	10.6	10.6	10.6	10.6	10.5	10.1	9.3	8.5	7.6	7.5		
28000	BFL	4050	4120	4210	4270	4340	4410	4420	4370	4300	4220	4210	117	160
	V1	99	99	99	99	99	99	98	96	93	91	90		
	VR	106	106	106	106	106	106	106	105	105	105	105		
	V2	119	119	119	119	119	119	118	117	116	114	114		
	GR2	11.3	11.3	11.3	11.3	11.3	11.2	10.8	10	9.1	8.2	8.1		
27000	BFL	4020	4090	4160	4230	4300	4370	4380	4330	4260	4180	4170	115	157
	V1	100	100	99	99	99	99	98	96	93	91	90		
	VR	104	104	104	104	104	104	104	104	104	103	103		
	V2	118	118	118	118	118	118	117	116	115	113	113		
	GR2	12.1	12.1	12.1	12.1	12.1	12	11.5	10.7	9.8	8.9	8.7		
26000	BFL	3980	4060	4120	4190	4260	4320	4340	4290	4220	4140	4130	113	154
	V1	100	100	100	100	100	99	98	96	94	91	91		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	116	115	113	112	112		
	GR2	12.9	12.9	12.9	12.9	12.9	12.8	12.3	11.4	10.5	9.6	9.4		

FIGURE 5-110. TAKE-OFF DISTANCE; FLAPS - 20° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.1	79.7	80.6	81.4	82.3	83.2	84.1	84.9	85.7	86.6	87.4		
39600	BFL	5110	5190	5300	5410	5520	5620	5720	5830	5940	6040	6150	141	193
	V1	115	115	115	115	115	114	114	114	114	114	113		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	BFL	4890	4970	5080	5180	5280	5380	5470	5580	5680	5780	5880	140	192
	V1	113	113	113	113	112	112	112	112	112	111	111		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	BFL	4540	4620	4710	4810	4900	4990	5080	5180	5270	5360	5460	137	189
	V1	110	109	109	109	109	109	108	108	108	108	108		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.8	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	BFL	4210	4280	4370	4460	4550	4630	4710	4800	4890	4970	5060	135	186
	V1	106	106	106	106	105	105	105	105	105	104	104		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.2	6.2	6.2		
36000	BFL	3910	3980	4060	4140	4220	4290	4370	4450	4530	4610	4690	133	183
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	BFL	3650	3710	3780	3860	3930	4000	4070	4140	4220	4290	4360	131	181
	V1	99	99	99	99	98	98	98	98	98	98	98		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
34000	BFL	3520	3580	3660	3730	3810	3890	3970	4050	4130	4210	4290	129	178
	V1	98	98	98	97	97	97	97	97	97	97	97		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.3	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4		
33000	BFL	3510	3560	3630	3700	3780	3860	3950	4020	4100	4180	4250	127	175
	V1	98	98	98	98	98	98	98	98	97	97	97		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9		
32000	BFL	3470	3520	3600	3690	3750	3830	3920	3990	4060	4140	4220	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		

FIGURE 5-110. TAKE-OFF DISTANCE; FLAPS - 20° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 79.1	-50 -58 79.7	-45 -49 80.6	-40 -40 81.4	-35 -31 82.3	-30 -22 83.2	-25 -13 84.1	-20 -4 84.9	-15 5 85.7	-10 14 86.6	-5 23 87.4	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3460	3510	3580	3650	3720	3800	3890	3950	4030	4110	4180	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	9	9	9		
30000	BFL	3420	3470	3540	3620	3690	3780	3840	3920	4000	4070	4150	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6		
29000	BFL	3400	3450	3520	3600	3670	3750	3810	3890	3960	4040	4120	119	163
	V1	99	99	98	98	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
28000	BFL	3370	3410	3490	3560	3640	3710	3780	3850	3940	4010	4070	117	160
	V1	99	99	99	99	99	99	99	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	119	119	119		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
27000	BFL	3350	3400	3470	3530	3600	3680	3750	3820	3900	3970	4040	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	118		
	GR2	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6		
26000	BFL	3320	3370	3430	3510	3580	3650	3720	3790	3870	3930	4000	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4		

FIGURE 5-110. TAKE-OFF DISTANCE; FLAPS - 20° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	111			
	N1%	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
39600	BFL	6260	6370	6480	6580	6700	6920	7470	8160	8890	9550		141	193
	V1	113	113	113	113	113	113	116	119	122	124			
	VR	134	134	134	134	134	134	136	137	139	140			
	V2	140	140	140	140	140	140	142	142	143	144			
	GR2	5.2	5.2	5.2	5.2	5.2	5	4.7	4.1	3.5	3.1			
39000	BFL	5990	6090	6190	6300	6410	6610	7140	7800	8510	9150		140	192
	V1	111	111	111	111	111	111	113	117	120	122			
	VR	132	132	132	132	132	132	134	135	137	138			
	V2	139	139	139	139	139	139	140	141	141	142			
	GR2	5.4	5.4	5.4	5.4	5.4	5.2	4.9	4.3	3.7	3.3			
38000	BFL	5550	5650	5740	5840	5940	6130	6620	7230	7890	8480		137	189
	V1	108	107	107	107	107	108	110	113	116	118			
	VR	129	129	129	129	129	129	130	132	134	135			
	V2	136	136	136	136	136	136	137	138	139	139			
	GR2	5.8	5.8	5.8	5.8	5.8	5.6	5.2	4.6	4	3.6			
37000	BFL	5150	5240	5320	5410	5500	5680	6130	6680	7300	7860		135	186
	V1	104	104	104	104	104	104	106	109	112	115			
	VR	125	125	125	125	125	126	127	129	130	132			
	V2	133	133	133	133	133	133	134	135	136	137			
	GR2	6.2	6.2	6.2	6.2	6.1	5.9	5.6	5	4.4	3.9			
36000	BFL	4770	4850	4930	5010	5100	5260	5660	6170	6740	7260		133	183
	V1	101	100	100	100	100	101	103	106	109	111			
	VR	122	122	122	122	122	122	124	126	127	129			
	V2	131	131	131	131	130	130	131	132	133	134			
	GR2	6.5	6.5	6.5	6.5	6.5	6.3	5.9	5.3	4.7	4.2			
35000	BFL	4440	4510	4590	4660	4740	4880	5230	5690	6210	6690		131	181
	V1	97	97	97	97	97	97	99	102	105	107			
	VR	119	119	119	119	119	119	121	122	124	125			
	V2	128	128	128	128	128	128	129	129	130	131			
	GR2	6.9	6.9	6.9	6.9	6.9	6.7	6.3	5.7	5.1	4.6			
34000	BFL	4370	4450	4530	4610	4680	4710	4830	5240	5720	6150		129	178
	V1	97	97	97	97	97	96	96	98	101	104			
	VR	116	116	116	116	116	117	118	119	121	122			
	V2	126	126	126	126	126	126	126	127	127	128			
	GR2	7.4	7.4	7.4	7.4	7.3	7.1	6.7	6.1	5.5	4.9			
33000	BFL	4330	4410	4490	4570	4640	4670	4690	4850	5280	5670		127	175
	V1	97	97	97	97	97	96	95	95	98	100			
	VR	114	114	114	114	114	114	115	116	118	119			
	V2	124	124	124	124	124	124	124	124	125	125			
	GR2	7.9	7.9	7.9	7.9	7.8	7.6	7.2	6.5	5.9	5.3			
32000	BFL	4300	4370	4450	4530	4600	4630	4650	4600	4880	5240		125	172
	V1	98	98	97	97	97	97	95	95	95	97			
	VR	112	112	112	112	112	112	113	113	115	116			
	V2	123	123	123	123	123	123	122	122	122	123			
	GR2	8.4	8.4	8.4	8.4	8.4	8.1	7.7	7	6.3	5.8			

FIGURE 5-110. TAKE-OFF DISTANCE; FLAPS - 20° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	111			
	N1%	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
31000	BFL	4260	4340	4410	4490	4560	4590	4600	4560	4520	4830		123	169
	V1	98	98	98	98	97	97	95	93	93	93			
	VR	111	111	111	111	111	111	111	111	112	113			
	V2	122	122	122	122	122	121	121	120	120	120			
	GR2	9	9	9	9	8.9	8.6	8.2	7.5	6.8	6.2			
30000	BFL	4220	4300	4370	4450	4520	4550	4560	4520	4450	4460		121	166
	V1	98	98	98	98	98	97	95	93	91	90			
	VR	109	109	109	109	109	109	109	109	109	110			
	V2	121	121	121	121	121	120	119	119	118	118			
	GR2	9.6	9.6	9.6	9.6	9.5	9.3	8.8	8.1	7.3	6.7			
29000	BFL	4190	4260	4340	4410	4480	4510	4520	4480	4400	4340		119	163
	V1	98	98	98	98	98	97	96	94	91	89			
	VR	107	107	107	107	107	107	107	107	107	107			
	V2	120	120	120	120	120	119	118	117	116	116			
	GR2	10.2	10.2	10.2	10.2	10.2	9.9	9.4	8.6	7.8	7.2			
28000	BFL	4150	4220	4310	4370	4440	4460	4480	4430	4360	4300		117	160
	V1	98	98	98	98	98	97	96	94	91	90			
	VR	106	106	106	106	106	106	106	105	105	105			
	V2	119	119	119	119	118	118	117	116	115	114			
	GR2	10.9	10.9	10.9	10.9	10.9	10.6	10.1	9.3	8.5	7.8			
27000	BFL	4110	4190	4260	4330	4400	4420	4440	4390	4320	4260		115	157
	V1	99	98	98	98	98	97	96	94	92	90			
	VR	104	104	104	104	104	104	104	104	103	103			
	V2	118	118	117	117	117	117	116	115	114	113			
	GR2	11.6	11.6	11.6	11.6	11.6	11.3	10.8	10	9.1	8.4			
26000	BFL	4090	4150	4230	4290	4360	4380	4390	4350	4280	4220		113	154
	V1	99	99	99	99	98	98	96	94	92	90			
	VR	102	102	102	102	102	102	102	102	102	102			
	V2	116	116	116	116	116	116	115	114	113	112			
	GR2	12.4	12.4	12.4	12.4	12.4	12.1	11.5	10.7	9.8	9.1			

FIGURE 5-111. TAKE-OFF DISTANCE; FLAPS - 20° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
39600	BFL	5550	5650	5770	5880	6000	6110	6220	6340	6460	6580	6690	142	194
	V1	117	117	117	117	117	116	116	116	116	116	116		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	5	5	5	5	5	5	5	5	5	5	5		
39000	BFL	5310	5400	5510	5620	5730	5840	5950	6060	6170	6280	6400	141	192
	V1	115	115	115	115	114	114	114	114	114	114	113		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	BFL	4930	5010	5120	5220	5320	5420	5520	5620	5730	5830	5930	138	189
	V1	112	111	111	111	111	111	110	110	110	110	110		
	VR	131	131	131	131	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.6	5.6	5.6		
37000	BFL	4570	4650	4740	4840	4930	5020	5110	5210	5300	5400	5490	136	187
	V1	108	108	108	108	107	107	107	107	107	106	106		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	BFL	4230	4300	4390	4480	4560	4640	4730	4820	4900	4990	5080	133	184
	V1	104	104	104	104	104	103	103	103	103	103	103		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
35000	BFL	3920	3980	4070	4150	4220	4300	4370	4450	4530	4620	4700	131	181
	V1	101	101	100	100	100	100	100	100	99	99	99		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
34000	BFL	3640	3700	3780	3850	3920	3990	4070	4150	4230	4310	4400	129	178
	V1	97	97	97	97	97	96	96	96	96	96	96		
	VR	118	118	118	118	118	118	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
33000	BFL	3570	3630	3710	3790	3870	3950	4040	4120	4200	4280	4360	127	175
	V1	97	97	97	97	97	96	96	96	96	96	96		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6		
32000	BFL	3560	3600	3680	3770	3840	3920	4000	4080	4160	4240	4320	125	172
	V1	97	97	97	97	97	97	97	97	97	97	96		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8	8	8	8	8	8.1	8.1	8.1	8.1	8.1	8.1		

FIGURE 5-111. TAKE-OFF DISTANCE; FLAPS - 20° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 79.6	-50 -58 80.2	-45 -49 81.1	-40 -40 82.0	-35 -31 82.8	-30 -22 83.7	-25 -13 84.6	-20 -4 85.4	-15 5 86.3	-10 14 87.1	-5 23 88.0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3520	3580	3660	3730	3810	3890	3970	4050	4130	4200	4280	123	169
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
30000	BFL	3510	3560	3630	3700	3780	3860	3930	4010	4090	4180	4240	121	166
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
29000	BFL	3470	3520	3590	3670	3760	3820	3900	3980	4050	4130	4210	119	163
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9		
28000	BFL	3450	3500	3570	3650	3720	3790	3870	3940	4020	4090	4170	117	160
	V1	98	98	98	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
27000	BFL	3410	3470	3540	3620	3690	3760	3840	3910	3980	4070	4140	115	157
	V1	98	98	98	98	98	98	98	98	98	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	11.3	11.3	11.3	11.3	11.3		
26000	BFL	3400	3440	3510	3580	3650	3730	3800	3880	3960	4020	4100	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12	12	12	12	12	12	12	12	12	12	12		

FIGURE 5-111. TAKE-OFF DISTANCE; FLAPS - 20° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	107			
	N1%	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
39600	BFL	6810	6930	7050	7170	7330	7750	8420	9160	9960	10300		142	194
	V1	115	115	115	115	115	117	119	122	125	126			
	VR	136	136	136	136	136	137	138	140	141	141			
	V2	142	142	142	142	142	142	143	144	145	145			
	GR2	5	5	5	5	4.9	4.6	4.2	3.7	3.1	2.9			
39000	BFL	6510	6620	6740	6850	7010	7410	8040	8740	9540	9870		141	192
	V1	113	113	113	113	113	115	117	120	123	124			
	VR	134	134	134	134	134	135	136	138	139	140			
	V2	140	140	140	140	140	140	142	142	143	143			
	GR2	5.2	5.2	5.2	5.2	5.1	4.8	4.4	3.9	3.3	3.1			
38000	BFL	6040	6140	6240	6350	6490	6860	7440	8110	8850	9180		138	189
	V1	110	109	109	109	109	111	113	116	119	120			
	VR	130	130	130	130	130	131	133	135	136	137			
	V2	137	137	137	137	137	138	139	140	140	141			
	GR2	5.6	5.6	5.6	5.6	5.4	5.1	4.7	4.2	3.6	3.4			
37000	BFL	5590	5680	5780	5880	6010	6350	6880	7500	8190	8490		136	187
	V1	106	106	106	106	106	107	110	113	116	117			
	VR	127	127	127	127	127	128	130	131	133	133			
	V2	134	134	134	134	134	135	136	137	138	138			
	GR2	5.9	5.9	5.9	5.9	5.8	5.4	5.1	4.5	4	3.7			
36000	BFL	5170	5250	5340	5430	5550	5870	6360	6920	7560	7850		133	184
	V1	102	102	102	102	102	104	106	109	112	113			
	VR	124	124	124	124	124	125	127	128	130	130			
	V2	132	132	132	132	132	132	133	134	135	135			
	GR2	6.3	6.3	6.3	6.3	6.1	5.8	5.4	4.9	4.3	4			
35000	BFL	4780	4860	4940	5020	5130	5410	5860	6370	6960	7230		131	181
	V1	99	99	99	99	99	100	102	105	108	109			
	VR	121	121	121	121	121	122	123	125	126	127			
	V2	129	129	129	129	129	129	130	131	132	132			
	GR2	6.7	6.7	6.7	6.7	6.5	6.2	5.8	5.3	4.7	4.4			
34000	BFL	4480	4560	4640	4720	4760	5000	5390	5870	6400	6650		129	178
	V1	96	96	96	96	95	97	99	101	104	106			
	VR	117	117	117	117	117	118	120	121	123	124			
	V2	126	126	126	126	126	126	127	128	129	129			
	GR2	7.1	7.1	7.1	7.1	6.9	6.6	6.2	5.6	5	4.8			
33000	BFL	4440	4520	4600	4680	4710	4730	4960	5390	5880	6100		127	175
	V1	96	96	96	96	96	94	95	98	101	102			
	VR	115	115	115	115	115	115	117	118	120	120			
	V2	124	124	124	124	124	124	125	125	126	126			
	GR2	7.6	7.6	7.6	7.6	7.4	7	6.6	6	5.4	5.2			
32000	BFL	4400	4480	4560	4640	4670	4690	4700	4950	5400	5600		125	172
	V1	96	96	96	96	96	95	93	94	97	98			
	VR	113	113	113	113	113	113	114	115	117	117			
	V2	122	122	122	122	122	122	122	123	123	123			
	GR2	8.1	8.1	8.1	8.1	7.9	7.5	7.1	6.5	5.8	5.6			

FIGURE 5-111. TAKE-OFF DISTANCE; FLAPS - 20° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	107			
	N1%	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
31000	BFL	4360	4440	4520	4600	4630	4650	4660	4620	4970	5160		123	169
	V1	97	97	97	96	96	95	93	91	94	95			
	VR	111	111	111	111	111	111	111	112	113	114			
	V2	121	121	121	121	121	121	120	120	121	121			
	GR2	8.6	8.6	8.6	8.6	8.4	8	7.6	6.9	6.3	6			
30000	BFL	4320	4400	4480	4560	4590	4600	4610	4570	4590	4750		121	166
	V1	97	97	97	97	96	95	93	91	91	91			
	VR	109	109	109	109	109	109	109	109	110	111			
	V2	120	120	120	120	120	119	119	118	118	118			
	GR2	9.2	9.2	9.2	9.2	9	8.6	8.1	7.5	6.8	6.5			
29000	BFL	4280	4360	4440	4520	4550	4560	4570	4530	4460	4430		119	163
	V1	97	97	97	97	96	95	94	92	89	89			
	VR	108	108	108	108	108	107	107	107	108	108			
	V2	119	119	119	119	119	118	117	117	116	116			
	GR2	9.9	9.9	9.9	9.9	9.6	9.2	8.7	8	7.3	7			
28000	BFL	4250	4320	4400	4480	4510	4520	4530	4490	4420	4390		117	160
	V1	97	97	97	97	96	95	94	92	90	89			
	VR	106	106	106	106	106	106	106	105	105	106			
	V2	118	118	118	118	118	117	116	115	114	114			
	GR2	10.5	10.5	10.5	10.5	10.3	9.9	9.3	8.6	7.9	7.5			
27000	BFL	4210	4280	4360	4430	4460	4480	4480	4440	4380	4350		115	157
	V1	97	97	97	97	97	95	94	92	90	89			
	VR	104	104	104	104	104	104	104	103	103	103			
	V2	117	117	117	117	117	116	115	114	113	113			
	GR2	11.3	11.3	11.3	11.3	11	10.6	10	9.3	8.5	8.2			
26000	BFL	4170	4250	4320	4390	4420	4440	4440	4400	4330	4300		113	154
	V1	98	98	98	97	97	96	94	92	90	89			
	VR	102	102	102	102	102	102	102	102	102	101			
	V2	116	116	116	116	116	115	114	113	112	111			
	GR2	12	12	12	12	11.8	11.3	10.8	10	9.2	8.8			

FIGURE 5-112. TAKE-OFF DISTANCE; FLAPS - 20° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	80.0	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5		
39600	BFL	5980	6080	6210	6340	6470	6590	6720	6850	6970	7100	7230	143	194
	V1	119	119	119	119	118	118	118	118	118	118	117		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.7	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
39000	BFL	5710	5810	5940	6060	6180	6290	6420	6540	6660	6780	6900	142	193
	V1	117	117	117	116	116	116	116	116	115	115	115		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.9	4.9	4.9	4.9	4.9	5	5	5	5	5	5		
38000	BFL	5290	5390	5500	5610	5720	5830	5940	6060	6170	6280	6390	139	190
	V1	113	113	113	113	112	112	112	112	112	112	111		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	BFL	4900	4990	5090	5200	5300	5400	5500	5600	5710	5810	5910	137	187
	V1	109	109	109	109	109	109	108	108	108	108	108		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
36000	BFL	4530	4610	4710	4800	4900	4990	5080	5180	5270	5360	5460	134	184
	V1	106	106	106	105	105	105	105	105	104	104	104		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6	6	6	6	6	6	6	6.1	6.1	6.1	6.1		
35000	BFL	4190	4260	4350	4430	4520	4600	4690	4780	4860	4950	5030	132	181
	V1	102	102	102	102	101	101	101	101	101	101	100		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
34000	BFL	3880	3940	4020	4100	4180	4260	4340	4410	4490	4570	4650	129	178
	V1	98	98	98	98	98	98	98	97	97	97	97		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9	6.9		
33000	BFL	3670	3730	3820	3900	3980	4060	4150	4230	4310	4400	4480	127	176
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
32000	BFL	3640	3700	3790	3860	3950	4040	4110	4190	4280	4360	4440	125	173
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	123	123	123	123	123	123		
	GR2	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8		

FIGURE 5-112. TAKE-OFF DISTANCE; FLAPS - 20° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 80.0	-50 -58 80.7	-45 -49 81.6	-40 -40 82.5	-35 -31 83.4	-30 -22 84.3	-25 -13 85.1	-20 -4 86.0	-15 5 86.8	-10 14 87.7	-5 23 88.5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3610	3680	3750	3830	3910	4010	4080	4170	4240	4320	4400	123	170
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
30000	BFL	3590	3650	3720	3800	3880	3960	4040	4120	4200	4280	4360	121	167
	V1	97	96	96	96	96	96	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
29000	BFL	3560	3620	3690	3780	3850	3930	4020	4090	4160	4240	4320	119	164
	V1	97	97	97	97	97	96	96	96	96	96	96		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
28000	BFL	3520	3580	3660	3750	3810	3890	3970	4060	4140	4210	4290	117	161
	V1	97	97	97	97	97	97	97	97	97	97	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	118	118	118	118	118	118		
	GR2	10.1	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		
27000	BFL	3500	3560	3640	3720	3780	3860	3940	4010	4090	4170	4250	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	BFL	3480	3530	3610	3680	3750	3830	3900	3980	4050	4130	4210	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	116	116	116		
	GR2	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7		

FIGURE 5-112. TAKE-OFF DISTANCE; FLAPS - 20° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	104			
	N1%	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
39600	BFL	7360	7490	7620	7750	7990	8660	9390	10190	11040	11060		143	194
	V1	117	117	117	117	117	120	123	125	128	128			
	VR	137	137	137	137	137	139	141	142	143	143			
	V2	143	143	143	143	143	144	145	146	146	146			
	GR2	4.8	4.8	4.8	4.8	4.4	4.2	3.8	3.3	2.7	2.7			
39000	BFL	7030	7150	7280	7400	7630	8270	8960	9740	10580	10600		142	193
	V1	115	115	115	115	115	118	120	123	126	126			
	VR	135	135	135	135	135	137	139	140	141	141			
	V2	141	141	141	141	141	142	144	144	145	145			
	GR2	5	5	5	4.9	4.6	4.3	4	3.5	2.9	2.9			
38000	BFL	6510	6620	6730	6850	7060	7640	8290	9030	9840	9850		139	190
	V1	111	111	111	111	112	114	116	119	122	122			
	VR	132	132	132	132	132	134	135	137	138	138			
	V2	139	139	139	138	138	139	141	141	142	142			
	GR2	5.3	5.3	5.3	5.3	5	4.7	4.3	3.8	3.2	3.2			
37000	BFL	6020	6120	6220	6330	6530	7060	7650	8350	9110	9120		137	187
	V1	108	107	107	107	108	110	113	116	118	118			
	VR	129	129	129	129	129	130	132	134	135	135			
	V2	136	136	136	136	136	136	137	138	139	139			
	GR2	5.7	5.7	5.7	5.6	5.3	5	4.6	4.1	3.5	3.5			
36000	BFL	5550	5650	5750	5850	6030	6520	7060	7690	8410	8420		134	184
	V1	104	104	104	104	104	107	109	112	115	115			
	VR	125	125	125	125	125	127	129	130	132	132			
	V2	133	133	133	133	132	134	135	135	136	136			
	GR2	6.1	6.1	6.1	6	5.7	5.4	5	4.4	3.9	3.8			
35000	BFL	5120	5210	5300	5390	5550	6010	6500	7080	7740	7760		132	181
	V1	100	100	100	100	101	103	105	108	111	111			
	VR	122	122	122	122	122	124	125	127	129	129			
	V2	130	130	130	130	129	131	132	132	133	133			
	GR2	6.4	6.4	6.4	6.4	6	5.7	5.4	4.8	4.2	4.2			
34000	BFL	4730	4810	4890	4970	5130	5520	5980	6510	7110	7120		129	178
	V1	97	97	97	97	97	99	102	104	107	107			
	VR	119	119	119	119	119	120	122	124	125	125			
	V2	127	127	127	127	126	128	129	130	130	130			
	GR2	6.9	6.9	6.9	6.8	6.4	6.1	5.8	5.2	4.6	4.6			
33000	BFL	4560	4650	4730	4800	4780	5080	5490	5980	6520	6530		127	176
	V1	95	95	95	95	95	95	98	100	103	103			
	VR	116	116	116	116	116	117	119	120	122	122			
	V2	124	124	124	124	124	125	126	127	127	127			
	GR2	7.3	7.3	7.3	7.2	6.9	6.5	6.2	5.6	4.9	4.9			
32000	BFL	4520	4610	4690	4760	4740	4770	5030	5470	5970	5980		125	173
	V1	96	96	96	95	94	94	94	97	99	99			
	VR	113	113	113	113	113	114	115	117	118	118			
	V2	123	123	123	122	122	122	123	124	124	124			
	GR2	7.8	7.8	7.8	7.7	7.3	7	6.6	6	5.4	5.3			

FIGURE 5-112. TAKE-OFF DISTANCE; FLAPS - 20° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

31000	BFL	4480	4570	4650	4710	4690	4730	4750	5000	5460	5470		123	170
	V1	96	96	96	95	94	93	93	93	96	96			
	VR	111	111	111	111	111	111	112	113	115	115			
	V2	121	121	121	121	120	120	120	121	122	122			
	GR2	8.3	8.3	8.3	8.3	7.8	7.5	7	6.4	5.8	5.8			
30000	BFL	4440	4520	4600	4670	4650	4680	4700	4650	5010	5020		121	167
	V1	96	96	96	96	94	93	92	92	92	92			
	VR	109	109	109	109	109	109	109	110	112	112			
	V2	120	120	120	120	119	119	118	118	119	119			
	GR2	8.9	8.9	8.9	8.8	8.4	8	7.6	6.9	6.3	6.2			
29000	BFL	4400	4480	4560	4630	4610	4640	4660	4610	4610	4610		119	164
	V1	96	96	96	96	95	93	92	90	89	89			
	VR	107	107	107	107	107	107	107	108	109	109			
	V2	119	119	119	119	118	117	117	116	116	116			
	GR2	9.5	9.5	9.5	9.5	9	8.6	8.1	7.4	6.8	6.7			
28000	BFL	4360	4440	4520	4580	4570	4590	4610	4560	4500	4500		117	161
	V1	96	96	96	96	95	94	92	90	88	88			
	VR	106	106	106	106	106	106	105	105	106	106			
	V2	118	118	118	117	117	116	115	115	114	114			
	GR2	10.2	10.2	10.2	10.1	9.7	9.2	8.8	8	7.3	7.3			
27000	BFL	4320	4400	4480	4540	4530	4550	4570	4520	4450	4450		115	157
	V1	97	97	97	96	95	94	92	90	88	88			
	VR	104	104	104	104	104	104	104	104	104	104			
	V2	116	116	116	116	116	115	114	113	112	112			
	GR2	10.9	10.9	10.9	10.8	10.4	9.9	9.4	8.7	7.9	7.9			
26000	BFL	4280	4370	4430	4500	4480	4510	4520	4470	4410	4410		113	154
	V1	97	97	97	97	95	94	93	91	88	88			
	VR	102	102	102	102	102	102	102	102	102	102			
	V2	116	115	115	115	115	114	113	112	111	111			
	GR2	11.7	11.7	11.7	11.6	11.1	10.6	10.1	9.4	8.5	8.5			

FIGURE 5-113. TAKE-OFF DISTANCE; FLAPS - 20° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	80.7	81.3	82.0	83.0	83.9	84.8	85.6	86.5	87.4	88.2	89.1		
39600	BFL	6590	6700	6840	6970	7090	7220	7370	7510	7650	7790	7930	144	194
	V1	122	122	122	121	121	121	121	120	120	120	120		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
39000	BFL	6290	6400	6530	6660	6770	6890	7030	7160	7300	7430	7570	143	193
	V1	120	119	119	119	119	118	118	118	118	118	118		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
38000	BFL	5820	5920	6040	6150	6260	6380	6500	6620	6750	6870	6990	140	190
	V1	116	116	115	115	115	115	114	114	114	114	114		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5	5	5	5	5	5	5	5.1	5.1	5.1	5.1		
37000	BFL	5380	5480	5590	5690	5790	5900	6010	6120	6230	6350	6460	138	187
	V1	112	112	112	111	111	111	111	110	110	110	110		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.3	5.3	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
36000	BFL	4970	5060	5160	5260	5350	5440	5550	5650	5750	5860	5960	135	185
	V1	108	108	108	108	107	107	107	107	107	106	106		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.7	5.7	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8		
35000	BFL	4590	4670	4760	4840	4930	5010	5110	5210	5300	5390	5490	133	182
	V1	104	104	104	104	104	103	103	103	103	103	102		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.1	6.1	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2		
34000	BFL	4230	4300	4380	4460	4540	4620	4700	4790	4880	4960	5050	130	179
	V1	101	100	100	100	100	100	99	99	99	99	99		
	VR	121	121	121	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.5	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6		
33000	BFL	3900	3970	4040	4120	4180	4260	4340	4410	4490	4570	4650	127	176
	V1	97	97	97	96	96	96	96	96	95	95	95		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.9	6.9	6.9	6.9	6.9	7	7	7	7	7	7		
32000	BFL	3710	3780	3860	3950	4040	4120	4210	4290	4380	4460	4550	125	173
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		

FIGURE 5-113. TAKE-OFF DISTANCE; FLAPS - 20° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

31000	BFL	3710	3770	3830	3920	4000	4090	4170	4260	4340	4420	4510	123	170
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9	8	8	8		
30000	BFL	3680	3740	3800	3880	3970	4050	4140	4220	4300	4380	4470	121	167
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
29000	BFL	3650	3710	3770	3850	3930	4030	4100	4190	4260	4340	4440	119	164
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
28000	BFL	3620	3660	3740	3820	3910	3980	4070	4140	4220	4310	4380	117	161
	V1	96	95	95	95	95	95	95	95	95	95	95		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.7	9.7	9.7	9.7	9.7	9.8	9.8	9.8	9.8	9.8	9.8		
27000	BFL	3590	3630	3710	3780	3880	3950	4040	4110	4180	4260	4340	115	158
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.5		
26000	BFL	3560	3610	3680	3750	3840	3910	3990	4070	4150	4230	4310	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	115	115	115	115	115	115	115	115	115		
	GR2	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.2		

FIGURE 5-113. TAKE-OFF DISTANCE; FLAPS - 20° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	100				
	N1%	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.2				
39600	BFL	8070	8220	8370	8590	9050	9800	10600	11460	12050			144	194
	V1	120	120	120	120	121	124	126	129	130				
	VR	140	140	140	140	140	142	143	144	145				
	V2	145	145	145	145	145	146	147	147	148				
	GR2	4.5	4.5	4.5	4.3	4	3.7	3.3	2.8	2.5				
39000	BFL	7700	7840	7990	8200	8630	9370	10130	10980	11550			143	193
	V1	117	117	117	118	119	122	124	127	128				
	VR	138	138	138	138	138	140	142	143	143				
	V2	143	143	143	143	143	145	145	146	146				
	GR2	4.7	4.7	4.7	4.5	4.2	3.9	3.5	3	2.6				
38000	BFL	7120	7250	7380	7580	7970	8640	9380	10200	10720			140	190
	V1	114	113	113	114	115	118	120	123	124				
	VR	134	134	134	134	135	137	138	140	140				
	V2	140	140	140	140	140	141	142	143	143				
	GR2	5.1	5.1	5	4.8	4.5	4.2	3.8	3.3	2.9				
37000	BFL	6580	6690	6820	7000	7360	7970	8660	9430	9950			138	187
	V1	110	110	110	110	111	114	116	119	121				
	VR	131	131	131	131	131	133	135	136	137				
	V2	137	137	137	137	137	138	140	140	141				
	GR2	5.4	5.4	5.4	5.2	4.8	4.5	4.1	3.6	3.3				
36000	BFL	6070	6170	6290	6450	6790	7340	7970	8710	9180			135	185
	V1	106	106	106	106	108	110	112	115	117				
	VR	127	127	127	127	128	130	132	133	134				
	V2	134	134	134	134	134	135	136	137	138				
	GR2	5.8	5.8	5.7	5.5	5.2	4.9	4.5	3.9	3.6				
35000	BFL	5580	5680	5790	5940	6250	6760	7330	8000	8480			133	182
	V1	102	102	102	102	104	106	109	111	113				
	VR	124	124	124	124	125	126	128	130	131				
	V2	131	131	131	131	131	132	133	134	135				
	GR2	6.2	6.2	6.1	5.9	5.6	5.2	4.8	4.3	3.9				
34000	BFL	5140	5230	5320	5460	5740	6210	6730	7340	7770			130	179
	V1	99	98	98	99	100	102	105	108	109				
	VR	120	120	120	120	121	123	125	126	127				
	V2	128	128	128	128	128	129	130	131	132				
	GR2	6.6	6.6	6.5	6.3	5.9	5.6	5.2	4.7	4.3				
33000	BFL	4730	4810	4900	5020	5270	5700	6180	6730	7110			127	176
	V1	95	95	95	95	96	99	101	104	105				
	VR	117	117	117	117	118	119	121	123	124				
	V2	125	125	125	125	125	126	127	128	129				
	GR2	7	7	6.9	6.7	6.3	6	5.6	5	4.7				
32000	BFL	4630	4720	4790	4800	4840	5210	5650	6160	6510			125	173
	V1	95	95	94	94	93	95	97	100	102				
	VR	114	114	114	114	114	116	118	119	120				
	V2	123	123	123	122	122	123	124	125	126				
	GR2	7.5	7.4	7.4	7.1	6.8	6.4	6	5.4	5.1				

FIGURE 5-113. TAKE-OFF DISTANCE; FLAPS - 20° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	100				
	N1%	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.2				
31000	BFL	4590	4670	4740	4760	4760	4790	5150	5620	5940			123	170
	V1	95	95	94	94	92	91	93	96	98				
	VR	111	111	111	111	112	112	114	116	117				
	V2	121	121	121	120	120	120	121	122	123				
	GR2	8	8	7.9	7.6	7.2	6.9	6.5	5.9	5.5				
30000	BFL	4550	4630	4700	4720	4720	4750	4750	5120	5410			121	167
	V1	95	95	95	94	93	91	90	92	94				
	VR	109	109	109	109	109	109	111	112	113				
	V2	119	119	119	119	118	118	118	119	120				
	GR2	8.5	8.5	8.4	8.2	7.8	7.4	6.9	6.3	5.9				
29000	BFL	4510	4590	4650	4670	4670	4700	4700	4700	4950			119	164
	V1	95	95	95	94	93	92	90	90	90				
	VR	107	107	107	107	107	107	108	109	110				
	V2	118	118	118	118	117	116	116	117	117				
	GR2	9.1	9.1	9.1	8.8	8.4	7.9	7.4	6.8	6.4				
28000	BFL	4470	4550	4610	4630	4630	4660	4660	4610	4570			117	161
	V1	95	95	95	94	93	92	90	88	87				
	VR	106	106	106	106	106	105	105	106	107				
	V2	117	117	117	116	116	115	115	114	114				
	GR2	9.8	9.8	9.7	9.4	9	8.6	8	7.3	6.9				
27000	BFL	4420	4500	4570	4590	4590	4610	4610	4560	4520			115	158
	V1	95	95	95	94	93	92	90	88	87				
	VR	104	104	104	104	104	104	104	104	104				
	V2	116	116	116	115	115	114	113	112	112				
	GR2	10.5	10.5	10.4	10.1	9.6	9.2	8.7	7.9	7.5				
26000	BFL	4390	4460	4520	4540	4540	4570	4570	4520	4480			113	155
	V1	96	96	95	95	93	92	91	89	87				
	VR	102	102	102	102	102	102	102	102	102				
	V2	115	115	115	114	114	113	112	111	110				
	GR2	11.2	11.2	11.1	10.8	10.4	9.9	9.4	8.6	8.1				

FIGURE 5-114. TAKE-OFF DISTANCE; FLAPS - 20° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.3	81.7	82.5	83.4	84.4	85.3	86.2	87.0	87.9	88.7	89.6		
39600	BFL	7250	7380	7520	7650	7780	7930	8090	8250	8400	8560	8710	145	195
	V1	125	125	124	124	124	123	123	123	123	123	123		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4.2	4.2	4.2	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3		
39000	BFL	6920	7040	7180	7300	7420	7570	7720	7860	8010	8160	8310	144	193
	V1	122	122	122	121	121	121	121	121	120	120	120		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
38000	BFL	6390	6510	6630	6750	6860	6990	7130	7260	7400	7530	7670	141	191
	V1	118	118	118	117	117	117	117	117	116	116	116		
	VR	137	137	137	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.7	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
37000	BFL	5900	6010	6120	6220	6330	6450	6580	6700	6820	6950	7070	139	188
	V1	114	114	114	114	113	113	113	113	112	112	112		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5	5	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
36000	BFL	5450	5540	5640	5740	5840	5950	6060	6180	6290	6400	6520	136	185
	V1	110	110	110	110	109	109	109	109	109	108	108		
	VR	130	130	130	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.4	5.4	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
35000	BFL	5020	5100	5200	5290	5370	5470	5580	5680	5790	5890	5990	134	182
	V1	107	106	106	106	106	105	105	105	105	105	104		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
34000	BFL	4610	4690	4780	4860	4940	5030	5130	5220	5320	5410	5510	131	179
	V1	103	103	102	102	102	102	101	101	101	101	101		
	VR	123	123	123	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
33000	BFL	4240	4310	4390	4470	4540	4620	4710	4790	4880	4960	5050	128	176
	V1	99	99	99	98	98	98	98	97	97	97	97		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
32000	BFL	3910	3970	4040	4110	4180	4250	4330	4410	4490	4570	4660	126	173
	V1	95	95	95	94	94	94	94	94	94	93	93		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		

FIGURE 5-114. TAKE-OFF DISTANCE; FLAPS - 20° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 81.3	-50 -58 81.7	-45 -49 82.5	-40 -40 83.4	-35 -31 84.4	-30 -22 85.3	-25 -13 86.2	-20 -4 87.0	-15 5 87.9	-10 14 88.7	-5 23 89.6	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3760	3830	3920	4010	4100	4190	4270	4360	4440	4530	4620	123	170
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
30000	BFL	3760	3810	3890	3980	4060	4160	4230	4320	4400	4490	4580	121	167
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.2		
29000	BFL	3730	3770	3850	3950	4040	4110	4200	4290	4360	4460	4530	119	164
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
28000	BFL	3710	3740	3820	3900	3990	4070	4170	4240	4320	4410	4490	117	161
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	105	105	105	106	106	106	106	106	106	106	106		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.2	9.2	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
27000	BFL	3680	3710	3780	3870	3960	4050	4120	4200	4290	4370	4450	115	158
	V1	94	94	94	94	95	95	94	94	94	94	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	9.9	9.9	9.9	10	10	10.1	10.1	10.1	10.1	10.1	10.1		
26000	BFL	3650	3680	3750	3830	3930	4000	4090	4170	4240	4320	4420	113	155
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.7	10.7	10.7	10.7	10.8	10.8	10.8	10.8	10.8	10.8	10.8		

FIGURE 5-114. TAKE-OFF DISTANCE; FLAPS - 20° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	97				
	N1%	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
39600	BFL	8870	9030	9250	9570	10260	11060	11930	12930	13170			145	195
	V1	122	122	122	123	125	128	130	132	133				
	VR	142	142	142	142	143	145	146	147	147				
	V2	147	147	147	147	147	148	149	149	149				
	GR2	4.3	4.3	4.1	3.8	3.5	3.3	2.8	2.3	2.2				
39000	BFL	8460	8610	8820	9130	9800	10560	11450	12370	12600			144	193
	V1	120	120	120	121	123	125	128	130	131				
	VR	140	140	140	140	141	143	144	145	145				
	V2	145	145	145	145	146	147	147	147	148				
	GR2	4.4	4.4	4.3	4	3.7	3.4	3	2.5	2.4				
38000	BFL	7810	7950	8140	8420	9040	9780	10600	11480	11690			141	191
	V1	116	116	116	117	119	121	124	126	127				
	VR	136	136	136	136	138	140	141	142	142				
	V2	142	142	142	142	142	144	144	145	145				
	GR2	4.8	4.8	4.6	4.3	4	3.8	3.3	2.8	2.7				
37000	BFL	7200	7330	7510	7770	8330	9020	9790	10640	10840			139	188
	V1	112	112	112	113	115	117	120	123	123				
	VR	133	133	133	133	134	136	138	139	139				
	V2	139	139	138	138	139	140	141	142	142				
	GR2	5.1	5.1	5	4.7	4.4	4.1	3.6	3.1	3				
36000	BFL	6640	6750	6910	7160	7660	8290	9040	9830	10030			136	185
	V1	108	108	108	109	111	113	116	119	119				
	VR	129	129	129	129	131	133	134	136	136				
	V2	136	136	135	135	136	137	138	139	139				
	GR2	5.5	5.5	5.3	5	4.7	4.4	4	3.4	3.3				
35000	BFL	6100	6210	6360	6580	7040	7610	8290	9050	9230			134	182
	V1	104	104	104	105	107	109	112	115	116				
	VR	126	126	126	126	127	129	131	132	133				
	V2	133	133	132	132	133	134	135	136	136				
	GR2	5.9	5.9	5.7	5.4	5.1	4.8	4.3	3.8	3.6				
34000	BFL	5600	5700	5840	6040	6470	6980	7600	8310	8490			131	179
	V1	101	101	101	101	103	105	108	111	112				
	VR	122	122	122	122	124	126	127	129	129				
	V2	130	130	129	129	130	131	132	133	133				
	GR2	6.3	6.3	6.1	5.8	5.4	5.1	4.7	4.1	4				
33000	BFL	5140	5230	5360	5540	5930	6400	6960	7600	7760			128	176
	V1	97	97	97	98	99	102	104	107	108				
	VR	119	119	119	119	120	122	124	125	126				
	V2	127	127	126	126	127	128	129	130	130				
	GR2	6.7	6.7	6.5	6.2	5.8	5.5	5.1	4.5	4.4				
32000	BFL	4750	4840	4910	5070	5420	5860	6360	6940	7090			126	173
	V1	93	93	93	94	96	98	100	103	104				
	VR	115	115	115	115	117	118	120	122	122				
	V2	124	124	123	123	124	125	126	127	127				
	GR2	7.1	7.1	6.9	6.6	6.2	5.9	5.5	4.9	4.8				

FIGURE 5-114. TAKE-OFF DISTANCE; FLAPS - 20° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	97				
	N1%	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
31000	BFL	4700	4790	4820	4810	4960	5340	5810	6330	6460			123	170
	V1	94	94	93	92	92	94	96	99	100				
	VR	112	112	112	112	113	115	117	118	118				
	V2	121	121	121	121	121	122	123	124	124				
	GR2	7.6	7.6	7.4	7	6.7	6.4	5.9	5.3	5.2				
30000	BFL	4660	4750	4770	4770	4780	4880	5280	5760	5880			121	167
	V1	94	94	93	92	91	90	93	95	96				
	VR	109	109	109	109	110	111	113	115	115				
	V2	119	119	119	118	118	119	120	121	121				
	GR2	8.1	8.2	7.9	7.5	7.2	6.8	6.3	5.7	5.6				
29000	BFL	4630	4700	4730	4720	4740	4770	4810	5230	5330			119	164
	V1	94	94	93	92	91	90	89	91	92				
	VR	107	107	107	107	107	108	109	111	111				
	V2	117	117	117	117	116	116	117	118	118				
	GR2	8.7	8.7	8.5	8.1	7.7	7.3	6.8	6.2	6.1				
28000	BFL	4580	4660	4680	4680	4690	4720	4710	4780	4870			117	161
	V1	94	94	93	92	91	90	88	88	88				
	VR	106	106	106	106	105	105	106	108	108				
	V2	116	116	116	115	115	114	114	115	115				
	GR2	9.4	9.4	9.1	8.7	8.3	7.9	7.4	6.7	6.6				
27000	BFL	4540	4610	4640	4630	4650	4680	4660	4610	4590			115	158
	V1	94	94	94	92	91	90	88	86	86				
	VR	104	104	104	104	104	104	104	104	105				
	V2	115	115	115	114	114	113	112	112	112				
	GR2	10.1	10.1	9.8	9.4	8.9	8.5	7.9	7.3	7.1				
26000	BFL	4500	4570	4590	4590	4610	4630	4620	4560	4550			113	155
	V1	94	94	94	93	91	90	89	87	86				
	VR	102	102	102	102	102	102	102	102	102				
	V2	114	114	114	113	112	112	111	110	110				
	GR2	10.8	10.8	10.5	10.1	9.6	9.2	8.6	7.9	7.7				

FIGURE 5-115. TAKE-OFF DISTANCE; FLAPS - 20° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.7	82.1	83.0	84.0	84.9	85.8	86.7	87.5	88.4	89.3	90.1		
39600	BFL	7970	8110	8260	8410	8550	8730	8900	9080	9250	9420	9600	147	195
	V1	127	127	127	127	126	126	126	126	126	125	125		
	VR	145	145	145	145	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.9	3.9	3.9	4	4	4	4	4	4	4	4		
39000	BFL	7610	7740	7890	8030	8160	8320	8480	8650	8810	8980	9140	145	194
	V1	125	125	125	124	124	124	123	123	123	123	123		
	VR	143	143	143	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
38000	BFL	7010	7140	7270	7400	7520	7680	7830	7980	8130	8280	8430	142	191
	V1	121	121	120	120	120	120	119	119	119	119	119		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
37000	BFL	6470	6580	6700	6820	6930	7070	7210	7350	7490	7620	7760	140	188
	V1	117	117	116	116	116	116	115	115	115	115	115		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.9	4.9	4.9	4.9	4.9		
36000	BFL	5960	6060	6170	6270	6380	6510	6640	6760	6890	7010	7140	137	185
	V1	113	113	112	112	112	111	111	111	111	111	111		
	VR	132	132	132	132	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
35000	BFL	5480	5570	5670	5770	5870	5990	6100	6210	6330	6450	6560	135	183
	V1	109	109	108	108	108	107	107	107	107	107	107		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.5	5.5	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
34000	BFL	5030	5120	5210	5300	5390	5490	5600	5700	5810	5910	6020	132	180
	V1	105	105	104	104	104	104	103	103	103	103	103		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.9	5.9	5.9	6	6	6	6	6	6	6	6		
33000	BFL	4620	4690	4780	4860	4940	5030	5130	5220	5320	5410	5510	129	177
	V1	101	101	100	100	100	100	100	99	99	99	99		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
32000	BFL	4240	4300	4380	4450	4530	4610	4700	4780	4870	4960	5040	127	174
	V1	97	97	97	96	96	96	96	96	95	95	95		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		

FIGURE 5-115. TAKE-OFF DISTANCE; FLAPS - 20° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 81.7	-50 -58 82.1	-45 -49 83.0	-40 -40 84.0	-35 -31 84.9	-30 -22 85.8	-25 -13 86.7	-20 -4 87.5	-15 5 88.4	-10 14 89.3	-5 23 90.1	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3890	3960	4030	4110	4200	4290	4380	4470	4560	4650	4740	124	171
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	114	114	114	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
30000	BFL	3820	3890	3980	4070	4160	4250	4340	4420	4520	4610	4690	121	168
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
29000	BFL	3830	3860	3940	4040	4140	4220	4300	4380	4470	4570	4650	119	165
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
28000	BFL	3790	3830	3920	4000	4090	4180	4270	4340	4430	4530	4600	117	161
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	116	116	116		
	GR2	8.9	8.9	8.9	8.9	9	9	9	9	9	9	9		
27000	BFL	3760	3800	3880	3970	4060	4130	4230	4310	4390	4480	4560	115	158
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.7	9.7	9.7		
26000	BFL	3730	3760	3850	3940	4020	4110	4180	4270	4350	4440	4510	113	155
	V1	94	94	94	94	94	94	94	93	93	93	93		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	114	114	114	114		
	GR2	10.3	10.3	10.3	10.3	10.4	10.4	10.4	10.4	10.4	10.4	10.4		

FIGURE 5-115. TAKE-OFF DISTANCE; FLAPS - 20° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	93					
	N1%	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.5					
39600	BFL	9770	9970	10280	10770	11610	12470	13490					147	195
	V1	125	125	126	127	129	131	134						
	VR	144	144	144	145	146	147	148						
	V2	149	149	148	148	149	150	150						
	GR2	4	4	3.7	3.4	3.1	2.8	2.4						
39000	BFL	9310	9500	9800	10280	11090	11920	12890	13800				145	194
	V1	123	123	123	125	127	129	131	133					
	VR	142	142	142	143	144	145	146	147					
	V2	147	147	146	146	148	148	149	149					
	GR2	4.2	4.1	3.9	3.6	3.3	3	2.5	2.1					
38000	BFL	8580	8750	9040	9470	10250	11060	11950	12780				142	191
	V1	119	119	119	121	123	125	127	130					
	VR	139	139	139	139	141	142	143	144					
	V2	144	143	143	143	144	146	146	146					
	GR2	4.5	4.5	4.2	3.9	3.6	3.3	2.8	2.4					
37000	BFL	7900	8060	8320	8720	9460	10210	11060	11830				140	188
	V1	114	114	115	116	119	121	124	126					
	VR	135	135	135	136	138	139	140	141					
	V2	140	140	140	140	142	142	143	143					
	GR2	4.9	4.8	4.5	4.2	3.9	3.6	3.2	2.7					
36000	BFL	7270	7410	7650	8020	8680	9410	10220	10940				137	185
	V1	110	110	111	112	115	117	120	122					
	VR	131	131	131	132	134	135	137	138					
	V2	137	137	137	137	138	139	140	141					
	GR2	5.2	5.2	4.9	4.5	4.2	3.9	3.5	3					
35000	BFL	6680	6810	7030	7370	7960	8620	9400	10090				135	183
	V1	106	106	107	108	111	113	116	118					
	VR	128	128	128	128	130	132	133	134					
	V2	134	134	134	134	135	136	137	138					
	GR2	5.6	5.5	5.2	4.9	4.6	4.3	3.8	3.4					
34000	BFL	6120	6240	6450	6750	7290	7890	8630	9260				132	180
	V1	103	103	103	104	107	109	112	114					
	VR	124	124	124	125	126	128	130	131					
	V2	131	131	130	130	132	133	134	135					
	GR2	6	5.9	5.6	5.3	4.9	4.6	4.2	3.7					
33000	BFL	5610	5720	5900	6180	6680	7220	7870	8490				129	177
	V1	99	99	99	100	103	105	108	110					
	VR	121	121	121	121	123	125	126	128					
	V2	128	128	127	127	129	130	131	132					
	GR2	6.4	6.3	6	5.6	5.3	5	4.6	4.1					
32000	BFL	5130	5230	5400	5650	6100	6600	7180	7740				127	174
	V1	95	95	96	97	99	101	104	106					
	VR	117	117	117	118	119	121	123	124					
	V2	125	125	124	124	126	127	128	128					
	GR2	6.8	6.8	6.4	6.1	5.7	5.4	4.9	4.5					

FIGURE 5-115. TAKE-OFF DISTANCE; FLAPS - 20° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	93					
	N1%	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.5					
31000	BFL	4820	4890	4940	5160	5560	6010	6550	7040				124	171
	V1	92	92	92	93	95	97	100	102					
	VR	113	113	113	114	116	117	119	120					
	V2	122	122	121	121	122	124	125	125					
	GR2	7.3	7.2	6.8	6.5	6.2	5.8	5.4	4.9					
30000	BFL	4780	4850	4830	4820	5070	5470	5950	6400				121	168
	V1	93	92	91	91	91	93	96	98					
	VR	110	110	110	111	112	114	115	117					
	V2	119	119	119	119	119	121	121	122					
	GR2	7.8	7.7	7.3	6.9	6.6	6.3	5.8	5.3					
29000	BFL	4730	4800	4780	4780	4810	4970	5390	5800				119	165
	V1	93	93	91	90	89	89	92	94					
	VR	108	108	108	108	108	110	112	113					
	V2	117	117	117	116	116	117	118	119					
	GR2	8.4	8.3	7.9	7.5	7.1	6.8	6.3	5.8					
28000	BFL	4700	4750	4740	4730	4760	4790	4890	5250				117	161
	V1	93	93	92	90	89	88	87	90					
	VR	105	105	105	105	105	106	108	109					
	V2	116	115	115	114	114	114	115	116					
	GR2	9	8.9	8.5	8	7.6	7.3	6.8	6.2					
27000	BFL	4640	4710	4690	4690	4710	4740	4720	4780				115	158
	V1	93	93	92	91	89	88	86	86					
	VR	104	104	104	104	104	104	105	106					
	V2	114	114	114	113	112	112	112	113					
	GR2	9.7	9.6	9.1	8.7	8.3	7.8	7.3	6.8					
26000	BFL	4600	4660	4650	4640	4670	4670	4670	4620				113	155
	V1	93	93	92	91	89	88	87	85					
	VR	102	102	102	102	102	102	102	103					
	V2	114	113	113	112	111	111	110	110					
	GR2	10.4	10.3	9.8	9.4	8.9	8.5	7.9	7.3					

FIGURE 5-116. TAKE-OFF DISTANCE; FLAPS - 20° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
39600	BFL	8750	8900	9080	9250	9430	9620	9820	10010	10200	10390	10580	148	196
	V1	130	130	130	129	129	129	129	129	128	128	128		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		
39000	BFL	8350	8490	8660	8820	9000	9180	9370	9550	9730	9910	10100	146	194
	V1	128	127	127	127	127	127	126	126	126	126	126		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
38000	BFL	7720	7850	8000	8150	8310	8480	8650	8820	8980	9150	9320	144	191
	V1	124	123	123	123	123	122	122	122	122	122	122		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4.2	4.2	4.2	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3		
37000	BFL	7090	7210	7350	7490	7630	7790	7940	8090	8250	8400	8550	141	189
	V1	119	119	119	119	118	118	118	118	118	117	117		
	VR	138	138	138	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
36000	BFL	6520	6630	6760	6880	7010	7150	7290	7430	7570	7710	7850	138	186
	V1	115	115	115	114	114	114	114	114	113	113	113		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	5	5	5		
35000	BFL	5990	6080	6200	6310	6430	6560	6690	6820	6940	7070	7200	136	183
	V1	111	111	111	110	110	110	110	109	109	109	109		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
34000	BFL	5490	5580	5680	5790	5900	6010	6130	6240	6360	6470	6590	133	180
	V1	107	107	106	106	106	106	106	105	105	105	105		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	132	132	132	132		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
33000	BFL	5020	5100	5200	5290	5390	5500	5600	5710	5810	5920	6020	130	177
	V1	103	103	102	102	102	102	102	101	101	101	101		
	VR	123	123	123	123	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
32000	BFL	4590	4660	4750	4830	4920	5020	5110	5210	5300	5400	5490	127	174
	V1	99	99	98	98	98	98	98	97	97	97	97		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.5	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6		

FIGURE 5-116. TAKE-OFF DISTANCE; FLAPS - 20° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
31000	BFL	4210	4270	4350	4430	4510	4600	4680	4770	4850	4940	5020	125	171
	V1	95	95	94	94	94	94	94	94	93	93	93		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.9	7	7	7	7	7	7	7	7	7	7		
30000	BFL	3920	3990	4080	4180	4270	4360	4450	4540	4630	4720	4810	122	168
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
29000	BFL	3900	3960	4060	4140	4230	4320	4410	4500	4590	4680	4770	119	165
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8	8	8	8	8	8	8	8	8	8	8		
28000	BFL	3870	3930	4020	4110	4200	4290	4360	4450	4540	4630	4730	117	162
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	116	116	116	116	116	116	116		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
27000	BFL	3840	3890	3980	4070	4160	4250	4330	4410	4500	4600	4670	115	159
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
26000	BFL	3810	3860	3950	4040	4120	4210	4290	4380	4450	4550	4630	113	155
	V1	92	92	92	93	93	92	92	92	92	92	92		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.9	9.9	10	10	10	10	10	10	10	10		

FIGURE 5-116. TAKE-OFF DISTANCE; FLAPS - 20° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	89					
	N1%	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
39600	BFL	10790	11080	11530	12250	13140	14140						148	196
	V1	128	129	130	132	133	135							
	VR	147	147	147	148	149	150							
	V2	151	150	150	151	151	152							
	GR2	3.7	3.5	3.2	3	2.7	2.3							
39000	BFL	10290	10570	10990	11690	12550	13520						146	194
	V1	126	126	127	129	131	133							
	VR	145	145	145	146	147	148							
	V2	149	149	149	149	150	150							
	GR2	3.9	3.7	3.4	3.1	2.8	2.5							
38000	BFL	9500	9760	10150	10790	11630	12510	13550	14040				144	191
	V1	122	122	123	125	127	129	131	133					
	VR	141	141	141	142	144	145	146	146					
	V2	146	145	145	146	147	147	148	148					
	GR2	4.2	4	3.7	3.4	3.1	2.8	2.4	2.2					
37000	BFL	8710	8950	9320	9950	10720	11580	12520	12980				141	189
	V1	117	118	119	121	123	125	127	128					
	VR	137	137	138	139	140	142	143	143					
	V2	142	142	142	143	144	144	145	145					
	GR2	4.6	4.4	4	3.7	3.5	3.1	2.7	2.5					
36000	BFL	8000	8220	8550	9120	9870	10670	11570	11980				138	186
	V1	113	113	114	116	119	121	123	125					
	VR	134	134	134	135	137	138	139	140					
	V2	139	139	139	139	140	141	142	142					
	GR2	4.9	4.7	4.4	4.1	3.8	3.4	3	2.8					
35000	BFL	7340	7540	7840	8350	9040	9810	10670	11060				136	183
	V1	109	109	110	112	115	117	120	121					
	VR	130	130	130	131	133	135	136	137					
	V2	136	135	135	136	137	138	139	139					
	GR2	5.3	5.1	4.7	4.4	4.1	3.8	3.3	3.1					
34000	BFL	6720	6900	7180	7640	8270	9000	9780	10160				133	180
	V1	105	105	106	108	110	113	115	117					
	VR	126	126	126	128	129	131	133	133					
	V2	132	132	132	133	134	135	136	136					
	GR2	5.7	5.4	5.1	4.8	4.5	4.1	3.7	3.4					
33000	BFL	6130	6300	6560	6980	7550	8190	8950	9300				130	177
	V1	101	101	102	104	106	108	111	113					
	VR	122	122	123	124	126	127	129	130					
	V2	129	129	129	129	131	132	133	133					
	GR2	6.1	5.8	5.5	5.2	4.8	4.5	4	3.8					
32000	BFL	5590	5750	5980	6370	6880	7470	8150	8490				127	174
	V1	97	97	98	100	102	104	107	108					
	VR	119	119	119	120	122	124	125	126					
	V2	126	126	126	126	127	128	130	130					
	GR2	6.5	6.3	5.9	5.5	5.2	4.9	4.4	4.2					

FIGURE 5-116. TAKE-OFF DISTANCE; FLAPS - 20° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	89					
	N1%	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
31000	BFL	5120	5250	5460	5790	6260	6790	7410	7710				125	171
	V1	93	93	94	96	98	100	103	104					
	VR	115	115	115	116	118	120	122	122					
	V2	123	123	123	123	124	125	126	127					
	GR2	7	6.7	6.3	6	5.7	5.3	4.8	4.6					
30000	BFL	4890	4900	4990	5280	5680	6160	6720	6990				122	168
	V1	91	91	90	92	94	96	99	100					
	VR	112	112	112	113	114	116	118	119					
	V2	120	120	120	120	121	122	123	123					
	GR2	7.4	7.2	6.8	6.4	6.1	5.7	5.3	5					
29000	BFL	4840	4840	4840	4850	5170	5580	6080	6330				119	165
	V1	92	91	89	88	90	92	95	96					
	VR	108	108	108	109	111	112	114	115					
	V2	117	117	117	117	118	119	120	120					
	GR2	8	7.7	7.3	6.9	6.6	6.2	5.7	5.4					
28000	BFL	4790	4790	4790	4800	4830	5050	5490	5710				117	162
	V1	92	91	90	88	88	88	91	92					
	VR	106	106	106	106	107	109	110	111					
	V2	115	115	115	115	115	116	117	117					
	GR2	8.6	8.3	7.8	7.4	7.1	6.7	6.2	5.9					
27000	BFL	4760	4770	4740	4750	4780	4800	4960	5140				115	159
	V1	92	91	90	89	87	86	86	87					
	VR	104	104	104	104	104	105	106	107					
	V2	114	114	113	112	112	113	113	114					
	GR2	9.2	8.9	8.4	8	7.6	7.2	6.7	6.4					
26000	BFL	4700	4710	4700	4710	4730	4750	4720	4700				113	155
	V1	92	91	90	89	88	86	85	84					
	VR	102	102	102	102	102	102	103	104					
	V2	113	113	112	111	110	110	111	111					
	GR2	9.9	9.6	9.1	8.7	8.3	7.8	7.3	7					

FIGURE 5-117. TAKE-OFF DISTANCE; FLAPS - 20° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.5	83.2	84.1	85.1	86.0	86.9	87.7	88.6	89.5	90.4	91.2		
39600	BFL	9600	9780	10000	10210	10420	10630	10850	11060	11280	11480	11700	149	196
	V1	133	133	133	132	132	132	132	132	132	131	131		
	VR	150	150	150	150	150	150	150	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
39000	BFL	9170	9330	9530	9740	9950	10150	10350	10560	10760	10940	11150	147	194
	V1	130	130	130	130	130	130	129	129	129	129	129		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		
38000	BFL	8450	8600	8790	8970	9160	9350	9530	9720	9910	10090	10280	145	192
	V1	126	126	126	126	125	125	125	125	125	125	124		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	4	4	4	4	4	4	4	4	4	4	4		
37000	BFL	7780	7920	8090	8260	8430	8600	8770	8940	9110	9280	9450	142	189
	V1	122	122	122	121	121	121	121	121	120	120	120		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
36000	BFL	7130	7260	7410	7560	7720	7880	8030	8190	8340	8490	8650	139	186
	V1	117	117	117	117	117	117	116	116	116	116	116		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
35000	BFL	6540	6650	6790	6930	7070	7210	7360	7490	7630	7770	7920	137	183
	V1	113	113	113	113	113	112	112	112	112	112	111		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	137	137	137	137	137	137	137	137		
	GR2	5	5	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
34000	BFL	5980	6080	6210	6340	6470	6590	6720	6850	6970	7100	7230	134	180
	V1	109	109	109	108	108	108	108	108	108	107	107		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.4	5.4	5.4	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5		
33000	BFL	5460	5550	5670	5780	5900	6020	6130	6250	6360	6480	6600	131	177
	V1	105	105	104	104	104	104	104	103	103	103	103		
	VR	125	125	125	125	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
32000	BFL	4980	5060	5170	5270	5380	5480	5590	5690	5800	5900	6000	128	175
	V1	101	100	100	100	100	100	99	99	99	99	99		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		

FIGURE 5-117. TAKE-OFF DISTANCE; FLAPS - 20° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 82.5	-50 -58 83.2	-45 -49 84.1	-40 -40 85.1	-35 -31 86.0	-30 -22 86.9	-25 -13 87.7	-20 -4 88.6	-15 5 89.5	-10 14 90.4	-5 23 91.2	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	4540	4610	4710	4800	4890	4990	5080	5180	5270	5360	5460	126	172
	V1	96	96	96	96	96	96	95	95	95	95	95		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8		
30000	BFL	4160	4230	4310	4390	4480	4570	4650	4740	4820	4900	4990	123	168
	V1	92	92	92	92	92	92	92	91	91	91	91		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
29000	BFL	4000	4070	4160	4250	4340	4430	4530	4620	4710	4800	4900	120	165
	V1	91	91	91	91	91	91	91	91	91	91	91		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.8		
28000	BFL	3970	4030	4130	4220	4310	4400	4490	4580	4670	4770	4860	117	162
	V1	91	91	91	91	91	91	91	91	91	91	91		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
27000	BFL	3930	4000	4090	4180	4270	4360	4450	4540	4630	4710	4800	115	159
	V1	91	91	91	91	91	91	91	91	91	91	91		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
26000	BFL	3900	3970	4050	4130	4230	4320	4400	4490	4580	4660	4760	113	156
	V1	92	92	92	92	91	91	91	91	91	91	91		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 5-117. TAKE-OFF DISTANCE; FLAPS - 20° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	86					
	N1%	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
39600	BFL	11970	12380	13020	13890	14910							149	196
	V1	132	132	134	136	138								
	VR	149	149	150	151	152								
	V2	153	152	152	153	154								
	GR2	3.4	3.1	2.8	2.5	2.2								
39000	BFL	11430	11800	12410	13270	14240							147	194
	V1	129	130	131	133	135								
	VR	147	147	148	149	150								
	V2	151	150	150	151	152								
	GR2	3.6	3.3	3	2.7	2.4								
38000	BFL	10520	10880	11440	12280	13170	14180						145	192
	V1	125	126	127	129	131	133							
	VR	144	144	144	146	147	147							
	V2	147	147	147	148	149	149							
	GR2	3.9	3.6	3.3	3	2.7	2.4							
37000	BFL	9680	10010	10530	11300	12180	13100	14220	14270				142	189
	V1	120	121	123	125	127	129	131	132					
	VR	140	140	141	142	143	144	145	145					
	V2	144	144	144	145	146	146	147	147					
	GR2	4.2	3.9	3.6	3.3	3	2.7	2.2	2.2					
36000	BFL	8860	9160	9670	10380	11210	12080	13110	13150				139	186
	V1	116	117	118	120	123	125	127	127					
	VR	136	136	137	138	140	141	142	142					
	V2	141	141	141	142	143	143	144	144					
	GR2	4.6	4.2	3.9	3.6	3.3	3	2.5	2.5					
35000	BFL	8110	8380	8830	9520	10280	11140	12070	12110				137	183
	V1	112	112	114	116	118	121	123	123					
	VR	132	132	133	135	136	138	138	139					
	V2	137	137	137	138	139	141	141	141					
	GR2	4.9	4.6	4.2	3.9	3.7	3.3	2.8	2.8					
34000	BFL	7410	7660	8070	8680	9420	10190	11110	11150				134	180
	V1	107	108	110	112	114	116	119	119					
	VR	128	128	129	131	133	134	135	135					
	V2	134	134	134	135	136	137	138	138					
	GR2	5.3	4.9	4.6	4.3	4	3.7	3.2	3.2					
33000	BFL	6760	6980	7360	7920	8580	9320	10170	10210				131	177
	V1	103	104	105	107	110	112	115	115					
	VR	124	124	125	127	129	130	132	132					
	V2	131	130	130	131	133	134	135	135					
	GR2	5.7	5.3	5	4.7	4.4	4.1	3.5	3.5					
32000	BFL	6150	6360	6700	7200	7800	8490	9280	9310				128	175
	V1	99	100	101	103	106	108	111	111					
	VR	121	121	121	123	125	127	128	128					
	V2	127	127	127	128	129	131	132	132					
	GR2	6.1	5.7	5.4	5.1	4.8	4.4	3.9	3.9					

FIGURE 5-117. TAKE-OFF DISTANCE; FLAPS - 20° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	86					
	N1%	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
31000	BFL	5590	5780	6090	6540	7080	7690	8440	8470				126	172
	V1	95	96	97	99	101	104	107	107					
	VR	117	117	117	119	121	123	124	124					
	V2	124	124	124	125	126	127	128	128					
	GR2	6.6	6.1	5.8	5.4	5.2	4.8	4.3	4.3					
30000	BFL	5110	5270	5540	5930	6410	6960	7630	7660				123	168
	V1	91	92	93	95	97	99	102	102					
	VR	113	113	114	115	117	119	120	121					
	V2	121	120	120	121	123	124	125	125					
	GR2	7	6.6	6.2	5.9	5.6	5.3	4.7	4.7					
29000	BFL	4930	4900	5050	5380	5800	6290	6900	6920				120	165
	V1	90	89	89	91	93	95	98	98					
	VR	110	110	110	111	113	115	117	117					
	V2	118	117	117	118	119	121	121	122					
	GR2	7.5	7.1	6.7	6.3	6	5.7	5.1	5.1					
28000	BFL	4880	4850	4850	4890	5250	5670	6210	6230				117	162
	V1	90	89	88	87	89	91	94	94					
	VR	106	106	107	108	109	111	113	113					
	V2	115	115	115	115	116	117	118	118					
	GR2	8.1	7.6	7.2	6.8	6.5	6.2	5.6	5.6					
27000	BFL	4830	4810	4800	4820	4850	5110	5580	5600				115	159
	V1	90	89	88	87	87	87	89	89					
	VR	104	104	104	104	106	107	109	109					
	V2	114	113	112	112	113	114	115	115					
	GR2	8.7	8.2	7.8	7.4	7	6.7	6.1	6.1					
26000	BFL	4790	4750	4750	4770	4800	4830	5010	5030				113	156
	V1	91	89	88	87	86	85	85	85					
	VR	102	102	102	102	102	103	105	105					
	V2	112	112	111	110	110	111	111	111					
	GR2	9.4	8.9	8.4	8	7.6	7.3	6.6	6.6					

FIGURE 5-118. TAKE-OFF DISTANCE; FLAPS - 20° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC / OATF / N1%	-54 / -65 / 83.1	-50 / -58 / 83.7	-45 / -49 / 84.6	-40 / -40 / 85.6	-35 / -31 / 86.5	-30 / -22 / 87.4	-25 / -13 / 88.3	-20 / -4 / 89.2	-15 / 5 / 90.0	-10 / 14 / 90.9	-5 / 23 / 91.8	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
39600	BFL	10680	10870	11090	11310	11550	11790	12030	12270	12500	12740	13030	150	197
	V1	136	136	136	136	136	136	135	135	135	135	135		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2		
39000	BFL	10200	10370	10580	10790	11020	11240	11470	11700	11920	12150	12420	148	195
	V1	134	134	133	133	133	133	133	133	132	132	132		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4		
38000	BFL	9390	9550	9740	9930	10140	10350	10560	10770	10970	11180	11430	146	192
	V1	129	129	129	129	129	128	128	128	128	128	128		
	VR	147	147	147	147	147	147	147	147	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.7	3.7	3.7	3.7	3.7	3.8	3.8	3.8	3.8	3.8	3.7		
37000	BFL	8640	8790	8960	9140	9330	9520	9710	9900	10090	10280	10510	143	189
	V1	125	125	125	124	124	124	124	124	124	124	124		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	146		
	GR2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4		
36000	BFL	7930	8070	8220	8380	8560	8730	8910	9080	9250	9420	9640	140	186
	V1	121	121	120	120	120	120	119	119	119	119	119		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
35000	BFL	7240	7360	7500	7650	7810	7970	8120	8280	8430	8590	8790	138	184
	V1	116	116	116	115	115	115	115	115	115	114	114		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7		
34000	BFL	6610	6720	6850	6980	7130	7270	7410	7550	7690	7830	8010	135	181
	V1	112	112	111	111	111	111	110	110	110	110	110		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1		
33000	BFL	6030	6130	6240	6360	6500	6620	6750	6880	7010	7140	7300	132	178
	V1	107	107	107	107	107	106	106	106	106	106	106		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5		
32000	BFL	5490	5580	5680	5790	5910	6020	6140	6250	6370	6490	6640	129	175
	V1	103	103	103	102	102	102	102	102	102	101	101		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6	6	6	6	6	6	6	6	6	6	5.9		

FIGURE 5-118. TAKE-OFF DISTANCE; FLAPS - 20° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 83.1	-50 -58 83.7	-45 -49 84.6	-40 -40 85.6	-35 -31 86.5	-30 -22 87.4	-25 -13 88.3	-20 -4 89.2	-15 5 90.0	-10 14 90.9	-5 23 91.8	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	4990	5070	5160	5260	5370	5470	5570	5680	5780	5890	6020	127	172
	V1	99	99	98	98	98	98	98	97	97	97	97		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.4		
30000	BFL	4530	4610	4690	4780	4880	4970	5060	5160	5250	5340	5460	124	169
	V1	94	94	94	94	94	94	94	93	93	93	93		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	122		
	GR2	6.9	6.9	6.9	6.9	6.9	7	7	7	7	7	6.8		
29000	BFL	4140	4210	4290	4370	4470	4560	4660	4750	4850	4940	5000	121	166
	V1	91	90	90	90	90	90	90	90	90	90	89		
	VR	112	112	112	111	111	111	111	111	111	111	111		
	V2	120	120	119	119	119	119	119	119	119	119	119		
	GR2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.3		
28000	BFL	4070	4140	4240	4330	4420	4520	4610	4710	4800	4890	4950	118	162
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	8	8	8	8	8	8	8	8	8	8	7.9		
27000	BFL	4030	4100	4200	4290	4380	4470	4570	4660	4750	4840	4900	115	159
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.5		
26000	BFL	3990	4060	4150	4250	4340	4430	4520	4610	4700	4790	4850	113	156
	V1	91	91	91	91	91	90	90	90	90	90	90		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.1		

FIGURE 5-118. TAKE-OFF DISTANCE; FLAPS - 20° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	82						
	N1%	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
	BFL	13430	14020	14850										
	V1	136	137	139										
39600	VR	152	153	153									150	197
	V2	155	155	155										
	GR2	2.9	2.6	2.3										
	BFL	12810	13380	14180	15160									
	V1	133	134	136	138									
39000	VR	150	151	151	152								148	195
	V2	153	153	153	154									
	GR2	3.1	2.8	2.5	2.3									
	BFL	11790	12320	13110	14000	15050								
	V1	129	130	132	134	136								
38000	VR	146	147	148	149	150							146	192
	V2	150	150	150	151	151								
	GR2	3.4	3.1	2.8	2.5	2.3								
	BFL	10840	11330	12060	12920	13880	15000							
	V1	124	125	127	129	131	133							
37000	VR	143	143	144	145	146	147						143	189
	V2	146	146	147	147	148	149							
	GR2	3.8	3.4	3.1	2.8	2.6	2.2							
	BFL	9950	10400	11070	11880	12790	13810	14580						
36000	V1	120	121	123	125	127	129	131					140	186
	VR	139	139	140	142	143	144	144						
	V2	143	143	143	144	145	145	146						
	GR2	4.1	3.8	3.4	3.2	2.9	2.5	2.2						
	BFL	9070	9510	10140	10880	11770	12690	13400						
	V1	115	116	118	121	123	125	127						
35000	VR	135	135	137	138	139	140	141					138	184
	V2	139	139	140	141	142	142	143						
	GR2	4.4	4.1	3.8	3.5	3.2	2.8	2.5						
	BFL	8270	8650	9260	9970	10760	11660	12300						
	V1	111	112	114	116	118	121	122						
34000	VR	131	131	133	134	136	137	138					135	181
	V2	136	136	136	138	139	139	140						
	GR2	4.8	4.4	4.1	3.8	3.5	3.2	2.8						
	BFL	7540	7880	8410	9080	9830	10660	11280						
	V1	106	108	109	112	114	116	118						
33000	VR	127	127	129	130	132	133	134					132	178
	V2	132	132	133	134	135	136	137						
	GR2	5.2	4.8	4.5	4.2	3.9	3.5	3.2						
	BFL	6850	7170	7650	8230	8950	9740	10290						
	V1	102	103	105	107	110	112	114						
32000	VR	123	123	125	126	128	130	131					129	175
	V2	129	129	129	130	132	133	133						
	GR2	5.6	5.2	4.9	4.6	4.3	3.9	3.6						

FIGURE 5-118. TAKE-OFF DISTANCE; FLAPS - 20° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	82						
	N1%	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
31000	BFL	6220	6510	6930	7460	8090	8830	9360					127	172
	V1	98	99	101	103	105	108	110						
	VR	119	119	121	122	124	126	127						
	V2	125	125	126	127	128	130	130						
	GR2	6	5.6	5.3	5	4.7	4.3	4						
30000	BFL	5640	5900	6280	6750	7310	7970	8470					124	169
	V1	94	95	96	98	101	103	105						
	VR	115	116	117	118	120	122	123						
	V2	122	122	122	123	125	126	127						
	GR2	6.5	6.1	5.7	5.4	5.1	4.7	4.4						
29000	BFL	5130	5350	5680	6100	6600	7190	7630					121	166
	V1	90	91	92	94	96	99	101						
	VR	111	112	113	114	116	118	119						
	V2	119	119	119	120	121	123	123						
	GR2	6.9	6.5	6.2	5.8	5.5	5.1	4.8						
28000	BFL	4930	4910	5150	5510	5950	6470	6860					118	162
	V1	88	88	88	90	92	94	96						
	VR	108	108	109	110	112	114	115						
	V2	116	116	116	117	118	119	120						
	GR2	7.5	7	6.7	6.3	6	5.6	5.3						
27000	BFL	4880	4860	4870	4980	5350	5810	6160					115	159
	V1	89	87	86	86	88	90	92						
	VR	105	105	105	107	108	110	111						
	V2	113	113	113	114	115	116	116						
	GR2	8	7.6	7.2	6.8	6.5	6.1	5.8						
26000	BFL	4840	4810	4820	4840	4870	5210	5510					113	156
	V1	89	87	86	85	84	86	87						
	VR	102	102	102	103	104	106	107						
	V2	112	111	110	110	111	112	113						
	GR2	8.7	8.2	7.8	7.4	7	6.6	6.3						

FIGURE 5-119. TAKE-OFF DISTANCE; FLAPS - 20° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	83.5	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.4		
39600	BFL	11850	12050	12310	12570	12840	13110	13370	13640	13900	14180	14580	151	197
	V1	140	140	140	139	139	139	139	139	139	139	139		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	158	158	157		
	GR2	3	3	3	3	3	3	3	3	3	3	2.8		
39000	BFL	11300	11490	11730	11990	12240	12490	12750	13000	13250	13510	13900	150	195
	V1	137	137	137	137	137	136	136	136	136	136	137		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	155		
	GR2	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	3.2	3.2	3		
38000	BFL	10410	10590	10810	11050	11280	11510	11740	11980	12210	12440	12800	147	193
	V1	133	133	132	132	132	132	132	132	132	132	132		
	VR	150	150	150	150	150	150	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.3		
37000	BFL	9570	9730	9930	10150	10360	10570	10780	11000	11210	11420	11760	144	190
	V1	128	128	128	128	128	127	127	127	127	127	127		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.6		
36000	BFL	8790	8940	9120	9310	9500	9700	9890	10090	10260	10450	10760	142	187
	V1	124	124	123	123	123	123	123	123	122	122	123		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	145	145	145		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	3.9		
35000	BFL	8030	8170	8330	8510	8680	8860	9030	9210	9380	9560	9840	139	184
	V1	119	119	119	119	119	118	118	118	118	118	118		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.3		
34000	BFL	7310	7430	7580	7740	7900	8060	8210	8370	8530	8690	8940	136	181
	V1	115	114	114	114	114	114	113	113	113	113	113		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.7		
33000	BFL	6650	6760	6890	7040	7180	7330	7470	7610	7750	7900	8130	133	178
	V1	110	110	110	109	109	109	109	109	109	109	109		
	VR	130	130	130	130	130	130	130	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	134		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.1		
32000	BFL	6050	6140	6270	6400	6530	6660	6780	6910	7040	7170	7380	130	175
	V1	106	105	105	105	105	105	104	104	104	104	104		
	VR	126	126	126	126	126	126	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.5		

FIGURE 5-119. TAKE-OFF DISTANCE; FLAPS - 20° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 83.5	-50 -58 84.2	-45 -49 85.2	-40 -40 86.1	-35 -31 87.0	-30 -22 87.9	-25 -13 88.8	-20 -4 89.7	-15 5 90.6	-10 14 91.5	-5 23 92.4	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	5490	5580	5690	5800	5920	6040	6150	6260	6380	6500	6690	128	172
	V1	101	101	101	101	100	100	100	100	100	100	100		
	VR	122	122	122	122	122	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	127		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	5.9		
30000	BFL	4970	5050	5150	5250	5360	5460	5560	5670	5770	5880	6050	125	169
	V1	97	97	96	96	96	96	96	96	95	95	96		
	VR	118	118	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.3		
29000	BFL	4520	4590	4680	4770	4860	4950	5050	5140	5230	5330	5470	122	166
	V1	93	92	92	92	92	92	92	91	91	91	92		
	VR	114	114	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	120		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.8		
28000	BFL	4160	4230	4330	4420	4510	4610	4710	4810	4900	4980	5000	119	163
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	117		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.3		
27000	BFL	4120	4190	4280	4380	4470	4570	4660	4760	4850	4930	4950	116	160
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	7.9		
26000	BFL	4080	4150	4240	4330	4430	4520	4610	4710	4800	4880	4900	113	156
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	112	112	112	112	112	112	112	112	112	112	111		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.5		

FIGURE 5-119. TAKE-OFF DISTANCE; FLAPS - 20° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	79						
	N1%	93.0	93.0	93.0	92.6	92.0	91.3	91.1						
39600	BFL	15160	16010										151	197
	V1	140	142											
	VR	155	156											
	V2	157	157											
	GR2	2.5	2.2											
39000	BFL	14450	15260										150	195
	V1	138	139											
	VR	153	154											
	V2	155	155											
	GR2	2.7	2.4											
38000	BFL	13320	14080	14970									147	193
	V1	133	135	136										
	VR	150	150	151										
	V2	152	152	152										
	GR2	3	2.7	2.4										
37000	BFL	12230	12950	13800	14770								144	190
	V1	128	130	132	134									
	VR	146	146	147	148									
	V2	148	149	149	150									
	GR2	3.3	3	2.7	2.4									
36000	BFL	11220	11880	12680	13590	14620							142	187
	V1	124	125	127	129	131								
	VR	142	143	144	145	146								
	V2	145	145	146	147	147								
	GR2	3.6	3.3	3	2.7	2.4								
35000	BFL	10250	10900	11610	12480	13420	14570	14910					139	184
	V1	119	121	123	125	127	129	130						
	VR	138	139	140	141	142	143	144						
	V2	141	142	143	143	144	145	145						
	GR2	4	3.6	3.3	3	2.8	2.3	2.2						
34000	BFL	9340	9910	10620	11410	12310	13340	13630					136	181
	V1	114	116	118	121	123	125	126						
	VR	134	135	136	137	139	140	140						
	V2	138	138	139	140	141	142	142						
	GR2	4.3	4	3.7	3.4	3.1	2.7	2.5						
33000	BFL	8470	9000	9650	10410	11250	12210	12460					133	178
	V1	110	112	114	116	118	121	121						
	VR	130	131	132	134	135	136	137						
	V2	134	134	135	137	138	138	138						
	GR2	4.7	4.3	4	3.7	3.4	3	2.9						
32000	BFL	7700	8170	8730	9450	10240	11150	11390					130	175
	V1	105	107	109	111	114	116	117						
	VR	126	127	128	130	131	133	133						
	V2	131	131	132	133	134	135	135						
	GR2	5.1	4.7	4.4	4.1	3.8	3.4	3.3						

FIGURE 5-119. TAKE-OFF DISTANCE; FLAPS - 20° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	79						
	N1%	93.0	93.0	93.0	92.6	92.0	91.3	91.1						
31000	BFL	6980	7400	7910	8540	9300	10130	10350					128	172
	V1	101	103	105	107	109	112	112						
	VR	122	123	124	125	127	129	129						
	V2	127	127	128	129	131	132	132						
	GR2	5.5	5.1	4.8	4.5	4.2	3.8	3.7						
30000	BFL	6310	6700	7150	7710	8390	9190	9380					125	169
	V1	97	98	100	102	105	107	108						
	VR	118	119	120	121	123	125	125						
	V2	124	124	125	126	127	129	129						
	GR2	5.9	5.5	5.2	4.9	4.6	4.2	4.1						
29000	BFL	5710	6040	6450	6950	7540	8260	8450					122	166
	V1	92	94	96	98	100	103	103						
	VR	114	114	116	117	119	121	121						
	V2	120	120	121	122	124	125	125						
	GR2	6.4	6	5.6	5.3	5	4.6	4.5						
28000	BFL	5170	5460	5810	6250	6780	7400	7580					119	163
	V1	88	90	91	93	95	98	99						
	VR	110	111	112	113	115	117	117						
	V2	117	117	118	119	120	121	122						
	GR2	6.9	6.5	6.1	5.8	5.5	5.1	4.9						
27000	BFL	4930	4940	5240	5620	6080	6630	6790					116	160
	V1	87	87	87	89	91	94	94						
	VR	106	107	108	109	111	113	113						
	V2	113	114	114	115	117	118	118						
	GR2	7.4	7	6.6	6.3	6	5.5	5.4						
26000	BFL	4890	4880	4880	5060	5450	5930	6060					113	156
	V1	87	86	84	85	87	89	90						
	VR	103	103	104	105	107	109	109						
	V2	111	111	111	112	113	114	114						
	GR2	8	7.6	7.2	6.8	6.5	6.1	5.9						

FIGURE 5-120. TAKE-OFF DISTANCE; FLAPS - 20° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	84.4	85.0	85.7	86.7	87.6	88.4	89.3	90.2	91.2	92.1	92.9		
39600	BFL	13220	13460	13790	14100	14420	14760	15090	15340	15600	15940	16520	152	198
	V1	144	144	144	144	144	144	144	143	143	143	144		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.4		
39000	BFL	12570	12810	13130	13420	13720	14040	14360	14600	14840	15180	15720	151	196
	V1	141	141	141	141	141	141	141	141	140	140	141		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.5		
38000	BFL	11560	11780	12070	12330	12600	12900	13200	13410	13640	13950	14440	148	193
	V1	136	136	136	136	136	136	136	136	136	136	137		
	VR	153	153	153	153	153	153	153	153	152	152	153		
	V2	155	155	155	155	155	155	155	155	155	155	154		
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	2.8		
37000	BFL	10640	10840	11100	11320	11570	11880	12150	12340	12520	12800	13260	145	190
	V1	132	132	132	131	131	131	131	131	131	131	132		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	151	151	152	152	152	151	151	151		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.2		
36000	BFL	9720	9900	10140	10360	10590	10850	11090	11260	11450	11720	12130	143	187
	V1	127	127	127	127	127	127	127	126	126	126	127		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	148	148	148	148	148	148	148	148	148	148	147		
	GR2	3.9	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.5		
35000	BFL	8890	9060	9270	9480	9690	9910	10140	10290	10470	10710	11080	140	184
	V1	122	122	122	122	122	122	122	121	121	121	122		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	3.8		
34000	BFL	8100	8250	8450	8630	8820	9030	9230	9370	9520	9750	10090	137	181
	V1	118	118	117	117	117	117	117	117	117	117	117		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	141	141	141	141	141	141	141	141	141	141	140		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.2		
33000	BFL	7370	7500	7680	7840	8020	8200	8390	8510	8650	8850	9160	134	179
	V1	113	113	113	113	113	112	112	112	112	112	113		
	VR	132	132	132	132	132	133	133	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5	5	5	5	5	4.9	4.9	4.9	5	4.8	4.6		
32000	BFL	6670	6790	6950	7100	7260	7420	7590	7700	7830	8010	8290	131	176
	V1	108	108	108	108	108	108	108	107	107	107	108		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5		

FIGURE 5-120. TAKE-OFF DISTANCE; FLAPS - 20° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 84.4	-50 -58 85.0	-45 -49 85.7	-40 -40 86.7	-35 -31 87.6	-30 -22 88.4	-25 -13 89.3	-20 -4 90.2	-15 5 91.2	-10 14 92.1	-5 23 92.9	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	6040	6150	6300	6430	6570	6720	6870	6970	7080	7250	7500	128	173
	V1	104	104	104	103	103	103	103	103	103	103	103		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	130	130	130	130	130	130	130	130	130	129	129		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.4		
30000	BFL	5460	5560	5690	5810	5940	6070	6200	6300	6400	6550	6770	126	170
	V1	99	99	99	99	99	99	99	98	98	98	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.1	5.8		
29000	BFL	4930	5020	5130	5240	5350	5470	5590	5670	5770	5900	6100	123	166
	V1	95	95	95	94	94	94	94	94	94	94	94		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.8	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.3		
28000	BFL	4470	4550	4650	4740	4840	4950	5050	5130	5210	5330	5490	120	163
	V1	90	90	90	90	90	90	90	90	89	89	90		
	VR	111	111	111	112	112	112	112	112	111	111	112		
	V2	119	119	119	119	119	119	119	119	119	119	118		
	GR2	7.3	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	6.8		
27000	BFL	4210	4280	4370	4460	4560	4660	4750	4850	4940	4990	5010	117	160
	V1	88	88	88	88	88	88	88	88	87	87	86		
	VR	107	107	107	107	108	108	108	108	107	107	107		
	V2	116	116	116	116	116	116	116	116	115	115	115		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.6	7.3		
26000	BFL	4170	4240	4320	4420	4510	4610	4700	4800	4890	4940	4950	114	157
	V1	88	88	88	88	88	88	88	88	88	87	86		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	112	112	112	112	112	112	112	112	112	112		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.2	7.8		

FIGURE 5-120. TAKE-OFF DISTANCE; FLAPS - 20° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	75							
	N1%	93.0	93.0	93.0	92.4	91.8	91.2							
39600	BFL													
	V1													
	VR													
	V2													
	GR2													
39000	BFL													
	V1													
	VR													
	V2													
	GR2													
38000	BFL	15190	16140										148	193
	V1	138	140											
	VR	153	153											
	V2	154	155											
	GR2	2.5	2.2											
37000	BFL	13970	14840	15860									145	190
	V1	133	135	137										
	VR	149	150	151										
	V2	151	151	152										
	GR2	2.8	2.5	2.2										
36000	BFL	12780	13630	14530	15650								143	187
	V1	128	130	132	134									
	VR	145	146	147	148									
	V2	147	148	149	149									
	GR2	3.1	2.8	2.5	2.3									
35000	BFL	11680	12460	13330	14310	15480							140	184
	V1	124	126	128	130	132								
	VR	141	142	143	144	145								
	V2	144	144	145	146	147								
	GR2	3.5	3.2	2.8	2.6	2.3								
34000	BFL	10650	11370	12160	13110	14160	15230						137	181
	V1	119	121	123	125	127	129							
	VR	137	138	139	141	142	143							
	V2	140	141	142	143	143	144							
	GR2	3.8	3.5	3.2	2.9	2.6	2.3							
33000	BFL	9670	10340	11070	11950	12900	13890						134	179
	V1	114	116	118	120	123	125							
	VR	133	134	135	137	138	139							
	V2	137	137	138	139	140	141							
	GR2	4.2	3.8	3.5	3.3	2.9	2.6							
32000	BFL	8750	9370	10050	10860	11790	12620						131	176
	V1	109	111	113	116	118	120							
	VR	129	130	131	133	134	135							
	V2	133	134	134	136	137	137							
	GR2	4.6	4.2	3.9	3.6	3.3	3							

FIGURE 5-120. TAKE-OFF DISTANCE; FLAPS - 20° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	75							
	N1%	93.0	93.0	93.0	92.4	91.8	91.2							
31000	BFL	7930	8470	9090	9830	10670	11490						128	173
	V1	105	107	109	111	113	116							
	VR	125	126	127	129	130	132							
	V2	129	130	131	132	133	134							
	GR2	5	4.6	4.3	4	3.7	3.3							
30000	BFL	7160	7650	8190	8880	9650	10400						126	170
	V1	100	102	104	106	109	111							
	VR	120	122	123	125	127	128							
	V2	126	126	127	128	130	131							
	GR2	5.4	5	4.7	4.4	4.1	3.7							
29000	BFL	6450	6890	7370	7980	8690	9380						123	166
	V1	96	98	99	102	104	106							
	VR	116	118	119	121	122	124							
	V2	122	123	123	125	126	127							
	GR2	5.8	5.5	5.1	4.8	4.5	4.2							
28000	BFL	5800	6180	6610	7160	7780	8420						120	163
	V1	91	93	95	97	99	102							
	VR	112	113	115	116	118	120							
	V2	118	119	120	121	122	123							
	GR2	6.3	5.9	5.6	5.3	4.9	4.6							
27000	BFL	5220	5560	5930	6410	6960	7510						117	160
	V1	87	89	90	92	95	97							
	VR	108	109	110	112	114	116							
	V2	115	116	116	117	119	120							
	GR2	6.8	6.4	6.1	5.8	5.4	5.1							
26000	BFL	4940	5000	5320	5730	6210	6700						114	157
	V1	85	84	86	88	90	92							
	VR	104	105	106	108	110	111							
	V2	111	112	113	114	115	116							
	GR2	7.4	7	6.6	6.3	5.9	5.6							

FIGURE 5-121. TAKE-OFF DISTANCE; FLAPS - 20° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	85.3	85.6	86.3	87.2	88.2	89.0	89.8	90.8	91.7	92.6	93.0		
39600	BFL	14950	15240	15580	15930	16280	16720	17070	17320	17650			154	198
	V1	149	149	149	149	149	149	148	148	148				
	VR	162	162	162	162	162	162	162	162	162				
	V2	163	163	163	163	163	163	163	163	163				
	GR2	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3				
39000	BFL	14210	14470	14800	15130	15470	15880	16210	16450	16770	17240		152	197
	V1	146	146	146	146	146	146	146	145	145	146			
	VR	160	160	160	160	160	160	160	160	160	160			
	V2	161	161	161	161	161	161	161	161	161	161			
	GR2	2.5	2.5	2.5	2.6	2.6	2.5	2.5	2.5	2.5	2.3			
38000	BFL	13040	13280	13580	13890	14200	14570	14880	15100	15400	15830	16520	149	194
	V1	141	141	141	140	140	140	140	140	140	141	142		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	157	157		
	GR2	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.7	2.4		
37000	BFL	11970	12190	12460	12740	13030	13370	13650	13850	14130	14520	15150	147	191
	V1	136	136	136	136	136	136	136	135	135	136	137		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	3	2.7		
36000	BFL	10960	11160	11410	11660	11920	12240	12500	12670	12930	13290	13880	144	188
	V1	131	131	131	131	131	131	131	130	130	131	132		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	150	150		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.3	3		
35000	BFL	9970	10150	10370	10610	10840	11130	11360	11520	11750	12080	12620	141	185
	V1	126	126	126	126	126	126	126	125	125	126	127		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	146	146		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.6	3.3		
34000	BFL	9080	9240	9450	9660	9880	10140	10340	10490	10700	11000	11490	138	182
	V1	121	121	121	121	121	121	121	120	120	121	122		
	VR	139	139	139	140	140	140	140	140	139	139	140		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4	3.7		
33000	BFL	8250	8390	8580	8770	8970	9220	9400	9520	9710	9990	10440	135	179
	V1	116	116	116	116	116	116	116	115	115	116	117		
	VR	135	135	135	135	135	136	136	135	135	135	136		
	V2	139	139	139	139	139	140	140	139	139	139	139		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.3	4.1		
32000	BFL	7480	7610	7780	7950	8130	8340	8510	8620	8800	9040	9440	133	176
	V1	112	112	111	111	111	111	111	111	111	111	112		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	135	135	135		
	GR2	5	5	5	5	5	5	5	5	4.9	4.7	4.4		

FIGURE 5-121. TAKE-OFF DISTANCE; FLAPS - 20° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 85.3	-50 -58 85.6	-45 -49 86.3	-40 -40 87.2	-35 -31 88.2	-30 -22 89.0	-25 -13 89.8	-20 -4 90.8	-15 5 91.7	-10 14 92.6	-5 23 93.0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	6750	6870	7020	7170	7330	7530	7670	7780	7940	8160	8520	130	173
	V1	107	107	106	106	106	106	106	106	106	106	107		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	132	132	132	132	132	132	132	132	132	131	131		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.2	4.8		
30000	BFL	6090	6200	6340	6470	6620	6790	6920	7010	7160	7360	7680	127	170
	V1	102	102	102	102	102	102	102	101	101	101	102		
	VR	122	122	122	122	123	123	123	122	122	122	123		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.6	5.3		
29000	BFL	5480	5580	5700	5830	5960	6110	6230	6310	6440	6610	6910	124	167
	V1	97	97	97	97	97	97	97	97	97	97	98		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	125	125	124	124	124	124		
	GR2	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.3	6.3	6	5.7		
28000	BFL	4930	5020	5130	5230	5350	5480	5590	5660	5780	5940	6200	121	164
	V1	93	93	93	93	93	93	92	92	92	92	93		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	120	120	120		
	GR2	6.8	6.8	6.8	6.9	6.9	6.8	6.8	6.8	6.7	6.5	6.2		
27000	BFL	4450	4530	4630	4720	4820	4940	5030	5100	5200	5330	5550	118	160
	V1	88	88	88	88	88	88	88	88	88	88	89		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	117	117	117	117	117	117	117	117	117	116	116		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3	7	6.7		
26000	BFL	4280	4330	4410	4510	4610	4700	4800	4900	4970	4990	5010	115	157
	V1	87	87	87	87	86	86	86	86	86	85	84		
	VR	105	105	105	105	105	106	106	105	105	105	106		
	V2	113	113	113	113	113	114	114	113	113	113	113		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.6	7.2		

FIGURE 5-121. TAKE-OFF DISTANCE; FLAPS - 20° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	72							
	N1%	93.0	93.0	92.8	92.2	91.5	91.2							
39600	BFL													
	V1													
	VR													
	V2													
	GR2													
39000	BFL													
	V1													
	VR													
	V2													
	GR2													
38000	BFL													
	V1													
	VR													
	V2													
	GR2													
37000	BFL	16060											147	191
	V1	139												
	VR	153												
	V2	154												
	GR2	2.3												
36000	BFL	14690	15690										144	188
	V1	134	136											
	VR	149	150											
	V2	150	151											
	GR2	2.7	2.4											
35000	BFL	13410	14330	15380									141	185
	V1	128	130	133										
	VR	145	146	147										
	V2	147	147	148										
	GR2	3	2.7	2.4										
34000	BFL	12210	13100	14060	15130								138	182
	V1	124	126	128	130									
	VR	140	142	143	144									
	V2	143	144	144	145									
	GR2	3.3	3	2.7	2.5									
33000	BFL	11100	11880	12810	13800	14940	15540						135	179
	V1	119	121	123	125	127	128							
	VR	136	138	139	140	141	142							
	V2	139	140	141	142	143	143							
	GR2	3.7	3.4	3.1	2.8	2.5	2.3							
32000	BFL	10060	10770	11590	12570	13590	14110						133	176
	V1	114	116	118	120	123	124							
	VR	132	133	135	136	138	138							
	V2	135	136	137	138	139	139							
	GR2	4.1	3.7	3.4	3.1	2.8	2.7							

FIGURE 5-121. TAKE-OFF DISTANCE; FLAPS - 20° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

31000	**BFL**	9090	9730	10480	11350	12350	12810						130	173
	V1	109	111	113	115	118	119							
	VR	128	129	131	132	134	134							
	V2	132	133	134	135	136	136							
	GR2	4.5	4.1	3.8	3.5	3.2	3							
30000	**BFL**	8190	8780	9450	10250	11170	11590						127	170
	V1	104	106	108	111	113	114							
	VR	124	125	127	128	130	130							
	V2	128	129	130	131	132	133							
	GR2	4.9	4.5	4.2	3.9	3.6	3.4							
29000	**BFL**	7370	7890	8500	9220	10030	10440						124	167
	V1	99	101	104	106	108	109							
	VR	119	121	122	124	126	126							
	V2	124	125	126	127	129	129							
	GR2	5.3	5	4.6	4.3	4	3.8							
28000	**BFL**	6610	7070	7610	8270	9000	9370						121	164
	V1	95	97	99	101	103	105							
	VR	115	116	118	120	122	122							
	V2	120	121	122	124	125	125							
	GR2	5.8	5.4	5.1	4.8	4.4	4.3							
27000	**BFL**	5910	6320	6800	7370	8040	8370						118	160
	V1	90	92	94	96	99	100							
	VR	111	112	114	115	117	118							
	V2	117	117	119	120	121	122							
	GR2	6.3	5.9	5.6	5.2	4.9	4.8							
26000	**BFL**	5290	5650	6060	6570	7150	7460						115	157
	V1	86	87	89	92	94	95							
	VR	107	108	109	111	113	114							
	V2	113	114	115	116	117	118							
	GR2	6.8	6.4	6.1	5.8	5.4	5.3							

FIGURE 5-122. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	BFL	4260	4320	4400	4470	4550	4620	4680	4750	4840	4920	5010	139	192
	V1	112	112	111	111	111	110	110	110	110	109	109		
	VR	130	130	130	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.5	5.5	5.5	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7		
39000	BFL	4080	4140	4220	4290	4360	4420	4490	4550	4640	4720	4800	138	191
	V1	110	110	109	109	109	108	108	108	108	107	107		
	VR	128	128	128	128	128	127	127	127	127	127	127		
	V2	136	136	136	136	136	135	135	135	135	135	135		
	GR2	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9		
38000	BFL	3810	3860	3930	4000	4060	4130	4190	4250	4320	4400	4480	136	188
	V1	107	106	106	106	105	105	105	104	104	104	104		
	VR	125	125	125	125	125	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6	6.1	6.1	6.1	6.1	6.2	6.2	6.3	6.3	6.3	6.3		
37000	BFL	3570	3620	3690	3750	3810	3870	3940	3990	4070	4140	4210	135	185
	V1	103	103	103	103	102	102	102	102	101	101	101		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.4	6.4	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6		
36000	BFL	3380	3430	3490	3560	3620	3680	3760	3840	3910	3990	4060	133	182
	V1	101	101	100	100	100	100	100	100	100	100	100		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	130	130	130	130		
	GR2	6.8	6.9	6.9	6.9	6.9	7	7	7.1	7.1	7.1	7.1		
35000	BFL	3280	3340	3410	3490	3570	3650	3730	3810	3880	3950	4030	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.3	7.3	7.3	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
34000	BFL	3250	3310	3390	3470	3540	3630	3700	3790	3860	3930	4000	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.8	7.8	7.8	7.8	7.9	7.9	7.9	8	8	8	8		
33000	BFL	3240	3300	3360	3440	3520	3590	3680	3750	3830	3900	3960	127	174
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.3	8.3	8.3	8.3	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
32000	BFL	3220	3270	3350	3420	3490	3570	3650	3720	3790	3870	3940	125	171
	V1	100	100	100	100	100	100	101	101	101	101	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	124	124	124	124	124	124		
	GR2	8.8	8.8	8.9	8.9	8.9	9	9	9.1	9.1	9.1	9.1		

FIGURE 5-122. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 76.9	-50 -58 77.2	-45 -49 78.1	-40 -40 79.0	-35 -31 79.9	-30 -22 80.8	-25 -13 81.7	-20 -4 82.6	-15 5 83.4	-10 14 84.2	-5 23 85.0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3190	3240	3310	3400	3470	3530	3610	3690	3760	3830	3910	123	168
	V1	100	100	100	100	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	123	123	123	123		
	GR2	9.4	9.4	9.4	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6		
30000	BFL	3160	3230	3290	3360	3430	3520	3590	3670	3730	3800	3880	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	122	122	122	122		
	GR2	10	10	10.1	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.3		
29000	BFL	3140	3200	3270	3340	3420	3490	3560	3630	3710	3770	3840	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.7	10.7	10.7	10.8	10.8	10.9	10.9	10.9	10.9	10.9		
28000	BFL	3120	3180	3250	3320	3390	3460	3530	3610	3680	3730	3810	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.4	11.4	11.5	11.5	11.6	11.6	11.6	11.6	11.6		
27000	BFL	3100	3150	3220	3280	3350	3430	3510	3580	3640	3710	3770	115	157
	V1	101	101	101	101	101	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.1	12.1	12.2	12.2	12.2	12.3	12.3	12.4	12.4	12.4	12.4		
26000	BFL	3080	3130	3190	3270	3340	3410	3470	3540	3620	3680	3740	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	102	102	102	103	103	103	103	103	103	103		
	V2	117	117	117	117	118	118	118	118	118	118	118		
	GR2	12.9	12.9	13	13	13	13.1	13.1	13.2	13.2	13.2	13.2		

FIGURE 5-122. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY
(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	122		
	N1%	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
39600	BFL	5100	5180	5270	5360	5450	5530	5620	6060	6700	7350	7970	139	192
	V1	109	109	109	109	109	108	108	111	114	118	120		
	VR	129	129	129	129	129	129	129	130	132	134	135		
	V2	137	137	137	137	137	137	137	137	139	140	140		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.1	4.5	3.8	3.3		
39000	BFL	4880	4970	5050	5140	5220	5310	5390	5800	6410	7030	7640	138	191
	V1	107	107	107	107	107	106	106	109	112	115	118		
	VR	127	127	127	127	127	127	127	128	131	132	134		
	V2	135	135	135	135	135	135	135	136	137	138	139		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.3	4.7	4	3.5		
38000	BFL	4550	4630	4710	4780	4860	4940	5020	5390	5950	6530	7110	136	188
	V1	104	104	104	103	103	103	103	105	109	112	115		
	VR	124	124	124	124	124	124	124	125	127	129	131		
	V2	133	133	133	133	133	133	133	133	134	135	136		
	GR2	6.3	6.3	6.3	6.2	6.2	6.2	6.2	5.7	5	4.3	3.8		
37000	BFL	4280	4350	4420	4500	4570	4640	4710	5020	5520	6070	6610	135	185
	V1	101	101	101	101	101	100	100	102	105	109	112		
	VR	122	122	122	122	122	122	122	123	124	126	128		
	V2	131	131	131	131	131	131	131	131	132	133	133		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6	5.3	4.7	4.1		
36000	BFL	4140	4210	4280	4360	4430	4510	4590	4710	5150	5640	6150	133	182
	V1	100	100	100	100	100	100	100	100	102	105	108		
	VR	120	120	120	120	120	120	120	120	122	123	125		
	V2	130	130	130	130	129	129	129	129	129	130	131		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.4	5.7	5.1	4.4		
35000	BFL	4100	4180	4250	4320	4390	4470	4550	4500	4790	5240	5710	131	180
	V1	100	100	100	100	100	100	100	98	99	102	105		
	VR	118	118	118	118	118	118	118	118	119	121	122		
	V2	128	128	128	128	128	128	128	127	127	128	129		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	6.9	6.1	5.4	4.8		
34000	BFL	4070	4140	4210	4290	4360	4430	4510	4460	4500	4870	5290	129	177
	V1	100	100	100	100	100	100	100	98	97	99	102		
	VR	116	116	116	116	116	116	116	116	117	118	119		
	V2	126	126	126	126	126	126	126	126	125	125	126		
	GR2	8	8	8	8	8	8	8	7.3	6.6	5.8	5.2		
33000	BFL	4040	4110	4180	4250	4320	4390	4470	4420	4350	4530	4900	127	174
	V1	100	100	100	100	100	100	100	98	95	96	98		
	VR	114	114	114	114	114	114	114	114	115	115	116		
	V2	125	125	125	125	125	125	125	124	124	124	124		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	7.8	7	6.3	5.6		
32000	BFL	4000	4070	4140	4210	4280	4360	4430	4380	4310	4260	4540	125	171
	V1	100	100	100	100	100	100	100	98	96	93	95		
	VR	112	112	112	112	112	112	112	112	113	113	114		
	V2	124	124	124	124	124	124	124	123	122	122	121		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9	8.4	7.5	6.7	6		

FIGURE 5-122. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY
(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	122		
	N1%	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
31000	BFL	3970	4040	4110	4180	4250	4320	4390	4350	4270	4190	4260	123	168
	V1	101	101	101	100	100	100	100	98	96	93	92		
	VR	111	111	111	111	111	111	111	111	111	111	112		
	V2	123	123	123	123	123	123	123	122	120	120	120		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	8.9	8	7.2	6.5		
30000	BFL	3940	4010	4070	4140	4210	4280	4350	4310	4230	4160	4090	121	166
	V1	101	101	101	101	101	101	100	98	96	93	91		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	120	119	118	118		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	9.5	8.6	7.8	7		
29000	BFL	3900	3980	4040	4110	4170	4240	4310	4270	4200	4120	4050	119	163
	V1	101	101	101	101	101	101	101	99	96	93	91		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	119	118	117	116		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.2	9.2	8.4	7.6		
28000	BFL	3870	3950	4010	4070	4140	4210	4270	4230	4160	4080	4020	117	160
	V1	101	101	101	101	101	101	101	99	96	94	91		
	VR	106	106	106	106	106	106	106	105	105	105	105		
	V2	119	119	119	119	119	119	119	118	117	116	115		
	GR2	11.6	11.6	11.6	11.6	11.6	11.6	11.6	10.8	9.9	9	8.2		
27000	BFL	3840	3900	3980	4040	4100	4170	4240	4190	4120	4040	3980	115	157
	V1	102	101	101	101	101	101	101	99	96	94	92		
	VR	104	104	104	104	104	104	104	104	104	103	103		
	V2	118	118	118	118	118	118	118	117	116	114	113		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.4	11.6	10.6	9.6	8.8		
26000	BFL	3800	3870	3940	4010	4070	4130	4200	4160	4080	4020	3950	113	154
	V1	102	102	102	102	102	101	101	99	97	94	92		
	VR	103	103	103	103	103	103	103	102	102	102	101		
	V2	118	118	118	118	118	118	118	116	115	113	112		
	GR2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	12.4	11.4	10.4	9.5		

FIGURE 5-123. TAKE-OFF DISTANCE; FLAPS - 20° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	BFL	4570	4640	4720	4800	4880	4960	5040	5120	5220	5310	5400	139	193
	V1	113	113	113	113	112	112	112	111	111	111	111		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.3	5.3	5.4	5.4	5.4	5.4	5.4	5.5	5.5	5.5	5.5		
39000	BFL	4370	4440	4520	4600	4680	4750	4820	4900	4990	5080	5170	138	191
	V1	111	111	111	111	110	110	110	109	109	109	109		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	136	136	136	136	136		
	GR2	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7		
38000	BFL	4070	4130	4210	4280	4350	4420	4490	4560	4650	4730	4810	136	188
	V1	108	108	107	107	107	107	106	106	106	106	106		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.9	5.9	5.9	5.9	5.9	6	6	6	6	6	6		
37000	BFL	3790	3850	3920	3980	4050	4110	4180	4240	4320	4400	4470	135	185
	V1	104	104	104	104	103	103	103	103	102	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4		
36000	BFL	3550	3600	3670	3730	3790	3860	3920	3980	4050	4130	4200	133	183
	V1	101	101	101	101	100	100	100	100	100	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8		
35000	BFL	3360	3420	3500	3580	3660	3740	3820	3900	3970	4050	4130	131	180
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	128	128	128	128	128		
	GR2	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
34000	BFL	3340	3400	3470	3550	3630	3710	3800	3870	3940	4020	4090	129	177
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7		
33000	BFL	3320	3380	3450	3530	3600	3690	3760	3830	3910	3980	4060	127	174
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	125	125		
	GR2	8	8.1	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2		
32000	BFL	3290	3350	3430	3500	3570	3660	3730	3800	3880	3950	4020	125	171
	V1	99	99	99	99	99	99	100	100	100	99	99		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7		

FIGURE 5-123. TAKE-OFF DISTANCE; FLAPS - 20° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 77.4	-50 -58 77.8	-45 -49 78.7	-40 -40 79.6	-35 -31 80.5	-30 -22 81.4	-25 -13 82.3	-20 -4 83.2	-15 5 84.0	-10 14 84.8	-5 23 85.6	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3270	3330	3390	3480	3550	3620	3700	3780	3850	3920	3990	123	169
	V1	99	99	100	100	100	100	100	100	100	100	100		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.1	9.1	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3		
30000	BFL	3250	3300	3380	3450	3520	3590	3680	3750	3820	3890	3960	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.8	9.8	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9		
29000	BFL	3220	3280	3350	3420	3500	3570	3650	3720	3790	3850	3920	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.4	10.4	10.4	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6		
28000	BFL	3200	3250	3320	3390	3460	3530	3610	3680	3760	3820	3900	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	119	119	119	119	119	119	119	119	119	119		
	GR2	11.1	11.1	11.1	11.1	11.2	11.2	11.3	11.3	11.3	11.3	11.3		
27000	BFL	3170	3230	3300	3370	3440	3510	3590	3650	3730	3790	3870	115	157
	V1	100	100	100	100	101	101	101	101	101	101	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	118	118	118	118	118	118	118	118	118		
	GR2	11.8	11.9	11.9	11.9	11.9	12	12	12	12	12	12		
26000	BFL	3150	3200	3270	3340	3400	3490	3560	3630	3690	3770	3830	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	117	117	117	117	117	117	117		
	GR2	12.6	12.6	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 5-123. TAKE-OFF DISTANCE; FLAPS - 20° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	118		
	N1%	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
39600	BFL	5490	5590	5690	5780	5880	5970	6220	6760	7430	8100	8530	139	193
	V1	111	111	110	110	110	110	111	114	117	120	122		
	VR	131	131	131	131	131	131	131	133	135	136	137		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.3	4.7	4.1	3.5	3.2		
39000	BFL	5260	5350	5440	5530	5620	5720	5950	6470	7100	7760	8170	138	191
	V1	109	109	108	108	108	108	109	112	115	118	120		
	VR	129	129	129	129	129	129	129	131	133	134	135		
	V2	136	136	136	136	136	136	137	138	138	139	140		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.4	4.9	4.3	3.7	3.3		
38000	BFL	4890	4980	5060	5150	5230	5310	5520	5990	6590	7210	7600	136	188
	V1	105	105	105	105	105	105	106	108	111	115	116		
	VR	126	126	126	126	126	126	126	128	130	131	132		
	V2	134	134	134	134	134	134	134	135	136	137	137		
	GR2	6	6	6	6	6	6	5.8	5.2	4.6	4	3.6		
37000	BFL	4550	4630	4700	4780	4860	4940	5130	5550	6100	6680	7040	135	185
	V1	102	102	102	102	101	101	102	105	108	111	113		
	VR	123	123	123	123	123	123	123	125	126	128	129		
	V2	131	131	131	131	131	131	131	132	133	134	134		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.2	5.6	4.9	4.3	4		
36000	BFL	4270	4340	4410	4480	4550	4630	4780	5150	5640	6180	6520	133	183
	V1	99	99	99	99	99	99	99	101	104	107	109		
	VR	120	120	120	120	120	120	121	122	123	125	126		
	V2	129	129	129	129	129	129	129	129	130	131	132		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.6	6	5.3	4.7	4.3		
35000	BFL	4200	4280	4350	4430	4500	4580	4620	4800	5240	5730	6050	131	180
	V1	99	99	99	99	99	99	98	98	101	104	106		
	VR	118	118	118	118	118	118	118	119	121	122	123		
	V2	128	127	127	127	127	127	127	127	128	129	129		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7	6.4	5.7	5	4.6		
34000	BFL	4170	4240	4310	4390	4460	4540	4580	4530	4870	5310	5610	129	177
	V1	99	99	99	99	99	99	98	98	98	101	103		
	VR	116	116	116	116	116	116	116	117	118	119	120		
	V2	126	126	126	126	126	126	126	126	126	126	127		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.5	6.8	6.1	5.4	5		
33000	BFL	4130	4200	4280	4350	4430	4500	4540	4490	4550	4920	5180	127	174
	V1	99	99	99	99	99	99	98	96	95	98	99		
	VR	114	114	114	114	114	114	114	115	115	116	117		
	V2	125	125	125	125	125	125	124	124	124	124	124		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	7.9	7.3	6.5	5.8	5.4		
32000	BFL	4100	4180	4240	4310	4390	4460	4530	4450	4390	4570	4800	125	171
	V1	99	99	99	99	99	99	98	96	94	94	96		
	VR	112	112	112	112	112	112	112	112	113	114	114		
	V2	123	123	123	123	123	123	123	122	122	122	122		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.5	7.8	7	6.3	5.8		

FIGURE 5-123. TAKE-OFF DISTANCE; FLAPS - 20° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	118		
	N1%	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
31000	BFL	4070	4130	4200	4290	4350	4420	4450	4420	4350	4270	4450	123	169
	V1	100	100	99	99	99	99	99	96	94	92	93		
	VR	111	111	111	111	111	111	111	111	111	111	112		
	V2	122	122	122	122	122	122	122	121	120	120	119		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.1	8.3	7.5	6.8	6.3		
30000	BFL	4040	4100	4180	4240	4310	4380	4410	4380	4310	4230	4180	121	166
	V1	100	100	100	100	100	99	99	97	94	92	90		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	119	118	118	118		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.7	8.9	8.1	7.3	6.8		
29000	BFL	3990	4060	4130	4200	4270	4340	4340	4340	4270	4190	4150	119	163
	V1	100	100	100	100	100	100	99	97	94	92	91		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	118	117	116	116		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.3	9.6	8.7	7.8	7.3		
28000	BFL	3960	4040	4100	4180	4240	4300	4330	4300	4230	4150	4110	117	160
	V1	100	100	100	100	100	100	99	97	95	92	91		
	VR	106	106	106	106	106	106	106	105	105	105	105		
	V2	120	120	120	119	119	119	118	117	116	115	114		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11	10.2	9.3	8.4	7.9		
27000	BFL	3920	4000	4060	4130	4210	4270	4300	4260	4190	4120	4070	115	157
	V1	100	100	100	100	100	100	99	97	95	92	91		
	VR	104	104	104	104	104	104	104	104	103	103	103		
	V2	118	118	118	118	118	118	117	116	115	114	113		
	GR2	12	12	12	12	12	12	11.7	10.9	10	9.1	8.6		
26000	BFL	3890	3960	4030	4090	4160	4230	4290	4220	4160	4080	4040	113	154
	V1	101	101	101	100	100	100	100	97	95	93	91		
	VR	102	102	102	102	102	102	102	102	102	102	101		
	V2	117	117	117	117	117	117	116	115	114	113	112		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.5	11.7	10.7	9.8	9.3		

FIGURE 5-124. TAKE-OFF DISTANCE; FLAPS - 20° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	BFL	4870	4950	5050	5150	5240	5340	5430	5530	5630	5730	5840	140	193
	V1	115	115	114	114	114	114	113	113	113	113	113		
	VR	133	133	133	133	133	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	BFL	4660	4740	4830	4930	5020	5110	5200	5290	5390	5480	5580	139	191
	V1	113	112	112	112	112	112	111	111	111	111	111		
	VR	131	131	131	131	131	131	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	BFL	4330	4400	4490	4580	4660	4740	4820	4910	5000	5090	5180	137	189
	V1	109	109	109	108	108	108	108	108	107	107	107		
	VR	128	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.7	5.7	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8		
37000	BFL	4030	4090	4170	4250	4330	4410	4480	4560	4650	4730	4810	135	186
	V1	106	105	105	105	105	105	104	104	104	104	104		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	BFL	3750	3810	3880	3960	4030	4100	4170	4240	4320	4400	4470	133	183
	V1	102	102	102	102	101	101	101	101	101	101	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	BFL	3500	3560	3630	3690	3760	3840	3920	4000	4080	4150	4230	131	180
	V1	99	99	98	98	98	98	98	98	98	98	98		
	VR	119	119	119	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
34000	BFL	3440	3500	3580	3650	3730	3810	3890	3960	4040	4120	4200	129	177
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	7.3	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4		
33000	BFL	3410	3470	3560	3620	3700	3790	3860	3930	4010	4080	4160	127	175
	V1	99	99	98	98	98	98	98	98	98	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9		
32000	BFL	3390	3450	3520	3590	3680	3760	3820	3900	3980	4050	4130	125	172
	V1	99	99	99	99	99	99	99	99	99	99	98		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		

FIGURE 5-124. TAKE-OFF DISTANCE; FLAPS - 20° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 77.9	-50 -58 78.6	-45 -49 79.5	-40 -40 80.4	-35 -31 81.2	-30 -22 82.1	-25 -13 83.0	-20 -4 83.8	-15 5 84.6	-10 14 85.5	-5 23 86.3	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3360	3420	3500	3580	3650	3720	3790	3870	3940	4020	4090	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	9	9	9	9	9		
30000	BFL	3340	3400	3470	3550	3610	3690	3760	3840	3910	3980	4060	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	121	121	121	121	121	121	121		
	GR2	9.5	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6		
29000	BFL	3320	3370	3440	3510	3580	3660	3740	3800	3880	3950	4030	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
28000	BFL	3280	3350	3420	3490	3560	3630	3710	3780	3840	3920	3980	117	160
	V1	100	100	99	99	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	118	118	118	118	118	118	118	118	118	118		
	GR2	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
27000	BFL	3270	3320	3390	3450	3530	3600	3680	3750	3810	3890	3950	115	157
	V1	100	100	100	100	100	100	100	100	100	100	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6		
26000	BFL	3240	3280	3360	3430	3500	3560	3640	3720	3780	3860	3910	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4		

FIGURE 5-124. TAKE-OFF DISTANCE; FLAPS - 20° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	114		
	N1%	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
39600	BFL	5940	6040	6150	6250	6350	6460	6890	7530	8220	8980	9150	140	193
	V1	113	112	112	112	112	112	114	117	120	123	124		
	VR	132	132	132	132	132	132	134	135	137	138	139		
	V2	139	139	139	139	139	139	140	141	142	143	143		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	4.9	4.3	3.7	3.1	3		
39000	BFL	5680	5780	5880	5980	6080	6180	6590	7200	7870	8590	8750	139	191
	V1	110	110	110	110	110	110	112	115	118	121	121		
	VR	130	130	130	130	130	130	132	133	135	136	137		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.1	4.5	3.9	3.3	3.2		
38000	BFL	5270	5360	5460	5550	5640	5730	6100	6670	7300	7980	8130	137	189
	V1	107	107	107	107	106	106	108	111	114	117	118		
	VR	127	127	127	127	127	127	128	130	132	133	134		
	V2	135	135	135	135	135	135	136	136	137	138	138		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.4	4.8	4.2	3.6	3.5		
37000	BFL	4890	4980	5060	5150	5230	5320	5650	6170	6760	7400	7540	135	186
	V1	104	103	103	103	103	103	105	107	111	114	114		
	VR	124	124	124	124	124	124	125	127	129	130	131		
	V2	132	132	132	132	132	132	133	134	134	135	136		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	5.8	5.2	4.5	3.9	3.8		
36000	BFL	4550	4620	4700	4780	4860	4930	5240	5700	6240	6830	6970	133	183
	V1	100	100	100	100	100	100	101	104	107	110	111		
	VR	121	121	121	121	121	121	122	124	125	127	127		
	V2	130	130	130	130	130	130	130	131	131	132	133		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.1	5.5	4.9	4.2	4.1		
35000	BFL	4310	4390	4470	4540	4620	4700	4850	5270	5750	6300	6420	131	180
	V1	98	98	98	98	98	98	98	100	103	106	107		
	VR	118	118	118	118	118	118	119	121	122	124	124		
	V2	127	127	127	127	127	127	127	128	129	129	130		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.5	5.9	5.2	4.6	4.5		
34000	BFL	4270	4350	4430	4500	4580	4660	4670	4890	5330	5830	5950	129	177
	V1	98	98	98	98	98	98	97	97	100	103	104		
	VR	116	116	116	116	116	116	117	118	119	121	121		
	V2	125	125	125	125	125	125	125	126	126	127	127		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7	6.3	5.6	5	4.8		
33000	BFL	4240	4310	4390	4470	4540	4620	4630	4580	4940	5390	5490	127	175
	V1	98	98	98	98	98	98	97	97	97	100	100		
	VR	114	114	114	114	114	114	114	115	116	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	125		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.4	6.8	6.1	5.4	5.2		
32000	BFL	4200	4280	4350	4430	4500	4580	4580	4540	4590	4980	5070	125	172
	V1	98	98	98	98	98	98	97	95	94	96	97		
	VR	112	112	112	112	112	112	112	113	114	115	115		
	V2	123	123	123	123	123	123	122	122	122	122	122		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	7.9	7.2	6.5	5.8	5.6		

FIGURE 5-124. TAKE-OFF DISTANCE; FLAPS - 20° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	114		
	N1%	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
31000	BFL	4160	4240	4310	4390	4460	4540	4540	4490	4420	4610	4690	123	169
	V1	99	99	99	98	98	98	97	95	92	93	94		
	VR	111	111	111	111	111	111	111	111	111	112	112		
	V2	121	121	121	121	121	121	121	120	120	120	120		
	GR2	9	9	9	9	9	9	8.5	7.8	7	6.2	6.1		
30000	BFL	4140	4200	4270	4350	4420	4500	4500	4450	4380	4300	4340	121	166
	V1	99	99	99	99	99	99	97	95	93	90	90		
	VR	109	109	109	109	109	109	109	109	109	110	110		
	V2	121	121	121	121	121	121	120	119	118	118	118		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.1	8.3	7.5	6.7	6.6		
29000	BFL	4090	4160	4240	4310	4380	4460	4460	4410	4340	4260	4240	119	163
	V1	99	99	99	99	99	99	97	95	93	90	90		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	117	116	116	116		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	9.7	8.9	8.1	7.3	7.1		
28000	BFL	4060	4140	4200	4270	4340	4420	4420	4370	4300	4220	4200	117	160
	V1	99	99	99	99	99	99	98	95	93	91	90		
	VR	106	106	106	106	106	106	106	105	105	105	105		
	V2	118	118	118	118	118	118	118	116	115	114	114		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.4	9.6	8.7	7.8	7.7		
27000	BFL	4020	4090	4160	4230	4300	4370	4380	4330	4260	4180	4160	115	157
	V1	99	99	99	99	99	99	98	96	93	91	90		
	VR	104	104	104	104	104	104	104	104	103	103	103		
	V2	117	117	117	117	117	117	116	115	114	113	112		
	GR2	11.6	11.6	11.6	11.6	11.6	11.6	11.1	10.3	9.4	8.5	8.3		
26000	BFL	3990	4050	4120	4190	4260	4330	4340	4290	4220	4140	4120	113	154
	V1	100	100	100	99	99	99	98	96	93	91	90		
	VR	102	102	102	102	102	102	102	102	102	101	101		
	V2	116	116	116	116	116	116	115	114	113	112	111		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	11.9	11	10.1	9.2	9		

FIGURE 5-125. TAKE-OFF DISTANCE; FLAPS - 20° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	BFL	5250	5340	5460	5570	5680	5780	5890	6000	6110	6220	6340	141	193
	V1	117	116	116	116	116	116	115	115	115	115	115		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	5	5	5		
39000	BFL	5020	5110	5220	5330	5430	5530	5630	5740	5850	5950	6060	140	192
	V1	114	114	114	114	114	113	113	113	113	113	113		
	VR	133	133	133	133	133	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2		
38000	BFL	4670	4750	4850	4940	5040	5140	5230	5330	5420	5520	5620	137	189
	V1	111	111	110	110	110	110	110	109	109	109	109		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	BFL	4330	4400	4500	4590	4680	4760	4850	4940	5030	5120	5210	135	186
	V1	107	107	107	107	107	106	106	106	106	106	105		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	133	133	133	133	133	133	133		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
36000	BFL	4020	4080	4170	4250	4330	4410	4490	4570	4660	4740	4820	133	183
	V1	104	103	103	103	103	103	103	102	102	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	BFL	3730	3790	3870	3950	4020	4100	4170	4250	4320	4400	4470	131	181
	V1	100	100	100	100	99	99	99	99	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	BFL	3520	3590	3660	3740	3820	3900	3980	4060	4140	4220	4300	129	178
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7	7	7	7	7	7	7.1	7.1	7.1	7.1	7.1		
33000	BFL	3500	3560	3630	3710	3790	3870	3950	4030	4100	4180	4260	127	175
	V1	98	98	98	97	97	97	97	97	97	97	97		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
32000	BFL	3490	3540	3610	3690	3770	3830	3910	4000	4070	4150	4220	125	172
	V1	98	98	98	98	98	98	98	98	97	97	97		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8	8	8	8	8	8	8	8	8	8	8		

FIGURE 5-125. TAKE-OFF DISTANCE; FLAPS - 20° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
31000	BFL	3450	3500	3590	3660	3740	3800	3880	3970	4040	4110	4190	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
30000	BFL	3430	3480	3560	3630	3700	3770	3850	3920	4010	4080	4150	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
29000	BFL	3400	3450	3520	3590	3660	3740	3830	3890	3970	4040	4110	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
28000	BFL	3380	3430	3500	3570	3640	3720	3790	3860	3930	4000	4080	117	160
	V1	99	99	99	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
27000	BFL	3350	3390	3470	3540	3610	3690	3760	3820	3900	3980	4050	115	157
	V1	99	99	99	99	99	99	99	99	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	118	118	118	117		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
26000	BFL	3330	3370	3440	3500	3580	3660	3730	3790	3860	3940	4000	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12	12	12	12	12	12	12	12	12	12	12		

FIGURE 5-125. TAKE-OFF DISTANCE; FLAPS - 20° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OATF	32	41	50	59	68	77	86	95	104	111			
	N1%	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
39600	BFL	6450	6560	6680	6790	6910	7100	7700	8420	9180	9830		141	193
	V1	115	114	114	114	114	114	117	120	123	125			
	VR	134	134	134	134	134	135	136	138	139	140			
	V2	141	141	141	141	141	141	142	143	143	144			
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.4	3.8	3.3	2.8			
39000	BFL	6170	6270	6380	6490	6600	6790	7370	8050	8770	9430		140	192
	V1	112	112	112	112	112	112	115	118	121	123			
	VR	132	132	132	132	132	133	134	136	137	138			
	V2	139	139	139	139	139	139	140	141	142	142			
	GR2	5.2	5.2	5.2	5.1	5.1	5.1	4.6	4	3.4	3			
38000	BFL	5720	5820	5920	6020	6120	6290	6820	7460	8150	8770		137	189
	V1	109	109	109	108	108	109	111	114	117	120			
	VR	129	129	129	129	129	130	131	133	134	136			
	V2	136	136	136	136	136	136	137	138	139	140			
	GR2	5.5	5.5	5.5	5.5	5.5	5.4	4.9	4.3	3.8	3.3			
37000	BFL	5300	5390	5480	5580	5670	5830	6310	6900	7550	8120		135	186
	V1	105	105	105	105	105	105	108	111	114	116			
	VR	126	126	126	126	126	126	128	130	131	132			
	V2	133	133	133	133	133	134	135	135	136	137			
	GR2	5.9	5.8	5.8	5.8	5.8	5.8	5.3	4.7	4.1	3.6			
36000	BFL	4900	4990	5080	5160	5250	5390	5830	6370	6970	7510		133	183
	V1	102	102	102	101	101	102	104	107	110	112			
	VR	123	123	123	123	123	123	125	126	128	129			
	V2	131	131	131	131	131	131	132	132	133	134			
	GR2	6.2	6.2	6.2	6.2	6.2	6.1	5.7	5	4.4	3.9			
35000	BFL	4550	4630	4700	4780	4860	4990	5380	5880	6420	6920		131	181
	V1	98	98	98	98	98	98	101	103	106	109			
	VR	120	120	120	120	120	120	121	123	125	126			
	V2	128	128	128	128	128	128	129	130	130	131			
	GR2	6.6	6.6	6.6	6.6	6.6	6.5	6	5.4	4.8	4.3			
34000	BFL	4380	4450	4530	4610	4690	4760	4960	5410	5910	6360		129	178
	V1	97	97	97	97	97	97	97	100	103	105			
	VR	117	117	117	117	117	117	118	120	121	123			
	V2	126	126	126	126	126	126	126	127	127	128			
	GR2	7.1	7.1	7.1	7.1	7	6.9	6.4	5.8	5.2	4.6			
33000	BFL	4340	4420	4490	4570	4650	4720	4700	5000	5450	5870		127	175
	V1	97	97	97	97	97	97	95	96	99	102			
	VR	114	114	114	114	114	114	115	117	118	120			
	V2	124	124	124	124	124	124	124	124	125	125			
	GR2	7.5	7.5	7.5	7.5	7.5	7.4	6.9	6.2	5.6	5			
32000	BFL	4300	4380	4450	4530	4610	4670	4660	4640	5030	5410		125	172
	V1	97	97	97	97	97	97	95	93	96	98			
	VR	112	112	112	112	112	112	113	114	115	117			
	V2	122	122	122	122	122	122	122	122	122	123			
	GR2	8	8	8	8	8	7.9	7.4	6.7	6	5.4			

FIGURE 5-125. TAKE-OFF DISTANCE; FLAPS - 20° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OATF	32	41	50	59	68	77	86	95	104	111			
	N1%	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
31000	BFL	4260	4340	4420	4490	4570	4630	4620	4560	4650	4990		123	169
	V1	98	97	97	97	97	97	95	93	92	95			
	VR	111	111	111	111	111	111	111	111	112	113			
	V2	121	121	121	121	121	121	120	120	120	120			
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	7.9	7.1	6.4	5.8			
30000	BFL	4220	4300	4380	4450	4530	4590	4570	4510	4440	4600		121	166
	V1	98	98	98	98	97	97	95	93	91	91			
	VR	109	109	109	109	109	109	109	109	110	111			
	V2	120	120	120	120	120	120	119	118	118	118			
	GR2	9.2	9.2	9.2	9.2	9.2	9.1	8.4	7.7	6.9	6.3			
29000	BFL	4190	4260	4350	4410	4490	4550	4530	4470	4400	4330		119	163
	V1	98	98	98	98	98	97	96	93	91	89			
	VR	107	107	107	107	107	107	107	107	107	108			
	V2	119	119	119	119	119	119	118	117	116	116			
	GR2	9.8	9.8	9.8	9.8	9.8	9.7	9.1	8.3	7.5	6.8			
28000	BFL	4160	4220	4300	4370	4440	4500	4490	4430	4360	4290		117	160
	V1	98	98	98	98	98	98	96	93	91	89			
	VR	106	106	106	106	106	106	106	105	105	105			
	V2	118	118	118	118	118	118	117	116	114	114			
	GR2	10.5	10.5	10.5	10.5	10.5	10.4	9.7	8.9	8.1	7.4			
27000	BFL	4110	4190	4260	4330	4400	4460	4440	4390	4310	4250		115	157
	V1	98	98	98	98	98	98	96	94	91	89			
	VR	104	104	104	104	104	104	104	104	103	103			
	V2	117	117	117	117	117	117	116	114	113	112			
	GR2	11.2	11.2	11.2	11.2	11.2	11.1	10.4	9.6	8.7	8			
26000	BFL	4080	4150	4220	4290	4360	4420	4400	4340	4270	4210		113	154
	V1	99	98	98	98	98	98	96	94	91	90			
	VR	102	102	102	102	102	102	102	102	102	101			
	V2	116	116	116	116	116	116	114	113	112	111			
	GR2	12	12	12	12	12	11.9	11.2	10.3	9.4	8.7			

FIGURE 5-126. TAKE-OFF DISTANCE; FLAPS - 20° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	BFL	5720	5820	5950	6070	6190	6300	6420	6550	6670	6790	6910	142	194
	V1	119	119	119	118	118	118	118	118	117	117	117		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	BFL	5470	5560	5680	5800	5910	6020	6140	6250	6370	6490	6610	141	192
	V1	117	116	116	116	116	116	115	115	115	115	115		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	BFL	5080	5160	5270	5380	5480	5590	5690	5800	5910	6020	6120	138	189
	V1	113	113	113	112	112	112	112	112	112	111	111		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	BFL	4710	4790	4890	4990	5080	5180	5270	5370	5470	5570	5670	136	187
	V1	109	109	109	109	109	108	108	108	108	108	108		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	BFL	4350	4430	4520	4610	4700	4790	4880	4970	5060	5150	5240	133	184
	V1	106	106	105	105	105	105	105	104	104	104	104		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.9	5.9	5.9	5.9	5.9	6	6	6	6	6	6		
35000	BFL	4030	4100	4180	4260	4340	4420	4500	4590	4670	4750	4840	131	181
	V1	102	102	102	101	101	101	101	101	101	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4		
34000	BFL	3730	3800	3870	3950	4020	4100	4170	4250	4320	4400	4470	129	178
	V1	98	98	98	98	98	98	97	97	97	97	97		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	BFL	3570	3640	3710	3790	3870	3950	4040	4120	4200	4280	4360	127	175
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
32000	BFL	3550	3620	3690	3760	3850	3920	4010	4080	4170	4240	4320	125	172
	V1	97	97	96	96	96	96	96	96	96	96	96		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		

FIGURE 5-126. TAKE-OFF DISTANCE; FLAPS - 20° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
31000	BFL	3540	3590	3650	3740	3820	3890	3980	4050	4120	4200	4280	123	169
	V1	97	97	97	97	97	97	97	97	96	96	96		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
30000	BFL	3510	3560	3620	3710	3790	3860	3940	4020	4090	4170	4240	121	166
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	119	119	120	120	120	120	120	120	120	120		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	BFL	3470	3530	3600	3680	3750	3820	3910	3990	4060	4140	4210	119	163
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
28000	BFL	3450	3500	3570	3650	3720	3790	3870	3940	4020	4090	4170	117	160
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
27000	BFL	3410	3470	3540	3620	3690	3760	3830	3910	3980	4060	4140	115	157
	V1	98	98	98	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	BFL	3390	3440	3510	3580	3650	3720	3800	3880	3950	4030	4090	113	154
	V1	98	98	98	98	98	98	98	98	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6		

FIGURE 5-126. TAKE-OFF DISTANCE; FLAPS - 20° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	107			
	N1%	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
39600	BFL	7040	7160	7290	7410	7540	7970	8690	9470	10280	10630		142	194
	V1	117	117	117	116	116	118	121	124	126	127			
	VR	136	136	136	136	136	137	139	140	141	142			
	V2	142	142	142	142	142	143	144	144	145	145			
	GR2	4.7	4.7	4.7	4.7	4.7	4.4	3.9	3.4	2.8	2.6			
39000	BFL	6720	6840	6960	7080	7200	7610	8310	9060	9850	10190		141	192
	V1	115	115	114	114	114	116	119	122	124	125			
	VR	134	134	134	134	134	135	137	138	140	140			
	V2	140	140	140	140	140	141	142	143	143	143			
	GR2	4.9	4.9	4.9	4.9	4.9	4.6	4.1	3.6	3	2.8			
38000	BFL	6230	6340	6450	6560	6670	7050	7690	8390	9160	9500		138	189
	V1	111	111	111	111	111	112	115	118	121	122			
	VR	131	131	131	131	131	132	134	135	137	137			
	V2	137	137	137	137	137	138	139	140	141	141			
	GR2	5.2	5.2	5.2	5.2	5.2	5	4.4	3.9	3.3	3.1			
37000	BFL	5770	5870	5970	6070	6180	6520	7110	7760	8470	8800		136	187
	V1	107	107	107	107	107	108	111	114	117	118			
	VR	128	128	128	128	128	129	130	132	134	134			
	V2	135	135	135	135	135	135	136	137	138	138			
	GR2	5.6	5.6	5.6	5.6	5.6	5.3	4.8	4.2	3.6	3.4			
36000	BFL	5330	5430	5520	5610	5700	6030	6560	7160	7830	8130		133	184
	V1	104	104	103	103	103	105	107	110	113	115			
	VR	125	125	125	125	125	126	127	129	130	131			
	V2	132	132	132	132	132	132	133	134	135	135			
	GR2	6	6	6	6	5.9	5.7	5.1	4.6	4	3.7			
35000	BFL	4920	5010	5090	5180	5260	5550	6050	6600	7220	7500		131	181
	V1	100	100	100	100	100	101	104	107	110	111			
	VR	121	121	121	121	121	122	124	126	127	128			
	V2	129	129	129	129	129	130	130	131	132	132			
	GR2	6.3	6.3	6.3	6.3	6.3	6.1	5.5	4.9	4.3	4.1			
34000	BFL	4550	4630	4710	4780	4860	5120	5570	6070	6630	6890		129	178
	V1	97	97	96	96	96	97	100	103	106	107			
	VR	118	118	118	118	118	119	121	122	124	124			
	V2	126	126	126	126	126	127	128	128	129	129			
	GR2	6.8	6.8	6.8	6.8	6.7	6.5	5.9	5.3	4.7	4.4			
33000	BFL	4440	4520	4600	4680	4760	4790	5110	5580	6090	6320		127	175
	V1	96	96	96	96	96	96	96	99	102	103			
	VR	115	115	115	115	115	116	117	119	120	121			
	V2	124	124	124	124	124	124	125	125	126	126			
	GR2	7.2	7.2	7.2	7.2	7.2	6.9	6.3	5.7	5.1	4.8			
32000	BFL	4400	4480	4560	4640	4710	4740	4720	5120	5600	5810		125	172
	V1	96	96	96	96	96	95	93	96	98	100			
	VR	113	113	113	113	113	113	114	116	117	118			
	V2	122	122	122	122	122	122	122	123	123	124			
	GR2	7.7	7.7	7.7	7.7	7.7	7.3	6.8	6.1	5.5	5.2			

FIGURE 5-126. TAKE-OFF DISTANCE; FLAPS - 20° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	107			
	N1%	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
31000	BFL	4370	4440	4520	4600	4670	4670	4670	4730	5150	5350		123	169
	V1	96	96	96	96	96	95	93	92	95	96			
	VR	111	111	111	111	111	111	111	113	114	115			
	V2	121	121	121	121	121	120	120	120	121	121			
	GR2	8.2	8.2	8.2	8.2	8.2	7.9	7.2	6.6	5.9	5.6			
30000	BFL	4320	4400	4480	4550	4630	4680	4620	4560	4740	4910		121	166
	V1	96	96	96	96	96	95	93	91	91	93			
	VR	109	109	109	109	109	109	109	110	111	112			
	V2	120	120	120	120	120	119	118	118	118	119			
	GR2	8.8	8.8	8.8	8.8	8.8	8.4	7.8	7.1	6.4	6.1			
29000	BFL	4290	4370	4440	4510	4590	4630	4580	4520	4520	4520		119	163
	V1	97	97	97	97	96	95	93	91	89	89			
	VR	107	107	107	107	107	107	107	107	108	109			
	V2	118	118	118	118	118	118	117	116	116	116			
	GR2	9.4	9.4	9.4	9.4	9.4	9.1	8.4	7.6	6.9	6.6			
28000	BFL	4240	4320	4400	4480	4540	4590	4530	4470	4410	4380		117	160
	V1	97	97	97	97	97	96	94	91	89	88			
	VR	106	106	106	106	106	106	105	105	106	106			
	V2	117	117	117	117	117	117	116	115	114	114			
	GR2	10.1	10.1	10.1	10.1	10.1	9.7	9	8.2	7.4	7.1			
27000	BFL	4210	4280	4350	4440	4500	4540	4490	4430	4360	4330		115	157
	V1	97	97	97	97	97	96	94	92	89	88			
	VR	104	104	104	104	104	104	104	103	103	103			
	V2	116	116	116	116	116	116	115	113	113	112			
	GR2	10.8	10.8	10.8	10.8	10.8	10.4	9.7	8.9	8.1	7.7			
26000	BFL	4160	4250	4310	4390	4460	4500	4440	4390	4320	4290		113	154
	V1	97	97	97	97	97	96	94	92	90	89			
	VR	102	102	102	102	102	102	102	102	101	101			
	V2	115	115	115	115	115	115	114	112	111	111			
	GR2	11.6	11.6	11.6	11.6	11.5	11.1	10.4	9.6	8.7	8.4			

FIGURE 5-127. TAKE-OFF DISTANCE; FLAPS - 20° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	BFL	6180	6280	6420	6560	6690	6820	6950	7090	7220	7350	7490	143	194
	V1	121	121	120	120	120	120	120	119	119	119	119		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.4	4.4	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5		
39000	BFL	5900	6010	6140	6260	6390	6510	6640	6770	6890	7020	7150	142	193
	V1	118	118	118	118	118	118	117	117	117	117	117		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.6	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
38000	BFL	5470	5560	5680	5800	5920	6030	6150	6260	6380	6500	6620	139	190
	V1	115	114	114	114	114	114	114	113	113	113	113		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5	5	5	5	5	5	5	5	5	5	5		
37000	BFL	5060	5150	5260	5370	5470	5580	5690	5800	5900	6010	6120	137	187
	V1	111	111	111	110	110	110	110	110	110	109	109		
	VR	130	130	130	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	BFL	4690	4760	4870	4960	5060	5160	5260	5360	5450	5550	5650	134	184
	V1	107	107	107	107	107	106	106	106	106	106	106		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
35000	BFL	4320	4400	4490	4580	4670	4760	4850	4940	5030	5120	5210	132	181
	V1	104	103	103	103	103	103	103	102	102	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
34000	BFL	4000	4060	4150	4230	4310	4390	4470	4550	4630	4720	4800	129	178
	V1	100	100	100	99	99	99	99	99	99	98	98		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
33000	BFL	3700	3760	3830	3910	3980	4060	4140	4230	4310	4390	4470	127	176
	V1	96	96	96	96	95	95	95	95	95	95	95		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	124	124	124	124	124	124	124		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
32000	BFL	3640	3700	3780	3860	3940	4030	4110	4190	4270	4350	4430	125	173
	V1	96	96	96	96	96	96	95	95	95	95	95		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		

FIGURE 5-127. TAKE-OFF DISTANCE; FLAPS - 20° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
31000	BFL	3620	3680	3760	3840	3910	4000	4070	4160	4230	4310	4400	123	170
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
30000	BFL	3590	3650	3720	3810	3890	3970	4050	4120	4210	4290	4360	121	167
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
29000	BFL	3560	3620	3690	3770	3850	3930	4010	4090	4160	4240	4320	119	164
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
28000	BFL	3540	3590	3660	3740	3820	3890	3980	4050	4130	4210	4290	117	161
	V1	97	97	96	96	96	96	96	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.8	9.8	9.8	9.8		
27000	BFL	3500	3560	3630	3710	3790	3860	3930	4010	4080	4160	4240	115	157
	V1	97	97	97	97	97	97	97	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
26000	BFL	3470	3530	3600	3680	3750	3830	3900	3980	4060	4130	4210	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.2		

FIGURE 5-127. TAKE-OFF DISTANCE; FLAPS - 20° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	104			
	N1%	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5	89.5			
39600	BFL	7620	7760	7900	8040	8190	8920	9730	10540	11430	11450		143	194
	V1	119	119	119	118	118	121	124	127	129	129			
	VR	138	138	138	138	138	140	142	143	143	143			
	V2	144	144	144	144	144	145	146	146	146	146			
	GR2	4.5	4.5	4.5	4.5	4.4	4	3.5	3	2.4	2.4			
39000	BFL	7280	7410	7540	7670	7820	8510	9310	10100	10940	10960		142	193
	V1	117	116	116	116	116	119	122	125	127	127			
	VR	136	136	136	136	136	138	140	141	142	142			
	V2	142	142	142	142	142	143	144	144	145	145			
	GR2	4.7	4.7	4.7	4.7	4.6	4.2	3.6	3.1	2.6	2.6			
38000	BFL	6730	6850	6970	7090	7230	7870	8610	9360	10180	10190		139	190
	V1	113	113	113	112	112	115	118	121	124	124			
	VR	133	133	133	133	133	135	136	138	139	139			
	V2	139	139	139	139	139	140	141	142	142	142			
	GR2	5	5	5	5	4.9	4.5	4	3.4	2.9	2.9			
37000	BFL	6230	6340	6450	6560	6680	7260	7950	8670	9450	9460		137	187
	V1	109	109	109	109	109	111	114	117	120	120			
	VR	129	129	129	129	129	131	133	134	136	136			
	V2	136	136	136	136	136	137	138	139	139	139			
	GR2	5.3	5.3	5.3	5.3	5.3	4.9	4.3	3.8	3.2	3.2			
36000	BFL	5750	5850	5950	6060	6170	6700	7330	7990	8730	8750		134	184
	V1	105	105	105	105	105	108	111	113	116	116			
	VR	126	126	126	126	126	128	130	131	133	133			
	V2	133	133	133	133	133	134	135	136	137	137			
	GR2	5.7	5.7	5.7	5.7	5.6	5.2	4.6	4.1	3.5	3.5			
35000	BFL	5300	5390	5480	5580	5690	6180	6750	7360	8050	8060		132	181
	V1	102	102	102	101	101	104	107	110	113	113			
	VR	123	123	123	123	123	125	126	128	129	129			
	V2	130	130	130	130	130	131	132	133	134	134			
	GR2	6.1	6.1	6.1	6.1	6	5.6	5	4.4	3.9	3.8			
34000	BFL	4880	4970	5050	5140	5240	5680	6210	6760	7400	7410		129	178
	V1	98	98	98	98	98	100	103	106	109	109			
	VR	119	119	119	119	119	121	123	124	126	126			
	V2	127	127	127	127	127	128	129	130	131	131			
	GR2	6.5	6.5	6.5	6.5	6.4	6	5.4	4.8	4.2	4.2			
33000	BFL	4560	4640	4730	4810	4860	5210	5700	6200	6780	6790		127	176
	V1	95	95	95	95	95	97	99	102	105	105			
	VR	116	116	116	116	116	118	119	121	123	123			
	V2	124	124	124	124	124	125	126	127	128	128			
	GR2	6.9	6.9	6.9	6.9	6.8	6.4	5.8	5.2	4.6	4.6			
32000	BFL	4520	4600	4680	4760	4820	4830	5210	5680	6200	6210		125	173
	V1	95	95	95	95	95	95	95	98	101	101			
	VR	113	113	113	113	113	114	116	118	119	119			
	V2	122	122	122	122	122	123	123	124	125	125			
	GR2	7.4	7.4	7.4	7.4	7.3	6.8	6.2	5.6	5	5			

FIGURE 5-127. TAKE-OFF DISTANCE; FLAPS - 20° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	104			
	N1%	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5	89.5			
31000	BFL	4480	4560	4650	4720	4770	4780	4780	5200	5680	5690		123	170
	V1	95	95	95	95	95	93	92	94	97	97			
	VR	111	111	111	111	111	111	113	114	116	116			
	V2	120	120	120	120	120	120	120	121	122	122			
	GR2	7.9	7.9	7.9	7.9	7.8	7.3	6.6	6	5.4	5.4			
30000	BFL	4440	4530	4610	4680	4730	4740	4690	4780	5210	5220		121	167
	V1	96	96	95	95	95	94	91	91	94	94			
	VR	109	109	109	109	109	109	110	111	113	113			
	V2	119	119	119	119	119	118	118	119	119	119			
	GR2	8.5	8.5	8.5	8.5	8.3	7.8	7.1	6.5	5.9	5.8			
29000	BFL	4410	4480	4560	4640	4680	4690	4640	4590	4780	4780		119	164
	V1	96	96	96	96	95	94	92	90	90	90			
	VR	107	107	107	107	107	107	107	108	110	110			
	V2	118	118	118	118	118	117	116	116	117	117			
	GR2	9.1	9.1	9.1	9.1	8.9	8.4	7.7	7	6.3	6.3			
28000	BFL	4350	4430	4510	4600	4640	4660	4610	4540	4480	4480		117	161
	V1	96	96	96	96	95	94	92	90	88	88			
	VR	106	106	106	106	106	105	105	106	106	106			
	V2	117	117	117	117	117	116	115	114	114	114			
	GR2	9.8	9.7	9.7	9.7	9.6	9.1	8.3	7.6	6.9	6.8			
27000	BFL	4310	4390	4470	4550	4590	4610	4560	4510	4440	4430		115	157
	V1	96	96	96	96	96	94	92	90	88	88			
	VR	104	104	104	104	104	104	104	104	104	104			
	V2	116	116	116	116	116	115	114	113	112	112			
	GR2	10.4	10.4	10.4	10.4	10.3	9.7	8.9	8.2	7.4	7.4			
26000	BFL	4280	4350	4420	4510	4550	4560	4510	4450	4390	4390		113	154
	V1	96	96	96	96	96	94	92	90	88	88			
	VR	102	102	102	102	102	102	102	102	102	102			
	V2	115	115	115	115	115	114	112	111	110	110			
	GR2	11.2	11.2	11.2	11.2	11	10.5	9.6	8.9	8.1	8.1			

FIGURE 5-128. TAKE-OFF DISTANCE; FLAPS - 20° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	BFL	6820	6940	7090	7220	7350	7490	7640	7780	7930	8080	8230	144	194
	V1	124	123	123	123	123	122	122	122	122	122	122		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
39000	BFL	6510	6630	6770	6890	7010	7150	7290	7430	7570	7710	7850	143	193
	V1	121	121	121	121	120	120	120	120	120	119	119		
	VR	139	139	139	139	139	138	138	138	138	138	138		
	V2	144	144	144	144	144	143	143	143	143	143	143		
	GR2	4.3	4.3	4.3	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
38000	BFL	6020	6130	6250	6370	6490	6610	6740	6860	6990	7120	7250	140	190
	V1	117	117	117	117	116	116	116	116	116	115	115		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	140	140	140	140	140	140	140		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
37000	BFL	5570	5660	5780	5890	5990	6100	6220	6340	6460	6580	6700	138	187
	V1	113	113	113	113	113	112	112	112	112	112	111		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	137	137	137	137	137	137	137		
	GR2	5	5	5	5	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
36000	BFL	5140	5230	5340	5440	5530	5630	5740	5850	5960	6070	6180	135	185
	V1	110	110	109	109	109	109	108	108	108	108	108		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	134	134	134	134	134	134		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
35000	BFL	4750	4830	4920	5020	5100	5190	5300	5390	5490	5590	5690	133	182
	V1	106	106	106	105	105	105	105	104	104	104	104		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
34000	BFL	4370	4440	4530	4620	4700	4780	4870	4960	5050	5140	5230	130	179
	V1	102	102	102	102	101	101	101	101	101	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	128	128	128	128	128	128		
	GR2	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
33000	BFL	4030	4090	4170	4250	4320	4390	4480	4560	4640	4720	4810	127	176
	V1	98	98	98	98	97	97	97	97	97	97	97		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	125	125		
	GR2	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
32000	BFL	3710	3770	3860	3940	4030	4120	4200	4290	4370	4450	4540	125	173
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7	7	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1		

FIGURE 5-128. TAKE-OFF DISTANCE; FLAPS - 20° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 80.2	-50 -58 80.7	-45 -49 81.5	-40 -40 82.4	-35 -31 83.3	-30 -22 84.2	-25 -13 85.1	-20 -4 85.9	-15 5 86.8	-10 14 87.6	-5 23 88.5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3680	3740	3820	3910	4000	4080	4160	4260	4330	4420	4500	123	170
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6		
30000	BFL	3680	3730	3800	3870	3970	4060	4140	4220	4290	4380	4460	121	167
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8	8	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
29000	BFL	3650	3700	3770	3850	3940	4020	4100	4180	4260	4330	4420	119	164
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
28000	BFL	3610	3670	3740	3820	3900	3970	4060	4140	4210	4300	4380	117	161
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
27000	BFL	3590	3640	3700	3780	3870	3950	4020	4100	4180	4260	4340	115	158
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	9.9	9.9	9.9	9.9	10	10	10	10	10	10	10		
26000	BFL	3560	3600	3670	3750	3830	3910	3990	4070	4140	4220	4290	113	155
	V1	96	96	96	96	96	96	95	95	95	95	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.6	10.6	10.6	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7		

FIGURE 5-128. TAKE-OFF DISTANCE; FLAPS - 20° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	100				
	N1%	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
39600	BFL	8380	8530	8680	8860	9290	10110	10970	11870	12490			144	194
	V1	121	121	121	121	122	125	128	130	132				
	VR	141	141	141	141	141	143	144	145	145				
	V2	145	145	145	145	146	147	147	148	148				
	GR2	4.2	4.2	4.2	4.1	3.9	3.5	3	2.5	2.2				
39000	BFL	7990	8140	8280	8450	8870	9660	10510	11370	11950			143	193
	V1	119	119	119	119	120	123	126	128	130				
	VR	138	138	138	138	139	141	142	143	144				
	V2	143	143	143	143	144	145	146	146	146				
	GR2	4.4	4.4	4.4	4.3	4.1	3.7	3.2	2.7	2.3				
38000	BFL	7390	7520	7650	7810	8190	8950	9730	10560	11110			140	190
	V1	115	115	115	115	116	119	122	124	126				
	VR	135	135	135	135	136	138	139	140	141				
	V2	140	140	140	140	141	142	143	143	143				
	GR2	4.7	4.7	4.7	4.7	4.4	4	3.5	2.9	2.6				
37000	BFL	6820	6940	7060	7210	7550	8240	9000	9790	10310			138	187
	V1	111	111	111	111	112	115	118	121	122				
	VR	132	132	132	132	132	134	136	137	138				
	V2	137	137	137	137	138	139	140	140	141				
	GR2	5.1	5.1	5.1	5	4.8	4.3	3.8	3.3	2.9				
36000	BFL	6290	6400	6510	6650	6960	7580	8290	9040	9540			135	185
	V1	108	107	107	107	108	111	114	117	119				
	VR	128	128	128	128	129	131	132	134	135				
	V2	134	134	134	134	135	136	137	138	138				
	GR2	5.4	5.4	5.4	5.4	5.1	4.7	4.1	3.6	3.2				
35000	BFL	5800	5900	6000	6120	6410	6970	7620	8350	8800			133	182
	V1	104	104	104	104	105	107	110	113	115				
	VR	125	125	125	125	125	127	129	131	131				
	V2	132	132	132	132	132	133	134	135	135				
	GR2	5.8	5.8	5.8	5.7	5.5	5	4.5	3.9	3.6				
34000	BFL	5330	5420	5510	5620	5890	6410	6990	7650	8110			130	179
	V1	100	100	100	100	101	104	106	109	111				
	VR	121	121	121	121	122	124	125	127	128				
	V2	128	128	128	128	129	130	131	132	132				
	GR2	6.2	6.2	6.2	6.1	5.9	5.4	4.8	4.3	3.9				
33000	BFL	4890	4980	5060	5160	5400	5880	6420	7000	7410			127	176
	V1	96	96	96	96	97	100	103	105	107				
	VR	118	118	118	118	118	120	122	123	125				
	V2	125	125	125	125	126	127	128	128	129				
	GR2	6.6	6.6	6.6	6.5	6.3	5.8	5.2	4.7	4.3				
32000	BFL	4620	4710	4790	4860	4950	5380	5880	6400	6770			125	173
	V1	94	94	94	94	94	96	99	101	103				
	VR	114	114	114	114	115	117	118	120	121				
	V2	123	123	123	123	123	124	125	125	126				
	GR2	7.1	7.1	7.1	7	6.7	6.2	5.6	5.1	4.7				

FIGURE 5-128. TAKE-OFF DISTANCE; FLAPS - 20° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	100				
	N1%	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
31000	BFL	4590	4660	4750	4810	4840	4910	5360	5850	6180			123	170
	V1	94	94	94	94	93	92	95	98	99				
	VR	112	112	112	112	112	113	115	117	118				
	V2	120	120	120	120	120	121	122	122	123				
	GR2	7.6	7.5	7.5	7.5	7.2	6.7	6.1	5.5	5.1				
30000	BFL	4550	4620	4700	4770	4790	4790	4890	5330	5630			121	167
	V1	94	94	94	94	93	92	91	94	95				
	VR	109	109	109	109	109	110	111	113	114				
	V2	119	119	119	119	118	118	119	119	120				
	GR2	8.1	8.1	8.1	8	7.7	7.1	6.5	5.9	5.5				
29000	BFL	4510	4580	4660	4720	4750	4740	4690	4880	5150			119	164
	V1	95	95	95	94	93	92	90	90	92				
	VR	107	107	107	107	107	107	108	110	111				
	V2	117	117	117	117	117	116	116	117	117				
	GR2	8.7	8.7	8.7	8.6	8.3	7.7	7	6.4	6				
28000	BFL	4460	4530	4610	4670	4700	4690	4650	4590	4710			117	161
	V1	95	95	95	94	93	92	90	88	88				
	VR	105	105	105	105	105	105	106	107	108				
	V2	116	116	116	116	116	115	114	114	115				
	GR2	9.3	9.3	9.3	9.2	8.9	8.3	7.6	6.9	6.5				
27000	BFL	4420	4490	4570	4630	4650	4660	4610	4540	4500			115	158
	V1	95	95	95	95	94	92	90	88	87				
	VR	104	104	104	104	104	104	104	104	104				
	V2	115	115	115	115	114	114	113	112	112				
	GR2	10	10	10	9.9	9.6	8.9	8.2	7.5	7				
26000	BFL	4370	4450	4530	4580	4610	4600	4550	4490	4460			113	155
	V1	95	95	95	95	94	92	90	88	87				
	VR	102	102	102	102	102	102	102	102	102				
	V2	114	114	114	114	113	112	111	111	110				
	GR2	10.7	10.7	10.7	10.6	10.3	9.6	8.9	8.1	7.6				

FIGURE 5-129. TAKE-OFF DISTANCE; FLAPS - 20° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	BFL	7520	7650	7800	7940	8080	8240	8410	8570	8730	8900	9070	145	195
	V1	126	126	126	126	125	125	125	125	125	125	124		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	BFL	7190	7320	7450	7580	7700	7860	8010	8170	8330	8480	8640	144	193
	V1	124	124	124	123	123	123	123	122	122	122	122		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	145	145	145	145	145	145	145	145	145		
	GR2	4	4	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	BFL	6630	6750	6880	7000	7120	7250	7400	7540	7680	7830	7970	141	191
	V1	120	120	119	119	119	119	118	118	118	118	118		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	BFL	6120	6230	6350	6460	6560	6690	6820	6950	7080	7220	7350	139	188
	V1	116	116	116	115	115	115	115	114	114	114	114		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
36000	BFL	5640	5740	5850	5950	6050	6160	6280	6410	6530	6650	6770	136	185
	V1	112	112	112	111	111	111	111	110	110	110	110		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
35000	BFL	5200	5290	5390	5480	5570	5680	5790	5900	6000	6110	6220	134	182
	V1	108	108	108	107	107	107	107	107	106	106	106		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.4	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
34000	BFL	4780	4860	4950	5040	5120	5220	5320	5420	5520	5620	5720	131	179
	V1	104	104	104	104	103	103	103	103	103	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
33000	BFL	4390	4470	4550	4620	4700	4790	4880	4970	5060	5150	5240	128	176
	V1	100	100	100	100	99	99	99	99	99	99	98		
	VR	120	120	120	120	120	120	120	120	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
32000	BFL	4040	4100	4180	4250	4310	4390	4480	4560	4640	4720	4800	126	173
	V1	96	96	96	96	96	95	95	95	95	95	95		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8		

FIGURE 5-129. TAKE-OFF DISTANCE; FLAPS - 20° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 80.7	-50 -58 81.1	-45 -49 81.9	-40 -40 82.9	-35 -31 83.8	-30 -22 84.7	-25 -13 85.5	-20 -4 86.4	-15 5 87.3	-10 14 88.1	-5 23 89.0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3760	3820	3910	4000	4090	4180	4260	4350	4430	4520	4600	123	170
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
30000	BFL	3760	3800	3880	3970	4060	4150	4220	4320	4400	4480	4570	121	167
	V1	93	93	93	93	94	94	93	93	93	93	93		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
29000	BFL	3730	3770	3850	3940	4030	4110	4190	4270	4360	4430	4530	119	164
	V1	94	94	94	94	94	94	94	94	94	94	93		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
28000	BFL	3700	3740	3820	3900	3990	4070	4160	4240	4320	4400	4480	117	161
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
27000	BFL	3670	3710	3780	3870	3950	4040	4120	4200	4270	4360	4440	115	158
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
26000	BFL	3630	3680	3750	3830	3920	4000	4080	4150	4240	4320	4400	113	155
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3		

FIGURE 5-129. TAKE-OFF DISTANCE; FLAPS - 20° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	97				
	N1%	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
39600	BFL	9230	9400	9570	9840	10530	11430	12380					145	195
	V1	124	124	124	124	126	129	131						
	VR	143	143	143	143	144	145	146						
	V2	147	147	147	147	148	149	149						
	GR2	3.9	3.9	3.9	3.8	3.5	3	2.5						
39000	BFL	8800	8960	9120	9380	10060	10940	11840	12840				144	193
	V1	122	122	122	122	124	127	129	132					
	VR	141	141	141	141	142	143	144	145					
	V2	145	145	145	145	146	147	147	148					
	GR2	4.1	4.1	4.1	4	3.6	3.2	2.7	2.2					
38000	BFL	8120	8270	8410	8660	9310	10130	11000	11910	12140			141	191
	V1	118	118	118	118	120	123	126	128	129				
	VR	137	137	137	137	139	140	141	142	142				
	V2	142	142	142	142	143	144	144	145	145				
	GR2	4.4	4.4	4.4	4.3	4	3.5	3	2.5	2.3				
37000	BFL	7480	7620	7750	7980	8570	9360	10190	11020	11250			139	188
	V1	114	114	114	114	116	119	122	124	125				
	VR	134	134	134	134	135	137	138	139	139				
	V2	139	139	139	139	140	141	142	142	142				
	GR2	4.8	4.8	4.8	4.6	4.3	3.8	3.3	2.8	2.6				
36000	BFL	6890	7010	7140	7350	7880	8610	9390	10220	10410			136	185
	V1	110	110	110	110	112	115	118	120	121				
	VR	130	130	130	130	132	133	135	136	136				
	V2	136	136	136	136	137	138	139	139	139				
	GR2	5.1	5.1	5.1	4.9	4.6	4.1	3.6	3.1	3				
35000	BFL	6340	6450	6560	6750	7240	7900	8650	9420	9610			134	182
	V1	106	106	106	106	108	111	114	117	117				
	VR	127	127	127	127	128	130	132	133	133				
	V2	133	133	133	133	134	135	136	136	136				
	GR2	5.5	5.5	5.5	5.3	5	4.5	4	3.4	3.3				
34000	BFL	5820	5920	6030	6200	6650	7250	7920	8660	8830			131	179
	V1	102	102	102	102	104	107	110	113	113				
	VR	123	123	123	123	125	126	128	130	130				
	V2	130	130	130	130	131	132	133	133	133				
	GR2	5.9	5.9	5.9	5.7	5.4	4.8	4.3	3.8	3.6				
33000	BFL	5340	5430	5520	5680	6090	6640	7250	7930	8100			128	176
	V1	98	98	98	99	100	103	106	109	109				
	VR	119	119	119	120	121	123	125	126	127				
	V2	127	127	127	127	128	129	129	130	130				
	GR2	6.3	6.3	6.3	6.1	5.8	5.2	4.7	4.1	4				
32000	BFL	4890	4970	5060	5210	5570	6070	6630	7240	7390			126	173
	V1	95	94	94	95	97	99	102	105	105				
	VR	116	116	116	116	118	119	121	123	123				
	V2	124	124	124	124	125	126	126	127	127				
	GR2	6.7	6.7	6.7	6.5	6.2	5.7	5.1	4.5	4.4				

FIGURE 5-129. TAKE-OFF DISTANCE; FLAPS - 20° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	97				
	N1%	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
31000	BFL	4690	4780	4860	4890	5080	5540	6050	6600	6730			123	170
	V1	93	93	93	93	93	95	98	101	101				
	VR	113	113	113	113	114	116	117	119	119				
	V2	121	121	121	121	121	122	123	124	124				
	GR2	7.2	7.2	7.2	7	6.6	6.1	5.5	4.9	4.8				
30000	BFL	4650	4740	4810	4840	4870	5040	5500	6000	6120			121	167
	V1	93	93	93	92	91	91	94	97	97				
	VR	110	110	110	110	110	112	114	115	116				
	V2	119	119	119	118	118	119	120	121	121				
	GR2	7.7	7.7	7.7	7.5	7.1	6.5	5.9	5.3	5.2				
29000	BFL	4600	4690	4780	4790	4790	4790	4990	5450	5560			119	164
	V1	93	93	93	93	91	90	90	93	93				
	VR	107	107	107	107	108	108	110	112	112				
	V2	117	117	117	116	116	116	117	118	118				
	GR2	8.3	8.3	8.3	8	7.6	7	6.4	5.8	5.6				
28000	BFL	4560	4640	4730	4750	4770	4740	4690	4970	5070			117	161
	V1	94	94	93	93	92	90	88	89	90				
	VR	105	105	105	105	105	106	107	108	109				
	V2	115	115	115	115	115	114	114	115	115				
	GR2	8.9	8.9	8.9	8.6	8.2	7.6	6.9	6.3	6.1				
27000	BFL	4510	4590	4670	4700	4700	4700	4650	4580	4620			115	158
	V1	94	94	94	93	92	90	88	86	86				
	VR	104	104	104	104	104	104	104	105	105				
	V2	114	114	114	114	113	113	112	112	113				
	GR2	9.6	9.6	9.6	9.3	8.8	8.2	7.5	6.8	6.7				
26000	BFL	4480	4550	4630	4650	4650	4660	4590	4540	4520			113	155
	V1	94	94	94	93	92	90	88	86	86				
	VR	102	102	102	102	102	101	101	102	102				
	V2	113	113	113	113	112	111	110	110	110				
	GR2	10.3	10.3	10.3	10	9.5	8.9	8.1	7.4	7.2				

FIGURE 5-130. TAKE-OFF DISTANCE; FLAPS - 20° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	BFL	8250	8400	8560	8710	8870	9060	9240	9420	9600	9780	9970	147	195
	V1	129	129	129	128	128	128	128	127	127	127	127		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.6	3.6	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7		
39000	BFL	7880	8020	8180	8320	8470	8650	8820	9000	9170	9340	9510	145	194
	V1	127	126	126	126	126	125	125	125	125	125	125		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
38000	BFL	7300	7430	7550	7680	7820	7980	8140	8300	8460	8620	8780	142	191
	V1	123	123	122	122	121	121	121	121	121	121	121		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
37000	BFL	6720	6830	6960	7080	7210	7350	7500	7640	7790	7930	8080	140	188
	V1	119	118	118	118	117	117	117	117	117	117	116		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
36000	BFL	6180	6290	6410	6520	6630	6770	6900	7030	7160	7300	7430	137	185
	V1	114	114	114	114	113	113	113	113	113	112	112		
	VR	133	133	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.8	4.8	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
35000	BFL	5690	5780	5890	5990	6090	6220	6340	6460	6580	6700	6830	135	183
	V1	110	110	110	110	109	109	109	109	109	109	108		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
34000	BFL	5220	5310	5410	5500	5590	5710	5820	5930	6040	6150	6260	132	180
	V1	106	106	106	106	105	105	105	105	105	105	104		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.5	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
33000	BFL	4790	4870	4960	5040	5130	5230	5330	5430	5530	5630	5730	129	177
	V1	102	102	102	102	101	101	101	101	101	101	101		
	VR	122	122	122	122	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	5.9	5.9	6	6	6	6	6	6	6	6	6		
32000	BFL	4390	4460	4540	4620	4690	4780	4870	4970	5060	5150	5240	127	174
	V1	98	98	98	98	98	97	97	97	97	97	97		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		

FIGURE 5-130. TAKE-OFF DISTANCE; FLAPS - 20° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
31000	BFL	4020	4090	4160	4230	4300	4380	4470	4550	4630	4710	4800	124	171
	V1	94	94	94	94	94	93	93	93	93	93	93		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
30000	BFL	3810	3880	3970	4060	4150	4240	4320	4410	4500	4580	4670	121	168
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
29000	BFL	3810	3850	3940	4030	4120	4210	4290	4380	4460	4550	4640	119	165
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
28000	BFL	3780	3830	3900	3990	4080	4170	4250	4330	4410	4510	4580	117	161
	V1	93	93	93	93	93	93	93	93	93	92	92		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
27000	BFL	3750	3780	3870	3960	4040	4130	4200	4290	4370	4460	4540	115	158
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	103	103	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
26000	BFL	3710	3750	3830	3920	4010	4090	4170	4250	4340	4420	4500	113	155
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.8	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 5-130. TAKE-OFF DISTANCE; FLAPS - 20° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	93					
	N1%	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
39600	BFL	10150	10340	10560	11050	11920	12920						147	195
	V1	127	127	127	128	130	133							
	VR	145	145	145	146	147	148							
	V2	149	149	149	149	150	150							
	GR2	3.7	3.7	3.6	3.3	3	2.5							
39000	BFL	9690	9870	10080	10540	11400	12360	13400					145	194
	V1	125	124	124	126	128	131	133						
	VR	143	143	143	144	145	146	147						
	V2	147	147	147	147	148	148	149						
	GR2	3.8	3.8	3.8	3.5	3.2	2.7	2.2						
38000	BFL	8940	9100	9300	9750	10540	11460	12420					142	191
	V1	120	120	120	122	124	127	129						
	VR	140	140	140	140	142	143	144						
	V2	144	144	144	144	145	146	146						
	GR2	4.2	4.2	4.1	3.8	3.5	3	2.5						
37000	BFL	8230	8380	8560	8960	9730	10600	11500	12300				140	188
	V1	116	116	116	117	120	123	125	127					
	VR	136	136	136	136	138	140	141	141					
	V2	141	141	141	141	142	143	143	144					
	GR2	4.5	4.5	4.4	4.2	3.8	3.3	2.8	2.4					
36000	BFL	7570	7700	7870	8240	8940	9770	10650	11370				137	185
	V1	112	112	112	113	116	119	122	124					
	VR	132	132	132	133	135	136	138	138					
	V2	138	138	138	138	139	140	140	141					
	GR2	4.8	4.8	4.8	4.5	4.1	3.6	3.1	2.7					
35000	BFL	6950	7070	7230	7560	8200	8990	9790	10490				135	183
	V1	108	108	108	109	112	115	118	120					
	VR	129	129	129	129	131	133	134	135					
	V2	134	134	134	134	136	137	137	138					
	GR2	5.2	5.2	5.2	4.8	4.5	4	3.4	3					
34000	BFL	6370	6490	6620	6930	7510	8220	8990	9660				132	180
	V1	104	104	104	105	108	111	113	116					
	VR	125	125	125	126	127	129	131	132					
	V2	131	131	131	131	132	133	134	135					
	GR2	5.6	5.6	5.5	5.2	4.8	4.3	3.8	3.3					
33000	BFL	5830	5940	6060	6340	6870	7510	8220	8850				129	177
	V1	100	100	100	101	104	107	109	112					
	VR	121	121	122	122	124	125	127	128					
	V2	128	128	128	128	129	130	131	132					
	GR2	6	6	5.9	5.6	5.2	4.7	4.2	3.7					
32000	BFL	5330	5430	5540	5800	6280	6860	7500	8090				127	174
	V1	97	96	96	98	100	103	105	108					
	VR	118	118	118	118	120	122	124	125					
	V2	125	125	125	125	126	127	128	129					
	GR2	6.4	6.4	6.3	6	5.6	5.1	4.5	4.1					

FIGURE 5-130. TAKE-OFF DISTANCE; FLAPS - 20° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	93					
	N1%	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
31000	BFL	4880	4960	5060	5290	5720	6250	6830	7360				124	171
	V1	93	93	93	94	96	99	101	104					
	VR	114	114	114	115	117	118	120	121					
	V2	122	122	122	122	123	124	125	126					
	GR2	6.9	6.9	6.8	6.4	6.1	5.5	4.9	4.5					
30000	BFL	4760	4840	4910	4910	5210	5680	6210	6690				121	168
	V1	92	92	92	92	92	95	97	100					
	VR	111	111	111	111	113	115	116	118					
	V2	119	119	119	119	120	121	122	122					
	GR2	7.4	7.4	7.3	6.9	6.5	6	5.4	4.9					
29000	BFL	4720	4800	4870	4860	4880	5150	5630	6060				119	165
	V1	92	92	92	91	91	91	93	95					
	VR	108	108	108	108	109	111	112	114					
	V2	117	117	117	117	117	118	119	119					
	GR2	7.9	7.9	7.8	7.4	7	6.4	5.8	5.3					
28000	BFL	4670	4750	4820	4810	4830	4800	5090	5470				117	161
	V1	92	92	92	91	90	88	89	91					
	VR	105	105	105	105	106	107	109	110					
	V2	115	115	115	114	114	115	115	116					
	GR2	8.5	8.5	8.4	8	7.5	6.9	6.3	5.8					
27000	BFL	4630	4710	4770	4760	4790	4760	4690	4980				115	158
	V1	93	93	92	91	90	88	88	88					
	VR	104	104	104	103	103	104	105	107					
	V2	114	114	114	113	112	112	113	113					
	GR2	9.1	9.1	9	8.6	8.1	7.5	6.8	6.3					
26000	BFL	4570	4650	4720	4720	4750	4710	4640	4590				113	155
	V1	93	93	92	91	90	88	86	84					
	VR	102	102	102	102	101	101	102	103					
	V2	113	113	113	112	111	110	110	110					
	GR2	9.9	9.9	9.8	9.3	8.8	8.1	7.4	6.9					

FIGURE 5-131. TAKE-OFF DISTANCE; FLAPS - 20° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	BFL	9090	9240	9440	9620	9800	10000	10210	10410	10610	10820	11020	148	196
	V1	132	132	132	131	131	131	131	130	130	130	130		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4		
39000	BFL	8660	8810	8990	9170	9350	9540	9740	9930	10120	10310	10510	146	194
	V1	129	129	129	129	128	128	128	128	128	128	128		
	VR	146	146	146	146	146	146	146	146	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.5	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
38000	BFL	8010	8150	8310	8470	8630	8810	8990	9170	9350	9520	9700	144	191
	V1	125	125	125	125	124	124	124	124	124	124	123		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
37000	BFL	7390	7520	7660	7810	7960	8130	8290	8450	8610	8780	8940	141	189
	V1	121	121	121	120	120	120	120	120	120	119	119		
	VR	139	139	139	139	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
36000	BFL	6780	6900	7030	7160	7300	7450	7600	7750	7890	8040	8190	138	186
	V1	117	117	116	116	116	116	116	115	115	115	115		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
35000	BFL	6230	6330	6450	6570	6700	6840	6970	7110	7240	7380	7510	136	183
	V1	113	113	112	112	112	112	112	111	111	111	111		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
34000	BFL	5710	5800	5910	6020	6140	6260	6380	6510	6630	6750	6870	133	180
	V1	109	108	108	108	108	107	107	107	107	107	107		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
33000	BFL	5220	5310	5410	5510	5610	5720	5840	5950	6060	6170	6280	130	177
	V1	104	104	104	104	104	103	103	103	103	103	103		
	VR	124	124	124	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
32000	BFL	4770	4850	4940	5030	5130	5230	5330	5430	5530	5630	5730	127	174
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		

FIGURE 5-131. TAKE-OFF DISTANCE; FLAPS - 20° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
31000	BFL	4360	4430	4510	4590	4680	4770	4860	4950	5040	5130	5220	125	171
	V1	96	96	96	96	96	95	95	95	95	95	95		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
30000	BFL	3990	4060	4130	4210	4280	4360	4450	4530	4610	4690	4780	122	168
	V1	92	92	92	92	92	91	91	91	91	91	91		
	VR	113	113	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
29000	BFL	3860	3930	4030	4120	4210	4290	4380	4470	4560	4650	4740	119	165
	V1	91	91	91	91	91	91	91	91	91	91	91		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
28000	BFL	3860	3910	4010	4090	4180	4270	4350	4440	4520	4610	4700	117	162
	V1	92	91	91	92	92	91	91	91	91	91	91		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
27000	BFL	3820	3870	3960	4050	4140	4220	4310	4390	4480	4570	4650	115	159
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
26000	BFL	3790	3850	3930	4020	4110	4180	4270	4350	4440	4520	4600	113	155
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 5-131. TAKE-OFF DISTANCE; FLAPS - 20° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	89					
	N1%	90.8	91.7	92.5	92.2	91.5	90.9	90.2	89.9					
39600	BFL	11230	11440	11820	12540	13540							148	196
	V1	130	130	130	132	135								
	VR	148	148	148	149	150								
	V2	151	151	151	151	152								
	GR2	3.4	3.4	3.2	2.9	2.5								
39000	BFL	10710	10910	11280	11990	12930	14030						146	194
	V1	127	127	128	130	132	135							
	VR	145	145	146	147	148	149							
	V2	149	149	149	150	150	151							
	GR2	3.6	3.5	3.4	3.1	2.7	2.2							
38000	BFL	9890	10070	10410	11070	11980	12990						144	191
	V1	123	123	124	126	128	131							
	VR	142	142	142	143	144	145							
	V2	146	146	146	146	147	148							
	GR2	3.9	3.9	3.7	3.4	3	2.5							
37000	BFL	9110	9280	9590	10210	11070	12010	13030	13520				141	189
	V1	119	119	120	122	124	127	129	130					
	VR	138	138	139	140	141	142	143	143					
	V2	143	143	143	143	144	145	145	145					
	GR2	4.2	4.2	4	3.7	3.3	2.8	2.3	2.1					
36000	BFL	8340	8500	8790	9390	10190	11100	12030	12480				138	186
	V1	115	115	115	117	120	123	125	126					
	VR	135	135	135	136	138	139	140	140					
	V2	139	139	139	140	141	142	142	142					
	GR2	4.6	4.5	4.3	4	3.6	3.1	2.6	2.4					
35000	BFL	7650	7790	8060	8590	9360	10210	11100	11510				136	183
	V1	111	111	111	113	116	119	121	122					
	VR	131	131	131	132	134	136	137	137					
	V2	136	136	136	137	138	139	139	139					
	GR2	4.9	4.9	4.7	4.4	4	3.5	2.9	2.7					
34000	BFL	7000	7130	7380	7860	8550	9360	10210	10590				133	180
	V1	107	107	107	109	112	115	117	118					
	VR	127	127	127	129	130	132	133	134					
	V2	133	133	133	133	135	136	136	136					
	GR2	5.3	5.3	5.1	4.7	4.3	3.8	3.3	3					
33000	BFL	6400	6520	6740	7180	7810	8560	9340	9710				130	177
	V1	103	103	103	105	107	110	113	114					
	VR	123	123	124	125	127	128	130	130					
	V2	130	129	129	130	131	132	133	133					
	GR2	5.7	5.7	5.4	5.1	4.7	4.2	3.6	3.4					
32000	BFL	5830	5940	6140	6540	7110	7780	8540	8870				127	174
	V1	99	99	99	101	103	106	109	110					
	VR	120	120	120	121	123	125	126	127					
	V2	126	126	126	127	128	129	130	130					
	GR2	6.1	6.1	5.8	5.5	5.1	4.6	4	3.8					

FIGURE 5-131. TAKE-OFF DISTANCE; FLAPS - 20° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	89					
	N1%	90.8	91.7	92.5	92.2	91.5	90.9	90.2	89.9					
31000	BFL	5320	5420	5590	5960	6470	7080	7750	8090				125	171
	V1	95	95	95	97	99	102	105	106					
	VR	116	116	116	117	119	121	123	123					
	V2	123	123	123	124	125	126	127	127					
	GR2	6.6	6.5	6.3	5.9	5.5	5	4.4	4.2					
30000	BFL	4870	4950	5100	5410	5880	6420	7030	7320				122	168
	V1	91	91	91	93	95	98	101	102					
	VR	112	112	113	114	115	117	119	120					
	V2	120	120	120	121	122	122	123	124					
	GR2	7	7	6.7	6.4	5.9	5.4	4.8	4.6					
29000	BFL	4820	4900	4920	4930	5320	5810	6360	6620				119	165
	V1	91	91	90	89	91	94	96	98					
	VR	109	109	109	110	112	113	115	116					
	V2	117	117	117	117	118	119	120	120					
	GR2	7.6	7.5	7.2	6.8	6.4	5.8	5.3	5					
28000	BFL	4790	4850	4870	4880	4890	5250	5740	5980				117	162
	V1	91	91	90	89	88	90	92	93					
	VR	106	106	106	106	108	109	111	112					
	V2	115	115	115	115	115	116	117	117					
	GR2	8.1	8	7.8	7.4	6.9	6.3	5.7	5.5					
27000	BFL	4740	4800	4820	4830	4830	4800	5170	5380				115	159
	V1	91	91	90	89	88	88	88	89					
	VR	103	103	103	104	104	106	107	108					
	V2	113	113	113	112	112	113	114	114					
	GR2	8.7	8.7	8.4	7.9	7.4	6.9	6.2	5.9					
26000	BFL	4690	4750	4770	4780	4780	4750	4700	4870				113	155
	V1	92	91	91	89	88	86	84	85					
	VR	102	102	102	102	102	102	104	104					
	V2	112	112	112	111	110	110	111	111					
	GR2	9.4	9.4	9.1	8.6	8.1	7.4	6.8	6.5					

FIGURE 5-132. TAKE-OFF DISTANCE; FLAPS - 20° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	BFL	9980	10160	10390	10610	10840	11060	11290	11510	11740	11970	12200	149	196
	V1	135	135	134	134	134	134	134	134	134	133	133		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1		
39000	BFL	9530	9700	9920	10130	10350	10560	10780	11000	11210	11420	11640	147	194
	V1	132	132	132	132	132	131	131	131	131	131	131		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
38000	BFL	8790	8950	9150	9340	9540	9740	9940	10130	10330	10530	10730	145	192
	V1	128	128	128	128	127	127	127	127	127	127	127		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
37000	BFL	8110	8250	8430	8610	8790	8970	9150	9330	9510	9700	9880	142	189
	V1	124	124	123	123	123	123	123	123	122	122	122		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	3.9	3.9	3.9	4	4	4	4	4	4	4	3.9		
36000	BFL	7450	7590	7750	7910	8080	8240	8410	8570	8740	8910	9070	139	186
	V1	119	119	119	119	119	119	119	118	118	118	118		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
35000	BFL	6820	6940	7090	7240	7390	7540	7690	7840	7990	8140	8290	137	183
	V1	115	115	115	115	114	114	114	114	114	114	114		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
34000	BFL	6240	6350	6490	6620	6760	6890	7030	7160	7300	7440	7570	134	180
	V1	111	111	111	110	110	110	110	110	110	109	109		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5	5	5	5	5	5	5	5	5	5	5		
33000	BFL	5700	5800	5920	6040	6170	6290	6410	6530	6660	6780	6910	131	177
	V1	107	106	106	106	106	106	106	105	105	105	105		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
32000	BFL	5190	5280	5400	5500	5620	5730	5840	5950	6060	6170	6290	128	175
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		

FIGURE 5-132. TAKE-OFF DISTANCE; FLAPS - 20° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 81.8	-50 -58 82.5	-45 -49 83.5	-40 -40 84.4	-35 -31 85.3	-30 -22 86.1	-25 -13 87.0	-20 -4 87.9	-15 5 88.8	-10 14 89.6	-5 23 90.5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	4730	4810	4910	5000	5110	5210	5310	5410	5510	5610	5710	126	172
	V1	98	98	98	98	98	97	97	97	97	97	97		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
30000	BFL	4310	4380	4480	4560	4650	4740	4830	4920	5010	5100	5190	123	168
	V1	94	94	94	94	93	93	93	93	93	93	93		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
29000	BFL	3960	4040	4130	4220	4310	4400	4490	4580	4670	4760	4850	120	165
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
28000	BFL	3960	4020	4110	4200	4270	4360	4450	4540	4630	4720	4820	117	162
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
27000	BFL	3910	3980	4070	4160	4240	4320	4420	4510	4600	4690	4760	115	159
	V1	91	91	91	91	91	90	90	90	90	90	90		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
26000	BFL	3870	3940	4030	4120	4200	4290	4380	4460	4550	4630	4720	113	156
	V1	91	91	91	91	91	91	91	91	91	90	90		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9	9	9	9	9	9	9	9	9	9	9		

FIGURE 5-132. TAKE-OFF DISTANCE; FLAPS - 20° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	86					
	N1%	91.3	92.2	92.6	92.0	91.4	90.8	90.1	90.1					
39600	BFL	12430	12700	13280	14230								149	196
	V1	133	133	135	136									
	VR	150	150	150	151									
	V2	153	153	153	153									
	GR2	3.1	3	2.7	2.5									
39000	BFL	11870	12130	12690	13590	14720							147	194
	V1	131	131	132	134	136								
	VR	148	148	148	149	150								
	V2	151	151	151	152	152								
	GR2	3.3	3.2	2.9	2.6	2.2								
38000	BFL	10930	11180	11710	12570	13610							145	192
	V1	126	127	128	130	132								
	VR	145	145	145	146	147								
	V2	148	148	148	149	149								
	GR2	3.6	3.5	3.2	2.9	2.5								
37000	BFL	10070	10290	10780	11610	12570	13650						142	189
	V1	122	122	123	126	128	131							
	VR	141	141	141	143	144	145							
	V2	145	145	145	146	146	147							
	GR2	3.9	3.8	3.5	3.2	2.8	2.3							
36000	BFL	9240	9450	9910	10670	11600	12590	13680	13720				139	186
	V1	118	118	119	121	124	127	129	129					
	VR	137	137	138	139	141	141	142	142					
	V2	141	141	141	142	143	144	144	144					
	GR2	4.3	4.2	3.9	3.6	3.1	2.6	2.1	2.1					
35000	BFL	8440	8640	9060	9800	10630	11600	12590	12630				137	183
	V1	113	114	115	117	120	122	125	125					
	VR	133	133	134	135	137	138	139	139					
	V2	138	138	138	139	140	141	141	141					
	GR2	4.7	4.5	4.2	3.9	3.5	3	2.5	2.4					
34000	BFL	7710	7890	8270	8940	9760	10660	11580	11620				134	180
	V1	109	109	111	113	116	118	121	121					
	VR	129	129	130	132	133	135	136	136					
	V2	135	135	135	136	137	138	138	138					
	GR2	5	4.9	4.6	4.3	3.8	3.3	2.8	2.8					
33000	BFL	7030	7200	7540	8150	8920	9740	10640	10670				131	177
	V1	105	105	106	109	111	114	117	117					
	VR	126	126	126	128	130	131	132	132					
	V2	131	131	131	132	134	134	135	135					
	GR2	5.4	5.3	4.9	4.6	4.2	3.7	3.1	3.1					
32000	BFL	6400	6550	6860	7420	8090	8890	9710	9740				128	175
	V1	101	101	102	104	107	110	113	113					
	VR	122	122	122	124	126	128	129	129					
	V2	128	128	128	129	130	131	132	132					
	GR2	5.8	5.7	5.3	5	4.6	4	3.5	3.5					

FIGURE 5-132. TAKE-OFF DISTANCE; FLAPS - 20° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	86					
	N1%	91.3	92.2	92.6	92.0	91.4	90.8	90.1	90.1					
31000	BFL	5810	5950	6230	6730	7350	8060	8830	8870				126	172
	V1	97	97	98	100	103	106	108	109					
	VR	118	118	118	120	122	124	125	125					
	V2	124	124	124	126	127	128	129	129					
	GR2	6.3	6.1	5.7	5.4	5	4.4	3.9	3.8					
30000	BFL	5290	5410	5660	6100	6650	7300	8020	8050				123	168
	V1	93	93	94	96	98	101	104	104					
	VR	114	114	114	116	118	120	122	122					
	V2	121	121	121	122	123	124	125	125					
	GR2	6.7	6.5	6.2	5.8	5.4	4.8	4.3	4.3					
29000	BFL	4940	4980	5150	5520	6010	6590	7230	7260				120	165
	V1	90	90	90	92	94	97	100	100					
	VR	110	110	111	112	114	116	118	118					
	V2	118	118	118	119	120	121	122	122					
	GR2	7.2	7	6.7	6.3	5.8	5.3	4.7	4.7					
28000	BFL	4910	4930	4930	5010	5420	5940	6520	6540				117	162
	V1	90	89	88	88	90	93	95	96					
	VR	107	107	107	109	110	112	114	114					
	V2	115	115	115	116	117	118	118	119					
	GR2	7.8	7.5	7.2	6.8	6.3	5.8	5.2	5.1					
27000	BFL	4860	4880	4880	4900	4910	5340	5850	5870				115	159
	V1	90	90	88	87	86	88	91	91					
	VR	104	104	104	105	106	108	110	110					
	V2	113	113	113	113	113	114	115	115					
	GR2	8.4	8.1	7.7	7.3	6.8	6.3	5.6	5.6					
26000	BFL	4800	4830	4830	4850	4840	4810	5250	5260				113	156
	V1	90	90	89	87	86	84	87	87					
	VR	102	102	102	102	103	104	106	106					
	V2	112	111	111	110	110	111	112	112					
	GR2	9	8.8	8.4	7.9	7.4	6.8	6.2	6.1					

FIGURE 5-133. TAKE-OFF DISTANCE; FLAPS - 20° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	BFL	11120	11310	11540	11780	12040	12290	12540	12800	13050	13310	13560	150	197
	V1	138	138	138	138	138	137	137	137	137	137	137		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8		
39000	BFL	10610	10800	11020	11250	11490	11730	11980	12220	12460	12700	12950	148	195
	V1	136	136	135	135	135	135	135	135	134	134	134		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3	3	3	3	3	3	3	3	3	3	3		
38000	BFL	9810	9980	10190	10390	10610	10840	11060	11280	11500	11720	11950	146	192
	V1	131	131	131	131	131	131	130	130	130	130	130		
	VR	148	148	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
37000	BFL	9030	9180	9370	9550	9760	9960	10170	10370	10570	10780	10980	143	189
	V1	127	127	127	126	126	126	126	126	126	126	126		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		
36000	BFL	8300	8440	8610	8780	8970	9150	9340	9520	9710	9900	10080	140	186
	V1	123	123	122	122	122	122	122	122	121	121	121		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4	4	4	4	4	4	4	4	4	4	4		
35000	BFL	7600	7730	7880	8040	8210	8380	8540	8710	8880	9050	9220	138	184
	V1	118	118	118	118	118	117	117	117	117	117	117		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
34000	BFL	6930	7050	7180	7330	7480	7630	7780	7930	8090	8240	8400	135	181
	V1	114	114	113	113	113	113	113	112	112	112	112		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
33000	BFL	6320	6420	6550	6680	6810	6950	7090	7230	7370	7500	7640	132	178
	V1	109	109	109	109	109	108	108	108	108	108	108		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1		
32000	BFL	5750	5850	5960	6070	6200	6320	6450	6570	6700	6820	6950	129	175
	V1	105	105	105	104	104	104	104	104	104	104	103		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		

FIGURE 5-133. TAKE-OFF DISTANCE; FLAPS - 20° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 82.4	-50 -58 83.0	-45 -49 83.9	-40 -40 84.8	-35 -31 85.7	-30 -22 86.6	-25 -13 87.5	-20 -4 88.4	-15 5 89.3	-10 14 90.1	-5 23 91.0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	5230	5310	5410	5520	5630	5740	5850	5960	6080	6190	6300	127	172
	V1	101	101	100	100	100	100	100	99	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
30000	BFL	4740	4810	4900	5000	5100	5200	5300	5400	5500	5600	5700	124	169
	V1	96	96	96	96	96	95	95	95	95	95	95		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4		
29000	BFL	4310	4380	4460	4550	4640	4730	4820	4910	4990	5090	5180	121	166
	V1	92	92	92	92	91	91	91	91	91	91	91		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	6.9	6.9	7	7	7	7	7	7	6.9	6.9	6.9		
28000	BFL	4040	4110	4210	4300	4390	4480	4570	4670	4760	4850	4940		162
	V1	89	89	89	89	89	89	89	89	89	89	89	118	
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	117	117	117	117	117	117	117	116	116	116	116		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
27000	BFL	4030	4090	4190	4280	4370	4460	4550	4640	4730	4820	4900	115	159
	V1	90	90	90	90	90	90	90	89	89	89	89		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8	8	8		
26000	BFL	4000	4050	4140	4230	4320	4410	4500	4590	4680	4770	4860	113	156
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	111	111	111	111	111	111	111	111	111	111	111		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		

FIGURE 5-133. TAKE-OFF DISTANCE; FLAPS - 20° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	82						
	N1%	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
39600	BFL	13860	14340	15180									150	197
	V1	137	138	139										
	VR	153	153	154										
	V2	155	155	155										
	GR2	2.8	2.6	2.3										
39000	BFL	13230	13680	14480									148	195
	V1	134	135	137										
	VR	151	151	152										
	V2	153	153	153										
	GR2	3	2.8	2.5										
38000	BFL	12210	12640	13380	14410								146	192
	V1	130	131	132	134									
	VR	147	148	148	149									
	V2	150	150	150	151									
	GR2	3.3	3.1	2.8	2.4									
37000	BFL	11220	11630	12340	13290	14410							143	189
	V1	126	126	128	130	133								
	VR	144	144	145	146	147								
	V2	147	147	147	148	148								
	GR2	3.6	3.4	3.1	2.7	2.3								
36000	BFL	10300	10670	11330	12250	13270	14440						140	186
	V1	121	122	124	126	128	131							
	VR	140	140	141	142	143	144							
	V2	143	143	144	145	145	146							
	GR2	3.9	3.7	3.4	3	2.6	2.1							
35000	BFL	9430	9770	10390	11240	12200	13270	14020					138	184
	V1	117	118	119	122	124	127	128						
	VR	136	136	137	139	140	141	141						
	V2	140	140	141	142	142	143	143						
	GR2	4.3	4	3.7	3.4	2.9	2.5	2.1						
34000	BFL	8580	8900	9490	10300	11200	12180	12870					135	181
	V1	112	113	115	117	120	123	124						
	VR	132	132	133	135	137	138	138						
	V2	137	137	137	138	139	140	140						
	GR2	4.7	4.4	4.1	3.7	3.3	2.8	2.5						
33000	BFL	7810	8100	8620	9390	10230	11170	11790					132	178
	V1	108	109	110	113	116	118	120						
	VR	128	128	129	131	133	134	135						
	V2	133	133	134	135	136	137	137						
	GR2	5.1	4.8	4.4	4.1	3.6	3.1	2.8						
32000	BFL	7100	7370	7840	8520	9320	10190	10790					129	175
	V1	103	104	106	108	111	114	116						
	VR	124	124	125	127	129	130	131						
	V2	130	130	130	131	133	133	134						
	GR2	5.5	5.2	4.8	4.5	4	3.5	3.1						

FIGURE 5-133. TAKE-OFF DISTANCE; FLAPS - 20° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	82						
	N1%	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
31000	BFL	6440	6680	7100	7720	8450	9270	9820					127	172
	V1	99	100	102	104	107	110	112						
	VR	120	120	122	123	125	127	128						
	V2	126	126	127	128	129	130	130						
	GR2	5.9	5.6	5.2	4.9	4.4	3.9	3.5						
30000	BFL	5830	6050	6430	6980	7620	8390	8910					124	169
	V1	95	96	97	100	102	105	107						
	VR	116	116	117	119	121	123	124						
	V2	123	123	123	124	125	127	127						
	GR2	6.3	6	5.7	5.3	4.8	4.3	3.9						
29000	BFL	5290	5480	5810	6300	6880	7560	8050					121	166
	V1	91	92	93	95	98	101	103						
	VR	112	113	114	115	117	119	120						
	V2	119	119	120	121	122	123	124						
	GR2	6.8	6.5	6.1	5.8	5.3	4.7	4.3						
28000	BFL	5000	4990	5260	5680	6190	6800	7230					118	162
	V1	89	89	89	91	94	96	98						
	VR	109	109	110	111	113	115	116						
	V2	116	116	117	117	119	120	120						
	GR2	7.3	7	6.6	6.2	5.7	5.2	4.8						
27000	BFL	4950	4950	4950	5130	5560	6100	6480					115	159
	V1	89	88	87	87	89	92	94						
	VR	105	105	106	107	109	111	112						
	V2	113	113	113	114	115	116	117						
	GR2	7.9	7.5	7.1	6.7	6.3	5.7	5.3						
26000	BFL	4900	4890	4890	4910	5000	5460	5800					113	156
	V1	89	88	87	85	85	88	89						
	VR	102	102	102	104	105	107	108						
	V2	111	111	111	111	112	113	113						
	GR2	8.5	8.1	7.7	7.3	6.8	6.2	5.8						

FIGURE 5-134. TAKE-OFF DISTANCE; FLAPS - 20° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	BFL	12380	12600	12870	13150	13440	13720	14010	14290	14580	14860	15150	151	197
	V1	142	142	142	142	141	141	141	141	141	141	141		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.6	2.6	2.5		
39000	BFL	11800	12010	12260	12530	12800	13080	13350	13610	13880	14160	14440	150	195
	V1	139	139	139	139	139	139	138	138	138	138	138		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.7	2.7		
38000	BFL	10890	11080	11310	11560	11810	12060	12310	12550	12800	13060	13310	147	193
	V1	135	135	134	134	134	134	134	134	134	134	134		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.1	3.1	3.1	3.1	3.1	3.1	3	3	3.1	3.1	3		
37000	BFL	10030	10200	10410	10640	10870	11090	11320	11550	11780	12010	12240	144	190
	V1	130	130	130	130	130	130	129	129	129	129	129		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4		
36000	BFL	9200	9350	9550	9760	9960	10170	10380	10590	10790	11010	11220	142	187
	V1	126	126	125	125	125	125	125	125	125	125	124		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.7	3.7	3.7	3.7		
35000	BFL	8410	8560	8740	8930	9120	9310	9500	9690	9880	10080	10270	139	184
	V1	121	121	121	121	121	121	120	120	120	120	120		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
34000	BFL	7690	7820	7980	8150	8320	8490	8660	8830	9000	9180	9350	136	181
	V1	117	117	116	116	116	116	116	116	115	115	115		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
33000	BFL	6980	7100	7240	7400	7550	7700	7860	8010	8170	8320	8480	133	178
	V1	112	112	112	112	111	111	111	111	111	111	111		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
32000	BFL	6340	6450	6580	6710	6850	6990	7130	7270	7410	7550	7690	130	175
	V1	108	107	107	107	107	107	107	106	106	106	106		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		

FIGURE 5-134. TAKE-OFF DISTANCE; FLAPS - 20° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 82.7	-50 -58 83.5	-45 -49 84.4	-40 -40 85.3	-35 -31 86.2	-30 -22 87.1	-25 -13 88.0	-20 -4 88.9	-15 5 89.8	-10 14 90.7	-5 23 91.5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	5750	5850	5960	6090	6210	6340	6460	6590	6710	6840	6970	128	172
	V1	103	103	103	103	102	102	102	102	102	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.7		
30000	BFL	5210	5290	5400	5510	5620	5730	5840	5960	6070	6180	6300	125	169
	V1	99	99	98	98	98	98	98	98	97	97	97		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
29000	BFL	4710	4780	4880	4980	5080	5180	5280	5380	5480	5580	5680	122	166
	V1	94	94	94	94	94	94	93	93	93	93	93		
	VR	115	115	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6		
28000	BFL	4280	4350	4430	4520	4610	4700	4790	4880	4960	5050	5150	119	163
	V1	90	90	90	90	89	89	89	89	89	89	89		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
27000	BFL	4120	4200	4290	4380	4480	4570	4670	4760	4850	4940	5020	116	160
	V1	89	89	89	89	89	89	89	89	88	88	88		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7		
26000	BFL	4080	4160	4250	4340	4430	4520	4620	4710	4800	4890	4970	113	156
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3		

FIGURE 5-134. TAKE-OFF DISTANCE; FLAPS - 20° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	79						
	N1%	92.4	93.0	92.4	91.7	91.1	90.4	90.3						
39600	BFL	15570											151	197
	V1	141												
	VR	156												
	V2	158												
	GR2	2.4												
39000	BFL	14830	15540										150	195
	V1	139	140											
	VR	154	154											
	V2	156	156											
	GR2	2.6	2.3											
38000	BFL	13680	14330	15350									147	193
	V1	134	135	137										
	VR	150	151	152										
	V2	152	152	153										
	GR2	2.9	2.6	2.3										
37000	BFL	12590	13210	14140	15270								144	190
	V1	129	131	133	135									
	VR	147	147	148	149									
	V2	149	149	150	150									
	GR2	3.2	2.9	2.6	2.3									
36000	BFL	11540	12120	13010	14040	15290							142	187
	V1	125	126	128	131	133								
	VR	143	143	144	145	147								
	V2	146	146	147	147	148								
	GR2	3.5	3.2	2.9	2.6	2.1								
35000	BFL	10570	11090	11930	12890	14000							139	184
	V1	120	122	124	126	129								
	VR	139	139	141	142	143								
	V2	142	142	143	144	144								
	GR2	3.9	3.6	3.3	2.9	2.4								
34000	BFL	9630	10130	10900	11820	12820	13990	14330					136	181
	V1	116	117	119	122	124	127	128						
	VR	135	136	137	138	139	140	141						
	V2	139	139	140	141	141	142	142						
	GR2	4.2	3.9	3.6	3.2	2.8	2.3	2.1						
33000	BFL	8730	9210	9940	10780	11740	12790	13080					133	178
	V1	111	113	115	117	120	123	123						
	VR	131	132	133	135	136	137	137						
	V2	135	135	136	137	138	138	139						
	GR2	4.6	4.3	4	3.6	3.1	2.6	2.5						
32000	BFL	7930	8330	9020	9810	10700	11690	11940					130	175
	V1	107	108	110	113	115	118	119						
	VR	127	127	129	131	132	133	134						
	V2	131	132	133	134	135	135	135						
	GR2	5	4.7	4.3	4	3.5	3	2.8						

FIGURE 5-134. TAKE-OFF DISTANCE; FLAPS - 20° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	79						
	N1%	92.4	93.0	92.4	91.7	91.1	90.4	90.3						
31000	BFL	7180	7550	8150	8890	9720	10650	10890					128	172
	V1	102	103	106	108	111	114	115						
	VR	123	123	125	127	128	130	130						
	V2	128	128	129	130	131	132	132						
	GR2	5.4	5.1	4.7	4.4	3.9	3.3	3.2						
30000	BFL	6490	6830	7360	8010	8790	9640	9870					125	169
	V1	98	99	101	104	107	109	110						
	VR	119	119	121	122	124	126	126						
	V2	124	124	126	127	128	129	129						
	GR2	5.9	5.5	5.2	4.8	4.3	3.7	3.6						
29000	BFL	5860	6150	6630	7210	7900	8710	8910					122	166
	V1	93	95	97	99	102	105	106						
	VR	114	115	117	118	120	122	122						
	V2	121	121	122	123	124	125	126						
	GR2	6.3	5.9	5.6	5.2	4.7	4.2	4						
28000	BFL	5300	5550	5970	6480	7090	7830	8020					119	163
	V1	89	90	92	95	97	100	101						
	VR	111	111	113	114	116	118	119						
	V2	118	118	119	120	121	122	122						
	GR2	6.8	6.4	6.1	5.7	5.2	4.6	4.4						
27000	BFL	5010	5020	5380	5820	6360	6990	7160					116	160
	V1	87	86	88	90	93	96	96						
	VR	107	107	109	110	112	114	114						
	V2	114	114	115	116	117	118	118						
	GR2	7.3	6.9	6.6	6.2	5.7	5.1	4.9						
26000	BFL	4960	4960	4960	5220	5690	6240	6400					113	156
	V1	87	86	86	86	88	91	92						
	VR	103	103	105	106	108	110	110						
	V2	111	111	112	113	114	115	115						
	GR2	7.9	7.5	7.1	6.7	6.2	5.6	5.4						

FIGURE 5-135. TAKE-OFF DISTANCE; FLAPS - 20° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	83.6	84.1	84.9	85.8	86.7	87.6	88.4	89.4	90.3	91.2	92.0		
39600	BFL	13890	14150	14470	14800	15130	15510	15880	16140	16410	16740	17110	152	198
	V1	146	146	146	146	146	145	145	145	145	145	145		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3		
39000	BFL	13220	13460	13760	14070	14390	14740	15100	15350	15600	15920	16270	151	196
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4		
38000	BFL	12130	12350	12630	12910	13210	13520	13880	14110	14310	14630	14960	148	193
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.7		
37000	BFL	11150	11350	11610	11870	12140	12430	12730	12940	13150	13410	13720	145	190
	V1	134	134	134	133	133	133	133	133	133	133	133		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3.1	3		
36000	BFL	10230	10410	10640	10880	11130	11400	11670	11860	12050	12290	12580	143	187
	V1	129	129	129	129	129	129	129	128	128	128	128		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4		
35000	BFL	9340	9510	9730	9940	10170	10410	10660	10830	11000	11220	11490	140	184
	V1	124	124	124	124	124	124	124	124	123	123	123		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	3.9	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.7		
34000	BFL	8530	8680	8880	9070	9270	9490	9720	9870	10030	10230	10480	137	181
	V1	120	120	120	119	119	119	119	119	119	119	119		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1		
33000	BFL	7750	7890	8070	8240	8420	8620	8830	8970	9110	9290	9510	134	179
	V1	115	115	115	115	115	115	115	114	114	114	114		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
32000	BFL	7030	7160	7320	7480	7640	7820	8000	8130	8250	8420	8620	131	176
	V1	110	110	110	110	110	110	110	110	109	109	109		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5	5	5	5	5	5	5	5	5	5	4.9		

FIGURE 5-135. TAKE-OFF DISTANCE; FLAPS - 20° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 83.6	-50 -58 84.1	-45 -49 84.9	-40 -40 85.8	-35 -31 86.7	-30 -22 87.6	-25 -13 88.4	-20 -4 89.4	-15 5 90.3	-10 14 91.2	-5 23 92.0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	6360	6470	6610	6760	6900	7060	7230	7340	7450	7600	7780	128	173
	V1	106	106	105	105	105	105	105	105	105	105	105		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	130	130	130	130	131	131	131	130	130	130	130		
	GR2	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.3		
30000	BFL	5750	5850	5980	6100	6240	6380	6530	6630	6730	6860	7030	126	170
	V1	101	101	101	101	101	101	101	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8		
29000	BFL	5180	5270	5390	5500	5620	5750	5880	5970	6060	6180	6330	123	166
	V1	97	97	96	96	96	96	96	96	96	96	96		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.2		
28000	BFL	4670	4750	4850	4950	5060	5170	5290	5360	5450	5550	5690	120	163
	V1	92	92	92	92	92	92	92	91	91	91	91		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	120	120	120	120	120	120	120	120	120	120	119		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.7		
27000	BFL	4230	4300	4390	4480	4580	4680	4780	4860	4960	5050	5130	117	160
	V1	88	88	88	88	87	87	87	87	87	87	87		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.2		
26000	BFL	4170	4240	4340	4430	4530	4620	4710	4810	4900	5000	5040	114	157
	V1	88	88	88	88	88	87	87	87	87	87	87		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8	8	8	8	8	8	8	8	8	8	7.8		

FIGURE 5-135. TAKE-OFF DISTANCE; FLAPS - 20° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	75							
	N1%	92.9	92.8	92.2	91.5	90.9	90.3							
39600	BFL													
	V1													
	VR													
	V2													
	GR2													
39000	BFL													
	V1													
	VR													
	V2													
	GR2													
38000	BFL	15530											148	193
	V1	139												
	VR	153												
	V2	155												
	GR2	2.4												
37000	BFL	14250	15150										145	190
	V1	134	136											
	VR	150	150											
	V2	151	152											
	GR2	2.8	2.5											
36000	BFL	13070	13880	15010									143	187
	V1	129	131	133										
	VR	146	147	148										
	V2	148	148	149										
	GR2	3.1	2.8	2.5										
35000	BFL	11940	12720	13730	14890								140	184
	V1	124	126	129	131									
	VR	142	143	144	145									
	V2	144	145	146	147									
	GR2	3.4	3.1	2.8	2.4									
34000	BFL	10890	11600	12580	13590	14840							137	181
	V1	120	122	124	126	129								
	VR	138	139	140	141	142								
	V2	141	141	142	143	144								
	GR2	3.8	3.4	3.1	2.7	2.3								
33000	BFL	9900	10560	11450	12420	13550	14630						134	179
	V1	115	117	119	122	124	127							
	VR	134	135	136	138	139	140							
	V2	137	138	139	140	140	141							
	GR2	4.1	3.8	3.5	3.1	2.6	2.2							
32000	BFL	8970	9570	10400	11300	12320	13320						131	176
	V1	110	112	115	117	120	122							
	VR	130	131	132	134	135	136							
	V2	134	134	135	136	137	138							
	GR2	4.5	4.2	3.8	3.5	3	2.5							

FIGURE 5-135. TAKE-OFF DISTANCE; FLAPS - 20° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	75							
	N1%	92.9	92.8	92.2	91.5	90.9	90.3							
31000	BFL	8100	8640	9420	10240	11210	12090						128	173
	V1	106	107	110	113	115	118							
	VR	125	127	128	130	131	132							
	V2	130	130	132	133	134	134							
	GR2	4.9	4.6	4.2	3.8	3.3	2.9							
30000	BFL	7310	7800	8500	9270	10140	10990						126	170
	V1	101	103	105	108	111	113							
	VR	121	122	124	126	128	129							
	V2	126	127	128	129	130	131							
	GR2	5.3	5	4.7	4.3	3.7	3.3							
29000	BFL	6580	7020	7640	8330	9150	9910						123	166
	V1	97	98	101	103	106	109							
	VR	117	118	120	122	124	125							
	V2	123	123	124	126	127	128							
	GR2	5.8	5.4	5.1	4.7	4.2	3.7							
28000	BFL	5910	6300	6850	7460	8200	8920						120	163
	V1	92	94	96	98	101	104							
	VR	113	114	116	118	119	121							
	V2	119	120	121	122	123	124							
	GR2	6.3	5.9	5.5	5.1	4.6	4.1							
27000	BFL	5320	5660	6130	6670	7330	7980						117	160
	V1	88	89	91	94	97	99							
	VR	109	110	112	113	115	117							
	V2	116	116	117	118	119	120							
	GR2	6.8	6.4	6	5.6	5.1	4.6							
26000	BFL	5010	5090	5490	5960	6540	7100						114	157
	V1	85	85	87	89	92	94							
	VR	105	106	107	109	111	113							
	V2	112	113	114	115	116	117							
	GR2	7.3	6.9	6.6	6.2	5.6	5.1							

FIGURE 5-136. TAKE-OFF DISTANCE; FLAPS - 20° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	84.5	84.8	85.4	86.4	87.3	88.1	88.9	89.9	90.8	91.7	92.6		
39600	BFL													
	V1													
	VR													
	V2													
	GR2													
39000	BFL													
	V1													
	VR													
	V2													
	GR2													
38000	BFL	13650	13900	14220	14550	14880	15300	15640	15860	16130	16480	16990	149	194
	V1	143	143	143	143	143	143	143	142	142	142	143		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.6	2.6	2.5	2.3		
37000	BFL	12510	12740	13030	13330	13640	14020	14330	14530	14780	15110	15580	147	191
	V1	138	138	138	138	138	138	138	137	137	137	138		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	155	155	155	155	155	155	155	155	155	154	154		
	GR2	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.6		
36000	BFL	11470	11680	11950	12220	12500	12850	13120	13310	13540	13840	14270	144	188
	V1	133	133	133	133	133	133	133	132	132	132	133		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	2.9		
35000	BFL	10490	10680	10920	11170	11430	11750	12010	12170	12380	12650	13040	141	185
	V1	128	128	128	128	128	128	128	128	127	127	128		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	148	148	148	148	148	148	148	148	148	148	147		
	GR2	3.6	3.6	3.6	3.6	3.6	3.5	3.5	3.5	3.5	3.5	3.3		
34000	BFL	9530	9700	9920	10150	10380	10670	10900	11050	11240	11480	11840	138	182
	V1	123	123	123	123	123	123	123	123	122	122	123		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	143		
	GR2	4	4	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.6		
33000	BFL	8670	8820	9020	9230	9440	9700	9900	10040	10210	10430	10760	135	179
	V1	119	118	118	118	118	118	118	118	117	117	118		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4		
32000	BFL	7860	8000	8170	8360	8550	8790	8970	9090	9240	9450	9740	133	176
	V1	114	114	113	113	113	113	113	113	113	113	113		
	VR	132	132	132	132	133	133	133	133	132	132	132		
	V2	136	136	136	137	137	137	137	136	136	136	136		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.4		

FIGURE 5-136. TAKE-OFF DISTANCE; FLAPS - 20° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 84.5	-50 -58 84.8	-45 -49 85.4	-40 -40 86.4	-35 -31 87.3	-30 -22 88.1	-25 -13 88.9	-20 -4 89.9	-15 5 90.8	-10 14 91.7	-5 23 92.6	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	7110	7230	7390	7560	7730	7950	8110	8210	8350	8540	8800	130	173
	V1	109	109	109	109	109	109	109	108	108	108	108		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	133	133	133	133	133	133	133	133	133	133	132		
	GR2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5	4.8		
30000	BFL	6410	6520	6660	6810	6970	7160	7300	7400	7520	7690	7930	127	170
	V1	104	104	104	104	104	104	104	103	103	103	104		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.2		
29000	BFL	5770	5870	6000	6130	6270	6440	6570	6650	6770	6910	7130	124	167
	V1	100	99	99	99	99	99	99	99	98	98	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	125	125	125	125	125	126	126	125	125	125	125		
	GR2	6.1	6.1	6.1	6.1	6	6	6	6	6	5.9	5.7		
28000	BFL	5180	5270	5380	5500	5630	5780	5890	5970	6060	6200	6380	121	164
	V1	95	95	95	95	95	95	94	94	94	94	94		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	122	122	122	122	122	122	122	122	122	121	121		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.1		
27000	BFL	4650	4730	4830	4940	5050	5180	5280	5340	5430	5550	5710	118	160
	V1	90	90	90	90	90	90	90	89	89	89	90		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	118	118	118	118	118	118	118	118	118	118	117		
	GR2	7.1	7.1	7.1	7.1	7.1	7	7	7	7	6.9	6.6		
26000	BFL	4250	4320	4420	4520	4620	4710	4800	4900	5000	5070	5130	115	157
	V1	86	86	86	86	86	86	86	86	86	86	85		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.2		

FIGURE 5-136. TAKE-OFF DISTANCE; FLAPS - 20° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	72							
	N1%	93.0	92.5	91.9	91.2	90.5	90.2							
39600	BFL													
	V1													
	VR													
	V2													
	GR2													
39000	BFL													
	V1													
	VR													
	V2													
	GR2													
38000	BFL													
	V1													
	VR													
	V2													
	GR2													
37000	BFL	16400											147	191
	V1	139												
	VR	153												
	V2	154												
	GR2	2.3												
36000	BFL	15020	16120										144	188
	V1	134	137											
	VR	149	150											
	V2	151	151											
	GR2	2.6	2.3											
35000	BFL	13740	14740	15940									141	185
	V1	130	132	134										
	VR	145	146	147										
	V2	147	148	149										
	GR2	2.9	2.6	2.3										
34000	BFL	12510	13470	14550	15820								138	182
	V1	125	127	129	132									
	VR	141	143	144	145									
	V2	144	144	145	146									
	GR2	3.3	3	2.6	2.2									
33000	BFL	11340	12250	13270	14410								135	179
	V1	120	122	124	127									
	VR	137	139	140	141									
	V2	140	141	142	142									
	GR2	3.6	3.3	3	2.6									
32000	BFL	10280	11090	12070	13100	14320	14940						133	176
	V1	115	117	119	122	125	126							
	VR	133	134	136	137	138	139							
	V2	136	137	138	139	139	140							
	GR2	4	3.7	3.3	2.9	2.4	2.2							

FIGURE 5-136. TAKE-OFF DISTANCE; FLAPS - 20° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	72							
	N1%	93.0	92.5	91.9	91.2	90.5	90.2							
31000	BFL	9290	10030	10890	11910	12990	13550						130	173
	V1	110	112	115	117	120	121							
	VR	129	130	132	133	135	135							
	V2	132	133	135	136	136	136							
	GR2	4.4	4.1	3.7	3.3	2.8	2.6							
30000	BFL	8360	9040	9830	10720	11780	12270						127	170
	V1	105	107	110	112	115	117							
	VR	124	126	128	129	131	131							
	V2	129	130	131	132	133	133							
	GR2	4.8	4.5	4.1	3.7	3.2	2.9							
29000	BFL	7520	8120	8840	9650	10620	11100						124	167
	V1	100	102	105	108	111	112							
	VR	120	122	124	125	127	128							
	V2	125	126	127	128	129	130							
	GR2	5.3	4.9	4.6	4.1	3.6	3.3							
28000	BFL	6740	7280	7930	8650	9510	9940						121	164
	V1	96	98	100	103	106	107							
	VR	116	117	119	121	123	123							
	V2	121	122	124	125	126	126							
	GR2	5.7	5.4	5	4.6	4	3.8							
27000	BFL	6020	6500	7070	7730	8500	8900						118	160
	V1	91	93	95	98	101	102							
	VR	112	113	115	117	118	119							
	V2	117	118	120	121	122	122							
	GR2	6.2	5.8	5.5	5	4.5	4.2							
26000	BFL	5380	5800	6300	6880	7580	7930						115	157
	V1	86	88	91	93	96	97							
	VR	107	109	111	112	114	115							
	V2	114	115	116	117	118	119							
	GR2	6.8	6.4	6	5.6	5	4.7							

FIGURE 5-137. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY
(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	4580	4650	4720	4790	4860	4960	5050	5150	5250	5330	5430	139	192
	V1	112	112	111	111	111	111	111	110	110	110	110		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.4	5.4	5.4	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.4		
39000	TOFL	4380	4450	4520	4590	4660	4750	4840	4930	5020	5100	5200	138	191
	V1	110	110	109	109	109	109	108	108	108	108	108		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	4080	4150	4210	4280	4340	4420	4510	4600	4680	4750	4840	136	188
	V1	107	106	106	106	105	105	105	105	105	105	105		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.9	5.9	6	6	6	6	6	6	6	6	6		
37000	TOFL	3820	3880	3940	4000	4060	4130	4210	4290	4360	4430	4510	135	185
	V1	103	103	103	103	102	102	102	102	102	102	102		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	3600	3670	3730	3800	3880	3950	4030	4100	4170	4250	4320	133	182
	V1	101	100	100	100	100	100	100	100	100	100	100		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	3530	3610	3690	3770	3850	3920	3990	4060	4140	4210	4290	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
34000	TOFL	3500	3580	3660	3740	3820	3890	3960	4030	4100	4180	4250	129	177
	V1	100	100	100	101	101	101	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.6	7.7	7.7	7.7	7.8	7.8	7.8	7.7	7.7	7.7	7.7		
33000	TOFL	3470	3550	3630	3710	3780	3860	3930	4000	4070	4140	4210	127	174
	V1	100	101	101	101	101	101	101	101	100	100	100		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	125	125	125	125	125	125	125	125	125		
	GR2	8.1	8.1	8.2	8.2	8.3	8.3	8.3	8.2	8.2	8.2	8.2		
32000	TOFL	3450	3520	3600	3680	3750	3820	3890	3960	4030	4110	4180	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.6	8.7	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		

FIGURE 5-137. TAKE-OFF DISTANCE; FLAPS - 20° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY
(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
31000	TOFL	3420	3500	3570	3650	3720	3790	3860	3930	4000	4070	4140	123	168
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.2	9.3	9.3	9.3	9.4	9.4	9.4	9.3	9.3	9.3	9.3		
30000	TOFL	3390	3470	3540	3620	3690	3760	3830	3890	3960	4040	4100	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.8	9.9	9.9	9.9	10	10	10	9.9	9.9	9.9	9.9		
29000	TOFL	3370	3440	3510	3590	3660	3730	3800	3860	3930	4000	4070	119	163
	V1	101	101	101	102	102	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	121	121	121	120	120	120	120	120	120		
	GR2	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
28000	TOFL	3340	3410	3480	3560	3630	3700	3760	3830	3900	3970	4030	117	160
	V1	102	102	102	102	102	102	102	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.2	11.2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
27000	TOFL	3310	3380	3460	3530	3600	3670	3730	3790	3860	3930	4000	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11.9	12	12	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	3290	3360	3430	3500	3570	3630	3700	3760	3830	3890	3960	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.7	12.8	12.8	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 5-138. TAKE-OFF DISTANCE; FLAPS - 20° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	4910	4990	5070	5150	5240	5340	5450	5550	5650	5740	5860	139	193
	V1	114	113	113	113	112	112	112	112	112	112	112		
	VR	132	131	131	131	131	131	131	131	131	131	131		
	V2	139	138	138	138	138	138	138	138	138	138	138		
	GR2	5.2	5.2	5.2	5.3	5.3	5.3	5.3	5.2	5.2	5.2	5.2		
39000	TOFL	4700	4780	4850	4930	5020	5110	5210	5310	5410	5500	5600	138	191
	V1	112	111	111	111	110	110	110	110	110	110	110		
	VR	130	130	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.4	5.4	5.4	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.4		
38000	TOFL	4370	4440	4510	4580	4660	4750	4840	4930	5020	5110	5200	136	188
	V1	108	108	107	107	107	107	107	107	106	106	106		
	VR	127	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	4060	4130	4200	4260	4340	4420	4500	4590	4670	4740	4840	135	185
	V1	105	104	104	104	104	103	103	103	103	103	103		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	131	131	131	131	131	131	131	131		
	GR2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1		
36000	TOFL	3790	3860	3920	3980	4050	4130	4200	4280	4350	4420	4500	133	183
	V1	101	101	101	101	100	100	100	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5		
35000	TOFL	3620	3700	3780	3860	3940	4020	4090	4160	4240	4320	4390	131	180
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.9	6.9	7	7	7	7	7	7	7	7	7		
34000	TOFL	3590	3670	3750	3830	3910	3980	4060	4130	4200	4280	4350	129	177
	V1	99	99	100	100	100	100	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4		
33000	TOFL	3560	3640	3720	3800	3880	3950	4020	4090	4170	4240	4310	127	174
	V1	100	100	100	100	100	100	100	100	99	99	99		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.9	7.9	7.9	8	8	8	7.9	7.9	7.9	7.9	7.9		
32000	TOFL	3530	3610	3690	3770	3840	3920	3990	4060	4130	4210	4280	125	171
	V1	100	100	100	100	100	100	100	100	100	100	99		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4		

FIGURE 5-138. TAKE-OFF DISTANCE; FLAPS - 20° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
31000	TOFL	3500	3580	3660	3730	3810	3880	3950	4020	4090	4170	4240	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	122	122	122	122	122	122	122	122	122	122		
	GR2	9	9	9	9.1	9.1	9.1	9	9	9	9	9		
30000	TOFL	3480	3550	3630	3700	3780	3850	3920	3990	4060	4130	4200	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6		
29000	TOFL	3450	3520	3600	3670	3750	3820	3890	3950	4020	4100	4160	119	163
	V1	100	100	100	101	101	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	120	120	120	120	119	119	119	119		
	GR2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	3420	3490	3570	3640	3720	3780	3850	3920	3990	4060	4120	117	160
	V1	101	101	101	101	101	101	101	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	119	119		
	GR2	10.9	10.9	11	11	11	11	11	11	11	11	10.9		
27000	TOFL	3390	3460	3540	3610	3680	3750	3820	3880	3950	4020	4090	115	157
	V1	101	101	101	101	101	101	101	101	101	101	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
26000	TOFL	3360	3430	3510	3580	3650	3720	3780	3850	3910	3990	4050	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	103	103	103	103	102	102	102	102		
	V2	116	116	117	117	117	117	117	117	117	117	117		
	GR2	12.4	12.4	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5		

FIGURE 5-139. TAKE-OFF DISTANCE; FLAPS - 20° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	5260	5350	5450	5550	5650	5760	5880	5990	6100	6200	6330	140	193
	V1	115	115	115	114	114	114	114	114	114	114	114		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5	5	5	5.1	5.1	5	5	5	5	5	5		
39000	TOFL	5030	5120	5220	5310	5410	5510	5620	5730	5840	5930	6050	139	191
	V1	113	113	112	112	112	112	112	112	112	111	111		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.2	5.2	5.2	5.3	5.3	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	4670	4760	4840	4920	5020	5120	5220	5320	5410	5500	5610	137	189
	V1	109	109	109	109	108	108	108	108	108	108	108		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5		
37000	TOFL	4330	4410	4490	4570	4660	4750	4840	4930	5020	5100	5200	135	186
	V1	106	106	105	105	105	105	105	105	105	104	104		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	132	132	132	132	132	132	132	132	132	132		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	4030	4100	4170	4250	4320	4400	4490	4580	4660	4730	4820	133	183
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
35000	TOFL	3750	3820	3890	3960	4040	4120	4190	4270	4340	4430	4500	131	180
	V1	99	99	99	99	98	98	98	98	98	98	98		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
34000	TOFL	3690	3770	3850	3930	4010	4080	4160	4230	4310	4390	4460	129	177
	V1	99	99	99	99	99	99	98	98	98	98	98		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	7.1		
33000	TOFL	3660	3740	3820	3890	3970	4050	4120	4190	4270	4350	4420	127	175
	V1	99	99	99	99	99	99	99	98	98	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.6	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	3630	3710	3780	3860	3940	4010	4090	4160	4230	4310	4380	125	172
	V1	99	99	99	99	99	99	99	99	99	99	98		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1		

FIGURE 5-139. TAKE-OFF DISTANCE; FLAPS - 20° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
31000	TOFL	3600	3670	3750	3830	3900	3980	4050	4120	4190	4270	4340	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
30000	TOFL	3570	3640	3720	3800	3870	3940	4010	4080	4160	4230	4300	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
29000	TOFL	3540	3610	3690	3760	3840	3910	3980	4050	4120	4200	4260	119	163
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.9	10	10	10	10	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	3510	3580	3660	3730	3800	3870	3940	4010	4080	4160	4220	117	160
	V1	100	100	100	100	100	100	100	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.6	10.6	10.7	10.7	10.6	10.6	10.6	10.6	10.6	10.6		
27000	TOFL	3480	3550	3630	3700	3770	3840	3910	3970	4040	4120	4190	115	157
	V1	100	100	100	100	100	100	100	100	100	100	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.3	11.3		
26000	TOFL	3450	3520	3590	3670	3740	3810	3870	3940	4010	4080	4150	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.1	12.1	12.1	12.2	12.2	12.1	12.1	12.1	12.1	12.1	12.1		

FIGURE 5-140. TAKE-OFF DISTANCE; FLAPS - 20° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	5690	5800	5910	6020	6140	6260	6380	6510	6630	6740	6880	141	193
	V1	117	117	117	116	116	116	116	116	116	116	116		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7		
39000	TOFL	5440	5550	5650	5760	5870	5990	6100	6220	6340	6450	6580	140	192
	V1	115	115	114	114	114	114	114	114	114	113	113		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5	5	5	5	5	5	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	5050	5150	5250	5340	5450	5550	5660	5770	5880	5980	6100	137	189
	V1	111	111	111	111	110	110	110	110	110	110	110		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	4680	4770	4860	4950	5050	5150	5240	5350	5450	5530	5640	135	186
	V1	108	107	107	107	107	107	107	107	106	106	106		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6		
36000	TOFL	4340	4420	4500	4590	4670	4760	4850	4950	5040	5120	5220	133	183
	V1	104	104	104	104	103	103	103	103	103	103	103		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
35000	TOFL	4020	4100	4170	4250	4330	4410	4490	4580	4660	4730	4820	131	181
	V1	100	100	100	100	100	100	100	100	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
34000	TOFL	3790	3870	3950	4030	4110	4190	4260	4340	4420	4500	4580	129	178
	V1	98	98	98	98	98	98	97	97	97	97	97		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	3750	3830	3910	3990	4070	4150	4230	4300	4380	4460	4540	127	175
	V1	98	98	98	98	98	98	98	97	97	97	97		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
32000	TOFL	3720	3800	3880	3960	4040	4110	4190	4260	4340	4420	4500	125	172
	V1	98	98	98	98	98	98	98	98	98	98	97		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		

FIGURE 5-140. TAKE-OFF DISTANCE; FLAPS - 20° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
31000	TOFL	3690	3770	3850	3920	4000	4080	4150	4220	4300	4380	4460	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3		
30000	TOFL	3660	3740	3810	3890	3970	4040	4110	4190	4260	4340	4410	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
29000	TOFL	3630	3700	3780	3860	3930	4000	4080	4150	4220	4300	4370	119	163
	V1	99	99	99	99	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5	9.5	9.5	9.5		
28000	TOFL	3600	3670	3750	3820	3900	3970	4040	4110	4180	4260	4330	117	160
	V1	99	99	99	99	99	99	99	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	117		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
27000	TOFL	3570	3640	3710	3790	3860	3930	4000	4070	4140	4220	4290	115	157
	V1	99	99	99	99	99	99	99	99	99	99	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	117	117	116	116		
	GR2	10.9	10.9	11	11	11	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	3540	3610	3680	3760	3830	3900	3970	4030	4100	4180	4250	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.6		

FIGURE 5-141. TAKE-OFF DISTANCE; FLAPS - 20° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	6210	6330	6450	6580	6710	6840	6970	7110	7250	7370	7530	142	194
	V1	119	119	119	119	119	118	118	118	118	118	118		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	143		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4		
39000	TOFL	5930	6050	6160	6280	6410	6540	6660	6800	6920	7040	7200	141	192
	V1	117	117	117	117	116	116	116	116	116	116	116		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6		
38000	TOFL	5500	5610	5710	5830	5940	6060	6180	6300	6410	6520	6670	138	189
	V1	113	113	113	113	113	113	113	112	112	112	112		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5	5	5.1	5.1	5.1	5	5	5	5	5	5		
37000	TOFL	5100	5200	5290	5400	5500	5610	5720	5830	5940	6040	6170	136	187
	V1	110	110	109	109	109	109	109	109	109	109	109		
	VR	129	128	128	128	128	128	128	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.3		
36000	TOFL	4720	4810	4900	4990	5090	5190	5290	5390	5490	5580	5700	133	184
	V1	106	106	106	106	105	105	105	105	105	105	105		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.7		
35000	TOFL	4360	4440	4520	4610	4700	4790	4880	4970	5060	5140	5250	131	181
	V1	102	102	102	102	102	102	102	101	101	101	101		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.1	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1		
34000	TOFL	4030	4110	4180	4260	4340	4420	4500	4590	4670	4750	4840	129	178
	V1	99	99	98	98	98	98	98	98	98	98	98		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.5		
33000	TOFL	3840	3920	4000	4080	4160	4240	4320	4400	4480	4560	4640	127	175
	V1	97	97	97	97	97	96	96	96	96	96	96		
	VR	115	115	115	115	115	115	115	115	115	115	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7	7	7	7	7	7	7	6.9	6.9	6.9	6.9		
32000	TOFL	3800	3880	3970	4050	4130	4200	4280	4360	4440	4520	4590	125	172
	V1	97	97	97	97	97	97	97	96	96	96	96		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.4	7.5	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4		

FIGURE 5-141. TAKE-OFF DISTANCE; FLAPS - 20° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
31000	TOFL	3770	3850	3930	4010	4090	4170	4240	4320	4400	4480	4550	123	169
	V1	97	97	97	97	97	97	97	97	97	97	96		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8	8	8	8	8	8	8	7.9	7.9	7.9	7.9		
30000	TOFL	3740	3820	3900	3980	4050	4130	4200	4280	4360	4440	4510	121	166
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5		
29000	TOFL	3710	3780	3860	3940	4020	4090	4170	4240	4320	4400	4470	119	163
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1		
28000	TOFL	3670	3750	3830	3900	3980	4050	4130	4200	4270	4350	4420	117	160
	V1	98	98	98	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.8	9.8	9.9	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	3640	3720	3790	3870	3940	4020	4090	4160	4230	4310	4380	115	157
	V1	98	98	98	98	98	98	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.5	10.6	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.4		
26000	TOFL	3610	3680	3760	3830	3910	3980	4050	4120	4190	4270	4340	113	154
	V1	98	98	98	98	98	98	98	98	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.2	11.2	11.2	11.2		

FIGURE 5-142. TAKE-OFF DISTANCE; FLAPS - 20° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	6720	6850	6990	7130	7270	7420	7570	7720	7860	7990	8180	143	194
	V1	121	121	121	121	121	121	120	120	120	120	120		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2		
39000	TOFL	6420	6550	6670	6810	6940	7080	7220	7370	7510	7630	7800	142	193
	V1	119	119	119	118	118	118	118	118	118	118	118		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.4	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4		
38000	TOFL	5940	6060	6170	6300	6420	6550	6680	6810	6940	7050	7210	139	190
	V1	115	115	115	115	115	114	114	114	114	114	114		
	VR	133	133	133	133	133	133	133	133	133	133	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7		
37000	TOFL	5500	5600	5710	5830	5940	6060	6180	6300	6420	6520	6670	137	187
	V1	111	111	111	111	111	111	111	111	110	110	110		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.1	5.1	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1		
36000	TOFL	5090	5180	5280	5390	5490	5600	5710	5820	5930	6020	6150	134	184
	V1	108	108	107	107	107	107	107	107	107	107	107		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4		
35000	TOFL	4690	4780	4870	4970	5070	5160	5260	5370	5460	5550	5670	132	181
	V1	104	104	104	104	103	103	103	103	103	103	103		
	VR	123	123	123	123	123	123	123	123	123	123	124		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8		
34000	TOFL	4320	4410	4490	4580	4660	4750	4840	4940	5030	5110	5220	129	178
	V1	100	100	100	100	100	100	100	99	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	127	127	127	127	127	127	127	127	128	128		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2		
33000	TOFL	3990	4070	4140	4220	4300	4380	4460	4550	4630	4700	4800	127	176
	V1	97	96	96	96	96	96	96	96	96	96	96		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6		
32000	TOFL	3900	3980	4070	4150	4230	4310	4390	4470	4550	4640	4720	125	173
	V1	96	96	96	96	96	96	96	95	95	95	95		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.1	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	7.1	7.1		

FIGURE 5-142. TAKE-OFF DISTANCE; FLAPS - 20° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
31000	TOFL	3870	3950	4030	4110	4190	4270	4350	4430	4510	4600	4670	123	170
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.6	7.7	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.6		
30000	TOFL	3830	3910	4000	4080	4160	4230	4310	4390	4470	4550	4630	121	167
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1		
29000	TOFL	3800	3880	3960	4040	4120	4200	4270	4350	4430	4510	4580	119	164
	V1	97	96	96	96	96	96	96	96	96	96	96		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	117	117	117	117		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.7		
28000	TOFL	3770	3840	3920	4000	4080	4160	4230	4310	4380	4470	4540	117	161
	V1	97	97	97	97	97	96	96	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.4	9.5	9.5	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4		
27000	TOFL	3730	3810	3890	3970	4040	4120	4190	4270	4340	4420	4490	115	157
	V1	97	97	97	97	97	97	97	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.1	10.1	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.1		
26000	TOFL	3700	3780	3850	3930	4000	4080	4150	4230	4300	4380	4450	113	154
	V1	97	97	97	97	97	97	97	97	97	97	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	115	115	114	114	114	114	114		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.8		

FIGURE 5-143. TAKE-OFF DISTANCE; FLAPS - 20° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	7400	7540	7680	7830	7990	8150	8320	8480	8640	8800	9010	144	194
	V1	124	124	123	123	123	123	123	123	123	123	123		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	4	4	4	4	4	4	4	4	4	3.9		
39000	TOFL	7070	7190	7330	7480	7630	7780	7930	8100	8250	8400	8600	143	193
	V1	122	121	121	121	121	121	121	121	120	120	121		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1		
38000	TOFL	6530	6650	6770	6910	7050	7190	7330	7480	7620	7750	7930	140	190
	V1	118	117	117	117	117	117	117	117	117	117	117		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4		
37000	TOFL	6030	6140	6250	6380	6500	6630	6760	6900	7020	7150	7310	138	187
	V1	114	114	113	113	113	113	113	113	113	113	113		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.8	4.9	4.9	4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.8		
36000	TOFL	5570	5670	5770	5880	6000	6120	6230	6360	6480	6590	6740	135	185
	V1	110	110	110	109	109	109	109	109	109	109	109		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1		
35000	TOFL	5140	5230	5320	5430	5530	5640	5750	5870	5970	6070	6210	133	182
	V1	106	106	106	106	106	105	105	105	105	105	105		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5		
34000	TOFL	4730	4810	4890	4990	5090	5190	5290	5390	5490	5580	5710	130	179
	V1	103	102	102	102	102	102	102	101	101	101	101		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6	6	6	6	6	6	6	5.9	5.9	5.9	5.9		
33000	TOFL	4350	4420	4500	4580	4670	4760	4850	4950	5040	5120	5230	127	176
	V1	99	98	98	98	98	98	98	98	98	98	98		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3		
32000	TOFL	4000	4070	4160	4250	4330	4410	4500	4580	4660	4750	4820	125	173
	V1	95	95	95	95	95	95	94	94	94	94	94		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7		

FIGURE 5-143. TAKE-OFF DISTANCE; FLAPS - 20° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
31000	TOFL	3950	4040	4120	4210	4290	4370	4450	4530	4620	4700	4780	123	170
	V1	95	95	95	95	95	95	95	95	94	94	94		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2		
30000	TOFL	3910	4000	4090	4170	4250	4330	4410	4490	4570	4660	4730	121	167
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7		
29000	TOFL	3880	3960	4050	4130	4210	4290	4370	4450	4530	4610	4680	119	164
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.3		
28000	TOFL	3840	3930	4010	4090	4170	4250	4330	4410	4490	4570	4640	117	161
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9	9	9.1	9.1	9.1	9	9	9	9	9	8.9		
27000	TOFL	3810	3890	3970	4050	4130	4210	4290	4360	4440	4520	4590	115	158
	V1	96	96	96	96	95	95	95	95	95	95	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.6		
26000	TOFL	3770	3860	3940	4010	4090	4170	4250	4320	4400	4480	4550	113	155
	V1	96	96	96	96	96	96	96	95	95	95	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	114	114	114	114	114	114	113	113	113	113		
	GR2	10.4	10.4	10.5	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.3		

FIGURE 5-144. TAKE-OFF DISTANCE; FLAPS - 20° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	8130	8270	8440	8610	8780	8960	9140	9330	9500	9680	9950	145	195
	V1	127	126	126	126	126	126	126	126	126	126	126		
	VR	143	143	143	143	143	143	143	143	143	143	144		
	V2	148	147	147	147	147	147	147	147	147	147	148		
	GR2	3.7	3.7	3.8	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.6		
39000	TOFL	7770	7910	8060	8230	8400	8560	8740	8920	9080	9250	9500	144	193
	V1	124	124	124	124	124	124	123	123	123	123	123		
	VR	141	141	141	141	141	141	141	141	141	141	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
38000	TOFL	7180	7300	7440	7590	7740	7900	8060	8220	8380	8530	8770	141	191
	V1	120	120	120	120	119	119	119	119	119	119	119		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	142	142	142	142	142	142	143	143	143	143		
	GR2	4.2	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.1		
37000	TOFL	6620	6730	6860	7000	7140	7280	7430	7580	7720	7860	8080	139	188
	V1	116	116	116	116	115	115	115	115	115	115	115		
	VR	134	134	134	134	134	134	134	134	134	134	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.4		
36000	TOFL	6100	6200	6320	6450	6580	6700	6840	6970	7100	7230	7430	136	185
	V1	112	112	112	112	112	111	111	111	111	111	111		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.7		
35000	TOFL	5610	5710	5820	5930	6050	6160	6290	6410	6530	6650	6830	134	182
	V1	108	108	108	108	108	108	107	107	107	107	107		
	VR	127	127	127	127	127	127	127	127	127	127	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.1		
34000	TOFL	5160	5250	5350	5450	5560	5670	5780	5890	6000	6110	6270	131	179
	V1	105	104	104	104	104	104	104	104	103	103	104		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.5		
33000	TOFL	4740	4820	4910	5000	5100	5200	5300	5400	5500	5600	5750	128	176
	V1	101	100	100	100	100	100	100	100	100	100	100		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	5.9		
32000	TOFL	4350	4420	4500	4580	4670	4760	4850	4940	5030	5130	5260	126	173
	V1	97	97	96	96	96	96	96	96	96	96	96		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.3		

FIGURE 5-144. TAKE-OFF DISTANCE; FLAPS - 20° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
31000	TOFL	4040	4130	4220	4310	4390	4480	4560	4640	4730	4810	4870	123	170
	V1	94	94	94	94	94	94	93	93	93	93	93		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	6.9	7	7	7	7	7	7	6.9	6.9	6.9	6.7		
30000	TOFL	4000	4090	4180	4270	4350	4430	4520	4600	4680	4760	4820	121	167
	V1	94	94	94	94	94	94	94	93	93	93	93		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	118		
	GR2	7.4	7.5	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.2		
29000	TOFL	3970	4060	4140	4220	4310	4390	4470	4550	4640	4710	4780	119	164
	V1	94	94	94	94	94	94	94	94	94	93	93		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	8	8	8	8	8	8	8	8	8	7.9	7.8		
28000	TOFL	3930	4020	4100	4180	4270	4350	4430	4510	4590	4660	4730	117	161
	V1	94	94	94	94	94	94	94	94	94	94	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.5	8.4		
27000	TOFL	3890	3980	4060	4140	4220	4310	4390	4460	4540	4620	4680	115	158
	V1	94	94	94	94	94	94	94	94	94	94	93		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.2	9.2	9		
26000	TOFL	3860	3940	4020	4100	4180	4260	4340	4420	4500	4570	4640	113	155
	V1	95	95	95	95	94	94	94	94	94	94	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10	10	10	10	10	10	10	10	9.9	9.9	9.7		

FIGURE 5-145. TAKE-OFF DISTANCE; FLAPS - 20° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	8930	9090	9280	9470	9660	9860	10060	10270	10480	10780	11210	147	195
	V1	129	129	129	129	129	128	128	128	128	129	129		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.4	3.3	3.1		
39000	TOFL	8520	8670	8860	9040	9220	9410	9600	9800	10000	10290	10700	145	194
	V1	127	127	126	126	126	126	126	126	126	126	127		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	148		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.5	3.3		
38000	TOFL	7890	8030	8200	8360	8530	8700	8880	9060	9250	9520	9900	142	191
	V1	123	123	123	122	122	122	122	122	122	122	123		
	VR	140	140	140	140	140	140	140	140	140	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4	4	4	4	4	4	4	3.9	3.9	3.8	3.6		
37000	TOFL	7260	7390	7540	7690	7850	8010	8170	8340	8510	8760	9150	140	188
	V1	119	119	118	118	118	118	118	118	118	118	119		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	141	141	141	141	141	141	141	141	141	141	142		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.1	3.9		
36000	TOFL	6680	6800	6940	7080	7220	7360	7510	7660	7820	8060	8400	137	185
	V1	115	114	114	114	114	114	114	114	114	114	115		
	VR	133	133	133	133	133	133	133	133	133	133	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.6	4.7	4.7	4.7	4.7	4.7	4.6	4.6	4.6	4.5	4.2		
35000	TOFL	6140	6250	6380	6500	6630	6760	6900	7030	7180	7400	7710	135	183
	V1	111	110	110	110	110	110	110	110	110	110	111		
	VR	129	129	129	129	129	129	129	129	129	130	130		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5	5	5	5	5	5	5	5	4.9	4.8	4.6		
34000	TOFL	5640	5740	5850	5970	6080	6200	6320	6450	6590	6780	7070	132	180
	V1	107	106	106	106	106	106	106	106	106	106	107		
	VR	126	126	126	126	126	126	126	126	126	126	127		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.2	4.9		
33000	TOFL	5170	5260	5360	5470	5570	5680	5790	5910	6030	6210	6480	129	177
	V1	103	102	102	102	102	102	102	102	102	102	103		
	VR	122	122	122	122	122	122	122	122	122	123	123		
	V2	129	129	129	129	128	128	128	128	129	129	129		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.6	5.3		
32000	TOFL	4730	4810	4900	5000	5100	5190	5300	5400	5510	5670	5930	127	174
	V1	99	99	98	98	98	98	98	98	98	98	99		
	VR	119	118	118	118	119	119	119	119	119	119	119		
	V2	125	125	125	125	125	125	125	125	125	126	126		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6	5.7		

FIGURE 5-145. TAKE-OFF DISTANCE; FLAPS - 20° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
31000	TOFL	4330	4400	4490	4570	4660	4750	4840	4930	5030	5180	5400	124	171
	V1	95	95	94	94	94	94	94	94	94	94	95		
	VR	115	115	115	115	115	115	115	115	115	115	116		
	V2	122	122	122	122	122	122	122	122	122	122	123		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.4	6.1		
30000	TOFL	4100	4190	4280	4370	4450	4540	4620	4710	4790	4840	4930	121	168
	V1	93	93	93	93	93	92	92	92	92	92	91		
	VR	111	111	111	111	111	111	111	111	111	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.9	6.6		
29000	TOFL	4060	4150	4240	4320	4410	4490	4580	4660	4740	4810	4800	119	165
	V1	93	93	93	93	93	93	93	92	92	92	91		
	VR	108	108	108	108	108	108	108	108	108	108	109		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.6	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.4	7		
28000	TOFL	4020	4110	4200	4280	4360	4450	4530	4610	4690	4760	4810	117	161
	V1	93	93	93	93	93	93	93	93	92	92	91		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8	7.6		
27000	TOFL	3980	4070	4160	4240	4320	4410	4490	4570	4640	4710	4770	115	158
	V1	93	93	93	93	93	93	93	93	93	92	91		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	113	113	113	113	113	113	113	113	113	113	112		
	GR2	8.8	8.9	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.6	8.2		
26000	TOFL	3950	4030	4120	4200	4280	4360	4440	4520	4600	4660	4720	113	155
	V1	93	93	93	93	93	93	93	93	93	92	91		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	111		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5	9.5	9.3	8.9		

FIGURE 5-146. TAKE-OFF DISTANCE; FLAPS - 20° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	9840	10040	10250	10460	10680	10900	11120	11350	11620	12120	12750	148	196
	V1	132	132	132	132	132	132	132	132	132	133	134		
	VR	148	148	148	148	148	148	148	148	148	149	149		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	2.8	2.5		
39000	TOFL	9390	9580	9780	9980	10190	10400	10610	10850	11090	11590	12190	146	194
	V1	130	130	129	129	129	129	129	129	129	130	132		
	VR	146	146	146	146	146	146	146	146	146	147	147		
	V2	149	149	149	149	149	149	149	149	149	150	150		
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3	2.7		
38000	TOFL	8670	8850	9030	9220	9400	9590	9790	9990	10230	10700	11300	144	191
	V1	126	125	125	125	125	125	125	125	125	126	128		
	VR	143	143	143	143	143	143	143	143	143	143	144		
	V2	146	146	146	146	146	146	146	146	146	146	147		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.3	3		
37000	TOFL	8010	8170	8340	8500	8680	8850	9030	9220	9430	9860	10420	141	189
	V1	122	121	121	121	121	121	121	121	121	122	123		
	VR	139	139	139	139	139	139	139	139	139	140	140		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4	4	4	4	4	4	4	4	3.9	3.7	3.3		
36000	TOFL	7350	7500	7650	7800	7960	8120	8290	8450	8650	9080	9600	138	186
	V1	117	117	117	117	117	117	116	116	117	118	119		
	VR	135	135	135	135	135	135	135	135	135	136	137		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.3	4	3.7		
35000	TOFL	6740	6880	7010	7160	7300	7450	7590	7750	7920	8310	8820	136	183
	V1	113	113	113	113	113	112	112	112	112	114	115		
	VR	132	132	132	132	132	132	132	132	132	132	133		
	V2	136	136	136	136	136	136	136	136	137	137	137		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.3	4		
34000	TOFL	6180	6300	6430	6550	6680	6820	6950	7090	7250	7600	8050	133	180
	V1	109	109	109	108	108	108	108	108	108	109	111		
	VR	128	128	128	128	128	128	128	128	128	129	129		
	V2	133	133	133	133	133	133	133	133	133	133	134		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	4.7	4.3		
33000	TOFL	5650	5760	5880	5990	6110	6230	6350	6480	6620	6940	7360	130	177
	V1	105	105	104	104	104	104	104	104	104	105	107		
	VR	124	124	124	124	124	124	124	124	124	125	126		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.1	4.7		
32000	TOFL	5160	5260	5360	5470	5570	5680	5790	5910	6040	6330	6710	127	174
	V1	101	101	100	100	100	100	100	100	100	101	103		
	VR	120	120	120	120	120	120	120	120	120	121	122		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.5	5.1		

FIGURE 5-146. TAKE-OFF DISTANCE; FLAPS - 20° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
31000	TOFL	4710	4790	4890	4980	5080	5180	5280	5380	5490	5760	6110	125	171
	V1	97	97	96	96	96	96	96	96	96	97	99		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	123	123	123	123	123	123	123	123	123	124	124		
	GR2	6.3	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.2	5.9	5.5		
30000	TOFL	4300	4380	4460	4550	4640	4720	4810	4910	5010	5240	5550	122	168
	V1	93	93	92	92	92	92	92	92	92	93	95		
	VR	113	113	113	113	113	113	113	113	113	114	114		
	V2	120	120	120	120	120	120	120	120	120	121	121		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7	6.4	5.9		
29000	TOFL	4160	4250	4340	4420	4510	4600	4690	4770	4850	4860	5040	119	165
	V1	92	92	92	92	91	91	91	91	91	91	91		
	VR	109	109	109	109	109	109	109	109	109	110	111		
	V2	117	117	117	117	117	117	117	117	117	117	118		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	6.8	6.4		
28000	TOFL	4120	4210	4290	4380	4470	4550	4640	4720	4800	4850	4800	117	162
	V1	92	92	92	92	92	92	91	91	91	90	89		
	VR	106	106	106	106	106	106	106	106	106	106	107		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.4	6.9		
27000	TOFL	4080	4160	4250	4340	4420	4510	4590	4670	4750	4800	4840	115	159
	V1	92	92	92	92	92	92	92	92	91	90	89		
	VR	103	103	103	103	103	103	103	103	103	104	104		
	V2	113	113	113	113	113	113	113	113	113	112	112		
	GR2	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.4	8.3	7.9	7.4		
26000	TOFL	4040	4120	4210	4290	4380	4460	4550	4620	4700	4760	4790	113	155
	V1	92	92	92	92	92	92	92	92	92	91	89		
	VR	102	102	102	102	102	102	102	102	102	102	101		
	V2	112	112	112	112	112	112	112	112	112	111	110		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9	8.6	8.1		

FIGURE 5-147. TAKE-OFF DISTANCE; FLAPS - 20° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	10850	11080	11310	11550	11790	12030	12280	12560	12890	13720		149	196
	V1	135	135	135	135	135	135	135	135	135	137			
	VR	151	151	151	151	151	151	151	151	151	151			
	V2	153	153	153	153	153	153	153	153	153	153			
	GR2	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.4			
39000	TOFL	10370	10590	10820	11040	11270	11500	11730	12000	12320	13100	13920	147	194
	V1	133	133	132	132	132	132	132	132	132	134	136		
	VR	149	149	149	149	149	149	149	149	149	149	150		
	V2	151	151	151	151	151	151	151	151	151	151	152		
	GR2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3	2.9	2.5	2.2		
38000	TOFL	9580	9780	9990	10200	10400	10620	10840	11090	11390	12120	12880	145	192
	V1	129	128	128	128	128	128	128	128	128	130	132		
	VR	145	145	145	145	145	145	145	145	145	146	147		
	V2	148	148	148	148	148	148	148	148	148	148	149		
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.2	2.8	2.5		
37000	TOFL	8820	9010	9200	9390	9580	9770	9970	10200	10490	11180	11900	142	189
	V1	124	124	124	124	124	124	124	124	124	126	128		
	VR	141	141	141	141	141	141	142	142	142	143	143		
	V2	145	145	145	145	145	145	145	145	145	145	146		
	GR2	3.8	3.8	3.8	3.8	3.8	3.7	3.7	3.6	3.5	3.2	2.8		
36000	TOFL	8120	8290	8460	8630	8810	8990	9170	9390	9650	10260	10960	139	186
	V1	120	120	120	120	120	119	119	119	120	122	124		
	VR	138	138	138	138	138	138	138	138	138	139	140		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4	3.9	3.5	3.1		
35000	TOFL	7430	7590	7740	7900	8060	8220	8380	8580	8850	9410	10060	137	183
	V1	116	116	115	115	115	115	115	115	116	117	119		
	VR	134	134	134	134	134	134	134	134	134	135	136		
	V2	138	138	138	138	138	138	138	138	138	139	139		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.2	3.8	3.4		
34000	TOFL	6790	6940	7080	7220	7370	7510	7660	7840	8070	8580	9220	134	180
	V1	111	111	111	111	111	111	111	111	111	113	115		
	VR	130	130	130	130	130	130	130	130	130	131	133		
	V2	135	135	135	135	135	135	135	135	135	135	136		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.6	4.2	3.8		
33000	TOFL	6200	6330	6460	6590	6720	6850	6990	7150	7370	7820	8390	131	177
	V1	107	107	107	107	107	107	107	107	107	109	111		
	VR	126	126	126	126	126	126	126	126	127	128	129		
	V2	132	132	132	132	132	132	132	132	132	132	133		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	4.9	4.6	4.1		
32000	TOFL	5650	5770	5880	6000	6120	6240	6360	6510	6700	7110	7640	128	175
	V1	103	103	103	102	102	102	102	102	103	104	106		
	VR	122	122	122	122	122	122	122	122	123	124	125		
	V2	128	128	128	128	128	128	128	128	128	129	129		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.3	5	4.5		

FIGURE 5-147. TAKE-OFF DISTANCE; FLAPS - 20° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
31000	TOFL	5140	5240	5350	5450	5560	5670	5780	5910	6090	6450	6930	126	172
	V1	99	99	98	98	98	98	98	98	98	100	102		
	VR	118	118	118	118	118	118	118	118	119	120	121		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	6.1	6.1	6.1	6	6	6	6	5.9	5.7	5.4	4.9		
30000	TOFL	4670	4770	4860	4950	5050	5150	5240	5370	5520	5850	6280	123	168
	V1	95	94	94	94	94	94	94	94	94	96	98		
	VR	115	115	115	115	115	115	115	115	115	116	117		
	V2	121	121	121	121	121	121	121	121	121	122	122		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.3	6.2	5.8	5.3		
29000	TOFL	4270	4350	4440	4530	4620	4710	4800	4890	5030	5300	5690	120	165
	V1	91	90	90	90	90	90	90	90	90	92	94		
	VR	111	111	111	111	111	111	111	111	111	112	113		
	V2	118	118	118	118	118	118	118	118	118	119	119		
	GR2	7	7	7	7	7	7	6.9	6.8	6.6	6.3	5.8		
28000	TOFL	4220	4300	4400	4480	4570	4660	4750	4810	4850	4880	5150	117	162
	V1	91	91	91	90	90	90	90	90	89	88	90		
	VR	107	107	107	107	107	107	107	107	108	108	109		
	V2	115	115	115	115	115	115	115	115	115	116	116		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.3	7.2	6.8	6.3		
27000	TOFL	4170	4260	4350	4440	4530	4620	4700	4760	4830	4910	4800	115	159
	V1	91	91	91	91	91	91	90	90	89	89	87		
	VR	104	104	104	104	104	104	104	104	104	105	106		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8	7.9	7.7	7.3	6.8		
26000	TOFL	4130	4220	4310	4390	4480	4570	4650	4710	4780	4850	4840	113	156
	V1	91	91	91	91	91	91	91	90	90	89	87		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	111	111	111	111	111	111	111	111	111	110	110		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.3	7.9	7.3		

FIGURE 5-148. TAKE-OFF DISTANCE; FLAPS - 20° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	12090	12350	12610	12870	13140	13420	13720	14120	14710			150	197
	V1	139	139	139	138	138	138	138	139	140				
	VR	153	153	153	153	153	153	153	153	154				
	V2	155	155	155	155	155	155	155	155	155				
	GR2	2.7	2.7	2.7	2.7	2.7	2.6	2.6	2.4	2.2				
39000	TOFL	11530	11780	12030	12290	12540	12800	13090	13470	14040			148	195
	V1	136	136	136	136	136	136	136	136	137				
	VR	151	151	151	151	151	151	151	151	152				
	V2	154	154	154	154	154	154	153	153	154				
	GR2	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.6	2.4				
38000	TOFL	10670	10900	11130	11360	11590	11830	12100	12450	12970	13810		146	192
	V1	132	132	132	132	131	131	131	132	133	135			
	VR	148	148	148	148	148	148	148	148	148	149			
	V2	150	150	150	150	150	150	150	150	150	151			
	GR2	3.2	3.2	3.2	3.1	3.1	3.1	3.1	2.9	2.7	2.4			
37000	TOFL	9830	10040	10250	10460	10670	10900	11140	11470	11970	12740	13810	143	189
	V1	128	128	127	127	127	127	127	128	129	130	133		
	VR	144	144	144	144	144	144	144	144	145	146	146		
	V2	147	147	147	147	147	147	147	147	147	148	148		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.2	3	2.7	2.2		
36000	TOFL	9030	9220	9410	9610	9800	10000	10220	10530	10990	11740	12730	140	186
	V1	123	123	123	123	123	123	123	123	124	126	129		
	VR	141	141	141	141	141	141	141	141	141	142	143		
	V2	144	144	144	144	144	144	144	144	144	144	145		
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.6	3.3	3	2.5		
35000	TOFL	8280	8460	8630	8810	8990	9170	9380	9650	10070	10760	11710	138	184
	V1	119	119	119	118	118	118	118	119	120	122	124		
	VR	137	137	137	137	137	137	137	137	137	138	140		
	V2	141	141	141	141	141	141	141	141	141	141	142		
	GR2	4.2	4.2	4.2	4.2	4.2	4.1	4.1	3.9	3.7	3.3	2.8		
34000	TOFL	7560	7720	7880	8040	8210	8370	8560	8810	9200	9840	10740	135	181
	V1	115	114	114	114	114	114	114	114	115	117	120		
	VR	133	133	133	133	133	133	133	133	134	135	136		
	V2	137	137	137	137	137	137	137	137	137	138	139		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.3	4	3.7	3.2		
33000	TOFL	6880	7020	7170	7310	7460	7610	7780	8010	8360	8980	9830	132	178
	V1	110	110	110	110	109	109	109	110	111	113	116		
	VR	129	129	129	129	129	129	129	129	130	131	132		
	V2	134	134	134	134	134	134	133	133	134	134	135		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.7	4.4	4.1	3.5		
32000	TOFL	6260	6390	6520	6650	6780	6920	7070	7280	7600	8140	8940	129	175
	V1	106	105	105	105	105	105	105	105	106	108	111		
	VR	125	125	125	125	125	125	125	125	126	127	129		
	V2	130	130	130	130	130	130	130	130	130	131	132		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.1	4.8	4.4	3.9		

FIGURE 5-148. TAKE-OFF DISTANCE; FLAPS - 20° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
31000	TOFL	5680	5800	5920	6040	6150	6280	6410	6600	6890	7380	8110	127	172
	V1	101	101	101	101	101	101	101	101	102	104	107		
	VR	121	121	121	121	121	121	121	121	122	123	125		
	V2	127	127	127	127	127	127	127	127	127	127	128		
	GR2	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.5	5.2	4.8	4.3		
30000	TOFL	5150	5260	5360	5470	5570	5680	5800	5970	6230	6680	7320	124	169
	V1	97	97	97	97	96	96	96	97	98	99	102		
	VR	117	117	117	117	117	117	117	117	118	119	121		
	V2	123	123	123	123	123	123	123	123	123	124	125		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	5.9	5.6	5.3	4.7		
29000	TOFL	4670	4770	4860	4950	5050	5150	5250	5400	5630	6030	6610	121	166
	V1	93	93	92	92	92	92	92	93	93	95	98		
	VR	113	113	113	113	113	113	113	113	114	115	117		
	V2	120	120	120	120	120	120	120	120	120	121	121		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6.1	5.7	5.1		
28000	TOFL	4330	4420	4510	4610	4700	4790	4870	4910	5100	5440	5960	118	162
	V1	90	89	89	89	89	89	89	89	89	91	94		
	VR	109	109	109	109	109	109	109	109	110	111	113		
	V2	117	117	117	117	117	117	117	117	117	117	118		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	6.9	6.6	6.2	5.6		
27000	TOFL	4290	4380	4470	4560	4650	4740	4820	4850	4870	4910	5350	115	159
	V1	90	90	90	90	89	89	89	89	88	87	89		
	VR	106	106	106	106	106	106	106	106	106	107	109		
	V2	114	114	114	114	114	114	114	113	113	114	115		
	GR2	7.8	7.8	7.8	7.7	7.7	7.7	7.7	7.4	7.1	6.7	6.1		
26000	TOFL	4240	4330	4420	4510	4600	4690	4760	4820	4880	4850	4830	113	156
	V1	90	90	90	90	90	90	89	89	88	87	85		
	VR	102	102	102	102	102	102	102	102	102	103	105		
	V2	111	111	111	111	111	111	111	111	111	111	111		
	GR2	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8	7.7	7.2	6.6		

FIGURE 5-149. TAKE-OFF DISTANCE; FLAPS - 20° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	13530	13820	14120	14420	14720	15020	15420					151	197
	V1	143	143	143	142	142	142	143						
	VR	156	156	156	156	156	156	156						
	V2	158	158	158	158	158	158	158						
	GR2	2.4	2.4	2.4	2.4	2.4	2.4	2.3						
39000	TOFL	12890	13170	13460	13740	14020	14320	14680	15260				150	195
	V1	140	140	140	140	140	140	140	141					
	VR	154	154	154	154	154	154	154	154					
	V2	156	156	156	156	156	156	156	156					
	GR2	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.2					
38000	TOFL	11890	12140	12400	12660	12930	13200	13530	14070	14810			147	193
	V1	135	135	135	135	135	135	135	136	138				
	VR	151	151	151	151	151	151	151	151	151				
	V2	153	153	153	153	153	153	153	153	153				
	GR2	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.5	2.2				
37000	TOFL	10960	11200	11440	11670	11920	12160	12470	12960	13640	14700		144	190
	V1	131	131	131	131	131	131	131	132	133	135			
	VR	147	147	147	147	147	147	147	147	148	149			
	V2	150	150	150	149	149	149	149	149	150	150			
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	2.8	2.5	2.2			
36000	TOFL	10060	10280	10490	10710	10940	11160	11440	11910	12550	13520		142	187
	V1	127	126	126	126	126	126	126	127	129	131			
	VR	143	143	143	143	143	143	143	144	144	145			
	V2	146	146	146	146	146	146	146	146	146	147			
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.1	2.9	2.5			
35000	TOFL	9220	9410	9610	9810	10010	10220	10470	10900	11500	12410	13580	139	184
	V1	122	122	122	122	122	122	122	123	124	127	129		
	VR	140	140	140	140	140	140	140	140	141	142	143		
	V2	143	143	143	143	143	143	143	143	143	144	144		
	GR2	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.5	3.2	2.8	2.2		
34000	TOFL	8430	8600	8780	8960	9150	9340	9560	9990	10510	11370	12450	136	181
	V1	118	118	117	117	117	117	117	118	120	122	125		
	VR	136	136	136	136	136	136	136	136	137	138	139		
	V2	139	139	139	139	139	139	139	139	140	140	141		
	GR2	4.3	4.3	4.3	4.2	4.2	4.2	4.2	3.8	3.5	3.1	2.6		
33000	TOFL	7670	7830	7990	8150	8320	8490	8690	9060	9580	10370	11400	133	178
	V1	113	113	113	113	112	112	113	114	115	118	121		
	VR	132	132	132	132	132	132	132	132	133	134	136		
	V2	136	136	136	136	136	136	136	136	136	137	138		
	GR2	4.7	4.7	4.6	4.6	4.6	4.6	4.5	4.2	3.9	3.5	2.9		
32000	TOFL	6950	7090	7240	7380	7530	7690	7870	8210	8700	9450	10390	130	175
	V1	108	108	108	108	108	108	108	109	110	113	116		
	VR	127	127	127	127	127	127	128	128	129	130	132		
	V2	132	132	132	132	132	132	132	132	133	134	134		
	GR2	5.1	5.1	5	5	5	5	4.9	4.6	4.3	3.8	3.3		

FIGURE 5-149. TAKE-OFF DISTANCE; FLAPS - 20° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
31000	TOFL	6300	6430	6560	6690	6830	6970	7130	7430	7860	8550	9440	128	172
	V1	104	104	104	104	103	103	103	104	106	109	112		
	VR	123	123	123	123	123	123	124	124	125	126	128		
	V2	129	129	129	129	129	129	129	129	129	130	131		
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5	4.7	4.2	3.6		
30000	TOFL	5700	5820	5940	6060	6180	6300	6440	6720	7100	7700	8540	125	169
	V1	100	99	99	99	99	99	99	100	101	104	107		
	VR	119	119	119	119	119	119	119	120	121	122	124		
	V2	125	125	125	125	125	125	125	125	125	126	127		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.4	5.1	4.6	4		
29000	TOFL	5150	5250	5360	5460	5570	5680	5810	6060	6400	6940	7670	122	166
	V1	95	95	95	95	95	95	95	95	97	99	102		
	VR	115	115	115	115	115	115	115	116	117	118	120		
	V2	122	122	122	122	122	122	122	122	122	123	124		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	5.9	5.5	5	4.4		
28000	TOFL	4660	4750	4850	4940	5030	5130	5240	5460	5760	6240	6900	119	163
	V1	91	91	90	90	90	90	90	91	92	95	98		
	VR	111	111	111	111	111	111	111	112	112	114	116		
	V2	118	118	118	118	118	118	118	118	118	119	120		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.4	6	5.5	4.9		
27000	TOFL	4400	4500	4590	4690	4780	4870	4950	4940	5200	5600	6190	116	160
	V1	89	89	89	89	88	88	88	88	88	90	93		
	VR	107	107	107	107	107	107	108	108	109	110	112		
	V2	115	115	115	115	115	115	115	115	115	116	117		
	GR2	7.5	7.4	7.4	7.4	7.4	7.4	7.3	6.9	6.5	6	5.3		
26000	TOFL	4360	4450	4540	4640	4730	4810	4900	4920	4880	5040	5540	113	156
	V1	89	89	89	89	89	88	88	87	86	86	89		
	VR	104	104	104	104	104	104	104	104	105	106	108		
	V2	112	112	112	112	112	112	112	112	112	112	113		
	GR2	8	8	8	8	8	8	7.9	7.5	7.1	6.5	5.8		

FIGURE 5-150. TAKE-OFF DISTANCE; FLAPS - 20° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	85.1	86.0	86.8	87.6	88.5	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	14510	14840										151	196
	V1	144	144											
	VR	158	158											
	V2	159	159											
	GR2	2.3	2.3											
38000	TOFL	13320	13620	13980	14330	14570	14840	15280					148	193
	V1	139	139	139	139	139	139	140						
	VR	154	154	154	154	154	154	154						
	V2	155	155	155	155	155	155	155						
	GR2	2.6	2.6	2.6	2.6	2.6	2.6	2.5						
37000	TOFL	12240	12520	12820	13130	13360	13600	14000	14810				145	190
	V1	135	135	135	135	134	134	135	137					
	VR	150	150	150	150	150	150	150	150					
	V2	152	152	152	152	152	152	152	152					
	GR2	3	2.9	2.9	2.9	2.9	2.9	2.8	2.4					
36000	TOFL	11250	11500	11780	12070	12270	12490	12850	13590	14460			143	187
	V1	130	130	130	130	130	130	130	132	134				
	VR	146	146	146	146	146	146	146	147	147				
	V2	149	149	149	149	149	149	149	149	149				
	GR2	3.3	3.3	3.3	3.2	3.2	3.2	3.1	2.7	2.3				
35000	TOFL	10290	10520	10780	11040	11220	11420	11750	12460	13260	14430		140	184
	V1	126	125	125	125	125	125	125	127	129	132			
	VR	142	142	143	143	142	142	143	143	144	145			
	V2	145	145	145	145	145	145	145	145	145	146			
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3	2.7	2.2			
34000	TOFL	9390	9600	9830	10070	10230	10420	10710	11360	12140	13180		137	181
	V1	121	121	121	121	120	120	121	122	124	127			
	VR	139	139	139	139	139	139	139	139	140	141			
	V2	142	142	142	142	142	142	142	142	142	143			
	GR2	4	4	4	4	4	4	3.8	3.4	3	2.5			
33000	TOFL	8540	8730	8950	9170	9300	9470	9750	10340	11050	12050	13240	134	179
	V1	116	116	116	116	116	116	116	118	120	122	126		
	VR	134	134	135	135	134	134	135	135	136	138	139		
	V2	138	138	138	138	138	138	138	138	139	139	140		
	GR2	4.4	4.4	4.4	4.3	4.3	4.3	4.2	3.8	3.3	2.9	2.3		
32000	TOFL	7750	7920	8120	8310	8440	8590	8830	9380	10050	10960	12080	131	176
	V1	111	111	111	111	111	111	111	113	115	118	121		
	VR	130	130	130	130	130	130	131	131	132	134	135		
	V2	135	135	135	135	135	134	134	135	135	136	137		
	GR2	4.8	4.8	4.8	4.7	4.7	4.8	4.6	4.2	3.7	3.2	2.6		

FIGURE 5-150. TAKE-OFF DISTANCE; FLAPS - 20° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	85.1	86.0	86.8	87.6	88.5	89.5	90.4	91.2	92.1	91.9	91.3		
31000	TOFL	7010	7160	7350	7520	7640	7760	7970	8480	9100	9940	10990	128	173
	V1	107	107	107	107	106	106	106	108	110	113	116		
	VR	126	126	126	126	126	126	126	127	128	130	131		
	V2	131	131	131	131	131	131	131	131	131	132	133		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	4.6	4.1	3.6	3		
30000	TOFL	6330	6470	6630	6780	6890	7010	7190	7640	8210	8980	9940	126	170
	V1	102	102	102	102	102	102	102	104	106	108	112		
	VR	122	122	122	122	122	122	122	123	124	126	127		
	V2	127	127	127	127	127	127	127	127	128	129	130		
	GR2	5.7	5.7	5.6	5.6	5.6	5.6	5.5	5	4.5	4	3.4		
29000	TOFL	5710	5830	5970	6110	6210	6310	6480	6880	7390	8080	8970	123	166
	V1	98	98	98	98	97	97	97	99	101	104	107		
	VR	118	118	118	118	118	118	118	119	120	121	123		
	V2	124	124	124	124	124	124	124	124	124	125	126		
	GR2	6.2	6.2	6.1	6.1	6.1	6.1	6	5.4	4.9	4.4	3.8		
28000	TOFL	5130	5240	5370	5490	5570	5670	5810	6170	6630	7240	8060	120	163
	V1	93	93	93	93	93	93	93	94	96	99	102		
	VR	114	114	114	114	114	114	114	115	116	117	119		
	V2	120	120	120	120	120	120	120	120	120	121	123		
	GR2	6.7	6.7	6.6	6.6	6.6	6.6	6.5	5.9	5.4	4.8	4.2		
27000	TOFL	4630	4730	4840	4950	5020	5110	5230	5530	5950	6490	7200	117	160
	V1	89	89	89	89	88	88	88	90	92	94	98		
	VR	110	110	110	110	110	110	110	110	111	113	115		
	V2	117	117	117	117	117	117	117	117	117	118	119		
	GR2	7.2	7.2	7.2	7.1	7.1	7.1	7	6.4	5.8	5.3	4.6		
26000	TOFL	4480	4570	4660	4750	4850	4940	5020	4990	5330	5800	6430	114	157
	V1	88	88	88	87	87	87	87	87	87	90	93		
	VR	105	106	106	106	106	106	106	106	107	109	111		
	V2	113	113	113	113	113	113	113	113	113	114	115		
	GR2	7.8	7.7	7.7	7.7	7.7	7.7	7.6	7	6.4	5.8	5.1		

FIGURE 5-151. TAKE-OFF DISTANCE; FLAPS - 20° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

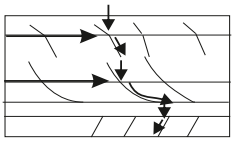
GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	85.4	86.3	87.1	87.9	88.9	89.8	90.7	91.6	92.2	91.5	90.8		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	15020	15370	15810	16160	16400	16720						149	194
	V1	144	144	144	144	144	144							
	VR	157	157	157	157	157	157							
	V2	158	158	158	158	158	158							
	GR2	2.4	2.4	2.4	2.4	2.4	2.3							
37000	TOFL	13760	14080	14480	14800	15020	15320	15990					147	191
	V1	139	139	139	139	139	138	140						
	VR	153	153	153	153	153	153	154						
	V2	155	155	155	155	155	155	155						
	GR2	2.7	2.7	2.7	2.7	2.7	2.7	2.4						
36000	TOFL	12600	12900	13260	13550	13750	14030	14630	15660				144	188
	V1	134	134	134	134	134	134	135	137					
	VR	149	149	150	150	150	150	150	150					
	V2	151	151	151	151	151	151	151	151					
	GR2	3.1	3	3	3	3	3	2.7	2.3					
35000	TOFL	11520	11790	12120	12380	12560	12810	13380	14320				141	185
	V1	129	129	129	129	129	129	130	132					
	VR	145	146	146	146	146	146	146	146					
	V2	148	148	148	148	148	148	148	148					
	GR2	3.4	3.4	3.4	3.4	3.4	3.3	3.1	2.6					
34000	TOFL	10520	10760	11070	11310	11470	11700	12200	13050	14170			138	182
	V1	124	124	124	124	124	124	125	127	130				
	VR	142	142	142	142	142	142	142	143	144				
	V2	144	144	145	145	144	144	144	144	145				
	GR2	3.8	3.8	3.7	3.7	3.7	3.7	3.4	2.9	2.4				
33000	TOFL	9540	9760	10040	10250	10400	10600	11050	11900	12910	14130		135	179
	V1	119	119	119	119	119	119	120	123	125	128			
	VR	137	137	138	138	137	137	138	139	140	141			
	V2	141	141	141	141	141	141	141	141	141	142			
	GR2	4.1	4.1	4.1	4.1	4.1	4.1	3.8	3.3	2.8	2.3			
32000	TOFL	8650	8860	9110	9300	9420	9610	10020	10760	11760	12870		133	176
	V1	115	115	115	115	114	114	115	117	120	123			
	VR	133	133	133	133	133	133	134	135	136	137			
	V2	137	137	137	137	137	137	137	137	138	138			
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.2	3.7	3.1	2.6			

FIGURE 5-151. TAKE-OFF DISTANCE; FLAPS - 20° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	85.4	86.3	87.1	87.9	88.9	89.8	90.7	91.6	92.2	91.5	90.8		
31000	TOFL	7830	8010	8230	8410	8520	8690	9050	9740	10620	11700	12810	130	173
	V1	110	110	110	110	109	109	110	113	115	118	121		
	VR	129	129	129	129	129	129	129	130	132	133	134		
	V2	133	133	133	133	133	133	133	134	134	135	136		
	GR2	5	5	4.9	4.9	4.9	4.9	4.6	4.1	3.5	3	2.4		
30000	TOFL	7070	7230	7430	7590	7690	7840	8160	8780	9590	10540	11600	127	170
	V1	105	105	105	105	105	105	105	108	111	114	117		
	VR	125	125	125	125	125	125	125	126	128	129	131		
	V2	130	130	130	130	130	130	130	130	130	131	132		
	GR2	5.4	5.4	5.4	5.4	5.4	5.3	5.1	4.5	3.9	3.3	2.8		
29000	TOFL	6360	6500	6680	6820	6910	7040	7330	7900	8630	9500	10470	124	167
	V1	100	100	100	100	100	100	101	103	106	109	112		
	VR	120	121	121	121	121	121	121	122	123	125	127		
	V2	126	126	126	126	126	126	126	126	127	128	129		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.5	4.9	4.3	3.7	3.2		
28000	TOFL	5710	5840	6000	6120	6200	6320	6570	7070	7750	8530	9400	121	164
	V1	96	96	96	96	95	95	96	98	101	104	107		
	VR	116	116	116	116	116	116	117	118	119	121	123		
	V2	122	122	122	122	122	122	122	122	123	124	125		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6	5.4	4.7	4.2	3.6		
27000	TOFL	5110	5230	5370	5470	5540	5650	5870	6320	6920	7630	8410	118	160
	V1	91	91	91	91	91	91	91	94	96	99	102		
	VR	112	112	112	112	112	112	112	113	115	117	118		
	V2	118	119	119	119	118	118	118	119	119	120	121		
	GR2	6.9	6.9	6.8	6.8	6.8	6.8	6.5	5.9	5.2	4.6	4		
26000	TOFL	4600	4710	4830	4920	4980	5080	5260	5630	6170	6790	7510	115	157
	V1	87	87	87	87	86	86	87	89	92	94	97		
	VR	108	108	108	108	108	108	108	109	111	112	114		
	V2	115	115	115	115	115	115	115	115	116	117	118		
	GR2	7.4	7.4	7.4	7.4	7.4	7.3	7.1	6.4	5.7	5.1	4.5		

V_1 CORRECTIONS
FLAPS - 20°
WET RUNWAY



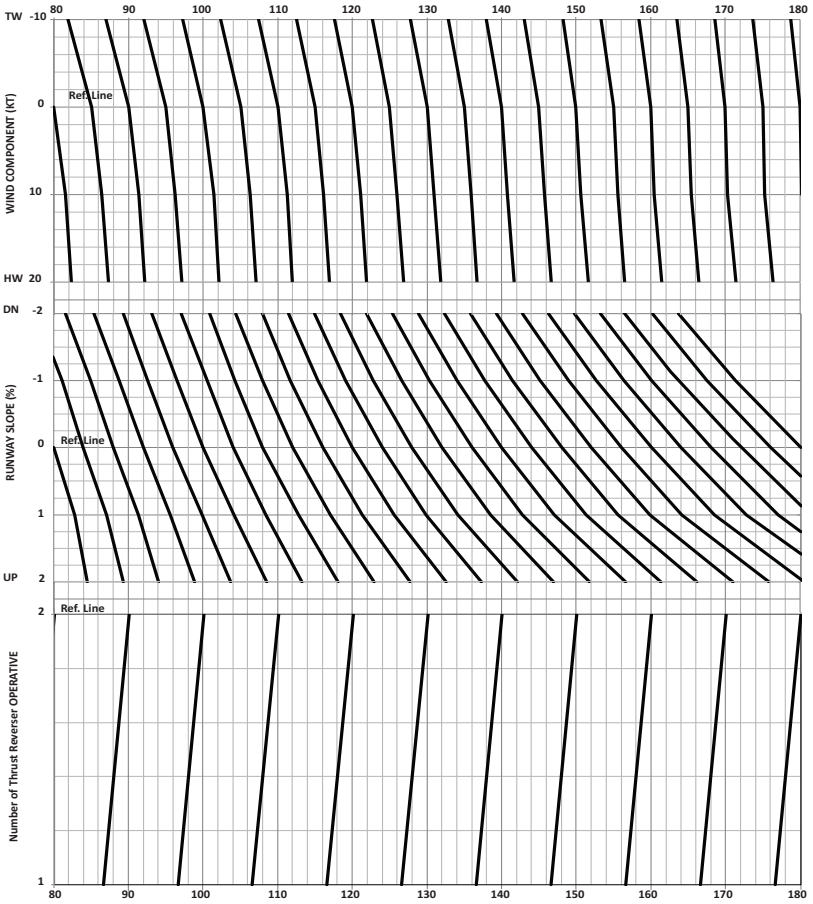


Figure 5-152. V_1 Correction; Flaps - 20°; Wet Runway

TAKEOFF FIELD LENGTH CORRECTIONS
FLAPS 20°
WET RUNWAY

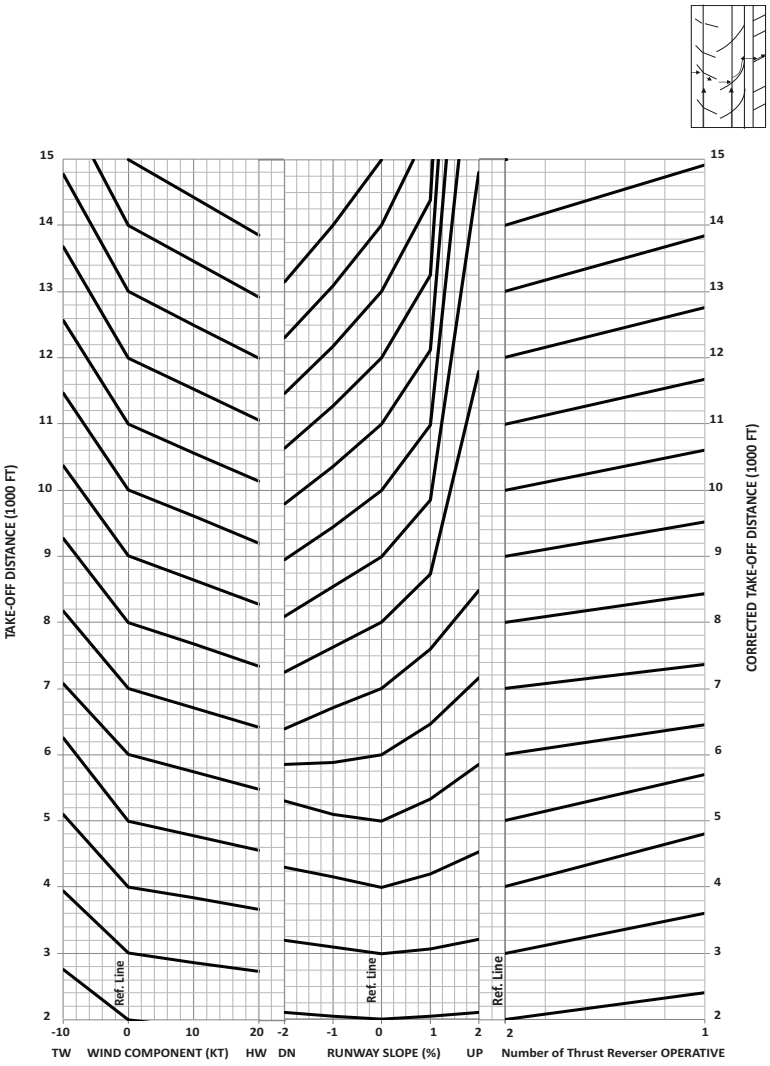


Figure 5-153. Takeoff Field Length Corrections; Flaps-20°; Wet Runway

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TAKEOFF CHARTS AND TABLES; FLAPS - 10°; DRY RUNWAY

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 10°
ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF

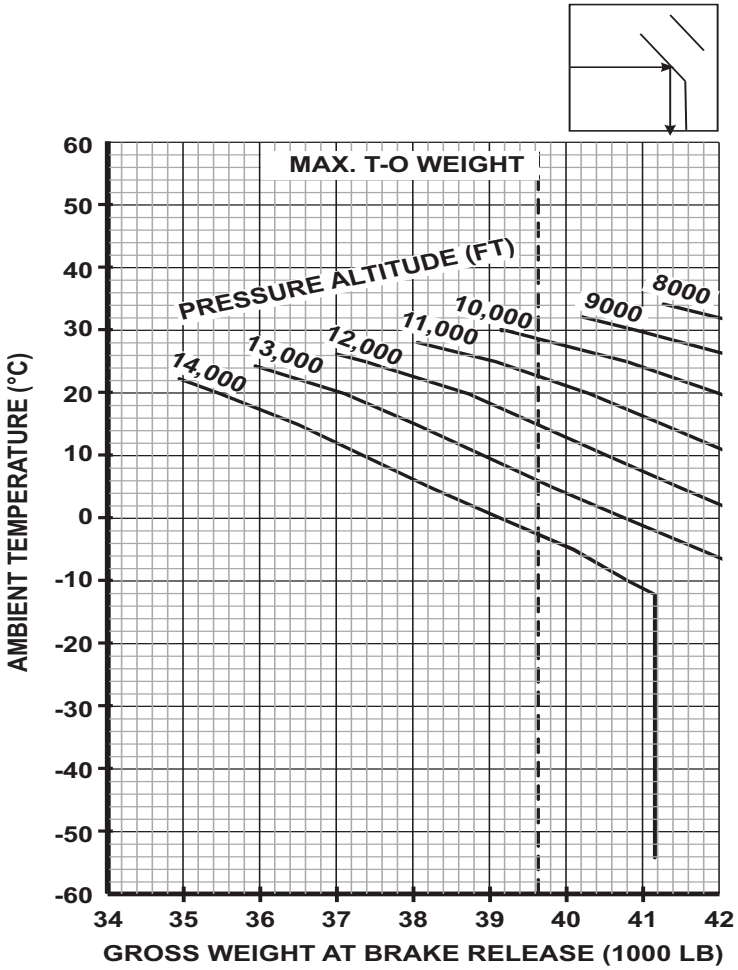


Figure 5-154. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 10°; ECS - Off; Engine Anti-ice - Off; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 10°
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF

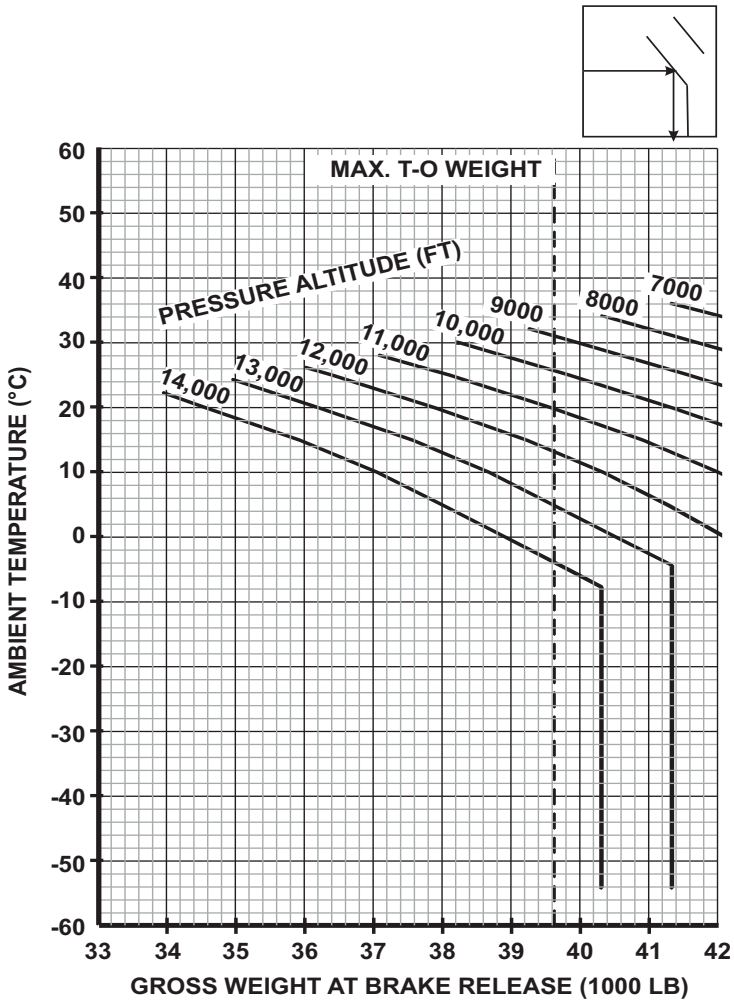


Figure 5-155. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 10°; ECS - On; Engine Anti-ice - Off; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 10°
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - OFF

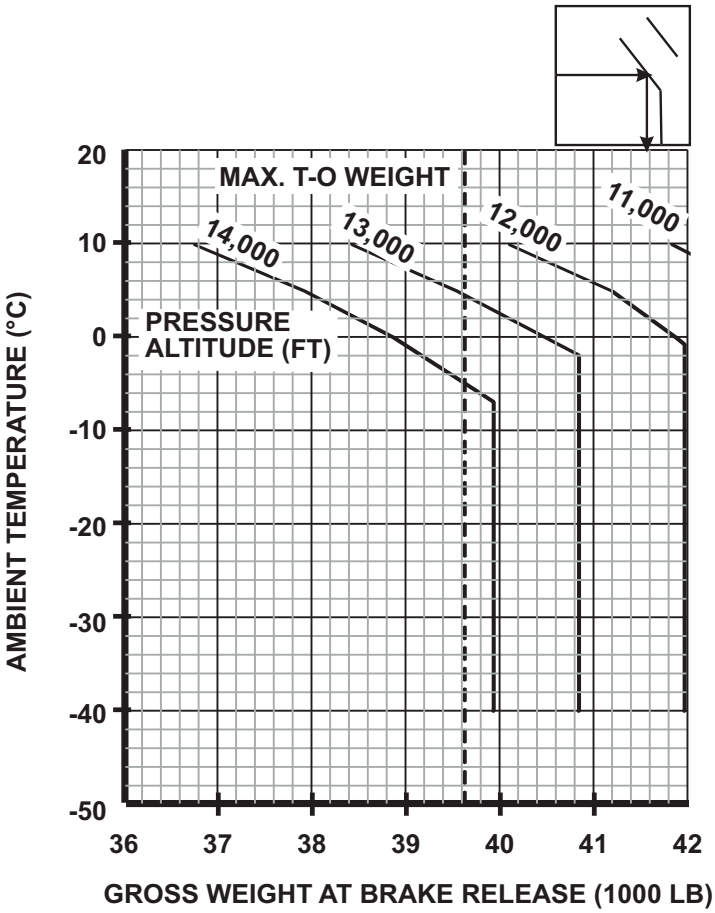


Figure 5-156. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 10°; ECS - On; Engine Anti-ice - On; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS;
(AS PERMITTED BY CLIMB REQUIREMENTS);
FLAPS - 10°;
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON

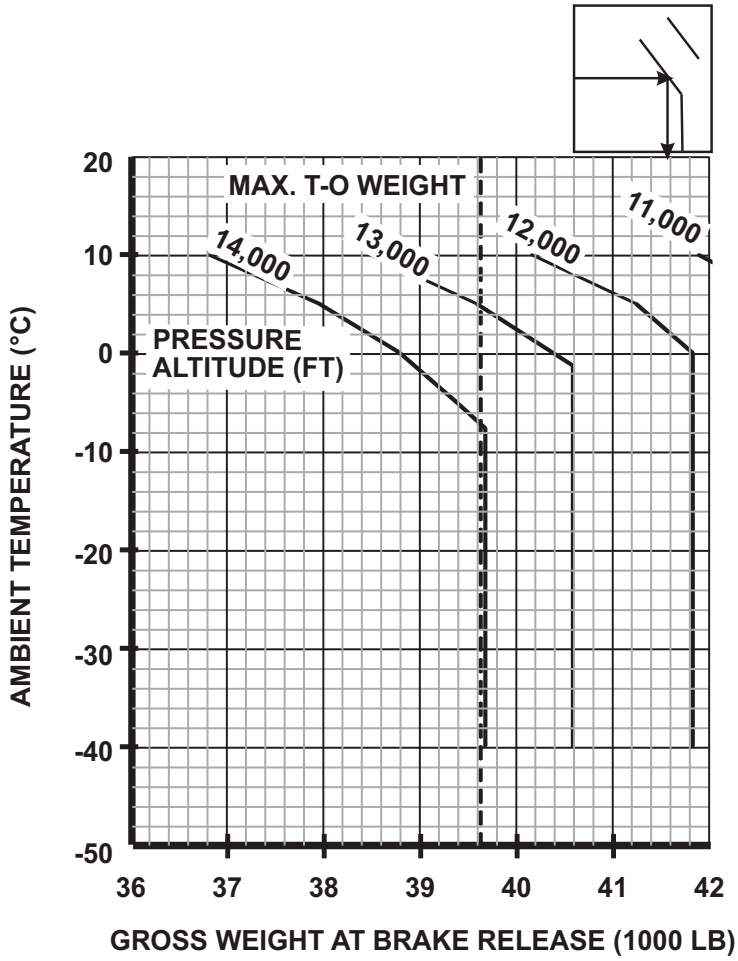


Figure 5-157. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 10°; ECS - On; Engine Anti-ice - On; Wing Anti-ice - On

**TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY BRAKE ENERGY);
FLAPS - 10°**

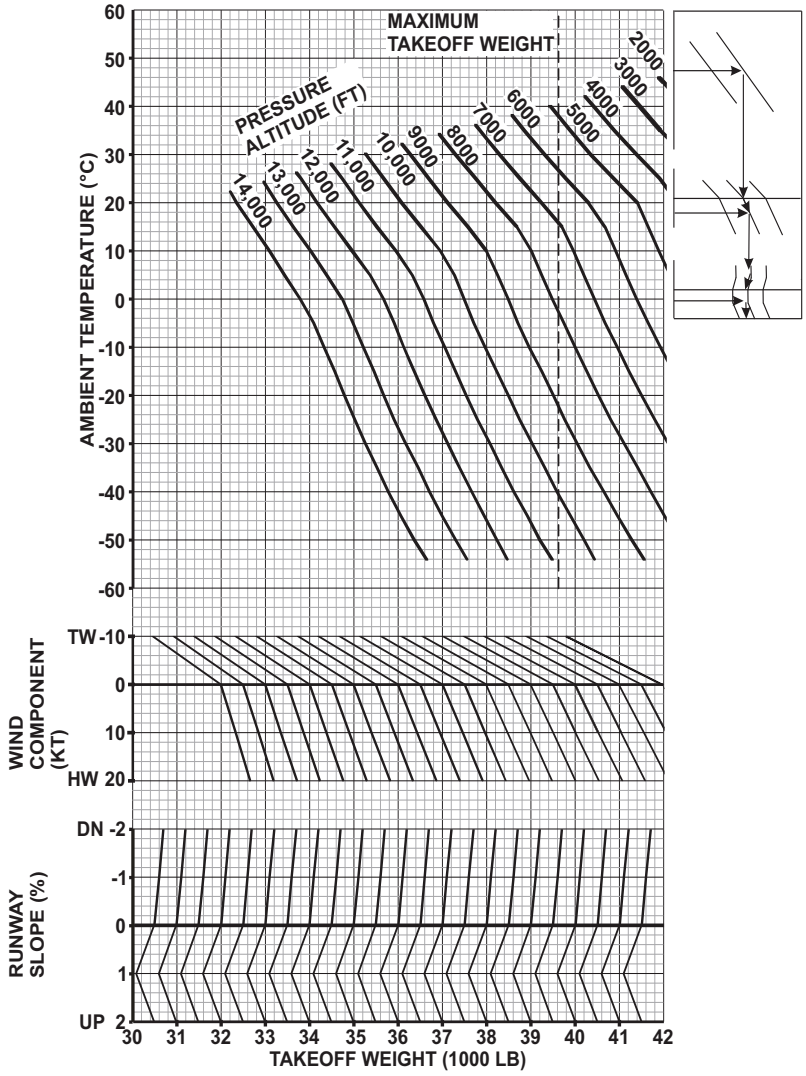


Figure 5-158. Takeoff Weight Limitations (As Permitted By Brake Energy); Flaps - 10°

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY TIRE SPEED LIMIT)
FLAPS - 10°;

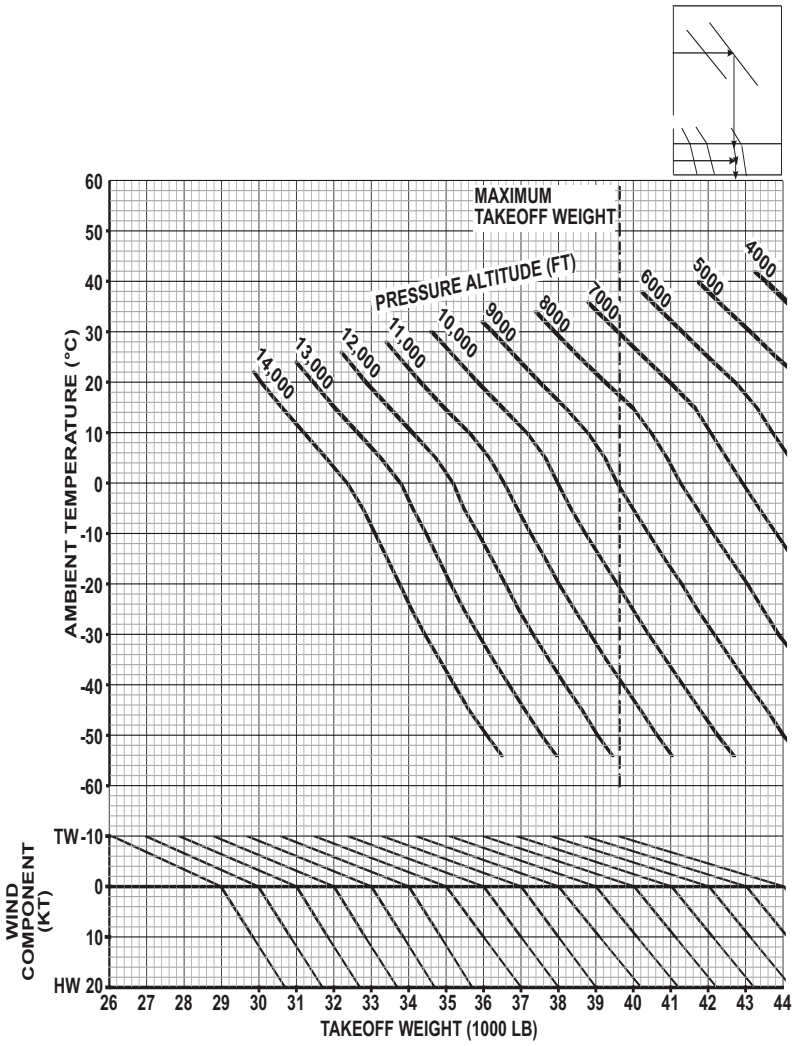


Figure 5-159. Takeoff Weight Limitations (As Permitted By Tire Speed Limit); Flaps - 10°;

FIGURE 5-160. TAKE-OFF DISTANCE; FLAPS - 10°; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
39600	TOFL	4210	4270	4340	4400	4470	4530	4590	4650	4730	4810	4890		
	V1	133	133	133	133	133	132	132	132	132	132	132		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	146	146	145	145	145	145	145	145	145	145	145		
	GR2	6.9	6.9	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1	139	192
39000	TOFL	4070	4120	4190	4250	4320	4380	4440	4490	4570	4640	4720		
	V1	131	131	131	131	131	130	130	130	130	130	130		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	7.1	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	138	191
38000	TOFL	3830	3880	3950	4010	4070	4120	4180	4230	4300	4370	4440		
	V1	128	128	128	127	127	127	127	127	127	126	126		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	142	142	142	141	141	141	141	141	141	141	141		
	GR2	7.5	7.5	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	136	188
37000	TOFL	3610	3660	3720	3770	3830	3890	3940	3990	4060	4120	4190		
	V1	124	124	124	124	124	124	124	123	123	123	123		
	VR	131	131	131	130	130	130	130	130	130	130	130		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.9	7.9	7.9	8	8	8	8.1	8.1	8.1	8.1	8.1	135	185
36000	TOFL	3410	3450	3510	3560	3620	3670	3720	3770	3830	3890	3950		
	V1	121	121	121	121	121	121	120	120	120	120	120		
	VR	128	128	128	128	128	127	127	127	127	127	127		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	8.3	8.3	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.6	8.6	133	182
35000	TOFL	3210	3260	3310	3360	3410	3460	3510	3550	3610	3670	3720		
	V1	118	118	118	118	118	118	117	117	117	117	117		
	VR	125	125	125	125	125	125	125	124	124	124	124		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.8	8.8	8.8	8.8	8.9	8.9	8.9	9	9	9	9	131	180
34000	TOFL	3030	3070	3120	3170	3220	3260	3300	3350	3400	3460	3510		
	V1	115	115	115	115	115	114	114	114	114	114	114		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	9.2	9.3	9.3	9.3	9.3	9.4	9.4	9.5	9.5	9.5	9.5	129	177
33000	TOFL	2870	2900	2950	2990	3040	3080	3130	3170	3220	3270	3320		
	V1	112	112	112	112	112	111	111	111	111	111	111		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.7	9.8	9.8	9.8	9.8	9.9	9.9	10	10	10	10	127	174
32000	TOFL	2710	2750	2790	2830	2880	2920	2960	3000	3040	3090	3140		
	V1	109	109	109	109	109	109	108	108	108	108	108		
	VR	117	117	117	117	116	116	116	116	116	116	116		
	V2	128	128	128	128	128	128	128	127	127	127	127		
	GR2	10.3	10.3	10.3	10.3	10.4	10.4	10.5	10.5	10.5	10.5	10.5	125	171
31000	TOFL	2560	2600	2640	2680	2720	2760	2800	2840	2880	2930	2970		
	V1	106	106	106	106	106	106	106	106	105	105	105		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.8	10.8	10.9	10.9	10.9	11	11	11.1	11.1	11.1	11.1	123	168

FIGURE 5-160. TAKE-OFF DISTANCE; FLAPS - 10°; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
30000	TOFL	2440	2470	2510	2550	2590	2630	2660	2700	2750	2790	2830		
	V1	104	104	104	104	103	103	103	103	103	103	103		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11.4	11.5	11.5	11.5	11.6	11.6	11.7	11.7	11.7	11.7	11.7	121	166
29000	TOFL	2320	2350	2390	2430	2470	2520	2560	2600	2650	2690	2730		
	V1	101	101	101	101	101	101	101	102	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	12.1	12.1	12.1	12.2	12.2	12.3	12.3	12.4	12.4	12.4	12.4	119	163
28000	TOFL	2290	2320	2370	2410	2450	2500	2540	2580	2620	2660	2700		
	V1	101	101	101	101	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.8	12.8	12.9	12.9	13	13	13.1	13.1	13.1	13.1	13.1	117	160
27000	TOFL	2270	2310	2350	2390	2430	2480	2520	2560	2600	2640	2680		
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	13.6	13.6	13.7	13.7	13.8	13.8	13.9	13.9	13.9	13.9	13.9	115	157
26000	TOFL	2260	2290	2330	2370	2410	2460	2500	2540	2580	2620	2660		
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	119	119	119	119	119		
	GR2	14.5	14.5	14.5	14.6	14.6	14.7	14.7	14.8	14.8	14.8	14.8	113	154

FIGURE 5-160. TAKE-OFF DISTANCE; FLAPS - 10°; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
39600	TOFL	4960	5040	5120	5200	5270	5350	5430	5780	6280	6800	7330		
	V1	132	132	132	131	131	131	131	134	136	139	141		
	VR	138	138	138	138	138	138	138	139	141	142	144		
	V2	145	145	145	145	145	145	145	146	147	148	149		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.5	5.9	5.3	4.7	139	192
39000	TOFL	4790	4870	4940	5010	5090	5160	5240	5580	6060	6550	7060		
	V1	130	130	130	129	129	129	129	132	134	137	139		
	VR	136	136	136	136	136	136	136	137	139	141	142		
	V2	144	144	144	144	144	144	144	144	145	146	147		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	6.8	6.1	5.4	4.9	138	191
38000	TOFL	4510	4580	4650	4720	4790	4860	4930	5240	5700	6160	6640		
	V1	126	126	126	126	126	126	126	128	131	134	136		
	VR	133	133	133	133	133	133	133	134	136	138	139		
	V2	141	141	141	141	141	141	141	142	143	143	144		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.1	6.4	5.8	5.2	136	188
37000	TOFL	4250	4320	4380	4450	4510	4580	4640	4930	5350	5790	6230		
	V1	123	123	123	123	123	123	123	125	128	130	133		
	VR	130	130	130	130	130	130	130	131	133	135	136		
	V2	139	139	139	139	139	139	139	139	140	141	142		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	7.5	6.8	6.1	5.6	135	185
36000	TOFL	4010	4070	4130	4190	4260	4310	4370	4630	5020	5430	5840		
	V1	120	120	120	120	120	120	120	121	124	127	129		
	VR	127	127	127	127	127	127	127	128	130	132	133		
	V2	137	137	137	137	137	136	136	136	138	138	139		
	GR2	8.6	8.6	8.6	8.6	8.5	8.5	8.5	7.9	7.2	6.5	5.9	133	182
35000	TOFL	3780	3840	3900	3950	4010	4060	4120	4350	4700	5080	5470		
	V1	117	117	117	117	117	117	117	118	121	124	126		
	VR	124	124	124	124	124	124	124	126	127	129	130		
	V2	134	134	134	134	134	134	134	134	135	136	137		
	GR2	9	9	9	9	9	9	9	8.3	7.6	6.9	6.3	131	180
34000	TOFL	3560	3610	3670	3730	3780	3830	3880	4090	4410	4750	5120		
	V1	114	114	114	114	114	113	113	115	118	120	123		
	VR	122	122	122	122	122	122	122	123	124	126	127		
	V2	132	132	132	132	132	132	132	132	133	133	134		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	8.8	8	7.3	6.7	129	177
33000	TOFL	3370	3420	3470	3520	3570	3620	3670	3850	4140	4450	4780		
	V1	111	111	111	111	111	111	111	112	114	117	119		
	VR	119	119	119	119	119	119	119	120	121	123	124		
	V2	130	129	129	129	129	129	129	130	130	131	131		
	GR2	10	10	10	10	10	10	10	9.3	8.5	7.8	7.1	127	174
32000	TOFL	3180	3230	3280	3320	3370	3420	3460	3630	3890	4160	4460		
	V1	108	108	108	108	108	108	108	109	111	113	116		
	VR	116	116	116	116	116	116	116	117	119	120	121		
	V2	127	127	127	127	127	127	127	127	128	128	129		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	9.8	9	8.2	7.5	125	171
31000	TOFL	3020	3060	3100	3150	3190	3240	3280	3420	3640	3900	4160		
	V1	105	105	105	105	105	105	105	106	108	110	112		
	VR	114	114	114	114	114	114	114	114	116	117	118		
	V2	125	125	125	125	125	125	125	125	125	126	126		
	GR2	11.1	11.1	11.1	11.1	11.1	11.1	11.1	10.4	9.5	8.7	8	123	168

FIGURE 5-160. TAKE-OFF DISTANCE; FLAPS - 10°; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
30000	TOFL	2870	2910	2950	2990	3030	3080	3120	3230	3430	3640	3890		
	V1	103	103	103	103	103	103	103	103	105	107	109		
	VR	111	111	111	111	111	111	111	112	113	114	115		
	V2	123	123	123	123	123	123	123	123	123	123	124		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	10.9	10.1	9.3	8.5	121	166
29000	TOFL	2770	2810	2840	2880	2920	2960	3000	3070	3220	3410	3620		
	V1	101	101	101	101	101	101	101	101	102	104	105		
	VR	109	109	109	109	109	109	109	109	110	111	112		
	V2	122	122	122	122	122	122	122	121	121	121	122		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.4	11.6	10.7	9.8	9.1	119	163
28000	TOFL	2740	2780	2820	2860	2900	2940	2980	2950	3050	3200	3380		
	V1	102	101	101	101	101	101	101	99	99	101	102		
	VR	107	107	107	107	107	107	107	107	108	108	110		
	V2	120	120	120	120	120	120	120	119	119	119	119		
	GR2	13.1	13.1	13.1	13.1	13.1	13.1	13.1	12.3	11.3	10.4	9.6	117	160
27000	TOFL	2720	2760	2800	2830	2870	2910	2950	2920	2880	3020	3160		
	V1	102	102	102	102	102	102	101	99	97	98	99		
	VR	105	105	105	105	105	105	105	105	105	106	107		
	V2	119	119	119	119	119	119	119	118	117	117	116		
	GR2	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.1	12.1	11.1	10.3	115	157
26000	TOFL	2700	2730	2770	2810	2850	2890	2920	2890	2850	2850	2970		
	V1	102	102	102	102	102	102	102	100	97	95	96		
	VR	103	103	103	103	103	103	103	103	103	103	104		
	V2	119	119	119	119	119	119	119	117	116	115	114		
	GR2	14.8	14.8	14.8	14.8	14.8	14.8	14.8	13.9	12.8	11.8	11	113	154

FIGURE 5-161. TAKE-OFF DISTANCE; FLAPS - 10°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.8	78.2	79.2	80.1	81.0	81.9	82.8	83.6	84.4	85.3	86.1		
39600	TOFL	4450	4510	4590	4660	4730	4810	4870	4950	5030	5110	5190		
	V1	134	134	134	134	134	134	133	133	133	133	133		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	139	193
39000	TOFL	4290	4350	4430	4500	4570	4640	4700	4770	4850	4930	5010		
	V1	132	132	132	132	132	132	131	131	131	131	131		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	7	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	138	191
38000	TOFL	4040	4100	4170	4240	4300	4370	4430	4490	4570	4640	4710		
	V1	129	129	129	129	129	128	128	128	128	128	128		
	VR	135	135	134	134	134	134	134	134	134	134	134		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5	136	188
37000	TOFL	3800	3860	3920	3980	4050	4100	4160	4220	4290	4360	4430		
	V1	126	126	125	125	125	125	125	125	124	124	124		
	VR	132	132	132	131	131	131	131	131	131	131	131		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	135	185
36000	TOFL	3580	3630	3690	3750	3810	3870	3920	3980	4040	4110	4170		
	V1	122	122	122	122	122	122	121	121	121	121	121		
	VR	129	129	129	129	128	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3	133	183
35000	TOFL	3380	3420	3480	3540	3590	3640	3700	3750	3810	3870	3930		
	V1	119	119	119	119	119	118	118	118	118	118	118		
	VR	126	126	126	126	126	126	125	125	125	125	125		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	131	180
34000	TOFL	3190	3230	3280	3330	3380	3430	3480	3530	3590	3650	3700		
	V1	116	116	116	116	116	115	115	115	115	115	115		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	133	133	133	133	132	132	132	132	132	132	132		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2	129	177
33000	TOFL	3000	3040	3090	3140	3190	3230	3280	3330	3380	3440	3490		
	V1	113	113	113	112	112	112	112	112	112	112	112		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.5	9.6	9.6	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7	127	174
32000	TOFL	2830	2870	2920	2960	3010	3050	3100	3140	3190	3240	3290		
	V1	110	110	110	110	109	109	109	109	109	109	109		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	128	128	128	128	128	128	128	128	128	127	127		
	GR2	10.1	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	125	171
31000	TOFL	2670	2710	2750	2800	2840	2880	2920	2960	3010	3060	3100		
	V1	107	107	107	107	106	106	106	106	106	106	106		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.6	10.6	10.6	10.7	10.7	10.7	10.8	10.8	10.8	10.8	10.8	123	169

FIGURE 5-161. TAKE-OFF DISTANCE; FLAPS - 10°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.8	78.2	79.2	80.1	81.0	81.9	82.8	83.6	84.4	85.3	86.1		
30000	TOFL	2530	2570	2610	2650	2690	2730	2770	2810	2860	2900	2950		
	V1	104	104	104	104	104	104	104	103	103	103	103		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11.2	11.2	11.2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.4	121	166
29000	TOFL	2410	2440	2480	2520	2560	2600	2630	2670	2720	2760	2800		
	V1	102	102	102	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	122	122	122	122		
	GR2	11.9	11.9	11.9	11.9	11.9	12	12	12	12	12.1	12.1	119	163
28000	TOFL	2340	2370	2410	2460	2500	2540	2590	2630	2670	2710	2750		
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.6	12.6	12.6	12.6	12.6	12.7	12.7	12.8	12.8	12.8	12.8	117	160
27000	TOFL	2320	2350	2400	2440	2480	2520	2570	2610	2650	2690	2730		
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	119	119	119	119	119	119	119		
	GR2	13.4	13.4	13.4	13.4	13.4	13.5	13.5	13.6	13.6	13.6	13.6	115	157
26000	TOFL	2300	2330	2380	2420	2460	2500	2550	2590	2630	2670	2710		
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	14.2	14.2	14.2	14.3	14.3	14.3	14.4	14.4	14.4	14.4	14.4	113	154

FIGURE 5-161. TAKE-OFF DISTANCE; FLAPS - 10°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
39600	TOFL	5280	5360	5440	5520	5600	5690	5890	6320	6840	7390	7730		
	V1	133	133	133	133	133	133	134	136	139	141	142		
	VR	139	139	139	139	139	139	139	141	143	144	145		
	V2	146	146	146	146	146	146	146	147	148	149	149		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.7	6.1	5.5	4.9	4.6	139	193
39000	TOFL	5090	5170	5250	5330	5400	5490	5680	6090	6590	7120	7460		
	V1	131	131	131	131	131	131	132	134	137	139	140		
	VR	137	137	137	137	137	137	138	139	141	142	143		
	V2	145	145	145	144	144	144	145	146	146	147	148		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	6.9	6.3	5.7	5.1	4.8	138	191
38000	TOFL	4790	4860	4940	5010	5090	5160	5340	5730	6200	6690	7010		
	V1	128	128	128	128	127	127	128	131	133	136	137		
	VR	134	134	134	134	134	134	135	136	138	140	141		
	V2	142	142	142	142	142	142	142	143	144	145	145		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.3	6.7	6	5.4	5.1	136	188
37000	TOFL	4500	4570	4640	4710	4780	4850	5010	5380	5820	6280	6580		
	V1	124	124	124	124	124	124	125	127	130	132	134		
	VR	131	131	131	131	131	131	132	133	135	137	138		
	V2	140	140	139	139	139	139	139	140	141	142	143		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.7	7.1	6.4	5.8	5.4	135	185
36000	TOFL	4240	4310	4370	4430	4500	4560	4710	5040	5460	5890	6160		
	V1	121	121	121	121	121	121	122	124	127	129	131		
	VR	128	128	128	128	128	128	129	130	132	134	135		
	V2	137	137	137	137	137	137	137	138	139	140	140		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.1	7.5	6.8	6.1	5.8	133	183
35000	TOFL	3990	4050	4110	4170	4230	4290	4430	4720	5110	5510	5770		
	V1	118	118	118	118	118	118	118	120	123	126	127		
	VR	125	125	125	125	125	125	126	127	129	131	132		
	V2	135	135	135	134	134	134	134	135	136	137	137		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.5	7.9	7.2	6.5	6.1	131	180
34000	TOFL	3760	3820	3870	3930	3990	4040	4160	4430	4770	5150	5390		
	V1	115	115	115	115	115	115	115	117	120	122	124		
	VR	123	123	123	123	123	123	123	124	126	128	129		
	V2	132	132	132	132	132	132	132	133	133	134	135		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9	8.3	7.6	6.9	6.5	129	177
33000	TOFL	3540	3590	3650	3700	3750	3800	3920	4160	4460	4800	5030		
	V1	112	112	112	111	111	111	112	114	116	119	120		
	VR	120	120	120	120	120	120	120	121	123	124	125		
	V2	130	130	130	130	130	130	130	130	131	132	132		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.4	8.8	8	7.3	6.9	127	174
32000	TOFL	3340	3390	3440	3490	3530	3590	3690	3900	4180	4480	4690		
	V1	109	109	109	108	108	108	109	111	113	115	117		
	VR	117	117	117	117	117	117	117	119	120	121	122		
	V2	127	127	127	127	127	127	127	128	128	129	129		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10	9.3	8.5	7.8	7.4	125	171
31000	TOFL	3150	3200	3240	3290	3340	3380	3470	3660	3920	4180	4360		
	V1	106	106	106	106	106	106	106	108	110	112	113		
	VR	114	114	114	114	114	114	114	116	117	118	119		
	V2	125	125	125	125	125	125	125	125	126	127	127		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.5	9.8	9	8.3	7.8	123	169

FIGURE 5-161. TAKE-OFF DISTANCE; FLAPS - 10°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
30000	TOFL	2990	3030	3080	3120	3160	3200	3280	3450	3660	3910	4070		
	V1	103	103	103	103	103	103	103	104	106	108	110		
	VR	112	112	112	112	112	112	112	113	114	115	116		
	V2	123	123	123	123	123	123	123	123	123	124	124		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.1	10.4	9.6	8.8	8.3	121	166
29000	TOFL	2840	2880	2920	2960	3000	3040	3110	3250	3430	3640	3790		
	V1	101	101	101	101	100	100	101	102	103	105	106		
	VR	109	109	109	109	109	109	109	110	111	112	113		
	V2	122	122	122	122	122	122	121	121	121	121	121		
	GR2	12.1	12.1	12	12	12	12	11.8	11	10.1	9.3	8.9	119	163
28000	TOFL	2790	2830	2870	2910	2950	2990	3010	3080	3220	3410	3530		
	V1	100	100	100	100	100	100	99	99	100	102	103		
	VR	107	107	107	107	107	107	107	107	108	109	110		
	V2	120	120	120	120	120	120	120	119	119	119	119		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.5	11.7	10.8	9.9	9.4	117	160
27000	TOFL	2770	2810	2850	2890	2930	2970	2980	2960	3040	3190	3300		
	V1	101	101	101	101	100	100	100	98	98	99	100		
	VR	105	105	105	105	105	105	105	105	106	106	107		
	V2	119	119	119	119	119	119	118	117	117	116	117		
	GR2	13.6	13.6	13.6	13.6	13.6	13.5	13.2	12.4	11.5	10.6	10.1	115	157
26000	TOFL	2740	2780	2820	2860	2900	2940	2960	2930	2890	3000	3080		
	V1	101	101	101	101	101	101	100	98	95	96	96		
	VR	103	103	103	103	103	103	103	103	103	104	104		
	V2	118	118	118	118	118	118	117	116	115	114	114		
	GR2	14.4	14.4	14.4	14.4	14.4	14.4	14.1	13.2	12.2	11.3	10.7	113	154

FIGURE 5-162. TAKE-OFF DISTANCE; FLAPS - 10°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.3	79.0	79.9	80.8	81.7	82.6	83.4	84.3	85.1	85.9	86.8		
39600	TOFL	4680	4750	4840	4920	5010	5090	5170	5260	5340	5430	5520		
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.7	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	140	193
39000	TOFL	4520	4590	4670	4750	4830	4910	4990	5070	5150	5240	5320		
	V1	133	133	133	133	133	133	133	133	133	133	132		
	VR	139	139	138	138	138	138	138	138	138	138	138		
	V2	146	146	146	146	145	145	145	145	145	145	145		
	GR2	6.9	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	139	191
38000	TOFL	4250	4310	4400	4470	4550	4620	4690	4770	4850	4930	5010		
	V1	130	130	130	130	130	129	129	129	129	129	129		
	VR	136	136	136	136	135	135	135	135	135	135	135		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.3	137	189
37000	TOFL	4000	4060	4130	4200	4270	4340	4410	4480	4550	4630	4700		
	V1	127	127	126	126	126	126	126	126	126	126	126		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	135	186
36000	TOFL	3750	3810	3880	3950	4010	4080	4140	4210	4280	4350	4420		
	V1	123	123	123	123	123	123	123	122	122	122	122		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	8	8	8	8	8	8	8	8	8	8	8	133	183
35000	TOFL	3540	3590	3650	3710	3780	3840	3900	3960	4020	4090	4150		
	V1	120	120	120	120	120	119	119	119	119	119	119		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	131	180
34000	TOFL	3330	3380	3440	3500	3560	3610	3670	3730	3790	3850	3910		
	V1	117	117	117	116	116	116	116	116	116	116	116		
	VR	124	124	124	124	124	124	123	123	123	123	123		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	129	177
33000	TOFL	3130	3180	3240	3290	3350	3400	3450	3510	3560	3620	3670		
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	131	131	131	131	131	131	131	131	131	131	130		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	127	175
32000	TOFL	2950	2990	3050	3100	3150	3200	3250	3300	3350	3410	3460		
	V1	110	110	110	110	110	110	110	110	110	110	109		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	125	172
31000	TOFL	2780	2820	2870	2920	2970	3010	3060	3110	3150	3200	3250		
	V1	107	107	107	107	107	107	107	107	106	106	106		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	126	126	126	126	126	125	125	125	125	125	125		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.5	123	169

FIGURE 5-162. TAKE-OFF DISTANCE; FLAPS - 10°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.3	79.0	79.9	80.8	81.7	82.6	83.4	84.3	85.1	85.9	86.8		
30000	TOFL	2630	2660	2710	2760	2800	2840	2890	2930	2980	3030	3070		
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11	11	11	11	11	11	11	11	11	11.1	11.1	121	166
29000	TOFL	2500	2530	2570	2620	2660	2700	2750	2790	2830	2870	2920		
	V1	102	102	102	102	102	101	101	101	101	101	101		
	VR	110	110	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.7	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	119	163
28000	TOFL	2390	2430	2470	2510	2550	2600	2640	2680	2730	2770	2810		
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.4	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	117	160
27000	TOFL	2370	2410	2450	2490	2530	2580	2620	2660	2700	2740	2780		
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.2	13.2	13.2	13.2	115	157
26000	TOFL	2360	2390	2430	2470	2510	2550	2600	2640	2680	2720	2760		
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	14	13.9	13.9	13.9	13.9	14	14	14	14	14	14	113	154

Figure V-162-1. TAKE-OFF DISTANCE; FLAPS - 10°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C) / OAT (°F) / N1 (%)	0 / 32 / 87.6	5 / 41 / 88.4	10 / 50 / 89.2	15 / 59 / 90.1	20 / 68 / 90.9	25 / 77 / 91.7	30 / 86 / 91.5	35 / 95 / 90.8	40 / 104 / 90.1	45 / 113 / 89.5	46 / 114 / 89.4	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
39600	TOFL	5610	5690	5780	5870	5960	6040	6400	6900	7460	8030	8150	140	193
	V1	134	134	134	134	134	134	136	138	141	143	143		
	VR	140	140	140	140	140	140	141	143	145	146	146		
	V2	147	147	147	147	147	147	148	148	149	150	150		
	GR2	6.7	6.7	6.7	6.7	6.7	6.6	6.3	5.7	5.1	4.5	4.4		
39000	TOFL	5410	5490	5580	5660	5750	5830	6170	6660	7180	7750	7870	139	191
	V1	132	132	132	132	132	132	134	136	139	141	142		
	VR	138	138	138	138	138	138	140	141	143	144	145		
	V2	145	145	145	145	145	145	146	147	148	148	149		
	GR2	6.9	6.9	6.9	6.9	6.9	6.8	6.5	5.9	5.3	4.7	4.6		
38000	TOFL	5080	5160	5240	5320	5400	5480	5800	6250	6750	7300	7410	137	189
	V1	129	129	129	129	129	129	130	133	136	138	139		
	VR	135	135	135	135	135	135	137	138	140	142	142		
	V2	143	143	143	143	143	143	143	144	145	146	146		
	GR2	7.3	7.3	7.2	7.2	7.2	7.2	6.9	6.3	5.6	5	4.9		
37000	TOFL	4770	4850	4920	4990	5070	5140	5440	5870	6330	6840	6950	135	186
	V1	126	126	125	125	125	125	127	130	132	135	135		
	VR	132	132	132	132	132	132	134	135	137	138	139		
	V2	140	140	140	140	140	140	141	142	143	143	143		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.2	6.6	6	5.4	5.2		
36000	TOFL	4480	4550	4620	4690	4760	4830	5100	5500	5930	6400	6510	133	183
	V1	122	122	122	122	122	122	124	126	129	131	132		
	VR	129	129	129	129	129	129	130	132	134	135	136		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	8	8	8	8	8	8	7.6	7	6.4	5.7	5.6		
35000	TOFL	4220	4280	4340	4410	4470	4540	4780	5140	5550	5990	6090	131	180
	V1	119	119	119	119	119	119	120	123	125	128	128		
	VR	126	126	126	126	126	126	127	129	131	132	133		
	V2	135	135	135	135	135	135	135	136	137	138	138		
	GR2	8.5	8.5	8.4	8.4	8.4	8.4	8.1	7.4	6.7	6.1	5.9		
34000	TOFL	3970	4030	4090	4150	4210	4270	4480	4810	5180	5600	5690	129	177
	V1	116	116	116	116	116	116	117	119	122	124	125		
	VR	123	123	123	123	123	123	124	126	128	129	130		
	V2	133	132	132	132	132	132	133	134	135	135	136		
	GR2	8.9	8.9	8.9	8.9	8.9	8.8	8.5	7.8	7.2	6.5	6.3		
33000	TOFL	3730	3790	3840	3890	3950	4010	4210	4500	4830	5220	5300	127	175
	V1	113	113	112	112	112	112	114	116	118	121	121		
	VR	121	121	121	121	121	121	122	123	124	126	126		
	V2	130	130	130	130	130	130	131	131	132	133	133		
	GR2	9.4	9.4	9.4	9.4	9.4	9.3	9	8.3	7.6	6.9	6.7		
32000	TOFL	3510	3550	3610	3660	3710	3770	3950	4210	4510	4850	4930	125	172
	V1	109	109	109	109	109	109	110	112	115	117	118		
	VR	118	118	118	118	118	118	119	120	121	123	123		
	V2	128	128	128	128	128	128	128	128	129	130	130		
	GR2	9.9	9.9	9.9	9.9	9.9	9.8	9.5	8.8	8	7.3	7.2		
31000	TOFL	3300	3350	3400	3450	3500	3540	3710	3950	4210	4510	4590	123	169
	V1	106	106	106	106	106	106	107	109	111	113	114		
	VR	115	115	115	115	115	115	116	117	118	120	120		
	V2	125	125	125	125	125	125	126	126	126	127	127		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10	9.3	8.5	7.8	7.6		
30000	TOFL	3120	3160	3210	3250	3300	3350	3480	3690	3930	4200	4260	121	166
	V1	103	103	103	103	103	103	104	106	108	110	110		
	VR	112	112	112	112	112	112	113	114	115	117	117		
	V2	123	123	123	123	123	123	123	124	124	125	125		
	GR2	11.1	11.1	11	11	11	11	10.6	9.8	9.1	8.3	8.1		

Figure V-162-1. TAKE-OFF DISTANCE; FLAPS - 10°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

29000	TOFL	2960	3000	3050	3090	3130	3170	3280	3460	3670	3920	3970	119	163
	V1	101	101	101	101	101	101	101	103	105	107	107		
	VR	109	109	109	109	109	109	110	111	112	114	114		
	V2	121	121	121	121	121	121	121	121	121	122	122		
	GR2	11.7	11.7	11.7	11.7	11.7	11.6	11.2	10.4	9.6	8.8	8.6		
28000	TOFL	2850	2890	2930	2970	3010	3050	3110	3250	3430	3640	3700	117	160
	V1	99	99	99	99	99	99	99	100	101	103	104		
	VR	107	107	107	107	107	107	107	108	109	111	111		
	V2	120	120	120	120	120	120	119	119	119	119	120		
	GR2	12.4	12.4	12.4	12.4	12.4	12.3	11.9	11.1	10.2	9.4	9.2		
27000	TOFL	2820	2860	2910	2950	2990	3020	3030	3070	3210	3400	3440	115	157
	V1	100	100	100	100	100	99	98	97	98	100	100		
	VR	105	105	105	105	105	105	105	106	106	107	108		
	V2	118	118	118	118	118	118	118	117	117	117	117		
	GR2	13.2	13.2	13.2	13.2	13.2	13.1	12.6	11.8	10.9	10	9.8		
26000	TOFL	2800	2840	2880	2920	2960	2990	3000	2970	3030	3170	3200	113	154
	V1	100	100	100	100	100	100	98	96	96	97	97		
	VR	103	103	103	103	103	103	103	103	104	104	104		
	V2	117	117	117	117	117	117	116	115	115	114	114		
	GR2	14	14	14	14	14	13.9	13.4	12.5	11.6	10.7	10.5		

FIGURE 5-163. TAKE-OFF DISTANCE; FLAPS - 10°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.4	82.3	83.2	84.1	84.9	85.7	86.6	87.4		
39600	TOFL	4970	5080	5180	5270	5370	5460	5550	5650	5740	5840	5930	141	193
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
39000	TOFL	4770	4880	4970	5060	5150	5240	5330	5420	5510	5600	5690	140	192
	V1	135	135	135	135	135	135	135	135	134	134	134		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	147	147	147	147	147	146	146	146	146	146	146		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
38000	TOFL	4470	4570	4650	4740	4820	4910	4990	5070	5160	5240	5320	137	189
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	137	137	137	137	137	137	136	136	136	136	136		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	7.1	7	6.9	6.9	7	7	7	7	7	7	7		
37000	TOFL	4200	4290	4370	4460	4530	4610	4680	4760	4840	4920	5000	135	186
	V1	128	128	128	128	128	127	127	127	127	127	127		
	VR	134	134	134	134	134	134	133	133	133	133	133		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
36000	TOFL	3940	4030	4100	4180	4250	4320	4390	4470	4540	4620	4690	133	183
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	131	131	131	131	131	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.8	7.7	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8		
35000	TOFL	3710	3780	3860	3930	4000	4060	4130	4200	4270	4330	4400	131	181
	V1	121	121	121	121	121	121	121	121	120	120	120		
	VR	128	128	128	128	128	127	127	127	127	127	127		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	8.3	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2		
34000	TOFL	3490	3560	3630	3690	3760	3820	3880	3950	4010	4070	4130	129	178
	V1	118	118	118	118	117	117	117	117	117	117	117		
	VR	125	125	125	125	125	125	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
33000	TOFL	3280	3350	3410	3470	3530	3590	3650	3710	3770	3820	3890	127	175
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	121	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	130	130		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
32000	TOFL	3080	3140	3200	3260	3320	3370	3430	3480	3530	3580	3650	125	172
	V1	111	111	111	111	111	111	111	111	110	110	110		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	129	129	129	129	129	129	129	129	128	128	128		
	GR2	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
31000	TOFL	2900	2960	3010	3060	3120	3170	3220	3260	3320	3370	3420	123	169
	V1	108	108	108	108	108	108	107	107	107	107	107		
	VR	116	116	116	116	116	116	115	115	115	115	115		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		

FIGURE 5-163. TAKE-OFF DISTANCE; FLAPS - 10°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.4	82.3	83.2	84.1	84.9	85.7	86.6	87.4		
30000	TOFL	2730	2780	2830	2880	2930	2970	3020	3070	3120	3170	3210	121	166
	V1	105	105	105	105	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.7	10.6	10.6	10.7	10.7	10.7	10.7	10.7	10.7	10.7		
29000	TOFL	2590	2630	2680	2730	2770	2820	2860	2910	2950	3000	3040	119	163
	V1	102	102	102	102	102	102	102	102	102	102	101		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
28000	TOFL	2460	2500	2550	2590	2630	2670	2720	2760	2800	2840	2880	117	160
	V1	100	100	100	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12	12	12	12	12	12	12	12	12	12		
27000	TOFL	2430	2460	2500	2540	2580	2630	2670	2710	2750	2800	2840	115	157
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.9	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.8	12.8	12.8		
26000	TOFL	2410	2440	2480	2520	2560	2600	2650	2690	2730	2770	2810	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.5	13.5	13.5	13.5	13.6	13.6	13.6	13.6	13.6	13.6		

FIGURE 5-163. TAKE-OFF DISTANCE; FLAPS - 10°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
39600	TOFL	6020	6120	6220	6310	6410	6580	7070	7650	8220	8730		141	193
	V1	137	137	136	136	136	137	139	142	144	145			
	VR	142	142	142	142	142	142	144	146	147	148			
	V2	148	148	148	148	148	148	149	150	151	151			
	GR2	6.4	6.4	6.4	6.4	6.4	6.2	5.9	5.3	4.7	4.2			
39000	TOFL	5790	5880	5970	6060	6150	6320	6790	7330	7900	8390		140	192
	V1	134	134	134	134	134	135	137	139	142	143			
	VR	140	140	140	140	140	140	142	143	145	146			
	V2	146	146	146	146	146	146	148	148	149	150			
	GR2	6.6	6.6	6.6	6.6	6.6	6.4	6.1	5.5	4.9	4.4			
38000	TOFL	5410	5490	5570	5670	5750	5900	6350	6850	7400	7860		137	189
	V1	130	130	130	130	130	131	133	136	138	140			
	VR	136	136	136	136	136	137	138	140	142	143			
	V2	143	143	143	143	143	143	145	145	146	147			
	GR2	7	7	7	7	6.9	6.7	6.4	5.8	5.2	4.7			
37000	TOFL	5080	5150	5240	5310	5400	5540	5950	6420	6930	7390		135	186
	V1	127	127	127	127	127	127	130	132	135	137			
	VR	133	133	133	133	133	134	135	137	139	140			
	V2	141	141	141	141	141	141	142	143	144	144			
	GR2	7.3	7.3	7.3	7.3	7.3	7.1	6.8	6.2	5.5	5.1			
36000	TOFL	4760	4840	4910	4980	5060	5200	5570	6010	6490	6910		133	183
	V1	124	123	123	123	123	124	126	129	131	133			
	VR	130	130	130	130	130	131	132	134	136	137			
	V2	138	138	138	138	138	138	139	140	141	142			
	GR2	7.8	7.8	7.7	7.8	7.7	7.5	7.1	6.5	5.9	5.4			
35000	TOFL	4470	4540	4610	4680	4750	4870	5210	5620	6060	6460		131	181
	V1	120	120	120	120	120	120	123	125	128	130			
	VR	127	127	127	127	127	128	129	131	133	134			
	V2	136	136	135	135	135	135	136	138	138	139			
	GR2	8.2	8.2	8.2	8.2	8.1	7.9	7.5	6.9	6.3	5.8			
34000	TOFL	4200	4260	4330	4390	4460	4570	4870	5250	5660	6030		129	178
	V1	117	117	117	117	117	117	119	122	124	126			
	VR	124	124	124	124	124	125	126	128	129	131			
	V2	133	133	133	133	133	133	134	135	136	136			
	GR2	8.6	8.6	8.6	8.6	8.6	8.3	7.9	7.3	6.7	6.1			
33000	TOFL	3940	4010	4060	4130	4180	4290	4560	4890	5270	5610		127	175
	V1	114	114	113	113	113	114	116	118	121	123			
	VR	122	122	122	122	122	122	123	125	126	128			
	V2	130	130	130	130	130	130	131	132	133	134			
	GR2	9.1	9.1	9.1	9.1	9	8.8	8.4	7.8	7.1	6.5			
32000	TOFL	3690	3750	3810	3860	3920	4020	4270	4560	4900	5220		125	172
	V1	110	110	110	110	110	111	112	114	117	119			
	VR	119	119	119	119	119	119	120	122	123	124			
	V2	128	128	128	128	128	128	129	129	130	131			
	GR2	9.6	9.6	9.6	9.6	9.5	9.3	8.9	8.2	7.5	7			
31000	TOFL	3470	3520	3570	3630	3680	3760	4000	4270	4550	4840		123	169
	V1	107	107	107	107	107	107	109	111	113	115			
	VR	115	115	115	115	115	116	117	119	120	121			
	V2	126	126	126	126	126	126	127	127	127	128			
	GR2	10.1	10.1	10.1	10.1	10.1	9.8	9.4	8.7	8	7.4			

FIGURE 5-163. TAKE-OFF DISTANCE; FLAPS - 10°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
30000	TOFL	3260	3310	3360	3410	3460	3530	3740	3980	4250	4490		121	166
	V1	104	104	104	104	104	104	106	108	110	111			
	VR	112	112	112	112	112	113	114	115	117	118			
	V2	123	123	123	123	123	123	124	124	125	125			
	GR2	10.7	10.7	10.7	10.7	10.6	10.4	9.9	9.2	8.5	7.9			
29000	TOFL	3090	3130	3180	3220	3270	3340	3500	3720	3960	4180		119	163
	V1	101	101	101	101	101	101	103	104	106	108			
	VR	110	110	110	110	110	110	111	112	114	115			
	V2	121	121	121	121	121	121	121	122	122	122			
	GR2	11.3	11.3	11.3	11.3	11.3	11	10.5	9.8	9	8.4			
28000	TOFL	2930	2970	3010	3050	3100	3160	3300	3470	3690	3890		117	160
	V1	99	99	99	99	99	99	100	101	103	105			
	VR	107	107	107	107	107	107	108	109	111	112			
	V2	119	119	119	119	119	119	119	119	120	120			
	GR2	12	12	12	12	11.9	11.6	11.1	10.4	9.6	9			
27000	TOFL	2880	2920	2960	3000	3040	3050	3110	3250	3430	3600		115	157
	V1	99	99	99	98	98	98	97	98	99	101			
	VR	105	105	105	105	105	105	106	106	107	108			
	V2	118	118	118	118	118	117	117	117	117	117			
	GR2	12.8	12.7	12.7	12.7	12.7	12.4	11.9	11.1	10.2	9.6			
26000	TOFL	2850	2890	2930	2970	3010	3020	3030	3070	3210	3350		113	154
	V1	99	99	99	99	99	98	96	95	96	98			
	VR	103	103	103	103	103	103	103	104	104	105			
	V2	117	117	117	117	117	116	116	115	115	115			
	GR2	13.6	13.6	13.6	13.6	13.5	13.2	12.6	11.8	10.9	10.2			

FIGURE 5-164. TAKE-OFF DISTANCE; FLAPS - 10°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
39600	TOFL	5350	5480	5580	5690	5790	5890	5990	6090	6200	6300	6400	142	194
	V1	140	140	140	139	139	139	139	139	139	139	139		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
39000	TOFL	5140	5260	5360	5460	5560	5650	5750	5850	5950	6040	6140	141	192
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
38000	TOFL	4800	4910	5000	5090	5180	5270	5360	5450	5540	5640	5730	138	189
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
37000	TOFL	4480	4580	4660	4750	4830	4920	5000	5080	5170	5250	5340	136	187
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
36000	TOFL	4200	4290	4370	4450	4530	4600	4680	4760	4840	4920	4990	133	184
	V1	126	126	126	126	125	125	125	125	125	125	125		
	VR	131	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
35000	TOFL	3940	4020	4100	4170	4240	4320	4390	4460	4540	4610	4680	131	181
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	128	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	136	136		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
34000	TOFL	3700	3780	3850	3920	3990	4050	4120	4190	4260	4330	4390	129	178
	V1	119	119	119	119	119	119	119	118	118	118	118		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
33000	TOFL	3480	3550	3620	3680	3740	3800	3870	3930	3990	4050	4120	127	175
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	122	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	131	131	131	131	131	131		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	3260	3330	3390	3450	3510	3570	3620	3680	3740	3800	3860	125	172
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	119	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9.4	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
31000	TOFL	3060	3120	3180	3230	3290	3340	3400	3460	3500	3560	3610	123	169
	V1	109	109	109	109	109	109	109	109	108	108	108		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	127	127	127	127	126	126	126	126	126	126	126		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 5-164. TAKE-OFF DISTANCE; FLAPS - 10°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
30000	TOFL	2870	2930	2980	3040	3080	3130	3180	3230	3280	3340	3390	121	166
	V1	106	106	106	106	105	105	105	105	105	105	105		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	124	124	124	124	123	123	123	123	123	123	123		
	GR2	10.4	10.3	10.3	10.3	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
29000	TOFL	2710	2760	2800	2850	2900	2950	2990	3040	3090	3140	3190	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	10.9	10.9	10.9	10.9	11	11	11	11	11	11		
28000	TOFL	2570	2610	2660	2700	2750	2790	2840	2880	2930	2970	3020	117	160
	V1	100	100	100	100	100	100	100	100	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6		
27000	TOFL	2470	2500	2540	2590	2630	2680	2720	2760	2800	2850	2890	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.4	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	2450	2480	2520	2560	2610	2650	2690	2740	2780	2820	2860	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.3	13.1	13.1	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2		

FIGURE 5-164. TAKE-OFF DISTANCE; FLAPS - 10°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
39600	TOFL	6510	6610	6710	6820	6940	7300	7880	8470	9120	9380		142	194
	V1	139	139	139	139	139	140	143	145	147	147			
	VR	144	144	144	144	144	145	147	148	150	150			
	V2	150	150	150	150	150	150	152	152	153	153			
	GR2	6.2	6.2	6.2	6.2	6.1	5.8	5.4	4.9	4.3	4.1			
39000	TOFL	6240	6340	6440	6540	6660	7000	7560	8140	8760	9030		141	192
	V1	136	136	136	136	136	138	140	143	144	145			
	VR	142	142	142	142	142	143	145	146	148	148			
	V2	148	148	148	148	148	148	150	151	151	151			
	GR2	6.4	6.4	6.4	6.4	6.3	6	5.6	5.1	4.5	4.3			
38000	TOFL	5820	5910	6000	6090	6200	6530	7040	7600	8180	8420		138	189
	V1	132	132	132	132	132	134	136	139	141	142			
	VR	138	138	138	138	138	139	141	143	144	145			
	V2	145	145	145	145	145	145	146	148	148	148			
	GR2	6.7	6.7	6.7	6.7	6.6	6.3	5.9	5.4	4.8	4.6			
37000	TOFL	5420	5510	5590	5680	5770	6070	6550	7070	7640	7870		136	187
	V1	129	128	128	128	128	130	132	135	137	138			
	VR	135	135	135	135	135	136	138	139	141	142			
	V2	142	142	141	141	141	142	143	144	145	145			
	GR2	7.1	7.1	7.1	7.1	6.9	6.6	6.2	5.7	5.1	4.9			
36000	TOFL	5080	5150	5230	5310	5410	5680	6120	6610	7150	7380		133	184
	V1	125	125	125	125	125	126	129	131	134	135			
	VR	132	132	132	132	132	133	134	136	138	139			
	V2	139	139	139	139	139	139	140	141	143	143			
	GR2	7.5	7.5	7.5	7.5	7.3	7	6.6	6.1	5.5	5.2			
35000	TOFL	4750	4830	4900	4980	5070	5320	5720	6170	6670	6890		131	181
	V1	121	121	121	121	122	123	125	128	130	131			
	VR	129	129	129	129	129	130	131	133	135	135			
	V2	136	136	136	136	136	136	137	139	140	140			
	GR2	7.9	7.9	7.9	7.9	7.7	7.4	7	6.4	5.8	5.6			
34000	TOFL	4460	4530	4600	4670	4750	4970	5340	5750	6220	6420		129	178
	V1	118	118	118	118	118	119	122	124	127	128			
	VR	126	126	126	126	126	126	128	130	131	132			
	V2	134	134	134	134	134	134	135	136	137	137			
	GR2	8.3	8.3	8.3	8.3	8.1	7.8	7.4	6.8	6.2	5.9			
33000	TOFL	4180	4240	4310	4370	4450	4650	4980	5350	5790	5980		127	175
	V1	115	115	115	115	115	116	118	120	123	124			
	VR	123	123	123	123	123	123	125	127	128	129			
	V2	131	131	131	131	131	131	132	133	134	134			
	GR2	8.8	8.8	8.8	8.8	8.6	8.3	7.8	7.3	6.6	6.3			
32000	TOFL	3920	3980	4040	4100	4170	4350	4650	4980	5370	5550		125	172
	V1	112	111	111	111	111	113	115	117	119	120			
	VR	120	120	120	120	120	120	122	123	125	126			
	V2	129	129	129	129	129	129	130	130	131	132			
	GR2	9.3	9.3	9.3	9.3	9.1	8.7	8.3	7.7	7	6.8			
31000	TOFL	3680	3730	3780	3840	3890	4070	4340	4640	4980	5150		123	169
	V1	108	108	108	108	108	109	111	113	116	117			
	VR	116	116	116	116	116	117	119	120	122	122			
	V2	126	126	126	126	126	126	127	128	128	129			
	GR2	9.8	9.8	9.8	9.8	9.6	9.2	8.8	8.2	7.5	7.2			

FIGURE 5-164. TAKE-OFF DISTANCE; FLAPS - 10°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
30000	TOFL	3440	3490	3540	3590	3650	3800	4040	4310	4620	4760		121	166
	V1	105	105	105	105	105	106	108	110	112	113			
	VR	113	113	113	113	113	114	116	117	118	119			
	V2	123	123	123	123	123	124	124	125	126	126			
	GR2	10.4	10.4	10.4	10.4	10.1	9.8	9.3	8.7	8	7.7			
29000	TOFL	3230	3280	3330	3380	3430	3560	3770	4020	4290	4420		119	163
	V1	102	102	102	102	102	103	104	106	108	109			
	VR	110	110	110	110	110	111	112	114	115	116			
	V2	121	121	121	121	121	121	122	122	123	123			
	GR2	11	11	11	10.9	10.7	10.3	9.9	9.2	8.5	8.2			
28000	TOFL	3060	3110	3150	3190	3240	3350	3520	3740	3990	4110		117	160
	V1	99	99	99	99	99	100	101	103	105	106			
	VR	108	108	108	108	108	108	109	111	112	113			
	V2	119	119	119	119	119	119	119	120	121	121			
	GR2	11.6	11.6	11.6	11.6	11.4	11	10.5	9.8	9.1	8.7			
27000	TOFL	2930	2980	3020	3060	3070	3170	3310	3480	3700	3800		115	157
	V1	97	97	97	97	97	97	98	99	101	102			
	VR	105	105	105	105	105	106	106	107	109	109			
	V2	117	117	117	117	117	117	117	117	117	118			
	GR2	12.4	12.4	12.4	12.3	12.1	11.7	11.1	10.4	9.6	9.3			
26000	TOFL	2910	2950	2990	3030	3040	3050	3120	3260	3440	3520		113	154
	V1	98	98	98	98	97	96	95	96	98	98			
	VR	103	103	103	103	103	103	104	104	106	106			
	V2	116	116	116	116	116	115	115	115	115	115			
	GR2	13.2	13.2	13.2	13.1	12.9	12.4	11.9	11.1	10.3	10			

FIGURE 5-165. TAKE-OFF DISTANCE; FLAPS - 10°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.0	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5		
39600	TOFL	5770	5870	5980	6100	6210	6320	6430	6540	6650	6760	6880	143	194
	V1	142	142	142	142	142	141	141	141	141	141	141		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
39000	TOFL	5540	5630	5740	5850	5960	6060	6170	6280	6380	6490	6600	142	193
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
38000	TOFL	5170	5250	5360	5460	5560	5650	5750	5850	5950	6050	6150	139	190
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	147	147	147	147	147	146	146	146	146	146	146		
	GR2	6.6	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
37000	TOFL	4820	4900	4990	5080	5170	5260	5360	5450	5540	5630	5720	137	187
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.9	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	4490	4560	4650	4730	4820	4900	4980	5070	5160	5240	5320	134	184
	V1	127	127	127	127	127	127	127	127	127	127	126		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.3	7.3	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	4190	4260	4340	4420	4500	4570	4650	4730	4810	4880	4960	132	181
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.7	7.7	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7		
34000	TOFL	3930	3990	4070	4140	4210	4290	4360	4420	4500	4570	4650	129	178
	V1	120	120	120	120	120	120	120	119	119	119	119		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	134	134		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
33000	TOFL	3690	3740	3810	3880	3950	4020	4080	4150	4210	4280	4350	127	176
	V1	117	117	117	116	116	116	116	116	116	116	116		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	3460	3510	3580	3640	3700	3760	3830	3890	3950	4010	4070	125	173
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	129	129	129	129	129	129		
	GR2	9.1	9	9	9	9	9	9	9	9	9	9		
31000	TOFL	3230	3280	3340	3400	3460	3520	3580	3630	3690	3750	3810	123	170
	V1	110	110	110	110	110	110	109	109	109	109	109		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.6	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		

FIGURE 5-165. TAKE-OFF DISTANCE; FLAPS - 10°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.0	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5		
30000	TOFL	3030	3080	3130	3180	3230	3290	3340	3400	3450	3510	3560	121	167
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.1	10.1	10	10	10	10.1	10.1	10.1	10.1	10.1	10.1		
29000	TOFL	2830	2880	2930	2980	3030	3080	3130	3180	3230	3280	3330	119	164
	V1	103	103	103	103	103	103	103	103	103	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.7	10.7	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
28000	TOFL	2680	2720	2770	2820	2860	2910	2960	3000	3050	3100	3140	117	161
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
27000	TOFL	2540	2580	2620	2670	2710	2750	2800	2840	2880	2930	2970	115	157
	V1	98	98	98	98	98	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12	12	12	12	12	12	12	12	12	12		
26000	TOFL	2500	2530	2580	2620	2660	2710	2750	2800	2840	2880	2930	113	154
	V1	98	98	97	97	97	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.8	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 5-165. TAKE-OFF DISTANCE; FLAPS - 10°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	104.25			
	N1 (%)	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
39600	TOFL	6990	7100	7200	7320	7470	8090	8710	9360	10040	10060		143	194
	V1	141	141	141	141	141	144	146	148	149	149			
	VR	146	146	146	146	146	148	150	151	152	152			
	V2	151	151	151	151	151	153	154	154	155	155			
	GR2	6	6	6	6	5.7	5.4	5	4.5	3.9	3.9			
39000	TOFL	6700	6810	6910	7020	7160	7750	8360	8990	9660	9670		142	193
	V1	139	139	139	139	139	141	144	145	147	147			
	VR	144	144	144	144	144	146	148	149	150	150			
	V2	150	150	149	149	149	151	152	153	153	153			
	GR2	6.2	6.2	6.2	6.2	5.8	5.6	5.2	4.7	4.1	4.1			
38000	TOFL	6250	6340	6440	6540	6670	7200	7800	8400	9030	9050		139	190
	V1	135	134	134	134	135	137	140	142	144	144			
	VR	140	140	140	140	140	142	144	146	147	147			
	V2	146	146	146	146	146	147	149	150	150	150			
	GR2	6.5	6.5	6.5	6.5	6.2	5.9	5.5	5	4.4	4.4			
37000	TOFL	5800	5900	5990	6090	6210	6700	7240	7820	8420	8430		137	187
	V1	130	130	130	130	131	133	136	138	140	140			
	VR	137	137	137	137	137	139	140	142	144	144			
	V2	143	143	143	143	143	144	145	146	147	147			
	GR2	6.9	6.9	6.9	6.8	6.5	6.2	5.8	5.3	4.7	4.7			
36000	TOFL	5400	5490	5580	5660	5780	6230	6720	7270	7840	7850		134	184
	V1	126	126	126	126	127	129	131	134	136	136			
	VR	133	133	133	133	133	135	137	139	140	140			
	V2	140	140	140	140	140	141	142	143	144	144			
	GR2	7.3	7.3	7.3	7.2	6.9	6.6	6.2	5.6	5	5			
35000	TOFL	5040	5120	5200	5280	5390	5800	6250	6750	7310	7320		132	181
	V1	123	123	123	123	123	125	128	130	133	133			
	VR	130	130	130	130	130	132	133	135	137	137			
	V2	137	137	137	137	137	138	139	140	141	141			
	GR2	7.7	7.7	7.7	7.6	7.3	6.9	6.5	6	5.4	5.4			
34000	TOFL	4720	4790	4870	4940	5050	5420	5830	6290	6810	6820		129	178
	V1	119	119	119	119	120	122	124	127	129	129			
	VR	127	127	127	127	127	128	130	132	133	134			
	V2	134	134	134	134	134	135	136	137	138	138			
	GR2	8.1	8.1	8.1	8	7.7	7.3	6.9	6.4	5.8	5.7			
33000	TOFL	4420	4490	4560	4630	4720	5050	5430	5850	6330	6340		127	176
	V1	116	116	116	116	116	118	120	123	125	125			
	VR	124	124	124	124	124	125	127	129	130	130			
	V2	132	132	132	132	132	132	133	134	135	135			
	GR2	8.5	8.5	8.5	8.5	8.1	7.8	7.4	6.8	6.2	6.1			
32000	TOFL	4140	4200	4260	4330	4410	4720	5050	5430	5880	5890		125	173
	V1	112	112	112	112	113	115	117	119	122	122			
	VR	120	120	120	120	120	122	124	125	127	127			
	V2	129	129	129	129	129	130	131	131	133	133			
	GR2	9	9	9	9	8.6	8.2	7.8	7.2	6.6	6.6			
31000	TOFL	3860	3930	3980	4040	4120	4400	4710	5050	5450	5460		123	170
	V1	109	109	109	109	109	111	113	115	118	118			
	VR	117	117	117	117	117	119	120	122	124	124			
	V2	127	127	126	126	126	127	128	129	130	130			
	GR2	9.5	9.5	9.5	9.5	9	8.7	8.3	7.7	7	7			

FIGURE 5-165. TAKE-OFF DISTANCE; FLAPS - 10°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	104.25			
	N1 (%)	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
30000	TOFL	3610	3670	3720	3780	3850	4100	4380	4680	5040	5040		121	167
	V1	106	106	106	106	106	108	110	112	114	114			
	VR	114	114	114	114	114	116	117	119	120	120			
	V2	124	124	124	124	124	124	125	126	127	127			
	GR2	10.1	10.1	10.1	10	9.6	9.2	8.8	8.2	7.5	7.5			
29000	TOFL	3380	3430	3480	3530	3590	3820	4070	4350	4660	4660		119	164
	V1	102	102	102	102	102	104	106	108	110	110			
	VR	111	111	111	111	111	112	114	115	117	117			
	V2	121	121	121	121	121	122	123	123	124	124			
	GR2	10.6	10.6	10.6	10.6	10.1	9.8	9.3	8.7	8	7.9			
28000	TOFL	3190	3240	3290	3330	3390	3560	3790	4030	4310	4320		117	161
	V1	100	100	100	100	100	101	103	105	107	107			
	VR	108	108	108	108	108	109	111	112	114	114			
	V2	119	119	119	119	119	119	120	120	121	121			
	GR2	11.3	11.3	11.3	11.2	10.8	10.4	9.9	9.2	8.5	8.5			
27000	TOFL	3020	3060	3100	3150	3200	3350	3520	3740	3990	4000		115	157
	V1	97	97	97	97	97	98	99	101	103	103			
	VR	106	106	106	106	106	106	107	109	110	110			
	V2	117	117	117	117	117	117	117	118	118	118			
	GR2	12	12	12	11.9	11.4	11	10.5	9.8	9.1	9.1			
26000	TOFL	2970	3010	3050	3090	3070	3150	3300	3470	3690	3700		113	154
	V1	97	97	97	97	95	95	96	98	99	99			
	VR	103	103	103	103	103	104	104	106	107	107			
	V2	116	116	116	116	115	115	115	115	116	116			
	GR2	12.8	12.8	12.8	12.7	12.2	11.7	11.2	10.5	9.7	9.7			

FIGURE 5-166. TAKE-OFF DISTANCE; FLAPS - 10°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.3	82.0	83.0	83.9	84.8	85.6	86.5	87.4	88.2	89.1		
39600	TOFL	6220	6380	6550	6670	6780	6890	7010	7140	7260	7380	7490	144	195
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	148	149	149	149	149	149	149	149	149	149	149		
	V2	154	154	154	154	154	154	154	154	154	154	153		
	GR2	5.9	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.8	5.8	5.8		
39000	TOFL	5950	6110	6290	6400	6500	6610	6730	6840	6960	7080	7180	143	193
	V1	142	142	142	142	142	142	142	142	142	142	141		
	VR	146	146	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	151		
	GR2	6.1	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	5550	5700	5850	5950	6040	6150	6260	6360	6470	6580	6680	140	190
	V1	138	138	138	138	138	138	138	138	137	137	137		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.4	6.3	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	5170	5310	5450	5540	5620	5720	5820	5920	6020	6110	6210	138	187
	V1	134	134	134	134	134	134	134	133	133	133	133		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.8	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	4810	4930	5060	5150	5230	5320	5410	5500	5590	5680	5770	135	185
	V1	130	130	130	130	130	129	129	129	129	129	129		
	VR	135	135	136	136	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	141	141		
	GR2	7.2	7	6.9	6.9	7	7	7	7	7	7	7		
35000	TOFL	4470	4590	4700	4780	4860	4940	5030	5110	5190	5270	5360	133	182
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	131	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	138	138	138		
	GR2	7.5	7.4	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	4160	4270	4380	4450	4520	4580	4670	4740	4820	4900	4980	130	179
	V1	122	122	122	122	121	121	121	121	121	121	121		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	135	135	135	135		
	GR2	7.9	7.8	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
33000	TOFL	3900	3990	4090	4160	4220	4300	4370	4440	4510	4580	4660	127	176
	V1	118	118	118	118	118	118	118	118	118	118	117		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.4	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
32000	TOFL	3650	3740	3830	3890	3960	4010	4090	4150	4220	4280	4350	125	173
	V1	115	115	115	115	115	114	114	114	114	114	114		
	VR	121	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.9	8.7	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	3410	3490	3580	3640	3690	3760	3810	3880	3930	4000	4060	123	170
	V1	111	111	111	111	111	111	111	111	111	111	110		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	127	127	127		
	GR2	9.4	9.2	9.1	9.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2		

FIGURE 5-166. TAKE-OFF DISTANCE; FLAPS - 10°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.3	82.0	83.0	83.9	84.8	85.6	86.5	87.4	88.2	89.1		
30000	TOFL	3190	3270	3340	3390	3450	3500	3560	3610	3670	3730	3790	121	167
	V1	108	108	108	108	108	107	107	107	107	107	107		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	124	124	124	124	124	124		
	GR2	9.9	9.8	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
29000	TOFL	2990	3050	3120	3160	3210	3260	3320	3370	3430	3480	3530	119	164
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.5	10.3	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	2800	2850	2910	2960	3010	3050	3100	3150	3200	3250	3300	117	161
	V1	101	101	101	101	101	101	101	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.1	10.9	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
27000	TOFL	2650	2700	2750	2800	2840	2880	2930	2980	3030	3070	3120	115	158
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.8	11.6	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	2550	2580	2620	2670	2710	2760	2800	2850	2890	2940	2980	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.6	12.4	12.2	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3		

FIGURE 5-166. TAKE-OFF DISTANCE; FLAPS - 10°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.3				
39600	TOFL	7620	7740	7870	8020	8380	9030	9730	10430	10910			144	195
	V1	144	144	144	144	145	147	149	151	152				
	VR	149	149	149	149	150	151	153	154	154				
	V2	153	153	153	153	154	155	156	156	157				
	GR2	5.7	5.7	5.7	5.5	5.2	4.9	4.5	4	3.7				
39000	TOFL	7300	7420	7540	7690	8040	8660	9340	10030	10480			143	193
	V1	141	141	141	142	143	145	147	149	150				
	VR	147	147	147	147	147	149	151	152	152				
	V2	151	151	151	151	152	153	154	155	155				
	GR2	5.9	5.9	5.9	5.7	5.4	5.1	4.7	4.2	3.8				
38000	TOFL	6790	6900	7010	7150	7470	8080	8710	9380	9800			140	190
	V1	137	137	137	137	139	141	143	145	146				
	VR	143	143	143	143	144	146	147	148	149				
	V2	148	148	148	148	148	150	151	152	152				
	GR2	6.3	6.3	6.2	6	5.7	5.4	5	4.5	4.1				
37000	TOFL	6310	6420	6520	6650	6950	7510	8100	8730	9150			138	187
	V1	133	133	133	133	135	137	139	141	143				
	VR	139	139	139	139	140	142	144	145	146				
	V2	145	145	145	144	145	146	147	148	149				
	GR2	6.6	6.6	6.6	6.4	6.1	5.8	5.3	4.8	4.4				
36000	TOFL	5870	5960	6060	6180	6450	6960	7520	8120	8510			135	185
	V1	129	129	129	129	130	133	135	137	139				
	VR	135	135	135	135	136	138	140	141	142				
	V2	141	141	141	141	142	143	144	145	146				
	GR2	7	7	6.9	6.7	6.4	6.1	5.7	5.1	4.8				
35000	TOFL	5450	5530	5630	5740	5990	6450	6960	7540	7910			133	182
	V1	125	125	125	125	126	129	131	134	135				
	VR	132	132	132	132	133	134	136	138	139				
	V2	138	138	138	138	138	140	141	142	143				
	GR2	7.4	7.4	7.3	7.1	6.8	6.4	6	5.5	5.1				
34000	TOFL	5060	5140	5220	5330	5560	5980	6450	6990	7330			130	179
	V1	121	121	121	121	122	125	127	130	131				
	VR	128	128	128	128	129	131	132	134	135				
	V2	135	135	135	135	135	137	138	139	139				
	GR2	7.8	7.8	7.7	7.5	7.2	6.8	6.4	5.8	5.5				
33000	TOFL	4730	4810	4880	4980	5190	5570	6000	6480	6820			127	176
	V1	117	117	117	118	119	121	123	126	127				
	VR	125	125	125	125	126	127	129	131	132				
	V2	133	133	133	133	133	134	135	136	137				
	GR2	8.2	8.2	8.2	7.9	7.6	7.2	6.8	6.2	5.8				
32000	TOFL	4420	4490	4560	4650	4830	5180	5570	6010	6320			125	173
	V1	114	114	114	114	115	117	120	122	124				
	VR	122	122	122	122	123	124	126	127	129				
	V2	130	130	130	130	130	131	132	133	134				
	GR2	8.7	8.7	8.6	8.4	8	7.7	7.3	6.7	6.3				
31000	TOFL	4130	4190	4260	4330	4510	4820	5170	5570	5850			123	170
	V1	110	110	110	111	112	114	116	118	120				
	VR	119	119	119	119	119	121	123	124	125				
	V2	127	127	127	127	127	128	129	130	131				
	GR2	9.2	9.2	9.1	8.9	8.5	8.1	7.7	7.1	6.7				

FIGURE 5-166. TAKE-OFF DISTANCE; FLAPS - 10°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.3				
30000	TOFL	3850	3910	3970	4040	4200	4480	4800	5160	5410			121	167
	V1	107	107	107	107	108	110	112	114	116				
	VR	115	115	115	115	116	118	119	121	122				
	V2	124	124	124	124	124	125	126	127	128				
	GR2	9.7	9.7	9.7	9.4	9	8.6	8.2	7.6	7.1				
29000	TOFL	3590	3640	3700	3760	3900	4170	4450	4770	4990			119	164
	V1	104	103	103	104	104	106	108	111	112				
	VR	112	112	112	112	113	114	116	117	118				
	V2	122	122	122	122	122	123	124	124	125				
	GR2	10.3	10.3	10.2	9.9	9.5	9.2	8.7	8.1	7.6				
28000	TOFL	3350	3400	3450	3510	3630	3860	4120	4410	4610			117	161
	V1	100	100	100	100	101	103	105	107	108				
	VR	109	109	109	109	109	111	113	114	115				
	V2	119	119	119	119	119	120	121	121	122				
	GR2	10.9	10.9	10.8	10.5	10.1	9.7	9.3	8.6	8.1				
27000	TOFL	3160	3210	3260	3310	3410	3590	3820	4080	4260			115	158
	V1	98	98	98	98	98	99	101	103	104				
	VR	106	106	106	106	106	108	109	111	112				
	V2	117	117	117	117	117	117	118	119	119				
	GR2	11.6	11.6	11.5	11.2	10.7	10.3	9.9	9.2	8.7				
26000	TOFL	3030	3070	3100	3120	3210	3360	3540	3770	3920			113	155
	V1	96	96	96	96	95	96	98	99	101				
	VR	103	103	103	103	104	104	106	107	108				
	V2	115	115	115	115	115	115	115	116	116				
	GR2	12.3	12.3	12.2	11.9	11.4	11	10.5	9.8	9.3				

FIGURE 5-167. TAKE-OFF DISTANCE; FLAPS - 10°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.3	81.7	82.5	83.4	84.4	85.3	86.2	87.0	87.9	88.7	89.6		
39600	TOFL	6760	7000	7160	7270	7390	7520	7650	7790	7910	8050	8180	145	195
	V1	147	147	147	147	147	147	147	147	147	147	147		
	VR	151	152	152	152	152	152	152	152	152	152	152		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.7	5.5	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	6490	6710	6860	6970	7080	7210	7340	7460	7580	7710	7840	144	193
	V1	145	145	145	145	145	145	145	145	144	144	144		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.8	5.7	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	6050	6250	6400	6500	6600	6720	6840	6940	7060	7180	7300	141	191
	V1	141	141	141	141	141	141	141	140	140	140	140		
	VR	145	146	146	146	146	146	146	146	146	146	146		
	V2	151	151	151	151	151	151	151	150	150	150	150		
	GR2	6.2	6	6	6	6	6	6	6	6	6	6		
37000	TOFL	5620	5810	5950	6040	6130	6240	6350	6450	6560	6670	6780	139	188
	V1	137	137	137	137	136	136	136	136	136	136	136		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.5	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	5220	5400	5520	5610	5690	5790	5890	5980	6080	6190	6290	136	185
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	137	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	143	143	143	143		
	GR2	6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
35000	TOFL	4840	5010	5120	5200	5280	5370	5450	5550	5640	5730	5830	134	182
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	140	140	140	140	140	140	140		
	GR2	7.3	7.1	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
34000	TOFL	4490	4640	4740	4820	4890	4960	5050	5140	5220	5310	5400	131	179
	V1	124	124	124	124	124	124	124	124	123	123	123		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.7	7.5	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
33000	TOFL	4160	4300	4390	4460	4530	4590	4680	4760	4830	4910	4990	128	176
	V1	120	120	120	120	120	119	119	119	119	119	119		
	VR	126	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.1	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
32000	TOFL	3890	4010	4100	4160	4210	4300	4360	4440	4510	4580	4660	126	173
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.4	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
31000	TOFL	3630	3750	3830	3890	3940	4010	4080	4140	4210	4270	4340	123	170
	V1	113	113	113	113	112	112	112	112	112	112	112		
	VR	119	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	128	128	128	128	128	128	128		
	GR2	9.1	8.9	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 5-167. TAKE-OFF DISTANCE; FLAPS - 10°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.3	81.7	82.5	83.4	84.4	85.3	86.2	87.0	87.9	88.7	89.6		
30000	TOFL	3390	3490	3570	3620	3660	3720	3800	3850	3920	3970	4040	121	167
	V1	109	109	109	109	109	109	109	109	109	108	108		
	VR	116	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	125	125	125	125	125	125	125		
	GR2	9.6	9.4	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
29000	TOFL	3160	3260	3320	3360	3410	3470	3530	3580	3640	3700	3760	119	164
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	10	10		
28000	TOFL	2950	3040	3100	3130	3180	3230	3280	3340	3390	3440	3500	117	161
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	109	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.8	10.5	10.4	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
27000	TOFL	2770	2840	2890	2940	2980	3030	3080	3130	3180	3230	3280	115	158
	V1	99	99	99	99	99	98	98	98	98	98	98		
	VR	106	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
26000	TOFL	2610	2680	2730	2770	2810	2860	2900	2950	3000	3040	3090	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.2	11.9	11.8	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 5-167. TAKE-OFF DISTANCE; FLAPS - 10°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
39600	TOFL	8320	8460	8610	8830	9400	10110	10860	11670	11880			145	195
	V1	147	147	147	147	149	151	152	154	154				
	VR	152	152	152	152	153	154	155	156	157				
	V2	156	156	155	155	156	157	158	158	158				
	GR2	5.5	5.5	5.4	5.1	4.8	4.5	4	3.5	3.4				
39000	TOFL	7970	8110	8250	8460	9010	9690	10430	11190	11380			144	193
	V1	144	144	144	145	147	148	150	152	152				
	VR	149	149	149	150	151	152	153	154	155				
	V2	154	154	154	154	154	155	156	156	156				
	GR2	5.7	5.7	5.6	5.3	5	4.7	4.2	3.7	3.6				
38000	TOFL	7430	7550	7690	7880	8390	9030	9720	10440	10620			141	191
	V1	140	140	140	141	142	144	146	148	148				
	VR	146	146	146	146	147	149	150	151	151				
	V2	150	150	150	150	151	152	153	153	153				
	GR2	6	6	5.9	5.6	5.3	5	4.5	4	3.9				
37000	TOFL	6890	7010	7130	7320	7810	8400	9050	9750	9910			139	188
	V1	136	136	136	137	138	140	142	144	145				
	VR	142	142	142	142	143	145	146	148	148				
	V2	147	147	147	147	148	149	150	150	150				
	GR2	6.4	6.4	6.2	5.9	5.6	5.3	4.8	4.3	4.2				
36000	TOFL	6390	6500	6620	6790	7240	7800	8410	9070	9220			136	185
	V1	132	132	132	132	134	136	139	141	141				
	VR	138	138	138	138	140	141	143	144	145				
	V2	143	143	143	143	144	146	146	147	147				
	GR2	6.7	6.7	6.6	6.3	5.9	5.6	5.2	4.6	4.5				
35000	TOFL	5920	6020	6130	6290	6710	7240	7800	8410	8560			134	182
	V1	128	128	128	128	130	132	135	137	137				
	VR	134	134	134	134	136	138	139	141	141				
	V2	140	140	140	140	141	142	143	144	144				
	GR2	7.1	7.1	6.9	6.6	6.3	6	5.5	5	4.8				
34000	TOFL	5490	5570	5680	5830	6200	6680	7220	7780	7930			131	179
	V1	123	123	123	124	126	128	131	133	133				
	VR	130	130	130	131	132	134	136	137	137				
	V2	137	137	137	137	137	139	140	141	141				
	GR2	7.5	7.5	7.3	7	6.7	6.4	5.9	5.3	5.2				
33000	TOFL	5080	5150	5250	5390	5730	6170	6660	7190	7320			128	176
	V1	119	119	119	120	122	124	126	129	129				
	VR	127	127	127	127	128	130	132	133	134				
	V2	134	134	134	134	134	135	136	137	137				
	GR2	7.9	7.9	7.7	7.4	7.1	6.8	6.3	5.7	5.6				
32000	TOFL	4730	4810	4890	5010	5320	5730	6180	6690	6800			126	173
	V1	116	115	116	116	118	120	123	125	126				
	VR	123	123	123	123	125	127	128	130	130				
	V2	131	131	131	131	131	132	134	135	135				
	GR2	8.4	8.4	8.2	7.8	7.5	7.2	6.7	6.1	6				
31000	TOFL	4410	4480	4560	4670	4950	5310	5720	6180	6290			123	170
	V1	112	112	112	112	114	116	119	121	122				
	VR	120	120	120	120	121	123	125	127	127				
	V2	128	128	128	128	128	130	131	132	132				
	GR2	8.9	8.9	8.7	8.3	7.9	7.6	7.1	6.5	6.4				

FIGURE 5-167. TAKE-OFF DISTANCE; FLAPS - 10°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
30000	TOFL	4100	4170	4240	4340	4600	4920	5290	5710	5810			121	167
	V1	108	108	108	109	111	113	115	117	118				
	VR	117	117	117	117	118	120	121	123	124				
	V2	125	125	125	125	126	127	128	129	129				
	GR2	9.4	9.4	9.2	8.8	8.4	8.1	7.6	7	6.8				
29000	TOFL	3820	3880	3940	4030	4270	4560	4890	5270	5360			119	164
	V1	105	105	105	105	107	109	111	113	114				
	VR	113	113	113	113	115	116	118	120	120				
	V2	123	123	122	122	123	124	125	126	126				
	GR2	9.9	9.9	9.7	9.3	8.9	8.6	8.1	7.5	7.3				
28000	TOFL	3550	3600	3660	3740	3950	4220	4520	4850	4930			117	161
	V1	101	101	101	102	103	105	107	109	110				
	VR	110	110	110	110	111	113	114	116	116				
	V2	120	120	119	119	120	121	122	123	123				
	GR2	10.5	10.5	10.3	9.9	9.5	9.1	8.6	8	7.8				
27000	TOFL	3330	3380	3430	3490	3660	3900	4170	4470	4540			115	158
	V1	98	98	98	98	99	101	103	105	106				
	VR	107	107	107	107	108	109	111	113	113				
	V2	117	117	117	117	117	118	119	120	120				
	GR2	11.2	11.2	10.9	10.5	10.1	9.7	9.2	8.5	8.4				
26000	TOFL	3130	3180	3230	3290	3420	3610	3860	4120	4180			113	155
	V1	95	95	95	96	96	98	100	102	102				
	VR	104	104	104	104	105	106	107	109	109				
	V2	115	115	115	115	115	115	116	117	117				
	GR2	11.9	11.9	11.6	11.2	10.7	10.4	9.8	9.1	8.9				

FIGURE 5-168. TAKE-OFF DISTANCE; FLAPS - 10°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.7	82.1	83.0	84.0	84.9	85.8	86.7	87.5	88.4	89.3	90.1		
39600	TOFL	7400	7660	7800	7930	8050	8200	8340	8490	8640	8790	8940	147	195
	V1	150	150	150	150	150	150	150	150	150	150	150		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5.4	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	7100	7350	7480	7600	7720	7870	8000	8140	8280	8420	8570	145	194
	V1	148	148	148	148	148	148	147	147	147	147	147		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	6610	6850	6960	7080	7190	7310	7450	7580	7710	7840	7970	142	191
	V1	144	144	144	144	144	143	143	143	143	143	143		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	153	153	153	153	153	152	152	152	152	152	152		
	GR2	5.9	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	6160	6380	6490	6590	6690	6810	6930	7050	7170	7300	7420	140	188
	V1	140	140	140	140	139	139	139	139	139	139	139		
	VR	144	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	149	149	149	149	149	149	149		
	GR2	6.3	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	5710	5930	6020	6120	6190	6310	6420	6530	6640	6760	6870	137	185
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.6	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	5280	5480	5570	5660	5730	5840	5940	6050	6150	6250	6360	135	183
	V1	131	131	131	131	131	131	130	130	130	130	130		
	VR	136	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	142	142	142	142	142	142	142		
	GR2	7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9		
34000	TOFL	4890	5070	5150	5230	5300	5400	5490	5590	5680	5780	5870	132	180
	V1	127	127	127	127	126	126	126	126	126	126	126		
	VR	132	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.4	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	4520	4680	4750	4830	4900	4990	5070	5160	5250	5330	5420	129	177
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	128	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	135	135	135	135	135	135	135		
	GR2	7.8	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
32000	TOFL	4180	4330	4400	4450	4520	4610	4690	4770	4840	4920	5000	127	174
	V1	118	118	118	118	118	118	118	118	117	117	117		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.3	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	3890	4020	4090	4150	4210	4280	4350	4430	4500	4570	4650	124	171
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.5	8.5	8.5	8.6	8.6	8.6	8.6	8.6	8.6	8.6		

FIGURE 5-168. TAKE-OFF DISTANCE; FLAPS - 10°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.7	82.1	83.0	84.0	84.9	85.8	86.7	87.5	88.4	89.3	90.1		
30000	TOFL	3620	3740	3810	3860	3920	3990	4050	4120	4180	4250	4320	121	168
	V1	111	111	111	111	110	110	110	110	110	110	110		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	126	126	126	126	126		
	GR2	9.3	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
29000	TOFL	3360	3480	3530	3580	3640	3700	3760	3820	3880	3940	4010	119	165
	V1	107	107	107	107	107	106	106	106	106	106	106		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.8	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
28000	TOFL	3140	3240	3290	3340	3380	3450	3490	3550	3600	3660	3720	117	161
	V1	103	103	103	103	103	103	103	103	103	103	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	120	120	120	120	120		
	GR2	10.4	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
27000	TOFL	2910	3000	3040	3090	3140	3190	3240	3290	3350	3400	3450	115	158
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11	10.7	10.7	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	2750	2810	2860	2900	2950	3000	3050	3100	3150	3190	3240	113	155
	V1	97	97	97	97	96	96	96	96	96	96	96		
	VR	104	105	105	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.7	11.4	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 5-168. TAKE-OFF DISTANCE; FLAPS - 10°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.6					
39600	TOFL	9090	9250	9450	9810	10540	11310	12190	12970				147	195
	V1	150	150	150	151	152	154	156	157					
	VR	154	154	154	155	156	157	158	159					
	V2	158	158	158	158	159	159	160	161					
	GR2	5.2	5.2	4.9	4.6	4.3	4	3.6	3.2					
39000	TOFL	8710	8860	9060	9400	10100	10850	11680	12430				145	194
	V1	147	147	147	148	150	152	153	155					
	VR	152	152	152	152	154	155	156	157					
	V2	156	156	156	156	157	157	158	159					
	GR2	5.4	5.4	5.1	4.8	4.5	4.2	3.8	3.3					
38000	TOFL	8110	8250	8430	8740	9400	10110	10860	11570				142	191
	V1	143	143	143	144	146	148	149	151					
	VR	148	148	148	149	150	152	153	154					
	V2	152	152	152	152	153	154	155	155					
	GR2	5.8	5.7	5.4	5.1	4.8	4.5	4.1	3.6					
37000	TOFL	7540	7670	7840	8140	8730	9390	10110	10740				140	188
	V1	139	139	139	140	142	144	146	147					
	VR	145	145	145	145	147	148	149	150					
	V2	149	149	149	149	150	151	152	152					
	GR2	6.1	6.1	5.8	5.4	5.2	4.8	4.4	3.9					
36000	TOFL	6980	7100	7270	7560	8120	8720	9400	10000				137	185
	V1	135	135	135	136	138	140	142	143					
	VR	141	141	141	141	143	144	146	147					
	V2	146	146	146	146	147	148	148	149					
	GR2	6.5	6.4	6.1	5.8	5.5	5.2	4.7	4.2					
35000	TOFL	6460	6570	6720	6990	7530	8080	8720	9270				135	183
	V1	130	130	131	132	134	136	138	139					
	VR	137	137	137	137	139	141	142	143					
	V2	142	142	142	142	143	144	145	146					
	GR2	6.8	6.8	6.5	6.1	5.8	5.5	5	4.6					
34000	TOFL	5970	6070	6210	6460	6950	7500	8070	8590				132	180
	V1	126	126	126	127	130	132	134	135					
	VR	133	133	133	133	135	137	138	140					
	V2	139	139	138	139	140	141	142	142					
	GR2	7.3	7.2	6.8	6.5	6.2	5.9	5.4	4.9					
33000	TOFL	5510	5600	5730	5960	6410	6930	7460	7940				129	177
	V1	122	122	122	123	125	128	130	131					
	VR	129	129	129	129	131	133	135	136					
	V2	135	135	135	135	136	138	139	139					
	GR2	7.7	7.6	7.2	6.9	6.6	6.3	5.8	5.3					
32000	TOFL	5090	5170	5290	5490	5900	6360	6890	7330				127	174
	V1	117	117	118	119	121	123	126	127					
	VR	125	125	125	126	127	129	131	132					
	V2	132	132	132	132	133	134	135	136					
	GR2	8.1	8	7.7	7.3	7	6.7	6.2	5.7					
31000	TOFL	4720	4800	4900	5080	5460	5880	6360	6790				124	171
	V1	113	114	114	115	117	119	122	124					
	VR	121	121	121	122	124	126	127	129					
	V2	129	129	129	129	130	131	132	133					
	GR2	8.6	8.5	8.1	7.7	7.4	7.1	6.6	6.1					

FIGURE 5-168. TAKE-OFF DISTANCE; FLAPS - 10°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.6					
30000	TOFL	4390	4460	4560	4720	5050	5430	5870	6260				121	168
	V1	110	110	110	111	113	115	118	120					
	VR	118	118	118	119	120	122	124	125					
	V2	126	126	126	126	127	128	129	130					
	GR2	9.1	9	8.6	8.2	7.9	7.5	7.1	6.5					
29000	TOFL	4070	4140	4230	4380	4680	5010	5410	5770				119	165
	V1	106	106	106	107	109	111	114	116					
	VR	114	114	114	115	117	119	120	122					
	V2	123	123	123	123	124	125	126	127					
	GR2	9.6	9.5	9.1	8.7	8.4	8	7.5	7					
28000	TOFL	3780	3840	3910	4050	4320	4630	4970	5300				117	161
	V1	102	102	103	103	105	108	110	112					
	VR	111	111	111	111	113	115	117	118					
	V2	120	120	120	120	121	122	123	124					
	GR2	10.2	10.1	9.7	9.2	8.9	8.6	8	7.5					
27000	TOFL	3500	3560	3620	3740	3990	4270	4580	4860				115	158
	V1	99	99	99	100	102	104	106	108					
	VR	107	107	107	108	110	111	113	114					
	V2	117	117	117	117	118	119	120	121					
	GR2	10.8	10.7	10.3	9.8	9.5	9.1	8.6	8					
26000	TOFL	3290	3340	3400	3490	3680	3930	4210	4460				113	155
	V1	96	96	96	96	98	100	102	104					
	VR	104	104	104	105	106	108	109	111					
	V2	115	115	115	115	115	116	117	118					
	GR2	11.5	11.4	10.9	10.5	10.1	9.7	9.2	8.6					

FIGURE 5-169. TAKE-OFF DISTANCE; FLAPS - 10°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
39600	TOFL	8180	8380	8530	8680	8830	9000	9160	9330	9490	9660	9830	148	196
	V1	153	153	153	153	153	153	153	153	153	153	153		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	161	161	161	161	160	160	160	160	160	160	160		
	GR2	5.1	5	5	5	5	5	5	5	5	5	5		
39000	TOFL	7830	8030	8180	8320	8460	8620	8780	8930	9090	9250	9410	146	194
	V1	151	151	151	151	151	151	151	151	151	150	150		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	159	159	159	159	158	158	158	158	158	158	158		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	7290	7470	7610	7740	7870	8020	8160	8310	8450	8600	8750	144	191
	V1	147	147	147	147	147	146	146	146	146	146	146		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	6770	6940	7070	7180	7310	7440	7580	7720	7850	7980	8120	141	189
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	151	151	151	151	151	151	151	151		
	GR2	5.9	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	6290	6450	6560	6660	6780	6910	7040	7160	7280	7410	7530	138	186
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	5830	5970	6060	6170	6280	6390	6510	6620	6730	6850	6960	136	183
	V1	134	134	134	134	134	134	134	134	134	133	133		
	VR	140	140	140	140	139	139	139	139	139	139	139		
	V2	145	145	145	145	144	144	144	144	144	144	144		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	5380	5510	5600	5690	5790	5900	6000	6100	6210	6310	6420	133	180
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.1	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	4960	5080	5160	5240	5340	5430	5530	5620	5720	5810	5910	130	177
	V1	125	125	125	125	125	125	125	124	124	124	124		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	137	137	137	137	137	137	137	137	137		
	GR2	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
32000	TOFL	4570	4680	4750	4830	4910	5000	5090	5170	5260	5350	5440	127	174
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
31000	TOFL	4210	4310	4370	4450	4520	4610	4690	4770	4840	4920	5010	125	171
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	130	130	130	130	130	130	130	130	130		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 5-169. TAKE-OFF DISTANCE; FLAPS - 10°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
30000	TOFL	3900	3990	4050	4120	4190	4260	4330	4400	4480	4550	4630	122	168
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.9	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	3610	3700	3760	3810	3880	3950	4010	4080	4150	4210	4280	119	165
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.4	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
28000	TOFL	3360	3420	3490	3530	3600	3660	3720	3780	3840	3900	3960	117	162
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
27000	TOFL	3120	3170	3230	3280	3330	3390	3450	3500	3560	3610	3670	115	159
	V1	101	101	101	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	108	108	108	108	108	108	108		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.4	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	2900	2960	3010	3060	3110	3160	3210	3260	3310	3360	3420	113	155
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.2	11.1	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2		

FIGURE 5-169. TAKE-OFF DISTANCE; FLAPS - 10°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89					
	N1 (%)	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
39600	TOFL	10000	10190	10490	11100	11890	12780	13760	14220				148	196
	V1	153	153	154	155	156	158	159	160					
	VR	157	157	157	159	160	161	162	162					
	V2	160	160	160	161	161	162	163	163					
	GR2	5	4.8	4.5	4.2	3.9	3.6	3.1	2.9					
39000	TOFL	9570	9760	10040	10600	11370	12240	13180	13610				146	194
	V1	150	151	151	152	154	155	157	157					
	VR	155	155	155	156	157	158	160	160					
	V2	158	158	158	158	159	160	161	161					
	GR2	5.2	5	4.7	4.4	4.1	3.8	3.3	3.1					
38000	TOFL	8900	9070	9340	9860	10610	11390	12250	12650				144	191
	V1	146	146	147	148	150	152	153	154					
	VR	151	151	151	152	154	155	156	156					
	V2	155	155	155	155	156	157	157	157					
	GR2	5.5	5.3	5	4.7	4.4	4.1	3.6	3.4					
37000	TOFL	8260	8420	8670	9150	9830	10580	11380	11750				141	189
	V1	142	142	143	144	146	148	149	150					
	VR	147	147	148	149	150	151	152	153					
	V2	151	151	151	152	153	153	154	154					
	GR2	5.8	5.6	5.3	5	4.7	4.4	3.9	3.7					
36000	TOFL	7660	7810	8040	8490	9110	9830	10550	10910				138	186
	V1	138	138	139	140	142	144	145	146					
	VR	143	143	144	145	146	148	149	149					
	V2	148	148	148	148	149	150	151	151					
	GR2	6.2	6	5.6	5.3	5	4.7	4.2	4					
35000	TOFL	7080	7220	7440	7870	8440	9080	9810	10110				136	183
	V1	133	134	134	136	138	139	142	142					
	VR	139	139	140	141	142	144	145	145					
	V2	144	144	144	145	146	147	148	148					
	GR2	6.6	6.3	6	5.7	5.4	5	4.6	4.3					
34000	TOFL	6530	6660	6860	7270	7810	8410	9060	9380				133	180
	V1	129	129	130	132	134	135	137	138					
	VR	135	135	136	137	139	140	141	142					
	V2	141	141	141	141	142	143	144	144					
	GR2	7	6.7	6.3	6	5.7	5.4	4.9	4.7					
33000	TOFL	6010	6130	6320	6690	7210	7760	8370	8640				130	177
	V1	124	125	125	127	129	131	133	134					
	VR	131	131	132	133	135	136	138	138					
	V2	137	137	137	138	139	140	141	141					
	GR2	7.4	7.1	6.7	6.4	6.1	5.8	5.3	5					
32000	TOFL	5530	5640	5810	6150	6620	7160	7710	7970				127	174
	V1	120	120	121	122	125	127	129	130					
	VR	127	127	127	129	131	133	134	135					
	V2	134	134	134	134	135	137	137	138					
	GR2	7.8	7.5	7.1	6.8	6.5	6.2	5.7	5.4					
31000	TOFL	5090	5180	5340	5640	6080	6580	7100	7330				125	171
	V1	116	116	116	118	120	123	125	126					
	VR	123	123	123	125	126	128	130	131					
	V2	130	130	130	130	132	133	134	134					
	GR2	8.3	8	7.6	7.2	6.9	6.6	6.1	5.8					

FIGURE 5-169. TAKE-OFF DISTANCE; FLAPS - 10°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89					
	N1 (%)	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
30000	TOFL	4700	4790	4930	5200	5590	6030	6540	6760				122	168
	V1	112	112	112	114	116	118	121	122					
	VR	119	119	120	121	123	125	126	127					
	V2	127	127	127	127	128	130	131	131					
	GR2	8.7	8.4	8	7.7	7.3	7	6.5	6.2					
29000	TOFL	4350	4440	4570	4810	5150	5550	6010	6220				119	165
	V1	108	108	108	110	112	114	117	118					
	VR	116	116	116	117	119	121	123	123					
	V2	124	124	124	124	125	127	128	128					
	GR2	9.3	8.9	8.5	8.1	7.8	7.5	7	6.7					
28000	TOFL	4030	4100	4220	4440	4750	5100	5520	5710				117	162
	V1	104	104	104	106	108	110	113	114					
	VR	112	112	112	114	115	117	119	120					
	V2	121	121	121	121	122	124	125	125					
	GR2	9.8	9.5	9	8.7	8.3	8	7.4	7.2					
27000	TOFL	3730	3790	3890	4090	4370	4690	5050	5230				115	159
	V1	100	100	101	102	104	106	108	109					
	VR	108	108	109	110	112	113	115	116					
	V2	118	118	118	118	119	120	121	122					
	GR2	10.4	10.1	9.6	9.2	8.9	8.5	8	7.7					
26000	TOFL	3470	3520	3610	3770	4020	4310	4630	4780				113	155
	V1	97	97	97	98	100	102	104	105					
	VR	105	105	105	106	108	110	111	112					
	V2	115	115	115	115	116	117	118	119					
	GR2	11.1	10.7	10.2	9.8	9.5	9.1	8.6	8.3					

FIGURE 5-170. TAKE-OFF DISTANCE; FLAPS - 10°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.5	83.2	84.1	85.1	86.0	86.9	87.7	88.6	89.5	90.4	91.2		
39600	TOFL	9060	9210	9390	9570	9760	9940	10130	10310	10500	10680	10870	149	196
	V1	157	157	157	157	157	157	157	157	157	157	157		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	164	164	163	163	163	163	163	163	163	163	163		
	GR2	4.8	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
39000	TOFL	8660	8810	8970	9150	9330	9500	9680	9850	10030	10200	10380	147	194
	V1	154	154	154	154	154	154	154	154	154	154	154		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	8030	8160	8310	8480	8640	8800	8970	9130	9290	9450	9610	145	192
	V1	150	150	150	150	150	150	150	150	150	150	150		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	158	158	157	157	157	157	157	157	157	157	157		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	7450	7560	7710	7860	8020	8160	8320	8460	8610	8760	8910	142	189
	V1	146	146	145	145	145	145	145	145	145	145	145		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	6890	7010	7150	7290	7430	7560	7700	7840	7980	8110	8250	139	186
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
35000	TOFL	6380	6490	6620	6740	6870	7000	7120	7250	7380	7500	7630	137	183
	V1	137	137	137	137	137	137	137	137	136	136	136		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4		
34000	TOFL	5890	5990	6100	6220	6340	6450	6570	6690	6800	6920	7030	134	180
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.8	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	5420	5510	5620	5720	5830	5940	6040	6150	6250	6360	6460	131	177
	V1	128	128	128	128	128	128	127	127	127	127	127		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.2	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
32000	TOFL	4980	5060	5160	5260	5350	5450	5550	5640	5740	5830	5930	128	175
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
31000	TOFL	4570	4650	4730	4820	4910	5000	5090	5170	5260	5350	5430	126	172
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.1	8	8	8	8	8	8	8	8	8	8		

FIGURE 5-170. TAKE-OFF DISTANCE; FLAPS - 10°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.5	83.2	84.1	85.1	86.0	86.9	87.7	88.6	89.5	90.4	91.2		
30000	TOFL	4200	4270	4350	4430	4510	4590	4670	4750	4830	4910	4990	123	168
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
29000	TOFL	3880	3930	4020	4080	4150	4220	4300	4370	4440	4510	4590	120	165
	V1	110	110	110	110	109	109	109	109	109	109	109		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.1	9	9	9	9	9	9	9	9	9	9		
28000	TOFL	3580	3630	3700	3770	3830	3900	3970	4030	4100	4160	4230	117	162
	V1	106	106	106	106	105	105	105	105	105	105	105		
	VR	114	114	114	114	114	114	114	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
27000	TOFL	3320	3360	3440	3480	3560	3600	3680	3730	3790	3850	3910	115	159
	V1	102	102	102	102	102	102	102	101	101	101	101		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.2	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
26000	TOFL	3070	3120	3170	3220	3280	3340	3390	3450	3500	3560	3610	113	156
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		

FIGURE 5-170. TAKE-OFF DISTANCE; FLAPS - 10°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	86.4					
	N1 (%)	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
39600	TOFL	11060	11300	11770	12530	13450	14490	15590	15630				149	196
	V1	157	157	158	159	160	162	163	163					
	VR	161	161	161	162	163	164	165	165					
	V2	163	163	163	164	164	165	165	165					
	GR2	4.7	4.3	4.1	3.8	3.5	3.2	2.7	2.7					
39000	TOFL	10570	10800	11250	11990	12860	13850	14930	14970				147	194
	V1	154	154	155	157	158	159	160	161					
	VR	158	158	159	160	161	162	163	163					
	V2	161	161	161	161	162	163	163	163					
	GR2	4.8	4.5	4.2	3.9	3.7	3.3	2.9	2.8					
38000	TOFL	9790	10000	10420	11150	11950	12850	13850	13890				145	192
	V1	150	150	151	152	154	155	157	157					
	VR	154	154	155	156	157	158	159	159					
	V2	157	157	157	158	159	159	160	160					
	GR2	5.2	4.8	4.5	4.2	4	3.6	3.1	3.1					
37000	TOFL	9070	9280	9670	10330	11110	11930	12840	12880				142	189
	V1	145	146	146	148	150	151	153	153					
	VR	150	150	151	152	153	154	155	155					
	V2	154	154	154	155	155	156	156	156					
	GR2	5.5	5.2	4.8	4.5	4.3	3.9	3.4	3.4					
36000	TOFL	8400	8590	8950	9550	10290	11070	11900	11930				139	186
	V1	141	141	142	144	146	147	149	149					
	VR	146	146	147	148	150	151	152	152					
	V2	150	150	150	151	152	153	153	153					
	GR2	5.9	5.5	5.2	4.9	4.6	4.3	3.7	3.7					
35000	TOFL	7770	7940	8280	8840	9490	10260	11020	11050				137	183
	V1	136	137	138	140	141	143	145	145					
	VR	142	142	143	144	146	147	148	148					
	V2	147	147	147	147	148	149	150	150					
	GR2	6.2	5.8	5.5	5.2	4.9	4.6	4.1	4					
34000	TOFL	7160	7330	7650	8160	8770	9460	10210	10230				134	180
	V1	132	132	133	135	137	139	141	141					
	VR	138	138	139	140	142	143	144	145					
	V2	143	143	143	144	145	146	147	147					
	GR2	6.6	6.2	5.9	5.6	5.3	4.9	4.4	4.4					
33000	TOFL	6590	6740	7050	7530	8090	8720	9420	9450				131	177
	V1	127	128	129	131	133	135	137	137					
	VR	134	134	135	136	138	139	141	141					
	V2	139	139	139	140	141	142	143	143					
	GR2	7	6.6	6.3	5.9	5.6	5.3	4.8	4.7					
32000	TOFL	6040	6180	6460	6920	7450	8030	8660	8690				128	175
	V1	123	123	124	127	129	131	133	133					
	VR	130	130	130	132	134	135	137	137					
	V2	135	135	135	137	138	139	140	140					
	GR2	7.4	7	6.6	6.3	6	5.7	5.1	5.1					
31000	TOFL	5540	5660	5920	6340	6840	7380	7960	7990				126	172
	V1	118	118	120	122	124	126	128	128					
	VR	125	125	126	128	130	132	133	133					
	V2	132	132	132	133	134	136	136	136					
	GR2	7.8	7.4	7	6.7	6.4	6.1	5.5	5.5					

FIGURE 5-170. TAKE-OFF DISTANCE; FLAPS - 10°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	86.4					
	N1 (%)	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
30000	TOFL	5080	5190	5420	5790	6250	6760	7300	7330				123	168
	V1	114	114	115	117	119	122	124	124					
	VR	121	121	122	124	126	128	129	129					
	V2	128	128	128	129	131	132	133	133					
	GR2	8.3	7.9	7.5	7.2	6.8	6.5	5.9	5.9					
29000	TOFL	4670	4770	4970	5300	5710	6180	6700	6720				120	165
	V1	109	110	111	113	115	117	120	120					
	VR	117	117	118	119	121	123	125	125					
	V2	125	125	125	126	127	128	130	130					
	GR2	8.8	8.3	7.9	7.6	7.3	7	6.4	6.4					
28000	TOFL	4310	4400	4590	4880	5240	5670	6160	6180				117	162
	V1	105	106	107	109	111	113	116	116					
	VR	113	113	114	116	118	120	122	122					
	V2	122	122	122	122	124	125	126	126					
	GR2	9.3	8.9	8.4	8.1	7.8	7.5	6.9	6.9					
27000	TOFL	3980	4050	4230	4490	4810	5180	5620	5640				115	159
	V1	101	102	103	104	107	109	111	112					
	VR	110	110	111	112	114	116	118	118					
	V2	119	119	119	119	121	122	123	123					
	GR2	9.9	9.4	9	8.6	8.3	8	7.4	7.4					
26000	TOFL	3670	3740	3890	4120	4410	4740	5120	5140				113	156
	V1	98	98	99	100	102	105	107	107					
	VR	106	106	107	108	110	112	114	114					
	V2	116	115	115	116	117	119	120	120					
	GR2	10.6	10	9.6	9.2	8.9	8.6	7.9	7.9					

FIGURE 5-171. TAKE-OFF DISTANCE; FLAPS - 10°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.1	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	91.8		
39600	TOFL	9880	10130	10330	10520	10730	10930	11140	11340	11550	11750	11970	150	197
	V1	160	160	160	160	160	160	160	160	160	160	160		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4		
39000	TOFL	9440	9690	9870	10060	10260	10450	10650	10840	11040	11230	11440	148	195
	V1	158	158	158	158	158	158	158	157	157	157	157		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6		
38000	TOFL	8740	8970	9130	9300	9480	9660	9840	10020	10200	10380	10570	146	192
	V1	153	153	153	153	153	153	153	153	153	153	153		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	5.1	5	5	5	5	5	5	5	5	5	4.9		
37000	TOFL	8070	8280	8430	8590	8760	8920	9090	9250	9410	9580	9750	143	189
	V1	148	148	148	148	148	148	148	148	148	148	148		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	7470	7660	7800	7950	8100	8250	8400	8550	8700	8850	9020	140	187
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6		
35000	TOFL	6900	7080	7210	7340	7480	7620	7760	7900	8040	8180	8320	138	184
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6		
34000	TOFL	6370	6530	6650	6770	6900	7030	7150	7280	7410	7530	7670	135	181
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.5	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.4		
	TOFL	5860	6010	6120	6230	6340	6460	6580	6690	6810	6920	7050	132	178
33000	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.8		
32000	TOFL	5370	5510	5610	5710	5820	5920	6030	6130	6240	6340	6460	129	175
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	138	138	138	138	138	138	137	137	137	137		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2		
31000	TOFL	4920	5050	5140	5230	5330	5420	5520	5610	5710	5800	5910	127	172
	V1	121	121	121	121	121	121	121	120	120	120	120		
	VR	127	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.6		

FIGURE 5-171. TAKE-OFF DISTANCE; FLAPS - 10°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.1	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	91.8		
30000	TOFL	4510	4630	4710	4790	4880	4970	5050	5140	5220	5310	5400	124	169
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1		
29000	TOFL	4140	4240	4310	4390	4470	4550	4630	4700	4780	4860	4950	121	166
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.6		
28000	TOFL	3800	3900	3950	4020	4100	4170	4240	4310	4380	4450	4530	118	162
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.1		
27000	TOFL	3510	3600	3660	3710	3790	3850	3910	3970	4040	4100	4170	115	159
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	119		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.7		
26000	TOFL	3250	3330	3370	3440	3490	3550	3600	3660	3720	3780	3840	113	156
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	116	117	116	116	116	116	116	116	116		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3		

FIGURE 5-171. TAKE-OFF DISTANCE; FLAPS - 10°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
39600	TOFL	12210	12600	13280	14180	15250	16430						150	197
	V1	160	161	162	163	164	165							
	VR	164	164	165	166	167	167							
	V2	166	166	166	167	167	168							
	GR2	4.2	3.9	3.6	3.3	3.1	2.7							
39000	TOFL	11670	12050	12700	13550	14560	15710	16430					148	195
	V1	158	158	159	160	162	163	163						
	VR	161	162	162	163	164	165	165						
	V2	163	163	164	164	165	165	165						
	GR2	4.4	4.1	3.8	3.5	3.2	2.9	2.6						
38000	TOFL	10790	11150	11780	12550	13470	14520	15270					146	192
	V1	153	154	155	156	157	159	160						
	VR	157	157	158	159	160	161	162						
	V2	160	160	160	161	161	162	162						
	GR2	4.7	4.4	4.1	3.8	3.5	3.2	2.8						
37000	TOFL	9960	10290	10890	11630	12470	13430	14120					143	189
	V1	148	149	150	152	153	154	155						
	VR	153	153	154	155	156	157	158						
	V2	156	156	156	157	158	158	159						
	GR2	5	4.7	4.4	4.1	3.8	3.5	3.1						
36000	TOFL	9210	9520	10060	10770	11560	12430	13050					140	187
	V1	144	145	146	148	149	151	151						
	VR	149	149	150	151	153	153	154						
	V2	152	152	152	153	154	155	155						
	GR2	5.4	5	4.7	4.4	4.1	3.8	3.4						
35000	TOFL	8500	8790	9290	9940	10700	11500	12070					138	184
	V1	139	140	141	143	145	146	147						
	VR	145	145	146	147	149	150	150						
	V2	149	149	149	150	151	151	152						
	GR2	5.7	5.4	5	4.7	4.4	4.1	3.8						
34000	TOFL	7840	8110	8570	9150	9860	10630	11150					135	181
	V1	135	136	137	139	141	142	143						
	VR	141	141	142	143	145	146	147						
	V2	145	145	145	146	147	148	148						
	GR2	6.1	5.7	5.4	5.1	4.8	4.4	4.1						
33000	TOFL	7200	7450	7890	8430	9060	9790	10290					132	178
	V1	130	131	133	134	136	138	139						
	VR	136	137	138	139	141	142	143						
	V2	141	141	141	142	143	144	145						
	GR2	6.5	6.1	5.8	5.4	5.2	4.8	4.4						
32000	TOFL	6600	6830	7250	7740	8340	9010	9470					129	175
	V1	125	126	128	130	132	134	135						
	VR	132	132	134	135	137	138	139						
	V2	137	137	138	139	140	141	141						
	GR2	6.9	6.5	6.2	5.8	5.5	5.2	4.8						
31000	TOFL	6040	6260	6630	7110	7660	8260	8680					127	172
	V1	121	122	123	125	127	129	131						
	VR	128	128	129	131	133	134	135						
	V2	133	133	134	135	136	137	138						
	GR2	7.3	6.9	6.6	6.2	5.9	5.5	5.2						

FIGURE 5-171. TAKE-OFF DISTANCE; FLAPS - 10°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
30000	TOFL	5520	5720	6060	6490	7010	7560	7960					124	169
	V1	116	117	119	121	123	125	126						
	VR	123	124	125	127	129	130	131						
	V2	129	129	130	131	133	134	134						
	GR2	7.8	7.3	7	6.7	6.3	6	5.6						
29000	TOFL	5050	5220	5530	5910	6380	6910	7270					121	166
	V1	111	112	114	116	118	121	122						
	VR	119	119	121	122	124	126	127						
	V2	126	126	126	127	129	130	131						
	GR2	8.2	7.8	7.4	7.1	6.8	6.4	6.1						
28000	TOFL	4630	4780	5050	5390	5810	6300	6640					118	162
	V1	107	108	109	111	114	116	118						
	VR	115	115	116	118	120	122	123						
	V2	122	122	123	124	125	127	127						
	GR2	8.7	8.3	7.9	7.6	7.3	6.9	6.5						
27000	TOFL	4260	4400	4650	4940	5320	5750	6070					115	159
	V1	103	104	105	107	109	112	113						
	VR	111	111	113	114	116	118	119						
	V2	119	119	119	121	122	123	124						
	GR2	9.3	8.8	8.4	8.1	7.8	7.4	7						
26000	TOFL	3920	4040	4260	4530	4860	5240	5530					113	156
	V1	99	100	101	103	105	107	109						
	VR	107	108	109	110	112	114	115						
	V2	116	116	116	117	119	120	121						
	GR2	9.9	9.4	9	8.6	8.3	7.9	7.6						

FIGURE 5-172. TAKE-OFF DISTANCE; FLAPS - 10°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.5	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.4		
39600	TOFL	10950	11150	11370	11590	11820	12050	12280	12500	12730	12960	13210	151	197
	V1	164	164	164	164	164	164	164	164	164	164	164		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1		
39000	TOFL	10460	10650	10860	11070	11290	11510	11720	11940	12150	12370	12620	150	196
	V1	161	161	161	161	161	161	161	161	161	161	161		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.3		
38000	TOFL	9680	9850	10040	10240	10440	10640	10840	11040	11230	11440	11660	147	193
	V1	156	156	156	156	156	156	156	156	156	156	156		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	163	163	163	163	163	163	163	163	163	163	162		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6		
37000	TOFL	8930	9090	9260	9450	9630	9810	9990	10170	10350	10540	10750	144	190
	V1	152	152	152	152	152	152	152	152	152	152	152		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	159	159	159	159	159	159	159	159	159	159	158		
	GR2	5.1	5.1	5	5	5	5	5	5	5	5	4.9		
36000	TOFL	8240	8380	8540	8710	8870	9040	9210	9370	9540	9710	9900	142	187
	V1	147	147	147	147	147	147	147	147	147	147	147		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	154		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.2		
35000	TOFL	7580	7720	7860	8010	8170	8320	8470	8620	8780	8930	9110	139	184
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.8	5.7	5.6		
34000	TOFL	6990	7110	7240	7380	7520	7670	7800	7940	8080	8220	8390	136	181
	V1	138	138	138	138	138	137	137	137	137	137	138		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.9		
33000	TOFL	6430	6540	6660	6780	6910	7040	7170	7290	7420	7550	7700	133	178
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.3		
32000	TOFL	5890	5990	6100	6220	6340	6450	6570	6680	6800	6910	7050	130	175
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.7		
31000	TOFL	5390	5480	5580	5680	5790	5890	6000	6100	6210	6310	6440	128	172
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.3	7.4	7.4	7.3	7.2		

FIGURE 5-172. TAKE-OFF DISTANCE; FLAPS - 10°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.5	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.4		
30000	TOFL	4930	5010	5100	5190	5290	5380	5480	5570	5670	5760	5880	125	169
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	131	131	131	131	131	131	131	131	131		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.6		
29000	TOFL	4500	4580	4660	4750	4830	4920	5000	5090	5170	5260	5360	122	166
	V1	114	114	114	114	114	113	113	113	113	113	113		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.1		
28000	TOFL	4120	4180	4260	4340	4410	4490	4570	4650	4720	4800	4900	119	163
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.6		
27000	TOFL	3780	3820	3890	3960	4030	4100	4170	4240	4310	4380	4470	116	160
	V1	105	105	104	104	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	120	120	120	120	120	120	120	120	120	120		
	GR2	9.4	9.4	9.4	9.3	9.3	9.3	9.3	9.3	9.4	9.3	9.1		
26000	TOFL	3470	3540	3580	3640	3720	3780	3840	3900	3960	4030	4100	113	156
	V1	101	101	100	100	100	100	100	100	100	100	100		
	VR	109	109	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10	10	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.7		

FIGURE 5-172. TAKE-OFF DISTANCE; FLAPS - 10°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	93.0	93.0	93.0	92.6	92.0	91.3	91.2						
39600	TOFL	13570	14220	15070	16130								151	197
	V1	164	165	166	167									
	VR	167	168	168	169									
	V2	169	169	169	170									
	GR2	3.8	3.5	3.2	2.9									
39000	TOFL	12950	13570	14380	15390	16580							150	196
	V1	161	162	163	164	165								
	VR	165	165	166	167	168								
	V2	166	166	167	167	168								
	GR2	3.9	3.6	3.3	3.1	2.8								
38000	TOFL	11980	12560	13300	14210	15290	16500						147	193
	V1	157	158	159	160	161	162							
	VR	160	161	162	163	163	164							
	V2	162	162	163	163	164	164							
	GR2	4.2	3.9	3.6	3.4	3.1	2.7							
37000	TOFL	11050	11600	12300	13130	14100	15250	15560					144	190
	V1	152	153	154	155	157	158	158						
	VR	156	157	158	158	159	160	161						
	V2	158	158	159	160	160	161	161						
	GR2	4.6	4.2	3.9	3.7	3.4	3	2.8						
36000	TOFL	10160	10690	11350	12120	13010	14050	14320					142	187
	V1	147	148	150	151	152	154	154						
	VR	152	152	154	154	155	156	157						
	V2	154	154	155	156	157	157	157						
	GR2	4.9	4.6	4.3	4	3.7	3.3	3.1						
35000	TOFL	9370	9850	10460	11210	12020	12960	13210					139	184
	V1	143	144	145	147	148	150	150						
	VR	147	148	149	151	152	153	153						
	V2	151	151	151	152	153	154	154						
	GR2	5.2	4.9	4.6	4.3	4	3.6	3.5						
34000	TOFL	8630	9070	9640	10320	11100	11950	12180					136	181
	V1	138	139	141	143	144	146	146						
	VR	143	144	145	147	148	149	149						
	V2	147	147	148	148	149	150	150						
	GR2	5.6	5.2	4.9	4.6	4.3	3.9	3.8						
33000	TOFL	7930	8340	8840	9490	10220	11020	11230					133	178
	V1	133	135	136	138	140	141	142						
	VR	139	140	141	142	144	145	145						
	V2	143	143	144	145	146	147	147						
	GR2	6	5.6	5.3	5	4.7	4.3	4.1						
32000	TOFL	7270	7650	8120	8690	9370	10140	10340					130	175
	V1	128	130	132	133	135	137	138						
	VR	134	135	137	138	140	141	141						
	V2	139	139	140	141	142	143	143						
	GR2	6.4	6	5.7	5.3	5.1	4.6	4.5						
31000	TOFL	6640	7000	7430	7970	8580	9290	9480					128	172
	V1	124	125	127	129	131	133	133						
	VR	130	131	132	134	135	137	137						
	V2	135	135	136	137	138	139	140						
	GR2	6.8	6.4	6.1	5.7	5.4	5	4.9						

FIGURE 5-172. TAKE-OFF DISTANCE; FLAPS - 10°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	93.0	93.0	93.0	92.6	92.0	91.3	91.2						
30000	TOFL	6060	6390	6790	7290	7850	8500	8670					125	169
	V1	119	120	122	124	126	128	129						
	VR	126	127	128	130	131	133	133						
	V2	131	131	132	134	135	136	136						
	GR2	7.2	6.8	6.5	6.2	5.8	5.4	5.3						
29000	TOFL	5530	5820	6180	6640	7160	7750	7900					122	166
	V1	114	115	117	120	122	124	124						
	VR	121	122	124	125	127	129	129						
	V2	128	128	128	130	131	132	132						
	GR2	7.7	7.3	6.9	6.6	6.3	5.8	5.7						
28000	TOFL	5040	5300	5620	6030	6510	7060	7200					119	163
	V1	109	111	112	115	117	119	120						
	VR	117	118	119	121	123	125	125						
	V2	124	124	125	126	127	128	129						
	GR2	8.1	7.7	7.4	7	6.7	6.3	6.2						
27000	TOFL	4600	4840	5100	5470	5900	6410	6540					116	160
	V1	105	106	108	110	112	115	115						
	VR	113	114	115	117	118	120	121						
	V2	120	120	121	122	123	125	125						
	GR2	8.6	8.2	7.8	7.5	7.2	6.8	6.7						
26000	TOFL	4220	4430	4680	5000	5380	5830	5950					113	156
	V1	101	102	104	105	108	110	111						
	VR	109	110	111	113	114	116	117						
	V2	117	117	118	119	120	121	122						
	GR2	9.2	8.8	8.4	8.1	7.7	7.3	7.2						

FIGURE 5-173. TAKE-OFF DISTANCE; FLAPS - 10°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.4	85.0	85.7	86.7	87.6	88.4	89.3	90.2	91.2	92.1	92.9		
39600	TOFL	11940	12220	12560	12820	13090	13370	13660	13870	14090	14340	14670	152	198
	V1	167	167	167	167	167	167	167	167	167	167	167		
	VR	170	170	170	170	170	170	170	170	170	170	170		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	4	4	3.9	3.9	3.9	3.9	3.8	3.9	3.9	3.8	3.7		
39000	TOFL	11410	11680	12000	12250	12500	12770	13050	13240	13450	13700	14010	151	196
	V1	164	164	164	164	164	164	164	164	164	164	165		
	VR	167	168	168	168	168	168	168	168	168	168	168		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4	4.1	4.1	4	3.8		
38000	TOFL	10570	10810	11110	11340	11570	11820	12070	12250	12450	12670	12960	148	193
	V1	160	160	160	160	160	160	160	160	160	160	160		
	VR	163	164	164	164	164	164	164	164	164	164	164		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.3	4.4	4.4	4.3	4.1		
37000	TOFL	9740	9970	10250	10450	10670	10900	11130	11300	11470	11680	11950	145	190
	V1	155	155	155	155	155	155	155	155	155	155	155		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.4		
36000	TOFL	8970	9170	9430	9620	9810	10020	10230	10390	10540	10740	10990	143	187
	V1	150	150	150	150	150	150	150	150	150	150	151		
	VR	154	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	5.2	5.1	5	5	5	5	5	5	5	5	4.8		
35000	TOFL	8250	8440	8670	8840	9020	9210	9410	9550	9690	9870	10100	140	185
	V1	145	145	146	146	146	146	146	145	145	145	146		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.1		
34000	TOFL	7580	7750	7960	8120	8280	8450	8630	8760	8890	9050	9260	137	182
	V1	140	140	141	141	141	141	141	141	141	141	141		
	VR	145	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.9	5.8	5.8	5.8	5.8	5.8	5.7	5.8	5.8	5.7	5.5		
33000	TOFL	6970	7130	7320	7470	7620	7770	7930	8050	8170	8320	8520	134	179
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	141	141	142	142	142	142	142	142	142	142	142		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.1	6.2	6.2	6.1	5.8		
32000	TOFL	6390	6530	6710	6840	6980	7120	7260	7380	7480	7620	7810	131	176
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	141	141	141	141	142	142	142	142	141	141	141		
	GR2	6.7	6.7	6.6	6.6	6.6	6.6	6.5	6.6	6.6	6.5	6.2		
31000	TOFL	5840	5970	6130	6260	6380	6510	6640	6740	6840	6960	7130	128	173
	V1	126	126	126	126	126	126	126	126	126	126	127		
	VR	132	132	133	133	133	133	133	133	133	133	133		
	V2	137	137	138	138	138	138	138	138	138	137	137		
	GR2	7.2	7.1	7	7	7	7	7	7	7	6.9	6.6		

FIGURE 5-173. TAKE-OFF DISTANCE; FLAPS - 10°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.4	85.0	85.7	86.7	87.6	88.4	89.3	90.2	91.2	92.1	92.9		
30000	TOFL	5310	5430	5580	5690	5800	5920	6040	6120	6210	6330	6480	126	169
	V1	121	121	121	121	121	121	121	121	121	121	121		
	VR	127	128	128	128	128	128	128	128	128	128	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.3	7.1		
29000	TOFL	4840	4950	5080	5180	5280	5380	5490	5570	5650	5750	5890	123	166
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.1	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.5		
28000	TOFL	4420	4510	4630	4720	4810	4900	5000	5070	5140	5230	5350	120	163
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.3	8		
27000	TOFL	4030	4110	4210	4290	4380	4460	4550	4610	4680	4760	4870	117	160
	V1	106	106	107	107	107	107	107	106	106	106	107		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	122	122	122	122	122	122	121	121	121		
	GR2	9.1	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.5		
26000	TOFL	3670	3740	3830	3910	3980	4060	4130	4190	4250	4330	4420	114	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.7	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.3	9		

FIGURE 5-173. TAKE-OFF DISTANCE; FLAPS - 10°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	93.0	93.0	93.0	92.4	91.8	91.2							
39600	TOFL	15220	16100										152	198
	V1	168	169											
	VR	170	171											
	V2	171	172											
	GR2	3.3	3											
39000	TOFL	14540	15370	16360	17590								151	196
	V1	165	166	167	168									
	VR	168	169	169	170									
	V2	169	169	170	171									
	GR2	3.5	3.2	2.9	2.7									
38000	TOFL	13460	14220	15120	16230	17460							148	193
	V1	161	162	163	164	165								
	VR	164	164	165	166	167								
	V2	165	165	166	167	167								
	GR2	3.8	3.5	3.2	2.9	2.6								
37000	TOFL	12420	13120	13930	14940	16120							145	190
	V1	156	157	158	159	160								
	VR	160	160	161	162	163								
	V2	161	161	162	163	163								
	GR2	4.1	3.8	3.5	3.2	2.9								
36000	TOFL	11430	12110	12840	13750	14820	15860						143	187
	V1	151	153	154	155	156	157							
	VR	155	156	157	158	159	159							
	V2	157	157	158	159	159	160							
	GR2	4.4	4.1	3.8	3.5	3.2	2.8							
35000	TOFL	10510	11130	11830	12650	13620	14570						140	185
	V1	146	148	149	150	152	153							
	VR	151	152	153	154	155	155							
	V2	153	153	154	155	155	156							
	GR2	4.8	4.4	4.1	3.8	3.5	3.2							
34000	TOFL	9650	10230	10870	11660	12520	13380						137	182
	V1	142	143	145	146	147	149							
	VR	146	147	148	150	151	151							
	V2	149	149	150	151	152	152							
	GR2	5.1	4.8	4.4	4.2	3.9	3.5							
33000	TOFL	8870	9390	9990	10730	11530	12310						134	179
	V1	137	138	140	142	143	144							
	VR	142	143	144	146	147	147							
	V2	145	145	146	147	148	149							
	GR2	5.5	5.1	4.8	4.5	4.2	3.8							
32000	TOFL	8130	8620	9150	9830	10600	11310						131	176
	V1	132	134	135	137	139	140							
	VR	138	139	140	141	143	144							
	V2	141	142	142	143	144	145							
	GR2	5.9	5.5	5.2	4.9	4.6	4.2							
31000	TOFL	7440	7890	8380	8990	9700	10380						128	173
	V1	128	129	131	132	134	136							
	VR	133	134	136	137	139	140							
	V2	137	138	139	140	141	141							
	GR2	6.3	5.9	5.6	5.3	4.9	4.6							

FIGURE 5-173. TAKE-OFF DISTANCE; FLAPS - 10°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	93.0	93.0	93.0	92.4	91.8	91.2							
30000	TOFL	6770	7200	7650	8220	8870	9490						126	169
	V1	122	124	126	128	130	131							
	VR	129	130	131	133	134	136							
	V2	133	134	135	136	137	138							
	GR2	6.7	6.3	6	5.7	5.3	5							
29000	TOFL	6160	6550	6980	7500	8080	8660						123	166
	V1	117	119	121	123	125	127							
	VR	124	126	127	129	130	132							
	V2	129	130	131	132	133	134							
	GR2	7.1	6.7	6.4	6.1	5.8	5.4							
28000	TOFL	5590	5940	6320	6820	7360	7870						120	163
	V1	113	114	116	119	121	122							
	VR	120	121	122	124	126	127							
	V2	125	126	127	128	130	130							
	GR2	7.6	7.2	6.8	6.5	6.2	5.8							
27000	TOFL	5080	5380	5710	6160	6670	7150						117	160
	V1	108	109	111	113	116	118							
	VR	115	116	118	120	122	123							
	V2	121	122	123	124	126	127							
	GR2	8.1	7.7	7.3	7	6.7	6.3							
26000	TOFL	4620	4880	5170	5560	6020	6470						114	157
	V1	103	105	106	108	111	113							
	VR	111	112	113	115	117	119							
	V2	118	118	119	120	122	123							
	GR2	8.6	8.2	7.8	7.5	7.2	6.8							

FIGURE 5-174. TAKE-OFF DISTANCE; FLAPS - 10°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	85.3	85.6	86.3	87.2	88.2	89.0	89.8	90.8	91.7	92.6	93.0		
39600	TOFL	13130	13570	13990	14290	14580	14930	15230	15440	15700	16010	16470	154	198
	V1	171	171	171	171	171	171	171	171	171	171	171		
	VR	173	173	173	173	173	174	174	174	174	174	174		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	3.8	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.4	3.2		
39000	TOFL	12540	12950	13350	13620	13900	14240	14520	14720	14970	15270	15710	152	197
	V1	168	168	168	168	168	168	168	168	168	168	168		
	VR	170	171	171	171	171	171	171	171	171	171	171		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	4	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.6	3.4		
38000	TOFL	11600	11970	12340	12590	12850	13160	13410	13600	13830	14110	14520	149	194
	V1	163	163	163	163	163	163	163	163	163	163	164		
	VR	166	167	167	167	167	167	167	167	167	167	167		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	4.3	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4	3.9	3.6		
37000	TOFL	10730	11070	11400	11640	11880	12160	12390	12570	12780	13030	13420	147	191
	V1	159	159	159	159	159	159	159	159	159	159	159		
	VR	162	162	163	163	163	163	163	163	163	163	163		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.2	4		
36000	TOFL	9860	10180	10490	10710	10930	11190	11400	11560	11750	11990	12350	144	188
	V1	154	154	154	154	154	154	154	154	154	154	155		
	VR	157	158	158	158	158	158	158	158	158	158	158		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	4.9	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.5	4.3		
35000	TOFL	9060	9350	9630	9820	10020	10260	10460	10600	10780	10990	11320	141	185
	V1	149	149	149	149	149	149	149	149	149	149	150		
	VR	153	153	154	154	154	154	154	154	154	154	154		
	V2	155	156	156	156	156	156	156	156	156	156	156		
	GR2	5.3	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5	4.9	4.6		
34000	TOFL	8310	8580	8830	9010	9190	9410	9590	9720	9880	10080	10380	138	182
	V1	144	144	144	144	144	144	144	144	144	144	145		
	VR	148	149	149	149	149	149	149	149	149	149	149		
	V2	151	152	152	152	152	152	152	152	152	152	152		
	GR2	5.7	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.4	5.2	4.9		
33000	TOFL	7630	7860	8090	8250	8420	8610	8770	8890	9040	9220	9500	135	179
	V1	139	139	139	139	139	139	139	139	139	139	140		
	VR	144	144	144	144	144	144	144	144	144	144	145		
	V2	148	148	148	148	148	148	148	148	148	147	147		
	GR2	6.1	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.6	5.3		
32000	TOFL	7000	7220	7430	7580	7730	7910	8050	8160	8300	8460	8720	133	176
	V1	134	134	135	135	135	135	135	135	135	135	135		
	VR	139	140	140	140	140	140	140	140	140	140	140		
	V2	143	144	144	144	144	144	144	144	144	144	144		
	GR2	6.4	6.3	6.2	6.3	6.3	6.2	6.2	6.2	6.2	6	5.7		
31000	TOFL	6400	6600	6790	6920	7060	7220	7350	7450	7580	7730	7970	130	173
	V1	129	129	130	130	130	130	130	130	130	130	130		
	VR	135	135	136	136	136	136	136	136	136	136	136		
	V2	139	140	140	140	140	140	140	140	140	140	140		
	GR2	6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6.1		

FIGURE 5-174. TAKE-OFF DISTANCE; FLAPS - 10°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	85.3	85.6	86.3	87.2	88.2	89.0	89.8	90.8	91.7	92.6	93.0		
30000	TOFL	5830	6010	6190	6310	6440	6590	6700	6790	6900	7040	7270	127	170
	V1	124	124	125	125	125	125	125	125	125	125	125		
	VR	130	131	131	131	131	131	131	131	131	131	131		
	V2	135	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7	6.8	6.5		
29000	TOFL	5280	5450	5600	5710	5830	5960	6060	6140	6240	6370	6580	124	167
	V1	119	119	119	119	119	119	119	119	119	119	120		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	131	131	132	132	132	132	132	132	131	131	131		
	GR2	7.8	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.3	7		
28000	TOFL	4800	4940	5080	5180	5280	5400	5490	5560	5650	5770	5960	121	164
	V1	114	114	114	114	114	114	114	114	114	114	115		
	VR	121	121	121	121	121	122	122	121	121	121	122		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.3	8.1	8.1	8.1	8.1	8.1	8	8.1	7.9	7.7	7.4		
27000	TOFL	4370	4490	4610	4700	4790	4900	4980	5050	5130	5230	5390	118	160
	V1	109	109	109	109	109	109	109	109	109	109	110		
	VR	116	116	117	117	117	117	117	117	117	117	117		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.8	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.4	8.2	7.9		
26000	TOFL	3970	4080	4190	4270	4350	4440	4520	4580	4650	4740	4890	115	157
	V1	104	104	104	104	104	104	104	104	104	104	105		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.3	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9	8.7	8.4		

FIGURE 5-174. TAKE-OFF DISTANCE; FLAPS - 10°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	72							
	N1 (%)	93.0	93.0	92.8	92.2	91.5	91.2							
39600	TOFL	17270											154	198
	V1	172												
	VR	174												
	V2	174												
	GR2	2.9												
39000	TOFL	16470	17510										152	197
	V1	169	170											
	VR	171	172											
	V2	172	172											
	GR2	3	2.8											
38000	TOFL	15220	16160	17290									149	194
	V1	165	166	167										
	VR	167	168	169										
	V2	168	168	169										
	GR2	3.3	3	2.8										
37000	TOFL	14060	14920	15940	17170								147	191
	V1	160	161	162	163									
	VR	163	164	165	165									
	V2	164	165	165	166									
	GR2	3.6	3.3	3.1	2.8									
36000	TOFL	12950	13720	14640	15750	16980							144	188
	V1	155	156	158	159	160								
	VR	159	159	160	161	162								
	V2	160	160	161	162	162								
	GR2	3.9	3.6	3.3	3.1	2.8								
35000	TOFL	11890	12610	13440	14440	15600	16180						141	185
	V1	151	152	153	154	155	156							
	VR	154	155	156	157	158	158							
	V2	156	156	157	158	158	158							
	GR2	4.3	4	3.7	3.4	3.1	2.9							
34000	TOFL	10900	11570	12350	13240	14280	14820						138	182
	V1	146	147	148	150	151	151							
	VR	150	151	152	153	154	154							
	V2	152	152	153	154	154	154							
	GR2	4.6	4.3	4	3.7	3.4	3.2							
33000	TOFL	9980	10600	11330	12150	13080	13570						135	179
	V1	141	142	144	145	146	147							
	VR	145	146	148	148	149	150							
	V2	147	148	149	150	150	151							
	GR2	5	4.6	4.3	4.1	3.7	3.5							
32000	TOFL	9160	9720	10380	11160	12000	12430						133	176
	V1	136	138	139	141	142	143							
	VR	141	142	143	145	145	146							
	V2	144	144	145	146	146	147							
	GR2	5.4	5	4.7	4.4	4.1	3.9							
31000	TOFL	8390	8890	9500	10200	11010	11390						130	173
	V1	131	133	135	136	138	138							
	VR	137	138	139	140	142	142							
	V2	140	140	141	142	143	143							
	GR2	5.8	5.4	5.1	4.8	4.4	4.3							

FIGURE 5-174. TAKE-OFF DISTANCE; FLAPS - 10°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	72							
	N1 (%)	93.0	93.0	92.8	92.2	91.5	91.2							
30000	TOFL	7650	8120	8660	9320	10050	10430						127	170
	V1	127	128	130	132	133	134							
	VR	132	133	135	136	137	138							
	V2	136	137	137	138	139	140							
	GR2	6.2	5.8	5.5	5.2	4.8	4.7							
29000	TOFL	6950	7390	7900	8480	9160	9500						124	167
	V1	122	123	125	127	129	130							
	VR	128	129	130	132	133	134							
	V2	132	133	134	135	136	136							
	GR2	6.6	6.2	5.9	5.6	5.3	5.1							
28000	TOFL	6280	6710	7180	7730	8320	8640						121	164
	V1	116	118	120	122	124	125							
	VR	123	124	126	128	129	130							
	V2	128	129	130	131	132	132							
	GR2	7.1	6.7	6.4	6	5.7	5.5							
27000	TOFL	5680	6040	6500	7000	7570	7840						118	160
	V1	111	113	115	117	119	120							
	VR	118	119	121	123	125	125							
	V2	123	124	126	127	128	129							
	GR2	7.6	7.2	6.8	6.5	6.2	6							
26000	TOFL	5130	5440	5830	6320	6840	7100						115	157
	V1	106	108	110	112	115	116							
	VR	113	115	116	119	120	121							
	V2	119	120	121	123	124	125							
	GR2	8.1	7.7	7.3	7	6.7	6.5							

FIGURE 5-175. TAKE-OFF DISTANCE; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	TOFL	4290	4350	4420	4490	4550	4620	4680	4750	4830	4910	4980	139	192
	V1	134	134	134	134	134	133	133	133	133	133	133		
	VR	139	139	138	138	138	138	138	138	138	138	138		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
39000	TOFL	4140	4200	4260	4330	4400	4460	4520	4580	4660	4730	4810	138	191
	V1	132	132	132	132	131	131	131	131	131	131	131		
	VR	137	137	137	137	137	137	136	136	136	136	136		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.9	7	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1		
38000	TOFL	3900	3950	4020	4080	4140	4200	4260	4310	4390	4460	4530	136	188
	V1	129	129	129	128	128	128	128	127	127	127	127		
	VR	134	134	134	134	134	134	134	133	133	133	133		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7.3	7.3	7.3	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
37000	TOFL	3670	3720	3780	3840	3900	3950	4010	4060	4130	4190	4260	135	185
	V1	125	125	125	125	125	125	124	124	124	124	124		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9		
36000	TOFL	3460	3510	3560	3620	3670	3730	3780	3830	3890	3960	4020	133	182
	V1	122	122	122	122	122	121	121	121	121	121	121		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	8.1	8.1	8.1	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3		
35000	TOFL	3260	3310	3360	3410	3470	3520	3560	3610	3670	3730	3790	131	180
	V1	119	119	119	119	118	118	118	118	118	118	118		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	135	135	135	135	135	135	134	134	134	134	134		
	GR2	8.5	8.6	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8		
34000	TOFL	3080	3120	3170	3220	3260	3310	3360	3400	3460	3510	3570	129	177
	V1	116	116	116	115	115	115	115	115	115	115	114		
	VR	123	123	122	122	122	122	122	122	122	122	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	9	9	9	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2		
33000	TOFL	2900	2940	2990	3030	3080	3130	3170	3210	3260	3320	3370	127	174
	V1	113	113	112	112	112	112	112	112	112	112	112		
	VR	120	120	120	120	120	120	119	119	119	119	119		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.5	9.5	9.5	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7		
32000	TOFL	2740	2780	2830	2870	2910	2950	3000	3040	3090	3130	3180	125	171
	V1	110	110	110	109	109	109	109	109	109	109	109		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	128	128	128	128	128	128	128	128	128	128	127		
	GR2	10	10	10.1	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.2		
31000	TOFL	2590	2630	2670	2710	2750	2790	2830	2870	2920	2960	3010	123	168
	V1	107	107	107	107	106	106	106	106	106	106	106		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.6	10.6	10.6	10.6	10.7	10.7	10.8	10.8	10.8	10.8	10.8		

FIGURE 5-175. TAKE-OFF DISTANCE; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
30000	TOFL	2460	2490	2530	2570	2610	2650	2690	2730	2770	2810	2850	121	166
	V1	104	104	104	104	104	104	104	103	103	103	103		
	VR	112	112	112	112	112	112	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11.2	11.2	11.2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.4		
29000	TOFL	2340	2370	2410	2450	2480	2520	2570	2610	2650	2690	2730	119	163
	V1	102	102	102	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	122	122	122	121		
	GR2	11.8	11.8	11.9	11.9	11.9	12	12	12.1	12.1	12.1	12.1		
28000	TOFL	2300	2330	2370	2420	2460	2500	2550	2590	2630	2670	2710	117	160
	V1	101	101	101	101	101	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.5	12.5	12.6	12.6	12.7	12.7	12.8	12.8	12.8	12.8	12.8		
27000	TOFL	2280	2310	2350	2400	2440	2480	2530	2570	2610	2650	2690	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	119	119	119	119	119	119	119		
	GR2	13.3	13.3	13.4	13.4	13.4	13.5	13.6	13.6	13.6	13.6	13.6		
26000	TOFL	2260	2300	2340	2380	2420	2460	2500	2550	2590	2630	2660	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	14.1	14.2	14.2	14.3	14.3	14.4	14.4	14.5	14.5	14.5	14.5		

FIGURE 5-175. TAKE-OFF DISTANCE; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
39600	TOFL	5060	5140	5220	5300	5380	5460	5540	5900	6420	6950	7480	139	192
	V1	133	132	132	132	132	132	132	134	137	140	142		
	VR	138	138	138	138	138	138	138	139	141	143	144		
	V2	145	145	145	145	145	145	145	146	147	148	149		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.3	5.7	5	4.5		
39000	TOFL	4890	4960	5040	5110	5190	5270	5350	5700	6190	6700	7220	138	191
	V1	131	130	130	130	130	130	130	133	135	138	140		
	VR	136	136	136	136	136	136	136	138	139	141	143		
	V2	144	144	144	144	144	144	144	144	145	146	147		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.5	5.8	5.2	4.7		
38000	TOFL	4600	4670	4740	4820	4890	4960	5030	5360	5830	6300	6790	136	188
	V1	127	127	127	127	127	127	127	129	132	135	137		
	VR	133	133	133	133	133	133	133	135	137	138	140		
	V2	142	142	142	142	142	142	142	142	143	144	145		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	6.9	6.2	5.6	5		
37000	TOFL	4330	4390	4460	4530	4600	4660	4730	5030	5470	5920	6370	135	185
	V1	124	124	124	124	124	124	124	126	129	131	134		
	VR	131	131	131	131	131	131	131	132	134	135	137		
	V2	139	139	139	139	139	139	139	139	140	141	142		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.3	6.6	5.9	5.3		
36000	TOFL	4080	4140	4210	4270	4330	4390	4460	4720	5130	5550	5970	133	182
	V1	121	121	121	121	121	121	121	122	125	128	130		
	VR	128	128	128	128	128	128	128	129	131	132	134		
	V2	137	137	137	137	137	137	137	137	138	139	139		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	7.7	6.9	6.3	5.7		
35000	TOFL	3840	3900	3960	4020	4080	4140	4190	4440	4810	5200	5590	131	180
	V1	118	118	117	117	117	117	117	119	122	125	127		
	VR	125	125	125	125	125	125	125	126	128	129	131		
	V2	134	134	134	134	134	134	134	135	135	136	137		
	GR2	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.1	7.3	6.7	6		
34000	TOFL	3620	3670	3730	3790	3840	3900	3950	4170	4500	4860	5230	129	177
	V1	114	114	114	114	114	114	114	116	118	121	124		
	VR	122	122	122	122	122	122	122	123	125	126	128		
	V2	132	132	132	132	132	132	132	132	133	134	134		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	8.5	7.8	7.1	6.4		
33000	TOFL	3420	3470	3520	3570	3620	3670	3720	3920	4220	4540	4890	127	174
	V1	111	111	111	111	111	111	111	113	115	118	120		
	VR	119	119	119	119	119	119	119	120	122	124	125		
	V2	130	129	129	129	129	129	129	129	130	131	132		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9	8.2	7.5	6.8		
32000	TOFL	3230	3270	3320	3370	3420	3470	3510	3680	3960	4240	4550	125	171
	V1	109	108	108	108	108	108	108	110	112	114	117		
	VR	117	117	117	117	117	117	117	118	119	121	122		
	V2	127	127	127	127	127	127	127	127	128	129	129		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	9.5	8.7	7.9	7.3		
31000	TOFL	3050	3100	3140	3180	3230	3270	3320	3470	3710	3970	4240	123	168
	V1	106	106	106	106	106	105	105	107	109	111	113		
	VR	114	114	114	114	114	114	114	115	116	118	119		
	V2	125	125	125	125	125	125	125	125	126	126	127		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.1	9.2	8.4	7.7		

FIGURE 5-175. TAKE-OFF DISTANCE; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
30000	TOFL	2900	2940	2980	3020	3060	3110	3150	3270	3480	3720	3960	121	166
	V1	103	103	103	103	103	103	103	104	106	108	110		
	VR	111	111	111	111	111	111	111	112	113	115	116		
	V2	123	123	123	123	123	123	123	123	123	124	124		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	10.6	9.8	9	8.2		
29000	TOFL	2770	2810	2850	2890	2930	2970	3010	3100	3270	3470	3690	119	163
	V1	101	101	101	101	101	101	101	101	103	104	106		
	VR	109	109	109	109	109	109	109	110	111	112	113		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12	11.3	10.4	9.5	8.8		
28000	TOFL	2750	2790	2830	2860	2900	2940	2980	2950	3080	3250	3440	117	160
	V1	101	101	101	101	101	101	101	99	100	101	103		
	VR	107	107	107	107	107	107	107	107	108	109	110		
	V2	120	120	120	120	120	120	120	119	119	119	119		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	11.9	11	10.1	9.3		
27000	TOFL	2730	2760	2800	2840	2880	2920	2950	2920	2910	3050	3210	115	157
	V1	102	102	102	101	101	101	101	99	97	98	100		
	VR	105	105	105	105	105	105	105	105	105	106	107		
	V2	119	119	119	119	119	119	119	118	117	116	116		
	GR2	13.6	13.6	13.6	13.6	13.6	13.6	13.6	12.7	11.7	10.8	9.9		
26000	TOFL	2700	2740	2780	2810	2850	2890	2930	2900	2850	2880	3010	113	154
	V1	102	102	102	102	102	102	102	99	97	96	97		
	VR	103	103	103	103	103	103	103	103	103	103	104		
	V2	118	118	118	118	118	118	118	116	115	114	114		
	GR2	14.4	14.4	14.4	14.4	14.4	14.4	14.4	13.5	12.5	11.5	10.6		

FIGURE 5-176. TAKE-OFF DISTANCE; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	TOFL	4540	4600	4680	4750	4830	4900	4970	5050	5130	5220	5300	139	193
	V1	135	135	135	135	135	134	134	134	134	134	134		
	VR	140	140	140	140	140	139	139	139	139	139	139		
	V2	147	147	146	146	146	146	146	146	146	146	146		
	GR2	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7		
39000	TOFL	4380	4440	4520	4590	4660	4730	4800	4870	4950	5030	5110	138	191
	V1	133	133	133	133	133	133	132	132	132	132	132		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
38000	TOFL	4120	4180	4250	4320	4390	4450	4520	4580	4660	4740	4810	136	188
	V1	130	130	130	130	129	129	129	129	129	129	129		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	143	143	142	142	142	142	142	142	142	142	142		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3		
37000	TOFL	3880	3930	4000	4060	4120	4180	4240	4310	4380	4450	4520	135	185
	V1	127	126	126	126	126	126	126	125	125	125	125		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7		
36000	TOFL	3650	3690	3760	3820	3880	3940	3990	4050	4120	4190	4250	133	183
	V1	123	123	123	123	123	122	122	122	122	122	122		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	138	137	137	137	137	137	137	137	137	137	137		
	GR2	7.9	7.9	8	8	8	8	8	8.1	8.1	8.1	8.1		
35000	TOFL	3430	3480	3540	3600	3650	3710	3760	3820	3880	3940	4000	131	180
	V1	120	120	120	120	119	119	119	119	119	119	119		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
34000	TOFL	3230	3280	3340	3390	3440	3490	3540	3590	3650	3710	3770	129	177
	V1	117	117	117	116	116	116	116	116	116	116	116		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
33000	TOFL	3040	3090	3140	3190	3240	3280	3330	3380	3440	3490	3540	127	174
	V1	114	113	113	113	113	113	113	113	112	112	112		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.3	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
32000	TOFL	2870	2910	2960	3010	3050	3100	3140	3190	3240	3290	3340	125	171
	V1	110	110	110	110	110	110	110	110	109	109	109		
	VR	118	118	118	118	117	117	117	117	117	117	117		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
31000	TOFL	2710	2750	2790	2840	2880	2920	2960	3010	3050	3100	3150	123	169
	V1	107	107	107	107	107	107	107	107	106	106	106		
	VR	115	115	115	115	115	115	115	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5		

FIGURE 5-176. TAKE-OFF DISTANCE; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
30000	TOFL	2560	2590	2640	2680	2720	2760	2800	2840	2890	2930	2980	121	166
	V1	105	104	104	104	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.9	10.9	11	11	11	11	11.1	11.1	11.1	11.1	11.1		
29000	TOFL	2430	2460	2510	2550	2590	2620	2660	2700	2750	2790	2830	119	163
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	110	110	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
28000	TOFL	2340	2380	2420	2460	2510	2550	2600	2640	2680	2720	2760	117	160
	V1	100	100	100	100	100	101	101	101	101	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	120	120	120	120	120	120	120		
	GR2	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
27000	TOFL	2330	2360	2400	2440	2490	2530	2570	2620	2660	2700	2740	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13	13.1	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2	13.2		
26000	TOFL	2310	2340	2380	2420	2470	2510	2550	2590	2630	2670	2710	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.9	13.9	13.9	13.9	14	14	14	14.1	14.1	14.1	14.1		

FIGURE 5-176. TAKE-OFF DISTANCE; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
39600	TOFL	5390	5470	5560	5640	5730	5810	6020	6460	7000	7560	7900	139	193
	V1	134	134	134	134	134	134	135	137	140	142	143		
	VR	139	139	139	139	139	139	140	141	143	145	146		
	V2	146	146	146	146	146	146	147	147	148	149	149		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.5	5.9	5.3	4.7	4.3		
39000	TOFL	5200	5280	5360	5440	5530	5610	5800	6230	6750	7300	7630	138	191
	V1	132	132	132	132	132	132	133	135	138	140	141		
	VR	138	138	138	138	138	138	138	140	141	143	144		
	V2	145	145	145	145	145	145	145	146	147	148	148		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.7	6.1	5.5	4.9	4.5		
38000	TOFL	4890	4960	5040	5120	5200	5270	5460	5860	6340	6850	7180	136	188
	V1	129	129	129	128	128	128	129	132	134	137	138		
	VR	135	135	135	135	135	135	135	137	138	140	141		
	V2	142	142	142	142	142	142	143	143	144	145	146		
	GR2	7.3	7.3	7.3	7.3	7.3	7.2	7	6.5	5.8	5.2	4.8		
37000	TOFL	4590	4660	4740	4810	4880	4950	5130	5500	5960	6430	6740	135	185
	V1	125	125	125	125	125	125	126	128	131	133	135		
	VR	132	132	132	132	132	132	132	134	136	137	138		
	V2	140	140	140	140	140	140	140	141	142	142	143		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.4	6.8	6.2	5.5	5.2		
36000	TOFL	4320	4390	4450	4520	4590	4650	4810	5160	5590	6030	6310	133	183
	V1	122	122	122	122	122	122	122	125	128	130	132		
	VR	129	129	129	129	129	129	129	131	133	134	135		
	V2	137	137	137	137	137	137	137	138	139	140	140		
	GR2	8.1	8.1	8	8	8	8	7.8	7.2	6.5	5.9	5.5		
35000	TOFL	4060	4130	4190	4250	4310	4370	4520	4830	5230	5640	5900	131	180
	V1	119	119	119	118	118	118	119	121	124	127	128		
	VR	126	126	126	126	126	126	126	128	130	131	132		
	V2	135	135	134	134	134	134	135	136	136	137	138		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.2	7.6	6.9	6.3	5.9		
34000	TOFL	3830	3880	3940	4000	4060	4120	4240	4520	4880	5270	5520	129	177
	V1	115	115	115	115	115	115	116	118	121	123	125		
	VR	123	123	123	123	123	123	123	125	126	128	129		
	V2	133	133	133	132	132	132	132	133	134	135	135		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.7	8.1	7.3	6.7	6.3		
33000	TOFL	3600	3650	3710	3760	3820	3870	3990	4240	4560	4920	5150	127	174
	V1	112	112	112	112	112	112	113	115	117	120	121		
	VR	120	120	120	120	120	120	121	122	123	125	126		
	V2	130	130	130	130	130	130	130	130	131	132	132		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.2	8.5	7.8	7.1	6.7		
32000	TOFL	3390	3440	3490	3540	3590	3640	3750	3980	4270	4580	4800	125	171
	V1	109	109	109	109	109	109	110	112	114	116	118		
	VR	117	117	117	117	117	117	118	119	120	122	123		
	V2	127	127	127	127	127	127	128	128	129	129	130		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.7	9	8.2	7.5	7.1		
31000	TOFL	3200	3240	3290	3340	3390	3430	3530	3730	3990	4270	4460	123	169
	V1	106	106	106	106	106	106	107	108	110	113	114		
	VR	114	114	114	114	114	114	115	116	118	119	120		
	V2	125	125	125	125	125	125	125	125	126	127	127		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.2	9.5	8.7	8	7.6		

FIGURE 5-176. TAKE-OFF DISTANCE; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
30000	TOFL	3020	3070	3110	3150	3200	3240	3320	3500	3730	3990	4150	121	166
	V1	104	103	103	103	103	103	104	105	107	109	110		
	VR	112	112	112	112	112	112	112	113	115	116	117		
	V2	123	123	123	123	123	123	123	123	123	124	124		
	GR2	11.1	11.1	11.1	11.1	11.1	11.1	10.8	10.1	9.3	8.5	8		
29000	TOFL	2870	2910	2950	2990	3040	3080	3150	3290	3490	3720	3870	119	163
	V1	101	101	101	101	101	101	101	102	104	106	107		
	VR	109	109	109	109	109	109	110	110	112	113	114		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.4	10.7	9.8	9	8.6		
28000	TOFL	2800	2840	2880	2920	2960	3000	3020	3110	3270	3470	3600	117	160
	V1	100	100	100	100	100	100	99	99	101	102	104		
	VR	107	107	107	107	107	107	107	108	109	110	111		
	V2	120	120	120	120	120	120	119	119	119	119	120		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.1	11.3	10.4	9.6	9.1		
27000	TOFL	2780	2810	2850	2890	2930	2970	2990	2960	3080	3240	3350	115	157
	V1	101	101	100	100	100	100	99	97	98	99	100		
	VR	105	105	105	105	105	105	105	105	106	107	108		
	V2	118	118	118	118	118	118	118	117	117	116	117		
	GR2	13.2	13.2	13.2	13.2	13.2	13.2	12.9	12.1	11.1	10.2	9.7		
26000	TOFL	2750	2790	2830	2870	2910	2940	2960	2930	2900	3040	3130	113	154
	V1	101	101	101	101	101	100	100	98	95	96	97		
	VR	103	103	103	103	103	103	103	103	103	104	104		
	V2	117	117	117	117	117	117	117	116	115	114	114		
	GR2	14.1	14	14	14	14	14	13.7	12.8	11.9	10.9	10.4		

FIGURE 5-177. TAKE-OFF DISTANCE; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	TOFL	4770	4850	4940	5030	5110	5200	5280	5370	5460	5550	5640	140	193
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
39000	TOFL	4610	4680	4770	4850	4940	5020	5090	5180	5270	5360	5440	139	191
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7		
38000	TOFL	4340	4410	4490	4570	4640	4720	4790	4870	4960	5040	5120	137	189
	V1	131	131	131	131	131	130	130	130	130	130	130		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
37000	TOFL	4080	4140	4220	4290	4370	4440	4500	4580	4650	4730	4810	135	186
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
36000	TOFL	3830	3890	3960	4030	4100	4160	4230	4300	4370	4440	4510	133	183
	V1	124	124	124	124	124	124	123	123	123	123	123		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
35000	TOFL	3600	3660	3720	3790	3850	3910	3970	4040	4100	4170	4240	131	180
	V1	121	121	121	120	120	120	120	120	120	120	120		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
34000	TOFL	3390	3440	3500	3560	3620	3680	3740	3800	3860	3920	3980	129	177
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.6	8.6		
33000	TOFL	3190	3240	3300	3350	3410	3460	3520	3570	3630	3690	3740	127	175
	V1	114	114	114	114	114	114	114	114	114	113	113		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
32000	TOFL	3000	3040	3100	3150	3200	3250	3300	3350	3410	3460	3520	125	172
	V1	111	111	111	111	111	111	110	110	110	110	110		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
31000	TOFL	2830	2870	2920	2970	3010	3060	3110	3160	3200	3250	3300	123	169
	V1	108	108	108	108	108	107	107	107	107	107	107		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	126	126	126	126	126	126	126	126	125	125	125		
	GR2	10.2	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		

FIGURE 5-177. TAKE-OFF DISTANCE; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
30000	TOFL	2660	2700	2750	2790	2840	2880	2920	2970	3020	3060	3110	121	166
	V1	105	105	105	105	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.8	10.8	10.7	10.7		
29000	TOFL	2520	2560	2600	2640	2690	2730	2770	2820	2860	2900	2950	119	163
	V1	102	102	102	102	102	102	102	102	102	102	101		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.4	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
28000	TOFL	2400	2430	2480	2520	2560	2610	2650	2690	2730	2770	2820	117	160
	V1	100	100	100	100	100	100	100	100	100	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12	12	12	12	12	12.1	12.1	12.1	12.1	12.1		
27000	TOFL	2380	2410	2460	2500	2540	2580	2630	2670	2710	2750	2790	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		
26000	TOFL	2360	2390	2440	2480	2520	2560	2600	2640	2690	2720	2760	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6		

FIGURE 5-177. TAKE-OFF DISTANCE; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
39600	TOFL	5730	5830	5920	6010	6100	6190	6550	7070	7630	8220	8350	140	193
	V1	135	135	135	135	135	135	137	139	142	144	144		
	VR	141	141	141	141	141	141	142	143	145	146	147		
	V2	147	147	147	147	147	147	148	149	149	150	150		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.1	5.5	4.9	4.3	4.2		
39000	TOFL	5530	5620	5710	5800	5880	5970	6320	6820	7370	7930	8060	139	191
	V1	133	133	133	133	133	133	135	137	140	142	142		
	VR	139	139	139	139	139	139	140	142	143	145	145		
	V2	146	146	146	146	146	146	146	147	148	149	149		
	GR2	6.7	6.7	6.6	6.6	6.6	6.6	6.3	5.7	5.1	4.5	4.3		
38000	TOFL	5200	5280	5370	5450	5530	5610	5940	6410	6910	7470	7590	137	189
	V1	130	130	130	130	130	130	132	134	137	139	139		
	VR	136	136	136	136	136	136	137	139	140	142	142		
	V2	143	143	143	143	143	143	144	145	145	146	146		
	GR2	7	7	7	7	7	7	6.6	6	5.4	4.8	4.7		
37000	TOFL	4880	4960	5040	5120	5190	5270	5570	6010	6490	7010	7130	135	186
	V1	127	127	127	126	126	126	128	131	133	136	136		
	VR	133	133	133	133	133	133	134	136	137	139	140		
	V2	141	141	141	141	141	141	141	142	143	144	144		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7	6.4	5.7	5.1	5		
36000	TOFL	4580	4650	4730	4790	4870	4940	5230	5640	6080	6560	6670	133	183
	V1	123	123	123	123	123	123	125	127	130	132	133		
	VR	130	130	130	130	130	130	131	133	134	136	136		
	V2	138	138	138	138	138	138	139	139	140	141	141		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.4	6.8	6.1	5.5	5.3		
35000	TOFL	4300	4370	4440	4500	4570	4630	4890	5270	5690	6140	6240	131	180
	V1	120	120	120	120	120	120	121	124	126	129	129		
	VR	127	127	127	127	127	127	128	130	131	133	133		
	V2	135	135	135	135	135	135	136	136	138	138	139		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	7.8	7.2	6.5	5.8	5.7		
34000	TOFL	4040	4110	4170	4230	4290	4350	4580	4920	5310	5740	5830	129	177
	V1	117	117	116	116	116	116	118	120	123	125	126		
	VR	124	124	124	124	124	124	125	127	128	130	130		
	V2	133	133	132	132	132	132	133	134	135	136	136		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.2	7.6	6.9	6.2	6.1		
33000	TOFL	3800	3860	3920	3970	4030	4090	4290	4600	4950	5350	5440	127	175
	V1	113	113	113	113	113	113	114	117	119	122	122		
	VR	121	121	121	121	121	121	122	124	125	127	127		
	V2	131	131	131	131	131	131	131	131	132	133	133		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	8.7	8	7.3	6.6	6.5		
32000	TOFL	3570	3620	3670	3730	3780	3830	4020	4300	4610	4980	5060	125	172
	V1	110	110	110	110	110	110	111	113	116	118	119		
	VR	118	118	118	118	118	118	119	120	122	124	124		
	V2	128	128	128	128	128	128	128	128	129	130	130		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.2	8.5	7.8	7	6.9		
31000	TOFL	3350	3400	3460	3510	3550	3600	3780	4020	4300	4630	4700	123	169
	V1	107	107	107	107	107	107	108	110	112	114	115		
	VR	115	115	115	115	115	115	116	118	119	120	121		
	V2	125	125	125	125	125	125	126	126	126	128	128		
	GR2	10.2	10.2	10.1	10.1	10.1	10.1	9.7	9	8.2	7.5	7.3		

FIGURE 5-177. TAKE-OFF DISTANCE; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
30000	TOFL	3160	3200	3250	3300	3340	3390	3540	3760	4020	4300	4360	121	166
	V1	104	104	104	104	104	104	105	107	109	111	111		
	VR	112	112	112	112	112	112	113	115	116	117	118		
	V2	123	123	123	123	123	123	123	124	124	125	125		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.3	9.5	8.7	8	7.8		
29000	TOFL	2990	3040	3080	3120	3170	3210	3330	3520	3740	4000	4060	119	163
	V1	101	101	101	101	101	101	102	103	105	107	108		
	VR	110	110	110	110	110	110	110	111	113	114	114		
	V2	121	121	121	121	121	121	121	121	122	122	122		
	GR2	11.4	11.4	11.4	11.4	11.4	11.3	10.9	10.1	9.3	8.5	8.3		
28000	TOFL	2860	2900	2940	2980	3020	3060	3150	3300	3490	3730	3780	117	160
	V1	99	99	99	99	99	99	99	100	102	104	104		
	VR	107	107	107	107	107	107	108	108	110	111	111		
	V2	119	119	119	119	119	119	119	119	119	120	120		
	GR2	12.1	12.1	12	12	12	12	11.5	10.7	9.9	9.1	8.9		
27000	TOFL	2830	2870	2910	2950	2990	3030	3030	3110	3260	3460	3500	115	157
	V1	100	100	99	99	99	99	98	98	99	101	101		
	VR	105	105	105	105	105	105	105	106	107	108	108		
	V2	118	118	118	118	118	118	117	117	117	117	117		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.3	11.4	10.5	9.7	9.5		
26000	TOFL	2800	2840	2880	2920	2960	3000	3000	2980	3070	3220	3260	113	154
	V1	100	100	100	100	100	99	98	96	96	97	98		
	VR	103	103	103	103	103	103	103	103	104	105	105		
	V2	117	117	117	117	117	117	116	115	115	114	114		
	GR2	13.6	13.6	13.6	13.6	13.6	13.6	13.1	12.1	11.2	10.3	10.1		

FIGURE 5-178. TAKE-OFF DISTANCE; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	TOFL	5080	5190	5290	5390	5490	5590	5680	5780	5880	5980	6070	141	193
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
39000	TOFL	4880	4990	5090	5180	5280	5370	5460	5550	5650	5740	5840	140	192
	V1	136	136	136	136	136	136	136	136	135	135	135		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
38000	TOFL	4570	4670	4760	4850	4940	5020	5100	5190	5280	5370	5450	137	189
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
37000	TOFL	4290	4390	4470	4560	4630	4710	4790	4880	4960	5040	5120	135	186
	V1	129	129	129	129	129	128	128	128	128	128	128		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
36000	TOFL	4030	4120	4200	4270	4350	4420	4500	4570	4650	4730	4800	133	183
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
35000	TOFL	3780	3860	3930	4010	4080	4150	4210	4290	4360	4430	4490	131	181
	V1	122	122	122	122	122	121	121	121	121	121	121		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
34000	TOFL	3550	3630	3700	3760	3830	3890	3960	4020	4090	4160	4220	129	178
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	133		
	GR2	8.5	8.3	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.3	8.3		
33000	TOFL	3340	3410	3480	3540	3600	3660	3720	3780	3840	3910	3970	127	175
	V1	115	115	115	115	115	115	115	115	115	115	114		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	3140	3210	3260	3320	3380	3430	3490	3550	3610	3660	3720	125	172
	V1	112	112	112	112	112	112	111	111	111	111	111		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9.4	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
31000	TOFL	2950	3010	3060	3120	3170	3220	3270	3330	3380	3430	3480	123	169
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 5-178. TAKE-OFF DISTANCE; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
30000	TOFL	2770	2830	2880	2930	2980	3020	3070	3120	3170	3220	3270	121	166
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	124	124	124	124	124	123	123	123	123	123	123		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
29000	TOFL	2620	2660	2710	2760	2810	2850	2900	2940	2990	3040	3080	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11	11	11	11	11	11	11	11	11	11		
28000	TOFL	2490	2530	2580	2620	2660	2710	2750	2790	2830	2880	2920	117	160
	V1	100	100	100	100	100	100	100	100	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.8	11.6	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.6		
27000	TOFL	2430	2460	2500	2550	2590	2630	2670	2720	2760	2800	2840	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	117	117	117	118	118	118	117	117		
	GR2	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	2410	2440	2480	2520	2570	2610	2650	2690	2730	2770	2820	113	154
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.4	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2		

FIGURE 5-178. TAKE-OFF DISTANCE; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
39600	TOFL	6170	6270	6370	6470	6570	6740	7250	7840	8420	8940		141	193
	V1	138	138	138	138	138	138	140	143	145	146			
	VR	143	143	143	143	143	143	145	146	148	149			
	V2	149	149	149	149	149	149	150	151	151	152			
	GR2	6.2	6.2	6.2	6.2	6.2	6.1	5.6	5	4.5	4			
39000	TOFL	5930	6020	6120	6210	6310	6470	6960	7530	8100	8600		140	192
	V1	135	135	135	135	135	136	138	140	142	144			
	VR	141	141	141	141	141	141	143	144	146	147			
	V2	147	147	147	147	147	147	148	149	149	150			
	GR2	6.4	6.4	6.4	6.4	6.4	6.3	5.8	5.2	4.6	4.2			
38000	TOFL	5540	5630	5720	5810	5900	6050	6510	7030	7580	8060		137	189
	V1	132	131	131	131	131	132	134	137	139	141			
	VR	137	137	137	137	137	137	139	141	142	144			
	V2	144	144	144	144	144	144	145	146	147	147			
	GR2	6.7	6.7	6.7	6.7	6.7	6.6	6.2	5.5	4.9	4.5			
37000	TOFL	5200	5280	5370	5450	5530	5670	6100	6590	7120	7570		135	186
	V1	128	128	128	128	128	128	131	133	136	138			
	VR	134	134	134	134	134	134	136	138	140	141			
	V2	141	141	141	141	141	141	142	143	144	145			
	GR2	7.1	7.1	7.1	7.1	7.1	7	6.5	5.9	5.3	4.8			
36000	TOFL	4870	4950	5030	5110	5180	5310	5710	6170	6660	7110		133	183
	V1	125	125	125	125	125	125	127	130	132	134			
	VR	131	131	131	131	131	131	133	135	136	138			
	V2	138	138	138	138	138	138	140	141	141	142			
	GR2	7.5	7.5	7.5	7.5	7.5	7.4	6.9	6.2	5.6	5.1			
35000	TOFL	4570	4640	4710	4780	4850	4970	5340	5770	6230	6630		131	181
	V1	121	121	121	121	121	121	124	126	129	131			
	VR	128	128	128	128	128	128	130	132	133	135			
	V2	136	136	136	136	136	136	137	138	139	139			
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.3	6.6	6	5.5			
34000	TOFL	4290	4350	4420	4480	4550	4660	4990	5380	5810	6190		129	178
	V1	118	118	118	118	118	118	120	123	125	127			
	VR	125	125	125	125	125	125	127	129	130	132			
	V2	133	133	133	133	133	133	134	135	136	137			
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	7.7	7	6.4	5.8			
33000	TOFL	4030	4080	4150	4210	4270	4370	4660	5010	5410	5770		127	175
	V1	114	114	114	114	114	115	117	119	122	124			
	VR	122	122	122	122	122	122	124	125	127	128			
	V2	131	131	131	131	131	131	132	132	133	134			
	GR2	8.8	8.8	8.8	8.8	8.8	8.7	8.2	7.5	6.8	6.3			
32000	TOFL	3770	3830	3880	3950	4000	4100	4360	4680	5030	5360		125	172
	V1	111	111	111	111	111	111	113	115	118	120			
	VR	119	119	119	119	119	119	121	122	124	125			
	V2	129	129	129	129	129	129	129	130	131	131			
	GR2	9.3	9.3	9.3	9.3	9.3	9.2	8.6	7.9	7.2	6.7			
31000	TOFL	3530	3590	3640	3690	3750	3830	4080	4360	4670	4970		123	169
	V1	108	108	108	108	108	108	110	112	114	116			
	VR	116	116	116	116	116	116	118	119	121	122			
	V2	126	126	126	126	126	126	126	127	127	128			
	GR2	9.8	9.8	9.8	9.8	9.8	9.7	9.1	8.4	7.7	7.1			

FIGURE 5-178. TAKE-OFF DISTANCE; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
30000	TOFL	3320	3370	3420	3470	3520	3590	3810	4070	4350	4610		121	166
	V1	105	105	105	105	105	105	106	109	111	113			
	VR	113	113	113	113	113	113	115	116	117	119			
	V2	123	123	123	123	123	123	124	125	125	126			
	GR2	10.4	10.4	10.4	10.4	10.3	10.2	9.7	8.9	8.2	7.6			
29000	TOFL	3130	3170	3220	3270	3310	3380	3570	3790	4040	4270		119	163
	V1	102	102	102	102	102	102	103	105	107	109			
	VR	110	110	110	110	110	110	112	113	114	115			
	V2	121	121	121	121	121	121	122	122	122	123			
	GR2	11	11	11	11	10.9	10.8	10.2	9.5	8.7	8.1			
28000	TOFL	2960	3010	3050	3090	3140	3200	3340	3540	3760	3980		117	160
	V1	99	99	99	99	99	99	100	102	104	105			
	VR	108	108	108	108	108	108	108	110	111	112			
	V2	119	119	119	119	119	119	119	119	120	120			
	GR2	11.6	11.6	11.6	11.6	11.6	11.5	10.9	10.1	9.3	8.6			
27000	TOFL	2880	2920	2970	3010	3050	3080	3160	3300	3500	3680		115	157
	V1	98	98	98	98	98	98	98	99	100	102			
	VR	105	105	105	105	105	105	106	107	108	109			
	V2	117	117	117	117	117	117	117	117	117	117			
	GR2	12.4	12.4	12.4	12.4	12.3	12.2	11.6	10.7	9.9	9.2			
26000	TOFL	2860	2900	2940	2980	3020	3050	3040	3110	3260	3420		113	154
	V1	99	99	99	98	98	98	96	96	97	98			
	VR	103	103	103	103	103	103	103	104	105	106			
	V2	116	116	116	116	116	116	115	115	114	115			
	GR2	13.2	13.2	13.2	13.2	13.1	13	12.3	11.4	10.5	9.9			

FIGURE 5-179. TAKE-OFF DISTANCE; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	TOFL	5490	5610	5720	5830	5940	6040	6150	6250	6360	6470	6570	142	194
	V1	141	141	141	141	140	140	140	140	140	140	140		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	5.9	5.9	5.9	5.9	6	6	6	6	5.9	5.9		
39000	TOFL	5270	5390	5500	5600	5700	5800	5900	6000	6100	6210	6310	141	192
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.2	6.2	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.1		
38000	TOFL	4920	5030	5130	5220	5320	5410	5500	5600	5690	5790	5880	138	189
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
37000	TOFL	4590	4690	4780	4870	4960	5040	5130	5210	5300	5390	5480	136	187
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
36000	TOFL	4300	4400	4480	4560	4640	4720	4800	4880	4960	5050	5130	133	184
	V1	127	127	127	127	127	127	126	126	126	126	126		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
35000	TOFL	4030	4120	4200	4270	4350	4420	4500	4570	4650	4720	4800	131	181
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
34000	TOFL	3780	3860	3930	4000	4070	4140	4210	4280	4350	4420	4490	129	178
	V1	120	120	120	120	120	119	119	119	119	119	119		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
33000	TOFL	3550	3620	3690	3760	3820	3890	3950	4020	4080	4140	4220	127	175
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	3330	3400	3460	3520	3580	3640	3700	3770	3830	3890	3950	125	172
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9.1	9	9	9	9	9	9	9	9	9	9		
31000	TOFL	3120	3180	3240	3300	3360	3410	3470	3520	3570	3640	3680	123	169
	V1	110	110	110	110	110	109	109	109	109	109	109		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		

FIGURE 5-179. TAKE-OFF DISTANCE; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
30000	TOFL	2930	2980	3040	3090	3140	3190	3250	3290	3350	3400	3450	121	166
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.1	10	10	10	10	10	10.1	10.1	10	10	10		
29000	TOFL	2740	2800	2850	2900	2940	2990	3040	3090	3140	3190	3230	119	163
	V1	103	103	103	103	103	103	103	103	103	103	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.7	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
28000	TOFL	2600	2640	2690	2740	2780	2830	2870	2920	2960	3010	3060	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
27000	TOFL	2480	2510	2550	2590	2640	2680	2720	2770	2810	2850	2890	115	157
	V1	98	98	98	98	98	98	98	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12	12	12	12	12	12	12	12	12	12		
26000	TOFL	2450	2480	2530	2570	2610	2660	2700	2740	2780	2820	2870	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 5-179. TAKE-OFF DISTANCE; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
39600	TOFL	6680	6790	6900	7010	7110	7490	8090	8700	9340	9620		142	194
	V1	140	140	140	140	140	141	144	146	147	148			
	VR	145	145	145	145	145	146	148	149	150	151			
	V2	150	150	150	150	150	151	152	153	153	153			
	GR2	5.9	5.9	5.9	5.9	5.9	5.7	5.2	4.6	4.1	3.8			
39000	TOFL	6410	6510	6620	6720	6830	7180	7770	8360	8990	9260		141	192
	V1	138	138	138	138	137	139	141	143	145	146			
	VR	143	143	143	143	143	144	146	147	148	149			
	V2	148	148	148	148	148	149	150	151	151	152			
	GR2	6.1	6.1	6.1	6.1	6.1	5.9	5.3	4.8	4.2	4			
38000	TOFL	5980	6070	6170	6270	6360	6700	7240	7810	8400	8670		138	189
	V1	134	134	134	134	134	135	137	140	142	143			
	VR	139	139	139	139	139	140	142	144	145	145			
	V2	145	145	145	145	145	146	147	148	148	149			
	GR2	6.5	6.5	6.5	6.5	6.4	6.2	5.7	5.1	4.5	4.3			
37000	TOFL	5560	5650	5740	5830	5910	6230	6730	7280	7840	8090		136	187
	V1	130	130	130	130	130	131	134	136	138	139			
	VR	135	135	135	135	135	137	138	140	142	142			
	V2	142	142	142	142	142	143	144	145	145	146			
	GR2	6.8	6.8	6.8	6.8	6.8	6.5	6	5.4	4.8	4.6			
36000	TOFL	5210	5290	5370	5450	5540	5820	6290	6800	7350	7590		133	184
	V1	126	126	126	126	126	127	130	132	135	136			
	VR	132	132	132	132	132	133	135	137	139	139			
	V2	139	139	139	139	139	140	141	142	143	143			
	GR2	7.2	7.2	7.2	7.2	7.2	6.9	6.4	5.8	5.2	4.9			
35000	TOFL	4870	4950	5030	5100	5180	5440	5880	6350	6860	7100		131	181
	V1	123	123	122	122	122	124	126	129	131	132			
	VR	129	129	129	129	129	130	132	134	135	136			
	V2	136	136	136	136	136	137	138	139	140	141			
	GR2	7.6	7.6	7.6	7.6	7.6	7.3	6.8	6.1	5.5	5.3			
34000	TOFL	4560	4630	4710	4780	4850	5090	5480	5920	6400	6610		129	178
	V1	119	119	119	119	119	120	123	125	128	129			
	VR	126	126	126	126	126	127	129	131	132	133			
	V2	134	134	134	134	134	134	135	136	137	138			
	GR2	8.1	8	8	8	8	7.7	7.2	6.5	5.9	5.7			
33000	TOFL	4270	4350	4410	4470	4540	4750	5110	5510	5950	6160		127	175
	V1	116	116	116	116	116	117	119	122	124	125			
	VR	123	123	123	123	123	124	126	127	129	130			
	V2	131	131	131	131	131	132	133	134	134	135			
	GR2	8.5	8.5	8.5	8.5	8.4	8.2	7.6	6.9	6.3	6			
32000	TOFL	4010	4060	4130	4190	4250	4440	4760	5130	5530	5720		125	172
	V1	112	112	112	112	112	113	116	118	120	122			
	VR	120	120	120	120	120	121	123	124	126	126			
	V2	129	129	129	129	129	129	130	131	132	132			
	GR2	9	9	9	9	8.9	8.6	8	7.4	6.7	6.4			
31000	TOFL	3740	3800	3860	3910	3980	4150	4440	4760	5130	5300		123	169
	V1	109	109	109	109	109	110	112	114	117	118			
	VR	117	117	117	117	117	118	119	121	122	123			
	V2	126	126	126	126	126	127	127	128	129	129			
	GR2	9.5	9.5	9.5	9.5	9.4	9.1	8.5	7.8	7.2	6.9			

FIGURE 5-179. TAKE-OFF DISTANCE; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
30000	TOFL	3500	3560	3610	3660	3720	3870	4140	4420	4750	4910		121	166
	V1	106	106	106	106	106	107	109	111	113	114			
	VR	114	114	114	114	114	115	116	118	119	120			
	V2	124	124	124	124	124	124	125	125	126	126			
	GR2	10	10	10	10	10	9.6	9	8.3	7.7	7.4			
29000	TOFL	3280	3330	3380	3430	3480	3620	3850	4110	4400	4540		119	163
	V1	102	102	102	102	102	103	105	107	109	110			
	VR	111	111	111	111	111	112	113	115	116	117			
	V2	121	121	121	121	121	121	122	122	123	124			
	GR2	10.6	10.6	10.6	10.6	10.5	10.2	9.6	8.9	8.2	7.9			
28000	TOFL	3100	3150	3190	3240	3280	3390	3590	3820	4090	4200		117	160
	V1	100	100	100	100	100	100	102	104	106	107			
	VR	108	108	108	108	108	109	110	111	113	113			
	V2	119	119	119	119	119	119	119	120	120	121			
	GR2	11.3	11.3	11.3	11.3	11.2	10.8	10.2	9.4	8.7	8.4			
27000	TOFL	2940	2980	3020	3060	3100	3210	3360	3560	3790	3900		115	157
	V1	97	97	97	97	97	98	98	100	102	103			
	VR	106	106	106	106	106	106	107	108	109	110			
	V2	117	117	117	117	117	117	117	117	118	118			
	GR2	12	12	12	12	11.9	11.5	10.8	10.1	9.3	9			
26000	TOFL	2910	2950	2990	3030	3070	3080	3160	3310	3510	3600		113	154
	V1	97	97	97	97	97	97	97	97	99	99			
	VR	103	103	103	103	103	103	104	105	106	107			
	V2	116	116	116	116	116	115	115	115	115	115			
	GR2	12.8	12.8	12.8	12.7	12.7	12.3	11.5	10.7	9.9	9.6			

FIGURE 5-180. TAKE-OFF DISTANCE; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	TOFL	5930	6030	6150	6270	6380	6490	6610	6730	6850	6960	7080	143	194
	V1	143	143	143	143	143	143	143	143	142	142	142		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	5690	5790	5900	6010	6120	6230	6340	6460	6570	6680	6790	142	193
	V1	141	141	140	140	140	140	140	140	140	140	140		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	5310	5400	5500	5610	5710	5810	5920	6020	6120	6220	6320	139	190
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.3	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	4950	5030	5130	5220	5320	5410	5510	5600	5700	5790	5890	137	187
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	4600	4680	4770	4860	4950	5030	5120	5210	5300	5380	5470	134	184
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	140	140	140		
	GR2	7.1	7	6.9	7	7	7	7	7	7	7	7		
35000	TOFL	4300	4370	4450	4540	4620	4700	4780	4860	4940	5020	5110	132	181
	V1	125	125	125	124	124	124	124	124	124	124	124		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	137	137		
	GR2	7.4	7.4	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	4020	4090	4170	4240	4320	4390	4470	4550	4620	4700	4760	129	178
	V1	121	121	121	121	121	121	121	121	121	120	120		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
33000	TOFL	3770	3830	3900	3970	4040	4110	4180	4250	4320	4390	4460	127	176
	V1	118	118	118	117	117	117	117	117	117	117	117		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
32000	TOFL	3540	3590	3660	3720	3790	3850	3920	3980	4040	4110	4170	125	173
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	129	129	129		
	GR2	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	3310	3360	3420	3480	3540	3600	3660	3720	3780	3840	3900	123	170
	V1	111	111	111	111	111	110	110	110	110	110	110		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		

FIGURE 5-180. TAKE-OFF DISTANCE; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
30000	TOFL	3090	3140	3200	3250	3310	3370	3420	3470	3530	3580	3640	121	167
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	124	124	124	124		
	GR2	9.8	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
29000	TOFL	2900	2940	2980	3040	3090	3140	3190	3240	3300	3350	3400	119	164
	V1	104	104	104	104	104	104	103	103	103	103	103		
	VR	112	112	112	112	112	111	111	111	111	111	111		
	V2	122	122	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	2720	2760	2810	2850	2900	2950	3000	3050	3090	3140	3190	117	161
	V1	101	101	101	101	101	100	100	100	100	100	100		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
27000	TOFL	2570	2610	2660	2700	2750	2790	2840	2880	2930	2970	3020	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	2500	2540	2580	2620	2670	2710	2750	2800	2840	2880	2930	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.5	12.4	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4		

FIGURE 5-180. TAKE-OFF DISTANCE; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	104.25			
	N1 (%)	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5	89.5			
39600	TOFL	7190	7310	7430	7550	7660	8310	8960	9620	10320	10330		143	194
	V1	142	142	142	142	142	145	147	149	150	150			
	VR	147	147	147	147	147	149	150	152	152	152			
	V2	152	152	152	152	152	153	154	155	155	155			
	GR2	5.7	5.7	5.7	5.7	5.6	5.3	4.7	4.2	3.6	3.6			
39000	TOFL	6900	7010	7130	7220	7350	7970	8600	9250	9920	9930		142	193
	V1	140	140	140	140	140	142	145	146	148	148			
	VR	145	145	145	145	145	147	148	150	151	151			
	V2	150	150	150	150	150	151	152	153	153	153			
	GR2	5.9	5.9	5.9	5.9	5.8	5.4	4.9	4.4	3.8	3.8			
38000	TOFL	6430	6530	6630	6730	6850	7430	8030	8630	9290	9300		139	190
	V1	136	136	136	136	136	138	141	143	145	145			
	VR	141	141	141	141	141	143	145	146	147	147			
	V2	147	147	147	147	147	148	149	150	150	150			
	GR2	6.3	6.3	6.3	6.2	6.1	5.8	5.2	4.7	4.1	4.1			
37000	TOFL	5980	6080	6160	6260	6370	6890	7470	8050	8670	8680		137	187
	V1	132	132	132	132	132	134	137	139	141	141			
	VR	137	137	137	137	137	140	141	143	144	144			
	V2	144	144	143	143	143	145	146	147	147	147			
	GR2	6.6	6.6	6.6	6.6	6.5	6.1	5.5	5	4.4	4.4			
36000	TOFL	5560	5640	5730	5820	5920	6390	6930	7490	8070	8080		134	184
	V1	128	128	128	128	128	130	133	135	137	137			
	VR	134	134	134	134	134	136	138	139	141	141			
	V2	140	140	140	140	140	141	143	144	144	144			
	GR2	7	7	7	6.9	6.8	6.5	5.9	5.3	4.7	4.7			
35000	TOFL	5180	5260	5340	5430	5520	5950	6450	6980	7540	7550		132	181
	V1	124	124	124	124	124	126	129	132	134	134			
	VR	130	130	130	130	131	132	134	136	137	138			
	V2	137	137	137	137	137	138	140	141	142	142			
	GR2	7.4	7.3	7.3	7.3	7.2	6.8	6.2	5.7	5.1	5.1			
34000	TOFL	4840	4920	5000	5070	5160	5560	6000	6490	7030	7040		129	178
	V1	120	120	120	120	120	123	125	128	130	130			
	VR	127	127	127	127	127	129	131	133	134	134			
	V2	135	135	135	135	135	136	136	138	139	139			
	GR2	7.8	7.8	7.8	7.8	7.6	7.3	6.6	6.1	5.4	5.4			
33000	TOFL	4530	4600	4670	4740	4820	5180	5590	6040	6530	6540		127	176
	V1	117	117	117	117	117	119	122	124	127	127			
	VR	124	124	124	124	124	126	128	129	131	131			
	V2	132	132	132	132	132	133	134	135	136	136			
	GR2	8.2	8.2	8.2	8.2	8.1	7.7	7.1	6.5	5.8	5.8			
32000	TOFL	4240	4300	4370	4440	4510	4830	5200	5610	6060	6070		125	173
	V1	113	113	113	113	113	116	118	120	123	123			
	VR	121	121	121	121	121	123	124	126	128	128			
	V2	129	129	129	129	129	130	131	132	133	133			
	GR2	8.7	8.7	8.7	8.7	8.5	8.1	7.5	6.9	6.2	6.2			
31000	TOFL	3960	4020	4080	4140	4210	4500	4830	5200	5620	5630		123	170
	V1	110	110	110	110	110	112	114	117	119	119			
	VR	118	118	118	118	118	120	121	123	124	124			
	V2	127	127	127	127	127	128	128	129	130	130			
	GR2	9.2	9.2	9.2	9.2	9	8.6	7.9	7.3	6.7	6.7			

FIGURE 5-180. TAKE-OFF DISTANCE; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	104.25			
	N1 (%)	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5	89.5			
30000	TOFL	3690	3750	3810	3860	3930	4190	4490	4820	5190	5200		121	167
	V1	107	107	107	107	107	109	111	113	115	115			
	VR	115	115	115	115	115	116	118	119	121	121			
	V2	124	124	124	124	124	125	126	126	127	127			
	GR2	9.7	9.7	9.7	9.7	9.5	9.1	8.4	7.8	7.1	7.1			
29000	TOFL	3450	3500	3550	3610	3660	3900	4170	4460	4800	4810		119	164
	V1	103	103	103	103	103	105	107	109	111	111			
	VR	111	111	112	112	112	113	115	116	118	118			
	V2	121	121	121	121	121	122	123	123	124	124			
	GR2	10.3	10.3	10.3	10.3	10.1	9.7	9	8.3	7.6	7.6			
28000	TOFL	3240	3290	3330	3380	3430	3630	3870	4150	4440	4440		117	161
	V1	100	100	100	100	100	102	104	106	108	108			
	VR	108	108	108	108	108	110	111	113	114	114			
	V2	119	119	119	119	119	120	120	121	122	122			
	GR2	10.9	10.9	10.9	10.9	10.7	10.3	9.5	8.9	8.1	8.1			
27000	TOFL	3060	3110	3150	3190	3240	3390	3600	3830	4100	4110		115	157
	V1	98	98	98	98	98	98	100	102	104	104			
	VR	106	106	106	106	106	107	108	110	111	111			
	V2	117	117	117	117	117	117	117	118	118	118			
	GR2	11.6	11.6	11.6	11.6	11.4	10.9	10.2	9.4	8.7	8.7			
26000	TOFL	2970	3010	3060	3100	3110	3200	3350	3550	3790	3790		113	154
	V1	97	97	96	96	96	96	97	98	100	100			
	VR	103	103	103	103	103	104	105	106	108	108			
	V2	115	115	115	115	115	115	115	115	116	116			
	GR2	12.4	12.4	12.3	12.3	12.1	11.6	10.8	10.1	9.3	9.3			

FIGURE 5-181. TAKE-OFF DISTANCE; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	TOFL	6390	6560	6740	6860	6970	7090	7220	7350	7470	7600	7730	144	195
	V1	146	146	146	146	146	145	145	145	145	145	145		
	VR	149	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.6	5.5	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	6130	6300	6460	6580	6690	6800	6920	7040	7170	7290	7410	143	193
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.7	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	5710	5860	6020	6120	6220	6320	6440	6550	6660	6780	6890	140	190
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	143	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6.2	6	5.9	6	6	6	6	6	6	6	6		
37000	TOFL	5320	5450	5600	5700	5790	5880	5990	6100	6200	6300	6410	138	187
	V1	135	135	135	135	135	135	135	135	135	135	134		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	146	145		
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
36000	TOFL	4940	5070	5210	5300	5380	5470	5570	5660	5760	5850	5940	135	185
	V1	131	131	131	131	131	131	131	131	131	130	130		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
35000	TOFL	4590	4710	4840	4920	4990	5080	5170	5260	5350	5430	5510	133	182
	V1	127	127	127	127	127	126	126	126	126	126	126		
	VR	132	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.1	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
34000	TOFL	4270	4380	4490	4570	4640	4720	4800	4890	4970	5040	5120	130	179
	V1	123	123	123	123	123	123	122	122	122	122	122		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.5	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
33000	TOFL	4000	4090	4200	4270	4330	4410	4480	4560	4630	4700	4780	127	176
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.1	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
32000	TOFL	3740	3830	3920	3990	4050	4120	4190	4250	4330	4390	4460	125	173
	V1	116	116	116	116	116	115	115	115	115	115	115		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	130	130		
	GR2	8.6	8.4	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
31000	TOFL	3500	3580	3670	3730	3780	3850	3910	3980	4030	4110	4170	123	170
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	127	127	127		
	GR2	9.1	8.9	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 5-181. TAKE-OFF DISTANCE; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
30000	TOFL	3260	3340	3420	3470	3530	3580	3650	3710	3760	3830	3880	121	167
	V1	109	109	109	109	108	108	108	108	108	108	108		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.6	9.4	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
29000	TOFL	3050	3120	3190	3240	3300	3340	3410	3450	3500	3560	3620	119	164
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	122	122	122	122	122	122		
	GR2	10.1	10	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	2840	2900	2980	3020	3060	3110	3160	3210	3260	3310	3370	117	161
	V1	101	101	102	102	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
27000	TOFL	2680	2730	2790	2830	2880	2920	2970	3020	3070	3120	3160	115	158
	V1	99	99	99	99	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.3	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
26000	TOFL	2560	2580	2630	2680	2720	2760	2810	2850	2890	2940	2980	113	155
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 5-181. TAKE-OFF DISTANCE; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
39600	TOFL	7850	7970	8110	8250	8610	9300	10010	10730	11220			144	195
	V1	145	145	145	145	146	148	150	151	152				
	VR	150	150	150	150	150	152	153	154	155				
	V2	154	154	154	154	154	156	156	156	157				
	GR2	5.5	5.5	5.5	5.4	5.2	4.8	4.2	3.7	3.4				
39000	TOFL	7530	7650	7770	7910	8250	8910	9620	10310	10780			143	193
	V1	143	143	143	143	144	146	148	149	150				
	VR	147	147	147	148	148	150	151	152	153				
	V2	152	152	152	152	152	153	154	155	155				
	GR2	5.7	5.7	5.7	5.6	5.3	4.9	4.4	3.9	3.5				
38000	TOFL	7000	7110	7220	7350	7680	8310	8970	9650	10080			140	190
	V1	139	138	138	138	140	142	144	146	147				
	VR	144	144	144	144	145	146	148	149	150				
	V2	149	148	148	148	149	150	151	152	152				
	GR2	6	6	6	5.9	5.7	5.3	4.7	4.2	3.8				
37000	TOFL	6500	6610	6720	6840	7130	7730	8360	9000	9420			138	187
	V1	134	134	134	134	135	138	140	142	143				
	VR	140	140	140	140	141	143	144	146	146				
	V2	145	145	145	145	146	147	148	149	149				
	GR2	6.3	6.3	6.3	6.3	6	5.6	5	4.5	4.1				
36000	TOFL	6040	6140	6240	6350	6620	7180	7770	8370	8770			135	185
	V1	130	130	130	130	131	134	136	139	140				
	VR	136	136	136	136	137	139	141	142	143				
	V2	142	142	142	142	142	144	145	146	146				
	GR2	6.7	6.7	6.7	6.6	6.3	5.9	5.4	4.8	4.5				
35000	TOFL	5600	5700	5790	5890	6140	6640	7200	7780	8150			133	182
	V1	126	126	126	126	127	130	132	135	136				
	VR	133	133	133	133	133	135	137	139	140				
	V2	139	139	139	139	139	140	142	143	143				
	GR2	7.1	7.1	7.1	7	6.7	6.3	5.7	5.2	4.8				
34000	TOFL	5210	5290	5370	5470	5700	6150	6650	7210	7570			130	179
	V1	122	122	122	122	123	126	128	131	132				
	VR	129	129	129	129	130	132	133	135	136				
	V2	136	136	136	136	136	137	138	139	140				
	GR2	7.5	7.5	7.5	7.4	7.1	6.7	6.1	5.5	5.2				
33000	TOFL	4860	4930	5010	5100	5310	5730	6190	6700	7050			127	176
	V1	119	119	119	119	120	122	124	127	129				
	VR	126	126	126	126	127	128	130	132	133				
	V2	133	133	133	133	133	134	135	136	137				
	GR2	7.9	7.9	7.9	7.8	7.5	7.1	6.5	5.9	5.5				
32000	TOFL	4530	4610	4680	4760	4950	5320	5750	6220	6530			125	173
	V1	115	115	115	115	116	118	121	123	125				
	VR	123	123	123	123	123	125	127	128	129				
	V2	130	130	130	130	130	132	132	134	134				
	GR2	8.4	8.4	8.4	8.3	8	7.5	6.9	6.3	5.9				
31000	TOFL	4230	4300	4360	4440	4610	4950	5330	5750	6050			123	170
	V1	112	112	112	112	112	115	117	119	121				
	VR	119	119	119	119	120	122	123	125	126				
	V2	127	127	127	127	128	129	130	130	131				
	GR2	8.9	8.9	8.9	8.7	8.4	8	7.4	6.7	6.3				

FIGURE 5-181. TAKE-OFF DISTANCE; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
30000	TOFL	3950	4000	4060	4130	4290	4600	4940	5320	5590			121	167
	V1	108	108	108	108	109	111	113	116	117				
	VR	116	116	116	116	117	118	120	122	123				
	V2	125	125	125	125	125	126	127	127	128				
	GR2	9.4	9.4	9.4	9.3	8.9	8.5	7.8	7.2	6.8				
29000	TOFL	3670	3730	3780	3850	3990	4270	4580	4920	5150			119	164
	V1	104	104	104	104	105	107	110	112	113				
	VR	113	113	113	113	113	115	117	118	119				
	V2	122	122	122	122	122	123	124	125	125				
	GR2	9.9	9.9	9.9	9.8	9.5	9	8.3	7.7	7.3				
28000	TOFL	3420	3470	3520	3580	3710	3950	4240	4540	4750			117	161
	V1	101	101	101	101	102	104	106	108	109				
	VR	109	109	109	109	110	112	113	115	116				
	V2	119	119	119	119	119	120	121	122	122				
	GR2	10.5	10.5	10.5	10.4	10.1	9.6	8.9	8.2	7.8				
27000	TOFL	3210	3260	3310	3360	3450	3670	3920	4190	4380			115	158
	V1	98	98	98	98	98	100	102	104	106				
	VR	106	106	106	106	107	108	110	111	112				
	V2	117	117	117	117	117	118	118	119	119				
	GR2	11.2	11.2	11.2	11.1	10.7	10.2	9.5	8.8	8.3				
26000	TOFL	3030	3070	3120	3160	3250	3410	3630	3870	4040			113	155
	V1	95	95	95	95	96	97	99	100	102				
	VR	104	104	104	104	104	105	106	108	109				
	V2	115	115	115	115	115	115	116	116	116				
	GR2	11.9	11.9	11.9	11.8	11.4	10.8	10.1	9.4	8.9				

FIGURE 5-182. TAKE-OFF DISTANCE; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	TOFL	6950	7190	7360	7480	7600	7740	7880	8020	8160	8300	8430	145	195
	V1	149	149	149	149	148	148	148	148	148	148	148		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.4	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	6670	6910	7060	7180	7290	7420	7550	7690	7820	7940	8080	144	193
	V1	146	146	146	146	146	146	146	146	146	146	145		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	6220	6430	6580	6680	6790	6910	7040	7160	7280	7390	7520	141	191
	V1	142	142	142	142	142	142	142	142	142	141	141		
	VR	147	147	147	147	146	146	146	146	146	146	146		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.9	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	5780	5990	6130	6230	6320	6440	6550	6670	6770	6880	7000	139	188
	V1	138	138	138	138	138	138	138	138	137	137	137		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	147	147	147		
	GR2	6.3	6.1	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	5370	5560	5680	5770	5860	5970	6070	6180	6270	6380	6480	136	185
	V1	134	134	134	134	134	133	133	133	133	133	133		
	VR	138	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	144	144	144	144	144	144	144		
	GR2	6.6	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
35000	TOFL	4980	5150	5270	5350	5430	5530	5630	5730	5810	5910	6010	134	182
	V1	130	130	130	130	129	129	129	129	129	129	129		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
34000	TOFL	4620	4770	4880	4960	5030	5120	5210	5290	5380	5470	5560	131	179
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	137	137	137	137		
	GR2	7.4	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
33000	TOFL	4280	4420	4520	4590	4660	4740	4810	4890	4980	5060	5140	128	176
	V1	121	121	121	121	121	121	121	121	120	120	120		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.8	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	3990	4120	4210	4270	4340	4410	4480	4560	4630	4710	4790	126	173
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	131	131	131	131	131		
	GR2	8.3	8.1	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	3730	3840	3920	3990	4030	4110	4180	4260	4320	4390	4460	123	170
	V1	114	114	114	114	113	113	113	113	113	113	113		
	VR	120	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	128	128	128		
	GR2	8.8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 5-182. TAKE-OFF DISTANCE; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
30000	TOFL	3470	3580	3660	3710	3770	3830	3890	3950	4020	4080	4150	121	167
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.3	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9		
29000	TOFL	3240	3330	3400	3450	3490	3560	3610	3670	3730	3790	3850	119	164
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.8	9.6	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
28000	TOFL	3020	3100	3170	3210	3260	3310	3360	3420	3470	3530	3580	117	161
	V1	103	103	103	103	103	102	102	102	102	102	102		
	VR	111	111	111	111	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.4	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
27000	TOFL	2810	2880	2930	2980	3030	3080	3130	3180	3230	3280	3330	115	158
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11	10.8	10.7	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	2650	2710	2770	2810	2850	2900	2950	3000	3040	3090	3130	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.8	11.5	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 5-182. TAKE-OFF DISTANCE; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
39600	TOFL	8570	8710	8860	9070	9650	10420	11190	12050	12250			145	195
	V1	148	148	148	148	150	152	153	155	155				
	VR	152	152	152	152	154	155	156	157	157				
	V2	156	156	156	156	157	158	158	159	159				
	GR2	5.2	5.2	5.2	5	4.7	4.3	3.8	3.3	3.1				
39000	TOFL	8210	8350	8490	8690	9250	9990	10740	11530	11750			144	193
	V1	145	145	145	146	147	149	151	152	153				
	VR	150	150	150	150	152	153	154	155	155				
	V2	154	154	154	154	155	156	156	157	157				
	GR2	5.4	5.4	5.4	5.2	4.9	4.4	3.9	3.4	3.3				
38000	TOFL	7650	7780	7900	8090	8620	9300	10020	10760	10940			141	191
	V1	141	141	141	142	143	145	147	149	149				
	VR	146	146	146	147	148	149	151	151	152				
	V2	151	151	151	151	152	152	153	154	154				
	GR2	5.7	5.7	5.7	5.5	5.2	4.7	4.2	3.7	3.6				
37000	TOFL	7120	7240	7350	7530	8020	8660	9340	10040	10200			139	188
	V1	137	137	137	138	139	142	144	145	146				
	VR	143	143	143	143	144	146	147	148	148				
	V2	147	147	147	147	148	149	150	151	151				
	GR2	6.1	6.1	6.1	5.8	5.6	5.1	4.5	4	3.9				
36000	TOFL	6590	6700	6810	6980	7450	8060	8680	9360	9510			136	185
	V1	133	133	133	133	135	138	140	142	142				
	VR	139	139	139	139	141	142	144	145	145				
	V2	144	144	144	144	145	146	147	148	148				
	GR2	6.4	6.4	6.4	6.2	5.9	5.4	4.9	4.3	4.2				
35000	TOFL	6110	6210	6310	6460	6890	7460	8050	8690	8830			134	182
	V1	129	129	129	129	131	134	136	138	138				
	VR	135	135	135	135	137	138	140	141	142				
	V2	141	141	141	141	142	143	143	144	145				
	GR2	6.8	6.8	6.8	6.6	6.3	5.8	5.2	4.7	4.5				
34000	TOFL	5650	5750	5840	5980	6370	6910	7450	8050	8190			131	179
	V1	125	125	125	125	127	130	132	134	134				
	VR	131	131	131	131	133	135	136	138	138				
	V2	137	137	137	137	138	139	140	141	141				
	GR2	7.2	7.2	7.2	6.9	6.6	6.1	5.6	5	4.9				
33000	TOFL	5230	5310	5390	5530	5880	6360	6890	7450	7570			128	176
	V1	120	120	120	121	123	125	128	130	130				
	VR	127	127	127	128	129	131	133	134	134				
	V2	134	134	134	134	135	136	137	138	138				
	GR2	7.6	7.6	7.6	7.3	7	6.5	5.9	5.4	5.2				
32000	TOFL	4860	4940	5020	5140	5460	5900	6390	6920	7040			126	173
	V1	117	117	117	117	119	121	124	126	127				
	VR	124	124	124	124	126	127	129	131	131				
	V2	131	131	131	131	132	133	134	135	135				
	GR2	8.1	8.1	8	7.8	7.4	6.9	6.4	5.8	5.6				
31000	TOFL	4530	4600	4680	4780	5070	5470	5910	6390	6530			123	170
	V1	113	113	113	113	115	118	120	122	123				
	VR	121	121	121	121	122	124	126	128	128				
	V2	128	128	128	128	129	130	131	132	133				
	GR2	8.5	8.5	8.5	8.2	7.9	7.4	6.8	6.2	6				

FIGURE 5-182. TAKE-OFF DISTANCE; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
30000	TOFL	4220	4280	4350	4450	4710	5070	5470	5910	6010			121	167
	V1	109	109	109	110	111	114	116	119	119				
	VR	117	117	117	118	119	121	122	124	124				
	V2	126	126	126	126	126	127	128	129	129				
	GR2	9	9	9	8.7	8.4	7.9	7.3	6.6	6.5				
29000	TOFL	3910	3970	4030	4130	4370	4690	5050	5440	5540			119	164
	V1	106	106	106	106	108	110	112	115	115				
	VR	114	114	114	114	115	117	119	120	121				
	V2	123	123	123	123	123	124	125	126	126				
	GR2	9.6	9.6	9.6	9.3	8.9	8.4	7.7	7.1	6.9				
28000	TOFL	3640	3690	3750	3830	4040	4340	4660	5010	5100			117	161
	V1	102	102	102	102	104	106	108	111	111				
	VR	110	110	110	111	112	114	115	117	117				
	V2	120	120	120	120	121	121	122	123	123				
	GR2	10.1	10.1	10.1	9.8	9.4	8.9	8.3	7.6	7.4				
27000	TOFL	3380	3430	3480	3550	3740	4000	4290	4610	4680			115	158
	V1	99	99	99	99	100	102	104	107	107				
	VR	107	107	107	107	108	110	112	113	114				
	V2	117	117	117	117	118	119	119	120	120				
	GR2	10.8	10.8	10.8	10.4	10	9.5	8.8	8.1	8				
26000	TOFL	3180	3230	3270	3340	3470	3700	3950	4240	4310			113	155
	V1	96	96	96	96	97	99	101	103	103				
	VR	104	104	104	104	105	107	108	110	110				
	V2	115	115	115	115	115	116	116	117	117				
	GR2	11.5	11.5	11.5	11.1	10.7	10.1	9.4	8.7	8.6				

FIGURE 5-183. TAKE-OFF DISTANCE; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	TOFL	7610	7880	8020	8160	8290	8450	8600	8760	8900	9050	9210	147	195
	V1	151	151	151	151	151	151	151	151	151	151	151		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	159	159	159	159	159	158	158	158	158	158	158		
	GR2	5.1	4.9	4.9	4.9	5	5	5	5	5	5	4.9		
39000	TOFL	7300	7560	7690	7820	7950	8100	8240	8380	8530	8680	8830	145	194
	V1	149	149	149	149	149	149	149	148	148	148	148		
	VR	152	153	153	153	153	153	153	153	153	153	153		
	V2	157	157	157	157	157	156	156	156	156	156	156		
	GR2	5.3	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.1	5.1		
38000	TOFL	6800	7040	7170	7290	7410	7540	7680	7810	7940	8080	8220	142	191
	V1	145	145	145	145	145	145	144	144	144	144	144		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.6	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	6340	6560	6670	6780	6890	7020	7130	7260	7390	7510	7640	140	188
	V1	141	141	141	141	141	141	140	140	140	140	140		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	149	149	149	149	149		
	GR2	6	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	5890	6100	6210	6310	6410	6530	6630	6750	6870	6990	7110	137	185
	V1	137	137	137	137	136	136	136	136	136	136	136		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	146	146	146	146	146		
	GR2	6.3	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	5450	5650	5750	5840	5930	6030	6130	6240	6350	6460	6570	135	183
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	137	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
34000	TOFL	5040	5230	5310	5400	5480	5570	5670	5770	5870	5970	6070	132	180
	V1	128	128	128	128	128	128	128	127	127	127	127		
	VR	133	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	139	139	139	139	139	139		
	GR2	7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
33000	TOFL	4660	4830	4910	4980	5050	5140	5230	5330	5420	5510	5600	129	177
	V1	124	124	124	124	123	123	123	123	123	123	123		
	VR	129	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.5	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
32000	TOFL	4300	4450	4530	4600	4660	4750	4830	4910	4990	5080	5160	127	174
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	132	132	132	132	132	132	132		
	GR2	7.9	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
31000	TOFL	4000	4130	4200	4270	4330	4400	4480	4550	4630	4710	4780	124	171
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	129	129	129	129	129	129		
	GR2	8.4	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 5-183. TAKE-OFF DISTANCE; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
30000	TOFL	3720	3850	3910	3960	4030	4090	4160	4230	4300	4370	4440	121	168
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	126	126	126	126	126	126		
	GR2	8.9	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
29000	TOFL	3460	3570	3630	3690	3740	3810	3860	3930	3990	4060	4120	119	165
	V1	108	108	108	108	108	108	107	107	107	107	107		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.4	9.2	9.2	9.2	9.3	9.3	9.3	9.2	9.2	9.2	9.2		
28000	TOFL	3220	3310	3360	3420	3460	3520	3580	3640	3700	3760	3820	117	161
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	2990	3080	3130	3160	3220	3270	3320	3380	3430	3480	3540	115	158
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.3	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
26000	TOFL	2790	2860	2900	2950	3000	3050	3100	3150	3200	3250	3300	113	155
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 5-183. TAKE-OFF DISTANCE; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
39600	TOFL	9370	9530	9710	10080	10830	11680	12590	13400				147	195
	V1	151	151	151	151	153	155	157	158					
	VR	155	155	155	156	157	158	159	160					
	V2	158	158	158	158	159	160	160	161					
	GR2	4.9	4.9	4.9	4.6	4.3	3.8	3.3	2.9					
39000	TOFL	8980	9130	9310	9660	10390	11180	12070	12830				145	194
	V1	148	148	148	149	151	152	154	155					
	VR	153	153	153	153	155	156	157	158					
	V2	156	156	156	156	157	158	158	159					
	GR2	5.1	5.1	5.1	4.8	4.4	4	3.5	3.1					
38000	TOFL	8360	8500	8660	8990	9660	10420	11230	11940				142	191
	V1	144	144	144	145	147	149	150	152					
	VR	149	149	149	150	151	152	153	154					
	V2	153	153	153	153	154	155	155	156					
	GR2	5.5	5.4	5.4	5.1	4.7	4.3	3.8	3.3					
37000	TOFL	7770	7900	8050	8350	8980	9690	10440	11100				140	188
	V1	140	140	140	141	143	145	147	148					
	VR	145	145	145	146	147	149	150	151					
	V2	149	149	149	149	150	151	152	152					
	GR2	5.8	5.8	5.7	5.4	5.1	4.6	4.1	3.6					
36000	TOFL	7230	7350	7490	7770	8340	9000	9720	10310				137	185
	V1	136	136	136	137	139	141	143	144					
	VR	142	142	142	142	144	145	146	147					
	V2	146	146	146	146	147	148	149	149					
	GR2	6.2	6.2	6.1	5.7	5.4	4.9	4.4	3.9					
35000	TOFL	6680	6790	6920	7200	7740	8350	9000	9590				135	183
	V1	132	132	132	133	135	137	139	141					
	VR	138	138	138	138	140	141	143	144					
	V2	143	143	143	143	144	145	145	146					
	GR2	6.5	6.5	6.4	6.1	5.8	5.3	4.7	4.3					
34000	TOFL	6170	6270	6390	6640	7180	7730	8340	8880				132	180
	V1	127	127	127	128	131	133	135	137					
	VR	134	134	134	134	136	138	139	140					
	V2	139	139	139	139	141	142	142	143					
	GR2	6.9	6.9	6.8	6.5	6.1	5.6	5.1	4.6					
33000	TOFL	5690	5780	5890	6120	6600	7150	7710	8210				129	177
	V1	123	123	123	124	126	129	131	133					
	VR	130	130	130	130	132	134	135	136					
	V2	136	136	136	136	137	138	139	140					
	GR2	7.3	7.3	7.2	6.8	6.5	6	5.4	4.9					
32000	TOFL	5240	5330	5430	5640	6080	6580	7120	7570				127	174
	V1	119	119	119	120	122	125	127	129					
	VR	126	126	126	126	128	130	132	133					
	V2	132	132	132	132	134	135	136	136					
	GR2	7.7	7.7	7.6	7.3	6.9	6.4	5.8	5.3					
31000	TOFL	4860	4940	5030	5220	5620	6080	6590	7020				124	171
	V1	115	115	115	116	118	121	123	125					
	VR	122	122	122	123	125	127	128	130					
	V2	129	129	129	129	131	132	133	133					
	GR2	8.2	8.2	8.1	7.7	7.3	6.8	6.2	5.7					

FIGURE 5-183. TAKE-OFF DISTANCE; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
30000	TOFL	4520	4590	4670	4840	5190	5610	6080	6500				121	168
	V1	111	111	111	112	114	117	119	121					
	VR	119	119	119	119	121	123	125	126					
	V2	126	126	126	126	128	129	130	131					
	GR2	8.7	8.7	8.6	8.2	7.8	7.3	6.7	6.2					
29000	TOFL	4190	4260	4330	4490	4800	5170	5600	5980				119	165
	V1	107	107	107	108	110	113	115	117					
	VR	115	115	115	116	118	119	121	123					
	V2	124	124	124	124	125	126	127	127					
	GR2	9.2	9.2	9.1	8.7	8.3	7.8	7.2	6.6					
28000	TOFL	3880	3940	4010	4150	4440	4770	5140	5490				117	161
	V1	104	104	104	104	106	109	111	113					
	VR	112	112	112	112	114	116	118	119					
	V2	121	121	121	121	122	123	124	124					
	GR2	9.8	9.8	9.6	9.2	8.8	8.3	7.7	7.1					
27000	TOFL	3590	3650	3710	3840	4090	4390	4730	5030				115	158
	V1	100	100	100	101	103	105	107	109					
	VR	108	108	108	109	110	112	114	115					
	V2	118	118	118	118	119	120	121	121					
	GR2	10.4	10.4	10.2	9.8	9.4	8.8	8.2	7.6					
26000	TOFL	3350	3400	3450	3540	3770	4040	4340	4610				113	155
	V1	97	97	97	97	99	101	103	105					
	VR	105	105	105	105	107	109	110	112					
	V2	115	115	115	115	116	117	117	118					
	GR2	11.1	11	10.9	10.4	10	9.4	8.8	8.2					

FIGURE 5-184. TAKE-OFF DISTANCE; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	TOFL	8420	8650	8810	8970	9130	9300	9460	9640	9810	9980	10160	148	196
	V1	155	155	155	155	154	154	154	154	154	154	154		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	8070	8270	8420	8570	8730	8900	9050	9210	9380	9540	9710	146	194
	V1	152	152	152	152	152	152	152	152	152	152	152		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	7510	7700	7840	7980	8120	8260	8420	8570	8720	8870	9030	144	191
	V1	148	148	148	148	148	148	148	148	147	147	147		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	156	156	156	156	155	155	155	155	155	155	155		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	6980	7160	7290	7410	7530	7680	7820	7960	8100	8240	8380	141	189
	V1	144	144	144	144	143	143	143	143	143	143	143		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.6	5.5	5.5	5.5	5.6	5.6	5.5	5.5	5.5	5.5	5.5		
36000	TOFL	6490	6640	6760	6890	7000	7130	7260	7390	7520	7650	7780	138	186
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	148	148	148	148	148	148	148		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
35000	TOFL	6010	6160	6270	6380	6480	6600	6720	6840	6960	7080	7200	136	183
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	5550	5700	5800	5890	5990	6100	6210	6320	6430	6540	6650	133	180
	V1	131	131	131	131	131	131	131	130	130	130	130		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	141	141	141	141	141	141	141	141		
	GR2	6.7	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6		
33000	TOFL	5120	5250	5340	5420	5520	5620	5720	5820	5920	6020	6120	130	177
	V1	126	126	126	126	126	126	126	126	126	126	126		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		
32000	TOFL	4720	4840	4920	4990	5070	5170	5260	5350	5440	5530	5630	127	174
	V1	122	122	122	122	122	122	121	121	121	121	121		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	134	134	134	134	134	134	134	134		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
31000	TOFL	4340	4450	4520	4580	4670	4750	4840	4920	5000	5080	5170	125	171
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		

FIGURE 5-184. TAKE-OFF DISTANCE; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
30000	TOFL	4010	4110	4170	4250	4310	4390	4460	4540	4620	4690	4770	122	168
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	127	127	127	127	127	127	127		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	3720	3810	3860	3930	3990	4060	4140	4210	4280	4350	4420	119	165
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	124	124	124	124	124	124	124	124	124		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
28000	TOFL	3450	3530	3580	3640	3700	3760	3830	3890	3950	4020	4080	117	162
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	121	121	121	121	121	121	121		
	GR2	9.6	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4		
27000	TOFL	3200	3270	3310	3380	3420	3480	3540	3600	3650	3710	3770	115	159
	V1	102	102	102	102	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	118	118	118	118	118	118	118		
	GR2	10.2	10	10	10.1	10.1	10.1	10.1	10.1	10.1	10	10		
26000	TOFL	2950	3030	3080	3120	3170	3220	3270	3330	3390	3430	3490	113	155
	V1	98	98	98	98	98	98	98	98	98	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7		

FIGURE 5-184. TAKE-OFF DISTANCE; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89					
	N1 (%)	90.8	91.7	92.5	92.2	91.5	90.9	90.2	90.0					
39600	TOFL	10340	10520	10800	11370	12240	13190	14230	14680				148	196
	V1	154	154	155	156	157	159	160	160					
	VR	158	158	158	159	160	161	162	162					
	V2	161	161	161	161	162	162	163	163					
	GR2	4.7	4.6	4.4	4.1	3.8	3.3	2.9	2.7					
39000	TOFL	9880	10050	10320	10910	11730	12630	13620	14080				146	194
	V1	152	152	152	153	155	156	158	158					
	VR	156	156	156	157	158	159	160	160					
	V2	159	159	159	159	160	160	161	161					
	GR2	4.9	4.8	4.6	4.3	4	3.5	3	2.8					
38000	TOFL	9180	9340	9600	10140	10900	11750	12650	13090				144	191
	V1	147	147	148	149	151	152	154	155					
	VR	152	152	152	153	154	155	156	157					
	V2	155	155	155	156	156	157	157	158					
	GR2	5.2	5.1	4.9	4.6	4.3	3.8	3.3	3.1					
37000	TOFL	8530	8670	8910	9410	10150	10920	11750	12150				141	189
	V1	143	143	144	145	147	149	150	151					
	VR	148	148	148	149	151	152	153	153					
	V2	152	152	152	152	153	154	154	155					
	GR2	5.5	5.5	5.3	4.9	4.6	4.1	3.6	3.4					
36000	TOFL	7910	8050	8260	8720	9390	10130	10910	11270				138	186
	V1	139	139	139	141	143	145	146	147					
	VR	144	144	144	145	147	148	149	150					
	V2	148	148	148	149	150	150	151	151					
	GR2	5.9	5.8	5.6	5.3	4.9	4.4	3.9	3.7					
35000	TOFL	7320	7450	7660	8070	8700	9380	10110	10460				136	183
	V1	135	135	135	137	139	141	142	143					
	VR	140	140	141	142	143	144	146	146					
	V2	145	145	145	145	146	147	148	148					
	GR2	6.3	6.2	5.9	5.6	5.2	4.8	4.2	4					
34000	TOFL	6770	6880	7070	7480	8050	8680	9380	9680				133	180
	V1	130	130	131	133	135	137	139	139					
	VR	136	136	137	138	139	141	142	143					
	V2	141	141	141	142	143	144	145	145					
	GR2	6.6	6.6	6.3	6	5.6	5.1	4.6	4.3					
33000	TOFL	6220	6330	6510	6900	7440	8020	8650	8940				130	177
	V1	126	126	126	128	130	132	134	135					
	VR	132	132	133	134	136	137	138	139					
	V2	138	138	138	139	140	140	141	141					
	GR2	7	7	6.7	6.4	6	5.5	4.9	4.7					
32000	TOFL	5720	5820	5980	6330	6850	7400	7980	8240				127	174
	V1	121	121	122	124	126	128	130	131					
	VR	128	128	128	130	132	133	135	135					
	V2	134	134	134	135	136	137	138	138					
	GR2	7.5	7.4	7.1	6.8	6.4	5.9	5.3	5.1					
31000	TOFL	5250	5350	5490	5810	6270	6800	7340	7590				125	171
	V1	117	117	117	119	121	124	126	127					
	VR	124	124	124	126	127	129	131	131					
	V2	131	131	130	131	133	134	134	135					
	GR2	7.9	7.8	7.5	7.2	6.8	6.3	5.7	5.4					

FIGURE 5-184. TAKE-OFF DISTANCE; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89					
	N1 (%)	90.8	91.7	92.5	92.2	91.5	90.9	90.2	90.0					
30000	TOFL	4850	4930	5060	5350	5770	6250	6780	7000				122	168
	V1	113	113	113	115	117	120	122	123					
	VR	120	120	121	122	124	126	127	128					
	V2	127	127	127	128	129	130	131	132					
	GR2	8.4	8.3	8	7.6	7.2	6.7	6.1	5.9					
29000	TOFL	4490	4570	4680	4940	5310	5750	6240	6460				119	165
	V1	109	109	109	111	113	116	118	119					
	VR	117	117	117	118	120	122	124	125					
	V2	124	124	124	125	126	127	128	129					
	GR2	8.9	8.8	8.5	8.1	7.7	7.2	6.6	6.3					
28000	TOFL	4150	4220	4330	4560	4890	5280	5720	5930				117	162
	V1	105	105	105	107	109	112	114	115					
	VR	113	113	113	115	116	118	120	121					
	V2	121	121	121	122	123	124	125	126					
	GR2	9.4	9.3	9	8.6	8.2	7.7	7.1	6.8					
27000	TOFL	3830	3890	3990	4200	4500	4840	5240	5420				115	159
	V1	101	101	102	103	105	107	110	111					
	VR	109	109	110	111	113	114	116	117					
	V2	118	118	118	119	120	121	122	122					
	GR2	10	9.9	9.6	9.2	8.8	8.2	7.6	7.3					
26000	TOFL	3540	3600	3680	3870	4130	4440	4790	4950				113	155
	V1	97	97	98	99	101	103	106	107					
	VR	106	106	106	107	109	111	112	113					
	V2	115	115	115	116	117	118	119	119					
	GR2	10.7	10.5	10.2	9.8	9.4	8.8	8.1	7.8					

FIGURE 5-185. TAKE-OFF DISTANCE; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	TOFL	9340	9500	9690	9880	10070	10260	10450	10640	10840	11030	11230	149	196
	V1	158	158	158	158	158	158	158	158	158	158	158		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
39000	TOFL	8940	9090	9280	9440	9630	9820	10000	10180	10370	10550	10740	147	194
	V1	156	156	156	155	155	155	155	155	155	155	155		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	162	162	162	161	161	161	161	161	161	161	161		
	GR2	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	8300	8440	8610	8760	8940	9110	9280	9450	9620	9790	9960	145	192
	V1	151	151	151	151	151	151	151	151	151	151	151		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
37000	TOFL	7690	7820	7980	8120	8280	8430	8590	8750	8900	9060	9220	142	189
	V1	147	147	147	147	147	147	147	146	146	146	146		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	155	155	155	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	7130	7250	7380	7520	7670	7810	7960	8100	8250	8390	8540	139	186
	V1	143	143	142	142	142	142	142	142	142	142	142		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
35000	TOFL	6610	6710	6830	6960	7100	7230	7360	7500	7630	7760	7890	137	183
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
34000	TOFL	6110	6190	6310	6430	6560	6680	6800	6920	7040	7160	7290	134	180
	V1	134	134	134	134	134	133	133	133	133	133	133		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
33000	TOFL	5630	5710	5820	5930	6050	6160	6270	6380	6490	6600	6710	131	177
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
32000	TOFL	5180	5240	5350	5450	5550	5650	5750	5850	5950	6060	6160	128	175
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
31000	TOFL	4750	4810	4900	4990	5090	5180	5270	5360	5450	5550	5640	126	172
	V1	120	120	120	120	120	120	120	120	120	119	119		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.6		

FIGURE 5-185. TAKE-OFF DISTANCE; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
30000	TOFL	4350	4420	4490	4580	4660	4750	4830	4910	5000	5080	5160	123	168
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
29000	TOFL	3990	4060	4140	4210	4290	4360	4440	4510	4590	4670	4740	120	165
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	3700	3760	3820	3900	3960	4030	4100	4170	4240	4300	4370	117	162
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	122	122	122	122	122	122	122		
	GR2	9.3	9.1	9.1	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
27000	TOFL	3420	3470	3520	3590	3650	3710	3780	3840	3900	3970	4030	115	159
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	119	119	119	119	119	119	119		
	GR2	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
26000	TOFL	3160	3210	3250	3310	3370	3430	3490	3540	3600	3660	3720	113	156
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3		

FIGURE 5-185. TAKE-OFF DISTANCE; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	86.4					
	N1 (%)	91.3	92.2	92.6	92.0	91.4	90.8	90.1	90.1					
39600	TOFL	11420	11640	12050	12880	13880	15000						149	196
	V1	158	158	158	160	161	162							
	VR	161	161	162	163	164	165							
	V2	164	164	164	164	165	165							
	GR2	4.4	4.3	4	3.7	3.3	2.9							
39000	TOFL	10930	11130	11540	12330	13260	14330	15380	15420				147	194
	V1	155	155	156	157	159	160	161	161					
	VR	159	159	159	160	161	162	163	163					
	V2	161	161	161	162	163	163	163	163					
	GR2	4.6	4.5	4.2	3.9	3.5	3	2.6	2.5					
38000	TOFL	10130	10320	10710	11460	12320	13290	14330	14380				145	192
	V1	151	151	152	153	155	156	157	157					
	VR	155	155	156	157	158	159	159	159					
	V2	158	158	158	159	159	160	160	160					
	GR2	4.9	4.8	4.5	4.2	3.8	3.3	2.8	2.8					
37000	TOFL	9380	9560	9910	10640	11440	12330	13280	13320				142	189
	V1	146	147	147	149	151	152	153	154					
	VR	151	151	151	153	154	155	156	156					
	V2	154	154	154	155	156	156	157	157					
	GR2	5.3	5.1	4.8	4.5	4.1	3.6	3.1	3.1					
36000	TOFL	8680	8850	9180	9850	10620	11440	12300	12340				139	186
	V1	142	142	143	145	147	148	150	150					
	VR	147	147	148	149	150	151	152	152					
	V2	151	151	151	152	152	153	153	153					
	GR2	5.6	5.4	5.1	4.8	4.4	3.9	3.4	3.4					
35000	TOFL	8030	8180	8490	9100	9820	10600	11390	11430				137	183
	V1	138	138	139	140	143	144	146	146					
	VR	143	143	144	145	146	148	149	149					
	V2	147	147	147	148	149	150	150	150					
	GR2	6	5.8	5.5	5.2	4.8	4.3	3.7	3.7					
34000	TOFL	7410	7550	7860	8400	9050	9800	10540	10580				134	180
	V1	133	133	134	136	138	140	142	142					
	VR	139	139	140	141	143	144	145	145					
	V2	144	144	144	144	145	146	147	147					
	GR2	6.4	6.2	5.8	5.5	5.1	4.6	4.1	4					
33000	TOFL	6830	6960	7230	7750	8350	9040	9760	9770				131	177
	V1	129	129	130	132	134	136	138	138					
	VR	135	135	136	137	139	140	141	141					
	V2	140	140	140	141	142	143	144	143					
	GR2	6.8	6.6	6.2	5.9	5.5	5	4.4	4.4					
32000	TOFL	6260	6380	6630	7130	7690	8310	8990	9020				128	175
	V1	124	124	125	128	130	132	134	134					
	VR	131	131	131	133	135	136	138	138					
	V2	136	136	136	137	139	139	140	140					
	GR2	7.2	6.9	6.6	6.3	5.9	5.3	4.8	4.8					
31000	TOFL	5730	5850	6070	6540	7060	7640	8250	8270				126	172
	V1	119	120	121	123	125	128	130	130					
	VR	126	127	127	129	131	132	134	134					
	V2	133	133	133	134	135	136	137	137					
	GR2	7.6	7.4	7	6.7	6.3	5.8	5.2	5.1					

FIGURE 5-185. TAKE-OFF DISTANCE; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	86.4					
	N1 (%)	91.3	92.2	92.6	92.0	91.4	90.8	90.1	90.1					
30000	TOFL	5250	5350	5550	5970	6470	7010	7570	7590				123	168
	V1	115	115	116	118	121	123	125	125					
	VR	122	122	123	125	127	128	130	130					
	V2	129	129	129	130	131	132	133	133					
	GR2	8.1	7.8	7.4	7.1	6.7	6.2	5.6	5.6					
29000	TOFL	4820	4910	5090	5460	5910	6430	6950	6970				120	165
	V1	111	111	112	114	116	119	121	121					
	VR	118	118	119	120	123	125	126	126					
	V2	125	125	125	126	128	129	130	130					
	GR2	8.6	8.3	7.9	7.6	7.2	6.6	6	6					
28000	TOFL	4450	4530	4690	5020	5420	5890	6390	6410				117	162
	V1	107	107	108	110	112	115	117	117					
	VR	114	114	115	117	119	121	123	123					
	V2	122	122	122	123	125	126	127	127					
	GR2	9.1	8.8	8.4	8.1	7.7	7.1	6.5	6.5					
27000	TOFL	4090	4170	4320	4620	4960	5380	5850	5870				115	159
	V1	103	103	103	106	108	110	113	113					
	VR	111	111	111	113	115	117	119	119					
	V2	119	119	119	120	121	122	124	124					
	GR2	9.7	9.4	9	8.6	8.2	7.6	7	6.9					
26000	TOFL	3780	3840	3970	4230	4550	4910	5320	5340				113	156
	V1	99	99	99	101	104	106	109	109					
	VR	107	107	108	109	111	113	115	115					
	V2	116	116	116	117	118	119	120	120					
	GR2	10.3	10	9.6	9.2	8.8	8.2	7.5	7.5					

FIGURE 5-186. TAKE-OFF DISTANCE; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	TOFL	10210	10470	10660	10870	11090	11300	11520	11730	11940	12160	12380	150	197
	V1	161	161	161	161	161	161	161	161	161	161	161		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1		
39000	TOFL	9770	10020	10200	10400	10600	10810	11010	11220	11420	11630	11830	148	195
	V1	159	159	159	159	159	159	158	158	158	158	158		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
38000	TOFL	9060	9280	9460	9640	9830	10020	10210	10390	10580	10770	10960	146	192
	V1	154	154	154	154	154	154	154	154	154	154	154		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6		
37000	TOFL	8380	8590	8750	8910	9090	9260	9440	9610	9780	9950	10130	143	189
	V1	150	150	150	150	150	150	150	150	150	150	150		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	157	157	157	156	156	156	156	156	156	156	156		
	GR2	5.1	5	5	5	5	5	5	5	5	5	5		
36000	TOFL	7730	7940	8090	8230	8400	8560	8710	8870	9030	9190	9350	140	187
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.5	5.3	5.3	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3		
35000	TOFL	7150	7330	7470	7610	7750	7900	8050	8190	8340	8490	8630	138	184
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	145	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
34000	TOFL	6600	6770	6890	7020	7160	7290	7420	7560	7690	7830	7960	135	181
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
33000	TOFL	6070	6230	6350	6460	6590	6710	6830	6950	7070	7200	7320	132	178
	V1	132	132	132	132	132	132	131	131	131	131	131		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
32000	TOFL	5590	5730	5830	5940	6050	6170	6280	6390	6500	6610	6720	129	175
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
31000	TOFL	5110	5250	5340	5430	5540	5640	5740	5840	5940	6040	6150	127	172
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3		

FIGURE 5-186. TAKE-OFF DISTANCE; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
30000	TOFL	4680	4800	4880	4970	5060	5160	5250	5340	5430	5520	5610	124	169
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	130	131	131	131	131	131	131	131	131	131	131		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
29000	TOFL	4280	4390	4470	4550	4630	4720	4800	4880	4960	5050	5130	121	166
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
28000	TOFL	3930	4030	4090	4170	4240	4320	4390	4470	4540	4620	4700	118	162
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8		
27000	TOFL	3630	3710	3770	3850	3910	3970	4040	4110	4180	4250	4320	115	159
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
26000	TOFL	3350	3430	3470	3550	3590	3660	3720	3780	3850	3910	3970	113	156
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10	10.1	10.1	10.1	10.1	10.1	10	10	10	10		

FIGURE 5-186. TAKE-OFF DISTANCE; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
39600	TOFL	12600	12950	13620	14640	15790							150	197
	V1	161	161	162	163	165								
	VR	164	165	165	166	167								
	V2	166	166	166	167	168								
	GR2	4.1	3.8	3.6	3.3	2.9								
39000	TOFL	12050	12380	13020	13980	15070	16210						148	195
	V1	158	159	160	161	162	163							
	VR	162	162	163	164	165	165							
	V2	164	164	164	165	165	165							
	GR2	4.3	4	3.7	3.4	3	2.6							
38000	TOFL	11170	11480	12070	12940	13940	15070	15760					146	192
	V1	154	154	155	157	158	159	160						
	VR	158	158	159	160	161	162	162						
	V2	160	160	160	161	162	162	162						
	GR2	4.6	4.3	4	3.7	3.3	2.8	2.5						
37000	TOFL	10320	10610	11180	11990	12890	13930	14640					143	189
	V1	150	150	151	153	154	155	156						
	VR	154	154	155	156	157	158	158						
	V2	156	156	157	157	158	159	159						
	GR2	4.9	4.6	4.3	4	3.6	3.1	2.8						
36000	TOFL	9530	9790	10340	11120	11940	12880	13530					140	187
	V1	145	145	147	149	150	151	152						
	VR	150	150	151	152	153	154	155						
	V2	153	153	153	154	155	155	155						
	GR2	5.2	5	4.7	4.3	3.9	3.4	3.1						
35000	TOFL	8790	9040	9530	10270	11050	11910	12500					138	184
	V1	141	141	142	144	146	147	148						
	VR	146	146	147	148	149	150	151						
	V2	149	149	149	150	151	152	152						
	GR2	5.6	5.3	5	4.7	4.3	3.8	3.4						
34000	TOFL	8110	8340	8790	9470	10220	11000	11550					135	181
	V1	136	137	138	140	142	143	144						
	VR	142	142	143	144	146	147	147						
	V2	146	146	146	147	148	148	148						
	GR2	6	5.7	5.3	5	4.6	4.1	3.7						
33000	TOFL	7460	7670	8090	8700	9400	10160	10660					132	178
	V1	131	132	133	135	137	139	140						
	VR	137	138	139	140	142	143	143						
	V2	142	142	142	143	144	145	145						
	GR2	6.4	6	5.7	5.4	4.9	4.4	4.1						
32000	TOFL	6850	7050	7440	8000	8630	9350	9840					129	175
	V1	127	128	129	131	133	135	136						
	VR	133	133	134	136	138	139	140						
	V2	138	138	139	140	141	141	142						
	GR2	6.8	6.4	6.1	5.8	5.3	4.8	4.4						
31000	TOFL	6260	6450	6820	7350	7920	8570	9030					127	172
	V1	122	123	124	127	129	131	132						
	VR	129	129	130	132	134	135	136						
	V2	134	134	135	136	137	138	138						
	GR2	7.2	6.8	6.5	6.2	5.7	5.2	4.8						

FIGURE 5-186. TAKE-OFF DISTANCE; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
30000	TOFL	5720	5890	6220	6720	7260	7850	8260					124	169
	V1	117	118	120	122	124	126	128						
	VR	124	125	126	128	130	131	132						
	V2	130	130	131	132	133	134	135						
	GR2	7.7	7.3	6.9	6.6	6.2	5.6	5.2						
29000	TOFL	5220	5370	5670	6120	6630	7180	7550					121	166
	V1	113	113	115	117	120	122	123						
	VR	120	120	122	123	125	127	128						
	V2	127	127	127	128	130	131	131						
	GR2	8.1	7.7	7.4	7	6.6	6	5.6						
28000	TOFL	4780	4910	5170	5570	6030	6560	6910					118	162
	V1	108	109	110	112	115	117	119						
	VR	116	116	117	119	121	123	124						
	V2	123	123	123	125	126	127	128						
	GR2	8.6	8.2	7.8	7.5	7.1	6.5	6.1						
27000	TOFL	4390	4520	4750	5110	5510	5990	6330					115	159
	V1	104	105	106	108	111	113	115						
	VR	112	112	113	115	117	119	120						
	V2	120	120	120	122	123	124	125						
	GR2	9.2	8.8	8.4	8	7.6	7	6.6						
26000	TOFL	4040	4150	4360	4670	5030	5460	5760					113	156
	V1	100	101	102	104	106	109	111						
	VR	108	109	110	111	113	115	116						
	V2	117	117	117	118	119	121	121						
	GR2	9.8	9.4	8.9	8.6	8.1	7.5	7.1						

FIGURE 5-187. TAKE-OFF DISTANCE; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	TOFL	11350	11560	11790	12020	12270	12510	12740	12980	13220	13460	13700	151	197
	V1	165	165	165	165	165	165	165	165	165	165	165		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	TOFL	10840	11030	11250	11480	11710	11930	12160	12390	12610	12850	13080	150	196
	V1	162	162	162	162	162	162	162	162	162	162	162		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	TOFL	10030	10220	10420	10630	10840	11050	11260	11470	11670	11890	12100	147	193
	V1	158	158	157	157	157	157	157	157	157	157	157		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	TOFL	9280	9450	9630	9820	10010	10210	10400	10590	10780	10980	11170	144	190
	V1	153	153	153	153	153	153	153	153	153	153	153		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
36000	TOFL	8550	8710	8870	9050	9230	9400	9580	9760	9930	10110	10290	142	187
	V1	148	148	148	148	148	148	148	148	148	148	148		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5		
35000	TOFL	7890	8040	8190	8350	8510	8680	8840	9000	9160	9320	9490	139	184
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	151	151	151	151	151	151		
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
34000	TOFL	7260	7390	7530	7680	7830	7970	8120	8270	8410	8560	8710	136	181
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
33000	TOFL	6680	6800	6930	7060	7200	7330	7470	7600	7740	7870	8010	133	178
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
32000	TOFL	6130	6240	6350	6480	6600	6720	6840	6970	7090	7210	7340	130	175
	V1	130	130	130	130	130	130	129	129	129	129	129		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
31000	TOFL	5620	5720	5820	5930	6050	6160	6270	6380	6490	6600	6720	128	172
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		

FIGURE 5-187. TAKE-OFF DISTANCE; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
30000	TOFL	5130	5220	5310	5410	5510	5610	5710	5810	5910	6020	6120	125	169
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
29000	TOFL	4680	4760	4840	4940	5030	5120	5210	5300	5390	5480	5580	122	166
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.1	8.1	8	8	8	8	8	8	8	8	7.9		
28000	TOFL	4270	4340	4420	4500	4590	4670	4750	4830	4910	5000	5080	119	163
	V1	111	111	110	110	110	110	110	110	110	110	110		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4		
27000	TOFL	3900	3970	4040	4110	4190	4260	4340	4410	4480	4560	4640	116	160
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9		
26000	TOFL	3600	3660	3710	3790	3850	3910	3980	4050	4110	4180	4250	113	156
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.8	9.7	9.7	9.7	9.7	9.7	9.6	9.6	9.7	9.6	9.6		

FIGURE 5-187. TAKE-OFF DISTANCE; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	92.4	93.0	92.4	91.7	91.1	90.4	90.3						
39600	TOFL	13980	14530	15530	16720								151	197
	V1	165	165	166	168									
	VR	168	168	169	170									
	V2	169	169	170	170									
	GR2	3.7	3.4	3.1	2.8									
39000	TOFL	13340	13870	14810	15940								150	196
	V1	162	163	164	165									
	VR	165	166	166	167									
	V2	167	167	167	168									
	GR2	3.9	3.6	3.3	3									
38000	TOFL	12340	12830	13680	14710	15880							147	193
	V1	158	158	159	161	162								
	VR	161	161	162	163	164								
	V2	163	163	163	164	164								
	GR2	4.2	3.9	3.6	3.3	2.8								
37000	TOFL	11400	11860	12640	13570	14640	15800	16080					144	190
	V1	153	154	155	156	158	159	159						
	VR	157	157	158	159	160	161	161						
	V2	159	159	159	160	161	161	161						
	GR2	4.5	4.2	3.9	3.5	3.1	2.6	2.5						
36000	TOFL	10500	10930	11680	12520	13490	14600	14890					142	187
	V1	148	149	151	152	153	155	155						
	VR	153	153	154	155	156	157	157						
	V2	155	155	156	156	157	157	158						
	GR2	4.8	4.5	4.2	3.8	3.4	2.9	2.8						
35000	TOFL	9680	10080	10780	11580	12460	13460	13730					139	184
	V1	144	145	146	148	149	150	151						
	VR	148	149	150	151	152	153	153						
	V2	151	151	152	153	153	154	154						
	GR2	5.2	4.8	4.5	4.2	3.8	3.2	3.1						
34000	TOFL	8900	9260	9930	10690	11500	12410	12650					136	181
	V1	139	140	142	144	145	146	147						
	VR	144	145	146	147	148	149	149						
	V2	147	147	148	149	150	150	150						
	GR2	5.5	5.2	4.9	4.5	4.1	3.6	3.4						
33000	TOFL	8180	8520	9110	9820	10600	11430	11660					133	178
	V1	134	135	137	139	141	142	143						
	VR	140	140	142	143	145	145	146						
	V2	144	144	145	146	146	147	147						
	GR2	5.9	5.5	5.2	4.9	4.4	3.9	3.8						
32000	TOFL	7500	7810	8360	9000	9730	10520	10730					130	175
	V1	130	131	133	134	137	138	139						
	VR	136	136	138	139	140	142	142						
	V2	140	140	141	142	143	143	143						
	GR2	6.3	5.9	5.6	5.3	4.8	4.3	4.1						
31000	TOFL	6860	7150	7670	8250	8930	9670	9870					128	172
	V1	125	126	128	130	132	134	135						
	VR	131	132	133	135	137	138	138						
	V2	136	136	137	138	139	140	140						
	GR2	6.7	6.3	6	5.7	5.2	4.6	4.5						

FIGURE 5-187. TAKE-OFF DISTANCE; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	92.4	93.0	92.4	91.7	91.1	90.4	90.3						
30000	TOFL	6260	6520	7000	7550	8150	8850	9030					125	169
	V1	120	121	123	125	127	130	130						
	VR	127	127	129	131	132	134	134						
	V2	132	132	133	135	135	136	136						
	GR2	7.1	6.8	6.4	6.1	5.6	5	4.9						
29000	TOFL	5700	5940	6370	6880	7450	8070	8240					122	166
	V1	115	116	118	121	123	125	126						
	VR	122	123	125	126	128	130	130						
	V2	128	128	129	131	132	133	133						
	GR2	7.6	7.2	6.9	6.5	6	5.5	5.3						
28000	TOFL	5190	5400	5790	6250	6770	7350	7500					119	163
	V1	110	112	114	116	118	121	121						
	VR	118	119	120	122	124	126	126						
	V2	124	124	125	127	128	129	129						
	GR2	8.1	7.7	7.3	7	6.5	5.9	5.8						
27000	TOFL	4730	4920	5260	5670	6150	6680	6830					116	160
	V1	106	107	109	111	114	116	117						
	VR	114	114	116	118	120	122	122						
	V2	120	121	122	123	124	125	126						
	GR2	8.6	8.2	7.8	7.5	7	6.4	6.2						
26000	TOFL	4340	4510	4810	5170	5600	6100	6230					113	156
	V1	102	103	105	107	109	112	112						
	VR	110	110	112	114	116	118	118						
	V2	117	117	118	120	121	122	122						
	GR2	9.2	8.7	8.4	8	7.5	6.9	6.8						

FIGURE 5-188. TAKE-OFF DISTANCE; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
39600	TOFL	12360	12670	13040	13320	13600	13900	14210	14420	14650	14920	15200	152	198
	V1	168	168	168	168	168	168	168	168	168	168	168		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	3.8	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5		
39000	TOFL	11810	12100	12460	12720	12980	13270	13560	13770	13990	14250	14510	151	196
	V1	165	165	165	165	165	165	165	165	165	165	165		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	4	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.7		
38000	TOFL	10930	11200	11520	11760	12000	12270	12540	12730	12930	13170	13410	148	193
	V1	161	161	161	161	161	161	161	161	161	161	161		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.3	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4		
37000	TOFL	10090	10340	10630	10850	11080	11320	11570	11740	11930	12150	12370	145	190
	V1	156	156	156	156	156	156	156	156	156	156	156		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.6	4.6	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.3		
36000	TOFL	9290	9520	9800	10000	10210	10430	10660	10820	10990	11190	11390	143	187
	V1	151	151	152	152	152	152	152	152	152	152	152		
	VR	155	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	4.9	4.8	4.8	4.8	4.8	4.7	4.8	4.8	4.8	4.7		
35000	TOFL	8540	8760	9010	9190	9380	9590	9800	9940	10090	10270	10470	140	185
	V1	146	147	147	147	147	147	147	147	147	147	147		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5		
34000	TOFL	7860	8050	8280	8450	8630	8820	9000	9140	9270	9440	9620	137	182
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.7	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4		
33000	TOFL	7220	7390	7600	7760	7920	8090	8260	8380	8510	8660	8820	134	179
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	142	142	143	143	143	143	143	143	143	143	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.1	6	5.9	5.9	5.9	5.9	5.8	5.9	5.9	5.9	5.8		
32000	TOFL	6620	6790	6980	7130	7270	7430	7580	7690	7810	7950	8100	131	176
	V1	132	133	133	133	133	133	133	133	133	133	133		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2		
31000	TOFL	6060	6210	6390	6520	6650	6790	6940	7030	7130	7260	7400	128	173
	V1	127	128	128	128	128	128	128	128	128	128	128		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.9	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.7	6.7	6.6		

FIGURE 5-188. TAKE-OFF DISTANCE; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
30000	TOFL	5520	5670	5830	5950	6070	6200	6330	6420	6510	6620	6750	126	169
	V1	122	123	123	123	123	123	123	123	123	123	123		
	VR	129	129	129	130	130	130	130	130	129	129	129		
	V2	134	134	135	135	135	135	135	135	134	134	134		
	GR2	7.4	7.3	7.2	7.2	7.2	7.2	7.1	7.2	7.2	7.2	7		
29000	TOFL	5020	5150	5300	5400	5510	5630	5740	5820	5900	6010	6120	123	166
	V1	117	118	118	118	118	118	118	118	118	118	118		
	VR	124	124	125	125	125	125	125	125	125	125	125		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.8	7.8	7.7	7.7	7.7	7.7	7.6	7.6	7.7	7.6	7.5		
28000	TOFL	4570	4680	4810	4910	5000	5110	5210	5280	5360	5450	5550	120	163
	V1	112	113	113	113	113	113	113	113	113	113	113		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	127	127	127	127	126	126	126		
	GR2	8.3	8.3	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	7.9		
27000	TOFL	4160	4260	4380	4460	4550	4640	4740	4800	4870	4950	5040	117	160
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	115	115	116	116	116	116	116	116	116	116	116		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.9	8.8	8.7	8.7	8.7	8.7	8.6	8.6	8.7	8.6	8.4		
26000	TOFL	3800	3880	3980	4060	4140	4220	4300	4360	4420	4500	4580	114	157
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.4	9.4	9.3	9.3	9.3	9.2	9.2	9.2	9.2	9.2	9		

FIGURE 5-188. TAKE-OFF DISTANCE; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	92.9	92.8	92.2	91.5	90.9	90.3							
39600	TOFL	15590	16470										152	198
	V1	168	169											
	VR	171	171											
	V2	172	172											
	GR2	3.3	3											
39000	TOFL	14900	15720	16950									151	196
	V1	166	167	168										
	VR	168	169	170										
	V2	170	170	170										
	GR2	3.4	3.1	2.9										
38000	TOFL	13770	14530	15640	16850								148	193
	V1	161	162	163	165									
	VR	164	165	166	167									
	V2	166	166	166	167									
	GR2	3.7	3.4	3.1	2.8									
37000	TOFL	12700	13390	14410	15500	16700							145	190
	V1	157	158	159	160	161								
	VR	160	161	162	162	163								
	V2	162	162	162	163	163								
	GR2	4	3.7	3.4	3.1	2.6								
36000	TOFL	11710	12350	13260	14250	15420							143	187
	V1	152	153	154	156	157								
	VR	156	157	157	158	159								
	V2	158	158	158	159	160								
	GR2	4.3	4	3.7	3.4	2.9								
35000	TOFL	10750	11370	12210	13100	14160	15180						140	185
	V1	147	149	150	151	152	154							
	VR	151	152	153	154	155	156							
	V2	154	154	155	155	156	156							
	GR2	4.7	4.3	4.1	3.7	3.2	2.8							
34000	TOFL	9880	10440	11260	12060	13010	13940						137	182
	V1	143	144	146	147	148	149							
	VR	147	148	149	150	151	152							
	V2	150	150	151	151	152	152							
	GR2	5	4.7	4.4	4	3.6	3.1							
33000	TOFL	9060	9590	10340	11110	11970	12800						134	179
	V1	138	139	141	143	144	145							
	VR	143	144	145	146	147	148							
	V2	146	146	147	148	148	149							
	GR2	5.4	5.1	4.7	4.4	3.9	3.5							
32000	TOFL	8320	8790	9480	10200	11000	11760						131	176
	V1	133	135	137	138	140	141							
	VR	139	139	141	142	143	144							
	V2	142	142	143	144	145	145							
	GR2	5.8	5.4	5.1	4.8	4.3	3.8							
31000	TOFL	7610	8050	8670	9340	10100	10790						128	173
	V1	129	130	132	134	136	137							
	VR	134	135	137	138	139	140							
	V2	138	139	140	140	141	142							
	GR2	6.2	5.8	5.5	5.1	4.6	4.2							

FIGURE 5-188. TAKE-OFF DISTANCE; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	92.9	92.8	92.2	91.5	90.9	90.3							
30000	TOFL	6940	7350	7930	8520	9230	9890						126	169
	V1	124	125	127	129	131	133							
	VR	130	131	132	134	135	137							
	V2	134	135	136	137	138	138							
	GR2	6.6	6.2	5.9	5.6	5	4.6							
29000	TOFL	6300	6690	7230	7780	8420	9030						123	166
	V1	118	120	123	124	127	128							
	VR	125	126	128	130	131	132							
	V2	130	131	132	133	134	135							
	GR2	7.1	6.7	6.4	6	5.5	5							
28000	TOFL	5710	6060	6570	7080	7660	8220						120	163
	V1	114	115	118	120	122	124							
	VR	120	122	124	125	127	128							
	V2	126	127	128	129	130	131							
	GR2	7.5	7.1	6.8	6.4	5.9	5.4							
27000	TOFL	5170	5480	5930	6420	6950	7460						117	160
	V1	108	110	113	115	117	119							
	VR	116	117	119	121	123	124							
	V2	122	123	124	126	127	127							
	GR2	8	7.6	7.3	6.9	6.4	5.9							
26000	TOFL	4700	4970	5350	5780	6290	6760						114	157
	V1	104	105	108	110	113	115							
	VR	111	113	115	116	118	120							
	V2	119	119	120	121	123	124							
	GR2	8.6	8.1	7.8	7.4	6.9	6.4							

FIGURE 5-189. TAKE-OFF DISTANCE; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
39600	TOFL	13520	14030	14500	14820	15140	15530	15840	16050	16320	16630	16970	154	198
	V1	171	171	172	172	172	172	172	172	172	172	172		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	175	175	175	175	175	175	175	175	175	175	175		
	GR2	3.6	3.5	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.1		
39000	TOFL	12900	13380	13830	14130	14430	14800	15090	15300	15550	15840	16180	152	197
	V1	168	169	169	169	169	169	169	169	169	169	169		
	VR	171	171	172	172	172	172	172	172	172	172	172		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	3.8	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.3		
38000	TOFL	11920	12360	12770	13040	13330	13660	13930	14120	14360	14620	14930	149	194
	V1	164	164	164	164	164	164	164	164	164	164	165		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	4.1	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.6		
37000	TOFL	11020	11420	11790	12040	12300	12610	12860	13030	13250	13500	13790	147	191
	V1	159	160	160	160	160	160	160	160	160	160	160		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	164	164	165	165	165	165	165	165	165	164	164		
	GR2	4.4	4.3	4.2	4.2	4.2	4.2	4.1	4.2	4.2	4.1	3.9		
36000	TOFL	10150	10520	10860	11090	11330	11610	11840	11990	12190	12420	12680	144	188
	V1	154	155	155	155	155	155	155	155	155	155	155		
	VR	158	159	159	159	159	159	159	159	159	159	159		
	V2	160	160	161	161	161	161	161	161	161	161	160		
	GR2	4.7	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.2		
35000	TOFL	9310	9660	9970	10190	10410	10670	10880	11010	11190	11400	11650	141	185
	V1	149	150	150	150	150	150	150	150	150	150	151		
	VR	154	154	154	154	154	155	155	155	154	154	154		
	V2	156	156	156	157	157	157	157	157	156	156	156		
	GR2	5.1	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.5		
34000	TOFL	8540	8850	9140	9340	9540	9780	9960	10090	10250	10440	10670	138	182
	V1	144	145	145	145	145	145	145	145	145	145	146		
	VR	149	150	150	150	150	150	150	150	150	150	150		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	4.9		
33000	TOFL	7830	8120	8380	8560	8740	8960	9130	9240	9390	9570	9770	135	179
	V1	139	140	141	141	141	141	141	141	141	141	141		
	VR	145	145	145	146	146	146	146	146	146	146	146		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.8	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.3		
32000	TOFL	7190	7440	7670	7840	8000	8200	8360	8460	8590	8750	8940	133	176
	V1	135	135	136	136	136	136	136	136	136	136	136		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	145	145	145	145	145	145	145	144	144		
	GR2	6.2	6.1	6	6	6	6	6	6	6	5.9	5.6		
31000	TOFL	6570	6810	7030	7180	7330	7520	7660	7750	7870	8020	8190	130	173
	V1	130	131	131	131	131	131	131	131	131	131	131		
	VR	136	136	137	137	137	137	137	137	137	137	137		
	V2	140	140	141	141	141	141	141	141	141	141	141		
	GR2	6.7	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6		

FIGURE 5-189. TAKE-OFF DISTANCE; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
30000	TOFL	6000	6210	6410	6540	6680	6850	6980	7050	7160	7300	7450	127	170
	V1	125	126	126	126	126	126	126	126	126	126	126		
	VR	131	132	132	132	132	132	132	132	132	132	132		
	V2	136	136	137	137	137	137	137	137	137	137	137		
	GR2	7.1	6.9	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.7	6.5		
29000	TOFL	5430	5630	5830	5950	6080	6230	6340	6420	6510	6640	6780	124	167
	V1	119	120	121	121	121	121	121	121	121	121	121		
	VR	126	127	128	128	128	128	128	128	128	128	128		
	V2	132	132	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	6.9		
28000	TOFL	4920	5100	5260	5370	5490	5630	5730	5790	5880	5990	6120	121	164
	V1	114	115	116	116	116	116	116	116	116	116	116		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	127	128	128	128	128	128	128	128	128	128	128		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.4		
27000	TOFL	4470	4620	4770	4870	4970	5090	5180	5240	5320	5410	5530	118	160
	V1	109	110	111	111	111	111	111	111	111	111	111		
	VR	117	117	118	118	118	118	118	118	118	118	118		
	V2	123	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.1	7.9		
26000	TOFL	4060	4190	4320	4410	4500	4610	4690	4740	4810	4900	5000	115	157
	V1	105	105	106	106	106	106	106	106	106	106	106		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	119	120	120	120	120	120	120	120	120	120	120		
	GR2	9.1	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.7	8.4		

FIGURE 5-189. TAKE-OFF DISTANCE; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	72							
	N1 (%)	93.0	92.6	92.0	91.3	90.6	90.3							
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	16850											152	197
	V1	170												
	VR	172												
	V2	172												
	GR2	3												
38000	TOFL	15550	16640	17900									149	194
	V1	165	166	167										
	VR	168	168	169										
	V2	168	169	169										
	GR2	3.3	3	2.7										
37000	TOFL	14360	15340	16530									147	191
	V1	161	162	163										
	VR	164	164	165										
	V2	164	165	166										
	GR2	3.6	3.3	3										
36000	TOFL	13200	14100	15170	16370								144	188
	V1	156	157	158	160									
	VR	159	160	161	162									
	V2	160	161	161	162									
	GR2	3.9	3.6	3.3	2.9									
35000	TOFL	12140	12950	13920	15000	16210							141	185
	V1	151	152	154	155	156								
	VR	155	156	156	157	158								
	V2	156	157	157	158	158								
	GR2	4.2	3.9	3.6	3.2	2.8								
34000	TOFL	11120	11900	12770	13740	14880	15440						138	182
	V1	146	148	149	150	152	152							
	VR	150	152	152	153	154	154							
	V2	152	153	153	154	155	155							
	GR2	4.6	4.2	3.9	3.5	3.1	2.8							
33000	TOFL	10190	10900	11720	12590	13620	14140						135	179
	V1	142	143	145	146	147	148							
	VR	146	147	148	149	150	150							
	V2	148	149	150	150	151	151							
	GR2	4.9	4.6	4.3	3.9	3.4	3.2							
32000	TOFL	9340	9990	10760	11560	12480	12950						133	176
	V1	137	138	140	142	143	144							
	VR	142	143	144	145	146	146							
	V2	144	145	146	146	147	147							
	GR2	5.3	4.9	4.6	4.2	3.8	3.5							
31000	TOFL	8540	9120	9830	10600	11430	11850						130	173
	V1	132	134	136	137	139	139							
	VR	137	138	140	141	142	142							
	V2	141	141	142	143	143	143							
	GR2	5.7	5.3	5	4.6	4.1	3.9							

FIGURE 5-189. TAKE-OFF DISTANCE; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	72							
	N1 (%)	93.0	92.6	92.0	91.3	90.6	90.3							
30000	TOFL	7790	8340	8980	9670	10470	10840						127	170
	V1	127	129	131	133	134	135							
	VR	133	134	136	137	138	139							
	V2	137	137	138	139	140	140							
	GR2	6.1	5.7	5.4	5	4.5	4.3							
29000	TOFL	7080	7600	8180	8820	9540	9910						124	167
	V1	122	124	126	128	130	131							
	VR	128	130	131	133	134	135							
	V2	133	133	134	135	136	136							
	GR2	6.5	6.2	5.8	5.4	4.9	4.7							
28000	TOFL	6400	6900	7450	8020	8680	9020						121	164
	V1	117	119	122	123	125	126							
	VR	124	125	127	128	130	130							
	V2	128	130	131	131	132	133							
	GR2	7	6.6	6.3	5.9	5.3	5.1							
27000	TOFL	5780	6220	6750	7280	7880	8190						118	160
	V1	112	114	117	119	121	122							
	VR	119	121	123	124	126	126							
	V2	124	125	127	128	129	129							
	GR2	7.5	7.1	6.8	6.4	5.8	5.6							
26000	TOFL	5210	5600	6070	6580	7140	7410						115	157
	V1	107	109	111	114	116	117							
	VR	114	116	118	120	121	122							
	V2	120	121	123	124	125	125							
	GR2	8	7.6	7.3	6.9	6.3	6.1							

FIGURE 5-190. TAKE-OFF DISTANCE; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	4570	4640	4710	4770	4840	4930	5010	5100	5180	5240	5320	139	192
	V1	134	134	134	134	133	133	133	133	133	133	133		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.6	6.7	6.7	6.7	6.8	6.7	6.7	6.7	6.7	6.8	6.8		
39000	TOFL	4410	4480	4540	4610	4670	4750	4830	4920	4990	5060	5130	138	191
	V1	132	132	132	132	131	131	131	131	131	131	131		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.8	6.9	6.9	6.9	7	7	6.9	6.9	6.9	7	7		
38000	TOFL	4150	4220	4280	4340	4400	4480	4550	4630	4700	4760	4830	136	188
	V1	129	129	129	128	128	128	128	128	128	128	128		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
37000	TOFL	3910	3970	4030	4080	4140	4210	4280	4350	4420	4480	4540	135	185
	V1	126	125	125	125	125	125	125	125	125	125	125		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
36000	TOFL	3680	3740	3790	3850	3900	3960	4030	4100	4160	4220	4270	133	182
	V1	122	122	122	122	122	122	121	121	121	121	121		
	VR	129	128	128	128	128	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
35000	TOFL	3470	3520	3570	3620	3670	3730	3800	3860	3920	3970	4020	131	180
	V1	119	119	119	119	118	118	118	118	118	118	118		
	VR	126	126	125	125	125	125	125	125	125	125	125		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.4	8.5	8.5	8.5	8.6	8.6	8.5	8.5	8.5	8.6	8.6		
34000	TOFL	3270	3320	3370	3410	3460	3520	3580	3630	3690	3740	3790	129	177
	V1	116	116	116	115	115	115	115	115	115	115	115		
	VR	123	123	123	123	123	123	123	123	123	123	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.9	8.9	8.9	9	9	9	9	9	9	9	9		
33000	TOFL	3080	3130	3170	3220	3260	3310	3370	3420	3480	3520	3570	127	174
	V1	113	113	112	112	112	112	112	112	112	112	112		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	129		
	GR2	9.4	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
32000	TOFL	2910	2950	3000	3040	3080	3130	3180	3230	3280	3320	3370	125	171
	V1	110	110	110	109	109	109	109	109	109	109	109		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.9	9.9	9.9	10	10	10	10	10	10	10	10.1		
31000	TOFL	2750	2790	2830	2870	2910	2960	3000	3050	3100	3140	3180	123	168
	V1	107	107	107	106	106	106	106	106	106	106	106		
	VR	115	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.5	10.6	10.6		

FIGURE 5-190. TAKE-OFF DISTANCE; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
30000	TOFL	2600	2640	2680	2720	2760	2800	2850	2890	2930	2970	3010	121	166
	V1	104	104	104	104	104	104	104	103	103	103	103		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11	11.1	11.1	11.1	11.2	11.2	11.2	11.1	11.1	11.2	11.2		
29000	TOFL	2470	2510	2550	2580	2620	2660	2710	2740	2780	2830	2870	119	163
	V1	102	102	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.7	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.9		
28000	TOFL	2430	2470	2510	2560	2600	2640	2680	2720	2760	2800	2840	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.6		
27000	TOFL	2410	2450	2490	2540	2580	2620	2660	2700	2730	2780	2820	115	157
	V1	102	102	102	102	102	102	102	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.2	13.2	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.4		
26000	TOFL	2390	2430	2470	2520	2560	2600	2640	2670	2710	2750	2790	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	14	14	14.1	14.1	14.2	14.2	14.1	14.1	14.1	14.1	14.2		

FIGURE 5-191. TAKE-OFF DISTANCE; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	4830	4910	4990	5060	5140	5230	5320	5420	5500	5570	5650	139	193
	V1	135	135	135	135	135	135	135	135	135	135	134		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
39000	TOFL	4670	4740	4820	4890	4960	5050	5140	5220	5310	5380	5450	138	191
	V1	133	133	133	133	133	133	133	133	133	133	132		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8		
38000	TOFL	4400	4470	4530	4600	4670	4750	4830	4920	4990	5060	5130	136	188
	V1	130	130	130	130	130	130	129	129	129	129	129		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
37000	TOFL	4130	4200	4260	4320	4390	4470	4540	4620	4690	4750	4820	135	185
	V1	127	127	126	126	126	126	126	126	126	126	126		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.5	7.5		
36000	TOFL	3880	3940	4000	4060	4120	4190	4270	4340	4400	4460	4520	133	183
	V1	123	123	123	123	123	123	123	123	123	122	122		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	138	138	138	138	138	138	138	138	138	138	137		
	GR2	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.8	7.8	7.9	7.9		
35000	TOFL	3650	3710	3770	3820	3880	3950	4010	4080	4140	4200	4250	131	180
	V1	120	120	120	120	119	119	119	119	119	119	119		
	VR	127	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
34000	TOFL	3440	3490	3550	3600	3650	3710	3770	3840	3900	3950	4000	129	177
	V1	117	117	117	116	116	116	116	116	116	116	116		
	VR	124	124	124	123	123	123	123	123	123	123	123		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.7	8.7	8.7	8.7	8.8	8.8	8.7	8.7	8.7	8.7	8.8		
33000	TOFL	3240	3290	3330	3380	3440	3490	3550	3610	3670	3710	3760	127	174
	V1	114	113	113	113	113	113	113	113	113	113	113		
	VR	121	121	121	121	121	121	121	121	121	121	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
32000	TOFL	3050	3090	3140	3190	3240	3290	3340	3400	3440	3490	3540	125	171
	V1	110	110	110	110	110	110	110	110	110	110	109		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.8		
31000	TOFL	2870	2920	2960	3010	3050	3100	3150	3200	3240	3290	3330	123	169
	V1	107	107	107	107	107	107	107	107	107	107	106		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	126	126	126	126	126	125	125	125	125	125	125		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.2	10.3	10.3		

FIGURE 5-191. TAKE-OFF DISTANCE; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
30000	TOFL	2710	2750	2790	2830	2880	2920	2970	3010	3060	3100	3140	121	166
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.8	10.8	10.9	10.9		
29000	TOFL	2570	2610	2650	2690	2730	2770	2820	2860	2900	2940	2980	119	163
	V1	102	102	102	102	102	101	101	101	101	101	101		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		
28000	TOFL	2480	2520	2560	2610	2650	2690	2730	2770	2810	2860	2900	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12.1	12.1	12.2	12.2	12.2	12.2	12.2	12.1	12.2	12.2		
27000	TOFL	2460	2500	2540	2590	2630	2670	2710	2750	2790	2830	2870	115	157
	V1	101	101	101	101	101	101	101	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	13		
26000	TOFL	2440	2480	2520	2560	2610	2650	2690	2720	2760	2800	2850	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.7	13.7	13.8	13.8	13.8	13.8	13.7	13.7	13.8	13.8		

FIGURE 5-192. TAKE-OFF DISTANCE; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	5110	5200	5290	5380	5470	5570	5660	5760	5850	5930	6020	140	193
	V1	137	137	137	136	136	136	136	136	136	136	136		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	148	148	148	148	148	148	148	148	147	147	147		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
39000	TOFL	4940	5020	5110	5190	5280	5370	5460	5560	5650	5720	5800	139	191
	V1	135	135	135	134	134	134	134	134	134	134	134		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
38000	TOFL	4650	4730	4810	4880	4970	5050	5140	5230	5310	5380	5460	137	189
	V1	131	131	131	131	131	131	131	131	131	131	130		
	VR	137	137	137	136	136	136	136	136	136	136	136		
	V2	144	144	144	143	143	143	143	143	143	143	143		
	GR2	6.8	6.8	6.8	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.9		
37000	TOFL	4370	4440	4520	4590	4670	4750	4830	4910	4990	5050	5130	135	186
	V1	128	128	128	128	127	127	127	127	127	127	127		
	VR	134	134	134	134	134	134	134	134	134	133	133		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
36000	TOFL	4100	4170	4230	4300	4380	4450	4530	4600	4680	4740	4800	133	183
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
35000	TOFL	3840	3910	3980	4040	4110	4180	4250	4320	4390	4450	4510	131	180
	V1	121	121	121	121	121	121	121	121	120	120	120		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	8	8	8	8	8	8	8	8	8	8	8.1		
34000	TOFL	3610	3680	3740	3800	3860	3920	3990	4050	4120	4170	4230	129	177
	V1	118	118	117	117	117	117	117	117	117	117	117		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
33000	TOFL	3400	3460	3510	3570	3630	3690	3750	3810	3870	3920	3970	127	175
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	122	122	121	121	121	121	121	121	121	121	121		
	V2	131	131	131	131	131	131	131	131	131	131	130		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
32000	TOFL	3190	3250	3300	3350	3410	3460	3520	3580	3630	3680	3730	125	172
	V1	111	111	111	111	111	111	111	111	111	110	110		
	VR	119	119	119	119	119	119	119	119	119	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
31000	TOFL	3000	3060	3100	3150	3200	3260	3310	3360	3410	3450	3500	123	169
	V1	108	108	108	108	108	108	108	107	107	107	107		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.9	10	10	10	10	10	10	9.9	9.9	10	10		

FIGURE 5-192. TAKE-OFF DISTANCE; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
30000	TOFL	2830	2870	2920	2960	3010	3060	3110	3160	3210	3250	3290	121	166
	V1	105	105	105	105	105	105	104	104	104	104	104		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.5	10.5	10.5	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.6		
29000	TOFL	2670	2710	2760	2800	2850	2890	2940	2980	3030	3070	3110	119	163
	V1	102	102	102	102	102	102	102	102	102	101	101		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11.1	11.1	11.2	11.2	11.1	11.1	11.1	11.1	11.1	11.2		
28000	TOFL	2540	2580	2620	2670	2710	2750	2790	2830	2870	2920	2960	117	160
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.9		
27000	TOFL	2510	2560	2600	2640	2680	2730	2770	2800	2850	2890	2930	115	157
	V1	100	100	100	100	100	100	100	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	118	118	118	118	118	118	118	118	118		
	GR2	12.5	12.5	12.6	12.6	12.6	12.6	12.6	12.5	12.5	12.6	12.6		
26000	TOFL	2490	2530	2580	2620	2660	2700	2740	2780	2820	2860	2910	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.3	13.3	13.4	13.4		

FIGURE 5-193. TAKE-OFF DISTANCE; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	5490	5590	5690	5790	5890	6000	6100	6210	6310	6400	6490	141	193
	V1	139	139	139	139	139	138	138	138	138	138	138		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
39000	TOFL	5280	5370	5470	5560	5660	5760	5860	5960	6060	6140	6230	140	192
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
38000	TOFL	4940	5030	5110	5200	5300	5390	5480	5580	5670	5740	5820	137	189
	V1	133	133	133	132	132	132	132	132	132	132	132		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.6	6.6		
37000	TOFL	4640	4720	4800	4880	4970	5060	5140	5230	5320	5390	5460	135	186
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	141		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	4350	4430	4510	4580	4660	4740	4820	4910	4980	5050	5120	133	183
	V1	126	126	126	126	126	126	125	125	125	125	125		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	4080	4150	4220	4290	4370	4440	4520	4590	4670	4720	4790	131	181
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
34000	TOFL	3820	3890	3960	4020	4090	4160	4230	4300	4370	4430	4490	129	178
	V1	119	119	119	119	119	119	119	119	118	118	118		
	VR	126	126	126	126	126	126	126	126	126	126	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.2		
33000	TOFL	3590	3650	3720	3780	3840	3910	3970	4040	4100	4160	4210	127	175
	V1	116	115	115	115	115	115	115	115	115	115	115		
	VR	123	123	123	123	123	123	123	123	123	123	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
32000	TOFL	3370	3430	3490	3550	3610	3670	3720	3780	3850	3890	3950	125	172
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	120	120	120	120	120	120	120	120	120	120	119		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	3160	3210	3270	3320	3380	3430	3490	3540	3600	3640	3690	123	169
	V1	109	109	109	109	109	109	108	108	108	108	108		
	VR	116	116	116	116	116	116	117	117	117	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 5-193. TAKE-OFF DISTANCE; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
30000	TOFL	2970	3020	3070	3110	3170	3220	3270	3320	3380	3420	3460	121	166
	V1	106	106	106	105	105	105	105	105	105	105	105		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	124	124	124	123	123	123	123	123	123	123	123		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.2	10.2		
29000	TOFL	2790	2830	2880	2930	2970	3020	3070	3120	3170	3210	3250	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.7	10.7	10.7	10.7	10.8		
28000	TOFL	2640	2690	2730	2780	2820	2860	2910	2950	3000	3040	3080	117	160
	V1	100	100	100	100	100	100	100	100	100	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
27000	TOFL	2560	2600	2650	2690	2730	2780	2820	2860	2900	2940	2990	115	157
	V1	99	99	99	99	99	99	98	98	98	98	98		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	2540	2580	2630	2670	2710	2750	2790	2830	2870	2920	2960	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 5-194. TAKE-OFF DISTANCE; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	5950	6050	6160	6270	6390	6500	6620	6730	6840	6930	7030	142	194
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
39000	TOFL	5710	5810	5910	6020	6130	6240	6350	6460	6560	6650	6750	141	192
	V1	139	139	139	139	139	139	139	139	138	138	138		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	6	6	6	6	6	6	5.9	5.9	6	6		
38000	TOFL	5330	5430	5520	5620	5720	5820	5920	6020	6120	6200	6290	138	189
	V1	135	135	135	135	135	135	135	135	135	134	134		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	145	145		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	4970	5050	5140	5230	5330	5420	5510	5610	5700	5780	5860	136	187
	V1	131	131	131	131	131	131	131	131	131	130	130		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.7	6.7		
36000	TOFL	4650	4730	4820	4900	4980	5070	5160	5250	5330	5400	5480	133	184
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
35000	TOFL	4360	4430	4510	4590	4670	4750	4830	4910	4980	5050	5120	131	181
	V1	124	124	124	124	124	124	123	123	123	123	123		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	4070	4150	4220	4290	4370	4440	4510	4590	4660	4720	4790	129	178
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	134	134	134	134	134	134	134	134		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.9		
33000	TOFL	3820	3890	3950	4020	4080	4160	4230	4300	4360	4420	4480	127	175
	V1	117	117	117	117	117	117	117	117	116	116	116		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	131	131	131		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
32000	TOFL	3580	3640	3700	3770	3830	3900	3960	4020	4090	4140	4200	125	172
	V1	114	113	113	113	113	113	113	113	113	113	113		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	3350	3410	3470	3530	3590	3650	3700	3770	3820	3880	3920	123	169
	V1	110	110	110	110	110	110	110	110	110	110	109		
	VR	118	118	118	118	118	118	118	118	118	117	117		
	V2	127	127	127	127	127	127	126	126	126	126	126		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 5-194. TAKE-OFF DISTANCE; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
30000	TOFL	3140	3190	3240	3290	3350	3400	3460	3510	3570	3610	3660	121	166
	V1	107	107	107	106	106	106	106	106	106	106	106		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
29000	TOFL	2940	2990	3040	3090	3140	3190	3240	3290	3340	3390	3430	119	163
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
28000	TOFL	2770	2810	2860	2900	2950	3000	3050	3090	3140	3180	3230	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	11	11	11	11	11	11	11	11	11		
27000	TOFL	2620	2660	2710	2750	2790	2840	2880	2930	2970	3010	3050	115	157
	V1	98	98	98	98	98	98	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
26000	TOFL	2580	2630	2670	2710	2760	2800	2840	2880	2920	2970	3010	113	154
	V1	98	98	98	98	98	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.4	12.4	12.5	12.5		

FIGURE 5-195. TAKE-OFF DISTANCE; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	6410	6530	6650	6770	6890	7020	7140	7270	7390	7480	7590	143	194
	V1	144	144	143	143	143	143	143	143	143	143	143		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	153	153	153	153	153	153	153	153	153	152	152		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
39000	TOFL	6140	6260	6370	6490	6600	6720	6840	6960	7070	7170	7280	142	193
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	151	151	151	151	151	151	151	151	150	150	150		
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.8		
38000	TOFL	5730	5830	5940	6050	6160	6260	6370	6490	6590	6680	6770	139	190
	V1	137	137	137	137	137	137	137	137	137	137	136		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6.1	6.1		
37000	TOFL	5330	5430	5530	5630	5730	5830	5930	6040	6130	6210	6300	137	187
	V1	133	133	133	133	133	133	133	133	133	133	132		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	4960	5050	5140	5230	5330	5420	5510	5610	5700	5770	5850	134	184
	V1	129	129	129	129	129	129	129	129	129	128	128		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	140	140		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	4630	4710	4790	4880	4970	5050	5140	5230	5310	5380	5450	132	181
	V1	125	125	125	125	125	125	125	125	125	125	124		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	137	137	137		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.2	7.2		
34000	TOFL	4330	4410	4480	4560	4640	4720	4800	4880	4960	5020	5100	129	178
	V1	122	121	121	121	121	121	121	121	121	121	121		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
33000	TOFL	4050	4120	4190	4270	4340	4410	4490	4560	4630	4690	4760	127	176
	V1	118	118	118	118	118	118	118	118	118	118	117		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	132	132	132	132	132	132		
	GR2	8	8	8	8	8	8	8	8	8	8	8		
32000	TOFL	3790	3860	3920	3990	4050	4130	4190	4270	4330	4390	4450	125	173
	V1	115	115	114	114	114	114	114	114	114	114	114		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.5	8.5		
31000	TOFL	3540	3600	3670	3730	3790	3850	3920	3980	4050	4090	4150	123	170
	V1	111	111	111	111	111	111	111	111	111	111	110		
	VR	118	118	118	118	118	119	119	119	119	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9	9	9	9	9	9	9	8.9	8.9	9	9		

FIGURE 5-195. TAKE-OFF DISTANCE; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
30000	TOFL	3310	3370	3420	3480	3540	3590	3650	3710	3770	3820	3870	121	167
	V1	108	108	108	107	107	107	107	107	107	107	107		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	124	124	124	124	124	124	124	124		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	3090	3140	3190	3250	3300	3350	3410	3460	3520	3570	3610	119	164
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10.1	10.1		
28000	TOFL	2890	2930	2980	3030	3080	3130	3180	3230	3280	3330	3370	117	161
	V1	101	101	101	101	101	101	101	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.6	10.6	10.6	10.6	10.7		
27000	TOFL	2730	2780	2820	2870	2920	2960	3010	3060	3100	3140	3190	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.3	11.3	11.4		
26000	TOFL	2640	2680	2730	2770	2810	2860	2900	2940	2980	3030	3080	113	154
	V1	97	97	97	97	97	97	97	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12	12.1	12.1		

FIGURE 5-196. TAKE-OFF DISTANCE; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	7000	7120	7250	7380	7520	7650	7790	7920	8050	8150	8280	144	195
	V1	146	146	146	146	146	146	146	146	146	146	146		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	155	155	155	155	155	155	155	155	155	154	154		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	TOFL	6720	6830	6950	7080	7210	7340	7470	7600	7720	7820	7940	143	193
	V1	144	144	144	144	144	144	144	144	144	143	143		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	153	153	153	153	153	153	153	153	152	152	152		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
38000	TOFL	6260	6370	6480	6600	6720	6840	6950	7080	7180	7280	7390	140	190
	V1	140	140	140	140	140	140	140	140	139	139	139		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	5820	5920	6020	6130	6240	6350	6460	6570	6670	6760	6860	138	187
	V1	136	136	136	136	136	135	135	135	135	135	135		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.1	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.2	6.2		
36000	TOFL	5410	5500	5590	5690	5800	5900	6000	6090	6190	6280	6370	135	185
	V1	132	132	131	131	131	131	131	131	131	131	131		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	142	142	142	142		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	5020	5100	5190	5280	5380	5470	5560	5650	5740	5820	5910	133	182
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8	6.9	6.9		
34000	TOFL	4660	4740	4820	4910	4990	5080	5160	5250	5330	5410	5480	130	179
	V1	124	123	123	123	123	123	123	123	123	123	123		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	4350	4420	4500	4570	4660	4730	4810	4900	4970	5040	5120	127	176
	V1	120	120	120	120	120	119	119	119	119	119	119		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	133	133	133	133	133	133		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
32000	TOFL	4060	4130	4200	4260	4350	4410	4490	4560	4640	4700	4770	125	173
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	130	130	130	130	130	130		
	GR2	8.1	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.2	8.2		
31000	TOFL	3800	3860	3920	3990	4050	4120	4190	4260	4330	4380	4450	123	170
	V1	113	113	113	112	112	112	112	112	112	112	112		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.6	8.6	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.7		

FIGURE 5-196. TAKE-OFF DISTANCE; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
30000	TOFL	3540	3590	3650	3720	3770	3840	3900	3970	4030	4080	4140	121	167
	V1	109	109	109	109	109	109	109	109	109	109	108		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	125	125	125	125	125	125	125	125	125	125		
	GR2	9.1	9.2	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.2		
29000	TOFL	3300	3350	3400	3460	3510	3570	3630	3690	3750	3800	3850	119	164
	V1	106	105	105	105	105	105	105	105	105	105	105		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	122	122	122	122	122	122	122	122	122	122		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
28000	TOFL	3070	3120	3160	3220	3280	3320	3380	3430	3490	3530	3580	117	161
	V1	102	102	102	102	102	102	102	102	102	101	101		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
27000	TOFL	2870	2910	2960	3010	3060	3110	3160	3210	3250	3300	3350	115	158
	V1	99	99	99	99	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	2710	2750	2800	2840	2890	2930	2980	3020	3070	3110	3150	113	155
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7		

FIGURE 5-197. TAKE-OFF DISTANCE; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	7630	7760	7900	8050	8200	8340	8490	8630	8780	8900	9040	145	195
	V1	149	149	149	149	149	149	149	149	149	148	148		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	157	157	157	157	157	157	157	156	156	156	156		
	GR2	5	5.1	5.1	5.1	5	5	5	5	5	5	5.1		
39000	TOFL	7320	7440	7580	7720	7860	8000	8140	8280	8420	8540	8670	144	193
	V1	147	147	147	147	146	146	146	146	146	146	146		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	155	155	155	155	155	155	155	154	154	154	154		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	6830	6930	7060	7190	7320	7450	7570	7710	7840	7950	8070	141	191
	V1	143	143	142	142	142	142	142	142	142	142	142		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.5	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
37000	TOFL	6360	6460	6580	6700	6820	6940	7050	7180	7290	7400	7510	139	188
	V1	139	139	138	138	138	138	138	138	138	138	138		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	5900	5990	6100	6210	6320	6420	6540	6660	6760	6860	6960	136	185
	V1	135	134	134	134	134	134	134	134	134	134	134		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	144	144	144	144	144	144		
	GR2	6.2	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.3		
35000	TOFL	5470	5560	5660	5760	5860	5950	6060	6170	6270	6350	6450	134	182
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	5070	5140	5230	5330	5410	5510	5600	5710	5800	5880	5960	131	179
	V1	126	126	126	126	126	126	126	126	126	125	125		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	4690	4760	4840	4920	5010	5090	5180	5270	5360	5430	5510	128	176
	V1	122	122	121	121	121	121	121	121	121	121	121		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	134	134	134	134	134	134	134	134		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
32000	TOFL	4360	4430	4500	4580	4660	4740	4820	4900	4980	5050	5120	126	173
	V1	118	118	118	118	118	118	118	118	117	117	117		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	131	131	131	131	131	131	131	131		
	GR2	7.8	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.9		
31000	TOFL	4060	4120	4190	4270	4340	4410	4480	4560	4640	4700	4770	123	170
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 5-197. TAKE-OFF DISTANCE; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
30000	TOFL	3780	3840	3910	3970	4050	4100	4170	4240	4310	4370	4430	121	167
	V1	111	111	111	110	110	110	110	110	110	110	110		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	3510	3570	3620	3680	3760	3810	3880	3940	4000	4050	4110	119	164
	V1	107	107	107	107	107	107	107	106	106	106	106		
	VR	115	115	115	115	115	115	115	115	115	115	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.3	9.4	9.4	9.4	9.4	9.4	9.3	9.3	9.3	9.4	9.4		
28000	TOFL	3270	3320	3370	3440	3480	3540	3600	3670	3710	3760	3820	117	161
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
27000	TOFL	3040	3080	3130	3180	3230	3280	3340	3390	3440	3490	3540	115	158
	V1	100	100	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	108	108	108	108	108	108	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.5	10.6	10.6	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	2840	2890	2930	2980	3030	3080	3130	3180	3220	3270	3310	113	155
	V1	97	97	96	96	96	96	96	96	96	96	96		
	VR	105	105	105	105	105	105	105	105	105	105	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		

FIGURE 5-198. TAKE-OFF DISTANCE; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	8320	8460	8630	8790	8950	9100	9270	9440	9600	9740	9910	147	195
	V1	152	152	152	152	152	151	151	151	151	151	151		
	VR	155	155	155	155	155	155	156	156	156	156	156		
	V2	159	159	159	159	159	158	158	158	158	158	158		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.8	4.8	4.8		
39000	TOFL	7980	8110	8270	8430	8580	8730	8890	9050	9200	9330	9490	145	194
	V1	149	149	149	149	149	149	149	149	149	149	149		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	157	157	157	157	157	156	156	156	156	156	156		
	GR2	5	5	5	5	5	5	4.9	4.9	4.9	5	4.9		
38000	TOFL	7440	7560	7700	7850	7980	8120	8270	8420	8560	8690	8830	142	191
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	149	149	149	149	149	149	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	6920	7030	7170	7290	7420	7550	7690	7840	7960	8070	8210	140	188
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	6440	6550	6670	6780	6900	7030	7150	7280	7400	7510	7630	137	185
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	146	146	146	146	146	146	146	146		
	GR2	6	6	6	6	6	6	5.9	5.9	5.9	6	6		
35000	TOFL	5980	6070	6180	6290	6400	6520	6630	6750	6870	6960	7080	135	183
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	143	143	143	143	143	143	143	143	143		
	GR2	6.3	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	5520	5610	5700	5800	5910	6010	6120	6230	6330	6420	6530	132	180
	V1	129	129	128	128	128	128	128	128	128	128	128		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
33000	TOFL	5090	5180	5260	5360	5450	5550	5650	5750	5840	5920	6020	129	177
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
32000	TOFL	4700	4770	4850	4940	5030	5110	5200	5290	5380	5450	5540	127	174
	V1	120	120	120	120	120	120	120	120	120	119	119		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
31000	TOFL	4350	4420	4490	4570	4660	4740	4820	4900	4980	5050	5130	124	171
	V1	116	116	116	116	116	116	116	116	116	115	115		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8	8	8	8	8	8	8	8	8	8	8		

FIGURE 5-198. TAKE-OFF DISTANCE; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
30000	TOFL	4050	4100	4170	4250	4320	4400	4470	4550	4620	4690	4760	121	168
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
29000	TOFL	3760	3820	3890	3940	4010	4080	4150	4220	4290	4350	4410	119	165
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	9	9	9	9	9	9	9	9	9	9		
28000	TOFL	3480	3530	3600	3650	3720	3780	3840	3910	3970	4020	4080	117	161
	V1	105	105	105	104	104	104	104	104	104	104	104		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5	9.5	9.6	9.5		
27000	TOFL	3230	3280	3330	3400	3450	3500	3550	3630	3670	3720	3780	115	158
	V1	101	101	101	101	101	101	101	101	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.1		
26000	TOFL	2990	3030	3090	3140	3190	3240	3290	3350	3400	3440	3500	113	155
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.7	10.8	10.8		

FIGURE 5-199. TAKE-OFF DISTANCE; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	9160	9330	9510	9680	9860	10050	10230	10420	10590	10750	10990	148	196
	V1	155	155	155	155	155	155	155	155	155	155	155		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	162	161	161	161	161	161	161	161	161	161	161		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4		
39000	TOFL	8750	8920	9090	9250	9430	9600	9790	9980	10120	10270	10540	146	194
	V1	152	152	152	152	152	152	152	152	152	152	153		
	VR	156	156	156	156	156	156	156	156	156	156	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6		
38000	TOFL	8140	8290	8440	8600	8770	8920	9090	9260	9410	9550	9780	144	191
	V1	148	148	148	148	148	148	148	148	148	148	148		
	VR	152	152	152	152	152	152	152	152	152	152	153		
	V2	156	156	155	155	155	155	155	155	155	155	156		
	GR2	5	5	5	5	5	5	5	5	5	5	4.9		
37000	TOFL	7570	7710	7850	7990	8140	8290	8440	8600	8740	8870	9080	141	189
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.2		
36000	TOFL	7020	7140	7280	7420	7550	7690	7830	7970	8100	8220	8420	138	186
	V1	140	140	140	140	140	140	140	140	140	140	140		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6		
35000	TOFL	6520	6620	6750	6880	7000	7130	7260	7390	7510	7620	7800	136	183
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	145	145	145	145	145	145	145	145	145	145		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6	6.1	5.9		
34000	TOFL	6020	6130	6240	6360	6480	6590	6710	6830	6940	7040	7210	133	180
	V1	131	131	131	131	131	131	131	131	131	131	132		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3		
33000	TOFL	5550	5640	5750	5860	5960	6070	6180	6290	6390	6480	6640	130	177
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7		
32000	TOFL	5110	5190	5290	5390	5480	5580	5680	5780	5880	5960	6100	127	174
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	7.3	7.1		
31000	TOFL	4690	4770	4860	4950	5040	5120	5210	5310	5390	5470	5600	125	171
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.5		

FIGURE 5-199. TAKE-OFF DISTANCE; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
30000	TOFL	4330	4400	4480	4570	4650	4730	4810	4890	4970	5040	5160	122	168
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8		
29000	TOFL	4010	4080	4150	4230	4300	4370	4450	4530	4600	4660	4770	119	165
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.7	8.5		
28000	TOFL	3720	3780	3840	3910	3970	4040	4110	4180	4250	4310	4410	117	162
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9		
27000	TOFL	3440	3490	3560	3610	3670	3730	3800	3860	3920	3970	4060	115	159
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.6		
26000	TOFL	3170	3240	3280	3350	3390	3460	3500	3560	3620	3670	3750	113	155
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.2		

FIGURE 5-200. TAKE-OFF DISTANCE; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	10080	10270	10470	10680	10880	11080	11290	11510	11690	11860	12270	149	196
	V1	158	158	158	158	158	158	158	158	158	158	159		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.3	4		
39000	TOFL	9650	9830	10030	10220	10420	10610	10810	11010	11200	11350	11750	147	194
	V1	156	156	156	156	156	156	156	156	156	156	156		
	VR	159	159	159	159	159	159	160	160	160	160	160		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.2		
38000	TOFL	8960	9130	9310	9490	9670	9850	10030	10230	10390	10540	10920	145	192
	V1	152	152	152	152	152	152	152	152	152	152	152		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.5		
37000	TOFL	8290	8460	8620	8790	8950	9120	9280	9460	9620	9750	10120	142	189
	V1	147	147	147	147	147	147	147	147	147	147	148		
	VR	151	151	151	151	151	151	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5.1	4.8		
36000	TOFL	7690	7840	7990	8140	8290	8450	8600	8770	8910	9030	9350	139	186
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.1		
35000	TOFL	7110	7250	7390	7530	7670	7810	7950	8110	8240	8350	8650	137	183
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	148		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.5		
34000	TOFL	6590	6710	6840	6970	7100	7220	7350	7480	7610	7720	7990	134	180
	V1	134	134	134	134	134	134	134	134	134	134	135		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	5.8		
33000	TOFL	6070	6180	6300	6420	6540	6650	6770	6900	7010	7110	7370	131	177
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	141		
	GR2	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.5	6.2		
32000	TOFL	5580	5680	5790	5900	6010	6110	6220	6340	6440	6530	6780	128	175
	V1	125	125	125	125	125	125	125	125	125	125	126		
	VR	131	131	131	131	131	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7	7	7	7	7	7	6.9	6.9	6.9	6.9	6.6		
31000	TOFL	5110	5210	5310	5400	5500	5600	5700	5800	5900	5980	6200	126	172
	V1	121	121	120	120	120	120	120	120	120	120	121		
	VR	127	127	127	127	127	127	127	127	127	127	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7.4	7		

FIGURE 5-200. TAKE-OFF DISTANCE; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
30000	TOFL	4680	4770	4860	4950	5030	5120	5210	5310	5390	5460	5670	123	168
	V1	116	116	116	116	116	116	116	116	116	116	117		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.5		
29000	TOFL	4300	4380	4460	4540	4620	4700	4780	4870	4950	5020	5190	120	165
	V1	112	112	111	111	111	111	111	111	111	111	112		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3	7.9		
28000	TOFL	3970	4050	4120	4190	4260	4340	4410	4490	4560	4620	4780	117	162
	V1	108	108	108	108	107	107	107	107	107	107	108		
	VR	115	115	115	115	115	115	115	115	115	115	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.5		
27000	TOFL	3670	3730	3790	3860	3930	3990	4060	4130	4200	4250	4400	115	159
	V1	103	103	103	103	103	103	103	103	103	103	104		
	VR	111	111	111	111	111	111	111	111	111	111	112		
	V2	120	119	119	119	119	119	119	119	119	119	119		
	GR2	9.5	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9		
26000	TOFL	3390	3440	3510	3560	3620	3680	3740	3810	3870	3920	4040	113	156
	V1	100	100	100	99	99	99	99	99	99	99	100		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	116	116	116	116	116	116	116	116	116	116		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10	10	9.6		

FIGURE 5-201. TAKE-OFF DISTANCE; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	11110	11340	11560	11790	12010	12240	12470	12710	12920	13220	13900	150	197
	V1	162	162	162	162	162	162	162	162	162	162	163		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	166	166	166	166	166	166	166	166	166	166	167		
	GR2	4	4	4	4	4	4	3.9	3.9	3.9	3.8	3.5		
39000	TOFL	10620	10840	11050	11270	11490	11700	11920	12150	12350	12640	13280	148	195
	V1	159	159	159	159	159	159	159	159	159	159	160		
	VR	162	162	162	162	162	162	162	162	162	163	163		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4	3.7		
38000	TOFL	9860	10060	10260	10460	10660	10860	11060	11270	11460	11720	12310	146	192
	V1	155	155	155	155	155	155	155	155	155	155	156		
	VR	158	158	158	158	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.3	4		
37000	TOFL	9130	9310	9490	9680	9860	10040	10230	10430	10600	10850	11410	143	189
	V1	150	150	150	150	150	150	150	150	150	150	152		
	VR	154	154	154	154	154	154	154	154	154	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.6	4.3		
36000	TOFL	8430	8600	8770	8940	9100	9290	9460	9640	9780	10030	10560	140	187
	V1	146	146	146	146	146	146	146	146	146	146	147		
	VR	150	150	150	150	150	150	150	150	150	151	151		
	V2	153	153	153	153	153	153	153	153	153	153	154		
	GR2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5	4.7		
35000	TOFL	7790	7950	8100	8260	8410	8570	8730	8890	9040	9250	9750	138	184
	V1	141	141	141	141	141	141	141	141	141	142	143		
	VR	146	146	146	146	146	146	146	146	146	146	147		
	V2	149	149	149	149	149	149	149	149	149	149	150		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.3	5		
34000	TOFL	7190	7340	7480	7620	7760	7900	8050	8200	8330	8530	8980	135	181
	V1	137	137	137	137	137	137	137	137	137	137	138		
	VR	142	142	142	142	142	142	142	142	142	142	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.3		
33000	TOFL	6620	6750	6880	7010	7140	7270	7410	7550	7680	7860	8270	132	178
	V1	132	132	132	132	132	132	132	132	132	133	134		
	VR	138	138	138	138	138	138	138	138	138	138	139		
	V2	142	142	142	142	142	142	142	142	142	142	143		
	GR2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.1	5.7		
32000	TOFL	6090	6210	6330	6450	6570	6690	6810	6930	7050	7220	7600	129	175
	V1	128	128	128	128	128	128	128	128	128	128	129		
	VR	134	134	134	134	134	134	134	134	134	134	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.4	6.1		
31000	TOFL	5580	5690	5800	5910	6010	6120	6230	6350	6450	6620	6970	127	172
	V1	123	123	123	123	123	123	123	123	123	124	125		
	VR	129	130	130	130	130	130	130	130	130	130	131		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.2	7.2	7.1	7.1	7.1	7.1	7.1	7	7	6.9	6.5		

FIGURE 5-201. TAKE-OFF DISTANCE; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
30000	TOFL	5100	5200	5300	5400	5490	5590	5690	5800	5900	6040	6370	124	169
	V1	118	118	118	118	118	118	118	118	118	119	120		
	VR	125	125	125	125	125	125	125	125	125	126	127		
	V2	131	131	131	131	131	131	131	131	131	131	132		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.5	7.4	7.3	6.9		
29000	TOFL	4660	4750	4840	4930	5020	5100	5190	5290	5380	5510	5800	121	166
	V1	114	114	114	114	114	114	114	114	114	114	115		
	VR	121	121	121	121	121	121	121	121	121	121	122		
	V2	127	127	127	127	127	127	127	127	127	127	128		
	GR2	8.1	8.1	8.1	8.1	8.1	8	8	8	7.9	7.8	7.4		
28000	TOFL	4270	4350	4430	4510	4590	4670	4750	4840	4920	5030	5290	118	162
	V1	109	109	109	109	109	109	109	109	109	109	111		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.4	8.2	7.9		
27000	TOFL	3930	4010	4080	4150	4220	4300	4370	4450	4520	4630	4860	115	159
	V1	105	105	105	105	105	105	105	105	105	105	107		
	VR	113	113	113	113	113	113	113	113	113	113	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9	9	8.8	8.4		
26000	TOFL	3630	3690	3750	3820	3880	3950	4010	4080	4150	4240	4450	113	156
	V1	101	101	101	101	101	101	101	101	101	101	103		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	118	117	117	117	117	117	117	117	117	117	118		
	GR2	9.8	9.8	9.8	9.8	9.7	9.7	9.7	9.6	9.6	9.4	9		

FIGURE 5-202. TAKE-OFF DISTANCE; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	12310	12560	12820	13070	13330	13580	13840	14110	14340	14860	15880	151	197
	V1	165	165	165	165	165	165	165	165	165	166	167		
	VR	168	168	168	168	168	168	168	168	168	168	169		
	V2	169	169	169	169	169	169	169	169	169	169	170		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.4	3.1		
39000	TOFL	11760	11990	12240	12480	12720	12960	13210	13460	13690	14190	15140	150	196
	V1	162	162	162	162	162	162	162	162	162	163	164		
	VR	165	165	166	166	166	166	166	166	166	166	167		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	3.9	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.8	3.6	3.3		
38000	TOFL	10880	11100	11330	11550	11770	11990	12220	12460	12670	13120	13990	147	193
	V1	158	158	158	158	158	158	158	158	158	158	160		
	VR	161	161	161	161	161	161	161	161	161	161	163		
	V2	163	163	163	163	163	163	163	163	163	163	164		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.1	3.9	3.6		
37000	TOFL	10080	10280	10480	10690	10890	11100	11310	11520	11720	12130	12930	144	190
	V1	154	154	154	154	154	154	154	154	154	154	155		
	VR	157	157	157	157	157	157	157	157	157	158	158		
	V2	159	159	159	159	159	159	159	159	159	159	160		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.2	3.9		
36000	TOFL	9290	9480	9660	9850	10040	10230	10420	10620	10800	11200	11940	142	187
	V1	149	149	149	149	149	149	149	149	149	150	151		
	VR	153	153	153	153	153	153	153	153	153	154	154		
	V2	155	155	155	155	155	155	155	155	155	156	156		
	GR2	4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.7	4.5	4.2		
35000	TOFL	8570	8740	8920	9090	9260	9430	9610	9800	9960	10330	11040	139	184
	V1	144	144	144	144	144	144	144	144	144	145	147		
	VR	149	149	149	149	149	149	149	149	149	149	151		
	V2	152	152	152	152	152	152	152	152	152	152	153		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	4.8	4.5		
34000	TOFL	7890	8040	8200	8360	8520	8670	8840	9010	9160	9500	10170	136	181
	V1	140	140	140	140	140	140	140	140	140	140	142		
	VR	145	145	145	145	145	145	145	145	145	145	147		
	V2	148	148	148	148	148	148	148	148	148	148	149		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.4	5.2	4.9		
33000	TOFL	7260	7400	7540	7690	7830	7980	8130	8280	8430	8740	9340	133	178
	V1	135	135	135	135	135	135	135	135	135	136	138		
	VR	140	140	140	140	140	140	141	141	141	141	142		
	V2	144	144	144	144	144	144	144	144	144	144	145		
	GR2	6	6	6	6	6	5.9	5.9	5.9	5.8	5.6	5.2		
32000	TOFL	6660	6790	6930	7060	7190	7320	7460	7600	7730	8020	8570	130	175
	V1	131	131	131	131	131	131	131	131	131	131	133		
	VR	136	136	136	136	136	136	136	136	136	137	138		
	V2	140	140	140	140	140	140	140	140	140	140	141		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.2	5.9	5.6		
31000	TOFL	6110	6220	6340	6460	6580	6700	6830	6960	7080	7350	7860	128	172
	V1	126	126	126	126	126	126	126	126	126	127	129		
	VR	132	132	132	132	132	132	132	132	132	133	134		
	V2	137	137	137	137	137	137	137	137	137	137	138		
	GR2	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.7	6.6	6.3	6		

FIGURE 5-202. TAKE-OFF DISTANCE; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
30000	TOFL	5570	5680	5790	5900	6010	6120	6230	6350	6460	6710	7180	125	169
	V1	121	121	121	121	121	121	121	121	121	122	124		
	VR	127	127	127	127	128	128	128	128	128	128	130		
	V2	133	133	133	133	133	133	133	133	133	133	134		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7	6.8	6.4		
29000	TOFL	5080	5180	5280	5380	5470	5570	5680	5780	5890	6110	6550	122	166
	V1	116	116	116	116	116	116	116	116	116	117	119		
	VR	123	123	123	123	123	123	123	123	123	124	125		
	V2	129	129	129	129	129	129	129	129	129	129	130		
	GR2	7.8	7.8	7.8	7.8	7.7	7.7	7.7	7.6	7.5	7.2	6.9		
28000	TOFL	4640	4720	4810	4900	4990	5070	5160	5260	5360	5550	5940	119	163
	V1	111	111	111	111	111	111	111	111	111	112	114		
	VR	119	119	119	119	119	119	119	119	119	119	121		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.1	8	7.7	7.3		
27000	TOFL	4230	4310	4390	4470	4550	4630	4710	4800	4880	5050	5400	116	160
	V1	107	107	107	107	107	107	107	107	107	108	110		
	VR	114	114	114	114	114	114	114	114	114	115	117		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.7	8.5	8.2	7.8	
26000	TOFL	3880	3950	4030	4100	4170	4240	4320	4400	4470	4630	4930	113	156
	V1	103	103	103	103	103	103	103	103	103	103	105		
	VR	111	111	111	111	111	111	111	111	111	111	113		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.1	8.8	8.4		

FIGURE 5-203. TAKE-OFF DISTANCE; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL	13670	13960	14270	14600	14840	15080	15380	15690	16030	16880		152	198
	V1	168	168	169	169	169	169	169	169	169	170			
	VR	171	171	171	171	171	171	171	171	171	172			
	V2	172	172	172	172	172	172	172	172	172	172			
	GR2	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.3	3.2	3			
39000	TOFL	13050	13330	13630	13940	14160	14400	14680	14980	15320	16100	17360	151	196
	V1	166	166	166	166	166	166	166	166	166	167	168		
	VR	169	169	169	169	169	169	169	169	169	169	170		
	V2	170	170	170	170	170	170	170	170	170	170	171		
	GR2	3.7	3.7	3.6	3.6	3.6	3.6	3.6	3.5	3.4	3.1	2.8		
38000	TOFL	12070	12330	12610	12890	13100	13310	13580	13850	14160	14880	16020	148	193
	V1	161	161	161	161	161	161	161	162	162	162	164		
	VR	165	165	165	165	165	165	165	165	165	165	166		
	V2	166	166	166	166	166	166	166	166	166	166	167		
	GR2	4	4	3.9	3.9	3.9	3.9	3.9	3.8	3.7	3.4	3.1		
37000	TOFL	11140	11380	11630	11890	12090	12280	12520	12780	13070	13720	14750	145	190
	V1	157	157	157	157	157	157	157	157	157	158	159		
	VR	160	160	160	160	160	160	160	160	160	161	162		
	V2	162	162	162	162	162	162	162	162	162	162	163		
	GR2	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.1	4	3.7	3.4		
36000	TOFL	10290	10500	10740	10980	11150	11330	11550	11790	12050	12650	13580	143	187
	V1	152	152	152	152	152	152	152	152	153	153	155		
	VR	156	156	156	156	156	156	156	156	156	157	158		
	V2	158	158	158	158	158	158	158	158	158	158	159		
	GR2	4.6	4.6	4.6	4.5	4.6	4.6	4.5	4.4	4.3	4	3.7		
35000	TOFL	9460	9660	9880	10100	10250	10420	10620	10840	11090	11670	12500	140	185
	V1	148	148	148	148	148	148	148	148	148	149	150		
	VR	152	152	152	152	152	152	152	152	152	153	154		
	V2	154	154	154	154	154	154	154	154	154	154	155		
	GR2	5	5	4.9	4.9	4.9	4.9	4.9	4.8	4.6	4.3	4		
34000	TOFL	8700	8880	9080	9280	9430	9580	9760	9960	10190	10720	11530	137	182
	V1	143	143	143	143	143	143	143	143	143	144	146		
	VR	148	148	148	148	148	148	148	148	148	149	150		
	V2	150	150	150	150	150	150	150	150	150	150	151		
	GR2	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.2	5	4.7	4.4		
33000	TOFL	7990	8150	8330	8520	8650	8780	8950	9140	9350	9850	10600	134	179
	V1	138	138	138	138	138	138	138	138	139	140	142		
	VR	143	143	143	143	143	143	143	143	143	144	146		
	V2	146	146	146	146	146	146	146	146	146	147	148		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.5	5.3	5.1	4.7		
32000	TOFL	7340	7490	7650	7820	7940	8060	8220	8380	8580	9030	9720	131	176
	V1	134	134	134	134	134	134	134	134	134	135	137		
	VR	139	139	139	139	139	139	139	139	139	140	141		
	V2	143	143	143	143	143	143	143	143	143	143	144		
	GR2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	5.9	5.7	5.4	5.1		
31000	TOFL	6720	6860	7010	7160	7270	7380	7520	7670	7860	8270	8890	128	173
	V1	129	129	129	129	129	129	129	129	129	130	132		
	VR	135	135	135	135	135	135	135	135	135	136	137		
	V2	139	139	139	139	139	139	139	139	139	139	140		
	GR2	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.1	5.8	5.5		

FIGURE 5-203. TAKE-OFF DISTANCE; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
30000	TOFL	6140	6260	6400	6540	6640	6740	6860	7000	7180	7560	8130	126	169
	V1	124	124	124	124	124	124	124	124	124	126	128		
	VR	130	130	130	130	130	130	130	130	131	132	133		
	V2	135	135	135	135	135	135	135	135	135	135	136		
	GR2	7.1	7	7	6.9	7	7	6.9	6.8	6.6	6.2	5.9		
29000	TOFL	5580	5700	5820	5950	6030	6120	6240	6370	6540	6890	7430	123	166
	V1	119	119	119	119	119	119	119	119	120	121	123		
	VR	126	126	126	126	126	126	126	126	126	127	129		
	V2	131	131	131	131	131	131	131	131	131	132	133		
	GR2	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.3	7	6.7	6.3		
28000	TOFL	5070	5170	5280	5390	5470	5550	5650	5770	5920	6250	6750	120	163
	V1	114	114	114	114	114	114	114	114	115	116	118		
	VR	121	121	121	121	121	121	121	121	121	123	124		
	V2	127	127	127	127	127	127	127	127	127	128	129		
	GR2	8	8	8	7.9	7.9	7.9	7.9	7.8	7.5	7.1	6.8		
27000	TOFL	4600	4700	4800	4890	4970	5040	5130	5230	5360	5650	6110	117	160
	V1	109	109	109	109	109	109	109	109	109	111	113		
	VR	117	117	117	117	117	117	117	117	117	118	120		
	V2	123	123	123	123	123	123	123	123	123	123	125		
	GR2	8.5	8.5	8.5	8.4	8.5	8.5	8.4	8.3	8	7.6	7.3		
26000	TOFL	4190	4270	4360	4450	4510	4580	4660	4750	4870	5120	5510	114	157
	V1	104	104	104	105	104	104	104	104	105	106	108		
	VR	112	112	112	112	112	112	112	112	112	113	115		
	V2	119	119	119	119	119	119	119	119	119	120	121		
	GR2	9.1	9.1	9.1	9	9	9	9	8.9	8.5	8.1	7.8		

FIGURE 5-204. TAKE-OFF DISTANCE; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 1 of 2)

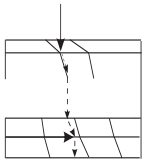
GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
39600	TOFL	15230	15560	15970	16310	16530	16830	17170	17530				154	198
	V1	172	172	172	172	172	172	172	172					
	VR	174	174	174	174	174	174	174	174					
	V2	175	175	175	175	175	175	175	175					
	GR2	3.3	3.2	3.2	3.2	3.2	3.2	3.1	3					
39000	TOFL	14510	14830	15220	15540	15760	16030	16360	16710	17360			152	197
	V1	169	169	169	169	169	169	169	170	170				
	VR	172	172	172	172	172	172	172	172	172				
	V2	173	173	173	173	173	173	173	173	173				
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.2	3				
38000	TOFL	13400	13700	14050	14340	14540	14790	15100	15420	16020	17090		149	194
	V1	165	165	165	165	165	165	165	165	166	166			
	VR	168	168	168	168	168	168	168	168	168	169			
	V2	169	169	169	169	169	169	169	169	169	169			
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.5	3.2	3			
37000	TOFL	12370	12640	12970	13240	13420	13660	13940	14230	14790	15750	16960	147	191
	V1	160	160	160	160	160	160	160	161	161	162	163		
	VR	164	164	164	164	164	164	164	164	164	165	165		
	V2	165	165	165	165	165	165	165	165	165	165	166		
	GR2	4.1	4.1	4	4	4	4	3.9	3.8	3.5	3.3	2.9		
36000	TOFL	11390	11640	11940	12180	12350	12570	12820	13100	13610	14480	15570	144	188
	V1	156	156	156	156	156	156	156	156	156	157	159		
	VR	159	159	159	159	159	159	159	159	160	160	161		
	V2	161	161	161	161	161	161	161	161	161	161	162		
	GR2	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.1	3.8	3.6	3.2		
35000	TOFL	10490	10710	10990	11210	11360	11560	11790	12050	12520	13300	14290	141	185
	V1	151	151	151	151	151	151	151	151	152	153	154		
	VR	155	155	155	155	155	155	155	155	155	156	157		
	V2	157	157	157	157	157	157	157	157	157	157	158		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.4	4.2	3.9	3.5		
34000	TOFL	9620	9830	10080	10280	10420	10600	10810	11050	11500	12220	13110	138	182
	V1	146	146	146	146	146	146	146	146	147	148	150		
	VR	151	151	151	151	151	151	151	151	151	152	153		
	V2	153	153	153	153	153	153	153	153	153	153	154		
	GR2	5.1	5.1	5.1	5	5	5	5	4.8	4.5	4.2	3.8		
33000	TOFL	8810	9010	9240	9420	9540	9710	9900	10120	10530	11220	12030	135	179
	V1	141	141	141	142	141	141	141	142	142	144	145		
	VR	146	146	146	146	146	146	146	146	147	148	149		
	V2	149	149	149	149	149	149	149	149	149	149	150		
	GR2	5.5	5.5	5.4	5.4	5.4	5.4	5.3	5.2	4.9	4.6	4.2		
32000	TOFL	8070	8250	8460	8620	8740	8880	9060	9260	9660	10280	11060	133	176
	V1	136	136	137	137	137	137	137	137	138	139	141		
	VR	142	142	142	142	142	142	142	142	142	143	145		
	V2	145	145	145	145	145	145	145	145	145	146	146		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.5	5.2	4.9	4.6		
31000	TOFL	7400	7560	7750	7900	8010	8140	8300	8480	8830	9410	10120	130	173
	V1	132	132	132	132	132	132	132	132	133	134	136		
	VR	137	137	138	138	138	138	138	138	138	139	140		
	V2	141	141	141	141	141	141	141	141	141	142	142		
	GR2	6.3	6.3	6.3	6.2	6.2	6.2	6.2	5.9	5.6	5.3	4.9		

FIGURE 5-204. TAKE-OFF DISTANCE; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
30000	TOFL	6760	6910	7080	7220	7310	7430	7580	7740	8080	8590	9240	127	170
	V1	127	127	127	127	127	127	127	127	128	130	131		
	VR	133	133	133	133	133	133	133	133	134	135	136		
	V2	137	137	137	137	137	137	137	137	137	138	139		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6	5.7	5.3		
29000	TOFL	6160	6290	6450	6570	6650	6760	6890	7050	7350	7850	8420	124	167
	V1	122	122	122	122	122	122	122	122	123	125	127		
	VR	129	129	129	129	129	129	129	129	129	131	132		
	V2	134	134	134	134	133	133	133	133	133	134	135		
	GR2	7.2	7.2	7.2	7.1	7.1	7.1	7	6.8	6.5	6.2	5.8		
28000	TOFL	5570	5700	5850	5960	6020	6120	6240	6380	6680	7120	7680	121	164
	V1	117	117	117	117	117	117	117	117	118	120	122		
	VR	124	124	124	124	124	124	124	124	125	126	128		
	V2	129	129	129	129	129	129	129	129	129	130	131		
	GR2	7.7	7.7	7.6	7.6	7.6	7.6	7.5	7.3	6.9	6.6	6.2		
27000	TOFL	5030	5140	5270	5370	5430	5520	5630	5750	6020	6460	6960	118	160
	V1	112	112	112	112	112	112	112	112	113	115	117		
	VR	119	119	119	119	119	119	119	119	120	122	123		
	V2	125	125	125	125	125	125	125	125	125	126	127		
	GR2	8.2	8.2	8.1	8.1	8.1	8.1	8	7.8	7.4	7.1	6.7		
26000	TOFL	4560	4660	4770	4860	4920	5000	5090	5190	5420	5800	6280	115	157
	V1	107	107	107	107	107	107	107	107	108	110	112		
	VR	114	114	114	114	114	114	114	114	115	117	119		
	V2	121	121	121	121	121	121	121	121	121	122	124		
	GR2	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.3	7.9	7.6	7.2		

BACK
TOC Local
TOC Main

V_1 CORRECTIONS
FLAPS - 10°
DRY RUNWAY



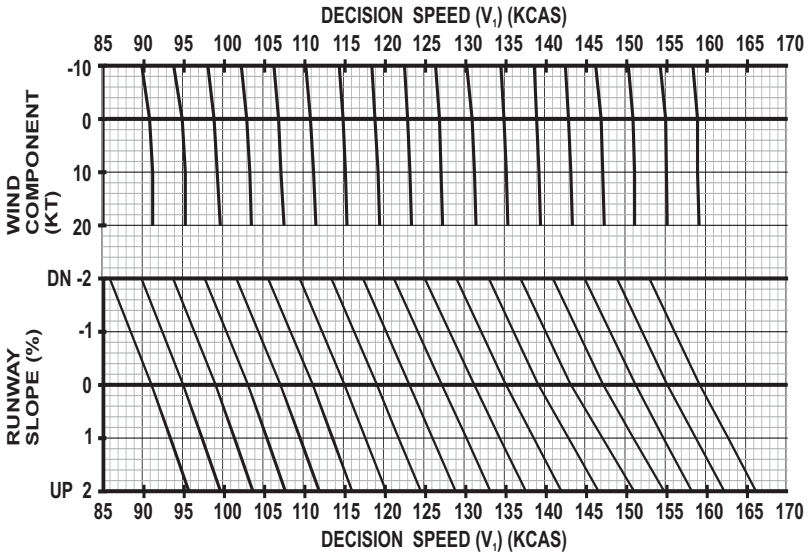


Figure 5-205. V_1 Correction; Flaps - 10°; Dry Runway

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29 Oct 2015

TAKEOFF FIELD LENGTH CORRECTIONS
FLAPS - 10°
DRY RUNWAY

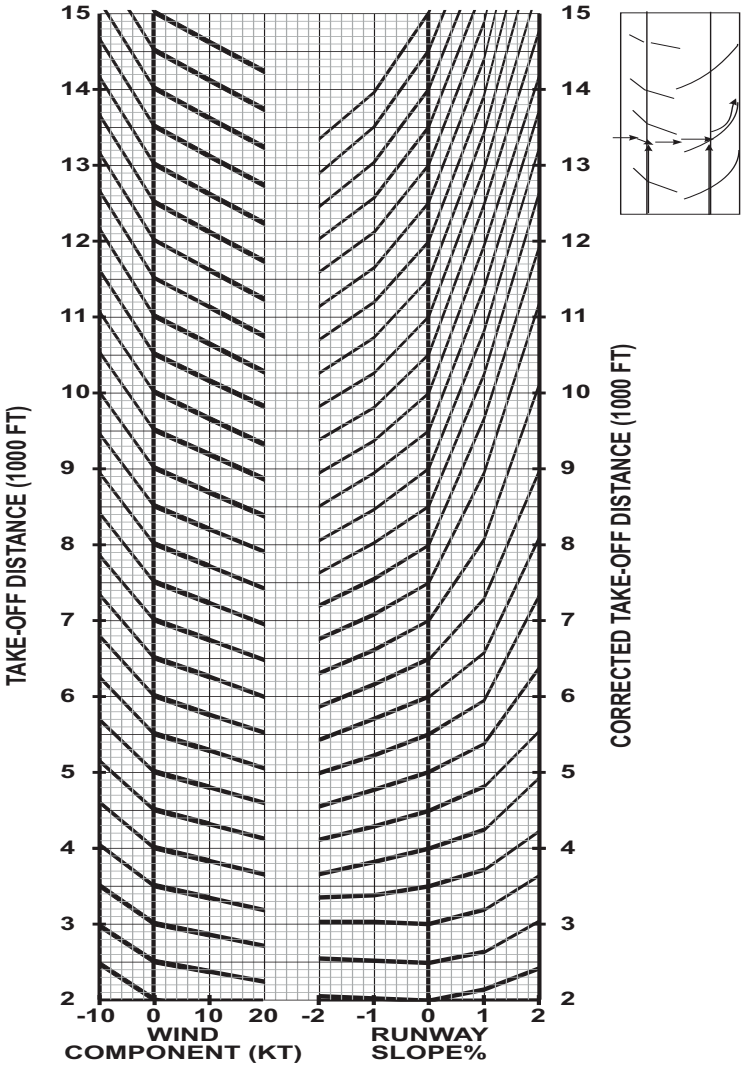

Figure 5-206. Takeoff Field Length Corrections; Flaps - 10°; Dry Runway

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TAKEOFF CHARTS AND TABLES; FLAPS - 10°; WET RUNWAY

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 10°
ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF

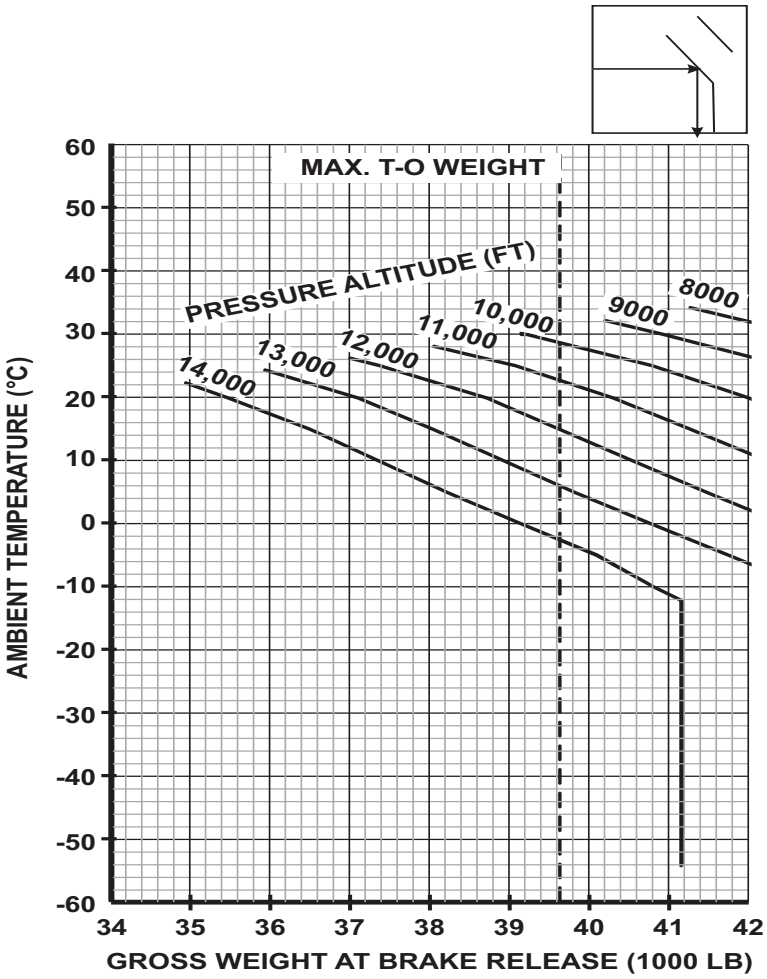


Figure 5-207. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 10°; ECS - Off; Engine Anti-ice - Off; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 10°
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF

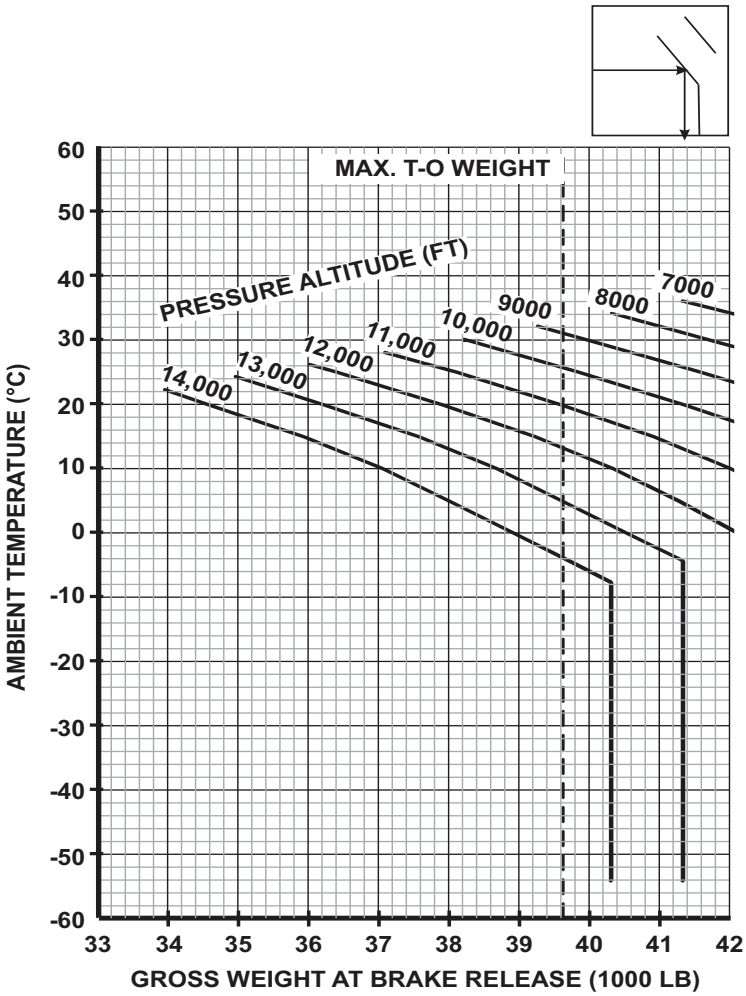


Figure 5-208. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 10°; ECS - On; Engine Anti-ice - Off; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
FLAPS - 10°
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - OFF

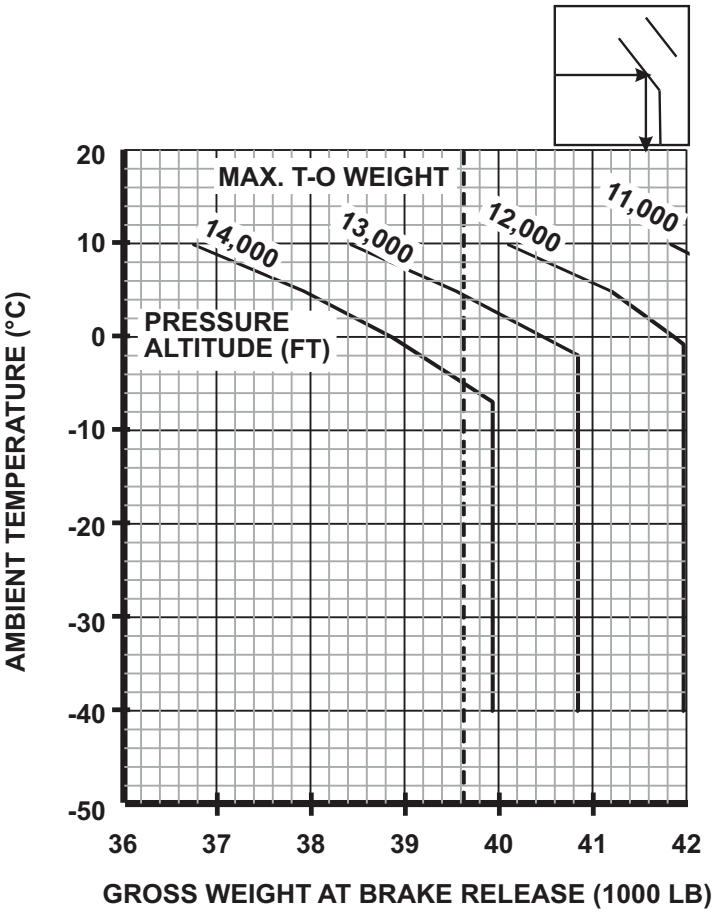


Figure 5-209. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 10°; ECS - On; Engine Anti-ice - On; Wing Anti-ice - Off

TAKEOFF WEIGHT LIMITATIONS;
(AS PERMITTED BY CLIMB REQUIREMENTS);
FLAPS - 10°;
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON

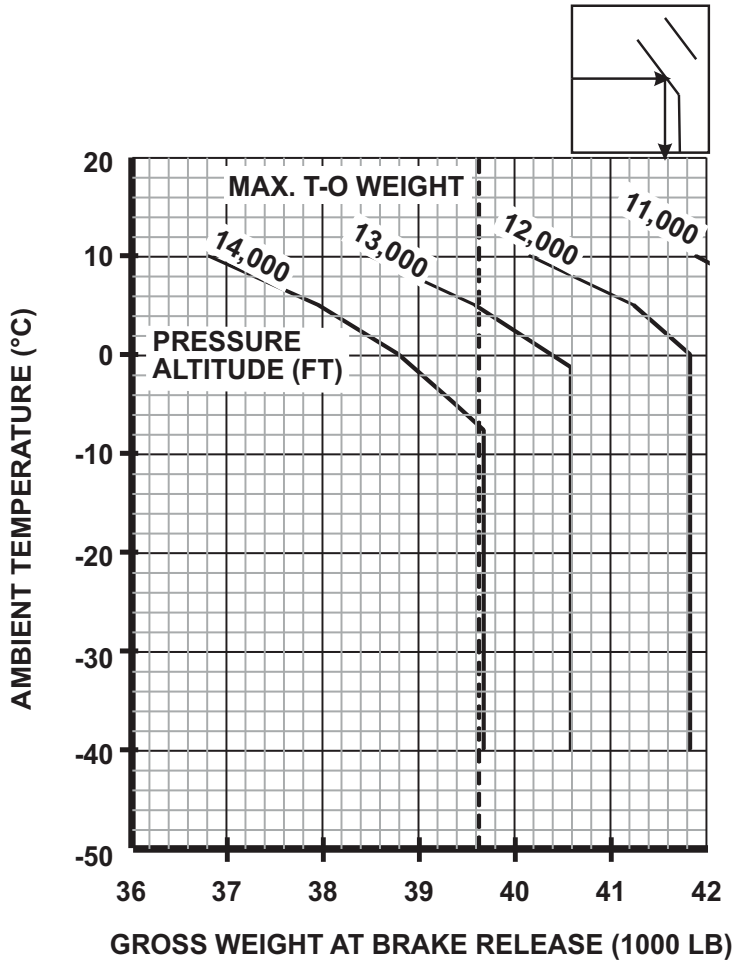


Figure 5-210. Takeoff Weight Limitations (As Permitted by Climb Requirements) Flaps - 10°; ECS - On; Engine Anti-ice - On; Wing Anti-ice - On

TAKEOFF WEIGHT LIMITATIONS (AS PERMITTED BY BRAKE ENERGY); FLAPS - 10°

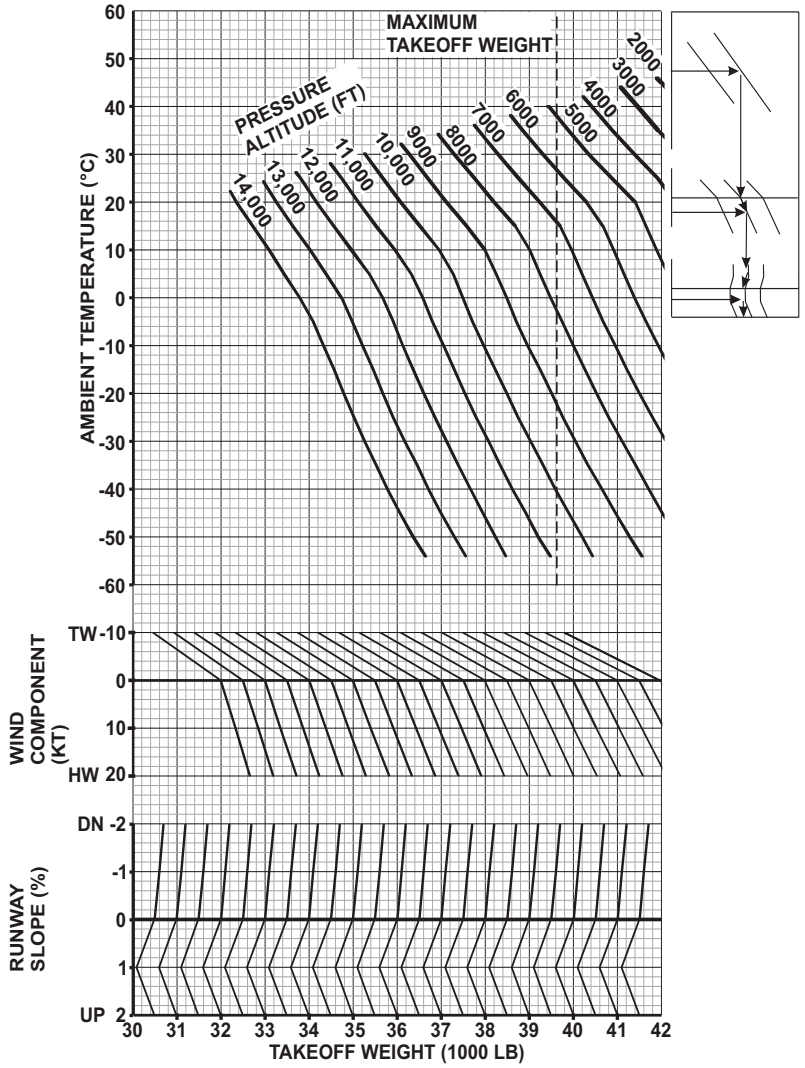


Figure 5-211. Takeoff Weight Limitations (As Permitted By Brake Energy); Flaps - 10°

TAKEOFF WEIGHT LIMITATIONS
(AS PERMITTED BY TIRE SPEED LIMIT)
FLAPS - 10°;

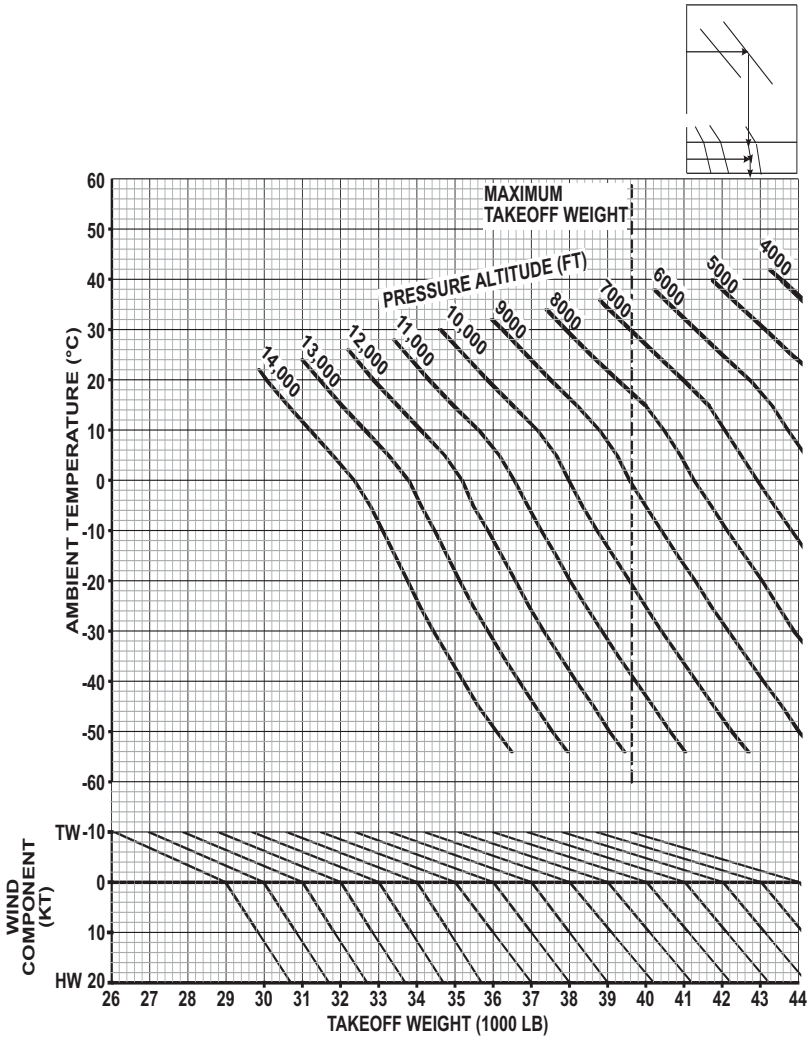


Figure 5-212. Takeoff Weight Limitations (As Permitted By Tire Speed Limit); Flaps - 10°;

FIGURE 5-213. TAKE-OFF DISTANCE; FLAPS - 10° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY (Sheet 1 of 2)

GW LBS	OATC / OATF / N1%	-54 / -65 / 77.3	-50 / -58 / 77.5	-45 / -49 / 78.4	-40 / -40 / 79.4	-35 / -31 / 80.3	-30 / -22 / 81.2	-25 / -13 / 82.1	-20 / -4 / 83.0	-15 / 5 / 83.8	-10 / 14 / 84.6	-5 / 23 / 85.4	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
39600	BFL	4730	4800	4880	4970	5050	5130	5200	5280	5380	5470	5570	151	192
	V1	118	117	117	117	116	116	116	115	115	115	115		
	VR	139	139	139	139	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9		
39000	BFL	4540	4610	4690	4770	4850	4920	4990	5070	5160	5250	5350	150	191
	V1	116	115	115	115	114	114	114	113	113	113	113		
	VR	137	137	137	137	137	137	136	136	136	136	136		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.9	6.9	7	7	7	7.1	7.1	7.2	7.2	7.2	7.2		
38000	BFL	4240	4300	4380	4450	4530	4600	4660	4730	4810	4900	4990	147	188
	V1	112	112	112	111	111	111	110	110	110	110	109		
	VR	134	134	134	134	134	134	134	133	133	133	133		
	V2	142	141	141	141	141	141	141	141	141	141	141		
	GR2	7.3	7.3	7.3	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
37000	BFL	3960	4010	4080	4150	4220	4280	4350	4410	4490	4570	4650	145	185
	V1	109	109	108	108	108	107	107	107	107	106	106		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9		
36000	BFL	3700	3750	3810	3880	3940	4000	4060	4120	4200	4270	4340	143	182
	V1	106	105	105	105	105	104	104	104	103	103	103		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	137	137	137	137	136	136	136	136	136	136	136		
	GR2	8.1	8.1	8.1	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3		
35000	BFL	3460	3510	3570	3630	3690	3740	3800	3850	3920	3990	4070	141	180
	V1	102	102	102	102	101	101	101	100	100	100	100		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.5	8.5	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8		
34000	BFL	3280	3340	3410	3490	3570	3650	3730	3810	3890	3960	4040	139	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	123	123	123	122	122	122	122	122	122	122	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	9	9	9	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2		
33000	BFL	3270	3330	3390	3470	3560	3620	3710	3780	3860	3930	4010	137	174
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	120	120	120	120	120	120	119	119	119	119	119		
	V2	130	130	130	130	130	130	130	129	129	130	130		
	GR2	9.5	9.5	9.5	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7		
32000	BFL	3240	3300	3380	3440	3530	3610	3680	3760	3830	3900	3970	135	171
	V1	100	100	100	100	100	101	101	101	101	101	101		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	10	10	10	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.3		

FIGURE 5-213. TAKE-OFF DISTANCE; FLAPS - 10° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A: WET RUNWAY (Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
31000	BFL	3220	3280	3350	3430	3500	3570	3660	3730	3810	3870	3940	133	168
	V1	100	100	100	101	101	101	101	101	101	101	101		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.5	10.6	10.6	10.6	10.7	10.7	10.8	10.8	10.8	10.8	10.8		
30000	BFL	3200	3260	3330	3400	3480	3550	3620	3700	3770	3850	3910	130	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11.1	11.2	11.2	11.2	11.3	11.3	11.4	11.4	11.4	11.4	11.4		
29000	BFL	3180	3220	3310	3380	3450	3530	3610	3680	3740	3810	3890	128	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	122	122	122	122		
	GR2	11.8	11.8	11.9	11.9	11.9	12	12	12.1	12.1	12.1	12.1		
28000	BFL	3150	3200	3270	3350	3420	3490	3570	3640	3720	3780	3860	126	160
	V1	101	101	101	101	101	101	101	102	102	102	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.5	12.5	12.6	12.6	12.6	12.7	12.8	12.8	12.8	12.8	12.8		
27000	BFL	3130	3190	3250	3330	3410	3480	3550	3630	3690	3760	3820	124	157
	V1	101	101	101	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	119	119	119	119	119	119	119		
	GR2	13.3	13.3	13.3	13.4	13.4	13.5	13.6	13.6	13.6	13.6	13.6		
26000	BFL	3110	3170	3240	3310	3380	3450	3520	3590	3670	3730	3790	121	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	118	118	118	118	118	118	118		
	GR2	14.1	14.1	14.2	14.2	14.3	14.3	14.4	14.5	14.5	14.5	14.5		

FIGURE 5-213. TAKE-OFF DISTANCE; FLAPS - 10° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	122		
	N1%	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
39600	BFL	5670	5760	5860	5960	6060	6160	6250	6750	7450	8190	8930	151	192
	V1	115	114	114	114	114	114	114	116	120	123	126		
	VR	138	138	138	138	138	138	138	139	141	143	144		
	V2	145	145	145	145	145	145	145	146	147	148	149		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.4	5.7	5.1	4.6		
39000	BFL	5440	5530	5620	5720	5810	5910	6000	6480	7150	7850	8580	150	191
	V1	113	112	112	112	112	112	112	114	118	121	124		
	VR	136	136	136	136	136	136	136	138	139	141	143		
	V2	144	144	144	144	144	144	144	144	145	146	147		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	6.6	5.9	5.3	4.7		
38000	BFL	5070	5160	5250	5330	5420	5510	5590	6040	6660	7310	7990	147	188
	V1	109	109	109	109	109	109	108	111	115	118	121		
	VR	133	133	133	133	133	133	133	135	137	138	140		
	V2	141	141	141	141	141	141	141	142	143	143	144		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	6.9	6.3	5.6	5.1		
37000	BFL	4730	4810	4890	4970	5050	5130	5210	5620	6200	6800	7430	145	185
	V1	106	106	106	106	105	105	105	108	111	114	118		
	VR	131	131	131	131	131	131	131	132	134	135	137		
	V2	139	139	139	139	139	139	139	139	140	141	142		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.3	6.6	6	5.4		
36000	BFL	4420	4490	4570	4640	4720	4790	4870	5220	5760	6320	6890	143	182
	V1	103	103	103	102	102	102	102	104	108	111	114		
	VR	128	128	128	128	128	128	128	129	131	132	134		
	V2	136	136	136	136	136	136	136	137	138	138	139		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	7.7	7	6.3	5.7		
35000	BFL	4140	4220	4290	4370	4450	4530	4610	4860	5340	5860	6390	141	180
	V1	100	100	100	100	100	100	100	101	104	108	111		
	VR	125	125	125	125	125	125	125	126	128	129	131		
	V2	134	134	134	134	134	134	134	134	135	136	137		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.1	7.4	6.7	6.1		
34000	BFL	4110	4190	4260	4340	4420	4500	4570	4520	4940	5420	5910	139	177
	V1	100	100	100	100	100	100	100	98	101	104	107		
	VR	122	122	122	122	122	122	122	123	125	126	128		
	V2	132	132	132	132	132	132	132	132	132	133	134		
	GR2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	8.6	7.8	7.1	6.5		
33000	BFL	4090	4150	4230	4300	4380	4460	4540	4480	4590	5010	5470	137	174
	V1	100	100	100	100	100	100	100	98	98	101	104		
	VR	119	119	119	119	119	119	119	120	122	123	125		
	V2	129	129	129	129	129	129	129	130	130	131	131		
	GR2	9.7	9.7	9.7	9.7	9.8	9.8	9.8	9.1	8.3	7.6	6.9		
32000	BFL	4050	4120	4190	4270	4350	4420	4500	4440	4360	4640	5040	135	171
	V1	101	101	100	100	100	100	100	98	96	97	100		
	VR	117	117	117	117	117	117	117	118	119	121	122		
	V2	127	127	127	127	127	127	127	127	128	128	129		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	9.6	8.8	8	7.3		

FIGURE 5-213. TAKE-OFF DISTANCE; FLAPS - 10° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	122		
	N1%	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
31000	BFL	4020	4090	4160	4240	4310	4390	4460	4410	4330	4300	4640	133	168
	V1	101	101	101	101	101	101	100	98	96	94	97		
	VR	114	114	114	114	114	114	114	115	116	118	119		
	V2	125	125	125	125	125	125	125	125	125	126	126		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.1	9.3	8.5	7.8		
30000	BFL	3980	4060	4130	4200	4280	4350	4430	4370	4290	4290	4290	130	166
	V1	101	101	101	101	101	101	101	99	96	94	93		
	VR	111	111	111	111	111	111	111	112	113	115	116		
	V2	123	123	123	123	123	123	123	123	123	123	124		
	GR2	11.4	11.4	11.5	11.5	11.5	11.5	11.5	10.7	9.9	9	8.3		
29000	BFL	3950	4020	4090	4170	4240	4320	4390	4330	4250	4170	4110	128	163
	V1	101	101	101	101	101	101	101	99	96	94	91		
	VR	109	109	109	109	109	109	109	110	110	112	113		
	V2	122	122	122	122	122	122	122	121	121	121	121		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	11.4	10.4	9.6	8.8		
28000	BFL	3920	4000	4060	4130	4210	4280	4360	4300	4220	4140	4070	126	160
	V1	101	101	101	101	101	101	101	99	96	94	92		
	VR	107	107	107	107	107	107	107	107	108	109	110		
	V2	120	120	120	120	120	121	121	119	119	119	119		
	GR2	12.8	12.8	12.8	12.8	12.8	12.9	12.9	12	11.1	10.2	9.4		
27000	BFL	3890	3970	4030	4100	4170	4250	4320	4260	4180	4100	4040	124	157
	V1	102	102	102	102	101	101	101	99	97	94	92		
	VR	105	105	105	105	105	105	105	105	105	106	107		
	V2	119	119	119	119	119	119	119	119	117	116	116		
	GR2	13.6	13.6	13.6	13.6	13.6	13.6	13.6	12.8	11.8	10.9	10		
26000	BFL	3870	3940	4000	4070	4140	4210	4280	4220	4150	4070	4000	121	154
	V1	102	102	102	102	102	102	102	100	97	94	92		
	VR	103	103	103	103	103	103	103	103	103	103	104		
	V2	118	118	118	118	118	118	118	117	115	115	114		
	GR2	14.5	14.5	14.5	14.5	14.5	14.5	14.5	13.6	12.6	11.6	10.7		

FIGURE 5-214. TAKE-OFF DISTANCE; FLAPS - 10° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	77.8	78.2	79.2	80.1	81.0	81.9	82.8	83.6	84.4	85.3	86.1		
39600	BFL	5030	5110	5210	5300	5390	5480	5560	5650	5760	5860	5970	151	193
	V1	119	119	118	118	118	117	117	117	116	116	116		
	VR	140	140	140	140	140	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7		
39000	BFL	4830	4910	5000	5090	5170	5260	5340	5430	5530	5630	5730	150	191
	V1	117	117	116	116	116	115	115	115	114	114	114		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	144	144	144	144		
	GR2	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
38000	BFL	4510	4580	4660	4750	4830	4900	4980	5060	5150	5250	5340	148	188
	V1	113	113	113	113	112	112	112	111	111	111	111		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3		
37000	BFL	4200	4270	4340	4420	4500	4570	4640	4710	4800	4880	4970	146	185
	V1	110	110	109	109	109	109	108	108	108	108	107		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	140	140	139	139	139	139	139		
	GR2	7.5	7.5	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7		
36000	BFL	3910	3970	4050	4120	4190	4250	4320	4390	4470	4550	4630	143	183
	V1	107	106	106	106	106	105	105	105	104	104	104		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.9	7.9	8	8	8	8	8.1	8.1	8.1	8.1	8.1		
35000	BFL	3650	3710	3780	3840	3910	3970	4030	4100	4170	4240	4310	141	180
	V1	103	103	103	102	102	102	102	101	101	101	101		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	134		
	GR2	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5		
34000	BFL	3410	3460	3530	3590	3660	3740	3830	3900	3980	4060	4140	139	177
	V1	100	100	99	99	99	99	99	99	99	99	99		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.8	8.8	8.8	8.9	8.9	8.9	8.9	9	9	9	9		
33000	BFL	3340	3400	3480	3560	3640	3720	3800	3880	3950	4030	4100	137	174
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	121	121	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.3	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.5	9.5	9.5		
32000	BFL	3330	3390	3450	3530	3620	3690	3770	3850	3920	4000	4070	135	171
	V1	99	99	99	99	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	117	117	117	117	117	117		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.8	9.8	9.8	9.9	9.9	9.9	9.9	10	10	10	10		

FIGURE 5-214. TAKE-OFF DISTANCE; FLAPS - 10° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 77.8	-50 -58 78.2	-45 -49 79.2	-40 -40 80.1	-35 -31 81.0	-30 -22 81.9	-25 -13 82.8	-20 -4 83.6	-15 5 84.4	-10 14 85.3	-5 23 86.1	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3300	3350	3440	3510	3580	3660	3740	3820	3890	3970	4040	133	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	115	115	115	115	115	115	115	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.5		
30000	BFL	3270	3330	3400	3490	3570	3630	3710	3790	3860	3930	4010	130	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.9	10.9	11	11	11	11.1	11.1	11.1	11.1	11.1	11.1		
29000	BFL	3250	3310	3380	3450	3530	3610	3690	3770	3830	3900	3980	128	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.8	11.8	11.8	11.8		
28000	BFL	3220	3290	3370	3440	3500	3580	3650	3730	3810	3870	3940	126	160
	V1	100	100	100	100	100	100	101	101	101	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	120	120	120	120	120	120	120	120		
	GR2	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.5	12.5	12.5	12.5		
27000	BFL	3210	3270	3340	3410	3490	3560	3640	3700	3770	3850	3910	124	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13	13	13.1	13.1	13.1	13.2	13.2	13.3	13.3	13.3	13.3		
26000	BFL	3190	3250	3320	3390	3450	3530	3600	3670	3740	3820	3880	121	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.9	13.9	13.9	13.9	14	14	14.1	14.1	14.1	14.1	14.1		

FIGURE 5-214. TAKE-OFF DISTANCE; FLAPS - 10° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	118		
	N1%	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
39600	BFL	6070	6180	6280	6390	6490	6600	6870	7470	8210	9000	9480	151	193
	V1	116	116	116	115	115	115	116	119	122	126	128		
	VR	139	139	139	139	139	139	140	141	143	145	146		
	V2	146	146	146	146	146	146	146	147	148	149	149		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.5	6	5.3	4.8	4.4		
39000	BFL	5830	5930	6030	6130	6230	6330	6590	7160	7870	8640	9110	150	191
	V1	114	114	114	113	113	113	114	117	120	124	126		
	VR	138	138	138	138	138	138	138	140	141	143	144		
	V2	144	144	144	144	144	144	145	145	146	147	148		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.7	6.2	5.5	4.9	4.6		
38000	BFL	5430	5520	5620	5710	5810	5900	6140	6680	7330	8040	8500	148	188
	V1	111	110	110	110	110	110	111	114	117	120	122		
	VR	135	135	135	135	135	135	135	137	138	140	141		
	V2	142	142	142	142	142	142	142	143	144	145	145		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.1	6.5	5.9	5.3	4.9		
37000	BFL	5060	5140	5230	5320	5400	5490	5710	6210	6820	7470	7890	146	185
	V1	107	107	107	107	107	107	107	110	114	117	119		
	VR	132	132	132	132	132	132	132	134	135	137	138		
	V2	139	139	139	139	139	139	140	140	141	142	143		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.5	6.9	6.2	5.6	5.2		
36000	BFL	4710	4790	4870	4950	5030	5110	5310	5760	6330	6930	7320	143	183
	V1	104	104	104	104	103	103	104	107	110	113	115		
	VR	129	129	129	129	129	129	129	131	133	134	135		
	V2	137	137	137	137	137	137	137	138	139	139	140		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	7.9	7.3	6.6	6	5.6		
35000	BFL	4390	4460	4540	4610	4690	4760	4940	5340	5870	6420	6780	141	180
	V1	101	101	101	100	100	100	101	103	107	110	112		
	VR	126	126	126	126	126	126	126	128	129	131	132		
	V2	134	134	134	134	134	134	135	135	136	137	137		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.3	7.7	7	6.3	5.9		
34000	BFL	4210	4290	4370	4450	4530	4610	4640	4950	5420	5940	6270	139	177
	V1	99	99	99	99	99	99	98	100	103	106	108		
	VR	123	123	123	123	123	123	123	125	126	128	129		
	V2	132	132	132	132	132	132	132	133	133	134	135		
	GR2	9	9	9	9	9	9	8.8	8.1	7.4	6.7	6.3		
33000	BFL	4180	4250	4330	4410	4490	4570	4600	4600	5010	5480	5790	137	174
	V1	99	99	99	99	99	99	98	97	100	103	105		
	VR	120	120	120	120	120	120	121	122	123	125	126		
	V2	130	130	130	130	130	130	130	130	131	132	132		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.2	8.6	7.9	7.2	6.7		
32000	BFL	4150	4220	4300	4380	4450	4530	4560	4510	4640	5060	5340	135	171
	V1	100	100	99	99	99	99	99	97	96	99	101		
	VR	117	117	117	117	117	117	118	119	120	122	123		
	V2	128	128	128	128	128	128	128	128	128	129	129		
	GR2	10	10	10	10	10	10	9.8	9.1	8.3	7.6	7.2		

FIGURE 5-214. TAKE-OFF DISTANCE; FLAPS - 10° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	118		
	N1%	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
31000	BFL	4110	4190	4260	4340	4420	4500	4550	4480	4400	4660	4910	133	169
	V1	100	100	100	100	100	100	99	97	94	96	97		
	VR	114	114	114	114	114	114	115	116	117	119	120		
	V2	125	125	125	125	125	125	125	126	126	126	127		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.3	9.6	8.8	8.1	7.6		
30000	BFL	4080	4150	4230	4300	4380	4460	4490	4440	4360	4310	4520	130	166
	V1	100	100	100	100	100	100	99	97	94	94	94		
	VR	112	112	112	112	112	112	112	113	115	116	117		
	V2	123	123	123	123	123	123	123	123	124	124	124		
	GR2	11.1	11.1	11.1	11.1	11.1	11.1	10.9	10.2	9.4	8.6	8.1		
29000	BFL	4050	4120	4190	4270	4350	4420	4480	4400	4330	4250	4200	128	163
	V1	100	100	100	100	100	100	99	97	95	92	91		
	VR	109	109	109	109	109	109	110	110	112	113	114		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	11.8	11.8	11.8	11.8	11.8	11.8	11.5	10.8	9.9	9.1	8.6		
28000	BFL	4020	4090	4160	4230	4310	4390	4410	4360	4290	4210	4170	126	160
	V1	100	100	100	100	100	100	99	97	95	92	91		
	VR	107	107	107	107	107	107	107	108	109	110	111		
	V2	120	120	120	120	120	120	119	119	119	119	119		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.2	11.4	10.6	9.7	9.2		
27000	BFL	3980	4050	4120	4200	4270	4350	4400	4320	4250	4180	4130	124	157
	V1	101	101	101	100	100	100	100	97	95	93	91		
	VR	105	105	105	105	105	105	105	105	106	107	107		
	V2	118	118	118	118	118	118	118	117	117	117	117		
	GR2	13.3	13.3	13.3	13.3	13.3	13.3	13	12.1	11.2	10.3	9.8		
26000	BFL	3950	4020	4090	4160	4240	4310	4340	4290	4220	4140	4090	121	154
	V1	101	101	101	101	101	101	100	98	95	93	91		
	VR	103	103	103	103	103	103	103	103	103	104	104		
	V2	117	117	117	117	117	117	117	116	115	114	114		
	GR2	14.1	14.1	14.1	14.1	14.1	14.1	13.8	12.9	12	11	10.5		

FIGURE 5-215. TAKE-OFF DISTANCE; FLAPS - 10° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	78.3	79.0	79.9	80.8	81.7	82.6	83.4	84.3	85.1	85.9	86.8		
39600	BFL	5330	5420	5530	5640	5750	5850	5950	6060	6170	6280	6400	152	193
	V1	120	119	119	119	119	118	118	118	118	118	117		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5		
39000	BFL	5120	5210	5310	5410	5510	5610	5710	5820	5930	6030	6140	150	191
	V1	118	117	117	117	117	116	116	116	116	116	115		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	145	145	145	145	145	145	145	145		
	GR2	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
38000	BFL	4770	4850	4950	5050	5140	5230	5320	5420	5520	5620	5720	148	189
	V1	114	114	114	114	113	113	113	113	112	112	112		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	7	7	7	7	7	7	7	7.1	7.1	7.1	7.1		
37000	BFL	4450	4520	4610	4700	4790	4870	4950	5050	5140	5230	5320	146	186
	V1	111	111	110	110	110	110	109	109	109	109	109		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
36000	BFL	4140	4200	4290	4370	4450	4530	4610	4690	4780	4860	4940	144	183
	V1	107	107	107	107	107	106	106	106	106	105	105		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
35000	BFL	3850	3920	3990	4070	4140	4210	4290	4360	4440	4520	4600	141	180
	V1	104	104	104	103	103	103	103	103	102	102	102		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.3		
34000	BFL	3590	3650	3720	3790	3860	3930	3990	4070	4140	4210	4280	139	177
	V1	100	100	100	100	100	100	99	99	99	99	99		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7		
33000	BFL	3440	3500	3580	3660	3740	3820	3900	3970	4050	4130	4210	137	175
	V1	99	99	99	99	99	99	99	99	99	99	98		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2		
32000	BFL	3420	3480	3550	3630	3710	3790	3870	3940	4020	4100	4180	135	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7		

FIGURE 5-215. TAKE-OFF DISTANCE; FLAPS - 10° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 78.3	-50 -58 79.0	-45 -49 79.9	-40 -40 80.8	-35 -31 81.7	-30 -22 82.6	-25 -13 83.4	-20 -4 84.3	-15 5 85.1	-10 14 85.9	-5 23 86.8	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3400	3460	3540	3600	3680	3760	3850	3910	3990	4070	4140	133	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
30000	BFL	3370	3430	3500	3580	3660	3740	3810	3880	3960	4030	4110	131	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.7	10.7	10.7	10.7	10.7	10.8	10.8	10.8	10.8	10.8	10.8		
29000	BFL	3340	3400	3480	3550	3620	3700	3780	3850	3930	4000	4080	128	163
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
28000	BFL	3330	3390	3460	3530	3600	3670	3760	3820	3900	3970	4040	126	160
	V1	100	100	100	100	100	100	100	100	100	100	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12	12	12	12	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
27000	BFL	3310	3360	3420	3500	3570	3640	3720	3800	3860	3940	4010	124	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.9	12.9	12.9	12.9	12.9		
26000	BFL	3280	3330	3410	3480	3550	3620	3690	3760	3840	3900	3980	121	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.6	13.6	13.6	13.6	13.6	13.7	13.7	13.7	13.7	13.7	13.7		

FIGURE 5-215. TAKE-OFF DISTANCE; FLAPS - 10° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	114		
	N1%	87.6	88.4	89.2	90.1	90.9	91.7	91.5	90.8	90.1	89.5	89.4		
39600	BFL	6510	6630	6740	6850	6970	7090	7550	8260	9050	9890	10080	152	193
	V1	117	117	117	117	117	117	118	122	125	128	129		
	VR	141	141	141	141	141	141	142	143	145	146	147		
	V2	147	147	147	147	147	147	148	148	149	150	150		
	GR2	6.5	6.5	6.5	6.5	6.5	6.4	6.1	5.6	5	4.4	4.3		
39000	BFL	6250	6360	6470	6580	6690	6800	7250	7920	8690	9500	9680	150	191
	V1	115	115	115	115	115	115	116	120	123	126	127		
	VR	139	139	139	139	139	139	140	142	143	145	145		
	V2	145	145	145	145	145	145	146	147	148	148	149		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.3	5.8	5.2	4.6	4.4		
38000	BFL	5820	5920	6020	6120	6220	6330	6750	7370	8080	8860	9030	148	189
	V1	112	112	112	111	111	111	113	116	119	123	123		
	VR	136	136	136	136	136	136	137	139	140	142	142		
	V2	143	143	143	143	143	143	144	144	145	146	146		
	GR2	7.1	7.1	7.1	7.1	7.1	7	6.7	6.1	5.5	4.9	4.8		
37000	BFL	5420	5510	5600	5700	5790	5890	6270	6860	7510	8230	8410	146	186
	V1	109	108	108	108	108	108	110	113	116	119	120		
	VR	133	133	133	133	133	133	134	136	137	139	139		
	V2	140	140	140	140	140	140	141	142	142	143	144		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.1	6.5	5.8	5.2	5.1		
36000	BFL	5030	5120	5200	5290	5380	5470	5820	6360	6970	7640	7790	144	183
	V1	105	105	105	105	105	104	106	109	112	116	116		
	VR	130	130	130	130	130	130	131	133	134	136	136		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.4	6.8	6.2	5.6	5.4		
35000	BFL	4680	4760	4840	4920	5000	5090	5400	5890	6450	7070	7210	141	180
	V1	102	102	102	101	101	101	103	106	109	112	113		
	VR	127	127	127	127	127	127	128	130	131	133	133		
	V2	135	135	135	135	135	135	136	137	137	138	138		
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	7.9	7.2	6.6	5.9	5.8		
34000	BFL	4350	4430	4500	4580	4650	4730	5010	5450	5960	6540	6670	139	177
	V1	99	99	98	98	98	98	100	102	105	109	109		
	VR	124	124	124	124	124	124	125	126	128	130	130		
	V2	133	133	133	133	133	133	133	134	135	135	136		
	GR2	8.7	8.7	8.7	8.7	8.7	8.6	8.3	7.7	7	6.3	6.2		
33000	BFL	4290	4360	4450	4530	4610	4680	4690	5030	5500	6030	6150	137	175
	V1	98	98	98	98	98	98	97	99	102	105	106		
	VR	121	121	121	121	121	121	122	123	125	127	127		
	V2	130	130	130	130	130	130	131	131	132	133	133		
	GR2	9.2	9.2	9.2	9.2	9.2	9.1	8.8	8.1	7.4	6.7	6.6		
32000	BFL	4250	4330	4410	4490	4570	4640	4650	4660	5060	5540	5650	135	172
	V1	99	99	99	98	98	98	97	96	98	101	102		
	VR	118	118	118	118	118	118	119	120	122	123	124		
	V2	128	128	128	128	128	128	128	129	129	130	130		
	GR2	9.7	9.7	9.7	9.7	9.7	9.6	9.3	8.6	7.8	7.1	7		

FIGURE 5-215. TAKE-OFF DISTANCE; FLAPS - 10° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	114		
	N1%	87.6	88.4	89.2	90.1	90.9	91.7	91.5	90.8	90.1	89.5	89.4		
31000	BFL	4220	4290	4370	4450	4540	4600	4620	4560	4670	5100	5200	133	169
	V1	99	99	99	99	99	98	97	95	95	98	98		
	VR	115	115	115	115	115	115	116	117	119	120	121		
	V2	126	126	126	126	126	126	126	126	127	127	127		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	9.8	9.1	8.3	7.6	7.4		
30000	BFL	4180	4260	4340	4420	4500	4570	4580	4520	4440	4690	4770	131	166
	V1	99	99	99	99	99	99	97	95	93	94	95		
	VR	112	112	112	112	112	112	113	114	116	117	117		
	V2	123	123	123	123	123	123	124	124	124	125	125		
	GR2	10.8	10.8	10.8	10.8	10.8	10.7	10.3	9.6	8.9	8.1	7.9		
29000	BFL	4150	4220	4300	4380	4460	4530	4540	4480	4400	4400	4400	128	163
	V1	99	99	99	99	99	99	98	95	93	91	91		
	VR	110	110	110	110	110	110	110	111	113	114	114		
	V2	121	121	121	121	121	121	121	121	122	122	122		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	10.9	10.2	9.4	8.6	8.4		
28000	BFL	4110	4190	4270	4340	4420	4490	4500	4440	4360	4280	4270	126	160
	V1	99	99	99	99	99	99	98	96	93	91	90		
	VR	107	107	107	107	107	107	108	108	110	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	120		
	GR2	12.1	12.1	12.1	12.1	12.1	12	11.6	10.8	10	9.2	9		
27000	BFL	4080	4150	4230	4310	4380	4450	4460	4400	4320	4240	4230	124	157
	V1	100	100	100	100	99	99	98	96	93	91	90		
	VR	105	105	105	105	105	105	105	106	107	108	108		
	V2	118	118	118	119	119	118	117	117	117	117	117		
	GR2	12.9	12.9	12.9	12.9	12.9	12.8	12.3	11.5	10.6	9.8	9.6		
26000	BFL	4050	4120	4190	4270	4350	4410	4420	4360	4290	4210	4190	121	154
	V1	100	100	100	100	100	100	98	96	94	91	91		
	VR	103	103	103	103	103	103	103	103	104	105	105		
	V2	117	117	117	117	117	117	116	115	115	114	114		
	GR2	13.7	13.7	13.7	13.7	13.7	13.6	13.1	12.3	11.3	10.4	10.3		

FIGURE 5-216. TAKE-OFF DISTANCE; FLAPS - 10° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.1	79.7	80.6	81.4	82.3	83.2	84.1	84.9	85.7	86.6	87.4		
39600	BFL	5750	5850	5980	6100	6220	6340	6460	6580	6710	6830	6950	152	193
	V1	122	121	121	121	121	121	120	120	120	120	120		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.3		
39000	BFL	5490	5590	5710	5830	5940	6060	6170	6280	6400	6520	6640	151	192
	V1	119	119	119	119	119	118	118	118	118	118	117		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	146	146	146	146	146		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
38000	BFL	5090	5180	5290	5400	5510	5610	5710	5820	5930	6040	6140	148	189
	V1	115	115	115	115	115	114	114	114	114	114	113		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
37000	BFL	4740	4820	4920	5020	5120	5220	5310	5410	5510	5610	5710	146	186
	V1	112	112	112	111	111	111	111	111	110	110	110		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2		
36000	BFL	4410	4480	4580	4670	4760	4850	4930	5030	5120	5210	5300	144	183
	V1	108	108	108	108	108	108	107	107	107	107	107		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6		
35000	BFL	4090	4160	4250	4330	4420	4500	4580	4670	4750	4840	4920	142	181
	V1	105	105	105	105	104	104	104	104	104	103	103		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	8	8	8	8	8		
34000	BFL	3810	3870	3960	4030	4110	4190	4260	4340	4420	4500	4570	139	178
	V1	102	101	101	101	101	101	101	100	100	100	100		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
33000	BFL	3550	3610	3690	3760	3830	3910	3990	4070	4150	4230	4310	137	175
	V1	98	98	98	98	98	98	98	98	98	97	97		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.8	8.8	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9		
32000	BFL	3500	3570	3640	3720	3800	3880	3960	4040	4120	4200	4280	135	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4		

FIGURE 5-216. TAKE-OFF DISTANCE; FLAPS - 10° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 79.1	-50 -58 79.7	-45 -49 80.6	-40 -40 81.4	-35 -31 82.3	-30 -22 83.2	-25 -13 84.1	-20 -4 84.9	-15 5 85.7	-10 14 86.6	-5 23 87.4	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3500	3550	3620	3690	3770	3850	3930	4010	4090	4160	4240	133	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.8	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
30000	BFL	3460	3510	3600	3670	3750	3820	3900	3980	4050	4130	4210	131	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	124	124	124	124	123	123	123	123	123	123	123		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
29000	BFL	3440	3490	3560	3640	3710	3790	3870	3940	4020	4100	4170	128	163
	V1	99	99	98	98	98	98	98	98	98	98	98		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11	11	11	11	11	11	11.1	11.1	11.1	11.1	11.1		
28000	BFL	3420	3470	3540	3610	3680	3770	3850	3920	3990	4060	4140	126	160
	V1	99	99	99	99	99	99	99	99	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
27000	BFL	3390	3440	3510	3580	3660	3730	3810	3890	3950	4030	4100	124	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.5	12.5	12.5		
26000	BFL	3360	3420	3490	3550	3630	3700	3780	3850	3930	4000	4070	121	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.2	13.2	13.2	13.2	13.2	13.2	13.3	13.3	13.3	13.3	13.3		

FIGURE 5-216. TAKE-OFF DISTANCE; FLAPS - 10° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	111			
	N1%	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
39600	BFL	7080	7200	7330	7450	7590	7830	8470	9280	10120	10870		152	193
	V1	120	119	119	119	119	120	122	125	128	131			
	VR	143	143	143	143	143	143	145	146	148	149			
	V2	148	148	148	148	148	148	150	150	151	151			
	GR2	6.3	6.3	6.3	6.3	6.2	6	5.7	5.1	4.6	4.1			
39000	BFL	6750	6870	6990	7110	7240	7480	8080	8860	9670	10400		151	192
	V1	117	117	117	117	117	117	120	123	126	129			
	VR	141	140	140	140	140	141	142	144	146	147			
	V2	146	146	146	146	146	147	148	149	149	150			
	GR2	6.4	6.4	6.4	6.4	6.4	6.2	5.9	5.3	4.7	4.3			
38000	BFL	6250	6360	6470	6580	6700	6920	7480	8180	8970	9640		148	189
	V1	113	113	113	113	113	113	116	119	122	125			
	VR	137	137	137	137	137	137	139	141	142	144			
	V2	144	144	143	143	143	144	145	146	146	147			
	GR2	6.8	6.8	6.8	6.8	6.8	6.6	6.2	5.6	5.1	4.6			
37000	BFL	5810	5920	6020	6120	6230	6430	6950	7600	8330	8980		146	186
	V1	110	110	110	109	109	110	112	116	119	122			
	VR	134	134	134	134	134	134	136	138	139	141			
	V2	141	141	141	141	141	141	142	143	144	144			
	GR2	7.2	7.2	7.2	7.2	7.1	6.9	6.6	6	5.4	4.9			
36000	BFL	5400	5490	5580	5680	5780	5970	6450	7050	7720	8340		144	183
	V1	106	106	106	106	106	107	109	112	115	118			
	VR	131	131	131	131	131	131	133	135	136	138			
	V2	138	138	138	138	138	138	139	140	141	142			
	GR2	7.6	7.6	7.6	7.6	7.5	7.3	6.9	6.3	5.7	5.2			
35000	BFL	5010	5100	5180	5270	5360	5530	5970	6520	7140	7710		142	181
	V1	103	103	103	103	103	103	105	108	112	114			
	VR	128	128	128	128	128	128	130	132	133	135			
	V2	136	136	136	136	136	136	137	138	138	139			
	GR2	8	8	8	8	7.9	7.7	7.3	6.7	6.1	5.6			
34000	BFL	4650	4730	4810	4890	4980	5130	5520	6030	6600	7110		139	178
	V1	100	100	100	99	99	100	102	105	108	111			
	VR	125	125	125	125	125	125	127	128	130	131			
	V2	133	133	133	133	133	133	134	135	136	136			
	GR2	8.4	8.4	8.4	8.4	8.4	8.1	7.8	7.1	6.5	6			
33000	BFL	4390	4470	4560	4640	4720	4770	5110	5560	6080	6550		137	175
	V1	97	97	97	97	97	97	99	101	104	107			
	VR	122	122	122	122	122	122	124	125	127	128			
	V2	131	131	131	131	131	131	132	132	133	134			
	GR2	8.9	8.9	8.9	8.9	8.8	8.6	8.2	7.6	6.9	6.4			
32000	BFL	4360	4440	4520	4600	4680	4700	4730	5120	5590	6030		135	172
	V1	98	98	97	97	97	97	95	98	101	103			
	VR	119	119	119	119	119	119	121	122	124	125			
	V2	128	128	128	128	128	128	129	130	130	131			
	GR2	9.4	9.4	9.4	9.4	9.3	9.1	8.7	8	7.3	6.8			

FIGURE 5-216. TAKE-OFF DISTANCE; FLAPS - 10° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	111			
	N1%	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
31000	BFL	4320	4400	4480	4560	4640	4660	4670	4730	5130	5530		133	169
	V1	98	98	98	98	97	97	95	94	97	99			
	VR	116	116	116	116	116	116	118	119	120	122			
	V2	126	126	126	126	126	126	127	127	128	128			
	GR2	9.9	9.9	9.9	9.9	9.9	9.6	9.2	8.5	7.8	7.2			
30000	BFL	4280	4360	4440	4530	4600	4620	4630	4580	4730	5070		131	166
	V1	98	98	98	98	98	97	96	93	94	96			
	VR	113	113	113	113	113	113	114	116	117	119			
	V2	123	123	123	123	123	123	124	124	125	125			
	GR2	10.5	10.5	10.5	10.5	10.4	10.1	9.7	9	8.3	7.7			
29000	BFL	4250	4330	4410	4490	4560	4580	4590	4540	4470	4650		128	163
	V1	98	98	98	98	98	97	96	94	91	92			
	VR	110	110	110	110	110	110	111	113	114	115			
	V2	121	121	121	121	121	121	122	122	122	123			
	GR2	11.1	11.1	11.1	11.1	11	10.7	10.3	9.6	8.8	8.2			
28000	BFL	4210	4290	4370	4450	4520	4540	4550	4500	4430	4360		126	160
	V1	98	98	98	98	98	97	96	94	91	90			
	VR	108	108	108	108	108	108	108	110	111	112			
	V2	119	119	119	119	119	119	119	119	120	120			
	GR2	11.7	11.7	11.7	11.7	11.7	11.4	10.9	10.2	9.4	8.8			
27000	BFL	4180	4250	4330	4410	4480	4500	4510	4460	4390	4320		124	157
	V1	99	99	98	98	98	98	96	94	92	90			
	VR	105	105	105	105	105	105	106	106	108	109			
	V2	118	118	118	118	118	117	117	117	117	117			
	GR2	12.5	12.5	12.5	12.5	12.4	12.1	11.6	10.8	10	9.4			
26000	BFL	4140	4220	4290	4370	4440	4460	4470	4420	4350	4280		121	154
	V1	99	99	99	99	99	98	96	94	92	90			
	VR	103	103	103	103	103	103	103	104	105	106			
	V2	116	116	116	116	116	117	115	115	115	115			
	GR2	13.3	13.3	13.3	13.3	13.2	12.9	12.4	11.6	10.7	10			

FIGURE 5-217. TAKE-OFF DISTANCE; FLAPS - 10° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39°	VSE
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
39600	BFL	6280	6390	6530	6660	6790	6920	7050	7190	7330	7460	7600	152	194
	V1	124	124	124	123	123	123	123	123	122	122	122		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
39000	BFL	5990	6100	6230	6360	6480	6600	6730	6860	6990	7120	7250	151	192
	V1	122	121	121	121	121	121	120	120	120	120	120		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
38000	BFL	5530	5630	5750	5870	5980	6100	6210	6330	6450	6570	6690	149	189
	V1	118	117	117	117	117	117	116	116	116	116	116		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6		
37000	BFL	5110	5200	5310	5410	5520	5620	5730	5840	5940	6050	6160	147	187
	V1	114	113	113	113	113	113	112	112	112	112	112		
	VR	136	136	136	136	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
36000	BFL	4740	4820	4920	5020	5120	5210	5310	5410	5510	5610	5710	144	184
	V1	110	110	110	109	109	109	109	109	108	108	108		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
35000	BFL	4400	4470	4570	4660	4750	4830	4920	5020	5110	5200	5290	142	181
	V1	106	106	106	106	106	106	105	105	105	105	105		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	136	136	136	136	136	136	136		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
34000	BFL	4080	4150	4240	4320	4400	4490	4570	4650	4740	4820	4910	140	178
	V1	103	103	103	102	102	102	102	102	102	101	101		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
33000	BFL	3800	3860	3940	4020	4090	4170	4240	4320	4400	4480	4550	137	175
	V1	99	99	99	99	99	99	98	98	98	98	98		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
32000	BFL	3590	3650	3730	3810	3890	3970	4050	4140	4220	4300	4380	135	172
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1		

FIGURE 5-217. TAKE-OFF DISTANCE; FLAPS - 10° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39°	VSE
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
31000	BFL	3570	3620	3700	3780	3870	3940	4020	4100	4180	4260	4340	133	169
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
30000	BFL	3540	3590	3670	3750	3830	3910	4000	4070	4150	4230	4310	131	166
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
29000	BFL	3510	3570	3650	3730	3800	3880	3970	4040	4110	4190	4270	128	163
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7		
28000	BFL	3490	3550	3610	3690	3770	3850	3940	4000	4080	4160	4230	126	160
	V1	98	98	98	98	97	97	97	97	97	97	97		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
27000	BFL	3460	3510	3590	3660	3750	3830	3900	3980	4060	4120	4200	124	157
	V1	98	98	98	98	98	98	98	98	98	98	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12	12	12	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	BFL	3440	3490	3570	3640	3720	3790	3860	3950	4010	4090	4160	121	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	117		
	GR2	12.8	12.8	12.8	12.8	12.8	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 5-217. TAKE-OFF DISTANCE; FLAPS - 10° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	107			
	N1%	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
39600	BFL	7730	7870	8010	8150	8340	8830	9610	10450	11380	11790		152	194
	V1	122	122	122	122	122	123	126	129	132	133			
	VR	145	145	145	145	145	146	148	149	150	151			
	V2	150	150	150	150	150	151	152	152	153	153			
	GR2	6	6	6	6	5.9	5.6	5.2	4.7	4.2	3.9			
39000	BFL	7380	7510	7640	7770	7950	8420	9170	9980	10890	11280		151	192
	V1	119	119	119	119	119	121	124	127	130	131			
	VR	143	143	143	143	143	144	145	147	148	149			
	V2	148	148	148	148	148	149	150	151	151	151			
	GR2	6.2	6.2	6.2	6.2	6.1	5.8	5.4	4.9	4.3	4.1			
38000	BFL	6800	6920	7040	7160	7330	7770	8440	9230	10070	10450		149	189
	V1	115	115	115	115	115	117	120	123	126	127			
	VR	139	139	139	139	139	140	142	144	145	145			
	V2	145	145	145	145	145	145	147	148	148	148			
	GR2	6.6	6.6	6.6	6.6	6.4	6.1	5.7	5.2	4.7	4.4			
37000	BFL	6270	6380	6490	6600	6760	7150	7780	8510	9300	9650		147	187
	V1	112	111	111	111	111	113	116	119	122	123			
	VR	135	135	135	135	135	136	138	140	141	142			
	V2	142	142	142	142	142	142	143	144	145	145			
	GR2	6.9	6.9	6.9	6.9	6.8	6.5	6.1	5.6	5	4.7			
36000	BFL	5810	5920	6020	6120	6260	6620	7200	7860	8630	8960		144	184
	V1	108	108	108	108	108	109	112	115	118	120			
	VR	132	132	132	132	132	133	135	137	138	139			
	V2	139	139	139	139	139	139	141	142	143	143			
	GR2	7.3	7.3	7.3	7.3	7.1	6.8	6.4	5.9	5.3	5.1			
35000	BFL	5390	5480	5570	5670	5800	6130	6650	7270	7960	8300		142	181
	V1	105	104	104	104	104	106	108	111	115	116			
	VR	129	129	129	129	129	130	132	134	135	136			
	V2	136	136	136	136	136	137	138	139	140	140			
	GR2	7.7	7.7	7.7	7.7	7.5	7.2	6.8	6.3	5.7	5.4			
34000	BFL	4990	5080	5170	5250	5370	5670	6150	6710	7350	7640		140	178
	V1	101	101	101	101	101	102	105	108	111	112			
	VR	126	126	126	126	126	127	129	130	132	133			
	V2	134	134	134	134	134	134	135	136	137	137			
	GR2	8.1	8.1	8.1	8.1	7.9	7.6	7.2	6.7	6.1	5.8			
33000	BFL	4630	4710	4790	4870	4980	5250	5670	6180	6770	7040		137	175
	V1	98	98	98	98	98	99	101	104	107	108			
	VR	123	123	123	123	123	124	126	127	129	130			
	V2	131	131	131	131	131	132	133	133	134	134			
	GR2	8.6	8.6	8.6	8.6	8.4	8.1	7.7	7.1	6.4	6.2			
32000	BFL	4460	4540	4630	4720	4740	4860	5230	5680	6210	6460		135	172
	V1	96	96	96	96	96	96	98	100	103	105			
	VR	120	120	120	120	120	121	122	124	126	126			
	V2	129	129	129	129	129	129	130	131	131	132			
	GR2	9.1	9.1	9.1	9.1	8.9	8.5	8.1	7.5	6.9	6.6			

FIGURE 5-217. TAKE-OFF DISTANCE; FLAPS - 10° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	107			
	N1%	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
31000	BFL	4420	4510	4590	4670	4700	4720	4820	5220	5700	5920		133	169
	V1	97	97	97	97	96	95	94	97	100	101			
	VR	117	117	117	117	117	118	119	121	122	123			
	V2	126	126	126	126	126	126	127	128	129	129			
	GR2	9.6	9.6	9.6	9.6	9.4	9	8.6	8	7.3	7			
30000	BFL	4390	4470	4550	4630	4660	4670	4680	4800	5220	5420		131	166
	V1	97	97	97	97	96	95	93	93	96	97			
	VR	114	114	114	114	114	115	116	117	119	120			
	V2	124	124	124	124	124	124	125	125	126	126			
	GR2	10.1	10.1	10.1	10.1	9.9	9.6	9.1	8.5	7.8	7.5			
29000	BFL	4350	4430	4510	4590	4620	4630	4640	4600	4790	4960		128	163
	V1	97	97	97	97	96	95	94	92	92	93			
	VR	111	111	111	111	111	112	113	114	116	116			
	V2	121	121	121	121	121	121	122	123	123	123			
	GR2	10.7	10.7	10.7	10.7	10.5	10.1	9.6	9	8.3	8			
28000	BFL	4310	4390	4470	4550	4580	4590	4600	4550	4550	4550		126	160
	V1	97	97	97	97	96	95	94	92	90	90			
	VR	108	108	108	108	108	109	110	111	113	113			
	V2	119	119	119	119	119	119	120	120	120	121			
	GR2	11.4	11.4	11.4	11.4	11.1	10.7	10.2	9.6	8.9	8.5			
27000	BFL	4280	4350	4430	4510	4540	4550	4550	4510	4440	4410		124	157
	V1	97	97	97	97	97	96	94	92	90	89			
	VR	106	106	106	106	106	106	107	108	109	110			
	V2	117	117	117	117	117	117	117	117	118	118			
	GR2	12.1	12.1	12.1	12.1	11.8	11.4	10.9	10.2	9.4	9.1			
26000	BFL	4240	4320	4390	4470	4500	4510	4510	4470	4400	4370		121	154
	V1	98	98	98	98	97	96	94	92	90	89			
	VR	103	103	103	103	103	103	104	105	106	107			
	V2	117	117	116	116	116	115	115	115	115	115			
	GR2	12.9	12.9	12.9	12.9	12.6	12.2	11.6	10.9	10.1	9.8			

FIGURE 5-218. TAKE-OFF DISTANCE; FLAPS - 10° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	80.0	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5		
39600	BFL	6800	6920	7080	7230	7370	7510	7660	7810	7960	8110	8260	153	194
	V1	126	126	126	126	125	125	125	125	125	124	124		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
39000	BFL	6490	6600	6750	6890	7030	7160	7310	7450	7590	7730	7870	151	193
	V1	124	124	123	123	123	123	123	122	122	122	122		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
38000	BFL	5990	6090	6230	6360	6480	6610	6740	6870	6990	7120	7250	149	190
	V1	120	119	119	119	119	119	118	118	118	118	118		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	BFL	5520	5620	5740	5860	5970	6090	6210	6320	6440	6560	6680	147	187
	V1	115	115	115	115	115	115	114	114	114	114	114		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
36000	BFL	5080	5170	5280	5390	5500	5600	5710	5820	5930	6040	6140	145	184
	V1	111	111	111	111	111	111	110	110	110	110	110		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7	7	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1		
35000	BFL	4700	4780	4880	4980	5080	5170	5270	5370	5470	5570	5670	142	181
	V1	108	108	107	107	107	107	107	106	106	106	106		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5		
34000	BFL	4350	4420	4520	4610	4700	4790	4880	4970	5060	5150	5250	140	178
	V1	104	104	104	104	103	103	103	103	103	103	102		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.8	7.8	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9		
33000	BFL	4040	4110	4190	4270	4360	4440	4520	4610	4690	4770	4860	138	176
	V1	101	101	100	100	100	100	100	100	99	99	99		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
32000	BFL	3750	3810	3890	3970	4040	4120	4190	4270	4350	4420	4500	135	173
	V1	97	97	97	97	97	96	96	96	96	96	96		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		

FIGURE 5-218. TAKE-OFF DISTANCE; FLAPS - 10° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 80.0	-50 -58 80.7	-45 -49 81.6	-40 -40 82.5	-35 -31 83.4	-30 -22 84.3	-25 -13 85.1	-20 -4 86.0	-15 5 86.8	-10 14 87.7	-5 23 88.5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3660	3720	3800	3880	3960	4050	4130	4220	4300	4380	4470	133	170
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
30000	BFL	3640	3690	3770	3860	3930	4020	4100	4180	4260	4340	4430	131	167
	V1	97	96	96	96	96	96	96	96	96	96	96		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
29000	BFL	3600	3660	3750	3820	3900	3980	4060	4150	4230	4310	4390	129	164
	V1	97	97	97	97	97	97	96	96	96	96	96		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
28000	BFL	3580	3640	3720	3790	3870	3950	4030	4110	4190	4270	4350	126	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	11	11	11	11	11	11	11	11	11		
27000	BFL	3540	3600	3680	3760	3850	3920	4000	4080	4150	4230	4310	124	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
26000	BFL	3530	3580	3650	3740	3820	3890	3960	4040	4120	4200	4280	121	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	115	115	115	116	116	116	116	116	116		
	GR2	12.4	12.4	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.5	12.5		

FIGURE 5-218. TAKE-OFF DISTANCE; FLAPS - 10° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	40		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	104			
	N1%	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
39600	BFL	8410	8560	8710	8860	9140	9940	10760	11690	12720	12740		153	194
	V1	124	124	124	124	124	127	130	133	136	136			
	VR	147	147	147	147	147	149	150	152	153	153			
	V2	152	152	152	152	151	153	154	154	155	155			
	GR2	5.8	5.8	5.8	5.8	5.5	5.2	4.8	4.3	3.8	3.8			
39000	BFL	8010	8160	8300	8450	8710	9470	10290	11170	12150	12180		151	193
	V1	122	121	121	121	122	125	127	130	133	133			
	VR	145	145	145	145	145	147	148	150	151	151			
	V2	150	150	150	150	149	151	152	153	153	153			
	GR2	6	6	6	6	5.7	5.4	5	4.5	3.9	3.9			
38000	BFL	7390	7520	7650	7780	8030	8720	9490	10320	11270	11290		149	190
	V1	118	117	117	117	118	120	123	126	129	129			
	VR	141	141	141	141	141	143	145	146	147	147			
	V2	147	147	147	147	146	148	149	150	150	150			
	GR2	6.3	6.3	6.3	6.3	6	5.7	5.3	4.8	4.2	4.2			
37000	BFL	6800	6920	7040	7160	7390	8020	8730	9530	10400	10420		147	187
	V1	113	113	113	113	114	116	119	122	125	125			
	VR	137	137	137	137	137	139	141	143	144	144			
	V2	143	143	143	143	143	144	146	147	147	147			
	GR2	6.7	6.7	6.7	6.7	6.3	6.1	5.7	5.1	4.6	4.5			
36000	BFL	6250	6360	6470	6590	6800	7370	8010	8760	9600	9610		145	184
	V1	109	109	109	109	110	112	115	118	121	121			
	VR	134	134	134	134	134	136	137	139	141	141			
	V2	140	140	140	140	140	141	142	143	144	144			
	GR2	7.1	7.1	7.1	7	6.7	6.4	6	5.5	4.9	4.9			
35000	BFL	5770	5870	5970	6080	6270	6790	7370	8060	8850	8860		142	181
	V1	106	106	105	105	106	108	111	114	117	117			
	VR	130	130	130	130	130	132	134	136	137	137			
	V2	137	137	137	137	137	138	139	140	141	141			
	GR2	7.5	7.5	7.5	7.4	7.1	6.8	6.4	5.8	5.2	5.2			
34000	BFL	5340	5430	5520	5620	5810	6270	6800	7430	8170	8180		140	178
	V1	102	102	102	102	103	105	107	110	114	114			
	VR	127	127	127	127	127	129	131	132	134	134			
	V2	135	135	135	135	135	135	136	137	139	139			
	GR2	7.9	7.9	7.9	7.8	7.5	7.2	6.8	6.2	5.6	5.6			
33000	BFL	4940	5030	5110	5200	5360	5780	6260	6840	7500	7520		138	176
	V1	99	99	99	99	99	101	104	107	110	110			
	VR	124	124	124	124	124	126	128	129	131	131			
	V2	132	132	132	132	131	133	134	135	135	135			
	GR2	8.3	8.3	8.3	8.3	7.9	7.6	7.2	6.6	6	6			
32000	BFL	4590	4670	4760	4830	4960	5330	5760	6280	6890	6900		135	173
	V1	96	96	96	96	96	98	100	103	106	106			
	VR	121	121	121	121	121	123	124	126	128	128			
	V2	129	129	129	129	129	130	131	132	133	133			
	GR2	8.8	8.8	8.8	8.8	8.4	8	7.6	7	6.4	6.4			

FIGURE 5-218. TAKE-OFF DISTANCE; FLAPS - 10° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	40		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	104			
	N1%	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
31000	BFL	4550	4630	4720	4790	4760	4920	5300	5760	6300	6320		133	170
	V1	96	96	96	96	94	94	97	99	102	102			
	VR	118	118	118	118	118	120	121	123	124	124			
	V2	127	127	127	127	127	127	128	129	130	130			
	GR2	9.3	9.3	9.3	9.3	8.8	8.5	8.1	7.5	6.8	6.8			
30000	BFL	4510	4590	4680	4750	4750	4750	4870	5280	5770	5780		131	167
	V1	96	96	96	96	95	93	93	95	98	98			
	VR	115	115	115	115	115	116	118	119	121	121			
	V2	124	124	124	124	124	125	126	126	127	127			
	GR2	9.8	9.8	9.8	9.8	9.4	9	8.6	8	7.3	7.3			
29000	BFL	4470	4550	4640	4710	4710	4710	4730	4840	5260	5270		129	164
	V1	96	96	96	96	95	93	92	92	94	94			
	VR	111	111	111	111	111	113	115	116	117	117			
	V2	122	122	122	121	121	122	123	123	124	124			
	GR2	10.4	10.4	10.4	10.3	9.9	9.6	9.1	8.5	7.8	7.8			
28000	BFL	4430	4510	4600	4660	4640	4670	4690	4630	4810	4820		126	161
	V1	96	96	96	96	95	94	92	90	91	91			
	VR	108	108	108	108	108	110	111	113	114	114			
	V2	119	119	119	119	119	119	120	121	121	121			
	GR2	11	11	11	11	10.5	10.1	9.7	9	8.3	8.3			
27000	BFL	4390	4470	4560	4620	4620	4620	4640	4580	4520	4520		124	157
	V1	97	97	97	96	95	94	92	90	88	88			
	VR	106	106	106	106	106	107	108	109	111	111			
	V2	117	117	117	117	117	117	118	118	119	119			
	GR2	11.8	11.8	11.8	11.7	11.2	10.8	10.3	9.6	8.9	8.9			
26000	BFL	4350	4430	4520	4580	4580	4580	4600	4540	4480	4470		121	154
	V1	97	97	97	97	95	94	93	91	88	88			
	VR	103	103	103	103	103	104	105	106	107	107			
	V2	116	116	116	115	115	115	115	115	116	116			
	GR2	12.5	12.5	12.5	12.4	11.9	11.5	11	10.3	9.5	9.5			

FIGURE 5-219. TAKE-OFF DISTANCE; FLAPS - 10° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC / OATF / N1%	-54 / -65 / 80.7	-50 / -58 / 81.3	-45 / -49 / 82.0	-40 / -40 / 83.0	-35 / -31 / 83.9	-30 / -22 / 84.8	-25 / -13 / 85.6	-20 / -4 / 86.5	-15 / 5 / 87.4	-10 / 14 / 88.2	-5 / 23 / 89.1	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
39600	BFL	7560	7690	7850	8000	8150	8300	8470	8630	8800	8960	9130	153	195
	V1	130	129	129	129	128	128	128	128	128	127	127		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.5	5.5	5.5	5.5	5.5	5.6	5.6	5.6	5.6	5.6	5.6		
39000	BFL	7200	7330	7490	7630	7770	7910	8070	8230	8380	8540	8690	152	193
	V1	127	127	127	126	126	126	125	125	125	125	125		
	VR	148	148	148	148	148	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.7	5.7	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8		
38000	BFL	6630	6750	6890	7020	7150	7280	7420	7560	7710	7850	7990	150	190
	V1	123	122	122	122	122	121	121	121	121	121	120		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
37000	BFL	6110	6210	6340	6460	6580	6700	6830	6960	7090	7220	7350	147	187
	V1	118	118	118	118	117	117	117	117	117	116	116		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
36000	BFL	5620	5720	5830	5940	6050	6150	6270	6390	6510	6630	6750	145	185
	V1	114	114	114	114	113	113	113	113	112	112	112		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
35000	BFL	5160	5250	5360	5460	5550	5650	5760	5870	5980	6090	6200	143	182
	V1	110	110	110	109	109	109	109	109	108	108	108		
	VR	133	133	133	133	133	133	133	133	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
34000	BFL	4740	4830	4920	5010	5100	5190	5290	5390	5490	5590	5690	140	179
	V1	106	106	106	106	105	105	105	105	104	104	104		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
33000	BFL	4380	4460	4550	4630	4710	4800	4890	4980	5070	5160	5260	138	176
	V1	103	102	102	102	102	101	101	101	101	101	101		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.9	7.9	7.9	8	8	8	8	8	8	8	8		
32000	BFL	4060	4130	4210	4290	4360	4440	4520	4610	4690	4770	4860	136	173
	V1	99	99	99	98	98	98	98	98	98	97	97		
	VR	123	123	123	123	123	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 5-219. TAKE-OFF DISTANCE; FLAPS - 10° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 80.7	-50 -58 81.3	-45 -49 82.0	-40 -40 83.0	-35 -31 83.9	-30 -22 84.8	-25 -13 85.6	-20 -4 86.5	-15 5 87.4	-10 14 88.2	-5 23 89.1	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3760	3820	3900	3970	4060	4140	4230	4310	4400	4480	4570	133	170
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.9	8.9	8.9	8.9	8.9	9	9	9	9	9	9		
30000	BFL	3700	3760	3850	3930	4020	4110	4190	4280	4360	4450	4530	131	167
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.4	9.4	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	BFL	3690	3740	3830	3910	3990	4070	4170	4240	4320	4410	4490	129	164
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10	10	10	10	10	10.1	10.1	10.1	10.1	10.1	10.1		
28000	BFL	3670	3710	3790	3880	3960	4040	4120	4200	4290	4370	4450	126	161
	V1	96	96	95	95	96	96	95	95	95	95	95		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.7		
27000	BFL	3640	3690	3750	3850	3920	4010	4090	4170	4260	4330	4410	124	158
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.2	11.2	11.2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
26000	BFL	3610	3660	3720	3820	3890	3980	4050	4130	4210	4290	4370	122	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.9	11.9	11.9	12	12	12.1	12.1	12.1	12.1	12.1	12.1		

FIGURE 5-219. TAKE-OFF DISTANCE; FLAPS - 10° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	100				
	N1%	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.2				
39600	BFL	9290	9460	9640	9900	10440	11290	12220	13260	13980			153	195
	V1	127	127	127	127	129	132	134	137	139				
	VR	150	150	150	150	150	152	153	154	155				
	V2	154	154	154	154	154	155	156	156	157				
	GR2	5.6	5.6	5.5	5.4	5.1	4.8	4.3	3.8	3.5				
39000	BFL	8850	9020	9190	9430	9950	10770	11670	12670	13360			152	193
	V1	125	124	124	125	126	129	132	134	136				
	VR	147	147	147	147	148	150	151	152	153				
	V2	152	152	152	152	152	153	154	155	155				
	GR2	5.8	5.8	5.7	5.6	5.2	4.9	4.5	4	3.7				
38000	BFL	8140	8290	8440	8670	9160	9940	10780	11730	12360			150	190
	V1	120	120	120	120	122	125	127	130	132				
	VR	144	144	144	144	145	146	148	149	150				
	V2	149	149	148	148	149	150	151	152	152				
	GR2	6.1	6.1	6.1	5.9	5.6	5.3	4.8	4.3	4				
37000	BFL	7490	7620	7760	7980	8410	9140	9920	10830	11430			147	187
	V1	116	116	116	116	118	121	123	126	128				
	VR	140	140	140	140	141	143	144	146	146				
	V2	145	145	145	145	145	147	148	149	149				
	GR2	6.4	6.4	6.4	6.2	5.9	5.6	5.2	4.6	4.3				
36000	BFL	6870	7000	7130	7330	7720	8380	9130	9970	10530			145	185
	V1	112	112	112	112	114	116	119	122	124				
	VR	136	136	136	136	137	139	141	142	143				
	V2	142	142	142	142	142	143	145	145	146				
	GR2	6.8	6.8	6.8	6.6	6.2	5.9	5.5	5	4.6				
35000	BFL	6310	6420	6540	6720	7080	7670	8370	9150	9670			143	182
	V1	108	108	108	108	110	112	115	118	120				
	VR	132	132	132	133	133	135	137	139	139				
	V2	139	139	139	139	139	140	141	142	143				
	GR2	7.2	7.2	7.1	6.9	6.6	6.3	5.9	5.3	4.9				
34000	BFL	5790	5900	6010	6170	6500	7030	7650	8390	8880			140	179
	V1	104	104	104	104	106	108	111	114	116				
	VR	129	129	129	129	130	131	133	135	136				
	V2	136	136	136	136	136	137	138	139	140				
	GR2	7.6	7.6	7.5	7.3	7	6.7	6.2	5.7	5.3				
33000	BFL	5350	5440	5540	5690	5990	6480	7040	7700	8180			138	176
	V1	100	100	100	101	102	104	107	110	112				
	VR	126	126	126	126	126	128	130	132	133				
	V2	133	133	133	133	133	134	135	136	137				
	GR2	8	8	8	7.7	7.4	7.1	6.6	6.1	5.7				
32000	BFL	4940	5030	5120	5260	5510	5960	6460	7070	7490			136	173
	V1	97	97	97	97	98	101	103	106	108				
	VR	122	122	122	122	123	125	126	128	129				
	V2	130	130	130	130	130	131	132	133	134				
	GR2	8.5	8.5	8.4	8.2	7.8	7.5	7.1	6.5	6.1				

FIGURE 5-219. TAKE-OFF DISTANCE; FLAPS - 10° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	100				
	N1%	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.2				
31000	BFL	4660	4740	4810	4850	5080	5470	5930	6470	6860			133	170
	V1	95	95	94	94	95	97	99	102	104				
	VR	119	119	119	119	120	122	123	125	126				
	V2	128	128	127	127	127	129	130	130	131				
	GR2	9	9	8.9	8.7	8.3	7.9	7.5	6.9	6.5				
30000	BFL	4620	4700	4770	4790	4790	5030	5430	5920	6260			131	167
	V1	95	95	95	94	94	94	96	98	100				
	VR	116	116	116	116	117	118	120	121	122				
	V2	125	125	125	125	125	126	127	128	128				
	GR2	9.5	9.5	9.4	9.2	8.8	8.4	8	7.4	7				
29000	BFL	4580	4660	4730	4750	4750	4770	4970	5400	5710			129	164
	V1	95	95	95	94	93	92	92	95	96				
	VR	113	113	113	113	113	115	116	118	119				
	V2	122	122	122	122	122	123	124	125	125				
	GR2	10.1	10.1	10	9.7	9.3	9	8.5	7.9	7.4				
28000	BFL	4540	4620	4690	4700	4700	4730	4730	4930	5190			126	161
	V1	95	95	95	94	93	92	90	91	93				
	VR	109	109	109	109	110	112	113	115	116				
	V2	119	119	119	119	119	120	121	122	122				
	GR2	10.7	10.7	10.6	10.3	9.9	9.5	9.1	8.4	8				
27000	BFL	4500	4580	4640	4660	4660	4690	4690	4630	4740			124	158
	V1	95	95	95	94	93	92	90	88	89				
	VR	106	106	106	106	107	108	110	111	112				
	V2	117	117	117	117	117	118	118	119	119				
	GR2	11.3	11.3	11.3	10.9	10.5	10.1	9.6	9	8.5				
26000	BFL	4450	4540	4600	4620	4620	4640	4640	4590	4540			122	155
	V1	96	96	95	95	93	92	91	89	87				
	VR	104	104	104	104	104	105	106	108	109				
	V2	115	115	115	115	115	115	116	116	116				
	GR2	12.1	12.1	12	11.7	11.2	10.8	10.3	9.6	9.1				

FIGURE 5-220. TAKE-OFF DISTANCE; FLAPS - 10° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.3	81.7	82.5	83.4	84.4	85.3	86.2	87.0	87.9	88.7	89.6		
39600	BFL	8360	8520	8680	8840	9000	9170	9360	9540	9720	9910	10090	154	195
	V1	133	133	132	132	132	131	131	131	131	131	131		
	VR	153	153	153	153	152	152	152	152	152	152	152		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.2	5.2	5.2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	BFL	7980	8130	8280	8420	8570	8740	8910	9090	9260	9430	9610	153	193
	V1	130	130	130	129	129	129	129	128	128	128	128		
	VR	151	151	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.4	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
38000	BFL	7350	7480	7630	7760	7900	8050	8210	8370	8530	8690	8850	150	191
	V1	126	126	125	125	125	124	124	124	124	124	124		
	VR	147	147	147	147	147	146	146	146	146	146	146		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	BFL	6780	6900	7030	7160	7280	7420	7560	7710	7860	8000	8150	148	188
	V1	122	121	121	121	120	120	120	120	120	119	119		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.1	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
36000	BFL	6210	6320	6440	6560	6660	6790	6930	7060	7190	7330	7460	145	185
	V1	117	117	117	116	116	116	116	115	115	115	115		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.6		
35000	BFL	5700	5800	5910	6010	6110	6220	6340	6470	6590	6710	6830	143	182
	V1	113	113	112	112	112	112	111	111	111	111	111		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
34000	BFL	5220	5310	5410	5500	5590	5700	5810	5920	6030	6140	6250	141	179
	V1	109	109	108	108	108	107	107	107	107	107	106		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	137	137	137	137	137	137	137	137		
	GR2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	BFL	4770	4850	4940	5030	5110	5210	5310	5410	5510	5600	5710	138	176
	V1	104	104	104	104	103	103	103	103	103	103	102		
	VR	128	128	128	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
32000	BFL	4390	4470	4550	4630	4710	4800	4890	4980	5070	5160	5260	136	173
	V1	101	101	100	100	100	100	99	99	99	99	99		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 5-220. TAKE-OFF DISTANCE; FLAPS - 10° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 81.3	-50 -58 81.7	-45 -49 82.5	-40 -40 83.4	-35 -31 84.4	-30 -22 85.3	-25 -13 86.2	-20 -4 87.0	-15 5 87.9	-10 14 88.7	-5 23 89.6	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	4060	4130	4200	4280	4340	4420	4510	4590	4670	4760	4840	134	170
	V1	97	97	97	97	96	96	96	96	96	95	95		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	128	128	128	128	128	128	128		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7		
30000	BFL	3780	3850	3930	4030	4120	4210	4290	4380	4470	4550	4640	131	167
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	118	118	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.1	9.1	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2	9.2		
29000	BFL	3790	3820	3910	3990	4080	4170	4260	4340	4430	4510	4600	129	164
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
28000	BFL	3760	3800	3880	3970	4050	4130	4220	4300	4390	4480	4560	126	161
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	111	111	111	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
27000	BFL	3730	3760	3850	3940	4020	4100	4190	4260	4350	4430	4520	124	158
	V1	95	94	94	95	95	95	95	94	94	94	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	BFL	3690	3730	3820	3900	3990	4060	4150	4240	4310	4390	4480	122	155
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6		

FIGURE 5-220. TAKE-OFF DISTANCE; FLAPS - 10° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	97				
	N1%	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
39600	BFL	10280	10470	10720	11110	11890	12820	13880	15130	15430			154	195
	V1	130	130	130	131	134	136	138	141	142				
	VR	152	152	152	153	154	155	156	157	157				
	V2	156	156	156	156	157	158	158	159	159				
	GR2	5.3	5.3	5.2	4.9	4.6	4.3	3.9	3.4	3.3				
39000	BFL	9790	9970	10210	10580	11330	12230	13240	14400	14710			153	193
	V1	128	128	128	129	131	133	136	139	140				
	VR	150	150	150	150	152	153	154	155	155				
	V2	154	154	154	154	155	156	156	157	157				
	GR2	5.5	5.5	5.4	5.1	4.8	4.5	4.1	3.6	3.5				
38000	BFL	9020	9180	9400	9740	10430	11270	12240	13300	13560			150	191
	V1	123	123	124	124	127	129	132	134	135				
	VR	146	146	146	147	148	149	151	152	152				
	V2	151	151	151	151	151	152	153	153	154				
	GR2	5.8	5.8	5.7	5.4	5.1	4.8	4.4	3.8	3.7				
37000	BFL	8300	8450	8650	8970	9610	10390	11290	12280	12520			148	188
	V1	119	119	119	120	122	125	127	130	131				
	VR	143	143	143	143	144	146	147	148	148				
	V2	148	148	147	147	148	149	150	151	151				
	GR2	6.2	6.2	6	5.7	5.4	5.1	4.7	4.2	4				
36000	BFL	7600	7730	7920	8210	8830	9550	10380	11320	11550			145	185
	V1	115	115	115	116	118	120	123	126	127				
	VR	139	139	139	139	140	142	143	145	145				
	V2	144	144	144	144	145	146	147	147	148				
	GR2	6.6	6.6	6.4	6.1	5.8	5.5	5	4.5	4.3				
35000	BFL	6950	7080	7250	7520	8080	8750	9520	10390	10600			143	182
	V1	110	110	111	111	114	116	119	122	123				
	VR	135	135	135	135	137	138	140	141	142				
	V2	141	141	140	140	141	143	144	144	144				
	GR2	6.9	6.9	6.8	6.4	6.1	5.8	5.4	4.8	4.7				
34000	BFL	6360	6470	6630	6880	7380	7990	8720	9520	9710			141	179
	V1	106	106	106	107	109	112	115	118	118				
	VR	131	131	131	131	133	135	136	138	138				
	V2	137	137	137	137	138	139	140	141	141				
	GR2	7.3	7.3	7.1	6.8	6.5	6.2	5.7	5.2	5				
33000	BFL	5810	5910	6060	6280	6730	7290	7960	8700	8880			138	176
	V1	102	102	102	103	105	108	110	113	114				
	VR	127	127	127	127	129	131	133	134	134				
	V2	134	134	134	134	135	136	137	138	138				
	GR2	7.7	7.7	7.5	7.2	6.9	6.6	6.1	5.5	5.4				
32000	BFL	5350	5440	5570	5770	6180	6690	7290	8000	8160			136	173
	V1	99	99	99	99	101	104	106	110	110				
	VR	124	124	124	124	126	127	129	131	131				
	V2	131	131	131	131	132	133	134	135	135				
	GR2	8.2	8.2	8	7.6	7.3	7	6.5	5.9	5.8				

FIGURE 5-220. TAKE-OFF DISTANCE; FLAPS - 10° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	97				
	N1%	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
31000	BFL	4930	5010	5130	5300	5670	6120	6670	7310	7470			134	170
	V1	95	95	95	96	98	100	103	106	106				
	VR	121	121	121	121	122	124	126	127	128				
	V2	128	128	128	128	129	130	131	132	132				
	GR2	8.7	8.7	8.4	8.1	7.7	7.4	6.9	6.4	6.2				
30000	BFL	4730	4820	4850	4880	5200	5600	6100	6670	6810			131	167
	V1	94	94	93	92	94	96	99	102	102				
	VR	117	117	117	117	119	120	122	124	124				
	V2	126	126	125	125	126	127	128	129	129				
	GR2	9.2	9.2	8.9	8.6	8.2	7.9	7.4	6.8	6.7				
29000	BFL	4690	4770	4800	4790	4810	5120	5550	6070	6200			129	164
	V1	94	94	93	92	91	93	95	98	98				
	VR	114	114	114	114	115	117	119	120	121				
	V2	123	123	123	123	123	124	125	126	126				
	GR2	9.7	9.7	9.5	9.1	8.7	8.4	7.9	7.3	7.1				
28000	BFL	4640	4730	4760	4750	4770	4800	5060	5510	5630			126	161
	V1	94	94	93	92	91	91	91	94	94				
	VR	110	110	110	110	112	113	115	117	117				
	V2	120	120	120	120	120	121	122	123	123				
	GR2	10.3	10.3	10.1	9.6	9.3	8.9	8.4	7.8	7.6				
27000	BFL	4600	4690	4720	4720	4720	4750	4730	5010	5110			124	158
	V1	94	94	94	92	91	90	90	90	90				
	VR	107	107	107	107	108	110	112	113	113				
	V2	117	117	117	117	117	118	119	120	120				
	GR2	10.9	10.9	10.7	10.2	9.9	9.5	9	8.3	8.2				
26000	BFL	4570	4640	4670	4660	4680	4700	4690	4630	4640			122	155
	V1	95	94	94	93	91	90	89	87	86				
	VR	104	104	104	104	105	106	108	110	110				
	V2	115	115	115	115	115	116	116	117	117				
	GR2	11.6	11.6	11.4	10.9	10.5	10.1	9.6	8.9	8.8				

FIGURE 5-221. TAKE-OFF DISTANCE; FLAPS - 10° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.7	82.1	83.0	84.0	84.9	85.8	86.7	87.5	88.4	89.3	90.1		
39600	BFL	9240	9400	9580	9760	9930	10140	10340	10550	10750	10960	11160	155	195
	V1	136	136	135	135	135	135	134	134	134	134	134		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	159	159	159	158	158	158	158	158	158	158	158		
	GR2	5	5	5	5	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
39000	BFL	8800	8960	9130	9300	9460	9660	9850	10050	10240	10430	10630	153	194
	V1	133	133	133	132	132	132	132	132	131	131	131		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	157	157	157	156	156	156	156	156	156	156	156		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.3	5.3	5.3	5.3	5.3		
38000	BFL	8110	8260	8410	8560	8700	8890	9070	9240	9420	9600	9780	151	191
	V1	129	129	128	128	128	127	127	127	127	127	127		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.5	5.5	5.5	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
37000	BFL	7470	7600	7740	7880	8020	8190	8350	8510	8670	8840	9000	148	188
	V1	124	124	124	124	123	123	123	123	123	122	122		
	VR	146	146	146	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	BFL	6880	6990	7130	7250	7380	7530	7670	7820	7970	8120	8270	146	185
	V1	120	120	120	119	119	119	119	119	118	118	118		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	146	146	146	146	146	146	146	146		
	GR2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
35000	BFL	6290	6390	6510	6630	6740	6870	7010	7140	7280	7410	7550	143	183
	V1	116	116	115	115	114	114	114	114	114	114	113		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7		
34000	BFL	5740	5840	5950	6050	6150	6280	6400	6520	6640	6770	6890	141	180
	V1	111	111	111	110	110	110	110	110	109	109	109		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	139	139	139	139	139	139	139	139		
	GR2	6.9	7	7	7	7	7	7	7	7.1	7.1	7.1		
33000	BFL	5240	5330	5430	5520	5610	5730	5840	5950	6060	6170	6280	139	177
	V1	107	107	106	106	106	106	105	105	105	105	105		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5		
32000	BFL	4780	4860	4940	5030	5110	5210	5310	5410	5510	5610	5710	136	174
	V1	103	102	102	102	102	101	101	101	101	101	101		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	132	132	132	132	132	132	132	132		
	GR2	7.8	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.9		

FIGURE 5-221. TAKE-OFF DISTANCE; FLAPS - 10° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 81.7	-50 -58 82.1	-45 -49 83.0	-40 -40 84.0	-35 -31 84.9	-30 -22 85.8	-25 -13 86.7	-20 -4 87.5	-15 5 88.4	-10 14 89.3	-5 23 90.1	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	4380	4460	4540	4610	4690	4780	4870	4960	5060	5150	5240	134	171
	V1	99	99	98	98	98	98	97	97	97	97	97		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	129	129	129	129	129	129	129	129		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.4	8.4		
30000	BFL	4040	4110	4180	4250	4320	4400	4480	4570	4650	4730	4810	131	168
	V1	95	95	95	94	94	94	94	94	94	93	93		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9		
29000	BFL	3840	3900	4000	4090	4180	4270	4360	4450	4540	4630	4720	129	165
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	116	116	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
28000	BFL	3840	3870	3960	4060	4160	4230	4320	4410	4510	4580	4670	127	161
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	10	10	10		
27000	BFL	3810	3840	3930	4020	4110	4200	4290	4370	4460	4540	4630	124	158
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.4	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
26000	BFL	3780	3810	3900	3990	4070	4170	4240	4340	4420	4510	4590	122	155
	V1	94	94	94	94	94	94	94	94	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.3	11.3	11.3		

FIGURE 5-221. TAKE-OFF DISTANCE; FLAPS - 10° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	93					
	N1%	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.5					
39600	BFL	11370	11600	11980	12560	13550	14610	15880	17060				155	195
	V1	134	134	134	136	138	141	143	146					
	VR	155	155	155	156	157	158	159	160					
	V2	158	158	158	158	159	160	160	161					
	GR2	5.1	5	4.8	4.5	4.2	3.9	3.4	3					
39000	BFL	10830	11050	11410	11960	12910	13900	15130	16250				153	194
	V1	131	131	132	133	135	138	141	143					
	VR	153	153	153	153	155	156	157	158					
	V2	156	156	156	156	157	158	159	159					
	GR2	5.3	5.2	4.9	4.6	4.4	4.1	3.6	3.2					
38000	BFL	9970	10170	10490	11020	11880	12830	13910	14970				151	191
	V1	126	126	127	129	131	133	136	139					
	VR	149	149	149	150	151	152	153	154					
	V2	153	153	153	153	154	155	155	156					
	GR2	5.6	5.5	5.3	4.9	4.7	4.3	3.9	3.5					
37000	BFL	9170	9360	9660	10130	10930	11800	12820	13770				148	188
	V1	122	122	123	124	127	129	132	134					
	VR	145	145	145	146	147	149	150	151					
	V2	150	150	149	149	150	151	152	152					
	GR2	5.9	5.9	5.6	5.3	5	4.7	4.2	3.8					
36000	BFL	8420	8590	8880	9320	10030	10840	11800	12660				146	185
	V1	118	118	119	120	122	124	127	130					
	VR	142	142	142	142	144	145	146	147					
	V2	146	146	146	146	147	148	149	149					
	GR2	6.3	6.2	5.9	5.6	5.3	5	4.5	4.1					
35000	BFL	7690	7840	8110	8510	9220	9950	10820	11640				143	183
	V1	113	113	114	115	118	120	123	125					
	VR	138	138	138	138	140	141	143	144					
	V2	143	143	143	143	144	145	146	146					
	GR2	6.7	6.6	6.3	5.9	5.7	5.3	4.9	4.4					
34000	BFL	7010	7160	7400	7770	8440	9110	9910	10650				141	180
	V1	109	109	110	111	114	116	119	121					
	VR	134	134	134	134	136	138	139	140					
	V2	139	139	139	139	141	142	142	143					
	GR2	7.1	7	6.7	6.3	6	5.7	5.2	4.8					
33000	BFL	6390	6520	6740	7080	7670	8330	9060	9730				139	177
	V1	105	105	105	107	109	112	114	117					
	VR	130	130	130	130	132	134	135	136					
	V2	136	136	136	136	137	138	139	140					
	GR2	7.5	7.4	7.1	6.7	6.4	6.1	5.6	5.1					
32000	BFL	5820	5930	6130	6430	6970	7560	8260	8870				136	174
	V1	100	100	101	102	105	107	110	112					
	VR	126	126	126	126	128	130	132	133					
	V2	132	132	132	132	133	135	136	136					
	GR2	7.9	7.8	7.5	7.1	6.8	6.5	6	5.5					

FIGURE 5-221. TAKE-OFF DISTANCE; FLAPS - 10° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	93					
	N1%	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.5					
31000	BFL	5330	5440	5610	5880	6360	6900	7550	8140				134	171
	V1	97	97	97	98	101	103	106	108					
	VR	122	122	122	123	124	126	128	129					
	V2	129	129	129	129	130	132	133	133					
	GR2	8.4	8.3	7.9	7.5	7.2	6.9	6.4	5.9					
30000	BFL	4900	4990	5150	5380	5810	6290	6870	7440				131	168
	V1	93	93	94	95	97	99	102	104					
	VR	119	119	119	119	121	123	125	126					
	V2	127	126	126	126	127	129	130	131					
	GR2	8.9	8.8	8.4	8	7.7	7.3	6.9	6.4					
29000	BFL	4800	4880	4860	4930	5300	5730	6250	6750				129	165
	V1	93	93	91	91	93	95	98	100					
	VR	115	115	115	116	117	119	121	122					
	V2	124	124	123	123	124	126	127	127					
	GR2	9.4	9.3	8.9	8.5	8.2	7.8	7.3	6.8					
28000	BFL	4760	4830	4810	4810	4850	5220	5670	6120				127	161
	V1	93	93	92	90	89	91	94	96					
	VR	112	112	112	112	114	116	117	119					
	V2	121	121	120	120	121	123	124	124					
	GR2	10	9.9	9.4	9	8.7	8.3	7.8	7.3					
27000	BFL	4720	4780	4770	4760	4790	4810	5150	5530				124	158
	V1	93	93	92	91	89	88	90	92					
	VR	108	108	108	109	110	112	114	115					
	V2	118	118	117	117	119	120	121	121					
	GR2	10.6	10.5	10	9.6	9.3	8.9	8.4	7.8					
26000	BFL	4670	4740	4720	4720	4740	4740	4740	5000				122	155
	V1	93	93	92	91	90	88	88	88					
	VR	105	105	105	105	107	108	110	111					
	V2	115	115	115	115	115	117	118	118					
	GR2	11.3	11.1	10.7	10.2	9.9	9.5	9	8.4					

FIGURE 5-222. TAKE-OFF DISTANCE; FLAPS - 10° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
39600	BFL	10270	10430	10640	10850	11060	11290	11520	11750	11980	12210	12440	155	196
	V1	140	139	139	139	138	138	138	138	138	138	138		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
39000	BFL	9760	9920	10130	10320	10530	10750	10960	11180	11400	11610	11840	154	194
	V1	137	136	136	136	136	136	135	135	135	135	135		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.9	4.9	5	5	5	5	5	5	5	5	5		
38000	BFL	8980	9140	9320	9490	9690	9890	10090	10290	10480	10680	10890	151	191
	V1	132	132	132	131	131	131	131	131	130	130	130		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	BFL	8250	8390	8560	8720	8900	9080	9260	9440	9630	9810	9990	149	189
	V1	128	127	127	127	127	126	126	126	126	126	125		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
36000	BFL	7580	7700	7860	8010	8160	8330	8500	8660	8830	8990	9160	146	186
	V1	123	123	123	122	122	122	122	122	121	121	121		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
35000	BFL	6940	7060	7200	7330	7470	7620	7780	7930	8080	8230	8380	144	183
	V1	119	118	118	118	118	117	117	117	117	117	117		
	VR	141	141	141	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
34000	BFL	6330	6440	6560	6680	6810	6950	7080	7220	7360	7490	7630	142	180
	V1	114	114	114	113	113	113	113	113	112	112	112		
	VR	137	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	BFL	5770	5860	5970	6080	6200	6320	6450	6570	6690	6820	6940	139	177
	V1	109	109	109	109	108	108	108	108	108	108	107		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
32000	BFL	5240	5330	5430	5520	5630	5740	5850	5970	6080	6190	6300	137	174
	V1	105	105	105	104	104	104	104	103	103	103	103		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		

FIGURE 5-222. TAKE-OFF DISTANCE; FLAPS - 10° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 82.1	-50 -58 82.6	-45 -49 83.6	-40 -40 84.5	-35 -31 85.4	-30 -22 86.3	-25 -13 87.2	-20 -4 88.1	-15 5 89.0	-10 14 89.8	-5 23 90.7	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	4760	4830	4920	5010	5110	5210	5310	5410	5510	5610	5710	134	171
	V1	101	100	100	100	100	99	99	99	99	99	99		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8	8	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
30000	BFL	4350	4420	4500	4580	4660	4760	4850	4930	5030	5120	5210	132	168
	V1	97	96	96	96	96	96	95	95	95	95	95		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	127	127	127	127	127	127	127		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.6	8.6	8.6	8.6		
29000	BFL	3990	4050	4130	4200	4290	4380	4470	4560	4650	4750	4840	129	165
	V1	93	92	92	92	92	92	92	92	92	92	92		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
28000	BFL	3900	3970	4060	4160	4250	4340	4430	4520	4610	4700	4790	127	162
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
27000	BFL	3890	3940	4040	4130	4220	4300	4390	4480	4580	4660	4750	124	159
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
26000	BFL	3850	3910	3990	4090	4170	4270	4360	4440	4540	4610	4700	122	155
	V1	93	93	93	93	93	92	92	92	92	92	92		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9		

FIGURE 5-222. TAKE-OFF DISTANCE; FLAPS - 10° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	89					
	N1%	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
39600	BFL	12680	13030	13590	14430	15540	16790	18270	18990				155	196
	V1	137	138	139	141	143	146	149	150					
	VR	158	158	158	159	160	161	162	163					
	V2	161	161	161	161	162	163	163	163					
	GR2	4.8	4.6	4.3	4	3.8	3.4	3	2.8					
39000	BFL	12060	12400	12910	13770	14800	15990	17390	18060				154	194
	V1	135	135	136	138	141	143	146	147					
	VR	156	156	156	157	158	159	160	161					
	V2	159	159	159	159	160	161	161	161					
	GR2	5	4.8	4.5	4.2	3.9	3.6	3.2	3					
38000	BFL	11090	11400	11870	12630	13620	14720	16000	16610				151	191
	V1	130	130	132	134	136	138	141	142					
	VR	152	152	152	153	154	156	157	157					
	V2	156	155	155	156	157	157	158	158					
	GR2	5.3	5.1	4.8	4.5	4.2	3.9	3.5	3.2					
37000	BFL	10180	10470	10910	11600	12530	13520	14710	15270				149	189
	V1	125	126	127	129	131	134	136	138					
	VR	148	148	148	149	151	152	153	153					
	V2	152	152	152	152	153	154	155	155					
	GR2	5.7	5.4	5.1	4.8	4.5	4.2	3.8	3.5					
36000	BFL	9340	9600	10000	10640	11470	12450	13510	14010				146	186
	V1	121	121	122	124	127	129	132	133					
	VR	144	144	144	145	147	148	149	150					
	V2	149	148	148	149	150	151	151	151					
	GR2	6	5.8	5.5	5.2	4.9	4.5	4.1	3.8					
35000	BFL	8540	8780	9160	9750	10510	11370	12380	12840				144	183
	V1	116	117	118	120	122	125	127	128					
	VR	140	140	141	142	143	144	146	146					
	V2	145	145	145	145	146	147	148	148					
	GR2	6.4	6.2	5.8	5.5	5.2	4.8	4.4	4.2					
34000	BFL	7780	8000	8340	8910	9610	10400	11330	11800				142	180
	V1	112	112	113	115	118	120	123	124					
	VR	136	136	137	138	139	141	142	143					
	V2	141	141	141	142	143	144	145	145					
	GR2	6.8	6.5	6.2	5.8	5.6	5.2	4.7	4.5					
33000	BFL	7070	7280	7580	8100	8780	9500	10340	10740				139	177
	V1	107	108	109	111	113	116	118	120					
	VR	132	132	132	134	136	137	138	139					
	V2	138	138	138	138	140	141	141	142					
	GR2	7.2	6.9	6.6	6.2	5.9	5.6	5.1	4.8					
32000	BFL	6420	6600	6880	7350	7970	8650	9420	9790				137	174
	V1	103	103	104	106	109	111	114	115					
	VR	128	128	128	130	132	133	135	135					
	V2	134	134	134	135	136	137	138	138					
	GR2	7.6	7.3	6.9	6.6	6.3	6	5.5	5.2					

FIGURE 5-222. TAKE-OFF DISTANCE; FLAPS - 10° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	89					
	N1%	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
31000	BFL	5820	5980	6230	6650	7210	7850	8570	8890				134	171
	V1	99	99	100	102	104	107	110	111					
	VR	124	124	124	125	127	129	131	131					
	V2	131	130	130	131	132	134	135	135					
	GR2	8	7.8	7.4	7	6.7	6.4	5.9	5.6					
30000	BFL	5310	5450	5660	6040	6540	7110	7790	8110				132	168
	V1	95	95	96	98	100	102	105	107					
	VR	120	120	120	122	123	125	127	128					
	V2	127	127	127	128	129	130	132	132					
	GR2	8.5	8.2	7.8	7.5	7.2	6.8	6.3	6.1					
29000	BFL	4920	4980	5180	5500	5950	6460	7080	7380				129	165
	V1	92	92	92	94	96	98	101	103					
	VR	117	117	117	118	120	122	123	124					
	V2	124	124	124	125	126	127	128	129					
	GR2	9	8.7	8.3	7.9	7.6	7.3	6.8	6.5					
28000	BFL	4870	4870	4870	5020	5400	5860	6410	6680				127	162
	V1	92	91	90	90	92	94	97	98					
	VR	113	113	113	114	116	118	120	121					
	V2	122	121	121	122	123	124	125	126					
	GR2	9.6	9.3	8.8	8.5	8.1	7.8	7.3	7					
27000	BFL	4830	4830	4820	4830	4910	5300	5780	6030				124	159
	V1	92	91	90	89	88	90	93	94					
	VR	109	109	109	111	112	114	116	117					
	V2	119	118	118	118	120	121	122	122					
	GR2	10.2	9.9	9.4	9	8.7	8.3	7.8	7.5					
26000	BFL	4780	4800	4770	4780	4800	4820	5220	5420				122	155
	V1	92	91	90	89	88	86	89	90					
	VR	106	106	106	107	109	110	112	113					
	V2	116	115	115	115	117	118	119	119					
	GR2	10.8	10.5	10	9.6	9.3	8.9	8.3	8.1					

FIGURE 5-223. TAKE-OFF DISTANCE; FLAPS - 10° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.5	83.2	84.1	85.1	86.0	86.9	87.7	88.6	89.5	90.4	91.2		
39600	BFL	11420	11630	11890	12150	12410	12670	12930	13190	13440	13700	13970	156	196
	V1	143	143	143	143	143	143	143	142	142	142	142		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.5	4.5	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
39000	BFL	10850	11050	11290	11530	11780	12030	12270	12510	12760	13000	13250	155	194
	V1	140	140	140	140	140	140	139	139	139	139	139		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.8	4.8	4.8		
38000	BFL	9950	10140	10360	10580	10810	11030	11250	11470	11700	11920	12150	152	192
	V1	136	135	135	135	135	135	135	134	134	134	134		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	5	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
37000	BFL	9120	9280	9490	9690	9890	10100	10300	10500	10710	10910	11120	150	189
	V1	131	131	130	130	130	130	130	129	129	129	129		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
36000	BFL	8350	8500	8690	8870	9060	9240	9430	9610	9800	9980	10170	147	186
	V1	126	126	126	126	125	125	125	125	125	124	124		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
35000	BFL	7640	7780	7950	8110	8280	8450	8620	8790	8960	9120	9290	145	183
	V1	121	121	121	121	121	120	120	120	120	120	120		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	147	147	147	147	147	147		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.2	6.2	6.2		
34000	BFL	6970	7090	7250	7400	7550	7700	7850	8010	8160	8310	8460	142	180
	V1	117	117	116	116	116	116	116	115	115	115	115		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
33000	BFL	6350	6460	6600	6740	6880	7010	7150	7290	7430	7560	7700	140	177
	V1	112	112	112	112	111	111	111	111	111	111	110		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
32000	BFL	5750	5850	5970	6090	6220	6340	6470	6590	6710	6840	6960	137	175
	V1	107	107	107	107	107	107	106	106	106	106	106		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		

FIGURE 5-223. TAKE-OFF DISTANCE; FLAPS - 10° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 82.5	-50 -58 83.2	-45 -49 84.1	-40 -40 85.1	-35 -31 86.0	-30 -22 86.9	-25 -13 87.7	-20 -4 88.6	-15 5 89.5	-10 14 90.4	-5 23 91.2	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	5200	5290	5400	5510	5620	5730	5850	5960	6070	6170	6290	135	172
	V1	103	103	102	102	102	102	102	101	101	101	101		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
30000	BFL	4710	4790	4890	4980	5090	5190	5290	5380	5480	5580	5680	132	168
	V1	98	98	98	98	98	97	97	97	97	97	97		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
29000	BFL	4280	4350	4440	4530	4620	4710	4800	4890	4970	5060	5160	130	165
	V1	94	94	94	94	93	93	93	93	93	93	92		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
28000	BFL	4010	4090	4180	4270	4360	4450	4550	4640	4740	4830	4920	127	162
	V1	91	91	91	91	91	91	91	91	91	91	91		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.4	9.4		
27000	BFL	3990	4050	4150	4240	4330	4410	4510	4610	4690	4780	4880	124	159
	V1	91	91	91	91	91	91	91	91	91	91	91		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
26000	BFL	3950	4020	4110	4200	4290	4380	4470	4570	4650	4740	4830	122	156
	V1	92	92	92	92	92	91	91	91	91	91	91		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		

FIGURE 5-223. TAKE-OFF DISTANCE; FLAPS - 10° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	30				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	86					
	N1%	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
39600	BFL	14280	14780	15500	16620	17880	19370						156	196
	V1	142	143	145	147	149	152							
	VR	162	162	162	163	164	165							
	V2	164	164	164	164	165	166							
	GR2	4.5	4.2	3.9	3.6	3.3	3							
39000	BFL	13550	14040	14770	15800	17000	18390						155	194
	V1	139	140	142	144	146	148							
	VR	159	159	160	161	162	163							
	V2	162	162	162	162	163	164							
	GR2	4.7	4.4	4.1	3.8	3.5	3.2							
38000	BFL	12430	12870	13550	14540	15630	16890	18420	18490				152	192
	V1	134	135	137	139	141	143	146	147					
	VR	155	155	156	157	158	159	160	160					
	V2	158	158	158	159	159	160	160	160					
	GR2	5	4.7	4.4	4.1	3.8	3.5	3	3					
37000	BFL	11380	11780	12400	13340	14370	15510	16900	16960				150	189
	V1	129	130	132	134	136	139	142	142					
	VR	151	151	152	153	154	155	156	156					
	V2	155	154	154	155	156	157	157	157					
	GR2	5.3	5	4.7	4.4	4.1	3.8	3.3	3.3					
36000	BFL	10410	10790	11360	12190	13190	14230	15490	15540				147	186
	V1	124	125	127	129	132	134	137	137					
	VR	147	147	148	149	150	151	152	152					
	V2	151	151	151	151	153	153	154	154					
	GR2	5.7	5.3	5	4.7	4.4	4.1	3.6	3.6					
35000	BFL	9520	9860	10380	11150	12050	13040	14180	14230				145	183
	V1	120	121	122	124	127	129	132	132					
	VR	143	143	144	145	147	148	149	149					
	V2	147	147	147	148	149	150	150	150					
	GR2	6	5.7	5.3	5	4.7	4.4	3.9	3.9					
34000	BFL	8670	8980	9470	10170	10980	11910	12980	13030				142	180
	V1	115	116	118	120	122	124	127	128					
	VR	139	139	140	141	143	144	145	145					
	V2	144	143	143	144	145	147	147	147					
	GR2	6.4	6	5.7	5.4	5.1	4.8	4.2	4.2					
33000	BFL	7890	8170	8620	9270	10010	10840	11870	11910				140	177
	V1	111	111	113	115	117	120	123	123					
	VR	135	135	136	137	139	140	142	142					
	V2	140	140	140	141	142	143	144	144					
	GR2	6.8	6.4	6.1	5.8	5.5	5.1	4.6	4.6					
32000	BFL	7130	7390	7800	8420	9110	9860	10770	10830				137	175
	V1	106	107	108	111	113	115	118	118					
	VR	131	131	131	133	135	136	138	138					
	V2	136	136	136	137	138	139	140	140					
	GR2	7.2	6.8	6.4	6.1	5.8	5.5	5	4.9					

FIGURE 5-223. TAKE-OFF DISTANCE; FLAPS - 10° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	30				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	86					
	N1%	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
31000	BFL	6450	6670	7050	7600	8260	8950	9780	9810				135	172
	V1	101	102	103	106	108	111	114	114					
	VR	126	126	127	129	131	132	134	134					
	V2	132	132	132	134	135	136	137	137					
	GR2	7.6	7.2	6.9	6.5	6.2	5.9	5.3	5.3					
30000	BFL	5820	6020	6350	6850	7440	8090	8850	8880				132	168
	V1	97	98	99	101	104	106	109	109					
	VR	122	122	123	124	126	128	130	130					
	V2	129	128	128	130	131	133	133	133					
	GR2	8.1	7.7	7.3	7	6.7	6.3	5.8	5.8					
29000	BFL	5280	5450	5740	6180	6710	7320	8020	8050				130	165
	V1	93	93	95	97	99	102	105	105					
	VR	118	118	119	120	122	124	126	126					
	V2	125	125	125	126	128	129	130	130					
	GR2	8.6	8.1	7.7	7.4	7.1	6.8	6.2	6.2					
28000	BFL	4960	4970	5230	5600	6070	6610	7280	7310				127	162
	V1	90	89	91	93	95	97	100	101					
	VR	114	114	115	117	118	120	122	122					
	V2	122	122	122	123	124	126	127	127					
	GR2	9.1	8.6	8.3	7.9	7.6	7.3	6.7	6.7					
27000	BFL	4910	4880	4880	5080	5480	5960	6550	6580				124	159
	V1	90	89	89	89	91	93	96	96					
	VR	111	111	111	113	115	117	118	119					
	V2	119	119	119	120	121	122	124	124					
	GR2	9.7	9.2	8.8	8.4	8.1	7.8	7.2	7.2					
26000	BFL	4870	4830	4830	4840	4960	5360	5880	5900				122	156
	V1	91	89	88	87	87	89	92	92					
	VR	107	107	108	109	111	113	114	115					
	V2	116	116	116	117	118	119	120	120					
	GR2	10.3	9.8	9.4	9	8.7	8.4	7.7	7.7					

FIGURE 5-224. TAKE-OFF DISTANCE; FLAPS - 10° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	83.1	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	91.8		
39600	BFL	12760	12990	13260	13530	13820	14110	14400	14680	14970	15260	15600	157	197
	V1	148	147	147	147	147	147	146	146	146	146	146		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
39000	BFL	12120	12340	12590	12850	13130	13400	13670	13950	14220	14490	14820	156	195
	V1	144	144	144	144	144	144	143	143	143	143	143		
	VR	163	163	162	162	162	162	162	162	162	162	162		
	V2	165	165	165	165	165	165	165	165	165	165	164		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4		
38000	BFL	11100	11290	11520	11760	12010	12260	12500	12750	13000	13250	13550	153	192
	V1	139	139	139	139	138	138	138	138	138	138	138		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
37000	BFL	10140	10320	10520	10740	10970	11190	11420	11650	11870	12100	12370	150	189
	V1	134	134	134	133	133	133	133	133	133	133	133		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1		
36000	BFL	9260	9420	9600	9800	10010	10210	10420	10620	10830	11040	11290	148	187
	V1	129	129	129	128	128	128	128	128	128	128	128		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4		
35000	BFL	8450	8590	8760	8940	9130	9310	9500	9690	9870	10060	10290	145	184
	V1	124	124	124	124	123	123	123	123	123	123	123		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	149		
	GR2	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8		
34000	BFL	7700	7830	7990	8150	8320	8490	8650	8820	8990	9160	9370	143	181
	V1	120	119	119	119	119	118	118	118	118	118	118		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2		
33000	BFL	6990	7110	7250	7390	7550	7700	7850	8000	8160	8310	8500	140	178
	V1	115	115	114	114	114	114	113	113	113	113	113		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6		
32000	BFL	6350	6460	6580	6690	6830	6970	7110	7240	7380	7520	7690	138	175
	V1	110	110	110	109	109	109	109	109	108	108	108		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		

FIGURE 5-224. TAKE-OFF DISTANCE; FLAPS - 10° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 83.1	-50 -58 83.7	-45 -49 84.6	-40 -40 85.6	-35 -31 86.5	-30 -22 87.4	-25 -13 88.3	-20 -4 89.2	-15 5 90.0	-10 14 90.9	-5 23 91.8	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	5730	5820	5930	6050	6170	6290	6420	6540	6660	6780	6940	135	172
	V1	105	105	105	105	104	104	104	104	104	104	104		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	134	134	134	134	134	134	134	134	134		
	GR2	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
30000	BFL	5170	5250	5350	5450	5560	5670	5780	5890	6000	6110	6250	132	169
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8	8	8	8	8	8	8	8	8	8	7.9		
29000	BFL	4670	4740	4830	4920	5020	5120	5220	5320	5410	5510	5630	130	166
	V1	96	96	96	95	95	95	95	95	95	94	94		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4		
28000	BFL	4230	4300	4370	4460	4550	4630	4720	4810	4890	4980	5090	127	162
	V1	92	91	91	91	91	91	91	90	90	90	90		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9	9	9	9	9	9	9	9.1	9.1	9.1	8.9		
27000	BFL	4090	4160	4260	4350	4440	4540	4640	4730	4820	4920	4980	125	159
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5		
26000	BFL	4050	4120	4220	4310	4400	4500	4590	4680	4780	4870	4930	122	156
	V1	91	91	91	91	91	91	90	90	90	90	90		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.1		

FIGURE 5-224. TAKE-OFF DISTANCE; FLAPS - 10° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	82						
	N1%	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
39600	BFL	16080	16810	17840	19120								157	197
	V1	147	148	150	153									
	VR	165	165	166	167									
	V2	167	167	167	167									
	GR2	4.1	3.8	3.5	3.2									
39000	BFL	15280	15970	16950	18160	19580							156	195
	V1	144	145	147	149	152								
	VR	162	163	163	164	165								
	V2	164	164	164	165	166								
	GR2	4.2	3.9	3.6	3.4	3.1								
38000	BFL	13980	14620	15550	16640	17920	19450						153	192
	V1	139	140	142	144	146	149							
	VR	158	159	159	160	161	162							
	V2	160	160	161	161	162	163							
	GR2	4.5	4.2	3.9	3.6	3.4	3							
37000	BFL	12770	13360	14230	15260	16410	17790	18840					150	189
	V1	133	135	137	139	141	144	146						
	VR	154	154	155	156	157	158	159						
	V2	157	157	157	158	158	159	159						
	GR2	4.8	4.5	4.2	3.9	3.7	3.3	3						
36000	BFL	11650	12200	13010	13990	15040	16280	17230					148	187
	V1	128	130	132	134	136	139	141						
	VR	150	150	151	152	153	154	155						
	V2	153	153	153	154	155	155	156						
	GR2	5.2	4.8	4.5	4.3	4	3.6	3.3						
35000	BFL	10630	11130	11850	12760	13770	14890	15750					145	184
	V1	123	125	127	129	131	134	136						
	VR	146	146	147	148	150	151	151						
	V2	149	149	149	151	151	152	152						
	GR2	5.5	5.2	4.9	4.6	4.3	3.9	3.6						
34000	BFL	9690	10140	10800	11600	12560	13610	14380					143	181
	V1	119	120	122	124	126	129	131						
	VR	142	142	143	144	146	147	147						
	V2	145	145	146	147	148	149	149						
	GR2	5.9	5.5	5.2	4.9	4.6	4.3	3.9						
33000	BFL	8790	9200	9820	10550	11420	12410	13110					140	178
	V1	114	115	117	119	122	124	126						
	VR	137	138	139	140	142	143	144						
	V2	142	142	142	143	144	145	145						
	GR2	6.3	5.9	5.6	5.3	5	4.6	4.3						
32000	BFL	7950	8340	8910	9580	10360	11270	11950					138	175
	V1	109	110	112	114	117	119	121						
	VR	133	133	135	136	138	139	140						
	V2	138	138	138	140	141	142	142						
	GR2	6.7	6.3	6	5.7	5.4	5	4.6						

FIGURE 5-224. TAKE-OFF DISTANCE; FLAPS - 10° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	82						
	N1%	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
31000	BFL	7180	7520	8060	8680	9390	10200	10830					135	172
	V1	104	105	108	110	112	115	116						
	VR	129	129	130	132	133	135	136						
	V2	134	134	135	136	137	138	139						
	GR2	7.1	6.7	6.4	6.1	5.8	5.4	5						
30000	BFL	6470	6770	7240	7830	8480	9220	9770					132	169
	V1	100	101	103	105	107	110	112						
	VR	124	125	126	128	129	131	132						
	V2	130	130	131	132	133	134	135						
	GR2	7.5	7.1	6.8	6.5	6.2	5.8	5.4						
29000	BFL	5820	6090	6510	7010	7630	8300	8810					130	166
	V1	95	96	98	100	103	105	107						
	VR	120	120	122	123	125	127	128						
	V2	126	126	127	128	130	131	131						
	GR2	8	7.6	7.2	6.9	6.6	6.2	5.9						
28000	BFL	5250	5490	5850	6300	6840	7480	7940					127	162
	V1	91	92	93	96	98	101	102						
	VR	116	116	117	119	121	123	124						
	V2	123	123	123	124	126	127	128						
	GR2	8.5	8.1	7.7	7.4	7.1	6.7	6.3						
27000	BFL	4960	4990	5300	5680	6170	6740	7170					125	159
	V1	89	89	89	91	94	96	98						
	VR	112	112	113	115	117	119	120						
	V2	120	120	120	121	123	124	125						
	GR2	9.1	8.6	8.2	7.9	7.6	7.2	6.8						
26000	BFL	4910	4890	4900	5140	5550	6050	6430					122	156
	V1	89	87	87	87	89	92	94						
	VR	108	108	110	111	113	115	116						
	V2	116	116	117	118	119	121	121						
	GR2	9.6	9.2	8.8	8.4	8.1	7.7	7.3						

FIGURE 5-225. TAKE-OFF DISTANCE; FLAPS - 10° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	83.5	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.4		
39600	BFL	14250	14500	14810	15130	15460	15790	16110	16430	16750	17080	17570	158	197
	V1	152	152	152	151	151	151	151	151	151	151	151		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	4	4.1	4.1	4.1	4.1	4	4	4	4.1	4.1	3.9		
39000	BFL	13510	13750	14040	14350	14660	14970	15270	15580	15880	16200	16660	157	196
	V1	149	148	148	148	148	148	148	148	147	147	148		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1		
38000	BFL	12370	12580	12850	13130	13410	13690	13980	14260	14530	14820	15250	154	193
	V1	143	143	143	143	143	142	142	142	142	142	143		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	163		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.4		
37000	BFL	11280	11470	11710	11970	12220	12480	12730	12990	13240	13500	13900	151	190
	V1	138	138	137	137	137	137	137	137	136	136	137		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	160	160	159	159	159	159	159	159	159	159	159		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.7		
36000	BFL	10260	10440	10660	10890	11120	11350	11580	11810	12040	12280	12640	149	187
	V1	133	132	132	132	132	132	131	131	131	131	132		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	155		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5		
35000	BFL	9340	9500	9690	9900	10110	10320	10530	10740	10940	11150	11490	146	184
	V1	127	127	127	127	127	126	126	126	126	126	126		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	151		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.4		
34000	BFL	8490	8640	8820	9010	9190	9380	9570	9760	9950	10140	10440	143	181
	V1	122	122	122	122	122	121	121	121	121	121	121		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6	6	6	6	6	6	6	6	6	6	5.8		
33000	BFL	7710	7850	8000	8180	8350	8510	8680	8850	9020	9200	9480	141	178
	V1	118	117	117	117	117	117	116	116	116	116	116		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.2		
32000	BFL	6980	7100	7240	7390	7550	7700	7850	8000	8150	8310	8560	138	175
	V1	113	112	112	112	112	112	111	111	111	111	111		
	VR	136	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.6		

FIGURE 5-225. TAKE-OFF DISTANCE; FLAPS - 10° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 83.5	-50 -58 84.2	-45 -49 85.2	-40 -40 86.1	-35 -31 87.0	-30 -22 87.9	-25 -13 88.8	-20 -4 89.7	-15 5 90.6	-10 14 91.5	-5 23 92.4	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	6300	6400	6530	6670	6800	6940	7070	7210	7340	7480	7710	135	172
	V1	108	107	107	107	107	107	106	106	106	106	106		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7		
30000	BFL	5670	5770	5880	6000	6130	6250	6370	6490	6610	6740	6940	133	169
	V1	103	103	102	102	102	102	102	102	101	101	102		
	VR	127	127	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.4		
29000	BFL	5110	5190	5290	5400	5510	5620	5730	5830	5940	6050	6230	130	166
	V1	98	98	98	97	97	97	97	97	97	97	97		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	128	128	128	128	128	128	128	128	128		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	7.9		
28000	BFL	4600	4670	4760	4860	4960	5050	5150	5240	5340	5440	5600	128	163
	V1	93	93	93	93	93	93	93	92	92	92	92		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	124		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.4		
27000	BFL	4170	4250	4350	4440	4540	4630	4730	4830	4930	5010	5040	125	160
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	8.9		
26000	BFL	4130	4210	4300	4400	4490	4590	4690	4780	4880	4960	4980	122	156
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	110	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	117		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.5		

FIGURE 5-225. TAKE-OFF DISTANCE; FLAPS - 10° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	79						
	N1%	93.0	93.0	93.0	92.6	92.0	91.3	91.1						
39600	BFL	18270	19320										158	197
	V1	153	154											
	VR	168	169											
	V2	169	170											
	GR2	3.6	3.3											
39000	BFL	17340	18320	19530									157	196
	V1	149	151	153										
	VR	166	166	167										
	V2	167	167	168										
	GR2	3.8	3.5	3.2										
38000	BFL	15870	16770	17870	19170								154	193
	V1	144	145	147	150									
	VR	162	162	163	164									
	V2	163	163	164	164									
	GR2	4.1	3.8	3.5	3.2									
37000	BFL	14470	15340	16330	17510	18870							151	190
	V1	138	140	142	144	146								
	VR	157	158	159	159	160								
	V2	159	159	160	161	161								
	GR2	4.4	4.1	3.8	3.5	3.2								
36000	BFL	13170	13960	14920	15990	17210	18750	19180					149	187
	V1	133	135	137	139	141	144	145						
	VR	153	153	155	155	156	157	157						
	V2	155	155	156	157	157	158	158						
	GR2	4.7	4.4	4.1	3.8	3.5	3.1	3						
35000	BFL	11980	12700	13590	14620	15720	17110	17490					146	184
	V1	127	129	132	134	136	139	139						
	VR	148	149	150	152	152	153	154						
	V2	151	151	152	153	154	154	154						
	GR2	5	4.7	4.4	4.1	3.8	3.4	3.3						
34000	BFL	10890	11550	12360	13310	14350	15590	15930					143	181
	V1	122	124	126	129	131	133	134						
	VR	144	145	146	147	149	149	150						
	V2	147	148	148	149	150	151	151						
	GR2	5.4	5.1	4.8	4.5	4.2	3.7	3.6						
33000	BFL	9880	10490	11210	12090	13080	14190	14500					141	178
	V1	118	119	121	124	126	128	129						
	VR	140	141	142	143	145	146	146						
	V2	143	144	144	146	147	147	147						
	GR2	5.8	5.4	5.1	4.8	4.5	4.1	4						
32000	BFL	8930	9510	10150	10930	11840	12910	13190					138	175
	V1	112	114	116	119	121	124	124						
	VR	135	136	138	139	141	142	142						
	V2	139	140	141	142	143	144	144						
	GR2	6.2	5.8	5.5	5.2	4.9	4.4	4.3						

FIGURE 5-225. TAKE-OFF DISTANCE; FLAPS - 10° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	79						
	N1%	93.0	93.0	93.0	92.6	92.0	91.3	91.1						
31000	BFL	8070	8570	9170	9890	10720	11690	11960					135	172
	V1	108	109	111	114	116	119	120						
	VR	131	132	133	135	136	138	138						
	V2	136	136	137	138	139	140	140						
	GR2	6.6	6.2	5.9	5.6	5.3	4.8	4.7						
30000	BFL	7250	7700	8260	8920	9660	10560	10800					133	169
	V1	103	104	107	109	111	114	115						
	VR	127	128	129	131	132	134	134						
	V2	132	132	133	134	135	136	137						
	GR2	7	6.6	6.3	6	5.7	5.2	5.1						
29000	BFL	6510	6920	7410	8020	8700	9490	9700					130	166
	V1	98	100	102	104	106	109	110						
	VR	122	123	125	126	128	130	130						
	V2	128	128	129	130	132	133	133						
	GR2	7.4	7.1	6.7	6.4	6.1	5.7	5.5						
28000	BFL	5830	6200	6630	7160	7790	8520	8710					128	163
	V1	93	95	97	99	102	104	105						
	VR	118	119	120	122	124	125	126						
	V2	124	124	125	126	128	129	129						
	GR2	7.9	7.5	7.2	6.9	6.6	6.1	6						
27000	BFL	5250	5550	5930	6400	6960	7630	7800					125	160
	V1	89	90	92	94	97	99	100						
	VR	113	114	116	117	119	121	122						
	V2	120	121	121	123	124	125	126						
	GR2	8.4	8	7.7	7.3	7	6.6	6.5						
26000	BFL	4960	5030	5350	5750	6250	6840	7020					122	156
	V1	87	86	88	90	92	95	96						
	VR	110	111	112	113	115	117	118						
	V2	117	117	118	119	121	122	122						
	GR2	9	8.6	8.2	7.9	7.6	7.1	7						

FIGURE 5-226. TAKE-OFF DISTANCE; FLAPS - 10° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	84.4	85.0	85.7	86.7	87.6	88.4	89.3	90.2	91.2	92.1	92.9		
39600	BFL	15900	16200	16600	16970	17350	17770	18180	18470	18780	19190	19900	159	198
	V1	156	156	156	156	156	156	156	156	156	156	157		
	VR	171	171	171	171	171	172	172	171	171	171	171		
	V2	173	173	173	173	173	173	173	173	173	173	172		
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.5		
39000	BFL	15080	15370	15750	16100	16460	16850	17240	17520	17820	18210	18890	158	196
	V1	153	153	153	153	153	153	153	152	152	152	153		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	4	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.7		
38000	BFL	13790	14060	14410	14730	15060	15420	15770	16030	16300	16670	17290	155	193
	V1	147	147	147	147	147	147	147	147	147	147	148		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4		
37000	BFL	12580	12820	13140	13440	13730	14060	14380	14620	14870	15210	15770	152	190
	V1	142	142	142	142	142	142	141	141	141	141	142		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	163	163	162	162	162	162	162	162	162	162	162		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.3		
36000	BFL	11430	11650	11940	12210	12480	12780	13070	13280	13500	13820	14330	149	187
	V1	136	136	136	136	136	136	136	136	135	135	137		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.6		
35000	BFL	10380	10580	10840	11080	11320	11590	11860	12050	12250	12540	13000	147	185
	V1	131	131	131	131	130	130	130	130	130	130	131		
	VR	151	151	151	151	151	152	152	152	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	4.9		
34000	BFL	9420	9600	9840	10060	10280	10520	10760	10940	11120	11380	11800	144	182
	V1	126	126	126	125	125	125	125	125	125	125	126		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.3		
33000	BFL	8540	8700	8920	9110	9310	9530	9750	9900	10070	10310	10680	141	179
	V1	121	120	120	120	120	120	120	120	120	120	120		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	146	146	146	147	147	146	146	146	146		
	GR2	6.1	6.1	6.1	6.1	6.1	6	6	6	6	6	5.7		
32000	BFL	7740	7880	8070	8250	8430	8630	8820	8960	9110	9320	9660	139	176
	V1	116	116	115	115	115	115	115	115	115	115	115		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	142	142	142		
	GR2	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4	6.1		

FIGURE 5-226. TAKE-OFF DISTANCE; FLAPS - 10° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 84.4	-50 -58 85.0	-45 -49 85.7	-40 -40 86.7	-35 -31 87.6	-30 -22 88.4	-25 -13 89.3	-20 -4 90.2	-15 5 91.2	-10 14 92.1	-5 23 92.9	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	6980	7110	7280	7440	7600	7780	7950	8080	8210	8400	8710	136	173
	V1	111	110	110	110	110	110	110	110	109	109	110		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	138	138		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.5		
30000	BFL	6270	6380	6530	6670	6820	6980	7140	7240	7360	7540	7810	133	169
	V1	105	105	105	105	105	105	105	105	104	104	105		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	135	135	134	134	134	134		
	GR2	7.4	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	6.9		
29000	BFL	5620	5720	5850	5980	6110	6250	6390	6480	6590	6740	6980	131	166
	V1	101	100	100	100	100	100	100	100	99	99	100		
	VR	124	124	124	124	124	125	125	124	124	124	124		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.3		
28000	BFL	5040	5130	5250	5360	5470	5600	5720	5810	5900	6040	6240	128	163
	V1	96	96	96	95	95	95	95	95	95	95	95		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.1	7.8		
27000	BFL	4520	4600	4710	4810	4910	5010	5120	5200	5280	5400	5580	125	160
	V1	91	91	91	91	91	91	91	90	90	90	91		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.7	8.3		
26000	BFL	4230	4300	4390	4480	4580	4680	4770	4870	4970	5020	5030	123	157
	V1	88	88	88	88	88	88	88	88	88	87	86		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	118	118		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.2	8.9		

FIGURE 5-226. TAKE-OFF DISTANCE; FLAPS - 10° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	75							
	N1%	93.0	93.0	93.0	92.4	91.8	91.2							
39600	BFL													
	V1													
	VR													
	V2													
	GR2													
39000	BFL	19860											158	196
	V1	155												
	VR	169												
	V2	170												
	GR2	3.3												
38000	BFL	18190	19340										155	193
	V1	149	151											
	VR	165	166											
	V2	166	166											
	GR2	3.6	3.3											
37000	BFL	16600	17640	18830									152	190
	V1	144	146	148										
	VR	161	161	162										
	V2	162	162	163										
	GR2	3.9	3.6	3.3										
36000	BFL	15100	16090	17160	18440	19940							149	187
	V1	138	140	142	144	147								
	VR	156	157	158	159	160								
	V2	158	158	159	159	160								
	GR2	4.2	3.9	3.6	3.4	3.1								
35000	BFL	13710	14620	15620	16780	18110	19540						147	185
	V1	132	134	137	139	141	144							
	VR	152	153	154	155	155	156							
	V2	154	154	155	156	156	157							
	GR2	4.6	4.3	4	3.7	3.4	3							
34000	BFL	12420	13270	14210	15270	16470	17740						144	182
	V1	127	129	131	133	136	138							
	VR	147	148	149	150	151	152							
	V2	150	150	151	152	152	153							
	GR2	4.9	4.6	4.3	4	3.7	3.3							
33000	BFL	11270	12020	12880	13900	14980	16110						141	179
	V1	122	124	126	128	130	133							
	VR	143	144	145	147	148	148							
	V2	146	146	147	148	149	149							
	GR2	5.3	4.9	4.6	4.3	4	3.7							
32000	BFL	10210	10890	11660	12580	13610	14610						139	176
	V1	117	119	121	123	126	128							
	VR	139	140	141	142	144	144							
	V2	142	143	143	144	145	145							
	GR2	5.7	5.3	5	4.7	4.4	4							

FIGURE 5-226. TAKE-OFF DISTANCE; FLAPS - 10° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	75							
	N1%	93.0	93.0	93.0	92.4	91.8	91.2							
31000	BFL	9200	9840	10520	11370	12310	13240						136	173
	V1	112	114	116	118	120	123							
	VR	134	135	137	138	139	140							
	V2	138	139	139	140	141	142							
	GR2	6.1	5.7	5.4	5.1	4.8	4.4							
30000	BFL	8280	8850	9490	10240	11100	11960						133	169
	V1	107	109	111	113	115	118							
	VR	130	131	132	134	135	137							
	V2	134	135	136	137	138	138							
	GR2	6.5	6.1	5.8	5.5	5.2	4.8							
29000	BFL	7400	7950	8520	9220	9980	10760						131	166
	V1	102	104	106	108	110	113							
	VR	125	127	128	130	131	132							
	V2	130	131	132	133	134	135							
	GR2	6.9	6.6	6.2	5.9	5.6	5.2							
28000	BFL	6610	7080	7610	8260	8970	9640						128	163
	V1	97	99	101	103	106	108							
	VR	121	122	123	125	127	128							
	V2	126	127	128	129	130	131							
	GR2	7.4	7	6.7	6.4	6	5.7							
27000	BFL	5890	6310	6760	7370	8010	8630						125	160
	V1	92	94	96	98	101	103							
	VR	116	117	119	121	122	124							
	V2	122	123	124	125	126	127							
	GR2	7.9	7.5	7.1	6.8	6.5	6.2							
26000	BFL	5280	5620	6010	6520	7130	7710						123	157
	V1	87	89	91	93	96	98							
	VR	112	113	114	116	118	120							
	V2	118	119	120	121	123	124							
	GR2	8.4	8	7.7	7.3	7	6.7							

FIGURE 5-227. TAKE-OFF DISTANCE; FLAPS - 10° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	85.3	85.6	86.3	87.2	88.2	89.0	89.8	90.8	91.7	92.6	93.0		
39600	BFL	17990	18330	18740	19160	19590							160	198
	V1	162	161	161	161	161								
	VR	175	175	175	175	175								
	V2	176	176	176	176	176								
	GR2	3.5	3.5	3.5	3.5	3.5								
39000	BFL	17040	17350	17750	18150	18550	19050	19460	19740				159	197
	V1	158	158	158	158	158	158	158	157					
	VR	172	172	172	172	172	172	172	172					
	V2	173	173	173	173	173	173	173	173					
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7					
38000	BFL	15560	15850	16210	16580	16950	17390	17770	18030	18380	18920	19750	156	194
	V1	152	152	152	152	152	152	152	152	152	152	154		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	4	4	4	4	4	4	4	4	3.9	3.8	3.5		
37000	BFL	14220	14480	14810	15140	15480	15890	16230	16470	16800	17290	18060	153	191
	V1	147	147	146	146	146	146	146	146	146	146	148		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.1	3.8		
36000	BFL	12940	13180	13470	13780	14090	14460	14760	14990	15290	15730	16440	150	188
	V1	141	141	141	141	141	141	140	140	140	141	142		
	VR	159	159	159	159	159	160	160	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.4	4.1		
35000	BFL	11720	11930	12200	12470	12750	13090	13370	13560	13840	14250	14890	148	185
	V1	135	135	135	135	135	135	135	134	134	135	136		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	156		
	GR2	5	5	5	5	5	5	5	5	4.9	4.8	4.4		
34000	BFL	10600	10800	11040	11290	11540	11850	12100	12270	12520	12890	13470	145	182
	V1	130	130	129	129	129	129	129	129	129	129	130		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	152		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.1	4.8		
33000	BFL	9590	9770	9990	10210	10440	10720	10940	11100	11330	11660	12180	142	179
	V1	124	124	124	124	124	124	124	123	123	124	125		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	148	148		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.5	5.2		
32000	BFL	8680	8840	9030	9230	9440	9690	9890	10030	10240	10540	11010	139	176
	V1	119	119	119	119	119	119	118	118	118	119	120		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	144	144		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.9	5.5		

FIGURE 5-227. TAKE-OFF DISTANCE; FLAPS - 10° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 85.3	-50 -58 85.6	-45 -49 86.3	-40 -40 87.2	-35 -31 88.2	-30 -22 89.0	-25 -13 89.8	-20 -4 90.8	-15 5 91.7	-10 14 92.6	-5 23 93.0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	7830	7970	8150	8330	8510	8740	8920	9040	9230	9500	9940	137	173
	V1	114	114	114	114	114	114	113	113	113	113	114		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	141	141	141	141	141	141	141	141	141	140	140		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.3	5.9		
30000	BFL	7040	7170	7330	7490	7660	7860	8020	8130	8300	8540	8920	134	170
	V1	109	109	109	109	108	108	108	108	108	108	109		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	136	136		
	GR2	7	7	7	7	7	7	7	7	6.9	6.7	6.4		
29000	BFL	6280	6400	6540	6680	6830	7020	7160	7250	7400	7610	7980	131	167
	V1	104	103	103	103	103	103	103	103	103	103	104		
	VR	127	127	127	127	127	127	127	127	127	127	128		
	V2	133	133	133	133	133	133	133	133	132	132	132		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4	7.1	6.8		
28000	BFL	5600	5700	5830	5950	6090	6250	6370	6450	6590	6770	7090	128	164
	V1	98	98	98	98	98	98	98	97	97	98	99		
	VR	122	122	122	122	122	123	123	122	122	122	123		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.6	7.3		
27000	BFL	5000	5090	5200	5310	5430	5570	5680	5750	5870	6030	6300	126	160
	V1	94	93	93	93	93	93	93	93	93	93	94		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.3	8.1	7.8		
26000	BFL	4470	4550	4650	4750	4850	4980	5070	5140	5240	5380	5610	123	157
	V1	89	89	88	88	88	88	88	88	88	88	89		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9	9	9	9	9	9	9	9	8.9	8.6	8.3		

FIGURE 5-227. TAKE-OFF DISTANCE; FLAPS - 10° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	72							
	N1%	93.0	93.0	92.8	92.2	91.5	91.2							
39600	BFL													
	V1													
	VR													
	V2													
	GR2													
39000	BFL													
	V1													
	VR													
	V2													
	GR2													
38000	BFL													
	V1													
	VR													
	V2													
	GR2													
37000	BFL	19140											153	191
	V1	150												
	VR	164												
	V2	165												
	GR2	3.5												
36000	BFL	17410	18560	19900									150	188
	V1	144	146	148										
	VR	160	161	161										
	V2	161	161	162										
	GR2	3.8	3.5	3.2										
35000	BFL	15820	16860	18060	19440								148	185
	V1	138	140	142	144									
	VR	155	156	157	158									
	V2	157	157	158	159									
	GR2	4.1	3.8	3.5	3.2									
34000	BFL	14310	15310	16380	17620	19100	19890						145	182
	V1	132	134	136	139	141	142							
	VR	151	152	153	154	154	155							
	V2	153	153	154	154	155	155							
	GR2	4.4	4.1	3.8	3.6	3.2	3.1							
33000	BFL	12940	13830	14860	15970	17280	17970						142	179
	V1	127	129	131	133	135	137							
	VR	146	147	149	149	150	151							
	V2	148	149	150	150	151	151							
	GR2	4.8	4.5	4.2	3.9	3.6	3.4							
32000	BFL	11690	12510	13440	14490	15650	16270						139	176
	V1	121	123	126	128	130	131							
	VR	142	143	144	145	146	147							
	V2	144	145	146	147	147	148							
	GR2	5.2	4.8	4.5	4.3	3.9	3.7							

FIGURE 5-227. TAKE-OFF DISTANCE; FLAPS - 10° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

31000	**BFL**	10580	11280	12130	13100	14170	14700						137	173
	V1	116	118	120	123	125	126							
	VR	138	139	140	141	142	143							
	V2	141	141	142	143	144	144							
	GR2	5.6	5.2	4.9	4.6	4.3	4.1							
30000	**BFL**	9510	10180	10910	11790	12790	13280						134	170
	V1	111	113	115	117	120	121							
	VR	133	134	136	137	138	139							
	V2	137	137	138	139	140	140							
	GR2	6	5.6	5.3	5	4.7	4.5							
29000	**BFL**	8520	9130	9820	10600	11490	11950						131	167
	V1	106	108	110	112	115	116							
	VR	129	130	131	133	134	135							
	V2	133	133	134	135	136	137							
	GR2	6.4	6.1	5.7	5.4	5.1	4.9							
28000	**BFL**	7580	8170	8790	9510	10320	10720						128	164
	V1	101	103	105	107	110	111							
	VR	124	125	127	128	130	130							
	V2	128	129	130	131	133	133							
	GR2	6.9	6.5	6.2	5.9	5.5	5.3							
27000	**BFL**	6730	7230	7840	8500	9220	9570						126	160
	V1	96	98	100	102	105	106							
	VR	119	120	122	124	126	126							
	V2	124	125	126	128	129	129							
	GR2	7.3	7	6.7	6.3	6	5.8							
26000	**BFL**	5970	6400	6920	7560	8220	8550						123	157
	V1	91	93	95	97	100	101							
	VR	114	116	117	119	121	122							
	V2	120	121	122	124	125	126							
	GR2	7.8	7.5	7.1	6.8	6.5	6.3							

FIGURE 5-228. TAKE-OFF DISTANCE; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY (Sheet 1 of 2)

GW LBS	OATC / OATF / N1%	-54 / -65 / 76.9	-50 / -58 / 77.2	-45 / -49 / 78.1	-40 / -40 / 79.0	-35 / -31 / 79.9	-30 / -22 / 80.8	-25 / -13 / 81.7	-20 / -4 / 82.6	-15 / 5 / 83.4	-10 / 14 / 84.2	-5 / 23 / 85.0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
39600	BFL	4840	4910	5000	5080	5170	5250	5330	5410	5510	5610	5710	139	192
	V1	119	118	118	118	117	117	117	116	116	116	116		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	145	145	145	145	145	145		
	GR2	6.5	6.5	6.5	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7		
39000	BFL	4650	4720	4800	4880	4960	5040	5120	5190	5290	5380	5480	138	191
	V1	117	116	116	116	116	115	115	114	114	114	114		
	VR	138	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.7	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9		
38000	BFL	4340	4400	4480	4560	4630	4710	4780	4840	4930	5020	5110	136	188
	V1	113	113	113	112	112	112	111	111	111	111	111		
	VR	135	135	135	134	134	134	134	134	134	134	134		
	V2	142	142	142	142	142	142	141	141	141	141	141		
	GR2	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.3	7.3	7.3	7.3		
37000	BFL	4050	4100	4180	4250	4320	4380	4450	4510	4600	4680	4760	135	185
	V1	110	110	109	109	109	108	108	108	108	107	107		
	VR	132	132	132	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.4	7.5	7.5	7.5	7.6	7.6	7.6	7.7	7.7	7.7	7.7		
36000	BFL	3770	3820	3890	3960	4020	4090	4150	4210	4290	4360	4440	133	182
	V1	107	106	106	106	105	105	105	105	104	104	104		
	VR	129	129	129	129	129	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	137	136	136		
	GR2	7.8	7.9	7.9	7.9	7.9	8	8	8.1	8.1	8.1	8.1		
35000	BFL	3530	3580	3640	3700	3760	3820	3880	3930	4000	4070	4140	131	180
	V1	103	103	103	102	102	102	102	101	101	101	101		
	VR	126	126	126	126	126	126	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.3	8.3	8.3	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
34000	BFL	3290	3350	3430	3500	3580	3660	3740	3820	3900	3970	4050	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.7	8.8	8.8	8.8	8.8	8.9	8.9	9	9	9	9		
33000	BFL	3270	3330	3400	3480	3560	3640	3720	3790	3870	3940	4020	127	174
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.2	9.2	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4		
32000	BFL	3250	3310	3390	3450	3530	3620	3690	3770	3840	3910	3980	125	171
	V1	100	100	100	100	100	100	101	101	101	101	101		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.7	9.7	9.8	9.8	9.8	9.9	9.9	10	10	10	10		

FIGURE 5-228. TAKE-OFF DISTANCE; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A: WET RUNWAY
(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
31000	BFL	3230	3280	3360	3440	3500	3580	3670	3740	3820	3880	3950	123	168
	V1	100	100	100	101	101	101	101	101	101	101	101		
	VR	115	115	115	115	115	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.3	10.3	10.3	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5		
30000	BFL	3210	3260	3330	3410	3490	3560	3630	3710	3780	3860	3920	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.9	10.9	10.9	10.9	11	11	11.1	11.1	11.1	11.1	11.1		
29000	BFL	3180	3230	3300	3380	3450	3530	3600	3690	3750	3820	3890	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.5	11.5	11.5	11.6	11.6	11.7	11.7	11.8	11.8	11.8	11.8		
28000	BFL	3150	3220	3290	3360	3440	3510	3580	3650	3730	3790	3860	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	120	120	120	120		
	GR2	12.2	12.2	12.2	12.3	12.3	12.4	12.4	12.5	12.5	12.5	12.5		
27000	BFL	3130	3200	3270	3340	3410	3480	3560	3630	3690	3760	3840	115	157
	V1	101	101	101	101	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.9	13	13	13	13.1	13.1	13.2	13.3	13.3	13.3	13.3		
26000	BFL	3110	3170	3240	3310	3380	3450	3530	3610	3660	3740	3800	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.8	13.8	13.8	13.9	13.9	14	14	14.1	14.1	14.1	14.1		

FIGURE 5-228. TAKE-OFF DISTANCE; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	122		
	N1%	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
39600	BFL	5810	5910	6010	6120	6220	6320	6430	6940	7660	8440	9170	139	192
	V1	116	116	115	115	115	115	115	118	121	125	128		
	VR	139	139	139	139	139	139	139	140	142	144	145		
	V2	145	145	145	145	145	145	145	146	147	148	149		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.1	5.5	4.8	4.3		
39000	BFL	5570	5670	5770	5870	5970	6070	6170	6660	7350	8080	8810	138	191
	V1	114	114	113	113	113	113	113	116	119	123	126		
	VR	137	137	137	137	137	137	137	138	140	142	143		
	V2	144	144	144	144	144	144	144	144	145	146	147		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.3	5.7	5	4.5		
38000	BFL	5200	5290	5380	5470	5560	5660	5750	6200	6850	7520	8210	136	188
	V1	110	110	110	110	110	110	110	112	116	119	122		
	VR	134	134	134	134	134	134	134	135	137	139	140		
	V2	141	141	141	141	141	141	141	142	143	144	145		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	6.7	6	5.4	4.8		
37000	BFL	4840	4930	5010	5100	5180	5270	5350	5770	6370	6990	7640	135	185
	V1	107	107	107	107	107	106	106	109	112	116	119		
	VR	131	131	131	131	131	131	131	132	134	136	137		
	V2	139	139	139	139	139	139	139	139	140	141	142		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.1	6.4	5.7	5.1		
36000	BFL	4520	4590	4670	4750	4830	4910	4980	5360	5920	6500	7090	133	182
	V1	104	104	104	103	103	103	103	106	109	112	115		
	VR	128	128	128	128	128	128	128	129	131	133	134		
	V2	136	136	136	136	136	136	136	137	138	139	139		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	7.4	6.7	6.1	5.5		
35000	BFL	4210	4280	4350	4430	4500	4570	4650	4980	5490	6030	6570	131	180
	V1	101	101	100	100	100	100	100	102	106	109	112		
	VR	125	125	125	125	125	125	125	126	128	130	131		
	V2	134	134	134	134	134	134	134	134	135	136	137		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	7.9	7.1	6.4	5.8		
34000	BFL	4120	4200	4270	4350	4420	4500	4580	4630	5080	5580	6080	129	177
	V1	100	100	100	100	100	100	100	99	102	105	108		
	VR	123	123	123	123	123	123	123	124	125	127	129		
	V2	132	132	132	132	132	132	132	132	133	133	134		
	GR2	9	9	9	8.9	8.9	8.9	8.9	8.3	7.6	6.8	6.2		
33000	BFL	4090	4160	4240	4310	4390	4470	4540	4490	4710	5160	5620	127	174
	V1	100	100	100	100	100	100	100	98	99	102	105		
	VR	120	120	120	120	120	120	120	121	122	124	126		
	V2	129	129	129	129	129	129	129	130	130	131	132		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	8.8	8	7.3	6.6		
32000	BFL	4060	4130	4200	4280	4350	4430	4500	4450	4370	4760	5180	125	171
	V1	100	100	100	100	100	100	100	98	98	98	101		
	VR	117	117	117	117	117	117	117	118	120	121	122		
	V2	127	127	127	127	127	127	127	127	128	128	129		
	GR2	10	10	10	10	9.9	9.9	9.9	9.3	8.5	7.7	7.1		

FIGURE 5-228. TAKE-OFF DISTANCE; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	122		
	N1%	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
31000	BFL	4030	4100	4170	4240	4320	4390	4470	4410	4330	4400	4770	123	168
	V1	101	101	101	101	100	100	100	98	96	95	98		
	VR	114	114	114	114	114	114	114	115	117	118	119		
	V2	125	125	125	125	125	125	125	125	125	126	126		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	9.8	9	8.2	7.5		
30000	BFL	3990	4060	4130	4210	4280	4360	4430	4370	4290	4210	4390	121	166
	V1	101	101	101	101	101	101	101	99	96	93	94		
	VR	112	112	112	112	112	112	112	112	114	115	116		
	V2	123	123	123	123	123	123	123	123	123	123	124		
	GR2	11.1	11.1	11.1	11.1	11.1	11.1	11.1	10.4	9.5	8.7	8		
29000	BFL	3960	4030	4110	4170	4250	4320	4390	4340	4260	4180	4110	119	163
	V1	101	101	101	101	101	101	101	99	96	94	91		
	VR	109	109	109	109	109	109	109	110	111	112	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11	10.1	9.3	8.5		
28000	BFL	3930	4000	4070	4140	4210	4280	4360	4300	4220	4140	4070	117	160
	V1	101	101	101	101	101	101	101	99	96	94	91		
	VR	107	107	107	107	107	107	107	107	108	109	110		
	V2	120	120	120	120	120	120	119	119	119	119	119		
	GR2	12.5	12.5	12.5	12.5	12.4	12.4	12.4	11.7	10.7	9.9	9.1		
27000	BFL	3900	3970	4030	4110	4170	4250	4320	4260	4180	4100	4040	115	157
	V1	102	102	101	101	101	101	101	99	96	94	92		
	VR	105	105	105	105	105	105	105	105	106	106	107		
	V2	118	118	118	118	118	118	118	117	117	116	116		
	GR2	13.3	13.3	13.3	13.2	13.2	13.2	13.2	12.4	11.4	10.5	9.7		
26000	BFL	3870	3930	4000	4080	4140	4210	4280	4230	4150	4070	4000	113	154
	V1	102	102	102	102	102	102	101	99	97	94	92		
	VR	103	103	103	103	103	103	103	103	103	104	104		
	V2	117	117	117	117	117	117	117	116	115	114	114		
	GR2	14.1	14.1	14.1	14.1	14.1	14.1	14.1	13.2	12.2	11.2	10.4		

FIGURE 5-229. TAKE-OFF DISTANCE; FLAPS - 10° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	BFL	5150	5240	5330	5430	5520	5610	5700	5800	5910	6020	6120	139	193
	V1	120	120	119	119	119	118	118	118	118	117	117		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.5	6.5	6.5	6.5		
39000	BFL	4950	5030	5120	5220	5300	5390	5470	5560	5670	5770	5880	138	191
	V1	118	118	117	117	117	116	116	116	116	115	115		
	VR	139	139	139	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7		
38000	BFL	4620	4690	4780	4870	4950	5030	5110	5190	5290	5380	5480	136	188
	V1	115	114	114	114	113	113	113	112	112	112	112		
	VR	136	136	136	136	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.9	6.9	6.9	7	7	7	7	7	7	7		
37000	BFL	4310	4370	4450	4530	4610	4680	4760	4830	4920	5010	5100	135	185
	V1	111	111	111	110	110	110	109	109	109	109	109		
	VR	133	133	133	133	133	132	132	132	132	132	132		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.3	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4		
36000	BFL	4010	4070	4140	4220	4290	4360	4420	4500	4580	4660	4740	133	183
	V1	108	107	107	107	107	106	106	106	106	105	105		
	VR	130	130	130	130	130	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.7	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8		
35000	BFL	3730	3790	3860	3930	3990	4060	4120	4190	4260	4340	4420	131	180
	V1	104	104	104	104	103	103	103	102	102	102	102		
	VR	127	127	127	127	127	127	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
34000	BFL	3480	3540	3600	3670	3730	3790	3840	3910	3990	4070	4140	129	177
	V1	101	101	100	100	100	100	99	99	99	99	99		
	VR	124	124	124	124	124	124	124	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.5	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7		
33000	BFL	3350	3410	3490	3570	3640	3720	3810	3880	3960	4040	4110	127	174
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9	9	9	9.1	9.1	9.1	9.1	9.2	9.2	9.2	9.2		
32000	BFL	3330	3390	3470	3540	3630	3700	3780	3860	3940	4010	4080	125	171
	V1	99	99	99	99	99	100	100	100	100	100	99		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.7	9.7	9.7	9.7		

FIGURE 5-229. TAKE-OFF DISTANCE; FLAPS - 10° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 77.4	-50 -58 77.8	-45 -49 78.7	-40 -40 79.6	-35 -31 80.5	-30 -22 81.4	-25 -13 82.3	-20 -4 83.2	-15 5 84.0	-10 14 84.8	-5 23 85.6	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3300	3360	3450	3520	3590	3670	3760	3820	3900	3980	4050	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2		
30000	BFL	3290	3340	3410	3490	3570	3650	3720	3790	3870	3940	4010	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.6	10.6	10.6	10.7	10.7	10.7	10.8	10.8	10.8	10.8	10.8		
29000	BFL	3260	3320	3400	3470	3540	3610	3690	3760	3840	3910	3980	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.3	11.3	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.4		
28000	BFL	3240	3300	3370	3440	3520	3590	3670	3740	3810	3880	3960	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.9	11.9	12	12	12	12.1	12.1	12.1	12.1	12.1	12.1		
27000	BFL	3220	3270	3340	3410	3480	3560	3630	3710	3790	3850	3930	115	157
	V1	100	100	100	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.7	12.7	12.7	12.7	12.8	12.8	12.8	12.9	12.9	12.9	12.9		
26000	BFL	3190	3240	3320	3390	3470	3540	3610	3680	3760	3820	3890	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	117	117	117	117	117	117	117		
	GR2	13.5	13.5	13.5	13.6	13.6	13.6	13.7	13.7	13.7	13.7	13.7		

FIGURE 5-229. TAKE-OFF DISTANCE; FLAPS - 10° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	118		
	N1%	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
39600	BFL	6230	6340	6450	6560	6680	6790	7060	7690	8460	9250	9750	139	193
	V1	117	117	117	117	117	117	117	120	124	127	129		
	VR	140	140	140	140	140	140	140	142	144	145	146		
	V2	146	146	146	146	146	146	146	147	148	149	149		
	GR2	6.5	6.5	6.5	6.5	6.5	6.4	6.3	5.7	5.1	4.5	4.2		
39000	BFL	5980	6090	6190	6300	6410	6510	6780	7370	8110	8890	9370	138	191
	V1	115	115	115	115	115	115	115	118	122	125	127		
	VR	138	138	138	138	138	138	139	140	142	144	144		
	V2	145	145	145	145	145	145	145	146	147	148	148		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.5	5.9	5.3	4.7	4.3		
38000	BFL	5570	5670	5770	5870	5970	6070	6320	6870	7550	8280	8740	136	188
	V1	112	112	111	111	111	111	112	115	118	122	124		
	VR	135	135	135	135	135	135	136	137	139	141	142		
	V2	142	142	142	142	142	142	142	143	144	145	146		
	GR2	7	7	7	7	7	7	6.8	6.3	5.6	5	4.7		
37000	BFL	5190	5280	5370	5460	5550	5650	5880	6390	7020	7700	8130	135	185
	V1	108	108	108	108	108	108	109	112	115	118	120		
	VR	132	132	132	132	132	132	133	134	136	138	139		
	V2	140	140	140	140	140	140	140	141	141	142	143		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.2	6.6	6	5.3	5		
36000	BFL	4830	4910	4990	5080	5160	5250	5460	5930	6520	7140	7550	133	183
	V1	105	105	105	105	105	105	105	108	111	115	117		
	VR	129	129	129	129	129	129	130	131	133	135	136		
	V2	137	137	137	137	137	137	137	138	139	140	140		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.6	7	6.3	5.7	5.3		
35000	BFL	4490	4570	4650	4730	4810	4880	5070	5500	6040	6620	6990	131	180
	V1	102	102	102	101	101	101	102	105	108	111	113		
	VR	126	126	126	126	126	126	127	128	130	132	133		
	V2	135	135	135	135	135	135	135	135	136	137	138		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8	7.4	6.7	6.1	5.7		
34000	BFL	4220	4300	4370	4450	4530	4610	4710	5090	5580	6120	6460	129	177
	V1	99	99	99	99	99	99	99	101	104	108	109		
	VR	123	123	123	123	123	123	124	125	127	129	130		
	V2	132	132	132	132	132	132	132	133	134	134	135		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.4	7.8	7.1	6.4	6.1		
33000	BFL	4190	4260	4340	4420	4500	4570	4610	4720	5160	5650	5970	127	174
	V1	99	99	99	99	99	99	98	98	101	104	106		
	VR	121	121	121	121	121	121	121	122	124	126	127		
	V2	130	130	130	130	130	130	130	130	131	132	132		
	GR2	9.2	9.2	9.2	9.1	9.1	9.1	8.9	8.3	7.6	6.8	6.4		
32000	BFL	4150	4230	4300	4380	4460	4540	4570	4520	4760	5210	5500	125	171
	V1	99	99	99	99	99	99	98	96	97	100	102		
	VR	118	118	118	118	118	118	118	119	121	122	123		
	V2	128	128	128	128	128	128	128	128	129	129	130		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.4	8.8	8	7.3	6.9		

FIGURE 5-229. TAKE-OFF DISTANCE; FLAPS - 10° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	118		
	N1%	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
31000	BFL	4120	4190	4270	4340	4420	4500	4530	4480	4410	4790	5050	123	169
	V1	100	100	99	99	99	99	99	97	97	97	99		
	VR	115	115	115	115	115	115	115	117	118	119	120		
	V2	125	125	125	125	125	125	125	126	126	127	127		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	9.9	9.3	8.5	7.8	7.3		
30000	BFL	4090	4160	4230	4310	4380	4460	4520	4440	4370	4420	4650	121	166
	V1	100	100	100	100	100	100	99	97	94	93	95		
	VR	112	112	112	112	112	112	112	114	115	116	117		
	V2	123	123	123	123	123	123	123	123	124	124	124		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.5	9.8	9	8.3	7.8		
29000	BFL	4050	4130	4190	4270	4350	4420	4460	4400	4330	4250	4280	119	163
	V1	100	100	100	100	100	100	99	97	94	92	91		
	VR	110	110	110	110	110	110	110	111	112	113	114		
	V2	121	121	121	121	121	121	121	121	121	122	122		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.1	10.4	9.6	8.8	8.3		
28000	BFL	4020	4090	4160	4230	4310	4380	4450	4360	4290	4210	4160	117	160
	V1	100	100	100	100	100	100	99	97	95	92	91		
	VR	107	107	107	107	107	107	107	108	109	110	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	11.8	11.1	10.2	9.4	8.9		
27000	BFL	3990	4060	4140	4200	4270	4350	4380	4330	4250	4170	4130	115	157
	V1	100	100	100	100	100	100	99	97	95	92	91		
	VR	105	105	105	105	105	105	105	105	106	107	108		
	V2	118	118	118	118	118	118	118	117	117	117	117		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.6	11.8	10.8	10	9.5		
26000	BFL	3950	4020	4100	4160	4240	4310	4370	4290	4210	4140	4090	113	154
	V1	101	101	101	101	100	100	100	98	95	93	91		
	VR	103	103	103	103	103	103	103	103	104	104	105		
	V2	117	117	117	117	117	117	116	116	115	114	114		
	GR2	13.7	13.7	13.7	13.7	13.7	13.7	13.4	12.5	11.6	10.6	10.1		

FIGURE 5-230. TAKE-OFF DISTANCE; FLAPS - 10° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	BFL	5470	5560	5680	5790	5900	6010	6110	6230	6340	6460	6580	140	193
	V1	121	121	120	120	120	120	119	119	119	119	119		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
39000	BFL	5250	5340	5450	5560	5660	5770	5870	5980	6090	6200	6310	139	191
	V1	119	119	118	118	118	118	117	117	117	117	117		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
38000	BFL	4900	4980	5090	5190	5280	5380	5470	5570	5680	5780	5890	137	189
	V1	115	115	115	115	115	114	114	114	114	114	113		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
37000	BFL	4560	4640	4730	4830	4920	5000	5090	5190	5280	5380	5470	135	186
	V1	112	112	112	111	111	111	111	110	110	110	110		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2		
36000	BFL	4240	4310	4400	4490	4570	4650	4730	4820	4910	5000	5080	133	183
	V1	108	108	108	108	108	107	107	107	107	107	107		
	VR	131	131	131	131	131	131	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6		
35000	BFL	3940	4010	4090	4170	4240	4320	4390	4480	4560	4640	4720	131	180
	V1	105	105	105	104	104	104	104	104	103	103	103		
	VR	128	128	128	128	128	128	127	127	127	127	127		
	V2	136	135	135	135	135	135	135	135	135	135	135		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	8	8	8	8	8		
34000	BFL	3670	3730	3810	3880	3950	4020	4090	4160	4240	4310	4390	129	177
	V1	101	101	101	101	101	101	100	100	100	100	100		
	VR	125	125	125	125	125	125	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
33000	BFL	3450	3510	3590	3670	3750	3820	3900	3980	4060	4140	4220	127	175
	V1	99	99	99	98	98	98	98	98	98	98	98		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9		
32000	BFL	3420	3490	3560	3640	3730	3790	3870	3950	4030	4100	4180	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4		

FIGURE 5-230. TAKE-OFF DISTANCE; FLAPS - 10° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
31000	BFL	3410	3460	3540	3620	3690	3770	3840	3930	4010	4080	4150	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.8	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
30000	BFL	3370	3430	3510	3580	3660	3740	3820	3890	3970	4040	4110	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5		
29000	BFL	3360	3420	3490	3570	3640	3720	3780	3860	3940	4010	4080	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11	11	11	11	11	11	11.1	11.1	11.1	11.1	11.1		
28000	BFL	3330	3380	3460	3530	3600	3680	3750	3830	3900	3970	4050	117	160
	V1	100	100	100	100	99	99	99	99	99	99	99		
	VR	108	108	108	108	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
27000	BFL	3300	3370	3440	3510	3580	3660	3720	3800	3870	3940	4010	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.5		
26000	BFL	3280	3340	3410	3470	3550	3630	3700	3770	3840	3920	3980	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.2	13.2	13.2	13.2	13.2	13.3	13.3	13.3	13.3	13.3	13.3		

FIGURE 5-230. TAKE-OFF DISTANCE; FLAPS - 10° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	114		
	N1%	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
39600	BFL	6700	6820	6940	7060	7180	7300	7780	8520	9330	10190	10370	140	193
	V1	119	118	118	118	118	118	120	123	126	130	130		
	VR	141	141	141	141	141	141	142	144	146	147	147		
	V2	147	147	147	147	147	147	148	149	149	150	150		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	5.9	5.3	4.7	4.1	4		
39000	BFL	6430	6540	6660	6770	6880	7000	7470	8170	8950	9790	9970	139	191
	V1	117	116	116	116	116	116	118	121	124	128	128		
	VR	140	140	140	140	140	140	141	142	144	145	146		
	V2	146	146	146	146	146	146	146	147	148	149	149		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.1	5.5	4.9	4.3	4.2		
38000	BFL	5990	6090	6200	6310	6410	6520	6950	7600	8340	9130	9310	137	189
	V1	113	113	113	113	113	113	114	118	121	124	125		
	VR	137	137	137	137	137	137	138	139	141	143	143		
	V2	143	143	143	143	143	143	144	145	145	146	146		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.4	5.8	5.2	4.6	4.5		
37000	BFL	5570	5670	5770	5870	5960	6060	6470	7070	7750	8510	8670	135	186
	V1	110	110	110	109	109	109	111	114	117	121	121		
	VR	134	134	134	134	134	134	135	136	138	140	140		
	V2	141	141	141	141	141	141	141	142	143	144	144		
	GR2	7.2	7.2	7.2	7.2	7.2	7.1	6.8	6.2	5.5	4.9	4.8		
36000	BFL	5170	5260	5360	5450	5540	5630	6000	6560	7190	7880	8040	133	183
	V1	106	106	106	106	106	106	108	111	114	117	118		
	VR	130	130	130	130	130	130	132	133	135	137	137		
	V2	138	138	138	138	138	138	139	139	140	141	141		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.2	6.5	5.9	5.3	5.1		
35000	BFL	4800	4890	4970	5060	5140	5220	5560	6080	6660	7300	7440	131	180
	V1	103	103	103	103	102	102	104	107	110	114	114		
	VR	127	127	127	127	127	127	129	130	132	134	134		
	V2	135	135	135	135	135	135	136	137	138	138	138		
	GR2	8	8	8	8	7.9	7.9	7.6	6.9	6.3	5.6	5.5		
34000	BFL	4460	4540	4620	4700	4770	4850	5150	5610	6150	6750	6880	129	177
	V1	100	100	99	99	99	99	101	104	107	110	111		
	VR	124	124	124	124	124	124	126	127	129	130	131		
	V2	133	133	133	133	133	133	133	134	135	136	136		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8	7.3	6.7	6	5.9		
33000	BFL	4290	4370	4450	4530	4610	4700	4770	5180	5670	6220	6340	127	175
	V1	98	98	98	98	98	98	97	100	103	106	107		
	VR	122	122	122	122	122	122	122	124	126	127	128		
	V2	130	130	130	130	130	130	131	131	132	133	133		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.4	7.8	7.1	6.4	6.3		
32000	BFL	4260	4340	4410	4500	4580	4660	4660	4790	5220	5730	5840	125	172
	V1	98	98	98	98	98	98	97	97	100	103	103		
	VR	119	119	119	119	119	119	120	121	122	124	124		
	V2	128	128	128	128	128	128	128	129	129	130	130		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	8.9	8.2	7.5	6.8	6.7		

FIGURE 5-230. TAKE-OFF DISTANCE; FLAPS - 10° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	113	114		
	N1%	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
31000	BFL	4220	4300	4380	4460	4540	4620	4620	4560	4810	5260	5360	123	169
	V1	99	99	99	98	98	98	97	95	96	99	100		
	VR	116	116	116	116	116	116	117	118	119	121	121		
	V2	126	126	126	126	126	126	126	126	127	127	128		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.4	8.7	8	7.3	7.1		
30000	BFL	4190	4260	4340	4420	4500	4580	4580	4520	4440	4830	4920	121	166
	V1	99	99	99	99	99	99	97	95	95	95	96		
	VR	113	113	113	113	113	113	114	115	116	118	118		
	V2	123	123	123	123	123	123	124	124	124	125	125		
	GR2	10.5	10.5	10.4	10.4	10.4	10.4	10	9.3	8.5	7.8	7.6		
29000	BFL	4150	4230	4300	4380	4460	4540	4530	4480	4400	4440	4520	119	163
	V1	99	99	99	99	99	99	97	95	93	92	92		
	VR	110	110	110	110	110	110	111	112	113	115	115		
	V2	121	121	121	121	121	121	121	121	122	122	122		
	GR2	11.1	11.1	11.1	11.1	11.1	11.1	10.6	9.8	9	8.3	8.1		
28000	BFL	4120	4190	4270	4340	4420	4500	4490	4440	4360	4280	4260	117	160
	V1	99	99	99	99	99	99	98	95	93	91	90		
	VR	107	107	107	107	107	107	108	109	110	112	112		
	V2	119	119	119	119	119	119	119	119	119	120	120		
	GR2	11.8	11.8	11.7	11.7	11.7	11.7	11.2	10.4	9.6	8.8	8.6		
27000	BFL	4090	4160	4230	4310	4380	4460	4450	4400	4320	4240	4220	115	157
	V1	99	99	99	99	99	99	98	96	93	91	90		
	VR	105	105	105	105	105	105	105	106	107	108	109		
	V2	118	118	118	117	117	117	117	117	117	117	117		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	11.9	11.1	10.3	9.4	9.2		
26000	BFL	4050	4120	4190	4270	4340	4420	4410	4360	4280	4200	4180	113	154
	V1	100	100	100	100	99	99	98	96	93	91	90		
	VR	103	103	103	103	103	103	103	103	104	105	105		
	V2	116	116	116	116	116	116	116	115	114	114	115		
	GR2	13.3	13.3	13.3	13.3	13.3	13.3	12.7	11.9	10.9	10.1	9.9		

FIGURE 5-231. TAKE-OFF DISTANCE; FLAPS - 10° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	BFL	5920	6020	6150	6280	6410	6530	6650	6780	6910	7040	7170	141	193
	V1	123	123	123	122	122	122	122	122	121	121	121		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.9	5.9	5.9	5.9	5.9	6	6	6	6	6	6		
39000	BFL	5650	5750	5880	6000	6120	6230	6350	6480	6600	6720	6840	140	192
	V1	121	120	120	120	120	120	119	119	119	119	119		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.1	6.1	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2		
38000	BFL	5240	5330	5450	5560	5670	5780	5880	6000	6110	6220	6330	137	189
	V1	117	117	116	116	116	116	116	115	115	115	115		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
37000	BFL	4880	4960	5070	5170	5270	5370	5470	5580	5680	5790	5890	135	186
	V1	113	113	113	113	113	112	112	112	112	112	111		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
36000	BFL	4530	4610	4710	4810	4900	4990	5080	5180	5280	5370	5470	133	183
	V1	110	110	109	109	109	109	109	108	108	108	108		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3		
35000	BFL	4210	4280	4370	4460	4550	4630	4710	4800	4890	4980	5070	131	181
	V1	106	106	106	106	106	105	105	105	105	105	104		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7		
34000	BFL	3910	3970	4060	4140	4220	4300	4370	4460	4540	4620	4700	129	178
	V1	103	103	102	102	102	102	102	102	101	101	101		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	133	133	133	133	133		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
33000	BFL	3640	3700	3780	3850	3920	4000	4070	4140	4220	4290	4360	127	175
	V1	99	99	99	99	99	99	98	98	98	98	98		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
32000	BFL	3510	3570	3650	3730	3810	3880	3960	4040	4120	4200	4280	125	172
	V1	98	98	98	98	98	98	98	98	98	97	97		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	128	128	128	128	128	128	128		
	GR2	9	9	9	9	9	9	9	9	9	9	9		

FIGURE 5-231. TAKE-OFF DISTANCE; FLAPS - 10° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 78.7	-50 -58 79.2	-45 -49 80.1	-40 -40 81.0	-35 -31 81.8	-30 -22 82.7	-25 -13 83.6	-20 -4 84.4	-15 5 85.2	-10 14 86.1	-5 23 86.9	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3490	3560	3630	3700	3770	3850	3930	4010	4090	4170	4250	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
30000	BFL	3470	3520	3590	3670	3740	3830	3900	3980	4060	4130	4210	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	114	114	114	114	113	113	113	113	113	113	113		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
29000	BFL	3450	3500	3580	3650	3730	3800	3870	3950	4020	4100	4170	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.6	10.6	10.6	10.6	10.6	10.7	10.7	10.7	10.7	10.7	10.7		
28000	BFL	3420	3460	3540	3610	3700	3760	3840	3910	3990	4070	4140	117	160
	V1	99	99	99	98	98	98	98	98	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
27000	BFL	3400	3450	3520	3580	3660	3730	3810	3880	3960	4040	4100	115	157
	V1	99	99	99	99	99	99	99	99	99	98	98		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12	12	12	12	12	12	12.1	12.1	12.1	12.1	12.1		
26000	BFL	3370	3410	3490	3560	3640	3710	3780	3850	3920	4000	4070	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 5-231. TAKE-OFF DISTANCE; FLAPS - 10° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	111			
	N1%	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
39600	BFL	7300	7430	7560	7690	7820	8050	8760	9580	10450	11200		141	193
	V1	121	121	121	121	121	121	124	127	130	132			
	VR	143	143	143	143	143	144	145	147	148	149			
	V2	149	149	149	149	149	149	150	151	151	152			
	GR2	6	6	6	6	5.9	5.9	5.4	4.8	4.3	3.8			
39000	BFL	6960	7090	7220	7340	7470	7680	8340	9150	9980	10720		140	192
	V1	119	118	118	118	118	118	121	125	128	130			
	VR	141	141	141	141	141	141	143	145	146	147			
	V2	147	147	147	147	147	147	148	149	149	150			
	GR2	6.2	6.2	6.2	6.2	6.2	6.1	5.6	5	4.4	4			
38000	BFL	6450	6560	6680	6790	6910	7110	7720	8480	9260	9980		137	189
	V1	115	115	114	114	114	115	117	121	124	127			
	VR	138	138	138	138	138	138	140	142	143	144			
	V2	144	144	144	144	144	144	145	146	147	147			
	GR2	6.5	6.5	6.5	6.5	6.5	6.4	5.9	5.3	4.8	4.3			
37000	BFL	5990	6100	6210	6310	6420	6610	7170	7860	8620	9280		135	186
	V1	111	111	111	111	111	111	114	117	120	123			
	VR	135	135	135	135	135	135	137	138	140	141			
	V2	141	141	141	141	141	141	142	143	144	145			
	GR2	6.9	6.9	6.9	6.9	6.8	6.8	6.3	5.7	5.1	4.6			
36000	BFL	5560	5660	5760	5860	5960	6130	6650	7290	7980	8630		133	183
	V1	108	108	108	107	107	108	110	113	117	120			
	VR	132	132	132	132	132	132	134	135	137	138			
	V2	139	139	139	139	139	139	140	141	141	142			
	GR2	7.3	7.3	7.2	7.2	7.2	7.2	6.7	6	5.4	4.9			
35000	BFL	5160	5250	5340	5430	5520	5680	6160	6740	7390	7980		131	181
	V1	104	104	104	104	104	104	107	110	113	116			
	VR	129	129	129	129	129	129	131	132	134	135			
	V2	136	136	136	136	136	136	137	138	139	139			
	GR2	7.7	7.7	7.7	7.7	7.6	7.6	7.1	6.4	5.8	5.3			
34000	BFL	4780	4870	4950	5030	5120	5260	5690	6230	6820	7370		129	178
	V1	101	101	101	101	101	101	103	106	109	112			
	VR	126	126	126	126	126	126	127	129	131	132			
	V2	133	133	133	133	133	134	134	135	136	137			
	GR2	8.1	8.1	8.1	8.1	8.1	8	7.5	6.8	6.2	5.7			
33000	BFL	4440	4520	4590	4670	4750	4870	5250	5740	6280	6790		127	175
	V1	98	98	97	97	97	98	100	103	106	108			
	VR	123	123	123	123	123	123	124	126	128	129			
	V2	131	131	131	131	131	131	132	132	133	134			
	GR2	8.5	8.5	8.5	8.5	8.5	8.4	7.9	7.2	6.6	6			
32000	BFL	4360	4440	4520	4600	4690	4750	4860	5290	5780	6240		125	172
	V1	97	97	97	97	97	97	96	99	102	105			
	VR	120	120	120	120	120	120	121	123	124	126			
	V2	128	128	128	128	128	129	129	130	130	131			
	GR2	9	9	9	9	9	8.9	8.4	7.7	7	6.4			

FIGURE 5-231. TAKE-OFF DISTANCE; FLAPS - 10° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	111			
	N1%	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
31000	BFL	4320	4400	4480	4560	4640	4710	4680	4870	5310	5720		123	169
	V1	98	97	97	97	97	97	95	96	98	101			
	VR	117	117	117	117	117	117	118	120	121	122			
	V2	126	126	126	126	126	126	127	127	128	128			
	GR2	9.5	9.5	9.5	9.5	9.5	9.4	8.9	8.1	7.5	6.9			
30000	BFL	4290	4360	4440	4520	4600	4670	4640	4580	4870	5240		121	166
	V1	98	98	98	98	98	97	95	95	95	97			
	VR	113	113	113	113	113	114	115	117	118	119			
	V2	124	124	124	124	124	124	124	125	125	126			
	GR2	10.1	10.1	10.1	10.1	10.1	10	9.4	8.7	7.9	7.3			
29000	BFL	4250	4330	4400	4480	4560	4630	4600	4540	4480	4800		119	163
	V1	98	98	98	98	98	97	96	93	93	93			
	VR	110	110	110	110	110	111	112	113	115	116			
	V2	121	121	121	121	121	121	122	122	122	123			
	GR2	10.7	10.7	10.7	10.7	10.7	10.6	10	9.2	8.5	7.8			
28000	BFL	4210	4290	4370	4450	4520	4590	4560	4500	4420	4410		117	160
	V1	98	98	98	98	98	98	96	93	91	90			
	VR	108	108	108	108	108	108	109	110	112	113			
	V2	119	119	119	119	119	119	119	120	120	120			
	GR2	11.3	11.3	11.3	11.3	11.3	11.2	10.6	9.8	9	8.4			
27000	BFL	4180	4250	4330	4410	4480	4540	4520	4450	4380	4310		115	157
	V1	98	98	98	98	98	98	96	94	91	89			
	VR	105	105	105	105	105	105	106	107	108	109			
	V2	117	117	117	117	117	117	117	117	117	118			
	GR2	12.1	12.1	12	12	12	11.9	11.3	10.4	9.6	9			
26000	BFL	4150	4220	4290	4370	4440	4500	4480	4410	4340	4270		113	154
	V1	99	99	98	98	98	98	96	94	92	90			
	VR	103	103	103	103	103	103	103	104	105	106			
	V2	116	116	116	116	116	117	115	115	115	115			
	GR2	12.8	12.8	12.8	12.8	12.8	12.7	12	11.1	10.3	9.6			

FIGURE 5-232. TAKE-OFF DISTANCE; FLAPS - 10° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	BFL	6480	6590	6740	6880	7010	7150	7290	7430	7570	7710	7860	142	194
	V1	126	125	125	125	125	125	124	124	124	124	124		
	VR	146	146	146	146	146	146	146	145	145	145	145		
	V2	151	151	151	151	150	150	150	150	150	150	150		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
39000	BFL	6180	6290	6430	6560	6690	6820	6950	7090	7220	7360	7490	141	192
	V1	123	123	123	123	122	122	122	122	122	121	121		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	149	149	149	148	148	148	148	148	148	148	148		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
38000	BFL	5710	5810	5940	6060	6180	6300	6420	6540	6670	6790	6910	138	189
	V1	119	119	119	119	118	118	118	118	118	117	117		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3		
37000	BFL	5270	5360	5480	5590	5700	5810	5920	6030	6140	6260	6370	136	187
	V1	115	115	115	115	114	114	114	114	114	113	113		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	BFL	4890	4970	5080	5180	5290	5380	5480	5590	5690	5800	5900	133	184
	V1	111	111	111	111	111	110	110	110	110	110	110		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7	6.9	6.9	6.9	7	7	7	7	7	7	7		
35000	BFL	4530	4610	4710	4810	4900	4990	5080	5180	5280	5370	5470	131	181
	V1	108	108	108	107	107	107	107	107	106	106	106		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	BFL	4200	4270	4360	4450	4540	4620	4710	4800	4880	4970	5060	129	178
	V1	104	104	104	104	104	103	103	103	103	103	103		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
33000	BFL	3900	3970	4050	4130	4210	4280	4360	4440	4530	4610	4690	127	175
	V1	101	101	100	100	100	100	100	100	99	99	99		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
32000	BFL	3620	3680	3760	3830	3910	3980	4050	4140	4220	4300	4380	125	172
	V1	97	97	97	97	97	96	96	96	96	96	96		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		

FIGURE 5-232. TAKE-OFF DISTANCE; FLAPS - 10° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 79.1	-50 -58 79.7	-45 -49 80.6	-40 -40 81.5	-35 -31 82.3	-30 -22 83.2	-25 -13 84.1	-20 -4 84.9	-15 5 85.8	-10 14 86.6	-5 23 87.4	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	3560	3620	3700	3780	3860	3940	4020	4100	4180	4260	4340	123	169
	V1	97	97	97	97	97	97	97	97	96	96	96		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
30000	BFL	3540	3590	3680	3760	3830	3920	3990	4070	4150	4220	4300	121	166
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	115	115	115	115	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.7	9.7	9.7	9.7	9.7	9.8	9.8	9.8	9.8	9.8	9.8		
29000	BFL	3520	3570	3650	3720	3800	3890	3950	4030	4110	4190	4270	119	163
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	BFL	3490	3540	3610	3690	3780	3850	3930	4000	4080	4150	4240	117	160
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	11	11	11	11		
27000	BFL	3470	3520	3590	3670	3740	3820	3900	3980	4050	4130	4190	115	157
	V1	98	98	98	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.7	11.7	11.7		
26000	BFL	3430	3490	3560	3640	3710	3790	3870	3940	4020	4080	4160	113	154
	V1	98	98	98	98	98	98	98	98	98	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	116	116	116	115	115		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4		

FIGURE 5-232. TAKE-OFF DISTANCE; FLAPS - 10° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	107			
	N1%	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
39600	BFL	8000	8150	8290	8440	8580	9100	9920	10810	11760	12190		142	194
	V1	124	123	123	123	123	125	128	131	134	135			
	VR	145	145	145	145	145	147	148	149	151	151			
	V2	150	150	150	150	150	151	152	153	153	153			
	GR2	5.7	5.7	5.7	5.7	5.7	5.5	4.9	4.4	3.9	3.6			
39000	BFL	7630	7770	7910	8040	8180	8660	9470	10310	11250	11660		141	192
	V1	121	121	121	121	121	122	125	128	131	132			
	VR	143	143	143	143	143	144	146	147	149	149			
	V2	148	148	148	148	148	149	150	151	151	151			
	GR2	5.9	5.9	5.9	5.9	5.9	5.7	5.1	4.6	4	3.8			
38000	BFL	7040	7170	7290	7420	7550	7990	8750	9550	10430	10810		138	189
	V1	117	117	117	117	117	118	121	124	127	129			
	VR	140	140	140	140	140	141	143	144	145	146			
	V2	145	145	145	145	145	146	147	148	148	149			
	GR2	6.3	6.2	6.2	6.2	6.2	6	5.5	4.9	4.3	4.1			
37000	BFL	6490	6600	6720	6830	6950	7360	8040	8820	9630	10000		136	187
	V1	113	113	113	113	113	114	117	120	123	125			
	VR	136	136	136	136	136	137	139	141	142	143			
	V2	142	142	142	142	142	143	144	145	145	146			
	GR2	6.6	6.6	6.6	6.6	6.6	6.3	5.8	5.2	4.7	4.4			
36000	BFL	6010	6120	6220	6330	6440	6810	7450	8150	8940	9280		133	184
	V1	109	109	109	109	109	110	114	117	120	121			
	VR	133	133	133	133	133	134	136	137	139	140			
	V2	139	139	139	139	139	140	141	142	143	143			
	GR2	7	7	7	7	6.9	6.7	6.2	5.6	5	4.7			
35000	BFL	5570	5670	5760	5860	5960	6300	6880	7540	8280	8610		131	181
	V1	106	106	106	106	105	107	110	113	116	118			
	VR	130	130	130	130	130	131	133	134	136	137			
	V2	137	137	137	137	137	137	138	139	140	141			
	GR2	7.4	7.4	7.4	7.4	7.3	7.1	6.5	5.9	5.3	5.1			
34000	BFL	5150	5240	5330	5420	5510	5820	6350	6960	7630	7940		129	178
	V1	102	102	102	102	102	103	106	109	112	114			
	VR	127	127	127	127	127	128	129	131	133	134			
	V2	134	134	134	134	134	135	135	136	137	138			
	GR2	7.8	7.8	7.8	7.8	7.8	7.5	6.9	6.3	5.7	5.4			
33000	BFL	4770	4850	4940	5020	5100	5380	5860	6400	7020	7310		127	175
	V1	99	99	99	99	99	100	103	106	109	110			
	VR	124	124	124	124	124	125	126	128	130	130			
	V2	132	132	132	132	132	132	133	134	134	135			
	GR2	8.2	8.2	8.2	8.2	8.2	7.9	7.3	6.7	6.1	5.8			
32000	BFL	4460	4540	4620	4710	4790	4970	5390	5890	6450	6710		125	172
	V1	96	96	96	96	96	96	99	102	105	106			
	VR	121	121	121	121	121	122	123	125	126	127			
	V2	129	129	129	129	129	129	130	131	132	132			
	GR2	8.7	8.7	8.7	8.7	8.7	8.4	7.8	7.2	6.5	6.2			

FIGURE 5-232. TAKE-OFF DISTANCE; FLAPS - 10° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	107			
	N1%	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
31000	BFL	4420	4500	4580	4670	4750	4770	4970	5400	5910	6150		123	169
	V1	96	96	96	96	96	95	95	98	101	102			
	VR	118	118	118	118	118	118	120	121	123	124			
	V2	126	126	126	126	126	127	127	128	129	129			
	GR2	9.2	9.2	9.2	9.2	9.2	8.9	8.3	7.6	6.9	6.7			
30000	BFL	4380	4460	4540	4630	4710	4730	4690	4960	5410	5620		121	166
	V1	97	96	96	96	96	95	95	95	97	99			
	VR	114	114	114	114	114	115	117	118	120	120			
	V2	124	124	124	124	124	124	125	125	126	126			
	GR2	9.8	9.8	9.7	9.7	9.7	9.4	8.8	8.1	7.4	7.1			
29000	BFL	4350	4420	4500	4590	4660	4690	4650	4580	4950	5140		119	163
	V1	97	97	97	97	96	95	93	91	94	95			
	VR	111	111	111	111	111	112	114	115	116	117			
	V2	121	121	121	121	121	122	122	123	123	124			
	GR2	10.3	10.3	10.3	10.3	10.3	10	9.3	8.6	7.9	7.6			
28000	BFL	4320	4400	4460	4540	4620	4640	4600	4540	4540	4700		117	160
	V1	97	97	97	97	97	96	94	91	91	91			
	VR	108	108	108	108	108	109	110	112	113	114			
	V2	119	119	119	119	119	119	120	120	121	121			
	GR2	10.9	10.9	10.9	10.9	10.9	10.6	9.9	9.2	8.4	8.1			
27000	BFL	4270	4350	4420	4510	4580	4600	4560	4500	4430	4400		115	157
	V1	97	97	97	97	97	96	94	92	89	88			
	VR	106	106	106	106	106	106	107	109	110	111			
	V2	117	117	117	117	117	117	117	117	118	118			
	GR2	11.6	11.6	11.6	11.6	11.6	11.3	10.5	9.8	9	8.7			
26000	BFL	4230	4320	4380	4460	4540	4560	4520	4460	4390	4350		113	154
	V1	97	97	97	97	97	96	94	92	90	89			
	VR	103	103	103	103	103	104	104	105	107	107			
	V2	115	115	115	115	115	115	115	115	115	115			
	GR2	12.4	12.4	12.4	12.4	12.4	12	11.2	10.4	9.6	9.3			

FIGURE 5-233. TAKE-OFF DISTANCE; FLAPS - 10° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	BFL	7050	7180	7340	7490	7650	7790	7950	8110	8270	8420	8580	143	194
	V1	128	128	128	127	127	127	127	127	126	126	126		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	BFL	6710	6830	6980	7130	7280	7420	7570	7720	7860	8010	8160	142	193
	V1	125	125	125	125	125	124	124	124	124	124	124		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	BFL	6200	6310	6450	6580	6720	6840	6980	7120	7250	7390	7520	139	190
	V1	121	121	121	121	120	120	120	120	120	120	119		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
37000	BFL	5710	5810	5940	6060	6180	6300	6430	6550	6680	6800	6920	137	187
	V1	117	117	117	117	116	116	116	116	116	115	115		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4		
36000	BFL	5260	5350	5460	5580	5690	5800	5910	6030	6140	6250	6370	134	184
	V1	113	113	113	112	112	112	112	112	112	111	111		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	140	140		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
35000	BFL	4850	4940	5050	5150	5250	5350	5460	5560	5660	5770	5870	132	181
	V1	109	109	109	109	108	108	108	108	108	108	107		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
34000	BFL	4490	4570	4670	4770	4860	4950	5050	5140	5240	5330	5430	129	178
	V1	106	105	105	105	105	105	105	104	104	104	104		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
33000	BFL	4160	4230	4320	4410	4490	4580	4670	4750	4840	4930	5020	127	176
	V1	102	102	102	102	101	101	101	101	101	101	100		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.9	7.9	7.9	7.9	7.9	8	8	8	8	8	8		
32000	BFL	3860	3920	4000	4090	4160	4240	4320	4400	4480	4560	4640	125	173
	V1	98	98	98	98	98	98	98	97	97	97	97		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		

FIGURE 5-233. TAKE-OFF DISTANCE; FLAPS - 10° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
31000	BFL	3650	3720	3800	3880	3960	4040	4130	4210	4290	4370	4460	123	170
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
30000	BFL	3630	3690	3780	3860	3930	4010	4090	4180	4260	4340	4430	121	167
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
29000	BFL	3590	3660	3750	3820	3900	3990	4060	4140	4230	4300	4380	119	164
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10	10	10	10	10	10	10	10	10	10	10		
28000	BFL	3580	3640	3710	3790	3860	3950	4020	4100	4180	4260	4350	117	161
	V1	97	97	97	96	96	96	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
27000	BFL	3550	3610	3680	3750	3840	3920	4000	4080	4150	4220	4300	115	157
	V1	97	97	97	97	97	97	97	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.2	11.2	11.2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
26000	BFL	3520	3570	3640	3730	3810	3890	3960	4040	4120	4200	4280	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12	12	12	12	12	12	12	12	12	12	12		

FIGURE 5-233. TAKE-OFF DISTANCE; FLAPS - 10° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	104			
	N1%	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5	89.5			
39600	BFL	8740	8900	9060	9220	9390	10230	11170	12110	13180	13200		143	194
	V1	126	126	126	126	126	128	132	134	137	137			
	VR	148	148	148	148	148	150	151	152	153	153			
	V2	152	152	152	152	152	153	154	154	155	155			
	GR2	5.5	5.5	5.5	5.5	5.4	5.1	4.5	4	3.5	3.4			
39000	BFL	8310	8460	8610	8770	8930	9760	10650	11580	12600	12620		142	193
	V1	123	123	123	123	123	126	129	132	135	135			
	VR	146	146	146	146	146	148	149	150	151	151			
	V2	150	150	150	150	150	152	152	153	153	153			
	GR2	5.7	5.7	5.7	5.7	5.6	5.2	4.7	4.2	3.6	3.6			
38000	BFL	7660	7800	7940	8080	8240	9000	9850	10720	11670	11690		139	190
	V1	119	119	119	119	119	122	125	128	131	131			
	VR	142	142	142	142	142	144	146	147	148	148			
	V2	147	147	147	147	147	148	149	150	150	150			
	GR2	6	6	6	6	5.9	5.6	5	4.5	3.9	3.9			
37000	BFL	7050	7180	7310	7430	7580	8270	9080	9870	10800	10820		137	187
	V1	115	115	115	115	115	118	121	124	127	127			
	VR	138	138	138	138	138	140	142	143	145	145			
	V2	144	144	144	144	144	145	146	147	147	147			
	GR2	6.4	6.4	6.4	6.3	6.3	5.9	5.3	4.8	4.2	4.2			
36000	BFL	6480	6600	6710	6830	6960	7590	8350	9110	9950	9970		134	184
	V1	111	111	111	111	111	114	117	120	123	123			
	VR	135	135	135	135	135	136	138	140	141	141			
	V2	140	140	140	140	140	142	143	144	144	144			
	GR2	6.7	6.7	6.7	6.7	6.6	6.2	5.7	5.1	4.5	4.5			
35000	BFL	5980	6080	6190	6300	6420	6990	7670	8400	9190	9210		132	181
	V1	107	107	107	107	107	110	113	116	119	119			
	VR	131	131	131	131	131	133	135	137	138	138			
	V2	137	137	137	137	137	139	140	141	142	142			
	GR2	7.1	7.1	7.1	7.1	7	6.6	6	5.5	4.9	4.9			
34000	BFL	5530	5620	5720	5820	5940	6450	7070	7730	8500	8520		129	178
	V1	104	104	104	103	103	106	109	112	115	115			
	VR	128	128	128	128	128	130	132	133	135	135			
	V2	135	135	135	135	135	136	137	138	139	139			
	GR2	7.5	7.5	7.5	7.5	7.4	7	6.4	5.8	5.2	5.2			
33000	BFL	5110	5190	5280	5370	5480	5950	6510	7120	7810	7840		127	176
	V1	100	100	100	100	100	102	105	108	111	112			
	VR	125	125	125	125	125	127	128	130	132	132			
	V2	132	132	132	132	132	133	134	135	136	136			
	GR2	8	8	8	7.9	7.9	7.4	6.8	6.2	5.6	5.6			
32000	BFL	4720	4800	4880	4970	5070	5470	5990	6530	7170	7180		125	173
	V1	97	97	97	97	97	99	102	105	108	108			
	VR	122	122	122	122	122	123	125	127	128	128			
	V2	130	130	130	130	129	131	131	132	133	133			
	GR2	8.4	8.4	8.4	8.4	8.3	7.9	7.2	6.7	6	6			

FIGURE 5-233. TAKE-OFF DISTANCE; FLAPS - 10° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	40	40.1		Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	104	104			
	N1%	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5	89.5			
31000	BFL	4540	4620	4710	4790	4850	5050	5490	5990	6570	6580		123	170
	V1	95	95	95	95	95	95	98	101	104	104			
	VR	119	119	119	119	119	120	122	123	125	125			
	V2	127	127	127	127	127	128	129	129	130	130			
	GR2	8.9	8.9	8.9	8.9	8.8	8.4	7.7	7.1	6.4	6.4			
30000	BFL	4500	4580	4670	4750	4800	4810	5040	5480	6000	6010		121	167
	V1	96	96	96	95	95	94	94	97	100	100			
	VR	115	115	115	115	115	117	119	120	122	122			
	V2	124	124	124	124	124	125	126	126	127	127			
	GR2	9.4	9.4	9.4	9.4	9.3	8.9	8.2	7.6	6.9	6.9			
29000	BFL	4460	4540	4620	4710	4760	4760	4710	5010	5470	5480		119	164
	V1	96	96	96	96	95	94	92	93	96	96			
	VR	112	112	112	112	112	114	115	117	118	118			
	V2	122	122	122	122	122	122	123	124	124	124			
	GR2	10	10	10	10	9.9	9.4	8.7	8.1	7.4	7.4			
28000	BFL	4430	4510	4590	4680	4720	4720	4670	4610	4980	4990		117	161
	V1	96	96	96	96	95	94	92	92	92	92			
	VR	109	109	109	109	109	110	112	113	115	115			
	V2	119	119	119	119	119	120	120	121	122	122			
	GR2	10.6	10.6	10.6	10.6	10.4	10	9.3	8.6	7.9	7.9			
27000	BFL	4380	4460	4540	4630	4670	4680	4620	4570	4570	4570		115	157
	V1	96	96	96	96	96	94	92	90	88	88			
	VR	106	106	106	106	106	107	109	110	112	112			
	V2	117	117	117	117	117	117	118	118	119	119			
	GR2	11.3	11.3	11.3	11.3	11.1	10.6	9.9	9.2	8.4	8.4			
26000	BFL	4340	4420	4500	4580	4630	4630	4580	4520	4460	4450		113	154
	V1	97	96	96	96	96	94	92	90	88	88			
	VR	104	104	104	104	104	104	105	107	108	108			
	V2	115	115	115	115	115	115	115	116	116	116			
	GR2	12	12	12	12	11.9	11.3	10.5	9.8	9.1	9			

FIGURE 5-234. TAKE-OFF DISTANCE; FLAPS - 10° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	BFL	7830	7970	8140	8300	8450	8610	8780	8960	9130	9300	9480	144	194
	V1	131	131	131	131	130	130	130	130	130	129	129		
	VR	151	151	151	151	151	151	151	150	150	150	150		
	V2	155	155	155	155	154	154	154	154	154	154	154		
	GR2	5.2	5.2	5.2	5.2	5.2	5.3	5.3	5.3	5.3	5.3	5.3		
39000	BFL	7470	7600	7760	7910	8050	8210	8370	8530	8700	8870	9030	143	193
	V1	129	129	128	128	128	127	127	127	127	127	127		
	VR	149	149	148	148	148	148	148	148	148	148	148		
	V2	153	153	152	152	152	152	152	152	152	152	152		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	BFL	6890	7010	7160	7290	7430	7560	7720	7870	8020	8170	8320	140	190
	V1	124	124	124	124	123	123	123	123	123	123	122		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.7	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	BFL	6330	6440	6580	6700	6820	6950	7090	7230	7360	7500	7640	138	187
	V1	120	120	120	119	119	119	119	119	118	118	118		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	BFL	5820	5920	6050	6160	6270	6380	6510	6640	6760	6890	7010	135	185
	V1	116	116	116	115	115	115	115	114	114	114	114		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	142	142	142	142	142	142	142	142		
	GR2	6.4	6.4	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5		
35000	BFL	5340	5440	5550	5650	5750	5860	5970	6090	6200	6320	6430	133	182
	V1	112	112	111	111	111	111	110	110	110	110	110		
	VR	134	134	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
34000	BFL	4910	5000	5100	5190	5290	5380	5490	5590	5700	5800	5910	130	179
	V1	108	108	107	107	107	107	106	106	106	106	106		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
33000	BFL	4540	4610	4710	4790	4880	4970	5060	5160	5260	5350	5450	127	176
	V1	104	104	104	103	103	103	103	103	102	102	102		
	VR	127	127	127	127	127	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7		
32000	BFL	4190	4260	4340	4420	4500	4580	4670	4760	4850	4930	5020	125	173
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		

FIGURE 5-234. TAKE-OFF DISTANCE; FLAPS - 10° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
31000	BFL	3870	3940	4020	4090	4160	4240	4320	4390	4470	4550	4630	123	170
	V1	97	97	96	96	96	96	96	96	95	95	95		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.5	8.5	8.5	8.5	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
30000	BFL	3690	3760	3840	3930	4010	4100	4180	4270	4350	4430	4520	121	167
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
29000	BFL	3690	3750	3820	3900	3980	4070	4160	4240	4310	4410	4480	119	164
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	114	114	114	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
28000	BFL	3670	3710	3790	3870	3950	4040	4110	4200	4280	4360	4440	117	161
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
27000	BFL	3630	3690	3760	3840	3920	4010	4090	4160	4240	4330	4410	115	158
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.8	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9		
26000	BFL	3600	3660	3720	3810	3890	3970	4050	4130	4210	4290	4360	113	155
	V1	96	96	96	96	96	96	96	95	95	95	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.5	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6	11.6		

FIGURE 5-234. TAKE-OFF DISTANCE; FLAPS - 10° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	100				
	N1%	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
39600	BFL	9650	9830	10010	10220	10710	11650	12670	13770	14520			144	194
	V1	129	129	129	129	130	133	136	139	140				
	VR	150	150	150	151	151	153	154	155	155				
	V2	154	154	154	154	155	156	156	156	157				
	GR2	5.3	5.2	5.2	5.2	5	4.5	4	3.5	3.2				
39000	BFL	9200	9370	9540	9730	10220	11120	12110	13150	13870			143	193
	V1	126	126	126	126	128	130	133	136	138				
	VR	148	148	148	148	149	151	152	153	153				
	V2	152	152	152	152	153	154	154	155	155				
	GR2	5.4	5.4	5.4	5.4	5.2	4.7	4.2	3.7	3.4				
38000	BFL	8480	8630	8790	8970	9410	10270	11200	12170	12830			140	190
	V1	122	122	122	122	123	126	129	132	134				
	VR	145	145	145	145	145	147	148	149	150				
	V2	149	149	149	149	150	151	151	152	152				
	GR2	5.8	5.8	5.8	5.7	5.5	5	4.5	4	3.7				
37000	BFL	7780	7920	8060	8230	8640	9460	10330	11260	11860			138	187
	V1	118	118	118	118	119	122	125	128	130				
	VR	141	141	141	141	142	144	145	146	147				
	V2	146	146	146	146	146	147	148	149	149				
	GR2	6.1	6.1	6.1	6	5.8	5.4	4.8	4.3	4				
36000	BFL	7140	7270	7400	7560	7930	8680	9510	10360	10950			135	185
	V1	114	114	113	113	115	118	121	124	126				
	VR	137	137	137	137	138	140	141	143	144				
	V2	142	142	142	142	143	144	145	146	146				
	GR2	6.4	6.4	6.4	6.4	6.2	5.7	5.2	4.6	4.3				
35000	BFL	6550	6670	6790	6930	7270	7940	8710	9520	10060			133	182
	V1	110	109	109	109	111	113	117	120	122				
	VR	133	133	133	133	134	136	138	139	140				
	V2	139	139	139	139	140	141	142	143	143				
	GR2	6.8	6.8	6.8	6.8	6.5	6.1	5.5	4.9	4.6				
34000	BFL	6010	6120	6230	6360	6660	7270	7970	8740	9250			130	179
	V1	106	106	105	105	107	109	112	116	118				
	VR	130	130	130	130	130	132	134	136	137				
	V2	136	136	136	136	136	138	138	139	140				
	GR2	7.2	7.2	7.2	7.2	6.9	6.4	5.9	5.3	4.9				
33000	BFL	5540	5640	5740	5860	6140	6690	7330	8040	8520			127	176
	V1	102	102	102	102	103	106	109	112	114				
	VR	126	126	126	126	127	129	131	133	134				
	V2	133	133	133	133	134	135	136	137	137				
	GR2	7.7	7.7	7.6	7.6	7.3	6.8	6.3	5.7	5.3				
32000	BFL	5110	5200	5290	5400	5650	6150	6730	7370	7830			125	173
	V1	99	98	98	98	99	102	105	108	110				
	VR	123	123	123	123	124	126	127	129	130				
	V2	131	131	131	131	131	132	133	134	134				
	GR2	8.1	8.1	8.1	8	7.8	7.3	6.7	6.1	5.7				

FIGURE 5-234. TAKE-OFF DISTANCE; FLAPS - 10° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	100				
	N1%	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
31000	BFL	4720	4800	4880	4980	5200	5640	6170	6750	7150			123	170
	V1	95	95	95	95	96	98	101	104	106				
	VR	120	120	120	120	121	122	124	126	127				
	V2	128	128	128	128	128	129	130	131	131				
	GR2	8.6	8.6	8.6	8.5	8.2	7.7	7.1	6.5	6.1				
30000	BFL	4600	4690	4770	4840	4860	5180	5640	6170	6530			121	167
	V1	94	94	94	94	93	95	97	100	102				
	VR	117	117	117	117	117	119	121	122	123				
	V2	125	125	125	125	125	126	127	128	128				
	GR2	9.1	9.1	9.1	9	8.7	8.2	7.6	7	6.6				
29000	BFL	4560	4660	4730	4790	4820	4810	5150	5620	5950			119	164
	V1	95	95	95	94	93	92	94	96	98				
	VR	113	113	113	113	114	116	117	119	120				
	V2	122	122	122	122	123	123	124	125	125				
	GR2	9.6	9.6	9.6	9.6	9.2	8.7	8.1	7.4	7				
28000	BFL	4530	4610	4690	4750	4770	4770	4720	5120	5410			117	161
	V1	95	95	95	94	94	92	92	92	94				
	VR	110	110	110	110	111	112	114	115	116				
	V2	120	120	120	120	120	121	121	122	122				
	GR2	10.2	10.2	10.2	10.1	9.8	9.3	8.6	8	7.5				
27000	BFL	4490	4570	4640	4710	4730	4720	4670	4670	4920			115	158
	V1	95	95	95	95	94	92	90	90	90				
	VR	107	107	107	107	107	109	110	112	113				
	V2	117	117	117	117	117	118	119	119	120				
	GR2	10.9	10.9	10.9	10.8	10.4	9.9	9.2	8.5	8.1				
26000	BFL	4440	4520	4600	4660	4680	4670	4620	4560	4520			113	155
	V1	95	95	95	95	94	92	90	88	87				
	VR	104	104	104	104	104	105	107	108	109				
	V2	115	115	115	115	115	115	116	116	117				
	GR2	11.6	11.6	11.6	11.5	11.1	10.5	9.8	9.1	8.7				

FIGURE 5-235. TAKE-OFF DISTANCE; FLAPS - 10° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	BFL	8660	8820	9000	9160	9320	9510	9700	9900	10090	10280	10480	145	195
	V1	134	134	134	134	133	133	133	133	133	132	132		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	157	157	157	157	157	157	157	156	156	156	156		
	GR2	4.9	4.9	4.9	4.9	5	5	5	5	5	5	5		
39000	BFL	8260	8410	8580	8730	8890	9070	9250	9430	9620	9800	9990	144	193
	V1	132	132	131	131	131	131	130	130	130	130	130		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.1	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	BFL	7620	7760	7910	8060	8190	8360	8520	8690	8860	9030	9200	141	191
	V1	128	127	127	127	126	126	126	126	126	126	125		
	VR	148	148	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.4	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	BFL	7020	7150	7290	7420	7550	7700	7850	8010	8160	8310	8470	139	188
	V1	123	123	123	123	122	122	122	122	121	121	121		
	VR	144	144	144	144	144	144	144	144	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	BFL	6460	6580	6710	6810	6920	7060	7200	7340	7480	7620	7760	136	185
	V1	119	119	119	118	118	118	117	117	117	117	117		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	BFL	5920	6020	6130	6240	6340	6470	6600	6730	6850	6980	7110	134	182
	V1	115	114	114	114	113	113	113	113	113	113	112		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	BFL	5410	5510	5610	5710	5810	5920	6030	6150	6260	6380	6500	131	179
	V1	110	110	110	110	109	109	109	109	109	108	108		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
33000	BFL	4950	5040	5130	5220	5300	5410	5510	5620	5720	5830	5930	128	176
	V1	106	106	106	105	105	105	105	105	104	104	104		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	134	134	134	134	134	134	134	134		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
32000	BFL	4550	4630	4720	4800	4880	4970	5070	5160	5260	5360	5450	126	173
	V1	102	102	102	102	101	101	101	101	101	100	100		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		

FIGURE 5-235. TAKE-OFF DISTANCE; FLAPS - 10° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
31000	BFL	4200	4270	4340	4420	4490	4580	4660	4750	4840	4920	5010	123	170
	V1	99	98	98	98	98	98	97	97	97	97	97		
	VR	122	122	122	122	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
30000	BFL	3870	3930	4010	4070	4140	4220	4300	4380	4450	4540	4630	121	167
	V1	95	95	95	94	94	94	94	94	93	93	93		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.7	8.7	8.7	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	BFL	3740	3800	3890	3980	4070	4160	4240	4330	4410	4500	4580	119	164
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
28000	BFL	3750	3790	3870	3960	4050	4120	4220	4290	4380	4460	4550	117	161
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.8	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
27000	BFL	3720	3760	3840	3920	4000	4090	4170	4260	4340	4420	4510	115	158
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.5		
26000	BFL	3690	3730	3800	3890	3980	4060	4140	4220	4290	4390	4470	113	155
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 5-235. TAKE-OFF DISTANCE; FLAPS - 10° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	97				
	N1%	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
39600	BFL	10680	10880	11070	11390	12210	13280	14430	15750	16070			145	195
	V1	132	132	132	132	135	137	140	143	144				
	VR	153	153	153	153	154	156	157	158	158				
	V2	156	156	156	156	157	158	158	159	159				
	GR2	5	5	5	4.8	4.5	4	3.6	3.1	3				
39000	BFL	10180	10360	10550	10860	11630	12670	13760	15010	15310			144	193
	V1	130	129	129	130	132	135	138	141	141				
	VR	151	151	151	151	152	154	154	156	156				
	V2	155	155	155	155	155	156	156	157	157				
	GR2	5.2	5.2	5.2	5	4.7	4.2	3.7	3.2	3.1				
38000	BFL	9370	9540	9720	10000	10730	11690	12710	13830	14100			141	191
	V1	125	125	125	125	128	131	133	136	137				
	VR	147	147	147	147	149	150	151	152	152				
	V2	151	151	151	151	152	153	153	154	154				
	GR2	5.5	5.5	5.5	5.3	5	4.5	4	3.5	3.4				
37000	BFL	8630	8790	8940	9210	9880	10770	11750	12770	13020			139	188
	V1	121	121	121	121	123	126	129	132	133				
	VR	143	143	143	144	145	147	148	149	149				
	V2	148	148	148	148	149	150	150	151	151				
	GR2	5.8	5.8	5.8	5.7	5.3	4.8	4.3	3.8	3.7				
36000	BFL	7910	8050	8200	8440	9080	9910	10800	11770	12000			136	185
	V1	117	116	116	117	119	122	125	128	129				
	VR	140	140	140	140	141	143	144	145	146				
	V2	145	145	145	145	146	146	147	148	148				
	GR2	6.2	6.2	6.2	6	5.7	5.2	4.7	4.1	4				
35000	BFL	7240	7370	7500	7720	8320	9090	9920	10830	11050			134	182
	V1	112	112	112	113	115	118	121	124	124				
	VR	136	136	136	136	138	139	141	142	142				
	V2	141	141	141	141	142	143	144	145	145				
	GR2	6.6	6.6	6.6	6.4	6	5.5	5	4.4	4.3				
34000	BFL	6620	6740	6860	7060	7590	8320	9090	9920	10120			131	179
	V1	108	108	108	108	110	114	116	119	120				
	VR	132	132	132	132	134	135	137	138	139				
	V2	138	138	138	138	139	140	141	141	141				
	GR2	6.9	6.9	6.9	6.7	6.4	5.9	5.3	4.8	4.7				
33000	BFL	6040	6150	6260	6440	6920	7570	8300	9070	9260			128	176
	V1	104	104	104	104	106	109	112	115	116				
	VR	128	128	128	128	130	132	133	135	135				
	V2	134	134	134	134	135	136	137	138	138				
	GR2	7.3	7.3	7.3	7.1	6.8	6.3	5.7	5.2	5				
32000	BFL	5550	5650	5750	5920	6350	6940	7610	8340	8510			126	173
	V1	100	100	100	100	102	105	108	111	112				
	VR	125	125	125	125	126	128	130	132	132				
	V2	132	132	132	132	132	133	134	135	135				
	GR2	7.8	7.8	7.8	7.6	7.2	6.7	6.1	5.5	5.4				

FIGURE 5-235. TAKE-OFF DISTANCE; FLAPS - 10° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	95	97				
	N1%	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
31000	BFL	5100	5190	5280	5440	5820	6360	6960	7650	7810			123	170
	V1	97	97	97	97	99	101	104	107	108				
	VR	121	121	121	122	123	125	127	128	129				
	V2	129	129	129	129	130	131	131	132	133				
	GR2	8.3	8.3	8.3	8	7.7	7.1	6.6	5.9	5.8				
30000	BFL	4710	4800	4890	4990	5330	5810	6360	6970	7120			121	167
	V1	93	93	93	93	95	98	100	103	104				
	VR	118	118	118	118	120	121	123	125	125				
	V2	126	126	126	126	127	128	129	129	130				
	GR2	8.8	8.8	8.8	8.5	8.1	7.6	7	6.4	6.2				
29000	BFL	4670	4760	4840	4870	4890	5300	5790	6340	6480			119	164
	V1	93	93	93	93	91	94	97	99	100				
	VR	115	115	115	115	116	118	119	121	121				
	V2	123	123	123	123	124	125	126	126	127				
	GR2	9.3	9.3	9.3	9	8.7	8.1	7.5	6.8	6.7				
28000	BFL	4640	4710	4800	4820	4840	4840	5260	5760	5880			117	161
	V1	94	94	94	93	92	90	93	95	96				
	VR	111	111	111	111	113	114	116	118	118				
	V2	120	120	120	120	121	122	123	123	124				
	GR2	9.9	9.9	9.9	9.6	9.2	8.6	8	7.3	7.2				
27000	BFL	4590	4670	4750	4780	4800	4800	4800	5210	5320			115	158
	V1	94	94	94	93	92	90	89	91	92				
	VR	108	108	108	108	109	111	112	114	114				
	V2	117	117	117	117	118	119	119	120	120				
	GR2	10.5	10.5	10.4	10.2	9.8	9.2	8.5	7.9	7.7				
26000	BFL	4550	4620	4710	4730	4750	4720	4660	4740	4820			113	155
	V1	94	94	94	93	92	90	88	88	88				
	VR	105	105	105	105	106	107	109	110	111				
	V2	115	115	115	115	115	116	117	117	117				
	GR2	11.1	11.1	11.1	10.9	10.4	9.8	9.1	8.4	8.3				

FIGURE 5-236. TAKE-OFF DISTANCE; FLAPS - 10° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	BFL	9580	9750	9940	10130	10310	10530	10740	10960	11170	11390	11610	147	195
	V1	138	138	137	137	136	136	136	136	136	136	136		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	BFL	9130	9290	9470	9640	9820	10030	10230	10440	10640	10850	11060	145	194
	V1	135	135	134	134	134	134	134	133	133	133	133		
	VR	154	154	154	154	154	154	154	154	153	153	153		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	BFL	8410	8560	8730	8890	9050	9240	9420	9610	9800	9990	10180	142	191
	V1	131	130	130	130	129	129	129	129	129	129	128		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	BFL	7740	7880	8040	8190	8330	8500	8670	8840	9010	9190	9360	140	188
	V1	126	126	126	125	125	125	125	125	124	124	124		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.5	5.5	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	BFL	7130	7260	7390	7530	7660	7820	7980	8140	8290	8450	8610	137	185
	V1	122	122	121	121	121	121	121	120	120	120	120		
	VR	143	143	143	143	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
35000	BFL	6550	6660	6790	6910	7030	7170	7320	7460	7600	7740	7890	135	183
	V1	118	118	117	117	117	116	116	116	116	116	116		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	143	143	143	143	143	143	143	143		
	GR2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	BFL	5980	6080	6190	6300	6410	6540	6670	6800	6920	7050	7190	132	180
	V1	113	113	113	112	112	112	112	111	111	111	111		
	VR	135	135	135	135	135	135	135	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
33000	BFL	5450	5540	5640	5740	5840	5960	6080	6190	6310	6430	6550	129	177
	V1	109	109	108	108	108	107	107	107	107	107	107		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
32000	BFL	4960	5050	5140	5230	5320	5430	5530	5640	5740	5850	5960	127	174
	V1	104	104	104	104	103	103	103	103	103	102	102		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		

FIGURE 5-236. TAKE-OFF DISTANCE; FLAPS - 10° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
31000	BFL	4540	4620	4700	4780	4860	4960	5060	5150	5250	5350	5440	124	171
	V1	100	100	100	100	99	99	99	99	99	99	98		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
30000	BFL	4180	4250	4320	4390	4470	4560	4640	4730	4820	4900	4990	121	168
	V1	97	96	96	96	96	95	95	95	95	95	95		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	BFL	3840	3900	3980	4070	4170	4250	4340	4430	4520	4610	4690	119	165
	V1	93	93	93	93	93	93	92	92	92	92	92		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
28000	BFL	3790	3860	3950	4040	4140	4230	4310	4390	4490	4560	4650	117	161
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	113	113	113	113	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.4	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
27000	BFL	3800	3830	3920	4010	4100	4180	4270	4350	4440	4530	4620	115	158
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10	10	10	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
26000	BFL	3770	3800	3890	3980	4070	4150	4220	4320	4390	4490	4570	113	155
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.6	10.6	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7		

FIGURE 5-236. TAKE-OFF DISTANCE; FLAPS - 10° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	93					
	N1%	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
39600	BFL	11830	12050	12310	12880	13920	15190	16550	17810				147	195
	V1	135	135	135	137	139	142	145	148					
	VR	156	156	156	156	158	159	160	160					
	V2	159	159	159	159	160	160	161	161					
	GR2	4.7	4.7	4.7	4.4	4.1	3.6	3.1	2.7					
39000	BFL	11260	11470	11720	12260	13280	14480	15760	16950				145	194
	V1	133	133	133	134	137	140	143	145					
	VR	153	153	154	154	155	157	158	158					
	V2	157	157	157	157	158	158	159	159					
	GR2	4.9	4.9	4.9	4.6	4.2	3.8	3.3	2.9					
38000	BFL	10370	10560	10790	11290	12230	13320	14520	15600				142	191
	V1	128	128	128	130	132	135	138	141					
	VR	150	150	150	150	152	153	154	155					
	V2	153	153	153	153	154	155	155	156					
	GR2	5.2	5.2	5.2	4.9	4.5	4	3.6	3.1					
37000	BFL	9530	9710	9920	10380	11240	12280	13340	14350				140	188
	V1	124	124	124	125	128	131	133	136					
	VR	146	146	146	147	148	149	150	151					
	V2	150	150	150	150	151	152	152	153					
	GR2	5.6	5.6	5.5	5.2	4.8	4.3	3.8	3.4					
36000	BFL	8770	8930	9120	9540	10330	11280	12290	13180				137	185
	V1	120	120	120	121	123	126	129	131					
	VR	142	142	142	143	144	146	147	148					
	V2	147	147	147	147	148	148	149	149					
	GR2	5.9	5.9	5.8	5.6	5.2	4.7	4.2	3.7					
35000	BFL	8040	8180	8360	8760	9480	10350	11290	12120				135	183
	V1	115	115	115	117	119	122	125	127					
	VR	139	139	139	139	141	142	143	144					
	V2	143	143	143	144	144	145	146	146					
	GR2	6.3	6.3	6.2	5.9	5.5	5	4.5	4.1					
34000	BFL	7320	7450	7610	7980	8680	9470	10340	11120				132	180
	V1	111	111	111	112	115	118	120	123					
	VR	134	134	135	135	137	138	140	141					
	V2	140	140	140	140	141	142	143	143					
	GR2	6.7	6.7	6.6	6.3	5.9	5.4	4.8	4.4					
33000	BFL	6670	6790	6930	7270	7920	8660	9450	10160				129	177
	V1	106	106	106	108	110	113	116	119					
	VR	131	131	131	131	133	135	136	137					
	V2	136	136	136	136	138	139	139	140					
	GR2	7.1	7.1	7	6.7	6.3	5.8	5.2	4.7					
32000	BFL	6060	6170	6300	6610	7180	7890	8610	9270				127	174
	V1	102	102	102	103	106	109	112	114					
	VR	127	127	127	127	129	131	132	133					
	V2	133	133	133	133	134	135	136	137					
	GR2	7.5	7.5	7.4	7.1	6.7	6.2	5.6	5.1					

FIGURE 5-236. TAKE-OFF DISTANCE; FLAPS - 10° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	93					
	N1%	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
31000	BFL	5540	5640	5760	6040	6550	7190	7900	8490				124	171
	V1	98	98	98	99	102	105	108	110					
	VR	123	123	123	124	125	127	129	130					
	V2	130	130	130	130	131	132	133	134					
	GR2	7.9	7.9	7.8	7.5	7.1	6.6	6	5.5					
30000	BFL	5080	5170	5280	5520	5980	6560	7190	7780				121	168
	V1	95	95	95	96	98	101	104	106					
	VR	120	120	120	120	122	124	126	127					
	V2	127	127	127	127	128	129	130	131					
	GR2	8.4	8.4	8.3	8	7.6	7	6.4	5.9					
29000	BFL	4780	4870	4940	5050	5450	5970	6540	7070				119	165
	V1	92	92	92	92	94	97	100	102					
	VR	116	116	116	117	118	120	122	123					
	V2	124	124	124	124	125	126	127	128					
	GR2	8.9	8.9	8.9	8.5	8.1	7.5	6.9	6.4					
28000	BFL	4740	4830	4890	4890	4980	5410	5930	6410				117	161
	V1	92	92	92	91	90	93	96	98					
	VR	112	112	113	113	115	117	118	120					
	V2	121	121	121	121	122	123	124	125					
	GR2	9.5	9.5	9.4	9	8.6	8	7.4	6.9					
27000	BFL	4690	4780	4850	4850	4850	4930	5360	5790				115	158
	V1	93	93	92	91	90	89	92	94					
	VR	109	109	109	109	111	113	115	116					
	V2	118	118	118	118	119	120	121	122					
	GR2	10.1	10.1	10	9.6	9.2	8.6	7.9	7.4					
26000	BFL	4650	4730	4800	4790	4810	4770	4860	5220				113	155
	V1	93	93	93	91	90	88	88	90					
	VR	105	105	105	106	107	109	111	112					
	V2	115	115	115	115	116	117	118	118					
	GR2	10.7	10.7	10.6	10.2	9.8	9.1	8.5	7.9					

FIGURE 5-237. TAKE-OFF DISTANCE; FLAPS - 10° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	BFL	10650	10830	11080	11300	11530	11770	12020	12260	12500	12750	12990	148	196
	V1	141	141	141	141	141	140	140	140	140	140	140		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
39000	BFL	10160	10330	10540	10730	10950	11180	11410	11640	11870	12100	12330	146	194
	V1	139	138	138	138	138	137	137	137	137	137	137		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	160	160	160	159	159	159	159	159	159	159	159		
	GR2	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
38000	BFL	9330	9490	9680	9870	10070	10280	10490	10700	10920	11120	11340	144	191
	V1	134	134	133	133	133	133	133	133	132	132	132		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	4.9	4.9	4.9	5	5	5	5	5	5	5	5		
37000	BFL	8570	8720	8900	9070	9250	9450	9640	9830	10030	10220	10410	141	189
	V1	129	129	129	129	128	128	128	128	128	128	127		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	BFL	7870	8000	8170	8320	8490	8660	8840	9020	9190	9370	9540	138	186
	V1	125	125	124	124	124	124	124	123	123	123	123		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.6		
35000	BFL	7220	7340	7490	7630	7780	7940	8100	8260	8420	8580	8750	136	183
	V1	120	120	120	120	120	119	119	119	119	119	119		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	145	145	145	145	145	145	145		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
34000	BFL	6600	6710	6850	6970	7110	7260	7400	7550	7690	7840	7990	133	180
	V1	116	116	116	115	115	115	115	115	114	114	114		
	VR	138	138	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
33000	BFL	6010	6110	6230	6340	6470	6600	6730	6860	6990	7120	7260	130	177
	V1	111	111	111	111	110	110	110	110	110	110	109		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	138	138	138	138	138	138	138	138	138		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
32000	BFL	5460	5550	5660	5760	5880	5990	6110	6230	6350	6470	6590	127	174
	V1	107	107	106	106	106	106	106	105	105	105	105		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		

FIGURE 5-237. TAKE-OFF DISTANCE; FLAPS - 10° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 81.4	-50 -58 82.0	-45 -49 82.9	-40 -40 83.9	-35 -31 84.8	-30 -22 85.7	-25 -13 86.5	-20 -4 87.4	-15 5 88.3	-10 14 89.1	-5 23 90.0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	4950	5030	5130	5230	5330	5430	5540	5640	5750	5860	5960	125	171
	V1	102	102	102	102	101	101	101	101	101	101	100		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
30000	BFL	4510	4590	4670	4760	4850	4940	5040	5140	5230	5330	5430	122	168
	V1	98	98	98	98	97	97	97	97	97	97	96		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
29000	BFL	4140	4200	4280	4360	4440	4530	4610	4700	4790	4870	4960	119	165
	V1	94	94	94	94	93	93	93	93	93	93	93		
	VR	118	118	118	118	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	BFL	3880	3950	4040	4130	4220	4310	4400	4490	4580	4670	4760	117	162
	V1	92	92	92	92	92	91	91	91	91	91	91		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
27000	BFL	3870	3930	4030	4110	4210	4280	4370	4460	4540	4640	4720	115	159
	V1	92	92	92	92	92	92	92	92	92	92	91		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
26000	BFL	3840	3890	3980	4070	4160	4240	4330	4420	4500	4590	4670	113	155
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	107	107	107	106	106	106	106	106	106	106	106		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.3	10.3	10.3	10.3	10.4	10.4	10.4	10.4	10.4	10.4	10.4		

FIGURE 5-237. TAKE-OFF DISTANCE; FLAPS - 10° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	89					
	N1%	90.8	91.7	92.5	92.2	91.5	90.9	90.2	89.9					
39600	BFL	13240	13490	13920	14810	16040	17490	19080	19710				148	196
	V1	140	140	140	142	145	148	151	152					
	VR	159	159	159	160	161	162	163	163					
	V2	162	162	162	162	162	163	163	163					
	GR2	4.5	4.4	4.3	4	3.6	3.1	2.7	2.5					
39000	BFL	12560	12800	13270	14080	15280	16640	18160	18810				146	194
	V1	137	137	137	139	142	145	148	149					
	VR	157	157	157	158	159	160	161	161					
	V2	159	159	159	160	160	161	161	161					
	GR2	4.7	4.6	4.4	4.2	3.8	3.3	2.8	2.6					
38000	BFL	11550	11770	12170	12990	14070	15310	16700	17350				144	191
	V1	132	132	133	135	137	140	143	144					
	VR	153	153	153	154	155	156	157	157					
	V2	156	156	156	156	157	158	158	158					
	GR2	5	4.9	4.8	4.4	4.1	3.6	3.1	2.9					
37000	BFL	10610	10810	11180	11900	12930	14080	15340	15940				141	189
	V1	127	127	128	130	133	136	138	140					
	VR	149	149	149	150	151	153	154	154					
	V2	152	152	152	153	154	154	155	155					
	GR2	5.3	5.3	5.1	4.8	4.4	3.9	3.4	3.2					
36000	BFL	9730	9910	10250	10910	11850	12910	14080	14630				138	186
	V1	123	123	123	125	128	131	134	135					
	VR	145	145	145	146	148	149	150	150					
	V2	149	149	149	149	150	151	151	152					
	GR2	5.6	5.6	5.4	5.1	4.7	4.2	3.7	3.5					
35000	BFL	8910	9080	9390	10000	10850	11870	12900	13420				136	183
	V1	118	118	119	121	123	126	129	130					
	VR	141	141	141	142	144	145	146	147					
	V2	145	145	145	146	147	148	148	148					
	GR2	6	6	5.8	5.4	5	4.5	4	3.8					
34000	BFL	8140	8290	8580	9150	9930	10830	11840	12280				133	180
	V1	114	114	115	116	119	122	125	126					
	VR	137	137	138	139	140	141	143	143					
	V2	142	142	142	143	143	144	145	145					
	GR2	6.4	6.3	6.1	5.8	5.4	4.9	4.3	4.1					
33000	BFL	7390	7530	7800	8340	9070	9890	10800	11260				130	177
	V1	109	109	110	112	115	117	120	122					
	VR	133	133	133	135	136	138	139	140					
	V2	138	138	138	139	140	141	142	142					
	GR2	6.8	6.7	6.5	6.2	5.8	5.2	4.7	4.5					
32000	BFL	6710	6830	7080	7560	8250	9010	9840	10230				127	174
	V1	105	105	105	107	110	113	116	117					
	VR	129	129	129	131	132	134	135	136					
	V2	135	135	135	136	137	138	138	139					
	GR2	7.2	7.2	6.9	6.6	6.2	5.6	5.1	4.8					

FIGURE 5-237. TAKE-OFF DISTANCE; FLAPS - 10° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	89					
	N1%	90.8	91.7	92.5	92.2	91.5	90.9	90.2	89.9					
31000	BFL	6070	6190	6400	6840	7460	8190	8940	9300				125	171
	V1	100	100	101	103	106	109	111	113					
	VR	125	125	125	126	128	130	132	132					
	V2	131	131	131	132	133	134	135	135					
	GR2	7.6	7.6	7.3	7	6.6	6	5.5	5.2					
30000	BFL	5520	5630	5820	6210	6770	7440	8150	8480				122	168
	V1	96	96	97	99	101	104	107	108					
	VR	121	121	121	123	124	126	128	129					
	V2	128	128	128	128	130	131	132	132					
	GR2	8.1	8.1	7.8	7.4	7	6.5	5.9	5.6					
29000	BFL	5050	5140	5310	5650	6150	6750	7430	7740				119	165
	V1	93	93	93	95	97	100	103	105					
	VR	117	117	118	119	121	123	125	125					
	V2	125	125	125	125	127	128	129	129					
	GR2	8.6	8.6	8.3	7.9	7.5	6.9	6.3	6.1					
28000	BFL	4850	4920	4950	5140	5580	6120	6720	7020				117	162
	V1	91	91	91	91	93	96	99	100					
	VR	114	114	114	115	117	119	121	122					
	V2	122	122	122	122	123	125	126	126					
	GR2	9.1	9.1	8.8	8.4	8	7.4	6.8	6.5					
27000	BFL	4810	4880	4900	4910	5060	5520	6060	6320				115	159
	V1	91	91	90	89	89	92	95	96					
	VR	110	110	110	112	113	115	117	118					
	V2	119	119	119	119	120	121	122	123					
	GR2	9.7	9.7	9.4	9	8.5	7.9	7.3	7					
26000	BFL	4770	4830	4850	4860	4860	4990	5450	5680				113	155
	V1	92	91	91	89	88	88	91	92					
	VR	106	106	107	108	109	111	113	114					
	V2	116	116	116	116	117	118	119	119					
	GR2	10.4	10.3	10	9.6	9.1	8.5	7.9	7.6					

FIGURE 5-238. TAKE-OFF DISTANCE; FLAPS - 10° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	BFL	11860	12080	12360	12620	12900	13170	13450	13720	13990	14270	14550	149	196
	V1	145	145	145	145	145	145	144	144	144	144	144		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
39000	BFL	11290	11490	11750	12010	12270	12530	12790	13050	13310	13570	13830	147	194
	V1	142	142	142	142	142	142	142	141	141	141	141		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
38000	BFL	10370	10560	10800	11030	11270	11500	11750	11980	12220	12450	12700	145	192
	V1	138	137	137	137	137	137	137	136	136	136	136		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
37000	BFL	9490	9670	9890	10100	10310	10530	10750	10960	11180	11390	11610	142	189
	V1	133	133	132	132	132	132	132	132	131	131	131		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5	5	5	5	5	5	5	5	5	5	5		
36000	BFL	8700	8860	9060	9250	9450	9640	9840	10040	10240	10430	10630	139	186
	V1	128	128	128	128	127	127	127	127	127	127	126		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
35000	BFL	7960	8100	8280	8460	8640	8820	9000	9180	9350	9530	9720	137	183
	V1	123	123	123	123	123	122	122	122	122	122	122		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
34000	BFL	7280	7410	7570	7730	7900	8060	8230	8390	8550	8720	8880	134	180
	V1	119	119	118	118	118	118	118	118	117	117	117		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
33000	BFL	6630	6740	6890	7030	7180	7330	7480	7620	7770	7920	8070	131	177
	V1	114	114	114	114	113	113	113	113	113	113	113		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
32000	BFL	6020	6120	6250	6380	6520	6650	6780	6910	7040	7180	7310	128	175
	V1	109	109	109	109	109	109	108	108	108	108	108		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		

FIGURE 5-238. TAKE-OFF DISTANCE; FLAPS - 10° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
31000	BFL	5440	5530	5650	5770	5890	6010	6130	6240	6360	6480	6600	126	172
	V1	105	105	104	104	104	104	104	104	103	103	103		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
30000	BFL	4910	5000	5110	5210	5320	5420	5530	5630	5740	5850	5950	123	168
	V1	100	100	100	100	99	99	99	99	99	99	99		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
29000	BFL	4460	4530	4630	4720	4820	4910	5010	5100	5200	5290	5390	120	165
	V1	96	96	96	95	95	95	95	95	95	94	94		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
28000	BFL	4070	4140	4230	4310	4400	4480	4570	4650	4740	4820	4910	117	162
	V1	92	92	91	91	91	91	91	91	91	91	90		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
27000	BFL	3940	4010	4100	4200	4280	4370	4460	4560	4650	4740	4830	115	159
	V1	91	91	91	91	91	90	90	90	90	90	90		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
26000	BFL	3930	4000	4090	4180	4250	4350	4440	4530	4610	4700	4800	113	156
	V1	91	91	91	91	91	91	91	91	91	91	90		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	116	116	116	116	116	116	116	116		
	GR2	10	10	10	10	10	10	10	10	10	10	10		

FIGURE 5-238. TAKE-OFF DISTANCE; FLAPS - 10° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	86					
	N1%	91.3	92.2	92.6	92.0	91.4	90.8	90.1	90.1					
39600	BFL	14820	15150	15860	17040	18550							149	196
	V1	144	144	145	148	151								
	VR	162	162	163	164	165								
	V2	164	164	164	165	165								
	GR2	4.2	4.1	3.8	3.6	3.1								
39000	BFL	14100	14410	15090	16190	17620	19230						147	194
	V1	141	141	142	145	148	151							
	VR	160	160	160	161	162	163							
	V2	162	162	162	163	163	164							
	GR2	4.4	4.3	4	3.7	3.3	2.8							
38000	BFL	12940	13230	13880	14900	16190	17650	19260	19280				145	192
	V1	136	136	138	140	143	146	149	148					
	VR	156	156	156	157	158	159	160	160					
	V2	159	159	159	159	160	160	160	160					
	GR2	4.7	4.6	4.3	4	3.6	3.1	2.6	2.6					
37000	BFL	11830	12100	12720	13700	14870	16200	17680	17740				142	189
	V1	131	131	133	135	138	141	144	144					
	VR	152	152	152	154	155	156	157	157					
	V2	155	155	155	156	156	157	157	157					
	GR2	5	4.9	4.6	4.3	3.9	3.4	2.9	2.9					
36000	BFL	10840	11090	11620	12540	13650	14860	16200	16250				139	186
	V1	126	126	128	130	133	136	139	139					
	VR	148	148	148	150	151	152	153	153					
	V2	151	151	151	152	153	153	154	154					
	GR2	5.4	5.3	4.9	4.7	4.2	3.7	3.2	3.2					
35000	BFL	9900	10130	10620	11440	12500	13610	14830	14880				137	183
	V1	122	122	123	125	128	131	134	134					
	VR	144	144	144	146	147	148	149	149					
	V2	148	148	148	149	150	150	150	150					
	GR2	5.7	5.6	5.3	5	4.5	4	3.5	3.5					
34000	BFL	9050	9260	9690	10440	11390	12460	13560	13610				134	180
	V1	117	117	118	121	124	127	129	129					
	VR	140	140	141	142	143	145	146	146					
	V2	144	144	144	145	146	147	147	147					
	GR2	6.1	6	5.7	5.3	4.9	4.4	3.8	3.8					
33000	BFL	8220	8410	8830	9520	10370	11360	12410	12450				131	177
	V1	112	113	114	116	119	122	125	125					
	VR	136	136	136	138	139	141	142	142					
	V2	141	141	141	142	143	143	144	144					
	GR2	6.5	6.4	6	5.7	5.2	4.7	4.2	4.2					
32000	BFL	7450	7620	8010	8660	9430	10320	11310	11350				128	175
	V1	108	108	109	112	114	117	120	120					
	VR	132	132	132	134	136	137	138	138					
	V2	137	137	137	138	139	140	141	141					
	GR2	6.9	6.8	6.4	6.1	5.6	5.1	4.6	4.5					

FIGURE 5-238. TAKE-OFF DISTANCE; FLAPS - 10° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	30	30.2				Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	86	86					
	N1%	91.3	92.2	92.6	92.0	91.4	90.8	90.1	90.1					
31000	BFL	6730	6880	7230	7840	8570	9370	10240	10280				126	172
	V1	103	103	104	107	110	113	116	116					
	VR	127	127	128	130	132	133	134	134					
	V2	133	133	133	135	136	136	137	137					
	GR2	7.3	7.2	6.8	6.5	6	5.5	4.9	4.9					
30000	BFL	6060	6210	6510	7060	7730	8480	9280	9310				123	168
	V1	98	99	100	102	105	108	111	111					
	VR	123	123	124	126	128	129	131	131					
	V2	129	129	129	131	132	133	134	134					
	GR2	7.8	7.6	7.3	6.9	6.5	5.9	5.3	5.3					
29000	BFL	5490	5610	5890	6370	6980	7670	8410	8440				120	165
	V1	94	94	96	98	101	104	107	107					
	VR	119	119	120	121	123	125	127	127					
	V2	126	126	126	127	128	130	130	130					
	GR2	8.3	8.1	7.7	7.4	6.9	6.4	5.8	5.7					
28000	BFL	4990	5110	5340	5770	6300	6950	7640	7670				117	162
	V1	90	90	92	94	96	99	102	103					
	VR	115	115	116	118	120	122	123	123					
	V2	123	123	123	124	125	126	127	127					
	GR2	8.8	8.6	8.2	7.9	7.4	6.8	6.2	6.2					
27000	BFL	4920	4960	4950	5220	5690	6260	6910	6930				115	159
	V1	90	90	90	90	92	95	98	98					
	VR	112	112	112	114	116	118	120	120					
	V2	120	119	119	121	122	123	124	124					
	GR2	9.4	9.2	8.8	8.4	7.9	7.3	6.7	6.7					
26000	BFL	4880	4910	4900	4930	5130	5620	6190	6210				113	156
	V1	90	90	89	87	88	91	94	94					
	VR	108	108	108	110	112	114	116	116					
	V2	116	116	116	117	119	120	121	121					
	GR2	10	9.8	9.4	9	8.5	7.9	7.2	7.2					

FIGURE 5-239. TAKE-OFF DISTANCE; FLAPS - 10° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	BFL	13310	13540	13820	14120	14430	14730	15040	15350	15650	15960	16280	150	197
	V1	150	149	149	149	149	149	149	149	149	148	148		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	BFL	12630	12860	13130	13400	13700	13990	14280	14570	14860	15160	15460	148	195
	V1	146	146	146	146	146	146	146	145	145	145	145		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	BFL	11590	11800	12050	12300	12560	12830	13100	13360	13630	13900	14170	146	192
	V1	141	141	141	141	141	141	140	140	140	140	140		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	BFL	10600	10790	11020	11240	11480	11730	11970	12210	12450	12700	12950	143	189
	V1	136	136	136	136	136	136	135	135	135	135	135		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	4.7	4.7	4.7	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7		
36000	BFL	9700	9870	10070	10270	10490	10720	10940	11160	11380	11600	11830	140	186
	V1	131	131	131	131	131	130	130	130	130	130	130		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
35000	BFL	8840	9000	9180	9360	9560	9770	9970	10160	10360	10570	10770	138	184
	V1	126	126	126	126	126	126	125	125	125	125	125		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
34000	BFL	8060	8200	8360	8530	8710	8900	9080	9260	9440	9620	9810	135	181
	V1	122	122	121	121	121	121	121	120	120	120	120		
	VR	143	143	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
33000	BFL	7330	7450	7600	7760	7920	8090	8250	8420	8580	8750	8920	132	178
	V1	117	117	116	116	116	116	116	116	115	115	115		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	142	142	142	142	142	142	142	142	142	142		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
32000	BFL	6660	6770	6900	7040	7190	7340	7480	7630	7780	7930	8080	129	175
	V1	112	112	112	112	111	111	111	111	111	111	110		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		

FIGURE 5-239. TAKE-OFF DISTANCE; FLAPS - 10° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
31000	BFL	6020	6120	6230	6360	6490	6620	6760	6890	7020	7150	7290	127	172
	V1	107	107	107	107	107	106	106	106	106	106	106		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
30000	BFL	5420	5510	5620	5730	5850	5970	6090	6200	6320	6440	6560	124	169
	V1	103	103	102	102	102	102	102	101	101	101	101		
	VR	126	126	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
29000	BFL	4880	4960	5060	5160	5260	5370	5470	5580	5680	5790	5900	121	166
	V1	98	98	97	97	97	97	97	97	97	96	96		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8	8	8	8	8	8	8	8	8	8	8		
28000	BFL	4410	4490	4570	4660	4750	4850	4940	5030	5120	5220	5320	118	162
	V1	93	93	93	93	93	93	92	92	92	92	92		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
27000	BFL	4050	4130	4220	4320	4410	4500	4600	4690	4780	4880	4970	115	159
	V1	90	90	90	90	90	90	90	89	89	89	89		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
26000	BFL	4040	4110	4200	4300	4390	4480	4570	4660	4760	4850	4930	113	156
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		

FIGURE 5-239. TAKE-OFF DISTANCE; FLAPS - 10° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	82						
	N1%	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
39600	BFL	16630	17200	18240	19730								150	197
	V1	148	149	151	154									
	VR	165	166	166	167									
	V2	167	167	167	168									
	GR2	3.9	3.7	3.4	3.1									
39000	BFL	15790	16340	17320	18720								148	195
	V1	145	146	148	150									
	VR	163	163	164	165									
	V2	165	165	165	166									
	GR2	4.1	3.9	3.6	3.3									
38000	BFL	14480	14990	15880	17140	18660							146	192
	V1	140	141	143	145	148								
	VR	159	159	160	161	162								
	V2	161	161	161	162	162								
	GR2	4.3	4.2	3.9	3.5	3.1								
37000	BFL	13230	13710	14560	15700	17070	18650	19710					143	189
	V1	135	136	138	140	143	146	148						
	VR	155	155	156	157	158	159	159						
	V2	157	157	158	158	159	159	159						
	GR2	4.7	4.5	4.2	3.8	3.4	2.9	2.6						
36000	BFL	12090	12530	13320	14400	15640	17060	18080					140	186
	V1	130	131	133	135	138	141	143						
	VR	151	151	152	153	154	155	155						
	V2	153	153	154	155	155	156	156						
	GR2	5	4.8	4.5	4.2	3.7	3.2	2.9						
35000	BFL	11010	11420	12150	13170	14300	15590	16510					138	184
	V1	125	126	128	130	133	136	138						
	VR	147	147	148	149	150	151	152						
	V2	150	150	150	151	152	152	152						
	GR2	5.4	5.1	4.8	4.5	4	3.5	3.2						
34000	BFL	10030	10400	11060	12000	13080	14240	15070					135	181
	V1	120	121	123	125	128	131	133						
	VR	142	143	144	145	146	147	148						
	V2	146	146	146	148	148	149	149						
	GR2	5.7	5.5	5.2	4.8	4.4	3.9	3.5						
33000	BFL	9120	9460	10050	10890	11890	12990	13740					132	178
	V1	115	116	118	120	123	126	128						
	VR	138	139	139	141	142	144	144						
	V2	142	142	143	144	145	145	146						
	GR2	6.1	5.9	5.5	5.2	4.7	4.2	3.9						
32000	BFL	8260	8570	9130	9890	10780	11830	12530					129	175
	V1	111	111	113	116	118	122	123						
	VR	134	134	135	137	138	140	141						
	V2	139	139	139	140	141	142	142						
	GR2	6.5	6.3	5.9	5.6	5.1	4.6	4.2						

FIGURE 5-239. TAKE-OFF DISTANCE; FLAPS - 10° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	82						
	N1%	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
31000	BFL	7450	7740	8260	8970	9770	10720	11380					127	172
	V1	106	107	108	111	114	117	119						
	VR	130	130	131	133	134	136	137						
	V2	135	135	136	137	138	138	139						
	GR2	7	6.7	6.3	6	5.5	4.9	4.6						
30000	BFL	6710	6970	7430	8090	8840	9680	10290					124	169
	V1	101	102	104	106	109	112	114						
	VR	125	126	127	129	130	132	133						
	V2	131	131	132	133	134	135	135						
	GR2	7.4	7.1	6.8	6.4	5.9	5.3	5						
29000	BFL	6030	6260	6670	7270	7960	8730	9260					121	166
	V1	96	97	99	101	104	107	109						
	VR	121	121	122	124	126	128	129						
	V2	127	127	128	129	130	131	132						
	GR2	7.9	7.5	7.2	6.8	6.3	5.8	5.4						
28000	BFL	5430	5630	5990	6520	7160	7860	8360					118	162
	V1	92	93	94	97	100	103	105						
	VR	117	117	118	120	122	124	125						
	V2	124	124	124	125	127	128	128						
	GR2	8.4	8	7.7	7.3	6.8	6.2	5.8						
27000	BFL	5020	5110	5420	5880	6440	7110	7560					115	159
	V1	89	89	90	93	95	98	100						
	VR	113	113	114	116	118	120	121						
	V2	120	120	121	122	123	125	125						
	GR2	8.9	8.6	8.2	7.8	7.3	6.7	6.3						
26000	BFL	4970	4970	4970	5300	5780	6370	6790					113	156
	V1	89	88	88	88	91	94	96						
	VR	109	109	110	112	114	116	117						
	V2	117	117	118	119	120	121	122						
	GR2	9.5	9.1	8.8	8.4	7.8	7.3	6.8						

FIGURE 5-240. TAKE-OFF DISTANCE; FLAPS - 10° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	BFL	14930	15190	15520	15870	16210	16570	16910	17260	17600	17960	18310	151	197
	V1	154	154	154	154	154	154	154	153	153	153	153		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6		
39000	BFL	14150	14400	14710	15040	15370	15700	16030	16350	16680	17020	17350	150	195
	V1	151	151	150	150	150	150	150	150	150	150	150		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	168	168	168	168	168	168	167	167	167	167	167		
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
38000	BFL	12940	13170	13450	13750	14050	14350	14650	14950	15250	15560	15860	147	193
	V1	145	145	145	145	145	145	145	145	144	144	144		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.1	4.1	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
37000	BFL	11830	12040	12300	12570	12840	13120	13390	13660	13940	14220	14500	144	190
	V1	140	140	140	140	140	139	139	139	139	139	139		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4		
36000	BFL	10770	10960	11190	11430	11680	11930	12180	12430	12670	12930	13180	142	187
	V1	135	135	134	134	134	134	134	134	134	134	133		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
35000	BFL	9810	9980	10190	10410	10640	10870	11090	11310	11540	11770	12000	139	184
	V1	130	130	129	129	129	129	129	129	128	128	128		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
34000	BFL	8910	9060	9250	9450	9660	9860	10060	10270	10470	10680	10890	136	181
	V1	125	124	124	124	124	124	124	123	123	123	123		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.5	5.5		
33000	BFL	8090	8230	8400	8580	8770	8950	9130	9310	9500	9690	9870	133	178
	V1	120	120	119	119	119	119	119	118	118	118	118		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	144		
	GR2	5.9	6	6	6	6	5.9	5.9	5.9	5.9	5.9	5.9		
32000	BFL	7330	7440	7600	7770	7930	8100	8260	8430	8590	8760	8930	130	175
	V1	115	114	114	114	114	114	114	113	113	113	113		
	VR	137	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.3	6.3	6.3		

FIGURE 5-240. TAKE-OFF DISTANCE; FLAPS - 10° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
31000	BFL	6620	6740	6870	7020	7170	7320	7460	7610	7760	7910	8060	128	172
	V1	110	110	109	109	109	109	109	109	108	108	108		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
30000	BFL	5960	6060	6180	6310	6450	6580	6710	6840	6970	7100	7240	125	169
	V1	105	105	105	104	104	104	104	104	104	103	103		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	7.2	7.2		
29000	BFL	5360	5450	5550	5670	5790	5910	6020	6140	6260	6380	6500	122	166
	V1	100	100	100	100	99	99	99	99	99	99	99		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.7	7.7	7.7	7.7		
28000	BFL	4810	4890	4980	5090	5190	5300	5400	5500	5610	5710	5820	119	163
	V1	95	95	95	95	95	95	94	94	94	94	94		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.2		
27000	BFL	4340	4410	4490	4580	4680	4770	4860	4950	5040	5130	5230	116	160
	V1	91	91	90	90	90	90	90	90	90	90	89		
	VR	115	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	121	121	121	121	121		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.7		
26000	BFL	4140	4220	4310	4400	4500	4590	4690	4780	4870	4970	5050	113	156
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.3		

FIGURE 5-240. TAKE-OFF DISTANCE; FLAPS - 10° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	79						
	N1%	92.4	93.0	92.4	91.7	91.1	90.4	90.3						
39600	BFL	18780	19700										151	197
	V1	154	155											
	VR	169	169											
	V2	170	170											
	GR2	3.5	3.3											
39000	BFL	17810	18680										150	195
	V1	150	152											
	VR	166	167											
	V2	167	168											
	GR2	3.7	3.4											
38000	BFL	16290	17090	18320	19860								147	193
	V1	145	146	148	151									
	VR	162	162	163	164									
	V2	163	164	164	165									
	GR2	4	3.7	3.4	3.1									
37000	BFL	14900	15620	16740	18120	19750							144	190
	V1	139	141	143	145	148								
	VR	158	158	159	160	161								
	V2	160	160	160	161	161								
	GR2	4.3	4	3.7	3.3	2.9								
36000	BFL	13560	14250	15280	16520	17990	19720						142	187
	V1	134	135	138	140	143	146							
	VR	154	154	155	156	157	158							
	V2	156	156	156	157	158	158							
	GR2	4.6	4.3	4	3.7	3.2	2.7							
35000	BFL	12350	12980	13970	15100	16420	17970	18390					139	184
	V1	129	130	133	135	138	141	142						
	VR	149	150	151	152	153	154	154						
	V2	152	152	153	153	154	155	155						
	GR2	5	4.7	4.4	4	3.5	3	2.9						
34000	BFL	11210	11810	12700	13780	14980	16370	16750					136	181
	V1	124	125	127	130	133	136	136						
	VR	145	146	147	148	149	150	150						
	V2	148	148	149	150	150	151	151						
	GR2	5.3	5	4.7	4.3	3.9	3.3	3.2						
33000	BFL	10170	10700	11510	12520	13650	14900	15240					133	178
	V1	119	120	122	125	128	131	131						
	VR	141	141	143	144	145	146	146						
	V2	144	144	145	146	147	147	147						
	GR2	5.7	5.4	5.1	4.7	4.2	3.7	3.5						
32000	BFL	9200	9690	10430	11350	12400	13540	13840					130	175
	V1	114	115	117	120	123	126	126						
	VR	136	137	138	140	141	142	143						
	V2	140	141	142	143	143	144	144						
	GR2	6.1	5.8	5.4	5	4.6	4	3.9						

FIGURE 5-240. TAKE-OFF DISTANCE; FLAPS - 10° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	77	79						
	N1%	92.4	93.0	92.4	91.7	91.1	90.4	90.3						
31000	BFL	8310	8750	9440	10250	11220	12310	12580					128	172
	V1	109	110	112	115	118	121	122						
	VR	132	133	134	136	137	139	139						
	V2	136	137	138	139	140	140	140						
	GR2	6.5	6.2	5.8	5.4	4.9	4.4	4.3						
30000	BFL	7470	7880	8510	9250	10110	11110	11380					125	169
	V1	104	105	108	110	113	116	117						
	VR	128	128	130	132	133	135	135						
	V2	133	133	134	135	136	137	137						
	GR2	6.9	6.6	6.3	5.8	5.3	4.8	4.7						
29000	BFL	6700	7060	7640	8320	9100	10000	10250					122	166
	V1	99	101	103	105	108	111	112						
	VR	123	124	126	127	129	131	131						
	V2	129	129	130	131	132	133	133						
	GR2	7.4	7	6.7	6.3	5.8	5.2	5.1						
28000	BFL	6000	6320	6830	7450	8160	8970	9190					119	163
	V1	94	96	98	101	103	106	107						
	VR	119	119	121	123	125	126	127						
	V2	125	125	126	127	128	129	130						
	GR2	7.9	7.5	7.1	6.8	6.2	5.7	5.5						
27000	BFL	5390	5650	6100	6650	7310	8050	8240					116	160
	V1	90	91	93	96	99	102	102						
	VR	114	115	117	119	121	122	123						
	V2	121	121	122	124	125	126	126						
	GR2	8.4	8	7.6	7.2	6.7	6.1	6						
26000	BFL	5040	5120	5490	5970	6550	7240	7420					113	156
	V1	87	87	89	91	94	97	98						
	VR	111	111	113	115	117	118	119						
	V2	118	118	119	120	121	123	123						
	GR2	8.9	8.5	8.2	7.8	7.2	6.6	6.5						

FIGURE 5-241. TAKE-OFF DISTANCE; FLAPS - 10° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	83.6	84.1	84.9	85.8	86.7	87.6	88.4	89.4	90.3	91.2	92.0		
39600	BFL	16750	17070	17450	17850	18260	18710	19170	19480	19800			152	198
	V1	159	159	159	159	159	159	159	158	158				
	VR	172	172	172	172	172	172	172	172	172				
	V2	173	173	173	173	173	173	173	173	173				
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4				
39000	BFL	15880	16180	16550	16930	17310	17740	18180	18470	18780	19160	19570	151	196
	V1	155	155	155	155	155	155	155	155	155	155	155		
	VR	170	170	170	170	170	170	170	170	170	170	170		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.5	3.6	3.6	3.5		
38000	BFL	14510	14780	15120	15460	15820	16210	16600	16880	17160	17500	17890	148	193
	V1	150	150	150	150	150	150	150	149	149	149	149		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	BFL	13220	13470	13770	14090	14410	14760	15120	15370	15630	15940	16300	145	190
	V1	144	144	144	144	144	144	144	144	143	143	143		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	163	163	163	163	163	163	163	163	163	163	162		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1		
36000	BFL	12050	12270	12550	12830	13130	13450	13770	14000	14240	14520	14860	143	187
	V1	139	139	139	138	138	138	138	138	138	138	138		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5		
35000	BFL	10930	11130	11380	11640	11900	12190	12490	12690	12900	13160	13470	140	184
	V1	133	133	133	133	133	133	133	132	132	132	132		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8		
34000	BFL	9920	10100	10320	10560	10800	11060	11320	11510	11700	11930	12220	137	181
	V1	128	128	128	128	127	127	127	127	127	127	127		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2		
33000	BFL	8980	9140	9350	9550	9770	10010	10250	10410	10580	10800	11060	134	179
	V1	123	123	122	122	122	122	122	122	122	122	122		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6		
32000	BFL	8140	8280	8470	8660	8850	9060	9280	9420	9580	9770	10010	131	176
	V1	118	118	117	117	117	117	117	117	117	117	117		
	VR	139	139	139	139	139	140	140	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6		

FIGURE 5-241. TAKE-OFF DISTANCE; FLAPS - 10° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	83.6	84.1	84.9	85.8	86.7	87.6	88.4	89.4	90.3	91.2	92.0		
31000	BFL	7350	7480	7640	7810	7990	8180	8370	8500	8640	8810	9030	128	173
	V1	113	113	113	112	112	112	112	112	111	111	112		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.4		
30000	BFL	6620	6730	6880	7030	7190	7360	7530	7650	7770	7930	8120	126	170
	V1	108	108	107	107	107	107	107	107	107	107	107		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7	7	7	7	7	7	6.9	6.9	7	7	6.8		
29000	BFL	5930	6030	6160	6300	6440	6590	6740	6850	6950	7090	7270	123	166
	V1	103	103	102	102	102	102	102	102	102	102	102		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	7.5	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.3		
28000	BFL	5300	5390	5510	5630	5750	5890	6020	6110	6210	6330	6490	120	163
	V1	98	98	98	97	97	97	97	97	97	97	97		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8	8	8	8	8	7.9	7.9	7.9	7.9	7.9	7.8		
27000	BFL	4740	4830	4930	5030	5140	5260	5380	5460	5540	5650	5790	117	160
	V1	93	93	93	93	92	92	92	92	92	92	92		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.3		
26000	BFL	4260	4330	4420	4520	4610	4710	4820	4890	4980	5080	5180	114	157
	V1	88	88	88	88	88	88	88	87	87	87	87		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	120	120	119	119	119	119		
	GR2	9.1	9.1	9.1	9.1	9.1	9	9	9	9	9	8.8		

FIGURE 5-241. TAKE-OFF DISTANCE; FLAPS - 10° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	75							
	N1%	92.9	92.8	92.2	91.5	90.9	90.3							
39600	BFL													
	V1													
	VR													
	V2													
	GR2													
39000	BFL													
	V1													
	VR													
	V2													
	GR2													
38000	BFL	18560	19730										148	193
	V1	150	152											
	VR	165	166											
	V2	166	167											
	GR2	3.6	3.3											
37000	BFL	16930	17980	19420									145	190
	V1	145	147	149										
	VR	161	162	163										
	V2	162	163	163										
	GR2	3.9	3.6	3.3										
36000	BFL	15440	16380	17670	19170								143	187
	V1	139	141	143	146									
	VR	157	157	158	159									
	V2	158	159	159	160									
	GR2	4.2	3.9	3.6	3.2									
35000	BFL	14010	14920	16080	17420	19040							140	184
	V1	133	135	138	140	143								
	VR	152	153	154	155	156								
	V2	154	155	155	156	157								
	GR2	4.5	4.2	3.9	3.5	3								
34000	BFL	12710	13540	14640	15850	17290	18720						137	181
	V1	128	130	132	135	138	140							
	VR	148	149	150	151	152	153							
	V2	150	151	152	152	153	153							
	GR2	4.8	4.5	4.2	3.8	3.3	2.9							
33000	BFL	11510	12280	13310	14410	15710	16990						134	179
	V1	123	125	127	130	132	135							
	VR	144	145	146	147	148	149							
	V2	146	147	148	149	149	150							
	GR2	5.2	4.9	4.6	4.2	3.7	3.2							
32000	BFL	10420	11100	12040	13090	14260	15400						131	176
	V1	118	120	122	125	127	130							
	VR	140	140	142	143	144	145							
	V2	143	143	144	145	145	146							
	GR2	5.6	5.3	4.9	4.5	4	3.6							

FIGURE 5-241. TAKE-OFF DISTANCE; FLAPS - 10° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	75							
	N1%	92.9	92.8	92.2	91.5	90.9	90.3							
31000	BFL	9410	10040	10860	11810	12930	13940						128	173
	V1	113	115	117	120	122	125							
	VR	135	136	138	139	140	141							
	V2	139	139	140	141	142	142							
	GR2	6	5.7	5.3	4.9	4.4	3.9							
30000	BFL	8460	9040	9800	10660	11660	12620						126	170
	V1	108	110	112	115	117	120							
	VR	131	132	133	135	136	137							
	V2	135	135	137	137	138	139							
	GR2	6.4	6.1	5.7	5.3	4.8	4.3							
29000	BFL	7580	8120	8820	9580	10500	11380						123	166
	V1	103	105	107	109	113	115							
	VR	126	127	129	131	132	133							
	V2	131	131	133	134	134	135							
	GR2	6.9	6.5	6.2	5.8	5.2	4.7							
28000	BFL	6760	7240	7900	8600	9410	10210						120	163
	V1	98	100	102	105	107	110							
	VR	121	123	125	126	128	129							
	V2	127	127	129	130	131	131							
	GR2	7.3	7	6.6	6.2	5.7	5.2							
27000	BFL	6020	6440	7020	7670	8430	9120						117	160
	V1	93	95	97	100	103	105							
	VR	117	118	120	122	124	125							
	V2	123	123	125	126	127	128							
	GR2	7.8	7.4	7.1	6.7	6.1	5.6							
26000	BFL	5380	5720	6230	6810	7510	8160						114	157
	V1	88	90	92	95	98	100							
	VR	112	113	115	117	119	121							
	V2	119	119	121	122	123	124							
	GR2	8.4	7.9	7.6	7.2	6.6	6.1							

FIGURE 5-242. TAKE-OFF DISTANCE; FLAPS - 10° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1%	84.5	84.8	85.4	86.4	87.3	88.1	88.9	89.9	90.8	91.7	92.6		
39600	BFL	18890	19240	19690									154	198
	V1	164	164	164										
	VR	175	175	175										
	V2	176	176	176										
	GR2	3.2	3.2	3.2										
39000	BFL	17870	18200	18620	19050	19490							152	197
	V1	160	160	160	160	160								
	VR	173	173	173	173	173								
	V2	174	174	174	174	174								
	GR2	3.4	3.4	3.4	3.4	3.4								
38000	BFL	16290	16600	16980	17370	17770	18280	18690	18950	19290	19700		149	194
	V1	154	154	154	154	154	154	154	154	154	154			
	VR	169	169	169	169	169	169	169	169	169	169			
	V2	170	170	170	170	170	170	170	170	170	170			
	GR2	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.7	3.7	3.6			
37000	BFL	14860	15140	15490	15850	16210	16680	17050	17290	17590	17970	18550	147	191
	V1	149	148	148	148	148	148	148	148	148	148	149		
	VR	165	165	165	165	165	165	165	165	164	164	164		
	V2	166	166	166	166	166	166	166	166	166	166	165		
	GR2	4	4	4	4	4	4	4	4	4	3.9	3.7		
36000	BFL	13510	13760	14080	14410	14740	15150	15490	15710	15990	16340	16870	144	188
	V1	143	143	143	143	143	143	143	142	142	142	143		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	162	162	162	162	162	162	162	162	161	161	161		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4		
35000	BFL	12280	12500	12790	13090	13390	13760	14060	14270	14520	14840	15320	141	185
	V1	137	137	137	137	137	137	137	137	136	136	137		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	157		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.4		
34000	BFL	11110	11310	11570	11840	12110	12450	12730	12910	13130	13420	13860	138	182
	V1	132	132	131	131	131	131	131	131	131	131	132		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	153	153	153	154	154	153	153	153	153		
	GR2	5.1	5.1	5.1	5.1	5	5	5	5	5	5	4.7		
33000	BFL	10050	10230	10460	10700	10950	11260	11500	11660	11870	12130	12530	135	179
	V1	126	126	126	126	126	126	126	126	125	125	126		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	149	149	149	149	150	150	150	149	149	149	149		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.1		
32000	BFL	9100	9260	9470	9690	9890	10190	10400	10550	10740	10980	11330	133	176
	V1	121	121	121	121	121	121	121	120	120	120	121		
	VR	142	142	142	142	142	143	143	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	145	145	145		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.5		

FIGURE 5-242. TAKE-OFF DISTANCE; FLAPS - 10° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC OATF N1%	-54 -65 84.5	-50 -58 84.8	-45 -49 85.4	-40 -40 86.4	-35 -31 87.3	-30 -22 88.1	-25 -13 88.9	-20 -4 89.9	-15 5 90.8	-10 14 91.7	-5 23 92.6	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
31000	BFL	8210	8360	8550	8750	8950	9190	9380	9520	9690	9900	10220	130	173
	V1	116	116	116	116	116	116	116	115	115	115	116		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	141		
	GR2	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	5.9		
30000	BFL	7400	7530	7700	7870	8060	8280	8450	8560	8710	8910	9200	127	170
	V1	111	111	111	111	111	111	111	110	110	110	111		
	VR	133	133	133	134	134	134	134	134	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	137		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.3		
29000	BFL	6640	6760	6910	7070	7230	7430	7580	7680	7810	7990	8240	124	167
	V1	106	106	106	106	106	106	105	105	105	105	105		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	133		
	GR2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	7.1	7.1	7	6.8		
28000	BFL	5920	6020	6150	6290	6440	6620	6750	6840	6950	7110	7330	121	164
	V1	101	101	100	100	100	100	100	100	100	100	100		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	129	129	129	130	130	130	130	130	129	129	129		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.2		
27000	BFL	5260	5350	5470	5590	5720	5880	5990	6070	6170	6310	6510	118	160
	V1	96	96	95	95	95	95	95	95	95	95	95		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8	7.7		
26000	BFL	4690	4770	4870	4980	5100	5230	5330	5400	5490	5610	5770	115	157
	V1	91	91	90	90	90	90	90	90	90	90	90		
	VR	114	114	114	114	115	115	115	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.5	8.2		

FIGURE 5-242. TAKE-OFF DISTANCE; FLAPS - 10° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW LBS	OATC	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	72							
	N1%	93.0	92.5	91.9	91.2	90.5	90.2							
39600	BFL													
	V1													
	VR													
	V2													
	GR2													
39000	BFL													
	V1													
	VR													
	V2													
	GR2													
38000	BFL													
	V1													
	VR													
	V2													
	GR2													
37000	BFL	19540											147	191
	V1	151												
	VR	165												
	V2	166												
	GR2	3.4												
36000	BFL	17770	19050										144	188
	V1	145	147											
	VR	160	161											
	V2	161	162											
	GR2	3.7	3.4											
35000	BFL	16130	17290	18700									141	185
	V1	139	141	143										
	VR	156	157	158										
	V2	157	158	158										
	GR2	4	3.7	3.4										
34000	BFL	14620	15690	16940	18420								138	182
	V1	133	135	138	140									
	VR	152	153	153	154									
	V2	153	154	154	155									
	GR2	4.4	4.1	3.7	3.3									
33000	BFL	13220	14220	15350	16660	18230	19040						135	179
	V1	128	130	132	135	138	139							
	VR	147	148	149	150	151	151							
	V2	149	150	150	151	152	152							
	GR2	4.7	4.4	4.1	3.7	3.2	3							
32000	BFL	11950	12860	13930	15100	16500	17220						133	176
	V1	122	125	127	129	132	134							
	VR	143	144	145	146	147	147							
	V2	145	146	147	147	148	148							
	GR2	5.1	4.8	4.4	4	3.5	3.3							

FIGURE 5-242. TAKE-OFF DISTANCE; FLAPS - 10° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW LBS	OATC	0	5	10	15	20	22						Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OATF	32	41	50	59	68	72							
	N1%	93.0	92.5	91.9	91.2	90.5	90.2							
31000	BFL	10780	11610	12570	13670	14920	15550						130	173
	V1	117	119	122	124	127	128							
	VR	138	140	141	142	143	143							
	V2	141	142	143	144	144	144							
	GR2	5.5	5.2	4.8	4.4	3.9	3.6							
30000	BFL	9710	10440	11320	12320	13470	14030						127	170
	V1	112	114	116	119	122	123							
	VR	134	135	137	138	139	139							
	V2	137	138	139	140	140	140							
	GR2	5.9	5.6	5.2	4.8	4.3	4							
29000	BFL	8710	9390	10160	11070	12140	12650						124	167
	V1	107	109	111	114	117	118							
	VR	130	131	132	134	135	135							
	V2	133	134	135	136	137	137							
	GR2	6.4	6	5.7	5.2	4.7	4.4							
28000	BFL	7770	8420	9130	9920	10890	11360						121	164
	V1	102	104	106	109	112	113							
	VR	125	126	128	129	131	131							
	V2	129	130	131	132	133	133							
	GR2	6.8	6.5	6.1	5.6	5.1	4.8							
27000	BFL	6880	7490	8150	8890	9740	10170						118	160
	V1	96	99	101	104	107	108							
	VR	120	122	124	125	127	127							
	V2	125	126	128	128	129	130							
	GR2	7.3	6.9	6.6	6.1	5.6	5.3							
26000	BFL	6090	6600	7240	7900	8680	9050						115	157
	V1	91	94	96	99	102	103							
	VR	115	117	119	121	122	123							
	V2	121	122	124	125	125	126							
	GR2	7.8	7.4	7.1	6.6	6	5.8							

FIGURE 5-243. TAKE-OFF DISTANCE; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY
(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	5200	5280	5370	5450	5530	5640	5760	5870	5980	6070	6190	139	192
	V1	119	118	118	118	117	117	117	117	117	117	117		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
39000	TOFL	4990	5070	5160	5240	5320	5420	5530	5640	5740	5830	5950	138	191
	V1	117	116	116	116	115	115	115	115	115	115	115		
	VR	138	138	138	138	137	137	137	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
38000	TOFL	4660	4740	4810	4890	4960	5060	5160	5260	5350	5440	5540	136	188
	V1	113	113	113	112	112	112	112	112	112	111	111		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	7	7	7.1	7.1	7.1	7.1	7	7	7	7		
37000	TOFL	4340	4410	4480	4550	4620	4710	4800	4900	4990	5060	5160	135	185
	V1	110	110	109	109	109	109	109	108	108	108	108		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
36000	TOFL	4040	4110	4170	4240	4300	4380	4470	4560	4640	4710	4800	133	182
	V1	107	106	106	106	105	105	105	105	105	105	105		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
35000	TOFL	3770	3830	3900	3960	4010	4090	4170	4250	4320	4390	4470	131	180
	V1	103	103	103	102	102	102	102	102	102	102	102		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.1	8.2	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.2		
34000	TOFL	3540	3620	3700	3780	3860	3940	4010	4080	4160	4230	4310	129	177
	V1	100	100	101	101	101	101	101	100	100	100	100		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
33000	TOFL	3520	3600	3670	3750	3830	3910	3980	4050	4120	4200	4270	127	174
	V1	101	101	101	101	101	101	101	101	100	100	100		
	VR	121	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
32000	TOFL	3490	3570	3650	3720	3800	3870	3950	4020	4090	4160	4240	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	117	117	117	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		

FIGURE 5-243. TAKE-OFF DISTANCE; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY
(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
31000	TOFL	3460	3540	3620	3690	3770	3840	3910	3980	4060	4130	4200	123	168
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.2	10.2	10.2	10.2		
30000	TOFL	3440	3510	3590	3670	3740	3810	3880	3950	4020	4100	4170	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.7	10.7	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
29000	TOFL	3410	3490	3560	3640	3710	3780	3850	3920	3990	4060	4130	119	163
	V1	101	101	101	102	102	102	101	101	101	101	101		
	VR	110	110	110	110	109	109	109	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.3	11.4	11.4	11.4	11.5	11.5	11.5	11.4	11.4	11.4	11.4		
28000	TOFL	3390	3460	3530	3610	3680	3750	3820	3890	3960	4030	4100	117	160
	V1	102	102	102	102	102	102	102	102	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	120	120	120		
	GR2	12	12.1	12.1	12.1	12.2	12.2	12.2	12.1	12.1	12.1	12.1		
27000	TOFL	3360	3430	3510	3580	3650	3720	3790	3850	3920	3990	4060	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.8	12.8	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		
26000	TOFL	3330	3410	3480	3550	3630	3690	3760	3820	3890	3960	4030	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.6	13.6	13.7	13.7	13.8	13.8	13.8	13.7	13.7	13.7	13.7		

FIGURE 5-244. TAKE-OFF DISTANCE; FLAPS - 10° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	5550	5640	5740	5830	5930	6050	6170	6290	6410	6520	6650	139	193
	V1	120	120	119	119	119	119	119	119	118	118	118		
	VR	141	141	141	140	140	140	140	140	140	140	141		
	V2	147	147	147	147	146	146	147	147	147	147	147		
	GR2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2		
39000	TOFL	5330	5420	5510	5600	5700	5810	5920	6040	6150	6250	6380	138	191
	V1	118	118	117	117	117	117	117	117	116	116	116		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4		
38000	TOFL	4970	5060	5140	5220	5310	5420	5520	5630	5740	5830	5950	136	188
	V1	115	114	114	114	113	113	113	113	113	113	113		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
37000	TOFL	4630	4710	4790	4860	4950	5040	5140	5240	5340	5430	5530	135	185
	V1	111	111	111	110	110	110	110	110	110	109	109		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
36000	TOFL	4310	4380	4450	4520	4600	4690	4780	4870	4960	5040	5140	133	183
	V1	108	108	107	107	107	107	106	106	106	106	106		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	137	137	137	137	137	137	137	137	137	137		
	GR2	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
35000	TOFL	4000	4070	4140	4200	4280	4360	4440	4530	4610	4680	4770	131	180
	V1	104	104	104	104	103	103	103	103	103	103	103		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.9	8	8	8	8	8	8	8	8	8	8		
34000	TOFL	3730	3790	3860	3920	3980	4060	4140	4210	4290	4360	4440	129	177
	V1	101	101	100	100	100	100	100	100	100	99	99		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.4	8.4	8.4	8.5	8.5	8.5	8.4	8.4	8.4	8.4	8.4		
33000	TOFL	3600	3680	3760	3850	3930	4000	4070	4150	4220	4300	4370	127	174
	V1	100	100	100	100	100	100	100	100	99	99	99		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
32000	TOFL	3580	3660	3740	3820	3890	3970	4040	4110	4190	4270	4340	125	171
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 5-244. TAKE-OFF DISTANCE; FLAPS - 10° ; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
31000	TOFL	3550	3630	3710	3780	3860	3940	4010	4080	4150	4230	4300	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.9	9.9	9.9	10	10	10	9.9	9.9	9.9	9.9	9.9		
30000	TOFL	3520	3600	3680	3750	3830	3900	3970	4050	4120	4190	4260	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	113	113	113	112	112	112	112	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.4	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
29000	TOFL	3490	3570	3650	3720	3800	3870	3940	4010	4080	4160	4230	119	163
	V1	100	100	101	101	101	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11.1	11.1	11.1	11.2	11.2	11.1	11.1	11.1	11.1	11.1		
28000	TOFL	3470	3540	3620	3690	3770	3840	3910	3980	4050	4120	4190	117	160
	V1	101	101	101	101	101	101	101	101	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8		
27000	TOFL	3440	3510	3590	3660	3740	3810	3880	3940	4010	4090	4150	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.5	12.5	12.5	12.6	12.6	12.6	12.6	12.5	12.5	12.5	12.5		
26000	TOFL	3410	3490	3560	3640	3710	3780	3840	3910	3980	4050	4120	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.3	13.3	13.3	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.3		

FIGURE 5-245. TAKE-OFF DISTANCE; FLAPS - 10° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	5910	6020	6130	6240	6370	6490	6620	6760	6880	6990	7150	140	193
	V1	121	121	121	120	120	120	120	120	120	120	120		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6	6	6	6.1	6.1	6	6	6	6	6	6		
39000	TOFL	5670	5780	5890	5990	6110	6230	6350	6480	6600	6710	6860	139	191
	V1	119	119	119	118	118	118	118	118	118	118	118		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.2	6.2	6.2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2		
38000	TOFL	5290	5390	5490	5590	5700	5810	5930	6040	6150	6250	6390	137	189
	V1	116	116	115	115	115	115	115	115	114	114	114		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5		
37000	TOFL	4930	5020	5110	5200	5300	5410	5510	5620	5730	5820	5940	135	186
	V1	112	112	112	112	111	111	111	111	111	111	111		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.9	6.9	7	7	7	7	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	4580	4670	4750	4830	4920	5020	5120	5220	5320	5400	5510	133	183
	V1	109	109	108	108	108	108	108	108	108	107	107		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.3	7.3	7.3	7.4	7.4	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	4250	4330	4410	4480	4570	4660	4750	4840	4930	5010	5110	131	180
	V1	105	105	105	105	105	104	104	104	104	104	104		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.7	7.7		
34000	TOFL	3950	4020	4100	4170	4240	4330	4410	4500	4580	4650	4740	129	177
	V1	102	102	102	101	101	101	101	101	101	101	101		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1		
33000	TOFL	3700	3780	3860	3940	4020	4100	4180	4250	4330	4410	4480	127	175
	V1	99	99	99	99	99	99	99	99	98	98	98		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.6	8.6	8.6	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6		
32000	TOFL	3670	3750	3830	3910	3990	4070	4140	4210	4290	4370	4450	125	172
	V1	99	99	99	99	99	99	99	99	99	99	98		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		

FIGURE 5-245. TAKE-OFF DISTANCE; FLAPS - 10° ; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

31000	**TOFL**	3640	3720	3800	3880	3960	4030	4110	4180	4250	4330	4410	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.6	9.7	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6		
30000	**TOFL**	3620	3690	3770	3850	3920	4000	4070	4140	4220	4300	4370	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
29000	**TOFL**	3590	3660	3740	3820	3890	3970	4040	4110	4180	4260	4330	119	163
	V1	100	100	100	100	100	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
28000	**TOFL**	3560	3630	3710	3790	3860	3930	4000	4070	4140	4220	4290	117	160
	V1	100	100	100	100	100	100	100	99	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.4	11.4	11.4	11.4		
27000	**TOFL**	3530	3600	3680	3760	3830	3900	3970	4040	4110	4190	4250	115	157
	V1	100	100	100	100	100	100	100	100	100	100	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	117	117	117	117	117	118	118	118	117		
	GR2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.1		
26000	**TOFL**	3500	3570	3650	3720	3800	3870	3930	4000	4070	4150	4220	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	13	13	13	13	13	13	12.9	12.9	12.9	12.9		

FIGURE 5-246. TAKE-OFF DISTANCE; FLAPS - 10° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	6420	6550	6680	6800	6940	7080	7220	7370	7510	7640	7800	141	193
	V1	123	123	123	123	123	123	122	122	122	122	122		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7		
39000	TOFL	6130	6250	6370	6500	6630	6760	6890	7030	7170	7290	7440	140	192
	V1	121	121	121	120	120	120	120	120	120	120	120		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6	6	6	6	6	6	6	5.9	5.9	5.9	5.9		
38000	TOFL	5680	5790	5900	6020	6140	6260	6380	6510	6630	6740	6890	137	189
	V1	117	117	117	117	117	116	116	116	116	116	116		
	VR	138	138	138	138	138	138	138	138	138	138	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	5280	5390	5490	5590	5710	5820	5940	6050	6170	6270	6400	135	186
	V1	114	113	113	113	113	113	113	113	113	112	112		
	VR	135	135	135	135	135	135	135	135	135	135	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.6		
36000	TOFL	4910	5000	5100	5200	5300	5400	5510	5620	5720	5820	5940	133	183
	V1	110	110	110	110	109	109	109	109	109	109	109		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7	7	7	7	7		
35000	TOFL	4550	4640	4730	4820	4910	5010	5110	5210	5300	5390	5500	131	181
	V1	107	106	106	106	106	106	106	106	106	105	105		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.4	7.4	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	4220	4300	4380	4460	4550	4640	4730	4820	4910	4990	5090	129	178
	V1	103	103	103	103	102	102	102	102	102	102	102		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8		
33000	TOFL	3920	4000	4070	4140	4220	4300	4380	4470	4550	4620	4710	127	175
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
32000	TOFL	3770	3850	3930	4010	4090	4170	4250	4320	4400	4480	4560	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		

FIGURE 5-246. TAKE-OFF DISTANCE; FLAPS - 10° ; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
31000	TOFL	3740	3820	3900	3980	4060	4130	4210	4280	4360	4440	4520	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
30000	TOFL	3710	3790	3860	3940	4020	4100	4170	4250	4320	4400	4480	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.9	9.9	9.9	9.9	9.9	9.8	9.8	9.8	9.8	9.8		
29000	TOFL	3680	3750	3830	3910	3990	4060	4140	4210	4280	4370	4440	119	163
	V1	99	99	99	99	99	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
28000	TOFL	3650	3720	3800	3880	3950	4030	4100	4170	4250	4330	4400	117	160
	V1	99	99	99	99	99	99	99	98	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11	11	11	11		
27000	TOFL	3620	3690	3770	3850	3920	3990	4060	4140	4210	4290	4360	115	157
	V1	99	99	99	99	99	99	99	99	99	99	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.7	11.7	11.7	11.7		
26000	TOFL	3590	3660	3740	3810	3890	3960	4030	4100	4170	4250	4320	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	116	116	116	116	116	115	115	115	115	115		
	GR2	12.5	12.5	12.6	12.6	12.6	12.5	12.5	12.5	12.5	12.5	12.5		

FIGURE 5-247. TAKE-OFF DISTANCE; FLAPS - 10° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	7050	7180	7320	7470	7620	7770	7930	8110	8260	8400	8600	142	194
	V1	126	126	126	125	125	125	125	125	125	125	125		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	6720	6850	6980	7120	7270	7420	7570	7720	7860	8000	8180	141	192
	V1	124	123	123	123	123	123	123	123	122	122	122		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6		
38000	TOFL	6210	6330	6450	6580	6710	6840	6980	7120	7260	7380	7550	138	189
	V1	120	119	119	119	119	119	119	119	118	118	118		
	VR	140	140	140	140	140	140	140	140	140	140	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6	6	6		
37000	TOFL	5720	5830	5950	6060	6180	6310	6430	6560	6680	6800	6950	136	187
	V1	116	115	115	115	115	115	115	115	114	114	114		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3		
36000	TOFL	5300	5410	5510	5620	5730	5840	5960	6080	6190	6290	6430	133	184
	V1	112	112	111	111	111	111	111	111	111	111	111		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.7		
35000	TOFL	4920	5010	5110	5210	5310	5410	5520	5630	5730	5830	5960	131	181
	V1	108	108	108	108	108	108	107	107	107	107	107		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	7.1	7.1		
34000	TOFL	4550	4640	4730	4820	4910	5010	5100	5210	5300	5390	5500	129	178
	V1	105	105	104	104	104	104	104	104	104	103	103		
	VR	127	127	127	127	127	127	127	127	127	127	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.5		
33000	TOFL	4210	4290	4370	4460	4540	4630	4720	4810	4900	4980	5080	127	175
	V1	101	101	101	101	101	100	100	100	100	100	100		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8	8	8	8	8	8	8	8	8	8	7.9		
32000	TOFL	3910	3980	4060	4130	4210	4290	4370	4450	4530	4610	4700	125	172
	V1	98	98	97	97	97	97	97	97	97	97	97		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.4	8.4		

FIGURE 5-247. TAKE-OFF DISTANCE; FLAPS - 10° ; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
31000	TOFL	3820	3900	3980	4060	4140	4220	4300	4380	4460	4540	4620	123	169
	V1	97	97	97	97	97	97	97	97	97	97	96		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9	9	9	9	9	9	9	8.9	8.9	8.9	8.9		
30000	TOFL	3790	3870	3950	4030	4110	4190	4260	4340	4420	4500	4580	121	166
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.4		
29000	TOFL	3760	3830	3920	4000	4070	4150	4230	4300	4380	4460	4540	119	163
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10	10		
28000	TOFL	3720	3800	3880	3960	4040	4110	4190	4260	4340	4420	4490	117	160
	V1	98	98	98	98	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.6	10.6	10.6	10.6		
27000	TOFL	3690	3770	3850	3930	4000	4080	4150	4230	4300	4380	4450	115	157
	V1	98	98	98	98	98	98	98	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.3	11.3		
26000	TOFL	3660	3740	3820	3890	3970	4040	4110	4190	4260	4340	4410	113	154
	V1	98	98	98	98	98	98	98	98	98	98	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	116	116	115	115	115	115	115	115		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12		

FIGURE 5-248. TAKE-OFF DISTANCE; FLAPS - 10° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	7680	7840	7990	8160	8330	8490	8670	8850	9020	9170	9390	143	194
	V1	129	128	128	128	128	128	128	128	127	127	127		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2		
39000	TOFL	7330	7480	7620	7780	7940	8100	8270	8440	8590	8740	8950	142	193
	V1	126	126	126	126	125	125	125	125	125	125	125		
	VR	146	146	146	146	146	146	146	146	146	146	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4		
38000	TOFL	6750	6890	7020	7160	7310	7460	7610	7760	7910	8040	8230	139	190
	V1	122	122	121	121	121	121	121	121	121	121	121		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7		
37000	TOFL	6220	6340	6470	6600	6730	6870	7000	7150	7280	7400	7570	137	187
	V1	118	117	117	117	117	117	117	117	117	117	117		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	5720	5830	5950	6070	6190	6310	6440	6570	6690	6800	6960	134	184
	V1	114	113	113	113	113	113	113	113	112	112	112		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.4		
35000	TOFL	5280	5380	5480	5600	5710	5820	5930	6050	6170	6270	6410	132	181
	V1	110	110	109	109	109	109	109	109	109	109	109		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.8		
34000	TOFL	4880	4980	5070	5180	5280	5380	5480	5590	5700	5790	5920	129	178
	V1	106	106	106	106	106	105	105	105	105	105	105		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2		
33000	TOFL	4510	4600	4680	4780	4870	4970	5060	5160	5260	5340	5460	127	176
	V1	103	102	102	102	102	102	102	102	102	101	101		
	VR	126	125	125	125	125	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.7	7.7	7.8	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
32000	TOFL	4170	4250	4330	4410	4500	4590	4680	4770	4850	4930	5040	125	173
	V1	99	99	99	99	98	98	98	98	98	98	98		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1		

FIGURE 5-248. TAKE-OFF DISTANCE; FLAPS - 10° ; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
31000	TOFL	3920	4000	4090	4170	4250	4330	4410	4490	4580	4660	4740	123	170
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.6		
30000	TOFL	3880	3970	4050	4130	4210	4290	4370	4450	4530	4620	4700	121	167
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.1		
29000	TOFL	3850	3930	4020	4100	4180	4260	4340	4410	4490	4580	4660	119	164
	V1	97	97	97	96	96	96	96	96	96	96	96		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.7	9.7	9.8	9.8	9.8	9.7	9.7	9.7	9.7	9.7	9.7		
28000	TOFL	3820	3900	3980	4060	4140	4220	4300	4370	4450	4540	4610	117	161
	V1	97	97	97	97	97	97	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.3	10.3	10.4	10.4	10.4	10.3	10.3	10.3	10.3	10.3	10.3		
27000	TOFL	3790	3870	3950	4030	4100	4180	4260	4330	4410	4500	4570	115	157
	V1	97	97	97	97	97	97	97	97	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11	11	11	11	11	11	11	10.9	10.9	10.9	10.9		
26000	TOFL	3750	3830	3910	3990	4070	4140	4220	4290	4370	4450	4530	113	154
	V1	97	97	97	97	97	97	97	97	97	97	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.6		

FIGURE 5-249. TAKE-OFF DISTANCE; FLAPS - 10° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	8500	8650	8820	9000	9190	9380	9570	9770	9950	10140	10380	144	194
	V1	132	131	131	131	131	131	131	131	131	131	131		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5	5.1	5.1	5.1	5.1	5.1	5	5	5	5	4.9		
39000	TOFL	8110	8260	8420	8590	8770	8950	9130	9320	9490	9670	9910	143	193
	V1	129	129	129	128	128	128	128	128	128	128	128		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.2	5.2	5.3	5.3	5.3	5.2	5.2	5.2	5.2	5.2	5.1		
38000	TOFL	7480	7620	7760	7920	8080	8250	8410	8580	8750	8910	9130	140	190
	V1	125	125	124	124	124	124	124	124	124	124	124		
	VR	145	145	145	145	145	145	145	145	145	145	146		
	V2	150	149	149	149	149	149	149	149	149	149	150		
	GR2	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.5		
37000	TOFL	6870	7000	7130	7280	7420	7570	7720	7880	8030	8180	8380	138	187
	V1	121	120	120	120	120	120	120	119	119	119	119		
	VR	142	141	141	141	141	141	141	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8		
36000	TOFL	6320	6430	6550	6680	6820	6950	7090	7240	7380	7510	7690	135	185
	V1	116	116	116	116	116	115	115	115	115	115	115		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.1		
35000	TOFL	5800	5900	6010	6130	6250	6380	6500	6640	6760	6880	7040	133	182
	V1	112	112	112	112	111	111	111	111	111	111	111		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	139	139	139	139	139	139	139	139	140	140		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5		
34000	TOFL	5320	5420	5520	5630	5740	5850	5970	6090	6200	6310	6460	130	179
	V1	108	108	108	108	107	107	107	107	107	107	107		
	VR	130	130	130	130	130	130	130	130	130	130	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7	7	7	7	7	7	7	7	7	7	6.9		
33000	TOFL	4910	5000	5090	5190	5290	5400	5500	5610	5720	5820	5950	127	176
	V1	105	104	104	104	104	104	104	103	103	103	103		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3		
32000	TOFL	4530	4610	4690	4780	4870	4970	5070	5170	5260	5350	5470	125	173
	V1	101	101	100	100	100	100	100	100	100	100	100		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8		

FIGURE 5-249. TAKE-OFF DISTANCE; FLAPS - 10° ; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
31000	TOFL	4180	4250	4330	4410	4500	4580	4670	4760	4850	4930	5040	123	170
	V1	97	97	97	97	97	96	96	96	96	96	96		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.3	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.2		
30000	TOFL	3960	4050	4140	4230	4310	4390	4480	4560	4640	4730	4800	121	167
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.8	8.9	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	3930	4020	4110	4190	4270	4350	4430	4520	4600	4680	4760	119	164
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.3		
28000	TOFL	3900	3980	4070	4150	4230	4310	4390	4470	4550	4640	4710	117	161
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.9	10	10	10	10	10	9.9	9.9	9.9	9.9	9.9		
27000	TOFL	3860	3950	4030	4110	4190	4270	4350	4430	4510	4600	4670	115	158
	V1	96	96	96	96	96	95	95	95	95	95	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.5	10.5	10.5	10.5		
26000	TOFL	3830	3910	4000	4080	4160	4230	4310	4390	4470	4550	4620	113	155
	V1	96	96	96	96	96	96	96	95	95	95	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.2	11.2	11.2		

FIGURE 5-250. TAKE-OFF DISTANCE; FLAPS - 10° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	9390	9550	9740	9950	10150	10360	10570	10800	11000	11210	11530	145	195
	V1	135	134	134	134	134	134	134	134	134	134	134		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.6		
39000	TOFL	8950	9110	9290	9480	9680	9870	10080	10290	10480	10680	10990	144	193
	V1	132	132	132	132	131	131	131	131	131	131	131		
	VR	152	151	151	151	151	151	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5	5	5	5	5	5	5	4.9	4.9	4.9	4.8		
38000	TOFL	8250	8400	8570	8750	8930	9110	9290	9480	9660	9840	10130	141	191
	V1	128	128	127	127	127	127	127	127	127	127	127		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.1		
37000	TOFL	7610	7740	7890	8050	8220	8380	8550	8730	8900	9060	9320	139	188
	V1	124	123	123	123	123	123	123	123	122	122	123		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.6	5.6	5.7	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.4		
36000	TOFL	7000	7120	7260	7410	7560	7710	7860	8030	8180	8330	8560	136	185
	V1	119	119	119	119	119	118	118	118	118	118	118		
	VR	141	140	140	140	140	140	140	140	140	140	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6	6	6	6	6	6	6	5.9	5.9	5.9	5.8		
35000	TOFL	6400	6510	6640	6770	6910	7050	7190	7340	7480	7610	7830	134	182
	V1	115	115	114	114	114	114	114	114	114	114	114		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.3	6.3	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.2		
34000	TOFL	5860	5960	6070	6190	6320	6440	6570	6700	6830	6960	7150	131	179
	V1	111	110	110	110	110	110	110	110	109	109	110		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.5		
33000	TOFL	5350	5440	5540	5660	5770	5880	6000	6120	6230	6350	6520	128	176
	V1	106	106	106	106	106	106	105	105	105	105	105		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.9		
32000	TOFL	4920	5000	5100	5200	5300	5400	5510	5620	5730	5830	5990	126	173
	V1	103	102	102	102	102	102	102	102	102	102	102		
	VR	126	125	125	125	125	125	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.3		

FIGURE 5-250. TAKE-OFF DISTANCE; FLAPS - 10° ; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
31000	TOFL	4520	4600	4680	4780	4870	4960	5060	5160	5250	5350	5490	123	170
	V1	99	99	98	98	98	98	98	98	98	98	98		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8	8	8	8	8	8	8	8	8	7.9	7.8		
30000	TOFL	4170	4230	4310	4400	4480	4560	4650	4740	4830	4920	5040	121	167
	V1	95	95	95	95	95	94	94	94	94	94	94		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.3		
29000	TOFL	4020	4110	4200	4280	4370	4450	4540	4620	4710	4780	4840	119	164
	V1	94	94	94	94	94	94	94	94	94	93	93		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9	9.1	9.1	9.1	9.1	9	9	9	9	8.9	8.8		
28000	TOFL	3980	4070	4160	4250	4330	4410	4500	4580	4660	4740	4800	117	161
	V1	94	94	94	94	94	94	94	94	94	94	93		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5	9.4		
27000	TOFL	3950	4040	4120	4210	4290	4370	4450	4530	4620	4690	4760	115	158
	V1	94	94	94	94	94	94	94	94	94	94	93		
	VR	108	108	108	108	108	108	108	108	108	108	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	9.9		
26000	TOFL	3910	4000	4090	4170	4250	4330	4410	4490	4570	4650	4710	113	155
	V1	95	95	95	95	94	94	94	94	94	94	94		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.8	10.8	10.8	10.6		

FIGURE 5-251. TAKE-OFF DISTANCE; FLAPS - 10° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	10380	10570	10790	11020	11250	11480	11720	11960	12210	12560	13060	147	195
	V1	138	138	138	137	137	137	137	137	137	137	138		
	VR	156	156	156	156	156	156	156	156	156	157	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.5	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.4	4.2		
39000	TOFL	9890	10070	10280	10490	10710	10930	11160	11390	11630	11970	12440	145	194
	V1	135	135	135	135	135	134	134	134	134	135	135		
	VR	154	154	154	154	154	154	154	154	154	154	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.3		
38000	TOFL	9110	9270	9470	9660	9870	10070	10270	10490	10710	11020	11460	142	191
	V1	131	131	130	130	130	130	130	130	130	130	131		
	VR	150	150	150	150	150	150	150	150	150	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5	5.1	5.1	5.1	5	5	5	5	5	4.9	4.7		
37000	TOFL	8380	8530	8710	8890	9070	9260	9450	9640	9850	10130	10540	140	188
	V1	126	126	126	126	126	126	126	125	125	126	127		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.2	5		
36000	TOFL	7710	7850	8010	8180	8350	8510	8690	8870	9050	9320	9700	137	185
	V1	122	122	122	122	121	121	121	121	121	122	122		
	VR	143	143	143	143	143	143	143	143	143	143	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.5	5.3		
35000	TOFL	7090	7210	7360	7510	7660	7820	7980	8140	8310	8560	8910	135	183
	V1	118	118	118	117	117	117	117	117	117	117	118		
	VR	139	139	139	139	139	139	139	139	139	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	5.9	5.6		
34000	TOFL	6470	6580	6710	6850	6990	7130	7270	7420	7580	7820	8160	132	180
	V1	113	113	113	113	113	113	112	112	112	113	114		
	VR	135	135	135	135	135	135	135	135	135	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	141		
	GR2	6.4	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.3	6		
33000	TOFL	5890	6000	6120	6240	6370	6490	6620	6760	6900	7110	7420	129	177
	V1	109	109	109	108	108	108	108	108	108	108	109		
	VR	131	131	131	131	131	131	131	131	131	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	6.8	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.7	6.4		
32000	TOFL	5370	5460	5570	5680	5790	5910	6020	6140	6270	6470	6750	127	174
	V1	105	104	104	104	104	104	104	104	104	104	105		
	VR	127	127	127	127	127	127	127	127	127	128	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	7.1	6.8		

FIGURE 5-251. TAKE-OFF DISTANCE; FLAPS - 10° ; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

31000	**TOFL**	4910	4990	5090	5190	5300	5400	5500	5610	5730	5910	6170	124	171
	V1	101	100	100	100	100	100	100	100	100	100	101		
	VR	124	124	124	124	124	124	124	124	124	124	125		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.5	7.2		
30000	**TOFL**	4500	4580	4670	4760	4850	4940	5040	5140	5250	5400	5640	121	168
	V1	97	97	97	96	96	96	96	96	96	96	97		
	VR	120	120	120	120	120	120	120	120	120	121	121		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8	7.6		
29000	**TOFL**	4130	4210	4300	4380	4470	4560	4650	4730	4810	4940	5150	119	165
	V1	93	93	93	93	93	93	93	92	92	93	93		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.5	8.1		
28000	**TOFL**	4080	4170	4260	4340	4430	4520	4600	4680	4760	4820	4830	117	161
	V1	93	93	93	93	93	93	93	93	92	92	91		
	VR	113	113	113	113	113	113	113	113	113	113	114		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	9.2	9.3	9.3	9.3	9.3	9.3	9.2	9.2	9.2	9	8.6		
27000	**TOFL**	4040	4130	4220	4300	4390	4470	4560	4640	4720	4780	4840	115	158
	V1	93	93	93	93	93	93	93	93	93	92	91		
	VR	110	109	109	109	109	109	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	119	119		
	GR2	9.8	9.9	9.9	9.9	9.8	9.8	9.8	9.8	9.8	9.6	9.2		
26000	**TOFL**	4000	4090	4180	4260	4350	4430	4510	4590	4670	4740	4790	113	155
	V1	93	93	93	93	93	93	93	93	93	92	91		
	VR	106	106	106	106	106	106	106	106	106	106	107		
	V2	115	115	115	115	115	115	115	115	115	115	116		
	GR2	10.4	10.5	10.5	10.5	10.5	10.5	10.4	10.4	10.4	10.2	9.8		

FIGURE 5-252. TAKE-OFF DISTANCE; FLAPS - 10° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	11540	11780	12030	12290	12540	12800	13070	13350	13720	14310	15030	148	196
	V1	142	141	141	141	141	141	141	141	141	142	144		
	VR	159	159	159	159	159	159	159	159	160	160	160		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.2	3.9	3.6		
39000	TOFL	11020	11250	11490	11730	11970	12220	12480	12740	13040	13610	14330	146	194
	V1	139	139	139	139	139	138	138	138	139	140	141		
	VR	157	157	157	157	157	157	157	157	157	158	158		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.3	4.1	3.8		
38000	TOFL	10120	10320	10540	10760	10990	11210	11440	11680	12010	12550	13220	144	191
	V1	134	134	134	134	134	134	134	134	134	135	136		
	VR	153	153	153	153	153	153	153	153	154	154	154		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.4	4.1		
37000	TOFL	9300	9480	9680	9890	10090	10300	10510	10730	11000	11500	12150	141	189
	V1	130	130	129	129	129	129	129	129	129	130	132		
	VR	150	150	150	150	150	150	150	150	150	150	151		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	4.7	4.4		
36000	TOFL	8530	8700	8880	9070	9260	9440	9640	9840	10080	10550	11140	138	186
	V1	125	125	125	125	125	124	124	124	124	126	127		
	VR	146	146	146	146	146	146	146	146	146	146	147		
	V2	149	149	149	149	149	149	149	149	149	149	150		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.1	4.7		
35000	TOFL	7820	7980	8150	8320	8480	8650	8830	9010	9230	9660	10210	136	183
	V1	121	121	120	120	120	120	120	120	120	121	123		
	VR	142	142	142	142	142	142	142	142	142	142	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.4	5.1		
34000	TOFL	7160	7300	7450	7610	7760	7920	8080	8250	8440	8840	9350	133	180
	V1	116	116	116	116	116	116	116	116	116	117	118		
	VR	138	138	138	138	138	138	138	138	138	139	139		
	V2	142	142	142	142	142	142	142	142	142	143	143		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	5.8	5.4		
33000	TOFL	6530	6660	6790	6930	7070	7210	7360	7510	7680	8060	8540	130	177
	V1	112	112	112	111	111	111	111	111	111	112	114		
	VR	134	134	134	134	134	134	134	134	134	135	136		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.4	6.2	5.8		
32000	TOFL	5920	6040	6160	6280	6410	6540	6670	6800	6960	7310	7760	127	174
	V1	107	107	107	107	107	106	106	106	106	108	109		
	VR	130	130	130	130	130	130	130	130	130	131	132		
	V2	135	135	135	135	135	135	135	135	135	136	136		
	GR2	7	7	7	7	7	7	7	6.9	6.8	6.6	6.2		

FIGURE 5-252. TAKE-OFF DISTANCE; FLAPS - 10° ; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
31000	TOFL	5370	5470	5580	5690	5810	5920	6040	6160	6300	6610	7030	125	171
	V1	103	103	102	102	102	102	102	102	102	103	105		
	VR	126	126	126	126	126	126	126	126	126	126	127		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7	6.6		
30000	TOFL	4880	4980	5080	5180	5280	5380	5490	5600	5720	6000	6380	122	168
	V1	99	98	98	98	98	98	98	98	98	99	101		
	VR	122	122	122	122	122	122	122	122	122	123	124		
	V2	128	128	128	128	128	128	128	128	128	128	129		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.7	7.4	7		
29000	TOFL	4460	4550	4640	4730	4820	4910	5000	5110	5210	5460	5800	119	165
	V1	95	94	94	94	94	94	94	94	94	95	97		
	VR	118	118	118	118	118	118	118	118	118	119	120		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.3	8.2	7.9	7.5		
28000	TOFL	4170	4260	4350	4440	4530	4620	4710	4790	4870	4980	5270	117	162
	V1	92	92	92	92	92	92	92	91	91	91	93		
	VR	115	115	115	115	115	115	115	115	115	115	116		
	V2	122	122	122	122	122	122	122	122	122	122	123		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8	8.4	8		
27000	TOFL	4130	4220	4310	4400	4490	4580	4660	4740	4820	4840	4820	115	159
	V1	92	92	92	92	92	92	92	92	91	90	89		
	VR	111	111	111	111	111	111	111	111	111	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	120		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4	9.3	9	8.5		
26000	TOFL	4100	4190	4270	4360	4450	4530	4620	4700	4770	4830	4820	113	155
	V1	92	92	92	92	92	92	92	92	92	91	89		
	VR	107	107	107	107	107	107	107	107	107	108	109		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	9.9	9.6	9.1		

FIGURE 5-253. TAKE-OFF DISTANCE; FLAPS - 10° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	12920	13210	13490	13780	14070	14360	14660	14980	15390	16480	17490	149	196
	V1	146	146	146	146	145	145	145	145	146	148	150		
	VR	163	163	163	163	163	163	163	163	163	164	164		
	V2	164	164	164	164	164	164	164	164	164	165	165		
	GR2	4	4	4	4	4	4	4	3.9	3.8	3.4	3.1		
39000	TOFL	12290	12560	12830	13100	13380	13650	13940	14250	14630	15660	16620	147	194
	V1	143	143	143	143	143	142	142	143	143	145	147		
	VR	160	160	160	160	160	160	160	160	160	161	162		
	V2	162	162	162	162	162	162	162	162	162	162	163		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4	3.6	3.3		
38000	TOFL	11310	11560	11800	12060	12310	12560	12830	13120	13480	14400	15290	145	192
	V1	138	138	138	138	138	138	138	138	138	140	142		
	VR	157	157	157	157	157	157	157	157	157	157	158		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.3	3.9	3.6		
37000	TOFL	10370	10600	10820	11050	11280	11510	11750	12020	12350	13230	14050	142	189
	V1	133	133	133	133	133	133	133	133	133	136	137		
	VR	153	153	153	153	153	153	153	153	153	154	154		
	V2	155	155	155	155	155	155	155	155	155	156	156		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.6	4.2	3.9		
36000	TOFL	9480	9690	9890	10100	10310	10520	10740	10990	11300	12100	12900	139	186
	V1	129	128	128	128	128	128	128	128	128	131	133		
	VR	149	149	149	149	149	149	149	149	149	150	150		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	5	4.6	4.2		
35000	TOFL	8670	8860	9050	9230	9420	9620	9820	10050	10330	11020	11760	137	183
	V1	124	124	124	123	123	123	123	123	124	126	128		
	VR	145	145	145	145	145	145	145	145	145	146	146		
	V2	148	148	148	148	148	148	148	148	148	148	149		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.3	4.9	4.5		
34000	TOFL	7920	8090	8260	8430	8600	8780	8960	9170	9430	10050	10740	134	180
	V1	119	119	119	119	119	119	119	119	119	121	123		
	VR	141	141	141	141	141	141	141	141	141	142	143		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.7	5.3	4.9		
33000	TOFL	7220	7380	7530	7680	7840	8000	8160	8360	8600	9160	9800	131	177
	V1	115	115	114	114	114	114	114	114	114	116	118		
	VR	137	137	137	137	137	137	137	137	137	138	139		
	V2	141	141	141	141	141	141	141	141	141	141	142		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2	6	5.6	5.2		
32000	TOFL	6570	6710	6840	6980	7120	7270	7410	7590	7810	8320	8910	128	175
	V1	110	110	110	110	110	110	110	110	110	112	114		
	VR	133	133	133	133	133	133	133	133	133	134	135		
	V2	137	137	137	137	137	137	137	137	137	138	138		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6	5.6		

FIGURE 5-253. TAKE-OFF DISTANCE; FLAPS - 10° ; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
31000	TOFL	5930	6060	6180	6300	6430	6560	6690	6850	7060	7530	8080	126	172
	V1	106	105	105	105	105	105	105	105	105	107	109		
	VR	128	128	128	128	128	128	128	128	129	130	131		
	V2	134	134	134	134	134	134	134	134	134	134	135		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	6.8	6.5	6		
30000	TOFL	5350	5460	5570	5680	5800	5910	6030	6180	6360	6770	7300	123	168
	V1	101	101	100	100	100	100	100	100	101	102	105		
	VR	124	124	124	124	124	124	124	124	124	125	127		
	V2	130	130	130	130	130	130	130	130	130	130	131		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.4	7.3	6.9	6.4		
29000	TOFL	4840	4940	5040	5140	5240	5350	5450	5580	5750	6100	6580	120	165
	V1	96	96	96	96	96	96	96	96	96	98	100		
	VR	120	120	120	120	120	120	120	120	120	121	122		
	V2	126	126	126	126	126	126	126	126	126	127	127		
	GR2	8.1	8.1	8.1	8.1	8.1	8	8	7.9	7.7	7.4	6.9		
28000	TOFL	4420	4510	4590	4680	4770	4870	4960	5070	5220	5530	5950	117	162
	V1	92	92	92	92	92	92	92	92	92	94	96		
	VR	116	116	116	116	116	116	116	116	116	117	119		
	V2	123	123	123	123	123	123	123	123	123	124	124		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.5	8.4	8.2	7.9	7.3		
27000	TOFL	4230	4320	4410	4500	4600	4690	4770	4830	4870	5010	5370	115	159
	V1	91	91	91	91	91	91	90	90	90	90	92		
	VR	112	112	112	112	112	112	112	112	113	113	115		
	V2	120	120	120	120	120	120	120	120	120	120	121		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	8.9	8.8	8.4	7.8		
26000	TOFL	4190	4280	4370	4460	4550	4640	4730	4780	4850	4850	4860	113	156
	V1	91	91	91	91	91	91	91	90	90	89	87		
	VR	108	108	108	108	108	108	108	108	109	110	111		
	V2	117	117	117	117	117	117	117	117	117	117	118		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.6	9.3	9	8.4		

FIGURE 5-254. TAKE-OFF DISTANCE; FLAPS - 10° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	14480	14800	15120	15440	15770	16100	16480	16970	17700	18910		150	197
	V1	150	150	150	150	150	150	150	151	152	154			
	VR	166	166	166	166	166	166	166	166	166	167			
	V2	167	167	167	167	167	167	167	167	167	168			
	GR2	3.8	3.8	3.8	3.7	3.7	3.7	3.7	3.5	3.3	3			
39000	TOFL	13750	14050	14360	14660	14970	15280	15640	16110	16810	17940	19480	148	195
	V1	147	147	147	147	147	147	147	147	148	151	153		
	VR	163	163	163	163	163	163	163	163	164	164	165		
	V2	165	165	165	165	165	165	165	165	165	165	166		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.7	3.5	3.2	2.8		
38000	TOFL	12610	12890	13160	13440	13720	14010	14340	14770	15400	16430	17840	146	192
	V1	142	142	142	142	142	142	142	142	143	145	148		
	VR	159	159	159	159	159	159	159	160	160	160	161		
	V2	161	161	161	161	161	161	161	161	161	162	162		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4	3.8	3.5	3		
37000	TOFL	11560	11810	12060	12320	12580	12840	13140	13540	14120	15050	16340	143	189
	V1	137	137	137	137	137	137	137	137	138	140	143		
	VR	155	155	155	155	155	155	155	156	156	156	157		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.3	4.1	3.8	3.3		
36000	TOFL	10560	10790	11020	11260	11490	11730	12000	12370	12920	13800	14980	140	186
	V1	132	132	132	132	131	131	131	132	133	135	138		
	VR	151	151	151	151	151	151	151	152	152	153	154		
	V2	154	154	154	154	154	154	154	154	154	154	155		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.7	4.4	4.1	3.6		
35000	TOFL	9630	9840	10050	10260	10470	10690	10940	11260	11790	12610	13690	138	184
	V1	127	127	127	127	127	127	127	127	128	130	133		
	VR	147	147	147	147	147	147	147	147	148	149	150		
	V2	150	150	150	150	150	150	150	150	150	151	151		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5	4.8	4.4	3.9		
34000	TOFL	8780	8970	9160	9350	9540	9740	9960	10260	10720	11480	12530	135	181
	V1	122	122	122	122	122	122	122	122	123	125	128		
	VR	143	143	143	143	143	143	143	143	144	145	146		
	V2	146	146	146	146	146	146	146	146	146	147	148		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.3	5.1	4.8	4.3		
33000	TOFL	7990	8160	8330	8500	8670	8850	9060	9330	9740	10420	11370	132	178
	V1	117	117	117	117	117	117	117	117	118	120	123		
	VR	139	139	139	139	139	139	139	139	140	141	142		
	V2	143	143	143	143	143	143	143	143	143	143	144		
	GR2	6	6	6	6	6	6	5.9	5.7	5.5	5.1	4.6		
32000	TOFL	7250	7410	7560	7720	7870	8040	8220	8470	8850	9470	10350	129	175
	V1	113	113	112	112	112	112	112	113	114	116	119		
	VR	135	135	135	135	135	135	135	135	136	137	138		
	V2	139	139	139	139	139	139	139	139	139	140	141		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.1	5.9	5.5	5		

FIGURE 5-254. TAKE-OFF DISTANCE; FLAPS - 10° ; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
31000	TOFL	6570	6710	6850	6980	7130	7270	7430	7660	8000	8580	9380	127	172
	V1	108	108	108	108	108	107	107	108	109	111	114		
	VR	131	131	131	131	131	131	131	131	131	133	134		
	V2	136	136	136	136	136	136	135	135	136	136	137		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.7	6.6	6.3	5.9	5.3		
30000	TOFL	5910	6040	6160	6280	6410	6540	6690	6890	7200	7740	8490	124	169
	V1	103	103	103	103	103	103	103	103	104	106	109		
	VR	126	126	126	126	126	126	126	126	127	128	130		
	V2	132	132	132	132	132	132	131	131	132	133	133		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7	6.7	6.3	5.8		
29000	TOFL	5320	5430	5540	5650	5760	5880	6010	6180	6470	6950	7640	121	166
	V1	99	98	98	98	98	98	98	98	99	101	104		
	VR	122	122	122	122	122	122	122	122	123	124	126		
	V2	128	128	128	128	128	128	128	128	128	129	130		
	GR2	7.8	7.8	7.7	7.7	7.7	7.7	7.7	7.4	7.1	6.8	6.2		
28000	TOFL	4800	4890	4990	5090	5190	5290	5410	5560	5810	6230	6860	118	162
	V1	94	94	94	94	94	93	93	94	95	97	100		
	VR	118	118	118	118	118	118	118	118	118	120	122		
	V2	124	124	124	124	124	124	124	124	124	125	126		
	GR2	8.3	8.3	8.3	8.2	8.2	8.2	8.1	7.9	7.6	7.2	6.6		
27000	TOFL	4360	4450	4540	4630	4720	4810	4910	5040	5250	5620	6180	115	159
	V1	90	90	90	90	90	89	89	90	91	93	95		
	VR	114	114	114	114	114	114	114	114	114	116	118		
	V2	121	121	121	121	121	121	121	121	121	122	123		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.7	8.5	8.1	7.7	7.1		
26000	TOFL	4300	4390	4490	4580	4670	4760	4840	4880	4890	5080	5560	113	156
	V1	90	90	90	90	90	90	89	89	88	88	91		
	VR	110	110	110	110	110	110	110	110	111	112	114		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.1	8.7	8.3	7.6		

FIGURE 5-255. TAKE-OFF DISTANCE; FLAPS - 10° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	16310	16670	17040	17400	17770	18150	18640	19370				151	197
	V1	155	155	155	155	155	155	155	156					
	VR	169	169	169	169	169	169	169	169					
	V2	170	170	170	170	170	170	170	170					
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.3	3.1					
39000	TOFL	15460	15800	16150	16490	16840	17190	17660	18360	19350			150	195
	V1	152	152	151	151	151	151	152	153	154				
	VR	167	167	167	167	167	167	167	167	167				
	V2	168	168	168	168	168	168	168	168	168				
	GR2	3.7	3.7	3.6	3.6	3.6	3.6	3.5	3.3	3				
38000	TOFL	14140	14450	14760	15070	15390	15720	16140	16780	17680	19090		147	193
	V1	146	146	146	146	146	146	146	147	149	151			
	VR	162	162	162	162	162	162	162	163	163	164			
	V2	164	164	164	164	164	164	164	164	164	165			
	GR2	4	4	3.9	3.9	3.9	3.9	3.8	3.6	3.3	3			
37000	TOFL	12920	13210	13490	13780	14070	14370	14750	15340	16150	17440	19130	144	190
	V1	141	141	141	141	140	140	141	142	143	146	149		
	VR	158	158	158	158	158	158	158	158	159	160	161		
	V2	160	160	160	160	160	160	160	160	160	161	161		
	GR2	4.3	4.3	4.3	4.2	4.2	4.2	4.1	3.9	3.6	3.2	2.8		
36000	TOFL	11790	12050	12310	12570	12840	13110	13450	14010	14750	15910	17440	142	187
	V1	136	136	135	135	135	135	135	137	138	140	144		
	VR	154	154	154	154	154	154	154	154	155	156	157		
	V2	156	156	156	156	156	156	156	156	156	157	157		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.2	4	3.5	3		
35000	TOFL	10740	10980	11210	11440	11690	11930	12240	12760	13470	14540	15930	139	184
	V1	131	130	130	130	130	130	130	131	133	135	138		
	VR	150	150	150	150	150	150	150	150	151	152	153		
	V2	152	152	152	152	152	152	152	152	153	153	154		
	GR2	5	5	4.9	4.9	4.9	4.9	4.8	4.5	4.3	3.9	3.3		
34000	TOFL	9760	9970	10190	10400	10620	10840	11110	11580	12250	13280	14540	136	181
	V1	125	125	125	125	125	125	125	126	128	131	133		
	VR	146	146	146	146	146	146	146	146	147	148	149		
	V2	149	149	149	149	149	149	148	148	149	150	150		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.2	4.9	4.6	4.2	3.7		
33000	TOFL	8860	9050	9250	9440	9630	9830	10080	10510	11110	12050	13250	133	178
	V1	120	120	120	120	120	120	120	121	123	125	129		
	VR	142	142	142	142	142	142	142	142	143	144	145		
	V2	145	145	145	145	145	145	145	145	145	146	147		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.3	5	4.5	4		
32000	TOFL	8040	8210	8380	8550	8730	8910	9130	9520	10060	10930	12030	130	175
	V1	116	115	115	115	115	115	115	116	118	120	124		
	VR	137	137	137	137	137	137	137	138	138	140	141		
	V2	141	141	141	141	141	141	141	141	141	142	143		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6	5.7	5.3	4.9	4.3		

FIGURE 5-255. TAKE-OFF DISTANCE; FLAPS - 10° ; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
31000	TOFL	7260	7420	7570	7720	7890	8050	8240	8610	9100	9870	10890	128	172
	V1	111	111	110	110	110	110	110	111	113	115	119		
	VR	133	133	133	133	133	133	133	133	134	136	137		
	V2	137	137	137	137	137	137	137	137	138	138	139		
	GR2	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.1	5.8	5.3	4.7		
30000	TOFL	6550	6690	6830	6960	7110	7250	7430	7750	8200	8910	9830	125	169
	V1	106	106	106	105	105	105	105	106	108	111	114		
	VR	129	129	129	129	129	129	129	129	130	131	133		
	V2	134	134	134	133	133	133	133	133	134	135	135		
	GR2	7	7	7	7	6.9	6.9	6.9	6.5	6.2	5.7	5.1		
29000	TOFL	5880	6000	6120	6240	6370	6500	6650	6950	7370	8010	8850	122	166
	V1	101	101	101	101	100	100	100	101	103	106	109		
	VR	124	124	124	124	124	124	124	124	125	127	129		
	V2	130	130	129	129	129	129	129	129	130	131	132		
	GR2	7.5	7.5	7.4	7.4	7.4	7.4	7.3	7	6.6	6.1	5.5		
28000	TOFL	5270	5380	5490	5600	5710	5820	5960	6220	6590	7180	7940	119	163
	V1	96	96	96	96	96	96	96	97	98	101	104		
	VR	120	120	120	120	120	120	120	120	121	123	125		
	V2	126	126	126	126	126	126	126	126	126	127	128		
	GR2	8	8	7.9	7.9	7.9	7.9	7.8	7.4	7.1	6.6	5.9		
27000	TOFL	4740	4830	4930	5020	5120	5220	5340	5560	5890	6400	7110	116	160
	V1	92	91	91	91	91	91	91	92	93	96	99		
	VR	115	115	115	115	115	115	115	116	117	118	120		
	V2	122	122	122	122	122	122	122	122	122	123	124		
	GR2	8.5	8.5	8.5	8.4	8.4	8.4	8.4	7.9	7.6	7	6.4		
26000	TOFL	4420	4510	4610	4710	4800	4890	4980	5030	5310	5750	6380	113	156
	V1	89	89	89	89	89	89	88	88	89	92	95		
	VR	111	111	111	111	111	111	111	112	113	114	116		
	V2	119	119	119	119	119	119	119	119	119	120	121		
	GR2	9.1	9.1	9.1	9	9	9	9	8.5	8.1	7.6	6.9		

FIGURE 5-256. TAKE-OFF DISTANCE; FLAPS - 10° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	85.1	86.0	86.8	87.6	88.5	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL	18400	18820	19290	19770								152	198
	V1	160	160	160	160									
	VR	172	172	172	172									
	V2	173	173	173	173									
	GR2	3.2	3.2	3.2	3.2									
39000	TOFL	17440	17840	18290	18740	19060	19420						151	196
	V1	156	156	157	157	156	156							
	VR	170	170	170	170	170	170							
	V2	171	171	171	171	171	171							
	GR2	3.4	3.4	3.4	3.3	3.3	3.3							
38000	TOFL	15940	16300	16710	17120	17420	17740	18310	19380				148	193
	V1	151	151	151	151	151	151	151	153					
	VR	166	166	166	166	166	166	166	166					
	V2	167	167	167	167	167	167	167	167					
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.5	3.1					
37000	TOFL	14520	14850	15220	15590	15860	16160	16670	17640	18740			145	190
	V1	145	145	145	145	145	145	145	147	149				
	VR	161	161	161	161	161	161	162	162	162				
	V2	163	163	163	163	163	163	163	163	163				
	GR2	4	4	4	4	4	4	3.8	3.4	3.2				
36000	TOFL	13230	13530	13860	14200	14450	14720	15170	16060	17060	18590		143	187
	V1	140	140	140	140	139	139	140	142	144	147			
	VR	157	157	157	157	157	157	157	158	158	159			
	V2	159	159	159	159	159	159	159	159	159	160			
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.2	3.8	3.5	3			
35000	TOFL	12030	12300	12610	12920	13140	13380	13800	14610	15530	16900	18610	140	184
	V1	134	134	134	134	134	134	134	136	138	141	144		
	VR	153	153	153	153	153	153	153	153	154	155	156		
	V2	155	155	155	155	155	155	155	155	155	156	156		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.5	4.1	3.8	3.3	2.8		
34000	TOFL	10910	11160	11440	11720	11920	12140	12500	13270	14150	15380	16910	137	181
	V1	129	129	129	129	129	129	129	131	133	136	139		
	VR	149	149	149	149	149	149	149	149	150	151	152		
	V2	151	151	151	151	151	151	151	151	151	152	152		
	GR2	5.1	5.1	5	5	5	5	4.9	4.4	4.1	3.6	3.1		
33000	TOFL	9900	10130	10380	10630	10810	11010	11330	12030	12850	13990	15380	134	179
	V1	124	124	124	124	123	123	124	126	128	131	134		
	VR	144	144	144	144	144	144	145	145	146	147	148		
	V2	147	147	147	147	147	147	147	147	148	148	149		
	GR2	5.5	5.5	5.4	5.4	5.4	5.4	5.3	4.8	4.4	4	3.4		
32000	TOFL	8950	9160	9380	9610	9770	9950	10230	10870	11630	12700	13970	131	176
	V1	119	119	119	119	118	118	118	120	122	125	129		
	VR	140	140	140	140	140	140	140	141	142	143	144		
	V2	143	143	143	143	143	143	143	143	144	144	145		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.2	4.8	4.3	3.7		

FIGURE 5-256. TAKE-OFF DISTANCE; FLAPS - 10° ; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	85.1	86.0	86.8	87.6	88.5	89.5	90.4	91.2	92.1	91.9	91.3		
31000	TOFL	8100	8280	8490	8690	8830	8990	9250	9820	10490	11470	12680	128	173
	V1	114	114	114	114	113	113	114	115	117	120	124		
	VR	136	136	136	136	136	136	136	137	137	139	140		
	V2	140	140	140	140	140	140	140	140	140	141	141		
	GR2	6.3	6.3	6.3	6.2	6.2	6.2	6.1	5.6	5.2	4.7	4.1		
30000	TOFL	7290	7460	7640	7830	7950	8090	8320	8850	9470	10350	11440	126	170
	V1	109	109	109	109	108	108	108	110	112	115	119		
	VR	131	131	131	131	131	131	132	132	133	135	136		
	V2	136	136	136	136	136	136	136	136	136	137	138		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.6	6.1	5.6	5.1	4.4		
29000	TOFL	6560	6700	6870	7030	7140	7270	7470	7940	8530	9310	10310	123	166
	V1	104	104	104	104	104	104	104	105	107	110	114		
	VR	127	127	127	127	127	127	127	128	129	130	132		
	V2	132	132	132	132	132	132	132	132	132	133	134		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7	6.5	6	5.5	4.8		
28000	TOFL	5850	5980	6120	6270	6370	6480	6650	7100	7640	8350	9250	120	163
	V1	99	99	99	99	98	98	98	100	103	105	109		
	VR	122	122	122	122	122	122	122	123	124	126	128		
	V2	128	128	128	128	128	128	128	128	128	129	130		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.5	7	6.4	5.9	5.3		
27000	TOFL	5220	5330	5460	5590	5670	5770	5920	6300	6790	7460	8280	117	160
	V1	94	94	94	94	94	93	93	95	97	100	104		
	VR	118	118	118	118	118	118	118	119	120	122	123		
	V2	124	124	124	124	124	124	124	124	124	126	127		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	7.5	6.9	6.4	5.7		
26000	TOFL	4680	4780	4890	5000	5070	5160	5290	5600	6040	6620	7390	114	157
	V1	89	89	89	89	89	89	89	90	93	95	99		
	VR	113	113	113	113	113	113	113	114	115	117	119		
	V2	120	120	120	120	120	120	120	120	120	121	123		
	GR2	8.8	8.8	8.8	8.7	8.7	8.7	8.6	8	7.4	6.9	6.2		

FIGURE 5-257. TAKE-OFF DISTANCE; FLAPS - 10° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 1 of 2)

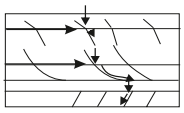
GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	85.4	86.3	87.1	87.9	88.9	89.8	90.7	91.6	92.2	91.5	90.8		
39600	TOFL												154	198
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	19690											152	197
	V1	161												
	VR	173												
	V2	174												
	GR2	3.2												
38000	TOFL	17950	18370	18890	19320	19610	20000						149	194
	V1	155	155	156	156	155	155							
	VR	169	169	169	169	169	169							
	V2	170	170	170	170	170	170							
	GR2	3.5	3.5	3.5	3.5	3.5	3.4							
37000	TOFL	16360	16740	17220	17610	17880	18230	19080					147	191
	V1	150	150	150	150	150	150	151						
	VR	165	165	165	165	165	165	165						
	V2	166	166	166	166	166	166	166						
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.5						
36000	TOFL	14860	15210	15640	15990	16230	16560	17320	18540				144	188
	V1	144	144	144	144	144	144	145	147					
	VR	160	160	161	161	160	160	161	161					
	V2	162	162	162	162	162	162	162	162					
	GR2	4.2	4.2	4.1	4.1	4.1	4.1	3.8	3.3					
35000	TOFL	13490	13800	14200	14520	14740	15030	15700	16810	18190	19940		141	185
	V1	138	138	138	138	138	138	139	142	144	147			
	VR	156	156	156	156	156	156	156	157	158	158			
	V2	158	158	158	158	158	158	158	158	158	159			
	GR2	4.5	4.5	4.5	4.5	4.5	4.4	4.2	3.7	3.2	2.7			
34000	TOFL	12240	12520	12880	13170	13360	13630	14240	15240	16490	18060	19850	138	182
	V1	133	133	133	133	132	132	134	136	138	142	145		
	VR	152	152	152	152	152	152	152	153	153	154	155		
	V2	154	154	154	154	154	154	154	154	154	155	155		
	GR2	4.9	4.9	4.8	4.8	4.8	4.8	4.5	4	3.5	3	2.5		
33000	TOFL	11060	11310	11640	11890	12070	12310	12860	13810	14960	16350	17960	135	179
	V1	127	127	127	127	127	127	128	130	133	136	139		
	VR	147	147	147	147	147	147	148	148	149	150	151		
	V2	150	150	150	150	150	150	150	150	150	151	151		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	4.9	4.4	3.9	3.4	2.8		
32000	TOFL	10010	10240	10530	10760	10910	11130	11620	12480	13580	14830	16270	133	176
	V1	122	122	122	122	122	122	123	125	128	131	134		
	VR	143	143	143	143	143	143	143	144	145	146	147		
	V2	146	146	146	146	146	146	146	146	146	147	147		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.3	4.8	4.2	3.7	3.2		

FIGURE 5-257. TAKE-OFF DISTANCE; FLAPS - 10° ; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean
	OAT	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1	85.4	86.3	87.1	87.9	88.9	89.8	90.7	91.6	92.2	91.5	90.8		
31000	TOFL	9030	9240	9490	9700	9840	10040	10460	11260	12260	13440	14720	130	173
	V1	117	117	117	117	116	116	117	120	123	126	128		
	VR	139	139	139	139	139	139	139	140	141	142	143		
	V2	142	142	142	142	142	142	142	142	143	143	144		
	GR2	6.1	6.1	6	6	6	6	5.7	5.1	4.6	4.1	3.5		
30000	TOFL	8150	8340	8570	8750	8880	9060	9430	10130	11040	12120	13310	127	170
	V1	112	112	112	112	111	111	112	115	117	120	123		
	VR	134	134	134	134	134	134	135	135	137	138	139		
	V2	138	138	138	138	138	138	138	138	139	139	140		
	GR2	6.5	6.5	6.4	6.4	6.4	6.4	6.1	5.6	5	4.4	3.9		
29000	TOFL	7310	7480	7690	7850	7960	8120	8460	9120	9930	10890	11990	124	167
	V1	107	107	107	107	106	106	107	110	112	115	118		
	VR	130	130	130	130	130	130	130	131	132	134	135		
	V2	134	134	134	134	134	134	134	134	135	136	136		
	GR2	7	6.9	6.9	6.9	6.9	6.9	6.6	6	5.4	4.8	4.2		
28000	TOFL	6550	6700	6890	7030	7120	7260	7570	8160	8930	9770	10760	121	164
	V1	102	102	102	102	101	101	102	105	107	110	113		
	VR	125	125	125	125	125	125	126	127	128	129	131		
	V2	130	130	130	130	130	130	130	130	131	132	132		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.1	6.5	5.8	5.3	4.7		
27000	TOFL	5810	5940	6110	6240	6310	6440	6710	7270	7950	8760	9620	118	160
	V1	97	97	97	97	96	96	97	99	102	105	108		
	VR	120	120	120	120	120	120	121	122	123	125	126		
	V2	126	126	126	126	126	126	126	127	127	128	129		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.6	6.9	6.3	5.7	5.1		
26000	TOFL	5170	5280	5430	5540	5610	5720	5940	6410	7080	7800	8600	115	157
	V1	92	92	92	92	91	91	92	94	97	100	103		
	VR	115	116	116	116	116	116	116	117	119	121	122		
	V2	122	122	122	122	122	122	122	122	123	124	125		
	GR2	8.5	8.5	8.4	8.4	8.4	8.4	8.1	7.4	6.8	6.2	5.5		

V_1 CORRECTIONS
FLAPS - 10°
WET RUNWAY



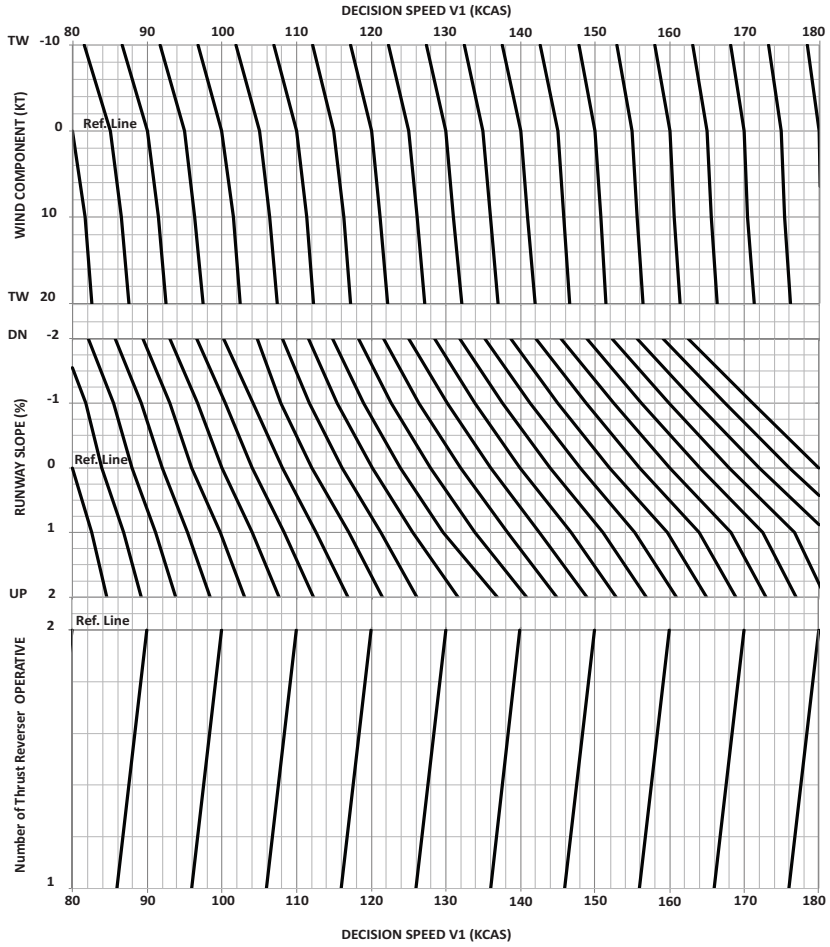


Figure 5-258. V_1 Correction; Flaps - 10°; Wet Runway

TAKEOFF FIELD LENGTH CORRECTIONS
FLAPS - 10°
WET RUNWAY

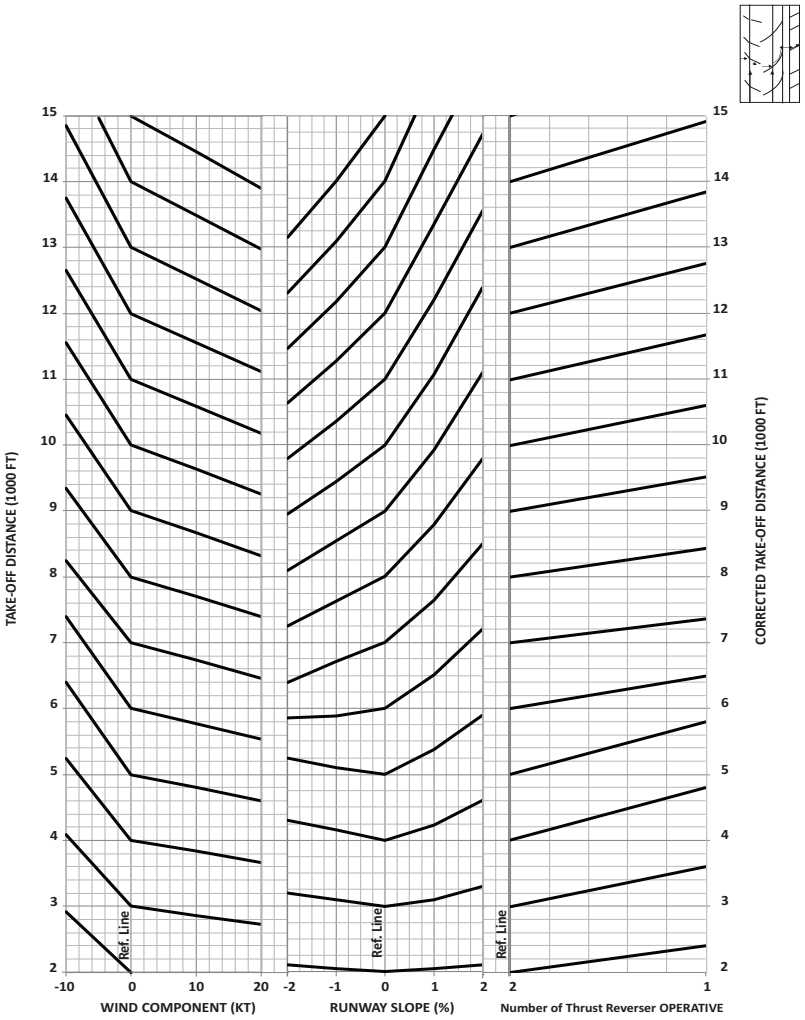


Figure 5-259. Takeoff Field Length Corrections; Flaps - 10°; Wet Runway

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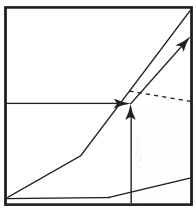
29 Oct 2015

TAKEOFF FLIGHT PATH

CLOSE-IN OBSTACLE CLEARANCE
REQUIRED AVERAGE GROSS CLIMB GRADIENT



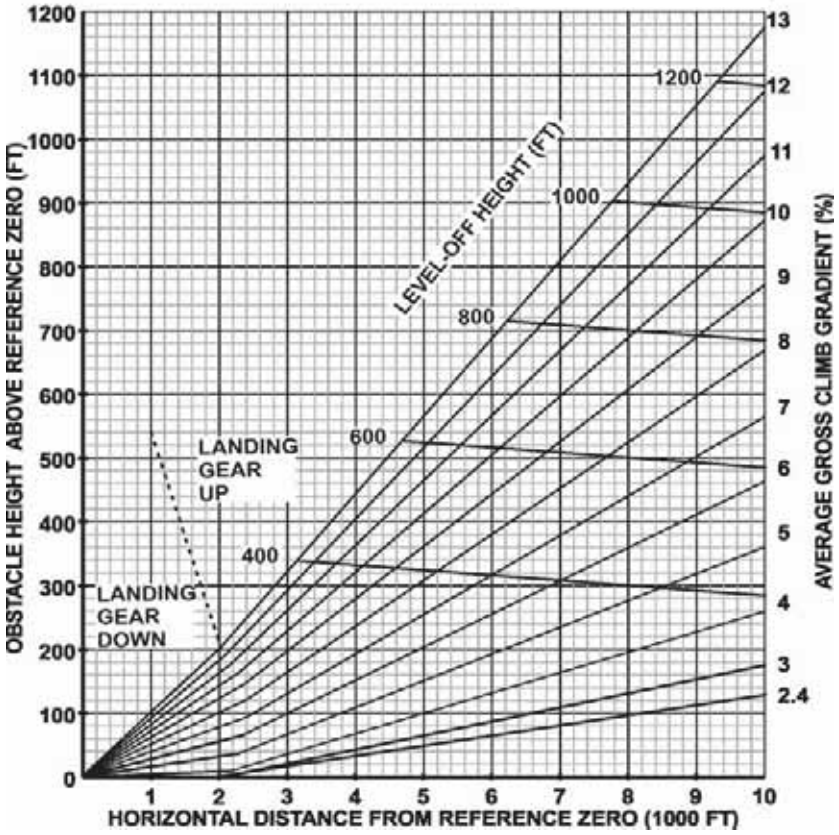


Figure 5-260. Close-in Obstacle Clearance Required Average Gross Climb Gradient

DISTANT OBSTACLE CLEARANCE; REQUIRED AVERAGE GROSS CLIMB GRADIENT

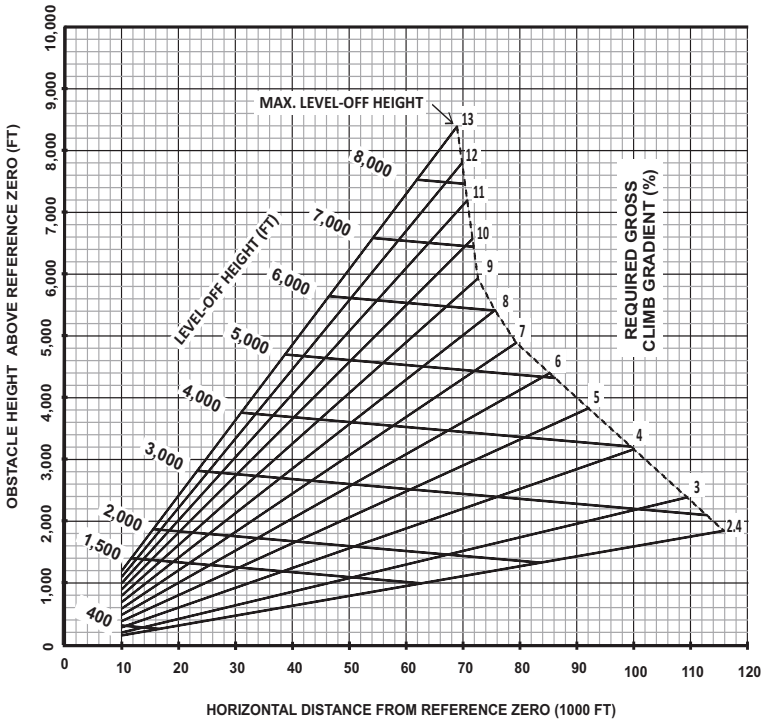


Figure 5-261. Distant Obstacle Clearance Required Average Gross Climb Gradient

CONVERSION OF GEOMETRIC ALTITUDE TO PRESSURE ALTITUDE INCREMENT

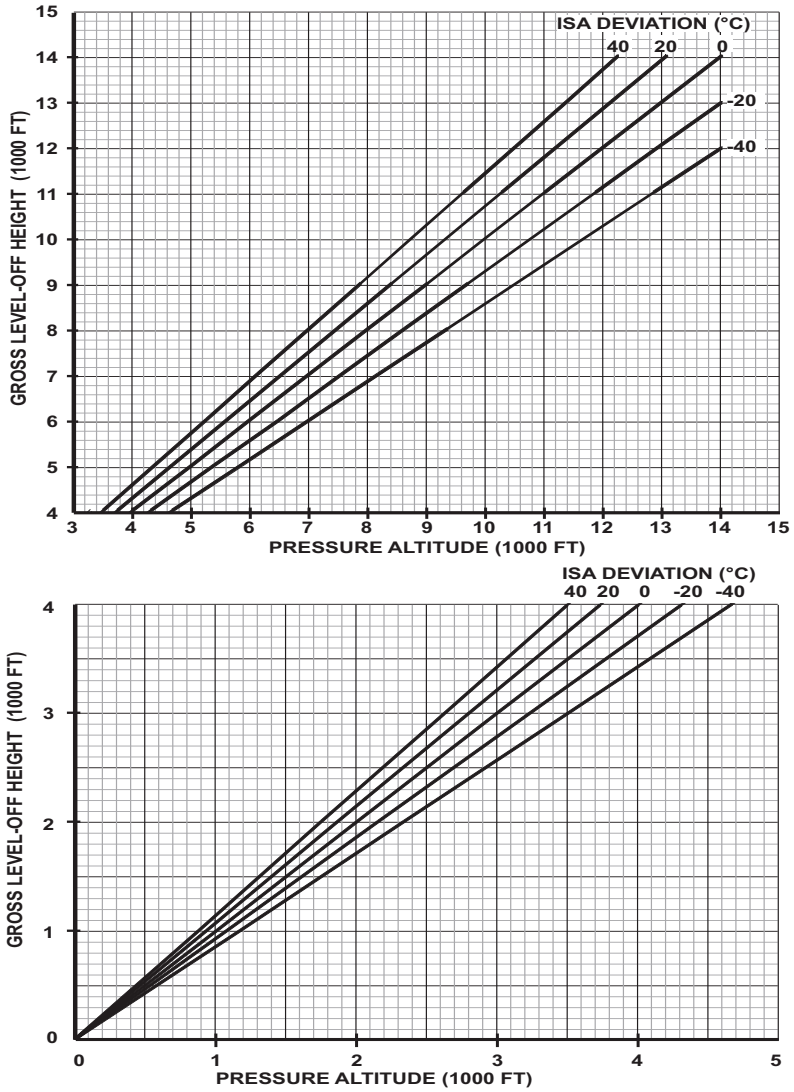


Figure 5-262. Conversion of Geometric Altitude to Pressure Altitude Increment

WIND CORRECTION: AVAILABLE TAKEOFF CLIMB GRADIENTS
2ND SEGMENT - ONE ENGINE INOPERATIVE
FLAPS - 20°
TAKEOFF THRUST GEAR - UP
AIRSPEED - V_2

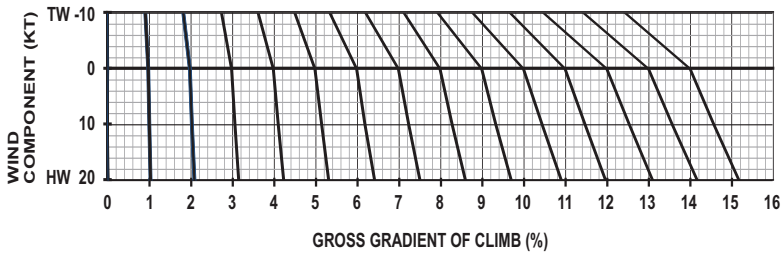


Figure 5-263. Wind correction: Available Takeoff Climb Gradients; 2nd Segment; Flaps - 20°

WIND CORRECTION: AVAILABLE TAKEOFF CLIMB GRADIENTS
2ND SEGMENT - ONE ENGINE INOPERATIVE
FLAPS - 10°
TAKEOFF THRUST GEAR - UP
AIRSPEED - V_2

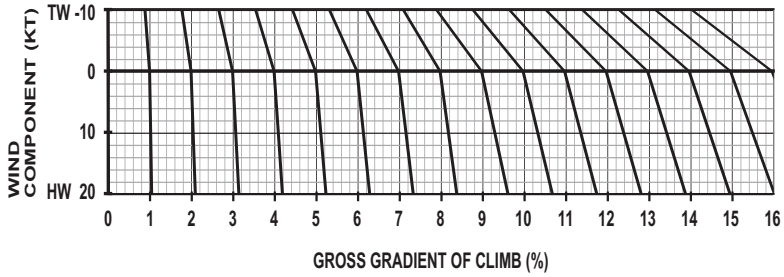
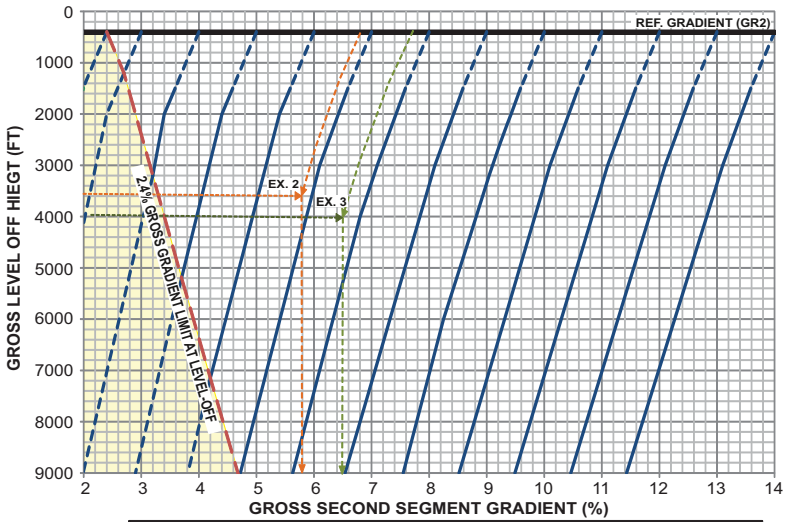


Figure 5-264. Wind correction: Available Takeoff Climb Gradients; 2nd Segment; Flaps - 10°

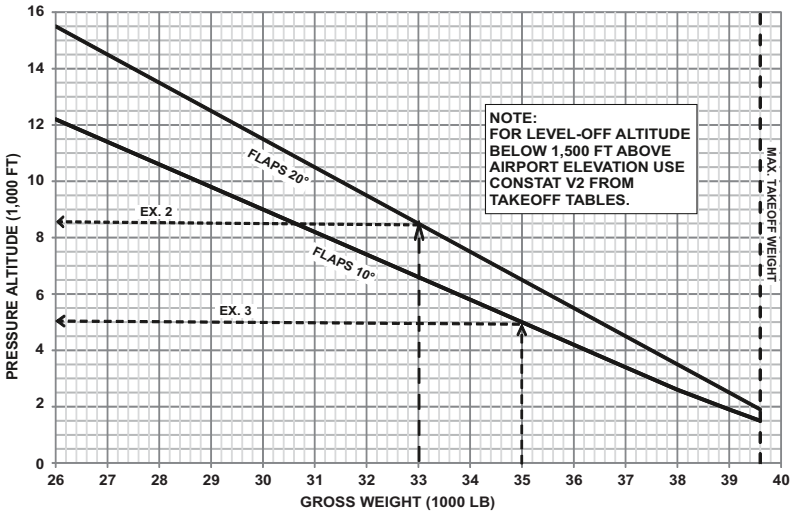
AVAILABLE TAKEOFF CLIMB GRADIENTS 2ND SEGMENT - ONE ENGINE INOPERATIVE LEVEL-OFF ALTITUDES GREATER THAN 1,500 FT ABOVE AIRPORT ELEVATION



NOTE:
FOR LEVEL-OFF ALTITUDE BELOW 1,500 FT ABOVE AIRPORT ELEVATION: REDUCE GR2 BY 0.1% PER 500 FT LEVEL-OFF HEIGHT ABOVE 400 FT.

Figure 5-265. Available Takeoff Climb Gradients; 2nd Segment; Level-off Altitudes Greater Than 1,500 Ft Above Airport Elevation

SECOND SEGMENT CLIMB
PRESSURE ALTITUDE AT WHICH V2 - SAFETY SPEED IS REQUIRED TO BE INCREASED



NOTE:
CLIMB AT INITIAL V2 SAFETY SPEED UP TO THE HIGHER OF: CURRENT FIGURE INDICATED PRESSURE ALTITUDE AND 1,500 FT ABOVE AIRPORT ELEVATION, THEN INCREASE THE CLIMB SPEED BY 2 KCAS PER 1,000 FT UP TO LEVEL-OFF ALTITUDE.

Figure 5-266. Pressure Altitude In Which To Initiate V2 Increase During 2nd Segment Climb

NET TAKEOFF FLIGHT PATH
TRANSITION SEGMENT - LEVEL FLIGHT ACCELERATION
ONE ENGINE INOPERATIVE
FLAPS - 20°

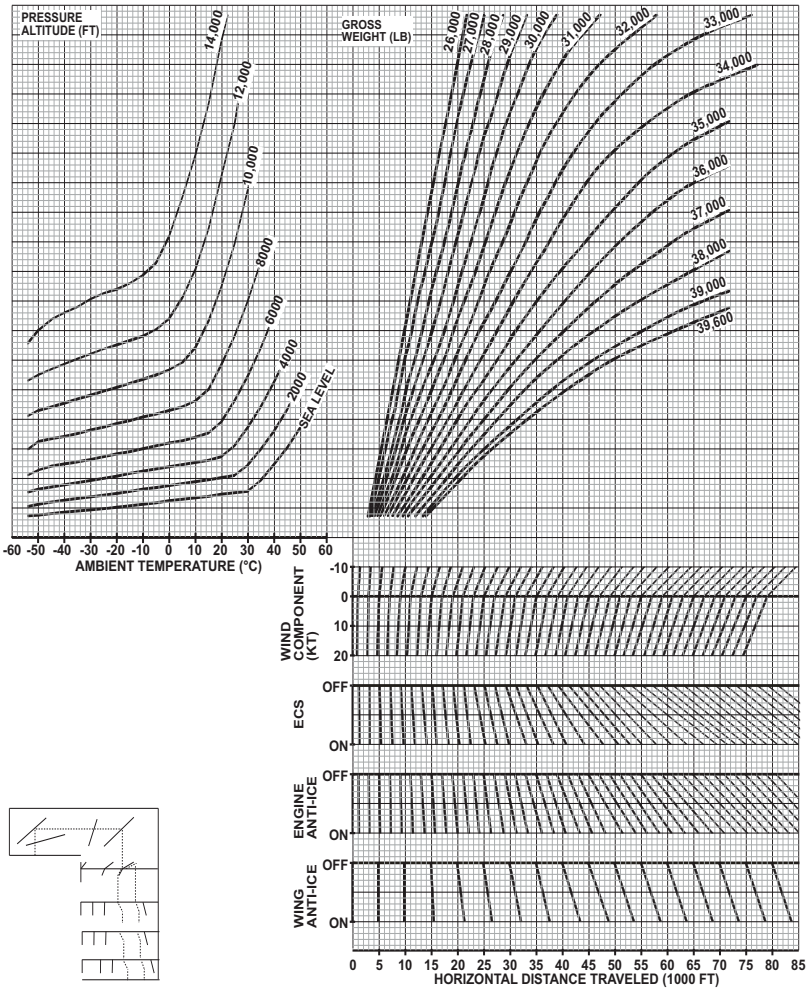


Figure 5-267. Net Takeoff Flight Path; Transition Segment - Level Flight Acceleration; Flaps - 20°

NET TAKEOFF FLIGHT PATH
TRANSITION SEGMENT - LEVEL FLIGHT ACCELERATION
ONE ENGINE INOPERATIVE
FLAPS - 10°

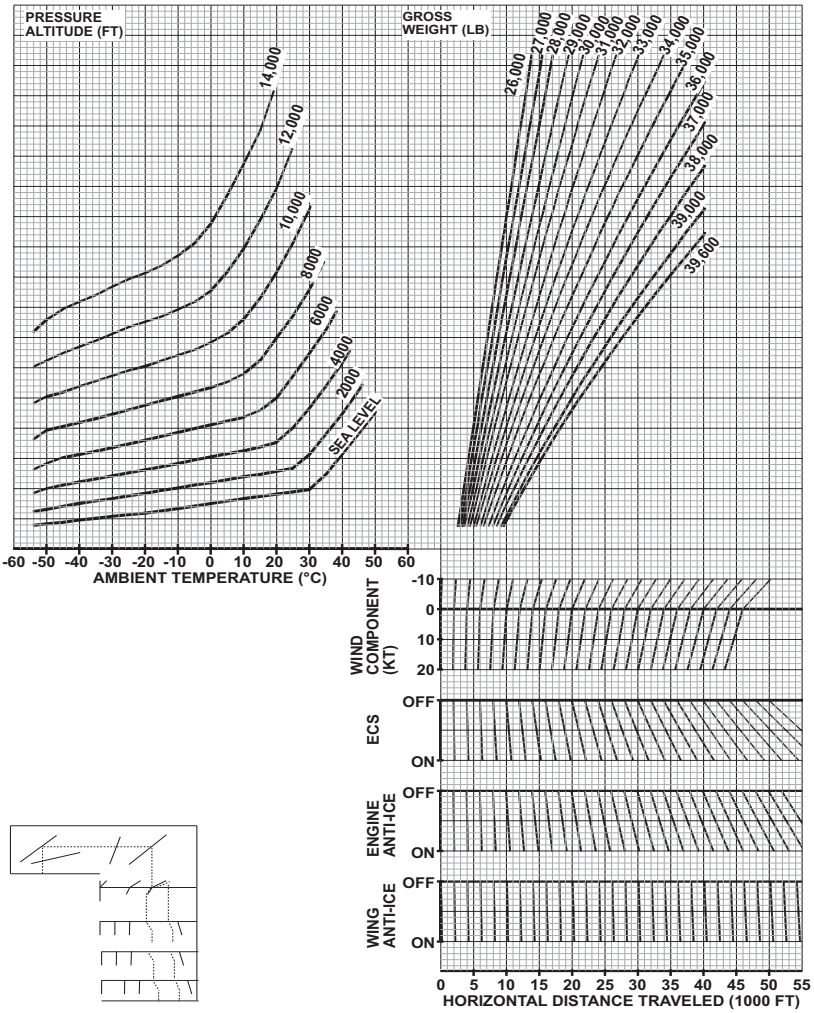


Figure 5-268. Net Takeoff Flight Path; Transition Segment - Level Flight Acceleration; Flaps - 10°

TAKEOFF CLIMB GRADIENTS
FINAL SEGMENT - ONE ENGINE INOPERATIVE
CLEAN CONFIGURATION
MAXIMUM CONTINUOUS THRUST

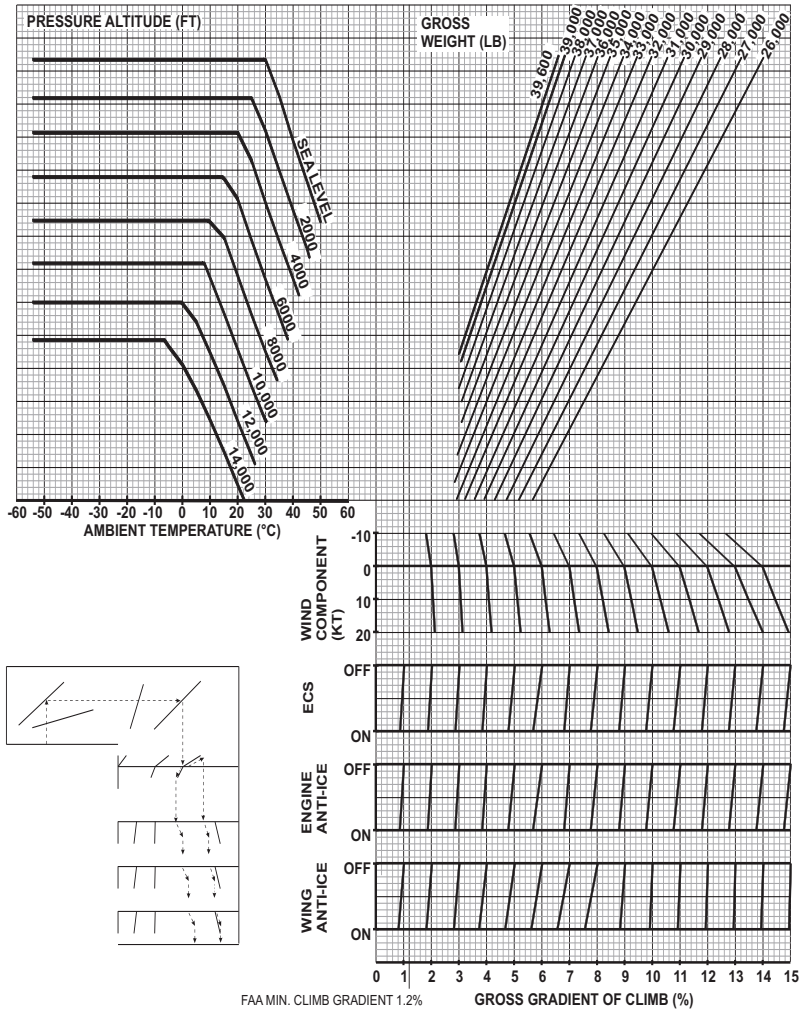


Figure 5-269. Takeoff Climb Gradients; Final Segment; Clean Configuration

ENROUTE CLIMB SPEED
CLEAN CONFIGURATION - ONE ENGINE INOPERATIVE

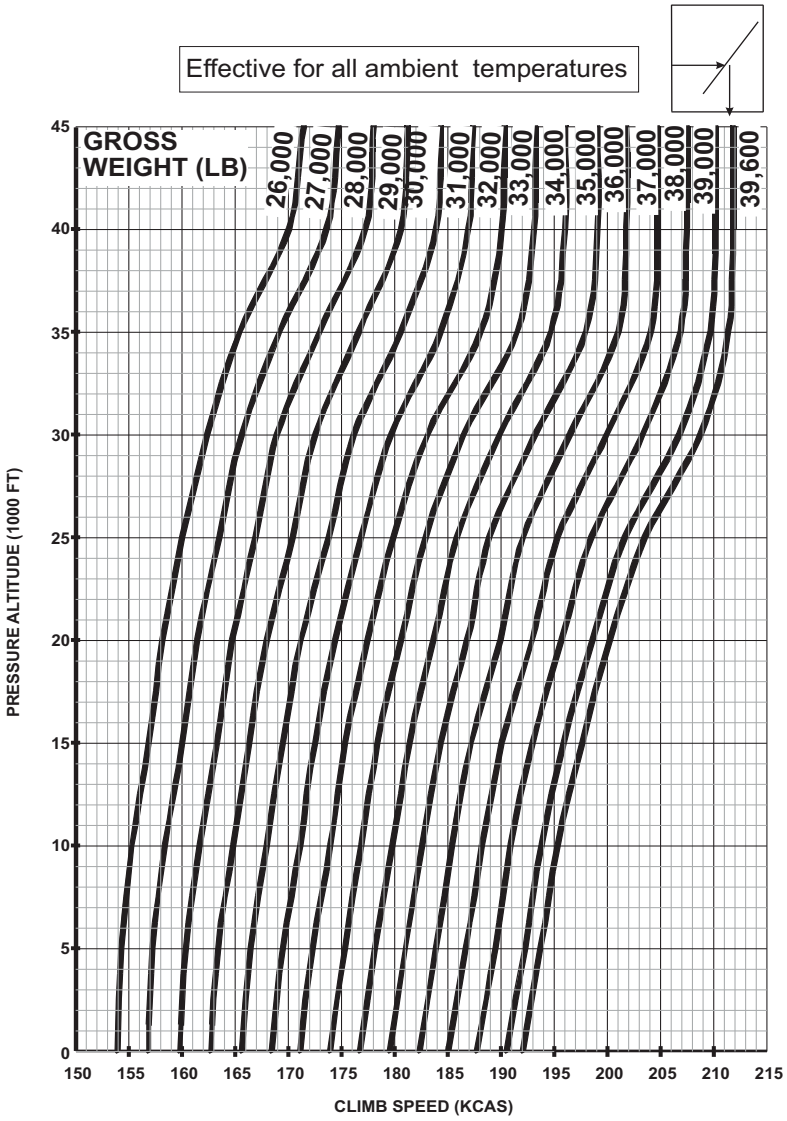


Figure 5-270. Enroute Climb Speed

ENROUTE CLIMB GRADIENTS
ONE ENGINE INOPERATIVE
MAXIMUM CLIMB THRUST
CLEAN CONFIGURATION

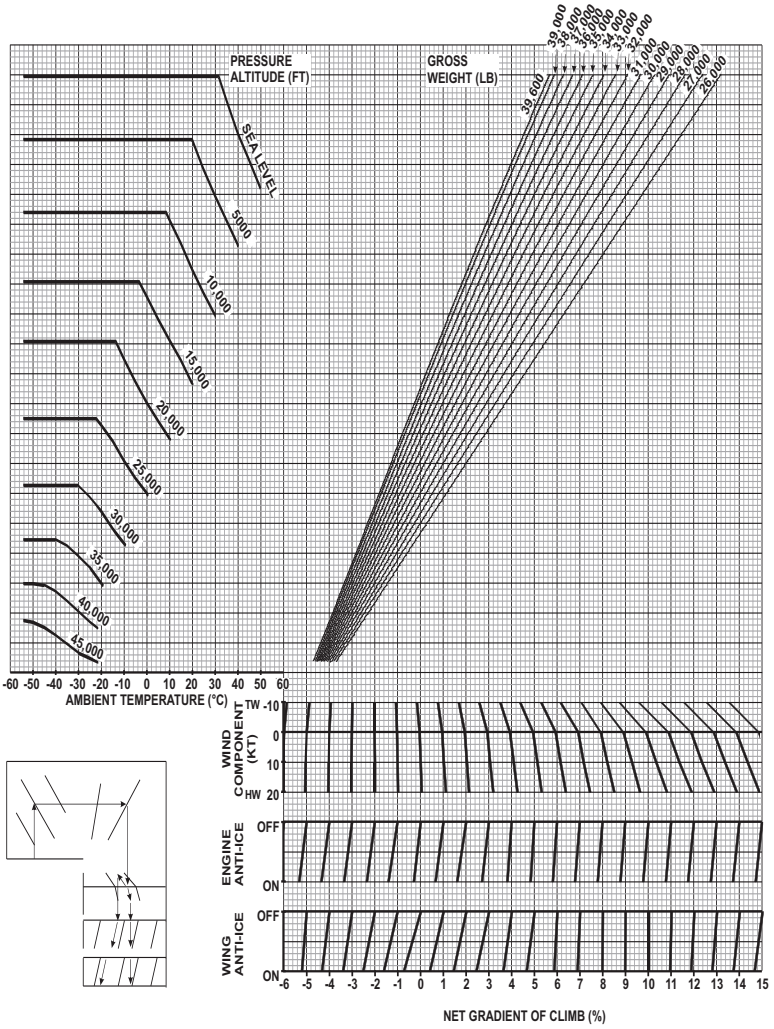


Figure 5-271. Enroute Climb Gradients; Clean Configuration

APPROACH AND LANDING - FLAPS - 39°

APPROACH CLIMB GRADIENTS; FLAPS - 20°; GEAR - UP ONE ENGINE INOPERATIVE (APR - ON)

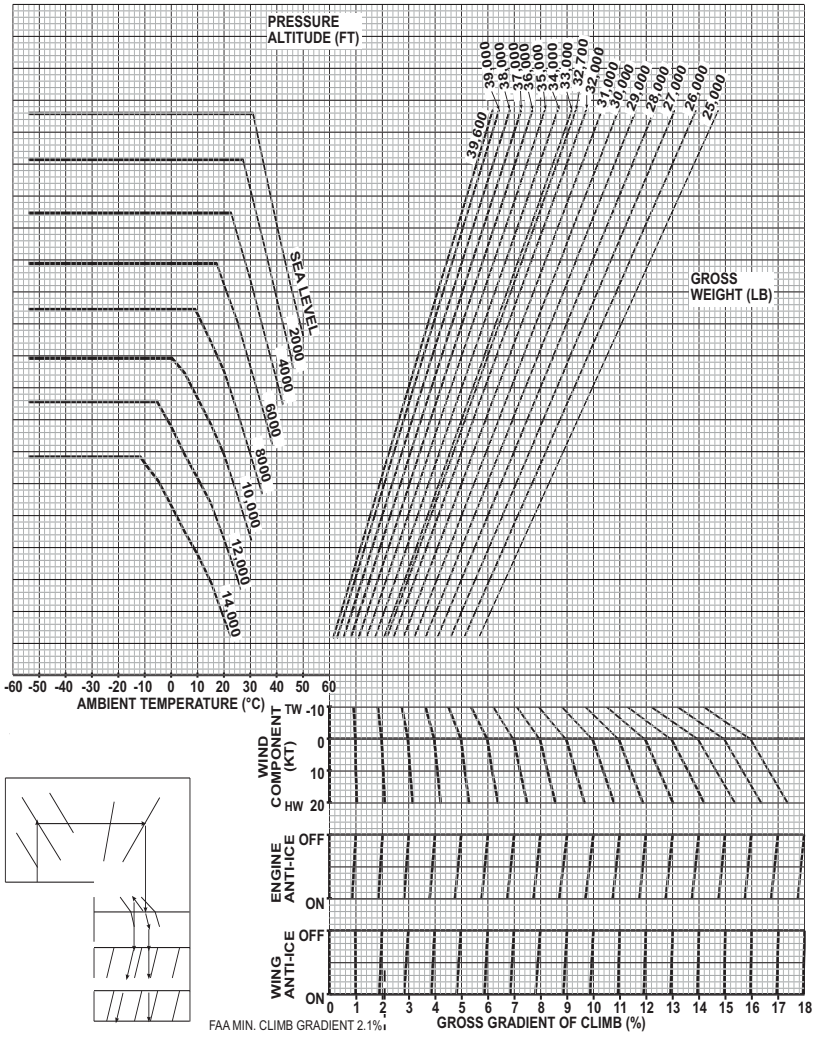


Figure 5-272. Approach Climb Gradients; Flaps - 20°; Gear - Up

LANDING CLIMB GRADIENTS
FLAPS - 39°; GEAR - DOWN; BOTH ENGINES OPERATIVE: TAKEOFF THRUST

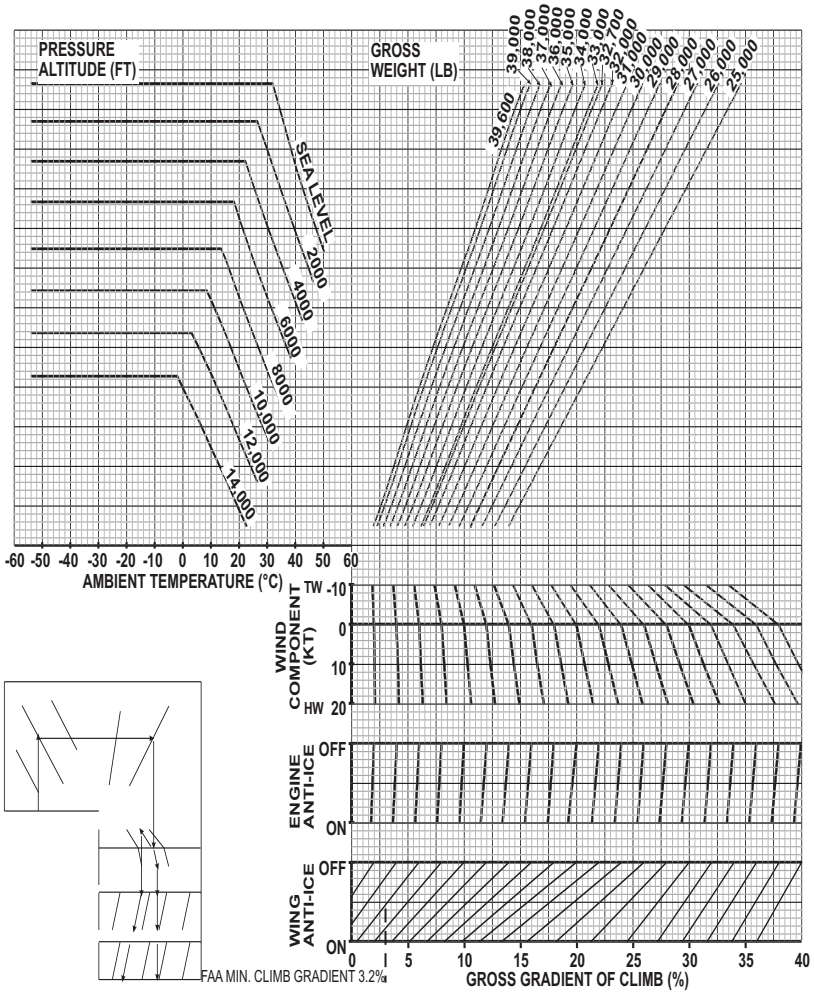


Figure 5-272. Landing Climb Gradients; Flaps - 39°; Gear - Down (Sheet 2 0f 2)

LANDING WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF

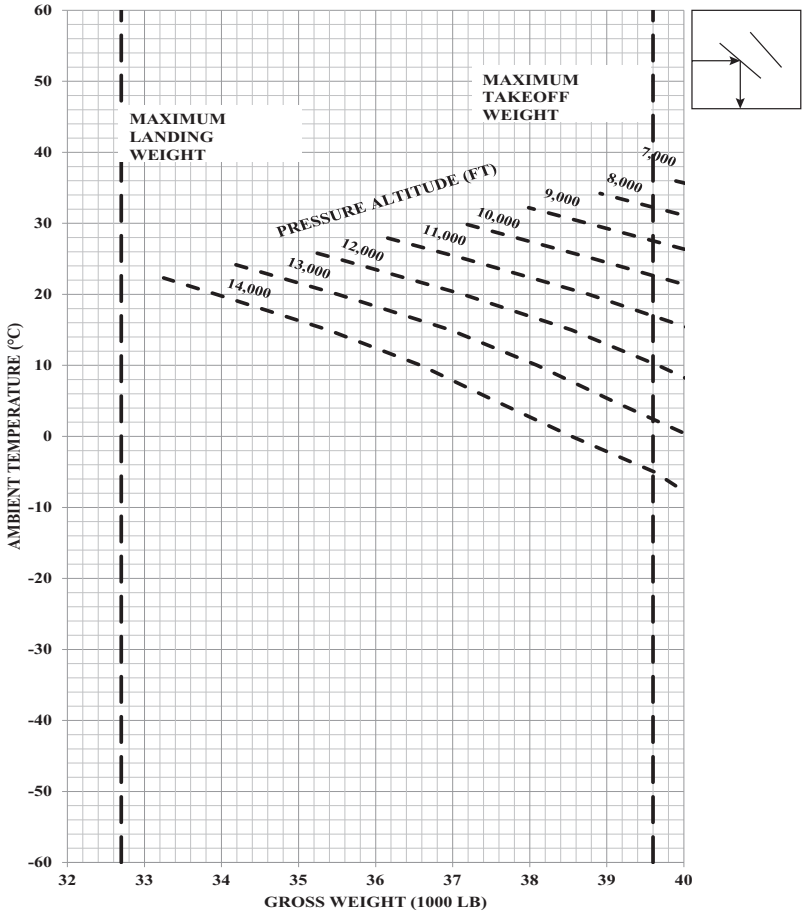


Figure 5-273. Landing Weight Limitations (As Permitted By Climb Requirements) ECS - On; Engine Anti-ice - Off; Wing Anti-ice - Off

LANDING WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - OFF

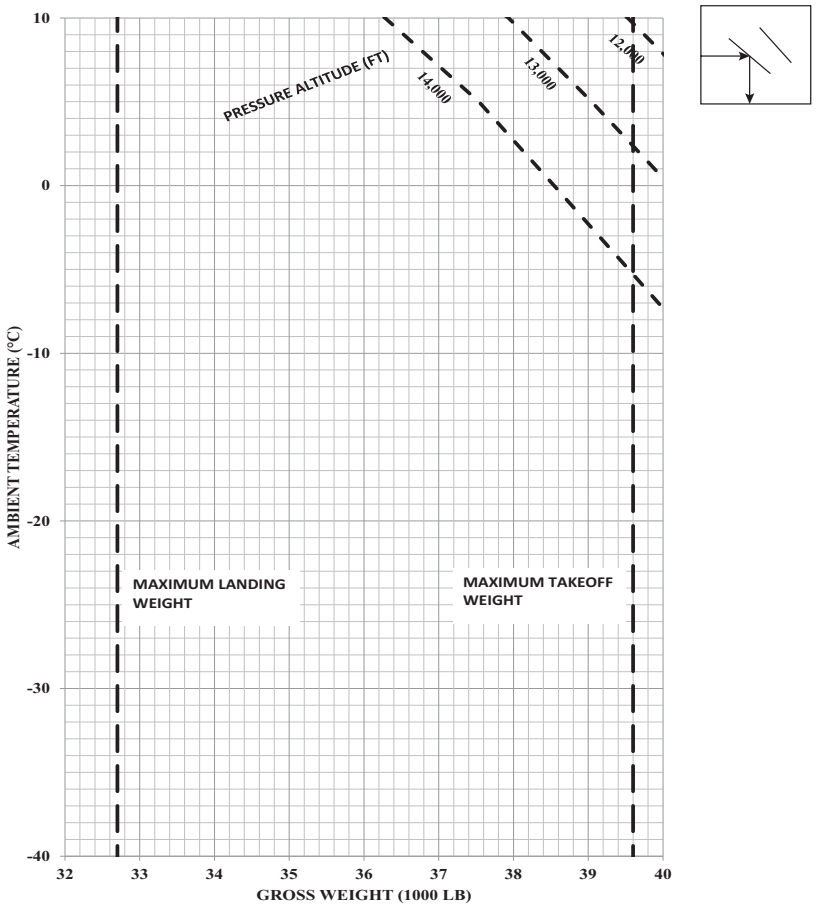


Figure 5-274. Landing Weight Limitations (As Permitted By Climb Requirements) ECS - On; Engine Anti-ice - On; Wing Anti-ice - Off

LANDING WEIGHT LIMITATIONS
(AS PERMITTED BY CLIMB REQUIREMENTS)
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON

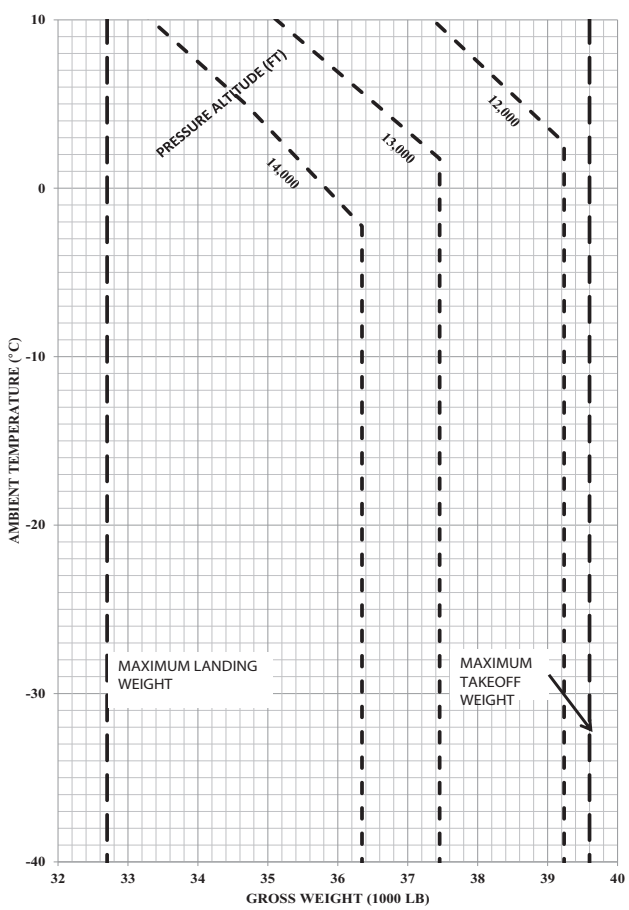


Figure 5-275. Landing Weight Limitations (As Permitted By Climb Requirements) ECS - On; Engine Anti-ice - On; Wing Anti-ice - On

LANDING WEIGHT LIMITATIONS (AS PERMITTED BY BRAKE ENERGY) FLAPS - 39°

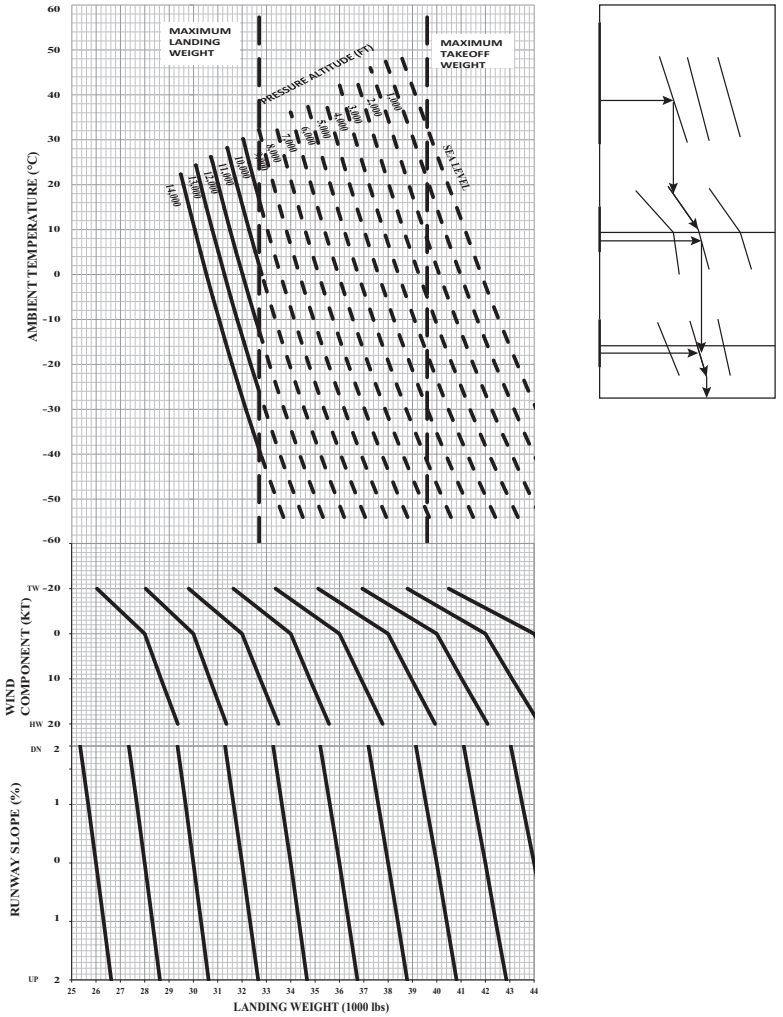


Figure 5-276. Landing Weight Limitations (As Permitted By Brake Energy); Flaps - 39°

LANDING WEIGHT LIMITATIONS (AS PERMITTED BY TIRE SPEED LIMITS) FLAPS - 39°;

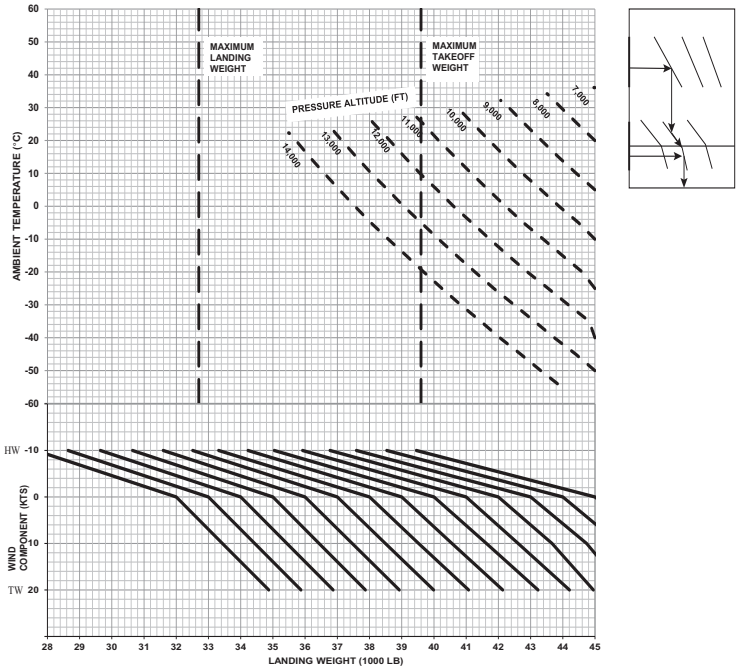


Figure 5-277. Landing Weight Limitations (As Permitted Tire Speed Limits); Flaps - 39°

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 1 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
SEA LEVEL	25000	116	111	2250
	26000	118	113	2320
	27000	120	115	2380
	28000	122	117	2440
	29000	124	119	2500
	30000	126	121	2560
	31000	128	123	2620
	32000	130	125	2680
	32700	132	127	2720
	33000	132	127	2740
	34000	134	129	2800
	35000	136	131	2860
	36000	138	133	2910
	37000	140	135	2970
	38000	141	136	3030
	39000	143	138	3090
	39600	144	139	3120

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 2 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
1000	25000	116	111	2300
	26000	118	113	2370
	27000	120	115	2430
	28000	122	117	2490
	29000	124	119	2550
	30000	126	121	2610
	31000	128	123	2680
	32000	130	125	2740
	32700	132	127	2780
	33000	132	127	2800
	34000	134	129	2860
	35000	136	131	2920
	36000	138	133	2980
	37000	140	135	3040
	38000	141	136	3100
	39000	143	138	3150
	39600	144	139	3200

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 3 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
2000	25000	116	111	2350
	26000	118	113	2420
	27000	120	115	2480
	28000	122	117	2540
	29000	124	119	2610
	30000	126	121	2670
	31000	128	123	2730
	32000	130	125	2800
	32700	132	127	2840
	33000	132	127	2860
	34000	134	129	2920
	35000	136	131	2980
	36000	138	133	3040
	37000	140	135	3100
	38000	142	137	3170
	39000	144	139	3250
	39600	145	140	3290

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39°
(Sheet 4 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
3000	25000	116	111	2400
	26000	118	113	2470
	27000	120	115	2530
	28000	122	117	2600
	29000	124	119	2670
	30000	126	121	2730
	31000	128	123	2790
	32000	130	125	2860
	32700	132	127	2900
	33000	132	127	2920
	34000	134	129	2990
	35000	136	131	3050
	36000	138	133	3110
	37000	140	135	3180
	38000	142	137	3270
	39000	145	140	3350
	39600	146	141	3400

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 5 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
4000	25000	116	111	2450
	26000	118	113	2520
	27000	120	115	2590
	28000	122	117	2660
	29000	124	119	2720
	30000	126	121	2790
	31000	128	123	2860
	32000	130	125	2920
	32700	132	127	2970
	33000	132	127	2990
	34000	134	129	3050
	35000	136	131	3120
	36000	138	133	3200
	37000	141	136	3280
	38000	143	138	3370
	39000	146	141	3460
	39600	147	142	3510

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 6 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
5000	25000	116	111	2510
	26000	118	113	2580
	27000	120	115	2650
	28000	122	117	2720
	29000	124	119	2780
	30000	126	121	2850
	31000	128	123	2920
	32000	130	125	2990
	32700	132	127	3030
	33000	132	127	3050
	34000	134	129	3120
	35000	137	132	3210
	36000	139	134	3300
	37000	142	137	3390
	38000	144	139	3480
	39000	147	142	3570
	39600	148	143	3620

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 7 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
6000	25000	116	111	2570
	26000	118	113	2640
	27000	120	115	2710
	28000	122	117	2780
	29000	124	119	2850
	30000	126	121	2920
	31000	128	123	2990
	32000	130	125	3060
	32700	132	127	3110
	33000	132	127	3130
	34000	135	130	3220
	35000	138	133	3310
	36000	140	135	3410
	37000	143	138	3500
	38000	145	140	3590
	39000	148	143	3690
	39600	149	144	3750

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 8 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
7000	25000	116	111	2620
	26000	118	113	2700
	27000	120	115	2770
	28000	122	117	2840
	29000	124	119	2920
	30000	126	121	2990
	31000	128	123	3060
	32000	131	126	3140
	32700	133	128	3210
	33000	133	128	3230
	34000	136	131	3330
	35000	139	134	3420
	36000	141	136	3520
	37000	144	139	3620
	38000	146	141	3720
	39000	149	144	3810
	39600	150	145	3870

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 9 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
8000	25000	116	111	2690
	26000	118	113	2760
	27000	120	115	2840
	28000	122	117	2910
	29000	124	119	2980
	30000	126	121	3060
	31000	129	124	3150
	32000	132	127	3240
	32700	133	128	3310
	33000	134	129	3340
	34000	137	132	3440
	35000	140	135	3540
	36000	142	137	3640
	37000	145	140	3740
	38000	147	142	3840
	39000	150	145	3950
	39600	152	147	4010

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39°
(Sheet 10 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
9000	25000	116	111	2750
	26000	118	113	2830
	27000	120	115	2900
	28000	122	117	2980
	29000	124	119	3050
	30000	127	122	3150
	31000	130	125	3250
	32000	132	127	3350
	32700	134	129	3420
	33000	135	130	3450
	34000	138	133	3560
	35000	141	136	3660
	36000	143	138	3770
	37000	146	141	3870
	38000	149	144	3980
	39000	151	146	4090
	39600	153	148	4150

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 11 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
10,000	25000	116	111	2810
	26000	118	113	2890
	27000	120	115	2970
	28000	122	117	3050
	29000	125	120	3150
	30000	128	123	3250
	31000	131	126	3360
	32000	133	128	3470
	32700	135	130	3540
	33000	136	131	3570
	34000	139	134	3680
	35000	142	137	3790
	36000	144	139	3900
	37000	147	142	4010
	38000	150	145	4120
	39000	152	147	4230
	39600	154	149	4290

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39°
(Sheet 12 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
11,000	25000	116	111	2880
	26000	118	113	2960
	27000	120	115	3040
	28000	123	118	3150
	29000	126	121	3260
	30000	129	124	3360
	31000	132	127	3480
	32000	134	129	3590
	32700	136	131	3660
	33000	137	132	3700
	34000	140	135	3810
	35000	143	138	3920
	36000	145	140	4040
	37000	148	143	4150
	38000	151	146	4260
	39000	153	148	4380
	39600	155	150	4440

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 13 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
12,000	25000	116	111	2960
	26000	118	113	3040
	27000	121	116	3150
	28000	124	119	3260
	29000	127	122	3370
	30000	130	125	3490
	31000	133	128	3600
	32000	135	130	3720
	32700	137	132	3800
	33000	138	133	3830
	34000	141	136	3950
	35000	144	139	4070
	36000	147	142	4180
	37000	149	144	4300
	38000	152	147	4420
	39000	155	150	4530
	39600	156	151	4610

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39°
(Sheet 14 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
13,000	25000	116	111	3030
	26000	119	114	3140
	27000	122	117	3260
	28000	125	120	3370
	29000	128	123	3490
	30000	131	126	3610
	31000	133	128	3730
	32000	136	131	3850
	32700	138	133	3930
	33000	139	134	3970
	34000	142	137	4100
	35000	145	140	4210
	36000	148	143	4330
	37000	150	145	4450
	38000	153	148	4580
	39000	156	151	4700
	39600	157	152	4770

FIGURE 5-278. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39° (Sheet 15 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Landing Distance Wind Components Correction; Flaps - 39°, Figure 5-279.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
14,000	25000	117	112	3130
	26000	120	115	3250
	27000	123	118	3370
	28000	126	121	3490
	29000	129	124	3620
	30000	132	127	3740
	31000	135	130	3860
	32000	138	133	3990
	32700	140	135	4080
	33000	140	135	4120
	34000	143	138	4240
	35000	146	141	4360
	36000	149	144	4490
	37000	152	147	4620
	38000	154	149	4740
	39000	157	152	4870
	39600	159	154	4940

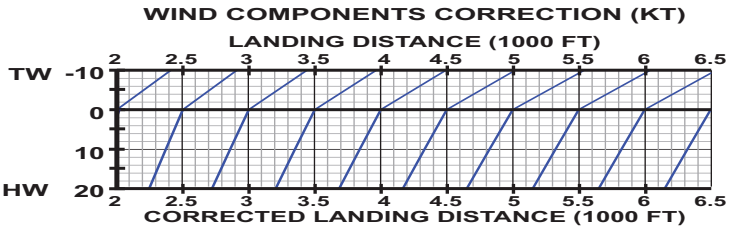


Figure 5-279. Actual Landing Distance Wind Components Correction; Flaps - 39°

FIGURE 5-280. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - HIGH; FLAPS - 39° (Sheet 1 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - High; Flaps - 39°, Figure 5-281.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
SEA LEVEL	25000	116	111	930	2060	2990
	26000	118	113	940	2130	3070
	27000	120	115	960	2200	3160
	28000	122	117	980	2270	3250
	29000	124	119	990	2340	3330
	30000	126	121	1010	2410	3420
	31000	128	123	1030	2470	3500
	32000	130	125	1040	2540	3580
	32700	132	127	1060	2590	3650
	33000	132	127	1060	2610	3670
	34000	134	129	1080	2680	3760
	35000	136	131	1090	2740	3830
	36000	138	133	1110	2810	3920
	37000	140	135	1120	2880	4000
	38000	141	136	1140	2950	4090
	39000	143	138	1150	3020	4170
	39600	144	139	1160	3060	4220
1000	25000	116	111	940	2120	3060
	26000	118	113	950	2190	3140
	27000	120	115	970	2260	3230
	28000	122	117	990	2330	3320
	29000	124	119	1010	2400	3410
	30000	126	121	1030	2470	3500
	31000	128	123	1040	2540	3580
	32000	130	125	1060	2610	3670
	32700	132	127	1070	2660	3730
	33000	132	127	1080	2680	3760
	34000	134	129	1090	2750	3840
	35000	136	131	1110	2820	3930
	36000	138	133	1130	2890	4020
	37000	140	135	1140	2960	4100
	38000	141	136	1160	3030	4190
	39000	143	138	1170	3100	4270
	39600	144	139	1180	3140	4320

FIGURE 5-280. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - HIGH; FLAPS - 39°
(Sheet 2 of 8)
NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - High; Flaps - 39°, Figure 5-281.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
2000	25000	116	111	950	2170	3120
	26000	118	113	970	2240	3210
	27000	120	115	990	2310	3300
	28000	122	117	1010	2390	3400
	29000	124	119	1020	2460	3480
	30000	126	121	1040	2530	3570
	31000	128	123	1060	2600	3660
	32000	130	125	1080	2670	3750
	32700	132	127	1090	2730	3820
	33000	132	127	1090	2750	3840
	34000	134	129	1110	2820	3930
	35000	136	131	1130	2890	4020
	36000	138	133	1140	2960	4100
	37000	140	135	1160	3030	4190
	38000	142	137	1170	3110	4280
	39000	144	139	1190	3200	4390
	39600	145	140	1210	3260	4470
3000	25000	116	111	960	2230	3190
	26000	118	113	980	2300	3280
	27000	120	115	1000	2370	3370
	28000	122	117	1020	2450	3470
	29000	124	119	1040	2520	3560
	30000	126	121	1060	2600	3660
	31000	128	123	1080	2670	3750
	32000	130	125	1090	2750	3840
	32700	132	127	1100	2800	3900
	33000	132	127	1110	2820	3930
	34000	134	129	1130	2890	4020
	35000	136	131	1140	2970	4110
	36000	138	133	1160	3040	4200
	37000	140	135	1180	3130	4310
	38000	142	137	1200	3220	4420
	39000	145	140	1220	3320	4540
	39600	146	141	1230	3380	4610

FIGURE 5-280. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - HIGH; FLAPS - 39° (Sheet 3 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - High; Flaps - 39°, Figure 5-281.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
4000	25000	116	111	980	2280	3260
	26000	118	113	1000	2360	3360
	27000	120	115	1020	2440	3460
	28000	122	117	1040	2510	3550
	29000	124	119	1060	2590	3650
	30000	126	121	1070	2670	3740
	31000	128	123	1090	2740	3830
	32000	130	125	1110	2820	3930
	32700	132	127	1120	2870	3990
	33000	132	127	1130	2900	4030
	34000	134	129	1140	2970	4110
	35000	136	131	1160	3050	4210
	36000	138	133	1180	3140	4320
	37000	141	136	1200	3240	4440
	38000	143	138	1230	3350	4580
	39000	146	141	1250	3450	4700
	39600	147	142	1260	3510	4770
5000	25000	116	111	990	2340	3330
	26000	118	113	1010	2420	3430
	27000	120	115	1030	2500	3530
	28000	122	117	1050	2580	3630
	29000	124	119	1070	2660	3730
	30000	126	121	1090	2740	3830
	31000	128	123	1110	2820	3930
	32000	130	125	1130	2890	4020
	32700	132	127	1140	2950	4090
	33000	132	127	1140	2970	4110
	34000	134	129	1160	3050	4210
	35000	137	132	1180	3160	4340
	36000	139	134	1210	3260	4470
	37000	142	137	1230	3370	4600
	38000	144	139	1250	3480	4730
	39000	147	142	1280	3590	4870
	39600	148	143	1290	3650	4940

FIGURE 5-280. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - HIGH; FLAPS - 39° (Sheet 4 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - High; Flaps - 39°, Figure 5-281.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
6000	25000	116	111	1010	2410	3420
	26000	118	113	1030	2490	3520
	27000	120	115	1050	2570	3620
	28000	122	117	1070	2650	3720
	29000	124	119	1090	2730	3820
	30000	126	121	1110	2810	3920
	31000	128	123	1130	2890	4020
	32000	130	125	1140	2970	4110
	32700	132	127	1160	3030	4190
	33000	132	127	1160	3060	4220
	34000	135	130	1190	3170	4360
	35000	138	133	1210	3280	4490
	36000	140	135	1230	3390	4620
	37000	143	138	1260	3500	4760
	38000	145	140	1280	3610	4890
	39000	148	143	1300	3730	5030
	39600	149	144	1320	3800	5120
7000	25000	116	111	1030	2470	3500
	26000	118	113	1050	2560	3610
	27000	120	115	1070	2640	3710
	28000	122	117	1090	2720	3810
	29000	124	119	1100	2810	3910
	30000	126	121	1120	2890	4010
	31000	128	123	1140	2970	4110
	32000	131	126	1160	3070	4230
	32700	133	128	1180	3150	4330
	33000	133	128	1190	3180	4370
	34000	136	131	1210	3290	4500
	35000	139	134	1240	3410	4650
	36000	141	136	1260	3530	4790
	37000	144	139	1290	3640	4930
	38000	146	141	1310	3760	5070
	39000	149	144	1330	3880	5210
	39600	150	145	1350	3950	5300

FIGURE 5-280. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - HIGH; FLAPS - 39° (Sheet 5 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - High; Flaps - 39°, Figure 5-281.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
8000	25000	116	111	1040	2540	3580
	26000	118	113	1060	2630	3690
	27000	120	115	1080	2720	3800
	28000	122	117	1100	2800	3900
	29000	124	119	1120	2890	4010
	30000	126	121	1140	2970	4110
	31000	129	124	1170	3080	4250
	32000	132	127	1190	3190	4380
	32700	133	128	1210	3270	4480
	33000	134	129	1220	3310	4530
	34000	137	132	1240	3430	4670
	35000	140	135	1270	3550	4820
	36000	142	137	1290	3670	4960
	37000	145	140	1320	3790	5110
	38000	147	142	1340	3920	5260
	39000	150	145	1370	4040	5410
	39600	152	147	1380	4120	5500
9000	25000	116	111	1060	2610	3670
	26000	118	113	1080	2700	3780
	27000	120	115	1100	2790	3890
	28000	122	117	1120	2880	4000
	29000	124	119	1140	2970	4110
	30000	127	122	1170	3080	4250
	31000	130	125	1190	3200	4390
	32000	132	127	1220	3320	4540
	32700	134	129	1240	3410	4650
	33000	135	130	1240	3440	4680
	34000	138	133	1270	3570	4840
	35000	141	136	1300	3690	4990
	36000	143	138	1320	3820	5140
	37000	146	141	1350	3950	5300
	38000	149	144	1370	4080	5450
	39000	151	146	1400	4210	5610
	39600	153	148	1410	4300	5710

FIGURE 5-280. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - HIGH; FLAPS - 39°
(Sheet 6 of 8)
NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - High; Flaps - 39°, Figure 5-281.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
10,000	25000	116	111	1070	2690	3760
	26000	118	113	1100	2780	3880
	27000	120	115	1120	2870	3990
	28000	122	117	1140	2960	4100
	29000	125	120	1160	3080	4240
	30000	128	123	1190	3200	4390
	31000	131	126	1220	3330	4550
	32000	133	128	1250	3460	4710
	32700	135	130	1270	3550	4820
	33000	136	131	1270	3590	4860
	34000	139	134	1300	3710	5010
	35000	142	137	1330	3850	5180
	36000	144	139	1350	3980	5330
	37000	147	142	1380	4120	5500
	38000	150	145	1410	4260	5670
	39000	152	147	1430	4390	5820
	39600	154	149	1450	4470	5920
11,000	25000	116	111	1090	2770	3860
	26000	118	113	1110	2860	3970
	27000	120	115	1140	2960	4100
	28000	123	118	1160	3080	4240
	29000	126	121	1190	3210	4400
	30000	129	124	1220	3330	4550
	31000	132	127	1250	3470	4720
	32000	134	129	1280	3600	4880
	32700	136	131	1290	3690	4980
	33000	137	132	1300	3730	5030
	34000	140	135	1330	3870	5200
	35000	143	138	1360	4010	5370
	36000	145	140	1390	4150	5540
	37000	148	143	1410	4290	5700
	38000	151	146	1440	4430	5870
	39000	153	148	1460	4570	6030
	39600	155	150	1480	4660	6140

FIGURE 5-280. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - HIGH; FLAPS - 39° (Sheet 7 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - High; Flaps - 39°, Figure 5-281.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
12,000	25000	116	111	1110	2860	3970
	26000	118	113	1130	2950	4080
	27000	121	116	1160	3080	4240
	28000	124	119	1190	3210	4400
	29000	127	122	1220	3350	4570
	30000	130	125	1250	3480	4730
	31000	133	128	1280	3620	4900
	32000	135	130	1310	3760	5070
	32700	137	132	1330	3860	5190
	33000	138	133	1330	3900	5230
	34000	141	136	1360	4040	5400
	35000	144	139	1390	4190	5580
	36000	147	142	1420	4330	5750
	37000	149	144	1450	4480	5930
	38000	152	147	1470	4620	6090
	39000	155	150	1500	4770	6270
	39600	156	151	1520	4860	6380
13,000	25000	116	111	1130	2940	4070
	26000	119	114	1160	3070	4230
	27000	122	117	1190	3210	4400
	28000	125	120	1220	3350	4570
	29000	128	123	1250	3490	4740
	30000	131	126	1280	3630	4910
	31000	133	128	1310	3770	5080
	32000	136	131	1340	3920	5260
	32700	138	133	1360	4020	5380
	33000	139	134	1370	4070	5440
	34000	142	137	1400	4220	5620
	35000	145	140	1420	4370	5790
	36000	148	143	1450	4520	5970
	37000	150	145	1480	4670	6150
	38000	153	148	1510	4830	6340
	39000	156	151	1540	4990	6530
	39600	157	152	1550	5080	6630

FIGURE 5-280. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - HIGH; FLAPS - 39° (Sheet 8 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - High; Flaps - 39°, Figure 5-281.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
14,000	25000	117	112	1150	3060	4210
	26000	120	115	1190	3200	4390
	27000	123	118	1220	3340	4560
	28000	126	121	1250	3490	4740
	29000	129	124	1280	3640	4920
	30000	132	127	1310	3780	5090
	31000	135	130	1340	3940	5280
	32000	138	133	1370	4090	5460
	32700	140	135	1390	4200	5590
	33000	140	135	1400	4250	5650
	34000	143	138	1430	4400	5830
	35000	146	141	1460	4560	6020
	36000	149	144	1490	4720	6210
	37000	152	147	1520	4880	6400
	38000	154	149	1540	5040	6580
	39000	157	152	1570	5200	6770
	39600	159	154	1590	5290	6880

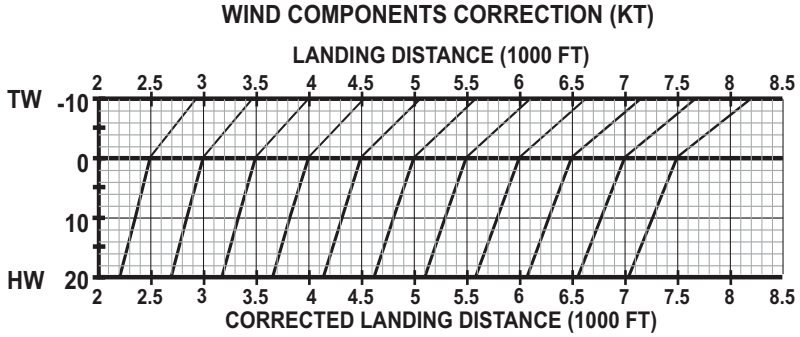


Figure 5-281. Actual Landing Distance Wind Components Correction; Autobrakes - High; Flaps - 39°

FIGURE 5-282. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - MED; FLAPS - 39° (Sheet 1 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Med; Flaps - 39°, Figure 5-283.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
SEA LEVEL	25000	116	111	930	2640	3570
	26000	118	113	950	2730	3680
	27000	120	115	960	2820	3780
	28000	122	117	980	2920	3900
	29000	124	119	1000	3010	4010
	30000	126	121	1020	3100	4120
	31000	128	123	1030	3190	4220
	32000	130	125	1050	3290	4340
	32700	132	127	1060	3350	4410
	33000	132	127	1070	3380	4450
	34000	134	129	1080	3470	4550
	35000	136	131	1100	3560	4660
	36000	138	133	1110	3660	4770
	37000	140	135	1130	3750	4880
	38000	141	136	1140	3840	4980
	39000	143	138	1160	3930	5090
	39600	144	139	1170	3990	5160
1000	25000	116	111	940	2710	3650
	26000	118	113	960	2810	3770
	27000	120	115	980	2900	3880
	28000	122	117	1000	3000	4000
	29000	124	119	1010	3090	4100
	30000	126	121	1030	3190	4220
	31000	128	123	1050	3280	4330
	32000	130	125	1070	3380	4450
	32700	132	127	1080	3440	4520
	33000	132	127	1080	3470	4550
	34000	134	129	1100	3570	4670
	35000	136	131	1110	3660	4770
	36000	138	133	1130	3760	4890
	37000	140	135	1150	3850	5000
	38000	141	136	1160	3950	5110
	39000	143	138	1180	4040	5220
	39600	144	139	1190	4110	5300

FIGURE 5-282. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - MED; FLAPS - 39° (Sheet 2 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Med; Flaps - 39°, Figure 5-283.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
2000	25000	116	111	950	2780	3730
	26000	118	113	970	2880	3850
	27000	120	115	990	2980	3970
	28000	122	117	1010	3080	4090
	29000	124	119	1030	3170	4200
	30000	126	121	1050	3270	4320
	31000	128	123	1060	3370	4430
	32000	130	125	1080	3470	4550
	32700	132	127	1090	3540	4630
	33000	132	127	1100	3570	4670
	34000	134	129	1110	3670	4780
	35000	136	131	1130	3760	4890
	36000	138	133	1150	3860	5010
	37000	140	135	1160	3960	5120
	38000	142	137	1180	4060	5240
	39000	144	139	1200	4190	5390
	39600	145	140	1210	4270	5480
3000	25000	116	111	970	2860	3830
	26000	118	113	990	2960	3950
	27000	120	115	1010	3060	4070
	28000	122	117	1030	3160	4190
	29000	124	119	1040	3260	4300
	30000	126	121	1060	3360	4420
	31000	128	123	1080	3470	4550
	32000	130	125	1100	3570	4670
	32700	132	127	1110	3640	4750
	33000	132	127	1110	3670	4780
	34000	134	129	1130	3770	4900
	35000	136	131	1150	3870	5020
	36000	138	133	1160	3970	5130
	37000	140	135	1180	4090	5270
	38000	142	137	1200	4220	5420
	39000	145	140	1230	4360	5590
	39600	146	141	1240	4440	5680

FIGURE 5-282. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - MED; FLAPS - 39° (Sheet 3 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Med; Flaps - 39°, Figure 5-283.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
4000	25000	116	111	980	2940	3920
	26000	118	113	1000	3040	4040
	27000	120	115	1020	3150	4170
	28000	122	117	1040	3250	4290
	29000	124	119	1060	3350	4410
	30000	126	121	1080	3460	4540
	31000	128	123	1100	3560	4660
	32000	130	125	1110	3670	4780
	32700	132	127	1130	3740	4870
	33000	132	127	1130	3770	4900
	34000	134	129	1150	3870	5020
	35000	136	131	1170	3980	5150
	36000	138	133	1190	4110	5300
	37000	141	136	1210	4250	5460
	38000	143	138	1230	4390	5620
	39000	146	141	1250	4530	5780
	39600	147	142	1270	4620	5890
5000	25000	116	111	1000	3020	4020
	26000	118	113	1020	3130	4150
	27000	120	115	1040	3230	4270
	28000	122	117	1060	3340	4400
	29000	124	119	1080	3450	4530
	30000	126	121	1090	3550	4640
	31000	128	123	1110	3660	4770
	32000	130	125	1130	3770	4900
	32700	132	127	1140	3840	4980
	33000	132	127	1150	3880	5030
	34000	134	129	1170	3990	5160
	35000	137	132	1190	4130	5320
	36000	139	134	1210	4270	5480
	37000	142	137	1240	4420	5660
	38000	144	139	1260	4570	5830
	39000	147	142	1280	4720	6000
	39600	148	143	1290	4810	6100

FIGURE 5-282. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - MED; FLAPS - 39° (Sheet 4 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Med; Flaps - 39°, Figure 5-283.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
6000	25000	116	111	1010	3110	4120
	26000	118	113	1030	3220	4250
	27000	120	115	1050	3330	4380
	28000	122	117	1070	3440	4510
	29000	124	119	1090	3550	4640
	30000	126	121	1110	3660	4770
	31000	128	123	1130	3770	4900
	32000	130	125	1150	3880	5030
	32700	132	127	1160	3960	5120
	33000	132	127	1170	4000	5170
	34000	135	130	1190	4150	5340
	35000	138	133	1220	4290	5510
	36000	140	135	1240	4450	5690
	37000	143	138	1260	4600	5860
	38000	145	140	1290	4760	6050
	39000	148	143	1310	4910	6220
	39600	149	144	1320	5010	6330
7000	25000	116	111	1030	3200	4230
	26000	118	113	1050	3310	4360
	27000	120	115	1070	3420	4490
	28000	122	117	1090	3540	4630
	29000	124	119	1110	3650	4760
	30000	126	121	1130	3770	4900
	31000	128	123	1150	3880	5030
	32000	131	126	1170	4010	5180
	32700	133	128	1190	4120	5310
	33000	133	128	1190	4160	5350
	34000	136	131	1220	4320	5540
	35000	139	134	1240	4470	5710
	36000	141	136	1270	4630	5900
	37000	144	139	1290	4800	6090
	38000	146	141	1320	4960	6280
	39000	149	144	1340	5120	6460
	39600	150	145	1350	5220	6570

FIGURE 5-282. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - MED; FLAPS - 39° (Sheet 5 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Med; Flaps - 39°, Figure 5-283.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
8000	25000	116	111	1050	3290	4340
	26000	118	113	1070	3410	4480
	27000	120	115	1090	3530	4620
	28000	122	117	1110	3640	4750
	29000	124	119	1130	3760	4890
	30000	126	121	1150	3880	5030
	31000	129	124	1170	4020	5190
	32000	132	127	1200	4180	5380
	32700	133	128	1210	4290	5500
	33000	134	129	1220	4340	5560
	34000	137	132	1250	4500	5750
	35000	140	135	1270	4670	5940
	36000	142	137	1300	4830	6130
	37000	145	140	1320	5000	6320
	38000	147	142	1350	5170	6520
	39000	150	145	1370	5350	6720
	39600	152	147	1390	5450	6840
9000	25000	116	111	1060	3390	4450
	26000	118	113	1080	3510	4590
	27000	120	115	1100	3630	4730
	28000	122	117	1130	3750	4880
	29000	124	119	1150	3870	5020
	30000	127	122	1170	4020	5190
	31000	130	125	1200	4190	5390
	32000	132	127	1220	4350	5570
	32700	134	129	1240	4470	5710
	33000	135	130	1250	4520	5770
	34000	138	133	1280	4690	5970
	35000	141	136	1300	4870	6170
	36000	143	138	1330	5040	6370
	37000	146	141	1350	5220	6570
	38000	149	144	1380	5400	6780
	39000	151	146	1400	5580	6980
	39600	153	148	1420	5700	7120

FIGURE 5-282. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - MED; FLAPS - 39° (Sheet 6 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Med; Flaps - 39°, Figure 5-283.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
10,000	25000	116	111	1080	3490	4570
	26000	118	113	1100	3620	4720
	27000	120	115	1120	3740	4860
	28000	122	117	1140	3860	5000
	29000	125	120	1170	4030	5200
	30000	128	123	1200	4190	5390
	31000	131	126	1220	4360	5580
	32000	133	128	1250	4540	5790
	32700	135	130	1270	4660	5930
	33000	136	131	1280	4720	6000
	34000	139	134	1300	4900	6200
	35000	142	137	1330	5080	6410
	36000	144	139	1360	5260	6620
	37000	147	142	1380	5450	6830
	38000	150	145	1410	5640	7050
	39000	152	147	1440	5830	7270
	39600	154	149	1450	5940	7390
11,000	25000	116	111	1100	3600	4700
	26000	118	113	1120	3730	4850
	27000	120	115	1140	3850	4990
	28000	123	118	1170	4020	5190
	29000	126	121	1200	4200	5400
	30000	129	124	1220	4370	5590
	31000	132	127	1250	4550	5800
	32000	134	129	1280	4740	6020
	32700	136	131	1300	4870	6170
	33000	137	132	1310	4920	6230
	34000	140	135	1340	5110	6450
	35000	143	138	1360	5300	6660
	36000	145	140	1390	5500	6890
	37000	148	143	1420	5700	7120
	38000	151	146	1440	5890	7330
	39000	153	148	1470	6080	7550
	39600	155	150	1490	6200	7690

FIGURE 5-282. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - MED; FLAPS - 39° (Sheet 7 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Med; Flaps - 39°, Figure 5-283.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
12,000	25000	116	111	1110	3720	4830
	26000	118	113	1140	3850	4990
	27000	121	116	1170	4030	5200
	28000	124	119	1200	4210	5410
	29000	127	122	1220	4390	5610
	30000	130	125	1250	4580	5830
	31000	133	128	1280	4770	6050
	32000	135	130	1310	4960	6270
	32700	137	132	1330	5090	6420
	33000	138	133	1340	5150	6490
	34000	141	136	1370	5350	6720
	35000	144	139	1400	5550	6950
	36000	147	142	1420	5750	7170
	37000	149	144	1450	5950	7400
	38000	152	147	1480	6150	7630
	39000	155	150	1500	6360	7860
	39600	156	151	1520	6480	8000
13,000	25000	116	111	1130	3840	4970
	26000	119	114	1160	4020	5180
	27000	122	117	1190	4200	5390
	28000	125	120	1220	4390	5610
	29000	128	123	1250	4580	5830
	30000	131	126	1280	4780	6060
	31000	133	128	1310	4980	6290
	32000	136	131	1340	5180	6520
	32700	138	133	1360	5320	6680
	33000	139	134	1370	5390	6760
	34000	142	137	1400	5600	7000
	35000	145	140	1430	5800	7230
	36000	148	143	1460	6010	7470
	37000	150	145	1490	6220	7710
	38000	153	148	1510	6430	7940
	39000	156	151	1540	6650	8190
	39600	157	152	1560	6780	8340

FIGURE 5-282. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - MED; FLAPS - 39° (Sheet 8 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Med; Flaps - 39°, Figure 5-283.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
14,000	25000	117	112	1160	4000	5160
	26000	120	115	1190	4190	5380
	27000	123	118	1220	4380	5600
	28000	126	121	1250	4590	5840
	29000	129	124	1280	4790	6070
	30000	132	127	1310	4990	6300
	31000	135	130	1340	5200	6540
	32000	138	133	1380	5420	6800
	32700	140	135	1400	5570	6970
	33000	140	135	1410	5630	7040
	34000	143	138	1430	5840	7270
	35000	146	141	1460	6060	7520
	36000	149	144	1490	6280	7770
	37000	152	147	1520	6500	8020
	38000	154	149	1550	6720	8270
	39000	157	152	1580	6950	8530
	39600	159	154	1590	7080	8670

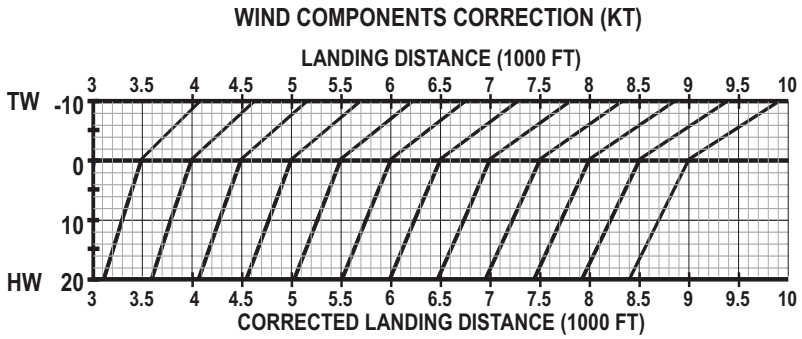


Figure 5-283. Actual Landing Distance Wind Components Correction; Autobrakes - Med; Flaps - 39°

FIGURE 5-284. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - LOW; FLAPS - 39° (Sheet 1 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Low; Flaps - 39°, Figure 5-285.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
SEA LEVEL	25000	116	111	930	3270	4200
	26000	118	113	950	3390	4340
	27000	120	115	960	3510	4470
	28000	122	117	980	3630	4610
	29000	124	119	1000	3740	4740
	30000	126	121	1020	3860	4880
	31000	128	123	1030	3980	5010
	32000	130	125	1050	4100	5150
	32700	132	127	1060	4180	5240
	33000	132	127	1070	4220	5290
	34000	134	129	1080	4340	5420
	35000	136	131	1100	4460	5560
	36000	138	133	1110	4580	5690
	37000	140	135	1130	4700	5830
	38000	141	136	1140	4820	5960
	39000	143	138	1160	4940	6100
	39600	144	139	1170	5010	6180
1000	25000	116	111	940	3360	4300
	26000	118	113	960	3480	4440
	27000	120	115	980	3600	4580
	28000	122	117	1000	3730	4730
	29000	124	119	1010	3850	4860
	30000	126	121	1030	3970	5000
	31000	128	123	1050	4090	5140
	32000	130	125	1070	4220	5290
	32700	132	127	1080	4300	5380
	33000	132	127	1080	4340	5420
	34000	134	129	1100	4460	5560
	35000	136	131	1110	4590	5700
	36000	138	133	1130	4710	5840
	37000	140	135	1150	4830	5980
	38000	141	136	1160	4960	6120
	39000	143	138	1180	5080	6260
	39600	144	139	1190	5170	6360

FIGURE 5-284. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - LOW; FLAPS - 39°
(Sheet 2 of 8)
NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Low; Flaps - 39°, Figure 5-285.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
2000	25000	116	111	950	3450	4400
	26000	118	113	970	3580	4550
	27000	120	115	990	3700	4690
	28000	122	117	1010	3830	4840
	29000	124	119	1030	3960	4990
	30000	126	121	1050	4080	5130
	31000	128	123	1060	4210	5270
	32000	130	125	1080	4340	5420
	32700	132	127	1090	4420	5510
	33000	132	127	1100	4460	5560
	34000	134	129	1110	4590	5700
	35000	136	131	1130	4720	5850
	36000	138	133	1150	4840	5990
	37000	140	135	1160	4970	6130
	38000	142	137	1180	5100	6280
	39000	144	139	1200	5270	6470
	39600	145	140	1210	5370	6580
3000	25000	116	111	970	3550	4520
	26000	118	113	990	3680	4670
	27000	120	115	1010	3810	4820
	28000	122	117	1030	3940	4970
	29000	124	119	1040	4070	5110
	30000	126	121	1060	4200	5260
	31000	128	123	1080	4330	5410
	32000	130	125	1100	4460	5560
	32700	132	127	1110	4550	5660
	33000	132	127	1110	4590	5700
	34000	134	129	1130	4720	5850
	35000	136	131	1150	4850	6000
	36000	138	133	1160	4980	6140
	37000	140	135	1180	5140	6320
	38000	142	137	1200	5310	6510
	39000	145	140	1230	5480	6710
	39600	146	141	1240	5590	6830

FIGURE 5-284. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - LOW; FLAPS - 39°
(Sheet 3 of 8)
NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Low; Flaps - 39°, Figure 5-285.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
4000	25000	116	111	980	3650	4630
	26000	118	113	1000	3790	4790
	27000	120	115	1020	3920	4940
	28000	122	117	1040	4050	5090
	29000	124	119	1060	4190	5250
	30000	126	121	1080	4320	5400
	31000	128	123	1100	4460	5560
	32000	130	125	1110	4590	5700
	32700	132	127	1130	4680	5810
	33000	132	127	1130	4720	5850
	34000	134	129	1150	4860	6010
	35000	136	131	1170	4990	6160
	36000	138	133	1190	5160	6350
	37000	141	136	1210	5340	6550
	38000	143	138	1230	5520	6750
	39000	146	141	1250	5710	6960
	39600	147	142	1270	5820	7090
5000	25000	116	111	1000	3760	4760
	26000	118	113	1020	3890	4910
	27000	120	115	1040	4030	5070
	28000	122	117	1060	4170	5230
	29000	124	119	1080	4310	5390
	30000	126	121	1090	4450	5540
	31000	128	123	1110	4580	5690
	32000	130	125	1130	4720	5850
	32700	132	127	1140	4820	5960
	33000	132	127	1150	4860	6010
	34000	134	129	1170	5000	6170
	35000	137	132	1190	5190	6380
	36000	139	134	1210	5370	6580
	37000	142	137	1240	5560	6800
	38000	144	139	1260	5760	7020
	39000	147	142	1280	5950	7230
	39600	148	143	1290	6070	7360

FIGURE 5-284. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - LOW; FLAPS - 39°
(Sheet 4 of 8)
NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Low; Flaps - 39°, Figure 5-285.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
6000	25000	116	111	1010	3870	4880
	26000	118	113	1030	4010	5040
	27000	120	115	1050	4150	5200
	28000	122	117	1070	4290	5360
	29000	124	119	1090	4440	5530
	30000	126	121	1110	4580	5690
	31000	128	123	1130	4720	5850
	32000	130	125	1150	4860	6010
	32700	132	127	1160	4970	6130
	33000	132	127	1170	5020	6190
	34000	135	130	1190	5210	6400
	35000	138	133	1220	5400	6620
	36000	140	135	1240	5600	6840
	37000	143	138	1260	5800	7060
	38000	145	140	1290	6000	7290
	39000	148	143	1310	6210	7520
	39600	149	144	1320	6330	7650
7000	25000	116	111	1030	3990	5020
	26000	118	113	1050	4130	5180
	27000	120	115	1070	4280	5350
	28000	122	117	1090	4430	5520
	29000	124	119	1110	4570	5680
	30000	126	121	1130	4720	5850
	31000	128	123	1150	4870	6020
	32000	131	126	1170	5040	6210
	32700	133	128	1190	5170	6360
	33000	133	128	1190	5230	6420
	34000	136	131	1220	5430	6650
	35000	139	134	1240	5640	6880
	36000	141	136	1270	5840	7110
	37000	144	139	1290	6060	7350
	38000	146	141	1320	6270	7590
	39000	149	144	1340	6480	7820
	39600	150	145	1350	6610	7960

FIGURE 5-284. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - LOW; FLAPS - 39° (Sheet 5 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Low; Flaps - 39°, Figure 5-285.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
8000	25000	116	111	1050	4110	5160
	26000	118	113	1070	4260	5330
	27000	120	115	1090	4410	5500
	28000	122	117	1110	4560	5670
	29000	124	119	1130	4710	5840
	30000	126	121	1150	4870	6020
	31000	129	124	1170	5050	6220
	32000	132	127	1200	5250	6450
	32700	133	128	1210	5400	6610
	33000	134	129	1220	5460	6680
	34000	137	132	1250	5670	6920
	35000	140	135	1270	5890	7160
	36000	142	137	1300	6100	7400
	37000	145	140	1320	6320	7640
	38000	147	142	1350	6540	7890
	39000	150	145	1370	6770	8140
	39600	152	147	1390	6910	8300
9000	25000	116	111	1060	4230	5290
	26000	118	113	1080	4390	5470
	27000	120	115	1100	4550	5650
	28000	122	117	1130	4700	5830
	29000	124	119	1150	4860	6010
	30000	127	122	1170	5060	6230
	31000	130	125	1200	5260	6460
	32000	132	127	1220	5480	6700
	32700	134	129	1240	5630	6870
	33000	135	130	1250	5700	6950
	34000	138	133	1280	5920	7200
	35000	141	136	1300	6150	7450
	36000	143	138	1330	6370	7700
	37000	146	141	1350	6600	7950
	38000	149	144	1380	6840	8220
	39000	151	146	1400	7080	8480
	39600	153	148	1420	7230	8650

FIGURE 5-284. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - LOW; FLAPS - 39° (Sheet 6 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Low; Flaps - 39°, Figure 5-285.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
10,000	25000	116	111	1080	4370	5450
	26000	118	113	1100	4530	5630
	27000	120	115	1120	4690	5810
	28000	122	117	1140	4850	5990
	29000	125	120	1170	5060	6230
	30000	128	123	1200	5270	6470
	31000	131	126	1220	5490	6710
	32000	133	128	1250	5720	6970
	32700	135	130	1270	5880	7150
	33000	136	131	1280	5950	7230
	34000	139	134	1300	6180	7480
	35000	142	137	1330	6420	7750
	36000	144	139	1360	6660	8020
	37000	147	142	1380	6900	8280
	38000	150	145	1410	7160	8570
	39000	152	147	1440	7400	8840
	39600	154	149	1450	7540	8990
11,000	25000	116	111	1100	4500	5600
	26000	118	113	1120	4670	5790
	27000	120	115	1140	4840	5980
	28000	123	118	1170	5050	6220
	29000	126	121	1200	5280	6480
	30000	129	124	1220	5510	6730
	31000	132	127	1250	5740	6990
	32000	134	129	1280	5980	7260
	32700	136	131	1300	6150	7450
	33000	137	132	1310	6220	7530
	34000	140	135	1340	6460	7800
	35000	143	138	1360	6710	8070
	36000	145	140	1390	6970	8360
	37000	148	143	1420	7230	8650
	38000	151	146	1440	7470	8910
	39000	153	148	1470	7730	9200
	39600	155	150	1490	7880	9370

FIGURE 5-284. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - LOW; FLAPS - 39° (Sheet 7 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Low; Flaps - 39°, Figure 5-285.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
12,000	25000	116	111	1110	4660	5770
	26000	118	113	1140	4830	5970
	27000	121	116	1170	5060	6230
	28000	124	119	1200	5290	6490
	29000	127	122	1220	5530	6750
	30000	130	125	1250	5770	7020
	31000	133	128	1280	6020	7300
	32000	135	130	1310	6260	7570
	32700	137	132	1330	6440	7770
	33000	138	133	1340	6520	7860
	34000	141	136	1370	6770	8140
	35000	144	139	1400	7040	8440
	36000	147	142	1420	7300	8720
	37000	149	144	1450	7560	9010
	38000	152	147	1480	7820	9300
	39000	155	150	1500	8090	9590
	39600	156	151	1520	8250	9770
13,000	25000	116	111	1130	4810	5940
	26000	119	114	1160	5050	6210
	27000	122	117	1190	5280	6470
	28000	125	120	1220	5530	6750
	29000	128	123	1250	5780	7030
	30000	131	126	1280	6030	7310
	31000	133	128	1310	6290	7600
	32000	136	131	1340	6550	7890
	32700	138	133	1360	6740	8100
	33000	139	134	1370	6820	8190
	34000	142	137	1400	7100	8500
	35000	145	140	1430	7360	8790
	36000	148	143	1460	7630	9090
	37000	150	145	1490	7910	9400
	38000	153	148	1510	8190	9700
	39000	156	151	1540	8470	10010
	39600	157	152	1560	8640	10200

FIGURE 5-284. V_{APP}, V_{REF} AND LANDING DISTANCES; AUTOBRAKES - LOW; FLAPS - 39° (Sheet 8 of 8)

NOTE

See Actual Landing Distance Wind Components Correction; Autobrakes - Low; Flaps - 39°, Figure 5-285.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	AIR DISTANCE (FT)	GROUND DISTANCE (FT)	ACTUAL LANDING DISTANCE (FT)
14,000	25000	117	112	1160	5020	6180
	26000	120	115	1190	5270	6460
	27000	123	118	1220	5520	6740
	28000	126	121	1250	5780	7030
	29000	129	124	1280	6040	7320
	30000	132	127	1310	6310	7620
	31000	135	130	1340	6580	7920
	32000	138	133	1380	6860	8240
	32700	140	135	1400	7060	8460
	33000	140	135	1410	7140	8550
	34000	143	138	1430	7420	8850
	35000	146	141	1460	7700	9160
	36000	149	144	1490	7990	9480
	37000	152	147	1520	8280	9800
	38000	154	149	1550	8570	10120
	39000	157	152	1580	8860	10440
	39600	159	154	1590	9030	10620

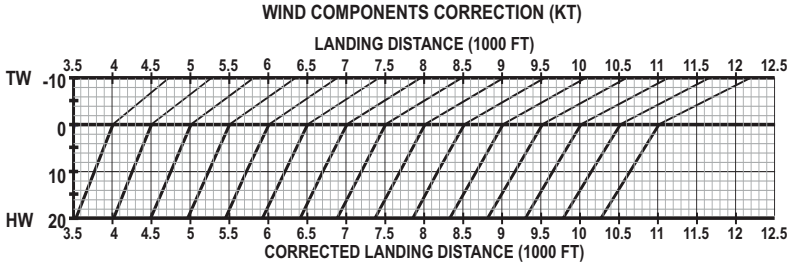


Figure 5-285. Actual Landing Distance Wind Components Correction; Autobrakes - Low; Flaps - 39°

LANDING FIELD LENGTH OPERATIONAL FACTOR CORRECTIONS

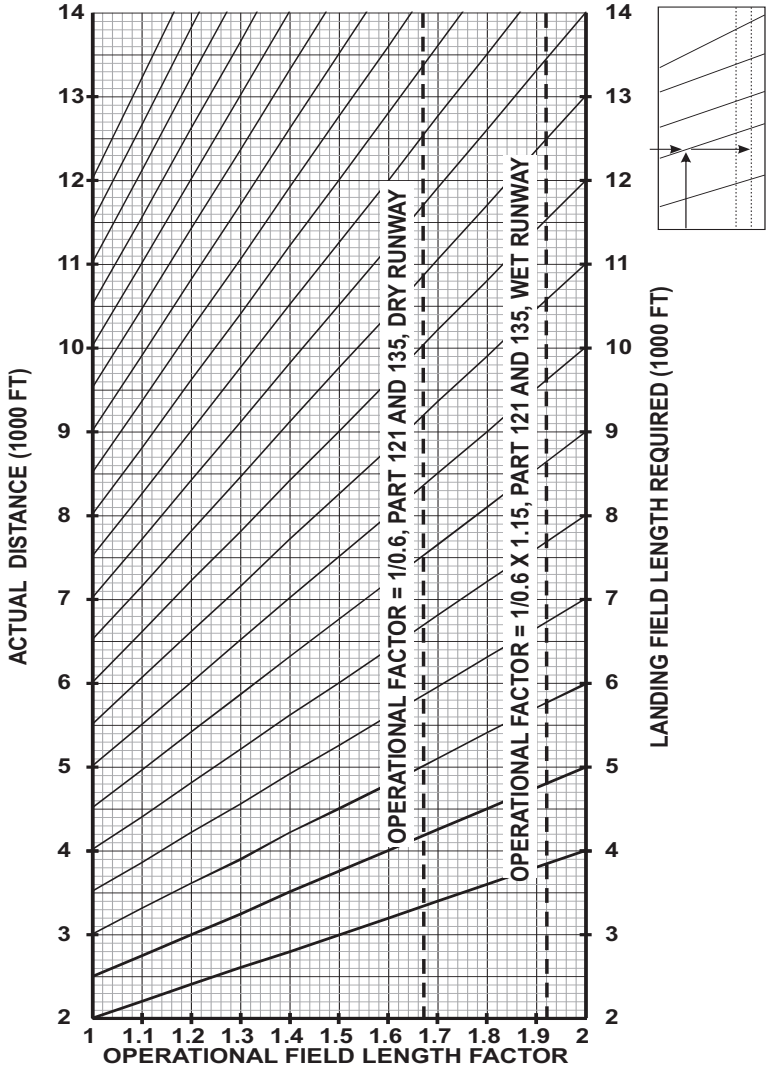


Figure 5-286. Landing Field Length Operational Factor Corrections

APPROACH AND LANDING - ABNORMAL FLAP SETTINGS

ABNORMAL LANDING WEIGHT LIMITATIONS (AS PERMITTED BY TIRE SPEED LIMITS) FLAPS - 20°;

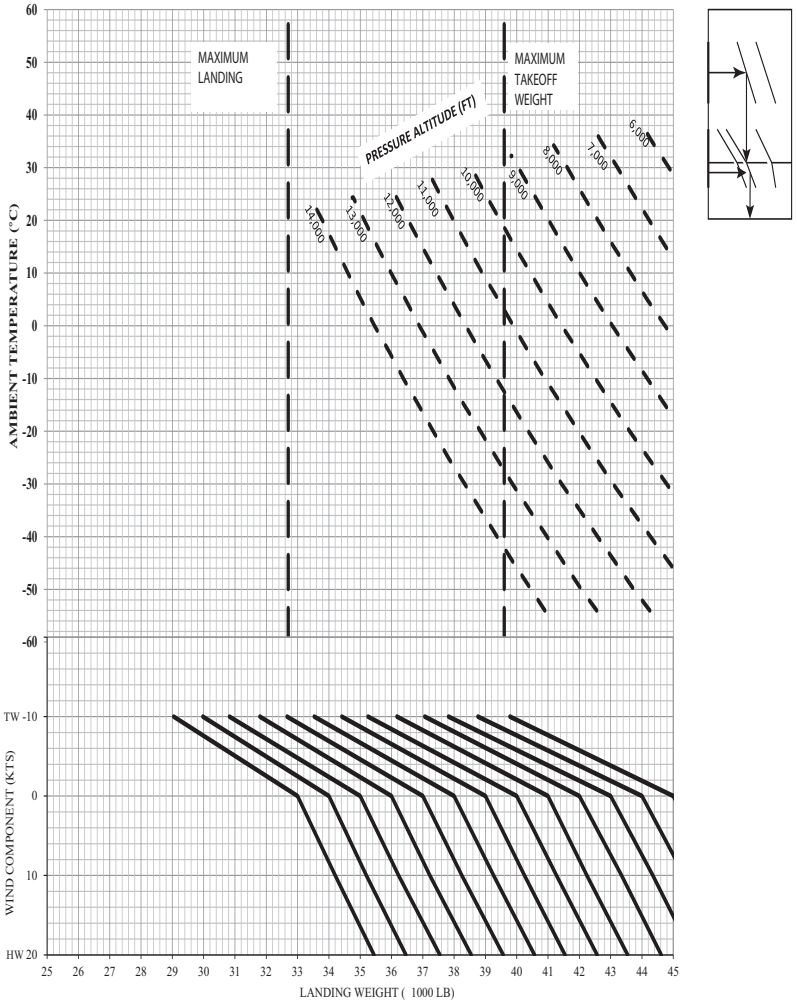


Figure 5-287. Abnormal Landing Weight Limitations (As Permitted Tire Speed Limits); Flaps - 20°

ABNORMAL LANDING WEIGHT LIMITATIONS (AS PERMITTED BY BRAKE ENERGY) FLAPS - 20°

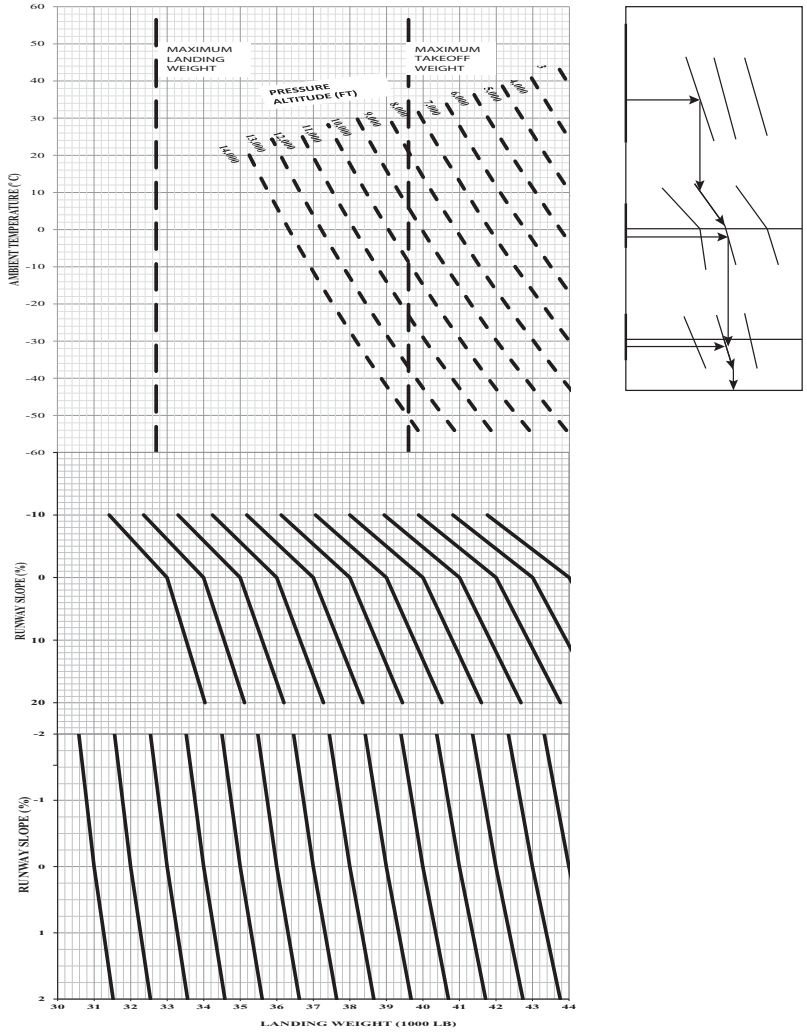


Figure 5-288. Abnormal Landing Weight Limitations (As Permitted By Brake Energy); Flaps - 20°

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20° (Sheet 1 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
SEA LEVEL	25000	120	115	2350
	26000	122	117	2420
	27000	125	120	2480
	28000	127	122	2540
	29000	129	124	2610
	30000	131	126	2670
	31000	133	128	2730
	32000	135	130	2790
	32700	137	132	2840
	33000	137	132	2860
	34000	139	134	2920
	35000	141	136	2980
	36000	143	138	3040
	37000	145	140	3100
	38000	147	142	3170
	39000	149	144	3240
	39600	151	146	3280

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
(Sheet 2 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
1000	25000	120	115	2400
	26000	122	117	2470
	27000	125	120	2530
	28000	127	122	2600
	29000	129	124	2660
	30000	131	126	2730
	31000	133	128	2790
	32000	135	130	2850
	32700	137	132	2900
	33000	137	132	2920
	34000	139	134	2980
	35000	141	136	3040
	36000	143	138	3110
	37000	145	140	3180
	38000	148	143	3250
	39000	150	145	3330
	39600	151	146	3370

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20° (Sheet 3 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
2000	25000	120	115	2450
	26000	122	117	2520
	27000	125	120	2590
	28000	127	122	2650
	29000	129	124	2720
	30000	131	126	2790
	31000	133	128	2850
	32000	135	130	2920
	32700	137	132	2960
	33000	137	132	2980
	34000	139	134	3050
	35000	141	136	3110
	36000	144	139	3190
	37000	146	141	3260
	38000	148	143	3340
	39000	151	146	3420
	39600	152	147	3470

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20° (Sheet 4 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
3000	25000	120	115	2510
	26000	122	117	2570
	27000	125	120	2640
	28000	127	122	2710
	29000	129	124	2780
	30000	131	126	2850
	31000	133	128	2910
	32000	135	130	2980
	32700	137	132	3030
	33000	137	132	3050
	34000	140	135	3120
	35000	142	137	3200
	36000	144	139	3280
	37000	147	142	3360
	38000	149	144	3440
	39000	151	146	3520
	39600	153	148	3570

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
(Sheet 5 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
4000	25000	120	115	2560
	26000	122	117	2630
	27000	125	120	2700
	28000	127	122	2770
	29000	129	124	2840
	30000	131	126	2910
	31000	133	128	2980
	32000	135	130	3050
	32700	137	132	3100
	33000	138	133	3120
	34000	140	135	3200
	35000	142	137	3290
	36000	145	140	3370
	37000	147	142	3450
	38000	150	145	3540
	39000	152	147	3620
	39600	154	149	3670

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20° (Sheet 6 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
5000	25000	120	115	2620
	26000	123	118	2690
	27000	125	120	2760
	28000	127	122	2830
	29000	129	124	2900
	30000	131	126	2980
	31000	133	128	3050
	32000	136	131	3130
	32700	137	132	3180
	33000	138	133	3210
	34000	141	136	3290
	35000	143	138	3380
	36000	146	141	3470
	37000	148	143	3550
	38000	150	145	3640
	39000	153	148	3730
	39600	154	149	3780

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
(Sheet 7 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
6000	25000	120	115	2680
	26000	123	118	2750
	27000	125	120	2820
	28000	127	122	2900
	29000	129	124	2970
	30000	131	126	3040
	31000	134	129	3130
	32000	136	131	3220
	32700	138	133	3280
	33000	139	134	3300
	34000	141	136	3390
	35000	144	139	3480
	36000	146	141	3570
	37000	149	144	3660
	38000	151	146	3750
	39000	154	149	3850
	39600	155	150	3900

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
(Sheet 8 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
7000	25000	120	115	2740
	26000	123	118	2810
	27000	125	120	2890
	28000	127	122	2970
	29000	129	124	3040
	30000	132	127	3130
	31000	134	129	3220
	32000	137	132	3310
	32700	139	134	3370
	33000	139	134	3400
	34000	142	137	3490
	35000	144	139	3580
	36000	147	142	3680
	37000	150	145	3780
	38000	152	147	3870
	39000	155	150	3970
	39600	156	151	4030

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
(Sheet 9 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
8000	25000	120	115	2800
	26000	123	118	2880
	27000	125	120	2960
	28000	127	122	3040
	29000	130	125	3130
	30000	132	127	3220
	31000	135	130	3310
	32000	137	132	3410
	32700	139	134	3470
	33000	140	135	3500
	34000	143	138	3600
	35000	145	140	3700
	36000	148	143	3800
	37000	151	146	3900
	38000	153	148	4000
	39000	156	151	4100
	39600	157	152	4160

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
(Sheet 10 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
9000	25000	120	115	2870
	26000	123	118	2950
	27000	125	120	3030
	28000	128	123	3120
	29000	130	125	3220
	30000	133	128	3320
	31000	136	131	3410
	32000	138	133	3510
	32700	140	135	3580
	33000	141	136	3610
	34000	143	138	3710
	35000	146	141	3820
	36000	149	144	3920
	37000	151	146	4030
	38000	154	149	4130
	39000	157	152	4240
	39600	158	153	4310

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
(Sheet 11 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
10,000	25000	120	115	2930
	26000	123	118	3020
	27000	125	120	3120
	28000	128	123	3220
	29000	131	126	3320
	30000	133	128	3420
	31000	136	131	3520
	32000	139	134	3620
	32700	141	136	3700
	33000	142	137	3730
	34000	144	139	3830
	35000	147	142	3940
	36000	150	145	4050
	37000	153	148	4160
	38000	155	150	4270
	39000	158	153	4390
	39600	160	155	4460

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
(Sheet 12 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
11,000	25000	120	115	3010
	26000	123	118	3110
	27000	126	121	3210
	28000	129	124	3310
	29000	131	126	3420
	30000	134	129	3520
	31000	137	132	3630
	32000	140	135	3740
	32700	142	137	3820
	33000	143	138	3850
	34000	145	140	3960
	35000	148	143	4070
	36000	151	146	4190
	37000	154	149	4310
	38000	157	152	4420
	39000	159	154	4540
	39600	161	156	4620

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
(Sheet 13 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
12,000	25000	121	116	3100
	26000	124	119	3210
	27000	127	122	3310
	28000	129	124	3420
	29000	132	127	3530
	30000	135	130	3640
	31000	138	133	3750
	32000	141	136	3870
	32700	143	138	3950
	33000	143	138	3980
	34000	146	141	4100
	35000	149	144	4220
	36000	152	147	4340
	37000	155	150	4460
	38000	158	153	4590
	39000	161	156	4720
	39600	163	158	4790

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20° (Sheet 14 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
13,000	25000	121	116	3190
	26000	124	119	3300
	27000	127	122	3420
	28000	130	125	3530
	29000	133	128	3640
	30000	136	131	3760
	31000	139	134	3880
	32000	142	137	4000
	32700	144	139	4080
	33000	144	139	4120
	34000	147	142	4250
	35000	150	145	4370
	36000	153	148	4500
	37000	156	151	4630
	38000	159	154	4760
	39000	162	157	4900
	39600	164	159	4980

FIGURE 5-289. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
(Sheet 15 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°, Figure 5-290.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
14,000	25000	122	117	3290
	26000	125	120	3410
	27000	128	123	3520
	28000	131	126	3640
	29000	134	129	3760
	30000	137	132	3890
	31000	140	135	4010
	32000	143	138	4140
	32700	145	140	4230
	33000	146	141	4270
	34000	149	144	4400
	35000	152	147	4530
	36000	155	150	4670
	37000	158	153	4810
	38000	161	156	4950
	39000	164	159	5090
	39600	166	161	5180

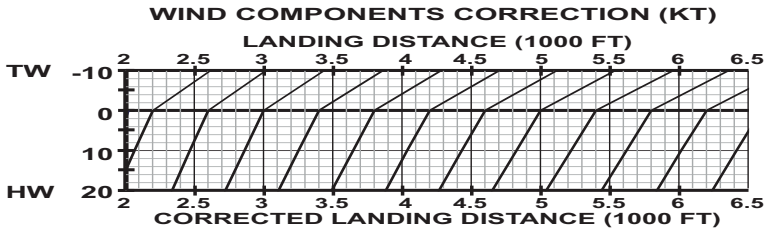


Figure 5-290. Actual Abnormal Landing Distance Wind Components Correction; Flaps - 20°

ABNORMAL LANDING WEIGHT LIMITATIONS (AS PERMITTED BY TIRE SPEED LIMITS) FLAPS - 10°;

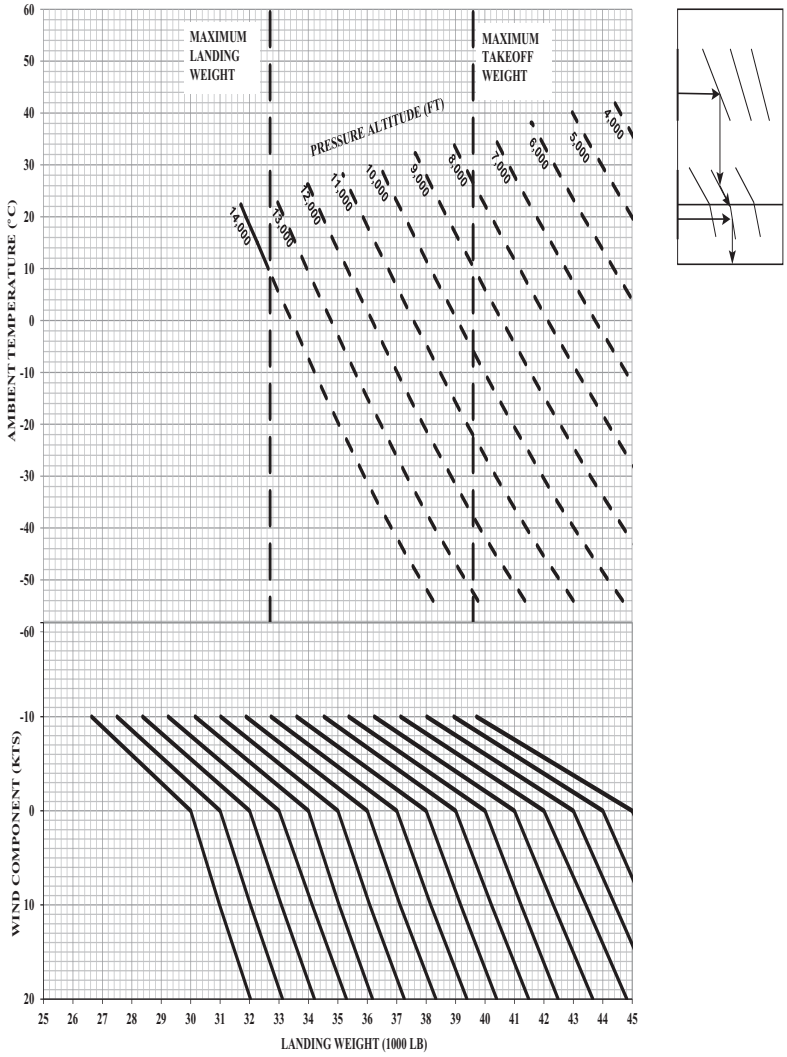


Figure 5-291. Abnormal Landing Weight Limitations (As Permitted Tire Speed Limits); Flaps - 10°

ABNORMAL LANDING WEIGHT LIMITATIONS
(AS PERMITTED BY BRAKE ENERGY)
FLAPS - 10°

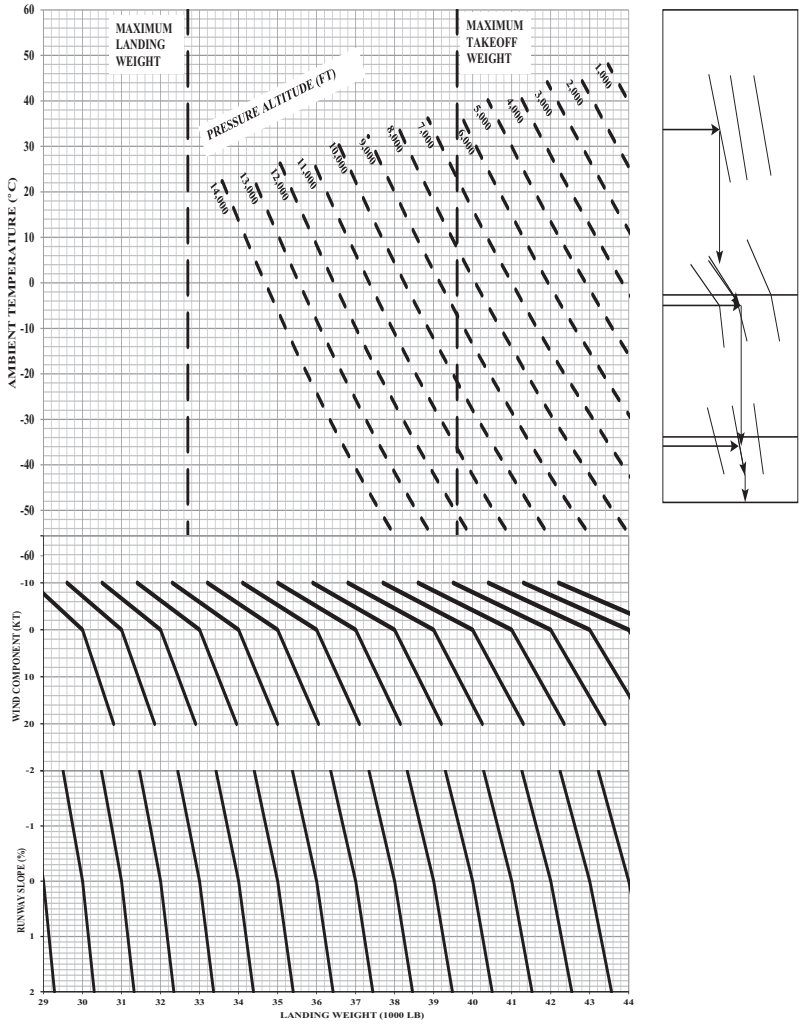


Figure 5-292. Abnormal Landing Weight Limitations (As Permitted By Brake Energy); Flaps - 10°

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 1 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
SEA LEVEL	25000	125	120	2480
	26000	128	123	2550
	27000	130	125	2610
	28000	132	127	2680
	29000	135	130	2750
	30000	137	132	2810
	31000	139	134	2880
	32000	141	136	2950
	32700	143	138	2990
	33000	143	138	3010
	34000	145	140	3080
	35000	147	142	3140
	36000	149	144	3210
	37000	152	147	3280
	38000	154	149	3340
	39000	156	151	3410
	39600	157	152	3450

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 2 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
1000	25000	125	120	2530
	26000	128	123	2600
	27000	130	125	2670
	28000	132	127	2740
	29000	135	130	2810
	30000	137	132	2880
	31000	139	134	2940
	32000	141	136	3010
	32700	143	138	3060
	33000	143	138	3080
	34000	145	140	3150
	35000	148	143	3220
	36000	150	145	3280
	37000	152	147	3350
	38000	154	149	3420
	39000	156	151	3490
	39600	157	152	3530

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 3 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
2000	25000	125	120	2580
	26000	128	123	2660
	27000	130	125	2730
	28000	132	127	2800
	29000	135	130	2870
	30000	137	132	2940
	31000	139	134	3010
	32000	141	136	3080
	32700	143	138	3130
	33000	143	138	3150
	34000	146	141	3220
	35000	148	143	3290
	36000	150	145	3360
	37000	152	147	3430
	38000	154	149	3500
	39000	156	151	3570
	39600	157	152	3610

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 4 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
3000	25000	125	120	2640
	26000	128	123	2710
	27000	130	125	2790
	28000	132	127	2860
	29000	135	130	2930
	30000	137	132	3000
	31000	139	134	3070
	32000	141	136	3150
	32700	143	138	3200
	33000	143	138	3220
	34000	146	141	3290
	35000	148	143	3370
	36000	150	145	3440
	37000	152	147	3510
	38000	154	149	3580
	39000	156	151	3670
	39600	158	153	3720

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 5 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
4000	25000	125	120	2700
	26000	128	123	2770
	27000	130	125	2850
	28000	132	127	2920
	29000	135	130	3000
	30000	137	132	3070
	31000	139	134	3150
	32000	141	136	3220
	32700	143	138	3270
	33000	144	139	3300
	34000	146	141	3370
	35000	148	143	3450
	36000	150	145	3520
	37000	152	147	3600
	38000	155	150	3690
	39000	157	152	3780
	39600	159	154	3830

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 6 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
5000	25000	125	120	2760
	26000	128	123	2840
	27000	130	125	2910
	28000	132	127	2990
	29000	135	130	3060
	30000	137	132	3140
	31000	139	134	3220
	32000	142	137	3300
	32700	143	138	3350
	33000	144	139	3370
	34000	146	141	3450
	35000	148	143	3530
	36000	150	145	3610
	37000	153	148	3710
	38000	156	151	3800
	39000	158	153	3900
	39600	160	155	3950

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 7 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
6000	25000	125	120	2820
	26000	128	123	2900
	27000	130	125	2980
	28000	132	127	3060
	29000	135	130	3140
	30000	137	132	3220
	31000	139	134	3300
	32000	142	137	3380
	32700	143	138	3430
	33000	144	139	3460
	34000	146	141	3530
	35000	149	144	3630
	36000	151	146	3720
	37000	154	149	3820
	38000	157	152	3920
	39000	159	154	4020
	39600	161	156	4080

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 8 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
7000	25000	125	120	2890
	26000	128	123	2970
	27000	130	125	3050
	28000	133	128	3130
	29000	135	130	3210
	30000	137	132	3300
	31000	140	135	3380
	32000	142	137	3460
	32700	143	138	3520
	33000	144	139	3540
	34000	147	142	3640
	35000	150	145	3740
	36000	152	147	3840
	37000	155	150	3950
	38000	158	153	4050
	39000	160	155	4150
	39600	162	157	4220

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 9 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
8000	25000	125	120	2950
	26000	128	123	3040
	27000	130	125	3120
	28000	133	128	3210
	29000	135	130	3290
	30000	137	132	3380
	31000	140	135	3460
	32000	142	137	3550
	32700	144	139	3620
	33000	145	140	3650
	34000	148	143	3760
	35000	150	145	3860
	36000	153	148	3970
	37000	156	151	4080
	38000	159	154	4190
	39000	162	157	4300
	39600	164	159	4370

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 10 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
9000	25000	125	120	3020
	26000	128	123	3110
	27000	130	125	3200
	28000	133	128	3290
	29000	135	130	3370
	30000	137	132	3460
	31000	140	135	3560
	32000	143	138	3660
	32700	145	140	3740
	33000	146	141	3770
	34000	149	144	3880
	35000	151	146	3990
	36000	154	149	4100
	37000	157	152	4220
	38000	160	155	4330
	39000	163	158	4450
	39600	165	160	4530

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 11 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
10,000	25000	126	121	3100
	26000	128	123	3190
	27000	131	126	3280
	28000	133	128	3370
	29000	135	130	3460
	30000	138	133	3560
	31000	141	136	3670
	32000	144	139	3780
	32700	146	141	3860
	33000	147	142	3890
	34000	150	145	4010
	35000	153	148	4130
	36000	156	151	4250
	37000	159	154	4370
	38000	162	157	4490
	39000	165	160	4620
	39600	167	162	4700

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 12 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
11,000	25000	126	121	3180
	26000	128	123	3270
	27000	131	126	3360
	28000	133	128	3450
	29000	136	131	3560
	30000	139	134	3680
	31000	142	137	3790
	32000	145	140	3910
	32700	147	142	3990
	33000	148	143	4030
	34000	151	146	4150
	35000	154	149	4270
	36000	157	152	4400
	37000	160	155	4530
	38000	163	158	4660
	39000	167	162	4800
	39600	169	164	4890

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10°
(Sheet 13 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
12,000	25000	126	121	3260
	26000	128	123	3360
	27000	131	126	3450
	28000	134	129	3560
	29000	137	132	3680
	30000	140	135	3800
	31000	143	138	3920
	32000	146	141	4040
	32700	148	143	4130
	33000	149	144	4170
	34000	152	147	4300
	35000	155	150	4430
	36000	158	153	4570
	37000	162	157	4710
	38000	165	160	4860
	39000	169	164	5010
	39600	171	166	5100

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 14 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
13,000	25000	126	121	3340
	26000	128	123	3440
	27000	131	126	3560
	28000	135	130	3680
	29000	138	133	3810
	30000	141	136	3930
	31000	144	139	4060
	32000	147	142	4190
	32700	149	144	4290
	33000	150	145	4330
	34000	153	148	4460
	35000	157	152	4610
	36000	160	155	4760
	37000	164	159	4910
	38000	167	162	5070
	39000	171	166	5220
	39600	173	168	5320

FIGURE 5-293. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10° (Sheet 15 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°, Figure 5-294.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
14,000	25000	126	121	3430
	26000	129	124	3550
	27000	132	127	3680
	28000	135	130	3810
	29000	139	134	3930
	30000	142	137	4070
	31000	145	140	4210
	32000	148	143	4350
	32700	151	146	4450
	33000	152	147	4490
	34000	155	150	4640
	35000	159	154	4800
	36000	162	157	4960
	37000	166	161	5120
	38000	170	165	5280
	39000	173	168	5450
	39600	175	170	5550

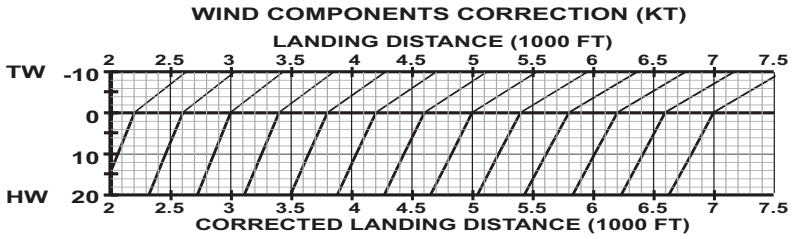


Figure 5-294. Actual Abnormal Landing Distance Wind Components Correction; Flaps - 10°

ABNORMAL LANDING WEIGHT LIMITATIONS (AS PERMITTED BY TIRE SPEED LIMITS) FLAPS - 0°;

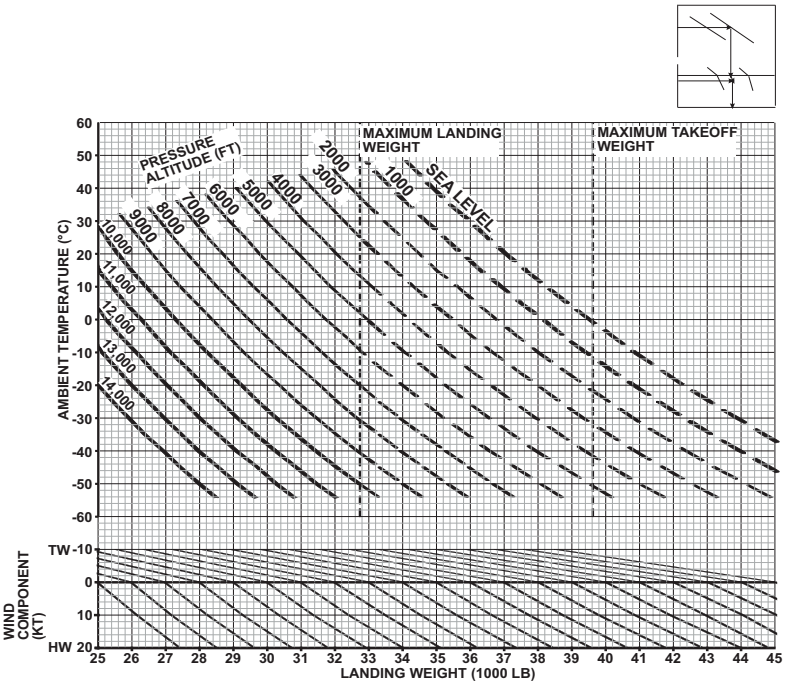


Figure 5-295. Abnormal Landing Weight Limitations (As Permitted Tire Speed Limits); Flaps - 0°

ABNORMAL LANDING WEIGHT LIMITATIONS (AS PERMITTED BY BRAKE ENERGY) FLAPS - 0°

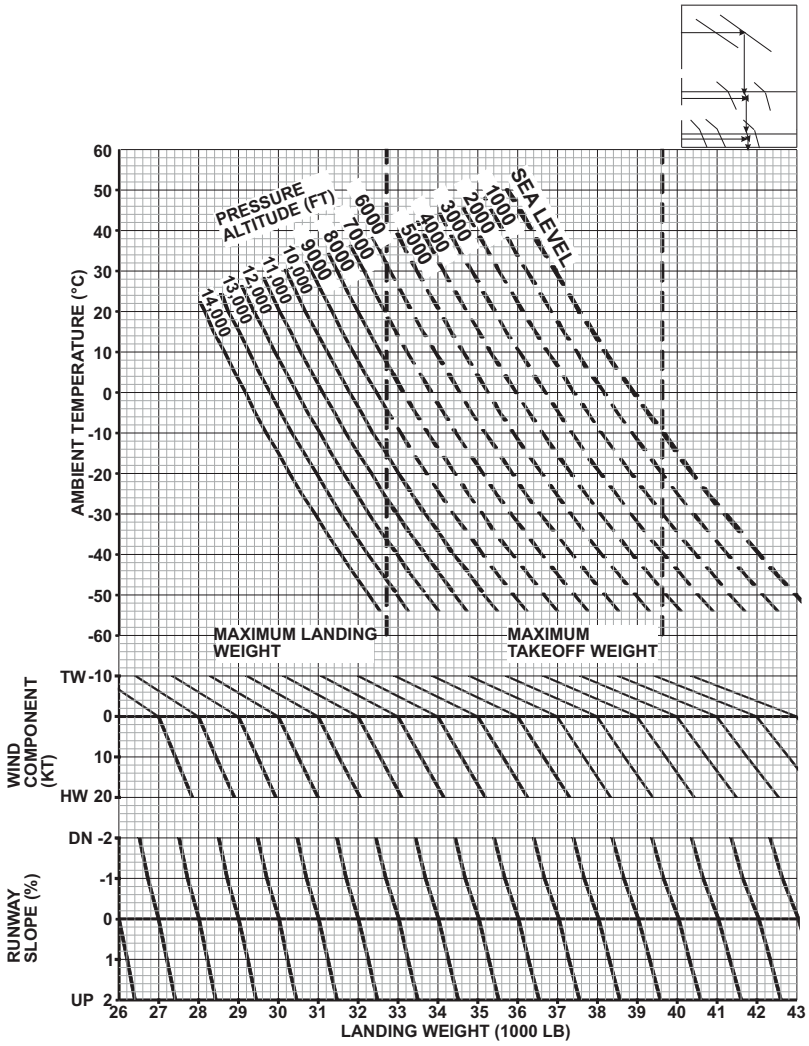


Figure 5-296. Abnormal Landing Weight Limitations (As Permitted By Brake Energy); Flaps - 0°

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0° (Sheet 1 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
SEA LEVEL	25000	156	151	3640
	26000	159	154	3750
	27000	162	157	3850
	28000	165	160	3960
	29000	168	163	4060
	30000	171	166	4170
	31000	173	168	4270
	32000	176	171	4380
	32700	178	173	4450
	33000	179	174	4480
	34000	182	177	4590
	35000	185	180	4700
	36000	187	182	4800
	37000	190	185	4910
	38000	193	188	5020
	39000	196	191	5130
	39600	197	192	5190

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
(Sheet 2 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
1000	25000	156	151	3720
	26000	159	154	3830
	27000	162	157	3940
	28000	165	160	4050
	29000	168	163	4160
	30000	171	166	4260
	31000	174	169	4370
	32000	176	171	4480
	32700	178	173	4560
	33000	179	174	4590
	34000	182	177	4700
	35000	185	180	4810
	36000	188	183	4930
	37000	190	185	5040
	38000	193	188	5150
	39000	196	191	5260
	39600	198	193	5330

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0° (Sheet 3 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
2000	25000	156	151	3810
	26000	159	154	3920
	27000	162	157	4030
	28000	165	160	4140
	29000	168	163	4250
	30000	171	166	4360
	31000	174	169	4480
	32000	177	172	4590
	32700	179	174	4670
	33000	180	175	4710
	34000	182	177	4820
	35000	185	180	4940
	36000	188	183	5050
	37000	191	186	5160
	38000	194	189	5280
	39000	196	191	5390
	39600	198	193	5460

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0° (Sheet 4 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
3000	25000	156	151	3890
	26000	159	154	4010
	27000	162	157	4130
	28000	165	160	4240
	29000	168	163	4350
	30000	171	166	4470
	31000	174	169	4590
	32000	177	172	4710
	32700	179	174	4790
	33000	180	175	4830
	34000	183	178	4940
	35000	186	181	5060
	36000	188	183	5180
	37000	191	186	5300
	38000	194	189	5420
	39000	197	192	5540
	39600	198	193	5610

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
(Sheet 5 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
4000	25000	156	151	3990
	26000	159	154	4110
	27000	162	157	4220
	28000	165	160	4340
	29000	168	163	4460
	30000	171	166	4580
	31000	174	169	4710
	32000	177	172	4830
	32700	179	174	4910
	33000	180	175	4950
	34000	183	178	5070
	35000	186	181	5190
	36000	189	184	5320
	37000	192	187	5440
	38000	194	189	5560
	39000	197	192	5680
	39600	199	194	5750

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0° (Sheet 6 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
5000	25000	156	151	4080
	26000	159	154	4200
	27000	162	157	4320
	28000	166	161	4450
	29000	169	164	4570
	30000	172	167	4700
	31000	175	170	4830
	32000	178	173	4950
	32700	180	175	5040
	33000	181	176	5080
	34000	183	178	5200
	35000	186	181	5330
	36000	189	184	5460
	37000	192	187	5580
	38000	195	190	5710
	39000	198	193	5830
	39600	199	194	5900

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
(Sheet 7 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
6000	25000	156	151	4180
	26000	160	155	4310
	27000	163	158	4430
	28000	166	161	4560
	29000	169	164	4690
	30000	172	167	4820
	31000	175	170	4950
	32000	178	173	5080
	32700	180	175	5170
	33000	181	176	5210
	34000	184	179	5340
	35000	187	182	5470
	36000	190	185	5600
	37000	192	187	5730
	38000	195	190	5860
	39000	198	193	5980
	39600	200	195	6060

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0° (Sheet 8 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
7000	25000	156	151	4290
	26000	160	155	4420
	27000	163	158	4550
	28000	166	161	4680
	29000	169	164	4820
	30000	172	167	4950
	31000	175	170	5090
	32000	178	173	5220
	32700	180	175	5310
	33000	181	176	5350
	34000	184	179	5490
	35000	187	182	5620
	36000	190	185	5750
	37000	193	188	5880
	38000	196	191	6010
	39000	198	193	6140
	39600	200	195	6220

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
(Sheet 9 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
8000	25000	157	152	4390
	26000	160	155	4530
	27000	163	158	4670
	28000	166	161	4810
	29000	170	165	4950
	30000	173	168	5080
	31000	176	171	5220
	32000	179	174	5360
	32700	181	176	5460
	33000	182	177	5500
	34000	185	180	5640
	35000	188	183	5770
	36000	190	185	5910
	37000	193	188	6040
	38000	196	191	6170
	39000	199	194	6310
	39600	200	195	6390

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0° (Sheet 10 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
9000	25000	157	152	4510
	26000	160	155	4650
	27000	164	159	4790
	28000	167	162	4940
	29000	170	165	5080
	30000	173	168	5220
	31000	176	171	5360
	32000	179	174	5510
	32700	181	176	5610
	33000	182	177	5650
	34000	185	180	5790
	35000	188	183	5930
	36000	191	186	6070
	37000	194	189	6200
	38000	196	191	6340
	39000	199	194	6480
	39600	201	196	6560

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
(Sheet 11 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
10,000	25000	157	152	4630
	26000	161	156	4780
	27000	164	159	4920
	28000	167	162	5070
	29000	170	165	5220
	30000	173	168	5370
	31000	177	172	5510
	32000	180	175	5660
	32700	181	176	5760
	33000	182	177	5800
	34000	185	180	5940
	35000	188	183	6090
	36000	191	186	6230
	37000	194	189	6370
	38000	197	192	6520
	39000	199	194	6660
	39600	201	196	6750

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0° (Sheet 12 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
11,000	25000	157	152	4760
	26000	161	156	4910
	27000	164	159	5060
	28000	167	162	5210
	29000	171	166	5360
	30000	174	169	5520
	31000	177	172	5670
	32000	180	175	5810
	32700	181	176	5920
	33000	183	178	5960
	34000	186	181	6110
	35000	189	184	6260
	36000	192	187	6400
	37000	194	189	6550
	38000	197	192	6700
	39000	200	195	6850
	39600	202	197	6940

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
(Sheet 13 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
12,000	25000	158	153	4890
	26000	161	156	5050
	27000	165	160	5200
	28000	168	163	5360
	29000	171	166	5520
	30000	174	169	5670
	31000	177	172	5820
	32000	180	175	5970
	32700	182	177	6080
	33000	183	178	6130
	34000	186	181	6280
	35000	189	184	6430
	36000	192	187	6580
	37000	195	190	6740
	38000	198	193	6890
	39000	201	196	7050
	39600	202	197	7140

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0° (Sheet 14 of 15)

NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
13,000	25000	158	153	5030
	26000	162	157	5190
	27000	165	160	5350
	28000	168	163	5510
	29000	171	166	5670
	30000	174	169	5830
	31000	178	173	5990
	32000	181	176	6140
	32700	182	177	6250
	33000	184	179	6300
	34000	187	182	6460
	35000	190	185	6620
	36000	192	187	6780
	37000	195	190	6930
	38000	198	193	7090
	39000	201	196	7250
	39600	203	198	7350

FIGURE 5-297. ABNORMAL V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
(Sheet 15 of 15)
NOTE

1. Increase dry ALD by 16% for every 1% downhill runway slope. Decrease dry ALD by 5% for every 1% uphill runway slope.
2. For landings with V_{REF} above the scheduled value, add 12% to the actual landing distance per each 10 kt overspeed.
3. If required: increase dry ALD by 3% for every 10°C above ISA. Decrease dry ALD by 2% for every 10°C below ISA.
4. See Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°, Figure 5-298.

PRESSURE ALTITUDE (FT)	GROSS WEIGHT (LB)	VAPP (KCAS)	VREF (KCAS)	ACTUAL LANDING DISTANCE (FT)
14,000	25000	158	153	5170
	26000	162	157	5340
	27000	165	160	5500
	28000	169	164	5670
	29000	172	167	5830
	30000	175	170	5990
	31000	178	173	6150
	32000	181	176	6320
	32700	182	177	6430
	33000	184	179	6480
	34000	187	182	6640
	35000	190	185	6810
	36000	193	188	6970
	37000	196	191	7140
	38000	199	194	7300
	39000	202	197	7470
	39600	203	198	7560

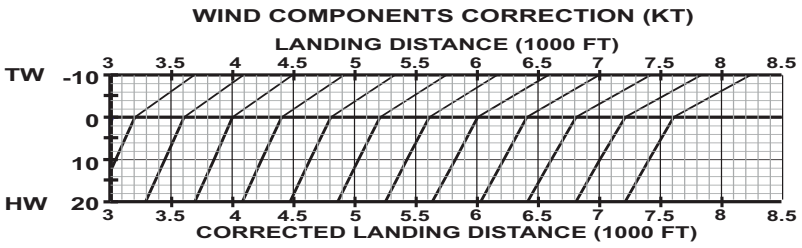


Figure 5-298. Actual Abnormal Landing Distance Wind Components Correction; Flaps - 0°

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FOREWORD

In accordance with Civil Aviation Authority procedures, detailed weight and balance data in this section are not subject to CAAI approval. Loading instructions in this section, however, have been approved by CAAI as satisfying their requirements for instructions on loading this airplane within approved limits of weight and center-of-gravity and on maintaining loading within such limits.

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INTRODUCTION

GENERAL

This is the weight and balance manual for the Gulfstream G280. aircraft. It is prepared in accordance with FAR 25.1583(c). A copy of this manual with the appropriate aircraft weight and balance data inserted will be delivered to the operator with each aircraft. Gulfstream Aerospace Corporation (GAC) will provide weight and balance data for custom furnishings and avionics for the individual aircraft to which this particular copy of the weight and balance manual applies.

When the aircraft is ready for delivery to the operator, GAC will determine the aircraft weight (by actual weighing) and record the basic weight and cg. The loading of the aircraft then becomes the operator's responsibility. It is important that the basic weight and cg be revised when any changes are made to the aircraft.

AIRCRAFT LOADING DATA

The main purpose of this manual is to ensure that the aircraft is operated within the allowable weight and center of gravity limits. This is achieved by observing the weight limitations listed in ALLOWABLE OPERATING WEIGHTS (LB), page VI-7 and using the procedure in ZERO FUEL WEIGHT CG LIMIT, page VI-11 to ensure that the zero fuel weight is within the ZFW center of gravity envelope. A complete worked example of the procedure is provided.

DEFINITIONS, page VI-4, TYPICAL WEIGHT SUMMARY, page VI-8, ZERO FUEL WEIGHT ENVELOPE, page VI-9 and ZERO FUEL WEIGHT RESTRICTED ZONE FUEL QUANTITY, page VI-10 provide additional data including typical weight summaries and definitions of terms used in this report.

FLOOR LOADING LIMITATIONS, page VI-15 points out the possibility of the aircraft tipping back under certain abnormal conditions and shows how to avoid the situation.

LANDING GEAR EXTENSION EFFECTS ON AIRCRAFT CG, page VI-16 and STATIC BALANCE TOLERANCES ON CONTROL SURFACES, page VI-17 respectively give data about the effect of landing gear position on aircraft cg and control surface mass balancing.

FUEL CG TABLE (GROUND STATIC ATTITUDE -1.7°), page VI-18 contains a fuel cg chart. % MAC VS. ARM (IN), page VI-20 illustrates a table for converting aircraft cg expressed as fuselage stations to percentages of MAC and vice versa.

AIRCRAFT WEIGHING PROCEDURES

AIRCRAFT WEIGHING PROCEDURES, page VI-22, contains PREPARATION FOR WEIGHING, LEVELING THE AIRCRAFT and MEASUREMENTS. It deals with the leveling and weighing of the aircraft. (A sample loading calculation is available). In addition to these procedures, scale manufacturer's instructions must be complied with.

EQUIPMENT LISTS

List of standard equipment and list of completion and operational items are furnished by GAC.

RECORD OF AIRCRAFT WEIGHT AND BALANCE

AIRCRAFT WEIGHING PROCEDURES, page VI-22 contains forms as follows:
Form A - WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A), page VI-25.
Form C - FORM C EMPTY WEIGHT AND CG CHANGE LOG, page VI-27.
Form D - FLIGHT LOADING COMPUTATION FORM (FORM D), page VI-28. These forms are used to compute and record weights and centers of gravity, from actual weights to ramp gross weight procedure. Form B is used by the manufacturer for delivery flights to a specific outfitting location. A complete record of this form will be entered into the aircraft's actual weight records. Forms A, C, and D will be used throughout the operational life of the aircraft.
It is recommended that all weight and balance records be preserved, clearly marking those that have been superseded.

AIRCRAFT LOADING DATA

DEFINITIONS

UNITS

All weights in this manual are expressed in pounds. All lengths in this manual are expressed in inches.

ALLOWABLE OPERATING WEIGHTS

The weight limitations of the aircraft at various flight stages. (see ALLOWABLE OPERATING WEIGHTS (LB), page VI-7 for values).

MTW

Maximum Taxi Weight (called also Maximum Ramp Weight) - Maximum weight approved for ground maneuver. It includes weight of start, taxi and run-up fuel.

MTOW

Maximum Takeoff Weight - Maximum weight approved for the start of the takeoff run.

MLW

Maximum Landing Weight - Maximum weight approved for the landing touchdown.

MZFW

Maximum Zero Fuel Weight - The maximum authorized weight of an aircraft without fuel.

MFW

Minimum Flight Weight - The Minimum authorized flight weight of an aircraft. It may be changed as a function of the relevant center of gravity.

BEW

Basic Empty Weight - Empty weight and crew.

(Continued)

BOW

Basic Operating Weight (Called also OWE - Operational Weight Empty) - The empty weight of the aircraft plus the weight of the required crew, their baggage and other standard items such as meals and potable water.

ARM

Called also Y coordinate, measured in inches, uses the location of components and the complete aircraft for longitudinal center of gravity (cg).

MAC

Mean Aerodynamic Chord - A wing reference chord. There is an option to present the longitudinal cg in non dimensional units (an alternative system to arm) of %MAC. This unit system is in use for Weight / cg envelope.

MAC = 112.92; LE MAC from datum = 405.71

The conversion formula between the 2 coordinate systems is:

$$\%MAC = \frac{\text{Arm (in)} - 405.71}{112.92} \times 100$$

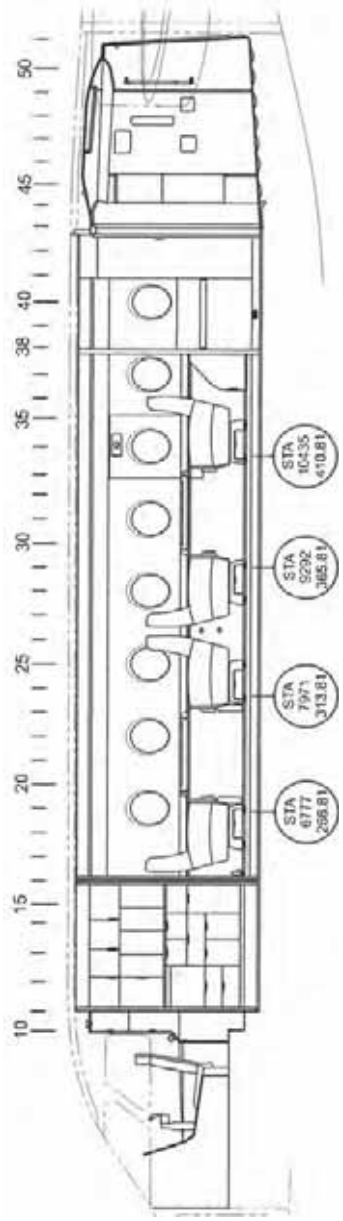
UNUSABLE FUEL

Combined of unusable undrainable fuel and unusable drainable fuel. these quantities are part of the basic weight.

Fuel	Weight (LB)
Undrainable	36
Drainable	87
Total Unusable	123

Other aircraft weight terms can be understood by referencing TYPICAL WEIGHT SUMMARY, page VI-8.

AIRCRAFT FUSELAGE STATIONS



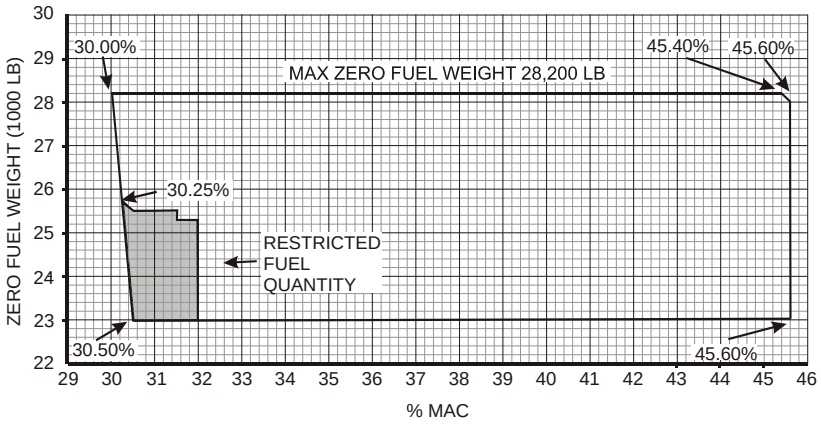
ALLOWABLE OPERATING WEIGHTS (LB)

Maximum Zero Fuel	Maximum Ramp	Maximum Takeoff	Maximum Landing
28,200	39,750	39,600	32,700

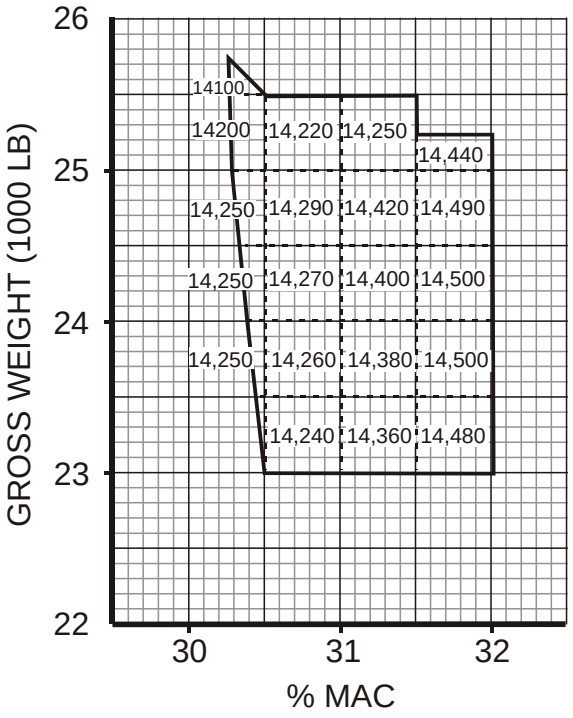
TYPICAL WEIGHT SUMMARY

Item	Weight (LB)
Outfitting - Nominal Weight Empty - Spec. 23,212	23,212
Unusable/Undrainable Fuel (see UNUSABLE FUEL, page VI-5) Engine Oil EMPTY WEIGHT	123 32 23,367
Crew (2) BASIC EMPTY WEIGHT (BEW)	380 23,747
(Operating Items - Typical) - Galley Supplies Beverage Supplies Crew Baggage Navigation Kit & Flight Manual Flight Manuals Lavatory Charges & Supplies Potable Water (10 gallons) Engine Covers OPERATING WEIGHT EMPTY (BOW/OWE)	403 24,150
Passengers (4) Baggage ZERO FUEL WEIGHT (ZFW)	800 200 25,150
Mission Fuel RAMP WEIGHT	14,600 39,750
Start and Taxi Fuel TAKEOFF WEIGHT	-150 39,600

ZERO FUEL WEIGHT ENVELOPE



ZERO FUEL WEIGHT RESTRICTED ZONE FUEL QUANTITY



Example: Between 23,500 lb - 24,000 lb and between 31% - 31.5% MAC, the maximum allowable amount of fuel is 14,380 lb.

ZERO FUEL WEIGHT CG LIMIT

This table enables the operator to ensure that the basic weight cg is within approved limits. The table is used as follows:

1. Obtain the current basic empty weight and moment from FORM C EMPTY WEIGHT AND CG CHANGE LOG, page VI-27 and enter on FLIGHT LOADING COMPUTATION FORM (FORM D), page VI-28
2. Enter on FLIGHT LOADING COMPUTATION FORM (FORM D), page VI-28 the weight and moment for each additional item that is part of the zero fuel weight
3. Add the above items to obtain the zero fuel weight and moment
4. Enter the ZERO FUEL WEIGHT CG LIMIT TABLE, page VI-12 at the ZFW obtained in Step 3
5. Ensure that the appropriate area of the chart is used, in accordance with ZERO FUEL WEIGHT ENVELOPE, page VI-9
6. Divide the moment obtained in step 3 by 10,000. If the moment/10,000 thus obtained is less than the lowest value or more than the highest value on the appropriate line, then the aircraft is not within the allowable cg limits and the loading must be changed accordingly
7. Read vertically from the value obtained in step 4 above to find the aircraft cg, both as a percentage of MAC and as a fuselage station

An alternate method is to divide the moment obtained in Step 3 by the ZFW to obtain the aircraft cg. After using the table in % MAC VS. ARM (IN), page VI-20 to find the center of gravity as a percentage of MAC, ZERO FUEL WEIGHT ENVELOPE, page VI-9 can be used to check the above procedure.

WARNING

AIRCRAFT CG WITHOUT PASSENGERS, CREW, FUEL SHALL NOT EXCEED THE AFT GROUND HANDLING LIMIT OF 462.20 INCHES (50% MAC) DURING ANY STAGE OF GROUND HANDLING OPERATIONS.

ZERO FUEL WEIGHT CG LIMIT TABLE

(Sheet 1 of 3)

MOMENT / 10,000

ZERO FUEL WEIGHT (LB)	% MAC	30.0	30.1	30.2	30.3	30.4	30.5	31.0	31.5	32.0	32.5	33.0	33.5	34.0
	ARM [IN]	439.6	439.7	439.8	439.9	440.0	440.1	440.7	441.3	441.8	442.4	443.0	443.5	444.1
	28,200	1240	1240	1240	1241	1241	1241	1243	1244	1246	1248	1249	1251	1252
	28,000		1231	1231	1232	1232	1232	1234	1236	1237	1239	1240	1242	1243
	27,800		1222	1223	1223	1223	1224	1225	1227	1228	1230	1231	1233	1235
	27,600		1214	1214	1214	1214	1215	1216	1218	1219	1221	1223	1224	1226
	27,400		1205	1205	1205	1206	1206	1208	1209	1211	1212	1214	1215	1217
	27,200		1196	1196	1197	1197	1197	1199	1200	1202	1203	1205	1206	1208
	27,000		1187	1187	1188	1188	1188	1190	1191	1193	1194	1196	1198	1199
	26,800			1179	1179	1179	1180	1181	1183	1184	1186	1187	1189	1190
	26,600			1170	1170	1170	1171	1172	1174	1175	1177	1178	1180	1181
	26,400			1161	1161	1162	1162	1163	1165	1166	1168	1169	1171	1172
	26,200			1152	1153	1153	1153	1155	1156	1158	1159	1161	1162	1164
	26,000			1143	1144	1144	1144	1146	1147	1149	1150	1152	1153	1155
	25,800				1135	1135	1136	1137	1138	1140	1141	1143	1144	1146
	25,600				1126	1126	1127	1128	1130	1131	1133	1134	1135	1137
	25,400				1117	1118	1118	1119	1121	1122	1124	1125	1127	1128
	25,200				1109	1109	1109	1111	1112	1113	1115	1116	1118	1119
	25,000				1100	1100	1100	1102	1103	1105	1106	1107	1109	1110
	24,800					1091	1092	1093	1094	1096	1097	1099	1100	1101
	24,600					1082	1083	1084	1086	1087	1088	1090	1091	1092
	24,400					1074	1074	1075	1077	1078	1079	1081	1082	1084
	24,200					1065	1065	1066	1068	1069	1071	1072	1073	1075
	24,000					1056	1056	1058	1059	1060	1062	1063	1064	1066
	23,800					1047	1048	1049	1050	1052	1053	1054	1056	1057
	23,600					1038	1039	1040	1041	1043	1044	1045	1047	1048
	23,400					1030	1030	1031	1033	1034	1035	1037	1038	1039
	23,200					1021	1021	1022	1024	1025	1026	1028	1029	1030
	23,000					1012	1012	1014	1015	1016	1018	1019	1020	1021

ZERO FUEL WEIGHT CG LIMIT TABLE

(Sheet 2 of 3)

MOMENT / 10,000

ZERO FUEL WEIGHT (LB)	% MAC	34.5	35.0	35.5	36.0	36.5	37.0	37.5	38.0	38.5	39.0	39.5	40.0	40.5
	ARM [IN]	444.7	445.2	445.8	446.3	446.9	447.5	448.0	448.6	449.2	449.7	450.3	450.9	451.4
28,200		1254	1256	1257	1259	1260	1262	1263	1265	1267	1268	1270	1271	1273
28,000		1245	1247	1248	1250	1251	1253	1255	1256	1258	1259	1261	1262	1264
27,800		1236	1238	1239	1241	1242	1244	1246	1247	1249	1250	1252	1253	1255
27,600		1227	1229	1230	1232	1233	1235	1237	1238	1240	1241	1243	1244	1246
27,400		1218	1220	1221	1223	1225	1226	1228	1229	1231	1232	1234	1235	1237
27,200		1209	1211	1213	1214	1216	1217	1219	1220	1222	1223	1225	1226	1228
27,000		1201	1202	1204	1205	1207	1208	1210	1211	1213	1214	1216	1217	1219
26,800		1192	1193	1195	1196	1198	1199	1201	1202	1204	1205	1207	1208	1210
26,600		1183	1184	1186	1187	1189	1190	1192	1193	1195	1196	1198	1199	1201
26,400		1174	1175	1177	1178	1180	1181	1183	1184	1186	1187	1189	1190	1192
26,200		1165	1166	1168	1169	1171	1172	1174	1175	1177	1178	1180	1181	1183
26,000		1156	1158	1159	1161	1162	1163	1165	1166	1168	1169	1171	1172	1174
25,800		1147	1149	1150	1152	1153	1154	1156	1157	1159	1160	1162	1163	1165
25,600		1138	1140	1141	1143	1144	1146	1147	1148	1150	1151	1153	1154	1156
25,400		1129	1131	1132	1134	1135	1137	1138	1139	1141	1142	1144	1145	1147
25,200		1121	1122	1123	1125	1126	1128	1129	1130	1132	1133	1135	1136	1138
25,000		1112	1113	1114	1116	1117	1119	1120	1122	1123	1124	1126	1127	1129
24,800		1103	1104	1106	1107	1108	1110	1111	1113	1114	1115	1117	1118	1120
24,600		1094	1095	1097	1098	1099	1101	1102	1104	1105	1106	1108	1109	1111
24,400		1085	1086	1088	1089	1090	1092	1093	1095	1096	1097	1099	1100	1101
24,200		1076	1077	1079	1080	1082	1083	1084	1086	1087	1088	1090	1091	1092
24,000		1067	1069	1070	1071	1073	1074	1075	1077	1078	1079	1081	1082	1083
23,800		1058	1060	1061	1062	1064	1065	1066	1068	1069	1070	1072	1073	1074
23,600		1049	1051	1052	1053	1055	1056	1057	1059	1060	1061	1063	1064	1065
23,400		1040	1042	1043	1044	1046	1047	1048	1050	1051	1052	1054	1055	1056
23,200		1032	1033	1034	1036	1037	1038	1039	1041	1042	1043	1045	1046	1047
23,000		1023	1024	1025	1027	1028	1029	1030	1032	1033	1034	1036	1037	1038

ZERO FUEL WEIGHT CG LIMIT TABLE

(Sheet 3 of 3)

MOMENT / 10,000

ZERO FUEL WEIGHT (LB)	% MAC	41.0	41.5	42.0	42.5	43.0	43.5	44.0	44.5	45.0	45.5	45.6
	ARM [IN]	452.0	452.6	453.1	453.7	454.3	454.8	455.4	455.9	456.5	457.1	457.2
28,200		1275	1276	1278	1279	1281	1283	1284	1286	1287	1289	
28,000		1266	1267	1269	1270	1272	1273	1275	1277	1278	1280	1280
27,800		1257	1258	1260	1261	1263	1264	1266	1268	1269	1271	1271
27,600		1248	1249	1251	1252	1254	1255	1257	1258	1260	1262	1262
27,400		1238	1240	1242	1243	1245	1246	1248	1249	1251	1252	1253
27,200		1229	1231	1232	1234	1236	1237	1239	1240	1242	1243	1244
27,000		1220	1222	1223	1225	1226	1228	1230	1231	1233	1234	1234
26,800		1211	1213	1214	1216	1217	1219	1220	1222	1223	1225	1225
26,600		1202	1204	1205	1207	1208	1210	1211	1213	1214	1216	1216
26,400		1193	1195	1196	1198	1199	1201	1202	1204	1205	1207	1207
26,200		1184	1186	1187	1189	1190	1192	1193	1195	1196	1198	1198
26,000		1175	1177	1178	1180	1181	1183	1184	1185	1187	1188	1189
25,800		1166	1168	1169	1171	1172	1173	1175	1176	1178	1179	1180
25,600		1157	1159	1160	1161	1163	1164	1166	1167	1169	1170	1170
25,400		1148	1149	1151	1152	1154	1155	1157	1158	1160	1161	1161
25,200		1139	1140	1142	1143	1145	1146	1148	1149	1150	1152	1152
25,000		1130	1131	1133	1134	1136	1137	1138	1140	1141	1143	1143
24,800		1121	1122	1124	1125	1127	1128	1129	1131	1132	1134	1134
24,600		1112	1113	1115	1116	1117	1119	1120	1122	1123	1124	1125
24,400		1103	1104	1106	1107	1108	1110	1111	1113	1114	1115	1116
24,200		1094	1095	1097	1098	1099	1101	1102	1103	1105	1106	1106
24,000		1085	1086	1087	1089	1090	1092	1093	1094	1096	1097	1097
23,800		1076	1077	1078	1080	1081	1082	1084	1085	1086	1088	1088
23,600		1067	1068	1069	1071	1072	1073	1075	1076	1077	1079	1079
23,400		1058	1059	1060	1062	1063	1064	1066	1067	1068	1070	1070
23,200		1049	1050	1051	1053	1054	1055	1056	1058	1059	1060	1061
23,000		1040	1041	1042	1043	1045	1046	1047	1049	1050	1051	1052

FLOOR LOADING LIMITATIONS

Baggage compartment loading, aft of station 508.00: maximum dead weight floor loading is 120 lb per square foot. Maximum compartment loading is 1980 lb. (The difference between 1980 lb and 120 lb per square foot usable floor area must be carried on suitable shelves).

MAIN CABIN FLOOR

Station 178 to station 504, dead weight and cargo loading: Maximum uniform loading is 100 pounds per square foot.

<<END>>

LANDING GEAR EXTENSION EFFECTS ON AIRCRAFT CG

STRUT COMPRESSIONS

Because landing gear shock strut compressions alter the location of the landing gears relative to the aircraft and thus alter the aircraft cg, allowance must be made when weighing the aircraft on wheels. No allowance is necessary when weighing on jacks because all shock struts are fully extended, simulating the in-flight landing gear extended configuration. Reference will be made to three landing gear configurations:

1. In-flight, landing gear extended - (shock struts fully extended).
2. In-flight, landing gear retracted.
3. On ground, landing gear extended - (main struts fully compressed, nose strut fully extended).

IN-FLIGHT, LANDING GEAR EXTENDED OR RETRACTED

The in-flight horizontal movement difference between landing gear retracted and extended is 3433 inch-pounds, which represents an aircraft cg movement aft of 0.1% to 0.15% MAC. depending on weight. Even though this e.g. movement is small, it is necessary to verify that the aircraft cg will remain in the zero fuel weight envelope for both conditions. (See ZERO FUEL WEIGHT ENVELOPE, page VI-9). After computing the aircraft weight and moment (landing gear extended), add 3433 inch pounds from the moment to determine the “inflight landing gear retracted aircraft cg”

ON GROUND, LANDING GEAR EXTENDED

If the aircraft is to be weighed on wheels it must be leveled and this is accomplished by bleeding the main shock struts until fully compressed and inflating the nose strut until the aircraft is level. (See LEVELING THE AIRCRAFT, page VI-23). After computing the aircraft weight and moment it is necessary to subtract 2390 in.-lb from the moment to determine the “in-flight landing gear extended, aircraft cg”. It is emphasized that this correction is not necessary if the aircraft is weighed on jacks.

STATIC BALANCE TOLERANCES ON CONTROL SURFACES

The ailerons surfaces are mass-balanced. The aircraft, as delivered from the production floor, has these surfaces balanced to allow for the weight of paint added by the outfitting facility. The following table displays the acceptable balance ranges. For further details concerning repairs and rebalancing, refer to the Maintenance Manual and balancing procedure.

<table>
<tr><th rowspan="2">Surface</th><th colspan="3">BALANCE MOMENT (IN.-LB)</th></tr>
<tr><th>Unpainted, Unprimed</th><th>Unpainted, Primed</th><th>Final paint</th></tr>
<tr><td>Aileron (nose heavy)</td><td rowspan="2">Not applicable</td><td>One layer of top coat minimum 4.2</td><td rowspan="2">Minimum 2.5</td></tr>
<tr><td>Two layers of top coat minimum 6.0</td></tr>
</table>

FUEL CG TABLE (GROUND STATIC ATTITUDE -1.7°)

(Sheet 1 of 2)

Fuel Weight (lb)	CG Arm (in.)	Moment (lb•in./ 10,000)	Fuel Weight (lb)	CG Arm (in.)	Moment (lb•in./ 10,000)	Fuel Weight (lb)	CG Arm (in.)	Moment (lb•in./ 10,000)
100	436.0	4.4	2800	423.4	118.6	5500	423.8	233.1
200	437.2	8.7	2900	423.2	122.7	5600	423.9	237.4
300	437.8	13.1	3000	423.1	126.9	5700	424.0	241.7
400	438.1	17.5	3100	422.9	131.1	5800	424.1	246.0
500	438.3	21.9	3200	422.8	135.3	5900	424.2	250.3
600	438.4	26.3	3300	422.8	139.5	6000	424.3	254.6
700	438.5	30.7	3400	422.7	143.7	6100	424.4	258.9
800	438.6	35.1	3500	422.6	147.9	6200	424.5	263.2
900	438.6	39.5	3600	422.6	152.1	6300	424.7	267.5
1000	438.7	43.9	3700	422.6	156.4	6400	424.8	271.9
1100	437.8	48.2	3800	422.6	160.6	6500	424.9	276.2
1200	435.6	52.3	3900	422.6	164.8	6600	425.0	280.5
1300	433.8	56.4	4000	422.6	169.1	6700	425.2	284.9
1400	432.2	60.5	4100	422.7	173.3	6800	425.3	289.2
1500	430.9	64.6	4200	422.7	177.5	6900	425.5	293.6
1600	429.7	68.8	4300	422.8	181.8	7000	425.7	298.0
1700	428.7	72.9	4400	422.8	186.0	7100	425.9	302.4
1800	427.8	77.0	4500	422.9	190.3	7200	426.1	306.8
1900	427.1	81.1	4600	422.9	194.6	7300	426.4	311.3
2000	426.4	85.3	4700	423.0	198.8	7400	426.7	315.8
2100	425.8	89.4	4800	423.1	203.1	7500	427.1	320.3
2200	425.3	93.6	4900	423.2	207.4	7600	427.5	324.9
2300	424.9	97.7	5000	423.3	211.6	7700	428.0	329.6
2400	424.5	101.9	5100	423.4	215.9	7800	428.5	334.2
2500	424.1	106.0	5200	423.5	220.2	7900	428.9	338.9
2600	423.9	110.2	5300	423.6	224.5	8000	429.4	343.6
2700	423.6	114.4	5400	423.7	228.8	8100	429.9	348.3
8200	430.5	353.0	10,900	436.0	475.2	13,600	436.8	594.1

FUEL CG TABLE (GROUND STATIC ATTITUDE -1.7°)

(Sheet 2 of 2)

Fuel Weight (lb)	CG Arm (in.)	Moment (lb•in./ 10,000)	Fuel Weight (lb)	CG Arm (in.)	Moment (lb•in./ 10,000)	Fuel Weight (lb)	CG Arm (in.)	Moment (lb•in./ 10,000)
8300	431.0	357.7	11,000	435.6	479.2	13,700	436.0	597.3
8400	431.6	362.5	11,100	435.2	483.1	13,800	435.1	600.4
8500	432.1	367.3	11,200	434.9	487.1	13,900	434.2	603.6
8600	432.7	372.1	11,300	434.5	491.0	14,000	433.4	606.8
8700	433.3	377.0	11,400	434.2	495.0	14,100	432.6	610.0
8800	433.9	381.8	11,500	433.8	498.9	14,200	431.8	613.2
8900	434.6	386.8	11,600	433.5	502.9	14,300	431.1	616.5
9000	435.2	391.7	11,700	433.2	506.8	14,400	430.4	619.7
9100	435.9	396.6	11,800	432.9	510.8	14,500	429.7	623.1
9200	436.6	401.6	11,900	432.8	515.1	14,600	429.1	626.4
9300	437.3	406.7	12,000	433.6	520.3			
9400	438.0	411.8	12,100	434.4	525.7			
9500	438.8	416.9	12,200	435.3	531.0			
9600	439.6	422.0	12,300	436.1	536.4			
9700	440.4	427.2	12,400	437.0	541.8			
9800	440.5	431.7	12,500	437.8	547.2			
9900	440.1	435.7	12,600	438.6	552.7			
10,000	439.6	439.6	12,700	439.5	558.1			
10,100	439.2	443.6	12,800	440.3	563.6			
10,200	438.8	447.6	12,900	441.1	569.1			
10,300	438.4	451.5	13,000	442.0	574.6			
10,400	437.9	455.5	13,100	441.4	578.2			
10,500	437.5	459.4	13,200	440.5	581.4			
10,600	437.1	463.4	13,300	439.6	584.6			
10,700	436.7	467.3	13,400	438.6	587.8			
10,800	436.3	471.3	13,500	437.7	590.9			

% MAC VS. ARM (IN)

(Sheet 1 of 2)

	ARM - INCREMENTS OF 0.1 IN									
ARM (in)	**0.0 in**	**0.1 in**	**0.2 in**	**0.3 in**	**0.4 in**	**0.5 in**	**0.6 in**	**0.7 in**	**0.8 in**	**0.9 in**
433	24.2	24.3	24.3	24.4	24.5	24.6	24.7	24.8	24.9	25.0
434	25.1	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9
435	25.9	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.6	26.7
436	26.8	26.9	27.0	27.1	27.2	27.3	27.4	27.4	27.5	27.6
437	27.7	27.8	27.9	28.0	28.1	28.2	28.2	28.3	28.4	28.5
438	28.6	28.7	28.8	28.9	29.0	29.0	29.1	29.2	29.3	29.4
439	29.5	29.6	29.7	29.7	29.8	29.9	30.0	30.1	30.2	30.3
440	30.4	30.5	30.5	30.6	30.7	30.8	30.9	31.0	31.1	31.2
441	31.3	31.3	31.4	31.5	31.6	31.7	31.8	31.9	32.0	32.1
442	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.8	32.9
443	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.6	33.7	33.8
444	33.9	34.0	34.1	34.2	34.3	34.4	34.4	34.5	34.6	34.7
445	34.8	34.9	35.0	35.1	35.2	35.2	35.3	35.4	35.5	35.6
446	35.7	35.8	35.9	35.9	36.0	36.1	36.2	36.3	36.4	36.5
447	36.6	36.7	36.7	36.8	36.9	37.0	37.1	37.2	37.3	37.4
448	37.5	37.5	37.6	37.7	37.8	37.9	38.0	38.1	38.2	38.3
449	38.3	38.4	38.5	38.6	38.7	38.8	38.9	39.0	39.0	39.1
450	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.8	39.9	40.0
451	40.1	40.2	40.3	40.4	40.5	40.6	40.6	40.7	40.8	40.9
452	41.0	41.1	41.2	41.3	41.4	41.4	41.5	41.6	41.7	41.8
453	41.9	42.0	42.1	42.1	42.2	42.3	42.4	42.5	42.6	42.7

% MAC VS. ARM (IN)

(Sheet 2 of 2)

	ARM - INCREMENTS OF 0.1 IN									
ARM (in)	**0.0 in**	**0.1 in**	**0.2 in**	**0.3 in**	**0.4 in**	**0.5 in**	**0.6 in**	**0.7 in**	**0.8 in**	**0.9 in**
454	42.8	42.9	42.9	43.0	43.1	43.2	43.3	43.4	43.5	43.6
455	43.7	43.7	43.8	43.9	44.0	44.1	44.2	44.3	44.4	44.5
456	44.5	44.6	44.7	44.8	44.9	45.0	45.1	45.2	45.2	45.3
457	45.4	45.5	45.6	45.7	45.8	45.9	46.0	46.0	46.1	46.2
458	46.3	46.4	46.5	46.6	46.7	46.8	46.8	46.9	47.0	47.1
459	47.2	47.3	47.4	47.5	47.6	47.6	47.7	47.8	47.9	48.0
460	48.1	48.2	48.3	48.3	48.4	48.5	48.6	48.7	48.8	48.9
461	49.0	49.1	49.1	49.2	49.3	49.4	49.5	49.6	49.7	49.8
462	49.9	49.9	50.0	50.1	50.2	50.3	50.4	50.5	50.6	50.7
463	50.7	50.8	50.9	51.0	51.1	51.2	51.3	51.4	51.4	51.5
464	51.6	51.7	51.8	51.9	52.0	52.1	52.2	52.2	52.3	52.4
465	52.5	52.6	52.7	52.8	52.9	53.0	53.0	53.1	53.2	53.3
466	53.4	53.5	53.6	53.7	53.8	53.8	53.9	54.0	54.1	54.2
467	54.3	54.4	54.5	54.5	54.6	54.7	54.8	54.9	55.0	55.1
468	55.2	55.3	55.3	55.4	55.5	55.6	55.7	55.8	55.9	56.0
469	56.1	56.1	56.2	56.3	56.4	56.5	56.6	56.7	56.8	56.9
470	56.9	57.0	57.1	57.2	57.3	57.4	57.5	57.6	57.6	57.7
471	57.8	57.9	58.0	58.1	58.2	58.3	58.4	58.4	58.5	58.6
472	58.7	58.8	58.9	59.0	59.1	59.2	59.2	59.3	59.4	59.5
473	59.6	59.7	59.8	59.9	60.0	60.0	60.1	60.2	60.3	60.4

AIRCRAFT WEIGHING PROCEDURES

LEVELING AND WEIGHING

PREPARATION FOR WEIGHING

The aircraft can be weighed either on wheels or jacks, (i.e., with the aircraft wheels on floor with platform scales or with jacks and load cells):

The aircraft must be level longitudinally and laterally.

Scales of the following capacities are required:

Wing jacks - 15,000 lb each; forward jack - 3970 lb.

Preparations for weighing is established with:

- Landing gear extended
- Wing flaps retracted
- Main entrance, baggage and lower maintenance doors closed
- Full hydraulic fluid
- Full engine oil
- Full APU oil
- Spoilers retracted
- Fuel tanks drained (the following fluids and/or items should be drained or removed, see step page VI-23)
- Thrust reversers stowed

1. Conduct a complete inventory check according to Master Equipment List (MEL), determine that all required equipment for the EMPTY WEIGHT + UNDRAINABLE FUEL condition is either installed or properly accounted for; any deviations must be recorded as shortages or overages, so that the empty weight may be computed from the actual weight

(Continued)

2. Fluids and/or items that should be drained or removed:
   a. Fuel - Aircraft must be defueled and then drained with the aircraft in ground static attitude (FRL - 1.7° nose down), using the four (4) drain valves on the inboard lower surface of the wing, two (2) drain valves on lower outboard surface of the wing, one (1) drain valve on the forward fuel tank and one (1) drain valve on the aft fuel tank
   b. Lavatory - Fluids and supplies must be removed and/or drained (items not on the equipment list)
   c. Galley and beverage supplies (liquids, foods, etc.) must be removed or drained (items not on the equipment list)
   d. Tools, work equipment, protective material, etc., should all be removed from the aircraft
   e. Exterior should be dry and clean

LEVELING THE AIRCRAFT

Longitudinal leveling is accomplished by placing a clinometer on the seat tracks in middle of cabin across from the emergency exit at sta. 414.7 in (FR 34) in fore and aft direction.
Lateral leveling is accomplished by placing a clinometer on the cockpit floor, sta. 177.8 in (FR 10) in left to right direction.

The aircraft on wheels can be leveled by fully deflating the main landing gear struts and then inflating the nose landing gear strut until the Fuselage Reference Line (FRL) = 0°.

Before weighing on jacks the aircraft must be approximately leveled first, by adjusting the landing gear struts, and the wheel brakes must be off. All jacks should then be raised at the same rate until the final leveling adjustments are made. This prevents any unsafe side loads on components which may cause scale errors.

MEASUREMENTS

When the aircraft is leveled and in the EMPTY WEIGHT + UNDRAINABLE FUEL condition, the dimensions and weights required for WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A), page VI-25 can be recorded.

With the aircraft on wheels, dimensions C and D must be measured. These distances must be measured because they vary with strut extension. Typical dimensions are C=167.01 inches; D=473.31 inches.

With the aircraft on jacks, no linear measurements are necessary. The arms are given on the WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A), page VI-25. To obtain the basic empty weight, add 87 lb. at arm 444.65 which represents the unusable less undrainable fuel (see UNUSABLE FUEL, page VI-5).

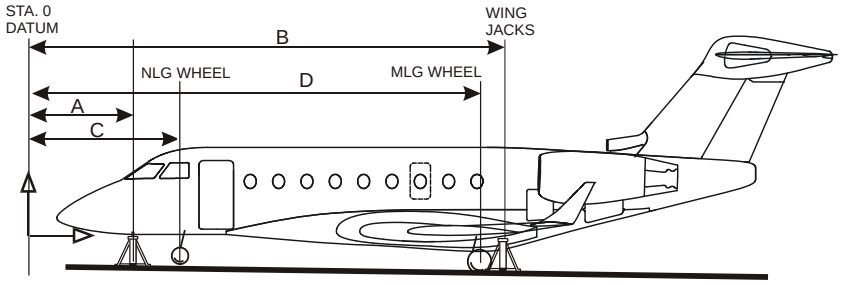
SAMPLE LOADING CALCULATION

An example of a complete weighing and loading process is as follows:

1. The WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A), page VI-25, shows the actual weighing results, corrected as necessary for items such as jacks pads and equipment shortages and overages.
2. The FORM C EMPTY WEIGHT AND CG CHANGE LOG, page VI-27 shows subsequent changes affecting the weight and/or balance of the aircraft that must be recorded on this form.
3. The FLIGHT LOADING COMPUTATION FORM (FORM D), page VI-28 shows the derivation of zero fuel weight and ramp weight from the basic weight and balance (WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A), page VI-25).
4. The resulting zero fuel weight and moment should now be checked using the procedures in ZERO FUEL WEIGHT CG LIMIT TABLE, page VI-12, to ensure that the aircraft is loaded within limits.

WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A)

GULFSTREAM G280 S/N _____



NOSE JACK REACTION - A = 105.94 IN.
NOSE WHEEL REACTION (TYPICAL) - C = 167.01 IN.
MAIN JACK REACTION - B = 478.90 IN.
MAIN WHEEL REACTION (TYPICAL) - D = 473.31 IN.

$$\%MAC = \frac{\text{Arm (in)} - 405.71}{112.92} \times 100$$

(Continued)

(AIRPLANE ON WHEELS / JACKS)*					
REACTION	SCALE READING	TARE (+/-)	NET *	ARM**	MOMENT
	LB	LB	LB	IN	LB*IN
MAIN LEFT					
MAIN RIGHT					
NOSE					
TOTAL					

EMPTY WEIGHT & CG DETERMINATION				
ITEM	WEIGHT	ARM	MOMENT	% MAC
TOTAL NET (FROM ABOVE)				
SHORTAGES (+)				
OVERAGES (-)				
UNUSABLE DRAINABLE FUEL	87.0	444.65		
EMPTY WEIGHT				

WEIGHED BY _____WITNESSED BY:_____DATE:_____

PREPARED BY:_____

* FOR TARE POSITIVE SUBTRACT HALF THE TARE. IF TARE IS NEGATIVE, ADD HALF THE TARE

** IF WEIGHED ON WHEELS, THE ARM MUST BE MEASURED BECAUSE IT CAN VARY WITH STRUT EXTENSION

See MEASUREMENTS, page VI-24

FORM C EMPTY WEIGHT AND CG CHANGE LOG

GULFSTREAM G280 S/N _____

ITEMS (LIST ALL ITEMS SUBSEQUENT TO WEIGHING)	WEIGHT (LB)	CG ARM (IN)	MOMENT (LB*IN)
Empty Weight (from Form A)			
Add: Flight Crew (2)	380	161.3	61294
Basic Empty Weight			

FLIGHT LOADING COMPUTATION FORM (FORM D)

GULFSTREAM G280 S/N _____

Trip No.	Takeoff Field Length			
Date	Temp. _____ ºC Allowable T.O.W.			
To	Estimated Landing Weight			
From	Landing Field Length Required			
ITEMS	**WEIGHT (LB)**	**ARM (IN)**	**MOMENT (LB*IN)**	**MAC (%)**
BASIC EMPTY WEIGHT (FROM FORM C)				
Add Operating Items:				
BASIC OPERATING WEIGHT				
Add Payload: Passenger(s)				
Add Passenger Baggage				
ZERO FUEL WEIGHT (28,200 LB MAX)				
Add Fuel (Usable):				
RAMP WEIGHT (39,750 LB MAX)				

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INTRODUCTION

GENERAL

This is the weight and balance manual for the Gulfstream G280. aircraft. It is prepared in accordance with FAR 25.1583(c). A copy of this manual with the appropriate aircraft weight and balance data inserted will be delivered to the operator with each aircraft. Gulfstream Aerospace Corporation (GAC) will provide weight and balance data for custom furnishings and avionics for the individual aircraft to which this particular copy of the weight and balance manual applies.

When the aircraft is ready for delivery to the operator, GAC will determine the aircraft weight (by actual weighing) and record the basic weight and cg. The loading of the aircraft then becomes the operator's responsibility. It is important that the basic weight and cg be revised when any changes are made to the aircraft.

AIRCRAFT LOADING DATA

The main purpose of this manual is to ensure that the aircraft is operated within the allowable weight and center of gravity limits. This is achieved by observing the weight limitations listed in ALLOWABLE OPERATING WEIGHTS (KG), page VI-M-7 and using the procedure in ZERO FUEL WEIGHT CG LIMIT, page VI-M-11 to ensure that the zero fuel weight is within the ZFW center of gravity envelope. A complete worked example of the procedure is provided.

DEFINITIONS, page VI-M-4, TYPICAL WEIGHT SUMMARY, page VI-M-8, ZERO FUEL WEIGHT ENVELOPE, page VI-M-9 and ZERO FUEL WEIGHT RESTRICTED ZONE FUEL QUANTITY, page VI-M-10 provide additional data including typical weight summaries and definitions of terms used in this report.

FLOOR LOADING LIMITATIONS, page VI-M-15 points out the possibility of the aircraft tipping back under certain abnormal conditions and shows how to avoid the situation.

LANDING GEAR EXTENSION EFFECTS ON AIRCRAFT CG, page VI-M-16 and STATIC BALANCE TOLERANCES ON CONTROL SURFACES, page VI-M-17 respectively give data about the effect of landing gear position on aircraft cg and control surface mass balancing.

FUEL CG TABLE (GROUND STATIC ATTITUDE -1.7°), page VI-M-18 contains a fuel cg chart. % MAC VS. ARM (M), page VI-M-19 illustrates a table for converting aircraft cg expressed as fuselage stations to percentages of MAC and vice versa.

AIRCRAFT WEIGHING PROCEDURES

AIRCRAFT WEIGHING PROCEDURES, page VI-M-22, contains PREPARATION FOR WEIGHING, LEVELING THE AIRCRAFT and MEASUREMENTS. It deals with the leveling and weighing of the aircraft. (A sample loading calculation is available). In addition to these procedures, scale manufacturer's instructions must be complied with.

EQUIPMENT LISTS

List of standard equipment and list of completion and operational items are furnished by GAC.

RECORD OF AIRCRAFT WEIGHT AND BALANCE

AIRCRAFT WEIGHING PROCEDURES, page VI-M-22 contains forms as follows:
Form A - WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A), page VI-M-25.
Form C - FORM C EMPTY WEIGHT AND CG CHANGE LOG, page VI-M-27.
Form D - FLIGHT LOADING COMPUTATION FORM (FORM D), page VI-M-28. These forms are used to compute and record weights and centers of gravity, from actual weights to ramp gross weight procedure. Form B is used by the manufacturer for delivery flights to a specific outfitting location. A complete record of this form will be entered into the aircraft's actual weight records. Forms A, C, and D will be used throughout the operational life of the aircraft.
It is recommended that all weight and balance records be preserved, clearly marking those that have been superseded.

AIRCRAFT LOADING DATA

DEFINITIONS

UNITS

All weights in this manual are expressed in kilograms. All lengths in this manual are expressed in meters.

ALLOWABLE OPERATING WEIGHTS

The weight limitations of the aircraft at various flight stages. (see ALLOWABLE OPERATING WEIGHTS (KG), page VI-M-7 for values).

MTW

Maximum Taxi Weight (called also Maximum Ramp Weight) - Maximum weight approved for ground maneuver. It includes weight of start, taxi and run-up fuel.

MTOW

Maximum Takeoff Weight - Maximum weight approved for the start of the takeoff run.

MLW

Maximum Landing Weight - Maximum weight approved for the landing touchdown.

MZFW

Maximum Zero Fuel Weight - The maximum authorized weight of an aircraft without fuel.

MFW

Minimum Flight Weight - The Minimum authorized flight weight of an aircraft. It may be changed as a function of the relevant center of gravity.

BEW

Basic Empty Weight - Empty weight and crew.

(Continued)

BOW

Basic Operating Weight (Called also OWE - Operational Weight Empty) - The empty weight of the aircraft plus the weight of the required crew, their baggage and other standard items such as meals and potable water.

ARM

Called also Y coordinate, measured in inches, uses the location of components and the complete aircraft for longitudinal center of gravity (cg).

MAC

Mean Aerodynamic Chord - A wing reference chord. There is an option to present the longitudinal cg in non dimensional units (an alternative system to arm) of %MAC. This unit system is in use for Weight / cg envelope.

MAC = 2.868; LE MAC from datum = 10.305

The conversion formula between the 2 coordinate systems is:

$$\%MAC = \frac{\text{Arm (m)} - 10.305}{2.868} \times 100$$

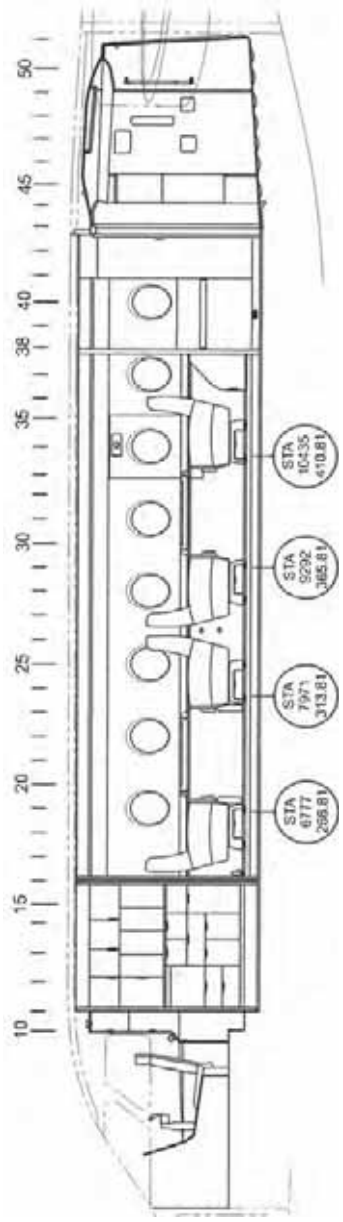
UNUSABLE FUEL

Combined of unusable undrainable fuel and unusable drainable fuel. these quantities are part of the basic weight.

Fuel	Weight (KG)
Undrainable	16
Drainable	39
Total Unusable	55

Other aircraft weight terms can be understood by referencing TYPICAL WEIGHT SUMMARY, page VI-M-8.

AIRCRAFT FUSELAGE STATIONS



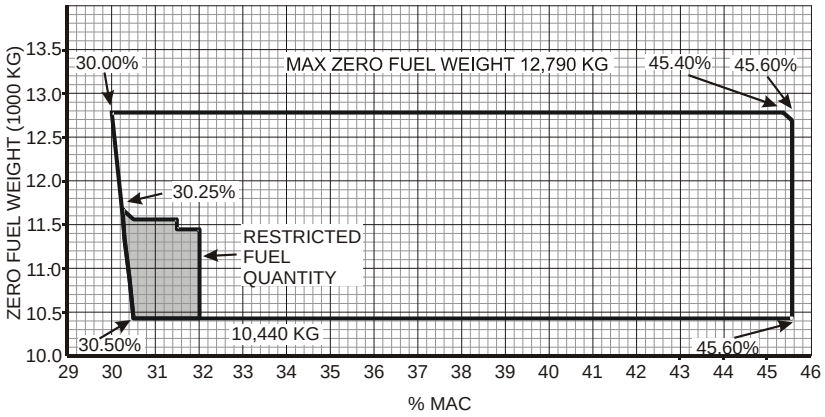
ALLOWABLE OPERATING WEIGHTS (KG)

Maximum Zero Fuel	Maximum Ramp	Maximum Takeoff	Maximum Landing
12,790	18,030	17,960	14,830

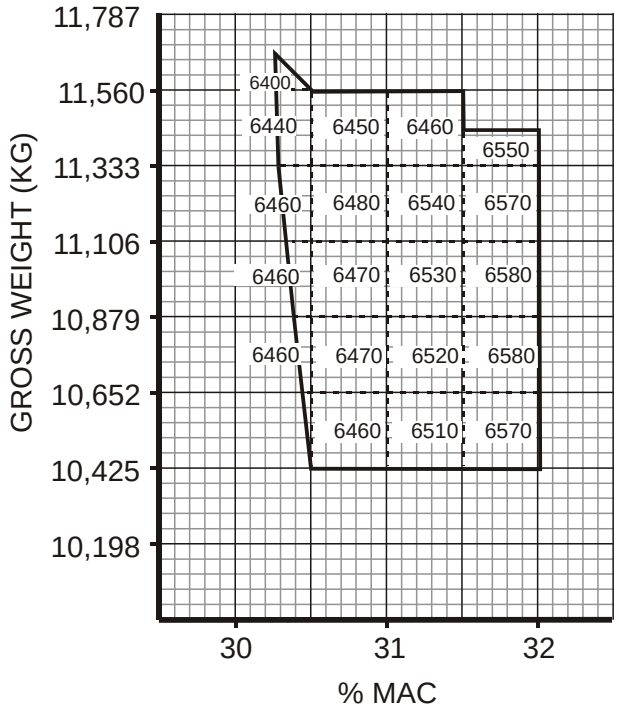
TYPICAL WEIGHT SUMMARY

Item	Weight (KG)
Outfitting - Nominal Weight Empty - Spec. 23,212	10,529
Unusable/Undrainable Fuel (see UNUSABLE FUEL, page VI-M-5) Engine Oil EMPTY WEIGHT	56 15 10,599
Crew (2) BASIC EMPTY WEIGHT (BEW)	172 10,771
(Operating Items - Typical) - Galley Supplies Beverage Supplies Crew Baggage Navigation Kit & Flight Manual Flight Manuals Lavatory Charges & Supplies Potable Water (38 liters) Engine Covers OPERATING WEIGHT EMPTY (BOW/OWE)	183 10,954
Passengers (4) Baggage ZERO FUEL WEIGHT (ZFW)	363 91 11,408
Mission Fuel RAMP WEIGHT	6622 18,030
Start and Taxi Fuel TAKEOFF WEIGHT	-68 17,962

ZERO FUEL WEIGHT ENVELOPE



ZERO FUEL WEIGHT RESTRICTED ZONE FUEL QUANTITY



Example: Between 10,652 kg - 10.879 kg lb and between 31% - 31.5% MAC, the maximum allowable amount of fuel is 6520 kg.

ZERO FUEL WEIGHT CG LIMIT

This table enables the operator to ensure that the basic weight cg is within approved limits. The table is used as follows:

1. Obtain the current basic empty weight and moment from FORM C EMPTY WEIGHT AND CG CHANGE LOG, page VI-M-27 and enter on FLIGHT LOADING COMPUTATION FORM (FORM D), page VI-M-28
2. Enter on FLIGHT LOADING COMPUTATION FORM (FORM D), page VI-M-28 the weight and moment for each additional item that is part of the zero fuel weight
3. Add the above items to obtain the zero fuel weight and moment
4. Enter the ZERO FUEL WEIGHT CG LIMIT TABLE, page VI-M-12 at the ZFW obtained in Step 3
5. Ensure that the appropriate area of the chart is used, in accordance with ZERO FUEL WEIGHT ENVELOPE, page VI-M-9
6. Divide the moment obtained in step 3 by 1000. If the moment/1000 thus obtained is less than the lowest value or more than the highest value on the appropriate line, then the aircraft is not within the allowable cg limits and the loading must be changed accordingly
7. Read vertically from the value obtained in step 4 above to find the aircraft cg, both as a percentage of MAC and as a fuselage station

An alternate method is to divide the moment obtained in Step 3 by the ZFW to obtain the aircraft cg. After using the table in % MAC VS. ARM (M), page VI-M-19 to find the center of gravity as a percentage of MAC, ZERO FUEL WEIGHT ENVELOPE, page VI-M-9 can be used to check the above procedure.

WARNING

AIRCRAFT CG WITHOUT PASSENGERS, CREW, FUEL SHALL NOT EXCEED THE AFT GROUND HANDLING LIMIT OF 11.74 METERS (50% MAC) DURING ANY STAGE OF GROUND HANDLING OPERATIONS.

ZERO FUEL WEIGHT CG LIMIT TABLE

(Sheet 1 of 3)
MOMENT / 1000

% MAC	30.0	30.1	30.2	30.3	30.4	30.5	31.0	31.5	32.0	32.5	33.0	33.5	34.0
ARM [M]	11.165	11.168	11.171	11.174	11.177	11.179	11.194	11.208	11.223	11.237	11.251	11.266	11.280
12,791	143	143	143	143	143	143	143	143	144	144	144	144	144
12,701		142	142	142	142	142	142	142	143	143	143	143	143
12,610		141	141	141	141	141	141	141	142	142	142	142	142
12,519		140	140	140	140	140	140	140	140	141	141	141	141
12,428		139	139	139	139	139	139	139	139	140	140	140	140
12,338		138	138	138	138	138	138	138	138	139	139	139	139
12,247		137	137	137	137	137	137	137	137	138	138	138	138
12,156			136	136	136	136	136	136	136	137	137	137	137
12,066			135	135	135	135	135	135	135	136	136	136	136
11,975			134	134	134	134	134	134	134	135	135	135	135
11,884			133	133	133	133	133	133	133	134	134	134	134
11,793			132	132	132	132	132	132	132	133	133	133	133
11,703				131	131	131	131	131	131	132	132	132	132
11,612				130	130	130	130	130	130	130	131	131	131
11,521				129	129	129	129	129	129	129	130	130	130
11,431				128	128	128	128	128	128	128	129	129	129
11,340				127	127	127	127	127	127	127	128	128	128
11,249					126	126	126	126	126	126	127	127	127
11,158					125	125	125	125	125	125	126	126	126
11,068					124	124	124	124	124	124	125	125	125
10,977					123	123	123	123	123	123	124	124	124
10,886					122	122	122	122	122	122	122	123	123
10,795					121	121	121	121	121	121	121	122	122
10,705					120	120	120	120	120	120	120	121	121
10,614					119	119	119	119	119	119	119	120	120
10,523					118	118	118	118	118	118	118	119	119
10,433					117	117	117	117	117	117	117	118	118

Gulfstream G280
AIRPLANE FLIGHT MANUAL

ZERO FUEL WEIGHT CG LIMIT TABLE

(Sheet 2 of 3)

MOMENT / 1000

% MAC	34.5	35.0	35.5	36.0	36.5	37.0	37.5	38.0	38.5	39.0	39.5	40.0	40.5
ARM [M]	11.294	11.309	11.323	11.337	11.352	11.366	11.380	11.395	11.409	11.423	11.438	11.452	11.466
12,791	144	145	145	145	145	145	146	146	146	146	146	146	147
12,701	143	144	144	144	144	144	145	145	145	145	145	145	146
12,610	142	143	143	143	143	143	144	144	144	144	144	144	145
12,519	141	142	142	142	142	142	142	143	143	143	143	143	144
12,428	140	141	141	141	141	141	141	142	142	142	142	142	143
12,338	139	140	140	140	140	140	140	141	141	141	141	141	141
12,247	138	138	139	139	139	139	139	140	140	140	140	140	140
12,156	137	137	138	138	138	138	138	139	139	139	139	139	139
12,066	136	136	137	137	137	137	137	137	138	138	138	138	138
11,975	135	135	136	136	136	136	136	136	137	137	137	137	137
11,884	134	134	135	135	135	135	135	135	136	136	136	136	136
11,793	133	133	134	134	134	134	134	134	135	135	135	135	135
11,703	132	132	133	133	133	133	133	133	134	134	134	134	134
11,612	131	131	131	132	132	132	132	132	132	133	133	133	133
11,521	130	130	130	131	131	131	131	131	131	132	132	132	132
11,431	129	129	129	130	130	130	130	130	130	131	131	131	131
11,340	128	128	128	129	129	129	129	129	129	130	130	130	130
11,249	127	127	127	128	128	128	128	128	128	129	129	129	129
11,158	126	126	126	127	127	127	127	127	127	127	128	128	128
11,068	125	125	125	125	126	126	126	126	126	126	127	127	127
10,977	124	124	124	124	125	125	125	125	125	125	126	126	126
10,886	123	123	123	123	124	124	124	124	124	124	125	125	125
10,795	122	122	122	122	123	123	123	123	123	123	123	124	124
10,705	121	121	121	121	122	122	122	122	122	122	122	123	123
10,614	120	120	120	120	120	121	121	121	121	121	121	122	122
10,523	119	119	119	119	119	120	120	120	120	120	120	121	121
10,433	118	118	118	118	118	119	119	119	119	119	119	119	120

ZERO FUEL WEIGHT CG LIMIT TABLE

(Sheet 3 of 3)
MOMENT / 1000

% MAC	41.0	41.5	42.0	42.5	43.0	43.5	44.0	44.5	45.0	45.5	45.6
ARM [M]	11.481	11.495	11.509	11.524	11.538	11.552	11.567	11.581	11.595	11.610	11.613
12,791	147	147	147	147	148	148	148	148	148	149	
12,701	146	146	146	146	147	147	147	147	147	147	147
12,610	145	145	145	145	145	146	146	146	146	146	146
12,519	144	144	144	144	144	145	145	145	145	145	145
12,428	143	143	143	143	143	144	144	144	144	144	144
12,338	142	142	142	142	142	143	143	143	143	143	143
12,247	141	141	141	141	141	141	142	142	142	142	142
12,156	140	140	140	140	140	140	141	141	141	141	141
12,066	139	139	139	139	139	139	140	140	140	140	140
11,975	137	138	138	138	138	138	139	139	139	139	139
11,884	136	137	137	137	137	137	137	138	138	138	138
11,793	135	136	136	136	136	136	136	137	137	137	137
11,703	134	135	135	135	135	135	135	136	136	136	136
11,612	133	133	134	134	134	134	134	134	135	135	135
11,521	132	132	133	133	133	133	133	133	134	134	134
11,431	131	131	132	132	132	132	132	132	133	133	133
11,340	130	130	131	131	131	131	131	131	131	132	132
11,249	129	129	129	130	130	130	130	130	130	131	131
11,158	128	128	128	129	129	129	129	129	129	130	130
11,068	127	127	127	128	128	128	128	128	128	128	129
10,977	126	126	126	126	127	127	127	127	127	127	127
10,886	125	125	125	125	126	126	126	126	126	126	126
10,795	124	124	124	124	125	125	125	125	125	125	125
10,705	123	123	123	123	124	124	124	124	124	124	124
10,614	122	122	122	122	122	123	123	123	123	123	123
10,523	121	121	121	121	121	122	122	122	122	122	122
10,433	120	120	120	120	120	121	121	121	121	121	121

FLOOR LOADING LIMITATIONS

Baggage compartment loading, aft of station 12.9: maximum dead weight floor loading is 585 kg per square meter. Maximum compartment loading is 898 kg. (The difference between 898 kg and 585 kg per square meter usable floor area must be carried on suitable shelves).

MAIN CABIN FLOOR

Station 4.5 to station 12.8, dead weight and cargo loading: Maximum uniform loading is 488 kg per square meter.

LANDING GEAR EXTENSION EFFECTS ON AIRCRAFT CG

STRUT COMPRESSIONS

Because landing gear shock strut compressions alter the location of the landing gears relative to the aircraft and thus alter the aircraft cg, allowance must be made when weighing the aircraft on wheels. No allowance is necessary when weighing on jacks because all shock struts are fully extended, simulating the in-flight landing gear extended configuration. Reference will be made to three landing gear configurations:

1. In-flight, landing gear extended - (shock struts fully extended).
2. In-flight, landing gear retracted.
3. On ground, landing gear extended - (main struts fully compressed, nose strut fully extended).

IN-FLIGHT, LANDING GEAR EXTENDED OR RETRACTED

The in-flight horizontal movement difference between landing gear retracted and extended is 40 meter-kilogram, which represents an aircraft cg movement aft of 0.1% to 0.15% MAC. depending on weight. Even though this e.g. movement is small, it is necessary to verify that the aircraft cg will remain in the zero fuel weight envelope for both conditions. (See ZERO FUEL WEIGHT ENVELOPE, page VI-M-9). After computing the aircraft weight and moment (landing gear extended), add 40 meter-kilogram from the moment to determine the “inflight landing gear retracted aircraft cg”

ON GROUND, LANDING GEAR EXTENDED

If the aircraft is to be weighed on wheels it must be leveled and this is accomplished by bleeding the main shock struts until fully compressed and inflating the nose strut until the aircraft is level. (See LEVELING THE AIRCRAFT, page VI-M-23). After computing the aircraft weight and moment it is necessary to subtract 27.548 kg•m from the moment to determine the “in-flight landing gear extended, aircraft cg”. It is emphasized that this correction is not necessary if the aircraft is weighed on jacks.

STATIC BALANCE TOLERANCES ON CONTROL SURFACES

The ailerons surfaces are mass-balanced. The aircraft, as delivered from the production floor, has these surfaces balanced to allow for the weight of paint added by the outfitting facility. The following table displays the acceptable balance ranges. For further details concerning repairs and rebalancing, refer to the Maintenance Manual and balancing procedure.

Surface	BALANCE MOMENT (KG•M)		
	Unpainted, Unprimed	**Unpainted, Primed**	**Final paint**
Aileron (nose heavy)	Not applicable	One layer of top coat minimum 0.05	Minimum 0.03
		Two layers of top coat minimum 0.07	

FUEL CG TABLE (GROUND STATIC ATTITUDE -1.7°)

(Sheet 1 of 2)

Fuel Weight (kg)	CG ARM (m)	Moment (kg•m/ 100)	Fuel Weight (kg)	CG ARM (m)	Moment (kg•m/ 100)	Fuel Weight (kg)	CG ARM (m)	Moment (kg•m/ 100)
50	11.1	5.5	1300	10.8	139.8	2550	10.8	274.6
100	11.1	11.1	1350	10.7	145.1	2600	10.8	280.0
150	11.1	16.7	1400	10.7	150.4	2650	10.8	285.5
200	11.1	22.3	1450	10.7	155.7	2700	10.8	291.0
250	11.1	27.8	1500	10.7	161.1	2750	10.8	296.4
300	11.1	33.4	1550	10.7	166.4	2800	10.8	301.9
350	11.1	39.0	1600	10.7	171.8	2850	10.8	307.4
400	11.1	44.6	1650	10.7	177.1	2900	10.8	312.9
450	11.1	50.1	1700	10.7	182.5	2950	10.8	318.4
500	11.1	55.6	1750	10.7	187.9	3000	10.8	323.9
550	11.1	60.8	1800	10.7	193.2	3050	10.8	329.4
600	11.0	66.1	1850	10.7	198.6	3100	10.8	335.0
650	11.0	71.3	1900	10.7	204.0	3150	10.8	340.5
700	10.9	76.5	1950	10.7	209.4	3200	10.8	346.1
750	10.9	81.8	2000	10.7	214.8	3250	10.8	351.7
800	10.9	87.0	2050	10.7	220.2	3300	10.8	357.3
850	10.9	92.2	2100	10.7	225.6	3350	10.8	363.0
900	10.8	97.5	2150	10.7	231.0	3400	10.8	368.8
950	10.8	102.8	2200	10.7	236.5	3450	10.9	374.7
1000	10.8	108.0	2250	10.8	241.9	3500	10.9	380.6
1050	10.8	113.3	2300	10.8	247.3	3550	10.9	386.5
1100	10.8	118.6	2350	10.8	252.8	3600	10.9	392.4
1150	10.8	123.9	2400	10.8	258.2	3650	10.9	398.4
1200	10.8	129.2	2450	10.8	263.6	3700	10.9	404.3
1250	10.8	134.5	2500	10.8	269.1	3750	10.9	410.4
3800	11.0	416.4	5050	11.1	558.1	6300	11.0	695.0
3850	11.0	422.5	5100	11.0	563.1	6350	11.0	699.1
3900	11.0	428.6	5150	11.0	568.2	6400	11.0	703.1

FUEL CG TABLE (GROUND STATIC ATTITUDE -1.7°)

(Sheet 2 of 2)

Fuel Weight (kg)	CG ARM (m)	Moment (kg•m/ 100)	Fuel Weight (kg)	CG ARM (m)	Moment (kg•m/ 100)	Fuel Weight (kg)	CG ARM (m)	Moment (kg•m/ 100)
3950	11.0	434.8	5200	11.0	573.2	6450	11.0	707.3
4000	11.0	441.0	5250	11.0	578.2	6500	10.9	711.4
4050	11.0	447.2	5300	11.0	583.2	6550	10.9	715.6
4100	11.1	453.5	5350	11.0	588.3	6600	10.9	719.8
4150	11.1	459.8	5400	11.0	593.7	6622	10.9	721.7
4200	11.1	466.2	5450	11.0	600.4			
4250	11.1	472.6	5500	11.0	607.2			
4300	11.1	479.1	5550	11.1	614.0			
4350	11.2	485.6	5600	11.1	620.9			
4400	11.2	492.2	5650	11.1	627.8			
4450	11.2	497.9	5700	11.1	634.7			
4500	11.2	502.9	5750	11.2	641.6			
4550	11.2	507.9	5800	11.2	648.5			
4600	11.2	513.0	5850	11.2	655.4			
4650	11.1	518.0	5900	11.2	662.3			
4700	11.1	523.0	5950	11.2	666.8			
4750	11.1	528.0	6000	11.2	670.9			
4800	11.1	533.0	6050	11.2	674.9			
4850	11.1	538.1	6100	11.1	679.0			
4900	11.1	543.1	6150	11.1	683.0			
4950	11.1	548.1	6200	11.1	687.0			
5000	11.1	553.1	6250	11.1	691.0			

% MAC VS. ARM (M)

(Sheet 1 of 3)

	ARM - INCREMENTS OF 0.01 M									
ARM (M)	0.000 m	0.002 m	0.004 m	0.006 m	0.008 m	0.010 m	0.012 m	0.014 m	0.016 m	0.018 m
11.000	24.2	24.4	24.4	24.4	24.5	24.6	24.7	24.7	24.8	24.9

% MAC VS. ARM (M)

(Sheet 2 of 3)

	ARM - INCREMENTS OF 0.01 M									
ARM (M)	0.000 m	0.002 m	0.004 m	0.006 m	0.008 m	0.010 m	0.012 m	0.014 m	0.016 m	0.018 m
11.020	24.9	25.0	25.1	25.1	25.2	25.3	25.3	25.4	25.5	25.6
11.040	25.6	25.7	25.8	25.8	25.9	26.0	26.0	26.1	26.2	26.3
11.060	26.3	26.4	26.5	26.5	26.6	26.7	26.7	26.8	26.9	27.0
11.080	27.0	27.1	27.2	27.2	27.3	27.4	27.4	27.5	27.6	27.6
11.100	27.7	27.8	27.9	27.9	28.0	28.1	28.1	28.2	28.3	28.3
11.120	28.4	28.5	28.6	28.6	28.7	28.8	28.8	28.9	29.0	29.0
11.140	29.1	29.2	29.3	29.3	29.4	29.5	29.5	29.6	29.7	29.7
11.160	29.8	29.9	30.0	30.0	30.1	30.2	30.2	30.3	30.4	30.4
11.180	30.5	30.6	30.6	30.7	30.8	30.9	30.9	31.0	31.1	31.1
11.200	31.2	31.3	31.3	31.4	31.5	31.6	31.6	31.7	31.8	31.8
11.220	31.9	32.0	32.0	32.1	32.2	32.3	32.3	32.4	32.5	32.5
11.240	32.6	32.7	32.7	32.8	32.9	32.9	33.0	33.1	33.2	33.2
11.260	33.3	33.4	33.4	33.5	33.6	33.6	33.7	33.8	33.9	33.9
11.280	34.0	34.1	34.1	34.2	34.3	34.3	34.4	34.5	34.6	34.6
11.300	34.7	34.8	34.8	34.9	35.0	35.0	35.1	35.2	35.3	35.3
11.320	35.4	35.5	35.5	35.6	35.7	35.7	35.8	35.9	35.9	36.0
11.340	36.1	36.2	36.2	36.3	36.4	36.4	36.5	36.6	36.6	36.7
11.360	36.8	36.9	36.9	37.0	37.1	37.1	37.2	37.3	37.3	37.4
11.380	37.5	37.6	37.6	37.7	37.8	37.8	37.9	38.0	38.0	38.1
11.400	38.2	38.2	38.3	38.4	38.5	38.5	38.6	38.7	38.7	38.8
11.420	38.9	38.9	39.0	39.1	39.2	39.2	39.3	39.4	39.4	39.5
11.440	39.6	39.6	39.7	39.8	39.9	39.9	40.0	40.1	40.1	40.2
11.460	40.3	40.3	40.4	40.5	40.6	40.6	40.7	40.8	40.8	40.9
11.480	41.0	41.0	41.1	41.2	41.2	41.3	41.4	41.5	41.5	41.6
11.500	41.7	41.7	41.8	41.9	41.9	42.0	42.1	42.2	42.2	42.3
11.520	42.4	42.4	42.5	42.6	42.6	42.7	42.8	42.9	42.9	43.0
11.540	43.1	43.1	43.2	43.3	43.3	43.4	43.5	43.5	43.6	43.7
11.560	43.8	43.8	43.9	44.0	44.0	44.1	44.2	44.2	44.3	44.4
11.580	44.5	44.5	44.6	44.7	44.7	44.8	44.9	44.9	45.0	45.1

% MAC VS. ARM (M)

(Sheet 3 of 3)

	ARM - INCREMENTS OF 0.01 M									
ARM (M)	0.000 m	0.002 m	0.004 m	0.006 m	0.008 m	0.010 m	0.012 m	0.014 m	0.016 m	0.018 m
11.600	45.2	45.2	45.3	45.4	45.4	45.5	45.6	45.6	45.7	45.8
11.620	45.9	45.9	46.0	46.1	46.1	46.2	46.3	46.3	46.4	46.5
11.640	46.5	46.6	46.7	46.8	46.8	46.9	47.0	47.0	47.1	47.2
11.660	47.2	47.3	47.4	47.5	47.5	47.6	47.7	47.7	47.8	47.9
11.680	47.9	48.0	48.1	48.2	48.2	48.3	48.4	48.4	48.5	48.6
11.700	48.6	48.7	48.8	48.8	48.9	49.0	49.1	49.1	49.2	49.3
11.720	49.3	49.4	49.5	49.5	49.6	49.7	49.8	49.8	49.9	50.0
11.740	50.0	50.1	50.2	50.2	50.3	50.4	50.5	50.5	50.6	50.7
11.760	50.7	50.8	50.9	50.9	51.0	51.1	51.2	51.2	51.3	51.4
11.780	51.4	51.5	51.6	51.6	51.7	51.8	51.8	51.9	52.0	52.1
11.800	52.1	52.2	52.3	52.3	52.4	52.5	52.5	52.6	52.7	52.8
11.820	52.8	52.9	53.0	53.0	53.1	53.2	53.2	53.3	53.4	53.5
11.840	53.5	53.6	53.7	53.7	53.8	53.9	53.9	54.0	54.1	54.1
11.860	54.2	54.3	54.4	54.4	54.5	54.6	54.6	54.7	54.8	54.8
11.880	54.9	55.0	55.1	55.1	55.2	55.3	55.3	55.4	55.5	55.5
11.900	55.6	55.7	55.8	55.8	55.9	56.0	56.0	56.1	56.2	56.2
11.920	56.3	56.4	56.5	56.5	56.6	56.7	56.7	56.8	56.9	56.9
11.940	57.0	57.1	57.1	57.2	57.3	57.4	57.4	57.5	57.6	57.6
11.960	57.7	57.8	57.8	57.9	58.0	58.1	58.1	58.2	58.3	58.3
11.980	58.4	58.5	58.5	58.6	58.7	58.8	58.8	58.9	59.0	59.0
12.000	59.1	59.2	59.2	59.3	59.4	59.4	59.5	59.6	59.7	59.7

AIRCRAFT WEIGHING PROCEDURES

LEVELING AND WEIGHING

PREPARATION FOR WEIGHING

The aircraft can be weighed either on wheels or jacks, (i.e., with the aircraft wheels on floor with platform scales or with jacks and load cells):
The aircraft must be level longitudinally and laterally.
Scales of the following capacities are required:
Wing jacks - 6800 kg each; forward jack - 1800 kg.
Preparations for weighing is established with:

- Landing gear extended
- Wing flaps retracted
- Main entrance, baggage and lower maintenance doors closed
- Full hydraulic fluid
- Full engine oil
- Full APU oil
- Spoilers retracted
- Fuel tanks drained (the following fluids and/or items should be drained or removed, see step page VI-M-23)
- Thrust reversers stowed

1. Conduct a complete inventory check according to Master Equipment List (MEL), determine that all required equipment for the EMPTY WEIGHT + UNDRAINABLE FUEL condition is either installed or properly accounted for; any deviations must be recorded as shortages or overages, so that the empty weight may be computed from the actual weight

(Continued)

2. Fluids and/or items that should be drained or removed:
   a. Fuel - Aircraft must be defueled and then drained with the aircraft in ground static attitude (FRL - 1.7° nose down), using the four (4) drain valves on the inboard lower surface of the wing, two (2) drain valves on lower outboard surface of the wing, one (1) drain valve on the forward fuel tank and one (1) drain valve on the aft fuel tank
   b. Lavatory - Fluids and supplies must be removed and/or drained (items not on the equipment list)
   c. Galley and beverage supplies (liquids, foods, etc.) must be removed or drained (items not on the equipment list)
   d. Tools, work equipment, protective material, etc., should all be removed from the aircraft
   e. Exterior should be dry and clean

LEVELING THE AIRCRAFT

Longitudinal leveling is accomplished by placing a clinometer on the seat tracks in middle of cabin across from the emergency exit at sta. 10.53 m (FR 34) in fore and aft direction.
Lateral leveling is accomplished by placing a clinometer on the cockpit floor, sta. 4.52 m (FR 10) in left to right direction.

The aircraft on wheels can be leveled by fully deflating the main landing gear struts and then inflating the nose landing gear strut until the Fuselage Reference Line (FRL) = 0°.

Before weighing on jacks the aircraft must be approximately leveled first, by adjusting the landing gear struts, and the wheel brakes must be off. All jacks should then be raised at the same rate until the final leveling adjustments are made. This prevents any unsafe side loads on components which may cause scale errors.

MEASUREMENTS

When the aircraft is leveled and in the EMPTY WEIGHT + UNDRAINABLE FUEL condition, the dimensions and weights required for WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A), page VI-M-25 can be recorded.

With the aircraft on wheels, dimensions C and D must be measured. These distances must be measured because they vary with strut extension. Typical dimensions are C=4.24 meters; D=12.02 meters.

With the aircraft on jacks, no linear measurements are necessary. The arms are given on the WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A), page VI-M-25. To obtain the basic empty weight, add 39 kg. at arm 11.30 which represents the unusable less undrainable fuel (see UNUSABLE FUEL, page VI-M-5).

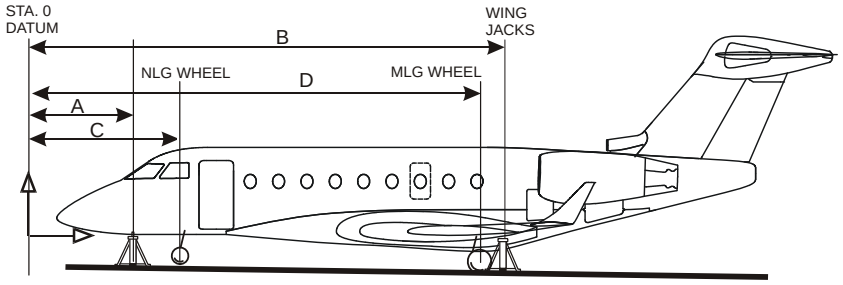
SAMPLE LOADING CALCULATION

An example of a complete weighing and loading process is as follows:

1. The WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A), page VI-M-25, shows the actual weighing results, corrected as necessary for items such as jacks pads and equipment shortages and overages.
2. The FORM C EMPTY WEIGHT AND CG CHANGE LOG, page VI-M-27 shows subsequent changes affecting the weight and/or balance of the aircraft that must be recorded on this form.
3. The FLIGHT LOADING COMPUTATION FORM (FORM D), page VI-M-28 shows the derivation of zero fuel weight and ramp weight from the basic weight and balance (WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A), page VI-M-25).
4. The resulting zero fuel weight and moment should now be checked using the procedures in ZERO FUEL WEIGHT CG LIMIT TABLE, page VI-M-12, to ensure that the aircraft is loaded within limits.

WEIGHING RECORD - ACTUAL WEIGHT AND BALANCE DATA FORM (FORM A)

GULFSTREAM G280 S/N _____



NOSE JACK REACTION - A = 2.69 M.
NOSE WHEEL REACTION (TYPICAL) - C = 4.24 M.
MAIN JACK REACTION - B = 12.16 M.
MAIN WHEEL REACTION (TYPICAL) - D = 12.02 M.

$$\%MAC = \frac{\text{Arm (m)} - 10.305}{2.868} \times 100$$

(Continued)

(AIRPLANE ON WHEELS / JACKS)*					
REACTION	SCALE READING	TARE (+/-)	NET *	ARM**	MOMENT
	KG	KG	KG	M	KG*M
MAIN LEFT					
MAIN RIGHT					
NOSE					
TOTAL					

EMPTY WEIGHT & CG DETERMINATION				
ITEM	WEIGHT	ARM	MOMENT	% MAC
TOTAL NET (FROM ABOVE)				
SHORTAGES (+)				
OVERAGES (-)				
UNUSABLE DRAINABLE FUEL	39.0	11.30		
EMPTY WEIGHT				

WEIGHED BY _____WITNESSED BY:_____DATE:_____

PREPARED BY:_____

* FOR TARE POSITIVE SUBTRACT HALF THE TARE. IF TARE IS NEGATIVE, ADD HALF THE TARE

** IF WEIGHED ON WHEELS, THE ARM MUST BE MEASURED BECAUSE IT CAN VARY WITH STRUT EXTENSION

See MEASUREMENTS, page VI-M-24

FORM C EMPTY WEIGHT AND CG CHANGE LOG

GULFSTREAM G280 S/N _____

ITEMS (LIST ALL ITEMS SUBSEQUENT TO WEIGHING)	WEIGHT (KG)	CG ARM (M)	MOMENT (KG*M)
Empty Weight (from Form A)			
Add: Flight Crew (2)	172	4.1	705.2
Basic Empty Weight			

FLIGHT LOADING COMPUTATION FORM (FORM D)

GULFSTREAM G280 S/N _____

Trip No.	Takeoff Field Length			
Date	Temp. _____ ºC Allowable T.O.W.			
To	Estimated Landing Weight			
From	Landing Field Length Required			
ITEMS	**WEIGHT (KG)**	**ARM (M)**	**MOMENT (KG*M)**	**MAC (%)**
BASIC EMPTY WEIGHT (FROM FORM C)				
Add Operating Items:				
BASIC OPERATING WEIGHT				
Add Payload: Passenger(s)				
Add Passenger Baggage				
ZERO FUEL WEIGHT (12,790 KG MAX)				
Add Fuel (Usable):				
RAMP WEIGHT (18,030 KG MAX)				

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WEIGHT CONVERSION

The following table enables aircraft weight conversion:

LB	25,000	25,500	26,000	26,500	27,000	27,500	28,000
KG	11,340	11,567	11,793	12,020	12,247	12,474	12,701
LB	28,500	29,000	29,500	3,0000	30,500	31,000	31,500
KG	12,927	13,154	13381	13,608	13,835	14,061	14,288
LB	32,000	32,500	32700	33,000	33,500	34,000	34,500
KG	14,515	14,742	14,832	14,969	15,195	15,422	15,649
LB	35,000	35,500	36,000	36,500	37,000	37,500	38,000
KG	15,876	16,103	16,329	16,556	16,783	17,010	17,237
LB	38,500	39,000	39,500	39600	4,0000	40,500	41,000
KG	17,463	17,690	17,917	17,962	18,144	18,370	18,597

DISTANCE CONVERSION

The following table enables takeoff, flight path and landing distance conversion:

FT	1000	2000	3000	4000	5000	6000	7000	8000	9000	10,000
M	305	610	914	1219	1524	1829	2134	2438	2743	3048
FT	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000	20,000
M	3353	3658	3962	4267	4572	4877	5182	5486	5791	6096
FT	21,000	22,000	23,000	24,000	25,000	26,000	27,000	28,000	29,000	30,000
M	6401	6705	7010	7315	7620	7925	8230	8534	8839	9144
FT	31,000	32,000	33,000	34,000	35,000	36,000	37,000	38,000	39,000	40,000
M	9449	9753	10,058	10,363	10,668	10,973	11,278	11,582	11,887	12,192
FT	41,000	42,000	43,000	44,000	45,000	46,000	47,000	48,000	49,000	50,000
M	12,497	12,802	13,106	13,411	13,716	14,021	14,326	14,630	14,935	15,240

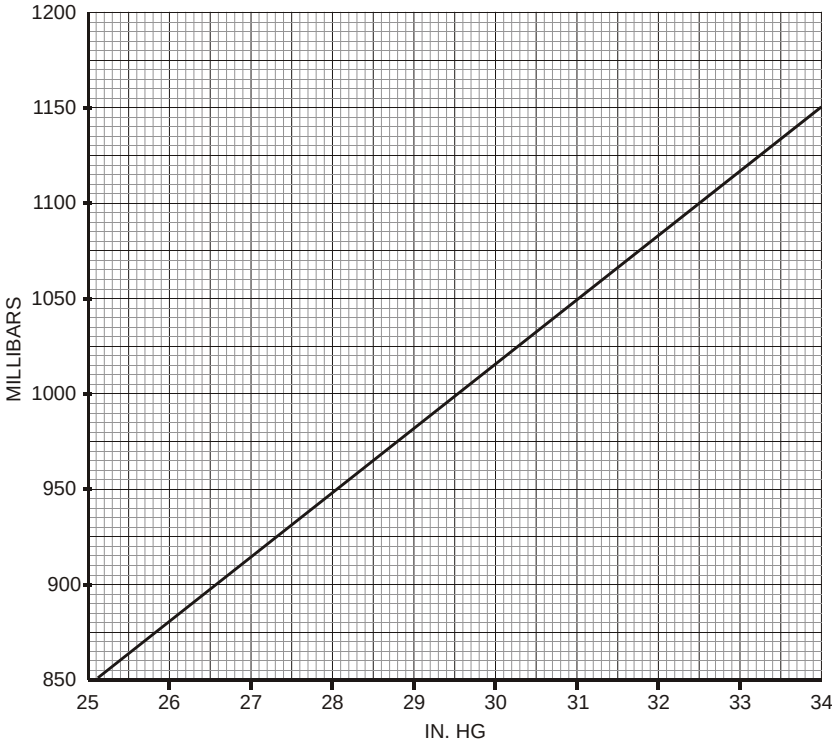
TEMPERATURE CONVERSION

°F	°C / °F	°C	°F	°C / °F	°C	°F	°C / °F	°C	°C / °F	°C
-76.0	-60	-51.1	6.8	-14	-25.6	87.8	31	-0.6	76	24.4
-74.2	-59	-50.6	8.6	-13	-25.0	89.6	32	0	77	25.0
-72.4	-58	-50.0	10.4	-12	-24.4	91.4	33	0.6	78	25.6
-70.6	-57	-49.4	12.2	-11	-23.9	93.2	34	1.1	79	26.1
-68.6	-56	-48.9	14.0	-10	-23.3	95.0	35	1.7	80	26.7
-67.0	-55	-48.3	15.8	- 9	-22.8	96.8	36	2.2	81	27.2
-65.2	-54	-47.7	17.6	- 8	-22.2	98.6	37	2.8	82	27.8
-63.4	-53	-47.2	19.4	- 7	-21.7	100.4	38	3.3	83	28.3
-61.6	-52	-46.7	21.2	- 6	-21.1	102.2	39	3.9	84	28.9
-59.8	-51	-46.1	23.0	- 5	-20.6	104.0	40	4.4	85	29.4
-58.0	-50	-45.6	24.8	- 4	-20.0	105.8	41	5.0	86	30.0
-56.2	-49	-45.0	26.6	- 3	-19.4	107.6	43	5.6	87	30.6
-54.4	-48	-44.4	28.4	- 2	-18.9	109.4	43	6.1	88	31.1
-52.6	-47	-43.9	30.2	- 1	-18.3	111.2	44	6.7	89	31.7
-50.8	-46	-43.3	32.0	0	-17.8	113.0	45	7.2	90	32.2
-49.0	-45	-42.8	33.8	+ 1	-17.2	114.8	46	7.8	91	32.8
-47.2	-44	-42.2	35.6	+ 2	-16.7	116.6	47	8.3	92	33.3
-45.4	-43	-41.7	37.4	+ 3	-16.1	118.4	48	8.9	93	33.9
-43.6	-42	-41.1	39.2	+ 4	-15.6	120.2	49	9.4	94	34.4
-41.8	-41	-40.6	41.0	+ 5	-15.0		50	9.4	95	35.0
-40.0	-40	-40.0	42.8	+ 6	-14.4		51	10.6	96	35.6
-38.2	-39	-39.4	44.6	+ 7	-13.9		52	11.1	97	36.1
-36.4	-38	-38.9	46.4	+ 8	-13.3		53	11.7	98	36.7
-34.6	-37	-38.3	48.2	+ 9	-12.8		54	12.2	99	37.2
-32.8	-36	-37.8	50.0	+10	-12.2		55	12.8	100	37.8
-31.0	-35	-37.2	51.8	+11	-11.7		56	13.3	101	38.3
-29.2	-34	-36.7	53.6	+12	-11.1		57	13.9	102	38.9
-27.4	-33	-36-1	55.4	+13	-10.6		59	15.0	103	39.4
-25.6	-32	-35.6	57.2	+14	-10.0		60	15.6	104	40.0
-23.8	-31	-35.0	59.0	+15	- 9.4		61	16.1	106	41.1
-20.2	-29	-33.9	62.6	+17	- 8.3		62	16.7	107	41.7
-18.4	-28	-33.3	64.4	+18	- 7.8		63	17.2	108	42.2
-16.6	-27	-32.8	66.2	+19	- 7.2		64	17.8	109	42.8
-14.8	-26	-32.2	68.0	+20	- 6.7		65	18.3	110	42.3
-13.0	-25	-31.7	69.8	+21	- 6.1		66	18.9	111	43.9
-11.2	-24	-31.1	71.6	+22	- 5.6		67	19.4	112	44.4
- 9.4	-23	-30.6	73.4	+23	- 5.0		68	20.0	113	45.0
- 7.6	-22	-30.0	75.2	+24	- 4.4		69	20.6	114	45.6
- 5.8	-21	-29.4	77.0	+25	- 3,9		70	21.1	115	46.1
- 4.0	-20	-28.9	78.8	+26	- 3.3		71	21.7	116	46.7
- 2.2	-19	-28.3	80.6	+27	- 2.8		72	22.2	117	47.2
- 0.4	-18	-27.8	82.4	+28	- 2.2		73	22.8	118	47.8
+ 1.4	-17	-27.2	84.2	+29	- 1.7		74	23.3	119	48.3
+ 3.2	-16	26.7	86.0	+30	-1.1		75	23.9	120	48.9
5.0	-15	-26.1								

STANDARD ATMOSPHERE

ALTITUDE (FT)	TEMPERATURE °C	TEMPERATURE °F	SPEED OF SOUND (KT)	PRESSURE IN. HG	PRESSURE RATIO P/P_0
0	15.0	59.0	661.7	29.92	1.0000
1000	13.0	55.4	659.5	28.86	.9644
2000	11.0	51.9	657.2	27.82	.9298
3000	9.0	40.3	654.9	26.82	.8963
4000	7.1	44.7	652.6	25.84	.8637
5000	5.1	41.2	650.3	24.90	.8321
6000	3.1	37.6	548.7	23.98	.8016
7000	1.1	34.1	645.6	23.02	.7717
8000	0.8	30.5	643.3	22.23	.7429
9000	-2.8	26.9	640.9	21.39	.7149
10,000	-4.8	23.4	638.6	20.58	.6878
11,000	-6.8	19.8	636.2	19.80	.6616
12,000	-10.8	12.7	631.5	18.30	.6115
14,000	-12.7	9.1	629.0	17.58	.5877
15,000	-14.7	5.4	626.6	16.89	.5646
16,000	-16.7	2.0	624.2	16.23	.5423
17,000	-19.6	1.5	621.8	15.58	.5206
18,000	-20.6	-5.1	619.4	14.95	.4997
19,000	-22.6	-8.7	617.0	14.35	.4795
20,000	-24.6	-12.2	614.6	13.76	.4590
21,000	-26.6	-15.8	612.1	13.20	.4410
22,000	-28.5	-19.3	609.6	12.65	.4228
23,000	-30.5	-22.9	607.1	12.12	.4031
24,000	-32.5	-26.5	604.6	11.61	.3881
25,000	-34.5	-30.0	602.1	11.12	.3716
26,000	-35.5	-33.6	599.6	10-64	.3657
27,000	-38.4	-37.1	597.1	10.18	.3404
28,000	-40.4	-40.7	594.6	9.742	.3256
29,000	-42.4	-44.3	592.1	9.315	.3113
30,000	-44.4	-47.8	589.5	8.904	.2976
31,000	-46.4	-51.4	586.9	8.507	.2843
32,000	-48.3	-54.9	584.4	8.125	.2715
33,000	-50.0	-59.5	581.8	7.757	.2592
34,000	-52.4	-62.1	579.2	7.402	.2474
35,000	-54.3	-65.6	576.6	7.061	.2360
36,000	-56.2	-69.2	574.0	7.733	.2250
37,000	-56.5	-69.7	573.7	6.418	.2145
38,000	-56.5	-69.7	573.7	6.118	.2045
39,000	-56.5	-69.7	573.7	5.832	.1947
40,000	-56.5	-69.7	573.7	5.559	.1858
41,000	-56.5	-69.7	573.7	5.299	.1771
42,000	-56.5	-69.7	573.7	5.051	.1631
43,000	-56.5	-69.7	573.7	4.815	.1609
44,000	-56.5	-69.7	573.7	4.590	1634
45,000	-56.5	-69.7	573.7	4.376	.1462
46,000	-56.5	-69.7	573.7	4.171	.1394
47,000	-56.5	-69.7	573.7	3.976	.1329
48,000	-56.5	-69.7	573.7	3.791	.1267

IN HG TO MILLIBAR CONVERSION



INDICATED/TRUE AIRSPEED CONVERSION

		CALIBRATED AIRSPEED (KCAS)					
		100	150	200	250	300	350
ISA DEV. (°C)	ALTITUDE (FT)	TRUE AIRSPEED (KTAS)					
-20	5000	104	155	207	259	310	361
	10,000	112	167	223	278	332	386
	15,000	121	181	240	299	357	414
	19,000	129	193	255	317	378	438
	21,000	133	199	264	327	389	450
	23,000	138	205	272	337	401	463
	25,000	142	212	281	348	413	476
	27,000	147	219	290	359	426	490
-10	5000	106	158	211	264	316	368
	10,000	114	171	227	283	339	394
	15,000	123	185	245	305	364	422
	19,000	132	197	261	324	386	447
	21000	136	203	269	334	398	460
	23,000	141	210	278	345	410	473
	25,000	146	217	287	356	422	487
	27,000	151	224	297	367	435	501
0	5000	108	161	215	268	322	375
	10,000	116	174	232	289	345	402
	15,000	126	188	250	311	371	431
	19,000	134	201	266	331	394	456
	21,000	139	207	275	341	406	470
	23,000	144	214	284	352	419	483
	25,000	149	222	293	363	432	498
	27,000	154	229	303	375	445	512
10	5000	110	164	219	273	327	381
	10,000	118	177	236	294	352	409
	15,000	128	192	255	317	379	439
	19,000	137	205	272	337	402	465
	21,000	142	212	280	348	414	479
	23,000	147	219	290	359	427	493
	25,000	152	226	299	371	440	508
	27,000	157	234	310	383	454	523
20	5000	111	167	223	278	333	388
	10,000	120	180	240	299	358	416
	15,000	131	195	260	323	386	447
	19,000	140	209	277	344	410	474
	21,000	144	216	286	355	422	488
	23,000	149	223	295	366	436	503
	25,000	155	231	305	378	449	518
	27,000	160	239	316	391	463	534

MACH NO./TRUE AIRSPEED CONVERSION

ISA -20°C

	INDICATED MACH NO.													
	0.66	0.68	0.7	0.72	0.74	0.75	0.76	0.78	0.8	0.81	0.82	0.83	0.84	0.85
ALT. (FT)	TRUE AIRSPEED (KIAS)													
21,000	387	399	411	422	434	440	446	457	469	475	481	487	493	499
23,000	384	395	407	419	430	436	442	453	465	471	477	483	488	494
25,000	380	392	403	415	426	432	438	449	461	467	472	478	484	490
27,000	377	388	400	411	422	428	434	445	457	462	468	474	480	485
29,000	373	385	396	407	419	424	430	441	453	458	464	469	475	481
31,000	370	381	392	403	415	420	426	437	448	454	459	465	471	476
33,000	366	377	388	400	411	416	422	433	444	449	455	461	466	472
35,000	363	374	385	396	407	412	418	429	440	445	451	456	462	467
37,000	361	372	383	393	404	410	415	426	437	443	448	454	459	464
39,000	361	372	383	393	404	410	415	426	437	443	448	454	459	464
41,000	361	372	383	393	404	410	415	426	437	443	448	454	459	464
43,000	361	372	383	393	404	410	415	426	437	443	448	454	459	464
45,000	361	372	383	393	404	410	415	426	437	443	448	454	459	464

ISA -10°C

	INDICATED MACH NO.													
	0.66	0.68	0.7	0.72	0.74	0.75	0.76	0.78	0.8	0.81	0.82	0.83	0.84	0.85
ALT. (FT)	TRUE AIRSPEED (KIAS)													
21,000	396	408	420	432	444	449	455	467	479	485	491	497	503	509
23,000	392	404	416	428	440	446	452	464	475	481	487	493	499	505
25,000	389	401	412	424	436	442	448	460	471	477	483	489	495	501
27,000	385	397	409	421	432	438	444	456	467	473	479	485	491	496
29,000	382	394	405	417	428	434	440	452	463	469	475	480	486	492
31,000	379	390	402	413	425	430	436	447	459	465	470	476	482	488
33,000	375	387	398	409	421	426	432	443	455	460	466	472	477	483
35,000	372	383	394	405	417	422	428	439	450	456	462	467	473	479
37,000	370	381	392	403	415	420	426	437	448	454	459	465	471	476
39,000	370	381	392	403	415	420	426	437	448	454	459	465	471	476
41,000	370	381	392	403	415	420	426	437	448	454	459	465	471	476
43,000	370	381	392	403	415	420	426	437	448	454	459	465	471	476
45,000	370	381	392	403	415	420	426	437	448	454	459	465	471	476

ISA

	INDICATED MACH NO.													
	0.66	0.68	0.7	0.72	0.74	0.75	0.76	0.78	0.8	0.81	0.82	0.83	0.84	0.85
ALT. (FT)	TRUE AIRSPEED (KIAS)													
21,000	404	416	428	441	453	459	465	477	489	496	502	508	514	520
23,000	401	413	425	437	449	455	461	473	486	492	498	504	510	516
25,000	397	409	421	433	445	451	457	470	482	488	494	500	506	512
27,000	394	406	418	430	442	448	454	466	478	484	489	495	501	507
29,000	391	402	414	426	438	444	450	462	473	479	485	491	497	503
31,000	387	399	411	422	434	440	446	458	469	475	481	487	493	499
33,000	384	396	407	419	430	436	442	454	465	471	477	483	489	494
35,000	380	392	403	415	427	432	438	450	461	467	473	478	484	490
37,000	379	390	402	413	424	430	436	447	459	465	470	476	482	488
39,000	379	390	402	413	424	430	436	447	459	465	470	476	482	488
41,000	379	390	402	413	424	430	436	447	459	465	470	476	482	488
43,000	379	390	402	413	424	430	436	447	459	465	470	476	482	488
45,000	379	390	402	413	424	430	436	447	459	465	470	476	482	488

ISA +10°C

	INDICATED MACH NO.													
	0.66	0.68	0.7	0.72	0.74	0.75	0.76	0.78	0.8	0.81	0.82	0.83	0.84	0.85
ALT. (FT)	TRUE AIRSPEED (KIAS)													
21,000	412	424	437	449	462	468	474	487	499	506	512	518	524	531
23,000	409	421	434	446	458	464	471	483	495	502	508	514	520	526
25,000	406	418	430	442	455	461	467	479	492	498	504	510	516	522
27,000	402	414	427	439	451	457	463	475	488	494	500	506	512	518
29,000	399	411	423	435	447	453	459	472	484	490	496	502	508	514
31,000	396	408	420	432	444	450	456	468	480	486	492	498	504	510
33,000	392	404	416	428	440	446	452	464	476	482	488	493	499	505
35,000	389	401	413	424	436	442	448	460	472	477	483	489	495	501
37,000	387	399	411	422	434	440	446	458	469	475	481	487	493	499
39,000	387	399	411	422	434	440	446	458	469	475	481	487	493	499
41,000	387	399	411	422	434	440	446	458	469	475	481	487	493	499
43,000	387	399	411	422	434	440	446	458	469	475	481	487	493	499
45,000	387	399	411	422	434	440	446	458	469	475	481	487	493	499

ISA +20°C

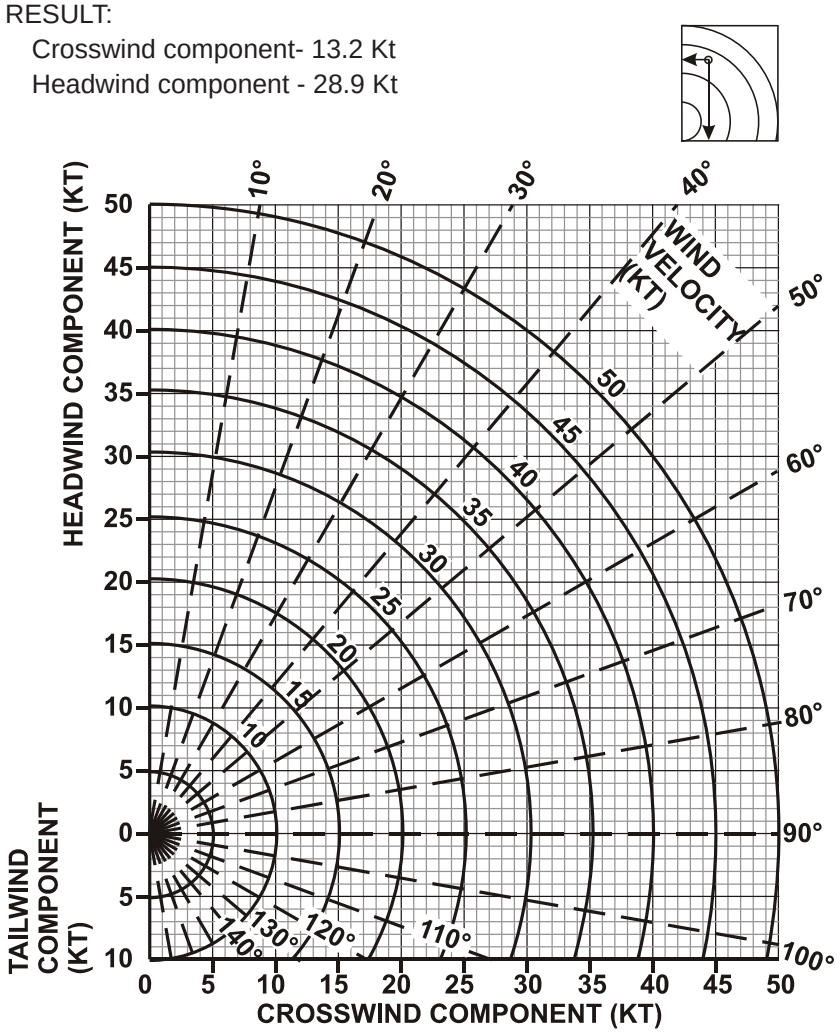
	INDICATED MACH NO.													
	0.66	**0.68**	**0.7**	**0.72**	**0.74**	**0.75**	**0.76**	**0.78**	**0.8**	**0.81**	**0.82**	**0.83**	**0.84**	**0.85**
ALT. (FT)	**TRUE AIRSPEED (KIAS)**													
21,000	420	433	445	458	471	477	484	496	509	515	522	528	534	541
23,000	417	429	442	455	467	474	480	493	505	511	518	524	530	537
25,000	414	426	439	451	464	470	476	489	501	508	514	520	526	533
27,000	410	423	435	448	460	466	473	485	497	504	510	516	522	529
29,000	407	420	432	444	457	463	469	481	494	500	506	512	518	524
31,000	404	416	428	441	453	459	465	477	490	496	502	508	514	520
33,000	401	413	425	437	449	455	461	474	486	492	498	504	510	516
35,000	397	409	422	434	446	452	458	470	482	488	494	500	506	512
37,000	396	408	420	432	444	450	456	468	480	486	492	498	504	510
39,000	396	408	420	432	444	450	456	468	480	486	492	498	504	510
41,000	396	408	420	432	444	450	456	468	480	486	492	498	504	510
43,000	396	408	420	432	444	450	456	468	480	486	492	498	504	510
45,000	396	408	420	432	444	450	456	468	480	486	492	498	504	510

WIND COMPONENTS

EXAMPLE:

GIVEN: Wind direction relative
to runway - 25°
Wind speed - 32 Kt

RESULT:
Crosswind component- 13.2 Kt
Headwind component - 28.9 Kt



VELOCITY CONVERSION

Table values represent the ratio between left column and top row units

UNIT	FEET PER SECOND (FT/S)	METERS PER SECOND (M/S)	KNOTS	KILOMETER PER HOUR (KPH)	MILES PER HOUR (MPH)
FT/S	1	0.304800	0.592484	1.097280	0.681818
M/S	3.28084	1	1.943844	3.60000	2.23694
KNOTS	1.687810	0.514444	1	1.852000	1.150779
KPH	0.911344	0.277778	0.539957	1	0.621371
MPH	1.466667	0.447040	0.868976	1.609344	1

PRESSURE CONVERSION

Table values represent the ratio between left column and top row units

UNIT	KPA	KG/CM^2	INCHES OF HG	MM OF HG	MBAR
KPA	1	0.0102	0.295	7.500	10
KG/CM^2	98.066	1	28.959	735.558	1013.25
IN HG	3.386	.0345	1	25.4	33.864
MM OF HG	0.1333	.0013	0.0394	1	1.333
MILLIBAR	0.1	.0010	0.0295	0.750	1

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TWO-ENGINE CLIMB

GENERAL

Climb performance tables are presented for a series of takeoff weights and ambient temperatures.

Normal climb data is based on the following climb schedule:

250 KCAS / 0.75 M_i

The climb calibrated speed should be maintained until the Mach number is intercepted.

If step climb technique is used, deduct figures given to reach present altitude, at current aircraft weight, from figures shown for the desired altitude.

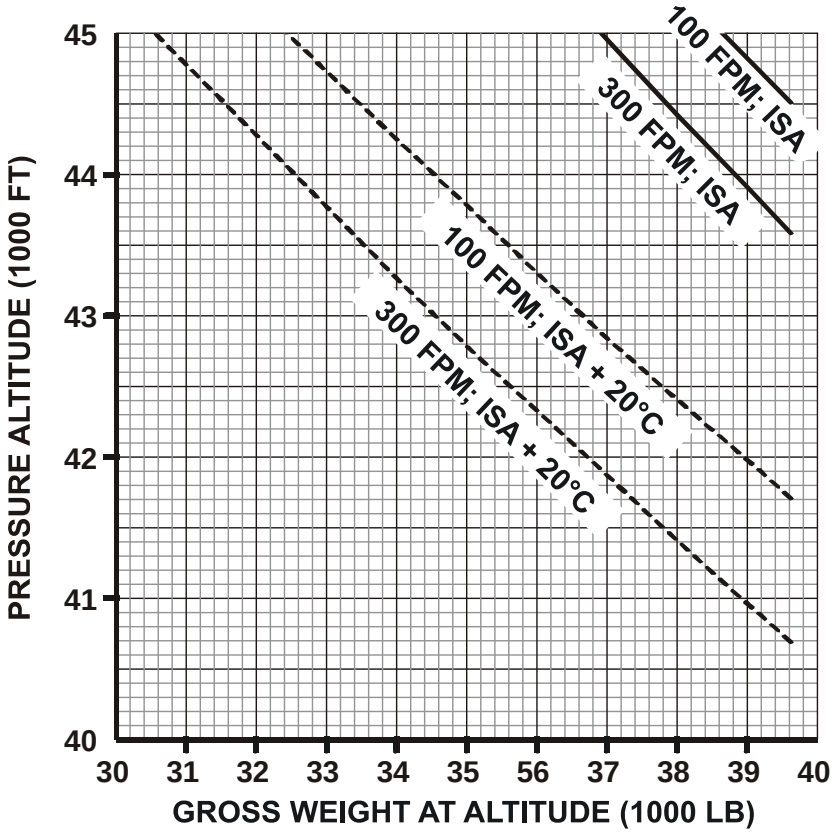
THRUST SETTINGS; TWO-ENGINE NORMAL CLIMB

Altitude	Climb Speed KCAS/M_i	Ambient Temperature at (ISA) (^{O}C)	N_1 (%RPM)				
			ISA-20^{O}C	ISA-10^{O}C	ISA	ISA+10^{O}C	ISA+20^{O}C
Sea Level	250	15	84.1	85.7	87.2	88.8	89.3
5,000	250	5	85.2	86.8	88.4	90.0	90.3
10,000	250	-5	85.9	87.6	89.3	91.0	90.7
15,000	250	-15	86.5	88.3	90.0	91.8	91.1
19,000	250	-23	87.1	89.0	90.8	92.6	91.5
21,000	250	-27	87.5	89.3	91.2	93.0	91.6
23,000	250	-31	87.8	89.7	91.5	93.3	91.7
25,000	250	-35	88.1	90.1	91.9	93.7	91.7
27,000	250	-39	88.5	90.4	92.3	94.2	91.8
29,000	250	-43	88.8	90.8	92.7	94.6	91.8
31,000	250	-46	88.9	90.9	92.8	94.7	92.0
33,000	250	-50	89.1	91.1	93.1	95.0	92.1
35,000	250	-54	88.9	91.0	93.0	95.0	92.2
37,000	0.75	-57	89.0	91.1	93.2	95.1	92.0
39,000	0.75	-57	89.3	91.4	93.5	94.6	91.2
41,000	0.75	-57	89.3	91.4	93.5	93.8	90.5
43,000	0.75	-57	88.9	91.0	93.1	92.9	89.9
45,000	0.75	-57	88.5	90.6	92.7	92.0	89.3

NOTE

Monitor ITT to prevent exceeding 928°C.

SERVICE CEILING;
TWO-ENGINE; NORMAL CLIMB



NORMAL CLIMB TABLES

CLIMB DATA - TAKE OFF GROSS WEIGHT: 26,000 LB

TWO ENGINE CLIMB

CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I

FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	11	65	582	11	68	612	11	71	643	12	77	680	16	105	791
44,000	-69.7	-56.5	10	61	566	11	64	596	11	67	626	11	72	660	15	97	760
43,000	-69.7	-56.5	10	58	551	10	61	580	10	64	609	11	68	642	14	89	733
42,000	-69.7	-56.5	9	55	537	10	58	565	10	60	593	10	64	624	13	83	709
41,000	-69.7	-56.5	9	52	523	9	55	550	9	57	578	10	60	607	12	78	686
40,000	-69.7	-56.5	9	50	510	9	52	536	9	54	563	9	57	591	12	73	665
39,000	-69.7	-56.5	8	47	497	8	49	522	9	51	548	9	54	575	11	69	645
38,000	-69.7	-56.5	8	45	484	8	47	508	8	49	534	9	51	560	10	65	626
37,000	-69.7	-56.5	8	42	471	8	44	495	8	46	519	8	49	544	10	61	607
36,000	-69.4	-56.3	7	40	458	7	42	481	8	44	505	8	46	530	9	58	589
35,000	-65.8	-54.3	7	38	444	7	40	467	7	42	490	7	43	513	9	54	569
34,000	-62.2	-52.4	7	36	429	7	37	451	7	39	473	7	41	495	8	50	548
33,000	-58.7	-50.4	6	34	415	6	35	435	7	37	457	7	38	478	8	47	528
32,000	-55.1	-48.4	6	32	400	6	33	420	6	34	441	6	36	461	8	44	508
31,000	-51.6	-46.4	6	30	386	6	31	405	6	32	425	6	34	445	7	41	489
30,000	-48.0	-44.4	5	28	373	6	29	391	6	30	410	6	32	429	7	38	470
29,000	-44.4	-42.5	5	26	359	5	27	377	5	29	395	5	30	413	6	36	452
27,000	-37.3	-38.5	5	23	333	5	24	349	5	25	366	5	26	383	6	31	417
25,000	-30.2	-34.5	4	21	308	4	21	323	4	22	338	4	23	353	5	27	383
23,000	-23.0	-30.6	4	18	283	4	19	296	4	20	310	4	20	324	5	24	350
21,000	-15.9	-26.6	3	16	258	3	17	271	3	17	283	4	18	296	4	21	319
19,000	-8.8	-22.6	3	14	234	3	14	245	3	15	256	3	16	268	4	18	287
15,000	5.5	-14.7	2	10	185	2	11	194	2	11	203	2	11	212	3	13	226
10,000	23.3	-4.8	1	6	124	1	6	130	1	7	136	2	7	142	2	8	150
5000	41.2	5.1	1	3	63	1	3	66	1	3	69	1	3	72	1	4	76

CLIMB DATA - TAKE OFF GROSS WEIGHT: 27,000 LB

TWO ENGINE CLIMB

CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I

FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	11	69	610	12	72	641	12	75	674	13	81	713	17	112	834
44,000	-69.7	-56.5	11	65	593	11	68	623	11	71	655	12	76	692	16	102	799
43,000	-69.7	-56.5	10	61	577	11	64	606	11	67	637	11	71	672	14	94	770
42,000	-69.7	-56.5	10	58	561	10	60	590	10	63	620	11	67	653	14	88	743
41,000	-69.7	-56.5	9	55	547	10	57	575	10	60	604	10	63	635	13	82	719
40,000	-69.7	-56.5	9	52	532	9	54	560	9	57	588	10	60	617	12	77	696
39,000	-69.7	-56.5	9	49	518	9	52	545	9	54	572	9	56	601	11	72	675
38,000	-69.7	-56.5	8	47	505	8	49	531	9	51	557	9	54	584	11	68	655
37,000	-69.7	-56.5	8	44	491	8	46	516	8	49	542	9	51	568	10	64	635
36,000	-69.4	-56.3	8	42	478	8	44	502	8	46	527	8	48	553	10	60	616
35,000	-65.8	-54.3	7	40	464	7	42	487	8	44	511	8	45	535	9	56	595
34,000	-62.2	-52.4	7	37	448	7	39	470	7	41	493	7	43	517	9	53	572
33,000	-58.7	-50.4	7	35	432	7	37	454	7	38	476	7	40	498	8	49	551
32,000	-55.1	-48.4	6	33	417	6	34	438	7	36	459	7	37	481	8	46	530
31,000	-51.6	-46.4	6	31	403	6	32	423	6	34	443	6	35	464	7	43	510
30,000	-48.0	-44.4	6	29	388	6	30	407	6	32	427	6	33	447	7	40	490
29,000	-44.4	-42.5	5	27	374	5	29	393	6	30	412	6	31	431	7	37	471
27,000	-37.3	-38.5	5	24	347	5	25	364	5	26	381	5	27	399	6	33	434
25,000	-30.2	-34.5	4	21	320	4	22	336	5	23	352	5	24	368	5	29	399
23,000	-23.0	-30.6	4	19	294	4	20	308	4	20	323	4	21	337	5	25	365
21,000	-15.9	-26.6	3	17	269	4	17	282	4	18	295	4	19	308	4	22	332
19,000	-8.8	-22.6	3	14	244	3	15	255	3	16	267	3	16	279	4	19	299
15,000	5.5	-14.7	2	11	193	2	11	202	2	11	211	2	12	220	3	13	235
10,000	23.3	-4.8	1	6	129	2	7	135	2	7	141	2	7	147	2	8	156
	41.2	5.1	1	3	65	1	3	68	1	3	71	1	3	75	1	4	79

CLIMB DATA - TAKE OFF GROSS WEIGHT: 28,000 LB
TWO ENGINE CLIMB
CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I
FOR%N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	12	72	638	12	76	671	13	79	705	13	85	748	18	120	879
44,000	-69.7	-56.5	11	68	620	12	71	652	12	74	685	13	80	724	16	108	841
43,000	-69.7	-56.5	11	64	603	11	67	634	11	70	666	12	75	702	15	100	808
42,000	-69.7	-56.5	10	60	586	11	63	617	11	66	648	11	70	682	14	92	779
41,000	-69.7	-56.5	10	57	571	10	60	600	10	63	630	11	66	663	13	86	753
40,000	-69.7	-56.5	9	54	556	10	57	584	10	59	613	10	62	644	13	80	728
39,000	-69.7	-56.5	9	51	541	9	54	569	9	56	597	10	59	627	12	75	706
38,000	-69.7	-56.5	9	49	527	9	51	553	9	53	581	9	56	609	11	71	684
37,000	-69.7	-56.5	8	46	512	8	49	538	9	51	565	9	53	593	11	67	663
36,000	-69.4	-56.3	8	44	498	8	46	524	8	48	550	9	50	576	10	63	643
35,000	-65.8	-54.3	8	42	483	8	43	508	8	45	533	8	47	558	10	59	621
34,000	-62.2	-52.4	7	39	466	7	41	490	8	43	514	8	44	538	9	55	597
33,000	-58.7	-50.4	7	37	450	7	38	473	7	40	496	7	42	519	9	51	574
32,000	-55.1	-48.4	6	34	435	7	36	456	7	37	478	7	39	501	8	48	552
31,000	-51.6	-46.4	6	32	419	6	34	440	6	35	461	7	37	483	8	45	531
30,000	-48.0	-44.4	6	30	404	6	32	424	6	33	445	6	34	465	7	42	511
29,000	-44.4	-42.5	6	29	390	6	30	409	6	31	428	6	32	448	7	39	491
27,000	-37.3	-38.5	5	25	361	5	26	379	5	27	397	5	29	415	6	34	452
25,000	-30.2	-34.5	5	22	333	5	23	349	5	24	366	5	25	383	6	30	416
23,000	-23.0	-30.6	4	20	306	4	20	321	4	21	336	4	22	351	5	26	380
21,000	-15.9	-26.6	4	17	280	4	18	293	4	19	306	4	19	320	4	22	345
19,000	-8.8	-22.6	3	15	253	3	16	265	3	16	277	3	17	290	4	19	311
15,000	5.5	-14.7	2	11	200	2	11	210	3	12	219	3	12	229	3	14	244
10,000	23.3	-4.8	2	7	134	2	7	141	2	7	147	2	8	153	2	8	163
5000	41.2	5.1	1	3	68	1	3	71	1	3	74	1	4	77	1	4	82

CLIMB DATA - TAKE OFF GROSS WEIGHT: 29,000 LB

TWO ENGINE CLIMB

CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I

FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	13	76	668	13	80	703	13	83	738	14	90	783	19	128	929
44,000	-69.7	-56.5	12	71	648	12	75	682	13	78	716	13	84	757	17	115	884
43,000	-69.7	-56.5	11	67	630	12	70	662	12	73	696	12	78	734	16	105	847
42,000	-69.7	-56.5	11	63	612	11	66	644	11	69	676	12	73	712	15	97	816
41,000	-69.7	-56.5	10	60	596	11	63	626	11	65	658	11	69	692	14	90	787
40,000	-69.7	-56.5	10	57	579	10	59	609	10	62	640	11	65	672	13	84	761
39,000	-69.7	-56.5	9	54	564	10	56	593	10	59	622	10	62	653	13	79	737
38,000	-69.7	-56.5	9	51	549	9	53	577	9	56	605	10	58	635	12	74	714
37,000	-69.7	-56.5	9	48	534	9	51	561	9	53	589	9	55	617	11	70	692
36,000	-69.4	-56.3	8	46	519	8	48	545	9	50	573	9	52	600	11	66	670
35,000	-65.8	-54.3	8	43	503	8	45	528	8	47	555	8	49	581	10	62	647
34,000	-62.2	-52.4	7	41	486	8	42	510	8	44	535	8	46	560	10	57	622
33,000	-58.7	-50.4	7	38	469	7	40	492	7	42	516	8	43	540	9	53	598
32,000	-55.1	-48.4	7	36	452	7	37	475	7	39	498	7	41	521	9	50	575
31,000	-51.6	-46.4	6	34	436	7	35	458	7	37	480	7	38	502	8	47	553
30,000	-48.0	-44.4	6	32	421	6	33	441	6	34	463	7	36	484	8	43	532
29,000	-44.4	-42.5	6	30	405	6	31	425	6	32	446	6	34	466	7	41	511
27,000	-37.3	-38.5	5	26	376	5	27	394	5	28	412	6	30	431	6	35	471
25,000	-30.2	-34.5	5	23	347	5	24	363	5	25	380	5	26	398	6	31	432
23,000	-23.0	-30.6	4	20	318	4	21	334	4	22	349	4	23	365	5	27	395
21,000	-15.9	-26.6	4	18	291	4	19	304	4	19	318	4	20	333	5	23	359
19,000	-8.8	-22.6	3	16	263	3	16	276	3	17	288	4	17	301	4	20	323
15,000	5.5	-14.7	3	11	208	3	12	218	3	12	228	3	13	238	3	14	254
10,000	23.3	-4.8	2	7	140	2	7	146	2	8	153	2	8	159	2	9	169
5000	41.2	5.1	1	3	71	1	3	74	1	4	77	1	4	80	1	4	85

CLIMB DATA - TAKE OFF GROSS WEIGHT: 30,000 LB
TWO ENGINE CLIMB
CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I
FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	13	80	699	14	84	736	14	87	773	15	95	821	20	137	983
44,000	-69.7	-56.5	13	75	678	13	78	713	13	82	748	14	88	792	18	122	931
43,000	-69.7	-56.5	12	70	657	12	74	691	12	77	726	13	82	766	17	111	889
42,000	-69.7	-56.5	11	66	639	12	69	671	12	72	705	12	77	743	16	102	854
41,000	-69.7	-56.5	11	62	621	11	65	653	11	68	685	12	72	721	15	95	823
40,000	-69.7	-56.5	10	59	604	11	62	635	11	65	666	11	68	700	14	88	795
39,000	-69.7	-56.5	10	56	587	10	59	617	10	61	648	11	64	680	13	83	769
38,000	-69.7	-56.5	9	53	571	10	56	600	10	58	630	10	61	661	12	78	744
37,000	-69.7	-56.5	9	50	556	9	53	584	9	55	613	10	58	643	12	73	721
36,000	-69.4	-56.3	9	48	540	9	50	568	9	52	596	9	55	624	11	69	698
35,000	-65.8	-54.3	8	45	523	8	47	550	9	49	577	9	51	604	11	64	674
34,000	-62.2	-52.4	8	42	505	8	44	530	8	46	556	8	48	583	10	60	648
33,000	-58.7	-50.4	7	40	487	8	41	511	8	43	537	8	45	562	9	56	623
32,000	-55.1	-48.4	7	37	470	7	39	493	7	41	517	8	42	542	9	52	599
31,000	-51.6	-46.4	7	35	453	7	36	476	7	38	499	7	40	522	8	48	575
30,000	-48.0	-44.4	6	33	437	6	34	459	7	36	481	7	37	503	8	45	553
29,000	-44.4	-42.5	6	31	421	6	32	442	6	34	463	6	35	484	8	42	531
27,000	-37.3	-38.5	5	27	390	6	28	409	6	30	428	6	31	448	7	37	489
25,000	-30.2	-34.5	5	24	360	5	25	377	5	26	395	5	27	413	6	32	449
23,000	-23.0	-30.6	4	21	331	4	22	346	5	23	363	5	24	379	5	28	410
21,000	-15.9	-26.6	4	19	302	4	19	316	4	20	331	4	21	345	5	24	373
19,000	-8.8	-22.6	3	16	273	4	17	286	4	17	299	4	18	312	4	21	336
15,000	5.5	-14.7	3	12	216	3	12	226	3	13	236	3	13	247	3	15	264
10,000	23.3	-4.8	2	7	145	2	8	152	2	8	158	2	8	165	2	9	175
5000	41.2	5.1	1	3	73	1	4	77	1	4	80	1	4	83	1	4	88

CLIMB DATA - TAKE OFF GROSS WEIGHT: 31,000 LB

TWO ENGINE CLIMB

CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I

FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	14	84	732	14	88	770	15	92	809	16	100	860	22	149	1045
44,000	-69.7	-56.5	13	79	708	13	82	744	14	86	782	14	93	828	20	130	981
43,000	-69.7	-56.5	12	74	686	13	77	721	13	80	758	14	86	800	18	118	933
42,000	-69.7	-56.5	12	69	666	12	72	700	12	76	735	13	80	775	17	108	894
41,000	-69.7	-56.5	11	65	647	12	68	680	12	71	714	12	75	751	15	99	860
40,000	-69.7	-56.5	11	62	629	11	65	661	11	68	694	12	71	729	15	93	830
39,000	-69.7	-56.5	10	58	611	10	61	642	11	64	675	11	67	708	14	86	802
38,000	-69.7	-56.5	10	55	594	10	58	625	10	61	656	11	63	688	13	81	776
37,000	-69.7	-56.5	9	53	578	10	55	607	10	57	637	10	60	668	12	76	751
36,000	-69.4	-56.3	9	50	562	9	52	590	9	54	619	10	57	649	12	72	727
35,000	-65.8	-54.3	9	47	544	9	49	571	9	51	600	9	54	628	11	67	701
34,000	-62.2	-52.4	8	44	525	8	46	551	8	48	578	9	50	606	10	62	674
33,000	-58.7	-50.4	8	41	506	8	43	531	8	45	557	8	47	584	10	58	647
32,000	-55.1	-48.4	7	39	488	7	40	512	8	42	537	8	44	562	9	54	622
31,000	-51.6	-46.4	7	36	471	7	38	494	7	40	518	7	41	542	9	50	598
30,000	-48.0	-44.4	7	34	454	7	36	476	7	37	499	7	39	522	8	47	574
29,000	-44.4	-42.5	6	32	437	6	33	458	7	35	480	7	36	503	8	44	551
27,000	-37.3	-38.5	6	28	405	6	29	424	6	31	444	6	32	465	7	38	508
25,000	-30.2	-34.5	5	25	373	5	26	391	5	27	410	5	28	428	6	33	466
23,000	-23.0	-30.6	5	22	343	5	23	359	5	24	376	5	25	393	6	29	426
21,000	-15.9	-26.6	4	19	313	4	20	328	4	21	343	4	22	358	5	25	386
19,000	-8.8	-22.6	4	17	283	4	17	296	4	18	310	4	19	324	4	22	348
15,000	5.5	-14.7	3	12	224	3	13	234	3	13	245	3	14	256	3	16	273
10,000	23.3	-4.8	2	7	150	2	8	157	2	8	164	2	8	171	2	9	182
5000	41.2	5.1	1	4	76	1	4	79	1	4	83	1	4	86	1	4	91

CLIMB DATA - TAKE OFF GROSS WEIGHT: 32,000 LB
TWO ENGINE CLIMB
CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I
FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	15	89	766	15	93	806	15	97	847	16	106	902			
44,000	-69.7	-56.5	14	83	740	14	86	778	14	90	817	15	98	866	21	140	1036
43,000	-69.7	-56.5	13	77	716	13	81	753	14	84	791	14	90	835	19	125	980
42,000	-69.7	-56.5	12	72	694	13	76	730	13	79	766	13	84	808	17	113	936
41,000	-69.7	-56.5	12	68	673	12	71	708	12	75	744	13	79	782	16	104	899
40,000	-69.7	-56.5	11	64	654	11	67	688	12	70	722	12	74	759	15	97	866
39,000	-69.7	-56.5	11	61	636	11	64	668	11	67	702	11	70	737	14	90	836
38,000	-69.7	-56.5	10	58	618	10	60	649	11	63	682	11	66	715	14	85	809
37,000	-69.7	-56.5	10	55	600	10	57	631	10	60	662	10	63	695	13	80	782
36,000	-69.4	-56.3	9	52	584	10	54	613	10	57	644	10	59	675	12	75	757
35,000	-65.8	-54.3	9	49	565	9	51	594	9	53	623	10	56	653	12	70	729
34,000	-62.2	-52.4	8	46	545	9	48	572	9	50	600	9	52	629	11	65	701
33,000	-58.7	-50.4	8	43	525	8	45	552	8	47	579	9	49	606	10	60	673
32,000	-55.1	-48.4	8	40	507	8	42	532	8	44	558	8	46	584	10	56	647
31,000	-51.6	-46.4	7	38	488	7	39	513	8	41	537	8	43	562	9	52	621
30,000	-48.0	-44.4	7	35	471	7	37	494	7	39	518	7	40	542	9	49	596
29,000	-44.4	-42.5	6	33	453	7	35	475	7	36	498	7	38	521	8	46	573
27,000	-37.3	-38.5	6	29	420	6	31	440	6	32	461	6	33	482	7	40	527
25,000	-30.2	-34.5	5	26	387	5	27	406	5	28	425	6	29	444	6	35	483
23,000	-23.0	-30.6	5	23	355	5	24	372	5	25	390	5	26	407	6	30	441
21,000	-15.9	-26.6	4	20	324	4	21	339	4	22	355	4	22	371	5	26	401
19,000	-8.8	-22.6	4	17	293	4	18	307	4	19	321	4	19	336	4	22	361
15,000	5.5	-14.7	3	13	232	3	13	243	3	14	254	3	14	265	3	16	283
10,000	23.3	-4.8	2	8	155	2	8	163	2	8	170	2	9	177	2	10	188
5000	41.2	5.1	1	4	79	1	4	82	1	4	86	1	4	89	1	4	95

CLIMB DATA - TAKE OFF GROSS WEIGHT: 33,000 LB

TWO ENGINE CLIMB

CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I

FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	16	94	803	16	98	845	16	103	887	17	113	948			
44,000	-69.7	-56.5	15	87	773	15	91	813	15	95	854	16	103	907	22	151	1098
43,000	-69.7	-56.5	14	81	747	14	85	785	14	88	825	15	95	872	20	133	1031
42,000	-69.7	-56.5	13	76	723	13	79	760	13	83	798	14	88	842	18	120	981
41,000	-69.7	-56.5	12	71	701	13	75	737	13	78	774	13	82	815	17	110	940
40,000	-69.7	-56.5	12	67	680	12	70	715	12	73	751	13	77	790	16	102	904
39,000	-69.7	-56.5	11	63	661	11	66	695	12	69	729	12	73	766	15	95	872
38,000	-69.7	-56.5	11	60	642	11	63	675	11	66	709	11	69	743	14	88	842
37,000	-69.7	-56.5	10	57	624	10	60	655	11	62	688	11	65	722	13	83	814
36,000	-69.4	-56.3	10	54	606	10	56	637	10	59	668	10	62	701	13	78	787
35,000	-65.8	-54.3	9	51	587	9	53	616	10	55	647	10	58	678	12	73	758
34,000	-62.2	-52.4	9	47	565	9	50	594	9	52	623	9	54	653	11	68	728
33,000	-58.7	-50.4	8	44	545	8	46	572	9	49	600	9	51	629	11	63	699
32,000	-55.1	-48.4	8	42	526	8	44	552	8	45	578	8	47	606	10	58	671
31,000	-51.6	-46.4	7	39	507	8	41	531	8	43	557	8	44	583	10	54	645
30,000	-48.0	-44.4	7	37	488	7	38	512	7	40	537	8	42	562	9	51	619
29,000	-44.4	-42.5	7	34	470	7	36	493	7	38	517	7	39	540	8	47	594
27,000	-37.3	-38.5	6	30	435	6	32	456	6	33	478	6	34	499	8	41	547
25,000	-30.2	-34.5	5	27	401	6	28	420	6	29	440	6	30	460	7	36	501
23,000	-23.0	-30.6	5	24	368	5	25	386	5	26	404	5	27	422	6	31	457
21,000	-15.9	-26.6	4	21	336	4	21	352	5	22	368	5	23	384	5	27	415
19,000	-8.8	-22.6	4	18	304	4	19	318	4	19	333	4	20	347	5	23	374
15,000	5.5	-14.7	3	13	240	3	14	251	3	14	263	3	15	274	3	17	293
10,000	23.3	-4.8	2	8	161	2	8	168	2	9	176	2	9	183	2	10	195
5000	41.2	5.1	1	4	81	1	4	85	1	4	89	1	4	93	1	5	98

CLIMB DATA - TAKE OFF GROSS WEIGHT: 34,000 LB

TWO ENGINE CLIMB

CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I

FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	16	100	843	17	104	886	17	109	931	19	121	998			
44,000	-69.7	-56.5	15	91	808	16	96	850	16	100	893	17	109	949			
43,000	-69.7	-56.5	14	85	779	15	89	819	15	93	860	16	100	911	21	142	1087
42,000	-69.7	-56.5	13	79	753	14	83	792	14	87	832	15	92	878	19	127	1029
41,000	-69.7	-56.5	13	74	730	13	78	767	13	81	805	14	86	848	18	115	982
40,000	-69.7	-56.5	12	70	708	12	73	744	13	77	781	13	81	821	17	107	943
39,000	-69.7	-56.5	12	66	687	12	69	722	12	72	758	12	76	796	16	99	908
38,000	-69.7	-56.5	11	63	667	11	65	701	12	68	736	12	72	772	15	92	877
37,000	-69.7	-56.5	11	59	648	11	62	680	11	65	714	11	68	749	14	87	847
36,000	-69.4	-56.3	10	56	629	10	59	661	11	61	694	11	64	727	13	81	818
35,000	-65.8	-54.3	10	53	608	10	55	639	10	58	671	10	60	703	13	76	788
34,000	-62.2	-52.4	9	49	586	9	52	616	10	54	646	10	56	677	12	70	756
33,000	-58.7	-50.4	9	46	565	9	48	593	9	50	622	9	53	652	11	65	726
32,000	-55.1	-48.4	8	43	545	8	45	572	9	47	600	9	49	628	10	61	697
31,000	-51.6	-46.4	8	41	525	8	42	551	8	44	577	8	46	604	10	57	669
30,000	-48.0	-44.4	7	38	506	8	40	530	8	41	556	8	43	582	9	53	642
29,000	-44.4	-42.5	7	36	487	7	37	511	7	39	535	7	41	560	9	49	616
27,000	-37.3	-38.5	6	31	450	6	33	472	7	34	495	7	36	517	8	43	566
25,000	-30.2	-34.5	6	28	415	6	29	435	6	30	456	6	31	476	7	37	519
23,000	-23.0	-30.6	5	24	381	5	25	399	5	26	418	5	28	437	6	32	474
21,000	-15.9	-26.6	5	21	347	5	22	364	5	23	381	5	24	398	5	28	430
19,000	-8.8	-22.6	4	19	314	4	19	329	4	20	344	4	21	360	5	24	387
15,000	5.5	-14.7	3	14	248	3	14	260	3	15	272	3	15	284	4	17	303
10,000	23.3	-4.8	2	8	166	2	9	174	2	9	182	2	9	190	2	10	201
5000	41.2	5.1	1	4	84	1	4	88	1	4	92	1	4	96	1	5	101

CLIMB DATA - TAKE OFF GROSS WEIGHT: 35,000 LB

TWO ENGINE CLIMB

CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I

FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	17	106	886	18	111	932	18	116	978	20	130	1054			
44,000	-69.7	-56.5	16	97	846	16	101	890	17	105	934	18	115	996			
43,000	-69.7	-56.5	15	89	813	15	93	855	16	97	898	16	105	952	23	152	1149
42,000	-69.7	-56.5	14	83	785	14	87	825	15	91	866	15	97	915	20	134	1080
41,000	-69.7	-56.5	13	78	759	14	81	798	14	85	838	14	90	883	19	122	1028
40,000	-69.7	-56.5	13	73	735	13	76	773	13	80	812	14	84	854	17	112	984
39,000	-69.7	-56.5	12	69	713	12	72	750	13	75	787	13	79	827	16	104	947
38,000	-69.7	-56.5	11	65	692	12	68	728	12	71	764	12	75	801	15	96	912
37,000	-69.7	-56.5	11	61	672	11	64	706	11	67	741	12	70	777	15	90	880
36,000	-69.4	-56.3	10	58	652	11	61	685	11	64	719	11	66	754	14	85	850
35,000	-65.8	-54.3	10	55	631	10	57	663	10	60	695	11	62	729	13	79	818
34,000	-62.2	-52.4	9	51	608	10	53	638	10	56	670	10	58	701	12	73	785
33,000	-58.7	-50.4	9	48	586	9	50	615	9	52	645	10	54	675	12	68	753
32,000	-55.1	-48.4	8	45	564	9	47	592	9	49	621	9	51	650	11	63	723
31,000	-51.6	-46.4	8	42	544	8	44	570	8	46	598	9	48	626	10	59	693
30,000	-48.0	-44.4	8	39	524	8	41	549	8	43	576	8	45	602	10	55	665
29,000	-44.4	-42.5	7	37	504	7	39	528	8	40	554	8	42	579	9	51	638
27,000	-37.3	-38.5	6	33	466	7	34	488	7	35	512	7	37	535	8	44	587
25,000	-30.2	-34.5	6	29	430	6	30	450	6	31	471	6	32	493	7	39	537
23,000	-23.0	-30.6	5	25	394	5	26	413	5	27	432	6	28	452	6	33	490
21,000	-15.9	-26.6	5	22	359	5	23	376	5	24	394	5	25	411	6	29	445
19,000	-8.8	-22.6	4	19	325	4	20	340	4	21	356	4	22	372	5	25	400
15,000	5.5	-14.7	3	14	257	3	15	269	3	15	281	3	16	293	4	18	314
10,000	23.3	-4.8	2	9	172	2	9	180	2	9	188	2	10	196	2	11	208
5000	41.2	5.1	1	4	87	1	4	91	1	4	95	1	4	99	1	5	104

CLIMB DATA - TAKE OFF GROSS WEIGHT: 36,000 LB
TWO ENGINE CLIMB
CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I
FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	19	113	934	19	119	982	19	124	1031	21	141	1119			
44,000	-69.7	-56.5	17	102	887	17	107	933	18	112	979	19	123	1047			
43,000	-69.7	-56.5	16	94	849	16	98	893	16	102	938	17	111	995			
42,000	-69.7	-56.5	15	87	818	15	91	860	15	95	903	16	101	954	22	143	1136
41,000	-69.7	-56.5	14	81	790	14	85	830	15	89	872	15	94	919	20	128	1076
40,000	-69.7	-56.5	13	76	765	13	80	804	14	83	844	14	88	888	18	117	1028
39,000	-69.7	-56.5	13	72	741	13	75	779	13	78	818	13	82	859	17	109	987
38,000	-69.7	-56.5	12	68	719	12	71	755	12	74	793	13	78	832	16	101	950
37,000	-69.7	-56.5	11	64	697	12	67	733	12	70	769	12	73	806	15	94	916
36,000	-69.4	-56.3	11	60	676	11	63	711	11	66	746	12	69	782	14	88	884
35,000	-65.8	-54.3	10	57	654	11	59	687	11	62	721	11	65	755	14	82	850
34,000	-62.2	-52.4	10	53	630	10	56	661	10	58	694	10	60	727	13	76	815
33,000	-58.7	-50.4	9	50	607	9	52	637	10	54	668	10	56	699	12	71	781
32,000	-55.1	-48.4	9	46	584	9	49	613	9	51	643	9	53	673	11	66	749
31,000	-51.6	-46.4	8	44	563	8	45	590	9	47	619	9	49	648	11	61	719
30,000	-48.0	-44.4	8	41	542	8	43	568	8	44	596	8	46	623	10	57	689
29,000	-44.4	-42.5	7	38	521	8	40	547	8	42	573	8	43	599	9	53	661
27,000	-37.3	-38.5	7	34	482	7	35	505	7	37	529	7	38	553	8	46	607
25,000	-30.2	-34.5	6	30	444	6	31	465	6	32	487	6	34	509	7	40	556
23,000	-23.0	-30.6	5	26	407	6	27	427	6	28	447	6	29	467	7	35	507
21,000	-15.9	-26.6	5	23	371	5	24	389	5	25	407	5	26	425	6	30	460
19,000	-8.8	-22.6	4	20	336	4	21	352	4	21	368	5	22	384	5	26	414
15,000	5.5	-14.7	3	15	265	3	15	278	3	16	290	3	16	303	4	18	324
10,000	23.3	-4.8	2	9	177	2	9	186	2	10	194	2	10	202	2	11	215
5000	41.2	5.1	1	4	90	1	4	94	1	4	98	1	5	102	1	5	108

CLIMB DATA - TAKE OFF GROSS WEIGHT: 37,000 LB

TWO ENGINE CLIMB

CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I

FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5	20	122	989	20	128	1039	21	133	1090						
44,000	-69.7	-56.5	18	109	932	18	114	980	19	119	1029	20	132	1105			
43,000	-69.7	-56.5	17	99	889	17	103	934	17	108	981	18	117	1043			
42,000	-69.7	-56.5	15	91	853	16	95	897	16	100	942	17	107	996	23	153	1200
41,000	-69.7	-56.5	15	85	822	15	89	865	15	93	908	16	99	957	21	136	1129
40,000	-69.7	-56.5	14	79	795	14	83	836	14	87	877	15	92	923	19	124	1075
39,000	-69.7	-56.5	13	75	770	13	78	809	14	82	849	14	86	892	18	114	1029
38,000	-69.7	-56.5	12	70	746	13	74	784	13	77	823	13	81	864	17	105	989
37,000	-69.7	-56.5	12	66	723	12	70	760	12	73	798	13	76	837	16	98	953
36,000	-69.4	-56.3	11	63	701	12	66	737	12	69	774	12	72	811	15	92	919
35,000	-65.8	-54.3	11	59	678	11	62	712	11	65	747	11	67	783	14	85	883
34,000	-62.2	-52.4	10	55	653	10	58	685	11	60	719	11	63	753	13	79	846
33,000	-58.7	-50.4	10	51	628	10	54	660	10	56	692	10	59	724	12	73	811
32,000	-55.1	-48.4	9	48	605	9	50	635	9	53	666	10	55	697	12	68	777
31,000	-51.6	-46.4	9	45	582	9	47	611	9	49	641	9	51	671	11	63	745
30,000	-48.0	-44.4	8	42	561	8	44	588	9	46	616	9	48	645	10	59	714
29,000	-44.4	-42.5	8	40	539	8	41	566	8	43	593	8	45	620	10	55	685
27,000	-37.3	-38.5	7	35	498	7	36	522	7	38	547	7	39	572	9	48	628
25,000	-30.2	-34.5	6	31	459	6	32	481	7	33	504	7	35	526	8	41	575
23,000	-23.0	-30.6	6	27	421	6	28	441	6	29	461	6	30	482	7	36	524
21,000	-15.9	-26.6	5	24	383	5	25	401	5	26	420	5	27	439	6	31	475
19,000	-8.8	-22.6	4	20	347	4	21	363	5	22	380	5	23	397	5	27	428
15,000	5.5	-14.7	3	15	274	3	16	287	3	16	300	4	17	313	4	19	335
10,000	23.3	-4.8	2	9	183	2	9	191	2	10	200	2	10	209	2	11	222
5000	41.2	5.1	1	4	92	1	4	97	1	5	101	1	5	105	1	5	111

CLIMB DATA - TAKE OFF GROSS WEIGHT: 38,000 LB
TWO ENGINE CLIMB
CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I
FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5							22	144	1160						
44,000	-69.7	-56.5	19	116	982	20	121	1032	20	127	1083	22	142	1171			
43,000	-69.7	-56.5	17	105	931	18	109	979	18	114	1027	19	124	1095			
42,000	-69.7	-56.5	16	96	890	17	100	936	17	105	983	18	112	1041			
41,000	-69.7	-56.5	15	89	856	16	93	900	16	97	945	16	103	997	22	144	1186
40,000	-69.7	-56.5	14	83	827	15	87	869	15	91	913	15	96	960	20	130	1125
39,000	-69.7	-56.5	14	78	800	14	82	841	14	85	883	15	90	927	19	119	1074
38,000	-69.7	-56.5	13	73	774	13	77	814	13	80	854	14	84	897	18	110	1031
37,000	-69.7	-56.5	12	69	750	13	72	788	13	76	828	13	79	868	17	103	992
36,000	-69.4	-56.3	12	65	727	12	68	764	12	71	802	13	75	841	16	96	956
35,000	-65.8	-54.3	11	61	703	11	64	738	12	67	775	12	70	812	15	89	918
34,000	-62.2	-52.4	11	57	676	11	60	710	11	62	745	11	65	780	14	82	878
33,000	-58.7	-50.4	10	53	651	10	56	683	10	58	716	11	61	750	13	76	841
32,000	-55.1	-48.4	9	50	626	10	52	657	10	54	689	10	57	722	12	71	806
31,000	-51.6	-46.4	9	47	603	9	49	633	9	51	663	10	53	694	11	66	773
30,000	-48.0	-44.4	8	44	580	9	46	609	9	48	638	9	50	668	11	61	740
29,000	-44.4	-42.5	8	41	558	8	43	585	8	45	613	9	47	642	10	57	709
27,000	-37.3	-38.5	7	36	515	7	38	540	8	39	566	8	41	592	9	49	651
25,000	-30.2	-34.5	6	32	474	7	33	497	7	34	521	7	36	544	8	43	595
23,000	-23.0	-30.6	6	28	435	6	29	456	6	30	477	6	31	498	7	37	542
21,000	-15.9	-26.6	5	24	396	5	25	415	5	26	434	5	27	453	6	32	491
19,000	-8.8	-22.6	5	21	358	5	22	375	5	23	392	5	24	410	5	27	442
15,000	5.5	-14.7	3	15	283	4	16	296	4	17	309	4	17	323	4	20	346
10,000	23.3	-4.8	2	9	189	2	10	198	2	10	206	2	11	215	3	12	229
	41.2	5.1	1	4	95	1	5	100	1	5	104	1	5	108	1	5	115

CLIMB DATA - TAKE OFF GROSS WEIGHT: 39,000 LB

TWO ENGINE CLIMB

CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I

FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5															
44,000	-69.7	-56.5	20	125	1038	21	130	1091	21	136	1144						
43,000	-69.7	-56.5	18	111	977	19	116	1027	19	121	1078	21	133	1154			
42,000	-69.7	-56.5	17	101	931	17	106	978	18	110	1027	19	119	1089			
41,000	-69.7	-56.5	16	93	892	16	97	938	17	102	985	17	108	1040	23	154	1250
40,000	-69.7	-56.5	15	87	860	15	91	904	16	95	949	16	100	999	21	138	1178
39,000	-69.7	-56.5	14	81	831	14	85	873	15	89	917	15	93	963	20	125	1122
38,000	-69.7	-56.5	13	76	804	14	80	845	14	83	887	14	87	931	18	116	1074
37,000	-69.7	-56.5	13	72	778	13	75	818	13	79	859	14	82	900	17	107	1032
36,000	-69.4	-56.3	12	68	754	12	71	792	13	74	832	13	77	872	16	100	993
35,000	-65.8	-54.3	12	64	728	12	67	765	12	70	803	12	73	841	15	93	953
34,000	-62.2	-52.4	11	59	700	11	62	735	11	65	772	12	68	808	14	86	912
33,000	-58.7	-50.4	10	55	674	11	58	707	11	60	742	11	63	777	13	79	873
32,000	-55.1	-48.4	10	52	648	10	54	680	10	56	714	10	59	747	13	73	836
31,000	-51.6	-46.4	9	48	624	9	51	655	10	53	686	10	55	718	12	68	801
30,000	-48.0	-44.4	9	45	600	9	47	630	9	49	660	9	51	691	11	63	767
29,000	-44.4	-42.5	8	43	577	8	44	605	9	46	634	9	48	664	11	59	735
27,000	-37.3	-38.5	7	37	533	8	39	558	8	41	585	8	42	612	9	51	674
25,000	-30.2	-34.5	7	33	490	7	34	514	7	36	538	7	37	562	8	44	616
23,000	-23.0	-30.6	6	29	449	6	30	471	6	31	493	6	32	515	7	38	561
21,000	-15.9	-26.6	5	25	409	5	26	428	6	27	448	6	28	468	6	33	508
19,000	-8.8	-22.6	5	22	370	5	23	387	5	24	405	5	25	423	6	28	457
15,000	5.5	-14.7	4	16	292	4	17	305	4	17	319	4	18	333	4	20	357
10,000	23.3	-4.8	2	10	195	2	10	204	2	10	213	2	11	222	3	12	236
5000	41.2	5.1	1	5	98	1	5	103	1	5	107	1	5	112	1	6	118

CLIMB DATA - TAKE OFF GROSS WEIGHT: 39,600 LB

TWO ENGINE CLIMB

CLIMB SPEED SCHEDULE - 250 KCAS/0.75 M_I

FOR %N1 SETTING SEE PAGE VIII-1-2

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
45,000	-69.7	-56.5															
44,000	-69.7	-56.5	21	131	1076	22	137	1130	22	142	1185						
43,000	-69.7	-56.5	19	115	1007	20	121	1058	20	126	1111	21	139	1192			
42,000	-69.7	-56.5	18	104	956	18	109	1005	18	114	1055	19	123	1120			
41,000	-69.7	-56.5	16	96	915	17	100	962	17	105	1010	18	112	1067	24	161	1292
40,000	-69.7	-56.5	15	89	881	16	93	926	16	97	972	17	103	1024	22	142	1212
39,000	-69.7	-56.5	14	83	850	15	87	894	15	91	938	16	96	986	20	129	1152
38,000	-69.7	-56.5	14	78	822	14	82	864	14	86	907	15	90	952	19	119	1102
37,000	-69.7	-56.5	13	74	796	13	77	836	14	81	878	14	84	920	18	110	1057
36,000	-69.4	-56.3	12	69	770	13	73	810	13	76	850	13	79	891	17	103	1017
35,000	-65.8	-54.3	12	65	744	12	68	781	12	71	820	13	74	859	16	95	975
34,000	-62.2	-52.4	11	61	715	11	63	751	12	66	788	12	69	825	15	88	932
33,000	-58.7	-50.4	11	57	688	11	59	722	11	62	757	11	64	793	14	81	892
32,000	-55.1	-48.4	10	53	662	10	55	694	10	58	728	11	60	762	13	75	854
31,000	-51.6	-46.4	9	49	637	10	52	668	10	54	700	10	56	733	12	70	818
30,000	-48.0	-44.4	9	46	612	9	48	642	9	50	673	10	53	705	11	65	783
29,000	-44.4	-42.5	8	43	589	9	45	617	9	47	647	9	49	677	11	60	750
27,000	-37.3	-38.5	8	38	543	8	40	569	8	41	597	8	43	624	10	52	688
25,000	-30.2	-34.5	7	34	500	7	35	524	7	36	549	7	38	573	8	45	628
23,000	-23.0	-30.6	6	29	458	6	31	480	6	32	502	6	33	525	7	39	572
21,000	-15.9	-26.6	5	26	417	6	27	437	6	28	457	6	29	477	7	34	518
19,000	-8.8	-22.6	5	22	377	5	23	395	5	24	413	5	25	431	6	29	466
15,000	5.5	-14.7	4	16	297	4	17	311	4	18	325	4	18	339	4	21	364
10,000	23.3	-4.8	2	10	199	2	10	208	2	11	217	2	11	226	3	12	241
5000	41.2	5.1	1	5	100	1	5	105	1	5	109	1	5	114	1	6	121

LONG RANGE CRUISE

GENERAL

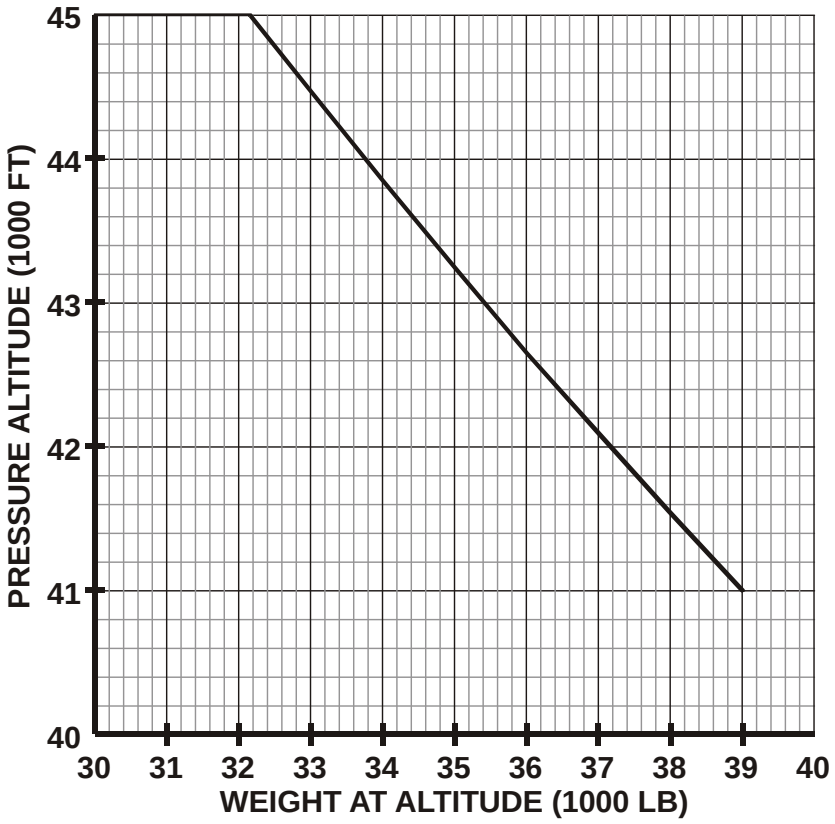
Long range cruise data is given for approximately 99% of maximum specific range speeds. The data is given as point performance in tabulated form for mission planning purposes.

A chart of optimum altitudes for long range cruise is given as a function of aircraft gross weight.

If constant flight level is maintained for an extended period of time, Mach number should be reduced as the weight of the aircraft is reduced in order to maintain the best specific range.

The prime parameter to stabilize the aircraft is mach number. N_1 data is only given for reference, and deviations in N_1 from aircraft to aircraft are normal.

OPTIMUM ALTITUDE FOR LONG RANGE CRUISE



Gulfstream G280
AIRPLANE FLIGHT MANUAL

LONG RANGE CRUISE TABLES

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	50.6	51.6	52.6	53.6	55.1	%N1	54.9	55.9	56.9	58.0	59.0	33,000
	0.36	0.36	0.37	0.37	0.37	MIND	0.39	0.39	0.39	0.39	0.39	
	227.8	232.2	237.0	241.4	247.2	KTAS	245.4	249.9	254.2	258.9	263.4	
	220.0	220.1	220.6	220.8	222.3	KCAS	237.2	237.0	236.7	236.9	236.9	
	1433	1470	1500	1528	1575	LB/HR	1658	1700	1729	1773	1817	
	0.159	0.158	0.158	0.157	0.157	NM/LB	0.148	0.147	0.147	0.146	0.145	
26,000	51.5	52.5	53.6	54.6	56.2	%N1	55.2	56.3	57.3	58.4	59.6	34,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.39	0.39	0.39	0.39	0.40	
	232.0	236.5	241.5	245.9	251.9	KTAS	246.7	251.2	255.6	260.6	266.6	
	224.2	224.2	224.8	224.9	226.5	KCAS	238.5	238.2	238.0	238.4	239.8	
	1478	1506	1548	1566	1625	LB/HR	1690	1732	1763	1810	1864	
	0.157	0.157	0.156	0.155	0.155	NM/LB	0.146	0.145	0.145	0.144	0.143	
27,000	52.5	53.5	54.7	55.7	56.7	%N1	55.8	56.8	57.8	59.0	60.2	35,000
	0.38	0.38	0.38	0.38	0.38	MIND	0.40	0.40	0.40	0.40	0.40	
	236.2	240.8	245.9	250.4	253.7	KTAS	249.3	253.8	258.2	263.4	269.7	
	228.3	228.3	228.9	229.0	228.2	KCAS	240.9	240.7	240.5	241.0	242.6	
	1514	1554	1586	1615	1647	LB/HR	1731	1763	1806	1842	1899	
	0.156	0.155	0.155	0.154	0.154	NM/LB	0.144	0.144	0.143	0.143	0.142	
28,000	53.4	54.4	55.4	56.4	57.0	%N1	56.3	57.3	58.4	59.5	60.8	36,000
	0.38	0.38	0.38	0.38	0.38	MIND	0.40	0.40	0.40	0.40	0.41	
	239.9	244.4	249.0	253.4	254.7	KTAS	252.1	256.7	261.2	266.5	272.7	
	231.8	231.7	231.9	231.8	229.0	KCAS	243.7	243.5	243.2	243.8	245.3	
	1558	1587	1627	1645	1676	LB/HR	1763	1808	1839	1890	1948	
	0.154	0.154	0.153	0.153	0.152	NM/LB	0.143	0.142	0.142	0.141	0.140	
29,000	53.7	54.7	55.7	56.7	57.3	%N1	56.8	57.9	59.0	60.1	61.4	37,000
	0.39	0.39	0.39	0.39	0.38	MIND	0.41	0.41	0.41	0.41	0.41	
	241.0	245.5	250.1	254.5	255.6	KTAS	254.9	259.6	264.1	269.6	275.9	
	232.9	232.8	232.8	232.8	229.9	KCAS	246.4	246.3	246.0	246.7	248.2	
	1575	1615	1645	1674	1693	LB/HR	1808	1854	1886	1940	1985	
	0.153	0.152	0.152	0.151	0.151	NM/LB	0.141	0.140	0.140	0.139	0.139	
30,000	54.0	55.0	56.0	57.0	57.6	%N1	57.4	58.5	59.5	60.7	62.0	38,000
	0.39	0.39	0.39	0.39	0.38	MIND	0.41	0.41	0.41	0.41	0.42	
	242.0	246.6	251.0	255.5	256.8	KTAS	257.9	262.8	267.3	272.8	279.3	
	233.9	233.8	233.7	233.7	231.0	KCAS	249.3	249.3	248.9	249.7	251.3	
	1592	1633	1662	1692	1712	LB/HR	1855	1891	1937	1977	2039	
	0.152	0.151	0.151	0.150	0.150	NM/LB	0.139	0.139	0.138	0.138	0.137	
31,000	54.2	55.3	56.3	57.3	58.0	%N1	57.9	59.1	60.1	61.3	62.7	39,000
	0.39	0.39	0.39	0.39	0.38	MIND	0.42	0.42	0.42	0.42	0.42	
	243.1	247.6	252.0	256.5	258.3	KTAS	261.1	266.1	270.6	276.3	283.0	
	234.9	234.8	234.7	234.6	232.3	KCAS	252.4	252.5	252.1	252.8	254.6	
	1621	1651	1691	1710	1745	LB/HR	1892	1942	1975	2032	2081	
	0.150	0.150	0.149	0.149	0.148	NM/LB	0.138	0.137	0.137	0.136	0.136	
32,000	54.6	55.6	56.6	57.7	58.4	%N1						
	0.39	0.39	0.39	0.39	0.39	MIND						
	244.2	248.8	253.2	257.8	260.1	KTAS						
	236.0	235.9	235.8	235.8	233.9	KCAS						
	1639	1681	1711	1742	1769	LB/HR						
	0.149	0.148	0.148	0.147	0.147	NM/LB						

10.000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	52.7	53.8	55.0	56.0	57.3	%N1	57.9	59.0	60.1	61.3	62.1	33,000
	0.39	0.39	0.39	0.39	0.39	MIND	0.43	0.43	0.43	0.43	0.43	
	239.8	245.0	250.2	254.8	259.8	KTAS	265.1	269.6	275.0	280.5	281.8	
	215.5	215.8	216.3	216.2	216.7	KCAS	238.5	237.8	238.0	238.3	235.2	
	1332	1369	1398	1423	1468	LB/HR	1607	1644	1677	1721	1740	
	0.180	0.179	0.179	0.178	0.177	NM/LB	0.165	0.164	0.164	0.163	0.162	
26,000	53.5	54.6	55.8	56.8	58.2	%N1	58.5	59.5	60.7	61.9	62.8	34,000
	0.40	0.40	0.40	0.40	0.40	MIND	0.44	0.44	0.44	0.44	0.43	
	243.4	248.6	253.9	258.6	263.6	KTAS	268.1	272.2	277.8	283.6	285.8	
	218.7	219.1	219.5	219.5	219.9	KCAS	241.2	240.1	240.4	241.0	238.6	
	1367	1405	1434	1461	1506	LB/HR	1645	1680	1715	1761	1786	
	0.178	0.177	0.177	0.176	0.175	NM/LB	0.163	0.162	0.162	0.161	0.160	
27,000	54.3	55.5	56.7	57.8	59.2	%N1	59.0	60.1	61.3	62.5	63.6	35,000
	0.40	0.40	0.40	0.40	0.41	MIND	0.44	0.44	0.44	0.44	0.44	
	247.0	252.5	257.9	262.7	268.0	KTAS	271.3	275.4	281.2	287.1	290.0	
	222.0	222.5	223.0	223.0	223.6	KCAS	244.1	242.9	243.4	244.0	242.1	
	1403	1443	1474	1501	1540	LB/HR	1685	1721	1758	1806	1835	
	0.176	0.175	0.175	0.174	0.174	NM/LB	0.161	0.160	0.160	0.159	0.158	
28,000	55.3	56.4	57.6	58.8	59.6	%N1	59.6	60.7	61.9	63.2	64.3	36,000
	0.41	0.41	0.41	0.41	0.41	MIND	0.45	0.45	0.45	0.45	0.44	
	251.3	256.8	262.4	267.3	270.1	KTAS	274.4	278.8	284.6	290.6	294.0	
	225.9	226.3	226.9	227.0	225.3	KCAS	247.0	246.0	246.4	247.0	245.5	
	1444	1476	1517	1536	1570	LB/HR	1726	1765	1801	1851	1885	
	0.174	0.174	0.173	0.172	0.172	NM/LB	0.159	0.158	0.158	0.157	0.156	
29,000	56.0	57.1	58.3	59.4	60.0	%N1	60.2	61.3	62.5	63.8	65.0	37,000
	0.42	0.42	0.42	0.42	0.41	MIND	0.45	0.45	0.45	0.45	0.45	
	254.9	260.1	265.4	270.3	272.1	KTAS	277.4	281.9	287.7	293.7	297.3	
	229.2	229.3	229.6	229.6	227.0	KCAS	249.7	248.7	249.2	249.7	248.3	
	1482	1512	1552	1572	1601	LB/HR	1767	1796	1844	1895	1931	
	0.172	0.172	0.171	0.170	0.170	NM/LB	0.157	0.157	0.156	0.155	0.154	
30,000	56.5	57.6	58.7	59.8	60.5	%N1	60.8	61.9	63.1	64.4	65.7	38,000
	0.42	0.42	0.42	0.42	0.42	MIND	0.46	0.46	0.46	0.46	0.45	
	257.4	262.5	267.7	272.7	274.3	KTAS	280.2	284.8	290.8	296.9	300.5	
	231.5	231.4	231.6	231.7	228.8	KCAS	252.3	251.4	251.8	252.5	251.0	
	1514	1544	1584	1604	1633	LB/HR	1808	1837	1888	1928	1964	
	0.170	0.170	0.169	0.168	0.168	NM/LB	0.155	0.155	0.154	0.154	0.153	
31,000	56.9	58.0	59.2	60.3	61.0	%N1	61.3	62.5	63.7	65.0	66.3	39,000
	0.42	0.42	0.42	0.42	0.42	MIND	0.46	0.46	0.46	0.46	0.46	
	259.9	264.9	270.1	275.2	276.4	KTAS	283.0	287.7	293.8	300.0	303.6	
	233.8	233.5	233.7	233.8	230.6	KCAS	254.8	254.0	254.5	255.1	253.7	
	1547	1577	1617	1638	1665	LB/HR	1850	1880	1920	1974	2011	
	0.168	0.168	0.167	0.166	0.166	NM/LB	0.153	0.153	0.153	0.152	0.151	
32,000	57.4	58.5	59.6	60.8	61.5	%N1						
	0.43	0.43	0.43	0.43	0.42	MIND						
	262.5	267.3	272.5	277.8	278.6	KTAS						
	236.1	235.7	235.8	236.0	232.5	KCAS						
	1581	1610	1652	1673	1699	LB/HR						
	0.166	0.166	0.165	0.165	0.164	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	55.9	57.2	58.4	59.5	61.0	%N1	60.7	61.9	63.2	64.6	66.0	33,000
	0.43	0.43	0.43	0.43	0.43	MIND	0.47	0.47	0.47	0.47	0.48	
	257.4	263.3	268.9	274.3	280.5	KTAS	282.6	287.6	294.3	301.3	309.0	
	214.7	215.1	215.4	215.6	216.5	KCAS	236.1	235.4	236.2	237.2	238.9	
	1274	1310	1345	1365	1417	LB/HR	1544	1580	1626	1674	1717	
	0.202	0.201	0.200	0.199	0.198	NM/LB	0.183	0.182	0.181	0.180	0.180	
26,000	56.8	58.1	59.3	60.5	61.8	%N1	61.3	62.5	63.9	65.3	66.8	34,000
	0.44	0.44	0.44	0.44	0.44	MIND	0.48	0.48	0.48	0.48	0.48	
	262.0	268.0	273.7	279.1	284.4	KTAS	286.6	291.9	298.5	305.7	313.6	
	218.6	219.0	219.3	219.4	219.5	KCAS	239.5	238.9	239.6	240.8	242.6	
	1317	1354	1382	1410	1451	LB/HR	1592	1622	1668	1717	1772	
	0.199	0.198	0.198	0.196	0.196	NM/LB	0.180	0.180	0.179	0.178	0.177	
27,000	57.7	59.0	60.2	61.4	62.2	%N1	61.9	63.2	64.5	66.0	67.6	35,000
	0.44	0.44	0.44	0.44	0.44	MIND	0.48	0.48	0.48	0.49	0.49	
	266.2	272.2	278.1	283.5	286.8	KTAS	290.5	296.1	302.6	310.0	318.0	
	222.2	222.5	222.9	223.0	221.4	KCAS	242.8	242.5	243.0	244.3	246.1	
	1351	1389	1426	1446	1478	LB/HR	1632	1673	1710	1761	1817	
	0.197	0.196	0.195	0.194	0.194	NM/LB	0.178	0.177	0.177	0.176	0.175	
28,000	58.3	59.5	60.7	61.9	62.7	%N1	62.6	63.9	65.2	66.7	68.3	36,000
	0.45	0.45	0.45	0.45	0.45	MIND	0.49	0.49	0.49	0.49	0.50	
	269.0	274.7	280.5	286.0	289.2	KTAS	294.3	300.2	306.7	314.3	322.5	
	224.5	224.6	224.9	224.9	223.3	KCAS	246.1	245.9	246.3	247.7	249.6	
	1387	1416	1453	1474	1506	LB/HR	1672	1715	1753	1806	1864	
	0.194	0.194	0.193	0.192	0.192	NM/LB	0.176	0.175	0.175	0.174	0.173	
29,000	58.7	59.9	61.1	62.3	63.2	%N1	63.2	64.5	65.9	67.4	68.9	37,000
	0.45	0.45	0.45	0.45	0.45	MIND	0.50	0.50	0.50	0.50	0.50	
	271.5	277.1	282.9	288.4	291.7	KTAS	298.1	304.3	310.7	318.5	325.0	
	226.6	226.6	226.8	226.9	225.3	KCAS	249.4	249.3	249.6	251.1	251.6	
	1414	1451	1481	1510	1543	LB/HR	1713	1759	1806	1852	1901	
	0.192	0.191	0.191	0.190	0.189	NM/LB	0.174	0.173	0.172	0.172	0.171	
30,000	59.1	60.3	61.6	62.8	63.8	%N1	63.9	65.2	66.6	68.1	69.2	38,000
	0.46	0.46	0.46	0.46	0.45	MIND	0.50	0.50	0.50	0.51	0.50	
	274.0	279.5	285.3	291.0	295.0	KTAS	302.0	308.5	314.9	323.2	326.4	
	228.8	228.6	228.8	229.0	227.9	KCAS	252.7	252.9	253.1	254.9	252.8	
	1442	1479	1518	1540	1578	LB/HR	1756	1804	1852	1901	1931	
	0.190	0.189	0.188	0.187	0.187	NM/LB	0.172	0.171	0.170	0.170	0.169	
31,000	59.5	60.7	62.0	63.3	64.5	%N1	64.6	66.0	67.3	68.7	69.6	39,000
	0.46	0.46	0.46	0.46	0.46	MIND	0.51	0.51	0.51	0.51	0.50	
	275.7	280.8	287.0	293.2	299.6	KTAS	306.5	313.3	319.5	327.1	327.8	
	230.2	229.7	230.2	230.7	231.5	KCAS	256.6	256.9	256.9	258.0	253.9	
	1466	1502	1543	1568	1619	LB/HR	1803	1854	1902	1947	1963	
	0.188	0.187	0.186	0.185	0.185	NM/LB	0.170	0.169	0.168	0.168	0.167	
32,000	60.1	61.3	62.6	63.9	65.3	%N1						
	0.46	0.46	0.46	0.47	0.47	MIND						
	278.8	283.8	290.2	296.9	304.3	KTAS						
	232.9	232.2	232.8	233.7	235.3	KCAS						
	1507	1534	1577	1605	1672	LB/HR						
	0.185	0.185	0.184	0.183	0.182	NM/LB						

19,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-42.6	-32.6	-22.6	-12.6	-2.6	OAT (°C)	-42.6	-32.6	-22.6	-12.6	-2.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	58.5	59.7	61.0	62.3	63.2	%N1	63.0	64.3	65.8	67.2	69.1	33,000
	0.46	0.46	0.46	0.46	0.46	MIND	0.50	0.50	0.51	0.51	0.52	
	272.2	278.2	284.0	290.2	293.3	KTAS	298.4	304.4	311.8	318.9	330.4	
	213.5	213.6	213.7	214.1	212.3	KCAS	234.7	234.3	235.2	235.9	240.0	
	1226	1259	1291	1313	1345	LB/HR	1499	1537	1583	1627	1694	
	0.222	0.221	0.220	0.218	0.218	NM/LB	0.199	0.198	0.197	0.196	0.195	
26,000	59.2	60.5	61.7	63.0	63.8	%N1	63.7	65.1	66.5	67.9	69.8	34,000
	0.47	0.47	0.47	0.47	0.46	MIND	0.51	0.51	0.51	0.52	0.52	
	275.9	281.8	287.7	293.7	296.4	KTAS	303.5	309.8	317.0	324.1	334.5	
	216.5	216.5	216.5	216.8	214.6	KCAS	238.8	238.6	239.2	239.9	243.0	
	1260	1293	1326	1347	1379	LB/HR	1548	1589	1634	1679	1742	
	0.219	0.218	0.217	0.215	0.215	NM/LB	0.196	0.195	0.194	0.193	0.192	
27,000	59.6	60.9	62.2	63.5	64.3	%N1	64.5	65.9	67.3	68.7	70.3	35,000
	0.47	0.47	0.47	0.47	0.47	MIND	0.52	0.52	0.52	0.52	0.53	
	278.6	284.5	290.5	296.6	299.8	KTAS	308.6	315.1	322.1	329.3	337.5	
	218.6	218.6	218.7	219.0	217.2	KCAS	242.9	242.8	243.2	243.9	245.3	
	1290	1323	1357	1380	1414	LB/HR	1599	1641	1678	1724	1776	
	0.216	0.215	0.214	0.213	0.212	NM/LB	0.193	0.192	0.192	0.191	0.190	
28,000	60.1	61.4	62.7	64.0	65.1	%N1	65.2	66.6	68.0	69.5	70.8	36,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.53	0.53	0.53	0.53	0.53	
	281.0	286.8	293.2	299.5	304.9	KTAS	313.6	320.5	327.2	334.6	340.4	
	220.6	220.4	220.7	221.2	221.0	KCAS	247.0	247.1	247.2	247.9	247.5	
	1319	1353	1390	1413	1459	LB/HR	1642	1687	1731	1780	1820	
	0.213	0.212	0.211	0.210	0.209	NM/LB	0.191	0.190	0.189	0.188	0.187	
29,000	60.5	61.8	63.1	64.4	65.9	%N1	65.9	67.3	68.7	70.1	71.3	37,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.54	0.54	0.54	0.54	0.54	
	282.3	288.0	294.7	301.5	310.0	KTAS	318.1	325.4	331.7	339.1	343.4	
	221.6	221.4	221.9	222.7	224.7	KCAS	250.7	251.1	250.7	251.3	249.7	
	1344	1378	1417	1443	1505	LB/HR	1692	1740	1774	1823	1856	
	0.210	0.209	0.208	0.207	0.206	NM/LB	0.188	0.187	0.187	0.186	0.185	
30,000	61.0	62.3	63.7	65.1	66.7	%N1	66.4	67.9	69.2	70.7	71.8	38,000
	0.48	0.48	0.48	0.49	0.49	MIND	0.54	0.55	0.54	0.55	0.54	
	285.3	291.0	298.1	305.3	314.9	KTAS	322.0	329.9	335.8	343.2	346.3	
	224.1	223.7	224.6	225.6	228.4	KCAS	253.9	254.6	253.9	254.5	251.9	
	1378	1413	1454	1482	1551	LB/HR	1731	1783	1825	1875	1892	
	0.207	0.206	0.205	0.204	0.203	NM/LB	0.186	0.185	0.184	0.183	0.183	
31,000	61.7	62.9	64.4	65.8	67.5	%N1	66.9	68.5	69.8	71.2	72.4	39,000
	0.49	0.49	0.49	0.49	0.50	MIND	0.55	0.55	0.55	0.55	0.55	
	289.4	295.1	302.4	309.7	319.8	KTAS	325.8	334.1	339.8	347.1	350.5	
	227.3	227.0	227.9	228.9	232.0	KCAS	256.9	258.0	257.0	257.5	255.1	
	1419	1454	1497	1526	1599	LB/HR	1771	1826	1867	1918	1936	
	0.204	0.203	0.202	0.201	0.200	NM/LB	0.184	0.183	0.182	0.181	0.181	
32,000	62.3	63.6	65.0	66.4	68.3	%N1						
	0.50	0.50	0.50	0.50	0.51	MIND						
	293.8	299.6	306.8	313.9	325.1	KTAS						
	230.9	230.5	231.3	232.1	236.0	KCAS						
	1462	1491	1534	1562	1650	LB/HR						
	0.201	0.201	0.200	0.198	0.197	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

21,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-46.6	-36.6	-26.6	-16.6	-6.6	OAT (°C)	-46.6	-36.6	-26.6	-16.6	-6.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	59.5	60.8	62.1	63.4	64.1	%N1	64.4	65.8	67.2	68.7	70.6	33,000
	0.48	0.48	0.48	0.48	0.47	MIND	0.53	0.53	0.53	0.53	0.54	
	279.0	284.9	291.0	297.2	299.5	KTAS	309.0	316.0	323.2	330.7	342.4	
	212.0	211.9	212.0	212.3	209.8	KCAS	235.7	235.9	236.3	237.1	241.0	
	1203	1233	1265	1287	1319	LB/HR	1493	1534	1577	1621	1695	
	0.232	0.231	0.230	0.229	0.227	NM/LB	0.207	0.206	0.205	0.204	0.202	
26,000	60.0	61.3	62.6	63.9	64.9	%N1	65.1	66.6	68.0	69.5	71.1	34,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.54	0.54	0.54	0.54	0.54	
	281.8	287.8	294.0	300.3	304.0	KTAS	314.2	321.5	328.5	336.1	345.2	
	214.3	214.1	214.3	214.6	213.1	KCAS	239.8	240.2	240.3	241.1	243.0	
	1231	1262	1295	1317	1357	LB/HR	1540	1584	1626	1672	1726	
	0.229	0.228	0.227	0.225	0.224	NM/LB	0.204	0.203	0.202	0.201	0.200	
27,000	60.4	61.7	63.1	64.4	65.7	%N1	65.9	67.4	68.8	70.2	71.6	35,000
	0.48	0.48	0.48	0.49	0.49	MIND	0.54	0.55	0.55	0.55	0.55	
	283.5	289.3	296.0	302.8	309.7	KTAS	319.3	327.0	333.7	341.4	348.1	
	215.6	215.3	215.8	216.4	217.2	KCAS	243.8	244.4	244.3	245.0	245.1	
	1254	1286	1321	1346	1408	LB/HR	1589	1635	1677	1724	1767	
	0.226	0.225	0.224	0.222	0.220	NM/LB	0.201	0.200	0.199	0.198	0.197	
28,000	60.9	62.2	63.6	65.0	66.6	%N1	66.5	68.0	69.4	70.9	72.2	36,000
	0.49	0.49	0.49	0.49	0.50	MIND	0.55	0.56	0.55	0.56	0.55	
	285.5	291.4	298.6	305.9	315.5	KTAS	324.0	332.4	338.7	346.3	351.9	
	217.2	217.0	217.7	218.7	221.4	KCAS	247.6	248.6	248.1	248.7	247.9	
	1280	1313	1351	1378	1454	LB/HR	1636	1687	1719	1767	1805	
	0.223	0.222	0.221	0.219	0.217	NM/LB	0.198	0.197	0.197	0.196	0.195	
29,000	61.5	62.8	64.2	65.7	67.5	%N1	67.0	68.6	70.0	71.4	72.8	37,000
	0.49	0.49	0.49	0.50	0.51	MIND	0.56	0.56	0.56	0.56	0.56	
	289.1	294.9	302.6	310.2	321.5	KTAS	328.2	337.0	343.1	350.6	356.3	
	220.0	219.6	220.7	221.9	225.8	KCAS	250.9	252.2	251.4	251.9	251.1	
	1314	1353	1394	1423	1502	LB/HR	1674	1728	1769	1817	1856	
	0.220	0.218	0.217	0.216	0.214	NM/LB	0.196	0.195	0.194	0.193	0.192	
30,000	62.2	63.5	65.0	66.4	68.4	%N1	67.5	69.1	70.5	72.0	73.4	38,000
	0.50	0.50	0.50	0.51	0.52	MIND	0.57	0.57	0.57	0.57	0.57	
	293.6	299.6	307.4	315.1	327.6	KTAS	331.9	341.1	347.0	354.4	360.8	
	223.6	223.2	224.3	225.5	230.1	KCAS	253.9	255.3	254.4	254.7	254.4	
	1359	1393	1436	1466	1553	LB/HR	1720	1777	1807	1855	1899	
	0.216	0.215	0.214	0.213	0.211	NM/LB	0.193	0.192	0.192	0.191	0.190	
31,000	62.9	64.3	65.7	67.2	69.2	%N1	68.0	69.7	71.0	72.5	74.1	39,000
	0.51	0.51	0.51	0.51	0.52	MIND	0.57	0.58	0.57	0.57	0.57	
	298.8	305.0	312.6	320.2	333.3	KTAS	335.5	344.8	350.8	358.2	365.1	
	227.6	227.4	228.3	229.3	234.3	KCAS	256.7	258.2	257.3	257.5	257.6	
	1403	1439	1482	1510	1602	LB/HR	1757	1815	1856	1905	1942	
	0.213	0.212	0.211	0.209	0.208	NM/LB	0.191	0.190	0.189	0.188	0.188	
32,000	63.6	65.0	66.5	67.9	70.0	%N1						
	0.52	0.52	0.52	0.52	0.53	MIND						
	303.9	310.5	317.9	325.4	338.3	KTAS						
	231.6	231.6	232.3	233.1	238.0	KCAS						
	1447	1486	1528	1557	1650	LB/HR						
	0.210	0.209	0.208	0.207	0.205	NM/LB						

23,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-50.6	-40.6	-30.6	-20.6	-10.6	OAT (°C)	-50.6	-40.6	-30.6	-20.6	-10.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	60.3	61.7	63.0	64.3	65.2	%N1	65.8	67.3	68.8	70.3	71.7	33,000
	0.49	0.49	0.49	0.49	0.49	MIND	0.55	0.55	0.55	0.56	0.56	
	284.9	291.1	297.5	303.9	307.2	KTAS	320.1	328.5	335.8	343.7	351.3	
	209.8	209.7	209.8	210.1	208.2	KCAS	236.8	237.7	238.0	238.7	239.3	
	1172	1203	1234	1256	1302	LB/HR	1489	1535	1577	1621	1665	
	0.243	0.242	0.241	0.239	0.236	NM/LB	0.215	0.214	0.213	0.212	0.211	
26,000	60.8	62.1	63.5	64.9	66.2	%N1	66.4	68.0	69.5	70.9	72.3	34,000
	0.49	0.49	0.49	0.50	0.50	MIND	0.56	0.56	0.56	0.56	0.56	
	286.4	292.4	299.3	306.4	314.4	KTAS	324.9	334.1	341.0	348.6	355.6	
	210.9	210.6	211.2	211.9	213.3	KCAS	240.5	241.9	241.8	242.3	242.4	
	1193	1223	1263	1282	1355	LB/HR	1533	1583	1624	1668	1710	
	0.240	0.239	0.237	0.236	0.232	NM/LB	0.212	0.211	0.210	0.209	0.208	
27,000	61.3	62.7	64.1	65.6	67.4	%N1	67.0	68.6	70.0	71.5	73.0	35,000
	0.50	0.50	0.50	0.50	0.51	MIND	0.57	0.57	0.57	0.57	0.57	
	289.7	295.7	303.1	310.9	323.1	KTAS	329.3	339.0	345.7	353.1	360.2	
	213.4	213.1	214.0	215.1	219.4	KCAS	243.9	245.6	245.3	245.5	245.7	
	1228	1258	1301	1323	1411	LB/HR	1576	1630	1670	1714	1757	
	0.236	0.235	0.233	0.232	0.229	NM/LB	0.209	0.208	0.207	0.206	0.205	
28,000	62.1	63.4	64.9	66.3	68.5	%N1	67.5	69.2	70.6	72.1	73.6	36,000
	0.51	0.51	0.51	0.51	0.52	MIND	0.57	0.58	0.58	0.58	0.58	
	294.5	300.6	308.5	316.2	330.5	KTAS	333.6	343.6	350.3	357.4	364.7	
	217.1	216.8	217.9	218.9	224.6	KCAS	247.2	249.2	248.7	248.7	248.9	
	1269	1301	1341	1369	1469	LB/HR	1612	1676	1717	1761	1797	
	0.232	0.231	0.230	0.228	0.225	NM/LB	0.207	0.205	0.204	0.203	0.203	
29,000	62.8	64.2	65.7	67.1	69.4	%N1	68.1	69.8	71.2	72.7	74.2	37,000
	0.52	0.52	0.52	0.52	0.53	MIND	0.58	0.59	0.58	0.58	0.59	
	299.7	306.1	314.0	321.7	336.9	KTAS	337.7	347.9	354.6	361.6	369.1	
	221.1	220.9	221.9	222.8	229.1	KCAS	250.3	252.4	251.8	251.7	252.0	
	1309	1348	1389	1417	1518	LB/HR	1655	1714	1755	1799	1846	
	0.229	0.227	0.226	0.225	0.222	NM/LB	0.204	0.203	0.202	0.201	0.200	
30,000	63.5	65.0	66.4	67.9	70.1	%N1	68.6	70.3	71.7	73.2	74.9	38,000
	0.52	0.52	0.53	0.53	0.54	MIND	0.59	0.59	0.59	0.59	0.59	
	304.9	311.7	319.4	327.1	341.8	KTAS	341.5	351.7	358.4	365.6	373.5	
	225.0	225.1	225.9	226.7	232.6	KCAS	253.3	255.3	254.7	254.6	255.2	
	1355	1392	1432	1460	1561	LB/HR	1699	1759	1801	1846	1886	
	0.225	0.224	0.223	0.221	0.219	NM/LB	0.201	0.200	0.199	0.198	0.198	
31,000	64.3	65.7	67.2	68.7	70.7	%N1	69.1	70.8	72.3	73.8	75.5	39,000
	0.53	0.53	0.54	0.54	0.55	MIND	0.59	0.60	0.60	0.60	0.60	
	310.0	317.3	324.9	332.6	345.3	KTAS	345.4	355.3	362.3	369.6	377.8	
	229.0	229.3	229.9	230.7	235.1	KCAS	256.3	258.0	257.6	257.5	258.2	
	1396	1442	1484	1512	1599	LB/HR	1736	1794	1839	1886	1937	
	0.222	0.220	0.219	0.218	0.216	NM/LB	0.199	0.198	0.197	0.196	0.195	
32,000	65.0	66.5	68.0	69.5	71.2	%N1						
	0.54	0.54	0.54	0.55	0.55	MIND						
	315.0	322.9	330.3	338.2	348.2	KTAS						
	232.9	233.5	233.9	234.7	237.2	KCAS						
	1445	1488	1529	1559	1627	LB/HR						
	0.218	0.217	0.216	0.215	0.214	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	61.2	62.5	64.0	65.4	67.4	%N1	66.9	68.6	70.1	71.5	73.0	33,000
	0.50	0.50	0.51	0.51	0.52	MIND	0.57	0.58	0.58	0.58	0.58	
	290.3	296.4	303.8	311.2	325.2	KTAS	329.9	340.5	348.1	355.3	363.6	
	207.0	206.6	207.3	208.1	213.4	KCAS	236.5	238.8	238.9	239.0	239.8	
	1138	1167	1206	1225	1327	LB/HR	1466	1527	1568	1608	1653	
	0.255	0.254	0.252	0.251	0.245	NM/LB	0.225	0.223	0.222	0.221	0.220	
26,000	61.9	63.2	64.7	66.2	68.7	%N1	67.4	69.2	70.7	72.2	73.7	34,000
	0.51	0.51	0.51	0.52	0.53	MIND	0.58	0.59	0.59	0.59	0.59	
	294.9	301.1	309.1	316.9	334.6	KTAS	334.9	346.0	353.3	360.2	368.2	
	210.4	210.0	211.1	212.1	219.9	KCAS	240.2	242.8	242.7	242.4	243.0	
	1175	1204	1246	1268	1388	LB/HR	1509	1573	1613	1652	1697	
	0.251	0.250	0.248	0.246	0.241	NM/LB	0.222	0.220	0.219	0.218	0.217	
27,000	62.6	64.0	65.5	67.0	69.7	%N1	68.0	69.8	71.3	72.8	74.3	35,000
	0.52	0.52	0.52	0.53	0.55	MIND	0.59	0.60	0.60	0.59	0.60	
	300.0	306.6	314.8	322.6	341.4	KTAS	339.8	351.2	358.2	364.9	372.7	
	214.2	214.0	215.1	216.1	224.5	KCAS	243.9	246.6	246.2	245.7	246.1	
	1215	1251	1290	1317	1434	LB/HR	1559	1618	1658	1697	1742	
	0.247	0.245	0.244	0.242	0.238	NM/LB	0.218	0.217	0.216	0.215	0.214	
28,000	63.4	64.8	66.3	67.8	70.2	%N1	68.6	70.3	71.8	73.3	75.0	36,000
	0.53	0.53	0.53	0.53	0.55	MIND	0.60	0.60	0.60	0.60	0.60	
	305.2	312.2	320.4	328.3	344.7	KTAS	344.3	354.9	362.1	369.1	377.0	
	218.0	218.1	219.2	220.0	226.8	KCAS	247.3	249.4	249.1	248.7	249.1	
	1256	1295	1335	1362	1467	LB/HR	1594	1658	1700	1741	1787	
	0.243	0.241	0.240	0.238	0.235	NM/LB	0.216	0.214	0.213	0.212	0.211	
29,000	64.1	65.6	67.1	68.6	70.7	%N1	69.1	70.8	72.4	73.9	75.5	37,000
	0.54	0.54	0.54	0.54	0.56	MIND	0.60	0.61	0.61	0.61	0.61	
	310.2	317.9	326.1	334.0	347.7	KTAS	348.1	358.1	365.5	372.6	380.7	
	221.8	222.2	223.2	224.0	228.9	KCAS	250.2	251.8	251.5	251.2	251.7	
	1298	1341	1382	1409	1499	LB/HR	1634	1689	1732	1774	1830	
	0.239	0.237	0.236	0.234	0.232	NM/LB	0.213	0.212	0.211	0.210	0.208	
30,000	64.8	66.4	67.9	69.5	71.2	%N1	69.6	71.3	72.9	74.4	76.0	38,000
	0.55	0.55	0.55	0.55	0.56	MIND	0.61	0.61	0.61	0.61	0.61	
	315.2	323.6	331.7	339.7	351.0	KTAS	351.7	361.3	368.9	376.1	383.8	
	225.5	226.4	227.2	228.0	231.1	KCAS	252.9	254.2	254.0	253.6	253.8	
	1341	1383	1430	1452	1533	LB/HR	1675	1729	1774	1817	1863	
	0.235	0.234	0.232	0.231	0.229	NM/LB	0.210	0.209	0.208	0.207	0.206	
31,000	65.6	67.2	68.7	70.3	71.8	%N1	70.2	71.8	73.4	74.9	76.5	39,000
	0.56	0.56	0.56	0.56	0.57	MIND	0.62	0.62	0.62	0.62	0.62	
	320.1	329.1	337.1	345.0	354.2	KTAS	355.2	364.4	372.2	379.4	386.9	
	229.2	230.4	231.1	231.7	233.3	KCAS	255.6	256.5	256.4	256.1	256.0	
	1386	1431	1472	1500	1567	LB/HR	1716	1760	1807	1860	1906	
	0.231	0.230	0.229	0.227	0.226	NM/LB	0.207	0.207	0.206	0.204	0.203	
32,000	66.3	67.9	69.4	70.9	72.4	%N1						
	0.56	0.57	0.57	0.57	0.57	MIND						
	324.9	334.7	342.6	350.2	358.9	KTAS						
	232.7	234.5	235.0	235.4	236.6	KCAS						
	1425	1474	1523	1543	1609	LB/HR						
	0.228	0.227	0.225	0.224	0.223	NM/LB						

27,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-58.5	-48.5	-38.5	-28.5	-18.5	OAT (°C)	-58.5	-48.5	-38.5	-28.5	-18.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	62.8	64.0	65.6	67.0	69.4	%N1	68.1	69.8	71.3	72.8	74.4	33,000
	0.54	0.53	0.53	0.54	0.55	MIND	0.60	0.60	0.60	0.60	0.60	
	305.8	310.5	318.9	326.5	341.5	KTAS	342.5	352.5	360.1	367.1	374.9	
	211.3	209.7	210.8	211.3	216.9	KCAS	238.0	239.5	239.4	239.0	239.3	
	1158	1181	1222	1241	1334	LB/HR	1464	1519	1559	1596	1637	
	0.264	0.263	0.261	0.259	0.256	NM/LB	0.234	0.232	0.231	0.230	0.229	
26,000	63.6	65.0	66.5	68.0	70.1	%N1	68.6	70.3	71.8	73.3	75.0	34,000
	0.55	0.54	0.55	0.55	0.56	MIND	0.61	0.61	0.61	0.61	0.61	
	311.4	317.9	325.9	333.3	345.7	KTAS	346.3	356.0	363.7	370.8	378.9	
	215.4	214.9	215.6	216.0	219.7	KCAS	240.8	242.0	241.9	241.5	241.9	
	1202	1232	1273	1292	1372	LB/HR	1506	1555	1595	1633	1677	
	0.259	0.258	0.256	0.255	0.252	NM/LB	0.230	0.229	0.228	0.227	0.226	
27,000	64.3	65.9	67.4	68.8	70.6	%N1	69.1	70.8	72.4	73.9	75.6	35,000
	0.56	0.56	0.56	0.56	0.56	MIND	0.61	0.62	0.62	0.61	0.62	
	316.8	324.4	332.0	339.3	349.0	KTAS	349.9	359.5	367.3	374.4	382.8	
	219.2	219.5	219.8	220.0	221.9	KCAS	243.5	244.5	244.4	244.0	244.6	
	1242	1277	1317	1336	1402	LB/HR	1541	1591	1632	1671	1724	
	0.255	0.254	0.252	0.251	0.249	NM/LB	0.227	0.226	0.225	0.224	0.222	
28,000	65.1	66.7	68.2	69.7	71.2	%N1	69.7	71.3	72.9	74.4	76.1	36,000
	0.56	0.57	0.57	0.57	0.57	MIND	0.62	0.62	0.62	0.62	0.62	
	321.7	329.9	337.7	345.1	352.6	KTAS	353.5	362.8	370.8	377.9	385.9	
	222.8	223.4	223.8	224.0	224.3	KCAS	246.1	246.9	246.9	246.5	246.6	
	1282	1320	1362	1380	1433	LB/HR	1578	1627	1670	1710	1754	
	0.251	0.250	0.248	0.247	0.246	NM/LB	0.224	0.223	0.222	0.221	0.220	
29,000	65.9	67.5	69.0	70.5	71.7	%N1	70.2	71.9	73.5	75.0	76.6	37,000
	0.57	0.57	0.58	0.58	0.57	MIND	0.63	0.63	0.63	0.63	0.63	
	326.5	335.1	343.2	350.6	355.8	KTAS	357.0	366.2	374.3	381.4	388.9	
	226.3	227.1	227.6	227.7	226.4	KCAS	248.6	249.3	249.4	248.9	248.7	
	1322	1362	1401	1425	1470	LB/HR	1615	1665	1709	1750	1792	
	0.247	0.246	0.245	0.243	0.242	NM/LB	0.221	0.220	0.219	0.218	0.217	
30,000	66.4	68.1	69.6	71.1	72.4	%N1	70.7	72.4	74.0	75.5	77.0	38,000
	0.58	0.58	0.58	0.58	0.58	MIND	0.63	0.63	0.63	0.63	0.63	
	330.6	339.7	347.6	354.9	360.7	KTAS	360.4	369.4	377.8	384.9	392.0	
	229.3	230.4	230.7	230.6	229.7	KCAS	251.1	251.7	251.9	251.3	250.8	
	1355	1404	1442	1467	1509	LB/HR	1653	1694	1749	1790	1832	
	0.244	0.242	0.241	0.240	0.239	NM/LB	0.218	0.218	0.216	0.215	0.214	
31,000	67.0	68.6	70.2	71.6	73.0	%N1	71.2	72.9	74.5	76.1	77.5	39,000
	0.59	0.59	0.59	0.59	0.59	MIND	0.64	0.64	0.64	0.64	0.64	
	334.6	344.2	351.9	358.9	365.6	KTAS	363.7	372.7	381.2	388.3	395.2	
	232.2	233.6	233.7	233.4	233.0	KCAS	253.6	254.0	254.3	253.6	252.9	
	1394	1440	1479	1502	1556	LB/HR	1684	1733	1781	1832	1873	
	0.240	0.239	0.238	0.236	0.235	NM/LB	0.216	0.215	0.214	0.212	0.211	
32,000	67.5	69.2	70.7	72.2	73.7	%N1						
	0.59	0.60	0.60	0.60	0.60	MIND						
	338.5	348.6	356.1	362.9	370.5	KTAS						
	235.1	236.7	236.6	236.1	236.3	KCAS						
	1428	1477	1522	1538	1597	LB/HR						
	0.237	0.236	0.234	0.233	0.232	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	64.3	65.8	67.4	68.8	70.5	%N1	69.1	70.8	72.4	73.9	75.6	33,000
	0.56	0.56	0.57	0.57	0.57	MIND	0.62	0.62	0.62	0.62	0.62	
	319.2	326.5	334.5	341.8	349.9	KTAS	351.0	360.5	368.6	375.6	384.2	
	213.7	213.6	214.0	214.1	214.8	KCAS	236.2	237.1	237.1	236.5	237.1	
	1165	1196	1234	1252	1301	LB/HR	1439	1490	1529	1565	1614	
	0.274	0.273	0.271	0.270	0.269	NM/LB	0.244	0.242	0.241	0.240	0.238	
26,000	65.1	66.7	68.2	69.7	71.1	%N1	69.6	71.3	72.9	74.4	76.1	34,000
	0.57	0.57	0.58	0.58	0.57	MIND	0.63	0.63	0.63	0.63	0.63	
	324.8	332.3	340.3	347.8	353.8	KTAS	354.6	364.1	372.3	379.3	387.5	
	217.6	217.5	217.9	218.0	217.3	KCAS	238.8	239.6	239.6	239.0	239.2	
	1203	1235	1275	1293	1335	LB/HR	1478	1523	1564	1607	1649	
	0.270	0.269	0.267	0.266	0.265	NM/LB	0.240	0.239	0.238	0.236	0.235	
27,000	66.0	67.5	69.0	70.5	71.6	%N1	70.2	71.9	73.5	75.0	76.6	35,000
	0.58	0.58	0.58	0.58	0.58	MIND	0.63	0.64	0.64	0.63	0.63	
	330.2	337.9	345.9	353.3	357.5	KTAS	358.2	367.7	376.0	382.9	390.5	
	221.5	221.4	221.7	221.7	219.7	KCAS	241.3	242.1	242.2	241.4	241.2	
	1241	1275	1315	1333	1370	LB/HR	1511	1558	1600	1643	1683	
	0.266	0.265	0.263	0.262	0.261	NM/LB	0.237	0.236	0.235	0.233	0.232	
28,000	66.5	68.1	69.6	71.1	72.3	%N1	70.7	72.4	74.1	75.6	77.1	36,000
	0.59	0.59	0.59	0.59	0.59	MIND	0.64	0.64	0.64	0.64	0.64	
	334.6	342.6	350.5	357.8	362.0	KTAS	361.7	371.1	379.7	386.5	393.6	
	224.5	224.7	224.8	224.7	222.6	KCAS	243.8	244.5	244.7	243.8	243.2	
	1277	1313	1353	1371	1409	LB/HR	1546	1593	1644	1680	1719	
	0.262	0.261	0.259	0.258	0.257	NM/LB	0.234	0.233	0.231	0.230	0.229	
29,000	67.0	68.6	70.2	71.6	73.0	%N1	71.2	73.0	74.6	76.1	77.6	37,000
	0.60	0.60	0.60	0.60	0.60	MIND	0.65	0.65	0.65	0.65	0.64	
	337.5	346.3	354.2	361.0	367.3	KTAS	365.1	374.5	383.2	390.0	396.9	
	226.6	227.2	227.3	226.8	226.0	KCAS	246.3	246.9	247.1	246.1	245.4	
	1308	1347	1384	1405	1452	LB/HR	1581	1628	1681	1718	1756	
	0.258	0.257	0.256	0.254	0.253	NM/LB	0.231	0.230	0.228	0.227	0.226	
30,000	67.5	69.1	70.7	72.2	73.7	%N1	71.7	73.4	75.1	76.6	78.2	38,000
	0.60	0.60	0.60	0.60	0.60	MIND	0.65	0.65	0.65	0.65	0.65	
	340.3	349.3	357.3	364.3	372.0	KTAS	368.4	377.4	386.2	393.2	401.5	
	228.6	229.3	229.4	229.0	229.1	KCAS	248.7	248.9	249.2	248.3	248.4	
	1335	1381	1418	1440	1494	LB/HR	1616	1663	1716	1755	1800	
	0.255	0.253	0.252	0.251	0.249	NM/LB	0.228	0.227	0.225	0.224	0.223	
31,000	68.0	69.7	71.2	72.7	74.3	%N1	72.2	73.8	75.5	77.1	78.8	39,000
	0.61	0.61	0.61	0.61	0.61	MIND	0.66	0.66	0.66	0.66	0.66	
	343.7	353.0	361.0	368.1	376.2	KTAS	371.7	380.3	389.2	396.5	406.0	
	231.0	231.9	231.9	231.5	231.8	KCAS	251.0	251.0	251.3	250.5	251.4	
	1369	1412	1456	1472	1536	LB/HR	1652	1698	1753	1794	1854	
	0.251	0.250	0.248	0.247	0.245	NM/LB	0.225	0.224	0.222	0.221	0.219	
32,000	68.5	70.2	71.8	73.3	75.0	%N1						
	0.61	0.62	0.62	0.62	0.62	MIND						
	347.4	356.8	364.8	371.9	380.2	KTAS						
	233.6	234.5	234.5	234.0	234.5	KCAS						
	1406	1450	1489	1512	1571	LB/HR						
	0.247	0.246	0.245	0.243	0.242	NM/LB						

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	65.8	67.4	69.0	70.5	71.6	%N1	70.0	71.8	73.4	75.0	76.6	33,000
	0.59	0.59	0.59	0.59	0.59	MIND	0.64	0.64	0.64	0.64	0.64	
	331.7	339.3	347.8	355.4	359.1	KTAS	358.6	368.4	376.9	383.9	391.9	
	215.0	214.8	215.3	215.3	212.9	KCAS	233.6	234.4	234.5	233.7	233.6	
	1156	1186	1225	1243	1273	LB/HR	1412	1456	1496	1536	1574	
	0.287	0.286	0.284	0.282	0.282	NM/LB	0.254	0.253	0.252	0.250	0.249	
26,000	66.4	68.0	69.6	71.1	72.1	%N1	70.6	72.4	74.0	75.6	77.1	34,000
	0.60	0.60	0.60	0.60	0.59	MIND	0.65	0.65	0.65	0.65	0.65	
	336.0	344.0	352.2	359.6	362.3	KTAS	362.4	372.3	380.9	387.8	395.2	
	218.0	217.9	218.1	218.0	215.0	KCAS	236.2	237.0	237.1	236.2	235.7	
	1187	1224	1258	1280	1303	LB/HR	1444	1495	1536	1570	1613	
	0.283	0.281	0.280	0.278	0.278	NM/LB	0.251	0.249	0.248	0.247	0.245	
27,000	66.9	68.5	70.1	71.6	72.9	%N1	71.2	73.0	74.6	76.2	77.7	35,000
	0.61	0.61	0.61	0.60	0.60	MIND	0.66	0.66	0.66	0.65	0.65	
	338.7	347.1	355.2	362.3	367.7	KTAS	367.0	376.6	385.3	392.3	399.5	
	219.8	220.0	220.1	219.7	218.3	KCAS	239.4	240.0	240.0	239.2	238.5	
	1214	1253	1287	1308	1347	LB/HR	1486	1531	1579	1614	1658	
	0.279	0.277	0.276	0.274	0.273	NM/LB	0.247	0.246	0.244	0.243	0.241	
28,000	67.3	68.9	70.5	72.0	73.5	%N1	71.7	73.5	75.1	76.7	78.4	36,000
	0.61	0.61	0.61	0.61	0.61	MIND	0.66	0.66	0.66	0.66	0.66	
	340.4	349.2	357.4	364.5	372.1	KTAS	370.7	380.0	388.8	396.2	404.5	
	221.0	221.4	221.6	221.1	221.1	KCAS	242.0	242.3	242.4	241.6	241.7	
	1238	1279	1314	1335	1383	LB/HR	1526	1570	1613	1651	1700	
	0.275	0.273	0.272	0.270	0.269	NM/LB	0.243	0.242	0.241	0.240	0.238	
29,000	67.8	69.5	71.1	72.6	74.2	%N1	72.2	73.9	75.6	77.2	79.0	37,000
	0.61	0.62	0.62	0.61	0.62	MIND	0.67	0.67	0.67	0.67	0.67	
	343.6	352.8	361.2	368.3	376.5	KTAS	374.2	383.2	392.1	399.9	409.3	
	223.2	223.9	224.1	223.6	223.9	KCAS	244.4	244.5	244.6	244.1	244.8	
	1273	1312	1353	1369	1426	LB/HR	1559	1603	1647	1694	1749	
	0.270	0.269	0.267	0.266	0.264	NM/LB	0.240	0.239	0.238	0.236	0.234	
30,000	68.4	70.1	71.7	73.2	74.9	%N1	72.7	74.5	76.2	77.8	79.6	38,000
	0.62	0.62	0.62	0.62	0.62	MIND	0.68	0.68	0.68	0.68	0.68	
	347.5	356.8	365.2	372.3	380.8	KTAS	378.4	387.3	396.4	404.6	414.3	
	225.8	226.5	226.7	226.1	226.6	KCAS	247.4	247.3	247.4	247.2	248.0	
	1306	1346	1389	1405	1465	LB/HR	1603	1648	1694	1736	1794	
	0.266	0.265	0.263	0.262	0.260	NM/LB	0.236	0.235	0.234	0.233	0.231	
31,000	68.9	70.6	72.3	73.8	75.5	%N1	73.3	75.0	76.8	78.4	80.2	39,000
	0.63	0.63	0.63	0.63	0.63	MIND	0.68	0.68	0.68	0.68	0.68	
	351.2	360.7	369.1	376.2	384.9	KTAS	382.7	391.7	400.9	409.4	418.4	
	228.4	229.2	229.3	228.7	229.2	KCAS	250.4	250.3	250.5	250.3	250.6	
	1340	1382	1425	1441	1504	LB/HR	1642	1688	1735	1788	1835	
	0.262	0.261	0.259	0.258	0.256	NM/LB	0.233	0.232	0.231	0.229	0.228	
32,000	69.5	71.2	72.9	74.4	76.1	%N1						
	0.63	0.64	0.64	0.63	0.64	MIND						
	355.0	364.6	373.0	380.1	388.6	KTAS						
	231.0	231.8	231.9	231.2	231.5	KCAS						
	1376	1419	1463	1479	1542	LB/HR						
	0.258	0.257	0.255	0.254	0.252	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	66.7	68.3	69.9	71.4	72.6	%N1	71.2	72.9	74.6	76.2	77.8	33,000
	0.61	0.61	0.61	0.61	0.60	MIND	0.66	0.67	0.67	0.66	0.66	
	339.4	347.8	356.2	363.6	366.6	KTAS	368.5	378.3	386.9	394.7	402.3	
	212.7	212.8	213.0	212.7	209.9	KCAS	232.3	232.9	232.7	232.2	231.8	
	1124	1159	1195	1212	1239	LB/HR	1391	1433	1477	1512	1553	
	0.302	0.300	0.298	0.297	0.296	NM/LB	0.265	0.264	0.262	0.261	0.259	
26,000	67.1	68.7	70.3	71.8	73.3	%N1	71.7	73.5	75.1	76.8	78.5	34,000
	0.61	0.61	0.61	0.61	0.61	MIND	0.67	0.67	0.67	0.67	0.67	
	340.3	348.8	357.1	364.4	371.2	KTAS	372.6	382.3	390.8	399.0	407.6	
	213.3	213.5	213.6	213.2	212.6	KCAS	235.1	235.5	235.3	234.9	235.0	
	1146	1182	1215	1235	1276	LB/HR	1428	1470	1515	1553	1598	
	0.297	0.295	0.294	0.292	0.291	NM/LB	0.261	0.260	0.258	0.257	0.255	
27,000	67.5	69.2	70.9	72.4	74.0	%N1	72.2	74.0	75.7	77.4	79.1	35,000
	0.62	0.62	0.62	0.62	0.62	MIND	0.68	0.68	0.68	0.68	0.68	
	342.8	351.8	360.6	367.7	375.8	KTAS	376.8	386.2	394.8	403.5	412.8	
	215.0	215.4	215.8	215.3	215.4	KCAS	237.9	238.1	237.9	237.8	238.3	
	1174	1209	1248	1264	1314	LB/HR	1466	1509	1554	1595	1645	
	0.292	0.291	0.289	0.288	0.286	NM/LB	0.257	0.256	0.254	0.253	0.251	
28,000	68.1	69.8	71.5	73.0	74.7	%N1	72.8	74.6	76.3	78.0	79.8	36,000
	0.63	0.63	0.63	0.63	0.63	MIND	0.69	0.69	0.69	0.69	0.69	
	346.7	355.9	364.7	372.0	380.3	KTAS	381.7	391.2	400.0	408.9	418.1	
	217.6	218.1	218.4	217.9	218.2	KCAS	241.3	241.4	241.2	241.2	241.5	
	1208	1244	1284	1301	1353	LB/HR	1509	1552	1600	1642	1693	
	0.287	0.286	0.284	0.283	0.281	NM/LB	0.253	0.252	0.250	0.249	0.247	
29,000	68.7	70.4	72.1	73.6	75.3	%N1	73.4	75.2	76.9	78.6	80.4	37,000
	0.63	0.63	0.63	0.63	0.63	MIND	0.70	0.70	0.70	0.70	0.70	
	350.7	360.1	368.8	376.2	384.9	KTAS	386.4	395.9	404.7	413.9	422.1	
	220.3	220.9	221.1	220.6	221.0	KCAS	244.5	244.5	244.3	244.4	244.1	
	1239	1281	1317	1339	1395	LB/HR	1552	1596	1638	1689	1737	
	0.283	0.281	0.280	0.278	0.276	NM/LB	0.249	0.248	0.247	0.245	0.243	
30,000	69.3	71.0	72.7	74.2	76.0	%N1	74.0	75.7	77.5	79.2	80.9	38,000
	0.64	0.64	0.64	0.64	0.64	MIND	0.70	0.70	0.70	0.70	0.70	
	354.7	364.2	372.9	380.4	389.3	KTAS	390.4	399.9	408.9	418.2	425.2	
	223.0	223.6	223.7	223.2	223.7	KCAS	247.2	247.2	247.0	247.2	246.0	
	1276	1315	1356	1373	1431	LB/HR	1593	1639	1683	1735	1772	
	0.278	0.277	0.275	0.274	0.272	NM/LB	0.245	0.244	0.243	0.241	0.240	
31,000	69.9	71.6	73.3	74.9	76.6	%N1	74.5	76.3	78.0	79.8	81.4	39,000
	0.65	0.65	0.65	0.65	0.65	MIND	0.71	0.71	0.71	0.71	0.71	
	358.7	368.5	377.2	384.7	393.2	KTAS	393.8	403.3	412.4	421.8	428.1	
	225.7	226.4	226.4	225.9	226.1	KCAS	249.6	249.5	249.3	249.5	247.8	
	1309	1355	1392	1414	1473	LB/HR	1627	1680	1726	1772	1814	
	0.274	0.272	0.271	0.269	0.267	NM/LB	0.242	0.240	0.239	0.238	0.236	
32,000	70.5	72.3	74.0	75.6	77.2	%N1						
	0.66	0.66	0.66	0.66	0.66	MIND						
	363.7	373.7	382.4	389.9	397.6	KTAS						
	229.1	229.8	229.8	229.2	228.8	KCAS						
	1352	1394	1432	1455	1512	LB/HR						
	0.269	0.268	0.267	0.265	0.263	NM/LB						

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)		-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	GROSS WEIGHT AT ALTITUDE (LB)
		-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
		67.3	68.9	70.6	72.1	73.7	%N1	72.3	74.1	75.8	77.5	79.2	
		0.62	0.62	0.62	0.62	0.62	MIND	0.69	0.69	0.69	0.69	0.69	
	25,000	342.0	350.5	359.4	366.9	374.3	KTAS	379.5	389.5	397.7	407.1	415.9	33,000
		207.0	207.0	207.4	207.0	206.7	KCAS	231.5	231.9	231.3	231.5	231.5	
		1075	1109	1145	1161	1204	LB/HR	1375	1416	1457	1497	1540	
		0.318	0.316	0.314	0.313	0.311	NM/LB	0.276	0.275	0.273	0.272	0.270	
		67.8	69.5	71.2	72.8	74.4	%N1	72.9	74.7	76.4	78.2	79.9	
		0.63	0.63	0.63	0.63	0.63	MIND	0.70	0.70	0.70	0.70	0.70	
	26,000	345.5	354.3	363.6	371.1	379.2	KTAS	384.8	394.7	403.2	412.7	421.2	34,000
		209.3	209.4	210.0	209.5	209.6	KCAS	235.0	235.2	234.7	234.9	234.7	
		1107	1143	1177	1197	1243	LB/HR	1420	1462	1499	1546	1589	
		0.312	0.310	0.309	0.307	0.305	NM/LB	0.271	0.270	0.269	0.267	0.265	
		68.4	70.1	71.8	73.4	75.1	%N1	73.5	75.3	77.0	78.8	80.5	
		0.64	0.64	0.64	0.64	0.64	MIND	0.71	0.71	0.71	0.71	0.71	
	27,000	349.7	358.8	367.9	375.7	384.2	KTAS	388.6	398.4	407.2	416.5	424.8	35,000
		212.0	212.2	212.6	212.3	212.5	KCAS	237.6	237.6	237.2	237.3	236.9	
		1143	1176	1214	1232	1285	LB/HR	1455	1498	1542	1584	1628	
		0.306	0.305	0.303	0.301	0.299	NM/LB	0.267	0.266	0.264	0.263	0.261	
		69.1	70.8	72.5	74.1	75.8	%N1	74.0	75.8	77.6	79.3	81.0	
		0.64	0.65	0.65	0.65	0.65	MIND	0.71	0.71	0.71	0.71	0.71	
	28,000	353.9	363.2	372.2	380.2	389.1	KTAS	392.1	401.8	410.8	420.1	427.2	36,000
		214.7	215.1	215.3	215.1	215.5	KCAS	239.9	239.8	239.5	239.5	238.3	
		1176	1215	1249	1272	1323	LB/HR	1491	1534	1580	1628	1662	
		0.301	0.299	0.298	0.296	0.294	NM/LB	0.263	0.262	0.260	0.258	0.257	
		69.7	71.5	73.2	74.8	76.5	%N1	74.6	76.4	78.2	79.9	81.5	
		0.65	0.66	0.66	0.66	0.66	MIND	0.72	0.72	0.72	0.72	0.72	
	29,000	359.2	369.0	377.7	386.0	394.6	KTAS	395.4	405.0	414.2	423.4	430.4	37,000
		218.2	218.7	218.7	218.5	218.7	KCAS	242.0	241.9	241.7	241.6	240.3	
		1214	1255	1289	1313	1365	LB/HR	1527	1576	1618	1667	1701	
		0.296	0.294	0.293	0.291	0.289	NM/LB	0.259	0.257	0.256	0.254	0.253	
		70.4	72.2	73.9	75.6	77.2	%N1	75.1	76.9	78.7	80.5	82.1	
		0.66	0.67	0.67	0.67	0.66	MIND	0.73	0.72	0.72	0.72	0.72	
	30,000	364.7	374.8	383.5	391.8	399.7	KTAS	398.1	407.8	417.2	426.3	434.3	38,000
		221.8	222.4	222.3	222.1	221.8	KCAS	243.9	243.7	243.6	243.4	242.6	
		1258	1297	1332	1356	1407	LB/HR	1561	1606	1656	1705	1751	
		0.290	0.289	0.288	0.286	0.284	NM/LB	0.255	0.254	0.252	0.250	0.248	
		71.1	72.9	74.6	76.3	77.9	%N1	75.7	77.5	79.3	81.1	82.8	
		0.67	0.68	0.67	0.67	0.67	MIND	0.73	0.73	0.73	0.73	0.73	
	31,000	369.9	380.0	388.4	397.1	404.9	KTAS	401.7	411.4	420.9	429.9	440.1	39,000
		225.2	225.8	225.4	225.3	224.9	KCAS	246.3	246.1	245.9	245.6	246.2	
		1298	1338	1372	1398	1451	LB/HR	1600	1652	1697	1748	1804	
		0.285	0.284	0.283	0.281	0.279	NM/LB	0.251	0.249	0.248	0.246	0.244	
		71.7	73.5	75.2	76.9	78.5	%N1						
		0.68	0.68	0.68	0.68	0.68	MIND						
	32,000	374.6	384.6	392.8	401.8	410.4	KTAS						
		228.3	228.7	228.2	228.2	228.2	KCAS						
		1333	1378	1413	1440	1498	LB/HR						
		0.281	0.279	0.278	0.276	0.274	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	68.5	70.2	71.9	73.5	75.2	%N1	73.8	75.6	77.4	79.1	80.8	33,000
	0.64	0.64	0.64	0.64	0.64	MIND	0.72	0.72	0.71	0.72	0.71	
	350.8	359.9	368.8	376.9	385.8	KTAS	390.8	400.4	409.6	419.3	427.1	
	204.2	204.3	204.5	204.3	204.7	KCAS	229.5	229.4	229.1	229.4	228.6	
	1063	1097	1131	1149	1198	LB/HR	1376	1415	1458	1498	1536	
	0.330	0.328	0.326	0.324	0.322	NM/LB	0.284	0.283	0.281	0.280	0.278	
26,000	69.2	70.9	72.6	74.3	76.0	%N1	74.4	76.2	78.0	79.8	81.4	34,000
	0.65	0.65	0.65	0.65	0.65	MIND	0.72	0.72	0.72	0.72	0.72	
	355.9	365.3	374.3	382.4	391.6	KTAS	394.4	404.0	413.2	423.0	430.0	
	207.4	207.6	207.8	207.6	208.0	KCAS	231.8	231.6	231.4	231.6	230.2	
	1102	1134	1170	1188	1239	LB/HR	1414	1453	1497	1538	1575	
	0.323	0.322	0.320	0.318	0.316	NM/LB	0.279	0.278	0.276	0.275	0.273	
27,000	69.9	71.7	73.4	75.1	76.7	%N1	75.0	76.8	78.6	80.4	82.0	35,000
	0.66	0.66	0.66	0.66	0.66	MIND	0.73	0.73	0.73	0.73	0.73	
	361.7	371.4	380.4	388.6	397.5	KTAS	398.2	408.0	417.3	427.1	434.9	
	211.0	211.4	211.5	211.2	211.4	KCAS	234.3	234.1	233.8	234.0	233.2	
	1141	1179	1211	1234	1282	LB/HR	1448	1495	1534	1582	1623	
	0.317	0.315	0.314	0.312	0.310	NM/LB	0.275	0.273	0.272	0.270	0.268	
28,000	70.7	72.5	74.2	75.8	77.4	%N1	75.7	77.6	79.4	81.1	82.8	36,000
	0.67	0.67	0.67	0.67	0.67	MIND	0.74	0.74	0.74	0.74	0.74	
	367.3	377.2	386.4	394.7	402.8	KTAS	404.3	414.2	423.6	432.4	442.0	
	214.5	215.0	215.1	214.8	214.5	KCAS	238.2	238.1	237.7	237.2	237.3	
	1181	1217	1255	1273	1325	LB/HR	1497	1546	1587	1632	1681	
	0.311	0.310	0.308	0.306	0.304	NM/LB	0.270	0.268	0.267	0.265	0.263	
29,000	71.4	73.2	74.9	76.6	78.1	%N1	76.3	78.1	80.0	81.7	83.6	37,000
	0.68	0.68	0.68	0.68	0.68	MIND	0.75	0.75	0.75	0.74	0.75	
	372.9	383.0	392.1	400.4	408.6	KTAS	407.6	417.7	427.2	436.2	449.0	
	218.1	218.5	218.5	218.2	217.8	KCAS	240.4	240.2	240.0	239.5	241.4	
	1223	1260	1298	1317	1367	LB/HR	1538	1588	1631	1678	1740	
	0.305	0.304	0.302	0.301	0.299	NM/LB	0.265	0.263	0.262	0.260	0.258	
30,000	72.0	73.8	75.5	77.2	78.9	%N1	76.9	78.8	80.6	82.4	84.3	38,000
	0.69	0.69	0.69	0.69	0.69	MIND	0.75	0.75	0.75	0.75	0.76	
	377.8	387.8	396.8	405.5	414.6	KTAS	411.5	421.8	431.8	441.6	452.6	
	221.2	221.5	221.3	221.2	221.3	KCAS	242.9	242.9	242.8	242.8	243.6	
	1259	1301	1336	1361	1415	LB/HR	1583	1635	1680	1732	1789	
	0.300	0.298	0.297	0.295	0.293	NM/LB	0.260	0.258	0.257	0.255	0.253	
31,000	72.6	74.4	76.2	77.9	79.6	%N1	77.5	79.4	81.2	83.0	84.8	39,000
	0.70	0.70	0.70	0.70	0.70	MIND	0.76	0.76	0.76	0.76	0.76	
	382.9	392.7	401.7	411.1	420.6	KTAS	415.3	425.6	435.8	445.7	455.2	
	224.5	224.6	224.3	224.5	224.8	KCAS	245.3	245.3	245.3	245.2	245.1	
	1302	1340	1376	1403	1460	LB/HR	1629	1676	1729	1783	1828	
	0.294	0.293	0.292	0.290	0.288	NM/LB	0.255	0.254	0.252	0.250	0.249	
32,000	73.2	75.0	76.8	78.5	80.3	%N1						
	0.71	0.71	0.71	0.71	0.71	MIND						
	387.0	396.7	405.8	415.3	424.8	KTAS						
	227.1	227.1	226.8	227.0	227.2	KCAS						
	1339	1377	1419	1442	1501	LB/HR						
	0.289	0.288	0.286	0.285	0.283	NM/LB						

39,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	70.1	71.8	73.6	75.2	76.9	%N1	75.6	77.5	79.3	81.1	82.8	33,000
	0.67	0.67	0.67	0.67	0.67	MIND	0.74	0.74	0.74	0.74	0.74	
	365.2	374.8	384.0	392.1	401.1	KTAS	406.6	416.6	425.8	436.0	444.4	
	203.4	203.7	203.9	203.5	203.7	KCAS	228.8	228.6	228.2	228.5	227.9	
	1065	1099	1133	1150	1197	LB/HR	1388	1427	1468	1514	1554	
	0.343	0.341	0.339	0.338	0.335	NM/LB	0.293	0.292	0.290	0.288	0.286	
26,000	70.9	72.6	74.4	76.1	77.7	%N1	76.3	78.2	80.0	81.7	83.6	34,000
	0.68	0.68	0.68	0.68	0.68	MIND	0.75	0.75	0.75	0.75	0.75	
	371.2	380.9	390.6	398.7	407.1	KTAS	411.3	421.5	431.1	439.6	451.2	
	207.1	207.3	207.6	207.2	207.0	KCAS	231.7	231.6	231.3	230.6	231.7	
	1105	1137	1173	1190	1241	LB/HR	1433	1474	1518	1559	1611	
	0.336	0.335	0.333	0.331	0.328	NM/LB	0.287	0.286	0.284	0.282	0.280	
27,000	71.6	73.4	75.2	76.9	78.5	%N1	76.8	78.7	80.6	82.4	84.2	35,000
	0.69	0.69	0.69	0.69	0.69	MIND	0.76	0.76	0.76	0.76	0.76	
	377.2	387.1	397.1	404.9	413.4	KTAS	413.8	424.1	433.9	443.8	454.5	
	210.7	211.0	211.4	210.7	210.5	KCAS	233.3	233.2	233.0	233.0	233.6	
	1143	1180	1218	1234	1284	LB/HR	1467	1515	1561	1602	1659	
	0.330	0.328	0.326	0.324	0.322	NM/LB	0.282	0.280	0.278	0.277	0.274	
28,000	72.3	74.1	75.9	77.5	79.3	%N1	77.5	79.4	81.2	83.0	84.8	36,000
	0.70	0.70	0.70	0.70	0.70	MIND	0.77	0.77	0.76	0.76	0.76	
	382.4	392.2	401.9	410.2	420.0	KTAS	417.9	428.3	438.2	448.2	457.6	
	213.9	214.0	214.2	213.7	214.2	KCAS	235.8	235.7	235.5	235.5	235.3	
	1184	1218	1256	1274	1329	LB/HR	1514	1563	1605	1654	1701	
	0.323	0.322	0.320	0.318	0.316	NM/LB	0.276	0.274	0.273	0.271	0.269	
29,000	72.9	74.7	76.5	78.2	80.0	%N1	78.1	80.0	81.9	83.7	85.5	37,000
	0.71	0.71	0.71	0.71	0.71	MIND	0.77	0.77	0.77	0.77	0.77	
	386.3	395.8	405.3	414.8	425.3	KTAS	421.9	432.5	442.5	452.6	462.2	
	216.3	216.2	216.2	216.3	217.1	KCAS	238.3	238.3	238.1	238.1	238.0	
	1219	1257	1291	1317	1372	LB/HR	1557	1608	1657	1708	1751	
	0.317	0.315	0.314	0.312	0.310	NM/LB	0.271	0.269	0.267	0.265	0.264	
30,000	73.5	75.3	77.1	78.9	80.6	%N1	78.7	80.7	82.6	84.4	86.2	38,000
	0.72	0.72	0.71	0.72	0.72	MIND	0.78	0.78	0.78	0.78	0.78	
	390.8	400.3	409.6	419.6	428.4	KTAS	426.0	436.6	446.9	457.1	466.9	
	219.0	218.8	218.7	219.1	218.8	KCAS	240.9	240.8	240.7	240.7	240.6	
	1257	1295	1330	1358	1409	LB/HR	1608	1654	1706	1758	1810	
	0.311	0.309	0.308	0.306	0.304	NM/LB	0.265	0.264	0.262	0.260	0.258	
31,000	74.1	75.9	77.7	79.5	81.2	%N1	79.3	81.2	83.2	85.0	86.8	39,000
	0.72	0.72	0.72	0.72	0.72	MIND	0.78	0.78	0.78	0.78	0.78	
	394.8	404.3	413.4	423.8	430.6	KTAS	428.4	439.1	449.6	459.8	469.8	
	221.5	221.2	220.9	221.4	220.1	KCAS	242.4	242.4	242.3	242.3	242.3	
	1294	1334	1369	1399	1445	LB/HR	1648	1695	1749	1803	1850	
	0.305	0.303	0.302	0.300	0.298	NM/LB	0.260	0.259	0.257	0.255	0.254	
32,000	74.8	76.7	78.4	80.3	81.9	%N1						
	0.73	0.73	0.73	0.73	0.73	MIND						
	399.8	409.5	418.6	429.1	436.6	KTAS						
	224.5	224.3	224.0	224.5	223.4	KCAS						
	1337	1374	1414	1440	1495	LB/HR						
	0.299	0.298	0.296	0.294	0.292	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

41,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
	71.9	73.7	75.5	77.2	78.8	%N1	77.5	79.4	81.3	83.1	84.9	
	0.70	0.70	0.70	0.70	0.70	MIND	0.77	0.77	0.77	0.77	0.77	
25,000	381.2	390.2	400.6	408.4	416.8	KTAS	419.2	429.7	439.8	450.1	459.3	33,000
	203.4	203.0	203.7	202.9	202.6	KCAS	225.9	225.8	225.7	225.9	225.5	
	1068	1099	1138	1150	1198	LB/HR	1397	1442	1486	1531	1573	
	0.357	0.355	0.352	0.350	0.348	NM/LB	0.300	0.298	0.296	0.294	0.292	
	72.6	74.4	76.2	77.9	79.7	%N1	78.1	80.1	82.0	83.9	85.7	
	0.71	0.71	0.71	0.70	0.71	MIND	0.78	0.78	0.78	0.78	0.78	
26,000	386.3	395.6	405.7	413.3	423.6	KTAS	423.7	434.3	444.6	455.1	464.4	34,000
	206.4	206.2	206.5	205.6	206.3	KCAS	228.5	228.5	228.4	228.6	228.3	
	1107	1140	1176	1191	1242	LB/HR	1441	1487	1533	1580	1624	
	0.349	0.347	0.345	0.343	0.341	NM/LB	0.294	0.292	0.290	0.288	0.286	
	73.2	75.0	76.8	78.6	80.4	%N1	78.8	80.8	82.7	84.6	86.4	
	0.71	0.71	0.71	0.71	0.71	MIND	0.78	0.78	0.78	0.78	0.78	
27,000	389.0	398.7	408.3	417.8	428.1	KTAS	427.4	438.1	448.5	459.0	468.7	35,000
	208.0	207.9	207.9	208.0	208.7	KCAS	230.7	230.7	230.7	230.8	230.7	
	1137	1173	1208	1229	1282	LB/HR	1489	1532	1579	1628	1674	
	0.342	0.340	0.338	0.336	0.334	NM/LB	0.287	0.286	0.284	0.282	0.280	
	73.8	75.7	77.5	79.3	81.0	%N1	79.4	81.4	83.3	85.2	87.0	
	0.72	0.72	0.72	0.72	0.72	MIND	0.79	0.79	0.79	0.79	0.79	
28,000	393.4	403.5	412.7	422.9	430.5	KTAS	429.8	440.6	451.1	461.6	471.4	36,000
	210.5	210.7	210.4	210.8	210.0	KCAS	232.2	232.2	232.2	232.3	232.1	
	1174	1212	1247	1270	1317	LB/HR	1524	1574	1623	1672	1720	
	0.335	0.333	0.331	0.329	0.327	NM/LB	0.282	0.280	0.278	0.276	0.274	
	74.6	76.4	78.2	80.1	81.7	%N1	80.0	82.0	84.0	85.8	87.6	
	0.73	0.73	0.73	0.73	0.73	MIND	0.79	0.79	0.79	0.79	0.79	
29,000	398.8	409.2	418.2	428.6	436.1	KTAS	431.1	441.9	452.5	462.4	472.1	37,000
	213.7	213.9	213.5	214.0	213.0	KCAS	233.0	232.9	233.0	232.7	232.5	
	1216	1255	1291	1315	1363	LB/HR	1568	1613	1664	1713	1762	
	0.328	0.326	0.324	0.322	0.320	NM/LB	0.275	0.274	0.272	0.270	0.268	
	75.4	77.3	79.1	81.0	82.7	%N1	80.7	82.7	84.6	86.5	88.3	
	0.74	0.75	0.74	0.75	0.74	MIND	0.79	0.79	0.79	0.79	0.79	
30,000	406.6	417.1	426.2	436.8	444.9	KTAS	433.1	443.9	454.5	464.1	473.6	38,000
	218.3	218.5	218.0	218.5	217.7	KCAS	234.2	234.1	234.1	233.7	233.4	
	1271	1312	1349	1374	1426	LB/HR	1610	1663	1709	1758	1808	
	0.320	0.318	0.316	0.314	0.312	NM/LB	0.269	0.267	0.266	0.264	0.262	
	76.2	78.1	80.0	81.7	83.6	%N1	81.3	83.3	85.3	87.2	89.1	
	0.75	0.76	0.75	0.75	0.75	MIND	0.80	0.80	0.80	0.80	0.79	
31,000	412.3	422.8	432.4	441.0	451.9	KTAS	435.3	446.1	456.7	466.4	475.7	39,000
	221.7	221.8	221.5	220.8	221.5	KCAS	235.5	235.4	235.4	235.0	234.5	
	1317	1359	1395	1418	1482	LB/HR	1655	1709	1757	1808	1865	
	0.313	0.311	0.310	0.308	0.305	NM/LB	0.263	0.261	0.260	0.258	0.255	
	76.8	78.7	80.6	82.4	84.2	%N1						
	0.76	0.76	0.76	0.76	0.76	MIND						
32,000	415.5	425.9	435.7	445.1	455.2	KTAS						
	223.6	223.6	223.4	223.1	223.3	KCAS						
	1353	1396	1438	1459	1522	LB/HR						
	0.307	0.305	0.303	0.301	0.299	NM/LB						

43,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	73.5	75.3	77.1	78.9	80.7	%N1	79.5	81.5	83.5	85.3	87.2	33,000
	0.72	0.72	0.72	0.72	0.72	MIND	0.79	0.79	0.79	0.79	0.79	
	392.1	401.8	411.0	419.9	429.7	KTAS	430.6	441.4	451.9	462.3	471.7	
	200.1	200.1	199.9	199.6	199.9	KCAS	222.1	222.0	222.0	222.1	221.7	
	1063	1095	1126	1144	1194	LB/HR	1407	1452	1496	1546	1588	
	0.369	0.367	0.365	0.362	0.360	NM/LB	0.306	0.304	0.302	0.299	0.297	
26,000	74.2	76.0	77.8	79.7	81.4	%N1	80.3	82.3	84.2	86.0	87.9	34,000
	0.72	0.72	0.72	0.73	0.72	MIND	0.79	0.79	0.79	0.79	0.79	
	395.7	405.7	414.7	425.5	433.0	KTAS	432.2	442.9	453.5	463.4	472.9	
	202.1	202.2	201.9	202.6	201.6	KCAS	223.0	222.9	222.9	222.7	222.3	
	1096	1133	1162	1189	1230	LB/HR	1450	1496	1543	1587	1636	
	0.361	0.358	0.357	0.354	0.352	NM/LB	0.298	0.296	0.294	0.292	0.289	
27,000	75.1	77.0	78.8	80.7	82.4	%N1	80.9	83.0	84.9	86.8	88.7	35,000
	0.74	0.74	0.74	0.74	0.74	MIND	0.80	0.80	0.80	0.79	0.79	
	403.9	414.5	423.5	434.5	442.3	KTAS	434.5	445.7	455.9	465.4	475.1	
	206.8	207.0	206.6	207.3	206.4	KCAS	224.3	224.5	224.2	223.7	223.5	
	1147	1184	1217	1241	1290	LB/HR	1493	1548	1589	1633	1685	
	0.352	0.350	0.348	0.345	0.343	NM/LB	0.291	0.288	0.287	0.285	0.282	
28,000	76.0	77.9	79.7	81.6	83.4	%N1	81.6	83.6	85.6	87.6	88.9	36,000
	0.75	0.75	0.75	0.75	0.75	MIND	0.80	0.80	0.80	0.80	0.78	
	411.4	422.0	431.6	441.2	450.9	KTAS	436.6	447.7	458.2	467.6	467.5	
	211.0	211.2	210.9	210.8	210.9	KCAS	225.5	225.6	225.5	224.9	219.5	
	1199	1238	1273	1294	1350	LB/HR	1543	1593	1636	1688	1682	
	0.343	0.341	0.339	0.337	0.334	NM/LB	0.283	0.281	0.280	0.277	0.278	
29,000	76.8	78.7	80.6	82.3	84.1	%N1	82.3	84.4	86.3	88.5	89.3	37,000
	0.76	0.76	0.76	0.76	0.76	MIND	0.80	0.80	0.80	0.80	0.73	
	416.2	426.9	436.6	444.7	455.0	KTAS	437.7	448.8	459.4	469.7	435.7	
	213.8	213.9	213.7	212.7	213.0	KCAS	226.2	226.2	226.2	226.1	203.0	
	1242	1282	1319	1335	1396	LB/HR	1586	1638	1689	1740	1657	
	0.335	0.333	0.331	0.329	0.326	NM/LB	0.276	0.274	0.272	0.270	0.263	
30,000	77.4	79.4	81.2	83.1	84.9	%N1	83.0	85.1	87.1	89.2		38,000
	0.77	0.77	0.77	0.77	0.77	MIND	0.80	0.80	0.80	0.80		
	419.5	430.0	440.1	450.2	459.8	KTAS	438.1	449.2	459.9	470.0		
	215.7	215.7	215.6	215.6	215.5	KCAS	226.4	226.5	226.4	226.2		
	1279	1319	1358	1381	1446	LB/HR	1629	1682	1735	1787		
	0.328	0.326	0.324	0.321	0.318	NM/LB	0.269	0.267	0.265	0.263		
31,000	78.2	80.1	82.0	83.9	85.7	%N1	83.5	85.6	87.6	89.8		39,000
	0.78	0.78	0.78	0.78	0.78	MIND	0.79	0.79	0.79	0.79		
	424.3	435.0	445.2	455.7	465.2	KTAS	432.4	443.6	453.7	462.8		
	218.4	218.4	218.4	218.6	218.3	KCAS	223.1	223.3	223.0	222.3		
	1326	1368	1409	1433	1496	LB/HR	1650	1706	1759	1815		
	0.320	0.318	0.316	0.313	0.311	NM/LB	0.262	0.260	0.258	0.255		
32,000	78.9	80.8	82.8	84.7	86.5	%N1						
	0.78	0.78	0.78	0.78	0.78	MIND						
	428.0	438.7	449.2	459.7	469.4	KTAS						
	220.6	220.5	220.5	220.7	220.5	KCAS						
	1367	1411	1454	1478	1544	LB/HR						
	0.313	0.311	0.309	0.306	0.304	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	75.5	77.4	79.2	81.2	82.9	%N1	81.8	83.8	85.8	87.9	88.9	33,000
	0.75	0.75	0.75	0.75	0.75	MIND	0.80	0.80	0.80	0.80	0.68	
	408.4	418.5	427.6	439.7	447.9	KTAS	437.3	448.4	459.0	468.2	406.6	
	199.7	199.7	199.2	200.4	199.7	KCAS	215.6	215.7	215.6	215.0	179.5	
	1078	1110	1143	1166	1214	LB/HR	1424	1470	1520	1561	1452	
	0.379	0.377	0.374	0.372	0.369	NM/LB	0.307	0.305	0.302	0.300	0.280	
26,000	76.4	78.3	80.2	82.0	83.8	%N1	82.6	84.6	86.6	88.7		34,000
	0.76	0.76	0.76	0.76	0.76	MIND	0.80	0.80	0.80	0.80		
	414.6	424.8	434.6	443.5	453.3	KTAS	438.0	449.0	459.7	470.0		
	203.1	203.0	202.8	202.3	202.4	KCAS	216.0	216.0	216.0	215.9		
	1124	1157	1194	1208	1259	LB/HR	1470	1517	1564	1615		
	0.369	0.367	0.364	0.362	0.360	NM/LB	0.298	0.296	0.294	0.291		
27,000	77.3	79.2	81.1	82.9	84.7	%N1	83.3	85.4	87.4	89.4		35,000
	0.77	0.77	0.77	0.77	0.77	MIND	0.80	0.80	0.80	0.80		
	419.7	429.9	439.9	448.9	458.4	KTAS	437.5	448.5	459.2	469.5		
	205.9	205.7	205.6	205.0	204.9	KCAS	215.7	215.7	215.7	215.6		
	1166	1204	1239	1257	1310	LB/HR	1514	1563	1611	1665		
	0.360	0.357	0.355	0.353	0.350	NM/LB	0.289	0.287	0.285	0.282		
28,000	78.0	79.9	81.8	83.8	85.6	%N1	83.9	86.0	88.0	90.1		36,000
	0.78	0.78	0.78	0.78	0.78	MIND	0.79	0.79	0.79	0.79		
	423.8	433.9	444.4	454.9	464.6	KTAS	430.7	441.5	451.8	462.6		
	208.2	207.9	207.9	208.1	208.0	KCAS	212.0	211.9	211.8	212.1		
	1207	1243	1284	1303	1362	LB/HR	1533	1582	1631	1688		
	0.351	0.349	0.346	0.344	0.341	NM/LB	0.281	0.279	0.277	0.274		
29,000	78.8	80.7	82.7	84.6	86.4	%N1	85.3	87.4	89.4	90.8		37,000
	0.78	0.78	0.78	0.78	0.78	MIND	0.79	0.79	0.79	0.77		
	428.0	438.5	448.9	459.5	469.3	KTAS	429.2	439.9	450.4	451.7		
	210.5	210.3	210.3	210.5	210.4	KCAS	211.1	211.1	211.1	206.5		
	1251	1290	1332	1351	1414	LB/HR	1590	1641	1693	1705		
	0.342	0.340	0.337	0.335	0.332	NM/LB	0.270	0.268	0.266	0.265		
30,000	79.5	81.5	83.4	85.3	87.2	%N1	86.8	88.9	90.9			38,000
	0.79	0.79	0.79	0.79	0.79	MIND	0.78	0.78	0.78			
	431.0	441.5	451.8	461.7	472.1	KTAS	427.7	438.5	448.9			
	212.1	212.0	211.8	211.6	211.8	KCAS	210.3	210.3	210.3			
	1290	1334	1373	1395	1457	LB/HR	1651	1706	1760			
	0.334	0.331	0.329	0.327	0.324	NM/LB	0.259	0.257	0.255			
31,000	80.3	82.3	84.3	86.1	88.0	%N1						39,000
	0.79	0.79	0.79	0.79	0.79	MIND						
	432.8	443.4	453.6	462.6	473.7	KTAS						
	213.1	213.0	212.8	212.1	212.6	KCAS						
	1336	1377	1418	1437	1504	LB/HR						
	0.324	0.322	0.320	0.318	0.315	NM/LB						
32,000	81.1	83.1	85.1	86.9	88.2	%N1						
	0.80	0.80	0.80	0.79	0.77	MIND						
	435.4	446.7	456.9	464.9	462.6	KTAS						
	214.6	214.7	214.5	213.3	207.0	KCAS						
	1382	1427	1469	1485	1497	LB/HR						
	0.315	0.313	0.311	0.309	0.309	NM/LB						

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CONSTANT SPEED CRUISE

CONSTANT SPEED CRUISE TABLES

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	150 KCAS						175 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	42.5	43.4	44.2	45.0	45.8	%N1	44.5	45.4	46.2	47.1	48.0	25,000
	1068	1093	1118	1145	1170	LB/HR	1154	1181	1208	1236	1263	
	0.146	0.145	0.144	0.144	0.143	NM/LB	0.157	0.156	0.156	0.155	0.154	
26,000	43.1	43.9	44.8	45.6	46.4	%N1	44.9	45.8	46.6	47.5	48.4	26,000
	1092	1118	1143	1171	1196	LB/HR	1172	1200	1227	1256	1282	
	0.142	0.142	0.141	0.140	0.140	NM/LB	0.155	0.154	0.153	0.153	0.152	
27,000	43.7	44.6	45.4	46.2	47.1	%N1	45.3	46.2	47.1	47.9	48.9	27,000
	1120	1146	1172	1200	1226	LB/HR	1190	1218	1245	1275	1302	
	0.139	0.138	0.138	0.137	0.136	NM/LB	0.152	0.152	0.151	0.150	0.150	
28,000	44.4	45.3	46.2	47.0	47.9	%N1	45.7	46.6	47.5	48.4	49.3	28,000
	1151	1178	1205	1234	1260	LB/HR	1208	1236	1264	1294	1321	
	0.135	0.135	0.134	0.133	0.133	NM/LB	0.150	0.150	0.149	0.148	0.148	
29,000	45.3	46.2	47.0	47.9	48.8	%N1	46.2	47.0	47.9	48.8	49.8	29,000
	1188	1215	1243	1273	1299	LB/HR	1227	1255	1284	1314	1341	
	0.131	0.130	0.130	0.129	0.129	NM/LB	0.148	0.147	0.147	0.146	0.145	
30,000						%N1	46.6	47.5	48.4	49.3	50.3	30,000
						LB/HR	1246	1275	1304	1335	1362	
						NM/LB	0.146	0.145	0.144	0.144	0.143	
31,000						%N1	47.0	48.0	48.9	49.8	50.8	31,000
						LB/HR	1266	1296	1325	1356	1384	
						NM/LB	0.143	0.143	0.142	0.141	0.141	
32,000						%N1	47.6	48.5	49.4	50.3	51.3	32,000
						LB/HR	1289	1319	1349	1380	1408	
						NM/LB	0.141	0.140	0.140	0.139	0.138	
33,000						%N1	48.1	49.0	49.9	50.9	51.9	33,000
						LB/HR	1312	1342	1372	1404	1433	
						NM/LB	0.138	0.138	0.137	0.136	0.136	
34,000						%N1	48.6	49.6	50.5	51.4	52.5	34,000
						LB/HR	1336	1367	1397	1430	1459	
						NM/LB	0.136	0.135	0.135	0.134	0.134	
35,000						%N1	49.2	50.2	51.1	52.0	53.2	35,000
						LB/HR	1361	1393	1424	1457	1486	
						NM/LB	0.133	0.133	0.132	0.132	0.131	
36,000						%N1	49.8	50.7	51.7	52.6	53.8	36,000
						LB/HR	1387	1418	1450	1484	1514	
						NM/LB	0.131	0.130	0.130	0.129	0.129	
37,000						%N1	50.5	51.5	52.5	53.4	54.6	37,000
						LB/HR	1419	1451	1484	1518	1548	
						NM/LB	0.128	0.127	0.127	0.126	0.126	
38,000						%N1	51.2	52.2	53.2	54.2	55.4	38,000
						LB/HR	1451	1485	1518	1553	1583	
						NM/LB	0.125	0.125	0.124	0.123	0.123	
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	200 KCAS						225 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	47.4	48.3	49.2	50.1	51.2	%N1	51.5	52.5	53.5	54.4	55.7	25,000
	1290	1320	1350	1381	1409	LB/HR	1471	1506	1538	1574	1602	
	0.161	0.160	0.159	0.158	0.158	NM/LB	0.158	0.158	0.157	0.156	0.156	
26,000	47.7	48.6	49.6	50.5	51.5	%N1	51.7	52.7	53.7	54.7	55.9	26,000
	1304	1334	1364	1396	1423	LB/HR	1480	1514	1547	1583	1612	
	0.159	0.158	0.158	0.157	0.156	NM/LB	0.157	0.157	0.156	0.155	0.155	
27,000	48.0	49.0	49.9	50.8	51.9	%N1	51.9	52.9	53.9	54.9	56.2	27,000
	1318	1348	1378	1410	1438	LB/HR	1490	1524	1557	1593	1622	
	0.157	0.157	0.156	0.155	0.155	NM/LB	0.156	0.156	0.155	0.154	0.154	
28,000	48.4	49.3	50.3	51.2	52.3	%N1	52.1	53.2	54.2	55.2	56.4	28,000
	1333	1364	1395	1427	1455	LB/HR	1500	1534	1568	1604	1633	
	0.155	0.155	0.154	0.153	0.153	NM/LB	0.155	0.155	0.154	0.153	0.153	
29,000	48.8	49.7	50.6	51.6	52.7	%N1	52.4	53.4	54.4	55.4	56.6	29,000
	1349	1380	1411	1443	1472	LB/HR	1509	1544	1578	1614	1645	
	0.154	0.153	0.152	0.152	0.151	NM/LB	0.154	0.154	0.153	0.152	0.152	
30,000	49.1	50.1	51.0	51.9	53.1	%N1	52.6	53.7	54.7	55.7	56.8	30,000
	1364	1396	1427	1460	1489	LB/HR	1521	1556	1589	1626	1659	
	0.152	0.151	0.151	0.150	0.150	NM/LB	0.153	0.153	0.152	0.151	0.151	
31,000	49.5	50.5	51.4	52.4	53.5	%N1	53.0	54.0	55.0	56.0	57.1	31,000
	1382	1414	1445	1479	1508	LB/HR	1534	1570	1603	1640	1676	
	0.150	0.149	0.149	0.148	0.148	NM/LB	0.152	0.151	0.151	0.150	0.149	
32,000	49.9	50.9	51.9	52.8	54.0	%N1	53.3	54.3	55.4	56.4	57.3	32,000
	1400	1433	1464	1498	1527	LB/HR	1548	1584	1618	1655	1693	
	0.148	0.147	0.147	0.146	0.146	NM/LB	0.150	0.150	0.149	0.149	0.148	
33,000	50.4	51.3	52.3	53.3	54.5	%N1	53.5	54.6	55.6	56.6	57.6	33,000
	1419	1451	1483	1518	1547	LB/HR	1563	1600	1634	1672	1711	
	0.146	0.145	0.145	0.144	0.144	NM/LB	0.149	0.148	0.148	0.147	0.146	
34,000	50.8	51.8	52.8	53.7	54.9	%N1	53.8	54.8	55.8	56.8	57.8	34,000
	1437	1470	1502	1537	1567	LB/HR	1580	1616	1651	1690	1729	
	0.144	0.144	0.143	0.142	0.142	NM/LB	0.147	0.147	0.146	0.146	0.145	
35,000	51.2	52.2	53.2	54.2	55.4	%N1	54.0	55.1	56.1	57.1	58.1	35,000
	1455	1488	1521	1556	1586	LB/HR	1598	1635	1671	1709	1748	
	0.142	0.142	0.141	0.141	0.140	NM/LB	0.146	0.145	0.145	0.144	0.143	
36,000	51.6	52.6	53.6	54.6	55.8	%N1	54.3	55.3	56.4	57.4	58.4	36,000
	1473	1507	1540	1575	1606	LB/HR	1616	1654	1690	1729	1768	
	0.141	0.140	0.140	0.139	0.139	NM/LB	0.144	0.144	0.143	0.142	0.142	
37,000	52.0	53.1	54.1	55.1	56.3	%N1	54.5	55.6	56.6	57.7	58.7	37,000
	1491	1525	1559	1595	1625	LB/HR	1635	1673	1709	1748	1788	
	0.139	0.138	0.138	0.137	0.137	NM/LB	0.143	0.142	0.141	0.141	0.140	
38,000	52.5	53.5	54.5	55.5	56.8	%N1	54.8	55.9	56.9	57.9	59.0	38,000
	1511	1546	1579	1616	1647	LB/HR	1653	1691	1728	1768	1808	
	0.137	0.137	0.136	0.135	0.135	NM/LB	0.141	0.140	0.140	0.139	0.138	
39,000	52.9	54.0	55.0	56.0	57.1	%N1	55.1	56.2	57.2	58.3	59.3	39,000
	1531	1566	1600	1637	1672	LB/HR	1674	1713	1750	1790	1831	
	0.135	0.135	0.134	0.134	0.133	NM/LB	0.139	0.139	0.138	0.137	0.137	

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	250 KCAS						275 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	55.5	56.6	57.7	58.7	59.8	%N1	59.6	60.8	61.9	63.1	64.3	25,000
	1721	1761	1800	1840	1880	LB/HR	2023	2070	2117	2163	2207	
	0.150	0.150	0.149	0.148	0.148	NM/LB	0.141	0.140	0.139	0.139	0.138	
26,000	55.6	56.7	57.7	58.8	59.8	%N1	59.7	60.9	62.0	63.1	64.3	26,000
	1725	1766	1804	1845	1885	LB/HR	2028	2074	2121	2167	2211	
	0.150	0.149	0.149	0.148	0.147	NM/LB	0.140	0.140	0.139	0.139	0.138	
27,000	55.7	56.8	57.8	58.9	59.9	%N1	59.8	60.9	62.1	63.2	64.4	27,000
	1732	1773	1812	1853	1893	LB/HR	2032	2079	2126	2172	2216	
	0.149	0.149	0.148	0.148	0.147	NM/LB	0.140	0.139	0.139	0.138	0.138	
28,000	55.8	56.9	58.0	59.0	60.1	%N1	59.8	61.0	62.1	63.3	64.5	28,000
	1741	1782	1821	1862	1903	LB/HR	2037	2084	2130	2177	2221	
	0.149	0.148	0.147	0.147	0.146	NM/LB	0.140	0.139	0.139	0.138	0.138	
29,000	56.0	57.0	58.1	59.2	60.2	%N1	59.9	61.1	62.2	63.4	64.5	29,000
	1750	1791	1830	1872	1912	LB/HR	2041	2088	2135	2182	2226	
	0.148	0.147	0.147	0.146	0.145	NM/LB	0.139	0.139	0.138	0.138	0.137	
30,000	56.1	57.2	58.2	59.3	60.4	%N1	60.0	61.1	62.3	63.4	64.6	30,000
	1759	1800	1840	1881	1922	LB/HR	2046	2093	2140	2187	2231	
	0.147	0.146	0.146	0.145	0.145	NM/LB	0.139	0.138	0.138	0.137	0.137	
31,000	56.2	57.3	58.4	59.4	60.5	%N1	60.0	61.2	62.4	63.5	64.7	31,000
	1768	1809	1849	1890	1931	LB/HR	2050	2098	2145	2191	2236	
	0.146	0.146	0.145	0.145	0.144	NM/LB	0.139	0.138	0.138	0.137	0.137	
32,000	56.4	57.4	58.5	59.6	60.7	%N1	60.1	61.3	62.4	63.6	64.7	32,000
	1779	1820	1860	1902	1943	LB/HR	2055	2103	2150	2197	2241	
	0.145	0.145	0.144	0.144	0.143	NM/LB	0.138	0.138	0.137	0.137	0.136	
33,000	56.5	57.6	58.7	59.8	60.9	%N1	60.2	61.4	62.6	63.7	64.8	33,000
	1790	1832	1872	1914	1956	LB/HR	2064	2112	2159	2206	2251	
	0.144	0.144	0.143	0.143	0.142	NM/LB	0.138	0.137	0.137	0.136	0.136	
34,000	56.7	57.8	58.9	60.0	61.0	%N1	60.4	61.5	62.7	63.9	64.9	34,000
	1802	1844	1884	1927	1968	LB/HR	2073	2121	2168	2215	2261	
	0.144	0.143	0.142	0.142	0.141	NM/LB	0.137	0.137	0.136	0.136	0.135	
35,000	56.9	58.0	59.0	60.1	61.2	%N1	60.5	61.7	62.8	64.0	65.1	35,000
	1813	1856	1897	1939	1981	LB/HR	2081	2130	2177	2225	2271	
	0.143	0.142	0.142	0.141	0.140	NM/LB	0.137	0.136	0.136	0.135	0.135	
36,000	57.0	58.1	59.2	60.3	61.4	%N1	60.6	61.8	63.0	64.1	65.2	36,000
	1825	1868	1909	1951	1993	LB/HR	2090	2139	2187	2234	2281	
	0.142	0.141	0.141	0.140	0.139	NM/LB	0.136	0.135	0.135	0.134	0.134	
37,000	57.2	58.3	59.4	60.5	61.6	%N1	60.8	61.9	63.1	64.3	65.3	37,000
	1839	1881	1923	1966	2008	LB/HR	2099	2148	2196	2244	2290	
	0.141	0.140	0.140	0.139	0.138	NM/LB	0.135	0.135	0.134	0.134	0.133	
38,000	57.4	58.6	59.7	60.8	61.9	%N1	60.9	62.0	63.2	64.4	65.4	38,000
	1855	1898	1940	1983	2026	LB/HR	2108	2157	2205	2253	2301	
	0.139	0.139	0.138	0.138	0.137	NM/LB	0.135	0.134	0.134	0.133	0.133	
39,000	57.7	58.8	59.9	61.0	62.1	%N1	61.0	62.2	63.4	64.5	65.5	39,000
	1871	1915	1957	2001	2043	LB/HR	2120	2169	2218	2266	2313	
	0.138	0.138	0.137	0.137	0.136	NM/LB	0.134	0.134	0.133	0.133	0.132	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	300 KCAS						330 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	63.5	64.7	65.9	67.1	68.3	%N1						25,000
	2359	2414	2469	2521	2576	LB/HR						
	0.131	0.131	0.130	0.130	0.129	NM/LB						
26,000	63.5	64.7	66.0	67.2	68.4	%N1						26,000
	2362	2417	2471	2524	2579	LB/HR						
	0.131	0.131	0.130	0.130	0.129	NM/LB						
27,000	63.5	64.8	66.0	67.2	68.4	%N1						27,000
	2364	2419	2474	2527	2582	LB/HR						
	0.131	0.131	0.130	0.130	0.129	NM/LB						
28,000	63.6	64.8	66.0	67.2	68.4	%N1						28,000
	2367	2422	2477	2530	2585	LB/HR						
	0.131	0.130	0.130	0.129	0.129	NM/LB						
29,000	63.6	64.8	66.1	67.3	68.5	%N1						29,000
	2370	2425	2480	2532	2588	LB/HR						
	0.131	0.130	0.130	0.129	0.129	NM/LB						
30,000	63.6	64.9	66.1	67.3	68.5	%N1						30,000
	2372	2428	2482	2535	2591	LB/HR						
	0.131	0.130	0.130	0.129	0.129	NM/LB						
31,000	63.7	64.9	66.1	67.4	68.6	%N1						31,000
	2377	2432	2487	2540	2596	LB/HR						
	0.130	0.130	0.129	0.129	0.128	NM/LB						
32,000	63.7	65.0	66.2	67.4	68.6	%N1						32,000
	2382	2437	2492	2545	2601	LB/HR						
	0.130	0.130	0.129	0.129	0.128	NM/LB						
33,000	63.8	65.0	66.3	67.5	68.7	%N1						33,000
	2386	2442	2497	2550	2606	LB/HR						
	0.130	0.129	0.129	0.128	0.128	NM/LB						
34,000	63.8	65.1	66.3	67.5	68.7	%N1						34,000
	2391	2447	2502	2555	2612	LB/HR						
	0.130	0.129	0.129	0.128	0.128	NM/LB						
35,000	63.9	65.1	66.4	67.6	68.8	%N1						35,000
	2396	2452	2507	2560	2617	LB/HR						
	0.129	0.129	0.128	0.128	0.127	NM/LB						
36,000	63.9	65.2	66.4	67.6	68.9	%N1						36,000
	2400	2456	2512	2565	2622	LB/HR						
	0.129	0.129	0.128	0.128	0.127	NM/LB						
37,000	64.0	65.2	66.5	67.7	68.9	%N1						37,000
	2405	2461	2517	2570	2627	LB/HR						
	0.129	0.128	0.128	0.127	0.127	NM/LB						
38,000	64.1	65.3	66.5	67.8	69.0	%N1						38,000
	2410	2466	2522	2576	2632	LB/HR						
	0.129	0.128	0.128	0.127	0.127	NM/LB						
39,000	64.2	65.4	66.6	67.9	69.1	%N1						39,000
	2419	2475	2531	2585	2642	LB/HR						
	0.128	0.128	0.127	0.127	0.126	NM/LB						

10,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	150 KCAS						175 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	45.5	46.4	47.3	48.2	49.0	%N1	47.5	48.4	49.3	50.3	51.2	25,000
	1013	1037	1062	1088	1112	LB/HR	1098	1123	1151	1178	1203	
	0.165	0.165	0.164	0.163	0.162	NM/LB	0.178	0.177	0.176	0.175	0.175	
26,000	46.1	47.0	47.9	48.8	49.7	%N1	47.9	48.8	49.8	50.7	51.7	26,000
	1038	1062	1088	1114	1139	LB/HR	1116	1142	1170	1197	1222	
	0.161	0.161	0.160	0.159	0.158	NM/LB	0.175	0.174	0.173	0.173	0.172	
27,000	46.7	47.7	48.6	49.5	50.4	%N1	48.3	49.3	50.2	51.2	52.2	27,000
	1066	1091	1118	1145	1169	LB/HR	1134	1160	1189	1216	1242	
	0.157	0.157	0.156	0.155	0.154	NM/LB	0.172	0.172	0.171	0.170	0.169	
28,000	47.5	48.5	49.4	50.3	51.3	%N1	48.7	49.7	50.7	51.6	52.6	28,000
	1098	1124	1151	1179	1204	LB/HR	1152	1179	1207	1236	1261	
	0.153	0.152	0.151	0.150	0.150	NM/LB	0.169	0.169	0.168	0.167	0.167	
29,000	48.4	49.4	50.4	51.3	52.3	%N1	49.2	50.2	51.1	52.1	53.1	29,000
	1136	1163	1191	1219	1245	LB/HR	1172	1199	1228	1257	1282	
	0.147	0.147	0.146	0.145	0.145	NM/LB	0.167	0.166	0.165	0.164	0.164	
30,000						%N1	49.7	50.7	51.6	52.6	53.6	30,000
						LB/HR	1192	1219	1248	1278	1303	
						NM/LB	0.164	0.163	0.163	0.162	0.161	
31,000						%N1	50.1	51.1	52.1	53.1	54.2	31,000
						LB/HR	1212	1240	1270	1299	1326	
						NM/LB	0.161	0.161	0.160	0.159	0.159	
32,000						%N1	50.7	51.7	52.7	53.7	54.8	32,000
						LB/HR	1235	1264	1294	1324	1350	
						NM/LB	0.158	0.158	0.157	0.156	0.156	
33,000						%N1	51.2	52.3	53.3	54.3	55.4	33,000
						LB/HR	1258	1287	1318	1349	1375	
						NM/LB	0.155	0.155	0.154	0.153	0.153	
34,000						%N1	51.8	52.8	53.9	54.9	56.0	34,000
						LB/HR	1283	1312	1344	1375	1402	
						NM/LB	0.152	0.152	0.151	0.150	0.150	
35,000						%N1	52.4	53.5	54.5	55.5	56.7	35,000
						LB/HR	1309	1339	1371	1402	1429	
						NM/LB	0.149	0.149	0.148	0.147	0.147	
36,000						%N1	53.0	54.1	55.1	56.2	57.4	36,000
						LB/HR	1335	1365	1398	1430	1458	
						NM/LB	0.146	0.146	0.145	0.144	0.144	
37,000						%N1	53.8	54.9	56.0	57.0	58.2	37,000
						LB/HR	1368	1399	1433	1466	1493	
						NM/LB	0.143	0.142	0.142	0.141	0.141	
38,000						%N1	54.6	55.7	56.8	57.9	59.1	38,000
						LB/HR	1401	1433	1467	1501	1529	
						NM/LB	0.139	0.139	0.138	0.138	0.138	
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

10,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	200 KCAS						225 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	50.4	51.4	52.3	53.3	54.4	%N1	54.4	55.5	56.6	57.6	59.0	25,000
	1225	1253	1283	1313	1339	LB/HR	1407	1438	1471	1506	1534	
	0.182	0.181	0.181	0.180	0.179	NM/LB	0.178	0.178	0.177	0.176	0.176	
26,000	50.7	51.7	52.7	53.7	54.8	%N1	54.6	55.7	56.8	57.9	59.2	26,000
	1240	1268	1298	1328	1354	LB/HR	1417	1448	1481	1516	1545	
	0.180	0.179	0.179	0.178	0.177	NM/LB	0.177	0.176	0.176	0.175	0.175	
27,000	51.0	52.0	53.0	54.1	55.2	%N1	54.9	56.0	57.0	58.1	59.4	27,000
	1255	1283	1313	1344	1370	LB/HR	1427	1459	1492	1527	1558	
	0.178	0.177	0.176	0.176	0.175	NM/LB	0.175	0.175	0.174	0.174	0.173	
28,000	51.4	52.4	53.4	54.4	55.6	%N1	55.1	56.2	57.3	58.4	59.6	28,000
	1271	1299	1330	1361	1388	LB/HR	1438	1470	1503	1538	1570	
	0.175	0.175	0.174	0.173	0.173	NM/LB	0.174	0.174	0.173	0.172	0.172	
29,000	51.8	52.8	53.8	54.8	56.0	%N1	55.3	56.4	57.5	58.6	59.8	29,000
	1287	1316	1347	1378	1405	LB/HR	1448	1480	1514	1549	1583	
	0.173	0.173	0.172	0.171	0.171	NM/LB	0.173	0.173	0.172	0.171	0.170	
30,000	52.1	53.2	54.2	55.2	56.4	%N1	55.6	56.7	57.8	58.9	60.0	30,000
	1303	1333	1364	1396	1423	LB/HR	1461	1493	1527	1563	1598	
	0.171	0.171	0.170	0.169	0.169	NM/LB	0.171	0.171	0.170	0.170	0.169	
31,000	52.6	53.6	54.7	55.7	56.9	%N1	56.0	57.1	58.2	59.3	60.3	31,000
	1322	1352	1383	1416	1443	LB/HR	1476	1508	1543	1579	1616	
	0.169	0.168	0.167	0.167	0.166	NM/LB	0.170	0.169	0.169	0.168	0.167	
32,000	53.0	54.1	55.1	56.2	57.4	%N1	56.2	57.3	58.4	59.5	60.5	32,000
	1341	1371	1403	1436	1464	LB/HR	1492	1525	1559	1596	1634	
	0.166	0.166	0.165	0.164	0.164	NM/LB	0.168	0.167	0.167	0.166	0.165	
33,000	53.5	54.5	55.6	56.6	57.9	%N1	56.4	57.6	58.7	59.8	60.8	33,000
	1360	1391	1423	1456	1484	LB/HR	1508	1541	1576	1613	1651	
	0.164	0.163	0.163	0.162	0.162	NM/LB	0.166	0.166	0.165	0.164	0.163	
34,000	53.9	55.0	56.0	57.1	58.4	%N1	56.7	57.8	58.9	60.1	61.1	34,000
	1379	1410	1443	1476	1504	LB/HR	1524	1558	1594	1631	1670	
	0.162	0.161	0.161	0.160	0.160	NM/LB	0.164	0.164	0.163	0.163	0.162	
35,000	54.3	55.4	56.5	57.6	58.8	%N1	57.0	58.1	59.2	60.3	61.4	35,000
	1398	1429	1462	1496	1525	LB/HR	1543	1577	1613	1651	1690	
	0.159	0.159	0.158	0.158	0.158	NM/LB	0.162	0.162	0.161	0.161	0.160	
36,000	54.8	55.9	56.9	58.0	59.3	%N1	57.2	58.4	59.5	60.6	61.7	36,000
	1417	1448	1482	1517	1545	LB/HR	1561	1596	1632	1670	1710	
	0.157	0.157	0.156	0.156	0.155	NM/LB	0.160	0.160	0.160	0.159	0.158	
37,000	55.2	56.3	57.4	58.5	59.7	%N1	57.5	58.7	59.8	60.9	62.0	37,000
	1436	1468	1502	1537	1568	LB/HR	1579	1614	1651	1690	1730	
	0.155	0.155	0.154	0.153	0.153	NM/LB	0.159	0.158	0.158	0.157	0.156	
38,000	55.7	56.8	57.9	59.0	60.1	%N1	57.8	58.9	60.1	61.2	62.4	38,000
	1457	1489	1523	1559	1593	LB/HR	1597	1633	1670	1709	1750	
	0.153	0.153	0.152	0.151	0.151	NM/LB	0.157	0.156	0.156	0.155	0.154	
39,000	56.2	57.3	58.4	59.5	60.5	%N1	58.1	59.3	60.4	61.6	62.7	39,000
	1477	1510	1545	1581	1617	LB/HR	1619	1655	1692	1732	1774	
	0.151	0.151	0.150	0.149	0.148	NM/LB	0.155	0.154	0.154	0.153	0.152	

10,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	250 KCAS						275 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	58.4	59.5	60.7	61.8	63.1	%N1	62.7	63.9	65.2	66.4	67.6	25,000
	1648	1687	1724	1764	1808	LB/HR	1946	1992	2036	2082	2132	
	0.169	0.168	0.167	0.167	0.166	NM/LB	0.157	0.156	0.156	0.155	0.154	
26,000	58.4	59.6	60.8	61.9	63.2	%N1	62.7	64.0	65.2	66.5	67.7	26,000
	1653	1691	1729	1769	1813	LB/HR	1951	1997	2041	2087	2137	
	0.168	0.168	0.167	0.166	0.165	NM/LB	0.156	0.156	0.155	0.155	0.154	
27,000	58.6	59.7	60.9	62.0	63.3	%N1	62.8	64.1	65.3	66.5	67.7	27,000
	1661	1699	1738	1777	1822	LB/HR	1956	2002	2046	2092	2142	
	0.167	0.167	0.166	0.165	0.164	NM/LB	0.156	0.155	0.155	0.154	0.153	
28,000	58.7	59.9	61.0	62.2	63.5	%N1	62.9	64.1	65.4	66.6	67.8	28,000
	1670	1709	1747	1787	1831	LB/HR	1961	2007	2051	2097	2148	
	0.166	0.166	0.165	0.165	0.163	NM/LB	0.156	0.155	0.155	0.154	0.153	
29,000	58.8	60.0	61.2	62.3	63.6	%N1	62.9	64.2	65.4	66.7	67.9	29,000
	1679	1718	1756	1796	1841	LB/HR	1965	2012	2056	2102	2153	
	0.165	0.165	0.164	0.164	0.163	NM/LB	0.155	0.155	0.154	0.154	0.153	
30,000	59.0	60.2	61.3	62.5	63.8	%N1	63.0	64.2	65.5	66.7	67.9	30,000
	1688	1727	1765	1806	1851	LB/HR	1970	2017	2061	2108	2158	
	0.165	0.164	0.164	0.163	0.162	NM/LB	0.155	0.154	0.154	0.153	0.152	
31,000	59.1	60.3	61.5	62.6	63.9	%N1	63.0	64.3	65.5	66.8	68.0	31,000
	1697	1736	1775	1815	1861	LB/HR	1975	2022	2066	2113	2163	
	0.164	0.163	0.163	0.162	0.161	NM/LB	0.154	0.154	0.154	0.153	0.152	
32,000	59.3	60.5	61.6	62.8	64.1	%N1	63.1	64.4	65.6	66.9	68.1	32,000
	1708	1748	1787	1828	1873	LB/HR	1982	2028	2073	2120	2170	
	0.163	0.162	0.162	0.161	0.160	NM/LB	0.154	0.153	0.153	0.152	0.152	
33,000	59.5	60.7	61.8	63.0	64.3	%N1	63.2	64.5	65.7	67.0	68.2	33,000
	1720	1760	1799	1840	1886	LB/HR	1991	2038	2083	2130	2179	
	0.162	0.161	0.161	0.160	0.159	NM/LB	0.153	0.153	0.152	0.152	0.151	
34,000	59.6	60.8	62.0	63.2	64.6	%N1	63.3	64.6	65.8	67.1	68.3	34,000
	1731	1772	1811	1853	1899	LB/HR	2000	2047	2092	2140	2189	
	0.160	0.160	0.159	0.159	0.158	NM/LB	0.153	0.152	0.152	0.151	0.150	
35,000	59.8	61.0	62.2	63.4	64.8	%N1	63.4	64.7	65.9	67.2	68.4	35,000
	1743	1784	1823	1865	1912	LB/HR	2009	2057	2102	2149	2199	
	0.159	0.159	0.158	0.158	0.157	NM/LB	0.152	0.151	0.151	0.150	0.150	
36,000	60.0	61.2	62.4	63.6	65.0	%N1	63.5	64.8	66.1	67.3	68.6	36,000
	1755	1796	1836	1878	1925	LB/HR	2019	2066	2112	2159	2209	
	0.158	0.158	0.157	0.157	0.156	NM/LB	0.151	0.151	0.150	0.150	0.149	
37,000	60.2	61.4	62.6	63.8	65.2	%N1	63.6	64.9	66.2	67.4	68.7	37,000
	1770	1811	1851	1894	1942	LB/HR	2028	2076	2121	2169	2219	
	0.157	0.156	0.156	0.155	0.154	NM/LB	0.150	0.150	0.150	0.149	0.148	
38,000	60.5	61.7	62.9	64.1	65.5	%N1	63.8	65.0	66.3	67.6	68.8	38,000
	1786	1828	1869	1911	1960	LB/HR	2039	2087	2132	2181	2230	
	0.156	0.155	0.155	0.154	0.153	NM/LB	0.150	0.149	0.149	0.148	0.147	
39,000	60.7	62.0	63.2	64.4	65.8	%N1	63.9	65.2	66.5	67.7	69.0	39,000
	1803	1845	1886	1929	1978	LB/HR	2051	2099	2145	2194	2243	
	0.154	0.154	0.153	0.152	0.151	NM/LB	0.149	0.148	0.148	0.147	0.147	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

10,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	300 KCAS						330 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	66.2	67.6	68.9	70.2	71.6	%N1						25,000
	2279	2332	2384	2438	2485	LB/HR						
	0.146	0.145	0.145	0.144	0.144	NM/LB						
26,000	66.3	67.6	68.9	70.2	71.6	%N1						26,000
	2281	2334	2387	2441	2488	LB/HR						
	0.146	0.145	0.145	0.144	0.144	NM/LB						
27,000	66.3	67.6	68.9	70.2	71.7	%N1						27,000
	2284	2337	2390	2444	2491	LB/HR						
	0.146	0.145	0.145	0.144	0.144	NM/LB						
28,000	66.3	67.7	69.0	70.3	71.7	%N1						28,000
	2287	2340	2393	2447	2494	LB/HR						
	0.145	0.145	0.144	0.144	0.144	NM/LB						
29,000	66.4	67.7	69.0	70.3	71.7	%N1						29,000
	2290	2343	2395	2450	2496	LB/HR						
	0.145	0.145	0.144	0.144	0.143	NM/LB						
30,000	66.4	67.7	69.0	70.4	71.8	%N1						30,000
	2293	2346	2399	2453	2500	LB/HR						
	0.145	0.144	0.144	0.143	0.143	NM/LB						
31,000	66.5	67.8	69.1	70.4	71.9	%N1						31,000
	2298	2351	2404	2459	2505	LB/HR						
	0.145	0.144	0.144	0.143	0.143	NM/LB						
32,000	66.5	67.8	69.2	70.5	71.9	%N1						32,000
	2303	2356	2409	2464	2510	LB/HR						
	0.144	0.144	0.143	0.143	0.143	NM/LB						
33,000	66.6	67.9	69.2	70.5	72.0	%N1						33,000
	2308	2361	2414	2469	2516	LB/HR						
	0.144	0.144	0.143	0.143	0.142	NM/LB						
34,000	66.6	68.0	69.3	70.6	72.1	%N1						34,000
	2312	2366	2419	2474	2521	LB/HR						
	0.144	0.143	0.143	0.142	0.142	NM/LB						
35,000	66.7	68.0	69.3	70.7	72.1	%N1						35,000
	2317	2371	2424	2479	2526	LB/HR						
	0.143	0.143	0.143	0.142	0.142	NM/LB						
36,000	66.7	68.1	69.4	70.7	72.2	%N1						36,000
	2322	2376	2429	2484	2532	LB/HR						
	0.143	0.143	0.142	0.142	0.141	NM/LB						
37,000	66.8	68.1	69.5	70.8	72.2	%N1						37,000
	2327	2381	2434	2490	2537	LB/HR						
	0.143	0.142	0.142	0.141	0.141	NM/LB						
38,000	66.9	68.2	69.6	70.9	72.3	%N1						38,000
	2334	2388	2442	2497	2546	LB/HR						
	0.142	0.142	0.142	0.141	0.141	NM/LB						
39,000	67.0	68.3	69.7	71.0	72.4	%N1						39,000
	2343	2397	2451	2507	2556	LB/HR						
	0.142	0.141	0.141	0.140	0.140	NM/LB						

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	150 KCAS						175 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	48.7	49.7	50.7	51.7	52.7	%N1	50.7	51.7	52.8	53.8	54.8	25,000
	969	993	1018	1044	1068	LB/HR	1052	1078	1104	1132	1157	
	0.187	0.186	0.185	0.184	0.183	NM/LB	0.200	0.199	0.199	0.197	0.197	
26,000	49.4	50.4	51.4	52.4	53.4	%N1	51.1	52.2	53.3	54.3	55.3	26,000
	994	1019	1044	1071	1095	LB/HR	1070	1097	1124	1152	1177	
	0.182	0.181	0.180	0.179	0.178	NM/LB	0.197	0.196	0.195	0.194	0.193	
27,000	50.1	51.2	52.2	53.2	54.2	%N1	51.6	52.7	53.7	54.8	55.9	27,000
	1024	1049	1076	1103	1128	LB/HR	1089	1116	1143	1172	1197	
	0.177	0.176	0.175	0.174	0.173	NM/LB	0.193	0.193	0.192	0.191	0.190	
28,000	51.0	52.0	53.1	54.1	55.2	%N1	52.1	53.2	54.2	55.3	56.4	28,000
	1057	1083	1110	1138	1164	LB/HR	1108	1135	1162	1192	1217	
	0.171	0.170	0.170	0.169	0.168	NM/LB	0.190	0.189	0.189	0.187	0.187	
29,000						%N1	52.6	53.7	54.8	55.8	56.9	29,000
						LB/HR	1128	1155	1183	1214	1239	
						NM/LB	0.187	0.186	0.185	0.184	0.184	
30,000						%N1	53.1	54.2	55.3	56.4	57.5	30,000
						LB/HR	1148	1176	1205	1235	1261	
						NM/LB	0.183	0.183	0.182	0.181	0.180	
31,000						%N1	53.6	54.7	55.8	56.9	58.1	31,000
						LB/HR	1169	1198	1227	1258	1284	
						NM/LB	0.180	0.179	0.179	0.178	0.177	
32,000						%N1	54.2	55.3	56.5	57.6	58.7	32,000
						LB/HR	1193	1222	1252	1284	1310	
						NM/LB	0.177	0.176	0.175	0.174	0.174	
33,000						%N1	54.8	55.9	57.1	58.2	59.4	33,000
						LB/HR	1217	1246	1276	1309	1335	
						NM/LB	0.173	0.173	0.172	0.171	0.170	
34,000						%N1	55.4	56.6	57.7	58.9	60.1	34,000
						LB/HR	1243	1272	1303	1337	1363	
						NM/LB	0.169	0.169	0.168	0.167	0.167	
35,000						%N1	56.1	57.3	58.4	59.6	60.8	35,000
						LB/HR	1269	1299	1331	1365	1391	
						NM/LB	0.166	0.165	0.165	0.164	0.164	
36,000						%N1	56.8	58.0	59.2	60.3	61.6	36,000
						LB/HR	1297	1328	1360	1395	1422	
						NM/LB	0.162	0.162	0.161	0.160	0.160	
37,000						%N1	57.6	58.9	60.0	61.2	62.4	37,000
						LB/HR	1331	1362	1396	1431	1462	
						NM/LB	0.158	0.158	0.157	0.156	0.156	
38,000						%N1	58.4	59.7	60.9	62.1	63.1	38,000
						LB/HR	1366	1398	1432	1469	1503	
						NM/LB	0.154	0.154	0.153	0.152	0.151	
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	200 KCAS						225 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	53.7	54.8	55.9	57.0	58.1	%N1	57.7	58.9	60.1	61.3	62.3	25,000
	1180	1209	1238	1269	1295	LB/HR	1355	1387	1420	1455	1488	
	0.204	0.203	0.202	0.201	0.200	NM/LB	0.199	0.198	0.198	0.197	0.196	
26,000	54.0	55.2	56.3	57.4	58.5	%N1	58.0	59.2	60.3	61.5	62.5	26,000
	1194	1223	1253	1285	1311	LB/HR	1366	1398	1431	1467	1500	
	0.201	0.200	0.200	0.198	0.198	NM/LB	0.197	0.197	0.196	0.195	0.194	
27,000	54.4	55.6	56.7	57.8	59.0	%N1	58.1	59.3	60.5	61.7	62.7	27,000
	1210	1239	1269	1301	1327	LB/HR	1377	1410	1443	1479	1513	
	0.199	0.198	0.197	0.196	0.196	NM/LB	0.196	0.195	0.195	0.193	0.193	
28,000	54.8	56.0	57.1	58.2	59.4	%N1	58.3	59.5	60.7	61.9	62.9	28,000
	1226	1256	1287	1319	1345	LB/HR	1389	1422	1455	1492	1525	
	0.196	0.195	0.194	0.193	0.193	NM/LB	0.194	0.194	0.193	0.192	0.191	
29,000	55.2	56.4	57.5	58.6	59.9	%N1	58.5	59.7	60.9	62.1	63.1	29,000
	1243	1273	1304	1336	1363	LB/HR	1400	1433	1468	1504	1538	
	0.193	0.193	0.192	0.191	0.190	NM/LB	0.193	0.192	0.191	0.190	0.190	
30,000	55.6	56.8	57.9	59.1	60.3	%N1	58.7	60.0	61.2	62.4	63.4	30,000
	1260	1290	1322	1355	1381	LB/HR	1415	1449	1483	1520	1554	
	0.191	0.190	0.189	0.188	0.188	NM/LB	0.191	0.190	0.189	0.188	0.188	
31,000	56.1	57.3	58.4	59.6	60.9	%N1	59.0	60.2	61.4	62.6	63.7	31,000
	1279	1310	1342	1375	1402	LB/HR	1431	1466	1500	1538	1572	
	0.188	0.187	0.186	0.185	0.185	NM/LB	0.188	0.188	0.187	0.186	0.185	
32,000	56.6	57.8	58.9	60.1	61.4	%N1	59.3	60.5	61.7	62.9	64.0	32,000
	1299	1330	1362	1396	1423	LB/HR	1448	1482	1517	1555	1589	
	0.185	0.184	0.184	0.183	0.182	NM/LB	0.186	0.186	0.185	0.184	0.183	
33,000	57.1	58.3	59.4	60.6	61.9	%N1	59.5	60.7	62.0	63.2	64.3	33,000
	1318	1349	1382	1417	1444	LB/HR	1464	1499	1534	1572	1607	
	0.182	0.182	0.181	0.180	0.180	NM/LB	0.184	0.184	0.183	0.182	0.181	
34,000	57.5	58.7	59.9	61.1	62.3	%N1	59.8	61.0	62.2	63.5	64.6	34,000
	1337	1369	1402	1437	1467	LB/HR	1481	1517	1553	1591	1626	
	0.180	0.179	0.178	0.177	0.177	NM/LB	0.182	0.181	0.181	0.180	0.179	
35,000	58.0	59.2	60.4	61.6	62.7	%N1	60.1	61.3	62.6	63.8	65.0	35,000
	1356	1388	1422	1458	1490	LB/HR	1500	1536	1572	1611	1646	
	0.177	0.177	0.176	0.175	0.174	NM/LB	0.180	0.179	0.179	0.178	0.177	
36,000	58.4	59.7	60.9	62.0	63.0	%N1	60.4	61.6	62.9	64.1	65.3	36,000
	1376	1409	1443	1479	1513	LB/HR	1518	1555	1592	1631	1666	
	0.175	0.174	0.173	0.172	0.172	NM/LB	0.178	0.177	0.176	0.175	0.175	
37,000	58.8	60.0	61.2	62.4	63.4	%N1	60.7	61.9	63.2	64.4	65.6	37,000
	1398	1431	1466	1503	1537	LB/HR	1536	1574	1611	1650	1686	
	0.172	0.171	0.171	0.170	0.169	NM/LB	0.176	0.175	0.174	0.173	0.173	
38,000	59.2	60.4	61.6	62.8	63.9	%N1	61.0	62.2	63.5	64.7	66.0	38,000
	1421	1455	1490	1528	1562	LB/HR	1556	1594	1632	1671	1707	
	0.169	0.169	0.168	0.167	0.166	NM/LB	0.173	0.173	0.172	0.171	0.171	
39,000	59.5	60.7	62.0	63.2	64.3	%N1	61.3	62.6	63.8	65.1	66.4	39,000
	1444	1479	1514	1552	1587	LB/HR	1578	1616	1654	1695	1731	
	0.166	0.166	0.165	0.164	0.164	NM/LB	0.171	0.170	0.170	0.169	0.168	

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	250 KCAS						275 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	61.3	62.6	63.8	65.1	66.4	%N1	65.2	66.6	67.9	69.3	70.6	25,000
	1596	1634	1672	1712	1748	LB/HR	1879	1924	1970	2016	2067	
	0.187	0.187	0.186	0.185	0.185	NM/LB	0.175	0.174	0.173	0.173	0.171	
26,000	61.4	62.6	63.9	65.2	66.5	%N1	65.3	66.7	68.0	69.3	70.6	26,000
	1601	1639	1678	1717	1753	LB/HR	1884	1929	1975	2021	2072	
	0.187	0.186	0.186	0.185	0.184	NM/LB	0.174	0.174	0.173	0.172	0.171	
27,000	61.5	62.8	64.1	65.3	66.6	%N1	65.4	66.7	68.1	69.4	70.7	27,000
	1609	1648	1687	1727	1763	LB/HR	1889	1934	1980	2027	2078	
	0.186	0.185	0.184	0.184	0.183	NM/LB	0.174	0.173	0.172	0.172	0.171	
28,000	61.7	62.9	64.2	65.5	66.8	%N1	65.4	66.8	68.1	69.5	70.8	28,000
	1618	1658	1696	1736	1772	LB/HR	1894	1939	1985	2032	2083	
	0.185	0.184	0.183	0.183	0.182	NM/LB	0.173	0.173	0.172	0.171	0.170	
29,000	61.8	63.1	64.4	65.6	67.0	%N1	65.5	66.8	68.2	69.5	70.8	29,000
	1627	1667	1706	1746	1782	LB/HR	1899	1944	1990	2037	2089	
	0.184	0.183	0.182	0.182	0.181	NM/LB	0.173	0.172	0.172	0.171	0.170	
30,000	61.9	63.2	64.5	65.8	67.1	%N1	65.5	66.9	68.3	69.6	70.9	30,000
	1636	1676	1715	1756	1792	LB/HR	1904	1949	1996	2043	2094	
	0.183	0.182	0.181	0.181	0.180	NM/LB	0.172	0.172	0.171	0.170	0.169	
31,000	62.1	63.4	64.7	65.9	67.3	%N1	65.6	67.0	68.3	69.6	71.0	31,000
	1646	1686	1725	1766	1802	LB/HR	1909	1954	2001	2048	2100	
	0.182	0.181	0.180	0.180	0.179	NM/LB	0.172	0.171	0.171	0.170	0.169	
32,000	62.3	63.6	64.9	66.1	67.5	%N1	65.7	67.1	68.4	69.8	71.1	32,000
	1657	1698	1737	1778	1815	LB/HR	1917	1963	2010	2057	2109	
	0.180	0.180	0.179	0.178	0.178	NM/LB	0.171	0.171	0.170	0.169	0.168	
33,000	62.5	63.8	65.1	66.3	67.7	%N1	65.8	67.2	68.5	69.9	71.2	33,000
	1669	1710	1750	1791	1827	LB/HR	1927	1973	2020	2068	2120	
	0.179	0.178	0.178	0.177	0.177	NM/LB	0.170	0.170	0.169	0.168	0.167	
34,000	62.7	64.0	65.2	66.5	68.0	%N1	65.9	67.3	68.7	70.0	71.4	34,000
	1681	1722	1762	1803	1840	LB/HR	1936	1983	2030	2078	2130	
	0.178	0.177	0.177	0.176	0.176	NM/LB	0.169	0.169	0.168	0.167	0.166	
35,000	62.8	64.1	65.4	66.7	68.2	%N1	66.0	67.4	68.8	70.1	71.5	35,000
	1693	1734	1774	1816	1853	LB/HR	1946	1993	2040	2088	2141	
	0.177	0.176	0.175	0.175	0.174	NM/LB	0.169	0.168	0.167	0.167	0.166	
36,000	63.0	64.3	65.6	66.9	68.4	%N1	66.2	67.5	68.9	70.2	71.6	36,000
	1705	1746	1787	1829	1866	LB/HR	1956	2002	2050	2099	2151	
	0.175	0.175	0.174	0.173	0.173	NM/LB	0.168	0.167	0.167	0.166	0.165	
37,000	63.3	64.6	65.9	67.2	68.7	%N1	66.3	67.7	69.0	70.4	71.8	37,000
	1721	1763	1804	1846	1884	LB/HR	1965	2012	2060	2109	2162	
	0.174	0.173	0.172	0.172	0.171	NM/LB	0.167	0.166	0.166	0.165	0.164	
38,000	63.6	64.9	66.2	67.5	68.9	%N1	66.4	67.8	69.2	70.5	71.9	38,000
	1738	1780	1822	1864	1903	LB/HR	1978	2025	2073	2122	2175	
	0.172	0.171	0.171	0.170	0.170	NM/LB	0.166	0.165	0.165	0.164	0.163	
39,000	63.8	65.1	66.5	67.8	69.2	%N1	66.6	68.0	69.3	70.7	72.1	39,000
	1754	1797	1839	1881	1923	LB/HR	1990	2038	2086	2136	2189	
	0.170	0.170	0.169	0.169	0.168	NM/LB	0.165	0.164	0.164	0.163	0.162	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	300 KCAS						330 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	68.9	70.4	71.8	73.2	74.6	%N1						25,000
	2216	2268	2322	2379	2423	LB/HR						
	0.161	0.161	0.160	0.159	0.159	NM/LB						
26,000	69.0	70.4	71.8	73.2	74.6	%N1						26,000
	2219	2271	2325	2382	2426	LB/HR						
	0.161	0.160	0.160	0.159	0.159	NM/LB						
27,000	69.0	70.4	71.9	73.3	74.6	%N1						27,000
	2222	2274	2328	2385	2429	LB/HR						
	0.161	0.160	0.160	0.159	0.159	NM/LB						
28,000	69.0	70.5	71.9	73.3	74.7	%N1						28,000
	2225	2277	2331	2389	2432	LB/HR						
	0.160	0.160	0.159	0.159	0.159	NM/LB						
29,000	69.1	70.5	71.9	73.3	74.7	%N1						29,000
	2228	2280	2334	2392	2435	LB/HR						
	0.160	0.160	0.159	0.158	0.158	NM/LB						
30,000	69.1	70.6	72.0	73.4	74.8	%N1						30,000
	2233	2285	2339	2397	2440	LB/HR						
	0.160	0.159	0.159	0.158	0.158	NM/LB						
31,000	69.2	70.6	72.0	73.5	74.8	%N1						31,000
	2238	2290	2344	2402	2445	LB/HR						
	0.159	0.159	0.158	0.158	0.158	NM/LB						
32,000	69.2	70.7	72.1	73.5	74.9	%N1						32,000
	2243	2295	2350	2408	2451	LB/HR						
	0.159	0.159	0.158	0.157	0.157	NM/LB						
33,000	69.3	70.8	72.2	73.6	74.9	%N1						33,000
	2248	2300	2355	2413	2456	LB/HR						
	0.159	0.158	0.158	0.157	0.157	NM/LB						
34,000	69.4	70.8	72.2	73.7	75.0	%N1						34,000
	2253	2305	2360	2418	2461	LB/HR						
	0.158	0.158	0.157	0.157	0.157	NM/LB						
35,000	69.4	70.9	72.3	73.7	75.1	%N1						35,000
	2258	2311	2366	2424	2467	LB/HR						
	0.158	0.158	0.157	0.156	0.156	NM/LB						
36,000	69.5	70.9	72.4	73.8	75.1	%N1						36,000
	2263	2316	2371	2429	2472	LB/HR						
	0.158	0.157	0.157	0.156	0.156	NM/LB						
37,000	69.5	71.0	72.4	73.8	75.2	%N1						37,000
	2268	2321	2376	2435	2478	LB/HR						
	0.157	0.157	0.156	0.156	0.156	NM/LB						
38,000	69.6	71.1	72.5	73.9	75.3	%N1						38,000
	2278	2331	2386	2445	2488	LB/HR						
	0.157	0.156	0.156	0.155	0.155	NM/LB						
39,000	69.7	71.2	72.6	74.0	75.4	%N1						39,000
	2287	2340	2396	2455	2499	LB/HR						
	0.156	0.156	0.155	0.154	0.154	NM/LB						

19,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	150 KCAS						175 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-42.6	-32.6	-22.6	-12.6	-2.6	OAT (°C)	-42.6	-32.6	-22.6	-12.6	-2.6	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	51.2	52.3	53.4	54.4	55.6	%N1	53.2	54.4	55.5	56.6	57.9	25,000
	935	960	985	1011	1035	LB/HR	1018	1044	1071	1099	1124	
	0.206	0.205	0.204	0.203	0.202	NM/LB	0.220	0.219	0.218	0.217	0.216	
26,000	51.9	53.0	54.1	55.2	56.4	%N1	53.7	54.9	56.1	57.2	58.5	26,000
	961	987	1013	1039	1063	LB/HR	1036	1064	1091	1120	1145	
	0.200	0.199	0.198	0.197	0.196	NM/LB	0.216	0.215	0.214	0.213	0.212	
27,000	52.7	53.9	55.0	56.1	57.3	%N1	54.2	55.4	56.6	57.7	59.0	27,000
	992	1019	1046	1072	1097	LB/HR	1055	1083	1111	1140	1165	
	0.194	0.193	0.192	0.191	0.190	NM/LB	0.212	0.211	0.210	0.209	0.208	
28,000	53.6	54.8	56.0	57.1	58.4	%N1	54.8	55.9	57.1	58.3	59.6	28,000
	1025	1053	1081	1108	1134	LB/HR	1074	1102	1131	1161	1186	
	0.188	0.187	0.186	0.185	0.184	NM/LB	0.209	0.208	0.207	0.205	0.205	
29,000						%N1	55.3	56.5	57.7	58.9	60.3	29,000
						LB/HR	1095	1123	1152	1183	1209	
						NM/LB	0.205	0.204	0.203	0.201	0.201	
30,000						%N1	55.9	57.1	58.3	59.4	60.9	30,000
						LB/HR	1115	1144	1174	1205	1231	
						NM/LB	0.201	0.200	0.199	0.198	0.197	
31,000						%N1	56.5	57.7	58.9	60.1	61.6	31,000
						LB/HR	1137	1167	1197	1229	1256	
						NM/LB	0.197	0.196	0.195	0.194	0.193	
32,000						%N1	57.1	58.3	59.6	60.8	62.3	32,000
						LB/HR	1161	1192	1223	1255	1282	
						NM/LB	0.193	0.192	0.191	0.190	0.189	
33,000						%N1	57.8	59.0	60.2	61.5	62.9	33,000
						LB/HR	1185	1216	1248	1281	1309	
						NM/LB	0.189	0.188	0.187	0.186	0.185	
34,000						%N1	58.5	59.7	61.0	62.2	63.5	34,000
						LB/HR	1212	1243	1276	1310	1341	
						NM/LB	0.185	0.184	0.183	0.182	0.181	
35,000						%N1	59.2	60.5	61.7	63.0	64.1	35,000
						LB/HR	1238	1271	1304	1338	1373	
						NM/LB	0.181	0.180	0.179	0.178	0.177	
36,000						%N1	59.8	61.1	62.4	63.6	64.7	36,000
						LB/HR	1271	1304	1338	1374	1409	
						NM/LB	0.176	0.176	0.175	0.173	0.172	
37,000						%N1	60.4	61.8	63.0	64.3	65.5	37,000
						LB/HR	1309	1344	1378	1414	1451	
						NM/LB	0.171	0.170	0.170	0.168	0.167	
38,000						%N1	61.1	62.4	63.7	65.0	66.2	38,000
						LB/HR	1347	1383	1418	1455	1492	
						NM/LB	0.166	0.166	0.165	0.164	0.163	
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

19,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	200 KCAS						225 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-42.6	-32.6	-22.6	-12.6	-2.6	OAT (°C)	-42.6	-32.6	-22.6	-12.6	-2.6	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	56.3	57.5	58.7	59.9	61.4	%N1	60.1	61.4	62.6	63.9	65.0	25,000
	1141	1171	1201	1232	1259	LB/HR	1320	1354	1388	1423	1458	
	0.224	0.223	0.222	0.220	0.220	NM/LB	0.217	0.216	0.215	0.214	0.213	
26,000	56.7	57.9	59.1	60.3	61.8	%N1	60.3	61.6	62.8	64.1	65.3	26,000
	1156	1186	1216	1248	1275	LB/HR	1331	1366	1400	1436	1471	
	0.221	0.220	0.219	0.218	0.217	NM/LB	0.215	0.214	0.213	0.212	0.211	
27,000	57.1	58.4	59.6	60.8	62.3	%N1	60.4	61.8	63.0	64.3	65.5	27,000
	1172	1202	1233	1265	1293	LB/HR	1343	1378	1413	1448	1483	
	0.218	0.217	0.216	0.215	0.214	NM/LB	0.213	0.212	0.211	0.210	0.209	
28,000	57.6	58.8	60.0	61.3	62.7	%N1	60.6	62.0	63.2	64.5	65.7	28,000
	1189	1219	1251	1283	1312	LB/HR	1355	1390	1425	1461	1496	
	0.215	0.214	0.213	0.212	0.211	NM/LB	0.212	0.211	0.210	0.209	0.208	
29,000	58.0	59.3	60.5	61.7	63.1	%N1	60.8	62.2	63.4	64.7	65.9	29,000
	1205	1236	1268	1301	1332	LB/HR	1366	1402	1437	1473	1509	
	0.212	0.211	0.210	0.209	0.208	NM/LB	0.210	0.209	0.208	0.207	0.206	
30,000	58.5	59.7	61.0	62.2	63.5	%N1	61.1	62.4	63.7	65.0	66.3	30,000
	1223	1254	1287	1320	1353	LB/HR	1383	1419	1454	1491	1526	
	0.209	0.208	0.207	0.206	0.205	NM/LB	0.207	0.206	0.205	0.204	0.203	
31,000	59.0	60.3	61.5	62.8	63.9	%N1	61.4	62.7	64.0	65.3	66.6	31,000
	1242	1274	1307	1341	1376	LB/HR	1399	1436	1472	1509	1544	
	0.206	0.205	0.204	0.202	0.201	NM/LB	0.205	0.204	0.203	0.202	0.201	
32,000	59.4	60.7	61.9	63.2	64.3	%N1	61.7	63.0	64.3	65.6	66.9	32,000
	1263	1296	1329	1364	1399	LB/HR	1416	1453	1489	1526	1562	
	0.202	0.201	0.200	0.199	0.198	NM/LB	0.202	0.202	0.201	0.200	0.199	
33,000	59.8	61.1	62.3	63.6	64.7	%N1	61.9	63.3	64.6	65.9	67.2	33,000
	1285	1318	1352	1387	1422	LB/HR	1432	1469	1506	1544	1579	
	0.199	0.198	0.197	0.196	0.195	NM/LB	0.200	0.199	0.198	0.197	0.197	
34,000	60.1	61.4	62.7	64.0	65.1	%N1	62.3	63.6	64.9	66.2	67.6	34,000
	1306	1340	1374	1410	1445	LB/HR	1450	1488	1525	1564	1599	
	0.196	0.195	0.194	0.193	0.191	NM/LB	0.198	0.197	0.196	0.195	0.194	
35,000	60.5	61.8	63.1	64.3	65.5	%N1	62.6	63.9	65.2	66.6	67.9	35,000
	1327	1362	1396	1433	1468	LB/HR	1469	1507	1545	1584	1619	
	0.192	0.192	0.191	0.190	0.188	NM/LB	0.195	0.194	0.193	0.192	0.192	
36,000	60.9	62.2	63.5	64.7	66.0	%N1	62.9	64.2	65.6	66.9	68.3	36,000
	1349	1384	1419	1455	1492	LB/HR	1488	1527	1564	1604	1640	
	0.189	0.189	0.188	0.187	0.186	NM/LB	0.193	0.192	0.191	0.190	0.189	
37,000	61.2	62.6	63.9	65.1	66.4	%N1	63.2	64.6	65.9	67.2	68.7	37,000
	1371	1407	1443	1480	1516	LB/HR	1506	1546	1584	1624	1660	
	0.186	0.185	0.185	0.184	0.183	NM/LB	0.190	0.189	0.189	0.188	0.187	
38,000	61.6	63.0	64.3	65.6	66.9	%N1	63.5	64.9	66.3	67.6	69.1	38,000
	1395	1431	1467	1504	1541	LB/HR	1527	1568	1606	1646	1682	
	0.183	0.182	0.182	0.181	0.180	NM/LB	0.188	0.187	0.186	0.185	0.185	
39,000	62.0	63.4	64.7	66.0	67.3	%N1	63.9	65.3	66.7	68.0	69.5	39,000
	1418	1455	1491	1529	1566	LB/HR	1549	1590	1629	1670	1706	
	0.180	0.179	0.179	0.178	0.177	NM/LB	0.185	0.184	0.183	0.182	0.182	

19,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	250 KCAS						275 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-42.6	-32.6	-22.6	-12.6	-2.6	OAT (°C)	-42.6	-32.6	-22.6	-12.6	-2.6	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	63.7	65.0	66.4	67.7	69.2	%N1	67.4	68.9	70.3	71.7	73.2	25,000
	1553	1593	1633	1674	1709	LB/HR	1832	1878	1926	1973	2018	
	0.204	0.203	0.203	0.202	0.201	NM/LB	0.190	0.189	0.188	0.188	0.187	
26,000	63.8	65.1	66.5	67.8	69.3	%N1	67.5	68.9	70.4	71.8	73.3	26,000
	1559	1600	1640	1680	1716	LB/HR	1837	1883	1931	1978	2023	
	0.204	0.203	0.202	0.201	0.200	NM/LB	0.189	0.189	0.188	0.187	0.186	
27,000	63.9	65.3	66.6	68.0	69.5	%N1	67.6	69.0	70.4	71.9	73.4	27,000
	1568	1609	1649	1690	1725	LB/HR	1842	1888	1936	1983	2029	
	0.202	0.201	0.201	0.200	0.199	NM/LB	0.189	0.188	0.187	0.187	0.186	
28,000	64.1	65.4	66.8	68.1	69.6	%N1	67.6	69.1	70.5	71.9	73.5	28,000
	1577	1618	1659	1699	1736	LB/HR	1847	1893	1941	1988	2034	
	0.201	0.200	0.199	0.199	0.198	NM/LB	0.188	0.188	0.187	0.186	0.185	
29,000	64.2	65.6	67.0	68.3	69.8	%N1	67.7	69.1	70.6	72.0	73.5	29,000
	1586	1628	1668	1709	1746	LB/HR	1852	1898	1946	1994	2040	
	0.200	0.199	0.198	0.197	0.197	NM/LB	0.188	0.187	0.186	0.186	0.185	
30,000	64.4	65.7	67.1	68.5	69.9	%N1	67.8	69.2	70.6	72.1	73.6	30,000
	1595	1637	1678	1719	1756	LB/HR	1857	1903	1951	1999	2045	
	0.199	0.198	0.197	0.196	0.196	NM/LB	0.187	0.187	0.186	0.185	0.184	
31,000	64.5	65.9	67.3	68.7	70.1	%N1	67.8	69.3	70.7	72.1	73.7	31,000
	1606	1648	1689	1730	1768	LB/HR	1862	1909	1957	2005	2051	
	0.198	0.197	0.196	0.195	0.194	NM/LB	0.187	0.186	0.185	0.184	0.184	
32,000	64.7	66.1	67.5	68.9	70.3	%N1	68.0	69.4	70.9	72.3	73.8	32,000
	1618	1660	1701	1743	1782	LB/HR	1872	1918	1967	2015	2061	
	0.196	0.195	0.194	0.194	0.193	NM/LB	0.186	0.185	0.184	0.184	0.183	
33,000	64.9	66.3	67.7	69.1	70.5	%N1	68.1	69.5	71.0	72.4	74.0	33,000
	1630	1672	1714	1756	1795	LB/HR	1881	1928	1977	2025	2072	
	0.195	0.194	0.193	0.192	0.192	NM/LB	0.185	0.184	0.183	0.183	0.182	
34,000	65.1	66.5	67.9	69.3	70.6	%N1	68.2	69.7	71.1	72.5	74.1	34,000
	1641	1684	1726	1768	1809	LB/HR	1891	1938	1987	2036	2082	
	0.193	0.192	0.192	0.191	0.190	NM/LB	0.184	0.183	0.183	0.182	0.181	
35,000	65.3	66.7	68.1	69.5	70.8	%N1	68.3	69.8	71.2	72.7	74.3	35,000
	1653	1696	1738	1781	1822	LB/HR	1900	1947	1997	2046	2093	
	0.192	0.191	0.190	0.189	0.189	NM/LB	0.183	0.183	0.182	0.181	0.180	
36,000	65.6	67.0	68.4	69.7	71.1	%N1	68.5	69.9	71.4	72.8	74.4	36,000
	1667	1711	1753	1796	1838	LB/HR	1910	1957	2007	2056	2103	
	0.190	0.190	0.189	0.188	0.187	NM/LB	0.182	0.182	0.181	0.180	0.179	
37,000	65.8	67.2	68.6	70.0	71.3	%N1	68.6	70.1	71.5	73.0	74.6	37,000
	1684	1728	1771	1815	1857	LB/HR	1920	1968	2018	2068	2115	
	0.188	0.188	0.187	0.186	0.185	NM/LB	0.181	0.181	0.180	0.179	0.178	
38,000	66.0	67.5	68.9	70.2	71.6	%N1	68.8	70.2	71.7	73.1	74.8	38,000
	1701	1745	1789	1833	1876	LB/HR	1933	1981	2031	2081	2129	
	0.187	0.186	0.185	0.184	0.183	NM/LB	0.180	0.179	0.179	0.178	0.177	
39,000	66.3	67.7	69.1	70.5	71.8	%N1	68.9	70.4	71.9	73.3	75.0	39,000
	1718	1763	1807	1851	1895	LB/HR	1945	1993	2044	2094	2142	
	0.185	0.184	0.183	0.182	0.181	NM/LB	0.179	0.178	0.177	0.177	0.176	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

19,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	300 KCAS						330 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-42.6	-32.6	-22.6	-12.6	-2.6	OAT (°C)	-42.6	-32.6	-22.6	-12.6	-2.6	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	70.9	72.4	73.9	75.4	76.8	%N1						25,000
	2148	2201	2256	2313	2361	LB/HR						
	0.176	0.176	0.175	0.174	0.174	NM/LB						
26,000	70.9	72.4	73.9	75.4	76.9	%N1						26,000
	2151	2204	2259	2316	2364	LB/HR						
	0.176	0.175	0.175	0.174	0.173	NM/LB						
27,000	70.9	72.4	73.9	75.4	76.9	%N1						27,000
	2154	2207	2262	2319	2367	LB/HR						
	0.176	0.175	0.174	0.173	0.173	NM/LB						
28,000	71.0	72.5	74.0	75.4	77.0	%N1						28,000
	2157	2209	2265	2322	2370	LB/HR						
	0.175	0.175	0.174	0.173	0.173	NM/LB						
29,000	71.0	72.5	74.0	75.5	77.0	%N1						29,000
	2160	2213	2268	2326	2374	LB/HR						
	0.175	0.175	0.174	0.173	0.173	NM/LB						
30,000	71.1	72.6	74.1	75.6	77.1	%N1						30,000
	2165	2219	2274	2332	2380	LB/HR						
	0.175	0.174	0.173	0.172	0.172	NM/LB						
31,000	71.1	72.6	74.1	75.6	77.1	%N1						31,000
	2171	2225	2280	2338	2387	LB/HR						
	0.174	0.174	0.173	0.172	0.172	NM/LB						
32,000	71.2	72.7	74.2	75.7	77.2	%N1						32,000
	2177	2230	2286	2344	2393	LB/HR						
	0.174	0.173	0.172	0.172	0.171	NM/LB						
33,000	71.2	72.8	74.3	75.8	77.3	%N1						33,000
	2182	2236	2292	2350	2399	LB/HR						
	0.173	0.173	0.172	0.171	0.171	NM/LB						
34,000	71.3	72.8	74.3	75.8	77.4	%N1						34,000
	2188	2242	2298	2357	2405	LB/HR						
	0.173	0.172	0.172	0.171	0.170	NM/LB						
35,000	71.4	72.9	74.4	75.9	77.4	%N1						35,000
	2194	2248	2304	2363	2412	LB/HR						
	0.172	0.172	0.171	0.170	0.170	NM/LB						
36,000	71.4	73.0	74.5	76.0	77.5	%N1						36,000
	2199	2254	2310	2369	2418	LB/HR						
	0.172	0.171	0.171	0.170	0.169	NM/LB						
37,000	71.5	73.0	74.6	76.1	77.6	%N1						37,000
	2208	2262	2319	2378	2427	LB/HR						
	0.171	0.171	0.170	0.169	0.169	NM/LB						
38,000	71.6	73.2	74.7	76.2	77.7	%N1						38,000
	2218	2273	2330	2390	2439	LB/HR						
	0.170	0.170	0.169	0.168	0.168	NM/LB						
39,000	71.8	73.3	74.8	76.3	77.9	%N1						39,000
	2229	2284	2341	2401	2450	LB/HR						
	0.170	0.169	0.168	0.167	0.167	NM/LB						

21,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	150 KCAS						175 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-46.6	-36.6	-26.6	-16.6	-6.6	OAT (°C)	-46.6	-36.6	-26.6	-16.6	-6.6	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	52.4	53.6	54.7	55.9	57.1	%N1	54.6	55.8	57.0	58.1	59.5	25,000
	922	947	973	999	1024	LB/HR	1003	1029	1057	1085	1111	
	0.216	0.215	0.213	0.212	0.211	NM/LB	0.231	0.230	0.228	0.227	0.226	
26,000	53.2	54.4	55.5	56.7	58.0	%N1	55.1	56.3	57.5	58.7	60.1	26,000
	948	974	1000	1026	1053	LB/HR	1021	1049	1077	1106	1132	
	0.210	0.209	0.207	0.206	0.205	NM/LB	0.226	0.225	0.224	0.223	0.222	
27,000	54.1	55.3	56.5	57.7	59.0	%N1	55.6	56.9	58.1	59.3	60.8	27,000
	980	1006	1034	1061	1088	LB/HR	1040	1068	1097	1126	1153	
	0.203	0.202	0.201	0.199	0.198	NM/LB	0.222	0.221	0.220	0.219	0.218	
28,000	55.1	56.3	57.5	58.7	60.1	%N1	56.2	57.4	58.6	59.9	61.4	28,000
	1013	1040	1069	1097	1125	LB/HR	1059	1088	1117	1147	1174	
	0.196	0.195	0.194	0.193	0.192	NM/LB	0.218	0.217	0.216	0.215	0.214	
29,000						%N1	56.8	58.0	59.3	60.5	62.0	29,000
						LB/HR	1080	1109	1139	1170	1196	
						NM/LB	0.214	0.213	0.212	0.211	0.210	
30,000						%N1	57.3	58.6	59.9	61.1	62.7	30,000
						LB/HR	1101	1130	1160	1192	1219	
						NM/LB	0.210	0.209	0.208	0.207	0.206	
31,000						%N1	58.0	59.3	60.5	61.8	63.3	31,000
						LB/HR	1123	1153	1184	1217	1246	
						NM/LB	0.206	0.205	0.204	0.202	0.201	
32,000						%N1	58.7	60.0	61.3	62.5	63.8	32,000
						LB/HR	1147	1178	1210	1243	1274	
						NM/LB	0.202	0.201	0.200	0.198	0.197	
33,000						%N1	59.4	60.7	62.0	63.3	64.4	33,000
						LB/HR	1172	1203	1235	1269	1304	
						NM/LB	0.197	0.197	0.195	0.194	0.193	
34,000						%N1	59.9	61.3	62.6	63.8	65.0	34,000
						LB/HR	1201	1233	1266	1301	1336	
						NM/LB	0.193	0.192	0.191	0.189	0.188	
35,000						%N1	60.5	61.8	63.1	64.4	65.6	35,000
						LB/HR	1230	1263	1297	1332	1368	
						NM/LB	0.188	0.187	0.186	0.185	0.183	
36,000						%N1	61.1	62.4	63.8	65.1	66.3	36,000
						LB/HR	1265	1298	1333	1369	1405	
						NM/LB	0.183	0.182	0.181	0.180	0.179	
37,000						%N1	61.8	63.2	64.5	65.8	67.1	37,000
						LB/HR	1303	1338	1373	1409	1446	
						NM/LB	0.178	0.177	0.176	0.175	0.174	
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

21,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	200 KCAS						225 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-46.6	-36.6	-26.6	-16.6	-6.6	OAT (°C)	-46.6	-36.6	-26.6	-16.6	-6.6	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	57.7	59.0	60.2	61.5	63.0	%N1	61.2	62.5	63.8	65.1	66.4	25,000
	1124	1154	1184	1216	1247	LB/HR	1304	1340	1374	1409	1447	
	0.235	0.233	0.232	0.231	0.229	NM/LB	0.227	0.225	0.224	0.223	0.222	
26,000	58.1	59.4	60.7	61.9	63.3	%N1	61.4	62.7	64.1	65.4	66.6	26,000
	1138	1169	1200	1232	1265	LB/HR	1316	1352	1387	1422	1459	
	0.232	0.230	0.229	0.228	0.226	NM/LB	0.225	0.223	0.222	0.221	0.220	
27,000	58.6	59.9	61.1	62.4	63.7	%N1	61.6	63.0	64.3	65.6	66.9	27,000
	1155	1185	1217	1249	1284	LB/HR	1328	1364	1399	1435	1472	
	0.228	0.227	0.226	0.225	0.223	NM/LB	0.223	0.221	0.220	0.219	0.218	
28,000	59.0	60.3	61.6	62.9	64.0	%N1	61.8	63.2	64.5	65.8	67.1	28,000
	1171	1202	1235	1267	1303	LB/HR	1340	1376	1411	1447	1484	
	0.225	0.224	0.223	0.221	0.219	NM/LB	0.221	0.219	0.218	0.217	0.216	
29,000	59.4	60.7	62.0	63.3	64.4	%N1	62.0	63.4	64.7	66.0	67.4	29,000
	1189	1220	1253	1286	1323	LB/HR	1352	1389	1424	1461	1497	
	0.222	0.221	0.219	0.218	0.216	NM/LB	0.219	0.217	0.216	0.215	0.214	
30,000	59.8	61.1	62.4	63.7	64.8	%N1	62.3	63.7	65.0	66.3	67.7	30,000
	1209	1241	1274	1308	1345	LB/HR	1369	1406	1442	1478	1515	
	0.218	0.217	0.216	0.214	0.213	NM/LB	0.216	0.215	0.214	0.213	0.212	
31,000	60.2	61.5	62.8	64.1	65.3	%N1	62.6	64.0	65.3	66.7	68.0	31,000
	1230	1263	1297	1331	1368	LB/HR	1385	1423	1459	1496	1532	
	0.214	0.213	0.212	0.211	0.209	NM/LB	0.213	0.212	0.211	0.210	0.209	
32,000	60.6	61.9	63.2	64.5	65.7	%N1	62.9	64.3	65.6	67.0	68.4	32,000
	1252	1285	1319	1354	1391	LB/HR	1402	1440	1476	1514	1550	
	0.211	0.210	0.208	0.207	0.206	NM/LB	0.211	0.210	0.209	0.208	0.207	
33,000	61.0	62.3	63.6	64.9	66.1	%N1	63.2	64.6	65.9	67.3	68.7	33,000
	1273	1307	1342	1377	1414	LB/HR	1418	1457	1494	1532	1568	
	0.207	0.206	0.205	0.204	0.202	NM/LB	0.208	0.207	0.206	0.205	0.204	
34,000	61.3	62.7	64.0	65.3	66.6	%N1	63.5	64.9	66.3	67.6	69.1	34,000
	1295	1329	1364	1400	1437	LB/HR	1437	1476	1513	1552	1588	
	0.204	0.203	0.202	0.200	0.199	NM/LB	0.206	0.205	0.204	0.203	0.202	
35,000	61.7	63.1	64.4	65.7	67.0	%N1	63.8	65.3	66.6	68.0	69.5	35,000
	1316	1351	1387	1423	1460	LB/HR	1456	1495	1533	1572	1608	
	0.200	0.199	0.198	0.197	0.196	NM/LB	0.203	0.202	0.201	0.200	0.199	
36,000	62.1	63.5	64.8	66.1	67.5	%N1	64.2	65.6	67.0	68.3	69.8	36,000
	1337	1374	1409	1445	1483	LB/HR	1475	1515	1553	1592	1628	
	0.197	0.196	0.195	0.194	0.193	NM/LB	0.200	0.199	0.199	0.198	0.197	
37,000	62.5	63.9	65.2	66.6	67.9	%N1	64.5	65.9	67.3	68.7	70.1	37,000
	1361	1397	1433	1470	1508	LB/HR	1493	1534	1573	1612	1649	
	0.194	0.193	0.192	0.191	0.190	NM/LB	0.198	0.197	0.196	0.195	0.194	
38,000	62.9	64.3	65.7	67.0	68.4	%N1	64.9	66.3	67.7	69.1	70.5	38,000
	1384	1421	1458	1495	1532	LB/HR	1515	1556	1595	1636	1673	
	0.190	0.190	0.189	0.188	0.187	NM/LB	0.195	0.194	0.193	0.192	0.192	
39,000	63.3	64.7	66.1	67.5	68.9	%N1	65.3	66.7	68.1	69.5	70.9	39,000
	1407	1445	1482	1520	1557	LB/HR	1537	1579	1618	1659	1698	
	0.187	0.186	0.186	0.185	0.184	NM/LB	0.192	0.191	0.190	0.190	0.189	

21,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	250 KCAS						275 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-46.6	-36.6	-26.6	-16.6	-6.6	OAT (°C)	-46.6	-36.6	-26.6	-16.6	-6.6	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	64.9	66.3	67.7	69.0	70.5	%N1	68.4	69.9	71.4	72.8	74.5	25,000
	1534	1575	1615	1656	1692	LB/HR	1809	1855	1903	1950	1994	
	0.213	0.212	0.211	0.210	0.210	NM/LB	0.198	0.197	0.197	0.196	0.195	
26,000	65.0	66.4	67.8	69.2	70.6	%N1	68.5	70.0	71.5	72.9	74.5	26,000
	1541	1582	1623	1663	1700	LB/HR	1814	1860	1908	1956	2000	
	0.212	0.211	0.210	0.209	0.209	NM/LB	0.198	0.197	0.196	0.195	0.194	
27,000	65.1	66.5	68.0	69.3	70.7	%N1	68.6	70.0	71.5	73.0	74.6	27,000
	1550	1591	1632	1673	1710	LB/HR	1819	1865	1914	1961	2006	
	0.211	0.210	0.209	0.208	0.208	NM/LB	0.197	0.196	0.195	0.194	0.194	
28,000	65.3	66.7	68.1	69.5	70.9	%N1	68.6	70.1	71.6	73.1	74.7	28,000
	1559	1601	1642	1682	1720	LB/HR	1824	1871	1919	1967	2011	
	0.210	0.209	0.208	0.207	0.206	NM/LB	0.196	0.196	0.195	0.194	0.193	
29,000	65.4	66.9	68.3	69.7	71.0	%N1	68.7	70.2	71.7	73.1	74.8	29,000
	1568	1610	1651	1692	1730	LB/HR	1829	1876	1924	1972	2017	
	0.209	0.208	0.207	0.206	0.205	NM/LB	0.196	0.195	0.194	0.193	0.193	
30,000	65.6	67.0	68.4	69.8	71.2	%N1	68.8	70.3	71.7	73.2	74.9	30,000
	1577	1619	1661	1702	1740	LB/HR	1834	1881	1930	1978	2022	
	0.207	0.206	0.206	0.205	0.204	NM/LB	0.195	0.195	0.194	0.193	0.192	
31,000	65.8	67.2	68.6	70.0	71.4	%N1	68.9	70.4	71.8	73.3	75.0	31,000
	1588	1631	1672	1714	1753	LB/HR	1841	1888	1937	1985	2030	
	0.206	0.205	0.204	0.203	0.202	NM/LB	0.195	0.194	0.193	0.192	0.192	
32,000	66.0	67.4	68.8	70.2	71.5	%N1	69.0	70.5	72.0	73.4	75.1	32,000
	1600	1643	1685	1727	1766	LB/HR	1851	1898	1947	1995	2040	
	0.204	0.203	0.203	0.202	0.201	NM/LB	0.194	0.193	0.192	0.191	0.191	
33,000	66.1	67.6	69.0	70.4	71.7	%N1	69.1	70.6	72.1	73.6	75.3	33,000
	1612	1655	1698	1740	1779	LB/HR	1861	1908	1957	2006	2051	
	0.203	0.202	0.201	0.200	0.199	NM/LB	0.193	0.192	0.191	0.190	0.190	
34,000	66.3	67.8	69.2	70.6	71.9	%N1	69.3	70.8	72.3	73.7	75.4	34,000
	1624	1667	1710	1753	1793	LB/HR	1870	1918	1967	2016	2062	
	0.201	0.200	0.200	0.199	0.198	NM/LB	0.192	0.191	0.190	0.189	0.189	
35,000	66.5	67.9	69.4	70.8	72.1	%N1	69.4	70.9	72.4	73.9	75.5	35,000
	1637	1680	1723	1766	1806	LB/HR	1880	1927	1977	2027	2073	
	0.200	0.199	0.198	0.197	0.196	NM/LB	0.191	0.190	0.189	0.188	0.188	
36,000	66.7	68.1	69.6	71.0	72.4	%N1	69.5	71.0	72.5	74.0	75.7	36,000
	1652	1695	1739	1782	1823	LB/HR	1890	1937	1987	2037	2083	
	0.198	0.197	0.196	0.195	0.195	NM/LB	0.190	0.189	0.188	0.187	0.187	
37,000	66.9	68.4	69.8	71.3	72.7	%N1	69.7	71.2	72.7	74.2	75.8	37,000
	1669	1712	1757	1800	1842	LB/HR	1901	1949	1999	2049	2096	
	0.196	0.195	0.194	0.193	0.193	NM/LB	0.189	0.188	0.187	0.186	0.185	
38,000	67.2	68.6	70.1	71.5	72.9	%N1	69.8	71.4	72.9	74.4	76.0	38,000
	1686	1730	1774	1818	1861	LB/HR	1914	1962	2012	2063	2110	
	0.194	0.193	0.192	0.191	0.191	NM/LB	0.187	0.187	0.186	0.185	0.184	
39,000	67.4	68.9	70.3	71.8	73.2	%N1	70.0	71.5	73.1	74.5	76.1	39,000
	1702	1747	1792	1837	1879	LB/HR	1926	1975	2025	2076	2124	
	0.192	0.191	0.190	0.190	0.189	NM/LB	0.186	0.186	0.185	0.184	0.183	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

21,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	300 KCAS						330 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-46.6	-36.6	-26.6	-16.6	-6.6	OAT (°C)	-46.6	-36.6	-26.6	-16.6	-6.6	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	71.7	73.3	74.8	76.3	77.9	%N1	75.3	77.0	78.6	80.2	81.8	25,000
	2118	2171	2226	2285	2333	LB/HR	2528	2594	2662	2734	2794	
	0.184	0.183	0.182	0.181	0.181	NM/LB	0.169	0.168	0.167	0.166	0.165	
26,000	71.7	73.3	74.8	76.4	77.9	%N1	75.4	77.0	78.6	80.2	81.9	26,000
	2120	2174	2229	2288	2336	LB/HR	2531	2597	2665	2736	2797	
	0.184	0.183	0.182	0.181	0.181	NM/LB	0.168	0.168	0.167	0.166	0.165	
27,000	71.8	73.3	74.9	76.4	78.0	%N1	75.4	77.0	78.7	80.2	81.9	27,000
	2123	2177	2232	2291	2339	LB/HR	2535	2601	2669	2741	2801	
	0.183	0.183	0.182	0.181	0.181	NM/LB	0.168	0.167	0.167	0.165	0.165	
28,000	71.8	73.4	74.9	76.4	78.0	%N1	75.4	77.1	78.7	80.3	82.0	28,000
	2126	2180	2235	2294	2342	LB/HR	2539	2605	2674	2746	2806	
	0.183	0.183	0.182	0.181	0.180	NM/LB	0.168	0.167	0.166	0.165	0.165	
29,000	71.9	73.4	75.0	76.5	78.1	%N1	75.5	77.1	78.7	80.3	82.0	29,000
	2130	2184	2240	2299	2346	LB/HR	2543	2610	2678	2750	2811	
	0.183	0.182	0.181	0.180	0.180	NM/LB	0.168	0.167	0.166	0.165	0.164	
30,000	71.9	73.5	75.0	76.6	78.2	%N1	75.5	77.2	78.8	80.4	82.0	30,000
	2136	2191	2246	2305	2353	LB/HR	2548	2614	2683	2755	2815	
	0.182	0.182	0.181	0.180	0.180	NM/LB	0.167	0.167	0.166	0.165	0.164	
31,000	72.0	73.6	75.1	76.6	78.2	%N1	75.6	77.2	78.8	80.4	82.1	31,000
	2142	2197	2253	2312	2360	LB/HR	2552	2618	2688	2760	2820	
	0.182	0.181	0.180	0.179	0.179	NM/LB	0.167	0.166	0.165	0.164	0.164	
32,000	72.1	73.6	75.2	76.7	78.3	%N1	75.6	77.3	78.9	80.4	82.1	32,000
	2149	2203	2259	2319	2367	LB/HR	2556	2623	2692	2764	2825	
	0.181	0.181	0.180	0.179	0.178	NM/LB	0.167	0.166	0.165	0.164	0.164	
33,000	72.1	73.7	75.3	76.8	78.4	%N1	75.7	77.3	78.9	80.5	82.2	33,000
	2155	2210	2266	2326	2374	LB/HR	2561	2627	2697	2769	2830	
	0.181	0.180	0.179	0.178	0.178	NM/LB	0.166	0.166	0.165	0.164	0.163	
34,000	72.2	73.8	75.3	76.9	78.5	%N1	75.7	77.3	79.0	80.5	82.2	34,000
	2161	2216	2272	2332	2380	LB/HR	2565	2632	2701	2774	2834	
	0.180	0.180	0.179	0.178	0.177	NM/LB	0.166	0.165	0.165	0.164	0.163	
35,000	72.3	73.9	75.4	76.9	78.6	%N1	75.8	77.4	79.0	80.6	82.3	35,000
	2167	2222	2279	2339	2387	LB/HR	2572	2639	2709	2782	2842	
	0.180	0.179	0.178	0.177	0.177	NM/LB	0.166	0.165	0.164	0.163	0.163	
36,000	72.4	73.9	75.5	77.0	78.6	%N1	75.8	77.5	79.1	80.7	82.4	36,000
	2173	2229	2286	2346	2394	LB/HR	2580	2648	2718	2791	2852	
	0.179	0.179	0.178	0.177	0.176	NM/LB	0.165	0.164	0.164	0.163	0.162	
37,000	72.5	74.0	75.6	77.1	78.8	%N1	75.9	77.6	79.2	80.8	82.5	37,000
	2184	2239	2297	2357	2405	LB/HR	2589	2656	2727	2800	2861	
	0.178	0.178	0.177	0.176	0.176	NM/LB	0.165	0.164	0.163	0.162	0.162	
38,000	72.6	74.2	75.7	77.3	78.9	%N1	76.0	77.6	79.3	80.9	82.6	38,000
	2195	2251	2308	2369	2418	LB/HR	2597	2665	2735	2809	2870	
	0.177	0.177	0.176	0.175	0.175	NM/LB	0.164	0.163	0.163	0.161	0.161	
39,000	72.7	74.3	75.9	77.4	79.1	%N1	76.1	77.7	79.4	80.9	82.7	39,000
	2206	2262	2320	2382	2430	LB/HR	2605	2673	2744	2818	2879	
	0.177	0.176	0.175	0.174	0.174	NM/LB	0.164	0.163	0.162	0.161	0.161	

21,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	340 KCAS											GROSS WEIGHT AT ALTITUDE (LB)
	-46.6	-36.6	-26.6	-16.6	-6.6	OAT (°C)	-46.6	-36.6	-26.6	-16.6	-6.6	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	76.5	78.1	79.7	81.3	83.1	%N1						25,000
	2681	2751	2824	2900	2962	LB/HR						
	0.163	0.163	0.162	0.161	0.161	NM/LB						
26,000	76.5	78.1	79.8	81.4	83.1	%N1						26,000
	2682	2753	2826	2902	2964	LB/HR						
	0.163	0.163	0.162	0.161	0.160	NM/LB						
27,000	76.5	78.2	79.8	81.4	83.1	%N1						27,000
	2684	2754	2828	2903	2965	LB/HR						
	0.163	0.163	0.162	0.161	0.160	NM/LB						
28,000	76.5	78.2	79.8	81.4	83.2	%N1						28,000
	2689	2759	2833	2908	2971	LB/HR						
	0.163	0.162	0.161	0.160	0.160	NM/LB						
29,000	76.6	78.2	79.9	81.5	83.2	%N1						29,000
	2694	2765	2838	2914	2977	LB/HR						
	0.163	0.162	0.161	0.160	0.160	NM/LB						
30,000	76.6	78.3	79.9	81.5	83.3	%N1						30,000
	2699	2770	2844	2920	2983	LB/HR						
	0.162	0.162	0.161	0.160	0.159	NM/LB						
31,000	76.7	78.3	80.0	81.6	83.3	%N1						31,000
	2704	2775	2849	2926	2989	LB/HR						
	0.162	0.161	0.160	0.159	0.159	NM/LB						
32,000	76.7	78.4	80.0	81.6	83.4	%N1						32,000
	2710	2781	2855	2931	2995	LB/HR						
	0.162	0.161	0.160	0.159	0.159	NM/LB						
33,000	76.8	78.5	80.1	81.7	83.4	%N1						33,000
	2715	2786	2860	2937	3001	LB/HR						
	0.161	0.161	0.160	0.159	0.158	NM/LB						
34,000	76.8	78.5	80.1	81.7	83.5	%N1						34,000
	2720	2792	2866	2943	3007	LB/HR						
	0.161	0.160	0.160	0.158	0.158	NM/LB						
35,000	76.9	78.6	80.2	81.8	83.5	%N1						35,000
	2725	2797	2872	2948	3013	LB/HR						
	0.161	0.160	0.159	0.158	0.158	NM/LB						
36,000	76.9	78.6	80.2	81.8	83.6	%N1						36,000
	2731	2802	2877	2954	3019	LB/HR						
	0.160	0.160	0.159	0.158	0.157	NM/LB						
37,000	77.0	78.7	80.3	81.9	83.6	%N1						37,000
	2739	2811	2886	2963	3028	LB/HR						
	0.160	0.159	0.158	0.157	0.157	NM/LB						
38,000	77.1	78.8	80.4	82.0	83.7	%N1						38,000
	2748	2820	2896	2973	3038	LB/HR						
	0.159	0.159	0.158	0.157	0.156	NM/LB						
39,000	77.2	78.9	80.5	82.1	83.8	%N1						39,000
	2757	2830	2905	2983	3049	LB/HR						
	0.159	0.158	0.157	0.156	0.156	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

23,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	150 KCAS						175 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-50.5	-40.5	-30.5	-20.5	-10.5	OAT (°C)	-50.5	-40.5	-30.5	-20.5	-10.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	53.8	55.1	56.3	57.4	58.7	%N1	56.0	57.2	58.5	59.7	61.2	25,000
	910	936	962	988	1018	LB/HR	988	1015	1043	1071	1100	
	0.226	0.224	0.223	0.222	0.219	NM/LB	0.242	0.241	0.239	0.238	0.236	
26,000	54.6	55.9	57.1	58.3	59.6	%N1	56.5	57.8	59.1	60.3	61.8	26,000
	936	962	989	1015	1047	LB/HR	1007	1034	1063	1092	1121	
	0.219	0.218	0.217	0.215	0.213	NM/LB	0.237	0.236	0.235	0.233	0.232	
27,000	55.6	56.9	58.1	59.4	60.8	%N1	57.1	58.4	59.7	60.9	62.5	27,000
	968	995	1023	1051	1083	LB/HR	1026	1054	1083	1113	1141	
	0.212	0.211	0.210	0.208	0.206	NM/LB	0.233	0.232	0.230	0.229	0.227	
28,000	56.7	58.0	59.2	60.5	61.9	%N1	57.7	59.0	60.3	61.6	63.1	28,000
	1001	1029	1058	1087	1120	LB/HR	1045	1074	1104	1134	1163	
	0.205	0.204	0.203	0.201	0.199	NM/LB	0.229	0.227	0.226	0.224	0.223	
29,000						%N1	58.3	59.6	60.9	62.2	63.6	29,000
						LB/HR	1066	1095	1125	1156	1187	
						NM/LB	0.224	0.223	0.222	0.220	0.219	
30,000						%N1	58.9	60.3	61.6	62.9	64.1	30,000
						LB/HR	1086	1116	1147	1179	1212	
						NM/LB	0.220	0.219	0.217	0.216	0.214	
31,000						%N1	59.6	60.9	62.2	63.5	64.7	31,000
						LB/HR	1110	1141	1172	1205	1240	
						NM/LB	0.215	0.214	0.213	0.211	0.209	
32,000						%N1	60.1	61.5	62.8	64.1	65.3	32,000
						LB/HR	1137	1168	1200	1233	1269	
						NM/LB	0.210	0.209	0.208	0.206	0.205	
33,000						%N1	60.6	62.0	63.3	64.6	65.9	33,000
						LB/HR	1164	1196	1229	1262	1298	
						NM/LB	0.205	0.204	0.203	0.202	0.200	
34,000						%N1	61.2	62.6	63.9	65.2	66.5	34,000
						LB/HR	1193	1226	1260	1294	1330	
						NM/LB	0.200	0.199	0.198	0.197	0.195	
35,000						%N1	61.8	63.2	64.5	65.9	67.2	35,000
						LB/HR	1223	1257	1291	1325	1362	
						NM/LB	0.195	0.194	0.193	0.192	0.190	
36,000						%N1	62.5	63.9	65.2	66.6	68.0	36,000
						LB/HR	1258	1293	1328	1363	1400	
						NM/LB	0.190	0.189	0.188	0.187	0.185	
37,000						%N1	63.2	64.6	66.0	67.4	68.8	37,000
						LB/HR	1296	1332	1368	1404	1442	
						NM/LB	0.184	0.183	0.182	0.181	0.180	
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

23,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	200 KCAS						225 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-50.5	-40.5	-30.5	-20.5	-10.5	OAT (°C)	-50.5	-40.5	-30.5	-20.5	-10.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	59.2	60.5	61.8	63.1	64.2	%N1	62.3	63.7	65.1	66.4	67.8	25,000
	1108	1138	1169	1200	1243	LB/HR	1289	1325	1360	1395	1434	
	0.246	0.244	0.243	0.241	0.238	NM/LB	0.236	0.235	0.234	0.233	0.231	
26,000	59.6	60.9	62.2	63.5	64.6	%N1	62.5	63.9	65.3	66.6	68.0	26,000
	1123	1154	1186	1218	1260	LB/HR	1301	1337	1372	1408	1446	
	0.242	0.241	0.240	0.238	0.235	NM/LB	0.234	0.233	0.232	0.231	0.229	
27,000	59.9	61.2	62.5	63.8	65.0	%N1	62.8	64.2	65.5	66.9	68.3	27,000
	1141	1173	1205	1237	1279	LB/HR	1313	1349	1385	1421	1458	
	0.238	0.237	0.236	0.234	0.231	NM/LB	0.232	0.231	0.230	0.229	0.227	
28,000	60.2	61.6	62.9	64.2	65.4	%N1	63.0	64.4	65.8	67.1	68.5	28,000
	1160	1192	1224	1257	1298	LB/HR	1325	1361	1397	1433	1471	
	0.235	0.233	0.232	0.231	0.228	NM/LB	0.230	0.229	0.228	0.227	0.225	
29,000	60.6	61.9	63.3	64.6	65.8	%N1	63.2	64.6	66.0	67.4	68.8	29,000
	1178	1211	1244	1277	1318	LB/HR	1338	1375	1411	1448	1484	
	0.231	0.230	0.228	0.227	0.224	NM/LB	0.228	0.227	0.226	0.224	0.223	
30,000	61.0	62.3	63.7	65.0	66.2	%N1	63.5	64.9	66.3	67.7	69.2	30,000
	1198	1232	1265	1298	1339	LB/HR	1354	1392	1429	1465	1502	
	0.227	0.226	0.225	0.223	0.221	NM/LB	0.225	0.224	0.223	0.222	0.221	
31,000	61.4	62.8	64.1	65.4	66.7	%N1	63.8	65.3	66.7	68.0	69.5	31,000
	1220	1254	1288	1322	1362	LB/HR	1371	1409	1446	1483	1519	
	0.223	0.222	0.221	0.219	0.217	NM/LB	0.222	0.221	0.220	0.219	0.218	
32,000	61.8	63.2	64.5	65.9	67.2	%N1	64.1	65.6	67.0	68.4	69.9	32,000
	1241	1276	1310	1345	1385	LB/HR	1387	1426	1463	1501	1537	
	0.219	0.218	0.217	0.216	0.213	NM/LB	0.220	0.219	0.218	0.216	0.216	
33,000	62.2	63.6	65.0	66.3	67.6	%N1	64.5	65.9	67.3	68.7	70.2	33,000
	1263	1298	1333	1368	1407	LB/HR	1404	1443	1481	1519	1555	
	0.215	0.214	0.213	0.212	0.210	NM/LB	0.217	0.216	0.215	0.214	0.213	
34,000	62.6	64.0	65.4	66.7	68.1	%N1	64.8	66.2	67.7	69.1	70.5	34,000
	1284	1320	1355	1391	1430	LB/HR	1423	1463	1501	1539	1576	
	0.212	0.211	0.210	0.208	0.207	NM/LB	0.214	0.213	0.212	0.211	0.210	
35,000	63.0	64.4	65.8	67.2	68.6	%N1	65.2	66.6	68.0	69.5	70.8	35,000
	1306	1342	1378	1414	1452	LB/HR	1442	1482	1521	1560	1597	
	0.208	0.207	0.206	0.205	0.203	NM/LB	0.211	0.210	0.209	0.208	0.207	
36,000	63.4	64.8	66.2	67.6	69.1	%N1	65.5	67.0	68.4	69.8	71.2	36,000
	1327	1364	1401	1437	1475	LB/HR	1461	1501	1541	1580	1618	
	0.205	0.204	0.203	0.202	0.200	NM/LB	0.209	0.208	0.207	0.206	0.205	
37,000	63.9	65.3	66.7	68.1	69.6	%N1	65.9	67.3	68.8	70.2	71.5	37,000
	1351	1388	1425	1462	1499	LB/HR	1480	1521	1561	1600	1639	
	0.201	0.200	0.199	0.198	0.197	NM/LB	0.206	0.205	0.204	0.203	0.202	
38,000	64.3	65.7	67.2	68.6	70.1	%N1	66.2	67.7	69.2	70.6	71.9	38,000
	1374	1413	1450	1487	1524	LB/HR	1502	1544	1584	1624	1664	
	0.198	0.197	0.196	0.195	0.194	NM/LB	0.203	0.202	0.201	0.200	0.199	
39,000	64.7	66.2	67.6	69.0	70.5	%N1	66.6	68.0	69.5	70.9	72.3	39,000
	1397	1437	1474	1512	1550	LB/HR	1524	1566	1607	1648	1688	
	0.195	0.194	0.193	0.192	0.191	NM/LB	0.200	0.199	0.198	0.197	0.196	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

23,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	250 KCAS						275 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-50.5	-40.5	-30.5	-20.5	-10.5	OAT (°C)	-50.5	-40.5	-30.5	-20.5	-10.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	66.0	67.5	68.9	70.3	71.7	%N1	69.3	70.9	72.4	73.9	75.5	25,000
	1516	1556	1598	1638	1676	LB/HR	1785	1831	1879	1927	1972	
	0.223	0.222	0.220	0.219	0.219	NM/LB	0.207	0.206	0.205	0.204	0.203	
26,000	66.1	67.6	69.0	70.5	71.8	%N1	69.4	71.0	72.5	74.0	75.6	26,000
	1524	1564	1605	1646	1685	LB/HR	1790	1836	1884	1933	1979	
	0.221	0.220	0.219	0.218	0.217	NM/LB	0.206	0.206	0.205	0.204	0.203	
27,000	66.3	67.7	69.2	70.6	71.9	%N1	69.5	71.0	72.6	74.1	75.7	27,000
	1533	1573	1615	1656	1695	LB/HR	1796	1842	1890	1939	1985	
	0.220	0.219	0.218	0.217	0.216	NM/LB	0.206	0.205	0.204	0.203	0.202	
28,000	66.4	67.9	69.3	70.7	72.1	%N1	69.6	71.1	72.7	74.2	75.8	28,000
	1542	1583	1625	1666	1705	LB/HR	1801	1848	1896	1945	1991	
	0.219	0.218	0.217	0.216	0.215	NM/LB	0.205	0.204	0.203	0.202	0.202	
29,000	66.5	68.0	69.4	70.9	72.3	%N1	69.7	71.2	72.7	74.2	75.8	29,000
	1551	1592	1634	1675	1715	LB/HR	1807	1853	1902	1951	1997	
	0.217	0.217	0.215	0.214	0.214	NM/LB	0.204	0.204	0.203	0.202	0.201	
30,000	66.7	68.1	69.6	71.0	72.4	%N1	69.7	71.3	72.8	74.3	75.9	30,000
	1560	1601	1644	1685	1725	LB/HR	1812	1859	1907	1957	2003	
	0.216	0.215	0.214	0.213	0.212	NM/LB	0.204	0.203	0.202	0.201	0.200	
31,000	66.8	68.3	69.8	71.2	72.6	%N1	69.9	71.4	72.9	74.4	76.0	31,000
	1572	1613	1656	1698	1738	LB/HR	1821	1867	1916	1966	2012	
	0.215	0.214	0.213	0.212	0.211	NM/LB	0.203	0.202	0.201	0.200	0.199	
32,000	67.0	68.5	70.0	71.4	72.8	%N1	70.0	71.6	73.1	74.6	76.2	32,000
	1584	1626	1669	1711	1752	LB/HR	1831	1878	1927	1977	2024	
	0.213	0.212	0.211	0.210	0.209	NM/LB	0.202	0.201	0.200	0.199	0.198	
33,000	67.2	68.7	70.1	71.6	73.0	%N1	70.1	71.7	73.2	74.8	76.3	33,000
	1596	1638	1681	1724	1765	LB/HR	1841	1888	1937	1988	2035	
	0.211	0.211	0.209	0.208	0.208	NM/LB	0.201	0.200	0.199	0.198	0.197	
34,000	67.4	68.9	70.3	71.8	73.2	%N1	70.3	71.9	73.4	74.9	76.5	34,000
	1608	1650	1694	1737	1778	LB/HR	1851	1899	1948	1999	2047	
	0.210	0.209	0.208	0.207	0.206	NM/LB	0.200	0.199	0.198	0.197	0.196	
35,000	67.5	69.0	70.5	72.0	73.4	%N1	70.4	72.0	73.6	75.1	76.6	35,000
	1620	1662	1706	1750	1792	LB/HR	1862	1909	1959	2010	2058	
	0.208	0.207	0.206	0.205	0.204	NM/LB	0.198	0.198	0.197	0.196	0.195	
36,000	67.8	69.3	70.8	72.2	73.7	%N1	70.6	72.2	73.7	75.2	76.8	36,000
	1636	1679	1724	1767	1810	LB/HR	1872	1920	1970	2021	2070	
	0.206	0.205	0.204	0.203	0.202	NM/LB	0.197	0.197	0.196	0.195	0.194	
37,000	68.0	69.5	71.0	72.5	74.0	%N1	70.8	72.3	73.9	75.4	76.9	37,000
	1653	1696	1741	1786	1829	LB/HR	1884	1932	1983	2035	2084	
	0.204	0.203	0.202	0.201	0.200	NM/LB	0.196	0.195	0.194	0.193	0.193	
38,000	68.3	69.8	71.3	72.8	74.3	%N1	70.9	72.5	74.1	75.6	77.1	38,000
	1670	1713	1759	1804	1847	LB/HR	1897	1945	1996	2049	2098	
	0.202	0.201	0.200	0.199	0.198	NM/LB	0.195	0.194	0.193	0.192	0.191	
39,000	68.5	70.0	71.5	73.0	74.6	%N1	71.1	72.7	74.3	75.8	77.3	39,000
	1687	1731	1777	1822	1866	LB/HR	1910	1958	2009	2062	2112	
	0.200	0.199	0.198	0.197	0.196	NM/LB	0.193	0.193	0.192	0.191	0.190	

23,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	300 KCAS						330 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-50.5	-40.5	-30.5	-20.5	-10.5	OAT (°C)	-50.5	-40.5	-30.5	-20.5	-10.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	72.6	74.2	75.8	77.4	79.1	%N1	76.3	78.0	79.6	81.2	83.0	25,000
	2088	2143	2198	2258	2304	LB/HR	2505	2573	2642	2713	2773	
	0.192	0.191	0.190	0.189	0.189	NM/LB	0.175	0.174	0.173	0.172	0.172	
26,000	72.7	74.3	75.9	77.4	79.1	%N1	76.3	78.0	79.7	81.3	83.1	26,000
	2091	2146	2202	2261	2307	LB/HR	2509	2577	2646	2718	2777	
	0.192	0.191	0.190	0.189	0.189	NM/LB	0.175	0.174	0.173	0.172	0.172	
27,000	72.7	74.3	75.9	77.5	79.1	%N1	76.4	78.1	79.7	81.3	83.1	27,000
	2094	2149	2205	2264	2310	LB/HR	2515	2582	2652	2724	2784	
	0.192	0.191	0.190	0.189	0.189	NM/LB	0.174	0.174	0.173	0.172	0.171	
28,000	72.7	74.3	75.9	77.5	79.2	%N1	76.4	78.1	79.8	81.4	83.2	28,000
	2097	2152	2208	2267	2313	LB/HR	2520	2588	2658	2730	2790	
	0.191	0.191	0.190	0.188	0.188	NM/LB	0.174	0.173	0.172	0.171	0.171	
29,000	72.8	74.4	76.0	77.6	79.3	%N1	76.5	78.2	79.8	81.4	83.2	29,000
	2102	2157	2213	2273	2319	LB/HR	2526	2594	2664	2736	2796	
	0.191	0.190	0.189	0.188	0.188	NM/LB	0.174	0.173	0.172	0.171	0.170	
30,000	72.9	74.5	76.1	77.6	79.4	%N1	76.5	78.2	79.9	81.5	83.3	30,000
	2109	2164	2220	2281	2326	LB/HR	2531	2599	2669	2742	2802	
	0.190	0.189	0.189	0.187	0.187	NM/LB	0.173	0.172	0.172	0.170	0.170	
31,000	73.0	74.6	76.2	77.7	79.4	%N1	76.6	78.3	79.9	81.6	83.3	31,000
	2115	2171	2227	2288	2334	LB/HR	2537	2605	2675	2747	2809	
	0.190	0.189	0.188	0.187	0.187	NM/LB	0.173	0.172	0.171	0.170	0.170	
32,000	73.0	74.7	76.3	77.8	79.5	%N1	76.6	78.3	80.0	81.6	83.4	32,000
	2122	2178	2235	2295	2341	LB/HR	2542	2610	2681	2753	2815	
	0.189	0.188	0.187	0.186	0.186	NM/LB	0.173	0.172	0.171	0.170	0.169	
33,000	73.1	74.7	76.3	77.9	79.6	%N1	76.7	78.4	80.1	81.7	83.4	33,000
	2129	2185	2242	2303	2349	LB/HR	2548	2616	2687	2759	2821	
	0.188	0.188	0.187	0.186	0.185	NM/LB	0.172	0.171	0.170	0.169	0.169	
34,000	73.2	74.8	76.4	78.0	79.7	%N1	76.8	78.5	80.1	81.7	83.5	34,000
	2135	2192	2249	2310	2357	LB/HR	2553	2622	2693	2766	2828	
	0.188	0.187	0.186	0.185	0.185	NM/LB	0.172	0.171	0.170	0.169	0.168	
35,000	73.3	74.9	76.5	78.1	79.8	%N1	76.8	78.5	80.2	81.8	83.6	35,000
	2142	2199	2256	2317	2365	LB/HR	2562	2632	2703	2776	2838	
	0.187	0.186	0.186	0.184	0.184	NM/LB	0.171	0.170	0.169	0.168	0.168	
36,000	73.4	75.0	76.6	78.2	79.9	%N1	76.9	78.6	80.3	81.9	83.7	36,000
	2149	2206	2264	2325	2373	LB/HR	2572	2641	2712	2786	2848	
	0.187	0.186	0.185	0.184	0.184	NM/LB	0.171	0.170	0.169	0.168	0.167	
37,000	73.5	75.1	76.8	78.3	80.0	%N1	77.0	78.7	80.4	82.0	83.8	37,000
	2161	2218	2277	2338	2387	LB/HR	2581	2650	2722	2796	2859	
	0.186	0.185	0.184	0.183	0.182	NM/LB	0.170	0.169	0.168	0.167	0.167	
38,000	73.7	75.3	76.9	78.5	80.2	%N1	77.1	78.8	80.5	82.1	83.9	38,000
	2173	2231	2289	2352	2401	LB/HR	2590	2660	2732	2805	2869	
	0.185	0.184	0.183	0.182	0.181	NM/LB	0.169	0.169	0.168	0.167	0.166	
39,000	73.8	75.4	77.1	78.6	80.3	%N1	77.2	78.9	80.6	82.2	83.9	39,000
	2185	2243	2302	2365	2415	LB/HR	2599	2669	2741	2815	2879	
	0.184	0.183	0.182	0.181	0.180	NM/LB	0.169	0.168	0.167	0.166	0.165	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

23,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	340 KCAS											GROSS WEIGHT AT ALTITUDE (LB)
	-50.5	-40.5	-30.5	-20.5	-10.5	OAT (°C)	-50.5	-40.5	-30.5	-20.5	-10.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.9	79.6	81.3	82.9	84.6	%N1						25,000
	2700	2773	2849	2925	2994	LB/HR						
	0.167	0.166	0.165	0.164	0.164	NM/LB						
26,000	77.9	79.6	81.3	82.9	84.6	%N1						26,000
	2703	2776	2851	2928	2997	LB/HR						
	0.167	0.166	0.165	0.164	0.163	NM/LB						
27,000	77.9	79.7	81.3	83.0	84.6	%N1						27,000
	2706	2779	2855	2932	3000	LB/HR						
	0.167	0.166	0.165	0.164	0.163	NM/LB						
28,000	78.0	79.7	81.4	83.0	84.7	%N1						28,000
	2712	2785	2861	2938	3007	LB/HR						
	0.166	0.166	0.165	0.163	0.163	NM/LB						
29,000	78.0	79.8	81.5	83.1	84.8	%N1						29,000
	2718	2791	2867	2945	3014	LB/HR						
	0.166	0.165	0.164	0.163	0.163	NM/LB						
30,000	78.1	79.8	81.5	83.2	84.8	%N1						30,000
	2723	2797	2874	2951	3020	LB/HR						
	0.166	0.165	0.164	0.163	0.162	NM/LB						
31,000	78.2	79.9	81.6	83.2	84.9	%N1						31,000
	2729	2803	2880	2957	3027	LB/HR						
	0.165	0.164	0.163	0.162	0.162	NM/LB						
32,000	78.2	80.0	81.6	83.3	84.9	%N1						32,000
	2735	2810	2886	2964	3034	LB/HR						
	0.165	0.164	0.163	0.162	0.161	NM/LB						
33,000	78.3	80.0	81.7	83.4	85.0	%N1						33,000
	2741	2816	2892	2970	3040	LB/HR						
	0.165	0.164	0.163	0.162	0.161	NM/LB						
34,000	78.3	80.1	81.8	83.4	85.1	%N1						34,000
	2747	2822	2899	2977	3047	LB/HR						
	0.164	0.163	0.162	0.161	0.161	NM/LB						
35,000	78.4	80.1	81.8	83.5	85.1	%N1						35,000
	2753	2828	2905	2983	3054	LB/HR						
	0.164	0.163	0.162	0.161	0.160	NM/LB						
36,000	78.5	80.2	81.9	83.5	85.2	%N1						36,000
	2759	2834	2912	2990	3061	LB/HR						
	0.163	0.163	0.162	0.161	0.160	NM/LB						
37,000	78.6	80.3	82.0	83.6	85.3	%N1						37,000
	2768	2843	2921	3000	3071	LB/HR						
	0.163	0.162	0.161	0.160	0.159	NM/LB						
38,000	78.6	80.4	82.1	83.7	85.4	%N1						38,000
	2777	2852	2930	3009	3081	LB/HR						
	0.162	0.162	0.161	0.160	0.159	NM/LB						
39,000	78.7	80.5	82.1	83.8	85.4	%N1						39,000
	2786	2862	2940	3019	3091	LB/HR						
	0.162	0.161	0.160	0.159	0.158	NM/LB						

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	150 KCAS						175 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	55.4	56.6	57.9	59.1	60.5	%N1	57.5	58.8	60.1	61.4	62.9	25,000
	896	922	948	974	1008	LB/HR	972	999	1028	1056	1090	
	0.237	0.236	0.234	0.232	0.229	NM/LB	0.254	0.253	0.251	0.249	0.246	
26,000	56.2	57.5	58.8	60.1	61.5	%N1	58.1	59.4	60.7	62.0	63.5	26,000
	922	948	975	1002	1037	LB/HR	991	1019	1048	1077	1112	
	0.230	0.229	0.227	0.226	0.223	NM/LB	0.249	0.248	0.246	0.244	0.241	
27,000	57.3	58.6	60.0	61.2	62.7	%N1	58.7	60.0	61.4	62.7	64.0	27,000
	955	982	1010	1038	1073	LB/HR	1010	1038	1068	1097	1135	
	0.222	0.221	0.220	0.218	0.215	NM/LB	0.244	0.243	0.241	0.240	0.237	
28,000	58.4	59.8	61.1	62.5	63.8	%N1	59.3	60.7	62.0	63.4	64.5	28,000
	989	1017	1046	1075	1113	LB/HR	1029	1058	1089	1119	1158	
	0.215	0.214	0.212	0.211	0.208	NM/LB	0.240	0.238	0.237	0.235	0.232	
29,000						%N1	59.8	61.2	62.6	63.9	65.0	29,000
						LB/HR	1051	1081	1112	1143	1182	
						NM/LB	0.235	0.233	0.232	0.230	0.227	
30,000						%N1	60.3	61.7	63.0	64.4	65.6	30,000
						LB/HR	1074	1105	1136	1167	1206	
						NM/LB	0.230	0.228	0.227	0.225	0.223	
31,000						%N1	60.8	62.2	63.6	64.9	66.2	31,000
						LB/HR	1100	1131	1164	1195	1234	
						NM/LB	0.224	0.223	0.222	0.220	0.218	
32,000						%N1	61.4	62.8	64.2	65.5	66.8	32,000
						LB/HR	1126	1159	1192	1224	1262	
						NM/LB	0.219	0.218	0.216	0.215	0.213	
33,000						%N1	62.0	63.4	64.8	66.1	67.5	33,000
						LB/HR	1154	1187	1221	1253	1292	
						NM/LB	0.214	0.213	0.211	0.210	0.208	
34,000						%N1	62.6	64.0	65.4	66.8	68.2	34,000
						LB/HR	1183	1217	1252	1285	1323	
						NM/LB	0.209	0.207	0.206	0.205	0.203	
35,000						%N1	63.2	64.6	66.0	67.4	68.9	35,000
						LB/HR	1213	1248	1283	1317	1355	
						NM/LB	0.203	0.202	0.201	0.200	0.198	
36,000						%N1	63.9	65.4	66.8	68.2	69.8	36,000
						LB/HR	1249	1285	1321	1356	1394	
						NM/LB	0.198	0.196	0.195	0.194	0.193	
37,000						%N1	64.7	66.2	67.6	69.1	70.6	37,000
						LB/HR	1287	1324	1361	1397	1435	
						NM/LB	0.192	0.191	0.189	0.188	0.187	
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	200 KCAS						225 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	60.4	61.8	63.1	64.4	65.5	%N1	63.5	64.9	66.3	67.7	69.2	25,000
	1093	1124	1156	1188	1237	LB/HR	1272	1308	1343	1379	1415	
	0.257	0.255	0.254	0.252	0.247	NM/LB	0.247	0.246	0.245	0.243	0.242	
26,000	60.7	62.1	63.4	64.8	65.9	%N1	63.7	65.2	66.6	68.0	69.5	26,000
	1109	1141	1173	1205	1253	LB/HR	1284	1320	1356	1391	1427	
	0.253	0.252	0.250	0.249	0.244	NM/LB	0.245	0.244	0.242	0.241	0.240	
27,000	61.1	62.5	63.8	65.2	66.4	%N1	63.9	65.4	66.8	68.2	69.8	27,000
	1128	1160	1193	1225	1272	LB/HR	1296	1332	1368	1404	1439	
	0.249	0.248	0.246	0.245	0.240	NM/LB	0.243	0.242	0.240	0.239	0.238	
28,000	61.5	62.9	64.2	65.6	66.8	%N1	64.2	65.6	67.1	68.5	70.0	28,000
	1146	1179	1212	1245	1290	LB/HR	1307	1344	1381	1417	1452	
	0.245	0.244	0.242	0.241	0.237	NM/LB	0.241	0.239	0.238	0.237	0.236	
29,000	61.8	63.2	64.6	66.0	67.3	%N1	64.5	65.9	67.3	68.8	70.3	29,000
	1165	1198	1232	1265	1309	LB/HR	1321	1359	1396	1432	1468	
	0.241	0.240	0.238	0.237	0.233	NM/LB	0.238	0.237	0.236	0.234	0.233	
30,000	62.2	63.7	65.0	66.4	67.8	%N1	64.8	66.2	67.7	69.1	70.6	30,000
	1185	1220	1254	1287	1330	LB/HR	1338	1376	1413	1450	1486	
	0.237	0.236	0.234	0.233	0.230	NM/LB	0.235	0.234	0.233	0.231	0.230	
31,000	62.7	64.1	65.5	66.9	68.3	%N1	65.1	66.6	68.0	69.5	70.9	31,000
	1207	1242	1276	1310	1352	LB/HR	1355	1393	1430	1468	1505	
	0.233	0.231	0.230	0.229	0.226	NM/LB	0.232	0.231	0.230	0.229	0.227	
32,000	63.1	64.5	66.0	67.3	68.8	%N1	65.4	66.9	68.4	69.8	71.2	32,000
	1229	1264	1299	1334	1374	LB/HR	1371	1410	1448	1485	1523	
	0.229	0.227	0.226	0.225	0.222	NM/LB	0.229	0.228	0.227	0.226	0.225	
33,000	63.5	65.0	66.4	67.8	69.3	%N1	65.8	67.2	68.7	70.2	71.5	33,000
	1250	1287	1322	1357	1396	LB/HR	1389	1428	1466	1504	1542	
	0.225	0.223	0.222	0.221	0.219	NM/LB	0.227	0.225	0.224	0.223	0.222	
34,000	64.0	65.4	66.9	68.3	69.8	%N1	66.1	67.6	69.1	70.5	71.9	34,000
	1272	1309	1345	1380	1417	LB/HR	1408	1447	1486	1524	1563	
	0.221	0.220	0.218	0.217	0.216	NM/LB	0.224	0.222	0.221	0.220	0.219	
35,000	64.4	65.9	67.3	68.7	70.3	%N1	66.4	67.9	69.4	70.9	72.2	35,000
	1293	1331	1367	1403	1440	LB/HR	1426	1466	1506	1545	1584	
	0.217	0.216	0.215	0.214	0.212	NM/LB	0.221	0.219	0.218	0.217	0.216	
36,000	64.9	66.3	67.8	69.2	70.7	%N1	66.7	68.2	69.7	71.2	72.6	36,000
	1315	1353	1390	1427	1464	LB/HR	1445	1485	1525	1565	1604	
	0.214	0.212	0.211	0.210	0.209	NM/LB	0.218	0.217	0.216	0.214	0.213	
37,000	65.3	66.8	68.3	69.7	71.1	%N1	67.0	68.6	70.1	71.5	72.9	37,000
	1338	1378	1415	1452	1490	LB/HR	1464	1505	1546	1586	1626	
	0.210	0.209	0.207	0.206	0.205	NM/LB	0.215	0.214	0.213	0.212	0.210	
38,000	65.8	67.3	68.8	70.2	71.6	%N1	67.4	68.9	70.4	71.9	73.3	38,000
	1362	1402	1440	1477	1515	LB/HR	1486	1527	1569	1610	1651	
	0.206	0.205	0.204	0.203	0.202	NM/LB	0.212	0.211	0.210	0.208	0.207	
39,000	66.3	67.8	69.2	70.7	72.0	%N1	67.7	69.3	70.8	72.3	73.8	39,000
	1385	1426	1464	1502	1541	LB/HR	1508	1550	1591	1633	1675	
	0.203	0.201	0.200	0.199	0.198	NM/LB	0.209	0.208	0.207	0.205	0.204	

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	250 KCAS						275 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	67.0	68.5	70.0	71.4	72.8	%N1	70.3	71.9	73.5	75.1	76.6	25,000
	1495	1535	1576	1617	1657	LB/HR	1756	1802	1850	1900	1946	
	0.233	0.232	0.231	0.229	0.228	NM/LB	0.217	0.216	0.215	0.214	0.213	
26,000	67.1	68.6	70.1	71.6	73.0	%N1	70.4	72.0	73.6	75.2	76.7	26,000
	1503	1543	1585	1626	1666	LB/HR	1762	1808	1856	1906	1952	
	0.231	0.231	0.229	0.228	0.227	NM/LB	0.216	0.215	0.214	0.213	0.212	
27,000	67.2	68.7	70.2	71.7	73.2	%N1	70.5	72.1	73.7	75.2	76.8	27,000
	1513	1552	1594	1636	1676	LB/HR	1768	1814	1862	1912	1959	
	0.230	0.229	0.228	0.227	0.226	NM/LB	0.215	0.215	0.214	0.212	0.211	
28,000	67.4	68.9	70.4	71.9	73.3	%N1	70.6	72.2	73.8	75.3	76.9	28,000
	1522	1562	1604	1646	1686	LB/HR	1774	1820	1868	1919	1966	
	0.229	0.228	0.227	0.225	0.224	NM/LB	0.215	0.214	0.213	0.212	0.211	
29,000	67.5	69.0	70.5	72.0	73.5	%N1	70.7	72.3	73.9	75.4	77.0	29,000
	1531	1571	1614	1656	1697	LB/HR	1780	1826	1874	1925	1972	
	0.227	0.226	0.225	0.224	0.223	NM/LB	0.214	0.213	0.212	0.211	0.210	
30,000	67.7	69.2	70.7	72.2	73.7	%N1	70.8	72.4	74.0	75.5	77.1	30,000
	1540	1581	1624	1666	1707	LB/HR	1786	1832	1881	1932	1979	
	0.226	0.225	0.224	0.223	0.222	NM/LB	0.213	0.213	0.212	0.210	0.209	
31,000	67.8	69.4	70.9	72.4	73.9	%N1	70.9	72.5	74.1	75.7	77.2	31,000
	1552	1593	1636	1679	1721	LB/HR	1796	1842	1891	1942	1990	
	0.224	0.223	0.222	0.221	0.220	NM/LB	0.212	0.211	0.210	0.209	0.208	
32,000	68.0	69.6	71.1	72.6	74.1	%N1	71.1	72.7	74.3	75.9	77.4	32,000
	1564	1605	1649	1692	1734	LB/HR	1806	1853	1902	1954	2003	
	0.222	0.222	0.220	0.219	0.218	NM/LB	0.211	0.210	0.209	0.208	0.207	
33,000	68.2	69.7	71.3	72.8	74.3	%N1	71.2	72.9	74.4	76.0	77.6	33,000
	1576	1618	1662	1705	1748	LB/HR	1817	1865	1914	1967	2015	
	0.221	0.220	0.219	0.218	0.217	NM/LB	0.210	0.209	0.208	0.206	0.206	
34,000	68.4	69.9	71.5	73.0	74.5	%N1	71.4	73.0	74.6	76.2	77.7	34,000
	1588	1630	1674	1718	1761	LB/HR	1828	1876	1926	1979	2027	
	0.219	0.218	0.217	0.216	0.215	NM/LB	0.208	0.207	0.207	0.205	0.204	
35,000	68.6	70.1	71.7	73.2	74.8	%N1	71.5	73.1	74.7	76.3	77.9	35,000
	1601	1643	1687	1732	1775	LB/HR	1840	1888	1938	1991	2039	
	0.217	0.217	0.215	0.214	0.213	NM/LB	0.207	0.206	0.205	0.204	0.203	
36,000	68.9	70.4	71.9	73.5	75.1	%N1	71.7	73.3	74.9	76.5	78.0	36,000
	1618	1660	1705	1750	1794	LB/HR	1851	1900	1950	2004	2052	
	0.215	0.214	0.213	0.212	0.211	NM/LB	0.206	0.205	0.204	0.203	0.202	
37,000	69.1	70.7	72.2	73.7	75.4	%N1	71.9	73.5	75.1	76.6	78.2	37,000
	1634	1677	1723	1768	1812	LB/HR	1864	1914	1965	2018	2067	
	0.213	0.212	0.211	0.210	0.209	NM/LB	0.204	0.203	0.202	0.201	0.200	
38,000	69.4	70.9	72.5	74.0	75.6	%N1	72.0	73.6	75.3	76.8	78.4	38,000
	1651	1694	1740	1786	1831	LB/HR	1878	1927	1979	2033	2081	
	0.211	0.210	0.209	0.208	0.207	NM/LB	0.203	0.202	0.201	0.200	0.199	
39,000	69.6	71.2	72.8	74.3	75.9	%N1	72.2	73.8	75.4	77.0	78.6	39,000
	1668	1711	1758	1804	1850	LB/HR	1891	1941	1993	2047	2096	
	0.209	0.208	0.207	0.206	0.205	NM/LB	0.201	0.201	0.200	0.198	0.198	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	300 KCAS						330 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	73.6	75.3	76.9	78.5	80.2	%N1	77.7	79.5	81.2	82.9	84.6	25,000
	2056	2113	2169	2229	2277	LB/HR	2525	2596	2668	2740	2806	
	0.201	0.200	0.199	0.198	0.197	NM/LB	0.179	0.178	0.177	0.176	0.175	
26,000	73.7	75.3	77.0	78.6	80.3	%N1	77.8	79.6	81.3	82.9	84.6	26,000
	2060	2116	2173	2233	2282	LB/HR	2531	2601	2674	2746	2813	
	0.201	0.200	0.199	0.197	0.197	NM/LB	0.178	0.177	0.176	0.175	0.175	
27,000	73.7	75.4	77.0	78.6	80.3	%N1	77.9	79.6	81.3	83.0	84.7	27,000
	2064	2120	2177	2237	2286	LB/HR	2537	2608	2680	2752	2820	
	0.200	0.199	0.198	0.197	0.197	NM/LB	0.178	0.177	0.176	0.175	0.174	
28,000	73.7	75.4	77.1	78.6	80.4	%N1	77.9	79.7	81.4	83.1	84.8	28,000
	2067	2124	2181	2241	2290	LB/HR	2543	2614	2686	2759	2826	
	0.200	0.199	0.198	0.197	0.196	NM/LB	0.178	0.177	0.176	0.174	0.174	
29,000	73.8	75.5	77.1	78.7	80.4	%N1	78.0	79.8	81.5	83.1	84.8	29,000
	2074	2131	2188	2249	2298	LB/HR	2549	2620	2693	2765	2833	
	0.199	0.198	0.197	0.196	0.196	NM/LB	0.177	0.176	0.175	0.174	0.173	
30,000	73.9	75.6	77.2	78.8	80.5	%N1	78.1	79.8	81.5	83.2	84.9	30,000
	2082	2139	2196	2257	2307	LB/HR	2555	2626	2699	2772	2840	
	0.198	0.198	0.197	0.195	0.195	NM/LB	0.177	0.176	0.175	0.174	0.173	
31,000	74.0	75.7	77.3	79.0	80.6	%N1	78.1	79.9	81.6	83.3	85.0	31,000
	2089	2147	2204	2265	2316	LB/HR	2561	2633	2706	2778	2847	
	0.198	0.197	0.196	0.194	0.194	NM/LB	0.176	0.175	0.174	0.173	0.172	
32,000	74.1	75.8	77.4	79.1	80.7	%N1	78.2	79.9	81.7	83.3	85.0	32,000
	2097	2154	2212	2274	2325	LB/HR	2567	2639	2712	2785	2854	
	0.197	0.196	0.195	0.194	0.193	NM/LB	0.176	0.175	0.174	0.173	0.172	
33,000	74.2	75.9	77.5	79.2	80.8	%N1	78.2	80.0	81.7	83.4	85.1	33,000
	2104	2162	2220	2282	2333	LB/HR	2573	2645	2718	2792	2861	
	0.196	0.195	0.194	0.193	0.193	NM/LB	0.175	0.175	0.173	0.172	0.172	
34,000	74.3	76.0	77.6	79.3	80.9	%N1	78.3	80.1	81.8	83.5	85.2	34,000
	2112	2170	2228	2290	2342	LB/HR	2580	2653	2726	2800	2869	
	0.196	0.195	0.194	0.192	0.192	NM/LB	0.175	0.174	0.173	0.172	0.171	
35,000	74.4	76.1	77.7	79.4	81.0	%N1	78.4	80.2	81.9	83.6	85.3	35,000
	2119	2178	2237	2298	2351	LB/HR	2589	2662	2735	2809	2879	
	0.195	0.194	0.193	0.192	0.191	NM/LB	0.174	0.173	0.172	0.171	0.171	
36,000	74.5	76.2	77.9	79.5	81.2	%N1	78.5	80.3	82.0	83.7	85.3	36,000
	2129	2188	2247	2309	2362	LB/HR	2597	2671	2744	2818	2889	
	0.194	0.193	0.192	0.191	0.190	NM/LB	0.174	0.173	0.172	0.171	0.170	
37,000	74.7	76.4	78.0	79.7	81.3	%N1	78.6	80.4	82.1	83.8	85.4	37,000
	2141	2200	2260	2323	2377	LB/HR	2606	2679	2754	2828	2898	
	0.193	0.192	0.191	0.190	0.189	NM/LB	0.173	0.172	0.171	0.170	0.169	
38,000	74.9	76.5	78.2	79.8	81.5	%N1	78.7	80.5	82.2	83.9	85.5	38,000
	2154	2213	2273	2336	2391	LB/HR	2615	2688	2763	2837	2908	
	0.192	0.191	0.190	0.189	0.188	NM/LB	0.173	0.172	0.171	0.170	0.169	
39,000	75.0	76.7	78.4	80.0	81.6	%N1	78.8	80.5	82.3	84.0	85.6	39,000
	2166	2226	2286	2350	2406	LB/HR	2623	2697	2772	2846	2918	
	0.191	0.190	0.189	0.188	0.187	NM/LB	0.172	0.171	0.170	0.169	0.168	

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	340 KCAS											GROSS WEIGHT AT ALTITUDE (LB)
	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	79.3	81.0	82.8	84.5	86.1	%N1						25,000
	2715	2792	2870	2947	3019	LB/HR						
	0.171	0.170	0.169	0.168	0.167	NM/LB						
26,000	79.3	81.1	82.8	84.5	86.2	%N1						26,000
	2719	2796	2873	2950	3022	LB/HR						
	0.171	0.170	0.169	0.168	0.167	NM/LB						
27,000	79.3	81.1	82.8	84.5	86.2	%N1						27,000
	2724	2801	2879	2956	3028	LB/HR						
	0.170	0.169	0.168	0.167	0.167	NM/LB						
28,000	79.4	81.2	82.9	84.6	86.3	%N1						28,000
	2731	2808	2886	2963	3035	LB/HR						
	0.170	0.169	0.168	0.167	0.166	NM/LB						
29,000	79.4	81.2	83.0	84.7	86.4	%N1						29,000
	2737	2815	2893	2970	3042	LB/HR						
	0.170	0.169	0.168	0.167	0.166	NM/LB						
30,000	79.5	81.3	83.0	84.7	86.4	%N1						30,000
	2744	2821	2900	2977	3049	LB/HR						
	0.169	0.168	0.167	0.166	0.166	NM/LB						
31,000	79.6	81.3	83.1	84.8	86.5	%N1						31,000
	2751	2828	2907	2985	3056	LB/HR						
	0.169	0.168	0.167	0.166	0.165	NM/LB						
32,000	79.6	81.4	83.1	84.8	86.6	%N1						32,000
	2758	2835	2914	2992	3064	LB/HR						
	0.168	0.167	0.166	0.165	0.165	NM/LB						
33,000	79.7	81.5	83.2	84.9	86.6	%N1						33,000
	2764	2842	2921	2999	3071	LB/HR						
	0.168	0.167	0.166	0.165	0.164	NM/LB						
34,000	79.7	81.5	83.3	85.0	86.7	%N1						34,000
	2771	2849	2928	3007	3078	LB/HR						
	0.167	0.167	0.166	0.165	0.164	NM/LB						
35,000	79.8	81.6	83.3	85.0	86.8	%N1						35,000
	2778	2856	2936	3014	3085	LB/HR						
	0.167	0.166	0.165	0.164	0.164	NM/LB						
36,000	79.9	81.6	83.4	85.1	86.8	%N1						36,000
	2787	2865	2945	3023	3095	LB/HR						
	0.167	0.166	0.165	0.164	0.163	NM/LB						
37,000	79.9	81.7	83.5	85.2	86.9	%N1						37,000
	2797	2875	2955	3034	3105	LB/HR						
	0.166	0.165	0.164	0.163	0.163	NM/LB						
38,000	80.0	81.8	83.6	85.3	87.0	%N1						38,000
	2807	2886	2966	3045	3116	LB/HR						
	0.165	0.164	0.163	0.163	0.162	NM/LB						
39,000	80.1	81.9	83.7	85.4	87.1	%N1						39,000
	2817	2896	2977	3056	3127	LB/HR						
	0.165	0.164	0.163	0.162	0.161	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

27,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	150 KCAS						175 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-58.5	-48.5	-38.5	-28.5	-18.5	OAT (°C)	-58.5	-48.5	-38.5	-28.5	-18.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	56.9	58.3	59.6	60.9	62.3	%N1	59.0	60.4	61.8	63.1	64.3	25,000
	894	914	941	967	1003	LB/HR	971	993	1022	1050	1090	
	0.245	0.246	0.244	0.242	0.238	NM/LB	0.263	0.263	0.261	0.259	0.255	
26,000	57.8	59.2	60.6	61.9	63.3	%N1	59.6	61.0	62.3	63.7	64.8	26,000
	921	941	968	996	1033	LB/HR	990	1013	1042	1071	1112	
	0.238	0.239	0.237	0.235	0.232	NM/LB	0.258	0.258	0.256	0.254	0.250	
27,000	58.9	60.4	61.8	63.1	64.4	%N1	60.0	61.5	62.8	64.2	65.4	27,000
	955	976	1004	1032	1071	LB/HR	1010	1034	1064	1093	1133	
	0.230	0.230	0.229	0.227	0.223	NM/LB	0.252	0.252	0.251	0.249	0.245	
28,000	60.0	61.4	62.8	64.1	65.4	%N1	60.5	61.9	63.3	64.7	65.9	28,000
	992	1014	1043	1073	1112	LB/HR	1031	1056	1087	1117	1156	
	0.221	0.221	0.220	0.218	0.215	NM/LB	0.247	0.247	0.245	0.244	0.240	
29,000						%N1	61.0	62.5	63.8	65.2	66.5	29,000
						LB/HR	1053	1079	1110	1141	1179	
						NM/LB	0.242	0.242	0.240	0.239	0.236	
30,000						%N1	61.5	63.0	64.4	65.7	67.1	30,000
						LB/HR	1075	1102	1134	1165	1203	
						NM/LB	0.237	0.237	0.235	0.234	0.231	
31,000						%N1	62.1	63.6	65.0	66.4	67.8	31,000
						LB/HR	1101	1129	1162	1193	1230	
						NM/LB	0.232	0.231	0.230	0.228	0.226	
32,000						%N1	62.7	64.1	65.6	67.0	68.4	32,000
						LB/HR	1126	1156	1189	1221	1258	
						NM/LB	0.226	0.226	0.224	0.223	0.221	
33,000						%N1	63.3	64.8	66.2	67.6	69.1	33,000
						LB/HR	1153	1185	1218	1251	1286	
						NM/LB	0.221	0.220	0.219	0.218	0.216	
34,000						%N1	63.9	65.4	66.9	68.3	69.9	34,000
						LB/HR	1182	1215	1249	1282	1317	
						NM/LB	0.216	0.215	0.214	0.212	0.211	
35,000						%N1	64.6	66.1	67.6	69.0	70.6	35,000
						LB/HR	1210	1245	1280	1313	1348	
						NM/LB	0.211	0.210	0.208	0.207	0.206	
36,000						%N1	65.4	66.9	68.4	69.9	71.4	36,000
						LB/HR	1247	1283	1319	1353	1389	
						NM/LB	0.205	0.203	0.202	0.201	0.200	
37,000						%N1	66.2	67.7	69.3	70.7	72.2	37,000
						LB/HR	1284	1321	1358	1394	1431	
						NM/LB	0.199	0.197	0.196	0.195	0.194	
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

27,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	200 KCAS						225 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-58.5	-48.5	-38.5	-28.5	-18.5	OAT (°C)	-58.5	-48.5	-38.5	-28.5	-18.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	61.5	62.9	64.3	65.7	67.0	%N1	64.7	66.1	67.6	69.1	70.6	25,000
	1091	1123	1155	1186	1223	LB/HR	1262	1298	1333	1368	1402	
	0.266	0.264	0.263	0.261	0.258	NM/LB	0.257	0.256	0.255	0.253	0.252	
26,000	61.8	63.3	64.7	66.0	67.4	%N1	64.9	66.4	67.9	69.3	70.8	26,000
	1107	1140	1172	1203	1240	LB/HR	1273	1309	1345	1381	1415	
	0.262	0.260	0.259	0.257	0.255	NM/LB	0.255	0.254	0.252	0.251	0.250	
27,000	62.2	63.7	65.1	66.5	67.9	%N1	65.1	66.6	68.1	69.6	71.0	27,000
	1125	1158	1191	1222	1258	LB/HR	1285	1321	1358	1393	1428	
	0.258	0.256	0.255	0.253	0.251	NM/LB	0.253	0.251	0.250	0.249	0.248	
28,000	62.6	64.1	65.5	66.9	68.4	%N1	65.4	66.9	68.4	69.9	71.3	28,000
	1143	1176	1210	1242	1277	LB/HR	1296	1333	1370	1405	1441	
	0.254	0.252	0.251	0.249	0.247	NM/LB	0.251	0.249	0.248	0.247	0.246	
29,000	63.0	64.5	65.9	67.3	68.8	%N1	65.7	67.2	68.7	70.2	71.6	29,000
	1161	1195	1229	1261	1296	LB/HR	1311	1348	1385	1421	1457	
	0.250	0.248	0.247	0.246	0.244	NM/LB	0.248	0.246	0.245	0.244	0.243	
30,000	63.5	65.0	66.4	67.8	69.4	%N1	66.0	67.6	69.0	70.5	71.9	30,000
	1182	1216	1250	1283	1317	LB/HR	1327	1365	1402	1439	1476	
	0.245	0.244	0.243	0.241	0.240	NM/LB	0.245	0.243	0.242	0.241	0.240	
31,000	63.9	65.4	66.9	68.3	69.9	%N1	66.3	67.8	69.3	70.8	72.2	31,000
	1203	1238	1273	1306	1339	LB/HR	1343	1381	1419	1457	1494	
	0.241	0.240	0.238	0.237	0.236	NM/LB	0.242	0.240	0.239	0.238	0.237	
32,000	64.4	65.9	67.4	68.8	70.4	%N1	66.6	68.1	69.6	71.1	72.5	32,000
	1224	1260	1295	1329	1362	LB/HR	1360	1398	1437	1474	1512	
	0.237	0.236	0.234	0.233	0.232	NM/LB	0.239	0.238	0.236	0.235	0.234	
33,000	64.9	66.4	67.9	69.3	70.8	%N1	66.9	68.4	69.9	71.4	72.9	33,000
	1245	1281	1317	1351	1386	LB/HR	1378	1416	1455	1494	1532	
	0.233	0.232	0.230	0.229	0.228	NM/LB	0.236	0.235	0.233	0.232	0.231	
34,000	65.3	66.9	68.3	69.8	71.3	%N1	67.2	68.7	70.3	71.8	73.2	34,000
	1265	1303	1339	1374	1409	LB/HR	1396	1435	1475	1514	1553	
	0.229	0.228	0.227	0.225	0.224	NM/LB	0.233	0.231	0.230	0.229	0.228	
35,000	65.8	67.3	68.8	70.3	71.7	%N1	67.5	69.1	70.6	72.1	73.6	35,000
	1286	1324	1361	1396	1433	LB/HR	1415	1454	1494	1534	1574	
	0.226	0.224	0.223	0.222	0.221	NM/LB	0.230	0.228	0.227	0.226	0.225	
36,000	66.2	67.8	69.3	70.7	72.1	%N1	67.8	69.4	70.9	72.4	74.0	36,000
	1308	1347	1384	1420	1457	LB/HR	1434	1474	1514	1554	1595	
	0.222	0.220	0.219	0.218	0.217	NM/LB	0.227	0.225	0.224	0.223	0.222	
37,000	66.7	68.2	69.7	71.2	72.6	%N1	68.2	69.7	71.3	72.8	74.4	37,000
	1331	1370	1408	1445	1483	LB/HR	1454	1494	1536	1577	1617	
	0.218	0.217	0.215	0.214	0.213	NM/LB	0.223	0.222	0.221	0.220	0.219	
38,000	67.1	68.6	70.1	71.6	73.1	%N1	68.5	70.1	71.7	73.2	74.8	38,000
	1354	1393	1432	1470	1509	LB/HR	1476	1517	1559	1600	1642	
	0.214	0.213	0.212	0.211	0.209	NM/LB	0.220	0.219	0.218	0.217	0.215	
39,000	67.5	69.0	70.6	72.1	73.6	%N1	68.9	70.5	72.1	73.6	75.2	39,000
	1378	1417	1456	1495	1535	LB/HR	1498	1539	1582	1624	1666	
	0.211	0.209	0.208	0.207	0.206	NM/LB	0.217	0.216	0.215	0.213	0.212	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

27,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	250 KCAS						275 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-58.5	-48.5	-38.5	-28.5	-18.5	OAT (°C)	-58.5	-48.5	-38.5	-28.5	-18.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	67.9	69.5	71.0	72.6	74.1	%N1	71.4	73.0	74.6	76.2	77.8	25,000
	1477	1518	1559	1601	1641	LB/HR	1736	1783	1830	1882	1929	
	0.243	0.242	0.241	0.239	0.238	NM/LB	0.226	0.225	0.224	0.223	0.222	
26,000	68.1	69.7	71.2	72.7	74.3	%N1	71.5	73.1	74.7	76.3	77.9	26,000
	1487	1528	1570	1612	1652	LB/HR	1743	1790	1838	1889	1936	
	0.241	0.240	0.239	0.238	0.237	NM/LB	0.225	0.224	0.223	0.222	0.221	
27,000	68.3	69.8	71.4	72.9	74.5	%N1	71.6	73.2	74.8	76.4	78.0	27,000
	1497	1538	1580	1622	1663	LB/HR	1749	1796	1845	1897	1943	
	0.240	0.239	0.238	0.236	0.235	NM/LB	0.224	0.224	0.222	0.221	0.220	
28,000	68.4	70.0	71.5	73.1	74.7	%N1	71.6	73.3	74.9	76.5	78.1	28,000
	1507	1548	1590	1633	1674	LB/HR	1756	1803	1852	1904	1950	
	0.238	0.237	0.236	0.235	0.234	NM/LB	0.224	0.223	0.222	0.220	0.219	
29,000	68.6	70.2	71.7	73.2	74.9	%N1	71.7	73.4	75.0	76.6	78.2	29,000
	1517	1558	1601	1644	1685	LB/HR	1762	1810	1859	1911	1958	
	0.237	0.236	0.234	0.233	0.232	NM/LB	0.223	0.222	0.221	0.219	0.218	
30,000	68.8	70.3	71.9	73.4	75.1	%N1	71.8	73.5	75.1	76.7	78.3	30,000
	1527	1569	1612	1655	1696	LB/HR	1770	1817	1866	1919	1966	
	0.235	0.234	0.233	0.231	0.230	NM/LB	0.222	0.221	0.220	0.218	0.218	
31,000	68.9	70.5	72.1	73.6	75.3	%N1	72.0	73.6	75.3	76.9	78.5	31,000
	1540	1581	1625	1669	1710	LB/HR	1781	1830	1879	1932	1979	
	0.233	0.232	0.231	0.230	0.229	NM/LB	0.220	0.219	0.218	0.217	0.216	
32,000	69.1	70.7	72.3	73.8	75.5	%N1	72.1	73.8	75.4	77.0	78.7	32,000
	1552	1594	1638	1682	1724	LB/HR	1793	1842	1891	1945	1992	
	0.231	0.230	0.229	0.228	0.227	NM/LB	0.219	0.218	0.217	0.215	0.215	
33,000	69.3	70.9	72.5	74.1	75.7	%N1	72.3	74.0	75.6	77.2	78.9	33,000
	1564	1606	1650	1695	1738	LB/HR	1805	1854	1904	1958	2005	
	0.229	0.229	0.227	0.226	0.225	NM/LB	0.217	0.217	0.216	0.214	0.213	
34,000	69.5	71.1	72.7	74.3	75.9	%N1	72.5	74.1	75.8	77.4	79.0	34,000
	1576	1619	1663	1708	1752	LB/HR	1817	1867	1917	1971	2018	
	0.228	0.227	0.226	0.224	0.223	NM/LB	0.216	0.215	0.214	0.213	0.212	
35,000	69.8	71.4	73.0	74.5	76.1	%N1	72.6	74.3	75.9	77.5	79.2	35,000
	1590	1633	1678	1724	1768	LB/HR	1829	1879	1929	1984	2031	
	0.226	0.225	0.224	0.222	0.221	NM/LB	0.215	0.214	0.213	0.211	0.211	
36,000	70.0	71.6	73.2	74.8	76.4	%N1	72.8	74.5	76.1	77.7	79.4	36,000
	1607	1650	1696	1742	1787	LB/HR	1842	1892	1943	1998	2045	
	0.223	0.222	0.221	0.220	0.219	NM/LB	0.213	0.212	0.211	0.210	0.209	
37,000	70.3	71.9	73.5	75.1	76.7	%N1	73.0	74.7	76.3	77.9	79.6	37,000
	1624	1667	1713	1760	1806	LB/HR	1855	1906	1958	2013	2060	
	0.221	0.220	0.219	0.218	0.216	NM/LB	0.212	0.211	0.210	0.208	0.208	
38,000	70.6	72.2	73.8	75.4	77.0	%N1	73.2	74.9	76.5	78.1	79.8	38,000
	1641	1684	1731	1778	1825	LB/HR	1869	1920	1972	2027	2075	
	0.219	0.218	0.217	0.216	0.214	NM/LB	0.210	0.209	0.208	0.207	0.206	
39,000	70.9	72.5	74.1	75.7	77.2	%N1	73.4	75.0	76.7	78.3	80.0	39,000
	1657	1701	1748	1796	1844	LB/HR	1882	1934	1986	2042	2091	
	0.217	0.216	0.215	0.213	0.212	NM/LB	0.209	0.208	0.207	0.205	0.204	

27,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	300 KCAS						330 KCAS					GROSS WEIGHT AT ALTITUDE (LB)
	-58.5	-48.5	-38.5	-28.5	-18.5	OAT (°C)	-58.5	-48.5	-38.5	-28.5	-18.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	74.6	76.3	78.0	79.6	81.2	%N1	79.2	81.0	82.8	84.5	86.2	25,000
	2036	2093	2151	2210	2267	LB/HR	2558	2630	2704	2778	2851	
	0.209	0.208	0.207	0.206	0.204	NM/LB	0.182	0.181	0.180	0.179	0.178	
26,000	74.6	76.3	78.0	79.7	81.3	%N1	79.3	81.1	82.9	84.6	86.3	26,000
	2041	2098	2156	2216	2273	LB/HR	2565	2637	2711	2786	2858	
	0.209	0.208	0.206	0.205	0.204	NM/LB	0.181	0.180	0.179	0.178	0.177	
27,000	74.7	76.4	78.1	79.7	81.4	%N1	79.3	81.2	82.9	84.6	86.3	27,000
	2046	2103	2161	2221	2278	LB/HR	2572	2644	2719	2794	2866	
	0.208	0.207	0.206	0.205	0.203	NM/LB	0.181	0.180	0.179	0.178	0.177	
28,000	74.8	76.5	78.2	79.8	81.4	%N1	79.4	81.2	83.0	84.7	86.4	28,000
	2052	2109	2167	2227	2285	LB/HR	2579	2651	2726	2801	2873	
	0.207	0.206	0.205	0.204	0.203	NM/LB	0.180	0.179	0.178	0.177	0.176	
29,000	74.9	76.6	78.3	79.9	81.6	%N1	79.5	81.3	83.0	84.8	86.5	29,000
	2060	2117	2176	2236	2295	LB/HR	2586	2658	2733	2809	2881	
	0.207	0.206	0.205	0.203	0.202	NM/LB	0.180	0.179	0.178	0.177	0.176	
30,000	75.0	76.7	78.4	80.0	81.7	%N1	79.5	81.3	83.1	84.8	86.6	30,000
	2069	2126	2185	2246	2305	LB/HR	2593	2665	2741	2816	2888	
	0.206	0.205	0.204	0.202	0.201	NM/LB	0.179	0.178	0.177	0.176	0.175	
31,000	75.1	76.8	78.5	80.2	81.8	%N1	79.6	81.4	83.2	84.9	86.6	31,000
	2077	2135	2195	2256	2314	LB/HR	2600	2673	2748	2824	2896	
	0.205	0.204	0.203	0.201	0.200	NM/LB	0.179	0.178	0.177	0.176	0.175	
32,000	75.2	76.9	78.6	80.3	81.9	%N1	79.7	81.5	83.2	85.0	86.7	32,000
	2086	2145	2204	2266	2324	LB/HR	2607	2680	2756	2831	2903	
	0.204	0.203	0.202	0.201	0.199	NM/LB	0.178	0.177	0.176	0.175	0.174	
33,000	75.3	77.0	78.7	80.4	82.0	%N1	79.7	81.5	83.3	85.0	86.8	33,000
	2095	2154	2214	2275	2334	LB/HR	2614	2687	2763	2839	2911	
	0.203	0.202	0.201	0.200	0.199	NM/LB	0.178	0.177	0.176	0.175	0.174	
34,000	75.4	77.1	78.8	80.5	82.1	%N1	79.8	81.6	83.4	85.1	86.9	34,000
	2105	2163	2224	2285	2344	LB/HR	2624	2698	2774	2850	2922	
	0.202	0.201	0.200	0.199	0.198	NM/LB	0.177	0.176	0.175	0.174	0.173	
35,000	75.5	77.2	78.9	80.6	82.3	%N1	79.9	81.7	83.5	85.2	87.0	35,000
	2114	2173	2233	2295	2354	LB/HR	2635	2709	2786	2862	2934	
	0.201	0.200	0.199	0.198	0.197	NM/LB	0.176	0.175	0.174	0.173	0.173	
36,000	75.6	77.4	79.1	80.7	82.4	%N1	80.0	81.8	83.6	85.3	87.1	36,000
	2126	2185	2246	2309	2368	LB/HR	2646	2720	2797	2874	2946	
	0.200	0.199	0.198	0.197	0.196	NM/LB	0.176	0.175	0.174	0.173	0.172	
37,000	75.8	77.5	79.2	80.9	82.6	%N1	80.1	81.9	83.7	85.5	87.2	37,000
	2139	2199	2260	2323	2382	LB/HR	2657	2731	2809	2886	2958	
	0.199	0.198	0.197	0.196	0.195	NM/LB	0.175	0.174	0.173	0.172	0.171	
38,000	75.9	77.7	79.4	81.0	82.8	%N1	80.2	82.0	83.8	85.6	87.3	38,000
	2152	2213	2274	2337	2396	LB/HR	2668	2743	2820	2898	2970	
	0.198	0.197	0.196	0.194	0.193	NM/LB	0.174	0.173	0.172	0.171	0.170	
39,000	76.1	77.8	79.5	81.2	82.9	%N1	80.3	82.1	83.9	85.7	87.4	39,000
	2166	2226	2288	2352	2411	LB/HR	2679	2754	2832	2909	2982	
	0.197	0.196	0.194	0.193	0.192	NM/LB	0.173	0.173	0.172	0.171	0.170	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

27,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	340 KCAS											GROSS WEIGHT AT ALTITUDE (LB)
	-58.5	-48.5	-38.5	-28.5	-18.5	OAT (°C)	-58.5	-48.5	-38.5	-28.5	-18.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	81.7	83.6	85.4	87.1	88.9	%N1						25,000
	2879	2959	3044	3126	3204	LB/HR						
	0.166	0.165	0.164	0.163	0.162	NM/LB						
26,000	81.8	83.6	85.4	87.2	89.0	%N1						26,000
	2885	2965	3050	3132	3210	LB/HR						
	0.166	0.165	0.164	0.163	0.162	NM/LB						
27,000	81.8	83.7	85.5	87.3	89.1	%N1						27,000
	2893	2973	3059	3141	3219	LB/HR						
	0.165	0.164	0.163	0.162	0.162	NM/LB						
28,000	81.9	83.8	85.6	87.4	89.1	%N1						28,000
	2902	2983	3068	3151	3230	LB/HR						
	0.165	0.164	0.163	0.162	0.161	NM/LB						
29,000	82.0	83.9	85.7	87.4	89.2	%N1						29,000
	2912	2992	3078	3162	3240	LB/HR						
	0.164	0.163	0.162	0.161	0.161	NM/LB						
30,000	82.1	83.9	85.8	87.5	89.3	%N1						30,000
	2921	3002	3088	3172	3250	LB/HR						
	0.163	0.163	0.162	0.161	0.160	NM/LB						
31,000	82.2	84.0	85.8	87.6	89.4	%N1						31,000
	2930	3012	3098	3182	3261	LB/HR						
	0.163	0.162	0.161	0.160	0.160	NM/LB						
32,000	82.2	84.1	85.9	87.7	89.5	%N1						32,000
	2940	3021	3108	3192	3271	LB/HR						
	0.162	0.162	0.161	0.160	0.159	NM/LB						
33,000	82.3	84.2	86.0	87.8	89.6	%N1						33,000
	2949	3031	3118	3202	3281	LB/HR						
	0.162	0.161	0.160	0.159	0.159	NM/LB						
34,000	82.4	84.3	86.1	87.9	89.7	%N1						34,000
	2958	3040	3128	3212	3292	LB/HR						
	0.161	0.161	0.160	0.159	0.158	NM/LB						
35,000	82.5	84.4	86.2	88.0	89.8	%N1						35,000
	2968	3050	3138	3222	3302	LB/HR						
	0.161	0.160	0.159	0.158	0.158	NM/LB						
36,000	82.6	84.5	86.3	88.1	89.9	%N1						36,000
	2981	3063	3151	3236	3317	LB/HR						
	0.160	0.159	0.158	0.158	0.157	NM/LB						
37,000	82.7	84.6	86.4	88.2		%N1						37,000
	2994	3077	3165	3251		LB/HR						
	0.160	0.159	0.158	0.157		NM/LB						
38,000	82.8	84.7	86.5	88.3		%N1						38,000
	3007	3091	3180	3265		LB/HR						
	0.159	0.158	0.157	0.156		NM/LB						
39,000	82.9	84.8	86.6	88.4		%N1						39,000
	3021	3105	3194	3280		LB/HR						
	0.158	0.157	0.156	0.155		NM/LB						

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.6 Mi						.62 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	66.3	67.8	69.4	70.9	72.2	%N1	67.3	68.8	70.4	71.9	73.4	25,000
	1267	1304	1340	1376	1412	LB/HR	1335	1374	1412	1450	1488	
	0.268	0.266	0.265	0.264	0.262	NM/LB	0.263	0.261	0.260	0.259	0.257	
26,000	66.5	68.0	69.6	71.1	72.5	%N1	67.4	69.0	70.6	72.1	73.6	26,000
	1279	1316	1353	1389	1426	LB/HR	1345	1384	1422	1461	1499	
	0.2654	0.2639	0.2625	0.2612	0.2597	NM/LB	0.2608	0.2594	0.258	0.2566	0.2553	
27,000	66.7	68.3	69.8	71.3	72.7	%N1	67.6	69.2	70.8	72.3	73.8	27,000
	1290	1328	1365	1401	1439	LB/HR	1356	1395	1434	1473	1511	
	0.263	0.262	0.260	0.259	0.257	NM/LB	0.259	0.257	0.256	0.255	0.253	
28,000	66.9	68.5	70.0	71.5	73.0	%N1	67.8	69.4	71.0	72.5	74.1	28,000
	1302	1340	1377	1414	1452	LB/HR	1368	1407	1446	1486	1524	
	0.2606	0.2592	0.2578	0.2565	0.255	NM/LB	0.2563	0.2551	0.2537	0.2523	0.2509	
29,000	67.1	68.7	70.2	71.7	73.2	%N1	68.0	69.6	71.2	72.7	74.3	29,000
	1315	1353	1391	1428	1466	LB/HR	1380	1420	1459	1499	1538	
	0.258	0.257	0.255	0.254	0.253	NM/LB	0.254	0.253	0.252	0.250	0.249	
30,000	67.4	69.0	70.5	72.1	73.6	%N1	68.3	69.8	71.4	73.0	74.6	30,000
	1331	1370	1408	1446	1484	LB/HR	1392	1432	1472	1512	1551	
	0.2549	0.2536	0.2522	0.2509	0.2494	NM/LB	0.2519	0.2507	0.2493	0.2479	0.2466	
31,000	67.7	69.3	70.8	72.4	73.9	%N1	68.5	70.1	71.6	73.2	74.8	31,000
	1348	1387	1425	1464	1503	LB/HR	1405	1445	1486	1526	1566	
	0.252	0.251	0.249	0.248	0.246	NM/LB	0.250	0.248	0.247	0.246	0.244	
32,000	68.0	69.6	71.1	72.7	74.2	%N1	68.8	70.4	72.0	73.5	75.2	32,000
	1364	1403	1443	1482	1521	LB/HR	1422	1462	1503	1544	1584	
	0.2487	0.2475	0.2461	0.2448	0.2434	NM/LB	0.2466	0.2455	0.2442	0.2428	0.2415	
33,000	68.3	69.9	71.4	73.0	74.6	%N1	69.1	70.7	72.3	73.8	75.5	33,000
	1381	1420	1460	1500	1540	LB/HR	1438	1479	1520	1562	1603	
	0.246	0.245	0.243	0.242	0.241	NM/LB	0.244	0.243	0.241	0.240	0.239	
34,000	68.6	70.2	71.8	73.3	75.0	%N1	69.3	71.0	72.6	74.1	75.8	34,000
	1400	1440	1480	1520	1561	LB/HR	1455	1496	1538	1580	1621	
	0.2424	0.2413	0.2399	0.2386	0.2372	NM/LB	0.241	0.24	0.2386	0.2372	0.2359	
35,000	68.9	70.5	72.1	73.7	75.3	%N1	69.6	71.2	72.9	74.4	76.1	35,000
	1419	1459	1500	1540	1581	LB/HR	1472	1513	1555	1598	1640	
	0.239	0.238	0.237	0.236	0.234	NM/LB	0.238	0.237	0.236	0.235	0.233	
36,000	69.3	70.9	72.5	74.0	75.7	%N1	69.9	71.6	73.2	74.8	76.4	36,000
	1438	1478	1520	1561	1602	LB/HR	1490	1532	1575	1618	1661	
	0.2361	0.235	0.2337	0.2324	0.231	NM/LB	0.2354	0.2344	0.2331	0.2317	0.2302	
37,000	69.6	71.2	72.8	74.4	76.1	%N1	70.3	71.9	73.5	75.1	76.7	37,000
	1456	1497	1539	1581	1624	LB/HR	1509	1551	1594	1639	1683	
	0.233	0.232	0.231	0.229	0.228	NM/LB	0.232	0.231	0.230	0.229	0.227	
38,000	70.0	71.6	73.2	74.8	76.5	%N1	70.6	72.2	73.9	75.5	77.1	38,000
	1478	1519	1562	1605	1649	LB/HR	1528	1570	1614	1659	1705	
	0.2296	0.2286	0.2273	0.226	0.2245	NM/LB	0.2295	0.2286	0.2273	0.2259	0.2244	
39,000	70.4	72.0	73.6	75.2	76.8	%N1	70.9	72.6	74.2	75.8	77.4	39,000
	1500	1542	1585	1629	1674	LB/HR	1547	1590	1634	1680	1727	
	0.226	0.225	0.224	0.223	0.221	NM/LB	0.227	0.226	0.225	0.223	0.222	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.64 Mi						.66 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	68.3	69.9	71.4	73.0	74.6	%N1	69.3	70.9	72.5	74.1	75.7	25,000
	1406	1446	1486	1527	1566	LB/HR	1480	1521	1563	1607	1648	
	0.257	0.256	0.255	0.253	0.252	NM/LB	0.252	0.251	0.250	0.248	0.247	
26,000	68.4	70.0	71.6	73.2	74.8	%N1	69.5	71.1	72.7	74.3	75.9	26,000
	1416	1456	1497	1538	1578	LB/HR	1489	1531	1573	1618	1659	
	0.2556	0.2544	0.253	0.2515	0.2503	NM/LB	0.2507	0.2496	0.2483	0.2467	0.2454	
27,000	68.6	70.2	71.8	73.4	75.0	%N1	69.7	71.3	72.9	74.5	76.1	27,000
	1426	1467	1508	1549	1589	LB/HR	1500	1542	1584	1629	1671	
	0.254	0.253	0.251	0.250	0.249	NM/LB	0.249	0.248	0.247	0.245	0.244	
28,000	68.8	70.4	72.0	73.5	75.2	%N1	69.8	71.5	73.1	74.7	76.3	28,000
	1437	1477	1518	1560	1600	LB/HR	1511	1553	1596	1641	1684	
	0.252	0.2508	0.2495	0.248	0.2468	NM/LB	0.2471	0.2461	0.2448	0.2432	0.2419	
29,000	69.0	70.6	72.2	73.8	75.4	%N1	70.0	71.7	73.3	74.8	76.5	29,000
	1449	1489	1531	1573	1613	LB/HR	1521	1563	1607	1652	1696	
	0.250	0.249	0.247	0.246	0.245	NM/LB	0.245	0.244	0.243	0.242	0.240	
30,000	69.2	70.8	72.4	74.0	75.7	%N1	70.2	71.8	73.5	75.0	76.6	30,000
	1461	1502	1544	1587	1627	LB/HR	1532	1574	1618	1664	1708	
	0.2478	0.2467	0.2454	0.2439	0.2426	NM/LB	0.2437	0.2427	0.2414	0.2398	0.2384	
31,000	69.4	71.0	72.6	74.2	75.9	%N1	70.4	72.1	73.7	75.3	76.9	31,000
	1473	1515	1557	1600	1642	LB/HR	1545	1587	1631	1678	1723	
	0.246	0.245	0.243	0.242	0.241	NM/LB	0.242	0.241	0.239	0.238	0.236	
32,000	69.6	71.3	72.9	74.4	76.1	%N1	70.6	72.3	73.9	75.5	77.1	32,000
	1486	1527	1570	1614	1656	LB/HR	1558	1600	1645	1691	1737	
	0.2436	0.2426	0.2413	0.2398	0.2385	NM/LB	0.2397	0.2388	0.2375	0.2359	0.2344	
33,000	69.9	71.5	73.1	74.7	76.3	%N1	70.9	72.5	74.1	75.7	77.3	33,000
	1499	1541	1584	1628	1671	LB/HR	1570	1613	1658	1705	1752	
	0.242	0.241	0.239	0.238	0.236	NM/LB	0.238	0.237	0.236	0.234	0.233	
34,000	70.2	71.8	73.4	75.0	76.6	%N1	71.1	72.7	74.4	76.0	77.5	34,000
	1516	1558	1601	1646	1690	LB/HR	1583	1626	1671	1719	1766	
	0.2389	0.2379	0.2366	0.2351	0.2337	NM/LB	0.2358	0.235	0.2337	0.2321	0.2306	
35,000	70.4	72.1	73.7	75.3	76.9	%N1	71.3	72.9	74.6	76.2	77.7	35,000
	1532	1574	1618	1664	1709	LB/HR	1596	1640	1685	1734	1781	
	0.236	0.235	0.234	0.233	0.231	NM/LB	0.234	0.233	0.232	0.230	0.229	
36,000	70.7	72.4	74.0	75.6	77.2	%N1	71.5	73.2	74.8	76.5	78.0	36,000
	1549	1591	1636	1682	1728	LB/HR	1613	1658	1704	1752	1800	
	0.2337	0.2328	0.2316	0.2301	0.2285	NM/LB	0.2314	0.2305	0.2293	0.2277	0.2262	
37,000	71.0	72.7	74.3	75.9	77.5	%N1	71.8	73.5	75.1	76.7	78.3	37,000
	1565	1608	1653	1700	1747	LB/HR	1630	1675	1722	1771	1819	
	0.231	0.230	0.229	0.228	0.226	NM/LB	0.229	0.228	0.227	0.225	0.224	
38,000	71.3	73.0	74.6	76.2	77.8	%N1	72.0	73.7	75.4	77.0	78.6	38,000
	1583	1627	1672	1720	1767	LB/HR	1648	1693	1740	1790	1838	
	0.2286	0.2278	0.2265	0.225	0.2234	NM/LB	0.2266	0.2257	0.2245	0.2229	0.2215	
39,000	71.6	73.3	74.9	76.5	78.1	%N1	72.3	74.0	75.6	77.2	78.9	39,000
	1603	1647	1693	1741	1789	LB/HR	1665	1711	1759	1809	1857	
	0.226	0.225	0.224	0.222	0.221	NM/LB	0.224	0.223	0.222	0.221	0.219	

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.68 Mi						.7 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	70.5	72.1	73.7	75.3	76.9	%N1	71.6	73.2	74.9	76.5	78.1	25,000
	1561	1604	1648	1696	1741	LB/HR	1646	1691	1738	1789	1836	
	0.246	0.245	0.244	0.242	0.241	NM/LB	0.241	0.240	0.238	0.237	0.235	
26,000	70.6	72.2	73.8	75.4	77.0	%N1	71.7	73.3	75.0	76.6	78.2	26,000
	1568	1611	1655	1703	1748	LB/HR	1653	1699	1745	1796	1843	
	0.2454	0.2444	0.2432	0.2414	0.24	NM/LB	0.2395	0.2386	0.2374	0.2356	0.2343	
27,000	70.7	72.3	74.0	75.6	77.1	%N1	71.8	73.4	75.1	76.7	78.3	27,000
	1575	1618	1663	1711	1756	LB/HR	1660	1706	1753	1804	1851	
	0.244	0.243	0.242	0.240	0.239	NM/LB	0.239	0.238	0.236	0.235	0.233	
28,000	70.9	72.5	74.2	75.8	77.3	%N1	71.9	73.5	75.2	76.8	78.4	28,000
	1586	1630	1674	1723	1769	LB/HR	1667	1713	1760	1811	1859	
	0.2425	0.2416	0.2404	0.2386	0.2371	NM/LB	0.2375	0.2366	0.2354	0.2337	0.2324	
29,000	71.1	72.7	74.4	76.0	77.5	%N1	72.0	73.7	75.3	77.0	78.6	29,000
	1597	1641	1686	1735	1782	LB/HR	1677	1723	1771	1822	1870	
	0.241	0.240	0.239	0.237	0.235	NM/LB	0.236	0.235	0.234	0.232	0.231	
30,000	71.3	72.9	74.6	76.2	77.7	%N1	72.2	73.9	75.5	77.2	78.8	30,000
	1609	1653	1698	1748	1795	LB/HR	1689	1736	1784	1836	1883	
	0.2391	0.2382	0.237	0.2352	0.2338	NM/LB	0.2344	0.2334	0.2323	0.2306	0.2293	
31,000	71.4	73.1	74.7	76.3	77.9	%N1	72.4	74.0	75.7	77.3	79.0	31,000
	1620	1665	1711	1760	1808	LB/HR	1702	1749	1797	1849	1897	
	0.237	0.237	0.235	0.234	0.232	NM/LB	0.233	0.232	0.231	0.229	0.228	
32,000	71.6	73.3	74.9	76.5	78.1	%N1	72.5	74.2	75.9	77.5	79.2	32,000
	1633	1677	1724	1774	1821	LB/HR	1714	1761	1810	1862	1910	
	0.2356	0.2347	0.2335	0.2318	0.2304	NM/LB	0.231	0.2301	0.2289	0.2273	0.2261	
33,000	71.8	73.5	75.1	76.7	78.3	%N1	72.7	74.4	76.1	77.7	79.4	33,000
	1646	1691	1738	1788	1836	LB/HR	1726	1774	1823	1875	1924	
	0.234	0.233	0.232	0.230	0.229	NM/LB	0.229	0.228	0.227	0.226	0.225	
34,000	72.0	73.7	75.3	76.9	78.5	%N1	72.9	74.6	76.3	77.9	79.6	34,000
	1659	1705	1752	1803	1851	LB/HR	1739	1787	1836	1889	1938	
	0.2318	0.2309	0.2297	0.228	0.2267	NM/LB	0.2277	0.2268	0.2256	0.224	0.2229	
35,000	72.2	73.9	75.5	77.1	78.8	%N1	73.1	74.8	76.5	78.1	79.8	35,000
	1673	1719	1767	1817	1865	LB/HR	1753	1801	1851	1904	1953	
	0.230	0.229	0.228	0.226	0.225	NM/LB	0.226	0.225	0.224	0.222	0.221	
36,000	72.4	74.0	75.7	77.3	79.0	%N1	73.3	75.0	76.7	78.3	80.0	36,000
	1686	1733	1781	1832	1880	LB/HR	1766	1816	1865	1919	1969	
	0.2281	0.2272	0.226	0.2244	0.2231	NM/LB	0.2242	0.2232	0.2221	0.2205	0.2193	
37,000	72.5	74.2	75.9	77.5	79.2	%N1	73.5	75.2	76.9	78.5	80.2	37,000
	1700	1747	1795	1847	1895	LB/HR	1780	1830	1880	1934	1985	
	0.226	0.225	0.224	0.223	0.221	NM/LB	0.222	0.222	0.220	0.219	0.218	
38,000	72.8	74.5	76.2	77.8	79.5	%N1	73.7	75.4	77.1	78.7	80.4	38,000
	1717	1764	1813	1865	1914	LB/HR	1794	1844	1895	1949	2001	
	0.224	0.2231	0.222	0.2204	0.2192	NM/LB	0.2207	0.2197	0.2187	0.2171	0.2159	
39,000	73.0	74.7	76.4	78.1	79.8	%N1	73.9	75.6	77.3	78.9	80.6	39,000
	1734	1782	1832	1884	1933	LB/HR	1808	1858	1909	1964	2016	
	0.222	0.221	0.220	0.218	0.217	NM/LB	0.219	0.218	0.217	0.216	0.214	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.72 Mi						.74 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	72.6	74.3	76.0	77.6	79.3	%N1	73.6	75.4	77.0	78.7	80.4	25,000
	1739	1787	1837	1889	1939	LB/HR	1834	1885	1938	1993	2047	
	0.234	0.233	0.232	0.230	0.229	NM/LB	0.228	0.227	0.226	0.225	0.223	
26,000	72.7	74.4	76.1	77.7	79.4	%N1	73.7	75.5	77.2	78.8	80.5	26,000
	1747	1795	1845	1898	1947	LB/HR	1842	1894	1946	2001	2056	
	0.2331	0.2322	0.231	0.2294	0.2282	NM/LB	0.2272	0.2262	0.225	0.2235	0.2221	
27,000	72.8	74.5	76.2	77.8	79.5	%N1	73.9	75.6	77.3	78.9	80.6	27,000
	1754	1803	1853	1906	1955	LB/HR	1851	1902	1955	2010	2066	
	0.232	0.231	0.230	0.228	0.227	NM/LB	0.226	0.225	0.224	0.223	0.221	
28,000	72.9	74.6	76.3	77.9	79.6	%N1	74.0	75.7	77.4	79.1	80.7	28,000
	1762	1811	1861	1914	1964	LB/HR	1859	1911	1964	2019	2075	
	0.2311	0.2302	0.229	0.2274	0.2262	NM/LB	0.2252	0.2242	0.223	0.2215	0.22	
29,000	73.0	74.7	76.4	78.0	79.8	%N1	74.1	75.8	77.5	79.2	80.9	29,000
	1770	1819	1869	1922	1973	LB/HR	1867	1919	1973	2028	2085	
	0.230	0.229	0.228	0.226	0.225	NM/LB	0.224	0.223	0.222	0.221	0.219	
30,000	73.1	74.8	76.5	78.2	79.9	%N1	74.2	76.0	77.7	79.3	81.0	30,000
	1777	1827	1877	1931	1981	LB/HR	1875	1928	1982	2037	2094	
	0.2292	0.2282	0.227	0.2255	0.2242	NM/LB	0.2232	0.2222	0.221	0.2196	0.218	
31,000	73.3	75.0	76.7	78.3	80.0	%N1	74.3	76.1	77.8	79.5	81.1	31,000
	1789	1839	1890	1944	1995	LB/HR	1884	1937	1991	2046	2104	
	0.228	0.227	0.226	0.224	0.223	NM/LB	0.222	0.221	0.220	0.219	0.217	
32,000	73.5	75.2	76.9	78.5	80.2	%N1	74.5	76.2	77.9	79.6	81.2	32,000
	1802	1852	1903	1957	2010	LB/HR	1893	1946	2001	2057	2115	
	0.226	0.2251	0.2239	0.2224	0.2211	NM/LB	0.2211	0.2201	0.2189	0.2175	0.2159	
33,000	73.6	75.4	77.1	78.7	80.4	%N1	74.6	76.4	78.1	79.8	81.4	33,000
	1814	1865	1916	1971	2024	LB/HR	1906	1959	2014	2070	2129	
	0.225	0.224	0.222	0.221	0.220	NM/LB	0.220	0.219	0.218	0.216	0.215	
34,000	73.8	75.5	77.2	78.9	80.6	%N1	74.8	76.6	78.3	80.0	81.6	34,000
	1826	1877	1929	1984	2038	LB/HR	1918	1972	2027	2084	2143	
	0.223	0.222	0.2209	0.2194	0.218	NM/LB	0.2182	0.2172	0.2161	0.2147	0.2131	
35,000	74.0	75.7	77.4	79.1	80.8	%N1	75.0	76.7	78.5	80.2	81.8	35,000
	1838	1890	1942	1997	2052	LB/HR	1930	1985	2040	2097	2157	
	0.222	0.221	0.219	0.218	0.217	NM/LB	0.217	0.216	0.215	0.213	0.212	
36,000	74.2	75.9	77.6	79.3	81.0	%N1	75.2	76.9	78.7	80.3	82.0	36,000
	1851	1903	1956	2012	2067	LB/HR	1943	1997	2053	2111	2171	
	0.22	0.219	0.2178	0.2164	0.2149	NM/LB	0.2155	0.2145	0.2133	0.2119	0.2103	
37,000	74.4	76.1	77.8	79.5	81.2	%N1	75.3	77.1	78.8	80.5	82.2	37,000
	1865	1918	1971	2027	2083	LB/HR	1956	2011	2067	2125	2186	
	0.218	0.217	0.216	0.215	0.213	NM/LB	0.214	0.213	0.212	0.211	0.209	
38,000	74.6	76.3	78.0	79.7	81.4	%N1	75.5	77.3	79.0	80.7	82.3	38,000
	1879	1932	1986	2042	2099	LB/HR	1970	2025	2082	2141	2201	
	0.2167	0.2157	0.2146	0.2132	0.2117	NM/LB	0.2125	0.2115	0.2103	0.209	0.2075	
39,000	74.8	76.5	78.2	79.9	81.6	%N1	75.7	77.4	79.2	80.9	82.6	39,000
	1894	1947	2001	2057	2115	LB/HR	1985	2041	2098	2157	2217	
	0.215	0.214	0.213	0.212	0.210	NM/LB	0.211	0.210	0.209	0.207	0.206	

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.76 Mi						.78 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	74.9	76.7	78.4	80.1	81.7	%N1	76.3	78.1	79.8	81.5	83.3	25,000
	1949	2004	2060	2118	2179	LB/HR	2089	2148	2209	2271	2332	
	0.221	0.220	0.218	0.217	0.215	NM/LB	0.211	0.210	0.209	0.208	0.206	
26,000	75.0	76.8	78.5	80.2	81.8	%N1	76.4	78.2	79.9	81.6	83.4	26,000
	1954	2009	2066	2124	2185	LB/HR	2095	2154	2215	2277	2339	
	0.22	0.219	0.2177	0.2163	0.2146	NM/LB	0.2106	0.2096	0.2084	0.2071	0.2058	
27,000	75.1	76.9	78.6	80.3	81.9	%N1	76.5	78.2	80.0	81.7	83.5	27,000
	1962	2017	2074	2132	2193	LB/HR	2101	2160	2222	2284	2346	
	0.219	0.218	0.217	0.216	0.214	NM/LB	0.210	0.209	0.208	0.207	0.205	
28,000	75.2	77.0	78.7	80.4	82.0	%N1	76.5	78.3	80.1	81.8	83.6	28,000
	1971	2026	2083	2142	2203	LB/HR	2108	2167	2228	2291	2353	
	0.2182	0.2171	0.2159	0.2145	0.2129	NM/LB	0.2093	0.2084	0.2072	0.2059	0.2045	
29,000	75.3	77.1	78.8	80.5	82.2	%N1	76.6	78.4	80.2	81.9	83.7	29,000
	1980	2035	2093	2151	2212	LB/HR	2116	2176	2237	2300	2363	
	0.217	0.216	0.215	0.214	0.212	NM/LB	0.209	0.208	0.206	0.205	0.204	
30,000	75.4	77.2	78.9	80.6	82.3	%N1	76.7	78.5	80.3	82.0	83.8	30,000
	1989	2045	2102	2161	2222	LB/HR	2125	2184	2246	2309	2372	
	0.2162	0.2152	0.214	0.2126	0.211	NM/LB	0.2076	0.2067	0.2055	0.2042	0.2029	
31,000	75.5	77.3	79.0	80.7	82.4	%N1	76.8	78.6	80.4	82.1	83.9	31,000
	1997	2054	2112	2171	2232	LB/HR	2133	2193	2255	2319	2382	
	0.215	0.214	0.213	0.212	0.210	NM/LB	0.207	0.206	0.205	0.203	0.202	
32,000	75.6	77.4	79.1	80.8	82.5	%N1	76.9	78.7	80.5	82.2	84.0	32,000
	2006	2063	2121	2181	2241	LB/HR	2142	2202	2264	2328	2392	
	0.2142	0.2132	0.212	0.2107	0.2092	NM/LB	0.206	0.2051	0.2039	0.2026	0.2012	
33,000	75.7	77.5	79.2	80.9	82.7	%N1	77.0	78.8	80.6	82.3	84.1	33,000
	2015	2072	2131	2191	2251	LB/HR	2150	2211	2273	2337	2402	
	0.213	0.212	0.211	0.210	0.208	NM/LB	0.205	0.204	0.203	0.202	0.200	
34,000	75.9	77.6	79.4	81.1	82.8	%N1	77.1	78.9	80.7	82.4	84.2	34,000
	2027	2084	2143	2203	2263	LB/HR	2159	2220	2282	2346	2411	
	0.2121	0.2111	0.2099	0.2086	0.2072	NM/LB	0.2044	0.2034	0.2023	0.201	0.1996	
35,000	76.0	77.8	79.5	81.2	83.0	%N1	77.2	79.0	80.8	82.5	84.3	35,000
	2040	2098	2157	2217	2278	LB/HR	2168	2228	2291	2356	2421	
	0.211	0.210	0.209	0.207	0.206	NM/LB	0.204	0.203	0.202	0.200	0.199	
36,000	76.2	78.0	79.7	81.4	83.2	%N1	77.4	79.2	80.9	82.7	84.4	36,000
	2054	2112	2171	2232	2292	LB/HR	2180	2241	2305	2369	2435	
	0.2093	0.2084	0.2072	0.2059	0.2046	NM/LB	0.2024	0.2015	0.2003	0.199	0.1976	
37,000	76.3	78.1	79.9	81.6	83.4	%N1	77.5	79.3	81.1	82.8	84.6	37,000
	2067	2125	2185	2247	2307	LB/HR	2194	2255	2319	2384	2451	
	0.208	0.207	0.206	0.205	0.203	NM/LB	0.201	0.200	0.199	0.198	0.196	
38,000	76.5	78.3	80.0	81.7	83.5	%N1	77.7	79.5	81.3	83.0	84.7	38,000
	2080	2139	2200	2261	2322	LB/HR	2207	2269	2334	2399	2466	
	0.2066	0.2057	0.2045	0.2032	0.202	NM/LB	0.1999	0.199	0.1978	0.1966	0.1951	
39,000	76.7	78.4	80.2	81.9	83.7	%N1	77.9	79.7	81.4	83.2	84.9	39,000
	2094	2153	2214	2276	2337	LB/HR	2221	2283	2348	2414	2482	
	0.205	0.204	0.203	0.202	0.201	NM/LB	0.199	0.198	0.197	0.195	0.194	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.8 Mi						.81 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.6	79.4	81.2	82.9	84.6	%N1	78.3	80.2	81.9	83.7	85.4	25,000
	2223	2285	2349	2416	2484	LB/HR	2304	2368	2435	2504	2576	
	0.204	0.203	0.202	0.200	0.199	NM/LB	0.199	0.198	0.197	0.196	0.194	
26,000	77.7	79.5	81.2	83.0	84.7	%N1	78.4	80.2	82.0	83.8	85.5	26,000
	2229	2291	2356	2422	2491	LB/HR	2310	2374	2442	2511	2583	
	0.203	0.2021	0.201	0.1997	0.1981	NM/LB	0.1983	0.1975	0.1963	0.195	0.1935	
27,000	77.7	79.5	81.3	83.0	84.8	%N1	78.5	80.3	82.1	83.8	85.5	27,000
	2235	2297	2362	2429	2498	LB/HR	2316	2381	2448	2518	2590	
	0.202	0.202	0.200	0.199	0.198	NM/LB	0.198	0.197	0.196	0.195	0.193	
28,000	77.8	79.6	81.4	83.1	84.8	%N1	78.6	80.4	82.2	83.9	85.6	28,000
	2241	2304	2369	2436	2505	LB/HR	2323	2388	2455	2525	2598	
	0.2019	0.201	0.1999	0.1986	0.197	NM/LB	0.1972	0.1964	0.1953	0.1939	0.1924	
29,000	77.9	79.7	81.5	83.2	84.9	%N1	78.6	80.5	82.3	84.0	85.7	29,000
	2248	2310	2375	2442	2512	LB/HR	2329	2394	2462	2532	2605	
	0.201	0.201	0.199	0.198	0.197	NM/LB	0.197	0.196	0.195	0.193	0.192	
30,000	78.0	79.8	81.6	83.3	85.0	%N1	78.7	80.5	82.3	84.1	85.8	30,000
	2256	2319	2384	2451	2521	LB/HR	2336	2401	2469	2539	2612	
	0.2006	0.1997	0.1986	0.1973	0.1958	NM/LB	0.1961	0.1953	0.1942	0.1929	0.1913	
31,000	78.1	79.9	81.7	83.4	85.1	%N1	78.8	80.7	82.5	84.2	85.9	31,000
	2265	2328	2393	2461	2532	LB/HR	2346	2411	2479	2550	2623	
	0.200	0.199	0.198	0.197	0.195	NM/LB	0.195	0.195	0.193	0.192	0.191	
32,000	78.2	80.0	81.8	83.5	85.2	%N1	78.9	80.8	82.6	84.3	86.0	32,000
	2274	2337	2403	2471	2542	LB/HR	2356	2421	2490	2561	2635	
	0.199	0.1982	0.197	0.1957	0.1942	NM/LB	0.1945	0.1937	0.1925	0.1912	0.1897	
33,000	78.3	80.1	81.9	83.6	85.3	%N1	79.1	80.9	82.7	84.4	86.1	33,000
	2283	2346	2412	2481	2552	LB/HR	2366	2432	2501	2572	2646	
	0.198	0.197	0.196	0.195	0.193	NM/LB	0.194	0.193	0.192	0.190	0.189	
34,000	78.4	80.2	82.0	83.7	85.4	%N1	79.2	81.0	82.8	84.5	86.2	34,000
	2292	2356	2422	2491	2562	LB/HR	2376	2443	2512	2584	2657	
	0.1975	0.1966	0.1955	0.1942	0.1926	NM/LB	0.1928	0.192	0.1908	0.1895	0.1881	
35,000	78.5	80.3	82.1	83.8	85.5	%N1	79.3	81.1	82.9	84.6	86.3	35,000
	2301	2365	2431	2500	2572	LB/HR	2387	2454	2524	2595	2669	
	0.197	0.196	0.195	0.193	0.192	NM/LB	0.192	0.191	0.190	0.189	0.187	
36,000	78.6	80.4	82.2	84.0	85.6	%N1	79.4	81.2	83.0	84.7	86.5	36,000
	2310	2374	2441	2510	2583	LB/HR	2397	2464	2535	2607	2680	
	0.1959	0.1951	0.194	0.1927	0.1911	NM/LB	0.1911	0.1903	0.1891	0.1879	0.1865	
37,000	78.7	80.5	82.3	84.1	85.7	%N1	79.5	81.3	83.1	84.9	86.6	37,000
	2319	2383	2450	2520	2593	LB/HR	2408	2475	2546	2618	2691	
	0.195	0.194	0.193	0.192	0.190	NM/LB	0.190	0.189	0.188	0.187	0.186	
38,000	78.9	80.7	82.5	84.2	85.9	%N1	79.6	81.4	83.2	85.0	86.7	38,000
	2332	2397	2465	2535	2608	LB/HR	2418	2486	2557	2630	2703	
	0.194	0.1932	0.1921	0.1908	0.1892	NM/LB	0.1894	0.1886	0.1875	0.1862	0.1849	
39,000	79.0	80.8	82.7	84.4	86.1	%N1	79.7	81.6	83.4	85.1	86.9	39,000
	2346	2411	2479	2550	2624	LB/HR	2433	2501	2573	2646	2718	
	0.193	0.192	0.191	0.190	0.188	NM/LB	0.188	0.188	0.186	0.185	0.184	

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.82 Mi						.83 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	79.1	80.9	82.7	84.5	86.2	%N1	80.3	82.2	84.0	85.8	87.5	25,000
	2387	2454	2524	2596	2669	LB/HR	2532	2603	2679	2754	2828	
	0.194	0.193	0.192	0.191	0.190	NM/LB	0.185	0.185	0.183	0.182	0.181	
26,000	79.2	81.0	82.8	84.5	86.2	%N1	80.4	82.3	84.1	85.9	87.6	26,000
	2394	2461	2532	2604	2677	LB/HR	2541	2612	2688	2764	2837	
	0.1937	0.1929	0.1917	0.1904	0.189	NM/LB	0.1848	0.1839	0.1828	0.1816	0.1805	
27,000	79.2	81.1	82.9	84.6	86.3	%N1	80.5	82.3	84.2	85.9	87.7	27,000
	2401	2469	2539	2612	2685	LB/HR	2549	2621	2697	2773	2847	
	0.193	0.192	0.191	0.190	0.188	NM/LB	0.184	0.183	0.182	0.181	0.180	
28,000	79.3	81.1	82.9	84.7	86.4	%N1	80.6	82.4	84.3	86.0	87.8	28,000
	2408	2476	2547	2619	2692	LB/HR	2558	2629	2706	2782	2856	
	0.1926	0.1917	0.1906	0.1893	0.1879	NM/LB	0.1835	0.1827	0.1815	0.1804	0.1793	
29,000	79.4	81.2	83.0	84.8	86.5	%N1	80.6	82.5	84.3	86.1	87.9	29,000
	2416	2483	2555	2627	2700	LB/HR	2566	2638	2715	2791	2865	
	0.192	0.191	0.190	0.189	0.187	NM/LB	0.183	0.182	0.181	0.180	0.179	
30,000	79.4	81.3	83.1	84.8	86.6	%N1	80.7	82.6	84.4	86.2	88.0	30,000
	2423	2491	2562	2635	2708	LB/HR	2575	2647	2724	2800	2875	
	0.1914	0.1906	0.1894	0.1881	0.1868	NM/LB	0.1823	0.1815	0.1803	0.1792	0.1781	
31,000	79.5	81.4	83.2	84.9	86.6	%N1	80.8	82.7	84.5	86.3	88.1	31,000
	2431	2499	2571	2644	2717	LB/HR	2583	2656	2733	2810	2884	
	0.191	0.190	0.189	0.188	0.186	NM/LB	0.182	0.181	0.180	0.179	0.178	
32,000	79.6	81.5	83.3	85.0	86.8	%N1	80.9	82.8	84.6	86.4	88.2	32,000
	2442	2511	2583	2656	2729	LB/HR	2594	2666	2744	2821	2896	
	0.1899	0.1891	0.1879	0.1866	0.1854	NM/LB	0.181	0.1802	0.179	0.1779	0.1768	
33,000	79.7	81.6	83.4	85.2	86.9	%N1	81.0	82.9	84.7	86.5	88.3	33,000
	2454	2523	2595	2669	2741	LB/HR	2606	2679	2757	2834	2910	
	0.189	0.188	0.187	0.186	0.185	NM/LB	0.180	0.179	0.178	0.177	0.176	
34,000	79.8	81.7	83.5	85.3	87.0	%N1	81.1	83.0	84.9	86.6	88.4	34,000
	2465	2535	2608	2681	2754	LB/HR	2618	2692	2770	2848	2923	
	0.1881	0.1873	0.1861	0.1849	0.1837	NM/LB	0.1793	0.1785	0.1773	0.1762	0.1752	
35,000	80.0	81.8	83.6	85.4	87.2	%N1	81.3	83.1	85.0	86.8	88.6	35,000
	2477	2546	2620	2694	2766	LB/HR	2631	2704	2783	2861	2937	
	0.187	0.186	0.185	0.184	0.183	NM/LB	0.179	0.178	0.177	0.175	0.174	
36,000	80.1	81.9	83.7	85.5	87.3	%N1	81.4	83.3	85.1	86.9	88.7	36,000
	2489	2558	2632	2706	2779	LB/HR	2643	2717	2797	2875	2951	
	0.1864	0.1856	0.1844	0.1832	0.1821	NM/LB	0.1776	0.1768	0.1757	0.1746	0.1735	
37,000	80.2	82.0	83.9	85.6	87.4	%N1	81.5	83.4	85.2	87.0	88.8	37,000
	2500	2570	2644	2719	2792	LB/HR	2656	2730	2810	2888	2965	
	0.186	0.185	0.184	0.182	0.181	NM/LB	0.177	0.176	0.175	0.174	0.173	
38,000	80.3	82.2	84.0	85.7	87.5	%N1	81.6	83.5	85.3	87.1	88.9	38,000
	2512	2582	2657	2732	2805	LB/HR	2668	2743	2823	2902	2979	
	0.1847	0.1839	0.1827	0.1815	0.1804	NM/LB	0.176	0.1752	0.174	0.1729	0.1719	
39,000	80.4	82.3	84.1	85.9	87.6	%N1	81.7	83.6	85.5	87.3	89.1	39,000
	2523	2594	2669	2744	2818	LB/HR	2680	2755	2836	2915	2993	
	0.184	0.183	0.182	0.181	0.180	NM/LB	0.175	0.174	0.173	0.172	0.171	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.84 Mi						.85 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	81.6	83.5	85.3	87.1	88.9	%N1	82.8	84.8	86.6	88.4		25,000
	2682	2757	2838	2917	2994	LB/HR	2837	2916	3001	3085		
	0.177	0.176	0.175	0.174	0.173	NM/LB	0.170	0.169	0.168	0.167		
26,000	81.7	83.6	85.4	87.2	89.0	%N1	82.9	84.9	86.7	88.5		26,000
	2692	2767	2848	2927	3005	LB/HR	2848	2928	3014	3097		
	0.1765	0.1757	0.1746	0.1735	0.1725	NM/LB	0.1688	0.1681	0.1669	0.1659		
27,000	81.8	83.6	85.5	87.3	89.1	%N1	83.0	85.0	86.8	88.6		27,000
	2702	2777	2859	2938	3016	LB/HR	2859	2940	3026	3110		
	0.176	0.175	0.174	0.173	0.172	NM/LB	0.168	0.167	0.166	0.165		
28,000	81.9	83.7	85.6	87.4	89.2	%N1	83.1	85.1	86.9	88.8		28,000
	2711	2787	2869	2949	3027	LB/HR	2871	2952	3038	3122		
	0.1752	0.1745	0.1733	0.1722	0.1712	NM/LB	0.1675	0.1667	0.1656	0.1646		
29,000	81.9	83.8	85.7	87.5	89.3	%N1	83.2	85.2	87.0	88.9		29,000
	2721	2797	2879	2959	3038	LB/HR	2882	2964	3050	3135		
	0.175	0.174	0.173	0.172	0.171	NM/LB	0.167	0.166	0.165	0.164		
30,000	82.0	83.9	85.8	87.6	89.4	%N1	83.3	85.3	87.1	89.0		30,000
	2731	2807	2890	2970	3049	LB/HR	2893	2976	3062	3147		
	0.174	0.1732	0.172	0.171	0.17	NM/LB	0.1662	0.1654	0.1643	0.1633		
31,000	82.1	84.0	85.9	87.7	89.5	%N1	83.4	85.4	87.2	89.1		31,000
	2741	2818	2900	2981	3060	LB/HR	2905	2987	3074	3160		
	0.173	0.173	0.171	0.170	0.169	NM/LB	0.166	0.165	0.164	0.163		
32,000	82.2	84.1	86.0	87.8	89.6	%N1	83.5	85.5	87.3	89.2		32,000
	2751	2828	2911	2991	3071	LB/HR	2916	2999	3086	3172		
	0.1727	0.172	0.1708	0.1698	0.1688	NM/LB	0.1649	0.1641	0.163	0.162		
33,000	82.3	84.2	86.1	87.9	89.7	%N1	83.6	85.6	87.4	89.3		33,000
	2763	2840	2924	3004	3084	LB/HR	2928	3011	3098	3185		
	0.172	0.171	0.170	0.169	0.168	NM/LB	0.164	0.163	0.162	0.161		
34,000	82.5	84.4	86.2	88.1	89.8	%N1	83.8	85.7	87.6	89.4		34,000
	2776	2854	2938	3019	3099	LB/HR	2942	3026	3113	3200		
	0.1711	0.1704	0.1692	0.1682	0.1672	NM/LB	0.1634	0.1626	0.1616	0.1606		
35,000	82.6	84.5	86.4	88.2	90.0	%N1	83.9	85.8	87.7	89.5		35,000
	2789	2867	2952	3033	3114	LB/HR	2956	3041	3129	3216		
	0.170	0.170	0.168	0.167	0.166	NM/LB	0.163	0.162	0.161	0.160		
36,000	82.7	84.6	86.5	88.3		%N1	84.0	85.9	87.8	89.7		36,000
	2803	2881	2966	3048		LB/HR	2971	3056	3144	3232		
	0.1695	0.1688	0.1676	0.1666		NM/LB	0.1618	0.161	0.16	0.159		
37,000	82.8	84.8	86.6	88.4		%N1	84.1	86.1	88.0	89.8		37,000
	2816	2895	2980	3063		LB/HR	2985	3071	3160	3248		
	0.169	0.168	0.167	0.166		NM/LB	0.161	0.160	0.159	0.158		
38,000	83.0	84.9	86.7	88.6		%N1	84.3	86.2	88.1	89.9		38,000
	2830	2910	2995	3078		LB/HR	3000	3086	3175	3264		
	0.1679	0.1671	0.166	0.165		NM/LB	0.1603	0.1594	0.1585	0.1574		
39,000	83.1	85.0	86.9	88.7		%N1	84.4	86.3	88.2	90.1		39,000
	2844	2924	3009	3093		LB/HR	3015	3102	3190	3280		
	0.167	0.166	0.165	0.164		NM/LB	0.160	0.159	0.158	0.157		

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.6 Mi						.62 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	66.2	67.8	69.3	70.9	72.3	%N1	67.1	68.7	70.3	71.8	73.3	25,000
	1176	1212	1246	1280	1315	LB/HR	1236	1273	1309	1345	1381	
	0.286	0.284	0.283	0.281	0.279	NM/LB	0.281	0.279	0.278	0.276	0.275	
26,000	66.4	68.0	69.6	71.1	72.5	%N1	67.3	68.9	70.5	72.0	73.6	26,000
	1188	1224	1258	1293	1328	LB/HR	1248	1285	1322	1358	1395	
	0.283	0.2812	0.2798	0.2783	0.2765	NM/LB	0.2783	0.2767	0.2753	0.2738	0.2721	
27,000	66.7	68.3	69.9	71.4	72.8	%N1	67.5	69.1	70.7	72.3	73.8	27,000
	1203	1239	1274	1309	1345	LB/HR	1260	1297	1334	1371	1408	
	0.280	0.278	0.276	0.275	0.273	NM/LB	0.276	0.274	0.273	0.271	0.270	
28,000	67.0	68.6	70.2	71.7	73.2	%N1	67.8	69.4	71.0	72.5	74.1	28,000
	1219	1256	1291	1327	1363	LB/HR	1272	1310	1347	1384	1421	
	0.2757	0.2741	0.2726	0.2712	0.2694	NM/LB	0.273	0.2716	0.2701	0.2686	0.267	
29,000	67.3	68.9	70.5	72.0	73.6	%N1	68.1	69.7	71.3	72.8	74.4	29,000
	1236	1273	1309	1345	1381	LB/HR	1288	1326	1364	1401	1439	
	0.272	0.270	0.269	0.268	0.266	NM/LB	0.270	0.268	0.267	0.265	0.264	
30,000	67.6	69.2	70.8	72.4	73.9	%N1	68.4	70.0	71.6	73.2	74.8	30,000
	1252	1290	1326	1362	1400	LB/HR	1305	1343	1381	1419	1458	
	0.2684	0.2669	0.2655	0.264	0.2624	NM/LB	0.2662	0.2649	0.2634	0.2619	0.2604	
31,000	68.0	69.6	71.2	72.7	74.3	%N1	68.7	70.3	71.9	73.5	75.1	31,000
	1271	1308	1345	1382	1420	LB/HR	1321	1360	1398	1437	1476	
	0.265	0.263	0.262	0.260	0.259	NM/LB	0.263	0.262	0.260	0.259	0.257	
32,000	68.3	69.9	71.5	73.1	74.7	%N1	69.0	70.6	72.2	73.8	75.5	32,000
	1290	1328	1365	1403	1441	LB/HR	1338	1377	1416	1455	1494	
	0.2607	0.2593	0.2579	0.2564	0.2548	NM/LB	0.2597	0.2584	0.257	0.2555	0.254	
33,000	68.7	70.3	71.9	73.5	75.1	%N1	69.3	71.0	72.6	74.2	75.9	33,000
	1308	1347	1385	1423	1462	LB/HR	1356	1395	1435	1475	1515	
	0.257	0.256	0.254	0.253	0.251	NM/LB	0.256	0.255	0.254	0.252	0.251	
34,000	69.0	70.7	72.3	73.9	75.5	%N1	69.7	71.3	72.9	74.5	76.2	34,000
	1328	1366	1405	1444	1484	LB/HR	1375	1415	1455	1496	1537	
	0.2532	0.2519	0.2506	0.2491	0.2475	NM/LB	0.2526	0.2514	0.2501	0.2485	0.247	
35,000	69.4	71.1	72.7	74.3	76.0	%N1	70.0	71.7	73.3	74.9	76.6	35,000
	1350	1389	1428	1468	1508	LB/HR	1394	1434	1475	1516	1558	
	0.249	0.248	0.247	0.245	0.244	NM/LB	0.249	0.248	0.247	0.245	0.244	
36,000	69.8	71.5	73.1	74.7	76.4	%N1	70.4	72.0	73.7	75.3	76.9	36,000
	1372	1411	1451	1492	1533	LB/HR	1413	1453	1495	1537	1580	
	0.2451	0.2439	0.2426	0.2412	0.2396	NM/LB	0.2458	0.2447	0.2434	0.2419	0.2402	
37,000	70.3	71.9	73.6	75.2	76.8	%N1	70.8	72.5	74.1	75.7	77.3	37,000
	1394	1434	1474	1516	1558	LB/HR	1435	1476	1518	1561	1605	
	0.241	0.240	0.239	0.237	0.236	NM/LB	0.242	0.241	0.240	0.238	0.236	
38,000	70.7	72.3	74.0	75.6	77.3	%N1	71.2	72.9	74.6	76.2	77.8	38,000
	1416	1456	1497	1539	1583	LB/HR	1458	1499	1542	1586	1632	
	0.2375	0.2364	0.2351	0.2337	0.2319	NM/LB	0.2382	0.2372	0.2359	0.2344	0.2326	
39,000	71.1	72.8	74.4	76.1	77.7	%N1	71.6	73.3	74.9	76.6	78.2	39,000
	1437	1478	1520	1563	1608	LB/HR	1482	1524	1567	1612	1658	
	0.234	0.233	0.232	0.230	0.228	NM/LB	0.234	0.233	0.232	0.231	0.229	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.64 Mi						.66 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	68.0	69.6	71.2	72.8	74.4	%N1	69.0	70.7	72.3	73.9	75.6	25,000
	1300	1338	1375	1414	1451	LB/HR	1367	1406	1445	1487	1526	
	0.276	0.275	0.273	0.271	0.270	NM/LB	0.271	0.269	0.268	0.266	0.265	
26,000	68.2	69.8	71.4	73.0	74.6	%N1	69.2	70.9	72.5	74.1	75.8	26,000
	1310	1349	1387	1425	1463	LB/HR	1377	1417	1457	1498	1538	
	0.2736	0.2723	0.2708	0.2692	0.2677	NM/LB	0.2685	0.2673	0.2659	0.2642	0.2627	
27,000	68.5	70.1	71.7	73.3	74.9	%N1	69.4	71.0	72.7	74.3	75.9	27,000
	1323	1361	1400	1439	1477	LB/HR	1388	1427	1468	1510	1550	
	0.271	0.270	0.268	0.267	0.265	NM/LB	0.266	0.265	0.264	0.262	0.261	
28,000	68.7	70.3	71.9	73.5	75.2	%N1	69.6	71.3	72.9	74.5	76.2	28,000
	1335	1374	1413	1452	1491	LB/HR	1400	1440	1480	1523	1564	
	0.2686	0.2673	0.2659	0.2642	0.2628	NM/LB	0.2642	0.263	0.2616	0.2599	0.2584	
29,000	68.9	70.5	72.2	73.7	75.4	%N1	69.8	71.5	73.1	74.7	76.4	29,000
	1347	1386	1425	1466	1504	LB/HR	1413	1453	1493	1536	1578	
	0.266	0.265	0.263	0.262	0.260	NM/LB	0.262	0.261	0.259	0.258	0.256	
30,000	69.1	70.8	72.4	74.0	75.7	%N1	70.1	71.7	73.4	75.0	76.6	30,000
	1360	1399	1439	1479	1518	LB/HR	1425	1465	1507	1550	1592	
	0.2637	0.2624	0.261	0.2594	0.258	NM/LB	0.2595	0.2584	0.257	0.2553	0.2537	
31,000	69.4	71.1	72.7	74.3	76.0	%N1	70.3	72.0	73.6	75.2	76.9	31,000
	1376	1416	1456	1497	1537	LB/HR	1438	1478	1520	1564	1607	
	0.261	0.259	0.258	0.256	0.255	NM/LB	0.257	0.256	0.255	0.253	0.251	
32,000	69.7	71.4	73.0	74.6	76.3	%N1	70.5	72.2	73.9	75.5	77.1	32,000
	1393	1433	1473	1515	1556	LB/HR	1451	1492	1534	1578	1622	
	0.2574	0.2563	0.2549	0.2533	0.2517	NM/LB	0.2549	0.2538	0.2525	0.2508	0.2491	
33,000	70.0	71.7	73.3	75.0	76.6	%N1	70.8	72.5	74.2	75.8	77.4	33,000
	1409	1450	1491	1533	1575	LB/HR	1467	1509	1551	1596	1641	
	0.254	0.253	0.252	0.250	0.249	NM/LB	0.252	0.251	0.250	0.248	0.246	
34,000	70.3	72.0	73.7	75.3	76.9	%N1	71.1	72.8	74.5	76.1	77.7	34,000
	1426	1466	1508	1551	1594	LB/HR	1484	1525	1568	1614	1660	
	0.2515	0.2504	0.249	0.2474	0.2458	NM/LB	0.2492	0.2482	0.2469	0.2451	0.2434	
35,000	70.7	72.4	74.0	75.6	77.2	%N1	71.4	73.1	74.8	76.4	78.0	35,000
	1444	1485	1527	1571	1615	LB/HR	1501	1543	1587	1633	1679	
	0.248	0.247	0.246	0.244	0.243	NM/LB	0.246	0.245	0.244	0.242	0.241	
36,000	71.0	72.7	74.4	76.0	77.6	%N1	71.7	73.4	75.0	76.7	78.3	36,000
	1463	1505	1547	1592	1637	LB/HR	1518	1561	1605	1652	1698	
	0.245	0.244	0.2427	0.2411	0.2393	NM/LB	0.2436	0.2426	0.2413	0.2396	0.2379	
37,000	71.4	73.0	74.7	76.4	77.9	%N1	72.0	73.7	75.3	77.0	78.7	37,000
	1483	1524	1568	1613	1659	LB/HR	1537	1580	1625	1672	1718	
	0.242	0.241	0.240	0.238	0.236	NM/LB	0.241	0.240	0.238	0.237	0.235	
38,000	71.7	73.4	75.0	76.7	78.3	%N1	72.3	74.0	75.7	77.3	79.0	38,000
	1502	1545	1589	1634	1680	LB/HR	1556	1600	1646	1694	1740	
	0.2387	0.2377	0.2364	0.2348	0.2331	NM/LB	0.2376	0.2366	0.2353	0.2337	0.2321	
39,000	72.0	73.7	75.4	77.0	78.7	%N1	72.6	74.3	76.0	77.6	79.4	39,000
	1524	1567	1612	1658	1705	LB/HR	1576	1621	1667	1715	1762	
	0.235	0.234	0.233	0.231	0.230	NM/LB	0.235	0.234	0.232	0.231	0.229	

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.68 Mi						.7 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	70.0	71.7	73.3	74.9	76.5	%N1	71.1	72.8	74.4	76.1	77.6	25,000
	1435	1475	1517	1561	1603	LB/HR	1509	1551	1594	1642	1688	
	0.266	0.264	0.263	0.261	0.260	NM/LB	0.260	0.259	0.258	0.256	0.254	
26,000	70.2	71.9	73.5	75.1	76.8	%N1	71.2	72.9	74.6	76.2	77.8	26,000
	1446	1487	1528	1573	1616	LB/HR	1516	1558	1602	1650	1696	
	0.2635	0.2624	0.261	0.2592	0.2575	NM/LB	0.2587	0.2577	0.2564	0.2544	0.2526	
27,000	70.4	72.1	73.7	75.4	77.0	%N1	71.4	73.1	74.7	76.4	78.0	27,000
	1457	1498	1540	1585	1629	LB/HR	1528	1571	1615	1663	1709	
	0.261	0.260	0.259	0.257	0.256	NM/LB	0.257	0.256	0.254	0.252	0.251	
28,000	70.6	72.3	73.9	75.6	77.2	%N1	71.6	73.3	74.9	76.6	78.2	28,000
	1468	1509	1552	1597	1642	LB/HR	1541	1583	1628	1676	1723	
	0.2595	0.2584	0.2571	0.2552	0.2535	NM/LB	0.2546	0.2536	0.2523	0.2504	0.2487	
29,000	70.8	72.5	74.2	75.8	77.4	%N1	71.7	73.5	75.1	76.8	78.4	29,000
	1480	1521	1564	1609	1655	LB/HR	1553	1596	1641	1689	1736	
	0.258	0.257	0.255	0.253	0.252	NM/LB	0.253	0.252	0.250	0.248	0.247	
30,000	71.0	72.7	74.4	76.0	77.6	%N1	71.9	73.6	75.3	77.0	78.6	30,000
	1492	1534	1577	1624	1669	LB/HR	1565	1608	1654	1703	1750	
	0.2553	0.2543	0.253	0.2511	0.2493	NM/LB	0.2506	0.2497	0.2484	0.2465	0.2449	
31,000	71.3	73.0	74.6	76.3	77.8	%N1	72.1	73.8	75.5	77.2	78.9	31,000
	1506	1548	1591	1638	1684	LB/HR	1577	1622	1667	1716	1764	
	0.253	0.252	0.251	0.249	0.247	NM/LB	0.249	0.248	0.246	0.245	0.243	
32,000	71.5	73.2	74.8	76.5	78.1	%N1	72.3	74.0	75.7	77.4	79.1	32,000
	1519	1561	1605	1653	1699	LB/HR	1591	1636	1682	1731	1779	
	0.2508	0.2498	0.2485	0.2467	0.245	NM/LB	0.2465	0.2455	0.2442	0.2424	0.2409	
33,000	71.7	73.4	75.0	76.7	78.3	%N1	72.5	74.3	76.0	77.6	79.3	33,000
	1532	1575	1620	1667	1714	LB/HR	1605	1650	1696	1746	1794	
	0.249	0.248	0.246	0.245	0.243	NM/LB	0.244	0.243	0.242	0.240	0.239	
34,000	71.9	73.6	75.3	76.9	78.6	%N1	72.7	74.5	76.2	77.8	79.6	34,000
	1546	1590	1635	1683	1729	LB/HR	1618	1664	1711	1761	1809	
	0.2464	0.2454	0.2441	0.2423	0.2407	NM/LB	0.2423	0.2413	0.2401	0.2383	0.2369	
35,000	72.1	73.9	75.5	77.2	78.9	%N1	72.9	74.7	76.4	78.1	79.8	35,000
	1564	1607	1653	1701	1748	LB/HR	1632	1678	1725	1776	1824	
	0.244	0.243	0.241	0.240	0.238	NM/LB	0.240	0.239	0.238	0.236	0.235	
36,000	72.4	74.1	75.8	77.5	79.2	%N1	73.2	74.9	76.6	78.3	80.0	36,000
	1581	1625	1671	1720	1767	LB/HR	1646	1693	1741	1791	1841	
	0.241	0.24	0.2388	0.2371	0.2355	NM/LB	0.2382	0.2372	0.236	0.2343	0.2328	
37,000	72.7	74.4	76.1	77.7	79.5	%N1	73.4	75.2	76.9	78.6	80.3	37,000
	1598	1643	1689	1739	1786	LB/HR	1664	1711	1759	1810	1860	
	0.239	0.238	0.236	0.235	0.233	NM/LB	0.236	0.235	0.234	0.232	0.230	
38,000	72.9	74.7	76.4	78.0	79.8	%N1	73.7	75.4	77.2	78.8	80.6	38,000
	1615	1661	1707	1757	1805	LB/HR	1681	1728	1777	1829	1880	
	0.2359	0.2349	0.2337	0.232	0.2306	NM/LB	0.2334	0.2323	0.2311	0.2295	0.2279	
39,000	73.2	74.9	76.6	78.3	80.1	%N1	73.9	75.7	77.4	79.1	80.8	39,000
	1633	1679	1727	1777	1825	LB/HR	1698	1746	1795	1847	1900	
	0.233	0.232	0.231	0.230	0.228	NM/LB	0.231	0.230	0.229	0.227	0.226	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.72 Mi						.74 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	72.1	73.8	75.5	77.2	78.8	%N1	73.1	74.9	76.6	78.3	80.0	25,000
	1595	1639	1685	1735	1783	LB/HR	1682	1729	1779	1830	1882	
	0.253	0.252	0.251	0.249	0.247	NM/LB	0.247	0.246	0.244	0.243	0.241	
26,000	72.2	73.9	75.6	77.3	79.0	%N1	73.3	75.0	76.7	78.4	80.1	26,000
	1602	1647	1693	1743	1791	LB/HR	1690	1738	1787	1839	1891	
	0.2518	0.2508	0.2495	0.2477	0.246	NM/LB	0.2453	0.2443	0.2429	0.2413	0.2395	
27,000	72.3	74.0	75.7	77.4	79.1	%N1	73.4	75.1	76.9	78.5	80.3	27,000
	1610	1655	1701	1751	1800	LB/HR	1699	1747	1796	1848	1900	
	0.251	0.250	0.248	0.247	0.245	NM/LB	0.244	0.243	0.242	0.240	0.238	
28,000	72.5	74.2	75.9	77.6	79.3	%N1	73.5	75.3	77.0	78.7	80.4	28,000
	1620	1665	1712	1762	1811	LB/HR	1707	1755	1805	1857	1910	
	0.249	0.248	0.2467	0.2449	0.2433	NM/LB	0.2429	0.2419	0.2406	0.239	0.2372	
29,000	72.7	74.4	76.1	77.8	79.5	%N1	73.6	75.4	77.1	78.8	80.5	29,000
	1632	1678	1725	1776	1825	LB/HR	1715	1764	1814	1866	1920	
	0.247	0.246	0.245	0.243	0.242	NM/LB	0.242	0.241	0.239	0.238	0.236	
30,000	72.9	74.6	76.3	78.0	79.7	%N1	73.8	75.6	77.3	79.0	80.7	30,000
	1645	1691	1738	1789	1838	LB/HR	1728	1777	1827	1879	1934	
	0.2453	0.2443	0.243	0.2413	0.2397	NM/LB	0.24	0.239	0.2377	0.2361	0.2342	
31,000	73.0	74.8	76.5	78.2	79.9	%N1	74.0	75.8	77.5	79.2	80.9	31,000
	1657	1703	1751	1802	1852	LB/HR	1740	1789	1840	1893	1948	
	0.244	0.243	0.241	0.240	0.238	NM/LB	0.238	0.237	0.236	0.234	0.233	
32,000	73.2	75.0	76.7	78.4	80.1	%N1	74.2	76.0	77.7	79.4	81.1	32,000
	1669	1716	1765	1816	1866	LB/HR	1752	1802	1853	1906	1962	
	0.2417	0.2407	0.2394	0.2378	0.2361	NM/LB	0.2366	0.2356	0.2343	0.2328	0.2309	
33,000	73.4	75.2	76.9	78.6	80.3	%N1	74.4	76.2	77.9	79.6	81.3	33,000
	1682	1730	1778	1830	1881	LB/HR	1765	1815	1866	1919	1976	
	0.240	0.239	0.238	0.236	0.234	NM/LB	0.235	0.234	0.233	0.231	0.229	
34,000	73.6	75.4	77.1	78.8	80.5	%N1	74.6	76.3	78.1	79.8	81.5	34,000
	1696	1744	1793	1845	1897	LB/HR	1777	1827	1879	1933	1990	
	0.2379	0.2368	0.2356	0.234	0.2323	NM/LB	0.2333	0.2323	0.231	0.2295	0.2276	
35,000	73.8	75.6	77.3	79.0	80.7	%N1	74.8	76.6	78.3	80.0	81.7	35,000
	1710	1758	1808	1860	1913	LB/HR	1790	1841	1894	1948	2006	
	0.236	0.235	0.234	0.232	0.230	NM/LB	0.232	0.231	0.229	0.228	0.226	
36,000	74.0	75.8	77.5	79.2	80.9	%N1	75.0	76.8	78.5	80.2	81.9	36,000
	1724	1773	1823	1875	1929	LB/HR	1805	1856	1909	1963	2022	
	0.234	0.233	0.2318	0.2302	0.2284	NM/LB	0.2297	0.2287	0.2275	0.226	0.224	
37,000	74.3	76.0	77.8	79.5	81.2	%N1	75.2	77.0	78.8	80.5	82.1	37,000
	1738	1787	1838	1890	1945	LB/HR	1819	1871	1924	1979	2038	
	0.232	0.231	0.230	0.228	0.227	NM/LB	0.228	0.227	0.226	0.224	0.222	
38,000	74.5	76.2	78.0	79.7	81.4	%N1	75.4	77.2	79.0	80.7	82.3	38,000
	1752	1802	1853	1906	1962	LB/HR	1833	1886	1940	1995	2055	
	0.2303	0.2292	0.228	0.2265	0.2247	NM/LB	0.2261	0.2251	0.2238	0.2224	0.2205	
39,000	74.7	76.5	78.3	80.0	81.7	%N1	75.6	77.4	79.1	80.9	82.6	39,000
	1769	1820	1871	1925	1981	LB/HR	1849	1902	1956	2012	2071	
	0.228	0.227	0.226	0.224	0.222	NM/LB	0.224	0.223	0.222	0.221	0.219	

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.76 Mi						.78 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	74.4	76.1	77.9	79.6	81.3	%N1	75.8	77.6	79.3	81.0	82.8	25,000
	1783	1833	1886	1939	1997	LB/HR	1905	1960	2016	2074	2133	
	0.239	0.238	0.237	0.235	0.233	NM/LB	0.229	0.228	0.227	0.226	0.224	
26,000	74.5	76.3	78.0	79.7	81.4	%N1	75.9	77.7	79.4	81.1	82.9	26,000
	1791	1842	1894	1948	2007	LB/HR	1913	1967	2024	2082	2141	
	0.2378	0.2367	0.2354	0.2339	0.2318	NM/LB	0.2285	0.2274	0.2261	0.2247	0.223	
27,000	74.6	76.4	78.2	79.9	81.5	%N1	76.0	77.8	79.5	81.3	83.0	27,000
	1799	1851	1903	1957	2016	LB/HR	1921	1976	2033	2091	2151	
	0.237	0.236	0.234	0.233	0.231	NM/LB	0.228	0.226	0.225	0.224	0.222	
28,000	74.7	76.5	78.3	80.0	81.7	%N1	76.1	77.9	79.6	81.4	83.2	28,000
	1808	1859	1912	1966	2026	LB/HR	1930	1985	2042	2100	2160	
	0.2355	0.2345	0.2332	0.2317	0.2296	NM/LB	0.2264	0.2254	0.2241	0.2227	0.2211	
29,000	74.9	76.7	78.4	80.1	81.8	%N1	76.2	78.0	79.8	81.5	83.3	29,000
	1816	1868	1921	1976	2035	LB/HR	1938	1994	2051	2109	2169	
	0.235	0.233	0.232	0.231	0.229	NM/LB	0.226	0.224	0.223	0.222	0.220	
30,000	75.0	76.8	78.5	80.3	81.9	%N1	76.3	78.1	79.9	81.6	83.4	30,000
	1825	1877	1930	1985	2045	LB/HR	1947	2002	2060	2119	2178	
	0.2334	0.2323	0.231	0.2296	0.2275	NM/LB	0.2245	0.2235	0.2222	0.2207	0.2192	
31,000	75.2	76.9	78.7	80.4	82.1	%N1	76.4	78.2	80.0	81.7	83.5	31,000
	1835	1888	1942	1997	2057	LB/HR	1955	2011	2069	2128	2188	
	0.232	0.231	0.230	0.228	0.226	NM/LB	0.224	0.223	0.221	0.220	0.218	
32,000	75.3	77.1	78.9	80.6	82.3	%N1	76.5	78.3	80.1	81.8	83.6	32,000
	1848	1901	1956	2012	2071	LB/HR	1964	2020	2078	2137	2198	
	0.2304	0.2293	0.228	0.2265	0.2246	NM/LB	0.2225	0.2215	0.2202	0.2188	0.2173	
33,000	75.5	77.3	79.0	80.8	82.5	%N1	76.6	78.5	80.3	82.0	83.8	33,000
	1862	1915	1970	2026	2086	LB/HR	1977	2033	2092	2151	2212	
	0.229	0.228	0.226	0.225	0.223	NM/LB	0.221	0.220	0.219	0.217	0.216	
34,000	75.7	77.4	79.2	80.9	82.7	%N1	76.8	78.6	80.4	82.2	84.0	34,000
	1875	1929	1984	2041	2100	LB/HR	1990	2047	2106	2166	2228	
	0.2271	0.2261	0.2248	0.2233	0.2215	NM/LB	0.2196	0.2186	0.2173	0.2159	0.2143	
35,000	75.8	77.6	79.4	81.1	82.9	%N1	77.0	78.8	80.6	82.3	84.1	35,000
	1888	1942	1998	2055	2114	LB/HR	2004	2061	2120	2181	2243	
	0.226	0.225	0.223	0.222	0.220	NM/LB	0.218	0.217	0.216	0.214	0.213	
36,000	76.0	77.8	79.6	81.3	83.1	%N1	77.2	79.0	80.8	82.5	84.3	36,000
	1902	1956	2012	2070	2129	LB/HR	2018	2075	2135	2196	2259	
	0.2239	0.2229	0.2216	0.2202	0.2185	NM/LB	0.2166	0.2156	0.2144	0.213	0.2114	
37,000	76.2	78.0	79.8	81.5	83.3	%N1	77.3	79.2	81.0	82.7	84.5	37,000
	1917	1972	2028	2086	2145	LB/HR	2031	2089	2149	2211	2274	
	0.222	0.221	0.220	0.218	0.217	NM/LB	0.215	0.214	0.213	0.212	0.210	
38,000	76.4	78.2	80.0	81.7	83.5	%N1	77.5	79.3	81.1	82.9	84.7	38,000
	1932	1988	2045	2103	2162	LB/HR	2045	2103	2164	2226	2290	
	0.2203	0.2193	0.2181	0.2167	0.2152	NM/LB	0.2137	0.2127	0.2115	0.2101	0.2085	
39,000	76.6	78.4	80.2	81.9	83.7	%N1	77.7	79.5	81.3	83.1	84.9	39,000
	1948	2004	2061	2120	2179	LB/HR	2061	2120	2180	2243	2308	
	0.219	0.218	0.216	0.215	0.214	NM/LB	0.212	0.211	0.210	0.209	0.207	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.8 Mi						.81 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.0	78.8	80.6	82.4	84.2	%N1	77.7	79.6	81.4	83.1	84.9	25,000
	2027	2085	2144	2206	2270	LB/HR	2101	2161	2223	2287	2354	
	0.221	0.220	0.219	0.217	0.216	NM/LB	0.216	0.215	0.214	0.212	0.211	
26,000	77.1	78.9	80.7	82.4	84.2	%N1	77.8	79.7	81.5	83.2	85.0	26,000
	2034	2091	2151	2213	2277	LB/HR	2108	2167	2230	2294	2361	
	0.2204	0.2195	0.2182	0.2168	0.2151	NM/LB	0.2153	0.2144	0.2132	0.2117	0.21	
27,000	77.2	79.0	80.8	82.5	84.3	%N1	77.9	79.8	81.6	83.3	85.1	27,000
	2040	2098	2158	2220	2285	LB/HR	2114	2174	2236	2301	2369	
	0.220	0.219	0.218	0.216	0.214	NM/LB	0.215	0.214	0.213	0.211	0.209	
28,000	77.3	79.1	80.9	82.7	84.4	%N1	78.0	79.9	81.7	83.4	85.2	28,000
	2049	2107	2168	2230	2295	LB/HR	2123	2183	2245	2310	2378	
	0.2187	0.2178	0.2166	0.2151	0.2134	NM/LB	0.2138	0.2129	0.2117	0.2102	0.2085	
29,000	77.4	79.2	81.0	82.8	84.5	%N1	78.1	80.0	81.8	83.6	85.3	29,000
	2058	2116	2177	2240	2305	LB/HR	2133	2193	2256	2321	2390	
	0.218	0.217	0.216	0.214	0.212	NM/LB	0.213	0.212	0.211	0.209	0.208	
30,000	77.5	79.3	81.1	82.9	84.7	%N1	78.3	80.1	81.9	83.7	85.4	30,000
	2067	2126	2187	2249	2315	LB/HR	2143	2203	2266	2332	2401	
	0.2168	0.2159	0.2147	0.2132	0.2115	NM/LB	0.2118	0.2109	0.2097	0.2083	0.2065	
31,000	77.6	79.5	81.3	83.0	84.8	%N1	78.4	80.2	82.1	83.8	85.5	31,000
	2076	2135	2196	2259	2325	LB/HR	2153	2213	2277	2343	2412	
	0.216	0.215	0.214	0.212	0.211	NM/LB	0.211	0.210	0.209	0.207	0.206	
32,000	77.7	79.6	81.4	83.1	84.9	%N1	78.5	80.4	82.2	83.9	85.7	32,000
	2085	2144	2206	2269	2336	LB/HR	2162	2223	2287	2353	2423	
	0.2149	0.214	0.2128	0.2114	0.2096	NM/LB	0.2099	0.209	0.2078	0.2064	0.2046	
33,000	77.8	79.7	81.5	83.2	85.0	%N1	78.6	80.5	82.3	84.1	85.8	33,000
	2094	2153	2215	2279	2346	LB/HR	2172	2234	2298	2364	2435	
	0.214	0.213	0.212	0.211	0.209	NM/LB	0.209	0.208	0.207	0.205	0.204	
34,000	78.0	79.8	81.6	83.4	85.1	%N1	78.7	80.6	82.4	84.2	85.9	34,000
	2104	2163	2225	2290	2357	LB/HR	2182	2244	2308	2375	2446	
	0.213	0.2121	0.2109	0.2095	0.2077	NM/LB	0.208	0.2071	0.2059	0.2045	0.2027	
35,000	78.1	80.0	81.8	83.6	85.3	%N1	78.9	80.7	82.6	84.4	86.1	35,000
	2118	2177	2240	2304	2373	LB/HR	2193	2255	2320	2387	2459	
	0.212	0.211	0.210	0.208	0.206	NM/LB	0.207	0.206	0.205	0.203	0.202	
36,000	78.3	80.1	82.0	83.7	85.5	%N1	79.0	80.9	82.8	84.5	86.2	36,000
	2131	2191	2254	2319	2388	LB/HR	2207	2270	2334	2402	2474	
	0.2103	0.2094	0.2083	0.2068	0.2051	NM/LB	0.2056	0.2047	0.2036	0.2022	0.2004	
37,000	78.5	80.3	82.1	83.9	85.6	%N1	79.2	81.1	82.9	84.7	86.4	37,000
	2145	2205	2268	2334	2403	LB/HR	2221	2284	2350	2418	2490	
	0.209	0.208	0.207	0.206	0.204	NM/LB	0.204	0.203	0.202	0.201	0.199	
38,000	78.6	80.5	82.3	84.1	85.8	%N1	79.4	81.2	83.1	84.9	86.6	38,000
	2159	2219	2283	2349	2419	LB/HR	2236	2299	2365	2434	2506	
	0.2076	0.2068	0.2056	0.2042	0.2024	NM/LB	0.203	0.2021	0.2009	0.1995	0.1978	
39,000	78.8	80.7	82.5	84.3	86.0	%N1	79.5	81.4	83.2	85.0	86.7	39,000
	2172	2233	2297	2364	2434	LB/HR	2250	2314	2381	2450	2522	
	0.206	0.206	0.204	0.203	0.201	NM/LB	0.202	0.201	0.200	0.198	0.197	

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.82 Mi						.83 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	78.5	80.4	82.2	84.0	85.7	%N1	79.8	81.7	83.5	85.3	87.1	25,000
	2177	2239	2303	2370	2440	LB/HR	2309	2375	2444	2515	2586	
	0.211	0.210	0.209	0.208	0.206	NM/LB	0.201	0.201	0.199	0.198	0.197	
26,000	78.6	80.4	82.3	84.0	85.7	%N1	79.9	81.8	83.6	85.4	87.2	26,000
	2184	2246	2310	2377	2448	LB/HR	2317	2383	2453	2524	2595	
	0.2104	0.2095	0.2083	0.2068	0.205	NM/LB	0.2007	0.1998	0.1985	0.1972	0.1958	
27,000	78.7	80.5	82.4	84.1	85.8	%N1	80.0	81.9	83.7	85.5	87.3	27,000
	2191	2253	2317	2384	2456	LB/HR	2326	2392	2462	2533	2604	
	0.210	0.209	0.208	0.206	0.204	NM/LB	0.200	0.199	0.198	0.197	0.195	
28,000	78.7	80.6	82.4	84.2	85.9	%N1	80.0	81.9	83.8	85.6	87.4	28,000
	2197	2260	2324	2392	2463	LB/HR	2334	2401	2471	2542	2614	
	0.2091	0.2082	0.207	0.2056	0.2038	NM/LB	0.1992	0.1983	0.1971	0.1957	0.1944	
29,000	78.9	80.7	82.6	84.4	86.0	%N1	80.1	82.0	83.9	85.7	87.5	29,000
	2208	2270	2336	2403	2475	LB/HR	2343	2410	2481	2552	2624	
	0.208	0.207	0.206	0.205	0.203	NM/LB	0.198	0.198	0.196	0.195	0.194	
30,000	79.0	80.9	82.7	84.5	86.2	%N1	80.3	82.2	84.0	85.8	87.6	30,000
	2219	2281	2347	2415	2487	LB/HR	2356	2423	2494	2566	2638	
	0.2071	0.2062	0.205	0.2036	0.2018	NM/LB	0.1974	0.1965	0.1953	0.1939	0.1926	
31,000	79.1	81.0	82.8	84.6	86.3	%N1	80.4	82.3	84.2	86.0	87.7	31,000
	2230	2293	2359	2428	2500	LB/HR	2368	2436	2507	2579	2652	
	0.206	0.205	0.204	0.203	0.201	NM/LB	0.196	0.196	0.194	0.193	0.192	
32,000	79.3	81.1	83.0	84.7	86.4	%N1	80.5	82.4	84.3	86.1	87.9	32,000
	2241	2305	2371	2440	2512	LB/HR	2380	2448	2520	2593	2666	
	0.205	0.2041	0.2029	0.2015	0.1998	NM/LB	0.1954	0.1945	0.1932	0.1919	0.1906	
33,000	79.4	81.3	83.1	84.9	86.6	%N1	80.7	82.6	84.4	86.2	88.0	33,000
	2253	2317	2384	2453	2525	LB/HR	2393	2461	2533	2606	2679	
	0.204	0.203	0.202	0.200	0.199	NM/LB	0.194	0.194	0.192	0.191	0.190	
34,000	79.5	81.4	83.2	85.0	86.7	%N1	80.8	82.7	84.5	86.4	88.1	34,000
	2264	2328	2396	2465	2537	LB/HR	2405	2474	2547	2620	2693	
	0.2029	0.202	0.2008	0.1994	0.1978	NM/LB	0.1934	0.1925	0.1912	0.19	0.1886	
35,000	79.6	81.5	83.3	85.1	86.9	%N1	80.9	82.8	84.7	86.5	88.3	35,000
	2275	2340	2408	2478	2549	LB/HR	2418	2487	2560	2633	2707	
	0.202	0.201	0.200	0.198	0.197	NM/LB	0.192	0.192	0.190	0.189	0.188	
36,000	79.7	81.6	83.5	85.3	87.0	%N1	81.0	82.9	84.8	86.6	88.4	36,000
	2288	2354	2422	2492	2563	LB/HR	2430	2499	2573	2647	2721	
	0.2008	0.1999	0.1987	0.1973	0.1958	NM/LB	0.1914	0.1905	0.1893	0.188	0.1867	
37,000	79.9	81.8	83.6	85.4	87.2	%N1	81.2	83.1	85.0	86.8	88.6	37,000
	2303	2369	2438	2508	2579	LB/HR	2445	2514	2589	2663	2737	
	0.200	0.199	0.197	0.196	0.195	NM/LB	0.190	0.189	0.188	0.187	0.186	
38,000	80.1	81.9	83.8	85.6	87.4	%N1	81.3	83.3	85.1	87.0	88.8	38,000
	2318	2384	2454	2525	2596	LB/HR	2461	2531	2606	2680	2756	
	0.1982	0.1973	0.1961	0.1947	0.1934	NM/LB	0.189	0.1881	0.1869	0.1857	0.1844	
39,000	80.2	82.1	84.0	85.7	87.5	%N1	81.5	83.4	85.3	87.1	88.9	39,000
	2333	2399	2469	2541	2612	LB/HR	2477	2548	2623	2698	2774	
	0.197	0.196	0.195	0.194	0.192	NM/LB	0.188	0.187	0.186	0.184	0.183	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.84 Mi						.85 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	81.0	83.0	84.8	86.6	88.4	%N1	82.3	84.3	86.1	88.0	89.8	25,000
	2447	2517	2592	2666	2741	LB/HR	2590	2664	2743	2821	2900	
	0.192	0.191	0.190	0.189	0.188	NM/LB	0.184	0.183	0.182	0.181	0.179	
26,000	81.1	83.1	84.9	86.7	88.5	%N1	82.4	84.4	86.3	88.1	89.9	26,000
	2457	2527	2602	2677	2752	LB/HR	2601	2676	2755	2833	2913	
	0.1915	0.1907	0.1894	0.1882	0.1869	NM/LB	0.1831	0.1822	0.181	0.1799	0.1786	
27,000	81.2	83.2	85.0	86.8	88.6	%N1	82.5	84.5	86.4	88.2	90.0	27,000
	2467	2538	2613	2687	2763	LB/HR	2612	2687	2767	2845	2925	
	0.191	0.190	0.189	0.187	0.186	NM/LB	0.182	0.182	0.180	0.179	0.178	
28,000	81.3	83.3	85.1	86.9	88.7	%N1	82.6	84.6	86.5	88.3		28,000
	2477	2548	2623	2698	2774	LB/HR	2623	2698	2779	2857		
	0.19	0.1892	0.1879	0.1867	0.1854	NM/LB	0.1815	0.1807	0.1795	0.1784		
29,000	81.4	83.4	85.2	87.1	88.8	%N1	82.8	84.7	86.6	88.5		29,000
	2487	2558	2633	2708	2784	LB/HR	2635	2710	2790	2869		
	0.189	0.188	0.187	0.186	0.185	NM/LB	0.181	0.180	0.179	0.178		
30,000	81.6	83.5	85.4	87.2	89.0	%N1	82.9	84.8	86.7	88.6		30,000
	2498	2569	2646	2721	2797	LB/HR	2646	2722	2803	2882		
	0.1884	0.1875	0.1863	0.1851	0.1838	NM/LB	0.18	0.1792	0.178	0.1768		
31,000	81.7	83.6	85.5	87.3	89.1	%N1	83.0	85.0	86.9	88.7		31,000
	2511	2583	2660	2735	2812	LB/HR	2660	2736	2817	2897		
	0.187	0.187	0.185	0.184	0.183	NM/LB	0.179	0.178	0.177	0.176		
32,000	81.8	83.8	85.6	87.5	89.3	%N1	83.1	85.1	87.0	88.9		32,000
	2525	2597	2674	2750	2827	LB/HR	2674	2751	2833	2913		
	0.1864	0.1856	0.1843	0.1832	0.1819	NM/LB	0.1781	0.1772	0.1761	0.1749		
33,000	82.0	83.9	85.8	87.6	89.4	%N1	83.3	85.2	87.1	89.0		33,000
	2538	2610	2688	2764	2842	LB/HR	2689	2766	2848	2929		
	0.186	0.185	0.183	0.182	0.181	NM/LB	0.177	0.176	0.175	0.174		
34,000	82.1	84.0	85.9	87.8	89.6	%N1	83.4	85.4	87.3	89.1		34,000
	2551	2624	2702	2779	2857	LB/HR	2703	2781	2863	2945		
	0.1845	0.1837	0.1824	0.1813	0.18	NM/LB	0.1762	0.1753	0.1742	0.1731		
35,000	82.2	84.2	86.1	87.9	89.7	%N1	83.6	85.5	87.4	89.3		35,000
	2564	2638	2716	2793	2872	LB/HR	2718	2796	2879	2961		
	0.184	0.183	0.182	0.180	0.179	NM/LB	0.175	0.174	0.173	0.172		
36,000	82.4	84.3	86.2	88.0	89.8	%N1	83.7	85.7	87.6	89.4		36,000
	2577	2651	2730	2807	2886	LB/HR	2732	2812	2894	2977		
	0.1826	0.1818	0.1805	0.1794	0.1781	NM/LB	0.1743	0.1734	0.1723	0.1712		
37,000	82.5	84.4	86.3	88.2	90.0	%N1	83.8	85.8	87.7	89.6		37,000
	2591	2665	2744	2822	2901	LB/HR	2747	2827	2910	2993		
	0.182	0.181	0.180	0.179	0.177	NM/LB	0.173	0.173	0.171	0.170		
38,000	82.7	84.6	86.5	88.4		%N1	84.0	85.9	87.9	89.7		38,000
	2607	2682	2762	2840		LB/HR	2761	2842	2925	3009		
	0.1805	0.1797	0.1785	0.1774		NM/LB	0.1725	0.1716	0.1705	0.1694		
39,000	82.8	84.8	86.7	88.6		%N1	84.1	86.1	88.0	89.9		39,000
	2625	2700	2781	2859		LB/HR	2780	2861	2945	3029		
	0.179	0.179	0.177	0.176		NM/LB	0.171	0.170	0.169	0.168		

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.6 Mi						.62 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	66.3	67.9	69.5	71.0	72.5	%N1	67.0	68.6	70.2	71.8	73.3	25,000
	1098	1131	1163	1195	1229	LB/HR	1148	1182	1216	1250	1285	
	0.303	0.302	0.300	0.298	0.296	NM/LB	0.300	0.298	0.297	0.295	0.293	
26,000	66.6	68.2	69.8	71.3	72.8	%N1	67.3	68.9	70.5	72.1	73.6	26,000
	1114	1148	1180	1213	1247	LB/HR	1162	1196	1230	1265	1300	
	0.2989	0.2972	0.2956	0.294	0.292	NM/LB	0.2962	0.2946	0.2931	0.2914	0.2895	
27,000	66.9	68.5	70.1	71.7	73.2	%N1	67.6	69.3	70.9	72.4	74.0	27,000
	1130	1164	1198	1231	1266	LB/HR	1178	1213	1248	1283	1318	
	0.295	0.293	0.291	0.290	0.288	NM/LB	0.292	0.291	0.289	0.287	0.286	
28,000	67.3	68.9	70.5	72.1	73.6	%N1	67.9	69.6	71.2	72.8	74.4	28,000
	1148	1183	1216	1250	1286	LB/HR	1195	1230	1265	1301	1337	
	0.29	0.2884	0.2869	0.2853	0.2834	NM/LB	0.288	0.2865	0.2851	0.2834	0.2816	
29,000	67.6	69.3	70.9	72.5	74.0	%N1	68.3	69.9	71.5	73.1	74.8	29,000
	1167	1202	1236	1271	1307	LB/HR	1211	1247	1282	1319	1355	
	0.285	0.284	0.282	0.281	0.279	NM/LB	0.284	0.283	0.281	0.280	0.278	
30,000	68.0	69.7	71.3	72.9	74.5	%N1	68.6	70.3	71.9	73.5	75.2	30,000
	1186	1221	1256	1291	1327	LB/HR	1229	1265	1301	1338	1375	
	0.2808	0.2793	0.2779	0.2763	0.2744	NM/LB	0.2799	0.2785	0.2771	0.2754	0.2737	
31,000	68.4	70.1	71.7	73.3	74.9	%N1	69.0	70.7	72.3	73.9	75.6	31,000
	1205	1241	1276	1312	1349	LB/HR	1248	1285	1321	1359	1397	
	0.276	0.275	0.274	0.272	0.270	NM/LB	0.276	0.274	0.273	0.271	0.270	
32,000	68.8	70.5	72.1	73.7	75.4	%N1	69.4	71.0	72.7	74.3	76.0	32,000
	1227	1263	1299	1336	1373	LB/HR	1267	1304	1341	1379	1418	
	0.2714	0.27	0.2687	0.267	0.2653	NM/LB	0.2716	0.2702	0.2689	0.2672	0.2656	
33,000	69.3	70.9	72.6	74.2	75.9	%N1	69.7	71.4	73.1	74.7	76.4	33,000
	1249	1286	1322	1360	1398	LB/HR	1286	1323	1361	1400	1439	
	0.267	0.265	0.264	0.262	0.261	NM/LB	0.268	0.266	0.265	0.263	0.262	
34,000	69.7	71.4	73.0	74.7	76.4	%N1	70.2	71.9	73.5	75.2	76.9	34,000
	1271	1308	1345	1384	1422	LB/HR	1309	1347	1385	1425	1465	
	0.262	0.2607	0.2594	0.2578	0.2561	NM/LB	0.2629	0.2616	0.2604	0.2587	0.2569	
35,000	70.1	71.8	73.5	75.1	76.8	%N1	70.6	72.3	74.0	75.7	77.3	35,000
	1292	1330	1368	1407	1447	LB/HR	1332	1370	1409	1450	1491	
	0.258	0.256	0.255	0.254	0.252	NM/LB	0.258	0.257	0.256	0.254	0.252	
36,000	70.6	72.3	73.9	75.6	77.2	%N1	71.1	72.8	74.5	76.1	77.8	36,000
	1314	1353	1391	1431	1472	LB/HR	1355	1394	1433	1475	1517	
	0.2533	0.2521	0.2509	0.2493	0.2475	NM/LB	0.254	0.2528	0.2516	0.2499	0.2481	
37,000	71.0	72.7	74.4	76.1	77.7	%N1	71.5	73.2	74.9	76.6	78.2	37,000
	1336	1375	1414	1455	1497	LB/HR	1378	1419	1459	1501	1544	
	0.249	0.248	0.247	0.245	0.243	NM/LB	0.250	0.248	0.247	0.246	0.244	
38,000	71.4	73.1	74.8	76.5	78.1	%N1	71.9	73.6	75.3	77.0	78.7	38,000
	1359	1398	1438	1480	1522	LB/HR	1403	1444	1485	1528	1571	
	0.2451	0.2439	0.2427	0.241	0.2393	NM/LB	0.2452	0.2441	0.2428	0.2412	0.2395	
39,000	71.8	73.5	75.2	76.9	78.6	%N1	72.3	74.0	75.8	77.5	79.2	39,000
	1383	1424	1464	1507	1549	LB/HR	1428	1469	1511	1556	1599	
	0.241	0.240	0.238	0.237	0.235	NM/LB	0.241	0.240	0.239	0.237	0.235	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.64 Mi						.66 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	67.9	69.5	71.1	72.7	74.3	%N1	68.8	70.4	72.1	73.7	75.4	25,000
	1205	1241	1276	1312	1348	LB/HR	1264	1301	1337	1376	1413	
	0.295	0.293	0.292	0.290	0.288	NM/LB	0.290	0.289	0.287	0.285	0.284	
26,000	68.1	69.8	71.4	73.0	74.6	%N1	69.0	70.7	72.3	73.9	75.7	26,000
	1217	1253	1289	1325	1362	LB/HR	1276	1313	1351	1389	1427	
	0.2918	0.2903	0.2889	0.2871	0.2854	NM/LB	0.287	0.2856	0.2842	0.2824	0.2808	
27,000	68.4	70.0	71.7	73.2	74.9	%N1	69.3	70.9	72.6	74.2	75.9	27,000
	1230	1266	1302	1338	1375	LB/HR	1289	1326	1364	1403	1441	
	0.289	0.287	0.286	0.284	0.283	NM/LB	0.284	0.283	0.282	0.280	0.278	
28,000	68.7	70.3	72.0	73.6	75.2	%N1	69.5	71.2	72.8	74.5	76.2	28,000
	1245	1281	1318	1355	1392	LB/HR	1301	1339	1377	1417	1456	
	0.2853	0.2839	0.2825	0.2808	0.2791	NM/LB	0.2814	0.2802	0.2788	0.277	0.2753	
29,000	69.0	70.7	72.3	73.9	75.6	%N1	69.8	71.4	73.1	74.7	76.4	29,000
	1261	1298	1335	1373	1411	LB/HR	1314	1352	1390	1430	1470	
	0.282	0.280	0.279	0.277	0.275	NM/LB	0.279	0.278	0.276	0.274	0.273	
30,000	69.3	71.0	72.6	74.3	76.0	%N1	70.1	71.8	73.4	75.1	76.7	30,000
	1278	1315	1352	1391	1429	LB/HR	1330	1369	1407	1448	1489	
	0.278	0.2767	0.2753	0.2735	0.2719	NM/LB	0.2753	0.2741	0.2728	0.2709	0.2692	
31,000	69.6	71.3	73.0	74.6	76.3	%N1	70.4	72.1	73.8	75.4	77.1	31,000
	1294	1332	1370	1409	1448	LB/HR	1347	1385	1425	1466	1508	
	0.274	0.273	0.272	0.270	0.268	NM/LB	0.272	0.271	0.269	0.268	0.266	
32,000	70.0	71.7	73.3	75.0	76.7	%N1	70.7	72.4	74.1	75.8	77.4	32,000
	1313	1351	1389	1429	1469	LB/HR	1363	1402	1442	1484	1526	
	0.2706	0.2693	0.268	0.2663	0.2645	NM/LB	0.2686	0.2675	0.2662	0.2644	0.2625	
33,000	70.4	72.1	73.7	75.4	77.0	%N1	71.0	72.7	74.4	76.1	77.7	33,000
	1331	1370	1409	1450	1491	LB/HR	1380	1419	1459	1502	1545	
	0.267	0.266	0.264	0.263	0.261	NM/LB	0.265	0.264	0.263	0.261	0.259	
34,000	70.7	72.4	74.1	75.8	77.4	%N1	71.3	73.1	74.8	76.4	78.1	34,000
	1350	1389	1429	1470	1512	LB/HR	1399	1439	1480	1523	1567	
	0.263	0.2618	0.2605	0.2588	0.257	NM/LB	0.2618	0.2607	0.2594	0.2576	0.2558	
35,000	71.1	72.8	74.5	76.2	77.8	%N1	71.7	73.4	75.1	76.8	78.4	35,000
	1369	1409	1449	1491	1534	LB/HR	1418	1459	1501	1545	1588	
	0.259	0.258	0.257	0.255	0.253	NM/LB	0.258	0.257	0.256	0.254	0.252	
36,000	71.5	73.2	74.9	76.6	78.2	%N1	72.0	73.7	75.4	77.1	78.8	36,000
	1393	1434	1474	1518	1560	LB/HR	1438	1479	1522	1566	1610	
	0.2549	0.2538	0.2525	0.2507	0.249	NM/LB	0.2547	0.2536	0.2523	0.2505	0.2489	
37,000	71.9	73.6	75.3	77.0	78.7	%N1	72.3	74.0	75.8	77.5	79.2	37,000
	1418	1459	1501	1544	1588	LB/HR	1458	1500	1543	1588	1632	
	0.251	0.249	0.248	0.246	0.245	NM/LB	0.251	0.250	0.249	0.247	0.246	
38,000	72.3	74.0	75.8	77.4	79.2	%N1	72.7	74.4	76.2	77.9	79.6	38,000
	1442	1484	1527	1571	1615	LB/HR	1481	1524	1568	1613	1658	
	0.2462	0.2451	0.2438	0.2421	0.2406	NM/LB	0.2473	0.2462	0.2449	0.2432	0.2417	
39,000	72.7	74.5	76.2	77.9	79.6	%N1	73.1	74.9	76.6	78.3	80.1	39,000
	1467	1510	1553	1598	1642	LB/HR	1507	1550	1595	1642	1686	
	0.242	0.241	0.240	0.238	0.237	NM/LB	0.243	0.242	0.241	0.239	0.238	

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.68 Mi						.7 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	69.7	71.4	73.1	74.7	76.4	%N1	70.7	72.4	74.1	75.8	77.4	25,000
	1327	1365	1403	1444	1484	LB/HR	1391	1430	1471	1514	1558	
	0.284	0.283	0.282	0.280	0.278	NM/LB	0.279	0.278	0.277	0.275	0.273	
26,000	70.0	71.6	73.3	74.9	76.6	%N1	70.9	72.6	74.3	76.0	77.6	26,000
	1338	1376	1415	1456	1497	LB/HR	1403	1442	1483	1527	1571	
	0.282	0.2809	0.2795	0.2776	0.2758	NM/LB	0.2769	0.2759	0.2745	0.2725	0.2705	
27,000	70.2	71.9	73.6	75.2	76.8	%N1	71.1	72.8	74.5	76.2	77.8	27,000
	1350	1388	1428	1469	1511	LB/HR	1415	1454	1496	1540	1584	
	0.280	0.278	0.277	0.275	0.273	NM/LB	0.275	0.274	0.272	0.270	0.268	
28,000	70.4	72.1	73.8	75.5	77.1	%N1	71.3	73.0	74.7	76.4	78.0	28,000
	1363	1402	1441	1484	1526	LB/HR	1427	1467	1509	1553	1598	
	0.2769	0.2758	0.2744	0.2725	0.2706	NM/LB	0.2723	0.2713	0.2699	0.2679	0.266	
29,000	70.7	72.4	74.1	75.7	77.3	%N1	71.5	73.3	75.0	76.6	78.3	29,000
	1376	1415	1455	1498	1540	LB/HR	1440	1481	1523	1568	1613	
	0.274	0.273	0.272	0.270	0.268	NM/LB	0.270	0.269	0.267	0.265	0.264	
30,000	70.9	72.6	74.3	76.0	77.6	%N1	71.8	73.5	75.2	76.9	78.6	30,000
	1389	1428	1468	1512	1555	LB/HR	1454	1495	1538	1583	1628	
	0.2717	0.2707	0.2694	0.2674	0.2655	NM/LB	0.2672	0.2662	0.2648	0.2629	0.2611	
31,000	71.2	72.9	74.6	76.2	77.9	%N1	72.0	73.7	75.4	77.1	78.8	31,000
	1402	1442	1483	1527	1571	LB/HR	1467	1509	1552	1598	1643	
	0.269	0.268	0.267	0.265	0.263	NM/LB	0.265	0.264	0.262	0.261	0.259	
32,000	71.4	73.2	74.9	76.5	78.2	%N1	72.2	73.9	75.7	77.3	79.1	32,000
	1419	1460	1501	1545	1589	LB/HR	1481	1523	1566	1613	1658	
	0.2659	0.2648	0.2635	0.2616	0.2598	NM/LB	0.2623	0.2613	0.2599	0.2581	0.2563	
33,000	71.7	73.4	75.2	76.8	78.5	%N1	72.4	74.2	75.9	77.6	79.3	33,000
	1436	1477	1519	1564	1608	LB/HR	1495	1538	1582	1629	1674	
	0.263	0.262	0.260	0.259	0.257	NM/LB	0.260	0.259	0.257	0.256	0.254	
34,000	72.0	73.7	75.4	77.1	78.8	%N1	72.7	74.5	76.2	77.9	79.7	34,000
	1453	1495	1537	1583	1627	LB/HR	1512	1556	1600	1647	1693	
	0.2596	0.2586	0.2572	0.2554	0.2537	NM/LB	0.2568	0.2558	0.2544	0.2526	0.251	
35,000	72.3	74.0	75.7	77.4	79.1	%N1	73.0	74.7	76.5	78.2	80.0	35,000
	1470	1512	1556	1601	1646	LB/HR	1529	1573	1618	1666	1712	
	0.257	0.256	0.254	0.253	0.251	NM/LB	0.254	0.253	0.252	0.250	0.248	
36,000	72.6	74.3	76.1	77.7	79.5	%N1	73.3	75.0	76.8	78.5	80.3	36,000
	1489	1532	1576	1622	1667	LB/HR	1546	1591	1637	1684	1732	
	0.2534	0.2523	0.251	0.2492	0.2476	NM/LB	0.2512	0.2501	0.2488	0.2471	0.2454	
37,000	72.9	74.7	76.4	78.1	79.9	%N1	73.5	75.3	77.1	78.8	80.6	37,000
	1509	1552	1597	1644	1689	LB/HR	1563	1608	1655	1703	1752	
	0.250	0.249	0.248	0.246	0.244	NM/LB	0.248	0.247	0.246	0.244	0.243	
38,000	73.2	75.0	76.7	78.4	80.2	%N1	73.8	75.6	77.4	79.1	80.9	38,000
	1529	1573	1618	1665	1711	LB/HR	1582	1628	1675	1724	1773	
	0.2468	0.2458	0.2444	0.2428	0.2413	NM/LB	0.2455	0.2444	0.2431	0.2414	0.2397	
39,000	73.5	75.3	77.1	78.8	80.6	%N1	74.2	75.9	77.7	79.4	81.2	39,000
	1548	1593	1639	1687	1734	LB/HR	1602	1648	1696	1745	1796	
	0.244	0.243	0.241	0.240	0.238	NM/LB	0.242	0.241	0.240	0.238	0.237	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.72 Mi						.74 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	71.6	73.4	75.1	76.7	78.4	%N1	72.7	74.4	76.2	77.9	79.6	25,000
	1462	1504	1547	1592	1637	LB/HR	1543	1587	1632	1680	1727	
	0.273	0.272	0.271	0.269	0.267	NM/LB	0.266	0.265	0.264	0.262	0.260	
26,000	71.8	73.6	75.3	77.0	78.7	%N1	72.8	74.6	76.3	78.0	79.8	26,000
	1474	1516	1560	1605	1651	LB/HR	1551	1595	1641	1689	1737	
	0.271	0.2699	0.2685	0.2666	0.2648	NM/LB	0.2648	0.2637	0.2622	0.2605	0.2587	
27,000	72.0	73.8	75.5	77.2	78.9	%N1	73.0	74.7	76.5	78.2	80.0	27,000
	1486	1529	1572	1619	1664	LB/HR	1561	1606	1653	1701	1749	
	0.269	0.268	0.266	0.264	0.263	NM/LB	0.263	0.262	0.260	0.259	0.257	
28,000	72.2	74.0	75.7	77.4	79.1	%N1	73.2	74.9	76.7	78.4	80.2	28,000
	1499	1541	1585	1632	1678	LB/HR	1574	1619	1666	1714	1763	
	0.2666	0.2656	0.2641	0.2623	0.2605	NM/LB	0.2609	0.2598	0.2584	0.2566	0.2549	
29,000	72.4	74.2	75.9	77.6	79.3	%N1	73.4	75.1	76.9	78.6	80.4	29,000
	1511	1554	1598	1645	1691	LB/HR	1586	1631	1679	1728	1777	
	0.265	0.263	0.262	0.260	0.259	NM/LB	0.259	0.258	0.256	0.255	0.253	
30,000	72.6	74.4	76.1	77.8	79.6	%N1	73.6	75.4	77.1	78.8	80.6	30,000
	1523	1567	1612	1659	1706	LB/HR	1598	1644	1692	1741	1791	
	0.2623	0.2612	0.2598	0.258	0.2563	NM/LB	0.2569	0.2559	0.2544	0.2527	0.2508	
31,000	72.9	74.6	76.3	78.0	79.8	%N1	73.8	75.6	77.3	79.0	80.8	31,000
	1537	1581	1627	1674	1721	LB/HR	1610	1657	1705	1754	1805	
	0.260	0.259	0.257	0.256	0.254	NM/LB	0.255	0.254	0.253	0.251	0.249	
32,000	73.1	74.8	76.6	78.3	80.1	%N1	74.0	75.8	77.5	79.3	81.0	32,000
	1551	1595	1641	1689	1737	LB/HR	1624	1671	1719	1769	1821	
	0.2576	0.2565	0.2551	0.2534	0.2517	NM/LB	0.2529	0.2518	0.2504	0.2487	0.2467	
33,000	73.3	75.1	76.8	78.5	80.3	%N1	74.2	76.0	77.8	79.5	81.2	33,000
	1565	1610	1656	1705	1753	LB/HR	1638	1685	1734	1785	1837	
	0.255	0.254	0.253	0.251	0.249	NM/LB	0.251	0.250	0.248	0.247	0.245	
34,000	73.5	75.3	77.0	78.8	80.5	%N1	74.4	76.2	78.0	79.7	81.5	34,000
	1579	1624	1671	1720	1769	LB/HR	1652	1700	1749	1800	1854	
	0.2531	0.252	0.2506	0.2489	0.2471	NM/LB	0.2486	0.2475	0.2461	0.2444	0.2424	
35,000	73.8	75.5	77.3	79.0	80.8	%N1	74.7	76.5	78.2	80.0	81.7	35,000
	1594	1640	1687	1736	1787	LB/HR	1666	1714	1764	1815	1870	
	0.251	0.250	0.248	0.247	0.245	NM/LB	0.247	0.245	0.244	0.242	0.240	
36,000	74.0	75.8	77.6	79.3	81.1	%N1	74.9	76.7	78.5	80.2	81.9	36,000
	1611	1657	1706	1755	1806	LB/HR	1680	1729	1779	1831	1886	
	0.248	0.2469	0.2455	0.2439	0.242	NM/LB	0.2444	0.2433	0.2419	0.2403	0.2382	
37,000	74.3	76.1	77.9	79.6	81.3	%N1	75.1	77.0	78.8	80.5	82.2	37,000
	1628	1675	1724	1774	1826	LB/HR	1696	1745	1796	1848	1904	
	0.245	0.244	0.243	0.241	0.239	NM/LB	0.242	0.241	0.240	0.238	0.236	
38,000	74.6	76.4	78.2	79.9	81.6	%N1	75.4	77.2	79.0	80.8	82.5	38,000
	1645	1693	1742	1793	1846	LB/HR	1713	1763	1815	1868	1924	
	0.2428	0.2417	0.2404	0.2388	0.2368	NM/LB	0.2397	0.2385	0.2371	0.2355	0.2335	
39,000	74.9	76.7	78.5	80.2	81.9	%N1	75.7	77.5	79.3	81.0	82.8	39,000
	1662	1711	1760	1811	1866	LB/HR	1732	1782	1835	1888	1944	
	0.240	0.239	0.238	0.236	0.234	NM/LB	0.237	0.236	0.235	0.233	0.231	

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.76 Mi						.78 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	73.9	75.7	77.4	79.2	80.9	%N1	75.3	77.1	78.9	80.6	82.4	25,000
	1634	1681	1730	1780	1832	LB/HR	1740	1791	1844	1898	1954	
	0.258	0.257	0.256	0.254	0.252	NM/LB	0.249	0.248	0.246	0.244	0.242	
26,000	74.0	75.8	77.6	79.3	81.0	%N1	75.4	77.2	79.0	80.8	82.5	26,000
	1642	1689	1739	1789	1842	LB/HR	1749	1800	1853	1907	1963	
	0.2568	0.2557	0.2542	0.2525	0.2505	NM/LB	0.2475	0.2463	0.2449	0.2432	0.2412	
27,000	74.2	75.9	77.7	79.4	81.2	%N1	75.5	77.3	79.1	80.9	82.6	27,000
	1651	1698	1748	1798	1852	LB/HR	1757	1808	1862	1916	1972	
	0.256	0.254	0.253	0.251	0.249	NM/LB	0.246	0.245	0.244	0.242	0.240	
28,000	74.3	76.1	77.9	79.6	81.3	%N1	75.6	77.5	79.3	81.0	82.8	28,000
	1660	1707	1757	1808	1862	LB/HR	1766	1817	1871	1925	1981	
	0.2541	0.253	0.2515	0.2499	0.2478	NM/LB	0.2451	0.244	0.2425	0.2408	0.239	
29,000	74.5	76.3	78.1	79.8	81.5	%N1	75.8	77.6	79.4	81.1	82.9	29,000
	1672	1720	1770	1822	1876	LB/HR	1774	1826	1880	1935	1991	
	0.252	0.251	0.250	0.248	0.246	NM/LB	0.244	0.243	0.241	0.240	0.238	
30,000	74.7	76.5	78.3	80.0	81.7	%N1	75.9	77.7	79.5	81.3	83.1	30,000
	1684	1733	1784	1835	1891	LB/HR	1787	1838	1892	1948	2003	
	0.2504	0.2493	0.2478	0.2462	0.2441	NM/LB	0.2423	0.2412	0.2397	0.2381	0.2364	
31,000	74.9	76.7	78.5	80.2	81.9	%N1	76.1	77.9	79.7	81.5	83.3	31,000
	1697	1746	1797	1849	1905	LB/HR	1800	1852	1907	1963	2018	
	0.249	0.247	0.246	0.244	0.242	NM/LB	0.240	0.239	0.238	0.236	0.235	
32,000	75.1	76.9	78.7	80.4	82.1	%N1	76.3	78.1	79.9	81.7	83.5	32,000
	1709	1759	1810	1863	1919	LB/HR	1814	1866	1921	1978	2033	
	0.2467	0.2456	0.2442	0.2426	0.2404	NM/LB	0.2386	0.2375	0.2361	0.2345	0.233	
33,000	75.3	77.1	78.9	80.6	82.3	%N1	76.4	78.3	80.1	81.9	83.7	33,000
	1722	1772	1824	1877	1934	LB/HR	1827	1881	1936	1992	2048	
	0.245	0.244	0.242	0.241	0.239	NM/LB	0.237	0.236	0.234	0.233	0.231	
34,000	75.5	77.3	79.1	80.9	82.6	%N1	76.6	78.5	80.3	82.1	83.9	34,000
	1737	1788	1841	1894	1950	LB/HR	1841	1895	1950	2007	2063	
	0.2427	0.2416	0.2402	0.2385	0.2366	NM/LB	0.2351	0.234	0.2326	0.231	0.2295	
35,000	75.7	77.5	79.3	81.1	82.8	%N1	76.8	78.7	80.5	82.3	84.1	35,000
	1753	1804	1857	1911	1967	LB/HR	1855	1909	1965	2023	2080	
	0.241	0.240	0.238	0.236	0.235	NM/LB	0.233	0.232	0.231	0.229	0.228	
36,000	75.9	77.7	79.5	81.3	83.1	%N1	77.0	78.9	80.7	82.5	84.3	36,000
	1769	1820	1874	1928	1984	LB/HR	1872	1926	1982	2041	2098	
	0.2384	0.2373	0.2359	0.2343	0.2326	NM/LB	0.2313	0.2302	0.2288	0.2273	0.2257	
37,000	76.1	78.0	79.8	81.5	83.3	%N1	77.2	79.1	80.9	82.7	84.5	37,000
	1784	1836	1890	1945	2001	LB/HR	1888	1943	2000	2058	2117	
	0.236	0.235	0.234	0.232	0.231	NM/LB	0.229	0.228	0.227	0.225	0.224	
38,000	76.3	78.2	80.0	81.7	83.5	%N1	77.5	79.3	81.2	82.9	84.7	38,000
	1800	1852	1907	1962	2018	LB/HR	1904	1960	2017	2076	2135	
	0.2343	0.2332	0.2318	0.2302	0.2287	NM/LB	0.2273	0.2263	0.2249	0.2234	0.2218	
39,000	76.5	78.4	80.2	82.0	83.8	%N1	77.7	79.6	81.4	83.2	85.0	39,000
	1817	1870	1925	1981	2036	LB/HR	1920	1976	2034	2094	2154	
	0.232	0.231	0.230	0.228	0.227	NM/LB	0.225	0.224	0.223	0.222	0.220	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.8 Mi						.81 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	76.5	78.3	80.1	81.9	83.7	%N1	77.2	79.1	80.9	82.6	84.4	25,000
	1849	1902	1958	2015	2072	LB/HR	1915	1971	2028	2088	2148	
	0.240	0.239	0.238	0.236	0.234	NM/LB	0.235	0.234	0.232	0.231	0.229	
26,000	76.6	78.5	80.3	82.0	83.9	%N1	77.3	79.2	81.0	82.8	84.6	26,000
	1858	1912	1967	2025	2082	LB/HR	1925	1981	2039	2098	2159	
	0.239	0.2379	0.2365	0.2348	0.2333	NM/LB	0.2335	0.2324	0.2311	0.2295	0.2278	
27,000	76.7	78.6	80.4	82.2	84.0	%N1	77.4	79.3	81.1	82.9	84.7	27,000
	1867	1921	1977	2035	2092	LB/HR	1935	1991	2049	2109	2170	
	0.238	0.237	0.235	0.234	0.232	NM/LB	0.232	0.231	0.230	0.228	0.227	
28,000	76.8	78.7	80.5	82.3	84.1	%N1	77.6	79.5	81.3	83.1	84.8	28,000
	1876	1930	1986	2045	2103	LB/HR	1945	2001	2060	2120	2181	
	0.2367	0.2356	0.2342	0.2326	0.231	NM/LB	0.2311	0.2301	0.2287	0.2272	0.2254	
29,000	77.0	78.8	80.6	82.4	84.2	%N1	77.7	79.6	81.4	83.2	85.0	29,000
	1885	1939	1996	2055	2113	LB/HR	1955	2011	2070	2131	2193	
	0.236	0.235	0.233	0.232	0.230	NM/LB	0.230	0.229	0.228	0.226	0.224	
30,000	77.1	78.9	80.8	82.5	84.3	%N1	77.8	79.7	81.6	83.3	85.1	30,000
	1894	1949	2005	2064	2123	LB/HR	1965	2022	2081	2142	2204	
	0.2344	0.2334	0.232	0.2304	0.2288	NM/LB	0.2288	0.2277	0.2264	0.2249	0.2231	
31,000	77.2	79.1	80.9	82.7	84.5	%N1	78.0	79.9	81.7	83.5	85.2	31,000
	1903	1959	2016	2075	2134	LB/HR	1975	2032	2091	2152	2215	
	0.233	0.232	0.231	0.229	0.228	NM/LB	0.228	0.227	0.225	0.224	0.222	
32,000	77.4	79.3	81.1	82.9	84.7	%N1	78.1	80.0	81.8	83.6	85.4	32,000
	1917	1973	2030	2090	2150	LB/HR	1986	2044	2103	2165	2228	
	0.2316	0.2305	0.2292	0.2276	0.2259	NM/LB	0.2263	0.2253	0.224	0.2225	0.2207	
33,000	77.6	79.4	81.3	83.1	84.8	%N1	78.3	80.2	82.0	83.8	85.6	33,000
	1931	1987	2044	2104	2165	LB/HR	2000	2058	2118	2180	2244	
	0.230	0.229	0.228	0.226	0.224	NM/LB	0.225	0.224	0.223	0.221	0.219	
34,000	77.7	79.6	81.5	83.2	85.0	%N1	78.5	80.4	82.2	84.0	85.8	34,000
	1944	2001	2059	2119	2181	LB/HR	2014	2072	2132	2195	2260	
	0.2283	0.2273	0.226	0.2244	0.2227	NM/LB	0.2232	0.2222	0.2209	0.2194	0.2176	
35,000	77.9	79.8	81.6	83.4	85.2	%N1	78.7	80.6	82.4	84.2	86.0	35,000
	1958	2015	2073	2134	2196	LB/HR	2027	2086	2147	2210	2276	
	0.227	0.226	0.224	0.223	0.221	NM/LB	0.222	0.221	0.219	0.218	0.216	
36,000	78.1	80.0	81.8	83.6	85.4	%N1	78.8	80.7	82.6	84.4	86.1	36,000
	1971	2029	2087	2149	2212	LB/HR	2041	2101	2161	2225	2291	
	0.2252	0.2242	0.2229	0.2213	0.2196	NM/LB	0.2202	0.2192	0.218	0.2164	0.2146	
37,000	78.3	80.2	82.0	83.8	85.6	%N1	79.0	80.9	82.8	84.6	86.3	37,000
	1986	2044	2103	2165	2229	LB/HR	2055	2115	2176	2240	2307	
	0.224	0.223	0.221	0.220	0.218	NM/LB	0.219	0.218	0.217	0.215	0.213	
38,000	78.5	80.4	82.3	84.1	85.8	%N1	79.2	81.1	83.0	84.8	86.5	38,000
	2002	2061	2120	2183	2247	LB/HR	2070	2130	2192	2256	2324	
	0.2217	0.2207	0.2195	0.2179	0.2162	NM/LB	0.2171	0.2161	0.2149	0.2134	0.2116	
39,000	78.7	80.6	82.5	84.3	86.0	%N1	79.4	81.3	83.2	85.0	86.7	39,000
	2019	2077	2137	2200	2266	LB/HR	2086	2147	2209	2274	2342	
	0.220	0.219	0.218	0.216	0.214	NM/LB	0.216	0.215	0.213	0.212	0.210	

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.82 Mi						.83 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.9	79.8	81.6	83.4	85.2	%N1	79.3	81.2	83.1	84.9	86.6	25,000
	1985	2042	2102	2163	2227	LB/HR	2104	2165	2228	2294	2363	
	0.229	0.228	0.227	0.225	0.224	NM/LB	0.219	0.218	0.217	0.215	0.213	
26,000	78.0	79.9	81.8	83.5	85.3	%N1	79.4	81.3	83.2	85.0	86.7	26,000
	1993	2051	2111	2172	2236	LB/HR	2112	2174	2237	2303	2372	
	0.2283	0.2273	0.226	0.2244	0.2226	NM/LB	0.2181	0.217	0.2158	0.2142	0.2125	
27,000	78.2	80.1	81.9	83.7	85.4	%N1	79.5	81.4	83.3	85.1	86.8	27,000
	2004	2062	2122	2184	2249	LB/HR	2123	2186	2250	2316	2384	
	0.227	0.226	0.225	0.223	0.221	NM/LB	0.217	0.216	0.215	0.213	0.211	
28,000	78.3	80.2	82.1	83.8	85.6	%N1	79.6	81.6	83.4	85.3	87.0	28,000
	2015	2073	2134	2196	2261	LB/HR	2136	2198	2263	2329	2397	
	0.2259	0.2248	0.2235	0.222	0.2202	NM/LB	0.2156	0.2146	0.2134	0.2119	0.2102	
29,000	78.5	80.4	82.2	84.0	85.7	%N1	79.8	81.7	83.6	85.4	87.2	29,000
	2025	2084	2145	2208	2273	LB/HR	2148	2211	2276	2343	2411	
	0.225	0.224	0.222	0.221	0.219	NM/LB	0.214	0.213	0.212	0.211	0.209	
30,000	78.6	80.5	82.3	84.2	85.9	%N1	79.9	81.8	83.7	85.5	87.3	30,000
	2036	2096	2156	2220	2286	LB/HR	2160	2224	2289	2356	2424	
	0.2235	0.2224	0.2212	0.2196	0.2178	NM/LB	0.2132	0.2122	0.2109	0.2094	0.2079	
31,000	78.7	80.6	82.5	84.3	86.0	%N1	80.1	82.0	83.9	85.7	87.5	31,000
	2047	2107	2168	2232	2298	LB/HR	2173	2236	2302	2369	2438	
	0.222	0.221	0.220	0.219	0.217	NM/LB	0.212	0.211	0.210	0.208	0.207	
32,000	78.9	80.8	82.6	84.5	86.2	%N1	80.2	82.1	84.0	85.8	87.6	32,000
	2058	2118	2179	2243	2311	LB/HR	2185	2249	2315	2383	2452	
	0.2211	0.2201	0.2188	0.2173	0.2155	NM/LB	0.2108	0.2098	0.2085	0.2071	0.2056	
33,000	79.0	81.0	82.8	84.6	86.3	%N1	80.3	82.3	84.1	86.0	87.8	33,000
	2071	2131	2193	2257	2325	LB/HR	2197	2262	2328	2396	2465	
	0.220	0.219	0.218	0.216	0.214	NM/LB	0.210	0.209	0.207	0.206	0.204	
34,000	79.2	81.1	83.0	84.8	86.5	%N1	80.5	82.4	84.3	86.2	87.9	34,000
	2085	2146	2208	2273	2341	LB/HR	2213	2278	2345	2413	2483	
	0.2183	0.2172	0.216	0.2145	0.2127	NM/LB	0.2082	0.2071	0.2059	0.2045	0.203	
35,000	79.4	81.3	83.2	85.0	86.7	%N1	80.7	82.6	84.5	86.3	88.1	35,000
	2099	2161	2223	2289	2357	LB/HR	2229	2294	2362	2431	2501	
	0.217	0.216	0.215	0.213	0.211	NM/LB	0.207	0.206	0.204	0.203	0.202	
36,000	79.6	81.5	83.4	85.2	86.9	%N1	80.8	82.8	84.7	86.5	88.3	36,000
	2114	2176	2239	2305	2373	LB/HR	2245	2311	2379	2449	2520	
	0.2153	0.2142	0.213	0.2115	0.2098	NM/LB	0.2052	0.2041	0.2029	0.2015	0.2	
37,000	79.7	81.7	83.5	85.3	87.1	%N1	81.0	83.0	84.9	86.7	88.5	37,000
	2129	2191	2255	2321	2389	LB/HR	2261	2328	2396	2467	2538	
	0.214	0.213	0.212	0.210	0.208	NM/LB	0.204	0.203	0.201	0.200	0.199	
38,000	79.9	81.8	83.7	85.5	87.3	%N1	81.2	83.2	85.1	86.9	88.7	38,000
	2143	2206	2271	2337	2405	LB/HR	2277	2344	2414	2484	2557	
	0.2123	0.2113	0.21	0.2086	0.207	NM/LB	0.2022	0.2012	0.2	0.1986	0.1971	
39,000	80.1	82.0	83.9	85.7	87.5	%N1	81.4	83.3	85.3	87.1	88.9	39,000
	2159	2222	2287	2355	2422	LB/HR	2294	2361	2431	2502	2575	
	0.211	0.210	0.209	0.207	0.206	NM/LB	0.201	0.200	0.199	0.197	0.196	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.84 Mi						.85 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	80.5	82.5	84.4	86.2	88.0	%N1	81.8	83.8	85.7	87.5	89.4	25,000
	2232	2298	2365	2435	2505	LB/HR	2364	2434	2506	2579	2654	
	0.209	0.208	0.207	0.205	0.204	NM/LB	0.200	0.199	0.197	0.196	0.195	
26,000	80.6	82.6	84.5	86.3	88.1	%N1	81.9	83.9	85.8	87.7	89.5	26,000
	2242	2308	2376	2445	2516	LB/HR	2375	2445	2518	2591	2667	
	0.2079	0.2069	0.2056	0.2042	0.2027	NM/LB	0.1986	0.1976	0.1963	0.1951	0.1935	
27,000	80.8	82.7	84.6	86.4	88.2	%N1	82.0	84.0	85.9	87.8	89.6	27,000
	2252	2318	2387	2456	2527	LB/HR	2386	2456	2530	2603	2679	
	0.207	0.206	0.205	0.203	0.202	NM/LB	0.198	0.197	0.195	0.194	0.193	
28,000	80.9	82.8	84.7	86.6	88.4	%N1	82.2	84.2	86.1	87.9	89.8	28,000
	2265	2332	2401	2471	2542	LB/HR	2399	2469	2543	2616	2693	
	0.2058	0.2048	0.2035	0.2021	0.2006	NM/LB	0.1966	0.1957	0.1944	0.1931	0.1916	
29,000	81.0	83.0	84.9	86.7	88.5	%N1	82.3	84.3	86.2	88.1	89.9	29,000
	2278	2345	2415	2485	2557	LB/HR	2413	2484	2558	2632	2709	
	0.205	0.204	0.202	0.201	0.199	NM/LB	0.196	0.195	0.193	0.192	0.191	
30,000	81.2	83.1	85.0	86.9	88.7	%N1	82.5	84.5	86.4	88.3	90.1	30,000
	2291	2359	2429	2499	2572	LB/HR	2427	2498	2573	2647	2725	
	0.2034	0.2024	0.2012	0.1998	0.1983	NM/LB	0.1944	0.1934	0.1921	0.1909	0.1894	
31,000	81.3	83.3	85.2	87.0	88.9	%N1	82.6	84.6	86.6	88.4		31,000
	2304	2372	2443	2514	2587	LB/HR	2441	2513	2588	2663		
	0.202	0.201	0.200	0.199	0.197	NM/LB	0.193	0.192	0.191	0.190		
32,000	81.5	83.4	85.3	87.2	89.0	%N1	82.8	84.8	86.7	88.6		32,000
	2318	2386	2457	2528	2602	LB/HR	2455	2527	2603	2678		
	0.2011	0.2001	0.1989	0.1975	0.196	NM/LB	0.1921	0.1912	0.1899	0.1887		
33,000	81.6	83.6	85.5	87.4	89.2	%N1	82.9	84.9	86.9	88.8		33,000
	2331	2399	2471	2543	2617	LB/HR	2469	2542	2618	2693		
	0.200	0.199	0.198	0.196	0.195	NM/LB	0.191	0.190	0.189	0.188		
34,000	81.8	83.7	85.6	87.5	89.3	%N1	83.1	85.1	87.0	88.9		34,000
	2344	2413	2485	2557	2632	LB/HR	2483	2556	2633	2709		
	0.1989	0.1979	0.1966	0.1953	0.1938	NM/LB	0.19	0.189	0.1877	0.1865		
35,000	82.0	83.9	85.8	87.7	89.5	%N1	83.3	85.3	87.2	89.1		35,000
	2362	2431	2504	2576	2652	LB/HR	2499	2573	2650	2726		
	0.197	0.196	0.195	0.194	0.192	NM/LB	0.189	0.188	0.187	0.185		
36,000	82.1	84.1	86.0	87.9	89.7	%N1	83.5	85.5	87.4	89.3		36,000
	2379	2449	2523	2596	2672	LB/HR	2519	2593	2671	2748		
	0.1959	0.1949	0.1937	0.1924	0.1909	NM/LB	0.1873	0.1863	0.1851	0.1839		
37,000	82.3	84.3	86.3	88.1	90.0	%N1	83.7	85.7	87.6	89.5		37,000
	2397	2468	2541	2615	2692	LB/HR	2539	2614	2692	2770		
	0.194	0.194	0.192	0.191	0.190	NM/LB	0.186	0.185	0.184	0.182		
38,000	82.5	84.5	86.5	88.3	90.2	%N1	83.9	85.9	87.8	89.7		38,000
	2415	2486	2560	2634	2712	LB/HR	2559	2635	2713	2792		
	0.193	0.1921	0.1908	0.1896	0.1881	NM/LB	0.1843	0.1834	0.1822	0.181		
39,000	82.7	84.7	86.7	88.5		%N1	84.1	86.1	88.1	90.0		39,000
	2432	2504	2579	2654		LB/HR	2579	2656	2735	2814		
	0.192	0.191	0.189	0.188		NM/LB	0.183	0.182	0.181	0.180		

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.6 Mi						.62 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	66.5	68.2	69.8	71.3	72.9	%N1	67.2	68.8	70.5	72.1	73.6	25,000
	1028	1059	1090	1121	1153	LB/HR	1071	1104	1135	1168	1201	
	0.321	0.319	0.317	0.316	0.313	NM/LB	0.318	0.316	0.315	0.313	0.311	
26,000	66.9	68.6	70.2	71.8	73.3	%N1	67.5	69.2	70.8	72.4	74.0	26,000
	1047	1078	1110	1141	1174	LB/HR	1088	1120	1153	1185	1220	
	0.3149	0.3133	0.3117	0.3099	0.3077	NM/LB	0.3132	0.3116	0.3101	0.3083	0.3061	
27,000	67.3	69.0	70.6	72.2	73.8	%N1	67.9	69.6	71.2	72.8	74.4	27,000
	1065	1098	1129	1162	1195	LB/HR	1105	1138	1171	1204	1239	
	0.309	0.308	0.306	0.305	0.302	NM/LB	0.308	0.307	0.305	0.304	0.301	
28,000	67.7	69.4	71.0	72.6	74.2	%N1	68.3	70.0	71.6	73.2	74.9	28,000
	1084	1117	1149	1182	1216	LB/HR	1124	1157	1190	1225	1260	
	0.3041	0.3025	0.301	0.2992	0.2971	NM/LB	0.3032	0.3016	0.3002	0.2984	0.2963	
29,000	68.2	69.9	71.5	73.1	74.7	%N1	68.7	70.4	72.0	73.7	75.3	29,000
	1106	1139	1172	1206	1240	LB/HR	1142	1177	1210	1245	1281	
	0.298	0.297	0.295	0.293	0.291	NM/LB	0.298	0.297	0.295	0.293	0.291	
30,000	68.6	70.3	72.0	73.6	75.2	%N1	69.1	70.8	72.5	74.1	75.8	30,000
	1127	1162	1195	1229	1265	LB/HR	1161	1196	1230	1266	1302	
	0.2924	0.2908	0.2895	0.2877	0.2856	NM/LB	0.2934	0.2919	0.2906	0.2887	0.2867	
31,000	69.1	70.8	72.5	74.1	75.8	%N1	69.6	71.3	73.0	74.6	76.3	31,000
	1149	1184	1218	1253	1289	LB/HR	1184	1220	1254	1291	1328	
	0.287	0.285	0.284	0.282	0.280	NM/LB	0.288	0.286	0.285	0.283	0.281	
32,000	69.6	71.3	73.0	74.6	76.3	%N1	70.1	71.8	73.5	75.1	76.8	32,000
	1171	1207	1241	1277	1314	LB/HR	1207	1243	1278	1316	1354	
	0.2815	0.28	0.2788	0.2769	0.275	NM/LB	0.2823	0.2809	0.2796	0.2777	0.2758	
33,000	70.0	71.8	73.5	75.1	76.8	%N1	70.5	72.3	74.0	75.7	77.3	33,000
	1193	1229	1263	1301	1338	LB/HR	1230	1267	1302	1341	1380	
	0.276	0.275	0.274	0.272	0.270	NM/LB	0.277	0.276	0.275	0.273	0.271	
34,000	70.5	72.2	73.9	75.6	77.2	%N1	71.0	72.8	74.5	76.2	77.8	34,000
	1214	1251	1286	1325	1363	LB/HR	1253	1291	1327	1367	1406	
	0.2714	0.27	0.2689	0.267	0.2651	NM/LB	0.2718	0.2704	0.2693	0.2673	0.2655	
35,000	71.0	72.7	74.4	76.1	77.7	%N1	71.5	73.2	74.9	76.6	78.3	35,000
	1237	1275	1311	1350	1389	LB/HR	1278	1316	1354	1394	1434	
	0.266	0.265	0.264	0.262	0.260	NM/LB	0.267	0.265	0.264	0.262	0.260	
36,000	71.4	73.2	74.9	76.6	78.2	%N1	71.9	73.7	75.4	77.1	78.8	36,000
	1262	1300	1337	1377	1416	LB/HR	1302	1341	1380	1421	1461	
	0.2613	0.2599	0.2588	0.2569	0.2552	NM/LB	0.2616	0.2603	0.259	0.2572	0.2556	
37,000	71.9	73.6	75.4	77.1	78.7	%N1	72.4	74.1	75.9	77.6	79.3	37,000
	1286	1325	1363	1403	1443	LB/HR	1327	1367	1407	1448	1489	
	0.256	0.255	0.254	0.252	0.251	NM/LB	0.257	0.255	0.254	0.252	0.251	
38,000	72.3	74.1	75.9	77.6	79.3	%N1	72.8	74.6	76.4	78.1	79.8	38,000
	1312	1352	1391	1432	1472	LB/HR	1353	1394	1435	1477	1518	
	0.2513	0.25	0.2487	0.247	0.2455	NM/LB	0.2517	0.2505	0.2491	0.2474	0.246	
39,000						%N1	73.3	75.1	76.9	78.6	80.4	39,000
						LB/HR	1380	1421	1463	1506	1547	
						NM/LB	0.247	0.246	0.244	0.243	0.241	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.64 Mi						.66 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	67.9	69.5	71.2	72.8	74.4	%N1	68.7	70.4	72.1	73.7	75.4	25,000
	1117	1150	1183	1217	1252	LB/HR	1170	1205	1239	1275	1311	
	0.315	0.313	0.312	0.310	0.308	NM/LB	0.310	0.309	0.307	0.305	0.303	
26,000	68.2	69.9	71.5	73.2	74.8	%N1	69.0	70.7	72.3	74.0	75.7	26,000
	1133	1167	1200	1235	1270	LB/HR	1182	1217	1252	1288	1325	
	0.3103	0.3088	0.3074	0.3055	0.3034	NM/LB	0.3067	0.3053	0.3038	0.302	0.2999	
27,000	68.6	70.2	71.9	73.5	75.2	%N1	69.3	71.0	72.7	74.3	76.0	27,000
	1149	1184	1218	1253	1289	LB/HR	1197	1233	1268	1305	1342	
	0.306	0.304	0.303	0.301	0.299	NM/LB	0.303	0.302	0.300	0.298	0.296	
28,000	68.9	70.6	72.3	73.9	75.6	%N1	69.6	71.3	73.0	74.7	76.4	28,000
	1166	1201	1235	1271	1307	LB/HR	1214	1249	1285	1322	1360	
	0.3016	0.3001	0.2987	0.2969	0.2949	NM/LB	0.2988	0.2975	0.2961	0.2942	0.2922	
29,000	69.3	71.0	72.7	74.3	76.0	%N1	70.0	71.7	73.4	75.0	76.7	29,000
	1184	1219	1254	1290	1327	LB/HR	1230	1266	1302	1340	1379	
	0.297	0.296	0.294	0.292	0.290	NM/LB	0.295	0.294	0.292	0.290	0.288	
30,000	69.7	71.4	73.1	74.7	76.4	%N1	70.3	72.0	73.7	75.4	77.1	30,000
	1203	1238	1274	1311	1348	LB/HR	1247	1283	1320	1358	1398	
	0.2924	0.291	0.2897	0.2878	0.2858	NM/LB	0.2909	0.2896	0.2883	0.2864	0.2843	
31,000	70.1	71.8	73.5	75.2	76.8	%N1	70.7	72.4	74.1	75.8	77.4	31,000
	1222	1258	1293	1332	1370	LB/HR	1265	1302	1339	1379	1419	
	0.288	0.287	0.285	0.283	0.281	NM/LB	0.287	0.285	0.284	0.282	0.280	
32,000	70.5	72.2	73.9	75.6	77.2	%N1	71.1	72.8	74.5	76.2	77.8	32,000
	1241	1277	1314	1352	1391	LB/HR	1284	1322	1360	1400	1441	
	0.2834	0.2821	0.2809	0.2789	0.277	NM/LB	0.2824	0.2812	0.2798	0.2779	0.2759	
33,000	71.0	72.7	74.4	76.1	77.7	%N1	71.4	73.2	74.9	76.6	78.2	33,000
	1265	1302	1339	1379	1419	LB/HR	1304	1342	1380	1421	1462	
	0.278	0.277	0.276	0.274	0.272	NM/LB	0.278	0.277	0.276	0.274	0.272	
34,000	71.4	73.1	74.9	76.6	78.2	%N1	71.7	73.5	75.2	76.9	78.6	34,000
	1289	1327	1365	1406	1446	LB/HR	1323	1362	1401	1443	1484	
	0.2728	0.2716	0.2703	0.2684	0.2666	NM/LB	0.2741	0.2729	0.2715	0.2696	0.2678	
35,000	71.8	73.6	75.3	77.0	78.7	%N1	72.2	74.0	75.7	77.4	79.1	35,000
	1313	1352	1391	1432	1473	LB/HR	1348	1388	1428	1471	1512	
	0.268	0.267	0.265	0.263	0.262	NM/LB	0.269	0.268	0.266	0.265	0.263	
36,000	72.3	74.1	75.8	77.5	79.2	%N1	72.6	74.4	76.2	77.9	79.6	36,000
	1339	1378	1418	1460	1501	LB/HR	1374	1414	1456	1499	1541	
	0.2627	0.2614	0.2601	0.2583	0.2567	NM/LB	0.264	0.2628	0.2614	0.2596	0.258	
37,000	72.8	74.5	76.3	78.0	79.8	%N1	73.1	74.9	76.7	78.4	80.2	37,000
	1365	1406	1447	1490	1531	LB/HR	1399	1440	1483	1527	1569	
	0.258	0.256	0.255	0.253	0.252	NM/LB	0.259	0.258	0.257	0.255	0.253	
38,000	73.2	75.0	76.8	78.5	80.3	%N1	73.6	75.4	77.1	78.9	80.7	38,000
	1392	1433	1476	1519	1561	LB/HR	1425	1467	1511	1555	1598	
	0.2526	0.2514	0.25	0.2483	0.2469	NM/LB	0.2544	0.2533	0.2518	0.2501	0.2486	
39,000	73.7	75.5	77.3	79.1	80.8	%N1	74.1	75.9	77.7	79.4	81.2	39,000
	1419	1461	1504	1549	1591	LB/HR	1454	1497	1542	1587	1633	
	0.248	0.247	0.245	0.244	0.242	NM/LB	0.249	0.248	0.247	0.245	0.243	

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.68 Mi						.7 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	69.6	71.3	73.0	74.6	76.3	%N1	70.5	72.2	73.9	75.6	77.2	25,000
	1225	1261	1297	1335	1373	LB/HR	1283	1320	1358	1398	1439	
	0.305	0.304	0.302	0.300	0.298	NM/LB	0.300	0.299	0.297	0.295	0.293	
26,000	69.9	71.6	73.3	74.9	76.6	%N1	70.7	72.5	74.2	75.9	77.5	26,000
	1238	1274	1311	1349	1388	LB/HR	1296	1333	1371	1411	1453	
	0.3017	0.3005	0.299	0.2971	0.2951	NM/LB	0.2969	0.2958	0.2943	0.2924	0.2901	
27,000	70.1	71.8	73.5	75.2	76.9	%N1	71.0	72.7	74.5	76.1	77.8	27,000
	1251	1287	1324	1363	1403	LB/HR	1309	1346	1385	1426	1468	
	0.299	0.297	0.296	0.294	0.292	NM/LB	0.294	0.293	0.291	0.289	0.287	
28,000	70.4	72.1	73.8	75.5	77.1	%N1	71.2	73.0	74.7	76.4	78.0	28,000
	1264	1301	1338	1377	1417	LB/HR	1322	1360	1400	1441	1483	
	0.2956	0.2944	0.293	0.2911	0.2889	NM/LB	0.2909	0.2898	0.2883	0.2864	0.2842	
29,000	70.7	72.4	74.2	75.9	77.5	%N1	71.5	73.2	74.9	76.6	78.3	29,000
	1280	1317	1355	1395	1436	LB/HR	1336	1374	1414	1456	1498	
	0.292	0.291	0.289	0.287	0.285	NM/LB	0.288	0.287	0.285	0.284	0.281	
30,000	71.0	72.8	74.5	76.2	77.8	%N1	71.7	73.5	75.2	76.9	78.6	30,000
	1297	1334	1373	1413	1455	LB/HR	1350	1389	1429	1471	1514	
	0.2881	0.287	0.2856	0.2836	0.2815	NM/LB	0.2849	0.2838	0.2823	0.2804	0.2783	
31,000	71.3	73.1	74.8	76.5	78.1	%N1	72.0	73.8	75.5	77.2	78.9	31,000
	1314	1352	1391	1432	1473	LB/HR	1367	1406	1447	1490	1533	
	0.284	0.283	0.282	0.280	0.278	NM/LB	0.281	0.280	0.279	0.277	0.275	
32,000	71.6	73.4	75.1	76.8	78.5	%N1	72.3	74.1	75.8	77.5	79.3	32,000
	1330	1369	1409	1450	1492	LB/HR	1384	1423	1465	1508	1552	
	0.2808	0.2797	0.2782	0.2764	0.2744	NM/LB	0.278	0.2769	0.2754	0.2735	0.2716	
33,000	72.0	73.7	75.5	77.2	78.9	%N1	72.6	74.4	76.1	77.8	79.6	33,000
	1350	1389	1429	1472	1514	LB/HR	1400	1441	1483	1527	1571	
	0.277	0.276	0.274	0.272	0.271	NM/LB	0.275	0.274	0.272	0.270	0.268	
34,000	72.3	74.1	75.8	77.5	79.3	%N1	72.9	74.7	76.4	78.2	79.9	34,000
	1369	1409	1450	1493	1536	LB/HR	1417	1458	1501	1546	1590	
	0.2729	0.2717	0.2703	0.2685	0.2666	NM/LB	0.2714	0.2703	0.2687	0.267	0.2651	
35,000	72.6	74.4	76.2	77.9	79.7	%N1	73.2	75.0	76.8	78.5	80.3	35,000
	1389	1429	1471	1515	1558	LB/HR	1437	1479	1522	1567	1612	
	0.269	0.268	0.266	0.265	0.263	NM/LB	0.268	0.267	0.265	0.263	0.262	
36,000	73.0	74.8	76.5	78.3	80.0	%N1	73.6	75.4	77.1	78.9	80.7	36,000
	1408	1449	1492	1536	1579	LB/HR	1456	1499	1543	1589	1635	
	0.2653	0.2642	0.2627	0.2609	0.2593	NM/LB	0.2641	0.263	0.2614	0.2597	0.2578	
37,000	73.4	75.2	77.0	78.8	80.6	%N1	73.9	75.7	77.5	79.3	81.0	37,000
	1434	1476	1520	1565	1609	LB/HR	1476	1519	1565	1610	1658	
	0.261	0.259	0.258	0.256	0.255	NM/LB	0.261	0.260	0.258	0.256	0.254	
38,000	73.9	75.7	77.5	79.3	81.0	%N1	74.2	76.1	77.9	79.6	81.4	38,000
	1460	1503	1548	1594	1640	LB/HR	1496	1539	1586	1632	1681	
	0.2559	0.2547	0.2532	0.2515	0.2497	NM/LB	0.2572	0.256	0.2545	0.2528	0.2507	
39,000	74.4	76.2	78.0	79.7	81.5	%N1	74.7	76.5	78.3	80.1	81.8	39,000
	1487	1530	1576	1623	1671	LB/HR	1521	1566	1613	1660	1711	
	0.251	0.250	0.249	0.247	0.245	NM/LB	0.253	0.252	0.250	0.249	0.246	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.72 Mi						.74 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	71.4	73.2	74.9	76.6	78.3	%N1	72.4	74.1	75.9	77.6	79.4	25,000
	1347	1386	1426	1469	1511	LB/HR	1415	1456	1499	1543	1587	
	0.294	0.293	0.291	0.289	0.287	NM/LB	0.287	0.286	0.285	0.283	0.281	
26,000	71.6	73.4	75.1	76.8	78.5	%N1	72.6	74.3	76.1	77.8	79.6	26,000
	1359	1399	1439	1482	1525	LB/HR	1427	1469	1512	1557	1600	
	0.291	0.2899	0.2884	0.2864	0.2844	NM/LB	0.2849	0.2837	0.2822	0.2802	0.2784	
27,000	71.8	73.6	75.3	77.1	78.7	%N1	72.8	74.6	76.3	78.0	79.8	27,000
	1371	1411	1452	1495	1538	LB/HR	1439	1481	1525	1570	1614	
	0.289	0.287	0.286	0.284	0.282	NM/LB	0.283	0.281	0.280	0.278	0.276	
28,000	72.1	73.8	75.6	77.3	79.0	%N1	73.0	74.8	76.5	78.3	80.1	28,000
	1385	1425	1467	1510	1554	LB/HR	1451	1494	1538	1583	1628	
	0.2856	0.2845	0.2829	0.281	0.2791	NM/LB	0.2802	0.279	0.2774	0.2755	0.2737	
29,000	72.3	74.1	75.8	77.6	79.3	%N1	73.2	75.0	76.8	78.5	80.3	29,000
	1399	1439	1482	1525	1569	LB/HR	1464	1507	1552	1598	1643	
	0.283	0.282	0.280	0.278	0.276	NM/LB	0.278	0.277	0.275	0.273	0.271	
30,000	72.6	74.3	76.1	77.8	79.6	%N1	73.4	75.2	77.0	78.8	80.5	30,000
	1412	1453	1496	1540	1584	LB/HR	1478	1521	1567	1613	1660	
	0.2801	0.2789	0.2774	0.2755	0.2737	NM/LB	0.2751	0.2739	0.2723	0.2704	0.2685	
31,000	72.8	74.6	76.3	78.1	79.8	%N1	73.7	75.5	77.3	79.0	80.8	31,000
	1426	1468	1511	1555	1600	LB/HR	1492	1536	1582	1628	1676	
	0.277	0.276	0.275	0.273	0.271	NM/LB	0.273	0.271	0.270	0.268	0.266	
32,000	73.1	74.8	76.6	78.4	80.2	%N1	73.9	75.7	77.5	79.3	81.0	32,000
	1442	1484	1527	1573	1617	LB/HR	1506	1550	1596	1644	1692	
	0.2744	0.2733	0.2717	0.2699	0.2681	NM/LB	0.27	0.2688	0.2672	0.2653	0.2633	
33,000	73.3	75.1	76.9	78.7	80.5	%N1	74.2	76.0	77.8	79.5	81.3	33,000
	1458	1501	1546	1591	1637	LB/HR	1520	1565	1611	1659	1708	
	0.271	0.270	0.269	0.267	0.265	NM/LB	0.268	0.266	0.265	0.263	0.261	
34,000	73.6	75.4	77.2	79.0	80.8	%N1	74.5	76.3	78.1	79.8	81.6	34,000
	1475	1519	1564	1610	1657	LB/HR	1536	1582	1629	1677	1728	
	0.2681	0.267	0.2654	0.2636	0.2617	NM/LB	0.2646	0.2634	0.2619	0.2601	0.2579	
35,000	73.9	75.7	77.5	79.3	81.1	%N1	74.7	76.6	78.4	80.2	81.9	35,000
	1492	1536	1582	1629	1677	LB/HR	1554	1599	1647	1696	1747	
	0.265	0.264	0.262	0.261	0.259	NM/LB	0.262	0.261	0.259	0.257	0.255	
36,000	74.2	76.1	77.8	79.6	81.4	%N1	75.0	76.9	78.7	80.5	82.2	36,000
	1510	1554	1600	1648	1697	LB/HR	1571	1617	1666	1715	1767	
	0.2621	0.2609	0.2593	0.2576	0.2555	NM/LB	0.2589	0.2577	0.2561	0.2543	0.2521	
37,000	74.6	76.4	78.2	80.0	81.7	%N1	75.3	77.2	79.0	80.8	82.5	37,000
	1530	1575	1622	1670	1721	LB/HR	1588	1635	1684	1734	1787	
	0.259	0.257	0.256	0.254	0.252	NM/LB	0.256	0.255	0.253	0.252	0.249	
38,000	74.9	76.8	78.6	80.4	82.1	%N1	75.6	77.5	79.3	81.1	82.8	38,000
	1551	1596	1644	1693	1745	LB/HR	1606	1654	1704	1755	1807	
	0.2551	0.254	0.2524	0.2507	0.2485	NM/LB	0.2531	0.252	0.2503	0.2486	0.2465	
39,000	75.3	77.1	79.0	80.7	82.5	%N1	75.9	77.8	79.6	81.4	83.2	39,000
	1571	1618	1666	1716	1769	LB/HR	1629	1678	1729	1780	1833	
	0.252	0.251	0.249	0.247	0.245	NM/LB	0.250	0.248	0.247	0.245	0.243	

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.76 Mi						.78 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	73.5	75.3	77.0	78.8	80.6	%N1	74.8	76.7	78.5	80.3	82.0	25,000
	1493	1537	1583	1630	1677	LB/HR	1588	1635	1684	1734	1786	
	0.280	0.278	0.277	0.275	0.273	NM/LB	0.270	0.269	0.267	0.265	0.263	
26,000	73.7	75.5	77.2	79.0	80.8	%N1	75.0	76.8	78.6	80.4	82.1	26,000
	1504	1549	1595	1642	1690	LB/HR	1596	1643	1692	1743	1795	
	0.2776	0.2763	0.2747	0.2728	0.2708	NM/LB	0.2685	0.2673	0.2657	0.2638	0.2617	
27,000	73.9	75.7	77.5	79.2	81.0	%N1	75.1	77.0	78.8	80.6	82.3	27,000
	1517	1561	1608	1656	1704	LB/HR	1605	1653	1702	1753	1806	
	0.275	0.274	0.273	0.271	0.269	NM/LB	0.267	0.266	0.264	0.262	0.260	
28,000	74.1	75.9	77.7	79.4	81.2	%N1	75.4	77.2	79.0	80.8	82.5	28,000
	1529	1574	1621	1669	1718	LB/HR	1618	1666	1716	1768	1821	
	0.2731	0.2719	0.2703	0.2684	0.2663	NM/LB	0.2648	0.2636	0.262	0.26	0.258	
29,000	74.3	76.1	77.9	79.7	81.4	%N1	75.5	77.4	79.2	81.0	82.7	29,000
	1541	1587	1634	1683	1733	LB/HR	1632	1680	1731	1783	1835	
	0.271	0.270	0.268	0.266	0.264	NM/LB	0.263	0.261	0.260	0.258	0.256	
30,000	74.5	76.3	78.1	79.9	81.6	%N1	75.7	77.6	79.4	81.2	83.0	30,000
	1554	1599	1647	1696	1747	LB/HR	1645	1694	1745	1798	1850	
	0.2688	0.2676	0.2659	0.2641	0.262	NM/LB	0.2605	0.2592	0.2576	0.2557	0.2539	
31,000	74.8	76.6	78.4	80.2	81.9	%N1	75.9	77.8	79.6	81.4	83.2	31,000
	1568	1614	1663	1712	1764	LB/HR	1659	1708	1760	1813	1864	
	0.266	0.265	0.264	0.262	0.260	NM/LB	0.258	0.257	0.256	0.254	0.252	
32,000	75.0	76.8	78.6	80.4	82.1	%N1	76.1	78.0	79.8	81.6	83.4	32,000
	1583	1629	1678	1728	1780	LB/HR	1674	1723	1775	1829	1880	
	0.2639	0.2627	0.2611	0.2592	0.2571	NM/LB	0.2561	0.2549	0.2533	0.2514	0.2499	
33,000	75.2	77.1	78.9	80.7	82.4	%N1	76.4	78.2	80.1	81.9	83.7	33,000
	1597	1644	1694	1744	1797	LB/HR	1690	1740	1792	1846	1897	
	0.262	0.260	0.259	0.257	0.255	NM/LB	0.254	0.252	0.251	0.249	0.248	
34,000	75.5	77.3	79.1	80.9	82.7	%N1	76.6	78.5	80.3	82.1	84.0	34,000
	1612	1660	1710	1761	1814	LB/HR	1706	1757	1810	1864	1915	
	0.259	0.2578	0.2562	0.2543	0.2523	NM/LB	0.2512	0.25	0.2485	0.2466	0.2453	
35,000	75.7	77.6	79.4	81.2	82.9	%N1	76.8	78.7	80.6	82.4	84.2	35,000
	1628	1676	1726	1778	1831	LB/HR	1722	1774	1827	1882	1934	
	0.257	0.255	0.254	0.252	0.250	NM/LB	0.249	0.248	0.246	0.244	0.243	
36,000	76.0	77.8	79.6	81.4	83.2	%N1	77.1	78.9	80.8	82.6	84.4	36,000
	1646	1695	1746	1798	1850	LB/HR	1739	1790	1844	1900	1953	
	0.2537	0.2526	0.251	0.2491	0.2474	NM/LB	0.2465	0.2453	0.2438	0.242	0.2406	
37,000	76.2	78.1	79.9	81.7	83.5	%N1	77.3	79.2	81.0	82.8	84.7	37,000
	1664	1713	1765	1818	1870	LB/HR	1755	1807	1861	1917	1971	
	0.251	0.250	0.248	0.246	0.245	NM/LB	0.244	0.243	0.242	0.240	0.238	
38,000	76.5	78.3	80.2	82.0	83.8	%N1	77.5	79.4	81.3	83.1	84.9	38,000
	1682	1732	1784	1838	1889	LB/HR	1772	1825	1880	1936	1991	
	0.2483	0.2471	0.2455	0.2438	0.2423	NM/LB	0.2418	0.2406	0.2392	0.2374	0.2359	
39,000	76.7	78.6	80.5	82.3	84.1	%N1	77.8	79.7	81.6	83.4	85.2	39,000
	1700	1751	1804	1858	1909	LB/HR	1790	1843	1898	1955	2011	
	0.246	0.244	0.243	0.241	0.240	NM/LB	0.240	0.238	0.237	0.235	0.234	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.8 Mi						.81 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	76.1	78.0	79.8	81.6	83.4	%N1	76.8	78.7	80.5	82.3	84.2	25,000
	1685	1735	1787	1841	1892	LB/HR	1747	1799	1853	1909	1962	
	0.261	0.260	0.258	0.256	0.255	NM/LB	0.255	0.254	0.252	0.250	0.249	
26,000	76.2	78.1	79.9	81.7	83.5	%N1	76.9	78.8	80.7	82.5	84.3	26,000
	1694	1744	1797	1851	1902	LB/HR	1757	1810	1864	1920	1973	
	0.2595	0.2582	0.2567	0.2548	0.2533	NM/LB	0.2532	0.252	0.2505	0.2487	0.2472	
27,000	76.3	78.2	80.0	81.8	83.7	%N1	77.1	79.0	80.8	82.6	84.4	27,000
	1703	1754	1806	1861	1912	LB/HR	1767	1820	1874	1930	1985	
	0.258	0.257	0.255	0.253	0.252	NM/LB	0.252	0.251	0.249	0.247	0.246	
28,000	76.5	78.3	80.2	82.0	83.8	%N1	77.2	79.1	80.9	82.8	84.6	28,000
	1712	1763	1816	1870	1922	LB/HR	1777	1830	1884	1941	1996	
	0.2567	0.2555	0.254	0.2521	0.2507	NM/LB	0.2504	0.2492	0.2478	0.246	0.2444	
29,000	76.6	78.5	80.4	82.2	84.0	%N1	77.4	79.3	81.1	82.9	84.7	29,000
	1725	1777	1830	1885	1937	LB/HR	1788	1841	1896	1953	2008	
	0.255	0.254	0.252	0.250	0.249	NM/LB	0.249	0.248	0.246	0.245	0.243	
30,000	76.8	78.7	80.6	82.4	84.2	%N1	77.5	79.5	81.3	83.1	84.9	30,000
	1739	1791	1844	1900	1952	LB/HR	1802	1855	1911	1968	2024	
	0.2528	0.2516	0.2501	0.2482	0.2467	NM/LB	0.247	0.2458	0.2444	0.2426	0.241	
31,000	77.0	78.9	80.8	82.6	84.4	%N1	77.7	79.7	81.5	83.3	85.1	31,000
	1752	1805	1858	1914	1968	LB/HR	1815	1870	1925	1983	2040	
	0.251	0.250	0.248	0.246	0.245	NM/LB	0.245	0.244	0.243	0.241	0.239	
32,000	77.2	79.1	81.0	82.8	84.6	%N1	77.9	79.8	81.7	83.5	85.3	32,000
	1766	1819	1873	1929	1983	LB/HR	1829	1884	1940	1998	2056	
	0.2489	0.2477	0.2462	0.2444	0.2429	NM/LB	0.2433	0.2421	0.2407	0.239	0.2373	
33,000	77.4	79.3	81.2	83.0	84.8	%N1	78.1	80.0	81.9	83.7	85.5	33,000
	1780	1833	1887	1944	1999	LB/HR	1843	1898	1954	2013	2071	
	0.247	0.246	0.244	0.243	0.241	NM/LB	0.242	0.240	0.239	0.237	0.236	
34,000	77.6	79.5	81.4	83.2	85.0	%N1	78.3	80.2	82.1	83.9	85.7	34,000
	1795	1849	1904	1961	2017	LB/HR	1857	1912	1969	2028	2087	
	0.2449	0.2437	0.2423	0.2405	0.2389	NM/LB	0.2397	0.2385	0.2371	0.2355	0.2337	
35,000	77.9	79.8	81.6	83.5	85.3	%N1	78.5	80.5	82.3	84.2	86.0	35,000
	1811	1866	1921	1978	2035	LB/HR	1873	1929	1986	2045	2105	
	0.243	0.242	0.240	0.238	0.237	NM/LB	0.238	0.237	0.235	0.234	0.232	
36,000	78.1	80.0	81.9	83.7	85.5	%N1	78.8	80.7	82.6	84.4	86.2	36,000
	1828	1882	1938	1996	2054	LB/HR	1888	1945	2002	2062	2123	
	0.2405	0.2393	0.2379	0.2362	0.2346	NM/LB	0.2357	0.2345	0.2332	0.2315	0.2297	
37,000	78.3	80.2	82.1	83.9	85.7	%N1	79.0	80.9	82.8	84.7	86.4	37,000
	1844	1899	1955	2014	2072	LB/HR	1904	1962	2019	2080	2142	
	0.238	0.237	0.236	0.234	0.233	NM/LB	0.234	0.233	0.231	0.230	0.228	
38,000	78.5	80.5	82.4	84.2	86.0	%N1	79.2	81.2	83.1	84.9	86.7	38,000
	1860	1916	1972	2031	2091	LB/HR	1920	1978	2036	2097	2160	
	0.2363	0.2351	0.2338	0.2321	0.2304	NM/LB	0.2318	0.2306	0.2293	0.2277	0.2258	
39,000	78.8	80.7	82.6	84.4	86.2	%N1	79.4	81.4	83.3	85.1	86.9	39,000
	1877	1933	1990	2050	2110	LB/HR	1936	1995	2053	2114	2178	
	0.234	0.233	0.232	0.230	0.228	NM/LB	0.230	0.229	0.227	0.226	0.224	

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.82 Mi						.83 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.5	79.4	81.3	83.1	84.9	%N1	78.8	80.8	82.6	84.5	86.3	25,000
	1810	1864	1920	1977	2034	LB/HR	1918	1976	2034	2094	2157	
	0.249	0.248	0.246	0.245	0.243	NM/LB	0.238	0.237	0.235	0.234	0.232	
26,000	77.6	79.6	81.4	83.2	85.0	%N1	79.0	80.9	82.8	84.7	86.4	26,000
	1821	1876	1931	1989	2046	LB/HR	1930	1988	2046	2107	2171	
	0.2474	0.2462	0.2448	0.243	0.2413	NM/LB	0.2363	0.2351	0.2338	0.2322	0.2302	
27,000	77.8	79.7	81.6	83.4	85.2	%N1	79.1	81.1	83.0	84.8	86.6	27,000
	1832	1887	1943	2001	2059	LB/HR	1942	2000	2059	2120	2184	
	0.246	0.245	0.243	0.242	0.240	NM/LB	0.235	0.234	0.232	0.231	0.229	
28,000	77.9	79.9	81.7	83.5	85.4	%N1	79.3	81.3	83.2	85.0	86.8	28,000
	1843	1898	1954	2012	2071	LB/HR	1953	2012	2071	2132	2197	
	0.2445	0.2433	0.2419	0.2402	0.2384	NM/LB	0.2335	0.2323	0.231	0.2294	0.2275	
29,000	78.1	80.0	81.9	83.7	85.5	%N1	79.5	81.4	83.3	85.2	86.9	29,000
	1854	1909	1966	2024	2084	LB/HR	1965	2024	2083	2146	2211	
	0.243	0.242	0.241	0.239	0.237	NM/LB	0.232	0.231	0.230	0.228	0.226	
30,000	78.3	80.2	82.1	83.9	85.7	%N1	79.6	81.6	83.5	85.3	87.1	30,000
	1866	1922	1979	2038	2098	LB/HR	1977	2037	2096	2159	2224	
	0.2414	0.2402	0.2389	0.2372	0.2354	NM/LB	0.2307	0.2295	0.2282	0.2266	0.2247	
31,000	78.5	80.4	82.3	84.1	85.9	%N1	79.8	81.8	83.7	85.5	87.3	31,000
	1880	1936	1994	2053	2114	LB/HR	1992	2052	2113	2176	2241	
	0.240	0.238	0.237	0.235	0.234	NM/LB	0.229	0.228	0.226	0.225	0.223	
32,000	78.7	80.6	82.5	84.3	86.1	%N1	80.0	82.0	83.9	85.7	87.5	32,000
	1894	1951	2008	2068	2130	LB/HR	2008	2069	2130	2194	2258	
	0.2379	0.2367	0.2353	0.2337	0.2319	NM/LB	0.2271	0.2259	0.2246	0.223	0.2213	
33,000	78.9	80.8	82.7	84.5	86.3	%N1	80.2	82.1	84.1	85.9	87.7	33,000
	1908	1965	2023	2083	2146	LB/HR	2024	2086	2147	2211	2277	
	0.236	0.235	0.234	0.232	0.230	NM/LB	0.225	0.224	0.223	0.221	0.220	
34,000	79.0	81.0	82.9	84.7	86.5	%N1	80.4	82.3	84.3	86.1	88.0	34,000
	1922	1980	2038	2099	2162	LB/HR	2041	2102	2164	2229	2295	
	0.2344	0.2332	0.2319	0.2303	0.2284	NM/LB	0.2235	0.2223	0.221	0.2195	0.2177	
35,000	79.2	81.2	83.1	84.9	86.7	%N1	80.6	82.5	84.5	86.3	88.2	35,000
	1936	1994	2053	2114	2178	LB/HR	2057	2119	2182	2247	2314	
	0.233	0.232	0.230	0.229	0.227	NM/LB	0.222	0.221	0.219	0.218	0.216	
36,000	79.5	81.4	83.3	85.2	86.9	%N1	80.8	82.7	84.7	86.5	88.4	36,000
	1952	2011	2069	2131	2196	LB/HR	2074	2137	2200	2266	2334	
	0.2308	0.2297	0.2284	0.2268	0.2249	NM/LB	0.2199	0.2187	0.2175	0.2159	0.2142	
37,000	79.7	81.6	83.5	85.4	87.2	%N1	81.0	83.0	84.9	86.8	88.7	37,000
	1968	2027	2087	2149	2214	LB/HR	2096	2160	2224	2290	2359	
	0.229	0.228	0.227	0.225	0.223	NM/LB	0.218	0.216	0.215	0.214	0.212	
38,000	79.9	81.8	83.7	85.6	87.4	%N1	81.3	83.3	85.2	87.1	89.0	38,000
	1984	2044	2104	2167	2232	LB/HR	2118	2182	2247	2314	2384	
	0.2271	0.2259	0.2246	0.223	0.2213	NM/LB	0.2153	0.2142	0.2129	0.2114	0.2097	
39,000	80.1	82.0	83.9	85.8	87.6	%N1	81.5	83.5	85.5	87.4	89.2	39,000
	2001	2061	2122	2185	2250	LB/HR	2140	2205	2271	2338	2409	
	0.225	0.224	0.223	0.221	0.220	NM/LB	0.213	0.212	0.211	0.209	0.208	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.84 Mi						.85 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	80.1	82.1	84.0	85.8	87.7	%N1	81.3	83.3	85.3	87.2	89.0	25,000
	2032	2094	2155	2220	2286	LB/HR	2152	2218	2284	2352	2423	
	0.227	0.226	0.225	0.223	0.221	NM/LB	0.217	0.216	0.215	0.213	0.211	
26,000	80.3	82.2	84.1	86.0	87.8	%N1	81.5	83.5	85.5	87.3	89.2	26,000
	2045	2107	2169	2234	2301	LB/HR	2166	2232	2299	2367	2439	
	0.2257	0.2245	0.2232	0.2216	0.2199	NM/LB	0.2156	0.2144	0.2131	0.2117	0.2099	
27,000	80.4	82.4	84.3	86.2	88.0	%N1	81.7	83.7	85.6	87.5	89.4	27,000
	2058	2121	2183	2248	2315	LB/HR	2180	2246	2314	2382	2454	
	0.224	0.223	0.222	0.220	0.219	NM/LB	0.214	0.213	0.212	0.210	0.209	
28,000	80.6	82.5	84.5	86.3	88.2	%N1	81.8	83.8	85.8	87.7	89.6	28,000
	2071	2134	2197	2263	2330	LB/HR	2194	2261	2329	2397	2470	
	0.2228	0.2216	0.2203	0.2188	0.2171	NM/LB	0.2129	0.2117	0.2104	0.209	0.2072	
29,000	80.7	82.7	84.6	86.5	88.3	%N1	82.0	84.0	86.0	87.9	89.7	29,000
	2085	2148	2211	2277	2345	LB/HR	2208	2275	2344	2413	2486	
	0.221	0.220	0.219	0.217	0.216	NM/LB	0.212	0.210	0.209	0.208	0.206	
30,000	80.9	82.9	84.8	86.7	88.5	%N1	82.2	84.2	86.1	88.0	89.9	30,000
	2098	2161	2225	2292	2360	LB/HR	2222	2290	2359	2428	2502	
	0.22	0.2189	0.2176	0.2161	0.2143	NM/LB	0.2102	0.209	0.2077	0.2063	0.2046	
31,000	81.0	83.0	85.0	86.8	88.7	%N1	82.3	84.3	86.3	88.2	90.1	31,000
	2111	2175	2240	2306	2376	LB/HR	2236	2304	2374	2444	2518	
	0.219	0.218	0.216	0.215	0.213	NM/LB	0.209	0.208	0.206	0.205	0.203	
32,000	81.2	83.2	85.2	87.1	88.9	%N1	82.5	84.5	86.5	88.4	90.3	32,000
	2129	2193	2258	2326	2396	LB/HR	2252	2320	2390	2461	2536	
	0.2168	0.2157	0.2144	0.2129	0.2111	NM/LB	0.2074	0.2063	0.205	0.2036	0.2018	
33,000	81.4	83.4	85.4	87.3	89.1	%N1	82.7	84.8	86.7	88.7		33,000
	2146	2211	2277	2345	2416	LB/HR	2271	2340	2411	2482		
	0.215	0.214	0.213	0.211	0.209	NM/LB	0.206	0.205	0.203	0.202		
34,000	81.6	83.7	85.6	87.5	89.4	%N1	83.0	85.0	87.0	88.9		34,000
	2164	2229	2296	2364	2436	LB/HR	2290	2359	2431	2502		
	0.2133	0.2122	0.2109	0.2094	0.2076	NM/LB	0.204	0.2029	0.2015	0.2002		
35,000	81.9	83.9	85.8	87.7	89.6	%N1	83.2	85.2	87.2	89.1		35,000
	2181	2248	2315	2383	2456	LB/HR	2309	2379	2451	2524		
	0.212	0.210	0.209	0.208	0.206	NM/LB	0.202	0.201	0.200	0.199		
36,000	82.1	84.1	86.0	87.9	89.8	%N1	83.4	85.4	87.4	89.4		36,000
	2199	2266	2334	2403	2476	LB/HR	2328	2400	2473	2546		
	0.2099	0.2088	0.2075	0.2061	0.2043	NM/LB	0.2006	0.1995	0.1982	0.1968		
37,000	82.3	84.3	86.3	88.2	90.1	%N1	83.6	85.7	87.7	89.6		37,000
	2220	2287	2356	2426	2500	LB/HR	2348	2420	2494	2568		
	0.208	0.207	0.206	0.204	0.202	NM/LB	0.199	0.198	0.197	0.195		
38,000	82.6	84.7	86.6	88.6	90.4	%N1	83.9	86.0	88.0	89.9		38,000
	2247	2316	2385	2456	2532	LB/HR	2375	2448	2522	2597		
	0.2054	0.2043	0.203	0.2016	0.1998	NM/LB	0.1966	0.1955	0.1943	0.193		
39,000	83.0	85.0	87.0	88.9		%N1	84.3	86.4	88.4	90.3		39,000
	2275	2344	2415	2486		LB/HR	2410	2484	2559	2635		
	0.203	0.202	0.201	0.199		NM/LB	0.194	0.193	0.191	0.190		

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.6 Mi						.62 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	67.3	69.0	70.6	72.2	73.7	%N1	67.8	69.5	71.2	72.8	74.3	25,000
	985	1015	1045	1074	1106	LB/HR	1021	1052	1082	1113	1145	
	0.333	0.331	0.329	0.328	0.325	NM/LB	0.332	0.330	0.329	0.327	0.325	
26,000	67.7	69.4	71.1	72.7	74.2	%N1	68.3	70.0	71.6	73.2	74.8	26,000
	1005	1036	1066	1096	1128	LB/HR	1039	1071	1102	1134	1167	
	0.33	0.32	0.32	0.32	0.32	NM/LB	0.33	0.32	0.32	0.32	0.32	
27,000	68.2	69.9	71.6	73.2	74.8	%N1	68.7	70.4	72.0	73.7	75.3	27,000
	1027	1058	1089	1120	1153	LB/HR	1058	1090	1122	1154	1188	
	0.319	0.318	0.316	0.314	0.312	NM/LB	0.320	0.319	0.317	0.315	0.313	
28,000	68.7	70.4	72.1	73.7	75.4	%N1	69.2	70.9	72.6	74.2	75.9	28,000
	1049	1081	1112	1144	1178	LB/HR	1080	1113	1145	1178	1212	
	0.31	0.31	0.31	0.31	0.31	NM/LB	0.31	0.31	0.31	0.31	0.31	
29,000	69.2	70.9	72.6	74.3	75.9	%N1	69.7	71.4	73.1	74.8	76.4	29,000
	1071	1103	1135	1168	1202	LB/HR	1103	1136	1169	1203	1238	
	0.306	0.305	0.303	0.301	0.299	NM/LB	0.307	0.306	0.304	0.302	0.300	
30,000	69.7	71.4	73.1	74.8	76.5	%N1	70.2	71.9	73.6	75.3	77.0	30,000
	1092	1126	1158	1192	1226	LB/HR	1126	1160	1194	1228	1264	
	0.3	0.3	0.3	0.3	0.29	NM/LB	0.3	0.3	0.3	0.3	0.29	
31,000	70.2	71.9	73.6	75.3	77.0	%N1	70.7	72.5	74.2	75.9	77.5	31,000
	1114	1148	1181	1216	1251	LB/HR	1150	1184	1219	1254	1291	
	0.294	0.293	0.291	0.290	0.288	NM/LB	0.295	0.293	0.292	0.290	0.288	
32,000	70.7	72.5	74.2	75.9	77.5	%N1	71.3	73.0	74.7	76.4	78.0	32,000
	1137	1172	1206	1241	1277	LB/HR	1174	1209	1244	1281	1318	
	0.29	0.29	0.29	0.28	0.28	NM/LB	0.29	0.29	0.29	0.28	0.28	
33,000	71.3	73.0	74.8	76.5	78.1	%N1	71.7	73.5	75.3	77.0	78.6	33,000
	1161	1196	1231	1267	1304	LB/HR	1198	1234	1270	1308	1345	
	0.282	0.281	0.280	0.278	0.276	NM/LB	0.283	0.281	0.280	0.278	0.276	
34,000	71.8	73.5	75.3	77.0	78.6	%N1	72.2	74.0	75.8	77.5	79.1	34,000
	1185	1221	1257	1294	1331	LB/HR	1224	1261	1298	1336	1374	
	0.28	0.28	0.27	0.27	0.27	NM/LB	0.28	0.28	0.27	0.27	0.27	
35,000	72.3	74.1	75.8	77.6	79.2	%N1	72.7	74.5	76.3	78.0	79.7	35,000
	1213	1250	1287	1325	1362	LB/HR	1250	1288	1326	1366	1403	
	0.270	0.269	0.267	0.266	0.264	NM/LB	0.271	0.270	0.268	0.266	0.265	
36,000						%N1	73.2	75.0	76.8	78.6	80.3	36,000
						LB/HR	1277	1316	1355	1395	1432	
						NM/LB	0.27	0.26	0.26	0.26	0.26	
37,000						%N1	73.8	75.6	77.4	79.2	80.9	37,000
						LB/HR	1306	1346	1386	1427	1465	
						NM/LB	0.259	0.258	0.257	0.255	0.254	
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.64 Mi						.66 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	68.5	70.2	71.8	73.4	75.1	%N1	69.2	70.9	72.5	74.2	75.8	25,000
	1060	1092	1124	1156	1189	LB/HR	1104	1137	1170	1204	1238	
	0.330	0.328	0.327	0.325	0.323	NM/LB	0.327	0.325	0.324	0.322	0.320	
26,000	68.8	70.5	72.2	73.8	75.5	%N1	69.5	71.2	72.9	74.6	76.3	26,000
	1077	1110	1142	1175	1208	LB/HR	1120	1154	1187	1222	1256	
	0.32	0.32	0.32	0.32	0.32	NM/LB	0.32	0.32	0.32	0.32	0.32	
27,000	69.3	71.0	72.6	74.3	76.0	%N1	69.9	71.6	73.3	75.0	76.6	27,000
	1096	1129	1162	1195	1230	LB/HR	1137	1171	1205	1240	1275	
	0.319	0.318	0.316	0.314	0.312	NM/LB	0.317	0.316	0.314	0.312	0.310	
28,000	69.7	71.4	73.1	74.7	76.4	%N1	70.3	72.0	73.7	75.4	77.0	28,000
	1115	1149	1182	1216	1251	LB/HR	1155	1189	1224	1259	1295	
	0.31	0.31	0.31	0.31	0.31	NM/LB	0.31	0.31	0.31	0.31	0.31	
29,000	70.1	71.8	73.5	75.2	76.9	%N1	70.7	72.4	74.1	75.8	77.5	29,000
	1134	1168	1202	1237	1272	LB/HR	1174	1209	1244	1280	1317	
	0.308	0.307	0.305	0.304	0.302	NM/LB	0.307	0.306	0.304	0.303	0.300	
30,000	70.6	72.4	74.1	75.8	77.4	%N1	71.1	72.9	74.6	76.3	77.9	30,000
	1158	1192	1227	1263	1299	LB/HR	1193	1228	1264	1301	1339	
	0.3	0.3	0.3	0.3	0.3	NM/LB	0.3	0.3	0.3	0.3	0.3	
31,000	71.1	72.9	74.6	76.3	77.9	%N1	71.5	73.3	75.0	76.7	78.3	31,000
	1182	1217	1252	1289	1327	LB/HR	1213	1249	1285	1323	1361	
	0.296	0.295	0.293	0.291	0.289	NM/LB	0.297	0.296	0.295	0.293	0.291	
32,000	71.6	73.4	75.1	76.8	78.5	%N1	72.0	73.8	75.5	77.2	78.9	32,000
	1206	1242	1278	1316	1354	LB/HR	1238	1275	1313	1351	1390	
	0.29	0.29	0.29	0.29	0.28	NM/LB	0.29	0.29	0.29	0.29	0.28	
33,000	72.1	73.9	75.7	77.4	79.0	%N1	72.5	74.3	76.0	77.7	79.4	33,000
	1232	1269	1306	1345	1383	LB/HR	1264	1302	1340	1380	1418	
	0.284	0.283	0.281	0.279	0.277	NM/LB	0.285	0.284	0.283	0.281	0.279	
34,000	72.6	74.4	76.2	77.9	79.6	%N1	73.0	74.7	76.5	78.2	80.0	34,000
	1259	1297	1335	1375	1413	LB/HR	1290	1328	1368	1408	1447	
	0.28	0.28	0.27	0.27	0.27	NM/LB	0.28	0.28	0.28	0.28	0.27	
35,000	73.2	75.0	76.7	78.5	80.2	%N1	73.5	75.3	77.1	78.8	80.6	35,000
	1286	1325	1364	1405	1443	LB/HR	1318	1357	1398	1439	1478	
	0.272	0.271	0.269	0.267	0.266	NM/LB	0.274	0.272	0.271	0.269	0.268	
36,000	73.7	75.5	77.3	79.0	80.8	%N1	74.0	75.8	77.6	79.4	81.1	36,000
	1314	1354	1394	1435	1474	LB/HR	1347	1388	1429	1471	1512	
	0.27	0.26	0.26	0.26	0.26	NM/LB	0.27	0.27	0.26	0.26	0.26	
37,000	74.2	76.0	77.8	79.6	81.3	%N1	74.6	76.4	78.2	80.0	81.7	37,000
	1343	1383	1425	1467	1507	LB/HR	1377	1418	1461	1504	1547	
	0.261	0.259	0.258	0.256	0.255	NM/LB	0.262	0.261	0.259	0.258	0.256	
38,000	74.7	76.6	78.4	80.2	81.9	%N1	75.1	77.0	78.8	80.6	82.3	38,000
	1371	1412	1455	1498	1541	LB/HR	1406	1449	1492	1536	1582	
	0.26	0.25	0.25	0.25	0.25	NM/LB	0.26	0.26	0.25	0.25	0.25	
39,000	75.3	77.2	79.0	80.8	82.5	%N1	75.7	77.6	79.4	81.2	82.9	39,000
	1401	1443	1487	1531	1576	LB/HR	1437	1480	1525	1571	1618	
	0.250	0.248	0.247	0.245	0.243	NM/LB	0.251	0.250	0.248	0.247	0.245	

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.68 Mi						.7 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	69.9	71.6	73.3	75.0	76.7	%N1	70.8	72.5	74.2	75.9	77.5	25,000
	1151	1185	1220	1255	1291	LB/HR	1204	1239	1275	1313	1351	
	0.323	0.321	0.320	0.318	0.316	NM/LB	0.318	0.316	0.315	0.313	0.311	
26,000	70.2	72.0	73.7	75.4	77.0	%N1	71.1	72.8	74.5	76.2	77.8	26,000
	1166	1200	1235	1271	1308	LB/HR	1217	1253	1289	1327	1366	
	0.32	0.32	0.32	0.31	0.31	NM/LB	0.31	0.31	0.31	0.31	0.31	
27,000	70.6	72.3	74.1	75.7	77.4	%N1	71.4	73.1	74.8	76.5	78.1	27,000
	1183	1217	1253	1289	1327	LB/HR	1231	1266	1303	1342	1381	
	0.314	0.313	0.311	0.309	0.307	NM/LB	0.311	0.310	0.308	0.306	0.304	
28,000	71.0	72.7	74.4	76.1	77.7	%N1	71.7	73.4	75.2	76.9	78.5	28,000
	1199	1234	1270	1307	1346	LB/HR	1248	1284	1321	1361	1400	
	0.31	0.31	0.31	0.31	0.3	NM/LB	0.31	0.31	0.3	0.3	0.3	
29,000	71.3	73.1	74.8	76.5	78.1	%N1	72.0	73.7	75.5	77.2	78.8	29,000
	1216	1251	1288	1326	1365	LB/HR	1264	1302	1340	1379	1419	
	0.306	0.304	0.303	0.301	0.299	NM/LB	0.303	0.301	0.300	0.298	0.296	
30,000	71.7	73.4	75.2	76.9	78.5	%N1	72.3	74.1	75.8	77.5	79.2	30,000
	1235	1271	1308	1347	1386	LB/HR	1281	1319	1358	1398	1438	
	0.3	0.3	0.3	0.3	0.29	NM/LB	0.3	0.3	0.3	0.29	0.29	
31,000	72.0	73.8	75.6	77.3	78.9	%N1	72.6	74.4	76.1	77.9	79.6	31,000
	1255	1292	1329	1369	1408	LB/HR	1299	1337	1376	1417	1457	
	0.296	0.295	0.293	0.291	0.290	NM/LB	0.295	0.293	0.292	0.290	0.288	
32,000	72.4	74.2	75.9	77.7	79.3	%N1	73.0	74.8	76.5	78.3	80.0	32,000
	1274	1312	1351	1390	1430	LB/HR	1319	1358	1398	1439	1479	
	0.29	0.29	0.29	0.29	0.29	NM/LB	0.29	0.29	0.29	0.29	0.28	
33,000	72.8	74.6	76.4	78.1	79.8	%N1	73.3	75.1	76.9	78.6	80.4	33,000
	1296	1334	1373	1414	1453	LB/HR	1338	1378	1419	1460	1502	
	0.287	0.286	0.284	0.282	0.281	NM/LB	0.286	0.285	0.283	0.281	0.280	
34,000	73.3	75.1	76.9	78.6	80.4	%N1	73.7	75.5	77.3	79.0	80.8	34,000
	1322	1362	1402	1443	1483	LB/HR	1358	1399	1440	1482	1525	
	0.28	0.28	0.28	0.28	0.27	NM/LB	0.28	0.28	0.28	0.28	0.28	
35,000	73.8	75.6	77.4	79.1	80.9	%N1	74.1	75.9	77.7	79.5	81.2	35,000
	1349	1389	1430	1472	1514	LB/HR	1380	1421	1464	1506	1550	
	0.276	0.274	0.273	0.271	0.269	NM/LB	0.277	0.276	0.274	0.273	0.271	
36,000	74.3	76.1	77.9	79.7	81.4	%N1	74.6	76.4	78.2	80.0	81.7	36,000
	1375	1417	1459	1502	1545	LB/HR	1408	1450	1493	1537	1583	
	0.27	0.27	0.27	0.27	0.26	NM/LB	0.27	0.27	0.27	0.27	0.27	
37,000	74.8	76.7	78.5	80.3	82.0	%N1	75.1	77.0	78.8	80.6	82.2	37,000
	1405	1447	1491	1534	1580	LB/HR	1435	1478	1523	1567	1615	
	0.265	0.263	0.262	0.260	0.258	NM/LB	0.267	0.265	0.264	0.262	0.260	
38,000	75.4	77.3	79.1	80.9	82.6	%N1	75.6	77.5	79.3	81.1	82.8	38,000
	1437	1480	1525	1569	1617	LB/HR	1463	1507	1553	1598	1648	
	0.26	0.26	0.26	0.25	0.25	NM/LB	0.26	0.26	0.26	0.26	0.25	
39,000	76.0	77.8	79.7	81.5	83.2	%N1	76.1	78.0	79.9	81.6	83.3	39,000
	1469	1514	1560	1606	1655	LB/HR	1494	1540	1587	1633	1683	
	0.253	0.252	0.250	0.248	0.246	NM/LB	0.256	0.255	0.253	0.251	0.249	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.72 Mi						.74 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	71.7	73.4	75.2	76.8	78.5	%N1	72.5	74.3	76.1	77.8	79.5	25,000
	1261	1298	1336	1375	1415	LB/HR	1322	1361	1401	1443	1483	
	0.312	0.311	0.309	0.307	0.305	NM/LB	0.306	0.305	0.303	0.301	0.299	
26,000	71.9	73.7	75.4	77.1	78.8	%N1	72.7	74.5	76.3	78.0	79.8	26,000
	1275	1312	1351	1390	1430	LB/HR	1334	1374	1415	1456	1497	
	0.31	0.31	0.31	0.3	0.3	NM/LB	0.3	0.3	0.3	0.3	0.3	
27,000	72.2	73.9	75.7	77.4	79.1	%N1	73.0	74.8	76.6	78.3	80.0	27,000
	1288	1327	1365	1406	1446	LB/HR	1349	1389	1430	1472	1513	
	0.305	0.304	0.302	0.301	0.299	NM/LB	0.300	0.299	0.297	0.295	0.293	
28,000	72.4	74.2	75.9	77.7	79.4	%N1	73.2	75.0	76.8	78.6	80.3	28,000
	1302	1341	1380	1421	1461	LB/HR	1363	1403	1445	1487	1530	
	0.3	0.3	0.3	0.3	0.3	NM/LB	0.3	0.3	0.29	0.29	0.29	
29,000	72.7	74.5	76.2	78.0	79.7	%N1	73.5	75.3	77.1	78.8	80.6	29,000
	1318	1357	1397	1438	1478	LB/HR	1377	1418	1460	1503	1546	
	0.299	0.297	0.296	0.294	0.292	NM/LB	0.294	0.292	0.291	0.289	0.287	
30,000	73.0	74.8	76.6	78.3	80.0	%N1	73.8	75.6	77.4	79.1	80.8	30,000
	1335	1374	1415	1456	1497	LB/HR	1391	1432	1475	1518	1562	
	0.29	0.29	0.29	0.29	0.29	NM/LB	0.29	0.29	0.29	0.29	0.28	
31,000	73.3	75.1	76.9	78.6	80.4	%N1	74.1	75.9	77.7	79.4	81.2	31,000
	1352	1392	1433	1475	1517	LB/HR	1408	1450	1493	1536	1582	
	0.291	0.290	0.288	0.286	0.285	NM/LB	0.287	0.286	0.284	0.283	0.281	
32,000	73.6	75.4	77.2	79.0	80.7	%N1	74.4	76.2	78.0	79.8	81.5	32,000
	1369	1410	1452	1494	1537	LB/HR	1425	1467	1512	1555	1602	
	0.29	0.29	0.28	0.28	0.28	NM/LB	0.28	0.28	0.28	0.28	0.28	
33,000	74.0	75.8	77.6	79.3	81.1	%N1	74.7	76.5	78.3	80.1	81.8	33,000
	1387	1429	1471	1514	1558	LB/HR	1442	1485	1530	1574	1622	
	0.284	0.282	0.281	0.279	0.277	NM/LB	0.280	0.279	0.277	0.276	0.274	
34,000	74.3	76.2	78.0	79.7	81.4	%N1	75.0	76.8	78.7	80.4	82.1	34,000
	1408	1450	1493	1537	1583	LB/HR	1459	1503	1548	1593	1642	
	0.28	0.28	0.28	0.27	0.27	NM/LB	0.28	0.28	0.27	0.27	0.27	
35,000	74.7	76.6	78.4	80.1	81.8	%N1	75.4	77.2	79.0	80.8	82.5	35,000
	1429	1472	1516	1560	1607	LB/HR	1479	1523	1569	1615	1664	
	0.275	0.274	0.273	0.271	0.269	NM/LB	0.274	0.272	0.271	0.269	0.267	
36,000	75.1	76.9	78.8	80.5	82.2	%N1	75.7	77.6	79.4	81.2	82.9	36,000
	1449	1493	1538	1583	1631	LB/HR	1500	1546	1593	1640	1689	
	0.27	0.27	0.27	0.27	0.26	NM/LB	0.27	0.27	0.27	0.26	0.26	
37,000	75.5	77.4	79.2	81.0	82.7	%N1	76.1	78.0	79.8	81.6	83.3	37,000
	1472	1516	1562	1607	1657	LB/HR	1524	1570	1618	1666	1715	
	0.267	0.266	0.264	0.263	0.261	NM/LB	0.265	0.264	0.262	0.261	0.259	
38,000	76.0	77.8	79.7	81.5	83.2	%N1	76.5	78.3	80.2	82.0	83.7	38,000
	1500	1545	1592	1639	1689	LB/HR	1547	1594	1643	1692	1740	
	0.26	0.26	0.26	0.26	0.26	NM/LB	0.26	0.26	0.26	0.26	0.26	
39,000	76.4	78.3	80.2	81.9	83.7	%N1	76.8	78.7	80.6	82.4	84.2	39,000
	1529	1576	1624	1672	1721	LB/HR	1571	1619	1669	1718	1766	
	0.257	0.256	0.254	0.253	0.251	NM/LB	0.257	0.256	0.254	0.253	0.251	

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.76 Mi						.78 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	73.5	75.3	77.1	78.9	80.6	%N1	74.7	76.6	78.4	80.1	81.9	25,000
	1393	1435	1478	1521	1565	LB/HR	1474	1518	1564	1610	1658	
	0.298	0.297	0.295	0.293	0.291	NM/LB	0.289	0.288	0.286	0.284	0.282	
26,000	73.8	75.6	77.4	79.1	80.8	%N1	75.0	76.8	78.6	80.4	82.1	26,000
	1406	1448	1491	1534	1579	LB/HR	1487	1532	1578	1624	1673	
	0.3	0.29	0.29	0.29	0.29	NM/LB	0.29	0.29	0.28	0.28	0.28	
27,000	74.0	75.8	77.6	79.3	81.1	%N1	75.2	77.0	78.9	80.6	82.3	27,000
	1418	1460	1504	1548	1593	LB/HR	1500	1545	1592	1638	1687	
	0.293	0.292	0.290	0.288	0.286	NM/LB	0.284	0.283	0.281	0.279	0.277	
28,000	74.2	76.1	77.9	79.6	81.3	%N1	75.4	77.3	79.1	80.9	82.6	28,000
	1432	1475	1519	1563	1610	LB/HR	1512	1558	1605	1653	1702	
	0.29	0.29	0.29	0.29	0.28	NM/LB	0.28	0.28	0.28	0.28	0.27	
29,000	74.5	76.3	78.1	79.9	81.6	%N1	75.7	77.5	79.4	81.1	82.8	29,000
	1447	1490	1535	1579	1626	LB/HR	1526	1572	1620	1668	1717	
	0.287	0.286	0.284	0.282	0.280	NM/LB	0.279	0.278	0.276	0.274	0.272	
30,000	74.8	76.6	78.4	80.2	81.9	%N1	75.9	77.8	79.6	81.4	83.1	30,000
	1461	1505	1550	1595	1643	LB/HR	1542	1589	1637	1686	1735	
	0.28	0.28	0.28	0.28	0.28	NM/LB	0.28	0.28	0.27	0.27	0.27	
31,000	75.0	76.9	78.7	80.5	82.2	%N1	76.2	78.0	79.9	81.6	83.4	31,000
	1476	1520	1566	1611	1660	LB/HR	1559	1606	1655	1704	1752	
	0.281	0.280	0.278	0.277	0.275	NM/LB	0.274	0.272	0.270	0.269	0.267	
32,000	75.3	77.2	79.0	80.8	82.4	%N1	76.4	78.3	80.1	81.9	83.7	32,000
	1491	1535	1582	1628	1677	LB/HR	1575	1623	1672	1722	1770	
	0.28	0.28	0.28	0.27	0.27	NM/LB	0.27	0.27	0.27	0.27	0.26	
33,000	75.6	77.5	79.3	81.1	82.8	%N1	76.6	78.5	80.4	82.2	84.0	33,000
	1508	1553	1600	1648	1697	LB/HR	1591	1639	1690	1740	1788	
	0.276	0.274	0.272	0.271	0.269	NM/LB	0.268	0.267	0.265	0.263	0.262	
34,000	75.9	77.8	79.6	81.4	83.1	%N1	76.9	78.8	80.7	82.4	84.2	34,000
	1525	1571	1619	1668	1716	LB/HR	1608	1657	1708	1759	1808	
	0.27	0.27	0.27	0.27	0.27	NM/LB	0.27	0.26	0.26	0.26	0.26	
35,000	76.2	78.0	79.9	81.6	83.4	%N1	77.2	79.1	80.9	82.7	84.5	35,000
	1544	1590	1639	1688	1736	LB/HR	1626	1675	1726	1778	1828	
	0.269	0.268	0.266	0.264	0.262	NM/LB	0.262	0.261	0.259	0.257	0.256	
36,000	76.4	78.3	80.2	81.9	83.7	%N1	77.4	79.3	81.2	83.0	84.8	36,000
	1562	1609	1659	1708	1756	LB/HR	1643	1693	1745	1797	1848	
	0.27	0.26	0.26	0.26	0.26	NM/LB	0.26	0.26	0.26	0.25	0.25	
37,000	76.8	78.7	80.5	82.3	84.1	%N1	77.7	79.6	81.5	83.3	85.1	37,000
	1583	1631	1681	1731	1779	LB/HR	1661	1711	1764	1816	1868	
	0.262	0.261	0.259	0.258	0.256	NM/LB	0.257	0.255	0.254	0.252	0.250	
38,000	77.1	79.0	80.9	82.7	84.5	%N1	77.9	79.9	81.7	83.5	85.3	38,000
	1607	1655	1706	1757	1806	LB/HR	1678	1729	1782	1835	1888	
	0.26	0.26	0.26	0.25	0.25	NM/LB	0.25	0.25	0.25	0.25	0.25	
39,000	77.5	79.4	81.2	83.0	84.8	%N1	78.2	80.2	82.1	83.9	85.7	39,000
	1630	1679	1731	1782	1833	LB/HR	1699	1751	1804	1858	1912	
	0.255	0.254	0.252	0.250	0.249	NM/LB	0.251	0.250	0.248	0.246	0.245	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.8 Mi						.81 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	75.9	77.8	79.6	81.4	83.1	%N1	76.6	78.5	80.4	82.1	83.9	25,000
	1558	1605	1654	1704	1752	LB/HR	1617	1666	1717	1768	1818	
	0.281	0.279	0.277	0.276	0.274	NM/LB	0.274	0.272	0.271	0.269	0.267	
26,000	76.1	78.0	79.8	81.5	83.3	%N1	76.8	78.7	80.5	82.3	84.1	26,000
	1569	1616	1666	1716	1764	LB/HR	1627	1676	1727	1779	1829	
	0.28	0.28	0.28	0.27	0.27	NM/LB	0.27	0.27	0.27	0.27	0.27	
27,000	76.3	78.2	80.0	81.8	83.6	%N1	77.0	78.9	80.7	82.5	84.3	27,000
	1583	1631	1681	1731	1779	LB/HR	1640	1690	1742	1793	1844	
	0.276	0.275	0.273	0.271	0.270	NM/LB	0.270	0.269	0.267	0.265	0.263	
28,000	76.5	78.4	80.2	82.0	83.8	%N1	77.2	79.1	81.0	82.7	84.5	28,000
	1596	1645	1695	1746	1794	LB/HR	1654	1704	1756	1809	1860	
	0.27	0.27	0.27	0.27	0.27	NM/LB	0.27	0.27	0.26	0.26	0.26	
29,000	76.7	78.6	80.4	82.2	84.0	%N1	77.4	79.3	81.2	82.9	84.7	29,000
	1610	1659	1710	1761	1810	LB/HR	1668	1719	1771	1824	1876	
	0.272	0.270	0.268	0.267	0.265	NM/LB	0.265	0.264	0.262	0.261	0.259	
30,000	76.9	78.8	80.6	82.4	84.2	%N1	77.6	79.5	81.4	83.2	85.0	30,000
	1624	1673	1724	1776	1826	LB/HR	1682	1733	1786	1839	1892	
	0.27	0.27	0.27	0.26	0.26	NM/LB	0.26	0.26	0.26	0.26	0.26	
31,000	77.1	79.0	80.9	82.7	84.5	%N1	77.8	79.7	81.6	83.4	85.2	31,000
	1640	1689	1741	1793	1843	LB/HR	1696	1747	1801	1854	1908	
	0.267	0.265	0.264	0.262	0.260	NM/LB	0.261	0.260	0.258	0.256	0.255	
32,000	77.4	79.3	81.1	82.9	84.7	%N1	78.0	80.0	81.8	83.6	85.4	32,000
	1656	1706	1758	1811	1862	LB/HR	1712	1764	1818	1872	1926	
	0.26	0.26	0.26	0.26	0.26	NM/LB	0.26	0.26	0.26	0.25	0.25	
33,000	77.6	79.5	81.4	83.2	85.0	%N1	78.3	80.2	82.1	83.9	85.7	33,000
	1672	1723	1776	1829	1881	LB/HR	1728	1781	1835	1889	1944	
	0.261	0.260	0.258	0.257	0.255	NM/LB	0.256	0.255	0.253	0.252	0.250	
34,000	77.8	79.8	81.7	83.4	85.2	%N1	78.5	80.5	82.3	84.2	85.9	34,000
	1689	1740	1793	1847	1900	LB/HR	1744	1797	1852	1907	1963	
	0.26	0.26	0.26	0.25	0.25	NM/LB	0.25	0.25	0.25	0.25	0.25	
35,000	78.1	80.0	81.9	83.7	85.5	%N1	78.7	80.7	82.6	84.4	86.2	35,000
	1705	1757	1811	1864	1918	LB/HR	1760	1814	1869	1924	1981	
	0.256	0.255	0.253	0.252	0.250	NM/LB	0.252	0.250	0.249	0.247	0.245	
36,000	78.4	80.3	82.2	84.0	85.8	%N1	79.0	80.9	82.8	84.7	86.4	36,000
	1724	1777	1831	1885	1940	LB/HR	1776	1831	1886	1942	1999	
	0.25	0.25	0.25	0.25	0.25	NM/LB	0.25	0.25	0.25	0.24	0.24	
37,000	78.7	80.6	82.5	84.3	86.1	%N1	79.3	81.2	83.2	85.0	86.7	37,000
	1744	1797	1852	1907	1962	LB/HR	1796	1851	1908	1964	2022	
	0.251	0.249	0.248	0.246	0.244	NM/LB	0.246	0.245	0.244	0.242	0.240	
38,000	79.0	80.9	82.8	84.6	86.4	%N1	79.6	81.6	83.5	85.3	87.1	38,000
	1764	1817	1873	1928	1985	LB/HR	1817	1873	1930	1987	2046	
	0.25	0.25	0.25	0.24	0.24	NM/LB	0.24	0.24	0.24	0.24	0.24	
39,000	79.2	81.2	83.1	84.9	86.7	%N1	79.9	81.9	83.8	85.6	87.4	39,000
	1783	1838	1894	1950	2007	LB/HR	1838	1895	1952	2011	2070	
	0.245	0.244	0.242	0.241	0.239	NM/LB	0.241	0.240	0.238	0.236	0.235	

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.82 Mi						.83 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.4	79.3	81.1	82.9	84.7	%N1	78.7	80.6	82.5	84.3	86.1	25,000
	1677	1728	1780	1833	1886	LB/HR	1777	1832	1887	1942	2001	
	0.267	0.266	0.264	0.262	0.261	NM/LB	0.255	0.254	0.252	0.251	0.249	
26,000	77.5	79.4	81.3	83.1	84.9	%N1	78.9	80.8	82.7	84.5	86.3	26,000
	1688	1739	1792	1845	1898	LB/HR	1789	1844	1900	1955	2014	
	0.27	0.26	0.26	0.26	0.26	NM/LB	0.25	0.25	0.25	0.25	0.25	
27,000	77.7	79.6	81.5	83.3	85.1	%N1	79.0	81.0	82.9	84.7	86.5	27,000
	1699	1751	1804	1857	1911	LB/HR	1801	1856	1912	1968	2027	
	0.264	0.262	0.261	0.259	0.257	NM/LB	0.252	0.251	0.249	0.247	0.245	
28,000	77.9	79.8	81.7	83.5	85.3	%N1	79.2	81.2	83.1	84.9	86.7	28,000
	1713	1765	1819	1873	1927	LB/HR	1815	1870	1927	1983	2043	
	0.26	0.26	0.26	0.26	0.26	NM/LB	0.25	0.25	0.25	0.25	0.24	
29,000	78.1	80.0	81.9	83.7	85.5	%N1	79.5	81.4	83.3	85.1	86.9	29,000
	1727	1780	1834	1888	1944	LB/HR	1830	1886	1943	2001	2061	
	0.259	0.258	0.256	0.255	0.253	NM/LB	0.248	0.247	0.245	0.243	0.241	
30,000	78.3	80.3	82.1	83.9	85.7	%N1	79.7	81.7	83.6	85.4	87.2	30,000
	1741	1795	1849	1904	1960	LB/HR	1846	1902	1960	2018	2078	
	0.26	0.26	0.25	0.25	0.25	NM/LB	0.25	0.24	0.24	0.24	0.24	
31,000	78.5	80.5	82.4	84.2	85.9	%N1	79.9	81.9	83.8	85.6	87.4	31,000
	1756	1809	1864	1919	1976	LB/HR	1861	1919	1977	2036	2097	
	0.255	0.254	0.252	0.251	0.249	NM/LB	0.244	0.242	0.241	0.239	0.237	
32,000	78.7	80.7	82.6	84.4	86.2	%N1	80.1	82.1	84.0	85.8	87.6	32,000
	1770	1824	1880	1935	1992	LB/HR	1878	1935	1994	2054	2115	
	0.25	0.25	0.25	0.25	0.25	NM/LB	0.24	0.24	0.24	0.24	0.24	
33,000	79.0	80.9	82.8	84.6	86.4	%N1	80.3	82.3	84.2	86.1	87.9	33,000
	1786	1840	1896	1952	2010	LB/HR	1896	1955	2014	2075	2137	
	0.251	0.250	0.248	0.246	0.245	NM/LB	0.239	0.238	0.236	0.235	0.233	
34,000	79.2	81.2	83.1	84.9	86.7	%N1	80.6	82.6	84.5	86.4	88.2	34,000
	1802	1857	1913	1969	2028	LB/HR	1918	1977	2038	2099	2162	
	0.25	0.25	0.25	0.24	0.24	NM/LB	0.24	0.24	0.23	0.23	0.23	
35,000	79.4	81.4	83.3	85.1	86.9	%N1	80.9	82.9	84.8	86.7	88.5	35,000
	1817	1873	1930	1987	2046	LB/HR	1940	2000	2061	2123	2187	
	0.247	0.245	0.244	0.242	0.240	NM/LB	0.234	0.232	0.231	0.229	0.228	
36,000	79.7	81.6	83.6	85.4	87.2	%N1	81.2	83.2	85.1	87.0	88.8	36,000
	1833	1889	1947	2005	2064	LB/HR	1962	2023	2084	2147	2213	
	0.24	0.24	0.24	0.24	0.24	NM/LB	0.23	0.23	0.23	0.23	0.22	
37,000	79.9	81.9	83.8	85.6	87.4	%N1	81.5	83.5	85.4	87.3	89.1	37,000
	1849	1906	1964	2023	2083	LB/HR	1984	2046	2108	2171	2238	
	0.242	0.241	0.240	0.238	0.236	NM/LB	0.229	0.227	0.226	0.224	0.222	
38,000	80.2	82.2	84.1	85.9	87.7	%N1	81.7	83.8	85.7	87.6	89.4	38,000
	1872	1929	1988	2048	2109	LB/HR	2006	2069	2132	2196	2264	
	0.24	0.24	0.24	0.23	0.23	NM/LB	0.23	0.22	0.22	0.22	0.22	
39,000	80.5	82.5	84.4	86.2	88.0	%N1	82.2	84.2	86.2	88.1	89.9	39,000
	1894	1953	2012	2073	2135	LB/HR	2041	2105	2169	2234	2304	
	0.237	0.235	0.234	0.232	0.230	NM/LB	0.222	0.221	0.220	0.218	0.216	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.84 Mi						.85 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	80.0	82.0	83.9	85.7	87.5	%N1	81.3	83.3	85.2	87.1	88.9	25,000
	1882	1940	1999	2059	2120	LB/HR	1993	2055	2117	2181	2247	
	0.244	0.243	0.241	0.239	0.238	NM/LB	0.233	0.232	0.230	0.229	0.227	
26,000	80.2	82.2	84.1	85.9	87.7	%N1	81.4	83.4	85.4	87.2	89.1	26,000
	1895	1953	2013	2073	2135	LB/HR	2007	2069	2132	2196	2263	
	0.24	0.24	0.24	0.24	0.24	NM/LB	0.23	0.23	0.23	0.23	0.23	
27,000	80.3	82.3	84.2	86.1	87.9	%N1	81.6	83.6	85.6	87.4	89.3	27,000
	1908	1967	2027	2087	2150	LB/HR	2021	2084	2147	2211	2279	
	0.241	0.239	0.238	0.236	0.234	NM/LB	0.230	0.229	0.227	0.226	0.224	
28,000	80.5	82.5	84.4	86.2	88.1	%N1	81.8	83.8	85.8	87.6	89.5	28,000
	1921	1980	2041	2102	2165	LB/HR	2035	2098	2162	2227	2295	
	0.24	0.24	0.24	0.23	0.23	NM/LB	0.23	0.23	0.23	0.22	0.22	
29,000	80.7	82.7	84.6	86.5	88.3	%N1	82.0	84.0	86.0	87.8	89.7	29,000
	1938	1998	2059	2120	2185	LB/HR	2050	2114	2178	2243	2312	
	0.237	0.236	0.234	0.232	0.231	NM/LB	0.227	0.225	0.224	0.222	0.220	
30,000	80.9	82.9	84.9	86.7	88.6	%N1	82.2	84.2	86.2	88.1	90.0	30,000
	1956	2016	2078	2140	2205	LB/HR	2069	2133	2198	2264	2334	
	0.23	0.23	0.23	0.23	0.23	NM/LB	0.22	0.22	0.22	0.22	0.22	
31,000	81.2	83.2	85.1	87.0	88.8	%N1	82.5	84.5	86.5	88.3		31,000
	1973	2034	2096	2159	2225	LB/HR	2088	2153	2219	2285		
	0.233	0.231	0.230	0.228	0.226	NM/LB	0.223	0.221	0.220	0.218		
32,000	81.4	83.4	85.3	87.2	89.0	%N1	82.7	84.7	86.7	88.6		32,000
	1991	2053	2115	2179	2245	LB/HR	2107	2173	2239	2306		
	0.23	0.23	0.23	0.23	0.22	NM/LB	0.22	0.22	0.22	0.22		
33,000	81.6	83.6	85.6	87.4	89.3	%N1	82.9	85.0	87.0	88.9		33,000
	2008	2071	2134	2198	2265	LB/HR	2126	2192	2259	2327		
	0.229	0.227	0.226	0.224	0.222	NM/LB	0.219	0.217	0.216	0.214		
34,000	81.9	83.9	85.9	87.8	89.6	%N1	83.2	85.2	87.2	89.1		34,000
	2033	2096	2160	2225	2293	LB/HR	2145	2212	2280	2349		
	0.23	0.22	0.22	0.22	0.22	NM/LB	0.22	0.22	0.21	0.21		
35,000	82.3	84.3	86.3	88.1	90.0	%N1	83.6	85.6	87.6	89.5		35,000
	2060	2124	2189	2255	2325	LB/HR	2176	2245	2314	2385		
	0.223	0.222	0.220	0.219	0.217	NM/LB	0.213	0.212	0.211	0.209		
36,000	82.6	84.6	86.6	88.5		%N1	84.0	86.1	88.1	90.0		36,000
	2088	2153	2219	2285		LB/HR	2212	2282	2352	2423		
	0.22	0.22	0.22	0.22		NM/LB	0.21	0.21	0.21	0.21		
37,000	83.0	85.0	87.0	88.9		%N1	84.5	86.6	88.6	90.4		37,000
	2115	2181	2248	2316		LB/HR	2249	2319	2390	2462		
	0.217	0.216	0.214	0.213		NM/LB	0.207	0.205	0.204	0.203		
38,000	83.3	85.4	87.3	89.3		%N1	85.0	87.0	89.0	90.9		38,000
	2143	2210	2277	2348		LB/HR	2285	2356	2429	2500		
	0.21	0.21	0.21	0.21		NM/LB	0.2	0.2	0.2	0.2		
39,000	83.7	85.8	87.8	89.7		%N1	85.4	87.5	89.5	91.3		39,000
	2173	2241	2310	2382		LB/HR	2321	2393	2467	2538		
	0.211	0.210	0.209	0.207		NM/LB	0.200	0.199	0.198	0.197		

39,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.6 Mi						.62 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	68.3	70.0	71.6	73.3	74.9	%N1	68.7	70.4	72.1	73.7	75.3	25,000
	950	979	1008	1037	1067	LB/HR	978	1008	1038	1067	1098	
	0.345	0.343	0.341	0.339	0.337	NM/LB	0.347	0.345	0.343	0.341	0.338	
26,000	68.8	70.5	72.2	73.8	75.5	%N1	69.2	71.0	72.6	74.3	76.0	26,000
	972	1002	1032	1061	1092	LB/HR	1001	1031	1062	1093	1124	
	0.34	0.34	0.33	0.33	0.33	NM/LB	0.34	0.34	0.33	0.33	0.33	
27,000	69.3	71.0	72.7	74.4	76.1	%N1	69.8	71.5	73.2	74.9	76.6	27,000
	994	1024	1055	1085	1117	LB/HR	1024	1055	1087	1118	1150	
	0.330	0.328	0.326	0.325	0.322	NM/LB	0.331	0.329	0.327	0.325	0.323	
28,000	69.9	71.6	73.3	75.0	76.7	%N1	70.3	72.1	73.8	75.5	77.2	28,000
	1015	1046	1078	1109	1141	LB/HR	1047	1079	1112	1143	1177	
	0.32	0.32	0.32	0.32	0.32	NM/LB	0.32	0.32	0.32	0.32	0.32	
29,000	70.4	72.2	73.9	75.6	77.3	%N1	70.9	72.7	74.4	76.1	77.8	29,000
	1038	1070	1102	1134	1167	LB/HR	1071	1104	1137	1170	1204	
	0.316	0.314	0.312	0.310	0.308	NM/LB	0.316	0.315	0.313	0.311	0.309	
30,000	71.0	72.7	74.5	76.2	77.8	%N1	71.5	73.3	75.0	76.7	78.4	30,000
	1062	1094	1128	1160	1194	LB/HR	1095	1129	1163	1196	1232	
	0.31	0.31	0.31	0.3	0.3	NM/LB	0.31	0.31	0.31	0.3	0.3	
31,000	71.6	73.3	75.1	76.8	78.4	%N1	72.1	73.8	75.6	77.3	79.0	31,000
	1086	1119	1153	1186	1221	LB/HR	1121	1155	1190	1225	1260	
	0.302	0.300	0.299	0.297	0.295	NM/LB	0.302	0.301	0.299	0.297	0.295	
32,000						%N1	72.6	74.4	76.2	77.9	79.6	32,000
						LB/HR	1148	1183	1219	1254	1290	
						NM/LB	0.3	0.29	0.29	0.29	0.29	
33,000						%N1	73.1	75.0	76.7	78.5	80.2	33,000
						LB/HR	1175	1211	1247	1284	1319	
						NM/LB	0.288	0.287	0.285	0.283	0.282	
34,000						%N1	73.8	75.6	77.4	79.2	80.9	34,000
						LB/HR	1206	1243	1281	1319	1354	
						NM/LB	0.28	0.28	0.28	0.28	0.27	
35,000						%N1						35,000
						LB/HR						
						NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

39,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.64 Mi						.66 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	69.2	70.9	72.6	74.3	75.9	%N1	69.8	71.5	73.2	74.9	76.6	25,000
	1011	1042	1073	1104	1135	LB/HR	1047	1079	1111	1143	1176	
	0.346	0.344	0.342	0.340	0.338	NM/LB	0.344	0.343	0.341	0.339	0.337	
26,000	69.7	71.4	73.1	74.8	76.5	%N1	70.3	72.0	73.7	75.4	77.1	26,000
	1030	1062	1093	1125	1157	LB/HR	1066	1099	1131	1164	1197	
	0.34	0.34	0.34	0.33	0.33	NM/LB	0.34	0.34	0.33	0.33	0.33	
27,000	70.2	71.9	73.6	75.3	77.0	%N1	70.7	72.4	74.2	75.9	77.5	27,000
	1052	1084	1117	1149	1182	LB/HR	1086	1118	1152	1185	1219	
	0.332	0.331	0.329	0.327	0.325	NM/LB	0.332	0.331	0.329	0.327	0.325	
28,000	70.8	72.5	74.2	75.9	77.6	%N1	71.1	72.9	74.6	76.3	78.0	28,000
	1076	1109	1142	1175	1209	LB/HR	1105	1138	1172	1206	1241	
	0.32	0.32	0.32	0.32	0.32	NM/LB	0.33	0.32	0.32	0.32	0.32	
29,000	71.3	73.1	74.8	76.5	78.2	%N1	71.7	73.5	75.2	77.0	78.6	29,000
	1100	1134	1168	1201	1237	LB/HR	1130	1164	1198	1233	1269	
	0.318	0.316	0.314	0.313	0.310	NM/LB	0.319	0.318	0.316	0.314	0.312	
30,000	71.9	73.7	75.4	77.2	78.8	%N1	72.2	74.0	75.8	77.5	79.2	30,000
	1126	1160	1195	1230	1266	LB/HR	1155	1190	1226	1262	1298	
	0.31	0.31	0.31	0.31	0.3	NM/LB	0.31	0.31	0.31	0.31	0.3	
31,000	72.5	74.3	76.0	77.7	79.4	%N1	72.8	74.6	76.3	78.1	79.8	31,000
	1154	1189	1224	1260	1296	LB/HR	1181	1217	1253	1290	1326	
	0.303	0.302	0.300	0.298	0.296	NM/LB	0.305	0.304	0.302	0.300	0.298	
32,000	73.0	74.8	76.6	78.3	80.1	%N1	73.3	75.1	76.9	78.7	80.4	32,000
	1181	1217	1254	1291	1326	LB/HR	1210	1247	1285	1322	1358	
	0.3	0.29	0.29	0.29	0.29	NM/LB	0.3	0.3	0.29	0.29	0.29	
33,000	73.6	75.4	77.2	79.0	80.7	%N1	73.9	75.8	77.6	79.3	81.1	33,000
	1210	1247	1284	1322	1357	LB/HR	1240	1278	1316	1355	1392	
	0.289	0.288	0.286	0.284	0.283	NM/LB	0.291	0.289	0.288	0.286	0.284	
34,000	74.2	76.0	77.8	79.6	81.3	%N1	74.5	76.4	78.2	80.0	81.7	34,000
	1238	1276	1315	1354	1391	LB/HR	1270	1309	1348	1388	1427	
	0.28	0.28	0.28	0.28	0.28	NM/LB	0.28	0.28	0.28	0.28	0.28	
35,000	74.7	76.6	78.4	80.2	81.9	%N1	75.1	77.0	78.8	80.6	82.3	35,000
	1267	1306	1346	1386	1425	LB/HR	1301	1341	1381	1421	1463	
	0.276	0.275	0.273	0.271	0.269	NM/LB	0.277	0.276	0.274	0.272	0.270	
36,000	75.4	77.3	79.1	80.9	82.7	%N1	75.7	77.6	79.5	81.3	83.0	36,000
	1301	1341	1381	1422	1464	LB/HR	1331	1373	1414	1455	1500	
	0.27	0.27	0.27	0.26	0.26	NM/LB	0.27	0.27	0.27	0.27	0.26	
37,000						%N1	76.3	78.2	80.1	81.9	83.6	37,000
						LB/HR	1363	1406	1448	1492	1536	
						NM/LB	0.265	0.263	0.261	0.260	0.258	
38,000						%N1	77.0	78.9	80.7	82.6	84.4	38,000
						LB/HR	1400	1444	1488	1533	1576	
						NM/LB	0.26	0.26	0.25	0.25	0.25	
39,000						%N1						39,000
						LB/HR						
						NM/LB						

39,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.68 Mi						.7 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	70.5	72.2	74.0	75.7	77.3	%N1	71.2	73.0	74.7	76.4	78.1	25,000
	1089	1122	1155	1188	1223	LB/HR	1133	1167	1201	1236	1272	
	0.341	0.340	0.338	0.336	0.333	NM/LB	0.338	0.336	0.334	0.332	0.330	
26,000	70.9	72.6	74.4	76.1	77.7	%N1	71.6	73.4	75.1	76.8	78.5	26,000
	1106	1139	1172	1207	1242	LB/HR	1149	1184	1218	1255	1291	
	0.34	0.33	0.33	0.33	0.33	NM/LB	0.33	0.33	0.33	0.33	0.33	
27,000	71.3	73.1	74.8	76.5	78.1	%N1	72.0	73.7	75.5	77.2	78.8	27,000
	1124	1157	1191	1226	1262	LB/HR	1166	1201	1236	1273	1310	
	0.331	0.329	0.327	0.325	0.323	NM/LB	0.328	0.326	0.325	0.323	0.320	
28,000	71.7	73.5	75.3	77.0	78.6	%N1	72.3	74.1	75.8	77.6	79.2	28,000
	1143	1177	1212	1248	1284	LB/HR	1184	1219	1255	1292	1329	
	0.33	0.32	0.32	0.32	0.32	NM/LB	0.32	0.32	0.32	0.32	0.32	
29,000	72.1	73.9	75.7	77.4	79.1	%N1	72.7	74.5	76.3	78.0	79.7	29,000
	1163	1198	1233	1270	1306	LB/HR	1204	1240	1276	1314	1351	
	0.320	0.318	0.316	0.314	0.312	NM/LB	0.318	0.316	0.315	0.313	0.311	
30,000	72.6	74.4	76.1	77.8	79.5	%N1	73.1	74.9	76.7	78.4	80.2	30,000
	1184	1220	1256	1293	1330	LB/HR	1224	1261	1298	1336	1373	
	0.31	0.31	0.31	0.31	0.31	NM/LB	0.31	0.31	0.31	0.31	0.31	
31,000	73.1	74.9	76.7	78.4	80.2	%N1	73.5	75.3	77.1	78.8	80.6	31,000
	1211	1248	1285	1323	1359	LB/HR	1244	1281	1319	1358	1396	
	0.307	0.305	0.304	0.302	0.300	NM/LB	0.308	0.306	0.304	0.302	0.301	
32,000	73.6	75.4	77.2	79.0	80.8	%N1	73.9	75.8	77.6	79.3	81.1	32,000
	1238	1276	1314	1353	1390	LB/HR	1267	1306	1344	1384	1423	
	0.3	0.3	0.3	0.29	0.29	NM/LB	0.3	0.3	0.3	0.3	0.29	
33,000	74.2	76.0	77.8	79.6	81.3	%N1	74.5	76.3	78.1	79.9	81.6	33,000
	1265	1304	1343	1382	1421	LB/HR	1295	1335	1374	1414	1456	
	0.294	0.292	0.290	0.289	0.287	NM/LB	0.295	0.294	0.292	0.290	0.288	
34,000	74.8	76.6	78.4	80.2	82.0	%N1	75.0	76.9	78.7	80.5	82.2	34,000
	1297	1337	1377	1417	1458	LB/HR	1323	1364	1404	1445	1489	
	0.29	0.29	0.28	0.28	0.28	NM/LB	0.29	0.29	0.29	0.28	0.28	
35,000	75.4	77.3	79.1	80.9	82.6	%N1	75.6	77.4	79.3	81.1	82.8	35,000
	1329	1370	1411	1452	1496	LB/HR	1351	1393	1435	1476	1521	
	0.280	0.278	0.276	0.275	0.273	NM/LB	0.283	0.282	0.280	0.278	0.276	
36,000	76.0	77.9	79.8	81.6	83.3	%N1	76.2	78.1	80.0	81.8	83.5	36,000
	1361	1403	1446	1488	1534	LB/HR	1385	1428	1471	1515	1561	
	0.27	0.27	0.27	0.27	0.27	NM/LB	0.28	0.27	0.27	0.27	0.27	
37,000	76.6	78.5	80.4	82.2	84.0	%N1	76.8	78.7	80.6	82.4	84.2	37,000
	1396	1439	1483	1527	1572	LB/HR	1422	1466	1511	1556	1601	
	0.266	0.265	0.263	0.261	0.259	NM/LB	0.269	0.267	0.266	0.264	0.262	
38,000	77.2	79.1	81.0	82.9	84.6	%N1	77.5	79.4	81.3	83.1	84.9	38,000
	1431	1476	1521	1566	1611	LB/HR	1459	1505	1551	1597	1644	
	0.26	0.26	0.26	0.25	0.25	NM/LB	0.26	0.26	0.26	0.26	0.26	
39,000	77.8	79.8	81.7	83.5	85.3	%N1	78.1	80.0	81.9	83.8	85.5	39,000
	1466	1512	1559	1605	1652	LB/HR	1496	1543	1591	1638	1687	
	0.253	0.252	0.250	0.249	0.247	NM/LB	0.256	0.254	0.252	0.251	0.249	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

39,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.72 Mi						.74 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	72.0	73.8	75.6	77.3	78.9	%N1	72.8	74.6	76.4	78.1	79.9	25,000
	1184	1219	1255	1292	1329	LB/HR	1239	1276	1314	1353	1391	
	0.332	0.331	0.329	0.327	0.325	NM/LB	0.327	0.325	0.323	0.321	0.319	
26,000	72.3	74.1	75.8	77.6	79.3	%N1	73.1	74.9	76.7	78.4	80.2	26,000
	1198	1234	1270	1308	1345	LB/HR	1253	1291	1330	1368	1407	
	0.33	0.33	0.33	0.32	0.32	NM/LB	0.32	0.32	0.32	0.32	0.32	
27,000	72.6	74.4	76.2	77.9	79.6	%N1	73.4	75.2	77.0	78.7	80.5	27,000
	1215	1252	1289	1327	1364	LB/HR	1267	1306	1345	1384	1423	
	0.324	0.322	0.320	0.318	0.316	NM/LB	0.319	0.318	0.316	0.314	0.312	
28,000	73.0	74.8	76.5	78.3	80.0	%N1	73.7	75.5	77.3	79.0	80.8	28,000
	1232	1270	1307	1346	1383	LB/HR	1283	1322	1362	1401	1442	
	0.32	0.32	0.32	0.31	0.31	NM/LB	0.32	0.31	0.31	0.31	0.31	
29,000	73.3	75.1	76.9	78.6	80.4	%N1	74.0	75.8	77.6	79.4	81.1	29,000
	1250	1288	1326	1365	1403	LB/HR	1301	1340	1381	1420	1462	
	0.315	0.313	0.312	0.310	0.308	NM/LB	0.311	0.309	0.307	0.306	0.303	
30,000	73.7	75.5	77.3	79.0	80.8	%N1	74.3	76.2	78.0	79.8	81.5	30,000
	1268	1307	1346	1385	1425	LB/HR	1318	1358	1399	1440	1482	
	0.31	0.31	0.31	0.31	0.3	NM/LB	0.31	0.31	0.3	0.3	0.3	
31,000	74.1	75.9	77.7	79.5	81.2	%N1	74.7	76.5	78.3	80.1	81.8	31,000
	1289	1328	1368	1408	1449	LB/HR	1336	1377	1418	1459	1502	
	0.305	0.304	0.302	0.300	0.298	NM/LB	0.303	0.301	0.299	0.298	0.295	
32,000	74.5	76.3	78.1	79.9	81.6	%N1	75.1	76.9	78.8	80.6	82.3	32,000
	1310	1350	1391	1431	1473	LB/HR	1356	1398	1440	1481	1526	
	0.3	0.3	0.3	0.3	0.29	NM/LB	0.3	0.3	0.29	0.29	0.29	
33,000	74.9	76.7	78.6	80.3	82.1	%N1	75.5	77.4	79.2	81.0	82.7	33,000
	1331	1372	1413	1454	1498	LB/HR	1378	1420	1464	1505	1551	
	0.296	0.294	0.292	0.291	0.288	NM/LB	0.294	0.292	0.290	0.289	0.286	
34,000	75.4	77.2	79.1	80.9	82.6	%N1	75.9	77.8	79.6	81.4	83.2	34,000
	1356	1398	1440	1481	1527	LB/HR	1400	1443	1487	1531	1577	
	0.29	0.29	0.29	0.29	0.28	NM/LB	0.29	0.29	0.29	0.28	0.28	
35,000	75.9	77.8	79.6	81.4	83.1	%N1	76.3	78.2	80.1	81.8	83.6	35,000
	1384	1426	1470	1512	1559	LB/HR	1423	1467	1512	1557	1602	
	0.284	0.283	0.281	0.279	0.277	NM/LB	0.284	0.283	0.281	0.279	0.277	
36,000	76.4	78.3	80.2	82.0	83.7	%N1	76.8	78.7	80.5	82.3	84.1	36,000
	1412	1456	1501	1545	1591	LB/HR	1450	1495	1541	1587	1632	
	0.28	0.28	0.28	0.27	0.27	NM/LB	0.28	0.28	0.28	0.27	0.27	
37,000	76.9	78.8	80.7	82.5	84.3	%N1	77.2	79.2	81.0	82.8	84.6	37,000
	1442	1487	1532	1578	1623	LB/HR	1479	1525	1573	1619	1666	
	0.273	0.271	0.270	0.268	0.266	NM/LB	0.273	0.272	0.270	0.268	0.266	
38,000	77.5	79.4	81.3	83.1	84.9	%N1	77.7	79.6	81.5	83.4	85.1	38,000
	1479	1525	1572	1618	1666	LB/HR	1509	1555	1604	1651	1699	
	0.27	0.26	0.26	0.26	0.26	NM/LB	0.27	0.27	0.26	0.26	0.26	
39,000	78.1	80.1	82.0	83.8	85.6	%N1	78.2	80.1	82.0	83.9	85.7	39,000
	1517	1564	1613	1660	1709	LB/HR	1538	1586	1635	1683	1733	
	0.259	0.258	0.256	0.255	0.253	NM/LB	0.263	0.261	0.260	0.258	0.256	

39,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.76 Mi						.78 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	73.7	75.6	77.4	79.1	80.9	%N1	74.9	76.7	78.5	80.3	82.1	25,000
	1302	1342	1382	1422	1463	LB/HR	1376	1418	1462	1503	1548	
	0.319	0.317	0.315	0.314	0.311	NM/LB	0.310	0.308	0.306	0.304	0.302	
26,000	74.0	75.8	77.7	79.4	81.2	%N1	75.1	77.0	78.8	80.6	82.3	26,000
	1316	1357	1398	1438	1480	LB/HR	1389	1432	1476	1517	1563	
	0.32	0.31	0.31	0.31	0.31	NM/LB	0.31	0.31	0.3	0.3	0.3	
27,000	74.3	76.1	78.0	79.7	81.5	%N1	75.4	77.3	79.1	80.9	82.6	27,000
	1331	1372	1414	1454	1497	LB/HR	1404	1447	1492	1534	1580	
	0.312	0.310	0.308	0.307	0.304	NM/LB	0.304	0.302	0.300	0.298	0.296	
28,000	74.6	76.4	78.2	80.0	81.8	%N1	75.7	77.6	79.4	81.2	82.9	28,000
	1346	1387	1429	1470	1514	LB/HR	1419	1463	1508	1552	1598	
	0.31	0.31	0.31	0.3	0.3	NM/LB	0.3	0.3	0.3	0.29	0.29	
29,000	74.9	76.7	78.5	80.3	82.1	%N1	76.0	77.9	79.7	81.5	83.2	29,000
	1361	1403	1445	1486	1531	LB/HR	1435	1479	1525	1570	1615	
	0.305	0.304	0.302	0.300	0.298	NM/LB	0.297	0.296	0.293	0.291	0.289	
30,000	75.2	77.1	78.9	80.7	82.4	%N1	76.2	78.1	80.0	81.8	83.6	30,000
	1378	1420	1464	1505	1551	LB/HR	1451	1496	1542	1589	1633	
	0.3	0.3	0.3	0.3	0.29	NM/LB	0.29	0.29	0.29	0.29	0.29	
31,000	75.5	77.4	79.2	81.0	82.8	%N1	76.5	78.4	80.3	82.1	83.9	31,000
	1395	1438	1482	1524	1570	LB/HR	1468	1513	1561	1607	1653	
	0.298	0.296	0.294	0.293	0.290	NM/LB	0.290	0.289	0.287	0.285	0.283	
32,000	75.8	77.7	79.6	81.4	83.1	%N1	76.8	78.7	80.6	82.4	84.2	32,000
	1412	1456	1500	1545	1590	LB/HR	1486	1532	1580	1627	1673	
	0.29	0.29	0.29	0.29	0.29	NM/LB	0.29	0.29	0.28	0.28	0.28	
33,000	76.2	78.1	79.9	81.7	83.4	%N1	77.1	79.0	80.9	82.7	84.5	33,000
	1430	1474	1520	1565	1610	LB/HR	1503	1550	1599	1646	1693	
	0.291	0.289	0.287	0.285	0.283	NM/LB	0.284	0.282	0.280	0.278	0.276	
34,000	76.5	78.4	80.3	82.1	83.9	%N1	77.4	79.3	81.2	83.0	84.8	34,000
	1453	1498	1544	1590	1635	LB/HR	1521	1568	1617	1666	1713	
	0.29	0.28	0.28	0.28	0.28	NM/LB	0.28	0.28	0.28	0.27	0.27	
35,000	76.9	78.8	80.7	82.5	84.3	%N1	77.7	79.6	81.5	83.3	85.1	35,000
	1476	1522	1570	1616	1662	LB/HR	1540	1588	1637	1686	1734	
	0.281	0.280	0.278	0.276	0.274	NM/LB	0.277	0.275	0.273	0.271	0.270	
36,000	77.3	79.2	81.1	82.9	84.7	%N1	78.0	80.0	81.9	83.7	85.5	36,000
	1500	1546	1595	1642	1689	LB/HR	1562	1611	1661	1710	1760	
	0.28	0.28	0.27	0.27	0.27	NM/LB	0.27	0.27	0.27	0.27	0.27	
37,000	77.7	79.6	81.5	83.3	85.1	%N1	78.4	80.3	82.2	84.1	85.8	37,000
	1523	1571	1620	1668	1716	LB/HR	1584	1633	1685	1735	1785	
	0.273	0.271	0.269	0.267	0.266	NM/LB	0.269	0.268	0.266	0.264	0.262	
38,000	78.1	80.1	82.0	83.8	85.6	%N1	78.7	80.7	82.6	84.4	86.2	38,000
	1552	1601	1651	1699	1749	LB/HR	1606	1656	1709	1759	1811	
	0.27	0.27	0.26	0.26	0.26	NM/LB	0.27	0.26	0.26	0.26	0.26	
39,000	78.6	80.6	82.5	84.3	86.1	%N1	79.1	81.0	83.0	84.8	86.6	39,000
	1582	1632	1683	1732	1784	LB/HR	1629	1679	1732	1783	1836	
	0.263	0.261	0.259	0.257	0.255	NM/LB	0.262	0.260	0.258	0.257	0.255	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

39,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.8 Mi						.81 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	75.9	77.8	79.7	81.4	83.2	%N1	76.7	78.6	80.4	82.2	84.0	25,000
	1449	1493	1540	1587	1631	LB/HR	1501	1548	1596	1644	1691	
	0.302	0.300	0.298	0.296	0.294	NM/LB	0.295	0.293	0.291	0.289	0.287	
26,000	76.2	78.1	79.9	81.7	83.5	%N1	76.9	78.8	80.7	82.4	84.2	26,000
	1463	1508	1555	1602	1646	LB/HR	1515	1562	1611	1660	1707	
	0.3	0.3	0.3	0.29	0.29	NM/LB	0.29	0.29	0.29	0.29	0.28	
27,000	76.4	78.3	80.2	81.9	83.7	%N1	77.1	79.0	80.9	82.7	84.5	27,000
	1476	1522	1570	1617	1662	LB/HR	1529	1577	1626	1675	1723	
	0.296	0.295	0.292	0.290	0.289	NM/LB	0.289	0.288	0.286	0.284	0.282	
28,000	76.6	78.5	80.4	82.2	84.0	%N1	77.3	79.2	81.1	82.9	84.7	28,000
	1492	1538	1586	1634	1680	LB/HR	1544	1591	1641	1690	1739	
	0.29	0.29	0.29	0.29	0.29	NM/LB	0.29	0.29	0.28	0.28	0.28	
29,000	76.9	78.8	80.7	82.5	84.3	%N1	77.6	79.5	81.4	83.2	85.0	29,000
	1508	1555	1604	1652	1699	LB/HR	1559	1608	1658	1708	1757	
	0.290	0.288	0.286	0.284	0.282	NM/LB	0.284	0.282	0.280	0.278	0.276	
30,000	77.2	79.1	80.9	82.7	84.5	%N1	77.8	79.8	81.6	83.5	85.3	30,000
	1525	1572	1621	1670	1717	LB/HR	1576	1625	1676	1725	1775	
	0.29	0.29	0.28	0.28	0.28	NM/LB	0.28	0.28	0.28	0.28	0.27	
31,000	77.4	79.3	81.2	83.0	84.8	%N1	78.1	80.0	81.9	83.7	85.5	31,000
	1541	1589	1639	1688	1736	LB/HR	1592	1641	1693	1743	1794	
	0.284	0.282	0.280	0.278	0.276	NM/LB	0.278	0.276	0.274	0.273	0.271	
32,000	77.7	79.6	81.5	83.3	85.1	%N1	78.3	80.3	82.2	84.0	85.8	32,000
	1558	1606	1657	1706	1755	LB/HR	1608	1658	1710	1761	1812	
	0.28	0.28	0.28	0.28	0.27	NM/LB	0.28	0.27	0.27	0.27	0.27	
33,000	78.0	79.9	81.8	83.6	85.4	%N1	78.6	80.6	82.5	84.3	86.1	33,000
	1578	1627	1678	1728	1778	LB/HR	1625	1676	1729	1779	1832	
	0.277	0.276	0.274	0.272	0.270	NM/LB	0.272	0.271	0.269	0.267	0.265	
34,000	78.3	80.3	82.2	84.0	85.8	%N1	78.9	80.9	82.8	84.7	86.4	34,000
	1598	1647	1699	1750	1800	LB/HR	1646	1698	1751	1802	1856	
	0.27	0.27	0.27	0.27	0.27	NM/LB	0.27	0.27	0.27	0.26	0.26	
35,000	78.6	80.6	82.5	84.3	86.1	%N1	79.3	81.2	83.2	85.0	86.8	35,000
	1618	1668	1721	1771	1823	LB/HR	1667	1719	1774	1826	1880	
	0.270	0.269	0.267	0.265	0.263	NM/LB	0.266	0.264	0.262	0.260	0.258	
36,000	78.9	80.9	82.8	84.7	86.5	%N1	79.6	81.6	83.5	85.3	87.2	36,000
	1638	1689	1742	1793	1846	LB/HR	1688	1741	1796	1849	1904	
	0.27	0.27	0.26	0.26	0.26	NM/LB	0.26	0.26	0.26	0.26	0.26	
37,000	79.3	81.2	83.2	85.0	86.8	%N1	79.9	81.9	83.9	85.7	87.5	37,000
	1659	1711	1765	1817	1871	LB/HR	1709	1763	1819	1873	1929	
	0.264	0.262	0.260	0.258	0.256	NM/LB	0.259	0.257	0.256	0.254	0.252	
38,000	79.7	81.6	83.6	85.4	87.2	%N1	80.3	82.3	84.2	86.1	87.9	38,000
	1684	1736	1791	1845	1899	LB/HR	1735	1789	1846	1901	1959	
	0.26	0.26	0.26	0.25	0.25	NM/LB	0.26	0.25	0.25	0.25	0.25	
39,000	80.0	82.0	84.0	85.8	87.6	%N1	80.7	82.7	84.7	86.5	88.4	39,000
	1708	1762	1817	1872	1928	LB/HR	1765	1821	1878	1935	1995	
	0.256	0.254	0.253	0.251	0.249	NM/LB	0.251	0.249	0.247	0.246	0.244	

39,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.82 Mi						.83 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.4	79.3	81.2	83.0	84.8	%N1	78.7	80.6	82.5	84.4	86.2	25,000
	1555	1604	1654	1703	1752	LB/HR	1648	1699	1753	1803	1857	
	0.288	0.286	0.284	0.283	0.281	NM/LB	0.275	0.274	0.272	0.270	0.268	
26,000	77.6	79.5	81.4	83.2	85.0	%N1	78.9	80.9	82.8	84.6	86.4	26,000
	1570	1618	1669	1719	1769	LB/HR	1663	1715	1769	1820	1875	
	0.29	0.28	0.28	0.28	0.28	NM/LB	0.27	0.27	0.27	0.27	0.27	
27,000	77.8	79.7	81.6	83.4	85.2	%N1	79.2	81.1	83.1	84.9	86.7	27,000
	1584	1633	1685	1734	1785	LB/HR	1679	1731	1786	1838	1893	
	0.283	0.281	0.279	0.277	0.275	NM/LB	0.270	0.269	0.267	0.265	0.263	
28,000	78.0	80.0	81.9	83.7	85.5	%N1	79.4	81.4	83.3	85.1	87.0	28,000
	1598	1648	1700	1750	1801	LB/HR	1695	1748	1803	1855	1911	
	0.28	0.28	0.28	0.27	0.27	NM/LB	0.27	0.27	0.26	0.26	0.26	
29,000	78.3	80.2	82.1	83.9	85.7	%N1	79.7	81.6	83.6	85.4	87.2	29,000
	1613	1663	1715	1766	1818	LB/HR	1710	1764	1819	1873	1929	
	0.278	0.276	0.274	0.273	0.270	NM/LB	0.265	0.264	0.262	0.260	0.258	
30,000	78.5	80.5	82.4	84.2	86.0	%N1	79.9	81.9	83.9	85.7	87.5	30,000
	1629	1679	1732	1783	1836	LB/HR	1728	1782	1839	1894	1951	
	0.28	0.27	0.27	0.27	0.27	NM/LB	0.26	0.26	0.26	0.26	0.26	
31,000	78.8	80.7	82.6	84.5	86.3	%N1	80.2	82.2	84.2	86.0	87.8	31,000
	1645	1696	1749	1800	1854	LB/HR	1750	1805	1862	1918	1976	
	0.273	0.271	0.269	0.267	0.265	NM/LB	0.259	0.258	0.256	0.254	0.252	
32,000	79.0	81.0	82.9	84.8	86.5	%N1	80.5	82.5	84.5	86.3	88.2	32,000
	1661	1712	1766	1818	1872	LB/HR	1772	1828	1885	1942	2002	
	0.27	0.27	0.27	0.26	0.26	NM/LB	0.26	0.25	0.25	0.25	0.25	
33,000	79.3	81.2	83.2	85.0	86.8	%N1	80.8	82.8	84.8	86.7	88.5	33,000
	1676	1729	1783	1835	1890	LB/HR	1794	1851	1909	1966	2027	
	0.267	0.266	0.264	0.262	0.260	NM/LB	0.253	0.251	0.249	0.248	0.246	
34,000	79.5	81.5	83.5	85.3	87.1	%N1	81.1	83.2	85.1	87.0	88.9	34,000
	1695	1747	1803	1856	1911	LB/HR	1816	1873	1932	1991	2052	
	0.26	0.26	0.26	0.26	0.26	NM/LB	0.25	0.25	0.25	0.24	0.24	
35,000	79.9	81.9	83.8	85.6	87.5	%N1	81.5	83.6	85.5	87.4	89.3	35,000
	1717	1770	1826	1881	1937	LB/HR	1844	1903	1962	2022	2085	
	0.261	0.260	0.258	0.256	0.254	NM/LB	0.246	0.244	0.243	0.241	0.239	
36,000	80.2	82.2	84.1	86.0	87.8	%N1	82.0	84.0	86.0	87.9		36,000
	1739	1794	1850	1906	1964	LB/HR	1879	1939	1999	2061		
	0.26	0.26	0.25	0.25	0.25	NM/LB	0.24	0.24	0.24	0.24		
37,000	80.5	82.5	84.5	86.3	88.2	%N1	82.5	84.5	86.5	88.5		37,000
	1762	1817	1874	1931	1990	LB/HR	1914	1975	2037	2099		
	0.254	0.253	0.251	0.249	0.247	NM/LB	0.237	0.235	0.234	0.232		
38,000	80.8	82.8	84.8	86.7	88.5	%N1	83.0	85.0	87.0	89.0		38,000
	1785	1841	1899	1956	2016	LB/HR	1949	2011	2074	2139		
	0.25	0.25	0.25	0.25	0.24	NM/LB	0.23	0.23	0.23	0.23		
39,000	81.3	83.3	85.2	87.1	89.0	%N1	83.4	85.5	87.5	89.5		39,000
	1814	1872	1930	1989	2051	LB/HR	1984	2048	2111	2179		
	0.247	0.245	0.244	0.242	0.240	NM/LB	0.229	0.227	0.226	0.223		

Gulfstream G280
AIRPLANE FLIGHT MANUAL

39,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.84 Mi						.85 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	80.0	82.0	84.0	85.8	87.6	%N1	81.3	83.3	85.3	87.2	89.0	25,000
	1744	1799	1856	1912	1969	LB/HR	1847	1906	1965	2025	2087	
	0.263	0.262	0.260	0.258	0.256	NM/LB	0.252	0.250	0.248	0.246	0.244	
26,000	80.2	82.2	84.2	86.0	87.8	%N1	81.5	83.5	85.5	87.4	89.2	26,000
	1760	1815	1872	1928	1987	LB/HR	1861	1920	1980	2040	2103	
	0.26	0.26	0.26	0.26	0.25	NM/LB	0.25	0.25	0.25	0.24	0.24	
27,000	80.5	82.5	84.4	86.3	88.1	%N1	81.7	83.8	85.7	87.6	89.5	27,000
	1777	1833	1891	1948	2007	LB/HR	1879	1939	2000	2060	2124	
	0.258	0.257	0.255	0.253	0.251	NM/LB	0.247	0.246	0.244	0.242	0.240	
28,000	80.7	82.7	84.7	86.5	88.4	%N1	82.0	84.0	86.0	87.9		28,000
	1795	1851	1909	1967	2027	LB/HR	1898	1959	2020	2081		
	0.26	0.25	0.25	0.25	0.25	NM/LB	0.24	0.24	0.24	0.24		
29,000	81.0	83.0	84.9	86.8	88.7	%N1	82.3	84.3	86.3	88.2		29,000
	1812	1869	1928	1986	2047	LB/HR	1917	1979	2040	2103		
	0.253	0.252	0.250	0.248	0.246	NM/LB	0.242	0.241	0.239	0.237		
30,000	81.2	83.2	85.2	87.0	88.9	%N1	82.5	84.6	86.5	88.5		30,000
	1830	1888	1947	2006	2068	LB/HR	1936	1998	2061	2124		
	0.25	0.25	0.25	0.25	0.24	NM/LB	0.24	0.24	0.24	0.23		
31,000	81.5	83.6	85.5	87.4	89.3	%N1	82.8	84.8	86.8	88.8		31,000
	1854	1913	1973	2033	2096	LB/HR	1956	2018	2081	2145		
	0.248	0.246	0.244	0.242	0.240	NM/LB	0.238	0.236	0.234	0.233		
32,000	81.9	83.9	85.9	87.8	89.7	%N1	83.2	85.3	87.3	89.3		32,000
	1882	1942	2002	2063	2128	LB/HR	1989	2053	2116	2183		
	0.24	0.24	0.24	0.24	0.24	NM/LB	0.23	0.23	0.23	0.23		
33,000	82.3	84.3	86.3	88.2		%N1	83.7	85.7	87.7	89.7		33,000
	1910	1971	2032	2094		LB/HR	2022	2087	2152	2221		
	0.240	0.239	0.237	0.235		NM/LB	0.230	0.228	0.227	0.225		
34,000	82.7	84.7	86.7	88.6		%N1	84.2	86.3	88.3	90.2		34,000
	1937	1999	2061	2124		LB/HR	2058	2125	2191	2259		
	0.24	0.24	0.23	0.23		NM/LB	0.23	0.22	0.22	0.22		
35,000	83.0	85.1	87.1	89.1		%N1	84.8	86.8	88.8	90.7		35,000
	1965	2028	2091	2156		LB/HR	2095	2163	2230	2297		
	0.234	0.232	0.231	0.229		NM/LB	0.222	0.220	0.219	0.217		
36,000	83.6	85.7	87.6	89.7		%N1	85.3	87.4	89.4	91.2		36,000
	2005	2070	2134	2203		LB/HR	2132	2201	2270	2335		
	0.23	0.23	0.23	0.22		NM/LB	0.22	0.22	0.21	0.21		
37,000	84.3	86.4	88.4	90.4		%N1	86.2	88.3	90.3			37,000
	2056	2123	2189	2258		LB/HR	2193	2263	2334			
	0.223	0.222	0.220	0.218		NM/LB	0.212	0.210	0.209			
38,000	85.2	87.2	89.2	91.1		%N1	87.2	89.3	91.3			38,000
	2110	2177	2246	2312		LB/HR	2259	2331	2405			
	0.22	0.22	0.21	0.21		NM/LB	0.21	0.2	0.2			
39,000	86.0	88.1	90.1	91.8		%N1						39,000
	2163	2232	2303	2367		LB/HR						
	0.212	0.211	0.209	0.208		NM/LB						

41,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.6 Mi						.62 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	69.5	71.2	72.9	74.6	76.3	%N1	69.9	71.7	73.4	75.1	76.8	25,000
	920	948	978	1006	1034	LB/HR	948	977	1007	1036	1065	
	0.356	0.355	0.352	0.350	0.348	NM/LB	0.357	0.355	0.353	0.351	0.349	
26,000	70.1	71.8	73.5	75.2	76.9	%N1	70.6	72.3	74.0	75.8	77.5	26,000
	942	971	1002	1030	1059	LB/HR	972	1002	1033	1062	1092	
	0.35	0.35	0.34	0.34	0.34	NM/LB	0.35	0.35	0.34	0.34	0.34	
27,000	70.7	72.4	74.2	75.9	77.6	%N1	71.2	72.9	74.7	76.4	78.1	27,000
	966	996	1027	1056	1086	LB/HR	996	1027	1059	1089	1120	
	0.339	0.338	0.335	0.333	0.331	NM/LB	0.340	0.338	0.336	0.334	0.332	
28,000	71.3	73.1	74.8	76.5	78.3	%N1	71.8	73.6	75.3	77.1	78.8	28,000
	990	1021	1052	1082	1113	LB/HR	1022	1053	1085	1116	1149	
	0.33	0.33	0.33	0.33	0.32	NM/LB	0.33	0.33	0.33	0.33	0.32	
29,000	72.0	73.8	75.5	77.3	79.0	%N1	72.5	74.3	76.0	77.8	79.5	29,000
	1018	1049	1081	1112	1145	LB/HR	1048	1080	1113	1145	1179	
	0.322	0.321	0.318	0.317	0.314	NM/LB	0.323	0.322	0.320	0.318	0.315	
30,000						%N1	73.1	74.9	76.6	78.4	80.1	30,000
						LB/HR	1075	1108	1142	1175	1209	
						NM/LB	0.32	0.31	0.31	0.31	0.31	
31,000						%N1						31,000
						LB/HR						
						NM/LB						
32,000						%N1						32,000
						LB/HR						
						NM/LB						
33,000						%N1						33,000
						LB/HR						
						NM/LB						
34,000						%N1						34,000
						LB/HR						
						NM/LB						
35,000						%N1						35,000
						LB/HR						
						NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

41,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.64 Mi						.66 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	70.4	72.1	73.8	75.5	77.3	%N1	70.8	72.5	74.3	76.0	77.7	25,000
	974	1005	1035	1065	1094	LB/HR	1002	1034	1064	1095	1126	
	0.359	0.357	0.355	0.353	0.351	NM/LB	0.360	0.358	0.356	0.354	0.351	
26,000	71.0	72.7	74.5	76.2	77.9	%N1	71.3	73.1	74.8	76.6	78.3	26,000
	998	1030	1061	1091	1122	LB/HR	1024	1057	1088	1120	1152	
	0.35	0.35	0.35	0.34	0.34	NM/LB	0.35	0.35	0.35	0.35	0.34	
27,000	71.6	73.4	75.1	76.9	78.5	%N1	72.0	73.8	75.5	77.3	78.9	27,000
	1024	1055	1087	1119	1151	LB/HR	1050	1083	1115	1147	1181	
	0.342	0.340	0.338	0.336	0.333	NM/LB	0.344	0.342	0.340	0.338	0.335	
28,000	72.3	74.0	75.8	77.6	79.2	%N1	72.6	74.4	76.1	77.9	79.6	28,000
	1050	1083	1116	1148	1181	LB/HR	1075	1109	1142	1176	1209	
	0.33	0.33	0.33	0.33	0.32	NM/LB	0.34	0.33	0.33	0.33	0.33	
29,000	72.9	74.7	76.4	78.2	79.9	%N1	73.2	75.0	76.8	78.5	80.3	29,000
	1078	1111	1145	1179	1212	LB/HR	1105	1139	1173	1208	1241	
	0.325	0.323	0.321	0.319	0.317	NM/LB	0.327	0.325	0.323	0.321	0.319	
30,000	73.5	75.3	77.1	78.9	80.6	%N1	73.8	75.7	77.5	79.2	81.0	30,000
	1107	1141	1176	1210	1244	LB/HR	1135	1170	1205	1241	1275	
	0.32	0.31	0.31	0.31	0.31	NM/LB	0.32	0.32	0.31	0.31	0.31	
31,000	74.1	75.9	77.8	79.5	81.3	%N1	74.5	76.3	78.1	79.9	81.7	31,000
	1136	1172	1207	1243	1277	LB/HR	1165	1202	1238	1274	1310	
	0.308	0.306	0.304	0.302	0.301	NM/LB	0.310	0.308	0.306	0.304	0.302	
32,000	74.7	76.6	78.4	80.2	82.0	%N1	75.1	77.0	78.8	80.6	82.4	32,000
	1166	1202	1238	1275	1311	LB/HR	1197	1234	1271	1309	1347	
	0.3	0.3	0.3	0.29	0.29	NM/LB	0.3	0.3	0.3	0.3	0.29	
33,000						%N1	75.8	77.7	79.5	81.4	83.1	33,000
						LB/HR	1228	1266	1305	1343	1383	
						NM/LB	0.294	0.292	0.290	0.288	0.286	
34,000						%N1	76.5	78.4	80.2	82.1	83.8	34,000
						LB/HR	1260	1299	1338	1379	1420	
						NM/LB	0.29	0.28	0.28	0.28	0.28	
35,000						%N1						35,000
						LB/HR						
						NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

41,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.68 Mi						.7 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	71.4	73.1	74.9	76.6	78.3	%N1	72.0	73.8	75.6	77.3	79.0	25,000
	1037	1069	1101	1133	1165	LB/HR	1074	1108	1140	1175	1208	
	0.359	0.356	0.354	0.352	0.350	NM/LB	0.356	0.354	0.352	0.350	0.347	
26,000	71.8	73.6	75.4	77.1	78.8	%N1	72.4	74.2	76.0	77.7	79.4	26,000
	1056	1089	1121	1154	1188	LB/HR	1092	1127	1160	1195	1229	
	0.35	0.35	0.35	0.35	0.34	NM/LB	0.35	0.35	0.35	0.34	0.34	
27,000	72.3	74.1	75.9	77.6	79.3	%N1	72.9	74.7	76.4	78.2	79.9	27,000
	1075	1109	1142	1177	1210	LB/HR	1113	1148	1182	1217	1251	
	0.346	0.343	0.342	0.339	0.337	NM/LB	0.344	0.342	0.340	0.337	0.336	
28,000	72.9	74.7	76.5	78.2	80.0	%N1	73.3	75.1	76.9	78.6	80.4	28,000
	1103	1137	1171	1206	1239	LB/HR	1133	1169	1204	1240	1273	
	0.34	0.33	0.33	0.33	0.33	NM/LB	0.34	0.34	0.33	0.33	0.33	
29,000	73.5	75.3	77.1	78.8	80.6	%N1	73.8	75.6	77.4	79.2	81.0	29,000
	1130	1166	1200	1236	1270	LB/HR	1156	1193	1228	1265	1300	
	0.329	0.327	0.325	0.323	0.321	NM/LB	0.331	0.329	0.327	0.325	0.323	
30,000	74.0	75.9	77.7	79.5	81.3	%N1	74.4	76.2	78.0	79.8	81.6	30,000
	1158	1194	1230	1266	1301	LB/HR	1185	1222	1259	1296	1333	
	0.32	0.32	0.32	0.32	0.31	NM/LB	0.32	0.32	0.32	0.32	0.31	
31,000	74.7	76.6	78.4	80.2	82.0	%N1	74.9	76.8	78.6	80.5	82.2	31,000
	1190	1227	1264	1301	1339	LB/HR	1214	1252	1289	1327	1366	
	0.312	0.310	0.309	0.307	0.305	NM/LB	0.315	0.313	0.312	0.310	0.307	
32,000	75.4	77.3	79.1	81.0	82.7	%N1	75.6	77.4	79.3	81.1	82.9	32,000
	1223	1261	1299	1337	1377	LB/HR	1243	1282	1320	1359	1400	
	0.3	0.3	0.3	0.3	0.3	NM/LB	0.31	0.31	0.3	0.3	0.3	
33,000	76.1	78.0	79.8	81.7	83.4	%N1	76.3	78.2	80.1	81.9	83.6	33,000
	1256	1295	1334	1373	1414	LB/HR	1278	1318	1358	1399	1440	
	0.296	0.294	0.292	0.291	0.288	NM/LB	0.299	0.298	0.296	0.294	0.291	
34,000	76.8	78.7	80.6	82.4	84.2	%N1	77.0	78.9	80.8	82.6	84.4	34,000
	1290	1331	1371	1413	1453	LB/HR	1315	1356	1397	1440	1481	
	0.29	0.29	0.28	0.28	0.28	NM/LB	0.29	0.29	0.29	0.29	0.28	
35,000	77.4	79.4	81.3	83.1	84.9	%N1	77.7	79.6	81.5	83.4	85.2	35,000
	1326	1368	1409	1452	1494	LB/HR	1353	1395	1438	1481	1525	
	0.280	0.279	0.277	0.275	0.273	NM/LB	0.283	0.281	0.279	0.277	0.275	
36,000	78.1	80.0	81.9	83.8	85.6	%N1	78.4	80.3	82.2	84.1	85.9	36,000
	1362	1405	1448	1491	1535	LB/HR	1391	1435	1478	1523	1568	
	0.27	0.27	0.27	0.27	0.27	NM/LB	0.28	0.27	0.27	0.27	0.27	
37,000						%N1	79.0	81.0	82.9	84.8	86.7	37,000
						LB/HR	1429	1474	1519	1564	1612	
						NM/LB	0.268	0.266	0.264	0.263	0.260	
38,000						%N1	79.7	81.7	83.7	85.6	87.4	38,000
						LB/HR	1467	1514	1560	1606	1656	
						NM/LB	0.26	0.26	0.26	0.26	0.25	
39,000						%N1	80.5	82.5	84.5	86.3	88.2	39,000
						LB/HR	1512	1560	1608	1656	1706	
						NM/LB	0.253	0.251	0.250	0.248	0.246	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

41,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.72 Mi						.74 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	72.7	74.5	76.3	78.0	79.8	%N1	73.4	75.2	77.0	78.7	80.5	25,000
	1118	1154	1188	1223	1257	LB/HR	1165	1202	1238	1274	1311	
	0.352	0.350	0.348	0.345	0.343	NM/LB	0.347	0.345	0.343	0.341	0.339	
26,000	73.0	74.9	76.6	78.4	80.2	%N1	73.7	75.5	77.4	79.1	80.9	26,000
	1136	1172	1206	1243	1277	LB/HR	1183	1220	1257	1294	1331	
	0.35	0.34	0.34	0.34	0.34	NM/LB	0.34	0.34	0.34	0.34	0.33	
27,000	73.4	75.2	77.0	78.8	80.6	%N1	74.1	75.9	77.7	79.5	81.3	27,000
	1154	1190	1225	1262	1297	LB/HR	1201	1238	1276	1313	1351	
	0.341	0.339	0.337	0.335	0.333	NM/LB	0.337	0.335	0.333	0.331	0.328	
28,000	73.9	75.7	77.5	79.3	81.0	%N1	74.4	76.3	78.1	79.9	81.7	28,000
	1175	1212	1248	1285	1322	LB/HR	1218	1257	1294	1332	1371	
	0.33	0.33	0.33	0.33	0.33	NM/LB	0.33	0.33	0.33	0.33	0.32	
29,000	74.3	76.1	78.0	79.7	81.5	%N1	74.9	76.7	78.5	80.4	82.1	29,000
	1197	1234	1271	1308	1346	LB/HR	1239	1277	1316	1354	1394	
	0.329	0.327	0.325	0.323	0.321	NM/LB	0.327	0.325	0.323	0.321	0.318	
30,000	74.7	76.6	78.4	80.2	82.0	%N1	75.3	77.2	79.0	80.9	82.6	30,000
	1218	1256	1294	1332	1370	LB/HR	1261	1300	1340	1378	1419	
	0.32	0.32	0.32	0.32	0.31	NM/LB	0.32	0.32	0.32	0.31	0.31	
31,000	75.3	77.1	79.0	80.8	82.6	%N1	75.8	77.6	79.5	81.3	83.1	31,000
	1244	1283	1321	1360	1400	LB/HR	1283	1323	1364	1403	1445	
	0.316	0.314	0.313	0.311	0.308	NM/LB	0.315	0.313	0.311	0.309	0.307	
32,000	75.8	77.7	79.6	81.4	83.2	%N1	76.2	78.1	80.0	81.8	83.6	32,000
	1272	1312	1351	1391	1432	LB/HR	1306	1346	1387	1429	1470	
	0.31	0.31	0.31	0.3	0.3	NM/LB	0.31	0.31	0.31	0.3	0.3	
33,000	76.4	78.3	80.2	82.0	83.8	%N1	76.8	78.7	80.5	82.4	84.2	33,000
	1300	1340	1381	1423	1464	LB/HR	1334	1376	1418	1461	1503	
	0.303	0.301	0.299	0.297	0.295	NM/LB	0.303	0.301	0.299	0.297	0.295	
34,000	77.0	78.9	80.8	82.6	84.4	%N1	77.3	79.2	81.1	82.9	84.7	34,000
	1332	1374	1416	1459	1501	LB/HR	1364	1406	1450	1493	1537	
	0.3	0.29	0.29	0.29	0.29	NM/LB	0.3	0.29	0.29	0.29	0.29	
35,000	77.7	79.6	81.5	83.4	85.2	%N1	77.8	79.7	81.6	83.5	85.3	35,000
	1371	1414	1457	1501	1545	LB/HR	1393	1437	1481	1526	1571	
	0.287	0.285	0.284	0.282	0.279	NM/LB	0.290	0.289	0.287	0.285	0.282	
36,000	78.4	80.3	82.2	84.1	85.9	%N1	78.4	80.3	82.3	84.1	85.9	36,000
	1409	1453	1498	1543	1589	LB/HR	1427	1472	1517	1562	1609	
	0.28	0.28	0.28	0.27	0.27	NM/LB	0.28	0.28	0.28	0.28	0.28	
37,000	79.1	81.0	83.0	84.9	86.7	%N1	79.1	81.0	83.0	84.9	86.7	37,000
	1448	1493	1539	1584	1633	LB/HR	1466	1512	1559	1604	1654	
	0.272	0.270	0.268	0.267	0.264	NM/LB	0.276	0.274	0.272	0.271	0.268	
38,000	79.8	81.8	83.7	85.6	87.4	%N1	79.8	81.8	83.7	85.6	87.4	38,000
	1487	1534	1580	1627	1678	LB/HR	1505	1553	1600	1648	1698	
	0.26	0.26	0.26	0.26	0.26	NM/LB	0.27	0.27	0.27	0.26	0.26	
39,000	80.4	82.4	84.4	86.2	88.1	%N1	80.4	82.4	84.4	86.2	88.1	39,000
	1526	1574	1622	1671	1721	LB/HR	1545	1594	1642	1691	1743	
	0.258	0.256	0.255	0.253	0.251	NM/LB	0.262	0.260	0.258	0.257	0.255	

41,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.76 Mi						.78 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	74.3	76.1	77.9	79.7	81.5	%N1	75.3	77.2	79.0	80.9	82.6	25,000
	1224	1262	1301	1338	1378	LB/HR	1291	1331	1372	1412	1454	
	0.339	0.337	0.335	0.333	0.331	NM/LB	0.330	0.328	0.326	0.324	0.322	
26,000	74.6	76.4	78.2	80.0	81.8	%N1	75.6	77.5	79.4	81.2	83.0	26,000
	1239	1278	1316	1355	1395	LB/HR	1307	1347	1389	1430	1471	
	0.34	0.33	0.33	0.33	0.33	NM/LB	0.33	0.32	0.32	0.32	0.32	
27,000	74.9	76.8	78.6	80.4	82.2	%N1	75.9	77.8	79.7	81.5	83.3	27,000
	1256	1295	1334	1373	1414	LB/HR	1322	1363	1406	1448	1489	
	0.331	0.329	0.327	0.325	0.322	NM/LB	0.322	0.321	0.318	0.316	0.314	
28,000	75.3	77.1	79.0	80.8	82.6	%N1	76.3	78.2	80.0	81.8	83.6	28,000
	1273	1313	1353	1392	1433	LB/HR	1338	1380	1423	1467	1508	
	0.33	0.32	0.32	0.32	0.32	NM/LB	0.32	0.32	0.31	0.31	0.31	
29,000	75.6	77.5	79.3	81.2	82.9	%N1	76.6	78.5	80.4	82.2	84.0	29,000
	1290	1331	1371	1411	1453	LB/HR	1356	1398	1442	1486	1528	
	0.322	0.320	0.318	0.316	0.314	NM/LB	0.314	0.313	0.310	0.308	0.306	
30,000	76.0	77.9	79.7	81.5	83.3	%N1	76.9	78.8	80.7	82.5	84.3	30,000
	1308	1349	1390	1432	1473	LB/HR	1374	1417	1461	1505	1549	
	0.32	0.32	0.31	0.31	0.31	NM/LB	0.31	0.31	0.31	0.3	0.3	
31,000	76.4	78.3	80.2	82.0	83.8	%N1	77.2	79.1	81.0	82.8	84.7	31,000
	1330	1371	1414	1457	1498	LB/HR	1392	1435	1480	1525	1569	
	0.312	0.311	0.308	0.306	0.304	NM/LB	0.306	0.305	0.302	0.300	0.298	
32,000	76.8	78.7	80.6	82.4	84.2	%N1	77.5	79.5	81.4	83.2	85.0	32,000
	1354	1396	1439	1483	1526	LB/HR	1411	1456	1501	1546	1591	
	0.31	0.31	0.3	0.3	0.3	NM/LB	0.3	0.3	0.3	0.3	0.29	
33,000	77.2	79.2	81.0	82.9	84.7	%N1	77.9	79.9	81.8	83.6	85.4	33,000
	1378	1421	1465	1509	1553	LB/HR	1434	1479	1525	1570	1617	
	0.302	0.300	0.298	0.296	0.293	NM/LB	0.297	0.295	0.293	0.291	0.289	
34,000	77.7	79.6	81.5	83.4	85.2	%N1	78.3	80.3	82.2	84.0	85.9	34,000
	1403	1447	1492	1536	1582	LB/HR	1457	1502	1549	1595	1642	
	0.3	0.29	0.29	0.29	0.29	NM/LB	0.29	0.29	0.29	0.29	0.28	
35,000	78.2	80.2	82.1	83.9	85.8	%N1	78.7	80.7	82.6	84.5	86.3	35,000
	1434	1479	1524	1570	1616	LB/HR	1479	1526	1573	1619	1668	
	0.290	0.288	0.286	0.284	0.282	NM/LB	0.288	0.286	0.285	0.283	0.280	
36,000	78.7	80.7	82.6	84.5	86.3	%N1	79.2	81.1	83.1	85.0	86.8	36,000
	1464	1510	1557	1603	1651	LB/HR	1506	1554	1601	1648	1699	
	0.28	0.28	0.28	0.28	0.28	NM/LB	0.28	0.28	0.28	0.28	0.28	
37,000	79.3	81.3	83.2	85.1	86.9	%N1	79.7	81.7	83.7	85.5	87.4	37,000
	1495	1542	1589	1636	1686	LB/HR	1540	1588	1637	1685	1737	
	0.278	0.276	0.274	0.273	0.270	NM/LB	0.277	0.275	0.273	0.272	0.269	
38,000	79.9	81.9	83.8	85.7	87.5	%N1	80.3	82.3	84.2	86.1	88.0	38,000
	1530	1578	1627	1675	1726	LB/HR	1573	1623	1672	1722	1776	
	0.27	0.27	0.27	0.27	0.26	NM/LB	0.27	0.27	0.27	0.27	0.26	
39,000	80.5	82.5	84.5	86.4	88.2	%N1	80.8	82.8	84.8	86.7	88.6	39,000
	1570	1620	1669	1719	1772	LB/HR	1606	1657	1708	1759	1814	
	0.265	0.263	0.261	0.259	0.257	NM/LB	0.265	0.264	0.262	0.260	0.258	

Gulfstream G280
AIRPLANE FLIGHT MANUAL

41,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.8 Mi						.81 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	76.3	78.2	80.1	81.9	83.7	%N1	77.0	78.9	80.8	82.6	84.4	25,000
	1355	1397	1441	1485	1527	LB/HR	1403	1447	1492	1538	1583	
	0.323	0.321	0.319	0.316	0.314	NM/LB	0.315	0.314	0.311	0.309	0.307	
26,000	76.6	78.5	80.4	82.2	84.0	%N1	77.3	79.2	81.1	82.9	84.7	26,000
	1371	1414	1458	1504	1546	LB/HR	1419	1463	1509	1554	1600	
	0.32	0.32	0.31	0.31	0.31	NM/LB	0.31	0.31	0.31	0.31	0.3	
27,000	76.9	78.8	80.7	82.5	84.3	%N1	77.5	79.5	81.4	83.2	85.0	27,000
	1388	1431	1476	1522	1565	LB/HR	1435	1480	1526	1572	1618	
	0.315	0.313	0.311	0.308	0.306	NM/LB	0.308	0.307	0.304	0.302	0.300	
28,000	77.1	79.1	81.0	82.8	84.6	%N1	77.8	79.8	81.7	83.5	85.3	28,000
	1405	1449	1494	1540	1584	LB/HR	1452	1497	1544	1590	1637	
	0.31	0.31	0.31	0.3	0.3	NM/LB	0.3	0.3	0.3	0.3	0.3	
29,000	77.4	79.4	81.3	83.1	84.9	%N1	78.1	80.0	81.9	83.8	85.6	29,000
	1422	1466	1512	1558	1603	LB/HR	1468	1514	1561	1608	1656	
	0.308	0.306	0.304	0.301	0.299	NM/LB	0.302	0.300	0.298	0.296	0.293	
30,000	77.8	79.7	81.6	83.5	85.3	%N1	78.4	80.3	82.2	84.1	85.9	30,000
	1442	1487	1533	1579	1626	LB/HR	1485	1532	1580	1626	1675	
	0.3	0.3	0.3	0.3	0.3	NM/LB	0.3	0.3	0.29	0.29	0.29	
31,000	78.1	80.1	82.0	83.8	85.6	%N1	78.7	80.7	82.6	84.5	86.3	31,000
	1462	1508	1555	1601	1649	LB/HR	1507	1554	1602	1649	1699	
	0.299	0.297	0.295	0.293	0.291	NM/LB	0.294	0.292	0.290	0.288	0.286	
32,000	78.5	80.4	82.3	84.2	86.0	%N1	79.1	81.1	83.0	84.9	86.7	32,000
	1482	1529	1576	1623	1672	LB/HR	1528	1576	1625	1672	1723	
	0.29	0.29	0.29	0.29	0.29	NM/LB	0.29	0.29	0.29	0.28	0.28	
33,000	78.8	80.8	82.7	84.6	86.4	%N1	79.5	81.4	83.4	85.3	87.1	33,000
	1503	1550	1598	1645	1695	LB/HR	1550	1599	1648	1696	1749	
	0.291	0.289	0.287	0.285	0.283	NM/LB	0.286	0.284	0.282	0.280	0.278	
34,000	79.2	81.2	83.1	85.0	86.8	%N1	79.8	81.8	83.8	85.6	87.5	34,000
	1526	1574	1623	1670	1721	LB/HR	1571	1621	1670	1720	1774	
	0.29	0.28	0.28	0.28	0.28	NM/LB	0.28	0.28	0.28	0.28	0.27	
35,000	79.6	81.6	83.5	85.4	87.3	%N1	80.3	82.3	84.3	86.1	88.0	35,000
	1551	1600	1649	1698	1751	LB/HR	1600	1651	1702	1753	1808	
	0.282	0.280	0.278	0.276	0.274	NM/LB	0.277	0.275	0.273	0.271	0.269	
36,000	80.0	82.0	84.0	85.8	87.7	%N1	80.8	82.8	84.7	86.6	88.5	36,000
	1576	1626	1676	1726	1780	LB/HR	1631	1683	1734	1787	1844	
	0.28	0.28	0.27	0.27	0.27	NM/LB	0.27	0.27	0.27	0.27	0.26	
37,000	80.4	82.4	84.4	86.3	88.1	%N1	81.2	83.2	85.2	87.2	89.1	37,000
	1601	1652	1702	1754	1809	LB/HR	1661	1714	1767	1821	1880	
	0.273	0.271	0.270	0.268	0.265	NM/LB	0.266	0.265	0.263	0.261	0.258	
38,000	80.9	82.9	84.8	86.8	88.7	%N1	81.7	83.7	85.6	87.7		38,000
	1631	1683	1734	1788	1845	LB/HR	1692	1746	1799	1855		
	0.27	0.27	0.26	0.26	0.26	NM/LB	0.26	0.26	0.26	0.26		
39,000	81.4	83.4	85.4	87.4	89.3	%N1	82.3	84.3	86.3	88.4		39,000
	1666	1718	1771	1826	1885	LB/HR	1733	1788	1843	1902		
	0.263	0.261	0.259	0.257	0.254	NM/LB	0.255	0.254	0.252	0.250		

41,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.82 Mi						.83 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.7	79.7	81.6	83.4	85.2	%N1	79.1	81.1	83.0	84.9	86.7	25,000
	1454	1499	1546	1592	1639	LB/HR	1541	1590	1639	1687	1739	
	0.308	0.306	0.304	0.302	0.300	NM/LB	0.294	0.292	0.290	0.289	0.286	
26,000	78.0	79.9	81.8	83.7	85.5	%N1	79.4	81.3	83.3	85.1	87.0	26,000
	1468	1514	1561	1607	1656	LB/HR	1557	1607	1656	1705	1757	
	0.31	0.3	0.3	0.3	0.3	NM/LB	0.29	0.29	0.29	0.29	0.28	
27,000	78.2	80.2	82.1	84.0	85.8	%N1	79.6	81.6	83.6	85.4	87.3	27,000
	1484	1531	1578	1624	1673	LB/HR	1574	1624	1674	1724	1777	
	0.302	0.300	0.298	0.296	0.294	NM/LB	0.288	0.286	0.284	0.283	0.280	
28,000	78.5	80.5	82.4	84.3	86.1	%N1	80.0	82.0	83.9	85.8	87.6	28,000
	1500	1547	1595	1642	1692	LB/HR	1596	1647	1697	1748	1803	
	0.3	0.3	0.29	0.29	0.29	NM/LB	0.28	0.28	0.28	0.28	0.28	
29,000	78.8	80.7	82.7	84.6	86.4	%N1	80.3	82.3	84.3	86.2	88.0	29,000
	1516	1564	1612	1659	1710	LB/HR	1617	1669	1720	1772	1828	
	0.296	0.294	0.292	0.290	0.288	NM/LB	0.280	0.279	0.277	0.275	0.272	
30,000	79.1	81.0	82.9	84.9	86.7	%N1	80.7	82.7	84.6	86.5	88.4	30,000
	1532	1581	1629	1677	1728	LB/HR	1639	1692	1744	1797	1853	
	0.29	0.29	0.29	0.29	0.28	NM/LB	0.28	0.27	0.27	0.27	0.27	
31,000	79.4	81.3	83.3	85.2	87.0	%N1	81.0	83.0	84.9	86.9	88.8	31,000
	1551	1600	1649	1698	1750	LB/HR	1661	1714	1767	1821	1879	
	0.289	0.287	0.285	0.283	0.281	NM/LB	0.273	0.271	0.269	0.267	0.265	
32,000	79.7	81.7	83.7	85.6	87.4	%N1	81.4	83.4	85.4	87.4	89.3	32,000
	1574	1624	1673	1723	1777	LB/HR	1692	1746	1800	1855	1914	
	0.28	0.28	0.28	0.28	0.28	NM/LB	0.27	0.27	0.26	0.26	0.26	
33,000	80.1	82.1	84.1	85.9	87.8	%N1	82.0	84.0	85.9	88.0		33,000
	1596	1647	1697	1748	1803	LB/HR	1726	1782	1837	1894		
	0.281	0.279	0.277	0.275	0.273	NM/LB	0.263	0.261	0.259	0.257		
34,000	80.5	82.5	84.4	86.3	88.2	%N1	82.5	84.5	86.5	88.6		34,000
	1619	1670	1721	1774	1830	LB/HR	1761	1818	1874	1933		
	0.28	0.28	0.27	0.27	0.27	NM/LB	0.26	0.26	0.25	0.25		
35,000	80.8	82.8	84.8	86.7	88.6	%N1	83.0	85.0	87.0	89.1		35,000
	1642	1694	1746	1800	1857	LB/HR	1796	1853	1911	1974		
	0.273	0.271	0.269	0.267	0.265	NM/LB	0.253	0.251	0.249	0.247		
36,000	81.4	83.4	85.3	87.3	89.2	%N1	83.6	85.6	87.6	89.8		36,000
	1678	1732	1785	1840	1899	LB/HR	1834	1893	1952	2019		
	0.27	0.27	0.26	0.26	0.26	NM/LB	0.25	0.25	0.24	0.24		
37,000	81.9	83.9	85.9	87.9		%N1	84.5	86.6	88.6	90.7		37,000
	1714	1769	1824	1881		LB/HR	1893	1953	2015	2082		
	0.261	0.260	0.258	0.256		NM/LB	0.240	0.238	0.236	0.234		
38,000	82.4	84.5	86.4	88.5		%N1	85.6	87.7	89.7	91.6		38,000
	1751	1807	1863	1921		LB/HR	1956	2018	2082	2144		
	0.26	0.25	0.25	0.25		NM/LB	0.23	0.23	0.23	0.23		
39,000	83.0	85.0	87.0	89.1		%N1	86.7	88.8	90.8			39,000
	1787	1844	1901	1964		LB/HR	2018	2082	2149			
	0.251	0.249	0.247	0.245		NM/LB	0.225	0.223	0.222			

Gulfstream G280
AIRPLANE FLIGHT MANUAL

41,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.84 Mi						.85 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	80.4	82.4	84.4	86.3	88.1	%N1	81.7	83.7	85.7	87.7		25,000
	1631	1684	1735	1788	1844	LB/HR	1725	1780	1836	1892		
	0.281	0.280	0.278	0.276	0.273	NM/LB	0.269	0.268	0.266	0.264		
26,000	80.7	82.7	84.6	86.6	88.4	%N1	82.0	84.0	86.0	88.0		26,000
	1649	1702	1754	1808	1864	LB/HR	1744	1800	1856	1913		
	0.28	0.28	0.27	0.27	0.27	NM/LB	0.27	0.26	0.26	0.26		
27,000	80.9	83.0	84.9	86.8	88.7	%N1	82.3	84.3	86.3	88.3		27,000
	1666	1720	1773	1827	1885	LB/HR	1763	1820	1876	1934		
	0.276	0.274	0.272	0.270	0.267	NM/LB	0.264	0.262	0.260	0.258		
28,000	81.3	83.3	85.2	87.2	89.1	%N1	82.5	84.6	86.5	88.6		28,000
	1689	1743	1797	1852	1911	LB/HR	1782	1839	1897	1956		
	0.27	0.27	0.27	0.27	0.26	NM/LB	0.26	0.26	0.26	0.25		
29,000	81.7	83.7	85.7	87.7		%N1	83.0	85.0	87.0	89.1		29,000
	1716	1771	1826	1883		LB/HR	1813	1871	1930	1992		
	0.267	0.266	0.264	0.262		NM/LB	0.256	0.255	0.253	0.250		
30,000	82.1	84.1	86.1	88.1		%N1	83.5	85.5	87.5	89.6		30,000
	1744	1800	1856	1913		LB/HR	1846	1905	1966	2030		
	0.26	0.26	0.26	0.26		NM/LB	0.25	0.25	0.25	0.25		
31,000	82.5	84.5	86.5	88.6		%N1	84.0	86.1	88.1	90.2		31,000
	1772	1828	1886	1945		LB/HR	1881	1941	2003	2068		
	0.259	0.257	0.256	0.253		NM/LB	0.247	0.245	0.243	0.241		
32,000	82.9	85.0	86.9	89.0		%N1	84.6	86.7	88.7	90.7		32,000
	1799	1857	1915	1977		LB/HR	1919	1980	2043	2107		
	0.26	0.25	0.25	0.25		NM/LB	0.24	0.24	0.24	0.24		
33,000	83.6	85.6	87.6	89.8		%N1	85.3	87.4	89.4	91.3		33,000
	1844	1903	1963	2029		LB/HR	1959	2021	2086	2149		
	0.249	0.247	0.245	0.243		NM/LB	0.237	0.236	0.234	0.232		
34,000	84.4	86.5	88.5	90.6		%N1	86.4	88.5	90.5			34,000
	1896	1956	2018	2084		LB/HR	2026	2090	2157			
	0.24	0.24	0.24	0.24		NM/LB	0.23	0.23	0.23			
35,000	85.3	87.4	89.4	91.3		%N1						35,000
	1950	2012	2076	2139		LB/HR						
	0.235	0.234	0.232	0.230		NM/LB						
36,000	86.2	88.3	90.3			%N1						36,000
	2004	2067	2133			LB/HR						
	0.23	0.23	0.23			NM/LB						
37,000	87.3	89.4	91.4			%N1						37,000
	2066	2130	2199			LB/HR						
	0.222	0.221	0.219			NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

43,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.6 Mi						.62 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	70.9	72.7	74.5	76.2	77.9	%N1	71.4	73.2	75.0	76.7	78.5	25,000
	898	926	955	982	1009	LB/HR	926	955	984	1012	1041	
	0.365	0.363	0.361	0.359	0.356	NM/LB	0.366	0.364	0.362	0.360	0.357	
26,000	71.6	73.4	75.2	77.0	78.7	%N1	72.1	73.9	75.7	77.5	79.2	26,000
	924	954	982	1010	1039	LB/HR	952	982	1011	1040	1071	
	0.35	0.35	0.35	0.35	0.35	NM/LB	0.36	0.35	0.35	0.35	0.35	
27,000						%N1	72.8	74.6	76.4	78.2	79.9	27,000
						LB/HR	978	1010	1039	1069	1101	
						NM/LB	0.346	0.344	0.342	0.340	0.338	
28,000						%N1	73.6	75.4	77.2	79.0	80.8	28,000
						LB/HR	1009	1042	1072	1104	1135	
						NM/LB	0.34	0.33	0.33	0.33	0.33	
29,000						%N1						29,000
						LB/HR						
						NM/LB						
30,000						%N1						30,000
						LB/HR						
						NM/LB						
31,000						%N1						31,000
						LB/HR						
						NM/LB						
32,000						%N1						32,000
						LB/HR						
						NM/LB						
33,000						%N1						33,000
						LB/HR						
						NM/LB						
34,000						%N1						34,000
						LB/HR						
						NM/LB						
35,000						%N1						35,000
						LB/HR						
						NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

43,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.64 Mi						.66 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	71.8	73.6	75.4	77.2	78.9	%N1	72.2	74.0	75.8	77.5	79.3	25,000
	952	982	1011	1040	1070	LB/HR	975	1006	1035	1065	1097	
	0.367	0.365	0.363	0.361	0.359	NM/LB	0.370	0.368	0.366	0.363	0.361	
26,000	72.6	74.4	76.1	77.9	79.6	%N1	72.9	74.7	76.5	78.3	80.0	26,000
	979	1010	1039	1069	1101	LB/HR	1001	1033	1063	1095	1127	
	0.36	0.36	0.35	0.35	0.35	NM/LB	0.36	0.36	0.36	0.35	0.35	
27,000	73.3	75.1	76.9	78.7	80.4	%N1	73.6	75.4	77.2	79.0	80.8	27,000
	1006	1039	1069	1101	1132	LB/HR	1032	1065	1096	1129	1160	
	0.348	0.345	0.343	0.341	0.339	NM/LB	0.350	0.347	0.345	0.343	0.341	
28,000	74.0	75.8	77.6	79.4	81.2	%N1	74.3	76.1	78.0	79.8	81.6	28,000
	1036	1070	1101	1134	1165	LB/HR	1062	1097	1129	1163	1196	
	0.34	0.34	0.33	0.33	0.33	NM/LB	0.34	0.34	0.34	0.33	0.33	
29,000	74.6	76.5	78.3	80.1	81.9	%N1	75.0	76.9	78.7	80.5	82.3	29,000
	1066	1100	1133	1166	1200	LB/HR	1094	1129	1163	1197	1232	
	0.328	0.326	0.324	0.322	0.320	NM/LB	0.330	0.327	0.326	0.323	0.321	
30,000						%N1	75.7	77.6	79.5	81.3	83.1	30,000
						LB/HR	1126	1162	1197	1232	1269	
						NM/LB	0.32	0.32	0.32	0.31	0.31	
31,000						%N1	76.5	78.4	80.2	82.1	83.9	31,000
						LB/HR	1158	1196	1232	1269	1306	
						NM/LB	0.311	0.309	0.307	0.305	0.303	
32,000						%N1						32,000
						LB/HR						
						NM/LB						
33,000						%N1						33,000
						LB/HR						
						NM/LB						
34,000						%N1						34,000
						LB/HR						
						NM/LB						
35,000						%N1						35,000
						LB/HR						
						NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

43,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.68 Mi						.7 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	72.5	74.3	76.1	77.9	79.6	%N1	73.0	74.8	76.6	78.4	80.2	25,000
	999	1030	1060	1092	1123	LB/HR	1029	1061	1092	1126	1158	
	0.372	0.370	0.368	0.365	0.363	NM/LB	0.372	0.369	0.368	0.365	0.363	
26,000	73.2	75.0	76.8	78.6	80.4	%N1	73.5	75.3	77.1	78.9	80.7	26,000
	1025	1058	1089	1122	1154	LB/HR	1049	1083	1114	1149	1181	
	0.36	0.36	0.36	0.36	0.35	NM/LB	0.36	0.36	0.36	0.36	0.36	
27,000	73.8	75.7	77.5	79.3	81.1	%N1	74.1	76.0	77.8	79.6	81.4	27,000
	1053	1087	1119	1153	1185	LB/HR	1078	1112	1145	1180	1214	
	0.353	0.350	0.349	0.346	0.344	NM/LB	0.355	0.353	0.351	0.348	0.346	
28,000	74.5	76.4	78.2	80.0	81.8	%N1	74.8	76.6	78.5	80.3	82.1	28,000
	1085	1120	1153	1187	1221	LB/HR	1107	1142	1176	1211	1247	
	0.34	0.34	0.34	0.34	0.33	NM/LB	0.35	0.34	0.34	0.34	0.34	
29,000	75.3	77.1	79.0	80.8	82.6	%N1	75.4	77.3	79.1	81.0	82.8	29,000
	1118	1154	1188	1223	1259	LB/HR	1136	1173	1207	1243	1280	
	0.332	0.330	0.328	0.326	0.324	NM/LB	0.337	0.334	0.333	0.330	0.328	
30,000	76.0	77.9	79.8	81.6	83.4	%N1	76.2	78.1	80.0	81.8	83.6	30,000
	1151	1188	1224	1259	1298	LB/HR	1171	1210	1246	1282	1321	
	0.32	0.32	0.32	0.32	0.31	NM/LB	0.33	0.32	0.32	0.32	0.32	
31,000	76.8	78.7	80.6	82.4	84.3	%N1	77.0	78.9	80.8	82.6	84.5	31,000
	1185	1224	1260	1299	1337	LB/HR	1207	1247	1284	1324	1363	
	0.314	0.311	0.310	0.307	0.305	NM/LB	0.317	0.315	0.313	0.310	0.308	
32,000	77.5	79.4	81.3	83.2	85.0	%N1	77.7	79.7	81.6	83.5	85.3	32,000
	1221	1261	1299	1339	1378	LB/HR	1245	1286	1325	1366	1406	
	0.3	0.3	0.3	0.3	0.3	NM/LB	0.31	0.3	0.3	0.3	0.3	
33,000	78.3	80.2	82.1	84.0	85.9	%N1	78.5	80.5	82.4	84.3	86.1	33,000
	1259	1300	1339	1380	1421	LB/HR	1284	1326	1366	1408	1450	
	0.295	0.293	0.291	0.289	0.287	NM/LB	0.298	0.296	0.294	0.292	0.289	
34,000						%N1	79.3	81.3	83.2	85.1	87.0	34,000
						LB/HR	1323	1366	1408	1450	1494	
						NM/LB	0.29	0.29	0.29	0.28	0.28	
35,000						%N1	80.1	82.1	84.0	85.9	87.8	35,000
						LB/HR	1364	1409	1452	1495	1539	
						NM/LB	0.281	0.278	0.277	0.275	0.273	
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

43,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.72 Mi						.74 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	73.6	75.4	77.2	79.0	80.8	%N1	74.2	76.0	77.9	79.7	81.5	25,000
	1067	1101	1133	1168	1201	LB/HR	1108	1144	1178	1213	1248	
	0.369	0.366	0.364	0.362	0.359	NM/LB	0.365	0.363	0.360	0.358	0.355	
26,000	74.1	75.9	77.7	79.5	81.3	%N1	74.6	76.5	78.3	80.1	81.9	26,000
	1088	1123	1156	1191	1226	LB/HR	1127	1163	1198	1233	1269	
	0.36	0.36	0.36	0.35	0.35	NM/LB	0.36	0.36	0.35	0.35	0.35	
27,000	74.5	76.4	78.2	80.0	81.8	%N1	75.1	77.0	78.8	80.7	82.4	27,000
	1110	1146	1180	1215	1250	LB/HR	1149	1186	1222	1257	1295	
	0.354	0.352	0.350	0.348	0.345	NM/LB	0.352	0.350	0.347	0.345	0.343	
28,000	75.1	77.0	78.8	80.6	82.4	%N1	75.6	77.5	79.3	81.2	83.0	28,000
	1135	1171	1206	1241	1279	LB/HR	1172	1209	1246	1282	1321	
	0.35	0.34	0.34	0.34	0.34	NM/LB	0.35	0.34	0.34	0.34	0.34	
29,000	75.7	77.6	79.5	81.3	83.1	%N1	76.1	78.0	79.9	81.7	83.5	29,000
	1163	1200	1236	1272	1311	LB/HR	1194	1232	1270	1307	1346	
	0.338	0.336	0.334	0.332	0.329	NM/LB	0.339	0.336	0.334	0.332	0.330	
30,000	76.3	78.2	80.1	82.0	83.8	%N1	76.7	78.6	80.5	82.3	84.1	30,000
	1191	1230	1267	1305	1343	LB/HR	1222	1260	1299	1339	1379	
	0.33	0.33	0.33	0.32	0.32	NM/LB	0.33	0.33	0.33	0.32	0.32	
31,000	77.0	78.9	80.8	82.7	84.5	%N1	77.3	79.2	81.1	82.9	84.8	31,000
	1223	1263	1301	1341	1381	LB/HR	1251	1291	1331	1372	1413	
	0.322	0.319	0.317	0.315	0.313	NM/LB	0.323	0.321	0.319	0.316	0.314	
32,000	77.8	79.7	81.6	83.5	85.3	%N1	77.8	79.8	81.7	83.6	85.4	32,000
	1262	1303	1342	1384	1425	LB/HR	1281	1322	1363	1404	1447	
	0.31	0.31	0.31	0.31	0.3	NM/LB	0.32	0.31	0.31	0.31	0.31	
33,000	78.5	80.5	82.4	84.3	86.1	%N1	78.5	80.5	82.4	84.3	86.2	33,000
	1301	1343	1384	1426	1469	LB/HR	1317	1360	1401	1444	1488	
	0.303	0.300	0.298	0.296	0.294	NM/LB	0.307	0.305	0.303	0.301	0.298	
34,000	79.3	81.3	83.2	85.1	87.0	%N1	79.3	81.3	83.2	85.1	87.0	34,000
	1340	1384	1426	1469	1513	LB/HR	1357	1401	1444	1487	1532	
	0.29	0.29	0.29	0.29	0.29	NM/LB	0.3	0.3	0.29	0.29	0.29	
35,000	80.0	82.1	84.0	85.8	87.8	%N1	80.1	82.1	84.0	85.8	87.8	35,000
	1379	1425	1468	1512	1557	LB/HR	1396	1442	1486	1530	1577	
	0.285	0.283	0.281	0.279	0.277	NM/LB	0.290	0.287	0.286	0.284	0.281	
36,000	80.8	82.8	84.8	86.6	88.5	%N1	80.8	82.8	84.8	86.6	88.5	36,000
	1419	1466	1510	1555	1602	LB/HR	1436	1484	1529	1574	1622	
	0.28	0.28	0.27	0.27	0.27	NM/LB	0.28	0.28	0.28	0.28	0.27	
37,000	81.5	83.6	85.5	87.3	89.4	%N1	81.5	83.5	85.5	87.3		37,000
	1461	1509	1556	1600	1649	LB/HR	1477	1525	1572	1618		
	0.269	0.267	0.266	0.264	0.262	NM/LB	0.274	0.272	0.270	0.268		
38,000						%N1	82.2	84.2	86.2	88.1		38,000
						LB/HR	1517	1567	1615	1662		
						NM/LB	0.27	0.26	0.26	0.26		
39,000						%N1	82.9	85.0	87.0	88.9		39,000
						LB/HR	1559	1611	1661	1709		
						NM/LB	0.259	0.257	0.256	0.254		

43,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.76 Mi						.78 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	75.0	76.9	78.7	80.6	82.3	%N1	76.0	77.9	79.8	81.6	83.4	25,000
	1159	1195	1232	1267	1305	LB/HR	1219	1257	1296	1335	1374	
	0.358	0.356	0.354	0.352	0.349	NM/LB	0.350	0.348	0.345	0.343	0.340	
26,000	75.4	77.3	79.1	81.0	82.8	%N1	76.4	78.3	80.2	82.0	83.8	26,000
	1176	1213	1250	1286	1325	LB/HR	1236	1274	1313	1354	1394	
	0.35	0.35	0.35	0.35	0.34	NM/LB	0.35	0.34	0.34	0.34	0.34	
27,000	75.8	77.7	79.5	81.4	83.2	%N1	76.7	78.7	80.5	82.3	84.2	27,000
	1194	1231	1269	1306	1345	LB/HR	1252	1292	1332	1374	1415	
	0.348	0.346	0.344	0.341	0.339	NM/LB	0.340	0.338	0.336	0.333	0.331	
28,000	76.2	78.1	80.0	81.8	83.7	%N1	77.1	79.0	80.9	82.7	84.5	28,000
	1215	1253	1291	1331	1370	LB/HR	1271	1311	1351	1393	1435	
	0.34	0.34	0.34	0.34	0.33	NM/LB	0.34	0.33	0.33	0.33	0.33	
29,000	76.7	78.6	80.5	82.3	84.2	%N1	77.4	79.4	81.3	83.1	84.9	29,000
	1237	1276	1315	1357	1397	LB/HR	1290	1331	1372	1414	1457	
	0.336	0.334	0.331	0.329	0.326	NM/LB	0.331	0.328	0.326	0.324	0.321	
30,000	77.2	79.1	81.0	82.8	84.7	%N1	77.9	79.8	81.7	83.6	85.4	30,000
	1261	1301	1341	1383	1424	LB/HR	1313	1354	1396	1439	1483	
	0.33	0.33	0.33	0.32	0.32	NM/LB	0.32	0.32	0.32	0.32	0.32	
31,000	77.7	79.6	81.5	83.4	85.2	%N1	78.3	80.2	82.2	84.0	85.9	31,000
	1287	1328	1369	1411	1454	LB/HR	1335	1378	1420	1464	1508	
	0.323	0.321	0.318	0.316	0.313	NM/LB	0.319	0.317	0.315	0.313	0.310	
32,000	78.3	80.2	82.1	84.0	85.8	%N1	78.7	80.7	82.6	84.5	86.3	32,000
	1318	1360	1402	1445	1489	LB/HR	1358	1402	1445	1488	1534	
	0.32	0.31	0.31	0.31	0.31	NM/LB	0.31	0.31	0.31	0.31	0.3	
33,000	78.8	80.8	82.7	84.6	86.5	%N1	79.3	81.3	83.2	85.1	86.9	33,000
	1349	1393	1435	1479	1524	LB/HR	1388	1433	1477	1521	1568	
	0.308	0.306	0.304	0.302	0.299	NM/LB	0.307	0.305	0.303	0.301	0.298	
34,000	79.4	81.4	83.4	85.2	87.1	%N1	79.9	81.9	83.8	85.7	87.6	34,000
	1380	1425	1468	1512	1559	LB/HR	1421	1468	1512	1558	1607	
	0.3	0.3	0.3	0.29	0.29	NM/LB	0.3	0.3	0.3	0.29	0.29	
35,000	80.2	82.2	84.1	86.0	87.9	%N1	80.5	82.5	84.5	86.3	88.2	35,000
	1419	1466	1510	1555	1604	LB/HR	1455	1502	1548	1595	1645	
	0.293	0.291	0.289	0.287	0.284	NM/LB	0.293	0.291	0.289	0.287	0.284	
36,000	80.9	82.9	84.8	86.7	88.7	%N1	81.0	83.1	85.0	87.0	88.9	36,000
	1459	1507	1553	1600	1650	LB/HR	1488	1537	1584	1633	1684	
	0.28	0.28	0.28	0.28	0.28	NM/LB	0.29	0.28	0.28	0.28	0.28	
37,000	81.5	83.6	85.6	87.5		%N1	81.7	83.8	85.7	87.7		37,000
	1500	1549	1597	1644		LB/HR	1530	1579	1629	1679		
	0.277	0.275	0.273	0.271		NM/LB	0.279	0.277	0.275	0.273		
38,000	82.3	84.3	86.3	88.2		%N1	82.4	84.4	86.4	88.5		38,000
	1542	1593	1642	1691		LB/HR	1571	1622	1673	1725		
	0.27	0.27	0.27	0.26		NM/LB	0.27	0.27	0.27	0.27		
39,000	83.0	85.1	87.1	89.2		%N1	83.1	85.1	87.1	89.3		39,000
	1588	1640	1691	1745		LB/HR	1612	1664	1717	1774		
	0.262	0.260	0.258	0.256		NM/LB	0.264	0.263	0.261	0.258		

Gulfstream G280
AIRPLANE FLIGHT MANUAL

43,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.8 Mi						.81 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	76.9	78.9	80.7	82.6	84.4	%N1	77.6	79.5	81.4	83.3	85.1	25,000
	1278	1318	1359	1402	1444	LB/HR	1321	1363	1405	1448	1492	
	0.342	0.340	0.338	0.335	0.332	NM/LB	0.335	0.333	0.331	0.328	0.325	
26,000	77.3	79.2	81.1	82.9	84.7	%N1	77.9	79.8	81.7	83.6	85.4	26,000
	1295	1336	1378	1421	1463	LB/HR	1338	1380	1423	1466	1511	
	0.34	0.34	0.33	0.33	0.33	NM/LB	0.33	0.33	0.33	0.32	0.32	
27,000	77.6	79.5	81.4	83.3	85.1	%N1	78.2	80.1	82.1	83.9	85.8	27,000
	1314	1356	1398	1441	1485	LB/HR	1354	1397	1440	1484	1530	
	0.333	0.331	0.328	0.326	0.323	NM/LB	0.327	0.325	0.323	0.320	0.317	
28,000	78.0	79.9	81.8	83.7	85.5	%N1	78.6	80.5	82.5	84.4	86.2	28,000
	1334	1377	1419	1463	1508	LB/HR	1375	1419	1463	1507	1554	
	0.33	0.33	0.32	0.32	0.32	NM/LB	0.32	0.32	0.32	0.32	0.31	
29,000	78.4	80.3	82.2	84.1	85.9	%N1	79.0	81.0	82.9	84.8	86.6	29,000
	1355	1398	1441	1485	1531	LB/HR	1396	1441	1486	1530	1578	
	0.323	0.321	0.318	0.316	0.313	NM/LB	0.317	0.315	0.313	0.311	0.308	
30,000	78.7	80.7	82.6	84.5	86.3	%N1	79.4	81.4	83.3	85.2	87.0	30,000
	1375	1419	1463	1507	1554	LB/HR	1418	1464	1509	1554	1603	
	0.32	0.32	0.31	0.31	0.31	NM/LB	0.31	0.31	0.31	0.31	0.3	
31,000	79.2	81.2	83.1	85.0	86.8	%N1	79.8	81.8	83.7	85.6	87.4	31,000
	1399	1444	1489	1533	1581	LB/HR	1440	1486	1532	1579	1628	
	0.313	0.310	0.308	0.306	0.303	NM/LB	0.308	0.305	0.303	0.301	0.298	
32,000	79.6	81.6	83.6	85.5	87.3	%N1	80.3	82.3	84.3	86.2	88.0	32,000
	1424	1470	1515	1561	1610	LB/HR	1470	1518	1565	1613	1664	
	0.31	0.3	0.3	0.3	0.3	NM/LB	0.3	0.3	0.3	0.29	0.29	
33,000	80.1	82.1	84.0	85.9	87.8	%N1	80.8	82.8	84.8	86.7	88.6	33,000
	1449	1496	1542	1589	1639	LB/HR	1501	1549	1597	1647	1699	
	0.302	0.300	0.298	0.295	0.293	NM/LB	0.295	0.293	0.291	0.289	0.286	
34,000	80.5	82.5	84.5	86.4	88.3	%N1	81.3	83.3	85.3	87.3		34,000
	1474	1522	1568	1617	1668	LB/HR	1531	1581	1630	1681		
	0.3	0.29	0.29	0.29	0.29	NM/LB	0.29	0.29	0.29	0.28		
35,000	81.1	83.1	85.0	87.1		%N1	81.8	83.8	85.8	87.9		35,000
	1508	1557	1605	1656		LB/HR	1564	1615	1665	1718		
	0.290	0.288	0.286	0.283		NM/LB	0.283	0.281	0.279	0.277		
36,000	81.6	83.6	85.6	87.7		%N1	82.6	84.6	86.6	88.8		36,000
	1543	1593	1642	1695		LB/HR	1612	1664	1717	1773		
	0.28	0.28	0.28	0.28		NM/LB	0.27	0.27	0.27	0.27		
37,000	82.2	84.2	86.2	88.4		%N1	83.3	85.4	87.4	89.6		37,000
	1577	1628	1679	1734		LB/HR	1660	1713	1768	1828		
	0.277	0.275	0.273	0.271		NM/LB	0.267	0.265	0.263	0.260		
38,000	82.8	84.8	86.8	89.0		%N1	84.3	86.3	88.4	90.5		38,000
	1616	1668	1721	1779		LB/HR	1712	1767	1824	1884		
	0.27	0.27	0.27	0.26		NM/LB	0.26	0.26	0.25	0.25		
39,000	83.7	85.7	87.8	90.0		%N1	85.6	87.7	89.7			39,000
	1672	1725	1781	1843		LB/HR	1779	1836	1895			
	0.262	0.260	0.258	0.255		NM/LB	0.249	0.247	0.245			

43,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.82 Mi						.83 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	78.2	80.2	82.1	84.0	85.8	%N1	79.7	81.6	83.6	85.5	87.3	25,000
	1365	1409	1452	1496	1542	LB/HR	1450	1497	1543	1590	1640	
	0.328	0.326	0.324	0.322	0.319	NM/LB	0.313	0.311	0.309	0.306	0.303	
26,000	78.5	80.5	82.4	84.3	86.1	%N1	80.1	82.1	84.0	85.9	87.7	26,000
	1382	1426	1470	1514	1561	LB/HR	1472	1520	1567	1615	1665	
	0.32	0.32	0.32	0.32	0.31	NM/LB	0.31	0.31	0.3	0.3	0.3	
27,000	78.8	80.8	82.7	84.6	86.5	%N1	80.4	82.4	84.4	86.3	88.2	27,000
	1398	1443	1487	1532	1579	LB/HR	1494	1542	1590	1639	1691	
	0.321	0.318	0.316	0.314	0.311	NM/LB	0.304	0.302	0.299	0.297	0.294	
28,000	79.2	81.2	83.1	85.0	86.8	%N1	80.8	82.8	84.7	86.7	88.6	28,000
	1415	1461	1506	1551	1600	LB/HR	1516	1565	1614	1664	1716	
	0.32	0.31	0.31	0.31	0.31	NM/LB	0.3	0.3	0.3	0.29	0.29	
29,000	79.6	81.6	83.5	85.4	87.2	%N1	81.2	83.2	85.2	87.2		29,000
	1438	1485	1530	1577	1626	LB/HR	1545	1595	1645	1696		
	0.312	0.309	0.307	0.305	0.302	NM/LB	0.294	0.292	0.290	0.287		
30,000	80.0	82.0	83.9	85.8	87.7	%N1	81.8	83.8	85.8	87.9		30,000
	1460	1508	1554	1602	1652	LB/HR	1580	1631	1682	1735		
	0.31	0.3	0.3	0.3	0.3	NM/LB	0.29	0.29	0.28	0.28		
31,000	80.4	82.4	84.3	86.2	88.1	%N1	82.3	84.4	86.4	88.5		31,000
	1483	1531	1578	1627	1679	LB/HR	1615	1667	1719	1775		
	0.302	0.300	0.298	0.296	0.293	NM/LB	0.281	0.279	0.277	0.274		
32,000	80.8	82.8	84.8	86.7	88.6	%N1	82.9	84.9	87.0	89.1		32,000
	1509	1558	1606	1657	1709	LB/HR	1650	1703	1757	1815		
	0.3	0.29	0.29	0.29	0.29	NM/LB	0.27	0.27	0.27	0.27		
33,000	81.4	83.4	85.4	87.4		%N1	83.6	85.7	87.7	89.8		33,000
	1546	1596	1645	1697		LB/HR	1693	1748	1804	1865		
	0.290	0.288	0.286	0.283		NM/LB	0.268	0.266	0.264	0.261		
34,000	82.0	84.0	86.0	88.1		%N1	84.7	86.8	88.8	90.8		34,000
	1582	1633	1684	1738		LB/HR	1755	1811	1869	1926		
	0.28	0.28	0.28	0.28		NM/LB	0.26	0.26	0.25	0.25		
35,000	82.5	84.6	86.6	88.7		%N1	85.9	88.0	90.0			35,000
	1618	1671	1723	1780		LB/HR	1817	1875	1935			
	0.277	0.275	0.273	0.270		NM/LB	0.250	0.248	0.246			
36,000	83.2	85.3	87.3	89.5		%N1						36,000
	1662	1715	1769	1829		LB/HR						
	0.27	0.27	0.27	0.26		NM/LB						
37,000	84.4	86.5	88.5	90.5		%N1						37,000
	1728	1784	1841	1900		LB/HR						
	0.259	0.258	0.255	0.253		NM/LB						
38,000	85.8	87.9	89.9			%N1						38,000
	1801	1858	1918			LB/HR						
	0.25	0.25	0.25			NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

43,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.84 Mi						.85 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	80.9	82.9	84.9	86.8	88.7	%N1	82.2	84.2	86.2	88.2		25,000
	1533	1582	1632	1683	1735	LB/HR	1622	1674	1727	1782		
	0.299	0.297	0.295	0.293	0.290	NM/LB	0.286	0.284	0.282	0.280		
26,000	81.3	83.3	85.3	87.3		%N1	82.6	84.6	86.6	88.7		26,000
	1561	1611	1661	1713		LB/HR	1647	1700	1754	1810		
	0.29	0.29	0.29	0.29		NM/LB	0.28	0.28	0.28	0.28		
27,000	81.8	83.8	85.8	87.8		%N1	83.1	85.1	87.2	89.2		27,000
	1588	1640	1691	1744		LB/HR	1680	1735	1789	1848		
	0.289	0.287	0.285	0.283		NM/LB	0.276	0.275	0.273	0.270		
28,000	82.2	84.2	86.2	88.3		%N1	83.7	85.7	87.8	89.8		28,000
	1616	1668	1721	1776		LB/HR	1715	1770	1826	1885		
	0.28	0.28	0.28	0.28		NM/LB	0.27	0.27	0.27	0.26		
29,000	82.7	84.7	86.7	88.8		%N1	84.3	86.4	88.4	90.4		29,000
	1644	1697	1750	1807		LB/HR	1752	1808	1866	1923		
	0.279	0.277	0.275	0.273		NM/LB	0.265	0.263	0.261	0.259		
30,000	83.4	85.4	87.4	89.5		%N1	85.0	87.1	89.1			30,000
	1688	1743	1798	1857		LB/HR	1792	1850	1909			
	0.27	0.27	0.27	0.27		NM/LB	0.26	0.26	0.26			
31,000	84.3	86.3	88.4	90.4		%N1	86.2	88.3	90.3			31,000
	1740	1796	1853	1911		LB/HR	1858	1917	1979			
	0.264	0.262	0.260	0.258		NM/LB	0.250	0.248	0.246			
32,000	85.2	87.3	89.3			%N1						32,000
	1793	1850	1910			LB/HR						
	0.26	0.25	0.25			NM/LB						
33,000	86.2	88.3	90.3			%N1						33,000
	1846	1905	1966			LB/HR						
	0.249	0.247	0.245			NM/LB						
34,000						%N1						34,000
						LB/HR						
						NM/LB						
35,000						%N1						35,000
						LB/HR						
						NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.6 Mi						.62 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000						%N1	73.2	75.0	76.8	78.6	80.4	25,000
						LB/HR	912	941	968	996	1025	
						NM/LB	0.372	0.369	0.367	0.365	0.363	
26,000						%N1						26,000
						LB/HR						
						NM/LB						
27,000						%N1						27,000
						LB/HR						
						NM/LB						
28,000						%N1						28,000
						LB/HR						
						NM/LB						
29,000						%N1						29,000
						LB/HR						
						NM/LB						
30,000						%N1						30,000
						LB/HR						
						NM/LB						
31,000						%N1						31,000
						LB/HR						
						NM/LB						
32,000						%N1						32,000
						LB/HR						
						NM/LB						
33,000						%N1						33,000
						LB/HR						
						NM/LB						
34,000						%N1						34,000
						LB/HR						
						NM/LB						
35,000						%N1						35,000
						LB/HR						
						NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.64 Mi						.66 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	73.6	75.4	77.3	79.0	80.8	%N1	73.9	75.8	77.6	79.4	81.2	25,000
	937	967	995	1025	1053	LB/HR	960	991	1020	1051	1080	
	0.373	0.371	0.369	0.367	0.364	NM/LB	0.376	0.373	0.371	0.369	0.366	
26,000	74.3	76.2	78.0	79.9	81.7	%N1	74.7	76.6	78.4	80.2	82.1	26,000
	967	998	1027	1058	1087	LB/HR	992	1023	1054	1085	1116	
	0.36	0.36	0.36	0.36	0.35	NM/LB	0.36	0.36	0.36	0.36	0.35	
27,000	75.2	77.1	78.9	80.8	82.6	%N1	75.5	77.4	79.2	81.1	82.9	27,000
	1001	1033	1064	1095	1126	LB/HR	1025	1057	1089	1120	1153	
	0.349	0.347	0.345	0.343	0.341	NM/LB	0.352	0.350	0.348	0.346	0.343	
28,000						%N1	76.3	78.2	80.1	81.9	83.8	28,000
						LB/HR	1057	1090	1124	1155	1189	
						NM/LB	0.34	0.34	0.34	0.34	0.33	
29,000						%N1						29,000
						LB/HR						
						NM/LB						
30,000						%N1						30,000
						LB/HR						
						NM/LB						
31,000						%N1						31,000
						LB/HR						
						NM/LB						
32,000						%N1						32,000
						LB/HR						
						NM/LB						
33,000						%N1						33,000
						LB/HR						
						NM/LB						
34,000						%N1						34,000
						LB/HR						
						NM/LB						
35,000						%N1						35,000
						LB/HR						
						NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.68 Mi						.7 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	74.2	76.0	77.8	79.6	81.4	%N1	74.4	76.3	78.1	79.9	81.8	25,000
	980	1011	1040	1072	1102	LB/HR	1002	1034	1064	1096	1127	
	0.379	0.377	0.375	0.372	0.370	NM/LB	0.382	0.379	0.377	0.375	0.372	
26,000	75.0	76.8	78.7	80.5	82.3	%N1	75.1	77.0	78.9	80.7	82.5	26,000
	1014	1046	1077	1109	1140	LB/HR	1032	1064	1096	1128	1161	
	0.37	0.36	0.36	0.36	0.36	NM/LB	0.37	0.37	0.37	0.36	0.36	
27,000	75.8	77.7	79.5	81.4	83.2	%N1	75.9	77.8	79.7	81.6	83.4	27,000
	1048	1080	1113	1145	1178	LB/HR	1066	1099	1133	1165	1199	
	0.355	0.353	0.350	0.348	0.346	NM/LB	0.359	0.357	0.355	0.353	0.350	
28,000	76.6	78.5	80.4	82.3	84.1	%N1	76.8	78.7	80.6	82.5	84.3	28,000
	1082	1116	1150	1183	1218	LB/HR	1102	1137	1172	1206	1242	
	0.34	0.34	0.34	0.34	0.33	NM/LB	0.35	0.35	0.34	0.34	0.34	
29,000	77.4	79.4	81.3	83.1	85.0	%N1	77.7	79.6	81.5	83.4	85.2	29,000
	1117	1152	1188	1223	1260	LB/HR	1140	1175	1212	1247	1286	
	0.333	0.331	0.328	0.326	0.324	NM/LB	0.336	0.334	0.331	0.329	0.326	
30,000	78.3	80.2	82.1	84.0	85.9	%N1	78.5	80.5	82.4	84.3	86.1	30,000
	1155	1192	1229	1265	1303	LB/HR	1178	1216	1253	1290	1330	
	0.32	0.32	0.32	0.32	0.31	NM/LB	0.32	0.32	0.32	0.32	0.32	
31,000						%N1	79.3	81.3	83.3	85.2	87.0	31,000
						LB/HR	1217	1256	1295	1332	1374	
						NM/LB	0.314	0.312	0.310	0.308	0.305	
32,000						%N1	80.2	82.3	84.2	86.0	88.0	32,000
						LB/HR	1260	1301	1340	1378	1423	
						NM/LB	0.3	0.3	0.3	0.3	0.3	
33,000						%N1						33,000
						LB/HR						
						NM/LB						
34,000						%N1						34,000
						LB/HR						
						NM/LB						
35,000						%N1						35,000
						LB/HR						
						NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.72 Mi						.74 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	74.8	76.6	78.5	80.3	82.1	%N1	75.3	77.2	79.1	80.9	82.7	25,000
	1028	1060	1092	1124	1157	LB/HR	1065	1098	1131	1164	1198	
	0.383	0.380	0.378	0.376	0.373	NM/LB	0.380	0.378	0.375	0.373	0.370	
26,000	75.4	77.3	79.2	81.0	82.8	%N1	75.9	77.8	79.6	81.5	83.3	26,000
	1057	1090	1123	1155	1189	LB/HR	1088	1122	1156	1188	1224	
	0.37	0.37	0.37	0.37	0.36	NM/LB	0.37	0.37	0.37	0.37	0.36	
27,000	76.1	78.0	79.9	81.8	83.6	%N1	76.5	78.4	80.3	82.1	84.0	27,000
	1086	1120	1154	1186	1221	LB/HR	1113	1148	1184	1218	1254	
	0.362	0.360	0.358	0.356	0.353	NM/LB	0.363	0.361	0.359	0.356	0.354	
28,000	76.8	78.8	80.7	82.5	84.3	%N1	77.1	79.1	81.0	82.8	84.6	28,000
	1116	1151	1187	1221	1258	LB/HR	1142	1178	1214	1251	1288	
	0.35	0.35	0.35	0.35	0.34	NM/LB	0.35	0.35	0.35	0.35	0.34	
29,000	77.7	79.6	81.5	83.4	85.3	%N1	77.8	79.7	81.6	83.5	85.3	29,000
	1154	1190	1228	1264	1302	LB/HR	1172	1209	1246	1283	1323	
	0.341	0.339	0.336	0.334	0.331	NM/LB	0.345	0.343	0.341	0.338	0.335	
30,000	78.5	80.5	82.4	84.3	86.2	%N1	78.5	80.5	82.4	84.3	86.2	30,000
	1193	1231	1269	1306	1347	LB/HR	1208	1246	1285	1323	1364	
	0.33	0.33	0.33	0.32	0.32	NM/LB	0.33	0.33	0.33	0.33	0.33	
31,000	79.3	81.3	83.3	85.2	87.1	%N1	79.4	81.3	83.3	85.2	87.1	31,000
	1233	1272	1311	1349	1392	LB/HR	1248	1288	1328	1366	1409	
	0.319	0.317	0.315	0.313	0.310	NM/LB	0.324	0.322	0.320	0.318	0.315	
32,000	80.2	82.2	84.2	86.0	87.9	%N1	80.2	82.2	84.2	86.0	87.9	32,000
	1272	1314	1354	1392	1437	LB/HR	1288	1330	1371	1410	1455	
	0.31	0.31	0.31	0.3	0.3	NM/LB	0.31	0.31	0.31	0.31	0.31	
33,000	81.0	83.0	85.0	86.8		%N1	81.0	83.0	85.0	86.8		33,000
	1312	1355	1396	1435		LB/HR	1328	1371	1414	1454		
	0.300	0.298	0.296	0.294		NM/LB	0.305	0.302	0.300	0.299		
34,000	81.9	83.9	85.9	87.7		%N1	81.8	83.8	85.8	87.6		34,000
	1359	1403	1446	1486		LB/HR	1368	1413	1457	1499		
	0.29	0.29	0.29	0.28		NM/LB	0.3	0.29	0.29	0.29		
35,000						%N1	82.5	84.6	86.6	88.4		35,000
						LB/HR	1409	1455	1500	1544		
						NM/LB	0.287	0.285	0.283	0.281		
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.76 Mi						.78 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	75.9	77.8	79.7	81.6	83.4	%N1	76.9	78.8	80.7	82.5	84.3	25,000
	1104	1139	1174	1207	1242	LB/HR	1156	1193	1230	1267	1305	
	0.376	0.374	0.371	0.369	0.367	NM/LB	0.369	0.366	0.364	0.361	0.358	
26,000	76.5	78.4	80.3	82.1	84.0	%N1	77.2	79.2	81.1	82.9	84.8	26,000
	1127	1162	1198	1233	1270	LB/HR	1174	1211	1249	1287	1326	
	0.37	0.37	0.36	0.36	0.36	NM/LB	0.36	0.36	0.36	0.36	0.35	
27,000	77.0	78.9	80.8	82.7	84.5	%N1	77.7	79.6	81.5	83.4	85.3	27,000
	1149	1186	1222	1260	1297	LB/HR	1196	1235	1273	1311	1351	
	0.361	0.359	0.357	0.354	0.351	NM/LB	0.356	0.354	0.351	0.349	0.346	
28,000	77.5	79.5	81.4	83.2	85.1	%N1	78.2	80.1	82.0	83.9	85.8	28,000
	1174	1211	1249	1287	1326	LB/HR	1219	1258	1298	1336	1377	
	0.35	0.35	0.35	0.35	0.34	NM/LB	0.35	0.35	0.34	0.34	0.34	
29,000	78.2	80.1	82.0	83.9	85.8	%N1	78.6	80.6	82.5	84.4	86.3	29,000
	1205	1244	1283	1320	1361	LB/HR	1242	1282	1322	1361	1403	
	0.345	0.342	0.340	0.338	0.335	NM/LB	0.343	0.341	0.338	0.336	0.333	
30,000	78.8	80.8	82.7	84.6	86.5	%N1	79.2	81.2	83.2	85.1	86.9	30,000
	1236	1276	1316	1354	1396	LB/HR	1272	1313	1354	1394	1437	
	0.34	0.33	0.33	0.33	0.33	NM/LB	0.34	0.33	0.33	0.33	0.33	
31,000	79.5	81.4	83.4	85.3	87.2	%N1	79.9	81.9	83.9	85.8	87.7	31,000
	1268	1309	1349	1388	1432	LB/HR	1305	1348	1390	1432	1475	
	0.328	0.325	0.323	0.321	0.318	NM/LB	0.327	0.324	0.322	0.320	0.317	
32,000	80.3	82.3	84.3	86.1	88.1	%N1	80.6	82.6	84.6	86.5	88.4	32,000
	1308	1351	1393	1434	1478	LB/HR	1339	1383	1426	1469	1514	
	0.32	0.32	0.31	0.31	0.31	NM/LB	0.32	0.32	0.31	0.31	0.31	
33,000	81.1	83.1	85.1	86.9		%N1	81.2	83.3	85.2	87.2		33,000
	1349	1393	1436	1479		LB/HR	1375	1420	1465	1511		
	0.308	0.306	0.304	0.302		NM/LB	0.310	0.308	0.306	0.303		
34,000	81.8	83.9	85.8	87.8		%N1	82.0	84.0	86.0	88.1		34,000
	1389	1435	1479	1524		LB/HR	1417	1462	1509	1557		
	0.3	0.3	0.29	0.29		NM/LB	0.3	0.3	0.3	0.29		
35,000	82.7	84.7	86.7	88.7		%N1	82.7	84.8	86.8	88.9		35,000
	1435	1481	1527	1576		LB/HR	1458	1505	1552	1604		
	0.290	0.288	0.285	0.283		NM/LB	0.292	0.290	0.288	0.285		
36,000	83.5	85.6	87.6	89.7		%N1	83.5	85.6	87.6	89.7		36,000
	1480	1528	1576	1629		LB/HR	1501	1548	1598	1653		
	0.28	0.28	0.28	0.27		NM/LB	0.28	0.28	0.28	0.28		
37,000	84.6	86.7	88.7	90.6		%N1	84.8	86.9	89.0			37,000
	1531	1580	1631	1682		LB/HR	1564	1614	1666			
	0.271	0.269	0.267	0.265		NM/LB	0.273	0.271	0.269			
38,000						%N1	86.3	88.5	90.5			38,000
						LB/HR	1631	1684	1738			
						NM/LB	0.26	0.26	0.26			
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.8 Mi						.81 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.8	79.7	81.6	83.5	85.3	%N1	78.3	80.3	82.2	84.1	85.9	25,000
	1213	1252	1291	1330	1370	LB/HR	1250	1290	1330	1369	1411	
	0.361	0.358	0.355	0.353	0.350	NM/LB	0.354	0.352	0.349	0.347	0.344	
26,000	78.2	80.1	82.0	83.9	85.8	%N1	78.8	80.7	82.7	84.6	86.4	26,000
	1233	1273	1313	1352	1393	LB/HR	1271	1312	1354	1393	1436	
	0.35	0.35	0.35	0.35	0.34	NM/LB	0.35	0.35	0.34	0.34	0.34	
27,000	78.6	80.5	82.5	84.4	86.2	%N1	79.2	81.2	83.1	85.0	86.9	27,000
	1254	1295	1335	1374	1416	LB/HR	1293	1335	1377	1418	1461	
	0.349	0.346	0.344	0.342	0.339	NM/LB	0.342	0.340	0.337	0.335	0.332	
28,000	79.1	81.0	83.0	84.9	86.7	%N1	79.6	81.6	83.6	85.5	87.3	28,000
	1277	1319	1360	1400	1443	LB/HR	1315	1357	1400	1442	1486	
	0.34	0.34	0.34	0.34	0.33	NM/LB	0.34	0.33	0.33	0.33	0.33	
29,000	79.6	81.5	83.5	85.4	87.3	%N1	80.2	82.2	84.2	86.1	88.0	29,000
	1302	1345	1387	1429	1472	LB/HR	1344	1388	1432	1476	1520	
	0.336	0.333	0.331	0.329	0.326	NM/LB	0.329	0.327	0.325	0.322	0.320	
30,000	80.1	82.1	84.0	85.9	87.8	%N1	80.8	82.8	84.7	86.7		30,000
	1327	1371	1414	1457	1501	LB/HR	1375	1419	1464	1511		
	0.33	0.33	0.32	0.32	0.32	NM/LB	0.32	0.32	0.32	0.31		
31,000	80.6	82.5	84.5	86.5	88.4	%N1	81.3	83.3	85.3	87.4		31,000
	1353	1397	1442	1487	1531	LB/HR	1405	1451	1497	1546		
	0.323	0.321	0.318	0.316	0.313	NM/LB	0.315	0.313	0.310	0.307		
32,000	81.2	83.2	85.2	87.2		%N1	81.9	84.0	86.0	88.1		32,000
	1388	1433	1478	1527		LB/HR	1442	1488	1535	1587		
	0.32	0.31	0.31	0.31		NM/LB	0.31	0.3	0.3	0.3		
33,000	81.8	83.8	85.8	87.9		%N1	82.8	84.8	86.8	88.9		33,000
	1423	1468	1515	1567		LB/HR	1490	1537	1586	1640		
	0.307	0.305	0.303	0.300		NM/LB	0.297	0.295	0.293	0.290		
34,000	82.4	84.4	86.4	88.5		%N1	83.6	85.7	87.8	89.8		34,000
	1457	1504	1552	1605		LB/HR	1538	1587	1638	1693		
	0.3	0.3	0.3	0.29		NM/LB	0.29	0.29	0.28	0.28		
35,000	83.2	85.3	87.3	89.4		%N1	84.8	86.9	88.9			35,000
	1506	1554	1604	1659		LB/HR	1594	1645	1698			
	0.290	0.288	0.286	0.283		NM/LB	0.278	0.276	0.274			
36,000	84.4	86.5	88.6	90.4		%N1	86.6	88.7	90.7			36,000
	1568	1618	1670	1721		LB/HR	1680	1735	1791			
	0.28	0.28	0.27	0.27		NM/LB	0.26	0.26	0.26			
37,000	85.9	88.0	90.0			%N1						37,000
	1634	1688	1742			LB/HR						
	0.268	0.266	0.264			NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.82 Mi						.83 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	78.9	80.9	82.8	84.7	86.6	%N1	80.5	82.5	84.5	86.4	88.3	25,000
	1288	1329	1371	1411	1454	LB/HR	1378	1423	1468	1514	1559	
	0.348	0.346	0.343	0.341	0.338	NM/LB	0.329	0.327	0.324	0.322	0.319	
26,000	79.3	81.3	83.3	85.2	87.0	%N1	80.9	82.9	84.9	86.9		26,000
	1309	1351	1394	1436	1479	LB/HR	1402	1447	1493	1542		
	0.34	0.34	0.34	0.34	0.33	NM/LB	0.32	0.32	0.32	0.32		
27,000	79.8	81.8	83.7	85.6	87.5	%N1	81.5	83.6	85.5	87.6		27,000
	1332	1375	1418	1462	1505	LB/HR	1437	1484	1531	1581		
	0.337	0.334	0.332	0.329	0.327	NM/LB	0.316	0.313	0.311	0.308		
28,000	80.2	82.2	84.2	86.1	88.0	%N1	82.1	84.2	86.2	88.2		28,000
	1354	1398	1442	1488	1532	LB/HR	1472	1520	1568	1620		
	0.33	0.33	0.33	0.32	0.32	NM/LB	0.31	0.31	0.3	0.3		
29,000	80.7	82.7	84.6	86.6		%N1	82.8	84.8	86.8	88.9		29,000
	1379	1424	1469	1516		LB/HR	1508	1556	1605	1659		
	0.325	0.323	0.320	0.317		NM/LB	0.301	0.299	0.297	0.294		
30,000	81.3	83.3	85.3	87.4		%N1	83.5	85.6	87.7	89.6		30,000
	1416	1461	1508	1558		LB/HR	1552	1601	1653	1707		
	0.32	0.31	0.31	0.31		NM/LB	0.29	0.29	0.29	0.29		
31,000	82.0	84.0	86.0	88.1		%N1	84.7	86.8	88.8			31,000
	1452	1499	1547	1598		LB/HR	1612	1664	1717			
	0.309	0.306	0.304	0.301		NM/LB	0.281	0.279	0.277			
32,000	82.6	84.6	86.7	88.7		%N1	85.9	88.0	90.0			32,000
	1489	1536	1585	1639		LB/HR	1672	1727	1782			
	0.3	0.3	0.3	0.29		NM/LB	0.27	0.27	0.27			
33,000	83.5	85.5	87.6	89.6		%N1						33,000
	1539	1588	1639	1694		LB/HR						
	0.291	0.289	0.287	0.284		NM/LB						
34,000	84.9	87.0	89.0			%N1						34,000
	1609	1661	1714			LB/HR						
	0.28	0.28	0.27			NM/LB						
35,000	86.3	88.4	90.4			%N1						35,000
	1679	1734	1789			LB/HR						
	0.267	0.265	0.263			NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	.84 Mi						.85 Mi					GROSS WEIGHT AT ALTITUDE (LB)
	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	81.9	83.9	85.9	88.0		%N1	83.2	85.3	87.3	89.3		25,000
	1467	1514	1562	1614		LB/HR	1554	1604	1655	1709		
	0.313	0.311	0.308	0.305		NM/LB	0.299	0.297	0.295	0.292		
26,000	82.4	84.4	86.4	88.4		%N1	83.9	86.0	88.0			26,000
	1495	1543	1592	1644		LB/HR	1590	1641	1694			
	0.31	0.31	0.3	0.3		NM/LB	0.29	0.29	0.29			
27,000	83.0	85.1	87.1	89.1		%N1	84.6	86.6	88.7			27,000
	1533	1582	1632	1686		LB/HR	1626	1678	1732			
	0.300	0.297	0.295	0.292		NM/LB	0.286	0.284	0.282			
28,000	84.0	86.0	88.1	90.0		%N1	85.7	87.8	89.8			28,000
	1583	1634	1687	1739		LB/HR	1686	1741	1797			
	0.29	0.29	0.29	0.28		NM/LB	0.28	0.27	0.27			
29,000	85.0	87.0	89.1			%N1						29,000
	1635	1688	1742			LB/HR						
	0.281	0.279	0.277			NM/LB						
30,000	85.9	88.0	90.0			%N1						30,000
	1687	1742	1797			LB/HR						
	0.27	0.27	0.27			NM/LB						
31,000						%N1						31,000
						LB/HR						
						NM/LB						
32,000						%N1						32,000
						LB/HR						
						NM/LB						
33,000						%N1						33,000
						LB/HR						
						NM/LB						
34,000						%N1						34,000
						LB/HR						
						NM/LB						
35,000						%N1						35,000
						LB/HR						
						NM/LB						
36,000						%N1						36,000
						LB/HR						
						NM/LB						
37,000						%N1						37,000
						LB/HR						
						NM/LB						
38,000						%N1						38,000
						LB/HR						
						NM/LB						
39,000						%N1						39,000
						LB/HR						
						NM/LB						

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MAXIMUM CRUISE

Thrust setting is at MAX CRZ and aircraft achieves maximum airspeed/Mach according to current altitude and weight.

If airspeed/Mach accelerates to V_{MO}/M_{MO} - thrust should set to not exceed aircraft operating limitations and maintain V_{MO}/M_{MO}.

MAXIMUM CRUISE TABLES

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	63.5	64.7	65.9	67.1	68.3	%N1	63.8	65.0	66.3	67.5	68.7	33,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2359	2414	2469	2503	2576	LB/HR	2386	2442	2497	2550	2606	
	0.131	0.131	0.130	0.130	0.129	NM/LB	0.130	0.129	0.129	0.128	0.128	
26,000	63.5	64.7	66.0	67.2	68.4	%N1	63.8	65.1	66.3	67.5	68.7	34,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2362	2417	2471	2506	2579	LB/HR	2391	2447	2502	2555	2612	
	0.131	0.131	0.130	0.130	0.129	NM/LB	0.130	0.129	0.129	0.128	0.127	
27,000	63.5	64.8	66.0	67.2	68.4	%N1	63.9	65.1	66.4	67.6	68.8	35,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2364	2419	2474	2508	2582	LB/HR	2396	2452	2507	2560	2617	
	0.131	0.131	0.130	0.130	0.129	NM/LB	0.129	0.129	0.128	0.128	0.127	
28,000	63.6	64.8	66.0	67.2	68.4	%N1	63.9	65.2	66.4	67.6	68.9	36,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2367	2422	2477	2511	2585	LB/HR	2400	2456	2512	2565	2622	
	0.131	0.130	0.130	0.129	0.129	NM/LB	0.129	0.129	0.128	0.128	0.127	
29,000	63.6	64.8	66.1	67.3	68.5	%N1	64.0	65.2	66.5	67.7	68.9	37,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2370	2425	2480	2514	2588	LB/HR	2405	2461	2517	2570	2627	
	0.131	0.130	0.130	0.129	0.129	NM/LB	0.129	0.128	0.128	0.127	0.127	
30,000	63.6	64.9	66.1	67.3	68.5	%N1	64.1	65.3	66.5	67.8	69.0	38,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2372	2428	2482	2517	2591	LB/HR	2410	2466	2522	2576	2632	
	0.131	0.130	0.130	0.129	0.129	NM/LB	0.129	0.128	0.128	0.127	0.127	
31,000	63.7	64.9	66.1	67.4	68.6	%N1	64.2	65.4	66.6	67.9	69.1	39,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2377	2432	2487	2521	2596	LB/HR	2419	2475	2531	2585	2642	
	0.130	0.130	0.129	0.129	0.128	NM/LB	0.128	0.128	0.127	0.127	0.126	
32,000	63.7	65.0	66.2	67.4	68.6	%N1						
	0.50	0.50	0.50	0.50	0.50	MIND						
	309.9	315.8	321.6	327.4	333.0	KTAS						
	300.0	300.0	300.0	300.0	300.0	KCAS						
	2382	2437	2492	2527	2601	LB/HR						
	0.130	0.130	0.129	0.129	0.128	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

10,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	66.2	67.6	68.9	70.2	71.6	%N1	66.6	67.9	69.2	70.5	72.0	33,000
	0.54	0.54	0.54	0.54	0.54	MIND	0.54	0.54	0.54	0.54	0.54	
	332.3	338.9	345.4	351.7	358.0	KTAS	332.3	338.9	345.4	351.7	358.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2279	2332	2384	2420	2485	LB/HR	2308	2361	2414	2469	2516	
	0.146	0.145	0.145	0.144	0.144	NM/LB	0.144	0.144	0.143	0.142	0.142	
26,000	66.3	67.6	68.9	70.2	71.6	%N1	66.6	68.0	69.3	70.6	72.1	34,000
	0.54	0.54	0.54	0.54	0.54	MIND	0.54	0.54	0.54	0.54	0.54	
	332.3	338.9	345.4	351.7	358.0	KTAS	332.3	338.9	345.4	351.7	358.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2281	2334	2387	2422	2488	LB/HR	2312	2366	2419	2474	2521	
	0.146	0.145	0.145	0.144	0.144	NM/LB	0.144	0.143	0.143	0.142	0.142	
27,000	66.3	67.6	68.9	70.2	71.7	%N1	66.7	68.0	69.3	70.7	72.1	35,000
	0.54	0.54	0.54	0.54	0.54	MIND	0.54	0.54	0.54	0.54	0.54	
	332.3	338.9	345.4	351.7	358.0	KTAS	332.3	338.9	345.4	351.7	358.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2284	2337	2390	2425	2491	LB/HR	2317	2371	2424	2479	2526	
	0.145	0.145	0.145	0.144	0.144	NM/LB	0.143	0.143	0.142	0.142	0.142	
28,000	66.3	67.7	69.0	70.3	71.7	%N1	66.7	68.1	69.4	70.7	72.2	36,000
	0.54	0.54	0.54	0.54	0.54	MIND	0.54	0.54	0.54	0.54	0.54	
	332.3	338.9	345.4	351.7	358.0	KTAS	332.3	338.9	345.4	351.7	358.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2287	2340	2393	2428	2494	LB/HR	2322	2376	2429	2484	2532	
	0.145	0.145	0.144	0.144	0.144	NM/LB	0.143	0.143	0.142	0.142	0.141	
29,000	66.4	67.7	69.0	70.3	71.7	%N1	66.8	68.1	69.5	70.8	72.2	37,000
	0.54	0.54	0.54	0.54	0.54	MIND	0.54	0.54	0.54	0.54	0.54	
	332.3	338.9	345.4	351.7	358.0	KTAS	332.3	338.9	345.4	351.7	358.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2290	2343	2395	2431	2496	LB/HR	2327	2381	2434	2490	2537	
	0.145	0.145	0.144	0.144	0.143	NM/LB	0.143	0.142	0.142	0.141	0.141	
30,000	66.4	67.7	69.0	70.4	71.8	%N1	66.9	68.2	69.6	70.9	72.3	38,000
	0.54	0.54	0.54	0.54	0.54	MIND	0.54	0.54	0.54	0.54	0.54	
	332.3	338.9	345.4	351.7	358.0	KTAS	332.3	338.9	345.4	351.7	358.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2293	2346	2399	2435	2500	LB/HR	2334	2388	2442	2497	2546	
	0.145	0.144	0.144	0.143	0.143	NM/LB	0.142	0.142	0.141	0.141	0.141	
31,000	66.5	67.8	69.1	70.4	71.9	%N1	67.0	68.3	69.7	71.0	72.4	39,000
	0.54	0.54	0.54	0.54	0.54	MIND	0.54	0.54	0.54	0.54	0.54	
	332.3	338.9	345.4	351.7	358.0	KTAS	332.3	338.9	345.4	351.7	358.0	
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2298	2351	2404	2440	2505	LB/HR	2343	2397	2451	2507	2556	
	0.145	0.144	0.144	0.143	0.143	NM/LB	0.142	0.141	0.141	0.140	0.140	
32,000	66.5	67.8	69.2	70.5	71.9	%N1						
	0.54	0.54	0.54	0.54	0.54	MIND						
	332.3	338.9	345.4	351.7	358.0	KTAS						
	300.0	300.0	300.0	300.0	300.0	KCAS						
	2303	2356	2409	2445	2510	LB/HR						
	0.144	0.144	0.143	0.143	0.143	NM/LB						

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	70.8	72.3	73.7	75.2	76.7	%N1	71.1	72.5	74.0	75.4	77.0	33,000
	0.62	0.62	0.62	0.62	0.62	MIND	0.62	0.62	0.62	0.62	0.62	
	374.0	381.8	389.4	396.8	404.2	KTAS	374.0	381.8	389.4	396.8	404.2	
	315.0	315.0	315.0	315.0	315.0	KCAS	315.0	315.0	315.0	315.0	315.0	
	2422	2479	2540	2576	2649	LB/HR	2446	2505	2566	2629	2676	
	0.154	0.154	0.153	0.152	0.153	NM/LB	0.153	0.152	0.152	0.151	0.151	
26,000	70.8	72.3	73.8	75.2	76.7	%N1	71.1	72.6	74.1	75.5	77.0	34,000
	0.62	0.62	0.62	0.62	0.62	MIND	0.62	0.62	0.62	0.62	0.62	
	374.0	381.8	389.4	396.8	404.2	KTAS	374.0	381.8	389.4	396.8	404.2	
	315.0	315.0	315.0	315.0	315.0	KCAS	315.0	315.0	315.0	315.0	315.0	
	2425	2482	2543	2580	2652	LB/HR	2452	2510	2572	2635	2682	
	0.154	0.154	0.153	0.152	0.152	NM/LB	0.153	0.152	0.151	0.151	0.151	
27,000	70.9	72.3	73.8	75.2	76.7	%N1	71.2	72.7	74.1	75.5	77.1	35,000
	0.62	0.62	0.62	0.62	0.62	MIND	0.62	0.62	0.62	0.62	0.62	
	374.0	381.8	389.4	396.8	404.2	KTAS	374.0	381.8	389.4	396.8	404.2	
	315.0	315.0	315.0	315.0	315.0	KCAS	315.0	315.0	315.0	315.0	315.0	
	2427	2485	2546	2583	2655	LB/HR	2457	2516	2577	2641	2688	
	0.154	0.154	0.153	0.152	0.152	NM/LB	0.152	0.152	0.151	0.150	0.150	
28,000	70.9	72.4	73.8	75.3	76.8	%N1	71.2	72.7	74.2	75.6	77.2	36,000
	0.62	0.62	0.62	0.62	0.62	MIND	0.62	0.62	0.62	0.62	0.62	
	374.0	381.8	389.4	396.8	404.2	KTAS	374.0	381.8	389.4	396.8	404.2	
	315.0	315.0	315.0	315.0	315.0	KCAS	315.0	315.0	315.0	315.0	315.0	
	2430	2488	2549	2586	2658	LB/HR	2462	2521	2583	2647	2694	
	0.154	0.153	0.153	0.152	0.152	NM/LB	0.152	0.151	0.151	0.150	0.150	
29,000	70.9	72.4	73.9	75.3	76.8	%N1	71.3	72.8	74.2	75.7	77.2	37,000
	0.62	0.62	0.62	0.62	0.62	MIND	0.62	0.62	0.62	0.62	0.62	
	374.0	381.8	389.4	396.8	404.2	KTAS	374.0	381.8	389.4	396.8	404.2	
	315.0	315.0	315.0	315.0	315.0	KCAS	315.0	315.0	315.0	315.0	315.0	
	2433	2491	2552	2589	2661	LB/HR	2468	2527	2589	2653	2700	
	0.154	0.153	0.153	0.152	0.152	NM/LB	0.152	0.151	0.150	0.150	0.150	
30,000	71.0	72.4	73.9	75.3	76.8	%N1	71.3	72.8	74.3	75.7	77.3	38,000
	0.62	0.62	0.62	0.62	0.62	MIND	0.62	0.62	0.62	0.62	0.62	
	374.0	381.8	389.4	396.8	404.2	KTAS	374.0	381.8	389.4	396.8	404.2	
	315.0	315.0	315.0	315.0	315.0	KCAS	315.0	315.0	315.0	315.0	315.0	
	2436	2494	2555	2592	2664	LB/HR	2473	2532	2594	2659	2706	
	0.154	0.153	0.152	0.152	0.152	NM/LB	0.151	0.151	0.150	0.149	0.149	
31,000	71.0	72.5	73.9	75.3	76.9	%N1	71.4	72.9	74.3	75.8	77.3	39,000
	0.62	0.62	0.62	0.62	0.62	MIND	0.62	0.62	0.62	0.62	0.62	
	374.0	381.8	389.4	396.8	404.2	KTAS	374.0	381.8	389.4	396.8	404.2	
	315.0	315.0	315.0	315.0	315.0	KCAS	315.0	315.0	315.0	315.0	315.0	
	2439	2496	2558	2594	2667	LB/HR	2479	2538	2600	2665	2712	
	0.153	0.153	0.152	0.151	0.152	NM/LB	0.151	0.150	0.150	0.149	0.149	
32,000	71.0	72.5	73.9	75.4	76.9	%N1						
	0.62	0.62	0.62	0.62	0.62	MIND						
	374.0	381.8	389.4	396.8	404.2	KTAS						
	315.0	315.0	315.0	315.0	315.0	KCAS						
	2441	2499	2561	2597	2670	LB/HR						
	0.153	0.153	0.152	0.151	0.151	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

19,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-42.6	-32.6	-22.6	-12.6	-2.6	OAT (°C)	-42.6	-32.6	-22.6	-12.6	-2.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	74.2	75.7	77.3	78.8	80.4	%N1	74.4	76.0	77.5	79.1	80.7	33,000
	0.69	0.69	0.69	0.69	0.69	MIND	0.69	0.69	0.69	0.69	0.69	
	410.4	419.2	427.9	436.3	444.6	KTAS	410.4	419.2	427.9	436.3	444.6	
	327.0	327.0	327.0	327.0	327.0	KCAS	327.0	327.0	327.0	327.0	327.0	
	2519	2583	2649	2688	2775	LB/HR	2541	2606	2673	2743	2801	
	0.163	0.162	0.162	0.161	0.160	NM/LB	0.162	0.161	0.160	0.159	0.159	
26,000	74.2	75.8	77.3	78.8	80.5	%N1	74.4	76.0	77.6	79.1	80.7	34,000
	0.69	0.69	0.69	0.69	0.69	MIND	0.69	0.69	0.69	0.69	0.69	
	410.4	419.2	427.9	436.3	444.6	KTAS	410.4	419.2	427.9	436.3	444.6	
	327.0	327.0	327.0	327.0	327.0	KCAS	327.0	327.0	327.0	327.0	327.0	
	2521	2585	2651	2690	2778	LB/HR	2544	2609	2676	2746	2805	
	0.163	0.162	0.161	0.160	0.160	NM/LB	0.161	0.161	0.160	0.159	0.159	
27,000	74.2	75.8	77.4	78.9	80.5	%N1	74.5	76.1	77.7	79.2	80.8	35,000
	0.69	0.69	0.69	0.69	0.69	MIND	0.69	0.69	0.69	0.69	0.69	
	410.4	419.2	427.9	436.3	444.6	KTAS	410.4	419.2	427.9	436.3	444.6	
	327.0	327.0	327.0	327.0	327.0	KCAS	327.0	327.0	327.0	327.0	327.0	
	2524	2588	2654	2694	2781	LB/HR	2551	2616	2683	2753	2812	
	0.163	0.162	0.161	0.160	0.160	NM/LB	0.161	0.160	0.159	0.158	0.158	
28,000	74.2	75.8	77.4	78.9	80.5	%N1	74.6	76.2	77.7	79.3	80.9	36,000
	0.69	0.69	0.69	0.69	0.69	MIND	0.69	0.69	0.69	0.69	0.69	
	410.4	419.2	427.9	436.3	444.6	KTAS	410.4	419.2	427.9	436.3	444.6	
	327.0	327.0	327.0	327.0	327.0	KCAS	327.0	327.0	327.0	327.0	327.0	
	2527	2591	2657	2697	2784	LB/HR	2558	2623	2690	2761	2820	
	0.162	0.162	0.161	0.160	0.160	NM/LB	0.160	0.160	0.159	0.158	0.158	
29,000	74.3	75.8	77.4	78.9	80.6	%N1	74.6	76.2	77.8	79.3	80.9	37,000
	0.69	0.69	0.69	0.69	0.69	MIND	0.69	0.69	0.69	0.69	0.69	
	410.4	419.2	427.9	436.3	444.6	KTAS	410.4	419.2	427.9	436.3	444.6	
	327.0	327.0	327.0	327.0	327.0	KCAS	327.0	327.0	327.0	327.0	327.0	
	2530	2594	2661	2700	2788	LB/HR	2565	2630	2698	2768	2828	
	0.162	0.162	0.161	0.160	0.159	NM/LB	0.160	0.159	0.159	0.158	0.157	
30,000	74.3	75.9	77.5	79.0	80.6	%N1	74.7	76.3	77.9	79.4	81.0	38,000
	0.69	0.69	0.69	0.69	0.69	MIND	0.69	0.69	0.69	0.69	0.69	
	410.4	419.2	427.9	436.3	444.6	KTAS	410.4	419.2	427.9	436.3	444.6	
	327.0	327.0	327.0	327.0	327.0	KCAS	327.0	327.0	327.0	327.0	327.0	
	2532	2597	2664	2703	2791	LB/HR	2572	2637	2705	2776	2836	
	0.162	0.161	0.161	0.160	0.159	NM/LB	0.160	0.159	0.158	0.157	0.157	
31,000	74.3	75.9	77.5	79.0	80.6	%N1	74.8	76.4	77.9	79.5	81.1	39,000
	0.69	0.69	0.69	0.69	0.69	MIND	0.69	0.69	0.69	0.69	0.69	
	410.4	419.2	427.9	436.3	444.6	KTAS	410.4	419.2	427.9	436.3	444.6	
	327.0	327.0	327.0	327.0	327.0	KCAS	327.0	327.0	327.0	327.0	327.0	
	2535	2600	2667	2706	2794	LB/HR	2579	2645	2713	2784	2844	
	0.162	0.161	0.160	0.159	0.159	NM/LB	0.159	0.158	0.158	0.157	0.156	
32,000	74.4	75.9	77.5	79.0	80.6	%N1						
	0.69	0.69	0.69	0.69	0.69	MIND						
	410.4	419.2	427.9	436.3	444.6	KTAS						
	327.0	327.0	327.0	327.0	327.0	KCAS						
	2538	2603	2670	2709	2798	LB/HR						
	0.162	0.161	0.160	0.159	0.159	NM/LB						

21,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-46.6	-36.6	-26.6	-16.6	-6.6	OAT (°C)	-46.6	-36.6	-26.6	-16.6	-6.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	76.5	78.1	79.7	81.3	83.1	%N1	76.8	78.5	80.1	81.7	83.4	33,000
	0.75	0.75	0.75	0.75	0.75	MIND	0.75	0.75	0.75	0.75	0.75	
	438.1	447.7	457.1	466.2	475.2	KTAS	438.1	447.7	457.1	466.2	475.2	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2681	2751	2824	2865	2962	LB/HR	2715	2786	2860	2937	3001	
	0.163	0.163	0.162	0.161	0.160	NM/LB	0.161	0.161	0.160	0.159	0.158	
26,000	76.5	78.1	79.8	81.4	83.1	%N1	76.8	78.5	80.1	81.7	83.5	34,000
	0.75	0.75	0.75	0.75	0.75	MIND	0.75	0.75	0.75	0.75	0.75	
	438.1	447.7	457.1	466.2	475.2	KTAS	438.1	447.7	457.1	466.2	475.2	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2682	2753	2826	2867	2964	LB/HR	2720	2792	2866	2943	3007	
	0.163	0.163	0.162	0.161	0.160	NM/LB	0.161	0.160	0.159	0.158	0.158	
27,000	76.5	78.2	79.8	81.4	83.1	%N1	76.9	78.6	80.2	81.8	83.5	35,000
	0.75	0.75	0.75	0.75	0.75	MIND	0.75	0.75	0.75	0.75	0.75	
	438.1	447.7	457.1	466.2	475.2	KTAS	438.1	447.7	457.1	466.2	475.2	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2684	2754	2828	2868	2965	LB/HR	2725	2797	2872	2948	3013	
	0.163	0.163	0.162	0.161	0.160	NM/LB	0.161	0.160	0.159	0.158	0.158	
28,000	76.5	78.2	79.8	81.4	83.2	%N1	76.9	78.6	80.2	81.8	83.6	36,000
	0.75	0.75	0.75	0.75	0.75	MIND	0.75	0.75	0.75	0.75	0.75	
	438.1	447.7	457.1	466.2	475.2	KTAS	438.1	447.7	457.1	466.2	475.2	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2689	2759	2833	2873	2971	LB/HR	2731	2802	2877	2954	3019	
	0.163	0.162	0.161	0.160	0.160	NM/LB	0.160	0.160	0.159	0.158	0.157	
29,000	76.6	78.2	79.9	81.5	83.2	%N1	77.0	78.7	80.3	81.9	83.6	37,000
	0.75	0.75	0.75	0.75	0.75	MIND	0.75	0.75	0.75	0.75	0.75	
	438.1	447.7	457.1	466.2	475.2	KTAS	438.1	447.7	457.1	466.2	475.2	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2694	2765	2838	2879	2977	LB/HR	2739	2811	2886	2963	3028	
	0.163	0.162	0.161	0.160	0.160	NM/LB	0.160	0.159	0.158	0.157	0.157	
30,000	76.6	78.3	79.9	81.5	83.3	%N1	77.1	78.8	80.4	82.0	83.7	38,000
	0.75	0.75	0.75	0.75	0.75	MIND	0.75	0.75	0.75	0.75	0.75	
	438.1	447.7	457.1	466.2	475.2	KTAS	438.1	447.7	457.1	466.2	475.2	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2699	2770	2844	2884	2983	LB/HR	2748	2820	2896	2973	3038	
	0.162	0.162	0.161	0.160	0.159	NM/LB	0.159	0.159	0.158	0.157	0.156	
31,000	76.7	78.3	80.0	81.6	83.3	%N1	77.2	78.9	80.5	82.1	83.8	39,000
	0.75	0.75	0.75	0.75	0.75	MIND	0.75	0.75	0.75	0.75	0.75	
	438.1	447.7	457.1	466.2	475.2	KTAS	438.1	447.7	457.1	466.2	475.2	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2704	2775	2849	2890	2989	LB/HR	2757	2830	2905	2983	3049	
	0.162	0.161	0.160	0.159	0.159	NM/LB	0.159	0.158	0.157	0.156	0.156	
32,000	76.7	78.4	80.0	81.6	83.4	%N1						
	0.75	0.75	0.75	0.75	0.75	MIND						
	438.1	447.7	457.1	466.2	475.2	KTAS						
	340.0	340.0	340.0	340.0	340.0	KCAS						
	2710	2781	2855	2896	2995	LB/HR						
	0.162	0.161	0.160	0.159	0.159	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

23,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-50.6	-40.6	-30.6	-20.6	-10.6	OAT (°C)	-50.6	-40.6	-30.6	-20.6	-10.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.9	79.6	81.3	82.9	84.6	%N1	78.3	80.0	81.7	83.4	85.0	33,000
	0.78	0.78	0.78	0.78	0.78	MIND	0.78	0.78	0.78	0.78	0.78	
	450.8	460.8	470.6	480.2	489.6	KTAS	450.8	460.8	470.6	480.2	489.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2700	2773	2849	2890	2994	LB/HR	2741	2816	2892	2970	3040	
	0.167	0.166	0.165	0.164	0.164	NM/LB	0.164	0.164	0.163	0.162	0.161	
26,000	77.9	79.6	81.3	82.9	84.6	%N1	78.3	80.1	81.8	83.4	85.1	34,000
	0.78	0.78	0.78	0.78	0.78	MIND	0.78	0.78	0.78	0.78	0.78	
	450.8	460.8	470.6	480.2	489.6	KTAS	450.8	460.8	470.6	480.2	489.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2703	2776	2851	2893	2997	LB/HR	2747	2822	2899	2977	3047	
	0.167	0.166	0.165	0.164	0.163	NM/LB	0.164	0.163	0.162	0.161	0.161	
27,000	77.9	79.7	81.3	83.0	84.6	%N1	78.4	80.1	81.8	83.5	85.1	35,000
	0.78	0.78	0.78	0.78	0.78	MIND	0.78	0.78	0.78	0.78	0.78	
	450.8	460.8	470.6	480.2	489.6	KTAS	450.8	460.8	470.6	480.2	489.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2706	2779	2855	2896	3000	LB/HR	2753	2828	2905	2983	3054	
	0.167	0.166	0.165	0.164	0.163	NM/LB	0.164	0.163	0.162	0.161	0.160	
28,000	78.0	79.7	81.4	83.0	84.7	%N1	78.5	80.2	81.9	83.5	85.2	36,000
	0.78	0.78	0.78	0.78	0.78	MIND	0.78	0.78	0.78	0.78	0.78	
	450.8	460.8	470.6	480.2	489.6	KTAS	450.8	460.8	470.6	480.2	489.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2712	2785	2861	2902	3007	LB/HR	2759	2834	2912	2990	3061	
	0.166	0.165	0.164	0.163	0.163	NM/LB	0.163	0.163	0.162	0.161	0.160	
29,000	78.0	79.8	81.5	83.1	84.8	%N1	78.6	80.3	82.0	83.6	85.3	37,000
	0.78	0.78	0.78	0.78	0.78	MIND	0.78	0.78	0.78	0.78	0.78	
	450.8	460.8	470.6	480.2	489.6	KTAS	450.8	460.8	470.6	480.2	489.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2718	2791	2867	2909	3014	LB/HR	2768	2843	2921	3000	3071	
	0.166	0.165	0.164	0.163	0.162	NM/LB	0.163	0.162	0.161	0.160	0.159	
30,000	78.1	79.8	81.5	83.2	84.8	%N1	78.6	80.4	82.1	83.7	85.4	38,000
	0.78	0.78	0.78	0.78	0.78	MIND	0.78	0.78	0.78	0.78	0.78	
	450.8	460.8	470.6	480.2	489.6	KTAS	450.8	460.8	470.6	480.2	489.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2723	2797	2874	2915	3020	LB/HR	2777	2852	2930	3009	3081	
	0.166	0.165	0.164	0.163	0.162	NM/LB	0.162	0.162	0.161	0.160	0.159	
31,000	78.2	79.9	81.6	83.2	84.9	%N1	78.7	80.5	82.1	83.8	85.4	39,000
	0.78	0.78	0.78	0.78	0.78	MIND	0.78	0.78	0.78	0.78	0.78	
	450.8	460.8	470.6	480.2	489.6	KTAS	450.8	460.8	470.6	480.2	489.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2729	2803	2880	2921	3027	LB/HR	2786	2862	2940	3019	3091	
	0.165	0.164	0.163	0.162	0.162	NM/LB	0.162	0.161	0.160	0.159	0.158	
32,000	78.2	80.0	81.6	83.3	84.9	%N1						
	0.78	0.78	0.78	0.78	0.78	MIND						
	450.8	460.8	470.6	480.2	489.6	KTAS						
	340.0	340.0	340.0	340.0	340.0	KCAS						
	2735	2810	2886	2928	3034	LB/HR						
	0.165	0.164	0.163	0.162	0.161	NM/LB						

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	79.3	81.0	82.8	84.5	86.1	%N1	79.7	81.5	83.2	84.9	86.6	33,000
	0.81	0.81	0.81	0.81	0.81	MIND	0.81	0.81	0.81	0.81	0.81	
	463.9	474.4	484.6	494.7	504.6	KTAS	463.9	474.4	484.6	494.7	504.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2715	2792	2870	2911	3019	LB/HR	2764	2842	2921	2999	3071	
	0.171	0.170	0.169	0.168	0.167	NM/LB	0.168	0.167	0.166	0.165	0.164	
26,000	79.3	81.1	82.8	84.5	86.2	%N1	79.7	81.5	83.3	85.0	86.7	34,000
	0.81	0.81	0.81	0.81	0.81	MIND	0.81	0.81	0.81	0.81	0.81	
	463.9	474.4	484.6	494.7	504.6	KTAS	463.9	474.4	484.6	494.7	504.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2719	2796	2873	2916	3022	LB/HR	2771	2849	2928	3007	3078	
	0.171	0.170	0.169	0.168	0.167	NM/LB	0.167	0.167	0.166	0.165	0.164	
27,000	79.3	81.1	82.8	84.5	86.2	%N1	79.8	81.6	83.3	85.0	86.8	35,000
	0.81	0.81	0.81	0.81	0.81	MIND	0.81	0.81	0.81	0.81	0.81	
	463.9	474.4	484.6	494.7	504.6	KTAS	463.9	474.4	484.6	494.7	504.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2724	2801	2879	2921	3028	LB/HR	2778	2856	2936	3014	3085	
	0.170	0.169	0.168	0.167	0.167	NM/LB	0.167	0.166	0.165	0.164	0.164	
28,000	79.4	81.2	82.9	84.6	86.3	%N1	79.9	81.6	83.4	85.1	86.8	36,000
	0.81	0.81	0.81	0.81	0.81	MIND	0.81	0.81	0.81	0.81	0.81	
	463.9	474.4	484.6	494.7	504.6	KTAS	463.9	474.4	484.6	494.7	504.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2731	2808	2886	2928	3035	LB/HR	2787	2865	2945	3023	3095	
	0.170	0.169	0.168	0.167	0.166	NM/LB	0.166	0.166	0.165	0.164	0.163	
29,000	79.4	81.2	83.0	84.7	86.4	%N1	79.9	81.7	83.5	85.2	86.9	37,000
	0.81	0.81	0.81	0.81	0.81	MIND	0.81	0.81	0.81	0.81	0.81	
	463.9	474.4	484.6	494.7	504.6	KTAS	463.9	474.4	484.6	494.7	504.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2737	2815	2893	2935	3042	LB/HR	2797	2875	2955	3034	3105	
	0.169	0.169	0.168	0.167	0.166	NM/LB	0.166	0.165	0.164	0.163	0.163	
30,000	79.5	81.3	83.0	84.7	86.4	%N1	80.0	81.8	83.6	85.3	87.0	38,000
	0.81	0.81	0.81	0.81	0.81	MIND	0.81	0.81	0.81	0.81	0.81	
	463.9	474.4	484.6	494.7	504.6	KTAS	463.9	474.4	484.6	494.7	504.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2744	2821	2900	2942	3049	LB/HR	2807	2886	2966	3045	3116	
	0.169	0.168	0.167	0.166	0.165	NM/LB	0.165	0.164	0.163	0.162	0.162	
31,000	79.6	81.3	83.1	84.8	86.5	%N1	80.1	81.9	83.7	85.4	87.1	39,000
	0.81	0.81	0.81	0.81	0.81	MIND	0.81	0.81	0.81	0.81	0.81	
	463.9	474.4	484.6	494.7	504.6	KTAS	463.9	474.4	484.6	494.7	504.6	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2751	2828	2907	2949	3056	LB/HR	2817	2896	2977	3056	3127	
	0.169	0.168	0.167	0.166	0.165	NM/LB	0.165	0.164	0.163	0.162	0.161	
32,000	79.6	81.4	83.1	84.8	86.6	%N1						
	0.81	0.81	0.81	0.81	0.81	MIND						
	463.9	474.4	484.6	494.7	504.6	KTAS						
	340.0	340.0	340.0	340.0	340.0	KCAS						
	2758	2835	2914	2956	3064	LB/HR						
	0.168	0.167	0.166	0.165	0.165	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

27,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-58.5	-48.5	-38.5	-28.5	-18.5	OAT (°C)	-58.5	-48.5	-38.5	-28.5	-18.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	81.7	83.6	85.4	87.1	88.9	%N1	82.3	84.2	86.0	87.8	89.6	33,000
	0.84	0.84	0.84	0.84	0.84	MIND	0.84	0.84	0.84	0.84	0.84	
	477.4	488.4	499.2	509.7	520.0	KTAS	477.4	488.4	499.2	509.7	520.0	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2879	2959	3044	3088	3204	LB/HR	2949	3031	3118	3202	3281	
	0.166	0.165	0.164	0.163	0.162	NM/LB	0.162	0.161	0.160	0.159	0.158	
26,000	81.8	83.6	85.4	87.2	89.0	%N1	82.4	84.3	86.1	87.9	89.7	34,000
	0.84	0.84	0.84	0.84	0.84	MIND	0.84	0.84	0.84	0.84	0.84	
	477.4	488.4	499.2	509.7	520.0	KTAS	477.4	488.4	499.2	509.7	520.0	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2885	2965	3050	3094	3210	LB/HR	2958	3040	3128	3212	3292	
	0.165	0.165	0.164	0.163	0.162	NM/LB	0.161	0.161	0.160	0.159	0.158	
27,000	81.8	83.7	85.5	87.3	89.1	%N1	82.5	84.4	86.2	88.0	89.8	35,000
	0.84	0.84	0.84	0.84	0.84	MIND	0.84	0.84	0.84	0.84	0.84	
	477.4	488.4	499.2	509.7	520.0	KTAS	477.4	488.4	499.2	509.7	520.0	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2893	2973	3059	3103	3219	LB/HR	2968	3050	3138	3222	3302	
	0.165	0.164	0.163	0.162	0.162	NM/LB	0.161	0.160	0.159	0.158	0.157	
28,000	81.9	83.8	85.6	87.4	89.1	%N1	82.6	84.5	86.3	88.1	89.9	36,000
	0.84	0.84	0.84	0.84	0.84	MIND	0.84	0.84	0.84	0.84	0.84	
	477.4	488.4	499.2	509.7	520.0	KTAS	477.4	488.4	499.2	509.7	520.0	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	340.0	
	2902	2983	3068	3113	3230	LB/HR	2981	3063	3151	3236	3317	
	0.165	0.164	0.163	0.162	0.161	NM/LB	0.160	0.159	0.158	0.158	0.157	
29,000	82.0	83.9	85.7	87.4	89.2	%N1	82.7	84.6	86.4	88.2	90.0	37,000
	0.84	0.84	0.84	0.84	0.84	MIND	0.84	0.84	0.84	0.84	0.84	
	477.4	488.4	499.2	509.7	520.0	KTAS	477.4	488.4	499.2	509.7	519.8	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	339.9	
	2912	2992	3078	3122	3240	LB/HR	2994	3077	3165	3251	3325	
	0.164	0.163	0.162	0.161	0.160	NM/LB	0.159	0.159	0.158	0.157	0.156	
30,000	82.1	83.9	85.8	87.5	89.3	%N1	82.8	84.7	86.5	88.3	90.0	38,000
	0.84	0.84	0.84	0.84	0.84	MIND	0.84	0.84	0.84	0.84	0.84	
	477.4	488.4	499.2	509.7	520.0	KTAS	477.4	488.4	499.2	509.7	519.3	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	339.5	
	2921	3002	3088	3133	3250	LB/HR	3007	3091	3180	3265	3324	
	0.163	0.163	0.162	0.161	0.160	NM/LB	0.159	0.158	0.157	0.156	0.156	
31,000	82.2	84.0	85.8	87.6	89.4	%N1	82.9	84.8	86.6	88.4	90.0	39,000
	0.84	0.84	0.84	0.84	0.84	MIND	0.84	0.84	0.84	0.84	0.83	
	477.4	488.4	499.2	509.7	520.0	KTAS	477.4	488.4	499.2	509.7	518.8	
	340.0	340.0	340.0	340.0	340.0	KCAS	340.0	340.0	340.0	340.0	339.1	
	2930	3012	3098	3143	3261	LB/HR	3021	3105	3194	3280	3323	
	0.163	0.162	0.161	0.160	0.159	NM/LB	0.158	0.157	0.156	0.155	0.156	
32,000	82.2	84.1	85.9	87.7	89.5	%N1						
	0.84	0.84	0.84	0.84	0.84	MIND						
	477.4	488.4	499.2	509.7	520.0	KTAS						
	340.0	340.0	340.0	340.0	340.0	KCAS						
	2940	3021	3108	3153	3271	LB/HR						
	0.162	0.162	0.161	0.160	0.159	NM/LB						

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	82.8	84.8	86.6	88.4	89.9	%N1	83.6	85.6	87.4	89.3	90.0	33,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	480.8	492.1	503.1	513.9	523.1	KTAS	480.8	492.1	503.1	513.9	519.5	
	331.9	331.9	331.9	331.9	331.0	KCAS	331.9	331.9	331.9	331.9	328.5	
	2837	2916	3001	3045	3128	LB/HR	2928	3011	3098	3185	3119	
	0.169	0.169	0.168	0.167	0.167	NM/LB	0.164	0.163	0.162	0.161	0.167	
26,000	82.9	84.9	86.7	88.5	90.0	%N1	83.8	85.7	87.6	89.4	90.0	34,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	480.8	492.1	503.1	513.9	522.6	KTAS	480.8	492.1	503.1	513.9	518.9	
	331.9	331.9	331.9	331.9	330.6	KCAS	331.9	331.9	331.9	331.9	328.1	
	2848	2928	3014	3058	3127	LB/HR	2942	3026	3113	3200	3118	
	0.169	0.168	0.167	0.166	0.167	NM/LB	0.163	0.163	0.162	0.161	0.166	
27,000	83.0	85.0	86.8	88.6	90.0	%N1	83.9	85.8	87.7	89.5	90.0	35,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	480.8	492.1	503.1	513.9	522.2	KTAS	480.8	492.1	503.1	513.9	518.4	
	331.9	331.9	331.9	331.9	330.3	KCAS	331.9	331.9	331.9	331.9	327.7	
	2859	2940	3026	3070	3126	LB/HR	2956	3041	3129	3216	3117	
	0.168	0.167	0.166	0.165	0.167	NM/LB	0.163	0.162	0.161	0.160	0.166	
28,000	83.1	85.1	86.9	88.8	90.0	%N1	84.0	85.9	87.8	89.7	90.0	36,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	480.8	492.1	503.1	513.9	521.7	KTAS	480.8	492.1	503.1	513.9	517.8	
	331.9	331.9	331.9	331.9	330.0	KCAS	331.9	331.9	331.9	331.9	327.3	
	2871	2952	3038	3083	3125	LB/HR	2971	3056	3144	3232	3116	
	0.167	0.167	0.166	0.165	0.167	NM/LB	0.162	0.161	0.160	0.159	0.166	
29,000	83.2	85.2	87.0	88.9	90.0	%N1	84.1	86.1	88.0	89.8	90.0	37,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	480.8	492.1	503.1	513.9	521.3	KTAS	480.8	492.1	503.1	513.9	517.3	
	331.9	331.9	331.9	331.9	329.7	KCAS	331.9	331.9	331.9	331.9	326.9	
	2882	2964	3050	3095	3124	LB/HR	2985	3071	3160	3248	3114	
	0.167	0.166	0.165	0.164	0.167	NM/LB	0.161	0.160	0.159	0.158	0.166	
30,000	83.3	85.3	87.1	89.0	90.0	%N1	84.3	86.2	88.1	89.9	90.0	38,000
	0.85	0.85	0.85	0.85	0.84	MIND	0.85	0.85	0.85	0.85	0.84	
	480.8	492.1	503.1	513.9	520.8	KTAS	480.8	492.1	503.1	513.9	516.7	
	331.9	331.9	331.9	331.9	329.4	KCAS	331.9	331.9	331.9	331.9	326.5	
	2893	2976	3062	3108	3123	LB/HR	3000	3086	3175	3264	3113	
	0.166	0.165	0.164	0.163	0.167	NM/LB	0.160	0.159	0.158	0.157	0.166	
31,000	83.4	85.4	87.2	89.1	90.0	%N1	84.4	86.3	88.2	90.1	90.0	39,000
	0.85	0.85	0.85	0.85	0.84	MIND	0.85	0.85	0.85	0.85	0.84	
	480.8	492.1	503.1	513.9	520.4	KTAS	480.8	492.1	503.1	513.9	516.2	
	331.9	331.9	331.9	331.9	329.1	KCAS	331.9	331.9	331.9	331.9	326.2	
	2905	2987	3074	3119	3122	LB/HR	3015	3102	3190	3280	3112	
	0.166	0.165	0.164	0.163	0.167	NM/LB	0.159	0.159	0.158	0.157	0.166	
32,000	83.5	85.5	87.3	89.2	90.0	%N1						
	0.85	0.85	0.85	0.85	0.84	MIND						
	480.8	492.1	503.1	513.9	520.0	KTAS						
	331.9	331.9	331.9	331.9	328.8	KCAS						
	2916	2999	3086	3132	3121	LB/HR						
	0.165	0.164	0.163	0.162	0.167	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	82.3	84.3	86.1	88.0	89.8	%N1	83.3	85.2	87.1	89.0	90.1	33,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.85	
	476.2	487.6	498.7	509.6	520.3	KTAS	476.2	487.6	498.7	509.6	517.1	
	318.0	318.0	318.0	318.0	318.0	KCAS	318.0	318.0	318.0	318.0	315.8	
	2590	2664	2743	2784	2900	LB/HR	2689	2766	2848	2929	2922	
	0.184	0.183	0.182	0.181	0.179	NM/LB	0.177	0.176	0.175	0.174	0.177	
26,000	82.4	84.4	86.3	88.1	89.9	%N1	83.4	85.4	87.3	89.1	90.1	34,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	476.2	487.6	498.7	509.6	520.3	KTAS	476.2	487.6	498.7	509.6	516.5	
	318.0	318.0	318.0	318.0	318.0	KCAS	318.0	318.0	318.0	318.0	315.4	
	2601	2676	2755	2797	2913	LB/HR	2703	2781	2863	2945	2920	
	0.183	0.182	0.181	0.180	0.179	NM/LB	0.176	0.175	0.174	0.173	0.177	
27,000	82.5	84.5	86.4	88.2	90.0	%N1	83.6	85.5	87.4	89.3	90.1	35,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	476.2	487.6	498.7	509.6	520.3	KTAS	476.2	487.6	498.7	509.6	515.9	
	318.0	318.0	318.0	318.0	318.0	KCAS	318.0	318.0	318.0	318.0	315.0	
	2612	2687	2767	2808	2925	LB/HR	2718	2796	2879	2961	2919	
	0.182	0.181	0.180	0.179	0.178	NM/LB	0.175	0.174	0.173	0.172	0.177	
28,000	82.6	84.6	86.5	88.3	90.1	%N1	83.7	85.7	87.6	89.4	90.1	36,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	476.2	487.6	498.7	509.6	519.9	KTAS	476.2	487.6	498.7	509.6	515.3	
	318.0	318.0	318.0	318.0	317.7	KCAS	318.0	318.0	318.0	318.0	314.6	
	2623	2698	2779	2820	2928	LB/HR	2732	2812	2894	2977	2918	
	0.182	0.181	0.179	0.178	0.178	NM/LB	0.174	0.173	0.172	0.171	0.177	
29,000	82.8	84.7	86.6	88.5	90.1	%N1	83.8	85.8	87.7	89.6	90.1	37,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	476.2	487.6	498.7	509.6	519.4	KTAS	476.2	487.6	498.7	509.6	514.7	
	318.0	318.0	318.0	318.0	317.4	KCAS	318.0	318.0	318.0	318.0	314.2	
	2635	2710	2790	2832	2927	LB/HR	2747	2827	2910	2993	2917	
	0.181	0.180	0.179	0.178	0.177	NM/LB	0.173	0.172	0.171	0.170	0.176	
30,000	82.9	84.8	86.7	88.6	90.1	%N1	84.0	85.9	87.9	89.7	90.1	38,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	476.2	487.6	498.7	509.6	519.0	KTAS	476.2	487.6	498.7	509.6	514.0	
	318.0	318.0	318.0	318.0	317.1	KCAS	318.0	318.0	318.0	318.0	313.7	
	2646	2722	2803	2845	2926	LB/HR	2761	2842	2925	3009	2915	
	0.180	0.179	0.178	0.177	0.177	NM/LB	0.172	0.172	0.170	0.169	0.176	
31,000	83.0	85.0	86.9	88.7	90.1	%N1	84.1	86.1	88.0	89.9	90.1	39,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	476.2	487.6	498.7	509.6	518.3	KTAS	476.2	487.6	498.7	509.6	513.2	
	318.0	318.0	318.0	318.0	316.6	KCAS	318.0	318.0	318.0	318.0	313.2	
	2660	2736	2817	2859	2925	LB/HR	2780	2861	2945	3029	2913	
	0.179	0.178	0.177	0.176	0.177	NM/LB	0.171	0.170	0.169	0.168	0.176	
32,000	83.1	85.1	87.0	88.9	90.1	%N1						
	0.85	0.85	0.85	0.85	0.85	MIND						
	476.2	487.6	498.7	509.6	517.7	KTAS						
	318.0	318.0	318.0	318.0	316.2	KCAS						
	2674	2751	2833	2875	2923	LB/HR						
	0.178	0.177	0.176	0.175	0.177	NM/LB						

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	81.8	83.8	85.7	87.5	89.4	%N1	82.9	84.9	86.9	88.8	90.3	33,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.85	
	471.7	483.1	494.4	505.3	516.1	KTAS	471.7	483.1	494.4	505.3	514.7	
	304.3	304.3	304.3	304.3	304.3	KCAS	304.3	304.3	304.3	304.3	303.4	
	2364	2434	2506	2546	2654	LB/HR	2469	2542	2618	2693	2737	
	0.200	0.198	0.197	0.196	0.194	NM/LB	0.191	0.190	0.189	0.188	0.188	
26,000	81.9	83.9	85.8	87.7	89.5	%N1	83.1	85.1	87.0	88.9	90.3	34,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.85	
	471.7	483.1	494.4	505.3	516.1	KTAS	471.7	483.1	494.4	505.3	514.0	
	304.3	304.3	304.3	304.3	304.3	KCAS	304.3	304.3	304.3	304.3	303.0	
	2375	2445	2518	2557	2667	LB/HR	2483	2556	2633	2709	2735	
	0.199	0.198	0.196	0.195	0.194	NM/LB	0.190	0.189	0.188	0.187	0.188	
27,000	82.0	84.0	85.9	87.8	89.6	%N1	83.3	85.3	87.2	89.1	90.3	35,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.85	
	471.7	483.1	494.4	505.3	516.1	KTAS	471.7	483.1	494.4	505.3	513.3	
	304.3	304.3	304.3	304.3	304.3	KCAS	304.3	304.3	304.3	304.3	302.4	
	2386	2456	2530	2569	2679	LB/HR	2499	2573	2650	2726	2734	
	0.198	0.197	0.195	0.194	0.193	NM/LB	0.189	0.188	0.187	0.185	0.188	
28,000	82.2	84.2	86.1	87.9	89.8	%N1	83.5	85.5	87.4	89.3	90.3	36,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	471.7	483.1	494.4	505.3	516.1	KTAS	471.7	483.1	494.4	505.3	512.4	
	304.3	304.3	304.3	304.3	304.3	KCAS	304.3	304.3	304.3	304.3	301.9	
	2399	2469	2543	2582	2693	LB/HR	2519	2593	2671	2748	2732	
	0.197	0.196	0.194	0.193	0.192	NM/LB	0.187	0.186	0.185	0.184	0.188	
29,000	82.3	84.3	86.2	88.1	89.9	%N1	83.7	85.7	87.6	89.5	90.3	37,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	471.7	483.1	494.4	505.3	516.1	KTAS	471.7	483.1	494.4	505.3	511.5	
	304.3	304.3	304.3	304.3	304.3	KCAS	304.3	304.3	304.3	304.3	301.3	
	2413	2484	2558	2598	2709	LB/HR	2539	2614	2692	2770	2730	
	0.195	0.194	0.193	0.192	0.191	NM/LB	0.186	0.185	0.184	0.182	0.187	
30,000	82.5	84.5	86.4	88.3	90.1	%N1	83.9	85.9	87.8	89.7	90.3	38,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	471.7	483.1	494.4	505.3	516.1	KTAS	471.7	483.1	494.4	505.3	510.7	
	304.3	304.3	304.3	304.3	304.3	KCAS	304.3	304.3	304.3	304.3	300.7	
	2427	2498	2573	2613	2725	LB/HR	2559	2635	2713	2792	2728	
	0.194	0.193	0.192	0.191	0.189	NM/LB	0.184	0.183	0.182	0.181	0.187	
31,000	82.6	84.6	86.6	88.4	90.3	%N1	84.1	86.1	88.1	90.0	90.3	39,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	471.7	483.1	494.4	505.3	516.1	KTAS	471.7	483.1	494.4	505.3	509.8	
	304.3	304.3	304.3	304.3	304.3	KCAS	304.3	304.3	304.3	304.3	300.2	
	2441	2513	2588	2628	2741	LB/HR	2579	2656	2735	2814	2727	
	0.193	0.192	0.191	0.190	0.188	NM/LB	0.183	0.182	0.181	0.180	0.187	
32,000	82.8	84.8	86.7	88.6	90.3	%N1						
	0.85	0.85	0.85	0.85	0.85	MIND						
	471.7	483.1	494.4	505.3	515.4	KTAS						
	304.3	304.3	304.3	304.3	303.8	KCAS						
	2455	2527	2603	2643	2738	LB/HR						
	0.192	0.191	0.190	0.189	0.188	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)		-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	GROSS WEIGHT AT ALTITUDE (LB)
		-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
		81.3	83.3	85.3	87.2	89.0	%N1	82.7	84.8	86.7	88.7	90.5	
		0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.85	
	25,000	467.0	478.6	490.0	501.0	511.9	KTAS	467.0	478.6	490.0	501.0	511.2	33,000
		290.9	290.9	290.9	290.9	290.9	KCAS	290.9	290.9	290.9	290.9	290.5	
		2152	2218	2284	2322	2423	LB/HR	2271	2340	2411	2482	2549	
		0.217	0.216	0.215	0.213	0.211	NM/LB	0.206	0.205	0.203	0.202	0.201	
		81.5	83.5	85.5	87.3	89.2	%N1	83.0	85.0	87.0	88.9	90.5	
		0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.85	
	26,000	467.0	478.6	490.0	501.0	511.9	KTAS	467.0	478.6	490.0	501.0	510.5	34,000
		290.9	290.9	290.9	290.9	290.9	KCAS	290.9	290.9	290.9	290.9	290.1	
		2166	2232	2299	2336	2439	LB/HR	2290	2359	2431	2502	2548	
		0.216	0.214	0.213	0.212	0.210	NM/LB	0.204	0.203	0.202	0.200	0.200	
		81.7	83.7	85.6	87.5	89.4	%N1	83.2	85.2	87.2	89.1	90.5	
		0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.85	
	27,000	467.0	478.6	490.0	501.0	511.9	KTAS	467.0	478.6	490.0	501.0	509.6	35,000
		290.9	290.9	290.9	290.9	290.9	KCAS	290.9	290.9	290.9	290.9	289.5	
		2180	2246	2314	2351	2454	LB/HR	2309	2379	2451	2524	2546	
		0.214	0.213	0.212	0.210	0.209	NM/LB	0.202	0.201	0.200	0.198	0.200	
		81.8	83.8	85.8	87.7	89.6	%N1	83.4	85.4	87.4	89.4	90.5	
		0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.85	
	28,000	467.0	478.6	490.0	501.0	511.9	KTAS	467.0	478.6	490.0	501.0	508.6	36,000
		290.9	290.9	290.9	290.9	290.9	KCAS	290.9	290.9	290.9	290.9	288.9	
		2194	2261	2329	2367	2470	LB/HR	2328	2400	2473	2546	2544	
		0.213	0.212	0.210	0.209	0.207	NM/LB	0.201	0.199	0.198	0.197	0.200	
		82.0	84.0	86.0	87.9	89.7	%N1	83.6	85.7	87.7	89.6	90.5	
		0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	29,000	467.0	478.6	490.0	501.0	511.9	KTAS	467.0	478.6	490.0	501.0	507.7	37,000
		290.9	290.9	290.9	290.9	290.9	KCAS	290.9	290.9	290.9	290.9	288.3	
		2208	2275	2344	2381	2486	LB/HR	2348	2420	2494	2568	2542	
		0.212	0.210	0.209	0.208	0.206	NM/LB	0.199	0.198	0.196	0.195	0.200	
		82.2	84.2	86.1	88.0	89.9	%N1	83.9	86.0	88.0	89.9	90.5	
		0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	30,000	467.0	478.6	490.0	501.0	511.9	KTAS	467.0	478.6	490.0	501.0	506.2	38,000
		290.9	290.9	290.9	290.9	290.9	KCAS	290.9	290.9	290.9	290.9	287.3	
		2222	2290	2359	2397	2502	LB/HR	2375	2448	2522	2597	2539	
		0.210	0.209	0.208	0.206	0.205	NM/LB	0.197	0.196	0.194	0.193	0.199	
		82.3	84.3	86.3	88.2	90.1	%N1	84.3	86.4	88.4	90.3	90.5	
		0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	31,000	467.0	478.6	490.0	501.0	511.9	KTAS	467.0	478.6	490.0	501.0	504.8	39,000
		290.9	290.9	290.9	290.9	290.9	KCAS	290.9	290.9	290.9	290.9	286.4	
		2236	2304	2374	2412	2518	LB/HR	2410	2484	2559	2635	2537	
		0.209	0.208	0.206	0.205	0.203	NM/LB	0.194	0.193	0.191	0.190	0.199	
		82.5	84.5	86.5	88.4	90.3	%N1						
		0.85	0.85	0.85	0.85	0.85	MIND						
	32,000	467.0	478.6	490.0	501.0	511.9	KTAS						
		290.9	290.9	290.9	290.9	290.9	KCAS						
		2252	2320	2390	2429	2536	LB/HR						
		0.207	0.206	0.205	0.204	0.202	NM/LB						

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	81.3	83.3	85.2	87.1	88.9	%N1	82.9	85.0	87.0	88.9	90.1	33,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.85	
	464.5	476.2	487.5	498.7	509.5	KTAS	464.5	476.2	487.5	498.7	506.9	
	277.9	277.9	277.9	277.9	277.9	KCAS	277.9	277.9	277.9	277.9	276.3	
	1993	2055	2117	2152	2247	LB/HR	2126	2192	2259	2327	2339	
	0.233	0.232	0.230	0.229	0.227	NM/LB	0.218	0.217	0.216	0.214	0.217	
26,000	81.4	83.4	85.4	87.2	89.1	%N1	83.2	85.2	87.2	89.1	90.1	34,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	464.5	476.2	487.5	498.7	509.5	KTAS	464.5	476.2	487.5	498.7	505.6	
	277.9	277.9	277.9	277.9	277.9	KCAS	277.9	277.9	277.9	277.9	275.5	
	2007	2069	2132	2167	2263	LB/HR	2145	2212	2280	2349	2337	
	0.231	0.230	0.229	0.227	0.225	NM/LB	0.217	0.215	0.214	0.212	0.216	
27,000	81.6	83.6	85.6	87.4	89.3	%N1	83.6	85.6	87.6	89.5	90.1	35,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	464.5	476.2	487.5	498.7	509.5	KTAS	464.5	476.2	487.5	498.7	504.0	
	277.9	277.9	277.9	277.9	277.9	KCAS	277.9	277.9	277.9	277.9	274.5	
	2021	2084	2147	2182	2279	LB/HR	2176	2245	2314	2385	2335	
	0.230	0.229	0.227	0.226	0.224	NM/LB	0.213	0.212	0.211	0.209	0.216	
28,000	81.8	83.8	85.8	87.6	89.5	%N1	84.0	86.1	88.1	90.0	90.1	36,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	464.5	476.2	487.5	498.7	509.5	KTAS	464.5	476.2	487.5	498.7	502.5	
	277.9	277.9	277.9	277.9	277.9	KCAS	277.9	277.9	277.9	277.9	273.6	
	2035	2098	2162	2197	2295	LB/HR	2212	2282	2352	2423	2332	
	0.228	0.227	0.225	0.224	0.222	NM/LB	0.210	0.209	0.207	0.206	0.215	
29,000	82.0	84.0	86.0	87.8	89.7	%N1	84.5	86.6	88.6	90.4	90.2	37,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	464.5	476.2	487.5	498.7	509.5	KTAS	464.5	476.2	487.5	498.7	501.2	
	277.9	277.9	277.9	277.9	277.9	KCAS	277.9	277.9	277.9	277.9	272.8	
	2050	2114	2178	2214	2312	LB/HR	2249	2319	2390	2462	2330	
	0.227	0.225	0.224	0.222	0.220	NM/LB	0.207	0.205	0.204	0.203	0.215	
30,000	82.2	84.2	86.2	88.1	90.0	%N1	85.0	87.0	89.0	90.9	90.2	38,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.83	
	464.5	476.2	487.5	498.7	509.5	KTAS	464.5	476.2	487.5	498.7	500.0	
	277.9	277.9	277.9	277.9	277.9	KCAS	277.9	277.9	277.9	277.9	272.1	
	2069	2133	2198	2234	2334	LB/HR	2285	2356	2429	2500	2328	
	0.225	0.223	0.222	0.220	0.218	NM/LB	0.203	0.202	0.201	0.199	0.215	
31,000	82.5	84.5	86.5	88.3	90.3	%N1	85.4	87.5	89.5	91.3	90.2	39,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.83	
	464.5	476.2	487.5	498.7	508.9	KTAS	464.5	476.2	487.5	498.7	498.4	
	277.9	277.9	277.9	277.9	277.5	KCAS	277.9	277.9	277.9	277.9	271.1	
	2088	2153	2219	2255	2343	LB/HR	2321	2393	2467	2538	2325	
	0.222	0.221	0.220	0.218	0.217	NM/LB	0.200	0.199	0.198	0.196	0.214	
32,000	82.7	84.7	86.7	88.6	90.1	%N1						
	0.85	0.85	0.85	0.85	0.85	MIND						
	464.5	476.2	487.5	498.7	507.9	KTAS						
	277.9	277.9	277.9	277.9	276.9	KCAS						
	2107	2173	2239	2276	2341	LB/HR						
	0.220	0.219	0.218	0.216	0.217	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

39,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	81.3	83.3	85.3	87.2	89.0	%N1	83.7	85.7	87.7	89.7	89.8	33,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	464.5	476.2	487.5	498.7	509.5	KTAS	464.5	476.2	487.5	498.7	502.1	
	265.4	265.4	265.4	265.4	265.4	KCAS	265.4	265.4	265.4	265.4	261.0	
	1847	1906	1965	1996	2087	LB/HR	2022	2087	2152	2221	2127	
	0.251	0.250	0.248	0.246	0.244	NM/LB	0.230	0.228	0.227	0.225	0.236	
26,000	81.5	83.5	85.5	87.4	89.2	%N1	84.2	86.3	88.3	90.2	89.8	34,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.84	
	464.5	476.2	487.5	498.7	509.5	KTAS	464.5	476.2	487.5	498.7	500.7	
	265.4	265.4	265.4	265.4	265.4	KCAS	265.4	265.4	265.4	265.4	260.2	
	1861	1920	1980	2011	2103	LB/HR	2058	2125	2191	2259	2125	
	0.250	0.248	0.246	0.244	0.242	NM/LB	0.226	0.224	0.223	0.221	0.236	
27,000	81.7	83.8	85.7	87.6	89.5	%N1	84.8	86.8	88.8	90.7	89.8	35,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.83	
	464.5	476.2	487.5	498.7	509.5	KTAS	464.5	476.2	487.5	498.7	499.2	
	265.4	265.4	265.4	265.4	265.4	KCAS	265.4	265.4	265.4	265.4	259.3	
	1879	1939	2000	2031	2124	LB/HR	2095	2163	2230	2297	2123	
	0.247	0.246	0.244	0.242	0.240	NM/LB	0.222	0.220	0.219	0.217	0.235	
28,000	82.0	84.0	86.0	87.9	89.7	%N1	85.3	87.4	89.4	91.2	89.8	36,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.83	
	464.5	476.2	487.5	498.7	508.9	KTAS	464.5	476.2	487.5	498.7	497.4	
	265.4	265.4	265.4	265.4	265.0	KCAS	265.4	265.4	265.4	265.4	258.2	
	1898	1959	2020	2052	2136	LB/HR	2132	2201	2270	2335	2121	
	0.245	0.243	0.241	0.240	0.238	NM/LB	0.218	0.216	0.215	0.214	0.235	
29,000	82.3	84.3	86.3	88.2	89.7	%N1	86.2	88.3	90.3	92.1	89.8	37,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.83	
	464.5	476.2	487.5	498.7	507.9	KTAS	464.5	476.2	487.5	498.1	495.9	
	265.4	265.4	265.4	265.4	264.4	KCAS	265.4	265.4	265.4	265.0	257.4	
	1917	1979	2040	2073	2135	LB/HR	2193	2263	2334	2388	2119	
	0.242	0.241	0.239	0.237	0.238	NM/LB	0.212	0.210	0.209	0.209	0.234	
30,000	82.5	84.6	86.5	88.5	89.7	%N1	87.2	89.3	91.3	92.0	89.8	38,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.83	
	464.5	476.2	487.5	498.7	506.8	KTAS	464.5	476.2	487.5	495.5	494.7	
	265.4	265.4	265.4	265.4	263.7	KCAS	265.4	265.4	265.4	263.5	256.7	
	1936	1998	2061	2092	2133	LB/HR	2259	2331	2405	2386	2117	
	0.240	0.238	0.237	0.235	0.238	NM/LB	0.206	0.204	0.203	0.208	0.234	
31,000	82.8	84.8	86.8	88.8	89.7	%N1	87.6	89.7	91.7	92.0	89.8	39,000
	0.85	0.85	0.85	0.85	0.84	MIND	0.85	0.85	0.85	0.84	0.82	
	464.5	476.2	487.5	498.7	505.4	KTAS	462.4	474.0	485.3	493.4	493.5	
	265.4	265.4	265.4	265.4	262.9	KCAS	264.0	264.0	264.0	262.2	256.0	
	1956	2018	2081	2113	2131	LB/HR	2275	2346	2421	2384	2116	
	0.237	0.236	0.234	0.232	0.237	NM/LB	0.203	0.202	0.200	0.207	0.233	
32,000	83.2	85.3	87.3	89.3	89.7	%N1						
	0.85	0.85	0.85	0.85	0.84	MIND						
	464.5	476.2	487.5	498.7	503.6	KTAS						
	265.4	265.4	265.4	265.4	261.9	KCAS						
	1989	2053	2116	2150	2129	LB/HR						
	0.234	0.232	0.230	0.228	0.237	NM/LB						

41,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	81.7	83.7	85.7	87.7	89.3	%N1	85.3	87.4	89.4	91.3	89.4	33,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.83	
	464.5	476.2	487.5	498.7	508.2	KTAS	464.5	476.2	487.5	498.7	495.9	
	253.4	253.4	253.4	253.4	252.6	KCAS	253.4	253.4	253.4	253.4	245.7	
	1725	1780	1836	1864	1928	LB/HR	1959	2021	2086	2149	1914	
	0.269	0.268	0.266	0.264	0.264	NM/LB	0.237	0.236	0.234	0.232	0.259	
26,000	82.0	84.0	86.0	88.0	89.3	%N1	86.4	88.5	90.5	91.4	89.4	34,000
	0.85	0.85	0.85	0.85	0.85	MIND	0.85	0.85	0.85	0.85	0.83	
	464.5	476.2	487.5	498.7	507.0	KTAS	464.5	476.2	487.5	495.6	494.5	
	253.4	253.4	253.4	253.4	251.9	KCAS	253.4	253.4	253.4	251.6	244.9	
	1744	1800	1856	1885	1927	LB/HR	2026	2090	2157	2149	1913	
	0.266	0.265	0.263	0.261	0.263	NM/LB	0.229	0.228	0.226	0.231	0.258	
27,000	82.3	84.3	86.3	88.3	89.3	%N1	87.3	89.4	91.4	91.4	89.4	35,000
	0.85	0.85	0.85	0.85	0.84	MIND	0.85	0.85	0.85	0.84	0.82	
	464.5	476.2	487.5	498.7	505.8	KTAS	463.9	475.6	486.9	493.2	493.4	
	253.4	253.4	253.4	253.4	251.2	KCAS	253.0	253.0	253.0	250.2	244.3	
	1763	1820	1876	1906	1925	LB/HR	2081	2144	2216	2148	1912	
	0.263	0.262	0.260	0.258	0.263	NM/LB	0.223	0.222	0.220	0.230	0.258	
28,000	82.5	84.6	86.5	88.6	89.3	%N1	87.4	89.4	91.5	91.5	89.4	36,000
	0.85	0.85	0.85	0.85	0.84	MIND	0.85	0.84	0.84	0.84	0.82	
	464.5	476.2	487.5	498.7	504.3	KTAS	461.5	473.1	484.4	491.2	491.9	
	253.4	253.4	253.4	253.4	250.4	KCAS	251.5	251.5	251.5	249.1	243.5	
	1782	1839	1897	1926	1924	LB/HR	2078	2142	2213	2148	1910	
	0.261	0.259	0.257	0.255	0.262	NM/LB	0.222	0.221	0.219	0.229	0.258	
29,000	83.0	85.0	87.0	89.1	89.3	%N1	87.5	89.5	91.6	91.5	89.4	37,000
	0.85	0.85	0.85	0.85	0.84	MIND	0.84	0.84	0.84	0.83	0.81	
	464.5	476.2	487.5	498.7	502.4	KTAS	459.4	470.9	482.2	489.0	488.0	
	253.4	253.4	253.4	253.4	249.4	KCAS	250.2	250.2	250.2	247.8	241.3	
	1813	1871	1930	1959	1922	LB/HR	2076	2140	2211	2147	1906	
	0.256	0.255	0.253	0.250	0.261	NM/LB	0.221	0.220	0.218	0.228	0.256	
30,000	83.5	85.5	87.5	89.6	89.3	%N1	87.5	89.6	91.6	91.6	89.4	38,000
	0.85	0.85	0.85	0.85	0.84	MIND	0.84	0.84	0.84	0.83	0.81	
	464.5	476.2	487.5	498.7	500.8	KTAS	456.8	468.2	479.5	487.0	484.4	
	253.4	253.4	253.4	253.4	248.5	KCAS	248.6	248.6	248.6	246.7	239.3	
	1846	1905	1966	1995	1920	LB/HR	2073	2137	2208	2146	1902	
	0.252	0.250	0.248	0.246	0.261	NM/LB	0.220	0.219	0.217	0.227	0.255	
31,000	84.0	86.1	88.1	90.2	89.3	%N1	87.6	89.7	91.7	91.6	89.5	39,000
	0.85	0.85	0.85	0.85	0.83	MIND	0.83	0.83	0.83	0.83	0.80	
	464.5	476.2	487.5	498.7	499.4	KTAS	454.8	466.2	477.4	485.4	480.4	
	253.4	253.4	253.4	253.4	247.7	KCAS	247.4	247.4	247.4	245.7	237.1	
	1881	1941	2003	2033	1918	LB/HR	2071	2135	2206	2145	1897	
	0.247	0.245	0.243	0.241	0.260	NM/LB	0.220	0.218	0.216	0.226	0.253	
32,000	84.6	86.7	88.7	90.7	89.3	%N1						
	0.85	0.85	0.85	0.85	0.83	MIND						
	464.5	476.2	487.5	498.7	497.6	KTAS						
	253.4	253.4	253.4	253.4	246.7	KCAS						
	1919	1980	2043	2074	1916	LB/HR						
	0.242	0.241	0.239	0.237	0.260	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

43,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	82.2	84.2	86.2	88.2	88.8	%N1	86.8	88.9	90.9	90.8	88.9	33,000
	0.85	0.85	0.85	0.85	0.84	MIND	0.84	0.84	0.84	0.84	0.81	
	464.5	476.2	487.5	498.7	503.8	KTAS	460.4	471.9	483.2	489.6	487.8	
	241.9	241.9	241.9	241.9	238.8	KCAS	239.4	239.4	239.4	236.9	230.2	
	1622	1674	1727	1753	1740	LB/HR	1884	1943	2007	1933	1719	
	0.286	0.284	0.282	0.280	0.290	NM/LB	0.244	0.243	0.241	0.253	0.284	
26,000	82.6	84.6	86.6	88.7	88.8	%N1	86.9	89.0	91.0	90.8	88.9	34,000
	0.85	0.85	0.85	0.85	0.84	MIND	0.84	0.84	0.84	0.83	0.81	
	464.5	476.2	487.5	498.7	501.8	KTAS	457.7	469.2	480.4	487.1	483.6	
	241.9	241.9	241.9	241.9	237.7	KCAS	237.9	237.8	237.9	235.5	228.0	
	1647	1700	1754	1780	1738	LB/HR	1881	1940	2004	1931	1714	
	0.282	0.280	0.278	0.276	0.289	NM/LB	0.243	0.242	0.240	0.252	0.282	
27,000	83.1	85.1	87.2	89.2	88.8	%N1	87.0	89.1	91.1	90.9	89.0	35,000
	0.85	0.85	0.85	0.85	0.83	MIND	0.83	0.83	0.83	0.83	0.80	
	464.5	476.2	487.5	498.7	500.0	KTAS	455.3	466.7	477.9	485.2	479.3	
	241.9	241.9	241.9	241.9	236.7	KCAS	236.4	236.4	236.5	234.5	225.7	
	1680	1735	1789	1817	1735	LB/HR	1878	1937	2001	1930	1708	
	0.276	0.274	0.272	0.270	0.288	NM/LB	0.242	0.241	0.239	0.251	0.281	
28,000	83.7	85.7	87.8	89.8	88.8	%N1	87.0	89.1	91.1	90.9	89.0	36,000
	0.85	0.85	0.85	0.85	0.83	MIND	0.83	0.83	0.83	0.83	0.78	
	464.5	476.2	487.5	498.7	498.4	KTAS	453.5	464.9	476.0	483.8	470.0	
	241.9	241.9	241.9	241.9	235.9	KCAS	235.4	235.4	235.4	233.7	220.8	
	1715	1770	1826	1854	1733	LB/HR	1876	1935	1999	1929	1696	
	0.271	0.269	0.267	0.265	0.288	NM/LB	0.242	0.240	0.238	0.251	0.277	
29,000	84.3	86.4	88.4	90.4	88.8	%N1	87.1	89.2	91.2	90.9	89.3	37,000
	0.85	0.85	0.85	0.85	0.83	MIND	0.83	0.83	0.83	0.82	0.73	
	464.5	476.2	487.5	498.7	496.6	KTAS	451.6	462.9	474.0	481.8	437.2	
	241.9	241.9	241.9	241.9	234.9	KCAS	234.2	234.2	234.3	232.6	203.8	
	1752	1808	1866	1893	1731	LB/HR	1874	1933	1997	1928	1657	
	0.265	0.263	0.261	0.259	0.287	NM/LB	0.241	0.239	0.237	0.250	0.264	
30,000	85.0	87.1	89.1	90.6	88.9	%N1	87.1	89.2	91.2	91.0		38,000
	0.85	0.85	0.85	0.85	0.83	MIND	0.82	0.82	0.82	0.81		
	464.5	476.2	487.5	497.1	494.8	KTAS	449.6	460.9	471.9	477.8		
	241.9	241.9	241.9	241.0	233.9	KCAS	233.1	233.1	233.1	230.5		
	1792	1850	1909	1938	1728	LB/HR	1872	1931	1994	1925		
	0.259	0.257	0.255	0.257	0.286	NM/LB	0.240	0.239	0.237	0.248		
31,000	86.2	88.3	90.3	90.7	88.9	%N1	87.2	89.3	91.3	91.1		39,000
	0.85	0.85	0.85	0.84	0.82	MIND	0.82	0.82	0.82	0.81		
	464.5	476.2	487.5	493.9	493.4	KTAS	447.8	459.0	470.0	473.5		
	241.9	241.9	241.9	239.3	233.2	KCAS	232.0	232.0	232.1	228.1		
	1858	1917	1979	1988	1727	LB/HR	1870	1929	1992	1922		
	0.250	0.248	0.246	0.255	0.286	NM/LB	0.239	0.238	0.236	0.246		
32,000	86.8	88.8	90.8	90.7	88.9	%N1						
	0.85	0.85	0.85	0.84	0.82	MIND						
	462.8	474.4	486.0	491.5	492.2	KTAS						
	240.9	240.9	241.0	238.0	232.5	KCAS						
	1886	1946	2010	2016	1725	LB/HR						
	0.245	0.244	0.242	0.254	0.285	NM/LB						

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	83.2	85.3	87.3	89.3	88.3	%N1	86.5	88.5	90.5	90.2	88.9	33,000
	0.85	0.85	0.85	0.85	0.83	MIND	0.83	0.83	0.83	0.82	0.68	
	464.5	476.2	487.5	498.7	497.7	KTAS	452.6	463.9	475.0	482.2	408.1	
	230.9	230.9	230.9	230.9	224.7	KCAS	224.1	224.1	224.1	222.2	180.2	
	1554	1604	1655	1709	1561	LB/HR	1697	1751	1808	1732	1456	
	0.299	0.297	0.295	0.292	0.319	NM/LB	0.267	0.265	0.263	0.278	0.280	
26,000	83.9	86.0	88.0	89.9	88.3	%N1	86.5	88.6	90.6	90.2		34,000
	0.85	0.85	0.85	0.85	0.83	MIND	0.82	0.82	0.82	0.82		
	464.5	476.2	487.5	498.0	495.9	KTAS	450.3	461.6	472.6	478.0		
	230.9	230.9	230.9	230.5	223.8	KCAS	222.8	222.8	222.8	220.0		
	1590	1641	1694	1745	1559	LB/HR	1694	1749	1805	1729		
	0.292	0.290	0.288	0.285	0.318	NM/LB	0.266	0.264	0.262	0.276		
27,000	84.6	86.6	88.7	89.9	88.4	%N1	86.6	88.7	90.7	90.3		35,000
	0.85	0.85	0.85	0.85	0.82	MIND	0.82	0.82	0.82	0.81		
	464.5	476.2	487.5	496.1	494.0	KTAS	448.3	459.5	470.5	473.9		
	230.9	230.9	230.9	229.5	222.9	KCAS	221.7	221.7	221.7	217.9		
	1626	1678	1732	1743	1556	LB/HR	1692	1747	1803	1726		
	0.286	0.284	0.281	0.285	0.317	NM/LB	0.265	0.263	0.261	0.275		
28,000	85.7	87.8	89.8	90.0	88.4	%N1	86.7	88.8	90.8	90.4		36,000
	0.85	0.85	0.85	0.84	0.82	MIND	0.81	0.81	0.81	0.80		
	464.5	476.2	487.5	492.9	492.5	KTAS	443.1	454.1	465.0	469.3		
	230.9	230.9	230.9	227.8	222.1	KCAS	218.8	218.8	218.8	215.5		
	1686	1741	1797	1741	1554	LB/HR	1687	1741	1797	1722		
	0.276	0.274	0.271	0.283	0.317	NM/LB	0.263	0.261	0.259	0.273		
29,000	86.2	88.2	90.3	90.0	88.4	%N1	86.9	89.0	91.0	90.8		37,000
	0.85	0.85	0.85	0.84	0.82	MIND	0.80	0.80	0.80	0.77		
	462.1	473.9	485.3	490.4	489.9	KTAS	438.9	449.8	460.6	452.8		
	229.5	229.6	229.6	226.5	220.8	KCAS	216.5	216.5	216.5	207.0		
	1707	1762	1819	1739	1550	LB/HR	1682	1737	1792	1707		
	0.271	0.269	0.267	0.282	0.316	NM/LB	0.261	0.259	0.257	0.265		
30,000	86.2	88.4	90.3	90.1	88.4	%N1	87.1	89.2	91.2			38,000
	0.84	0.84	0.84	0.83	0.81	MIND	0.79	0.79	0.79			
	459.7	471.0	482.5	488.2	484.0	KTAS	429.2	439.9	450.4			
	228.2	228.0	228.2	225.4	217.8	KCAS	211.1	211.1	211.1			
	1704	1759	1816	1737	1542	LB/HR	1671	1725	1781			
	0.270	0.268	0.266	0.281	0.314	NM/LB	0.257	0.255	0.253			
31,000	86.3	88.4	90.4	90.1	88.4	%N1						39,000
	0.84	0.84	0.84	0.83	0.80	MIND						
	456.8	468.2	479.4	485.8	480.1	KTAS						
	226.5	226.5	226.5	224.1	215.8	KCAS						
	1701	1756	1812	1735	1536	LB/HR						
	0.269	0.267	0.265	0.280	0.313	NM/LB						
32,000	86.4	88.5	90.5	90.1	88.5	%N1						
	0.83	0.83	0.83	0.83	0.78	MIND						
	454.4	465.8	476.9	484.0	469.5	KTAS						
	225.2	225.1	225.1	223.1	210.5	KCAS						
	1699	1753	1810	1734	1523	LB/HR						
	0.267	0.266	0.263	0.279	0.308	NM/LB						

DESCENT

DESCENT SUMMARY

1. Clean Configuration
2. Descent speed schedule:
   Mach 0.75 . 250 KCAS
   The descent Mach number should be maintained until the calibrated speed is intercepted.
3. Flight idle thrust
4. ISA conditions

NOTE

1. Use linear interpolation between given weight values (25,000 lb and 39,000 lb).
2. Ambient temperature effects:
   For each 10°C above standard temperature:
   Increase descent time by 2%.
   Increase descent distance by 4%.
   Increase required descent fuel by 5%.
   For each 10°C below standard temperature:
   Decrease descent time by 2%.
   Decrease descent distance by 4%.
   Decrease required descent fuel by 5%.

DESCENT TABLES

INITIAL WEIGHT - 25,000 LB

INITIAL ALTITUDE (FT)	TIME (MIN)	AIR DISTANCE (NM)	REQUIRED FUEL (LB)
45,000	19	110	228
44,000	19	107	224
43,000	18	104	220
42,000	18	101	216
41,000	17	98	213
40,000	17	95	209
39,000	17	93	206
38,000	16	90	203
37,000	16	88	200
36,000	16	86	198
35,000	15	84	195
32,000	14	76	185
30,000	14	71	178
28,000	13	66	171
25,000	12	58	158
20,000	9	45	133
15,000	7	33	104
10,000	5	22	73
5,000	2	11	39

INITIAL WEIGHT - 39,000 LB

INITIAL ALTITUDE (FT)	TIME (MIN)	AIR DISTANCE (NM)	REQUIRED FUEL (LB)
45,000	25	140	297
44,000	24	137	293
43,000	24	134	289
42,000	23	131	285
41,000	23	128	282
40,000	23	125	278
39,000	22	122	274
38,000	22	120	271
37,000	21	117	267
36,000	21	114	264
35,000	21	111	260
32,000	19	101	248
30,000	18	94	238
28,000	17	88	229
25,000	16	78	212
20,000	13	61	179
15,000	10	45	141
10,000	7	29	99
5,000	3	14	53

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HOLDING

HOLDING - ENGINE AND WING ANTI-ICE OFF

SEA LEVEL
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-5.0	5.0	15.0	25.0	35.0	OAT (°C)	-5.0	5.0	15.0	25.0	35.0	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	41.0	41.7	42.5	43.3	44.0	%N1	46.4	47.3	48.1	49.0	49.9	33,000
	0.25	0.25	0.25	0.25	0.25	MIND	0.29	0.29	0.29	0.29	0.29	
	159.7	162.7	165.6	168.4	171.2	KTAS	184.1	187.5	190.8	194.1	197.4	
	165.6	165.6	165.6	165.6	165.6	KCAS	190.8	190.8	190.8	190.8	190.8	
	1240	1269	1298	1330	1359	LB/HR	1472	1506	1540	1576	1609	
	0.129	0.128	0.128	0.127	0.126	NM/LB	0.125	0.124	0.124	0.123	0.123	
26,000	41.6	42.4	43.2	44.0	44.7	%N1	47.1	48.0	48.9	49.7	50.7	34,000
	0.26	0.26	0.26	0.26	0.26	MIND	0.29	0.29	0.29	0.29	0.29	
	162.9	165.9	168.8	171.7	174.6	KTAS	187.1	190.5	193.9	197.3	200.6	
	168.8	168.8	168.8	168.8	168.8	KCAS	193.9	193.9	193.9	193.9	193.9	
	1268	1297	1328	1360	1389	LB/HR	1503	1537	1572	1609	1642	
	0.128	0.128	0.127	0.126	0.126	NM/LB	0.124	0.124	0.123	0.123	0.122	
27,000	42.3	43.1	43.9	44.7	45.4	%N1	47.8	48.7	49.6	50.5	51.5	35,000
	0.26	0.26	0.26	0.26	0.26	MIND	0.30	0.30	0.30	0.30	0.30	
	166.0	169.0	172.1	175.0	177.9	KTAS	190.1	193.6	197.0	200.4	203.7	
	172.1	172.1	172.1	172.1	172.1	KCAS	197.0	197.0	197.0	197.0	197.0	
	1296	1326	1357	1390	1420	LB/HR	1534	1569	1604	1641	1675	
	0.128	0.127	0.127	0.126	0.125	NM/LB	0.124	0.123	0.123	0.122	0.122	
28,000	43.0	43.8	44.6	45.4	46.2	%N1	48.5	49.4	50.3	51.3	52.2	36,000
	0.27	0.27	0.27	0.27	0.27	MIND	0.30	0.30	0.30	0.30	0.30	
	169.1	172.2	175.3	178.3	181.3	KTAS	193.0	196.6	200.1	203.5	206.9	
	175.3	175.3	175.3	175.3	175.3	KCAS	200.1	200.1	200.1	200.1	200.1	
	1325	1356	1387	1420	1451	LB/HR	1565	1601	1636	1674	1710	
	0.128	0.127	0.126	0.126	0.125	NM/LB	0.123	0.123	0.122	0.122	0.121	
29,000	43.7	44.5	45.3	46.1	46.9	%N1	49.2	50.2	51.1	52.0	53.0	37,000
	0.27	0.27	0.27	0.27	0.27	MIND	0.31	0.31	0.31	0.31	0.31	
	172.2	175.4	178.5	181.6	184.6	KTAS	195.9	199.5	203.1	206.6	210.0	
	178.5	178.5	178.5	178.5	178.5	KCAS	203.1	203.1	203.1	203.1	203.1	
	1354	1385	1417	1451	1482	LB/HR	1596	1632	1669	1707	1746	
	0.127	0.127	0.126	0.125	0.125	NM/LB	0.123	0.122	0.122	0.121	0.120	
30,000	44.3	45.2	46.0	46.8	47.7	%N1	49.9	50.9	51.8	52.7	53.8	38,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.31	0.31	0.31	0.31	0.31	
	175.2	178.5	181.6	184.8	187.8	KTAS	198.8	202.4	206.0	209.6	213.1	
	181.7	181.7	181.7	181.7	181.7	KCAS	206.0	206.0	206.0	206.0	206.0	
	1383	1415	1448	1482	1513	LB/HR	1627	1664	1701	1740	1782	
	0.127	0.126	0.125	0.125	0.124	NM/LB	0.122	0.122	0.121	0.120	0.120	
31,000	45.0	45.9	46.7	47.5	48.4	%N1	50.6	51.6	52.5	53.5	54.5	39,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.32	0.32	0.32	0.32	0.32	
	178.2	181.5	184.8	187.9	191.1	KTAS	201.6	205.3	209.0	212.6	216.1	
	184.8	184.8	184.8	184.8	184.8	KCAS	209.0	209.0	209.0	209.0	209.0	
	1413	1445	1478	1513	1545	LB/HR	1659	1696	1734	1774	1819	
	0.126	0.126	0.125	0.124	0.124	NM/LB	0.122	0.121	0.121	0.120	0.119	
32,000	45.7	46.6	47.4	48.3	49.2	%N1						
	0.28	0.28	0.28	0.28	0.28	MIND						
	181.2	184.5	187.8	191.1	194.2	KTAS						
	187.8	187.8	187.8	187.8	187.8	KCAS						
	1443	1476	1509	1545	1577	LB/HR						
	0.126	0.125	0.124	0.124	0.123	NM/LB						

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	43.6	44.5	45.3	46.1	47.0	%N1	49.6	50.5	51.5	52.4	53.6	33,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.32	0.32	0.32	0.32	0.32	
	172.0	175.3	178.5	181.7	184.8	KTAS	199.5	203.3	207.1	210.7	214.4	
	166.0	166.0	166.0	166.0	166.0	KCAS	192.6	192.6	192.6	192.6	192.6	
	1116	1142	1168	1196	1222	LB/HR	1382	1414	1445	1479	1508	
	0.154	0.153	0.153	0.152	0.151	NM/LB	0.144	0.144	0.143	0.142	0.142	
26,000	44.4	45.2	46.1	46.9	47.8	%N1	50.3	51.3	52.3	53.2	54.4	34,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.32	0.32	0.32	0.32	0.32	
	175.5	178.9	182.2	185.4	188.6	KTAS	202.8	206.7	210.5	214.2	217.9	
	169.4	169.4	169.4	169.4	169.4	KCAS	195.8	195.8	195.8	195.8	195.8	
	1148	1175	1202	1230	1256	LB/HR	1416	1449	1481	1515	1544	
	0.153	0.152	0.152	0.151	0.150	NM/LB	0.143	0.143	0.142	0.141	0.141	
27,000	45.1	46.0	46.8	47.7	48.6	%N1	51.1	52.1	53.1	54.0	55.3	35,000
	0.29	0.29	0.29	0.29	0.29	MIND	0.33	0.33	0.33	0.33	0.33	
	179.0	182.4	185.8	189.1	192.3	KTAS	206.0	210.0	213.9	217.7	221.4	
	172.7	172.7	172.7	172.7	172.7	KCAS	199.0	199.0	199.0	199.0	199.0	
	1180	1208	1235	1264	1291	LB/HR	1450	1483	1516	1551	1581	
	0.152	0.151	0.150	0.150	0.149	NM/LB	0.142	0.142	0.141	0.140	0.140	
28,000	45.8	46.7	47.6	48.5	49.4	%N1	51.9	52.9	53.9	54.9	56.1	36,000
	0.29	0.29	0.29	0.29	0.29	MIND	0.33	0.33	0.33	0.33	0.33	
	182.4	185.9	189.4	192.7	196.0	KTAS	209.3	213.3	217.2	221.1	224.9	
	176.1	176.1	176.1	176.1	176.1	KCAS	202.1	202.1	202.1	202.1	202.1	
	1213	1241	1269	1299	1326	LB/HR	1484	1518	1551	1587	1617	
	0.150	0.150	0.149	0.148	0.148	NM/LB	0.141	0.141	0.140	0.139	0.139	
29,000	46.6	47.5	48.4	49.3	50.3	%N1	52.6	53.7	54.7	55.7	56.9	37,000
	0.30	0.30	0.30	0.30	0.30	MIND	0.34	0.34	0.34	0.34	0.34	
	185.9	189.5	193.0	196.4	199.8	KTAS	212.5	216.5	220.5	224.5	228.3	
	179.5	179.5	179.5	179.5	179.5	KCAS	205.2	205.2	205.2	205.2	205.2	
	1246	1275	1304	1334	1362	LB/HR	1518	1552	1586	1623	1655	
	0.149	0.149	0.148	0.147	0.147	NM/LB	0.140	0.139	0.139	0.138	0.138	
30,000	47.3	48.2	49.2	50.1	51.1	%N1	53.4	54.4	55.5	56.5	57.5	38,000
	0.30	0.30	0.30	0.30	0.30	MIND	0.34	0.34	0.34	0.34	0.34	
	189.4	193.0	196.6	200.1	203.5	KTAS	215.6	219.8	223.8	227.8	231.7	
	182.8	182.8	182.8	182.8	182.8	KCAS	208.3	208.3	208.3	208.3	208.3	
	1280	1310	1339	1370	1399	LB/HR	1551	1587	1621	1658	1697	
	0.148	0.147	0.147	0.146	0.146	NM/LB	0.139	0.139	0.138	0.137	0.137	
31,000	48.1	49.0	49.9	50.8	51.9	%N1	54.0	55.0	56.0	57.1	58.0	39,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.35	0.35	0.35	0.35	0.35	
	192.8	196.5	200.1	203.7	207.2	KTAS	218.7	222.9	227.0	231.0	235.0	
	186.1	186.1	186.1	186.1	186.1	KCAS	211.2	211.2	211.2	211.2	211.2	
	1314	1344	1375	1406	1435	LB/HR	1589	1626	1661	1700	1739	
	0.147	0.146	0.146	0.145	0.144	NM/LB	0.138	0.137	0.137	0.136	0.135	
32,000	48.8	49.8	50.7	51.6	52.7	%N1						
	0.31	0.31	0.31	0.31	0.31	MIND						
	196.1	199.9	203.6	207.2	210.8	KTAS						
	189.4	189.4	189.4	189.4	189.4	KCAS						
	1348	1379	1410	1443	1472	LB/HR						
	0.145	0.145	0.144	0.144	0.143	NM/LB						

10,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	46.7	47.6	48.6	49.5	50.4	%N1	52.9	53.9	55.0	56.0	57.2	33,000
	0.30	0.30	0.30	0.30	0.30	MIND	0.35	0.35	0.35	0.35	0.35	
	186.4	190.1	193.8	197.3	200.9	KTAS	216.9	221.3	225.5	229.7	233.7	
	167.1	167.1	167.1	167.1	167.1	KCAS	194.7	194.7	194.7	194.7	194.7	
	1066	1091	1118	1144	1169	LB/HR	1334	1364	1396	1429	1456	
	0.175	0.174	0.173	0.172	0.172	NM/LB	0.163	0.162	0.162	0.161	0.160	
26,000	47.5	48.4	49.4	50.3	51.2	%N1	53.7	54.7	55.8	56.9	58.1	34,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.36	0.36	0.36	0.36	0.36	
	190.4	194.2	197.9	201.6	205.2	KTAS	220.4	224.8	229.1	233.4	237.5	
	170.7	170.7	170.7	170.7	170.7	KCAS	197.9	197.9	197.9	197.9	197.9	
	1098	1124	1151	1179	1204	LB/HR	1369	1399	1432	1465	1493	
	0.173	0.173	0.172	0.171	0.171	NM/LB	0.161	0.161	0.160	0.159	0.159	
27,000	48.2	49.2	50.2	51.1	52.1	%N1	54.4	55.5	56.6	57.7	59.0	35,000
	0.32	0.32	0.32	0.32	0.32	MIND	0.37	0.37	0.37	0.37	0.37	
	194.4	198.2	202.0	205.8	209.4	KTAS	223.9	228.4	232.8	237.0	241.3	
	174.3	174.3	174.3	174.3	174.3	KCAS	201.0	201.0	201.0	201.0	201.0	
	1131	1157	1186	1213	1239	LB/HR	1403	1435	1468	1502	1530	
	0.172	0.171	0.170	0.170	0.169	NM/LB	0.160	0.159	0.159	0.158	0.158	
28,000	49.0	50.0	51.0	51.9	52.9	%N1	55.2	56.3	57.4	58.5	59.7	36,000
	0.32	0.32	0.32	0.32	0.32	MIND	0.37	0.37	0.37	0.37	0.37	
	198.3	202.2	206.1	209.9	213.7	KTAS	227.3	231.9	236.3	240.7	245.0	
	177.8	177.8	177.8	177.8	177.8	KCAS	204.1	204.1	204.1	204.1	204.1	
	1165	1191	1220	1249	1274	LB/HR	1438	1470	1504	1539	1570	
	0.170	0.170	0.169	0.168	0.168	NM/LB	0.158	0.158	0.157	0.156	0.156	
29,000	49.8	50.8	51.8	52.7	53.8	%N1	56.0	57.1	58.2	59.3	60.4	37,000
	0.33	0.33	0.33	0.33	0.33	MIND	0.38	0.38	0.38	0.38	0.38	
	202.2	206.2	210.1	214.0	217.8	KTAS	230.7	235.3	239.8	244.3	248.6	
	181.3	181.3	181.3	181.3	181.3	KCAS	207.2	207.2	207.2	207.2	207.2	
	1198	1225	1255	1284	1310	LB/HR	1473	1506	1540	1576	1612	
	0.169	0.168	0.167	0.167	0.166	NM/LB	0.157	0.156	0.156	0.155	0.154	
30,000	50.6	51.6	52.6	53.6	54.7	%N1	56.6	57.7	58.8	60.0	61.0	38,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.38	0.38	0.38	0.38	0.38	
	206.0	210.1	214.1	218.1	221.9	KTAS	234.1	238.7	243.3	247.8	252.2	
	184.8	184.8	184.8	184.8	184.8	KCAS	210.3	210.3	210.3	210.3	210.3	
	1232	1260	1290	1320	1346	LB/HR	1511	1545	1580	1617	1655	
	0.167	0.167	0.166	0.165	0.165	NM/LB	0.155	0.155	0.154	0.153	0.152	
31,000	51.3	52.4	53.4	54.4	55.5	%N1	57.2	58.3	59.4	60.6	61.6	39,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.39	0.39	0.39	0.39	0.39	
	209.7	213.9	218.0	222.0	226.0	KTAS	237.4	242.1	246.8	251.3	255.8	
	188.2	188.2	188.2	188.2	188.2	KCAS	213.3	213.3	213.3	213.3	213.3	
	1266	1295	1325	1356	1383	LB/HR	1550	1584	1621	1659	1698	
	0.166	0.165	0.164	0.164	0.163	NM/LB	0.153	0.153	0.152	0.152	0.151	
32,000	52.1	53.2	54.2	55.2	56.4	%N1						
	0.35	0.35	0.35	0.35	0.35	MIND						
	213.4	217.6	221.8	225.9	229.9	KTAS						
	191.5	191.5	191.5	191.5	191.5	KCAS						
	1300	1329	1361	1393	1420	LB/HR						
	0.164	0.164	0.163	0.162	0.162	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	50.1	51.1	52.2	53.2	54.2	%N1	56.7	57.9	59.1	60.2	61.5	33,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.39	0.39	0.39	0.39	0.39	
	203.4	207.6	211.7	215.8	219.8	KTAS	236.3	241.2	246.0	250.8	255.4	
	169.0	169.0	169.0	169.0	169.0	KCAS	196.8	196.8	196.8	196.8	196.8	
	1027	1052	1078	1106	1130	LB/HR	1302	1333	1366	1400	1427	
	0.198	0.197	0.196	0.195	0.194	NM/LB	0.181	0.181	0.180	0.179	0.179	
26,000	50.9	52.0	53.0	54.1	55.1	%N1	57.6	58.8	59.9	61.1	62.3	34,000
	0.35	0.35	0.35	0.35	0.35	MIND	0.40	0.40	0.40	0.40	0.40	
	207.8	212.1	216.3	220.5	224.5	KTAS	240.3	245.2	250.1	254.9	259.6	
	172.7	172.7	172.7	172.7	172.7	KCAS	200.1	200.1	200.1	200.1	200.1	
	1061	1087	1114	1142	1167	LB/HR	1338	1369	1403	1438	1467	
	0.196	0.195	0.194	0.193	0.192	NM/LB	0.180	0.179	0.178	0.177	0.177	
27,000	51.7	52.8	53.9	54.9	56.0	%N1	58.4	59.6	60.8	62.0	62.9	35,000
	0.35	0.35	0.35	0.35	0.35	MIND	0.41	0.41	0.41	0.41	0.41	
	212.0	216.4	220.7	225.0	229.1	KTAS	244.1	249.2	254.2	259.0	263.8	
	176.3	176.3	176.3	176.3	176.3	KCAS	203.4	203.4	203.4	203.4	203.4	
	1095	1121	1149	1178	1203	LB/HR	1373	1406	1440	1476	1509	
	0.194	0.193	0.192	0.191	0.190	NM/LB	0.178	0.177	0.177	0.175	0.175	
28,000	52.6	53.7	54.7	55.8	56.9	%N1	58.9	60.1	61.3	62.6	63.6	36,000
	0.36	0.36	0.36	0.36	0.36	MIND	0.41	0.41	0.41	0.41	0.41	
	216.2	220.7	225.1	229.4	233.6	KTAS	248.0	253.1	258.2	263.1	268.0	
	179.8	179.8	179.8	179.8	179.8	KCAS	206.6	206.6	206.6	206.6	206.6	
	1129	1156	1184	1214	1240	LB/HR	1412	1445	1480	1517	1551	
	0.192	0.191	0.190	0.189	0.188	NM/LB	0.176	0.175	0.174	0.173	0.173	
29,000	53.4	54.5	55.6	56.7	57.8	%N1	59.5	60.7	61.9	63.2	64.3	37,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.42	0.42	0.42	0.42	0.42	
	220.3	224.9	229.4	233.8	238.1	KTAS	251.8	257.0	262.1	267.1	272.1	
	183.3	183.3	183.3	183.3	183.3	KCAS	209.8	209.8	209.8	209.8	209.8	
	1163	1191	1220	1251	1277	LB/HR	1450	1485	1521	1559	1593	
	0.189	0.189	0.188	0.187	0.186	NM/LB	0.174	0.173	0.172	0.171	0.171	
30,000	54.2	55.3	56.5	57.6	58.7	%N1	60.1	61.3	62.5	63.8	64.9	38,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.43	0.43	0.43	0.43	0.43	
	224.4	229.1	233.6	238.1	242.5	KTAS	255.5	260.8	266.0	271.1	276.1	
	186.7	186.7	186.7	186.7	186.7	KCAS	213.0	213.0	213.0	213.0	213.0	
	1197	1226	1256	1288	1314	LB/HR	1489	1525	1562	1600	1635	
	0.187	0.187	0.186	0.185	0.185	NM/LB	0.172	0.171	0.170	0.169	0.169	
31,000	55.0	56.2	57.3	58.4	59.7	%N1	60.6	61.9	63.1	64.4	65.6	39,000
	0.38	0.38	0.38	0.38	0.38	MIND	0.43	0.43	0.43	0.43	0.43	
	228.4	233.1	237.8	242.3	246.8	KTAS	259.3	264.7	270.0	275.1	280.2	
	190.1	190.1	190.1	190.1	190.1	KCAS	216.3	216.3	216.3	216.3	216.3	
	1232	1261	1292	1325	1351	LB/HR	1528	1566	1603	1642	1678	
	0.185	0.185	0.184	0.183	0.183	NM/LB	0.170	0.169	0.168	0.168	0.167	
32,000	55.9	57.0	58.2	59.3	60.6	%N1						
	0.39	0.39	0.39	0.39	0.39	MIND						
	232.4	237.2	241.9	246.6	251.1	KTAS						
	193.4	193.4	193.4	193.4	193.4	KCAS						
	1267	1297	1329	1362	1389	LB/HR						
	0.183	0.183	0.182	0.181	0.181	NM/LB						

20,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-44.6	-34.6	-24.6	-14.6	-4.6	OAT (°C)	-44.6	-34.6	-24.6	-14.6	-4.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	53.4	54.6	55.8	56.9	58.2	%N1	60.3	61.7	63.0	64.2	65.4	33,000
	0.38	0.38	0.38	0.38	0.38	MIND	0.44	0.44	0.44	0.44	0.44	
	222.2	227.1	231.8	236.4	240.9	KTAS	259.2	264.8	270.3	275.7	280.9	
	170.8	170.8	170.8	170.8	170.8	KCAS	199.8	199.8	199.8	199.8	199.8	
	991	1018	1045	1073	1097	LB/HR	1276	1310	1344	1380	1415	
	0.224	0.223	0.222	0.220	0.220	NM/LB	0.203	0.202	0.201	0.200	0.198	
26,000	54.4	55.6	56.7	57.9	59.3	%N1	61.0	62.3	63.6	64.9	66.2	34,000
	0.39	0.39	0.39	0.39	0.39	MIND	0.45	0.45	0.45	0.45	0.45	
	227.0	231.9	236.7	241.5	246.1	KTAS	263.6	269.3	274.9	280.4	285.7	
	174.5	174.5	174.5	174.5	174.5	KCAS	203.3	203.3	203.3	203.3	203.3	
	1026	1053	1081	1110	1135	LB/HR	1316	1351	1386	1422	1458	
	0.221	0.220	0.219	0.218	0.217	NM/LB	0.200	0.199	0.198	0.197	0.196	
27,000	55.3	56.5	57.7	58.9	60.3	%N1	61.6	63.0	64.3	65.6	66.9	35,000
	0.39	0.39	0.39	0.39	0.39	MIND	0.46	0.46	0.46	0.46	0.46	
	231.8	236.8	241.7	246.5	251.2	KTAS	268.0	273.8	279.5	285.1	290.5	
	178.2	178.2	178.2	178.2	178.2	KCAS	206.8	206.8	206.8	206.8	206.8	
	1060	1088	1117	1147	1173	LB/HR	1356	1392	1427	1464	1500	
	0.219	0.218	0.216	0.215	0.214	NM/LB	0.198	0.197	0.196	0.195	0.194	
28,000	56.2	57.4	58.6	59.8	61.4	%N1	62.3	63.6	65.0	66.3	67.6	36,000
	0.40	0.40	0.40	0.40	0.40	MIND	0.46	0.46	0.46	0.46	0.46	
	236.5	241.6	246.6	251.5	256.3	KTAS	272.4	278.3	284.0	289.7	295.2	
	181.9	181.9	181.9	181.9	181.9	KCAS	210.2	210.2	210.2	210.2	210.2	
	1095	1124	1154	1185	1211	LB/HR	1396	1433	1469	1507	1543	
	0.216	0.215	0.214	0.212	0.212	NM/LB	0.195	0.194	0.193	0.192	0.191	
29,000	57.1	58.4	59.6	60.8	62.4	%N1	62.9	64.3	65.6	67.0	68.4	37,000
	0.41	0.41	0.41	0.41	0.41	MIND	0.47	0.47	0.47	0.47	0.47	
	241.1	246.3	251.4	256.4	261.3	KTAS	276.5	282.5	288.3	294.1	299.7	
	185.5	185.5	185.5	185.5	185.5	KCAS	213.5	213.5	213.5	213.5	213.5	
	1130	1159	1190	1222	1249	LB/HR	1435	1474	1511	1549	1585	
	0.213	0.212	0.211	0.210	0.209	NM/LB	0.193	0.192	0.191	0.190	0.189	
30,000	58.0	59.3	60.5	61.8	63.2	%N1	63.5	64.9	66.3	67.6	69.1	38,000
	0.42	0.42	0.42	0.42	0.42	MIND	0.48	0.48	0.48	0.48	0.48	
	245.6	251.0	256.2	261.3	266.3	KTAS	280.5	286.6	292.5	298.3	304.0	
	189.1	189.1	189.1	189.1	189.1	KCAS	216.7	216.7	216.7	216.7	216.7	
	1165	1195	1227	1260	1290	LB/HR	1474	1514	1551	1591	1627	
	0.211	0.210	0.209	0.207	0.207	NM/LB	0.190	0.189	0.189	0.188	0.187	
31,000	58.9	60.2	61.5	62.7	64.0	%N1	64.2	65.6	66.9	68.3	69.8	39,000
	0.43	0.43	0.43	0.43	0.43	MIND	0.48	0.48	0.48	0.48	0.48	
	250.1	255.6	260.9	266.1	271.2	KTAS	284.4	290.6	296.6	302.5	308.3	
	192.7	192.7	192.7	192.7	192.7	KCAS	219.8	219.8	219.8	219.8	219.8	
	1200	1231	1264	1297	1331	LB/HR	1514	1554	1593	1633	1669	
	0.208	0.208	0.206	0.205	0.204	NM/LB	0.188	0.187	0.186	0.185	0.185	
32,000	59.7	61.0	62.3	63.5	64.7	%N1						
	0.43	0.43	0.43	0.43	0.43	MIND						
	254.7	260.2	265.6	270.9	276.1	KTAS						
	196.3	196.3	196.3	196.3	196.3	KCAS						
	1237	1270	1303	1338	1373	LB/HR						
	0.206	0.205	0.204	0.202	0.201	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	57.3	58.6	59.9	61.2	62.7	%N1	63.8	65.3	66.7	68.1	69.6	33,000
	0.42	0.42	0.42	0.42	0.42	MIND	0.50	0.50	0.50	0.50	0.50	
	244.3	249.8	255.2	260.5	265.7	KTAS	284.9	291.4	297.7	303.9	309.9	
	173.2	173.2	173.2	173.2	173.2	KCAS	203.0	203.0	203.0	203.0	203.0	
	965	992	1020	1048	1082	LB/HR	1265	1302	1338	1373	1411	
	0.253	0.252	0.250	0.249	0.246	NM/LB	0.225	0.224	0.223	0.221	0.220	
26,000	58.3	59.7	61.0	62.3	63.7	%N1	64.5	66.0	67.4	68.8	70.4	34,000
	0.43	0.43	0.43	0.43	0.43	MIND	0.50	0.50	0.50	0.50	0.50	
	249.7	255.4	260.9	266.3	271.6	KTAS	289.6	296.1	302.5	308.8	314.9	
	177.2	177.2	177.2	177.2	177.2	KCAS	206.4	206.4	206.4	206.4	206.4	
	1000	1028	1057	1086	1124	LB/HR	1304	1342	1379	1415	1452	
	0.250	0.249	0.247	0.245	0.242	NM/LB	0.222	0.221	0.219	0.218	0.217	
27,000	59.4	60.7	62.1	63.4	64.5	%N1	65.2	66.7	68.2	69.6	71.0	35,000
	0.44	0.44	0.44	0.44	0.44	MIND	0.51	0.51	0.51	0.51	0.51	
	255.1	260.9	266.5	272.1	277.5	KTAS	294.4	301.1	307.6	314.0	320.2	
	181.1	181.1	181.1	181.1	181.1	KCAS	210.0	210.0	210.0	210.0	210.0	
	1035	1064	1094	1125	1167	LB/HR	1344	1383	1420	1457	1495	
	0.247	0.245	0.244	0.242	0.238	NM/LB	0.219	0.218	0.217	0.215	0.214	
28,000	60.2	61.5	62.9	64.2	65.3	%N1	65.9	67.4	68.9	70.4	71.7	36,000
	0.45	0.45	0.45	0.45	0.45	MIND	0.52	0.52	0.52	0.52	0.52	
	260.5	266.4	272.1	277.8	283.3	KTAS	299.4	306.2	312.8	319.3	325.6	
	185.0	185.0	185.0	185.0	185.0	KCAS	213.7	213.7	213.7	213.7	213.7	
	1073	1103	1135	1166	1209	LB/HR	1384	1424	1463	1501	1539	
	0.243	0.241	0.240	0.238	0.234	NM/LB	0.216	0.215	0.214	0.213	0.212	
29,000	60.9	62.3	63.7	65.0	66.2	%N1	66.6	68.1	69.6	71.0	72.4	37,000
	0.46	0.46	0.46	0.46	0.46	MIND	0.53	0.53	0.53	0.53	0.53	
	265.7	271.7	277.6	283.4	289.0	KTAS	304.3	311.2	317.9	324.5	331.0	
	188.9	188.9	188.9	188.9	188.9	KCAS	217.4	217.4	217.4	217.4	217.4	
	1112	1143	1176	1208	1251	LB/HR	1425	1465	1505	1544	1583	
	0.239	0.238	0.236	0.235	0.231	NM/LB	0.214	0.212	0.211	0.210	0.209	
30,000	61.6	63.0	64.4	65.8	67.1	%N1	67.2	68.7	70.2	71.6	73.1	38,000
	0.47	0.47	0.47	0.47	0.47	MIND	0.54	0.54	0.54	0.54	0.54	
	270.7	276.9	282.8	288.7	294.5	KTAS	309.2	316.2	323.1	329.8	336.3	
	192.6	192.6	192.6	192.6	192.6	KCAS	221.0	221.0	221.0	221.0	221.0	
	1150	1183	1216	1249	1292	LB/HR	1466	1507	1547	1587	1628	
	0.235	0.234	0.232	0.231	0.228	NM/LB	0.211	0.210	0.209	0.208	0.207	
31,000	62.4	63.8	65.2	66.5	67.9	%N1	67.7	69.3	70.8	72.3	73.7	39,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.55	0.55	0.55	0.55	0.55	
	275.5	281.8	287.9	293.8	299.7	KTAS	314.1	321.2	328.2	335.0	341.6	
	196.1	196.1	196.1	196.1	196.1	KCAS	224.7	224.7	224.7	224.7	224.7	
	1188	1223	1257	1290	1332	LB/HR	1507	1548	1590	1631	1673	
	0.232	0.230	0.229	0.228	0.225	NM/LB	0.208	0.208	0.206	0.205	0.204	
32,000	63.1	64.5	65.9	67.3	68.7	%N1						
	0.49	0.49	0.49	0.49	0.49	MIND						
	280.3	286.6	292.8	298.9	304.8	KTAS						
	199.6	199.6	199.6	199.6	199.6	KCAS						
	1227	1262	1297	1332	1372	LB/HR						
	0.228	0.227	0.226	0.224	0.222	NM/LB						

30,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-64.4	-54.4	-44.4	-34.4	-24.4	OAT (°C)	-64.4	-54.4	-44.4	-34.4	-24.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	61.0	62.5	63.9	65.3	66.7	%N1	67.4	69.0	70.6	72.1	73.6	33,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.56	0.56	0.56	0.56	0.56	
	270.1	276.5	282.7	288.8	294.8	KTAS	316.7	324.2	331.6	338.7	345.8	
	176.4	176.4	176.4	176.4	176.4	KCAS	208.3	208.3	208.3	208.3	208.3	
	970	995	1024	1052	1081	LB/HR	1264	1302	1339	1375	1412	
	0.278	0.278	0.276	0.275	0.273	NM/LB	0.250	0.249	0.248	0.246	0.245	
26,000	61.9	63.4	64.8	66.2	67.6	%N1	68.1	69.7	71.2	72.8	74.4	34,000
	0.49	0.49	0.49	0.49	0.49	MIND	0.57	0.57	0.57	0.57	0.57	
	275.8	282.3	288.7	295.0	301.1	KTAS	322.4	330.0	337.5	344.8	351.9	
	180.3	180.3	180.3	180.3	180.3	KCAS	212.2	212.2	212.2	212.2	212.2	
	1004	1032	1062	1091	1118	LB/HR	1305	1343	1381	1418	1457	
	0.275	0.274	0.272	0.270	0.269	NM/LB	0.247	0.246	0.244	0.243	0.242	
27,000	62.7	64.2	65.7	67.1	68.6	%N1	68.7	70.3	71.9	73.5	75.1	35,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.58	0.58	0.58	0.58	0.58	
	281.5	288.1	294.6	301.0	307.2	KTAS	328.0	335.7	343.3	350.8	358.0	
	184.1	184.1	184.1	184.1	184.1	KCAS	216.1	216.1	216.1	216.1	216.1	
	1039	1069	1100	1130	1157	LB/HR	1345	1384	1424	1462	1502	
	0.271	0.270	0.268	0.266	0.266	NM/LB	0.244	0.243	0.241	0.240	0.238	
28,000	63.6	65.1	66.6	68.0	69.6	%N1	69.4	71.0	72.6	74.2	75.9	36,000
	0.51	0.51	0.51	0.51	0.51	MIND	0.59	0.59	0.59	0.59	0.59	
	287.3	294.1	300.8	307.3	313.6	KTAS	333.7	341.6	349.4	356.9	364.3	
	188.1	188.1	188.1	188.1	188.1	KCAS	220.1	220.1	220.1	220.1	220.1	
	1074	1106	1138	1168	1196	LB/HR	1387	1427	1467	1508	1549	
	0.268	0.266	0.264	0.263	0.262	NM/LB	0.241	0.239	0.238	0.237	0.235	
29,000	64.4	66.0	67.5	68.9	70.6	%N1	70.0	71.7	73.3	74.9	76.5	37,000
	0.52	0.52	0.52	0.52	0.52	MIND	0.60	0.60	0.60	0.60	0.60	
	293.4	300.3	307.1	313.7	320.2	KTAS	339.5	347.5	355.4	363.1	370.6	
	192.2	192.2	192.2	192.2	192.2	KCAS	224.2	224.2	224.2	224.2	224.2	
	1110	1143	1176	1207	1236	LB/HR	1430	1470	1512	1554	1597	
	0.264	0.263	0.261	0.260	0.259	NM/LB	0.237	0.236	0.235	0.234	0.232	
30,000	65.3	66.8	68.4	69.9	71.3	%N1	70.7	72.3	74.0	75.6	77.2	38,000
	0.53	0.53	0.53	0.53	0.53	MIND	0.61	0.61	0.61	0.61	0.61	
	299.3	306.4	313.4	320.1	326.8	KTAS	345.3	353.4	361.4	369.2	376.9	
	196.3	196.3	196.3	196.3	196.3	KCAS	228.2	228.2	228.2	228.2	228.2	
	1147	1181	1215	1247	1280	LB/HR	1474	1515	1558	1602	1647	
	0.261	0.259	0.258	0.257	0.255	NM/LB	0.234	0.233	0.232	0.230	0.229	
31,000	66.1	67.6	69.2	70.7	72.1	%N1	71.4	73.0	74.7	76.3	77.9	39,000
	0.54	0.54	0.54	0.54	0.54	MIND	0.62	0.62	0.62	0.62	0.62	
	305.3	312.5	319.6	326.5	333.3	KTAS	351.0	359.3	367.4	375.4	383.2	
	200.4	200.4	200.4	200.4	200.4	KCAS	232.2	232.2	232.2	232.2	232.2	
	1185	1220	1255	1289	1324	LB/HR	1518	1561	1605	1651	1698	
	0.258	0.256	0.255	0.253	0.252	NM/LB	0.231	0.230	0.229	0.227	0.226	
32,000	66.7	68.3	69.9	71.4	72.9	%N1						
	0.55	0.55	0.55	0.55	0.55	MIND						
	311.1	318.4	325.6	332.7	339.6	KTAS						
	204.4	204.4	204.4	204.4	204.4	KCAS						
	1224	1261	1297	1332	1368	LB/HR						
	0.254	0.253	0.251	0.250	0.248	NM/LB						

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	64.8	66.4	68.0	69.5	71.2	%N1	71.1	72.8	74.5	76.2	77.8	33,000
	0.55	0.55	0.55	0.55	0.55	MIND	0.65	0.65	0.65	0.65	0.65	
	300.8	308.2	315.5	322.6	329.6	KTAS	354.7	363.5	372.1	380.5	388.7	
	180.6	180.6	180.6	180.6	180.6	KCAS	215.2	215.2	215.2	215.2	215.2	
	948	977	1006	1034	1059	LB/HR	1274	1312	1349	1389	1429	
	0.317	0.316	0.314	0.312	0.311	NM/LB	0.278	0.277	0.276	0.274	0.272	
26,000	65.8	67.4	69.0	70.6	72.1	%N1	71.7	73.4	75.2	76.9	78.5	34,000
	0.56	0.56	0.56	0.56	0.56	MIND	0.66	0.66	0.66	0.66	0.66	
	307.8	315.4	322.9	330.2	337.3	KTAS	360.5	369.5	378.2	386.7	395.1	
	185.0	185.0	185.0	185.0	185.0	KCAS	219.0	219.0	219.0	219.0	219.0	
	984	1013	1043	1072	1101	LB/HR	1317	1355	1394	1436	1477	
	0.313	0.311	0.310	0.308	0.306	NM/LB	0.274	0.273	0.271	0.269	0.268	
27,000	66.6	68.3	69.9	71.5	73.0	%N1	72.3	74.1	75.8	77.5	79.3	35,000
	0.57	0.57	0.57	0.57	0.57	MIND	0.67	0.67	0.67	0.67	0.67	
	314.7	322.5	330.1	337.6	344.9	KTAS	366.1	375.2	384.1	392.8	401.2	
	189.5	189.5	189.5	189.5	189.5	KCAS	222.7	222.7	222.7	222.7	222.7	
	1021	1053	1083	1114	1146	LB/HR	1359	1399	1440	1482	1524	
	0.308	0.306	0.305	0.303	0.301	NM/LB	0.269	0.268	0.267	0.265	0.263	
28,000	67.4	69.0	70.7	72.3	73.8	%N1	72.9	74.7	76.5	78.2	80.0	36,000
	0.59	0.59	0.59	0.59	0.59	MIND	0.68	0.68	0.68	0.68	0.68	
	321.6	329.6	337.4	345.0	352.5	KTAS	371.3	380.6	389.6	398.4	407.0	
	193.9	193.9	193.9	193.9	193.9	KCAS	226.1	226.1	226.1	226.1	226.1	
	1062	1094	1125	1158	1191	LB/HR	1401	1442	1484	1528	1571	
	0.303	0.301	0.300	0.298	0.296	NM/LB	0.265	0.264	0.262	0.261	0.259	
29,000	68.1	69.8	71.5	73.1	74.7	%N1	73.5	75.3	77.1	78.8	80.6	37,000
	0.60	0.60	0.60	0.60	0.60	MIND	0.69	0.69	0.69	0.69	0.69	
	328.7	336.8	344.8	352.6	360.2	KTAS	376.5	385.9	395.0	403.9	412.6	
	198.4	198.4	198.4	198.4	198.4	KCAS	229.5	229.5	229.5	229.5	229.5	
	1103	1136	1169	1203	1237	LB/HR	1443	1485	1529	1574	1619	
	0.298	0.296	0.295	0.293	0.291	NM/LB	0.261	0.260	0.258	0.257	0.255	
30,000	68.9	70.6	72.3	73.9	75.5	%N1	74.1	75.9	77.7	79.5	81.3	38,000
	0.61	0.61	0.61	0.61	0.61	MIND	0.70	0.70	0.70	0.70	0.70	
	335.7	344.1	352.2	360.2	368.0	KTAS	381.6	391.1	400.3	409.4	418.2	
	203.0	203.0	203.0	203.0	203.0	KCAS	232.9	232.9	232.9	232.9	232.9	
	1146	1181	1215	1250	1286	LB/HR	1485	1529	1574	1620	1669	
	0.293	0.291	0.290	0.288	0.286	NM/LB	0.257	0.256	0.254	0.253	0.251	
31,000	69.7	71.4	73.0	74.7	76.4	%N1	74.8	76.6	78.4	80.2	81.9	39,000
	0.62	0.62	0.62	0.62	0.62	MIND	0.70	0.70	0.70	0.70	0.70	
	342.7	351.3	359.6	367.7	375.6	KTAS	386.6	396.2	405.6	414.8	423.7	
	207.5	207.5	207.5	207.5	207.5	KCAS	236.2	236.2	236.2	236.2	236.2	
	1190	1226	1261	1298	1335	LB/HR	1528	1573	1621	1668	1720	
	0.288	0.286	0.285	0.283	0.281	NM/LB	0.253	0.252	0.250	0.249	0.246	
32,000	70.4	72.1	73.8	75.5	77.1	%N1						
	0.64	0.64	0.64	0.64	0.64	MIND						
	348.7	357.4	365.9	374.1	382.2	KTAS						
	211.4	211.4	211.4	211.4	211.4	KCAS						
	1232	1269	1304	1343	1382	LB/HR						
	0.283	0.282	0.281	0.279	0.277	NM/LB						

40,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	69.5	71.2	72.9	74.6	76.3	%N1	75.7	77.6	79.4	81.3	83.0	33,000
	0.63	0.63	0.63	0.63	0.63	MIND	0.73	0.73	0.73	0.73	0.73	
	345.2	353.8	362.3	370.6	378.6	KTAS	398.0	408.0	417.8	427.3	436.6	
	187.0	187.0	187.0	187.0	187.0	KCAS	218.3	218.3	218.3	218.3	218.3	
	977	1007	1038	1067	1098	LB/HR	1327	1368	1410	1450	1494	
	0.353	0.351	0.349	0.347	0.345	NM/LB	0.300	0.298	0.296	0.295	0.292	
26,000	70.3	72.1	73.8	75.5	77.2	%N1	76.5	78.4	80.2	82.0	83.8	34,000
	0.65	0.65	0.65	0.65	0.65	MIND	0.74	0.74	0.74	0.74	0.74	
	352.6	361.5	370.1	378.6	386.8	KTAS	403.9	414.0	423.9	433.6	443.1	
	191.3	191.3	191.3	191.3	191.3	KCAS	221.8	221.8	221.8	221.8	221.8	
	1019	1050	1082	1113	1145	LB/HR	1374	1417	1461	1504	1548	
	0.346	0.344	0.342	0.340	0.338	NM/LB	0.294	0.292	0.290	0.288	0.286	
27,000	71.2	72.9	74.7	76.4	78.1	%N1	77.1	79.1	80.9	82.8	84.6	35,000
	0.66	0.66	0.66	0.66	0.66	MIND	0.75	0.75	0.75	0.75	0.75	
	360.0	369.0	377.8	386.5	394.9	KTAS	409.6	419.8	429.9	439.7	449.3	
	195.6	195.6	195.6	195.6	195.6	KCAS	225.3	225.3	225.3	225.3	225.3	
	1062	1094	1127	1160	1194	LB/HR	1424	1468	1514	1559	1604	
	0.339	0.337	0.335	0.333	0.331	NM/LB	0.288	0.286	0.284	0.282	0.280	
28,000	72.0	73.8	75.6	77.3	78.9	%N1	77.9	79.8	81.7	83.6	85.4	36,000
	0.67	0.67	0.67	0.67	0.67	MIND	0.76	0.76	0.76	0.76	0.76	
	366.8	376.0	385.0	393.7	402.3	KTAS	415.1	425.6	435.7	445.7	455.4	
	199.6	199.6	199.6	199.6	199.6	KCAS	228.7	228.7	228.7	228.7	228.7	
	1104	1137	1171	1206	1241	LB/HR	1475	1521	1570	1616	1663	
	0.332	0.331	0.329	0.326	0.324	NM/LB	0.281	0.280	0.278	0.276	0.274	
29,000	72.7	74.5	76.3	78.1	79.8	%N1	78.6	80.5	82.5	84.3	86.2	37,000
	0.68	0.68	0.68	0.68	0.68	MIND	0.77	0.77	0.77	0.77	0.77	
	373.3	382.7	391.8	400.8	409.5	KTAS	420.6	431.2	441.5	451.6	461.4	
	203.5	203.5	203.5	203.5	203.5	KCAS	232.0	232.0	232.0	232.0	232.0	
	1147	1182	1217	1253	1288	LB/HR	1527	1575	1626	1673	1723	
	0.325	0.324	0.322	0.320	0.318	NM/LB	0.275	0.274	0.272	0.270	0.268	
30,000	73.5	75.3	77.1	78.8	80.6	%N1	79.3	81.3	83.2	85.1	86.9	38,000
	0.70	0.70	0.70	0.70	0.70	MIND	0.78	0.78	0.78	0.78	0.78	
	379.7	389.2	398.5	407.6	416.5	KTAS	426.0	436.7	447.2	457.4	467.3	
	207.3	207.3	207.3	207.3	207.3	KCAS	235.3	235.3	235.3	235.3	235.3	
	1190	1227	1263	1300	1336	LB/HR	1580	1630	1682	1732	1783	
	0.319	0.317	0.316	0.313	0.312	NM/LB	0.270	0.268	0.266	0.264	0.262	
31,000	74.2	76.0	77.9	79.6	81.4	%N1	80.2	82.2	84.1	86.0	87.8	39,000
	0.71	0.71	0.71	0.71	0.71	MIND	0.79	0.79	0.79	0.79	0.79	
	386.0	395.6	405.1	414.3	423.4	KTAS	431.4	442.2	452.8	463.1	473.2	
	211.1	211.1	211.1	211.1	211.1	KCAS	238.6	238.6	238.6	238.6	238.6	
	1235	1273	1311	1349	1388	LB/HR	1642	1694	1748	1800	1855	
	0.313	0.311	0.309	0.307	0.305	NM/LB	0.263	0.261	0.259	0.257	0.255	
32,000	75.0	76.8	78.7	80.5	82.2	%N1						
	0.72	0.72	0.72	0.72	0.72	MIND						
	392.0	401.9	411.5	420.9	430.1	KTAS						
	214.7	214.7	214.7	214.7	214.7	KCAS						
	1281	1320	1360	1399	1441	LB/HR						
	0.306	0.304	0.303	0.301	0.298	NM/LB						

45,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	74.7	76.5	78.4	80.2	82.0	%N1	83.2	85.3	87.3			33,000
	0.71	0.71	0.71	0.71	0.71	MIND	0.82	0.82	0.82			
	390.3	400.1	409.7	419.0	428.2	KTAS	446.1	457.3	468.2			
	190.0	190.0	190.0	190.0	190.0	KCAS	220.5	220.5	220.5			
	1020	1052	1084	1116	1148	LB/HR	1523	1571	1621			
	0.383	0.380	0.378	0.375	0.373	NM/LB	0.293	0.291	0.289			
26,000	75.6	77.5	79.3	81.2	83.0	%N1						34,000
	0.73	0.73	0.73	0.73	0.73	MIND						
	397.9	407.9	417.6	427.2	436.5	KTAS						
	194.1	194.1	194.1	194.1	194.1	KCAS						
	1068	1102	1135	1167	1202	LB/HR						
	0.373	0.370	0.368	0.366	0.363	NM/LB						
27,000	76.5	78.4	80.3	82.2	84.0	%N1						35,000
	0.74	0.74	0.74	0.74	0.74	MIND						
	405.3	415.5	425.4	435.1	444.6	KTAS						
	198.1	198.1	198.1	198.1	198.1	KCAS						
	1116	1151	1187	1221	1257	LB/HR						
	0.363	0.361	0.359	0.356	0.354	NM/LB						
28,000	77.4	79.4	81.3	83.1	85.0	%N1						36,000
	0.76	0.76	0.76	0.76	0.76	MIND						
	412.4	422.8	432.9	442.8	452.4	KTAS						
	201.9	201.9	201.9	201.9	201.9	KCAS						
	1165	1202	1240	1277	1316	LB/HR						
	0.354	0.352	0.349	0.347	0.344	NM/LB						
29,000	78.3	80.3	82.2	84.1	86.0	%N1						37,000
	0.77	0.77	0.77	0.77	0.77	MIND						
	419.4	429.9	440.2	450.2	460.1	KTAS						
	205.7	205.7	205.7	205.7	205.7	KCAS						
	1218	1257	1297	1335	1376	LB/HR						
	0.344	0.342	0.340	0.337	0.334	NM/LB						
30,000	79.2	81.2	83.2	85.1	86.9	%N1						38,000
	0.78	0.78	0.78	0.78	0.78	MIND						
	426.2	436.9	447.4	457.6	467.6	KTAS						
	209.5	209.5	209.5	209.5	209.5	KCAS						
	1272	1313	1354	1394	1437	LB/HR						
	0.335	0.333	0.330	0.328	0.325	NM/LB						
31,000	80.3	82.3	84.3	86.2		%N1						39,000
	0.79	0.79	0.79	0.79		MIND						
	433.0	443.8	454.5	464.8		KTAS						
	213.2	213.2	213.2	213.2		KCAS						
	1335	1379	1422	1466		LB/HR						
	0.324	0.322	0.320	0.317		NM/LB						
32,000	81.5	83.6	85.6	87.7		%N1						
	0.80	0.80	0.80	0.80		MIND						
	439.6	450.6	461.4	471.9		KTAS						
	216.9	216.9	216.9	216.9		KCAS						
	1414	1459	1506	1557		LB/HR						
	0.311	0.309	0.306	0.303		NM/LB						

HOLDING - WING AND ENGINE ANTI-ICE ON

SEA LEVEL
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-5.0	5.0	15.0	25.0	35.0	OAT (°C)	-5.0	5.0	15.0	25.0	35.0	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	43.0	43.8	44.7	45.6	46.5	%N1	46.8	47.8	48.8	49.7	50.8	33,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.29	0.29	0.29	0.29	0.29	
	178.5	181.8	185.0	188.2	191.3	KTAS	184.1	187.5	190.8	194.1	197.4	
	185.0	185.0	185.0	185.0	185.0	KCAS	190.8	190.8	190.8	190.8	190.8	
	1571	1613	1658	1706	1759	LB/HR	1750	1798	1849	1902	1962	
	0.114	0.113	0.112	0.110	0.109	NM/LB	0.105	0.104	0.103	0.102	0.101	
26,000	43.3	44.2	45.1	46.0	46.9	%N1	47.6	48.5	49.5	50.5	51.7	34,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.29	0.29	0.29	0.29	0.29	
	178.5	181.8	185.0	188.2	191.3	KTAS	187.1	190.5	193.9	197.3	200.6	
	185.0	185.0	185.0	185.0	185.0	KCAS	193.9	193.9	193.9	193.9	193.9	
	1588	1630	1675	1724	1778	LB/HR	1785	1835	1887	1941	2000	
	0.112	0.112	0.110	0.109	0.108	NM/LB	0.105	0.104	0.103	0.102	0.100	
27,000	43.7	44.6	45.5	46.4	47.4	%N1	48.3	49.3	50.3	51.4	52.5	35,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.30	0.30	0.30	0.30	0.30	
	178.5	181.8	185.0	188.2	191.3	KTAS	190.1	193.6	197.0	200.4	203.7	
	185.0	185.0	185.0	185.0	185.0	KCAS	197.0	197.0	197.0	197.0	197.0	
	1607	1650	1696	1744	1800	LB/HR	1821	1872	1925	1981	2039	
	0.111	0.110	0.109	0.108	0.106	NM/LB	0.104	0.103	0.102	0.101	0.100	
28,000	44.2	45.0	45.9	46.9	47.8	%N1	49.1	50.1	51.1	52.2	53.4	36,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.30	0.30	0.30	0.30	0.30	
	178.5	181.8	185.0	188.2	191.3	KTAS	193.0	196.6	200.1	203.5	206.9	
	185.0	185.0	185.0	185.0	185.0	KCAS	200.1	200.1	200.1	200.1	200.1	
	1625	1669	1716	1765	1822	LB/HR	1858	1911	1965	2022	2080	
	0.110	0.109	0.108	0.107	0.105	NM/LB	0.104	0.103	0.102	0.101	0.099	
29,000	44.6	45.5	46.4	47.3	48.3	%N1	49.8	50.9	51.9	53.0	54.2	37,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.31	0.31	0.31	0.31	0.31	
	178.5	181.8	185.0	188.2	191.3	KTAS	195.9	199.5	203.1	206.6	210.0	
	185.0	185.0	185.0	185.0	185.0	KCAS	203.1	203.1	203.1	203.1	203.1	
	1644	1689	1736	1786	1844	LB/HR	1897	1950	2006	2064	2125	
	0.109	0.108	0.107	0.105	0.104	NM/LB	0.103	0.102	0.101	0.100	0.099	
30,000	45.0	45.9	46.8	47.7	48.7	%N1	50.6	51.6	52.7	53.8	54.8	38,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.31	0.31	0.31	0.31	0.31	
	178.5	181.8	185.0	188.2	191.3	KTAS	198.8	202.4	206.0	209.6	213.1	
	185.0	185.0	185.0	185.0	185.0	KCAS	206.0	206.0	206.0	206.0	206.0	
	1663	1708	1756	1807	1865	LB/HR	1936	1991	2047	2107	2170	
	0.107	0.106	0.105	0.104	0.103	NM/LB	0.103	0.102	0.101	0.099	0.098	
31,000	45.4	46.3	47.2	48.2	49.2	%N1	51.3	52.3	53.3	54.4	55.4	39,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.32	0.32	0.32	0.32	0.32	
	178.5	181.8	185.0	188.2	191.3	KTAS	201.6	205.3	209.0	212.6	216.1	
	185.0	185.0	185.0	185.0	185.0	KCAS	209.0	209.0	209.0	209.0	209.0	
	1682	1728	1776	1827	1887	LB/HR	1975	2032	2090	2152	2216	
	0.106	0.105	0.104	0.103	0.101	NM/LB	0.102	0.101	0.100	0.099	0.098	
32,000	46.1	47.0	48.0	48.9	50.0	%N1						
	0.28	0.28	0.28	0.28	0.28	MIND						
	181.2	184.5	187.8	191.1	194.2	KTAS						
	187.8	187.8	187.8	187.8	187.8	KCAS						
	1715	1762	1812	1864	1924	LB/HR						
	0.106	0.105	0.104	0.103	0.101	NM/LB						

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	46.0	46.9	47.9	48.8	49.9	%N1	50.1	51.2	52.3	53.3	54.6	33,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.32	0.32	0.32	0.32	0.32	
	191.6	195.3	198.9	202.5	205.9	KTAS	199.5	203.3	207.1	210.7	214.4	
	185.0	185.0	185.0	185.0	185.0	KCAS	192.6	192.6	192.6	192.6	192.6	
	1452	1492	1533	1576	1621	LB/HR	1661	1707	1756	1808	1863	
	0.132	0.131	0.130	0.128	0.127	NM/LB	0.120	0.119	0.118	0.117	0.115	
26,000	46.3	47.3	48.3	49.2	50.3	%N1	50.9	52.0	53.1	54.2	55.5	34,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.32	0.32	0.32	0.32	0.32	
	191.6	195.3	198.9	202.5	205.9	KTAS	202.8	206.7	210.5	214.2	217.9	
	185.0	185.0	185.0	185.0	185.0	KCAS	195.8	195.8	195.8	195.8	195.8	
	1470	1511	1553	1597	1642	LB/HR	1700	1748	1798	1851	1910	
	0.130	0.129	0.128	0.127	0.125	NM/LB	0.119	0.118	0.117	0.116	0.114	
27,000	46.8	47.7	48.7	49.7	50.8	%N1	51.7	52.8	53.9	55.0	56.2	35,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.33	0.33	0.33	0.33	0.33	
	191.6	195.3	198.9	202.5	205.9	KTAS	206.0	210.0	213.9	217.7	221.4	
	185.0	185.0	185.0	185.0	185.0	KCAS	199.0	199.0	199.0	199.0	199.0	
	1491	1533	1575	1620	1667	LB/HR	1739	1789	1840	1895	1954	
	0.129	0.127	0.126	0.125	0.124	NM/LB	0.118	0.117	0.116	0.115	0.113	
28,000	47.2	48.2	49.2	50.2	51.3	%N1	52.5	53.6	54.7	55.8	56.8	36,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.33	0.33	0.33	0.33	0.33	
	191.6	195.3	198.9	202.5	205.9	KTAS	209.3	213.3	217.2	221.1	224.9	
	185.0	185.0	185.0	185.0	185.0	KCAS	202.1	202.1	202.1	202.1	202.1	
	1513	1554	1598	1644	1691	LB/HR	1779	1829	1882	1939	1999	
	0.127	0.126	0.125	0.123	0.122	NM/LB	0.118	0.117	0.115	0.114	0.113	
29,000	47.6	48.6	49.6	50.6	51.8	%N1	53.1	54.2	55.3	56.4	57.4	37,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.34	0.34	0.34	0.34	0.34	
	191.6	195.3	198.9	202.5	205.9	KTAS	212.5	216.5	220.5	224.5	228.3	
	185.0	185.0	185.0	185.0	185.0	KCAS	205.2	205.2	205.2	205.2	205.2	
	1534	1576	1620	1667	1716	LB/HR	1819	1871	1925	1983	2043	
	0.125	0.124	0.123	0.121	0.120	NM/LB	0.117	0.116	0.115	0.113	0.112	
30,000	48.0	49.0	50.0	51.1	52.2	%N1	53.6	54.7	55.9	57.0	58.1	38,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.34	0.34	0.34	0.34	0.34	
	191.6	195.3	198.9	202.5	205.9	KTAS	215.6	219.8	223.8	227.8	231.7	
	185.0	185.0	185.0	185.0	185.0	KCAS	208.3	208.3	208.3	208.3	208.3	
	1555	1598	1643	1690	1740	LB/HR	1860	1912	1968	2027	2088	
	0.123	0.122	0.121	0.120	0.118	NM/LB	0.116	0.115	0.114	0.112	0.111	
31,000	48.6	49.6	50.6	51.6	52.8	%N1	54.2	55.3	56.5	57.6	58.7	39,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.35	0.35	0.35	0.35	0.35	
	192.8	196.5	200.1	203.7	207.2	KTAS	218.7	222.9	227.0	231.0	235.0	
	186.1	186.1	186.1	186.1	186.1	KCAS	211.2	211.2	211.2	211.2	211.2	
	1582	1626	1672	1721	1772	LB/HR	1900	1953	2010	2070	2133	
	0.122	0.121	0.120	0.118	0.117	NM/LB	0.115	0.114	0.113	0.112	0.110	
32,000	49.4	50.4	51.4	52.5	53.7	%N1						
	0.31	0.31	0.31	0.31	0.31	MIND						
	196.1	199.9	203.6	207.2	210.8	KTAS						
	189.4	189.4	189.4	189.4	189.4	KCAS						
	1621	1667	1714	1764	1817	LB/HR						
	0.121	0.120	0.119	0.117	0.116	NM/LB						

10,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	49.0	50.0	51.0	52.0	53.0	%N1	53.4	54.5	55.7	56.7	57.9	33,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.35	0.35	0.35	0.35	0.35	
	206.2	210.3	214.4	218.3	222.2	KTAS	216.9	221.3	225.5	229.7	233.7	
	185.0	185.0	185.0	185.0	185.0	KCAS	194.7	194.7	194.7	194.7	194.7	
	1345	1382	1421	1403	1437	LB/HR	1596	1641	1692	1624	1665	
	0.153	0.152	0.151	0.156	0.155	NM/LB	0.136	0.135	0.133	0.141	0.140	
26,000	49.4	50.4	51.4	52.4	53.4	%N1	54.2	55.3	56.5	57.5	58.7	34,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.36	0.36	0.36	0.36	0.36	
	206.2	210.3	214.4	218.3	222.2	KTAS	220.4	224.8	229.1	233.4	237.5	
	185.0	185.0	185.0	185.0	185.0	KCAS	197.9	197.9	197.9	197.9	197.9	
	1367	1404	1444	1422	1456	LB/HR	1641	1688	1741	1664	1709	
	0.151	0.150	0.148	0.154	0.153	NM/LB	0.134	0.133	0.132	0.140	0.139	
27,000	49.8	50.9	51.9	52.8	53.9	%N1	55.0	56.1	57.3	58.4	59.5	35,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.37	0.37	0.37	0.37	0.37	
	206.2	210.3	214.4	218.3	222.2	KTAS	223.9	228.4	232.8	237.0	241.3	
	185.0	185.0	185.0	185.0	185.0	KCAS	201.0	201.0	201.0	201.0	201.0	
	1391	1429	1470	1443	1478	LB/HR	1686	1735	1790	1704	1773	
	0.148	0.147	0.146	0.151	0.150	NM/LB	0.133	0.132	0.130	0.139	0.136	
28,000	50.3	51.3	52.3	53.3	54.3	%N1	55.6	56.8	58.0	59.1	60.2	36,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.37	0.37	0.37	0.37	0.37	
	206.2	210.3	214.4	218.3	222.2	KTAS	227.3	231.9	236.3	240.7	245.0	
	185.0	185.0	185.0	185.0	185.0	KCAS	204.1	204.1	204.1	204.1	204.1	
	1415	1454	1496	1465	1500	LB/HR	1729	1778	1834	1760	1836	
	0.146	0.145	0.143	0.149	0.148	NM/LB	0.131	0.130	0.129	0.137	0.133	
29,000	50.7	51.7	52.8	53.8	54.8	%N1	56.2	57.4	58.7	59.7	61.0	37,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.38	0.38	0.38	0.38	0.38	
	206.2	210.3	214.4	218.3	222.2	KTAS	230.7	235.3	239.8	244.3	248.6	
	185.0	185.0	185.0	185.0	185.0	KCAS	207.2	207.2	207.2	207.2	207.2	
	1439	1479	1522	1486	1522	LB/HR	1769	1820	1877	1819	1900	
	0.143	0.142	0.141	0.147	0.146	NM/LB	0.130	0.129	0.128	0.134	0.131	
30,000	51.1	52.2	53.2	54.2	55.3	%N1	56.9	58.1	59.3	60.4	61.7	38,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.38	0.38	0.38	0.38	0.38	
	206.2	210.3	214.4	218.3	222.2	KTAS	234.1	238.7	243.3	247.8	252.2	
	185.0	185.0	185.0	185.0	185.0	KCAS	210.3	210.3	210.3	210.3	210.3	
	1463	1503	1548	1507	1544	LB/HR	1810	1862	1920	1879	1964	
	0.141	0.140	0.139	0.145	0.144	NM/LB	0.129	0.128	0.127	0.132	0.128	
31,000	51.9	52.9	54.0	55.0	56.1	%N1	57.5	58.7	60.0	61.1	62.5	39,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.39	0.39	0.39	0.39	0.39	
	209.7	213.9	218.0	222.0	226.0	KTAS	237.4	242.1	246.8	251.3	255.8	
	188.2	188.2	188.2	188.2	188.2	KCAS	213.3	213.3	213.3	213.3	213.3	
	1506	1548	1595	1545	1583	LB/HR	1851	1905	1964	1939	2028	
	0.139	0.138	0.137	0.144	0.143	NM/LB	0.128	0.127	0.126	0.130	0.126	
32,000	52.6	53.7	54.9	55.9	57.0	%N1						
	0.35	0.35	0.35	0.35	0.35	MIND						
	213.4	217.6	221.8	225.9	229.9	KTAS						
	191.5	191.5	191.5	191.5	191.5	KCAS						
	1551	1595	1644	1584	1624	LB/HR						
	0.138	0.136	0.135	0.143	0.142	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	52.4	53.5	54.7	55.9	57.1	%N1	57.1	58.4	59.7	61.0	62.3	33,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.39	0.39	0.39	0.39	0.39	
	222.4	227.0	231.5	236.0	240.3	KTAS	236.3	241.2	246.0	250.8	255.4	
	185.0	185.0	185.0	185.0	185.0	KCAS	196.8	196.8	196.8	196.8	196.8	
	1308	1346	1385	1426	1469	LB/HR	1574	1620	1668	1718	1770	
	0.170	0.169	0.167	0.166	0.164	NM/LB	0.150	0.149	0.148	0.146	0.144	
26,000	52.8	54.0	55.1	56.3	57.5	%N1	58.0	59.3	60.6	61.9	63.1	34,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.40	0.40	0.40	0.40	0.40	
	222.4	227.0	231.5	236.0	240.3	KTAS	240.3	245.2	250.1	254.9	259.6	
	185.0	185.0	185.0	185.0	185.0	KCAS	200.1	200.1	200.1	200.1	200.1	
	1330	1368	1408	1450	1494	LB/HR	1619	1667	1716	1769	1823	
	0.167	0.166	0.164	0.163	0.161	NM/LB	0.148	0.147	0.146	0.144	0.142	
27,000	53.2	54.4	55.6	56.8	58.0	%N1	58.6	59.9	61.2	62.5	63.8	35,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.41	0.41	0.41	0.41	0.41	
	222.4	227.0	231.5	236.0	240.3	KTAS	244.1	249.2	254.2	259.0	263.8	
	185.0	185.0	185.0	185.0	185.0	KCAS	203.4	203.4	203.4	203.4	203.4	
	1355	1394	1434	1477	1522	LB/HR	1663	1712	1763	1800	1875	
	0.164	0.163	0.161	0.160	0.158	NM/LB	0.147	0.146	0.144	0.144	0.141	
28,000	53.7	54.9	56.1	57.3	58.5	%N1	59.2	60.6	61.9	63.1	64.5	36,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.41	0.41	0.41	0.41	0.41	
	222.4	227.0	231.5	236.0	240.3	KTAS	248.0	253.1	258.2	263.1	268.0	
	185.0	185.0	185.0	185.0	185.0	KCAS	206.6	206.6	206.6	206.6	206.6	
	1379	1419	1460	1504	1549	LB/HR	1704	1756	1809	1830	1928	
	0.161	0.160	0.159	0.157	0.155	NM/LB	0.146	0.144	0.143	0.144	0.139	
29,000	54.1	55.3	56.5	57.8	59.0	%N1	59.8	61.2	62.5	63.7	65.2	37,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.42	0.42	0.42	0.42	0.42	
	222.4	227.0	231.5	236.0	240.3	KTAS	251.8	257.0	262.1	267.1	272.1	
	185.0	185.0	185.0	185.0	185.0	KCAS	209.8	209.8	209.8	209.8	209.8	
	1403	1444	1486	1531	1577	LB/HR	1746	1800	1854	1860	1980	
	0.159	0.157	0.156	0.154	0.152	NM/LB	0.144	0.143	0.141	0.144	0.137	
30,000	54.7	56.0	57.2	58.4	59.7	%N1	60.5	61.8	63.2	64.3	66.0	38,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.43	0.43	0.43	0.43	0.43	
	224.4	229.1	233.6	238.1	242.5	KTAS	255.5	260.8	266.0	271.1	276.1	
	186.7	186.7	186.7	186.7	186.7	KCAS	213.0	213.0	213.0	213.0	213.0	
	1438	1479	1523	1568	1616	LB/HR	1788	1844	1900	1891	2033	
	0.156	0.155	0.153	0.152	0.150	NM/LB	0.143	0.141	0.140	0.143	0.136	
31,000	55.5	56.8	58.0	59.3	60.6	%N1	61.1	62.4	63.8	64.9	66.7	39,000
	0.38	0.38	0.38	0.38	0.38	MIND	0.43	0.43	0.43	0.43	0.43	
	228.4	233.1	237.8	242.3	246.8	KTAS	259.3	264.7	270.0	275.1	280.2	
	190.1	190.1	190.1	190.1	190.1	KCAS	216.3	216.3	216.3	216.3	216.3	
	1483	1526	1571	1618	1667	LB/HR	1830	1888	1947	1921	2086	
	0.154	0.153	0.151	0.150	0.148	NM/LB	0.142	0.140	0.139	0.143	0.134	
32,000	56.3	57.6	58.9	60.1	61.5	%N1						
	0.39	0.39	0.39	0.39	0.39	MIND						
	232.4	237.2	241.9	246.6	251.1	KTAS						
	193.4	193.4	193.4	193.4	193.4	KCAS						
	1528	1573	1619	1668	1718	LB/HR						
	0.152	0.151	0.149	0.148	0.146	NM/LB						

20,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-44.6	-34.6	-24.6	-14.6	-4.6	OAT (°C)	-44.6	-34.6	-24.6	-14.6	-4.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	55.4	56.7	58.0	59.3	60.9	%N1	60.7	62.1	63.5	64.9	66.4	33,000
	0.41	0.41	0.41	0.41	0.41	MIND	0.44	0.44	0.44	0.44	0.44	
	240.4	245.6	250.7	255.7	260.6	KTAS	259.2	264.8	270.3	275.7	280.9	
	185.0	185.0	185.0	185.0	185.0	KCAS	199.8	199.8	199.8	199.8	199.8	
	1271	1310	1351	1393	1423	LB/HR	1541	1590	1641	1694	1747	
	0.189	0.187	0.186	0.184	0.183	NM/LB	0.168	0.167	0.165	0.163	0.161	
26,000	55.9	57.2	58.5	59.8	61.5	%N1	61.3	62.8	64.2	65.7	67.2	34,000
	0.41	0.41	0.41	0.41	0.41	MIND	0.45	0.45	0.45	0.45	0.45	
	240.4	245.6	250.7	255.7	260.6	KTAS	263.6	269.3	274.9	280.4	285.7	
	185.0	185.0	185.0	185.0	185.0	KCAS	203.3	203.3	203.3	203.3	203.3	
	1292	1332	1374	1416	1449	LB/HR	1588	1639	1692	1746	1800	
	0.186	0.184	0.183	0.181	0.180	NM/LB	0.166	0.164	0.162	0.161	0.159	
27,000	56.4	57.7	59.1	60.4	62.1	%N1	62.0	63.5	65.0	66.4	67.9	35,000
	0.41	0.41	0.41	0.41	0.41	MIND	0.46	0.46	0.46	0.46	0.46	
	240.4	245.6	250.7	255.7	260.6	KTAS	268.0	273.8	279.5	285.1	290.5	
	185.0	185.0	185.0	185.0	185.0	KCAS	206.8	206.8	206.8	206.8	206.8	
	1315	1355	1398	1441	1477	LB/HR	1636	1689	1743	1799	1856	
	0.183	0.181	0.179	0.177	0.176	NM/LB	0.164	0.162	0.160	0.159	0.157	
28,000	56.9	58.3	59.6	61.0	62.7	%N1	62.7	64.2	65.7	67.2	68.6	36,000
	0.41	0.41	0.41	0.41	0.41	MIND	0.46	0.46	0.46	0.46	0.46	
	240.4	245.6	250.7	255.7	260.6	KTAS	272.4	278.3	284.0	289.7	295.2	
	185.0	185.0	185.0	185.0	185.0	KCAS	210.2	210.2	210.2	210.2	210.2	
	1337	1379	1422	1466	1505	LB/HR	1684	1738	1794	1852	1912	
	0.180	0.178	0.176	0.174	0.173	NM/LB	0.162	0.160	0.158	0.156	0.154	
29,000	57.5	58.9	60.2	61.6	63.2	%N1	63.4	64.9	66.4	67.9	69.4	37,000
	0.41	0.41	0.41	0.41	0.41	MIND	0.47	0.47	0.47	0.47	0.47	
	241.1	246.3	251.4	256.4	261.3	KTAS	276.5	282.5	288.3	294.1	299.7	
	185.5	185.5	185.5	185.5	185.5	KCAS	213.5	213.5	213.5	213.5	213.5	
	1362	1405	1449	1494	1537	LB/HR	1731	1787	1844	1904	1968	
	0.177	0.175	0.174	0.172	0.170	NM/LB	0.160	0.158	0.156	0.154	0.152	
30,000	58.4	59.8	61.2	62.6	64.0	%N1	64.0	65.5	67.0	68.5	70.1	38,000
	0.42	0.42	0.42	0.42	0.42	MIND	0.48	0.48	0.48	0.48	0.48	
	245.6	251.0	256.2	261.3	266.3	KTAS	280.5	286.6	292.5	298.3	304.0	
	189.1	189.1	189.1	189.1	189.1	KCAS	216.7	216.7	216.7	216.7	216.7	
	1403	1448	1493	1540	1589	LB/HR	1773	1819	1894	1958	2023	
	0.175	0.173	0.172	0.170	0.168	NM/LB	0.158	0.158	0.154	0.152	0.150	
31,000	59.3	60.6	62.0	63.4	64.8	%N1	64.6	66.1	67.7	69.2	70.7	39,000
	0.43	0.43	0.43	0.43	0.43	MIND	0.48	0.48	0.48	0.48	0.48	
	250.1	255.6	260.9	266.1	271.2	KTAS	284.4	290.6	296.6	302.5	308.3	
	192.7	192.7	192.7	192.7	192.7	KCAS	219.8	219.8	219.8	219.8	219.8	
	1446	1493	1541	1590	1641	LB/HR	1815	1848	1945	2011	2077	
	0.173	0.171	0.169	0.167	0.165	NM/LB	0.157	0.157	0.153	0.150	0.148	
32,000	60.0	61.4	62.7	64.1	65.6	%N1						
	0.43	0.43	0.43	0.43	0.43	MIND						
	254.7	260.2	265.6	270.9	276.1	KTAS						
	196.3	196.3	196.3	196.3	196.3	KCAS						
	1493	1541	1591	1642	1694	LB/HR						
	0.171	0.169	0.167	0.165	0.163	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	58.9	60.4	61.8	63.2	64.7	%N1	64.1	65.6	67.2	68.8	70.6	33,000
	0.45	0.45	0.45	0.45	0.45	MIND	0.50	0.50	0.50	0.50	0.50	
	260.4	266.3	272.1	277.7	283.2	KTAS	284.9	291.4	297.7	303.9	309.9	
	185.0	185.0	185.0	185.0	185.0	KCAS	203.0	203.0	203.0	203.0	203.0	
	1212	1252	1293	1338	1391	LB/HR	1521	1572	1625	1680	1740	
	0.215	0.213	0.210	0.208	0.204	NM/LB	0.187	0.185	0.183	0.181	0.178	
26,000	59.4	60.8	62.3	63.7	65.2	%N1	64.7	66.3	67.9	69.5	71.3	34,000
	0.45	0.45	0.45	0.45	0.45	MIND	0.50	0.50	0.50	0.50	0.50	
	260.4	266.3	272.1	277.7	283.2	KTAS	289.6	296.1	302.5	308.8	314.9	
	185.0	185.0	185.0	185.0	185.0	KCAS	206.4	206.4	206.4	206.4	206.4	
	1236	1278	1320	1365	1418	LB/HR	1567	1620	1675	1731	1793	
	0.211	0.209	0.206	0.203	0.200	NM/LB	0.185	0.183	0.181	0.178	0.176	
27,000	59.8	61.3	62.8	64.2	65.8	%N1	65.4	67.0	68.6	70.2	72.0	35,000
	0.45	0.45	0.45	0.45	0.45	MIND	0.51	0.51	0.51	0.51	0.51	
	260.4	266.3	272.1	277.7	283.2	KTAS	294.4	301.1	307.6	314.0	320.2	
	185.0	185.0	185.0	185.0	185.0	KCAS	210.0	210.0	210.0	210.0	210.0	
	1262	1304	1348	1394	1445	LB/HR	1616	1670	1726	1784	1846	
	0.206	0.204	0.202	0.199	0.196	NM/LB	0.182	0.180	0.178	0.176	0.173	
28,000	60.3	61.8	63.2	64.7	66.4	%N1	66.1	67.7	69.3	71.0	72.7	36,000
	0.45	0.45	0.45	0.45	0.45	MIND	0.52	0.52	0.52	0.52	0.52	
	260.5	266.4	272.1	277.8	283.3	KTAS	299.4	306.2	312.8	319.3	325.6	
	185.0	185.0	185.0	185.0	185.0	KCAS	213.7	213.7	213.7	213.7	213.7	
	1288	1331	1375	1422	1472	LB/HR	1665	1721	1779	1839	1901	
	0.202	0.200	0.198	0.195	0.192	NM/LB	0.180	0.178	0.176	0.174	0.171	
29,000	61.1	62.6	64.1	65.6	67.3	%N1	66.7	68.4	70.0	71.7	73.5	37,000
	0.46	0.46	0.46	0.46	0.46	MIND	0.53	0.53	0.53	0.53	0.53	
	265.7	271.7	277.6	283.4	289.0	KTAS	304.3	311.2	317.9	324.5	331.0	
	188.9	188.9	188.9	188.9	188.9	KCAS	217.4	217.4	217.4	217.4	217.4	
	1335	1380	1426	1475	1523	LB/HR	1715	1772	1832	1893	1956	
	0.199	0.197	0.195	0.192	0.190	NM/LB	0.177	0.176	0.174	0.171	0.169	
30,000	61.8	63.4	64.9	66.4	68.2	%N1	67.4	69.1	70.8	72.4	74.2	38,000
	0.47	0.47	0.47	0.47	0.47	MIND	0.54	0.54	0.54	0.54	0.54	
	270.7	276.9	282.8	288.7	294.5	KTAS	309.2	316.2	323.1	329.8	336.3	
	192.6	192.6	192.6	192.6	192.6	KCAS	221.0	221.0	221.0	221.0	221.0	
	1382	1428	1476	1526	1577	LB/HR	1765	1823	1885	1948	2011	
	0.196	0.194	0.192	0.189	0.187	NM/LB	0.175	0.173	0.171	0.169	0.167	
31,000	62.6	64.1	65.7	67.3	69.0	%N1	68.1	69.7	71.4	73.1	74.9	39,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.55	0.55	0.55	0.55	0.55	
	275.5	281.8	287.9	293.8	299.7	KTAS	314.1	321.2	328.2	335.0	341.6	
	196.1	196.1	196.1	196.1	196.1	KCAS	224.7	224.7	224.7	224.7	224.7	
	1428	1476	1526	1578	1631	LB/HR	1807	1873	1937	2001	2066	
	0.193	0.191	0.189	0.186	0.184	NM/LB	0.174	0.171	0.169	0.167	0.165	
32,000	63.4	64.9	66.5	68.0	69.8	%N1						
	0.49	0.49	0.49	0.49	0.49	MIND						
	280.3	286.6	292.8	298.9	304.8	KTAS						
	199.6	199.6	199.6	199.6	199.6	KCAS						
	1474	1525	1576	1629	1685	LB/HR						
	0.190	0.188	0.186	0.184	0.181	NM/LB						

30,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-64.4	-54.4	-44.4	-34.4	-24.4	OAT (°C)	-64.4	-54.4	-44.4	-34.4	-24.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	62.2	63.8	65.4	67.0	68.6	%N1	67.7	69.5	71.2	72.9	74.7	33,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.56	0.56	0.56	0.56	0.56	
	282.8	289.5	296.0	302.4	308.7	KTAS	316.7	324.2	331.6	338.7	345.8	
	185.0	185.0	185.0	185.0	185.0	KCAS	208.3	208.3	208.3	208.3	208.3	
	1177	1219	1262	1307	1356	LB/HR	1512	1565	1619	1675	1727	
	0.240	0.238	0.235	0.231	0.228	NM/LB	0.210	0.207	0.205	0.202	0.200	
26,000	62.7	64.3	65.9	67.5	69.2	%N1	68.4	70.2	72.0	73.6	75.5	34,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.57	0.57	0.57	0.57	0.57	
	282.8	289.5	296.0	302.4	308.7	KTAS	322.4	330.0	337.5	344.8	351.9	
	185.0	185.0	185.0	185.0	185.0	KCAS	212.2	212.2	212.2	212.2	212.2	
	1203	1246	1290	1335	1384	LB/HR	1560	1615	1670	1728	1780	
	0.235	0.232	0.230	0.227	0.223	NM/LB	0.207	0.204	0.202	0.199	0.198	
27,000	63.2	64.8	66.5	68.1	69.7	%N1	69.1	70.9	72.7	74.3	76.2	35,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.58	0.58	0.58	0.58	0.58	
	282.8	289.5	296.0	302.4	308.7	KTAS	328.0	335.7	343.3	350.8	358.0	
	185.0	185.0	185.0	185.0	185.0	KCAS	216.1	216.1	216.1	216.1	216.1	
	1228	1273	1318	1364	1412	LB/HR	1608	1665	1721	1782	1835	
	0.230	0.227	0.225	0.222	0.219	NM/LB	0.204	0.202	0.199	0.197	0.195	
28,000	63.9	65.6	67.3	68.9	70.6	%N1	69.8	71.6	73.4	75.0	76.9	36,000
	0.51	0.51	0.51	0.51	0.51	MIND	0.59	0.59	0.59	0.59	0.59	
	287.3	294.1	300.8	307.3	313.6	KTAS	333.7	341.6	349.4	356.9	364.3	
	188.1	188.1	188.1	188.1	188.1	KCAS	220.1	220.1	220.1	220.1	220.1	
	1271	1317	1364	1411	1459	LB/HR	1658	1717	1775	1838	1892	
	0.226	0.223	0.221	0.218	0.215	NM/LB	0.201	0.199	0.197	0.194	0.193	
29,000	64.8	66.5	68.1	69.7	71.5	%N1	70.5	72.3	74.1	75.7	77.6	37,000
	0.52	0.52	0.52	0.52	0.52	MIND	0.60	0.60	0.60	0.60	0.60	
	293.4	300.3	307.1	313.7	320.2	KTAS	339.5	347.5	355.4	363.1	370.6	
	192.2	192.2	192.2	192.2	192.2	KCAS	224.2	224.2	224.2	224.2	224.2	
	1320	1368	1416	1464	1513	LB/HR	1710	1770	1831	1895	1952	
	0.222	0.220	0.217	0.214	0.212	NM/LB	0.199	0.196	0.194	0.192	0.190	
30,000	65.6	67.3	68.9	70.5	72.3	%N1	71.1	73.0	74.8	76.4	78.3	38,000
	0.53	0.53	0.53	0.53	0.53	MIND	0.61	0.61	0.61	0.61	0.61	
	299.3	306.4	313.4	320.1	326.8	KTAS	345.3	353.4	361.4	369.2	376.9	
	196.3	196.3	196.3	196.3	196.3	KCAS	228.2	228.2	228.2	228.2	228.2	
	1368	1417	1467	1517	1567	LB/HR	1764	1826	1889	1954	2013	
	0.219	0.216	0.214	0.211	0.209	NM/LB	0.196	0.194	0.191	0.189	0.187	
31,000	66.3	68.0	69.7	71.3	73.1	%N1	71.8	73.6	75.5	77.1	79.0	39,000
	0.54	0.54	0.54	0.54	0.54	MIND	0.62	0.62	0.62	0.62	0.62	
	305.3	312.5	319.6	326.5	333.3	KTAS	351.0	359.3	367.4	375.4	383.2	
	200.4	200.4	200.4	200.4	200.4	KCAS	232.2	232.2	232.2	232.2	232.2	
	1416	1467	1518	1569	1620	LB/HR	1820	1883	1949	2015	2075	
	0.216	0.213	0.211	0.208	0.206	NM/LB	0.193	0.191	0.189	0.186	0.185	
32,000	67.0	68.8	70.5	72.1	73.9	%N1						
	0.55	0.55	0.55	0.55	0.55	MIND						
	311.1	318.4	325.6	332.7	339.6	KTAS						
	204.4	204.4	204.4	204.4	204.4	KCAS						
	1464	1516	1568	1622	1673	LB/HR						
	0.213	0.210	0.208	0.205	0.203	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	65.4	67.1	68.8	70.5	72.3	%N1	71.4	73.2	75.0	77.0		33,000
	0.56	0.56	0.56	0.56	0.56	MIND	0.65	0.65	0.65	0.65		
	307.7	315.3	322.8	330.1	337.2	KTAS	354.7	363.5	372.1	380.5		
	185.0	185.0	185.0	185.0	185.0	KCAS	215.2	215.2	215.2	215.2		
	1141	1182	1225	1266	1308	LB/HR	1513	1568	1589	1677		
	0.270	0.267	0.264	0.261	0.258	NM/LB	0.234	0.232	0.234	0.227		
26,000	65.9	67.7	69.4	71.1	72.9	%N1	72.0	73.9	75.7	77.7		34,000
	0.56	0.56	0.56	0.56	0.56	MIND	0.66	0.66	0.66	0.66		
	307.8	315.4	322.9	330.2	337.3	KTAS	360.5	369.5	378.2	386.7		
	185.0	185.0	185.0	185.0	185.0	KCAS	219.0	219.0	219.0	219.0		
	1166	1208	1252	1294	1336	LB/HR	1562	1620	1624	1733		
	0.264	0.261	0.258	0.255	0.253	NM/LB	0.231	0.228	0.233	0.223		
27,000	66.8	68.6	70.3	72.0	73.8	%N1	72.7	74.6	76.4	78.4		35,000
	0.57	0.57	0.57	0.57	0.57	MIND	0.67	0.67	0.67	0.67		
	314.7	322.5	330.1	337.6	344.9	KTAS	366.1	375.2	384.1	392.8		
	189.5	189.5	189.5	189.5	189.5	KCAS	222.7	222.7	222.7	222.7		
	1213	1257	1301	1345	1389	LB/HR	1610	1668	1674	1788		
	0.259	0.257	0.254	0.251	0.248	NM/LB	0.227	0.225	0.229	0.220		
28,000	67.6	69.4	71.1	72.9	74.7	%N1	73.3	75.2	77.0	79.0		36,000
	0.59	0.59	0.59	0.59	0.59	MIND	0.68	0.68	0.68	0.68		
	321.6	329.6	337.4	345.0	352.5	KTAS	371.3	380.6	389.6	398.4		
	193.9	193.9	193.9	193.9	193.9	KCAS	226.1	226.1	226.1	226.1		
	1261	1306	1351	1397	1443	LB/HR	1657	1713	1733	1842		
	0.255	0.252	0.250	0.247	0.244	NM/LB	0.224	0.222	0.225	0.216		
29,000	68.4	70.2	72.0	73.8	75.6	%N1	73.9	75.9	77.7	79.7		37,000
	0.60	0.60	0.60	0.60	0.60	MIND	0.69	0.69	0.69	0.69		
	328.7	336.8	344.8	352.6	360.2	KTAS	376.5	385.9	395.0	403.9		
	198.4	198.4	198.4	198.4	198.4	KCAS	229.5	229.5	229.5	229.5		
	1310	1356	1403	1451	1499	LB/HR	1703	1761	1795	1896		
	0.251	0.248	0.246	0.243	0.240	NM/LB	0.221	0.219	0.220	0.213		
30,000	69.2	71.1	72.8	74.6	76.4	%N1	74.5	76.5	78.4	80.4		38,000
	0.61	0.61	0.61	0.61	0.61	MIND	0.70	0.70	0.70	0.70		
	335.7	344.1	352.2	360.2	368.0	KTAS	381.6	391.1	400.3	409.4		
	203.0	203.0	203.0	203.0	203.0	KCAS	232.9	232.9	232.9	232.9		
	1361	1409	1457	1508	1558	LB/HR	1748	1811	1861	1950		
	0.247	0.244	0.242	0.239	0.236	NM/LB	0.218	0.216	0.215	0.210		
31,000	70.0	71.8	73.6	75.4		%N1	75.1					39,000
	0.62	0.62	0.62	0.62		MIND	0.70					
	342.7	351.3	359.6	367.7		KTAS	386.6					
	207.5	207.5	207.5	207.5		KCAS	236.2					
	1414	1464	1507	1567		LB/HR	1795					
	0.242	0.240	0.239	0.235		NM/LB	0.215					
32,000	70.7	72.5	74.3	76.2		%N1						
	0.64	0.64	0.64	0.64		MIND						
	348.7	357.4	365.9	374.1		KTAS						
	211.4	211.4	211.4	211.4		KCAS						
	1464	1516	1550	1622		LB/HR						
	0.238	0.236	0.236	0.231		NM/LB						

40,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)		-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3		GROSS WEIGHT AT ALTITUDE (LB)
		-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20		
	25,000	69.8	71.7	73.5	75.4		%N1						33,000	
		0.63	0.63	0.63	0.63		MIND							
		345.2	353.8	362.3	370.6		KTAS							
		187.0	187.0	187.0	187.0		KCAS							
		1154	1197	1240	1282		LB/HR							
		0.299	0.295	0.292	0.289		NM/LB							
	26,000	70.7	72.6	74.5	76.4		%N1						34,000	
		0.65	0.65	0.65	0.65		MIND							
		352.6	361.5	370.1	378.6		KTAS							
		191.3	191.3	191.3	191.3		KCAS							
		1205	1250	1293	1337		LB/HR							
		0.293	0.289	0.286	0.283		NM/LB							
	27,000	71.5	73.5	75.4	77.3		%N1						35,000	
		0.66	0.66	0.66	0.66		MIND							
		360.0	369.0	377.8	386.5		KTAS							
		195.6	195.6	195.6	195.6		KCAS							
		1256	1302	1347	1394		LB/HR							
		0.287	0.283	0.280	0.277		NM/LB							
	28,000	72.4	74.3	76.2			%N1						36,000	
		0.67	0.67	0.67			MIND							
		366.8	376.0	385.0			KTAS							
		199.6	199.6	199.6			KCAS							
		1306	1354	1402			LB/HR							
		0.281	0.278	0.275			NM/LB							
	29,000	73.1	75.1	77.0			%N1						37,000	
		0.68	0.68	0.68			MIND							
		373.3	382.7	391.8			KTAS							
		203.5	203.5	203.5			KCAS							
		1357	1406	1456			LB/HR							
		0.275	0.272	0.269			NM/LB							
	30,000	73.9	75.9				%N1						38,000	
		0.70	0.70				MIND							
		379.7	389.2				KTAS							
		207.3	207.3				KCAS							
		1408	1458				LB/HR							
		0.270	0.267				NM/LB							
	31,000						%N1						39,000	
							MIND							
							KTAS							
							KCAS							
							LB/HR							
							NM/LB							
	32,000						%N1							
							MIND							
							KTAS							
							KCAS							
							LB/HR							
							NM/LB							

SINGLE ENGINE OPERATIONS

SINGLE ENGINE DRIFTDOWN

Driftdown data is provided as function of altitude and weight at time of engine failure for either ISA or ISA+20°C temperature.

To attain the driftdown performance shown, the recommended driftdown procedure described below must be followed.

DRIFTDOWN PROCEDURE

1. At the failure of one engine, maximum continuous thrust is set and held on the operating engine during any deceleration, if required to reduce the speed to the entry descent Mach. Any deceleration should be performed at the initial altitude before the start of descent.
2. The descent Mach number should be maintained until the calibrated speed is intercepted. The calibrated speed is then held down to the final driftdown altitude (identified as Cruise Altitude).
3. At the final driftdown altitude, a 200 fpm rate of climb capability will be possible at maximum continuous thrust at the Start Cruise speed shown.
4. Moderate thrust reductions are required at the Cruise Altitude to stabilize at the Start Cruise calibrated airspeed.

NOTE

Start Cruise speeds are the MRC speeds defined for the Cruise Altitude and final driftdown weight.

SINGLE ENGINE DRIFTDOWN TABLES

ISA

(Sheet 1 of 2)

INITIAL WEIGHT (LB)	INITIAL ALTITUDE (FT)	DESCENT AIRSPEED (MIND/ KCAS)	FUEL USED (LB)	DISTANCE (NM)	TIME (MIN)	CRUISE ALTITUDE (FT)	START CRUISE (KCAS)
25,000	45000	0.78/209	825	283	47	37000	175
	43000	0.75/209	785	264	44	37000	175
	41000	0.72/209	726	240	41	37000	175
	39000	0.69/209	640	208	36	36900	175
	37000	0.66/209	466	150	27	36700	176
27,000	45000	0.80/217	922	298	49	35100	182
	43000	0.77/217	893	284	47	35000	182
	41000	0.74/217	852	266	44	35000	183
	39000	0.71/217	794	243	41	34900	183
	37000	0.68/217	686	207	36	34800	183
	35000	0.65/217	504	151	27	34700	184
29,000	45000	0.80/224	998	305	50	33400	189
	43000	0.79/224	978	295	48	33300	189
	41000	0.76/224	940	278	46	33300	189
	39000	0.73/224	887	258	43	33200	190
	37000	0.70/224	824	235	40	33200	190
	35000	0.67/224	704	197	34	33100	190
31,000	45000	0.80/232	1063	308	50	31600	196
	43000	0.80/232	1046	299	48	31600	196
	41000	0.79/232	1014	285	47	31600	196
	39000	0.75/232	979	270	45	31500	197
	37000	0.72/232	922	250	42	31500	197
	35000	0.69/232	834	222	38	31400	197
	33000	0.66/232	708	185	32	31300	198
33,000	45000	0.80/239	1142	314	50	29900	203
	43000	0.80/239	1122	305	49	29900	203
	41000	0.80/239	1101	295	48	29900	203
	39000	0.77/239	1067	281	46	29800	204
	37000	0.74/239	1026	265	44	29800	204
	35000	0.71/239	959	243	41	29700	204
	33000	0.68/239	864	215	36	29700	204
	31000	0.65/239	720	176	30	29500	205

SINGLE ENGINE DRIFTDOWN TABLES

ISA

(Sheet 2 of 2)

INITIAL WEIGHT (LB)	INITIAL ALTITUDE (FT)	DESCENT AIRSPEED (MIND/ KCAS)	FUEL USED (LB)	DISTANCE (NM)	TIME (MIN)	CRUISE ALTITUDE (FT)	START CRUISE (KCAS)
35,000	45000	0.80/244	1224	322	51	28300	210
	43000	0.80/244	1205	312	50	28300	210
	41000	0.80/244	1187	303	49	28300	210
	39000	0.79/244	1153	290	47	28200	210
	37000	0.76/244	1111	275	45	28200	210
	35000	0.73/244	1046	254	42	28200	211
	33000	0.70/244	989	235	39	28100	211
	31000	0.67/244	873	203	35	28000	211
	29000	0.64/244	710	162	28	27900	212
37,000	45000	0.80/250	1295	326	51	26600	217
	43000	0.80/250	1266	314	50	26600	217
	41000	0.80/250	1255	307	49	26600	217
	39000	0.80/250	1222	295	47	26600	217
	37000	0.77/250	1183	281	46	26600	217
	35000	0.74/250	1132	264	43	26600	217
	33000	0.71/250	1071	245	41	26500	217
	31000	0.68/250	1001	224	38	26400	218
	29000	0.66/250	878	193	33	26300	218
39,000	43000	0.80/256	1336	319	50	25000	224
	41000	0.80/256	1325	311	49	25000	224
	39000	0.80/256	1296	301	48	25000	224
	37000	0.79/256	1265	289	47	24900	224
	35000	0.76/256	1222	274	44	24900	224
	33000	0.73/256	1166	256	42	24900	224
	31000	0.70/256	1103	238	40	24800	224
	29000	0.67/256	1018	215	36	24700	225

ISA + 20°C
(Sheet 1 of 2)

INITIAL WEIGHT (LB)	INITIAL ALTITUDE (FT)	DESCENT AIRSPEED (MIND/ KCAS)	FUEL USED (LB)	DISTANCE (NM)	TIME (MIN)	CRUISE ALTITUDE (FT)	START CRUISE (KCAS)
25,000	45000	0.78/209	706	247	40	35600	179
	43000	0.75/209	683	234	38	35500	179
	41000	0.72/209	648	216	35	35500	179
	39000	0.69/209	592	193	32	35500	179
	37000	0.66/209	503	160	27	35400	179
27,000	45000	0.80/217	819	269	43	33500	186
	43000	0.77/217	794	256	41	33500	186
	41000	0.74/217	762	240	39	33500	186
	39000	0.71/217	726	223	37	33500	186
	37000	0.68/217	665	200	33	33300	187
	35000	0.65/217	571	167	28	33300	187
29,000	45000	0.80/224	933	288	45	31300	194
	43000	0.79/224	929	282	45	31300	194
	41000	0.76/224	895	266	43	31300	194
	39000	0.73/224	871	253	41	31200	195
	37000	0.70/224	823	233	38	31100	195
	35000	0.67/224	743	206	34	31100	195
	33000	0.64/224	646	175	29	30900	196
31,000	45000	0.80/232	1035	301	47	29000	202
	43000	0.80/232	1024	293	46	29000	202
	41000	0.79/232	1001	282	45	29000	202
	39000	0.75/232	964	266	43	29000	203
	37000	0.72/232	942	254	41	28900	203
	35000	0.69/232	889	234	38	28800	203
	33000	0.66/232	807	208	35	28800	203
	31000	0.64/232	707	178	30	28600	204
	29000	0.61/232	511	126	22	28400	204
33,000	45000	0.80/239	1149	316	49	26800	209
	43000	0.80/239	1140	309	48	26800	209
	41000	0.80/239	1116	298	47	26800	209
	39000	0.77/239	1092	286	46	26800	209
	37000	0.74/239	1073	275	44	26600	209
	35000	0.71/239	1014	254	41	26600	210
	33000	0.68/239	956	235	39	26600	210
	31000	0.65/239	879	211	35	26500	210
	29000	0.63/239	764	179	30	26400	210

ISA + 20°C
(Sheet 2 of 2)

INITIAL WEIGHT (LB)	INITIAL ALTITUDE (FT)	DESCENT AIRSPEED (MIND/ KCAS)	FUEL USED (LB)	DISTANCE (NM)	TIME (MIN)	CRUISE ALTITUDE (FT)	START CRUISE (KCAS)
35,000	43000	0.80/244	1295	332	52	24600	216
	41000	0.80/244	1277	323	51	24600	216
	39000	0.79/244	1264	314	50	24600	216
	37000	0.76/244	1222	298	48	24600	216
	35000	0.73/244	1181	283	46	24600	216
	33000	0.70/244	1133	265	44	24500	216
	31000	0.67/244	1052	242	40	24500	216
	29000	0.64/244	961	216	36	24400	216
37,000	43000	0.80/250	1415	345	54	22700	222
	41000	0.80/250	1396	336	53	22700	222
	39000	0.80/250	1382	328	52	22700	222
	37000	0.77/250	1354	316	51	22600	222
	35000	0.74/250	1317	301	49	22600	222
	33000	0.71/250	1268	284	46	22600	222
	31000	0.68/250	1206	265	44	22500	222
	29000	0.66/250	1143	246	41	22500	222
39,000	41000	0.80/256	1504	346	55	20800	227
	39000	0.80/256	1493	339	54	20800	227
	37000	0.79/256	1462	327	52	20800	227
	35000	0.76/256	1429	314	51	20700	227
	33000	0.73/256	1395	300	49	20700	227
	31000	0.70/256	1342	283	47	20700	227
	29000	0.67/256	1281	265	44	20600	227

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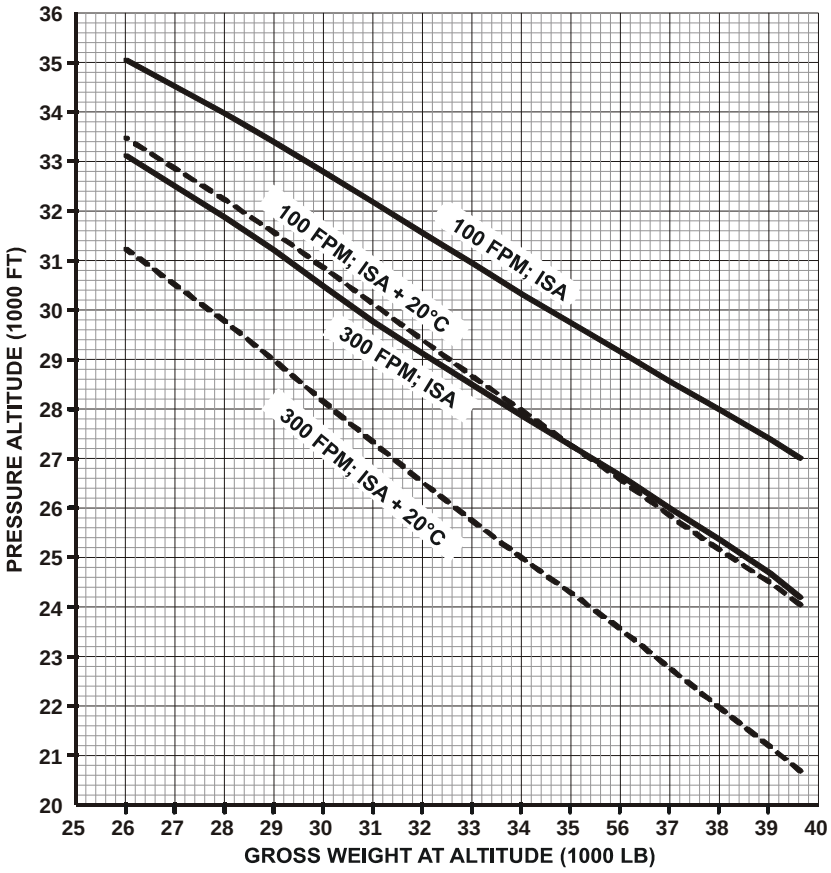
SINGLE-ENGINE CLIMB
SERVICE CEILING; SINGLE-ENGINE



THRUST SETTINGS; SINGLE-ENGINE CLIMB

Altitude	Climb Speed (KCAS)	Ambient Temperature at ISA (°C)	N_1 (%RPM)				
			ISA-20°C	ISA-10°C	ISA	ISA+10°C	ISA+20°C
Sea Level	200	15	84.3	85.9	87.4	89.0	89.4
5000	200	5	85.5	87.1	88.8	90.4	90.6
10,000	200	-5	86.2	88.0	89.7	91.3	91.2
15,000	200	-15	86.9	88.7	90.5	92.2	91.5
19,000	200	-23	87.9	89.8	91.6	93.4	91.9
21,000	200	-27	88.5	90.3	92.2	93.9	92.1
23,000	200	-31	88.9	90.8	92.7	94.5	92.2
25,000	200	-35	89.4	91.3	93.2	95.0	92.4
27,000	200	-39	89.2	91.2	93.1	94.9	92.6
29,000	200	-43	89.1	91.0	93.0	94.8	92.8
31,000	200	-46	88.9	91.0	92.9	94.8	93.1
33,000	200	-50	88.9	90.9	92.9	94.8	93.4
35,000	200	-54	88.7	90.7	92.7	94.7	93.6

SINGLE ENGINE CLIMB TABLES

CLIMB DATA - TAKE OFF GROSS WEIGHT: 26,000 LB

CLIMB SPEED - 200 KCAS

FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3	35	167	981	36	176	1034	37	184	1086	38	193	1141			
34,000	-62.2	-52.4	30	139	878	31	146	924	32	153	971	33	160	1019	47	244	1341
33,000	-58.7	-50.4	27	120	805	27	126	847	28	132	890	29	138	934	40	198	1176
32,000	-55.1	-48.4	24	106	749	25	111	787	25	116	826	26	122	867	35	170	1065
31,000	-51.6	-46.4	22	95	701	22	100	736	23	104	773	24	109	810	31	148	980
30,000	-48.0	-44.4	20	86	659	21	90	692	21	94	726	22	98	761	28	132	910
29,000	-44.4	-42.5	19	78	622	19	82	653	19	85	685	20	89	718	26	118	850
27,000	-37.3	-38.5	16	66	558	16	68	585	17	71	614	17	74	643	22	97	748
25,000	-30.2	-34.5	14	56	503	14	58	527	15	61	552	15	63	578	18	80	664
23,000	-23.0	-30.6	12	48	454	13	50	475	13	52	498	13	54	521	16	67	591
21,000	-15.9	-26.6	11	41	408	11	43	427	11	44	447	11	46	468	14	56	525
19,000	-8.8	-22.6	9	35	366	10	37	383	10	38	400	10	40	418	12	47	465
15,000	5.5	-14.7	7	25	284	7	26	297	7	27	311	7	28	325	8	33	355
10,000	23.3	-4.8	4	15	187	4	16	196	5	16	205	5	17	213	5	19	230
5000	41.2	5.1	2	7	94	2	7	98	2	7	102	2	8	106	2	9	114

CLIMB DATA - TAKE OFF GROSS WEIGHT:
27,000 LB
CLIMB SPEED - 200 KCAS
FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3	40	193	1098	41	203	1158	42	212	1216	43	221	1276			
34,000	-62.2	-52.4	33	155	960	34	162	1010	35	170	1061	36	178	1115			
33,000	-58.7	-50.4	29	132	871	30	138	916	31	144	963	31	151	1010	45	225	1305
32,000	-55.1	-48.4	26	115	805	27	121	846	27	126	888	28	132	932	38	188	1165
31,000	-51.6	-46.4	24	103	750	24	107	788	25	112	827	25	117	868	34	163	1062
30,000	-48.0	-44.4	22	92	704	22	96	739	23	101	775	23	105	812	30	143	981
29,000	-44.4	-42.5	20	84	663	20	87	695	21	91	729	21	95	764	28	128	912
27,000	-37.3	-38.5	17	70	592	17	73	621	18	76	651	18	79	682	23	104	799
25,000	-30.2	-34.5	15	59	533	15	62	558	15	64	585	16	67	612	20	86	706
23,000	-23.0	-30.6	13	51	480	13	53	502	14	55	526	14	57	550	17	71	627
21,000	-15.9	-26.6	11	43	431	12	45	451	12	47	472	12	49	494	14	60	557
19,000	-8.8	-22.6	10	37	386	10	39	403	10	40	422	11	42	441	12	50	492
15,000	5.5	-14.7	7	27	299	7	28	313	8	29	327	8	30	342	9	35	375
10,000	23.3	-4.8	5	16	197	5	16	206	5	17	215	5	18	225	5	20	243
5000	41.2	5.1	2	7	98	2	8	103	2	8	107	2	8	112	3	9	120

CLIMB DATA - TAKE OFF GROSS WEIGHT: 28,000 LB

CLIMB SPEED - 200 KCAS

FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4	37	175	1060	38	183	1117	39	192	1173	40	200	1232			
33,000	-58.7	-50.4	32	145	948	33	152	997	34	159	1048	34	167	1100	51	261	1477
32,000	-55.1	-48.4	28	126	869	29	132	913	30	138	959	30	144	1006	43	211	1287
31,000	-51.6	-46.4	25	111	806	26	116	846	27	121	888	27	127	932	37	180	1160
30,000	-48.0	-44.4	23	99	753	24	104	790	24	108	829	25	113	869	33	157	1064
29,000	-44.4	-42.5	21	90	707	22	94	741	22	98	778	23	102	815	30	139	984
27,000	-37.3	-38.5	18	74	629	19	78	660	19	81	692	19	84	724	25	112	856
25,000	-30.2	-34.5	16	63	565	16	66	592	16	68	620	17	71	649	21	92	753
23,000	-23.0	-30.6	14	54	508	14	56	531	14	58	557	15	61	582	18	76	667
21,000	-15.9	-26.6	12	46	456	12	48	477	12	50	499	13	52	522	15	64	590
19,000	-8.8	-22.6	10	39	407	11	41	426	11	42	446	11	44	466	13	53	521
15,000	5.5	-14.7	8	28	315	8	29	330	8	30	345	8	31	360	9	37	395
10,000	23.3	-4.8	5	17	207	5	17	217	5	18	226	5	19	236	6	21	256
5000	41.2	5.1	2	8	103	2	8	108	2	8	113	2	9	117	3	9	126

CLIMB DATA - TAKE OFF GROSS WEIGHT: 29,000 LB

CLIMB SPEED - 200 KCAS

FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4	43	200	1186	44	210	1250	45	220	1312	46	230	1378			
33,000	-58.7	-50.4	35	162	1037	36	170	1091	37	177	1146	38	185	1204			
32,000	-55.1	-48.4	31	138	940	32	144	988	32	151	1037	33	158	1089	48	241	1437
31,000	-51.6	-46.4	28	120	866	28	126	910	29	132	955	30	138	1002	41	200	1274
30,000	-48.0	-44.4	25	107	805	25	112	845	26	117	887	27	122	930	36	172	1157
29,000	-44.4	-42.5	23	96	754	23	100	791	24	105	830	24	109	870	32	151	1063
27,000	-37.3	-38.5	19	79	669	20	83	701	20	86	735	21	90	769	27	120	917
25,000	-30.2	-34.5	17	67	598	17	70	627	17	73	657	18	76	687	22	98	803
23,000	-23.0	-30.6	15	57	537	15	59	562	15	62	589	15	64	616	19	81	709
21,000	-15.9	-26.6	13	48	481	13	50	503	13	53	527	13	55	551	16	68	626
19,000	-8.8	-22.6	11	41	429	11	43	449	11	45	470	12	47	491	14	56	551
15,000	5.5	-14.7	8	29	332	8	31	347	8	32	363	9	33	379	10	39	417
10,000	23.3	-4.8	5	17	218	5	18	228	5	19	238	5	20	248	6	22	269
5000	41.2	5.1	2	8	108	2	8	113	2	9	118	3	9	123	3	10	133

CLIMB DATA - TAKE OFF GROSS WEIGHT: 30,000 LB

CLIMB SPEED - 200 KCAS

FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4	40	182	1145	41	191	1205	41	199	1265	42	209	1328			
32,000	-55.1	-48.4	34	152	1022	35	159	1074	35	166	1127	36	174	1183			
31,000	-51.6	-46.4	30	131	933	31	137	980	31	143	1029	32	150	1080	46	225	1408
30,000	-48.0	-44.4	27	116	863	27	121	906	28	126	951	29	132	997	40	191	1262
29,000	-44.4	-42.5	24	103	805	25	108	844	25	112	886	26	117	928	35	165	1152
27,000	-37.3	-38.5	21	85	710	21	88	744	21	92	780	22	96	817	29	130	984
25,000	-30.2	-34.5	18	71	634	18	74	664	18	77	695	19	80	728	24	105	857
23,000	-23.0	-30.6	15	60	567	16	63	594	16	65	622	16	68	651	20	86	753
21,000	-15.9	-26.6	13	51	508	14	53	531	14	55	556	14	58	581	17	72	663
19,000	-8.8	-22.6	12	44	453	12	45	473	12	47	495	12	49	518	15	60	583
15,000	5.5	-14.7	9	31	349	9	32	366	9	34	382	9	35	399	10	41	440
10,000	23.3	-4.8	5	18	229	5	19	239	6	20	250	6	21	261	6	23	283
5000	41.2	5.1	3	8	114	3	9	119	3	9	124	3	9	129	3	10	139

CLIMB DATA - TAKE OFF GROSS WEIGHT:
31,000 LB
CLIMB SPEED - 200 KCAS
FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4															
32,000	-55.1	-48.4	38	170	1125	39	178	1183	39	186	1241	40	195	1303			
31,000	-51.6	-46.4	33	144	1014	33	151	1066	34	158	1118	35	165	1174	53	260	1590
30,000	-48.0	-44.4	29	126	931	30	131	977	30	137	1025	31	143	1075	45	214	1397
29,000	-44.4	-42.5	26	111	863	27	116	905	27	121	950	28	127	996	39	183	1259
27,000	-37.3	-38.5	22	90	757	22	94	793	23	98	831	23	103	871	31	141	1061
25,000	-30.2	-34.5	19	75	672	19	79	704	20	82	738	20	85	772	26	113	917
23,000	-23.0	-30.6	16	64	600	17	66	629	17	69	658	17	72	689	22	92	802
21,000	-15.9	-26.6	14	54	536	14	56	561	15	59	587	15	61	614	18	76	704
19,000	-8.8	-22.6	12	46	477	13	48	499	13	50	522	13	52	546	16	63	617
15,000	5.5	-14.7	9	33	368	9	34	385	9	35	402	10	37	420	11	43	464
10,000	23.3	-4.8	6	19	240	6	20	251	6	21	262	6	22	274	7	25	298
5000	41.2	5.1	3	9	119	3	9	125	3	9	130	3	10	136	3	11	146

CLIMB DATA - TAKE OFF GROSS WEIGHT: 32,000 LB

CLIMB SPEED - 200 KCAS

FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4															
32,000	-55.1	-48.4	43	194	1253	44	203	1318	45	212	1383	46	222	1452			
31,000	-51.6	-46.4	36	160	1109	37	168	1165	38	175	1223	39	183	1284			
30,000	-48.0	-44.4	32	138	1008	32	144	1058	33	150	1110	34	157	1164	51	245	1566
29,000	-44.4	-42.5	28	121	928	29	126	974	30	132	1022	30	137	1071	43	205	1388
27,000	-37.3	-38.5	24	97	808	24	101	846	25	106	887	25	110	929	34	154	1150
25,000	-30.2	-34.5	20	80	715	20	84	748	21	87	784	21	91	821	28	122	985
23,000	-23.0	-30.6	17	68	636	18	70	666	18	73	698	18	76	730	23	99	856
21,000	-15.9	-26.6	15	57	567	15	60	593	16	62	621	16	65	650	20	81	749
19,000	-8.8	-22.6	13	49	504	13	51	527	13	53	552	14	55	577	16	67	655
15,000	5.5	-14.7	9	34	387	10	36	405	10	37	424	10	39	443	12	45	490
10,000	23.3	-4.8	6	20	252	6	21	264	6	22	276	6	23	288	7	26	313
5000	41.2	5.1	3	9	125	3	10	131	3	10	137	3	10	142	3	12	154

CLIMB DATA - TAKE OFF GROSS WEIGHT: 33,000 LB

CLIMB SPEED - 200 KCAS

FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4															
32,000	-55.1	-48.4															
31,000	-51.6	-46.4	40	180	1222	41	188	1285	42	196	1348	43	205	1415			
30,000	-48.0	-44.4	35	151	1095	35	158	1149	36	165	1206	37	173	1266			
29,000	-44.4	-42.5	31	131	1000	31	137	1049	32	143	1101	33	149	1155	49	232	1545
27,000	-37.3	-38.5	25	104	863	26	109	904	26	113	948	27	118	993	37	169	1250
25,000	-30.2	-34.5	21	86	760	22	89	795	22	93	834	23	97	873	30	132	1059
23,000	-23.0	-30.6	18	72	674	19	75	706	19	78	739	20	81	773	25	106	915
21,000	-15.9	-26.6	16	61	600	16	63	627	16	66	657	17	68	687	21	87	797
19,000	-8.8	-22.6	14	52	532	14	54	556	14	56	582	15	58	609	18	71	694
15,000	5.5	-14.7	10	36	408	10	38	427	10	39	446	11	41	466	12	48	518
10,000	23.3	-4.8	6	21	265	6	22	277	6	23	290	7	24	302	7	27	330
5000	41.2	5.1	3	10	131	3	10	137	3	10	143	3	11	149	3	12	161

CLIMB DATA - TAKE OFF GROSS WEIGHT: 34,000 LB

CLIMB SPEED - 200 KCAS

FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4															
32,000	-55.1	-48.4															
31,000	-51.6	-46.4	45	205	1362	47	214	1432	48	224	1503	49	234	1578			
30,000	-48.0	-44.4	38	168	1196	39	175	1256	40	183	1318	41	191	1383			
29,000	-44.4	-42.5	33	143	1081	34	150	1134	35	156	1190	36	163	1248	56	267	1742
27,000	-37.3	-38.5	27	112	922	28	117	966	28	122	1013	29	127	1061	41	187	1365
25,000	-30.2	-34.5	23	91	808	23	95	846	24	99	886	24	104	928	32	143	1140
23,000	-23.0	-30.6	19	76	715	20	79	748	20	83	783	21	86	820	27	114	978
21,000	-15.9	-26.6	17	64	634	17	67	663	17	70	694	18	72	726	22	93	848
19,000	-8.8	-22.6	14	54	562	15	57	587	15	59	615	15	61	642	19	76	736
15,000	5.5	-14.7	11	38	429	11	40	449	11	41	470	11	43	491	13	51	547
10,000	23.3	-4.8	6	22	278	7	23	291	7	24	304	7	25	317	8	29	347
5000	41.2	5.1	3	10	138	3	11	144	3	11	150	3	11	157	4	13	169

CLIMB DATA - TAKE OFF GROSS WEIGHT:
35,000 LB
CLIMB SPEED - 200 KCAS
FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4															
32,000	-55.1	-48.4															
31,000	-51.6	-46.4															
30,000	-48.0	-44.4	43	188	1317	44	196	1383	44	205	1451	46	214	1524			
29,000	-44.4	-42.5	36	157	1173	37	164	1230	38	171	1291	39	179	1354			
27,000	-37.3	-38.5	29	120	987	30	126	1034	30	131	1084	31	137	1136	45	208	1498
25,000	-30.2	-34.5	24	98	859	25	102	899	25	106	943	26	111	987	35	155	1231
23,000	-23.0	-30.6	21	81	757	21	84	792	22	88	830	22	92	868	29	123	1047
21,000	-15.9	-26.6	18	68	670	18	71	701	18	74	734	19	77	767	24	99	903
19,000	-8.8	-22.6	15	57	592	16	60	619	16	62	648	16	65	678	20	81	781
15,000	5.5	-14.7	11	40	452	11	42	472	12	43	494	12	45	516	14	54	577
10,000	23.3	-4.8	7	23	292	7	24	305	7	25	319	7	26	333	8	30	365
5000	41.2	5.1	3	11	144	3	11	151	3	11	157	3	12	164	4	13	178

CLIMB DATA - TAKE OFF GROSS WEIGHT: 36,000 LB

CLIMB SPEED - 200 KCAS

FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4															
32,000	-55.1	-48.4															
31,000	-51.6	-46.4															
30,000	-48.0	-44.4	48	214	1468	49	223	1541	50	233	1617	51	244	1698			
29,000	-44.4	-42.5	40	174	1279	41	181	1342	42	189	1408	43	198	1478			
27,000	-37.3	-38.5	31	130	1058	32	135	1108	33	141	1163	33	148	1218	50	233	1659
25,000	-30.2	-34.5	26	104	914	26	109	957	27	113	1003	28	118	1050	38	170	1332
23,000	-23.0	-30.6	22	86	802	22	90	840	23	93	879	23	97	920	31	132	1122
21,000	-15.9	-26.6	19	72	708	19	75	740	20	78	775	20	81	811	25	106	962
19,000	-8.8	-22.6	16	61	625	16	63	653	17	66	684	17	68	715	21	86	829
15,000	5.5	-14.7	12	42	475	12	44	497	12	46	520	12	47	543	14	57	609
10,000	23.3	-4.8	7	25	306	7	26	320	7	27	335	8	28	349	8	32	383
5000	41.2	5.1	3	11	151	3	12	158	3	12	165	4	12	172	4	14	186

CLIMB DATA - TAKE OFF GROSS WEIGHT:
37,000 LB
CLIMB SPEED - 200 KCAS
FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4															
32,000	-55.1	-48.4															
31,000	-51.6	-46.4															
30,000	-48.0	-44.4															
29,000	-44.4	-42.5	45	194	1408	46	203	1476	47	212	1549	48	221	1625			
27,000	-37.3	-38.5	34	141	1137	34	147	1191	35	153	1249	36	160	1309	57	266	1858
25,000	-30.2	-34.5	28	112	974	28	116	1020	29	121	1069	29	126	1119	42	186	1448
23,000	-23.0	-30.6	23	92	851	24	95	890	24	99	932	25	103	976	33	142	1205
21,000	-15.9	-26.6	20	76	748	20	79	783	21	83	819	21	86	857	27	113	1025
19,000	-8.8	-22.6	17	64	659	17	67	689	18	69	721	18	72	754	22	91	880
15,000	5.5	-14.7	12	44	499	13	46	522	13	48	546	13	50	571	15	60	643
10,000	23.3	-4.8	7	26	321	8	27	336	8	28	351	8	29	366	9	33	403
5000	41.2	5.1	3	12	158	4	12	165	4	13	172	4	13	180	4	15	195

CLIMB DATA - TAKE OFF GROSS WEIGHT: 38,000 LB

CLIMB SPEED - 200 KCAS

FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4															
32,000	-55.1	-48.4															
31,000	-51.6	-46.4															
30,000	-48.0	-44.4															
29,000	-44.4	-42.5															
27,000	-37.3	-38.5	37	154	1230	37	160	1289	38	167	1351	39	174	1416			
25,000	-30.2	-34.5	30	120	1042	30	125	1090	31	130	1143	32	136	1197	46	206	1589
23,000	-23.0	-30.6	25	98	904	25	102	946	26	106	991	26	110	1037	36	155	1300
21,000	-15.9	-26.6	21	81	793	21	84	829	22	88	868	22	91	908	29	122	1097
19,000	-8.8	-22.6	18	68	696	18	70	728	19	73	762	19	76	796	24	97	936
15,000	5.5	-14.7	13	47	526	13	49	550	13	51	575	14	53	601	16	63	679
10,000	23.3	-4.8	8	27	337	8	28	352	8	29	368	8	30	384	9	35	424
5000	41.2	5.1	4	12	165	4	13	173	4	13	180	4	14	188	4	15	205

CLIMB DATA - TAKE OFF GROSS WEIGHT:
39,000 LB
CLIMB SPEED - 200 KCAS
FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4															
32,000	-55.1	-48.4															
31,000	-51.6	-46.4															
30,000	-48.0	-44.4															
29,000	-44.4	-42.5															
27,000	-37.3	-38.5	40	169	1338	41	176	1401	42	184	1469	43	192	1540			
25,000	-30.2	-34.5	32	129	1117	32	135	1169	33	141	1225	34	146	1283	51	232	1759
23,000	-23.0	-30.6	26	104	963	27	109	1007	28	113	1055	28	118	1104	39	169	1409
21,000	-15.9	-26.6	22	86	840	23	89	879	23	93	920	24	97	962	31	131	1177
19,000	-8.8	-22.6	19	72	736	19	75	769	20	78	805	20	81	842	25	104	998
15,000	5.5	-14.7	14	49	554	14	51	579	14	53	606	14	55	633	17	67	719
10,000	23.3	-4.8	8	28	354	8	30	370	9	31	386	9	32	403	10	37	446
5000	41.2	5.1	4	13	173	4	13	181	4	14	189	4	14	197	4	16	215

CLIMB DATA - TAKE OFF GROSS WEIGHT: 39,600LB

CLIMB SPEED - 200 KCAS

FOR %N1 SETTING SEE PAGE VIII-7-8

PRESS ALT. (FT)	TEMP. (ISA)		ISA-20°C			ISA-10°C			ISA			ISA+10°C			ISA+20°C		
	°F	°C	TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)			TIME (MIN)/ DIST (NM)/ FBO (LB)		
35,000	-65.8	-54.3															
34,000	-62.2	-52.4															
33,000	-58.7	-50.4															
32,000	-55.1	-48.4															
31,000	-51.6	-46.4															
30,000	-48.0	-44.4															
29,000	-44.4	-42.5															
27,000	-37.3	-38.5	43	179	1411	43	187	1477	44	195	1549	45	203	1623			
25,000	-30.2	-34.5	33	136	1166	34	141	1220	35	147	1279	36	153	1339	55	250	1880
23,000	-23.0	-30.6	28	109	1001	28	113	1047	29	118	1096	29	123	1147	41	179	1482
21,000	-15.9	-26.6	23	89	871	24	93	910	24	97	953	25	101	997	33	137	1229
19,000	-8.8	-22.6	20	74	762	20	77	796	20	80	833	21	84	871	26	108	1038
15,000	5.5	-14.7	14	51	571	14	53	597	15	55	625	15	57	653	18	69	744
10,000	23.3	-4.8	8	29	364	9	30	381	9	32	398	9	33	415	10	38	460
5000	41.2	5.1	4	13	178	4	14	186	4	14	194	4	15	203	5	17	221

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MAXIMUM RANGE CRUISE

Maximum range cruise data is given for approximately the maximum specific range speeds. The data is given as point performance in tabulated form for mission planning purposes.

If constant flight level is maintained for an extended period of time, Mach number should be reduced as the weight of the aircraft is reduced in order to maintain the best specific range.

The prime parameter to stabilize the aircraft is mach number. N_1 data is only given for reference, and deviations in N_1 from aircraft to aircraft are normal.

SINGLE ENGINE MAXIMUM RANGE CRUISE TABLES

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	60.3	61.5	62.7	63.8	65.2	%N1	67.5	68.8	70.1	71.4	72.8	33,000
	0.30	0.30	0.30	0.30	0.30	MIND	0.35	0.35	0.35	0.35	0.35	
	188	191	195	198	202	KTAS	217	221	225	229	233	
	181	181	181	181	181	KIAS	209	209	209	209	209	
	1014	1034	1053	1071	1090	LB/HR	1359	1386	1411	1436	1461	
	0.185	0.185	0.185	0.185	0.185	NM/LB	0.160	0.160	0.160	0.160	0.160	
26,000	61.4	62.6	63.8	65.0	66.2	%N1	68.3	69.6	71.0	72.3	73.6	34,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.35	0.35	0.35	0.35	0.35	
	191	195	199	202	206	KTAS	220	224	228	232	236	
	185	185	185	185	185	KIAS	213	213	213	213	213	
	1052	1072	1092	1111	1131	LB/HR	1399	1426	1452	1478	1504	
	0.182	0.182	0.182	0.182	0.182	NM/LB	0.157	0.157	0.157	0.157	0.157	
27,000	62.3	63.6	64.8	66.0	67.1	%N1	69.0	70.3	71.7	73.0	74.3	35,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.36	0.36	0.36	0.36	0.36	
	195	199	202	206	209	KTAS	223	227	231	236	240	
	188	188	188	188	188	KIAS	215	215	215	215	215	
	1091	1112	1133	1153	1173	LB/HR	1436	1463	1490	1517	1543	
	0.179	0.179	0.179	0.179	0.179	NM/LB	0.155	0.155	0.155	0.155	0.155	
28,000	63.2	64.4	65.7	66.9	68.0	%N1	69.7	71.0	72.4	73.7	75.1	36,000
	0.32	0.32	0.32	0.32	0.32	MIND	0.36	0.36	0.36	0.36	0.36	
	199	202	206	210	213	KTAS	226	230	234	239	243	
	192	192	192	192	192	KIAS	218	218	218	218	218	
	1132	1154	1175	1196	1216	LB/HR	1473	1501	1529	1556	1583	
	0.175	0.175	0.175	0.175	0.175	NM/LB	0.153	0.153	0.153	0.153	0.153	
29,000	64.0	65.3	66.5	67.8	69.0	%N1	70.3	71.7	73.1	74.4	75.8	37,000
	0.32	0.32	0.32	0.32	0.32	MIND	0.37	0.37	0.37	0.37	0.37	
	202	206	210	214	217	KTAS	229	233	238	242	246	
	195	195	195	195	195	KIAS	221	221	221	221	221	
	1174	1197	1219	1240	1262	LB/HR	1512	1541	1569	1597	1624	
	0.172	0.172	0.172	0.172	0.172	NM/LB	0.151	0.151	0.151	0.151	0.151	
30,000	64.9	66.2	67.4	68.7	69.9	%N1	71.0	72.4	73.8	75.2	76.6	38,000
	0.33	0.33	0.33	0.33	0.33	MIND	0.37	0.37	0.37	0.37	0.37	
	206	210	214	218	221	KTAS	232	236	241	245	249	
	199	199	199	199	199	KIAS	224	224	224	224	224	
	1218	1241	1264	1287	1309	LB/HR	1551	1581	1610	1638	1667	
	0.169	0.169	0.169	0.169	0.169	NM/LB	0.149	0.149	0.149	0.149	0.149	
31,000	65.7	67.0	68.3	69.6	70.9	%N1	71.7	73.1	74.5	75.9	77.3	39,000
	0.33	0.33	0.33	0.33	0.33	MIND	0.37	0.37	0.37	0.37	0.37	
	210	214	218	221	225	KTAS	235	239	244	248	252	
	202	202	202	202	202	KIAS	227	227	227	227	227	
	1263	1287	1311	1335	1358	LB/HR	1591	1622	1652	1681	1710	
	0.166	0.166	0.166	0.166	0.166	NM/LB	0.147	0.147	0.147	0.147	0.147	
32,000	66.6	67.9	69.2	70.5	71.9	%N1						
	0.34	0.34	0.34	0.34	0.34	MIND						
	213	217	221	225	229	KTAS						
	206	206	206	206	206	KIAS						
	1310	1336	1360	1384	1408	LB/HR						
	0.163	0.163	0.163	0.163	0.163	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

10,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	64.0	65.3	66.6	67.9	69.0	%N1	71.0	72.4	73.8	75.2	76.6	33,000
	0.33	0.33	0.33	0.33	0.33	MIND	0.38	0.38	0.38	0.38	0.38	
	203	207	211	215	219	KTAS	233	238	242	247	251	
	182	182	182	182	182	KIAS	209	209	209	209	209	
	996	1016	1035	1055	1073	LB/HR	1321	1347	1373	1398	1423	
	0.204	0.204	0.204	0.204	0.204	NM/LB	0.176	0.176	0.176	0.176	0.176	
26,000	65.0	66.3	67.6	68.9	70.1	%N1	71.7	73.2	74.6	76.0	77.5	34,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.39	0.39	0.39	0.39	0.39	
	207	211	215	219	223	KTAS	236	241	246	250	255	
	186	186	186	186	186	KIAS	212	212	212	212	212	
	1041	1062	1082	1102	1122	LB/HR	1363	1390	1417	1443	1468	
	0.199	0.199	0.199	0.199	0.199	NM/LB	0.173	0.173	0.173	0.173	0.173	
27,000	65.9	67.2	68.6	69.9	71.1	%N1	72.5	74.0	75.4	76.9	78.4	35,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.39	0.39	0.39	0.39	0.39	
	212	216	220	224	228	KTAS	240	245	249	254	259	
	190	190	190	190	190	KIAS	216	216	216	216	216	
	1089	1110	1132	1153	1173	LB/HR	1406	1434	1462	1489	1515	
	0.194	0.194	0.194	0.194	0.194	NM/LB	0.171	0.171	0.171	0.171	0.171	
28,000	66.8	68.1	69.5	70.8	72.1	%N1	73.3	74.8	76.2	77.7	79.2	36,000
	0.35	0.35	0.35	0.35	0.35	MIND	0.40	0.40	0.40	0.40	0.40	
	216	220	224	228	232	KTAS	243	248	253	258	262	
	193	193	193	193	193	KIAS	219	219	219	219	219	
	1130	1153	1175	1197	1218	LB/HR	1451	1480	1508	1536	1563	
	0.191	0.191	0.191	0.191	0.191	NM/LB	0.168	0.168	0.168	0.168	0.168	
29,000	67.7	69.0	70.4	71.7	73.1	%N1	74.1	75.6	77.1	78.5	80.0	37,000
	0.36	0.36	0.36	0.36	0.36	MIND	0.40	0.40	0.40	0.40	0.40	
	219	223	228	232	236	KTAS	247	252	257	261	266	
	197	197	197	197	197	KIAS	222	222	222	222	222	
	1166	1189	1212	1235	1257	LB/HR	1497	1527	1556	1585	1613	
	0.188	0.188	0.188	0.188	0.188	NM/LB	0.165	0.165	0.165	0.165	0.165	
30,000	68.5	69.9	71.3	72.7	74.0	%N1	74.9	76.4	77.9	79.3	80.8	38,000
	0.36	0.36	0.36	0.36	0.36	MIND	0.41	0.41	0.41	0.41	0.41	
	222	227	231	236	240	KTAS	250	255	260	265	270	
	200	200	200	200	200	KIAS	225	225	225	225	225	
	1203	1227	1251	1274	1296	LB/HR	1545	1576	1606	1636	1665	
	0.185	0.185	0.185	0.185	0.185	NM/LB	0.162	0.162	0.162	0.162	0.162	
31,000	69.4	70.8	72.2	73.6	74.9	%N1	75.5	77.1	78.6	80.1	81.5	39,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.41	0.41	0.41	0.41	0.41	
	226	230	235	239	243	KTAS	254	259	264	269	274	
	203	203	203	203	203	KIAS	228	228	228	228	228	
	1241	1266	1290	1314	1337	LB/HR	1595	1627	1658	1688	1718	
	0.182	0.182	0.182	0.182	0.182	NM/LB	0.159	0.159	0.159	0.159	0.159	
32,000	70.2	71.6	73.0	74.4	75.7	%N1						
	0.37	0.37	0.37	0.37	0.37	MIND						
	229	234	239	243	247	KTAS						
	206	206	206	206	206	KIAS						
	1280	1306	1331	1356	1380	LB/HR						
	0.179	0.179	0.179	0.179	0.179	NM/LB						

Section VIII-7
Single Engine Maximum Range Cruise

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)		-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	GROSS WEIGHT AT ALTITUDE (LB)
		-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
	25,000	67.4	68.8	70.2	71.6	73.0	%N1	74.7	76.3	77.8	79.4	80.9	
		0.36	0.36	0.36	0.36	0.36	MIND	0.42	0.42	0.42	0.42	0.42	
		219	224	229	233	237	KTAS	253	258	263	268	273	
		183	183	183	183	183	KIAS	211	211	211	211	211	33,000
		982	1002	1022	1041	1061	LB/HR	1332	1360	1387	1414	1440	
		0.224	0.224	0.224	0.224	0.224	NM/LB	0.190	0.190	0.190	0.190	0.190	
		68.4	69.8	71.2	72.6	74.1	%N1	75.6	77.2	78.7	80.3	81.7	
		0.37	0.37	0.37	0.37	0.37	MIND	0.43	0.43	0.43	0.43	0.43	
	26,000	224	228	233	237	242	KTAS	257	262	267	273	278	
		186	186	186	186	186	KIAS	214	214	214	214	214	34,000
		1019	1041	1061	1082	1102	LB/HR	1383	1412	1440	1468	1495	
		0.219	0.219	0.219	0.219	0.219	NM/LB	0.186	0.186	0.186	0.186	0.186	
		69.3	70.8	72.2	73.7	75.2	%N1	76.3	77.9	79.4	81.0	82.6	
		0.38	0.38	0.38	0.38	0.38	MIND	0.43	0.43	0.43	0.43	0.43	
	27,000	228	233	237	242	246	KTAS	260	266	271	276	281	
		190	190	190	190	190	KIAS	217	217	217	217	217	35,000
		1059	1081	1102	1124	1144	LB/HR	1425	1454	1483	1512	1539	
		0.215	0.215	0.215	0.215	0.215	NM/LB	0.183	0.183	0.183	0.183	0.183	
		70.3	71.8	73.3	74.7	76.1	%N1	77.0	78.6	80.2	81.7	83.4	
		0.39	0.39	0.39	0.39	0.39	MIND	0.44	0.44	0.44	0.44	0.44	
	28,000	232	237	242	246	251	KTAS	264	270	275	280	285	
		193	193	193	193	193	KIAS	220	220	220	220	220	36,000
		1100	1123	1145	1167	1189	LB/HR	1467	1498	1527	1557	1585	
		0.211	0.211	0.211	0.211	0.211	NM/LB	0.180	0.180	0.180	0.180	0.180	
		71.3	72.8	74.3	75.7	77.1	%N1	77.7	79.3	80.9	82.5	84.1	
		0.39	0.39	0.39	0.39	0.39	MIND	0.44	0.44	0.44	0.44	0.44	
	29,000	236	241	246	251	255	KTAS	268	273	279	284	289	
		197	197	197	197	197	KIAS	223	223	223	223	223	37,000
		1143	1166	1190	1212	1235	LB/HR	1511	1542	1573	1603	1633	
		0.207	0.207	0.207	0.207	0.207	NM/LB	0.177	0.177	0.177	0.177	0.177	
		72.2	73.7	75.2	76.7	78.1	%N1	78.4	80.0	81.6	83.2	84.8	
		0.40	0.40	0.40	0.40	0.40	MIND	0.45	0.45	0.45	0.45	0.45	
	30,000	240	245	250	255	260	KTAS	271	277	282	288	293	
		200	200	200	200	200	KIAS	226	226	226	226	226	38,000
		1187	1212	1236	1259	1283	LB/HR	1556	1589	1620	1651	1682	
		0.202	0.202	0.202	0.202	0.202	NM/LB	0.174	0.174	0.174	0.174	0.174	
		73.0	74.5	76.1	77.6	79.1	%N1	79.1	80.7	82.4	84.0	85.5	
		0.41	0.41	0.41	0.41	0.41	MIND	0.46	0.46	0.46	0.46	0.46	
	31,000	244	250	254	259	264	KTAS	275	281	286	292	297	
		204	204	204	204	204	KIAS	230	230	230	230	230	39,000
		1233	1259	1284	1309	1333	LB/HR	1603	1636	1669	1701	1732	
		0.198	0.198	0.198	0.198	0.198	NM/LB	0.172	0.172	0.172	0.172	0.172	
		73.9	75.4	77.0	78.5	80.1	%N1						
		0.41	0.41	0.41	0.41	0.41	MIND						
	32,000	249	254	259	264	269	KTAS						
		207	207	207	207	207	KIAS						
		1282	1308	1334	1360	1385	LB/HR						
		0.194	0.194	0.194	0.194	0.194	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

19,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-42.6	-32.6	-22.6	-12.6	-2.6	OAT (°C)	-42.6	-32.6	-22.6	-12.6	-2.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	70.5	72.0	73.5	75.0	76.5	%N1	77.6	79.3	80.9	82.6	84.2	33,000
	0.40	0.40	0.40	0.40	0.40	MIND	0.46	0.46	0.46	0.46	0.46	
	234	239	244	249	253	KTAS	270	276	281	287	292	
	183	183	183	183	183	KIAS	212	212	212	212	212	
	970	991	1011	1031	1051	LB/HR	1333	1362	1390	1417	1444	
	0.241	0.241	0.241	0.241	0.241	NM/LB	0.202	0.202	0.202	0.202	0.202	
26,000	71.5	73.1	74.6	76.1	77.6	%N1	78.3	80.0	81.7	83.3	85.0	34,000
	0.40	0.40	0.40	0.40	0.40	MIND	0.46	0.46	0.46	0.46	0.46	
	239	244	249	254	259	KTAS	274	280	285	291	296	
	187	187	187	187	187	KIAS	215	215	215	215	215	
	1015	1037	1058	1079	1099	LB/HR	1377	1406	1435	1464	1491	
	0.235	0.235	0.235	0.235	0.235	NM/LB	0.199	0.199	0.199	0.199	0.199	
27,000	72.5	74.1	75.6	77.2	78.6	%N1	79.0	80.7	82.4	84.1	85.7	35,000
	0.41	0.41	0.41	0.41	0.41	MIND	0.47	0.47	0.47	0.47	0.47	
	244	249	254	259	264	KTAS	277	283	289	294	300	
	191	191	191	191	191	KIAS	217	217	217	217	217	
	1062	1085	1107	1129	1150	LB/HR	1418	1448	1478	1507	1536	
	0.229	0.229	0.229	0.229	0.229	NM/LB	0.195	0.195	0.195	0.195	0.195	
28,000	73.4	75.0	76.6	78.1	79.7	%N1	79.7	81.4	83.1	84.8	86.4	36,000
	0.42	0.42	0.42	0.42	0.42	MIND	0.47	0.47	0.47	0.47	0.47	
	248	254	259	264	269	KTAS	280	286	292	298	303	
	194	194	194	194	194	KIAS	220	220	220	220	220	
	1111	1135	1159	1181	1204	LB/HR	1460	1492	1522	1552	1582	
	0.224	0.224	0.224	0.224	0.224	NM/LB	0.192	0.192	0.192	0.192	0.192	
29,000	74.3	75.9	77.5	79.1	80.7	%N1	80.4	82.1	83.8	85.5	87.1	37,000
	0.43	0.43	0.43	0.43	0.43	MIND	0.48	0.48	0.48	0.48	0.48	
	253	259	264	269	274	KTAS	283	289	295	301	307	
	198	198	198	198	198	KIAS	222	222	222	222	222	
	1160	1185	1209	1233	1257	LB/HR	1504	1537	1568	1599	1630	
	0.218	0.218	0.218	0.218	0.218	NM/LB	0.188	0.188	0.188	0.188	0.188	
30,000	75.2	76.8	78.4	80.0	81.6	%N1	81.0	82.8	84.5	86.2	87.9	38,000
	0.43	0.43	0.43	0.43	0.43	MIND	0.48	0.48	0.48	0.48	0.48	
	257	263	268	274	279	KTAS	286	293	299	305	310	
	202	202	202	202	202	KIAS	225	225	225	225	225	
	1201	1227	1252	1277	1301	LB/HR	1550	1583	1616	1648	1679	
	0.214	0.214	0.214	0.214	0.214	NM/LB	0.185	0.185	0.185	0.185	0.185	
31,000	76.1	77.7	79.4	81.0	82.5	%N1	81.7	83.5	85.2	86.9	88.6	39,000
	0.44	0.44	0.44	0.44	0.44	MIND	0.49	0.49	0.49	0.49	0.49	
	261	267	273	278	283	KTAS	290	297	303	309	315	
	205	205	205	205	205	KIAS	228	228	228	228	228	
	1243	1270	1296	1322	1347	LB/HR	1597	1631	1664	1697	1729	
	0.210	0.210	0.210	0.210	0.210	NM/LB	0.182	0.182	0.182	0.182	0.182	
32,000	76.8	78.5	80.1	81.8	83.3	%N1						
	0.45	0.45	0.45	0.45	0.45	MIND						
	266	271	277	282	288	KTAS						
	208	208	208	208	208	KIAS						
	1287	1315	1342	1368	1395	LB/HR						
	0.206	0.206	0.206	0.206	0.206	NM/LB						

Section VIII-7
Single Engine Maximum Range Cruise

21,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)		-46.6	-36.6	-26.6	-16.6	-6.6	OAT (°C)	-46.6	-36.6	-26.6	-16.6	-6.6		GROSS WEIGHT AT ALTITUDE (LB)
		-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20		
	25,000	72.1	73.6	75.2	76.8	78.2	%N1	78.9	80.6	82.3	84.0	85.7	33,000	
		0.41	0.41	0.41	0.41	0.41	MIND	0.47	0.47	0.47	0.47	0.47		
		242	248	253	258	263	KTAS	277	283	289	295	301		
		184	184	184	184	184	KIAS	211	211	211	211	211		
		976	998	1018	1039	1059	LB/HR	1327	1356	1384	1412	1439		
		0.248	0.248	0.248	0.248	0.248	NM/LB	0.209	0.209	0.209	0.209	0.209		
	26,000	73.0	74.6	76.2	77.8	79.4	%N1	79.6	81.4	83.1	84.8	86.4	34,000	
		0.42	0.42	0.42	0.42	0.42	MIND	0.48	0.48	0.48	0.48	0.48		
		248	253	258	263	269	KTAS	281	287	293	299	305		
		188	188	188	188	188	KIAS	213	213	213	213	213		
		1026	1048	1070	1092	1113	LB/HR	1370	1400	1429	1458	1486		
		0.241	0.241	0.241	0.241	0.241	NM/LB	0.205	0.205	0.205	0.205	0.205		
	27,000	73.9	75.6	77.2	78.8	80.4	%N1	80.4	82.1	83.9	85.6	87.2	35,000	
		0.43	0.43	0.43	0.43	0.43	MIND	0.48	0.48	0.48	0.48	0.48		
		252	258	263	269	274	KTAS	284	290	296	302	308		
		191	191	191	191	191	KIAS	216	216	216	216	216		
		1071	1094	1117	1140	1162	LB/HR	1416	1447	1477	1506	1536		
		0.236	0.236	0.236	0.236	0.236	NM/LB	0.201	0.201	0.201	0.201	0.201		
	28,000	74.9	76.5	78.2	79.8	81.4	%N1	81.1	82.9	84.6	86.4	88.1	36,000	
		0.44	0.44	0.44	0.44	0.44	MIND	0.49	0.49	0.49	0.49	0.49		
		257	263	268	273	279	KTAS	289	295	301	307	313		
		195	195	195	195	195	KIAS	220	220	220	220	220		
		1112	1136	1160	1183	1206	LB/HR	1462	1494	1525	1556	1586		
		0.231	0.231	0.231	0.231	0.231	NM/LB	0.197	0.197	0.197	0.197	0.197		
	29,000	75.8	77.5	79.1	80.7	82.3	%N1	81.9	83.7	85.4	87.2	88.9	37,000	
		0.45	0.45	0.45	0.45	0.45	MIND	0.50	0.50	0.50	0.50	0.50		
		261	267	273	278	284	KTAS	293	300	306	312	318		
		198	198	198	198	198	KIAS	223	223	223	223	223		
		1155	1180	1205	1229	1253	LB/HR	1509	1542	1574	1606	1637		
		0.226	0.226	0.226	0.226	0.226	NM/LB	0.194	0.194	0.194	0.194	0.194		
	30,000	76.7	78.3	80.0	81.6	83.2	%N1	82.7	84.5	86.2	88.0	89.7	38,000	
		0.45	0.45	0.45	0.45	0.45	MIND	0.51	0.51	0.51	0.51	0.51		
		266	272	277	283	289	KTAS	298	304	311	317	323		
		202	202	202	202	202	KIAS	227	227	227	227	227		
		1199	1225	1251	1276	1301	LB/HR	1558	1592	1625	1658	1690		
		0.222	0.222	0.222	0.222	0.222	NM/LB	0.191	0.191	0.191	0.191	0.191		
	31,000	77.4	79.1	80.8	82.5	84.1	%N1	83.4	85.2	87.0	88.8	90.5	39,000	
		0.46	0.46	0.46	0.46	0.46	MIND	0.52	0.52	0.52	0.52	0.52		
		270	276	282	288	293	KTAS	303	309	316	322	328		
		205	205	205	205	205	KIAS	231	231	231	231	231		
		1245	1272	1298	1324	1350	LB/HR	1608	1643	1678	1711	1744		
		0.217	0.217	0.217	0.217	0.217	NM/LB	0.188	0.188	0.188	0.188	0.188		
	32,000	78.2	79.9	81.6	83.2	84.9	%N1							
		0.47	0.47	0.47	0.47	0.47	MIND							
		274	280	286	291	297	KTAS							
		208	208	208	208	208	KIAS							
		1285	1313	1340	1367	1394	LB/HR							
		0.213	0.213	0.213	0.213	0.213	NM/LB							

Gulfstream G280
AIRPLANE FLIGHT MANUAL

23,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-50.6	-40.6	-30.6	-20.6	-10.6	OAT (°C)	-50.6	-40.6	-30.6	-20.6	-10.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	73.5	75.1	76.8	78.4	80.0	%N1	80.4	82.2	83.9	85.6	87.3	33,000
	0.43	0.43	0.43	0.43	0.43	MIND	0.49	0.49	0.49	0.49	0.49	
	251	257	262	268	273	KTAS	286	292	298	304	310	
	184	184	184	184	184	KIAS	210	210	210	210	210	
	983	1005	1026	1047	1068	LB/HR	1328	1357	1386	1414	1442	
	0.256	0.256	0.256	0.256	0.256	NM/LB	0.215	0.215	0.215	0.215	0.215	
26,000	74.4	76.1	77.8	79.4	81.1	%N1	81.2	83.0	84.8	86.5	88.2	34,000
	0.44	0.44	0.44	0.44	0.44	MIND	0.50	0.50	0.50	0.50	0.50	
	256	262	267	273	278	KTAS	291	297	304	310	316	
	188	188	188	188	188	KIAS	214	214	214	214	214	
	1024	1047	1069	1091	1112	LB/HR	1375	1405	1435	1464	1493	
	0.250	0.250	0.250	0.250	0.250	NM/LB	0.212	0.212	0.212	0.212	0.212	
27,000	75.4	77.1	78.8	80.4	82.0	%N1	82.0	83.8	85.6	87.4	89.1	35,000
	0.45	0.45	0.45	0.45	0.45	MIND	0.51	0.51	0.51	0.51	0.51	
	261	267	272	278	283	KTAS	296	302	309	315	321	
	192	192	192	192	192	KIAS	218	218	218	218	218	
	1067	1091	1114	1137	1159	LB/HR	1423	1455	1486	1516	1546	
	0.245	0.245	0.245	0.245	0.245	NM/LB	0.208	0.208	0.208	0.208	0.208	
28,000	76.4	78.1	79.8	81.4	83.0	%N1	82.8	84.6	86.4	88.2	90.0	36,000
	0.46	0.46	0.46	0.46	0.46	MIND	0.52	0.52	0.52	0.52	0.52	
	266	272	278	283	289	KTAS	301	307	314	320	327	
	195	195	195	195	195	KIAS	222	222	222	222	222	
	1112	1137	1161	1185	1208	LB/HR	1473	1506	1538	1569	1600	
	0.239	0.239	0.239	0.239	0.239	NM/LB	0.204	0.204	0.204	0.204	0.204	
29,000	77.2	78.9	80.6	82.3	83.9	%N1	83.5	85.4	87.2	89.0	90.7	37,000
	0.46	0.46	0.46	0.46	0.46	MIND	0.52	0.52	0.52	0.52	0.52	
	270	276	282	288	293	KTAS	304	311	318	324	331	
	198	198	198	198	198	KIAS	225	225	225	225	225	
	1154	1180	1205	1229	1253	LB/HR	1519	1552	1585	1618	1649	
	0.234	0.234	0.234	0.234	0.234	NM/LB	0.201	0.201	0.201	0.201	0.201	
30,000	78.0	79.7	81.4	83.1	84.8	%N1	84.2	86.0	87.9	89.7	91.3	38,000
	0.47	0.47	0.47	0.47	0.47	MIND	0.53	0.53	0.53	0.53	0.53	
	274	280	286	292	297	KTAS	307	314	321	327	331	
	201	201	201	201	201	KIAS	227	227	227	227	225	
	1195	1221	1247	1273	1298	LB/HR	1561	1595	1629	1663	1710	
	0.229	0.229	0.229	0.229	0.229	NM/LB	0.197	0.197	0.197	0.197	0.194	
31,000	78.7	80.5	82.2	83.9	85.6	%N1	84.9	86.7	88.6	90.4	91.3	39,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.53	0.53	0.53	0.53	0.51	
	277	284	290	296	301	KTAS	310	317	324	330	324	
	204	204	204	204	204	KIAS	229	229	229	229	220	
	1238	1265	1292	1318	1344	LB/HR	1604	1640	1675	1709	1704	
	0.224	0.224	0.224	0.224	0.224	NM/LB	0.193	0.193	0.193	0.193	0.190	
32,000	79.5	81.3	83.0	84.8	86.4	%N1						
	0.48	0.48	0.48	0.48	0.48	MIND						
	281	287	294	300	305	KTAS						
	207	207	207	207	207	KIAS						
	1282	1311	1339	1366	1393	LB/HR						
	0.219	0.219	0.219	0.219	0.219	NM/LB						

Section VIII-7
Single Engine Maximum Range Cruise

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)		-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5		GROSS WEIGHT AT ALTITUDE (LB)
		-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20		
	25,000	75.0	76.7	78.4	80.0	81.7	%N1	82.0	83.9	85.7	87.5	89.3	33,000	
		0.45	0.45	0.45	0.45	0.45	MIND	0.52	0.52	0.52	0.52	0.52		
		260	266	272	277	283	KTAS	298	305	311	318	324		
		185	185	185	185	185	KIAS	213	213	213	213	213		
		980	1003	1024	1046	1066	LB/HR	1338	1368	1398	1427	1455		
		0.265	0.265	0.265	0.265	0.265	NM/LB	0.223	0.223	0.223	0.223	0.223		
	26,000	76.0	77.7	79.5	81.1	82.7	%N1	82.8	84.6	86.5	88.3	90.1	34,000	
		0.46	0.46	0.46	0.46	0.46	MIND	0.52	0.52	0.52	0.52	0.52		
		265	271	277	283	288	KTAS	302	309	315	322	328		
		188	188	188	188	188	KIAS	216	216	216	216	216		
		1025	1049	1071	1094	1115	LB/HR	1383	1414	1445	1475	1504		
		0.259	0.259	0.259	0.259	0.259	NM/LB	0.218	0.218	0.218	0.218	0.218		
	27,000	76.9	78.6	80.3	82.0	83.7	%N1	83.4	85.3	87.2	89.0	90.8	35,000	
		0.47	0.47	0.47	0.47	0.47	MIND	0.53	0.53	0.53	0.53	0.53		
		269	275	281	287	293	KTAS	305	312	319	325	332		
		191	191	191	191	191	KIAS	218	218	218	218	218		
		1065	1089	1113	1136	1158	LB/HR	1425	1457	1489	1520	1550		
		0.253	0.253	0.253	0.253	0.253	NM/LB	0.214	0.214	0.214	0.214	0.214		
	28,000	77.7	79.5	81.2	82.9	84.6	%N1	84.1	86.0	87.9	89.7	91.4	36,000	
		0.47	0.47	0.47	0.47	0.47	MIND	0.53	0.53	0.53	0.53	0.53		
		273	279	285	291	297	KTAS	308	315	322	328	333		
		194	194	194	194	194	KIAS	220	220	220	220	218		
		1106	1131	1156	1180	1203	LB/HR	1469	1502	1534	1566	1609		
		0.247	0.247	0.247	0.247	0.247	NM/LB	0.210	0.210	0.210	0.210	0.207		
	29,000	78.5	80.3	82.1	83.8	85.5	%N1	84.9	86.8	88.7	90.5	91.5	37,000	
		0.48	0.48	0.48	0.48	0.48	MIND	0.54	0.54	0.54	0.54	0.52		
		277	284	290	296	302	KTAS	311	318	325	331	325		
		197	197	197	197	197	KIAS	222	222	222	222	213		
		1150	1176	1201	1226	1251	LB/HR	1514	1548	1582	1615	1603		
		0.241	0.241	0.241	0.241	0.241	NM/LB	0.205	0.205	0.205	0.205	0.203		
	30,000	79.4	81.2	83.0	84.7	86.4	%N1	85.6	87.5	89.4	91.2	91.6	38,000	
		0.49	0.49	0.49	0.49	0.49	MIND	0.54	0.54	0.54	0.54	0.51		
		282	288	294	300	306	KTAS	313	320	326	333	317		
		201	201	201	201	201	KIAS	223	223	223	223	208		
		1195	1222	1248	1274	1300	LB/HR	1550	1586	1620	1653	1597		
		0.236	0.236	0.236	0.236	0.236	NM/LB	0.202	0.202	0.202	0.202	0.199		
	31,000	80.3	82.2	84.0	85.7	87.4	%N1	86.2	88.2	90.1	91.9	91.6	39,000	
		0.50	0.50	0.50	0.50	0.50	MIND	0.55	0.55	0.55	0.55	0.49		
		287	294	300	306	312	KTAS	314	321	328	335	308		
		205	205	205	205	205	KIAS	225	225	225	225	202		
		1241	1269	1296	1323	1350	LB/HR	1587	1623	1658	1692	1591		
		0.231	0.231	0.231	0.231	0.231	NM/LB	0.198	0.198	0.198	0.198	0.194		
	32,000	81.2	83.0	84.8	86.6	88.4	%N1							
		0.51	0.51	0.51	0.51	0.51	MIND							
		293	299	306	312	318	KTAS							
		209	209	209	209	209	KIAS							
		1289	1318	1346	1374	1402	LB/HR							
		0.227	0.227	0.227	0.227	0.227	NM/LB							

Gulfstream G280
AIRPLANE FLIGHT MANUAL

27,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-58.5	-48.5	-38.5	-28.5	-18.5	OAT (°C)	-58.5	-48.5	-38.5	-28.5	-18.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	76.4	78.1	79.8	81.6	83.2	%N1	83.3	85.2	87.1	88.9	90.8	33,000
	0.47	0.47	0.47	0.47	0.47	MIND	0.53	0.53	0.53	0.53	0.53	
	268	274	280	286	292	KTAS	305	312	319	326	332	
	184	184	184	184	184	KIAS	211	211	211	211	211	
	977	1000	1022	1044	1065	LB/HR	1334	1365	1395	1424	1453	
	0.274	0.274	0.274	0.274	0.274	NM/LB	0.229	0.229	0.229	0.229	0.229	
26,000	77.2	79.0	80.8	82.5	84.3	%N1	84.0	85.9	87.8	89.7	91.6	34,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.54	0.54	0.54	0.54	0.54	
	272	279	285	291	297	KTAS	308	315	322	329	336	
	187	187	187	187	187	KIAS	213	213	213	213	213	
	1019	1043	1066	1088	1110	LB/HR	1379	1411	1442	1472	1525	
	0.267	0.267	0.267	0.267	0.267	NM/LB	0.224	0.224	0.224	0.224	0.220	
27,000	78.1	79.9	81.7	83.4	85.2	%N1	84.8	86.7	88.7	90.6	91.7	35,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.54	0.54	0.54	0.54	0.53	
	277	283	289	295	301	KTAS	310	317	324	331	328	
	190	190	190	190	190	KIAS	214	214	214	214	208	
	1063	1088	1112	1135	1158	LB/HR	1414	1447	1478	1510	1519	
	0.260	0.260	0.260	0.260	0.260	NM/LB	0.219	0.219	0.219	0.219	0.216	
28,000	79.1	80.9	82.7	84.5	86.3	%N1	85.6	87.6	89.5	91.4	91.8	36,000
	0.49	0.49	0.49	0.49	0.49	MIND	0.55	0.55	0.55	0.55	0.51	
	282	289	295	301	307	KTAS	312	319	326	333	319	
	194	194	194	194	194	KIAS	216	216	216	216	202	
	1108	1134	1159	1183	1207	LB/HR	1450	1484	1516	1548	1513	
	0.255	0.255	0.255	0.255	0.255	NM/LB	0.215	0.215	0.215	0.215	0.211	
29,000	80.1	81.9	83.8	85.5	87.3	%N1	86.5	88.4	90.4	92.3	91.9	37,000
	0.50	0.50	0.50	0.50	0.50	MIND	0.55	0.55	0.55	0.55	0.50	
	288	295	301	308	314	KTAS	313	321	328	335	309	
	199	199	199	199	199	KIAS	217	217	217	217	195	
	1155	1181	1207	1233	1258	LB/HR	1488	1522	1556	1589	1505	
	0.250	0.250	0.250	0.250	0.250	NM/LB	0.211	0.211	0.211	0.211	0.205	
30,000	81.0	82.9	84.7	86.5	88.3	%N1	87.3	89.3	91.2	93.1		38,000
	0.52	0.52	0.52	0.52	0.52	MIND	0.55	0.55	0.55	0.55		
	294	301	307	314	320	KTAS	315	322	329	336		
	203	203	203	203	203	KIAS	218	218	218	218		
	1203	1231	1258	1285	1311	LB/HR	1528	1563	1597	1631		
	0.244	0.244	0.244	0.244	0.244	NM/LB	0.206	0.206	0.206	0.206		
31,000	81.8	83.7	85.5	87.4	89.3	%N1	88.1	90.1	92.1	93.9		39,000
	0.52	0.52	0.52	0.52	0.52	MIND	0.55	0.55	0.55	0.55		
	299	306	312	319	325	KTAS	317	324	331	337		
	206	206	206	206	206	KIAS	219	219	219	219		
	1249	1278	1306	1334	1361	LB/HR	1569	1605	1640	1683		
	0.239	0.239	0.239	0.239	0.239	NM/LB	0.202	0.202	0.202	0.200		
32,000	82.5	84.4	86.3	88.1	90.0	%N1						
	0.53	0.53	0.53	0.53	0.53	MIND						
	302	309	316	322	329	KTAS						
	209	209	209	209	209	KIAS						
	1291	1321	1350	1378	1406	LB/HR						
	0.234	0.234	0.234	0.234	0.234	NM/LB						

Section VIII-7
Single Engine Maximum Range Cruise

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)		-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5		GROSS WEIGHT AT ALTITUDE (LB)
		-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20		
	25,000	77.7	79.6	81.4	83.1	84.9	%N1	84.7	86.7	88.7	90.6	91.9	33,000	
		0.49	0.49	0.49	0.49	0.49	MIND	0.55	0.55	0.55	0.55	0.54		
		276	282	289	295	301	KTAS	309	316	323	330	331		
		183	183	183	183	183	KIAS	206	206	206	206	202		
		977	1000	1022	1044	1066	LB/HR	1317	1348	1378	1408	1434		
		0.282	0.282	0.282	0.282	0.282	NM/LB	0.235	0.235	0.235	0.235	0.230		
	26,000	78.8	80.7	82.5	84.3	86.1	%N1	85.8	87.8	89.7	91.7	92.0	34,000	
		0.50	0.50	0.50	0.50	0.50	MIND	0.55	0.55	0.55	0.55	0.52		
		282	289	295	302	308	KTAS	311	318	325	332	322		
		188	188	188	188	188	KIAS	208	208	208	208	197		
		1022	1046	1069	1092	1115	LB/HR	1355	1386	1417	1448	1428		
		0.276	0.276	0.276	0.276	0.276	NM/LB	0.229	0.229	0.229	0.229	0.225		
	27,000	79.8	81.7	83.6	85.4	87.2	%N1	86.8	88.8	90.8	92.7	92.2	35,000	
		0.51	0.51	0.51	0.51	0.51	MIND	0.55	0.55	0.55	0.55	0.50		
		289	295	302	308	315	KTAS	313	320	327	334	308		
		192	192	192	192	192	KIAS	209	209	209	209	188		
		1069	1094	1119	1143	1166	LB/HR	1394	1427	1459	1490	1418		
		0.270	0.270	0.270	0.270	0.270	NM/LB	0.224	0.224	0.224	0.224	0.217		
	28,000	80.8	82.7	84.5	86.4	88.3	%N1	87.8	89.8	91.8	93.7		36,000	
		0.52	0.52	0.52	0.52	0.52	MIND	0.56	0.56	0.56	0.56			
		295	302	308	315	322	KTAS	314	322	329	336			
		197	197	197	197	197	KIAS	210	210	210	210			
		1118	1144	1170	1195	1220	LB/HR	1435	1469	1502	1534			
		0.264	0.264	0.264	0.264	0.264	NM/LB	0.219	0.219	0.219	0.219			
	29,000	81.5	83.5	85.3	87.2	89.1	%N1	88.7	90.7	92.6	94.5		37,000	
		0.53	0.53	0.53	0.53	0.53	MIND	0.56	0.56	0.56	0.55			
		298	305	312	319	325	KTAS	315	322	329	334			
		199	199	199	199	199	KIAS	211	210	210	209			
		1158	1186	1212	1238	1264	LB/HR	1458	1499	1541	1580			
		0.257	0.257	0.257	0.257	0.257	NM/LB	0.216	0.215	0.213	0.212			
	30,000	82.3	84.3	86.2	88.0	90.0	%N1	88.8	90.7	92.7	94.5		38,000	
		0.53	0.53	0.53	0.53	0.53	MIND	0.54	0.54	0.54	0.53			
		302	309	316	323	329	KTAS	304	310	317	322			
		201	201	201	201	201	KIAS	203	203	202	201			
		1201	1229	1257	1284	1310	LB/HR	1444	1484	1525	1563			
		0.251	0.251	0.251	0.251	0.251	NM/LB	0.211	0.209	0.208	0.206			
	31,000	83.1	85.0	87.0	88.8	90.8	%N1						39,000	
		0.54	0.54	0.54	0.54	0.54	MIND							
		305	312	319	326	333	KTAS							
		204	204	204	204	204	KIAS							
		1245	1275	1303	1331	1359	LB/HR							
		0.245	0.245	0.245	0.245	0.245	NM/LB							
	32,000	83.8	85.7	87.7	89.6	91.6	%N1							
		0.54	0.54	0.54	0.54	0.54	MIND							
		307	314	321	328	335	KTAS							
		205	205	205	205	205	KIAS							
		1281	1311	1340	1369	1397	LB/HR							
		0.240	0.240	0.240	0.240	0.240	NM/LB							

Gulfstream G280
AIRPLANE FLIGHT MANUAL

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	79.5	81.4	83.2	85.1	86.8	%N1	87.0	89.1	91.1	93.1	92.6	33,000
	0.51	0.51	0.51	0.51	0.51	MIND	0.56	0.56	0.56	0.56	0.50	
	288	295	302	308	315	KTAS	312	319	326	334	307	
	185	185	185	185	185	KIAS	201	201	201	201	181	
	984	1007	1030	1053	1075	LB/HR	1304	1335	1365	1395	1334	
	0.293	0.293	0.293	0.293	0.293	NM/LB	0.239	0.239	0.239	0.239	0.230	
26,000	80.4	82.3	84.2	86.1	87.9	%N1	88.2	90.3	92.3	94.2		34,000
	0.52	0.52	0.52	0.52	0.52	MIND	0.56	0.56	0.56	0.56		
	294	301	308	314	321	KTAS	314	321	328	336		
	189	189	189	189	189	KIAS	203	203	203	203		
	1028	1053	1077	1100	1123	LB/HR	1347	1379	1410	1441		
	0.286	0.286	0.286	0.286	0.286	NM/LB	0.233	0.233	0.233	0.233		
27,000	81.2	83.2	85.1	86.9	88.9	%N1	88.9	90.9	92.9	94.7		35,000
	0.53	0.53	0.53	0.53	0.53	MIND	0.55	0.55	0.55	0.55		
	297	305	311	318	325	KTAS	310	317	324	329		
	192	192	192	192	192	KIAS	200	200	200	199		
	1069	1095	1120	1144	1168	LB/HR	1353	1392	1431	1468		
	0.278	0.278	0.278	0.278	0.278	NM/LB	0.229	0.228	0.226	0.224		
28,000	82.1	84.0	85.9	87.8	89.8	%N1						36,000
	0.54	0.54	0.54	0.54	0.54	MIND						
	301	308	315	322	329	KTAS						
	194	194	194	194	194	KIAS						
	1113	1139	1165	1191	1216	LB/HR						
	0.271	0.271	0.271	0.271	0.271	NM/LB						
29,000	82.8	84.8	86.7	88.6	90.7	%N1						37,000
	0.54	0.54	0.54	0.54	0.54	MIND						
	304	311	318	325	332	KTAS						
	196	196	196	196	196	KIAS						
	1151	1178	1205	1232	1257	LB/HR						
	0.264	0.264	0.264	0.264	0.264	NM/LB						
30,000	83.5	85.5	87.5	89.5	91.6	%N1						38,000
	0.55	0.55	0.55	0.55	0.55	MIND						
	306	313	320	327	334	KTAS						
	197	197	197	197	197	KIAS						
	1186	1215	1242	1269	1296	LB/HR						
	0.258	0.258	0.258	0.258	0.258	NM/LB						
31,000	84.7	86.7	88.7	90.7	92.3	%N1						39,000
	0.55	0.55	0.55	0.55	0.55	MIND						
	308	315	322	329	333	KTAS						
	199	199	199	199	197	KIAS						
	1223	1253	1281	1309	1351	LB/HR						
	0.252	0.252	0.252	0.252	0.247	NM/LB						
32,000	85.9	87.9	89.9	91.9	92.4	%N1						
	0.55	0.55	0.55	0.55	0.53	MIND						
	310	317	324	331	324	KTAS						
	200	200	200	200	191	KIAS						
	1262	1293	1322	1351	1345	LB/HR						
	0.245	0.245	0.245	0.245	0.241	NM/LB						

Section VIII-7
Single Engine Maximum Range Cruise

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	80.9	82.8	84.7	86.6	88.5	%N1	88.8	90.8	92.8	94.7		33,000
	0.53	0.53	0.53	0.53	0.53	MIND	0.54	0.54	0.54	0.53		
	296	303	310	317	324	KTAS	299	306	312	317		
	184	184	184	184	184	KIAS	186	186	185	184		
	982	1006	1029	1052	1074	LB/HR	1235	1271	1309	1344		
	0.302	0.302	0.302	0.302	0.302	NM/LB	0.242	0.241	0.239	0.236		
26,000	81.7	83.7	85.7	87.5	89.5	%N1						34,000
	0.54	0.54	0.54	0.54	0.54	MIND						
	300	307	314	321	328	KTAS						
	187	187	187	187	187	KIAS						
	1024	1049	1074	1097	1121	LB/HR						
	0.293	0.293	0.293	0.293	0.293	NM/LB						
27,000	82.5	84.5	86.5	88.4	90.6	%N1						35,000
	0.54	0.54	0.54	0.54	0.54	MIND						
	302	309	317	324	331	KTAS						
	188	188	188	188	188	KIAS						
	1059	1084	1110	1134	1158	LB/HR						
	0.285	0.285	0.285	0.285	0.285	NM/LB						
28,000	83.4	85.4	87.4	89.3	91.6	%N1						36,000
	0.55	0.55	0.55	0.55	0.55	MIND						
	304	312	319	326	333	KTAS						
	189	189	189	189	189	KIAS						
	1095	1121	1148	1173	1198	LB/HR						
	0.278	0.278	0.278	0.278	0.278	NM/LB						
29,000	84.7	86.7	88.7	90.7	92.6	%N1						37,000
	0.55	0.55	0.55	0.55	0.55	MIND						
	306	314	321	328	335	KTAS						
	191	191	191	191	191	KIAS						
	1133	1161	1188	1214	1240	LB/HR						
	0.270	0.270	0.270	0.270	0.270	NM/LB						
30,000	86.0	88.1	90.1	92.0	92.8	%N1						38,000
	0.56	0.56	0.56	0.56	0.54	MIND						
	309	316	323	331	325	KTAS						
	192	192	192	192	185	KIAS						
	1173	1202	1230	1257	1263	LB/HR						
	0.263	0.263	0.263	0.263	0.258	NM/LB						
31,000	87.3	89.4	91.4	93.4	93.2	%N1						39,000
	0.56	0.56	0.56	0.56	0.50	MIND						
	311	318	326	333	305	KTAS						
	194	194	194	194	173	KIAS						
	1216	1246	1275	1303	1251	LB/HR						
	0.255	0.255	0.255	0.255	0.244	NM/LB						
32,000	88.6	90.7	92.7	94.7		%N1						
	0.56	0.56	0.56	0.56		MIND						
	313	320	328	335		KTAS						
	195	195	195	195		KIAS						
	1269	1300	1330	1359		LB/HR						
	0.247	0.247	0.247	0.247		NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	82.3	84.3	86.3	88.2	90.2	%N1						33,000
	0.55	0.55	0.55	0.55	0.55	MIND						
	300	308	315	322	329	KTAS						
	180	180	180	180	180	KIAS						
	969	993	1017	1040	1062	LB/HR						
	0.310	0.310	0.310	0.310	0.310	NM/LB						
26,000	83.3	85.4	87.4	89.3	91.5	%N1						34,000
	0.55	0.55	0.55	0.55	0.55	MIND						
	302	310	317	324	332	KTAS						
	182	182	182	182	182	KIAS						
	1006	1031	1055	1079	1102	LB/HR						
	0.301	0.301	0.301	0.301	0.301	NM/LB						
27,000	84.8	86.9	88.9	90.8	92.7	%N1						35,000
	0.55	0.55	0.55	0.55	0.55	MIND						
	305	312	320	327	334	KTAS						
	183	183	183	183	183	KIAS						
	1045	1071	1096	1121	1145	LB/HR						
	0.292	0.292	0.292	0.292	0.292	NM/LB						
28,000	86.3	88.4	90.4	92.3	93.3	%N1						36,000
	0.56	0.56	0.56	0.56	0.54	MIND						
	307	315	322	329	327	KTAS						
	185	185	185	185	179	KIAS						
	1087	1114	1140	1166	1181	LB/HR						
	0.283	0.283	0.283	0.283	0.277	NM/LB						
29,000	87.8	89.9	91.9	93.8	93.8	%N1						37,000
	0.56	0.56	0.56	0.56	0.49	MIND						
	309	317	325	332	297	KTAS						
	186	186	186	186	162	KIAS						
	1137	1165	1193	1220	1165	LB/HR						
	0.272	0.272	0.272	0.272	0.255	NM/LB						
30,000	88.7	90.7	92.7	94.7		%N1						38,000
	0.56	0.55	0.55	0.55		MIND						
	305	312	319	326		KTAS						
	183	183	183	182		KIAS						
	1139	1173	1210	1225		LB/HR						
	0.268	0.266	0.264	0.261		NM/LB						
31,000						%N1						39,000
						MIND						
						KTAS						
						KIAS						
						LB/HR						
						NM/LB						
32,000						%N1						
						MIND						
						KTAS						
						KIAS						
						LB/HR						
						NM/LB						

Section VIII-7
Single Engine Maximum Range Cruise

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)		-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
		-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000		84.9	86.9	89.0	90.9	92.6	%N1						33,000
		0.56	0.56	0.56	0.56	0.56	MIND						
		304	312	319	327	334	KTAS						
		175	175	175	175	175	KIAS						
		963	988	1011	1034	1057	LB/HR						
		0.316	0.316	0.316	0.316	0.316	NM/LB						
26,000		86.5	88.6	90.6	92.6	92.9	%N1						34,000
		0.56	0.56	0.56	0.56	0.53	MIND						
		307	315	322	329	319	KTAS						
		177	177	177	177	167	KIAS						
		1009	1034	1059	1083	1080	LB/HR						
		0.304	0.304	0.304	0.304	0.295	NM/LB						
27,000		88.2	90.2	92.3	94.2		%N1						35,000
		0.57	0.57	0.57	0.57		MIND						
		309	317	325	332		KTAS						
		179	179	179	179		KIAS						
		1063	1090	1116	1141		LB/HR						
		0.291	0.291	0.291	0.291		NM/LB						
28,000		89.0	91.0	93.0			%N1						36,000
		0.55	0.55	0.55			MIND						
		300	308	315			KTAS						
		173	173	173			KIAS						
		1058	1092	1127			LB/HR						
		0.284	0.282	0.279			NM/LB						
29,000							%N1						37,000
							MIND						
							KTAS						
							KIAS						
							LB/HR						
							NM/LB						
30,000							%N1						38,000
							MIND						
							KTAS						
							KIAS						
							LB/HR						
							NM/LB						
31,000							%N1						39,000
							MIND						
							KTAS						
							KIAS						
							LB/HR						
							NM/LB						
32,000							%N1						
							MIND						
							KTAS						
							KIAS						
							LB/HR						
							NM/LB						

SINGLE ENGINE MAXIMUM CRUISE TABLES

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)

	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
	81.4	83.0	84.6	86.1	87.7	%N1	81.8	83.4	84.9	86.5	88.0	
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
25,000	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	33,000
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2321	2382	2440	2469	2563	LB/HR	2354	2416	2475	2537	2600	
	0.134	0.133	0.132	0.131	0.130	NM/LB	0.132	0.131	0.130	0.129	0.128	
	81.5	83.0	84.6	86.2	87.7	%N1	81.8	83.4	85.0	86.6	88.1	
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
26,000	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	34,000
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2324	2385	2443	2473	2566	LB/HR	2360	2421	2481	2543	2606	
	0.133	0.132	0.132	0.131	0.130	NM/LB	0.131	0.130	0.130	0.129	0.128	
	81.5	83.1	84.6	86.2	87.7	%N1	81.9	83.5	85.1	86.6	88.2	
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
27,000	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	35,000
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2328	2388	2447	2476	2570	LB/HR	2366	2427	2487	2549	2613	
	0.133	0.132	0.131	0.131	0.130	NM/LB	0.131	0.130	0.129	0.128	0.127	
	81.5	83.1	84.7	86.2	87.8	%N1	81.9	83.5	85.1	86.7	88.2	
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
28,000	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	36,000
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2331	2392	2450	2480	2574	LB/HR	2372	2433	2493	2556	2619	
	0.133	0.132	0.131	0.130	0.129	NM/LB	0.131	0.130	0.129	0.128	0.127	
	81.6	83.1	84.7	86.3	87.8	%N1	82.0	83.6	85.2	86.7	88.3	
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
29,000	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	37,000
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2334	2395	2454	2483	2577	LB/HR	2377	2439	2499	2562	2625	
	0.133	0.132	0.131	0.130	0.129	NM/LB	0.130	0.129	0.129	0.128	0.127	
	81.6	83.2	84.8	86.3	87.8	%N1	82.1	83.7	85.2	86.8	88.4	
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
30,000	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	38,000
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2337	2398	2457	2486	2581	LB/HR	2383	2445	2505	2568	2632	
	0.133	0.132	0.131	0.130	0.129	NM/LB	0.130	0.129	0.128	0.127	0.127	
	81.6	83.2	84.8	86.4	87.9	%N1	82.2	83.8	85.4	86.9	88.5	
	0.50	0.50	0.50	0.50	0.50	MIND	0.50	0.50	0.50	0.50	0.50	
31,000	309.9	315.8	321.6	327.4	333.0	KTAS	309.9	315.8	321.6	327.4	333.0	39,000
	300.0	300.0	300.0	300.0	300.0	KCAS	300.0	300.0	300.0	300.0	300.0	
	2343	2404	2463	2492	2587	LB/HR	2394	2456	2517	2580	2644	
	0.132	0.131	0.131	0.130	0.129	NM/LB	0.129	0.129	0.128	0.127	0.126	
	81.7	83.3	84.9	86.4	88.0	%N1						
	0.50	0.50	0.50	0.50	0.50	MIND						
32,000	309.9	315.8	321.6	327.4	333.0	KTAS						
	300.0	300.0	300.0	300.0	300.0	KCAS						
	2349	2410	2469	2499	2594	LB/HR						
	0.132	0.131	0.130	0.129	0.128	NM/LB						

GROSS WEIGHT AT ALTITUDE (LB)

10,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	84.4	86.1	87.7	89.4	89.7	%N1	84.7	86.4	88.1	89.7	89.7	33,000
	0.54	0.54	0.54	0.54	0.53	MIND	0.54	0.54	0.54	0.54	0.52	
	332.3	338.9	345.4	351.7	348.8	KTAS	331.9	338.5	344.9	351.1	345.7	
	300.0	300.0	300.0	300.0	292.1	KCAS	299.7	299.7	299.6	299.4	289.5	
	2305	2364	2426	2453	2403	LB/HR	2334	2394	2455	2514	2399	
	0.144	0.143	0.142	0.141	0.145	NM/LB	0.142	0.141	0.140	0.140	0.144	
26,000	84.4	86.1	87.8	89.5	89.7	%N1	84.7	86.4	88.1	89.7	89.7	34,000
	0.54	0.54	0.54	0.54	0.53	MIND	0.54	0.54	0.54	0.54	0.52	
	332.3	338.9	345.4	351.7	348.5	KTAS	331.5	338.1	344.5	350.7	345.2	
	300.0	300.0	300.0	300.0	291.9	KCAS	299.3	299.3	299.2	299.0	289.1	
	2308	2367	2429	2456	2403	LB/HR	2334	2393	2455	2513	2399	
	0.144	0.143	0.142	0.141	0.145	NM/LB	0.142	0.141	0.140	0.140	0.144	
27,000	84.5	86.2	87.8	89.5	89.7	%N1	84.7	86.4	88.1	89.7	89.7	35,000
	0.54	0.54	0.54	0.54	0.53	MIND	0.54	0.54	0.54	0.54	0.52	
	332.3	338.9	345.4	351.7	348.3	KTAS	331.0	337.6	344.0	350.2	344.6	
	300.0	300.0	300.0	300.0	291.7	KCAS	298.9	298.9	298.8	298.7	288.6	
	2311	2370	2433	2460	2402	LB/HR	2333	2393	2454	2513	2398	
	0.144	0.143	0.142	0.141	0.145	NM/LB	0.142	0.141	0.140	0.139	0.144	
28,000	84.5	86.2	87.9	89.5	89.7	%N1	84.7	86.4	88.1	89.7	89.7	36,000
	0.54	0.54	0.54	0.54	0.53	MIND	0.54	0.54	0.54	0.54	0.52	
	332.3	338.9	345.4	351.7	348.0	KTAS	330.6	337.2	343.6	349.8	343.6	
	300.0	300.0	300.0	300.0	291.5	KCAS	298.5	298.5	298.4	298.3	287.7	
	2315	2374	2436	2464	2402	LB/HR	2333	2392	2454	2512	2397	
	0.144	0.143	0.142	0.141	0.145	NM/LB	0.142	0.141	0.140	0.139	0.143	
29,000	84.5	86.2	87.9	89.6	89.7	%N1	84.8	86.4	88.1	89.8	89.7	37,000
	0.54	0.54	0.54	0.54	0.53	MIND	0.54	0.54	0.54	0.54	0.52	
	332.3	338.9	345.4	351.7	347.6	KTAS	330.2	336.8	343.1	349.3	342.6	
	300.0	300.0	300.0	300.0	291.1	KCAS	298.1	298.1	298.0	297.9	286.9	
	2318	2377	2440	2467	2402	LB/HR	2332	2392	2454	2512	2396	
	0.143	0.143	0.142	0.141	0.145	NM/LB	0.142	0.141	0.140	0.139	0.143	
30,000	84.6	86.3	88.0	89.6	89.7	%N1	84.8	86.5	88.1	89.8	89.7	38,000
	0.54	0.54	0.54	0.54	0.53	MIND	0.54	0.54	0.54	0.54	0.52	
	332.3	338.9	345.4	351.7	347.1	KTAS	329.3	335.9	342.2	348.4	341.6	
	300.0	300.0	300.0	300.0	290.7	KCAS	297.3	297.3	297.2	297.1	286.0	
	2322	2381	2444	2471	2401	LB/HR	2331	2391	2453	2511	2394	
	0.143	0.142	0.141	0.140	0.145	NM/LB	0.141	0.140	0.140	0.139	0.143	
31,000	84.7	86.3	88.0	89.7	89.7	%N1	84.8	86.5	88.1	89.8	89.7	39,000
	0.54	0.54	0.54	0.54	0.52	MIND	0.54	0.54	0.54	0.53	0.52	
	332.3	338.9	345.4	351.7	346.6	KTAS	328.4	335.0	341.3	347.4	340.6	
	300.0	300.0	300.0	300.0	290.3	KCAS	296.5	296.5	296.4	296.2	285.1	
	2328	2387	2450	2477	2400	LB/HR	2330	2390	2452	2510	2393	
	0.143	0.142	0.141	0.140	0.144	NM/LB	0.141	0.140	0.139	0.138	0.142	
32,000	84.7	86.4	88.1	89.7	89.7	%N1						
	0.54	0.54	0.54	0.54	0.52	MIND						
	332.3	338.9	345.3	351.5	346.1	KTAS						
	300.0	300.0	300.0	299.8	289.9	KCAS						
	2334	2393	2456	2482	2400	LB/HR						
	0.142	0.142	0.141	0.140	0.144	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)

-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	
-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
85.5	87.3	89.0	90.7	90.2	%N1	85.5	87.3	89.0	90.7	90.2	
0.57	0.57	0.57	0.57	0.55	MIND	0.57	0.57	0.57	0.57	0.54	
344.1	351.3	358.1	364.9	357.1	KTAS	340.9	348.0	354.7	361.4	351.8	33,000
289.0	289.0	288.9	288.8	277.2	KCAS	286.2	286.2	286.1	286.0	273.0	
2116	2172	2229	2256	2139	LB/HR	2114	2170	2227	2282	2136	
0.163	0.162	0.161	0.160	0.167	NM/LB	0.161	0.160	0.159	0.158	0.165	
25,000											
85.5	87.3	89.0	90.7	90.2	%N1	85.5	87.3	89.0	90.7	90.3	
0.57	0.57	0.57	0.57	0.55	MIND	0.57	0.57	0.57	0.57	0.54	
343.9	351.0	357.9	364.6	356.6	KTAS	340.3	347.3	354.1	360.7	350.7	34,000
288.8	288.8	288.7	288.6	276.8	KCAS	285.7	285.7	285.5	285.4	272.1	
2116	2172	2229	2256	2139	LB/HR	2114	2170	2227	2282	2136	
0.163	0.162	0.161	0.160	0.167	NM/LB	0.161	0.160	0.159	0.158	0.164	
26,000											
85.5	87.3	89.0	90.7	90.2	%N1	85.6	87.3	89.0	90.8	90.3	
0.57	0.57	0.57	0.57	0.55	MIND	0.56	0.56	0.56	0.56	0.54	
343.6	350.8	357.6	364.3	356.1	KTAS	339.3	346.3	353.1	359.7	349.6	35,000
288.6	288.6	288.5	288.3	276.4	KCAS	284.8	284.8	284.7	284.6	271.2	
2116	2172	2229	2256	2139	LB/HR	2113	2170	2226	2281	2135	
0.162	0.162	0.160	0.160	0.166	NM/LB	0.161	0.160	0.159	0.158	0.164	
27,000											
85.5	87.3	89.0	90.7	90.2	%N1	85.6	87.3	89.1	90.8	90.3	
0.57	0.57	0.57	0.57	0.55	MIND	0.56	0.56	0.56	0.56	0.54	
343.2	350.3	357.2	363.9	355.5	KTAS	338.3	345.3	352.0	358.6	348.4	36,000
288.2	288.2	288.1	288.0	275.9	KCAS	284.0	284.0	283.8	283.7	270.2	
2116	2172	2228	2256	2138	LB/HR	2113	2169	2226	2281	2134	
0.162	0.161	0.160	0.159	0.166	NM/LB	0.160	0.159	0.158	0.157	0.163	
28,000											
85.5	87.3	89.0	90.7	90.2	%N1	85.6	87.3	89.1	90.8	90.3	
0.57	0.57	0.57	0.57	0.55	MIND	0.56	0.56	0.56	0.56	0.53	
342.7	349.8	356.7	363.4	355.0	KTAS	337.3	344.3	351.0	357.6	346.8	37,000
287.8	287.8	287.7	287.6	275.5	KCAS	283.1	283.1	283.0	282.8	269.0	
2115	2171	2228	2255	2138	LB/HR	2112	2168	2225	2280	2133	
0.162	0.161	0.160	0.159	0.166	NM/LB	0.160	0.159	0.158	0.157	0.163	
29,000											
85.5	87.3	89.0	90.7	90.2	%N1	85.6	87.3	89.1	90.8	90.3	
0.57	0.57	0.57	0.57	0.55	MIND	0.56	0.56	0.56	0.56	0.53	
342.3	349.4	356.2	362.9	354.5	KTAS	336.3	343.3	350.0	356.5	345.2	38,000
287.4	287.4	287.3	287.2	275.1	KCAS	282.2	282.3	282.1	282.0	267.7	
2115	2171	2228	2255	2138	LB/HR	2111	2168	2224	2279	2132	
0.162	0.161	0.160	0.159	0.166	NM/LB	0.159	0.158	0.157	0.156	0.162	
30,000											
85.5	87.3	89.0	90.7	90.2	%N1	85.6	87.3	89.1	90.8	90.3	
0.57	0.57	0.57	0.57	0.54	MIND	0.56	0.56	0.56	0.56	0.53	
341.8	348.9	355.7	362.4	354.0	KTAS	335.2	342.2	348.9	355.4	343.6	39,000
287.0	287.0	286.9	286.8	274.7	KCAS	281.3	281.3	281.2	281.0	266.4	
2115	2171	2228	2255	2137	LB/HR	2111	2167	2224	2279	2132	
0.162	0.161	0.160	0.159	0.166	NM/LB	0.159	0.158	0.157	0.156	0.161	
31,000											
85.5	87.3	89.0	90.7	90.2	%N1						
0.57	0.57	0.57	0.57	0.54	MIND						
341.3	348.4	355.2	361.9	352.9	KTAS						
286.6	286.6	286.5	286.4	273.9	KCAS						
2114	2171	2227	2255	2137	LB/HR						
0.161	0.160	0.159	0.159	0.165	NM/LB						
32,000											

GROSS WEIGHT AT ALTITUDE (LB)

19,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-42.6	-32.6	-22.6	-12.6	-2.6	OAT (°C)	-42.6	-32.6	-22.6	-12.6	-2.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	86.3	88.2	90.0	91.7	90.9	%N1	86.4	88.2	90.0	91.8	90.9	33,000
	0.60	0.60	0.60	0.59	0.57	MIND	0.59	0.59	0.59	0.59	0.55	
	351.8	359.5	366.8	373.9	362.9	KTAS	346.5	354.1	361.3	368.2	354.7	
	278.2	278.4	278.3	278.2	264.5	KCAS	273.9	274.1	273.9	273.8	258.3	
	1940	1997	2050	2077	1935	LB/HR	1936	1994	2047	2099	1930	
	0.181	0.180	0.179	0.178	0.188	NM/LB	0.179	0.178	0.177	0.175	0.184	
26,000	86.3	88.2	90.0	91.8	90.9	%N1	86.4	88.2	90.0	91.8	90.9	34,000
	0.59	0.59	0.59	0.59	0.57	MIND	0.58	0.58	0.58	0.58	0.55	
	351.3	359.0	366.3	373.4	362.3	KTAS	345.3	353.0	360.1	367.0	352.8	
	277.8	278.0	277.9	277.8	264.0	KCAS	272.9	273.1	273.0	272.9	256.9	
	1939	1997	2050	2077	1935	LB/HR	1935	1993	2046	2098	1929	
	0.181	0.180	0.179	0.178	0.187	NM/LB	0.178	0.177	0.176	0.175	0.183	
27,000	86.3	88.2	90.0	91.8	90.9	%N1	86.4	88.2	90.0	91.8	90.9	35,000
	0.59	0.59	0.59	0.59	0.56	MIND	0.58	0.58	0.58	0.58	0.55	
	350.7	358.5	365.7	372.8	361.7	KTAS	344.2	351.9	358.9	365.8	351.0	
	277.4	277.6	277.5	277.3	263.6	KCAS	272.0	272.2	272.1	272.0	255.5	
	1939	1997	2050	2077	1934	LB/HR	1935	1992	2045	2097	1927	
	0.181	0.180	0.178	0.177	0.187	NM/LB	0.178	0.177	0.176	0.174	0.182	
28,000	86.4	88.2	90.0	91.8	90.9	%N1	86.4	88.2	90.0	91.8	90.9	36,000
	0.59	0.59	0.59	0.59	0.56	MIND	0.58	0.58	0.58	0.58	0.55	
	350.2	358.0	365.2	372.2	361.1	KTAS	343.0	350.6	357.6	364.5	349.1	
	277.0	277.1	277.0	276.9	263.1	KCAS	271.0	271.2	271.1	270.9	254.1	
	1939	1996	2049	2075	1934	LB/HR	1934	1991	2044	2096	1926	
	0.181	0.179	0.178	0.177	0.187	NM/LB	0.177	0.176	0.175	0.174	0.181	
29,000	86.4	88.2	90.0	91.8	90.9	%N1	86.4	88.3	90.0	91.8	90.9	37,000
	0.59	0.59	0.59	0.59	0.56	MIND	0.58	0.58	0.58	0.58	0.54	
	349.7	357.4	364.7	371.7	360.1	KTAS	341.4	349.0	356.0	362.8	346.6	
	276.5	276.7	276.6	276.5	262.3	KCAS	269.7	269.9	269.8	269.6	252.2	
	1938	1996	2049	2076	1933	LB/HR	1933	1990	2043	2095	1925	
	0.180	0.179	0.178	0.177	0.186	NM/LB	0.177	0.175	0.174	0.173	0.180	
30,000	86.4	88.2	90.0	91.8	90.9	%N1	86.4	88.3	90.1	91.8	90.9	38,000
	0.59	0.59	0.59	0.59	0.56	MIND	0.57	0.58	0.57	0.57	0.54	
	349.2	356.9	364.1	371.1	358.8	KTAS	339.8	347.3	354.3	361.1	343.5	
	276.1	276.3	276.2	276.0	261.3	KCAS	268.4	268.6	268.5	268.3	249.8	
	1938	1995	2049	2074	1933	LB/HR	1931	1989	2042	2094	1923	
	0.180	0.179	0.178	0.177	0.186	NM/LB	0.176	0.175	0.174	0.172	0.179	
31,000	86.4	88.2	90.0	91.8	90.9	%N1	86.4	88.3	90.1	91.8	90.9	39,000
	0.59	0.59	0.59	0.59	0.56	MIND	0.57	0.57	0.57	0.57	0.53	
	348.6	356.4	363.6	370.6	357.5	KTAS	338.2	345.7	352.6	359.4	340.3	
	275.7	275.8	275.7	275.6	260.4	KCAS	267.1	267.3	267.1	267.0	247.4	
	1938	1995	2048	2074	1932	LB/HR	1930	1988	2041	2093	1921	
	0.180	0.179	0.178	0.176	0.185	NM/LB	0.175	0.174	0.173	0.172	0.177	
32,000	86.4	88.2	90.0	91.8	90.9	%N1						
	0.59	0.59	0.59	0.59	0.56	MIND						
	347.6	355.3	362.4	369.4	356.2	KTAS						
	274.8	275.0	274.9	274.7	259.4	KCAS						
	1937	1994	2047	2073	1931	LB/HR						
	0.179	0.178	0.177	0.176	0.184	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

21,000 FT
PRESSURE ALTITUDE

	-46.6	-36.6	-26.6	-16.6	-6.6	OAT (°C)	-46.6	-36.6	-26.6	-16.6	-6.6	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	86.7	88.5	90.3	92.1	91.1	%N1	86.7	88.6	90.4	92.2	91.1	33,000
	0.61	0.61	0.61	0.61	0.57	MIND	0.60	0.60	0.60	0.59	0.56	
	355.5	363.2	370.7	377.9	365.4	KTAS	348.9	356.5	363.8	370.8	354.5	
	272.7	272.7	272.6	272.4	257.8	KCAS	267.4	267.4	267.3	267.1	249.8	
	1858	1910	1961	1987	1836	LB/HR	1852	1904	1955	2005	1828	
	0.191	0.190	0.189	0.188	0.199	NM/LB	0.188	0.187	0.186	0.185	0.194	
26,000	86.7	88.5	90.4	92.1	91.1	%N1	86.8	88.6	90.4	92.2	91.1	34,000
	0.61	0.61	0.61	0.60	0.57	MIND	0.59	0.59	0.59	0.59	0.55	
	354.9	362.6	370.1	377.3	364.7	KTAS	347.7	355.3	362.5	369.6	352.6	
	272.2	272.2	272.1	271.9	257.3	KCAS	266.5	266.4	266.3	266.1	248.4	
	1857	1909	1960	1986	1836	LB/HR	1851	1904	1954	2004	1827	
	0.191	0.190	0.189	0.188	0.199	NM/LB	0.188	0.187	0.186	0.184	0.193	
27,000	86.7	88.5	90.4	92.1	91.1	%N1	86.8	88.6	90.4	92.2	91.1	35,000
	0.60	0.60	0.60	0.60	0.57	MIND	0.59	0.59	0.59	0.59	0.55	
	354.4	362.1	369.5	376.7	364.0	KTAS	346.1	353.6	360.8	367.8	350.1	
	271.8	271.7	271.6	271.5	256.8	KCAS	265.2	265.1	265.0	264.8	246.6	
	1857	1909	1960	1986	1835	LB/HR	1850	1902	1953	2003	1825	
	0.191	0.190	0.189	0.187	0.198	NM/LB	0.187	0.186	0.185	0.184	0.192	
28,000	86.7	88.6	90.4	92.1	91.1	%N1	86.8	88.6	90.5	92.2	91.1	36,000
	0.60	0.60	0.60	0.60	0.57	MIND	0.59	0.59	0.59	0.59	0.55	
	353.8	361.5	368.9	376.1	362.7	KTAS	344.4	351.9	359.1	366.0	346.7	
	271.3	271.3	271.2	271.0	255.8	KCAS	263.8	263.8	263.6	263.4	244.1	
	1856	1908	1959	1985	1834	LB/HR	1849	1901	1952	2002	1823	
	0.191	0.189	0.188	0.187	0.198	NM/LB	0.186	0.185	0.184	0.183	0.190	
29,000	86.7	88.6	90.4	92.2	91.1	%N1	86.8	88.6	90.5	92.2	91.1	37,000
	0.60	0.60	0.60	0.60	0.57	MIND	0.58	0.58	0.58	0.58	0.54	
	353.2	360.9	368.3	375.5	361.3	KTAS	342.7	350.1	357.3	364.2	343.3	
	270.9	270.8	270.7	270.5	254.8	KCAS	262.5	262.4	262.3	262.0	241.6	
	1856	1908	1959	1985	1833	LB/HR	1848	1900	1951	2000	1820	
	0.190	0.189	0.188	0.187	0.197	NM/LB	0.185	0.184	0.183	0.182	0.189	
30,000	86.7	88.6	90.4	92.2	91.1	%N1	86.8	88.7	90.5	92.3	91.1	38,000
	0.60	0.60	0.60	0.60	0.57	MIND	0.58	0.58	0.58	0.58	0.53	
	352.5	360.1	367.5	374.6	359.9	KTAS	341.0	348.4	355.5	362.3	339.4	
	270.3	270.2	270.1	269.9	253.8	KCAS	261.1	261.0	260.9	260.7	238.7	
	1855	1907	1958	1984	1832	LB/HR	1847	1899	1949	1999	1818	
	0.190	0.189	0.188	0.187	0.196	NM/LB	0.185	0.183	0.182	0.181	0.187	
31,000	86.7	88.6	90.4	92.2	91.1	%N1	86.8	88.7	90.5	92.3	91.1	39,000
	0.60	0.60	0.60	0.60	0.56	MIND	0.58	0.58	0.58	0.58	0.53	
	351.3	358.9	366.3	373.4	358.5	KTAS	338.5	345.8	352.8	359.5	335.0	
	269.3	269.3	269.2	269.0	252.7	KCAS	259.1	259.0	258.8	258.6	235.5	
	1854	1906	1957	1983	1831	LB/HR	1845	1897	1947	1997	1814	
	0.189	0.188	0.187	0.186	0.196	NM/LB	0.183	0.182	0.181	0.180	0.185	
32,000	86.7	88.6	90.4	92.2	91.1	%N1						
	0.60	0.60	0.60	0.60	0.56	MIND						
	350.1	357.7	365.0	372.1	356.5	KTAS						
	268.4	268.3	268.2	268.0	251.3	KCAS						
	1853	1905	1956	1982	1830	LB/HR						
	0.189	0.188	0.187	0.185	0.195	NM/LB						

GROSS WEIGHT AT ALTITUDE (LB)

GROSS WEIGHT AT ALTITUDE (LB)

Section VIII-7
Single Engine Maximum Cruise

23,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-50.6	-40.6	-30.6	-20.6	-10.6	OAT (°C)	-50.6	-40.6	-30.6	-20.6	-10.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	86.8	88.7	90.6	92.3	91.1	%N1	86.9	88.8	90.7	92.4	91.2	33,000
	0.62	0.62	0.62	0.62	0.58	MIND	0.60	0.60	0.60	0.60	0.56	
	358.5	366.3	373.9	381.3	367.2	KTAS	350.3	358.0	365.4	372.5	353.1	
	266.5	266.4	266.3	266.1	250.6	KCAS	260.2	260.1	259.9	259.7	240.6	
	1769	1819	1867	1893	1737	LB/HR	1764	1813	1862	1909	1726	
	0.203	0.201	0.200	0.199	0.211	NM/LB	0.199	0.197	0.196	0.195	0.205	
26,000	86.8	88.7	90.6	92.4	91.1	%N1	86.9	88.8	90.7	92.5	91.2	34,000
	0.62	0.62	0.62	0.62	0.58	MIND	0.60	0.60	0.60	0.60	0.55	
	357.8	365.7	373.3	380.6	366.1	KTAS	348.6	356.2	363.6	370.6	349.5	
	266.0	265.9	265.8	265.6	249.9	KCAS	258.8	258.7	258.5	258.3	238.1	
	1769	1818	1867	1892	1736	LB/HR	1763	1812	1860	1907	1724	
	0.202	0.201	0.200	0.199	0.211	NM/LB	0.198	0.197	0.195	0.194	0.203	
27,000	86.8	88.7	90.6	92.4	91.1	%N1	87.0	88.9	90.7	92.5	91.2	35,000
	0.61	0.61	0.61	0.61	0.58	MIND	0.60	0.60	0.60	0.60	0.55	
	357.2	365.1	372.6	379.9	364.6	KTAS	346.8	354.3	361.6	368.6	345.9	
	265.5	265.5	265.3	265.1	248.8	KCAS	257.4	257.3	257.1	256.8	235.5	
	1768	1818	1867	1892	1735	LB/HR	1761	1811	1859	1906	1721	
	0.202	0.201	0.200	0.198	0.210	NM/LB	0.197	0.196	0.195	0.193	0.201	
28,000	86.8	88.7	90.6	92.4	91.1	%N1	87.0	88.9	90.7	92.5	91.2	36,000
	0.61	0.61	0.61	0.61	0.58	MIND	0.59	0.59	0.59	0.59	0.54	
	356.6	364.4	372.0	379.3	363.2	KTAS	344.9	352.4	359.7	366.6	341.7	
	265.0	265.0	264.8	264.6	247.8	KCAS	255.9	255.8	255.7	255.4	232.5	
	1768	1818	1866	1892	1734	LB/HR	1760	1809	1858	1904	1718	
	0.202	0.200	0.199	0.198	0.209	NM/LB	0.196	0.195	0.194	0.193	0.199	
29,000	86.9	88.8	90.6	92.4	91.1	%N1	87.0	88.9	90.8	92.6	91.3	37,000
	0.61	0.61	0.61	0.61	0.57	MIND	0.59	0.59	0.59	0.59	0.53	
	355.5	363.3	370.9	378.1	361.7	KTAS	342.4	349.9	357.1	363.8	337.0	
	264.2	264.2	264.0	263.7	246.7	KCAS	254.0	253.9	253.7	253.3	229.2	
	1767	1817	1865	1891	1733	LB/HR	1758	1807	1856	1902	1714	
	0.201	0.200	0.199	0.198	0.209	NM/LB	0.195	0.194	0.192	0.191	0.197	
30,000	86.9	88.8	90.6	92.4	91.1	%N1	87.1	89.0	90.8	92.6	91.3	38,000
	0.61	0.61	0.61	0.61	0.57	MIND	0.58	0.58	0.58	0.58	0.53	
	354.3	362.0	369.5	376.7	359.8	KTAS	339.3	346.7	353.8	360.5	331.3	
	263.2	263.2	263.0	262.8	245.4	KCAS	251.6	251.5	251.2	250.9	225.2	
	1766	1816	1865	1890	1731	LB/HR	1756	1805	1853	1900	1710	
	0.201	0.199	0.198	0.197	0.208	NM/LB	0.193	0.192	0.191	0.190	0.194	
31,000	86.9	88.8	90.6	92.4	91.1	%N1	87.1	89.0	90.9	92.7	91.3	39,000
	0.61	0.61	0.61	0.61	0.57	MIND	0.58	0.58	0.58	0.58	0.51	
	353.0	360.8	368.2	375.4	357.7	KTAS	336.1	343.4	350.4	357.1	324.3	
	262.3	262.2	262.0	261.8	243.9	KCAS	249.1	249.0	248.8	248.4	220.2	
	1765	1815	1864	1888	1730	LB/HR	1754	1803	1851	1897	1704	
	0.200	0.199	0.198	0.196	0.207	NM/LB	0.192	0.190	0.189	0.188	0.190	
32,000	86.9	88.8	90.6	92.4	91.2	%N1						
	0.61	0.61	0.61	0.60	0.56	MIND						
	351.8	359.5	366.9	374.1	355.6	KTAS						
	261.3	261.2	261.1	260.8	242.3	KCAS						
	1765	1814	1863	1888	1728	LB/HR						
	0.199	0.198	0.197	0.196	0.206	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	87.0	88.9	90.8	92.6	91.1	%N1	87.1	89.0	90.9	92.7	91.3	33,000
	0.63	0.63	0.63	0.63	0.59	MIND	0.61	0.61	0.61	0.61	0.56	
	361.0	369.0	376.8	384.2	367.9	KTAS	350.6	358.3	365.8	372.9	348.3	
	260.0	259.9	259.7	259.4	242.8	KCAS	252.1	252.0	251.8	251.4	229.3	
	1678	1725	1771	1796	1637	LB/HR	1673	1720	1766	1810	1622	
	0.215	0.214	0.213	0.212	0.225	NM/LB	0.210	0.208	0.207	0.206	0.215	
26,000	87.0	88.9	90.8	92.6	91.1	%N1	87.1	89.1	90.9	92.7	91.3	34,000
	0.63	0.63	0.63	0.62	0.59	MIND	0.61	0.61	0.61	0.60	0.55	
	360.3	368.3	376.1	383.5	366.3	KTAS	348.8	356.5	363.9	371.0	343.8	
	259.5	259.4	259.2	258.9	241.7	KCAS	250.7	250.6	250.4	250.0	226.2	
	1677	1725	1771	1796	1636	LB/HR	1672	1719	1765	1809	1618	
	0.215	0.214	0.212	0.211	0.224	NM/LB	0.209	0.207	0.206	0.205	0.212	
27,000	87.0	88.9	90.8	92.6	91.1	%N1	87.2	89.1	90.9	92.7	91.4	35,000
	0.62	0.62	0.62	0.62	0.58	MIND	0.60	0.60	0.60	0.60	0.54	
	359.6	367.6	375.3	382.7	364.7	KTAS	346.7	354.4	361.7	368.6	338.8	
	258.9	258.8	258.7	258.3	240.6	KCAS	249.2	249.0	248.8	248.3	222.7	
	1677	1724	1771	1795	1635	LB/HR	1671	1718	1764	1808	1614	
	0.214	0.213	0.212	0.211	0.223	NM/LB	0.207	0.206	0.205	0.204	0.210	
28,000	87.0	88.9	90.8	92.6	91.1	%N1	87.2	89.1	91.0	92.8	91.4	36,000
	0.62	0.62	0.62	0.62	0.58	MIND	0.60	0.60	0.60	0.59	0.53	
	358.2	366.2	373.9	381.2	362.9	KTAS	343.4	351.0	358.2	364.9	332.5	
	257.9	257.8	257.6	257.3	239.3	KCAS	246.7	246.5	246.2	245.8	218.4	
	1676	1724	1770	1795	1633	LB/HR	1669	1716	1762	1805	1609	
	0.214	0.212	0.211	0.210	0.222	NM/LB	0.206	0.205	0.203	0.202	0.207	
29,000	87.0	89.0	90.8	92.6	91.1	%N1	87.3	89.2	91.1	92.9	91.5	37,000
	0.62	0.62	0.62	0.62	0.58	MIND	0.59	0.59	0.59	0.59	0.52	
	356.9	364.8	372.5	379.7	360.7	KTAS	340.0	347.4	354.6	361.2	324.9	
	256.9	256.7	256.6	256.3	237.8	KCAS	244.1	243.9	243.6	243.1	213.2	
	1676	1723	1769	1793	1631	LB/HR	1667	1714	1759	1803	1603	
	0.213	0.212	0.211	0.209	0.221	NM/LB	0.204	0.203	0.202	0.200	0.203	
30,000	87.0	89.0	90.8	92.6	91.2	%N1	87.4	89.3	91.2	93.0	91.6	38,000
	0.62	0.62	0.62	0.62	0.57	MIND	0.58	0.58	0.58	0.58	0.51	
	355.5	363.4	371.0	378.3	358.4	KTAS	336.1	343.4	350.4	356.9	317.3	
	255.8	255.7	255.6	255.2	236.2	KCAS	241.1	241.0	240.6	240.1	208.1	
	1675	1722	1769	1793	1630	LB/HR	1664	1711	1756	1799	1597	
	0.212	0.211	0.210	0.209	0.220	NM/LB	0.202	0.201	0.200	0.198	0.199	
31,000	87.1	89.0	90.9	92.7	91.2	%N1	87.5	89.4	91.3	93.1	91.6	39,000
	0.62	0.61	0.61	0.61	0.57	MIND	0.58	0.58	0.57	0.57	0.49	
	354.2	362.0	369.6	376.8	356.0	KTAS	331.6	338.8	345.7	352.1	308.4	
	254.8	254.7	254.5	254.2	234.6	KCAS	237.7	237.5	237.2	236.7	202.0	
	1675	1722	1768	1792	1628	LB/HR	1661	1707	1753	1796	1591	
	0.211	0.210	0.209	0.208	0.219	NM/LB	0.200	0.198	0.197	0.196	0.194	
32,000	87.1	89.0	90.9	92.7	91.2	%N1						
	0.61	0.61	0.61	0.61	0.56	MIND						
	352.4	360.2	367.7	374.9	352.2	KTAS						
	253.4	253.3	253.1	252.8	231.9	KCAS						
	1674	1721	1767	1791	1625	LB/HR						
	0.211	0.209	0.208	0.207	0.217	NM/LB						

27,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-58.5 / -20	-48.5 / -10	-38.5 / 0	-28.5 / 10	-18.5 / 20	OAT (°C) / ISA DEV (°C)	-58.5 / -20	-48.5 / -10	-38.5 / 0	-28.5 / 10	-18.5 / 20	GROSS WEIGHT AT ALTITUDE (LB)
25,000	87.5	89.5	91.4	93.2	91.3	%N1	87.8	89.7	91.6	93.5	91.6	33,000
	0.64	0.63	0.63	0.63	0.59	MIND	0.61	0.61	0.61	0.61	0.55	
	362.4	370.6	378.5	386.1	369.2	KTAS	348.6	356.3	363.9	370.9	342.5	
	252.7	252.5	252.4	252.1	235.4	KCAS	242.4	242.3	242.1	241.6	217.5	
	1591	1636	1681	1704	1550	LB/HR	1583	1628	1673	1715	1530	
	0.228	0.227	0.225	0.224	0.238	NM/LB	0.220	0.219	0.218	0.216	0.224	
26,000	87.6	89.5	91.4	93.2	91.3	%N1	87.8	89.8	91.7	93.5	91.6	34,000
	0.63	0.63	0.63	0.63	0.59	MIND	0.61	0.60	0.60	0.60	0.54	
	361.3	369.4	377.3	384.7	367.5	KTAS	345.3	353.0	360.4	367.4	335.9	
	251.8	251.7	251.5	251.1	234.2	KCAS	240.0	239.9	239.6	239.2	213.2	
	1590	1635	1680	1703	1549	LB/HR	1582	1627	1671	1713	1525	
	0.227	0.226	0.225	0.223	0.237	NM/LB	0.218	0.217	0.216	0.214	0.220	
27,000	87.6	89.5	91.4	93.3	91.3	%N1	87.9	89.8	91.8	93.6	91.7	35,000
	0.63	0.63	0.63	0.63	0.59	MIND	0.60	0.60	0.60	0.60	0.53	
	359.7	367.8	375.7	383.1	365.2	KTAS	341.8	349.4	356.7	363.5	327.7	
	250.7	250.5	250.4	250.0	232.7	KCAS	237.5	237.3	237.0	236.5	207.7	
	1589	1634	1679	1702	1547	LB/HR	1579	1624	1669	1710	1519	
	0.226	0.225	0.224	0.222	0.236	NM/LB	0.216	0.215	0.214	0.213	0.216	
28,000	87.6	89.6	91.5	93.3	91.4	%N1	88.0	89.9	91.8	93.6	91.8	36,000
	0.63	0.63	0.63	0.63	0.58	MIND	0.59	0.59	0.59	0.59	0.51	
	358.2	366.2	374.1	381.5	362.7	KTAS	337.3	344.8	351.9	358.5	319.4	
	249.5	249.4	249.2	248.9	231.1	KCAS	234.2	234.0	233.7	233.1	202.3	
	1589	1634	1679	1702	1545	LB/HR	1575	1620	1664	1705	1513	
	0.225	0.224	0.223	0.222	0.235	NM/LB	0.214	0.213	0.211	0.210	0.211	
29,000	87.6	89.6	91.5	93.3	91.4	%N1	88.0	90.0	91.9	93.7	91.9	37,000
	0.63	0.62	0.62	0.62	0.58	MIND	0.58	0.58	0.58	0.58	0.50	
	356.7	364.7	372.5	379.9	360.3	KTAS	332.2	339.5	346.5	353.0	308.9	
	248.4	248.3	248.1	247.8	229.4	KCAS	230.5	230.2	229.9	229.3	195.4	
	1588	1633	1678	1701	1543	LB/HR	1570	1614	1658	1700	1505	
	0.225	0.223	0.222	0.221	0.234	NM/LB	0.212	0.210	0.209	0.208	0.205	
30,000	87.7	89.6	91.5	93.3	91.4	%N1	88.1	90.1	92.0	93.8		38,000
	0.62	0.62	0.62	0.62	0.57	MIND	0.57	0.57	0.57	0.57		
	354.8	362.8	370.5	377.8	356.7	KTAS	325.8	332.8	339.6	345.7		
	247.1	246.9	246.7	246.4	227.0	KCAS	225.8	225.5	225.1	224.3		
	1587	1632	1677	1699	1541	LB/HR	1563	1608	1651	1692		
	0.224	0.222	0.221	0.220	0.231	NM/LB	0.208	0.207	0.206	0.204		
31,000	87.7	89.7	91.6	93.4	91.5	%N1	88.2	90.2	92.1	93.9		39,000
	0.62	0.62	0.62	0.62	0.57	MIND	0.56	0.56	0.56	0.55		
	352.8	360.7	368.4	375.6	352.5	KTAS	317.8	324.7	331.3	337.2		
	245.6	245.4	245.2	244.9	224.2	KCAS	220.0	219.7	219.3	218.6		
	1586	1631	1675	1698	1538	LB/HR	1555	1599	1643	1683		
	0.222	0.221	0.220	0.219	0.229	NM/LB	0.204	0.203	0.202	0.200		
32,000	87.7	89.7	91.6	93.4	91.5	%N1						
	0.61	0.61	0.61	0.61	0.56	MIND						
	350.8	358.7	366.3	373.5	347.9	KTAS						
	244.1	244.0	243.8	243.4	221.2	KCAS						
	1585	1630	1674	1697	1534	LB/HR						
	0.221	0.220	0.219	0.218	0.227	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

29,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-62.5	-52.5	-42.5	-32.5	-22.5	OAT (°C)	-62.5	-52.5	-42.5	-32.5	-22.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
	88.1	90.0	92.0	93.8	91.5	%N1	88.5	90.5	92.4	94.3	91.9	
	0.64	0.64	0.64	0.64	0.60	MIND	0.61	0.61	0.61	0.61	0.54	
25,000	362.9	371.1	379.1	386.7	369.8	KTAS	343.3	351.1	358.6	365.6	330.5	33,000
	244.7	244.5	244.3	243.9	227.7	KCAS	230.7	230.5	230.3	229.8	202.3	
	1504	1547	1590	1612	1462	LB/HR	1492	1535	1578	1619	1434	
	0.241	0.240	0.238	0.237	0.253	NM/LB	0.230	0.229	0.227	0.226	0.230	
	88.1	90.1	92.0	93.8	91.6	%N1	88.6	90.6	92.5	94.4	92.0	
	0.64	0.64	0.64	0.64	0.60	MIND	0.60	0.60	0.60	0.60	0.52	
26,000	361.1	369.3	377.3	384.8	367.2	KTAS	338.9	346.4	353.7	360.3	321.5	34,000
	243.4	243.3	243.1	242.7	226.0	KCAS	227.6	227.3	227.0	226.3	196.6	
	1503	1546	1589	1611	1460	LB/HR	1489	1532	1574	1614	1428	
	0.240	0.239	0.237	0.236	0.252	NM/LB	0.228	0.226	0.225	0.223	0.225	
	88.1	90.1	92.0	93.9	91.6	%N1	88.6	90.6	92.5	94.4	92.2	
	0.64	0.64	0.63	0.63	0.59	MIND	0.59	0.59	0.59	0.59	0.50	
27,000	359.4	367.6	375.5	383.0	364.6	KTAS	332.9	340.3	347.4	353.9	308.2	35,000
	242.2	242.0	241.8	241.4	224.3	KCAS	223.3	223.0	222.7	222.1	188.1	
	1502	1545	1588	1610	1459	LB/HR	1481	1523	1566	1606	1418	
	0.239	0.238	0.236	0.235	0.250	NM/LB	0.225	0.223	0.222	0.220	0.217	
	88.2	90.2	92.1	93.9	91.6	%N1	88.7	90.6	92.6	94.4		
	0.63	0.63	0.63	0.63	0.59	MIND	0.57	0.57	0.57	0.57		
28,000	357.5	365.6	373.5	380.9	361.4	KTAS	324.7	331.6	338.5	344.5		36,000
	240.8	240.6	240.4	240.0	222.2	KCAS	217.5	217.1	216.7	215.8		
	1501	1544	1587	1609	1456	LB/HR	1470	1512	1554	1593		
	0.238	0.237	0.235	0.234	0.248	NM/LB	0.221	0.219	0.218	0.216		
	88.2	90.2	92.1	94.0	91.7	%N1	88.7	90.7	92.6	94.5		
	0.63	0.63	0.63	0.63	0.58	MIND	0.56	0.56	0.56	0.55		
29,000	355.3	363.3	371.2	378.5	356.9	KTAS	315.2	321.9	328.5	334.4		37,000
	239.2	239.0	238.8	238.4	219.3	KCAS	210.9	210.4	210.0	209.2		
	1499	1542	1586	1607	1453	LB/HR	1458	1499	1541	1580		
	0.237	0.236	0.234	0.233	0.246	NM/LB	0.216	0.215	0.213	0.212		
	88.3	90.3	92.2	94.0	91.7	%N1	88.8	90.7	92.7	94.5		
	0.62	0.62	0.62	0.62	0.57	MIND	0.54	0.54	0.54	0.53		
30,000	353.0	361.0	368.8	376.1	352.2	KTAS	304.2	310.4	316.6	321.8		38,000
	237.6	237.5	237.3	236.8	216.3	KCAS	203.1	202.5	202.0	201.0		
	1498	1541	1584	1605	1450	LB/HR	1444	1484	1525	1563		
	0.236	0.234	0.233	0.231	0.243	NM/LB	0.211	0.209	0.208	0.206		
	88.3	90.3	92.3	94.1	91.8	%N1						
	0.62	0.62	0.62	0.62	0.56	MIND						
31,000	350.6	358.5	366.2	373.4	346.3	KTAS						39,000
	235.9	235.7	235.5	235.0	212.5	KCAS						
	1496	1539	1583	1603	1446	LB/HR						
	0.234	0.233	0.231	0.230	0.239	NM/LB						
	88.4	90.4	92.3	94.2	91.8	%N1						
	0.61	0.61	0.61	0.61	0.55	MIND						
32,000	347.0	354.8	362.5	369.5	339.5	KTAS						
	233.4	233.1	232.9	232.4	208.1	KCAS						
	1494	1537	1580	1601	1441	LB/HR						
	0.232	0.231	0.229	0.228	0.236	NM/LB						

31,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-66.4	-56.4	-46.4	-36.4	-26.4	OAT (°C)	-66.4	-56.4	-46.4	-36.4	-26.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	88.4	90.4	92.3	94.2	91.8	%N1	88.9	90.9	92.9	94.7	92.6	33,000
	0.65	0.65	0.64	0.64	0.60	MIND	0.59	0.59	0.59	0.59	0.50	
	361.5	369.8	377.9	385.6	368.6	KTAS	332.0	339.3	346.5	352.8	307.0	
	235.6	235.3	235.1	234.7	218.9	KCAS	215.2	214.8	214.4	213.6	180.6	
	1411	1451	1493	1513	1375	LB/HR	1383	1423	1464	1502	1334	
	0.256	0.255	0.253	0.252	0.268	NM/LB	0.240	0.238	0.237	0.235	0.230	
26,000	88.4	90.4	92.4	94.3	91.9	%N1	88.9	90.9	92.9	94.7		34,000
	0.64	0.64	0.64	0.64	0.60	MIND	0.57	0.57	0.57	0.57		
	359.5	367.7	375.8	383.3	365.9	KTAS	321.3	328.2	335.1	341.2		
	234.2	233.9	233.7	233.3	217.2	KCAS	207.9	207.4	207.0	206.2		
	1409	1450	1491	1512	1373	LB/HR	1368	1408	1448	1486		
	0.255	0.254	0.252	0.250	0.266	NM/LB	0.235	0.233	0.231	0.230		
27,000	88.5	90.5	92.4	94.3	91.9	%N1	88.9	90.9	92.9	94.7		35,000
	0.64	0.64	0.64	0.64	0.59	MIND	0.55	0.55	0.55	0.55		
	356.9	365.1	373.1	380.7	361.3	KTAS	310.3	316.9	323.5	329.2		
	232.4	232.2	232.0	231.6	214.3	KCAS	200.4	199.8	199.5	198.5		
	1407	1447	1489	1509	1370	LB/HR	1353	1392	1431	1468		
	0.254	0.252	0.251	0.249	0.264	NM/LB	0.229	0.228	0.226	0.224		
28,000	88.5	90.5	92.5	94.4	92.0	%N1						36,000
	0.63	0.63	0.63	0.63	0.58	MIND						
	354.4	362.5	370.5	378.0	356.3	KTAS						
	230.7	230.4	230.2	229.8	211.2	KCAS						
	1405	1445	1487	1507	1367	LB/HR						
	0.252	0.251	0.249	0.248	0.261	NM/LB						
29,000	88.6	90.6	92.5	94.4	92.1	%N1						37,000
	0.63	0.63	0.63	0.63	0.57	MIND						
	351.8	359.8	367.6	374.9	350.2	KTAS						
	228.8	228.5	228.3	227.9	207.4	KCAS						
	1403	1443	1485	1504	1363	LB/HR						
	0.251	0.249	0.248	0.246	0.257	NM/LB						
30,000	88.7	90.7	92.6	94.5	92.1	%N1						38,000
	0.62	0.62	0.62	0.62	0.56	MIND						
	347.7	355.6	363.4	370.6	343.2	KTAS						
	226.0	225.7	225.5	225.0	203.0	KCAS						
	1399	1440	1481	1501	1358	LB/HR						
	0.249	0.247	0.245	0.244	0.253	NM/LB						
31,000	88.8	90.8	92.7	94.6	92.3	%N1						39,000
	0.61	0.61	0.61	0.61	0.55	MIND						
	343.5	351.3	359.0	366.1	333.4	KTAS						
	223.1	222.8	222.6	222.2	196.9	KCAS						
	1395	1436	1478	1496	1351	LB/HR						
	0.246	0.245	0.243	0.241	0.247	NM/LB						
32,000	88.9	90.9	92.8	94.7	92.4	%N1						
	0.60	0.60	0.60	0.60	0.53	MIND						
	338.3	346.0	353.5	360.4	323.5	KTAS						
	219.5	219.2	219.0	218.5	190.8	KCAS						
	1391	1432	1473	1492	1345	LB/HR						
	0.243	0.242	0.240	0.238	0.241	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

33,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-70.4	-60.4	-50.4	-40.4	-30.4	OAT (°C)	-70.4	-60.4	-50.4	-40.4	-30.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	88.6	90.6	92.6	94.5	92.2	%N1	88.8	90.8	92.8	94.7		33,000
	0.65	0.64	0.64	0.64	0.60	MIND	0.54	0.54	0.54	0.53		
	357.7	366.0	374.2	382.0	365.5	KTAS	299.4	305.8	312.4	317.2		
	225.0	224.7	224.5	224.2	209.1	KCAS	186.3	185.8	185.4	184.1		
	1310	1348	1388	1407	1289	LB/HR	1235	1271	1309	1344		
	0.273	0.272	0.270	0.268	0.284	NM/LB	0.242	0.241	0.239	0.236		
26,000	88.6	90.6	92.6	94.5	92.3	%N1						34,000
	0.64	0.64	0.64	0.64	0.59	MIND						
	354.8	363.0	371.2	378.9	360.2	KTAS						
	223.0	222.8	222.6	222.3	206.0	KCAS						
	1306	1344	1384	1403	1285	LB/HR						
	0.272	0.270	0.268	0.266	0.280	NM/LB						
27,000	88.6	90.7	92.6	94.5	92.4	%N1						35,000
	0.63	0.63	0.63	0.63	0.58	MIND						
	351.6	359.7	367.8	375.4	354.0	KTAS						
	220.9	220.6	220.4	220.1	202.2	KCAS						
	1303	1340	1380	1398	1281	LB/HR						
	0.270	0.268	0.267	0.265	0.276	NM/LB						
28,000	88.7	90.7	92.7	94.6	92.5	%N1						36,000
	0.63	0.62	0.62	0.62	0.57	MIND						
	346.9	354.9	362.9	370.3	346.9	KTAS						
	217.8	217.5	217.3	216.9	197.9	KCAS						
	1297	1335	1375	1393	1277	LB/HR						
	0.267	0.266	0.264	0.262	0.272	NM/LB						
29,000	88.7	90.7	92.7	94.6	92.7	%N1						37,000
	0.62	0.62	0.62	0.61	0.55	MIND						
	342.1	349.9	357.7	364.9	336.2	KTAS						
	214.5	214.2	214.0	213.5	191.5	KCAS						
	1291	1329	1369	1386	1270	LB/HR						
	0.265	0.263	0.261	0.260	0.265	NM/LB						
30,000	88.8	90.8	92.8	94.7	92.8	%N1						38,000
	0.61	0.60	0.60	0.60	0.54	MIND						
	335.6	343.2	350.9	358.0	325.4	KTAS						
	210.2	209.8	209.6	209.2	185.0	KCAS						
	1283	1321	1361	1378	1263	LB/HR						
	0.262	0.260	0.258	0.256	0.258	NM/LB						
31,000	88.8	90.8	92.8	94.7	93.2	%N1						39,000
	0.59	0.59	0.59	0.59	0.50	MIND						
	326.7	333.9	341.2	347.8	305.3	KTAS						
	204.3	203.8	203.5	202.9	173.1	KCAS						
	1271	1309	1348	1363	1251	LB/HR						
	0.257	0.255	0.253	0.251	0.244	NM/LB						
32,000	88.8	90.8	92.8	94.7		%N1						
	0.57	0.57	0.57	0.56		MIND						
	314.7	321.6	328.7	335.1		KTAS						
	196.4	195.9	195.6	195.1		KCAS						
	1255	1292	1331	1346		LB/HR						
	0.251	0.249	0.247	0.245		NM/LB						

Section VIII-7
Single Engine Maximum Cruise

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	88.7	90.8	92.8	94.8	92.7	%N1						33,000
	0.64	0.64	0.64	0.64	0.59	MIND						
	351.4	359.6	367.9	375.8	357.9	KTAS						
	213.1	212.7	212.6	212.4	197.1	KCAS						
	1205	1240	1278	1296	1199	LB/HR						
	0.292	0.290	0.288	0.286	0.298	NM/LB						
26,000	88.7	90.8	92.8	94.7	92.8	%N1						34,000
	0.63	0.63	0.63	0.63	0.58	MIND						
	345.8	353.8	362.0	369.8	350.2	KTAS						
	209.5	209.1	209.0	208.7	192.5	KCAS						
	1196	1231	1269	1287	1195	LB/HR						
	0.289	0.287	0.285	0.283	0.293	NM/LB						
27,000	88.7	90.8	92.8	94.7	93.0	%N1						35,000
	0.62	0.62	0.62	0.62	0.56	MIND						
	339.6	347.4	355.4	362.9	339.2	KTAS						
	205.4	205.0	204.9	204.6	186.1	KCAS						
	1186	1221	1259	1275	1188	LB/HR						
	0.286	0.285	0.282	0.280	0.286	NM/LB						
28,000	88.7	90.7	92.7	94.7	93.3	%N1						36,000
	0.60	0.60	0.60	0.60	0.54	MIND						
	331.6	339.2	347.0	354.3	327.2	KTAS						
	200.3	199.9	199.7	199.4	179.2	KCAS						
	1173	1209	1246	1263	1181	LB/HR						
	0.283	0.281	0.278	0.276	0.277	NM/LB						
29,000	88.7	90.7	92.7	94.7	93.8	%N1						37,000
	0.58	0.58	0.58	0.58	0.49	MIND						
	319.4	326.5	334.0	340.9	297.4	KTAS						
	192.4	191.9	191.8	191.4	162.1	KCAS						
	1157	1192	1229	1245	1165	LB/HR						
	0.276	0.274	0.272	0.269	0.255	NM/LB						
30,000	88.7	90.7	92.7	94.7		%N1						38,000
	0.56	0.55	0.55	0.55		MIND						
	305.1	311.8	319.0	325.7		KTAS						
	183.4	182.8	182.7	182.4		KCAS						
	1139	1173	1210	1225		LB/HR						
	0.268	0.266	0.264	0.261		NM/LB						
31,000						%N1						39,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
32,000						%N1						
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

37,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-76.5	-66.5	-56.5	-46.5	-36.5	OAT (°C)	-76.5	-66.5	-56.5	-46.5	-36.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	89.0	91.1	93.1	94.8	92.6	%N1						33,000
	0.62	0.62	0.62	0.62	0.56	MIND						
	340.4	348.8	357.0	363.1	333.9	KTAS						
	197.7	197.6	197.5	196.3	175.5	KCAS						
	1108	1144	1180	1191	1088	LB/HR						
	0.307	0.305	0.303	0.301	0.307	NM/LB						
26,000	89.0	91.0	93.1	94.9	92.9	%N1						34,000
	0.61	0.61	0.61	0.60	0.53	MIND						
	331.7	339.9	347.9	354.0	319.1	KTAS						
	192.3	192.2	192.1	191.1	167.3	KCAS						
	1095	1131	1167	1178	1080	LB/HR						
	0.303	0.301	0.298	0.296	0.295	NM/LB						
27,000	89.0	91.0	93.0	94.9		%N1						35,000
	0.58	0.58	0.58	0.58		MIND						
	317.7	325.6	333.1	339.2		KTAS						
	183.6	183.6	183.4	182.6		KCAS						
	1077	1113	1149	1159		LB/HR						
	0.295	0.293	0.290	0.288		NM/LB						
28,000	89.0	91.0	93.0	94.9		%N1						36,000
	0.55	0.55	0.55	0.55		MIND						
	300.4	307.8	314.9	320.7		KTAS						
	173.1	173.0	172.9	172.1		KCAS						
	1058	1092	1127	1138		LB/HR						
	0.284	0.282	0.279	0.277		NM/LB						
29,000						%N1						37,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
30,000						%N1						38,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
31,000						%N1						39,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
32,000						%N1						
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						

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SINGLE ENGINE HOLDING TABLES - WING AND ENGINE ANTI-ICE - OFF

SEA LEVEL
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-5.0 / -20	5.0 / -10	15.0 / 0	25.0 / 10	35.0 / 20	OAT (°C) / ISA DEV (°C)	-5.0 / -20	5.0 / -10	15.0 / 0	25.0 / 10	35.0 / 20	GROSS WEIGHT AT ALTITUDE (LB)
25,000	55.0	56.1	57.1	58.1	59.1	%N1	62.2	63.3	64.5	65.7	66.8	33,000
	0.25	0.25	0.25	0.25	0.25	MIND	0.29	0.29	0.29	0.29	0.29	
	159.7	162.7	165.6	168.4	171.2	KTAS	184.1	187.5	190.8	194.1	197.4	
	165.6	165.6	165.6	165.6	165.6	KCAS	190.8	190.8	190.8	190.8	190.8	
	972	995	1018	1042	1065	LB/HR	1266	1296	1326	1356	1386	
	0.164	0.164	0.163	0.162	0.161	NM/LB	0.145	0.145	0.144	0.143	0.142	
26,000	55.9	57.0	58.1	59.1	60.1	%N1	62.9	64.1	65.3	66.5	67.7	34,000
	0.26	0.26	0.26	0.26	0.26	MIND	0.29	0.29	0.29	0.29	0.29	
	162.9	165.9	168.8	171.7	174.6	KTAS	187.1	190.5	193.9	197.3	200.6	
	168.8	168.8	168.8	168.8	168.8	KCAS	193.9	193.9	193.9	193.9	193.9	
	1008	1032	1055	1080	1104	LB/HR	1305	1335	1367	1398	1428	
	0.162	0.161	0.160	0.159	0.158	NM/LB	0.143	0.143	0.142	0.141	0.140	
27,000	56.9	57.9	59.0	60.1	61.1	%N1	63.7	64.9	66.2	67.4	68.6	35,000
	0.26	0.26	0.26	0.26	0.26	MIND	0.30	0.30	0.30	0.30	0.30	
	166.0	169.0	172.1	175.0	177.9	KTAS	190.1	193.6	197.0	200.4	203.7	
	172.1	172.1	172.1	172.1	172.1	KCAS	197.0	197.0	197.0	197.0	197.0	
	1044	1068	1093	1118	1143	LB/HR	1344	1374	1407	1439	1471	
	0.159	0.158	0.157	0.156	0.156	NM/LB	0.141	0.141	0.140	0.139	0.138	
28,000	57.8	58.9	60.0	61.1	62.2	%N1	64.5	65.7	67.0	68.2	69.4	36,000
	0.27	0.27	0.27	0.27	0.27	MIND	0.30	0.30	0.30	0.30	0.30	
	169.1	172.2	175.3	178.3	181.3	KTAS	193.0	196.6	200.1	203.5	206.9	
	175.3	175.3	175.3	175.3	175.3	KCAS	200.1	200.1	200.1	200.1	200.1	
	1080	1106	1131	1157	1182	LB/HR	1382	1414	1448	1480	1513	
	0.157	0.156	0.155	0.154	0.153	NM/LB	0.140	0.139	0.138	0.137	0.137	
29,000	58.7	59.8	61.0	62.1	63.2	%N1	65.3	66.5	67.8	69.0	70.3	37,000
	0.27	0.27	0.27	0.27	0.27	MIND	0.31	0.31	0.31	0.31	0.31	
	172.2	175.4	178.5	181.6	184.6	KTAS	195.9	199.5	203.1	206.6	210.0	
	178.5	178.5	178.5	178.5	178.5	KCAS	203.1	203.1	203.1	203.1	203.1	
	1117	1143	1170	1197	1222	LB/HR	1421	1453	1488	1521	1556	
	0.154	0.153	0.153	0.152	0.151	NM/LB	0.138	0.137	0.136	0.136	0.135	
30,000	59.7	60.8	61.9	63.1	64.2	%N1	66.1	67.3	68.6	69.8	71.2	38,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.31	0.31	0.31	0.31	0.31	
	175.2	178.5	181.6	184.8	187.8	KTAS	198.8	202.4	206.0	209.6	213.1	
	181.7	181.7	181.7	181.7	181.7	KCAS	206.0	206.0	206.0	206.0	206.0	
	1154	1181	1209	1236	1262	LB/HR	1459	1492	1528	1563	1598	
	0.152	0.151	0.150	0.150	0.149	NM/LB	0.136	0.136	0.135	0.134	0.133	
31,000	60.6	61.7	62.9	64.0	65.1	%N1	66.8	68.1	69.4	70.7	71.9	39,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.32	0.32	0.32	0.32	0.32	
	178.2	181.5	184.8	187.9	191.1	KTAS	201.6	205.3	209.0	212.6	216.1	
	184.8	184.8	184.8	184.8	184.8	KCAS	209.0	209.0	209.0	209.0	209.0	
	1191	1219	1248	1276	1303	LB/HR	1498	1531	1569	1604	1642	
	0.150	0.149	0.148	0.147	0.147	NM/LB	0.135	0.134	0.133	0.133	0.132	
32,000	61.4	62.5	63.7	64.9	66.0	%N1						
	0.28	0.28	0.28	0.28	0.28	MIND						
	181.2	184.5	187.8	191.1	194.2	KTAS						
	187.8	187.8	187.8	187.8	187.8	KCAS						
	1229	1258	1287	1316	1345	LB/HR						
	0.147	0.147	0.146	0.145	0.144	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

5000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	58.3	59.5	60.6	61.7	62.9	%N1	65.6	66.9	68.2	69.5	70.8	33,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.32	0.32	0.32	0.32	0.32	
	172.0	175.3	178.5	181.7	184.8	KTAS	199.5	203.3	207.1	210.7	214.4	
	166.0	166.0	166.0	166.0	166.0	KCAS	192.6	192.6	192.6	192.6	192.6	
	949	970	993	1016	1038	LB/HR	1253	1281	1311	1341	1370	
	0.181	0.181	0.180	0.179	0.178	NM/LB	0.159	0.159	0.158	0.157	0.157	
26,000	59.4	60.5	61.7	62.8	64.1	%N1	66.5	67.8	69.1	70.3	71.7	34,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.32	0.32	0.32	0.32	0.32	
	175.5	178.9	182.2	185.4	188.6	KTAS	202.8	206.7	210.5	214.2	217.9	
	169.4	169.4	169.4	169.4	169.4	KCAS	195.8	195.8	195.8	195.8	195.8	
	986	1008	1031	1055	1078	LB/HR	1291	1321	1352	1383	1412	
	0.178	0.177	0.177	0.176	0.175	NM/LB	0.157	0.157	0.156	0.155	0.154	
27,000	60.4	61.6	62.8	63.9	65.3	%N1	67.3	68.6	69.9	71.2	72.6	35,000
	0.29	0.29	0.29	0.29	0.29	MIND	0.33	0.33	0.33	0.33	0.33	
	179.0	182.4	185.8	189.1	192.3	KTAS	206.0	210.0	213.9	217.7	221.4	
	172.7	172.7	172.7	172.7	172.7	KCAS	199.0	199.0	199.0	199.0	199.0	
	1023	1047	1070	1095	1118	LB/HR	1330	1360	1393	1424	1455	
	0.175	0.174	0.174	0.173	0.172	NM/LB	0.155	0.154	0.154	0.153	0.152	
28,000	61.5	62.7	63.9	65.1	66.2	%N1	68.1	69.4	70.8	72.1	73.3	36,000
	0.29	0.29	0.29	0.29	0.29	MIND	0.33	0.33	0.33	0.33	0.33	
	182.4	185.9	189.4	192.7	196.0	KTAS	209.3	213.3	217.2	221.1	224.9	
	176.1	176.1	176.1	176.1	176.1	KCAS	202.1	202.1	202.1	202.1	202.1	
	1061	1085	1110	1136	1159	LB/HR	1369	1400	1434	1466	1501	
	0.172	0.171	0.171	0.170	0.169	NM/LB	0.153	0.152	0.152	0.151	0.150	
29,000	62.4	63.6	64.8	66.0	67.2	%N1	68.8	70.1	71.5	72.8	74.1	37,000
	0.30	0.30	0.30	0.30	0.30	MIND	0.34	0.34	0.34	0.34	0.34	
	185.9	189.5	193.0	196.4	199.8	KTAS	212.5	216.5	220.5	224.5	228.3	
	179.5	179.5	179.5	179.5	179.5	KCAS	205.2	205.2	205.2	205.2	205.2	
	1099	1125	1150	1177	1202	LB/HR	1409	1441	1476	1510	1547	
	0.169	0.168	0.168	0.167	0.166	NM/LB	0.151	0.150	0.149	0.149	0.148	
30,000	63.2	64.4	65.7	66.9	68.1	%N1	69.5	70.9	72.2	73.5	74.9	38,000
	0.30	0.30	0.30	0.30	0.30	MIND	0.34	0.34	0.34	0.34	0.34	
	189.4	193.0	196.6	200.1	203.5	KTAS	215.6	219.8	223.8	227.8	231.7	
	182.8	182.8	182.8	182.8	182.8	KCAS	208.3	208.3	208.3	208.3	208.3	
	1138	1164	1190	1218	1244	LB/HR	1450	1483	1519	1554	1593	
	0.166	0.166	0.165	0.164	0.164	NM/LB	0.149	0.148	0.147	0.147	0.145	
31,000	64.0	65.3	66.5	67.8	69.0	%N1	70.2	71.6	72.9	74.3	75.6	39,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.35	0.35	0.35	0.35	0.35	
	192.8	196.5	200.1	203.7	207.2	KTAS	218.7	222.9	227.0	231.0	235.0	
	186.1	186.1	186.1	186.1	186.1	KCAS	211.2	211.2	211.2	211.2	211.2	
	1176	1203	1230	1259	1286	LB/HR	1490	1524	1561	1598	1638	
	0.164	0.163	0.163	0.162	0.161	NM/LB	0.147	0.146	0.145	0.145	0.143	
32,000	64.8	66.1	67.4	68.6	69.9	%N1						
	0.31	0.31	0.31	0.31	0.31	MIND						
	196.1	199.9	203.6	207.2	210.8	KTAS						
	189.4	189.4	189.4	189.4	189.4	KCAS						
	1214	1242	1271	1300	1328	LB/HR						
	0.162	0.161	0.160	0.159	0.159	NM/LB						

10,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	62.1	63.4	64.6	65.9	67.2	%N1	69.5	70.9	72.3	73.7	75.0	33,000
	0.30	0.30	0.30	0.30	0.30	MIND	0.35	0.35	0.35	0.35	0.35	
	186.4	190.1	193.8	197.3	200.9	KTAS	216.9	221.3	225.5	229.7	233.7	
	167.1	167.1	167.1	167.1	167.1	KCAS	194.7	194.7	194.7	194.7	194.7	
	931	953	976	999	1024	LB/HR	1246	1276	1306	1339	1370	
	0.200	0.199	0.199	0.198	0.196	NM/LB	0.174	0.173	0.173	0.172	0.171	
26,000	63.3	64.5	65.8	67.1	68.3	%N1	70.3	71.7	73.1	74.5	75.8	34,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.36	0.36	0.36	0.36	0.36	
	190.4	194.2	197.9	201.6	205.2	KTAS	220.4	224.8	229.1	233.4	237.5	
	170.7	170.7	170.7	170.7	170.7	KCAS	197.9	197.9	197.9	197.9	197.9	
	968	992	1015	1038	1066	LB/HR	1286	1317	1348	1382	1414	
	0.197	0.196	0.195	0.194	0.193	NM/LB	0.171	0.171	0.170	0.169	0.168	
27,000	64.3	65.6	66.9	68.1	69.3	%N1	71.0	72.5	73.9	75.3	76.7	35,000
	0.32	0.32	0.32	0.32	0.32	MIND	0.37	0.37	0.37	0.37	0.37	
	194.4	198.2	202.0	205.8	209.4	KTAS	223.9	228.4	232.8	237.0	241.3	
	174.3	174.3	174.3	174.3	174.3	KCAS	201.0	201.0	201.0	201.0	201.0	
	1006	1031	1055	1080	1109	LB/HR	1326	1358	1390	1425	1458	
	0.193	0.192	0.192	0.191	0.189	NM/LB	0.169	0.168	0.167	0.166	0.165	
28,000	65.1	66.4	67.8	69.1	70.3	%N1	71.8	73.2	74.7	76.1	77.5	36,000
	0.32	0.32	0.32	0.32	0.32	MIND	0.37	0.37	0.37	0.37	0.37	
	198.3	202.2	206.1	209.9	213.7	KTAS	227.3	231.9	236.3	240.7	245.0	
	177.8	177.8	177.8	177.8	177.8	KCAS	204.1	204.1	204.1	204.1	204.1	
	1046	1071	1096	1122	1152	LB/HR	1366	1399	1432	1469	1503	
	0.190	0.189	0.188	0.187	0.186	NM/LB	0.166	0.166	0.165	0.164	0.163	
29,000	66.0	67.3	68.7	70.0	71.2	%N1	72.5	74.0	75.5	76.9	78.4	37,000
	0.33	0.33	0.33	0.33	0.33	MIND	0.38	0.38	0.38	0.38	0.38	
	202.2	206.2	210.1	214.0	217.8	KTAS	230.7	235.3	239.8	244.3	248.6	
	181.3	181.3	181.3	181.3	181.3	KCAS	207.2	207.2	207.2	207.2	207.2	
	1086	1111	1138	1165	1195	LB/HR	1406	1440	1475	1512	1548	
	0.186	0.186	0.185	0.184	0.182	NM/LB	0.164	0.163	0.163	0.162	0.161	
30,000	66.9	68.2	69.6	70.9	72.2	%N1	73.3	74.8	76.2	77.7	79.2	38,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.38	0.38	0.38	0.38	0.38	
	206.0	210.1	214.1	218.1	221.9	KTAS	234.1	238.7	243.3	247.8	252.2	
	184.8	184.8	184.8	184.8	184.8	KCAS	210.3	210.3	210.3	210.3	210.3	
	1126	1152	1180	1209	1238	LB/HR	1446	1481	1517	1556	1593	
	0.183	0.182	0.181	0.180	0.179	NM/LB	0.162	0.161	0.160	0.159	0.158	
31,000	67.8	69.1	70.5	71.8	73.2	%N1	74.1	75.6	77.0	78.5	80.0	39,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.39	0.39	0.39	0.39	0.39	
	209.7	213.9	218.0	222.0	226.0	KTAS	237.4	242.1	246.8	251.3	255.8	
	188.2	188.2	188.2	188.2	188.2	KCAS	213.3	213.3	213.3	213.3	213.3	
	1166	1193	1222	1252	1282	LB/HR	1486	1523	1560	1600	1639	
	0.180	0.179	0.178	0.177	0.176	NM/LB	0.160	0.159	0.158	0.157	0.156	
32,000	68.6	70.0	71.4	72.8	74.1	%N1						
	0.35	0.35	0.35	0.35	0.35	MIND						
	213.4	217.6	221.8	225.9	229.9	KTAS						
	191.5	191.5	191.5	191.5	191.5	KCAS						
	1206	1235	1264	1296	1326	LB/HR						
	0.177	0.176	0.175	0.174	0.173	NM/LB						

15,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	65.9	67.3	68.7	70.0	71.4	%N1	73.3	74.8	76.4	77.9	79.4	33,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.39	0.39	0.39	0.39	0.39	
	203.4	207.6	211.7	215.8	219.8	KTAS	236.3	241.2	246.0	250.8	255.4	
	169.0	169.0	169.0	169.0	169.0	KCAS	196.8	196.8	196.8	196.8	196.8	
	931	954	978	1003	1027	LB/HR	1243	1274	1308	1341	1376	
	0.219	0.218	0.217	0.215	0.214	NM/LB	0.190	0.189	0.188	0.187	0.186	
26,000	66.9	68.3	69.7	71.1	72.4	%N1	74.1	75.7	77.2	78.8	80.3	34,000
	0.35	0.35	0.35	0.35	0.35	MIND	0.40	0.40	0.40	0.40	0.40	
	207.8	212.1	216.3	220.5	224.5	KTAS	240.3	245.2	250.1	254.9	259.6	
	172.7	172.7	172.7	172.7	172.7	KCAS	200.1	200.1	200.1	200.1	200.1	
	969	993	1018	1044	1071	LB/HR	1283	1315	1350	1385	1422	
	0.214	0.214	0.212	0.211	0.210	NM/LB	0.187	0.186	0.185	0.184	0.183	
27,000	67.8	69.3	70.7	72.1	73.5	%N1	75.0	76.5	78.1	79.6	81.1	35,000
	0.35	0.35	0.35	0.35	0.35	MIND	0.41	0.41	0.41	0.41	0.41	
	212.0	216.4	220.7	225.0	229.1	KTAS	244.1	249.2	254.2	259.0	263.8	
	176.3	176.3	176.3	176.3	176.3	KCAS	203.4	203.4	203.4	203.4	203.4	
	1008	1032	1059	1086	1114	LB/HR	1323	1356	1393	1429	1467	
	0.210	0.210	0.209	0.207	0.206	NM/LB	0.185	0.184	0.183	0.181	0.180	
28,000	68.8	70.2	71.7	73.1	74.6	%N1	75.8	77.3	78.9	80.5	82.0	36,000
	0.36	0.36	0.36	0.36	0.36	MIND	0.41	0.41	0.41	0.41	0.41	
	216.2	220.7	225.1	229.4	233.6	KTAS	248.0	253.1	258.2	263.1	268.0	
	179.8	179.8	179.8	179.8	179.8	KCAS	206.6	206.6	206.6	206.6	206.6	
	1047	1072	1099	1127	1158	LB/HR	1364	1399	1436	1474	1513	
	0.207	0.206	0.205	0.203	0.202	NM/LB	0.182	0.181	0.180	0.179	0.177	
29,000	69.8	71.2	72.7	74.1	75.6	%N1	76.5	78.1	79.6	81.2	82.8	37,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.42	0.42	0.42	0.42	0.42	
	220.3	224.9	229.4	233.8	238.1	KTAS	251.8	257.0	262.1	267.1	272.1	
	183.3	183.3	183.3	183.3	183.3	KCAS	209.8	209.8	209.8	209.8	209.8	
	1085	1112	1140	1169	1202	LB/HR	1407	1443	1482	1520	1560	
	0.203	0.202	0.201	0.200	0.198	NM/LB	0.179	0.178	0.177	0.176	0.174	
30,000	70.7	72.2	73.7	75.1	76.5	%N1	77.2	78.8	80.4	81.9	83.6	38,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.43	0.43	0.43	0.43	0.43	
	224.4	229.1	233.6	238.1	242.5	KTAS	255.5	260.8	266.0	271.1	276.1	
	186.7	186.7	186.7	186.7	186.7	KCAS	213.0	213.0	213.0	213.0	213.0	
	1125	1152	1182	1212	1245	LB/HR	1450	1488	1528	1567	1606	
	0.200	0.199	0.198	0.196	0.195	NM/LB	0.176	0.175	0.174	0.173	0.172	
31,000	71.6	73.1	74.6	76.1	77.5	%N1	77.9	79.5	81.1	82.7	84.3	39,000
	0.38	0.38	0.38	0.38	0.38	MIND	0.43	0.43	0.43	0.43	0.43	
	228.4	233.1	237.8	242.3	246.8	KTAS	259.3	264.7	270.0	275.1	280.2	
	190.1	190.1	190.1	190.1	190.1	KCAS	216.3	216.3	216.3	216.3	216.3	
	1164	1193	1223	1255	1288	LB/HR	1494	1533	1574	1614	1656	
	0.196	0.195	0.194	0.193	0.192	NM/LB	0.174	0.173	0.172	0.170	0.169	
32,000	72.4	74.0	75.5	77.0	78.4	%N1						
	0.39	0.39	0.39	0.39	0.39	MIND						
	232.4	237.2	241.9	246.6	251.1	KTAS						
	193.4	193.4	193.4	193.4	193.4	KCAS						
	1203	1233	1265	1298	1332	LB/HR						
	0.193	0.192	0.191	0.190	0.189	NM/LB						

20,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-44.6	-34.6	-24.6	-14.6	-4.6	OAT (°C)	-44.6	-34.6	-24.6	-14.6	-4.6	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	69.8	71.3	72.8	74.3	75.9	%N1	77.2	78.9	80.6	82.2	83.8	33,000
	0.38	0.38	0.38	0.38	0.38	MIND	0.44	0.44	0.44	0.44	0.44	
	222.2	227.1	231.8	236.4	240.9	KTAS	259.2	264.8	270.3	275.7	280.9	
	170.8	170.8	170.8	170.8	170.8	KCAS	199.8	199.8	199.8	199.8	199.8	
	925	949	974	1000	1026	LB/HR	1248	1282	1317	1353	1388	
	0.240	0.239	0.238	0.236	0.235	NM/LB	0.208	0.207	0.205	0.204	0.202	
26,000	70.9	72.4	73.9	75.5	77.0	%N1	78.0	79.7	81.4	83.0	84.7	34,000
	0.39	0.39	0.39	0.39	0.39	MIND	0.45	0.45	0.45	0.45	0.45	
	227.0	231.9	236.7	241.5	246.1	KTAS	263.6	269.3	274.9	280.4	285.7	
	174.5	174.5	174.5	174.5	174.5	KCAS	203.3	203.3	203.3	203.3	203.3	
	963	988	1014	1042	1070	LB/HR	1293	1329	1364	1401	1436	
	0.236	0.235	0.233	0.232	0.230	NM/LB	0.204	0.203	0.202	0.200	0.199	
27,000	72.0	73.5	75.1	76.6	78.1	%N1	78.8	80.5	82.2	83.9	85.5	35,000
	0.39	0.39	0.39	0.39	0.39	MIND	0.46	0.46	0.46	0.46	0.46	
	231.8	236.8	241.7	246.5	251.2	KTAS	268.0	273.8	279.5	285.1	290.5	
	178.2	178.2	178.2	178.2	178.2	KCAS	206.8	206.8	206.8	206.8	206.8	
	1002	1027	1055	1084	1113	LB/HR	1339	1376	1412	1450	1487	
	0.231	0.231	0.229	0.227	0.226	NM/LB	0.200	0.199	0.198	0.197	0.195	
28,000	72.9	74.5	76.1	77.6	79.2	%N1	79.6	81.3	83.0	84.7	86.3	36,000
	0.40	0.40	0.40	0.40	0.40	MIND	0.46	0.46	0.46	0.46	0.46	
	236.5	241.6	246.6	251.5	256.3	KTAS	272.4	278.3	284.0	289.7	295.2	
	181.9	181.9	181.9	181.9	181.9	KCAS	210.2	210.2	210.2	210.2	210.2	
	1041	1069	1097	1127	1158	LB/HR	1384	1423	1460	1499	1538	
	0.227	0.226	0.225	0.223	0.221	NM/LB	0.197	0.196	0.195	0.193	0.192	
29,000	73.8	75.4	77.0	78.6	80.2	%N1	80.4	82.1	83.8	85.5	87.1	37,000
	0.41	0.41	0.41	0.41	0.41	MIND	0.47	0.47	0.47	0.47	0.47	
	241.1	246.3	251.4	256.4	261.3	KTAS	276.5	282.5	288.3	294.1	299.7	
	185.5	185.5	185.5	185.5	185.5	KCAS	213.5	213.5	213.5	213.5	213.5	
	1081	1110	1140	1171	1201	LB/HR	1429	1469	1507	1547	1589	
	0.223	0.222	0.221	0.219	0.217	NM/LB	0.193	0.192	0.191	0.190	0.189	
30,000	74.7	76.3	77.9	79.5	81.1	%N1	81.1	82.8	84.5	86.2	87.9	38,000
	0.42	0.42	0.42	0.42	0.42	MIND	0.48	0.48	0.48	0.48	0.48	
	245.6	251.0	256.2	261.3	266.3	KTAS	280.5	286.6	292.5	298.3	304.0	
	189.1	189.1	189.1	189.1	189.1	KCAS	216.7	216.7	216.7	216.7	216.7	
	1121	1152	1183	1215	1247	LB/HR	1475	1516	1556	1597	1639	
	0.219	0.218	0.217	0.215	0.214	NM/LB	0.190	0.189	0.188	0.187	0.185	
31,000	75.6	77.2	78.9	80.5	82.0	%N1	81.8	83.5	85.3	87.0	88.7	39,000
	0.43	0.43	0.43	0.43	0.43	MIND	0.48	0.48	0.48	0.48	0.48	
	250.1	255.6	260.9	266.1	271.2	KTAS	284.4	290.6	296.6	302.5	308.3	
	192.7	192.7	192.7	192.7	192.7	KCAS	219.8	219.8	219.8	219.8	219.8	
	1161	1193	1226	1259	1293	LB/HR	1521	1563	1604	1648	1691	
	0.215	0.214	0.213	0.211	0.210	NM/LB	0.187	0.186	0.185	0.184	0.182	
32,000	76.5	78.1	79.8	81.4	82.9	%N1						
	0.43	0.43	0.43	0.43	0.43	MIND						
	254.7	260.2	265.6	270.9	276.1	KTAS						
	196.3	196.3	196.3	196.3	196.3	KCAS						
	1202	1236	1270	1304	1340	LB/HR						
	0.212	0.211	0.209	0.208	0.206	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

25,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	73.8	75.5	77.2	78.8	80.5	%N1	81.2	83.1	84.9	86.6	88.4	33,000
	0.42	0.42	0.42	0.42	0.42	MIND	0.50	0.50	0.50	0.50	0.50	
	244.3	249.8	255.2	260.5	265.7	KTAS	284.9	291.4	297.7	303.9	309.9	
	173.2	173.2	173.2	173.2	173.2	KCAS	203.0	203.0	203.0	203.0	203.0	
	925	950	977	1005	1032	LB/HR	1271	1308	1345	1382	1420	
	0.264	0.263	0.261	0.259	0.257	NM/LB	0.224	0.223	0.221	0.220	0.218	
26,000	74.8	76.5	78.2	79.9	81.6	%N1	82.0	83.9	85.7	87.5	89.3	34,000
	0.43	0.43	0.43	0.43	0.43	MIND	0.50	0.50	0.50	0.50	0.50	
	249.7	255.4	260.9	266.3	271.6	KTAS	289.6	296.1	302.5	308.8	314.9	
	177.2	177.2	177.2	177.2	177.2	KCAS	206.4	206.4	206.4	206.4	206.4	
	966	992	1020	1048	1079	LB/HR	1317	1355	1393	1431	1471	
	0.258	0.257	0.256	0.254	0.252	NM/LB	0.220	0.219	0.217	0.216	0.214	
27,000	75.9	77.6	79.3	81.0	82.6	%N1	82.8	84.7	86.5	88.3	90.1	35,000
	0.44	0.44	0.44	0.44	0.44	MIND	0.51	0.51	0.51	0.51	0.51	
	255.1	260.9	266.5	272.1	277.5	KTAS	294.4	301.1	307.6	314.0	320.2	
	181.1	181.1	181.1	181.1	181.1	KCAS	210.0	210.0	210.0	210.0	210.0	
	1007	1035	1064	1092	1126	LB/HR	1364	1403	1443	1482	1524	
	0.253	0.252	0.251	0.249	0.246	NM/LB	0.216	0.215	0.213	0.212	0.210	
28,000	76.8	78.6	80.3	82.0	83.6	%N1	83.6	85.5	87.4	89.2	91.0	36,000
	0.45	0.45	0.45	0.45	0.45	MIND	0.52	0.52	0.52	0.52	0.52	
	260.5	266.4	272.1	277.8	283.3	KTAS	299.4	306.2	312.8	319.3	325.6	
	185.0	185.0	185.0	185.0	185.0	KCAS	213.7	213.7	213.7	213.7	213.7	
	1050	1080	1110	1140	1174	LB/HR	1411	1452	1493	1534	1577	
	0.248	0.247	0.245	0.244	0.241	NM/LB	0.212	0.211	0.210	0.208	0.206	
29,000	77.7	79.5	81.2	82.9	84.7	%N1	84.4	86.3	88.2	90.1		37,000
	0.46	0.46	0.46	0.46	0.46	MIND	0.53	0.53	0.53	0.53		
	265.7	271.7	277.6	283.4	289.0	KTAS	304.3	311.2	317.9	324.5		
	188.9	188.9	188.9	188.9	188.9	KCAS	217.4	217.4	217.4	217.4		
	1095	1126	1157	1188	1221	LB/HR	1460	1502	1545	1588		
	0.243	0.241	0.240	0.238	0.237	NM/LB	0.208	0.207	0.206	0.204		
30,000	78.6	80.4	82.2	83.9	85.6	%N1	85.4	87.3	89.2	91.0		38,000
	0.47	0.47	0.47	0.47	0.47	MIND	0.54	0.54	0.54	0.54		
	270.7	276.9	282.8	288.7	294.5	KTAS	309.2	316.2	323.1	329.8		
	192.6	192.6	192.6	192.6	192.6	KCAS	221.0	221.0	221.0	221.0		
	1139	1171	1204	1236	1271	LB/HR	1514	1558	1602	1646		
	0.238	0.236	0.235	0.234	0.232	NM/LB	0.204	0.203	0.202	0.200		
31,000	79.5	81.3	83.1	84.8	86.5	%N1	86.3	88.2	90.1	92.0		39,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.55	0.55	0.55	0.55		
	275.5	281.8	287.9	293.8	299.7	KTAS	314.1	321.2	328.2	335.0		
	196.1	196.1	196.1	196.1	196.1	KCAS	224.7	224.7	224.7	224.7		
	1183	1216	1250	1284	1320	LB/HR	1567	1612	1658	1704		
	0.233	0.232	0.230	0.229	0.227	NM/LB	0.200	0.199	0.198	0.197		
32,000	80.4	82.2	84.0	85.8	87.5	%N1						
	0.49	0.49	0.49	0.49	0.49	MIND						
	280.3	286.6	292.8	298.9	304.8	KTAS						
	199.6	199.6	199.6	199.6	199.6	KCAS						
	1226	1262	1297	1332	1370	LB/HR						
	0.229	0.227	0.226	0.224	0.222	NM/LB						

30,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-64.4	-54.4	-44.4	-34.4	-24.4	OAT (°C)	-64.4	-54.4	-44.4	-34.4	-24.4	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	77.8	79.7	81.5	83.3	85.1	%N1	86.5	88.5	90.5	92.5		33,000
	0.48	0.48	0.48	0.48	0.48	MIND	0.56	0.56	0.56	0.56		
	270.1	276.5	282.7	288.8	294.8	KTAS	316.7	324.2	331.6	338.7		
	176.4	176.4	176.4	176.4	176.4	KCAS	208.3	208.3	208.3	208.3		
	940	968	996	1025	1055	LB/HR	1326	1367	1408	1450		
	0.287	0.286	0.284	0.282	0.279	NM/LB	0.239	0.237	0.236	0.234		
26,000	78.9	80.8	82.6	84.4	86.2	%N1	87.9	90.0	92.0	93.9		34,000
	0.49	0.49	0.49	0.49	0.49	MIND	0.57	0.57	0.57	0.57		
	275.8	282.3	288.7	295.0	301.1	KTAS	322.4	330.0	337.5	344.8		
	180.3	180.3	180.3	180.3	180.3	KCAS	212.2	212.2	212.2	212.2		
	984	1012	1042	1072	1104	LB/HR	1384	1427	1470	1514		
	0.280	0.279	0.277	0.275	0.273	NM/LB	0.233	0.231	0.230	0.228		
27,000	79.9	81.8	83.6	85.5	87.3	%N1						35,000
	0.50	0.50	0.50	0.50	0.50	MIND						
	281.5	288.1	294.6	301.0	307.2	KTAS						
	184.1	184.1	184.1	184.1	184.1	KCAS						
	1027	1057	1088	1120	1154	LB/HR						
	0.274	0.272	0.271	0.269	0.266	NM/LB						
28,000	80.8	82.7	84.6	86.4	88.3	%N1						36,000
	0.51	0.51	0.51	0.51	0.51	MIND						
	287.3	294.1	300.8	307.3	313.6	KTAS						
	188.1	188.1	188.1	188.1	188.1	KCAS						
	1072	1103	1135	1169	1205	LB/HR						
	0.268	0.267	0.265	0.263	0.260	NM/LB						
29,000	81.7	83.7	85.6	87.4	89.4	%N1						37,000
	0.52	0.52	0.52	0.52	0.52	MIND						
	293.4	300.3	307.1	313.7	320.2	KTAS						
	192.2	192.2	192.2	192.2	192.2	KCAS						
	1118	1151	1184	1220	1258	LB/HR						
	0.262	0.261	0.259	0.257	0.255	NM/LB						
30,000	82.7	84.6	86.6	88.4	90.5	%N1						38,000
	0.53	0.53	0.53	0.53	0.53	MIND						
	299.3	306.4	313.4	320.1	326.8	KTAS						
	196.3	196.3	196.3	196.3	196.3	KCAS						
	1164	1199	1234	1271	1312	LB/HR						
	0.257	0.256	0.254	0.252	0.249	NM/LB						
31,000	83.6	85.6	87.5	89.5	91.5	%N1						39,000
	0.54	0.54	0.54	0.54	0.54	MIND						
	305.3	312.5	319.6	326.5	333.3	KTAS						
	200.4	200.4	200.4	200.4	200.4	KCAS						
	1211	1248	1284	1323	1367	LB/HR						
	0.252	0.250	0.249	0.247	0.244	NM/LB						
32,000	85.0	87.0	89.0	91.0		%N1						
	0.55	0.55	0.55	0.55		MIND						
	311.1	318.4	325.6	332.7		KTAS						
	204.4	204.4	204.4	204.4		KCAS						
	1268	1307	1346	1387		LB/HR						
	0.245	0.244	0.242	0.240		NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

35,000 FT
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-74.3	-64.3	-54.3	-44.3	-34.3	OAT (°C)	-74.3	-64.3	-54.3	-44.3	-34.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	82.3	84.3	86.3	88.2	90.3	%N1						33,000
	0.55	0.55	0.55	0.55	0.55	MIND						
	300.8	308.2	315.5	322.6	329.6	KTAS						
	180.6	180.6	180.6	180.6	180.6	KCAS						
	963	992	1023	1055	1089	LB/HR						
	0.313	0.311	0.308	0.306	0.303	NM/LB						
26,000	83.9	85.9	87.9	89.9	91.9	%N1						34,000
	0.56	0.56	0.56	0.56	0.56	MIND						
	307.8	315.4	322.9	330.2	337.3	KTAS						
	185.0	185.0	185.0	185.0	185.0	KCAS						
	1015	1047	1080	1114	1149	LB/HR						
	0.303	0.301	0.299	0.296	0.294	NM/LB						
27,000	85.8	87.9	89.9	91.8		%N1						35,000
	0.57	0.57	0.57	0.57		MIND						
	314.7	322.5	330.1	337.6		KTAS						
	189.5	189.5	189.5	189.5		KCAS						
	1073	1108	1143	1179		LB/HR						
	0.293	0.291	0.289	0.286		NM/LB						
28,000	87.7	89.8	91.8	93.8		%N1						36,000
	0.59	0.59	0.59	0.59		MIND						
	321.6	329.6	337.4	345.0		KTAS						
	193.9	193.9	193.9	193.9		KCAS						
	1132	1169	1207	1245		LB/HR						
	0.284	0.282	0.280	0.277		NM/LB						
29,000						%N1						37,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
30,000						%N1						38,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
31,000						%N1						39,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
32,000						%N1						
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						

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SINGLE ENGINE HOLDING TABLES - WING AND ENGINE ANTI-ICE - ON

Section VIII-7
Single Engine Holding Anti-ice - On

SEA LEVEL
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-5.0	5.0	15.0	25.0	35.0	OAT (°C)	-5.0	5.0	15.0	25.0	35.0	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	57.9	59.0	60.1	61.2	62.1	%N1	62.5	63.8	65.1	66.5	67.3	33,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.29	0.29	0.29	0.29	0.29	
	178.5	181.8	185.0	188.2	191.3	KTAS	184.1	187.5	190.8	194.1	197.4	
	185.0	185.0	185.0	185.0	185.0	KCAS	190.8	190.8	190.8	190.8	190.8	
	1195	1223	1253	1280	1339	LB/HR	1468	1511	1559	1619	1614	
	0.149	0.149	0.148	0.147	0.143	NM/LB	0.125	0.124	0.122	0.120	0.122	
26,000	58.4	59.5	60.6	61.7	62.6	%N1	63.4	64.7	66.0	67.5	68.2	34,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.29	0.29	0.29	0.29	0.29	
	178.5	181.8	185.0	188.2	191.3	KTAS	187.1	190.5	193.9	197.3	200.6	
	185.0	185.0	185.0	185.0	185.0	KCAS	193.9	193.9	193.9	193.9	193.9	
	1214	1243	1274	1303	1362	LB/HR	1522	1568	1619	1685	1674	
	0.147	0.146	0.145	0.144	0.141	NM/LB	0.123	0.121	0.120	0.117	0.120	
27,000	58.9	60.0	61.1	62.3	63.2	%N1	64.3	65.6	66.9	68.2	69.1	35,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.30	0.30	0.30	0.30	0.30	
	178.5	181.8	185.0	188.2	191.3	KTAS	190.1	193.6	197.0	200.4	203.7	
	185.0	185.0	185.0	185.0	185.0	KCAS	197.0	197.0	197.0	197.0	197.0	
	1242	1274	1307	1341	1388	LB/HR	1576	1626	1680	1730	1735	
	0.144	0.143	0.142	0.140	0.138	NM/LB	0.121	0.119	0.117	0.116	0.117	
28,000	59.4	60.5	61.7	62.8	63.8	%N1	65.1	66.4	67.7	69.0	70.0	36,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.30	0.30	0.30	0.30	0.30	
	178.5	181.8	185.0	188.2	191.3	KTAS	193.0	196.6	200.1	203.5	206.9	
	185.0	185.0	185.0	185.0	185.0	KCAS	200.1	200.1	200.1	200.1	200.1	
	1272	1306	1341	1378	1415	LB/HR	1626	1675	1727	1774	1795	
	0.140	0.139	0.138	0.137	0.135	NM/LB	0.119	0.117	0.116	0.115	0.115	
29,000	59.9	61.0	62.2	63.4	64.4	%N1	65.8	67.1	68.5	69.7	70.9	37,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.31	0.31	0.31	0.31	0.31	
	178.5	181.8	185.0	188.2	191.3	KTAS	195.9	199.5	203.1	206.6	210.0	
	185.0	185.0	185.0	185.0	185.0	KCAS	203.1	203.1	203.1	203.1	203.1	
	1302	1338	1375	1415	1441	LB/HR	1668	1718	1772	1818	1854	
	0.137	0.136	0.135	0.133	0.133	NM/LB	0.117	0.116	0.115	0.114	0.113	
30,000	60.4	61.5	62.7	64.0	65.0	%N1	66.4	67.8	69.2	70.5	71.7	38,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.31	0.31	0.31	0.31	0.31	
	178.5	181.8	185.0	188.2	191.3	KTAS	198.8	202.4	206.0	209.6	213.1	
	185.0	185.0	185.0	185.0	185.0	KCAS	206.0	206.0	206.0	206.0	206.0	
	1333	1369	1408	1452	1467	LB/HR	1710	1761	1818	1863	1907	
	0.134	0.133	0.131	0.130	0.130	NM/LB	0.116	0.115	0.113	0.113	0.112	
31,000	60.8	62.0	63.2	64.5	65.6	%N1	67.1	68.5	70.0	71.3	72.4	39,000
	0.28	0.28	0.28	0.28	0.28	MIND	0.32	0.32	0.32	0.32	0.32	
	178.5	181.8	185.0	188.2	191.3	KTAS	201.6	205.3	209.0	212.6	216.1	
	185.0	185.0	185.0	185.0	185.0	KCAS	209.0	209.0	209.0	209.0	209.0	
	1363	1401	1442	1489	1494	LB/HR	1752	1804	1863	1907	1954	
	0.131	0.130	0.128	0.126	0.128	NM/LB	0.115	0.114	0.112	0.111	0.111	
32,000	61.7	62.9	64.1	65.5	66.4	%N1						
	0.28	0.28	0.28	0.28	0.28	MIND						
	181.2	184.5	187.8	191.1	194.2	KTAS						
	187.8	187.8	187.8	187.8	187.8	KCAS						
	1415	1456	1500	1553	1553	LB/HR						
	0.128	0.127	0.125	0.123	0.125	NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

5000 (FT)
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-14.9	-4.9	5.1	15.1	25.1	OAT (°C)	-14.9	-4.9	5.1	15.1	25.1	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	61.2	62.4	63.7	65.1	66.6	%N1	66.2	67.5	68.9	70.1	71.7	33,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.32	0.32	0.32	0.32	0.32	
	191.6	195.3	198.9	202.5	205.9	KTAS	199.5	203.3	207.1	210.7	214.4	
	185.0	185.0	185.0	185.0	185.0	KCAS	192.6	192.6	192.6	192.6	192.6	
	1251	1284	1322	1365	1403	LB/HR	1481	1519	1568	1554	1645	
	0.153	0.152	0.151	0.148	0.147	NM/LB	0.135	0.134	0.132	0.136	0.130	
26,000	61.6	62.9	64.3	65.6	67.1	%N1	66.9	68.3	69.7	70.9	72.5	34,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.32	0.32	0.32	0.32	0.32	
	191.6	195.3	198.9	202.5	205.9	KTAS	202.8	206.7	210.5	214.2	217.9	
	185.0	185.0	185.0	185.0	185.0	KCAS	195.8	195.8	195.8	195.8	195.8	
	1271	1305	1345	1389	1426	LB/HR	1523	1563	1614	1584	1692	
	0.151	0.150	0.148	0.146	0.144	NM/LB	0.133	0.132	0.130	0.135	0.129	
27,000	62.2	63.5	64.8	66.2	67.6	%N1	67.7	69.1	70.6	71.7	73.3	35,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.33	0.33	0.33	0.33	0.33	
	191.6	195.3	198.9	202.5	205.9	KTAS	206.0	210.0	213.9	217.7	221.4	
	185.0	185.0	185.0	185.0	185.0	KCAS	199.0	199.0	199.0	199.0	199.0	
	1295	1330	1371	1417	1452	LB/HR	1565	1609	1661	1616	1743	
	0.148	0.147	0.145	0.143	0.142	NM/LB	0.132	0.131	0.129	0.135	0.127	
28,000	62.7	64.1	65.4	66.9	68.2	%N1	68.5	69.9	71.4	72.6	74.2	36,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.33	0.33	0.33	0.33	0.33	
	191.6	195.3	198.9	202.5	205.9	KTAS	209.3	213.3	217.2	221.1	224.9	
	185.0	185.0	185.0	185.0	185.0	KCAS	202.1	202.1	202.1	202.1	202.1	
	1319	1355	1397	1445	1479	LB/HR	1608	1655	1709	1668	1798	
	0.145	0.144	0.142	0.140	0.139	NM/LB	0.130	0.129	0.127	0.133	0.125	
29,000	63.3	64.6	66.0	67.4	68.7	%N1	69.3	70.7	72.2	73.4	75.0	37,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.34	0.34	0.34	0.34	0.34	
	191.6	195.3	198.9	202.5	205.9	KTAS	212.5	216.5	220.5	224.5	228.3	
	185.0	185.0	185.0	185.0	185.0	KCAS	205.2	205.2	205.2	205.2	205.2	
	1343	1379	1424	1462	1505	LB/HR	1651	1702	1756	1736	1856	
	0.143	0.142	0.140	0.138	0.137	NM/LB	0.129	0.127	0.126	0.129	0.123	
30,000	63.8	65.2	66.6	67.8	69.2	%N1	70.0	71.4	73.0	74.3	75.8	38,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.34	0.34	0.34	0.34	0.34	
	191.6	195.3	198.9	202.5	205.9	KTAS	215.6	219.8	223.8	227.8	231.7	
	185.0	185.0	185.0	185.0	185.0	KCAS	208.3	208.3	208.3	208.3	208.3	
	1366	1404	1450	1477	1531	LB/HR	1694	1746	1803	1804	1909	
	0.140	0.139	0.137	0.137	0.135	NM/LB	0.127	0.126	0.124	0.126	0.121	
31,000	64.5	65.9	67.2	68.4	69.9	%N1	70.7	72.2	73.8	75.1	76.6	39,000
	0.31	0.31	0.31	0.31	0.31	MIND	0.35	0.35	0.35	0.35	0.35	
	192.8	196.5	200.1	203.7	207.2	KTAS	218.7	222.9	227.0	231.0	235.0	
	186.1	186.1	186.1	186.1	186.1	KCAS	211.2	211.2	211.2	211.2	211.2	
	1397	1435	1481	1496	1564	LB/HR	1736	1790	1849	1869	1957	
	0.138	0.137	0.135	0.136	0.133	NM/LB	0.126	0.125	0.123	0.124	0.120	
32,000	65.4	66.7	68.1	69.2	70.8	%N1						
	0.31	0.31	0.31	0.31	0.31	MIND						
	196.1	199.9	203.6	207.2	210.8	KTAS						
	189.4	189.4	189.4	189.4	189.4	KCAS						
	1439	1476	1524	1524	1604	LB/HR						
	0.136	0.135	0.134	0.136	0.131	NM/LB						

Section VIII-7
Single Engine Holding Anti-ice - On

10,000 FTþ
PRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)

	-24.8	-14.8	-4.8	5.2	15.2	OAT (°C)	-24.8	-14.8	-4.8	5.2	15.2	
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	64.7	66.2	67.6	69.0	70.3	%N1	69.9	71.4	72.8	74.3	75.9	33,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.35	0.35	0.35	0.35	0.35	
	206.2	210.3	214.4	218.3	222.2	KTAS	216.9	221.3	225.5	229.7	233.7	
	185.0	185.0	185.0	185.0	185.0	KCAS	194.7	194.7	194.7	194.7	194.7	
	1225	1260	1294	1332	1370	LB/HR	1444	1524	1554	1594	1661	
	0.168	0.167	0.166	0.164	0.162	NM/LB	0.150	0.145	0.145	0.144	0.141	
26,000	65.2	66.6	68.1	69.5	70.8	%N1	70.7	72.2	73.7	75.1	76.7	34,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.36	0.36	0.36	0.36	0.36	
	206.2	210.3	214.4	218.3	222.2	KTAS	220.4	224.8	229.1	233.4	237.5	
	185.0	185.0	185.0	185.0	185.0	KCAS	197.9	197.9	197.9	197.9	197.9	
	1246	1283	1319	1358	1396	LB/HR	1492	1567	1592	1624	1692	
	0.166	0.164	0.163	0.161	0.159	NM/LB	0.148	0.143	0.144	0.144	0.140	
27,000	65.8	67.2	68.6	70.0	71.4	%N1	71.5	73.0	74.5	75.9	77.4	35,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.37	0.37	0.37	0.37	0.37	
	206.2	210.3	214.4	218.3	222.2	KTAS	223.9	228.4	232.8	237.0	241.3	
	185.0	185.0	185.0	185.0	185.0	KCAS	201.0	201.0	201.0	201.0	201.0	
	1267	1310	1347	1388	1425	LB/HR	1542	1611	1633	1652	1720	
	0.163	0.161	0.159	0.157	0.156	NM/LB	0.145	0.142	0.143	0.143	0.140	
28,000	66.3	67.7	69.1	70.6	72.0	%N1	72.3	73.9	75.3	76.7	78.2	36,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.37	0.37	0.37	0.37	0.37	
	206.2	210.3	214.4	218.3	222.2	KTAS	227.3	231.9	236.3	240.7	245.0	
	185.0	185.0	185.0	185.0	185.0	KCAS	204.1	204.1	204.1	204.1	204.1	
	1288	1336	1376	1417	1455	LB/HR	1595	1654	1676	1679	1747	
	0.160	0.157	0.156	0.154	0.153	NM/LB	0.143	0.140	0.141	0.143	0.140	
29,000	66.8	68.2	69.7	71.2	72.6	%N1	73.1	74.6	76.2	77.5	79.0	37,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.38	0.38	0.38	0.38	0.38	
	206.2	210.3	214.4	218.3	222.2	KTAS	230.7	235.3	239.8	244.3	248.6	
	185.0	185.0	185.0	185.0	185.0	KCAS	207.2	207.2	207.2	207.2	207.2	
	1309	1362	1404	1447	1484	LB/HR	1647	1698	1733	1741	1771	
	0.158	0.154	0.153	0.151	0.150	NM/LB	0.140	0.139	0.138	0.140	0.140	
30,000	67.3	68.8	70.2	71.7	73.1	%N1	73.8	75.4	77.0	78.4	82.1	38,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.38	0.38	0.38	0.38	0.43	
	206.2	210.3	214.4	218.3	222.2	KTAS	234.1	238.7	243.3	247.8	282.0	
	185.0	185.0	185.0	185.0	185.0	KCAS	210.3	210.3	210.3	210.3	235.4	
	1330	1389	1431	1476	1514	LB/HR	1689	1742	1788	1808	1804	
	0.155	0.152	0.150	0.148	0.147	NM/LB	0.139	0.137	0.136	0.137	0.156	
31,000	68.2	69.7	71.2	72.7	74.1	%N1	74.5	76.1	77.8	79.3	82.1	39,000
	0.34	0.34	0.34	0.34	0.34	MIND	0.39	0.39	0.39	0.39	0.42	
	209.7	213.9	218.0	222.0	226.0	KTAS	237.4	242.1	246.8	251.3	278.5	
	188.2	188.2	188.2	188.2	188.2	KCAS	213.3	213.3	213.3	213.3	232.4	
	1364	1435	1481	1526	1566	LB/HR	1732	1786	1841	1878	1802	
	0.154	0.149	0.147	0.145	0.144	NM/LB	0.137	0.136	0.134	0.134	0.155	
32,000	69.1	70.6	72.0	73.5	75.0	%N1						
	0.35	0.35	0.35	0.35	0.35	MIND						
	213.4	217.6	221.8	225.9	229.9	KTAS						
	191.5	191.5	191.5	191.5	191.5	KCAS						
	1398	1481	1518	1561	1620	LB/HR						
	0.153	0.147	0.146	0.145	0.142	NM/LB						

GROSS WEIGHT AT ALTITUDE (LB)

Gulfstream G280
AIRPLANE FLIGHT MANUAL

15,000 FT
ÞPRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-34.7	-24.7	-14.7	-4.7	5.3	OAT (°C)	-34.7	-24.7	-14.7	-4.7	5.3	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	68.1	69.7	71.2	72.8	74.3	%N1	73.8	75.5	77.2	78.8		33,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.39	0.39	0.39	0.39		
	222.4	227.0	231.5	236.0	240.3	KTAS	236.3	241.2	246.0	250.8		
	185.0	185.0	185.0	185.0	185.0	KCAS	196.8	196.8	196.8	196.8		
	1207	1242	1279	1319	1355	LB/HR	1467	1527	1573	1622		
	0.184	0.183	0.181	0.179	0.177	NM/LB	0.161	0.158	0.156	0.155		
26,000	68.7	70.2	71.8	73.4	74.9	%N1	74.6	76.4	78.1	79.7		34,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.40	0.40	0.40	0.40		
	222.4	227.0	231.5	236.0	240.3	KTAS	240.3	245.2	250.1	254.9		
	185.0	185.0	185.0	185.0	185.0	KCAS	200.1	200.1	200.1	200.1		
	1231	1267	1305	1345	1382	LB/HR	1483	1572	1621	1675		
	0.181	0.179	0.178	0.175	0.174	NM/LB	0.162	0.156	0.154	0.152		
27,000	69.2	70.8	72.4	74.0	75.5	%N1	75.3	77.2	78.9	82.7		35,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.41	0.41	0.41	0.46		
	222.4	227.0	231.5	236.0	240.3	KTAS	244.1	249.2	254.2	292.5		
	185.0	185.0	185.0	185.0	185.0	KCAS	203.4	203.4	203.4	230.2		
	1257	1294	1333	1374	1410	LB/HR	1500	1611	1668	1676		
	0.177	0.176	0.174	0.172	0.170	NM/LB	0.163	0.155	0.152	0.175		
28,000	69.8	71.4	73.0	74.6	76.1	%N1	76.1	77.9	81.3	82.7		36,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.41	0.41	0.45	0.45		
	222.4	227.0	231.5	236.0	240.3	KTAS	248.0	253.1	283.5	288.5		
	185.0	185.0	185.0	185.0	185.0	KCAS	206.6	206.6	227.3	227.0		
	1283	1321	1360	1401	1439	LB/HR	1524	1632	1707	1676		
	0.173	0.172	0.170	0.168	0.167	NM/LB	0.163	0.155	0.166	0.172		
29,000	70.4	72.0	73.6	75.2	76.7	%N1	78.6	80.0				37,000
	0.37	0.37	0.37	0.37	0.37	MIND	0.46	0.45				
	222.4	227.0	231.5	236.0	240.3	KTAS	276.0	279.0				
	185.0	185.0	185.0	185.0	185.0	KCAS	230.5	228.2				
	1309	1347	1387	1429	1468	LB/HR	1591	1630				
	0.170	0.169	0.167	0.165	0.164	NM/LB	0.173	0.171				
30,000	71.1	72.7	74.3	76.0	80.4	%N1						38,000
	0.37	0.37	0.37	0.37	0.43	MIND						
	224.4	229.1	233.6	238.1	280.5	KTAS						
	186.7	186.7	186.7	186.7	216.5	KCAS						
	1345	1385	1426	1468	1466	LB/HR						
	0.167	0.165	0.164	0.162	0.191	NM/LB						
31,000	72.0	73.7	75.3	77.0	80.4	%N1						39,000
	0.38	0.38	0.38	0.38	0.43	MIND						
	228.4	233.1	237.8	242.3	276.5	KTAS						
	190.1	190.1	190.1	190.1	213.3	KCAS						
	1390	1433	1476	1519	1461	LB/HR						
	0.164	0.163	0.161	0.160	0.189	NM/LB						
32,000	73.0	74.6	76.3	77.9		%N1						
	0.39	0.39	0.39	0.39		MIND						
	232.4	237.2	241.9	246.6		KTAS						
	193.4	193.4	193.4	193.4		KCAS						
	1436	1482	1525	1570		LB/HR						
	0.162	0.160	0.159	0.157		NM/LB						

Section VIII-7
Single Engine Holding Anti-ice - On

20,000 FT
ÞPRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)		-44.6	-34.6	-24.6	-14.6	-4.6	OAT (°C)	-44.6	-34.6	-24.6	-14.6	-4.6	GROSS WEIGHT AT ALTITUDE (LB)
		-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
	25,000	71.9	73.6	75.3	77.0		%N1						
		0.41	0.41	0.41	0.41		MIND						
		240.4	245.6	250.7	255.7		KTAS						
		185.0	185.0	185.0	185.0		KCAS						
		1177	1214	1252	1291		LB/HR						
		0.204	0.202	0.200	0.198		NM/LB						
	26,000	72.5	74.2	75.9	77.6		%N1						
		0.41	0.41	0.41	0.41		MIND						
		240.4	245.6	250.7	255.7		KTAS						
		185.0	185.0	185.0	185.0		KCAS						
		1202	1238	1278	1317		LB/HR						
		0.200	0.198	0.196	0.194		NM/LB						
	27,000	73.1	74.8	76.5	78.2		%N1						
		0.41	0.41	0.41	0.41		MIND						
		240.4	245.6	250.7	255.7		KTAS						
		185.0	185.0	185.0	185.0		KCAS						
		1228	1265	1305	1346		LB/HR						
		0.196	0.194	0.192	0.190		NM/LB						
	28,000	73.7	75.4	77.1	78.8		%N1						
		0.41	0.41	0.41	0.41		MIND						
		240.4	245.6	250.7	255.7		KTAS						
		185.0	185.0	185.0	185.0		KCAS						
		1253	1292	1333	1374		LB/HR						
		0.192	0.190	0.188	0.186		NM/LB						
	29,000	74.3	76.0	77.8	79.5		%N1						
		0.41	0.41	0.41	0.41		MIND						
		241.1	246.3	251.4	256.4		KTAS						
		185.5	185.5	185.5	185.5		KCAS						
		1284	1323	1365	1407		LB/HR						
		0.188	0.186	0.184	0.182		NM/LB						
	30,000	75.2	77.0	78.8	80.5		%N1						
		0.42	0.42	0.42	0.42		MIND						
		245.6	251.0	256.2	261.3		KTAS						
		189.1	189.1	189.1	189.1		KCAS						
		1332	1373	1416	1458		LB/HR						
		0.184	0.183	0.181	0.179		NM/LB						
	31,000	76.1	77.9	79.7	81.4		%N1						
		0.43	0.43	0.43	0.43		MIND						
		250.1	255.6	260.9	266.1		KTAS						
		192.7	192.7	192.7	192.7		KCAS						
		1381	1423	1468	1512		LB/HR						
		0.181	0.180	0.178	0.176		NM/LB						
	32,000	78.9	80.3				%N1						
		0.48	0.48				MIND						
		284.5	287.0				KTAS						
		219.9	217.0				KCAS						
		1388	1420				LB/HR						
		0.205	0.202				NM/LB						

Gulfstream G280
AIRPLANE FLIGHT MANUAL

25,000 FT
ÞPRESSURE ALTITUDE

GROSS WEIGHT AT ALTITUDE (LB)	-54.5	-44.5	-34.5	-24.5	-14.5	OAT (°C)	-54.5	-44.5	-34.5	-24.5	-14.5	GROSS WEIGHT AT ALTITUDE (LB)
	-20	-10	0	10	20	ISA DEV (°C)	-20	-10	0	10	20	
25,000	75.5	77.4				%N1						33,000
	0.45	0.45				MIND						
	260.4	266.3				KTAS						
	185.0	185.0				KCAS						
	1157	1194				LB/HR						
	0.225	0.223				NM/LB						
26,000	76.9					%N1						34,000
	0.48					MIND						
	276.0					KTAS						
	196.4					KCAS						
	1101					LB/HR						
	0.251					NM/LB						
27,000						%N1						35,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
28,000						%N1						36,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
29,000						%N1						37,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
30,000						%N1						38,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
31,000						%N1						39,000
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						
32,000						%N1						
						MIND						
						KTAS						
						KCAS						
						LB/HR						
						NM/LB						

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LIST OF APPENDICES

Supplements marked with ✓ are applicable to your aircraft.

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CAAI APPROVED
15 Apr 2015

Appendix No. 1
for
GULFSTREAM G280 AIRCRAFT

CONFIGURATION DEVIATION LIST

GULFSTREAM AEROSPACE LP

CAAI APPROVED
15 Apr 2015

Appendix 1

CONFIGURATION DEVIATION LIST

PURPOSE

This Configuration Deviation List (CDL) contains additional certificate limitations for operation of the Gulfstream 280 without certain secondary airframe and engine parts as listed herein. The certificate limitations in Section 1 are applicable except as amended herein. All CAAI and FAA approved limitations must be followed when operating with a configuration deviation.

APPLICABILITY

This list does not include parts which do not affect the airworthiness of the airplane, such as galley equipment, entertainment systems, passenger convenience items, etc., and is based on the configuration of the airplane as originally manufactured. Secondary airframe parts changed or added during completion or while the airplane is in operation should be addressed by supplementary revisions to the list.

MULTIPLE ITEMS

No more than one part for any subsystem in this list may be missing, unless specifically designated combinations are indicated herein. Unless otherwise specified herein, parts from different subsystems may be missing. The performance penalties are cumulative. The decision of the pilot in command of the flight, to have allowable missing parts corrected prior to flight, will take precedence over the provisions contained in this publication.

If an additional part is lost in flight, the airplane may not depart the airport at which it landed following this event until it again complies with the limitations of this appendix. This does not preclude the issuance of a ferry permit to allow the airplane to be flown to a point where the necessary repairs or replacements can be made.

ACTION REQUIRED

MAINTENANCE LOG

The operator shall list in the airplane logbook an appropriate notation covering the missing part(s) on each flight.

DAMAGE INSPECTION

The operator shall make a thorough check of the airplane to ascertain that other areas have not been damaged or affected.

PLACARDING

The operator shall make a placard by duplicating the complete CDL item from this publication and cut it to size to show only the subject item. Install this placard in a conspicuous location in the cockpit. If the missing part requires a reduction of V_{MO}/M_{MO}, an approved placard for the reduced V_{MO}/M_{MO} must be installed adjacent to the airspeed indicator and any additional restrictions must be placarded for the pilots to easily see.

PERFORMANCE AND FLIGHT PLANNING

The effects of the missing parts will be included in the calculations for takeoff, landing and cruise. Performance penalties for multiple items are cumulative.

Appendix 1

LIMITATIONS

1. The numbering and designation of systems in CDL appendix is based on ATA Specification No. 100. The parts within each system are identified by functional description and, when necessary, by part numbers.
2. When the airplane is operated using this appendix, it must be operated in accordance with the limitations specified in the AFM, as amended by this appendix.
3. The associated limitations must be listed on a placard affixed in the cockpit on the pilot's instrument panel in clear view of the pilot.
4. The pilot shall be notified of each operation with a missing part(s) by listing the missing part(s) in the flight or dispatch release.
5. No more than three parts that have each been determined to cause a negligible performance degradation may be missing for takeoff without applying a performance penalty. When more than three such parts are missing, a performance penalty of either 0.5 percent of the maximum takeoff weight or 100 pounds, whichever is less, must be applied for takeoff, enroute, and landing for each missing part.
6. takeoff performance penalties are applicable to takeoff performance considerations (i.e., takeoff field length, first, second, or final segment climb, or takeoff flight path), or to maximum certified takeoff gross weight.
7. Landing performance penalties are applicable to landing gross weights that are limited by structural limit, landing field length, landing climb, or approach climb.
8. Enroute performance penalties are applicable to operations that are limited by one engine inoperative enroute climb performance.

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ATA	SYSTEM OR UNIT	NO. INST	NO. REQD	REQUIREMENTS FOR FLIGHT
49	**Auxiliary Power Unit**			
49	-1 APU Inlet Door	1	0	APU operations are not authorized. Maximum speed - 250 KCAS / 0.70M_i.

ATA	SYSTEM OR UNIT	NO. INST	NO. REQD	REQUIREMENTS FOR FLIGHT
52	**Doors**			
52	-1 Battery Access Door (LH/RH) (149CL/157CR)	2	0	Max airspeed 250 KCAS/0.70M_i.
52	-2 External Power Receptacle Door (149DL)	1	0	Max airspeed 250 KCAS/0.70M_i.
52	-3 Water Fill Access Panel (157DR)	1	0	Max airspeed 250 KCAS/0.70M_i.
52	-4 Refuel-Defuel Control Box Door (152CR)	1	0	Not required. Max airspeed 250 KCAS/0.70M_i.
52	-5 Hydraulic System Service Door (RH) (157DR)	1	0	Not required. Max airspeed 250 KCAS/0.70M_i.
52	-6 Refuel-Defuel Adapter Panel (Refueling Port) (152BR)	1	0	Not required. Max airspeed 250 KCAS/0.70M_i.

(Continued)

ATA	SYSTEM OR UNIT	NO. INST	NO. REQD	REQUIREMENTS FOR FLIGHT
52	-7 APU Compartment Service Door (313AL)	1	0	APU operations are not authorized. Ferry Permit required. Maximum speed - 250 KCAS / 0.70M_i. Note: Flight into known or forecast icing conditions must be avoided.
52	-8 Waste Door (311CR)	1	0	Not required. Max airspeed 250 KCAS/0.70M_i.
52	-9 Main Entrance Door Telescoping Rods	2	1	One must always be installed to prevent damage to door and adjacent structure. Only one person may stand on the door.
52	-10 ATS Ground Service Compt. Door (311BL)	1	0	Not required. Max airspeed 250 KCAS/0.70M_i.

ATA	SYSTEM OR UNIT	NO. INST	NO. REQD	REQUIREMENTS FOR FLIGHT
53	**Fuselage Structures**			

ATA	SYSTEM OR UNIT	NO. INST	NO. REQD	REQUIREMENTS FOR FLIGHT
55	**Stabilizers**			
55	-1 Vertical Stabilizer Tip Cap	1	0	Max speed 250 KCAS/0.70M_i.
55	-2 Horizontal Stabilizer Tip Cap	2	0	Max speed 250 KCAS/0.70M_i.
55	-3 Elevators Actuator Fairing	2	0	Max speed 250 KCAS/0.70M_i. Flight into known or forecast icing conditions should be avoided.
55	-4 Horizontal Stabilizer Vortex Generator (V/G) (10 ea. side)	20	0	If 2 or more V/G's are missing on any side of the horizontal tail, forward zero-fuel c.g. at takeoff should be limited to 33%.

ATA	SYSTEM OR UNIT	NO. INST	NO. REQD	REQUIREMENTS FOR FLIGHT
56	**Windows**			
56	-1 Windshields	2	2	With the windshield or side window heating/protective ply cracked, one takeoff to a base of maintenance is permitted. With either main structural windshield ply cracked, a takeoff is permitted for ferry purposes only. Passengers are prohibited. See CRACKED WINDSHIELD OR SIDE WINDOW,page IIIA-247 **NOTE** For any cracked windshield or side window, turn W/S Heat Switch OFF (Affected side). Reduce cabin differential pressure to 7 PSI or less. Slow to a maximum of 0.72M/250 KIAS (200 KIAS below 8000 ft). One pilot will don oxygen mask if above 10,000 feet. If the inner ply is cracked, the adjacent pilot will don smoke goggles. Flight into known or forecast icing conditions should be avoided.

ATA	SYSTEM OR UNIT	NO. INST	NO. REQD	REQUIREMENTS FOR FLIGHT
57	**Wings**			
57	-1 Wing Vortex Generators (V/G) (42 ea. Side)	84	0	If any V/G's are missing on any side of the wing, M_{MO} should be limited to 0.82 Mach.
57	-2 Wing/Flap Gap Seals	2	0	Expect heavy wing on missing seals side.
57	-3 Wingtip Position Light Lens	2	1	Flight into known or forecast icing conditions should be avoided.
57	-4 Wing Landing Light Lens	2	1	Flight into known or forecast icing conditions should be avoided.
57	-5 Aileron Actuator Fairings	2	0	Max speed 250 KCAS/0.70M_i. Flight into known or forecast icing conditions should be avoided.

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LIST OF SUPPLEMENTS

Supplements marked with ✓ are applicable to your aircraft.

Supplement No.		Title	Page
☐	1	Terrain Awareness and Warning System (TAWS)	X-1-1
☐	2	TCAS II TSS-4100 SYSTEM	X-2-1
☐	3	Brake Kinetic Energy (BKE) and Brake Cooling	X-3-1
☐	4	Rockwell Collins Pro Line Fusion FMS Flight Management Systems	X-4-1
☐	5	Flaps - 0 Performance	X-5-1
☐	6	Category II Operations	X-6-1
☐	7	European Aviation Safety Agency Flight Manual Supplement	X-7-1
☐	8	Contaminated Runway Operations	X-8-1
☐	9	Transport Canada Civil Aviation Flight Manual Supplement	X-9-1
☐	10	Brazilian Aircraft Flight Manual Supplement	X-10-1
☐	11	APR OFF Corrections	X-11-1

(Continued)

LIST OF SUPPLEMENTS (CONTINUED)

Supplements marked with ✓ are applicable to your aircraft.

Supplement No.	Title	Page
☐ 12	Steep Approach Landing Operations (CAAI Approved) [Reserved]	
☐ 13	Steep Approach Landing Operations (FAA Approved) [Reserved]	
☐ 14	Steep Approach Landing Operations (EASA Approved) [Reserved]	
☐ 15	VERTICAL WEATHER DISPLAY (VWX) AND PREDICTIVE WINDSHEAR (PWS)	X-15-1
☐ 16	ROCKWELL COLLINS PRO LINE FUSION SURFACE MANAGEMENT SYSTEM (SMS)	X-16-1

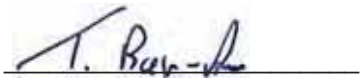
CAAI APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 1
for
GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

TERRAIN AWARENESS AND WARNING SYSTEM (TAWS)

This Supplement must be attached to CAAI approved Airplane Flight Manual dated 15 Apr 2015 whenever Terrain Awareness and Warning System (TAWS) is installed.
Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

CAAI APPROVED: 

Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Date: 15 Apr 2015 Manual No._____

GULFSTREAM AEROSPACE LP

Supplement 1

TERRAIN AWARENESS AND WARNING SYSTEM (TAWS)

GENERAL

The general information in the introduction section is applicable with the addition of the following:

SECTION I
LIMITATIONS

1. The TAWS may give little or no warning/alert for flight into steeply rising terrain.
2. The TAWS may give little or no warning/alert for stabilized descent in landing configuration into terrain where no ILS glideslope exists and the altitude awareness callouts are not activated.
3. Terrain clearances or descent rates during radar vectoring that are not compatible with those required by the minimum regulatory standards for Ground Proximity Warning equipment may cause unwanted warnings or alerts.
4. This system provides aural and visual windshear warning and alerts only. No flight guidance is presented.
5. Navigation is not to be predicated upon the use of TERRAIN database display.
6. Pilots are authorized to deviate from their current air traffic control (ATC) clearance to the extent necessary to comply with an TAWS warning.
7. The terrain display is intended to serve as situational awareness tool only.and may not provide the accuracy and/or fidelity on which to solely base terrain avoidance maneuvering.
8. The TAWS database, displays and alerting algorithms currently do not account for man-made obstructions.

(Continued)

9. The terrain display must be inhibited by TERR INHIBIT pushbutton on pedestal and get a status CAS if within 15 nm of landing at an airport for which any of the following apply:
   a. The airport has no approved instrument approach procedure
   b. The longest runway is less than 3500 ft long
   c. The airport has incomplete runway data
   d. The airport /approach has the potential to produce a false terrain alert even though the FMS meets normal navigation accuracy requirements

The system aural alerts may be silenced only during malfunction and when it is clear that no ground collision danger is present, by pulling IPC 3 cb.

SECTION II
EMERGENCY PROCEDURES

No change.

SECTION III
ABNORMAL PROCEDURES

No change.

SECTION IV
NORMAL PROCEDURES

SYSTEM ACTIVATION

The TAWS is active when right distribution electrical bus is on, the TAWS Aural Inhibits pushbuttons are not selected on and the following systems are operating:

- Aural GS receiver
- TAWS
- Radar Altimeter
- Air data computer
- GS receiver
- NAV receivers
- Flight Management Computer / GPS
- Gear/flap system
- AHRS or IRS

SELF-TEST

Perform a system test on the ground prior to the first flight of the day. Select TAWS TEST on the SMC – TEST page.

When the TAWS Pilot Initiated Test is activated, the following occur:

- HSI will automatically switch to a 120° compass arc HSI map format.
- Selected range for HSI map will automatically be set to the 5 nm half range ring.
- Terrain overlay will be automatically selected on the HSI map.
- WX, and Traffic overlays will be automatically de-selected on the HSI map.
- TAWS will annunciate aural and visual caution, warning, and INOP cues.

(Continued)

- Map format switches to tactical
- Map reference point switches to aircraft center
- Map orientation switches to heading
- Selected range for map will be automatically be set to the 5nm half range ring
- Terrain overlay will be automatically selected on the map
- All overlays will be automatically de-selected on the map
- TAWS will annunciate aural and visual caution, warning, and INOP cues
- Manual selection of overlay, range, map orientation, and map format will be inhibited while terrain test is in progress.
- Terrain overlay data is removed on any displayed map or HSI where TAWS is selected
- A TAWS Test Pattern is displayed on the Map display
- Flashing TAWS TEST is annunciated on the map display
- Ground PROX Fail and Windshear Fail advisory messages are displayed for 2 seconds
- TERRAIN NOT AVAILABLE advisory message is displayed
- GND PROX flashing yellow annunciation displayed on PFD
- “GLIDESLOPE” aural sounds
- GND PROX yellow annunciation extinguished on PFD
- GLIDESLOPE CANCEL PBA or soft switch control illuminated
- GLIDESLOPE CANCEL PBA or soft switch control extinguished
- TERRAIN NOT AVAILABLE advisory message removed
- Terrain Fail advisory message is displayed
- PULL UP flashing red annunciation is displayed on PFD
- “PULL UP” aural sounds
- PULL UP red annunciation extinguished on PFD
- WINDSHEAR flashing red annunciation is displayed on PFD
- “WINDSHEAR” aural sounds

(Continued)

- WINDSHEAR red annunciation extinguishes on PFD
- WINDSHEAR flashing Yellow annunciation displayed on PFD
- WINDSHEAR yellow annunciation extinguished on PFD
- Terrain Fail advisory message removed
- PULL UP flashing red annunciation is displayed on PFD
- “TERRAIN, TERRAIN, PULL UP” aural sounds
- PULL UP red annunciation extinguished on PFD
- GND PROX flashing yellow annunciation is displayed on PFD
- GND PROX yellow annunciation extinguishes on PFD
- Configured sink rate aural sounds
- Configured mode 1 pull up aural sounds
- Configured terrain aural sounds
- Configured mode 2 pull up aural sounds
- Configured don’t sink aural sounds
- “Too Low Terrain” aural sounds
- “Too Low Gear” aural sounds
- “Too Low Flaps” aural sounds
- “Too Low Terrain” aural sounds
- Configured glideslope (soft) aural sounds
- Configured glideslope (normal) aural sounds
- Configured bank angle aural sounds if enabled
- Configured approaching minimums aural sounds if enabled
- Configured minimums aural sounds if enabled
- 500 ft aural sounds if hard callout enabled (mutually exclusive with smart 500 ft callout)
- Selected altitude callouts aural (s) sounds (those that are selected)
- 500 ft Aural sounds if smart callout enabled (mutually exclusive with hard 500 ft callout)
- Configured windshear warning aural sounds if enabled
- Configured windshear caution aural sounds if enabled (this will not be sounds if windshear caution is enabled without voice)
- Configured terrain clearance floor aural sounds
- Configured terrain caution aural sounds

(Continued)

- Configured terrain warning aural sounds
- Configured obstacle caution aural sounds
- Configured obstacle warning aural sounds
- Ground PROX Fail and Windshear Fail advisory messages removed

The test fails if:

a. Glideslope is inoperative, “Glideslope Inop” aural sounds instead of “Glideslope aural” in short self test
b. GPWS is inoperative, “GPWS Inop” aural sounds instead of “Pull Up” aural in short self test
c. If windshear is inoperative, “Windshear Inop” aural sounds instead of “Windshear” aural in short self test
d. If bank angle is enabled and inoperative, “Bank Angle Inop” aural sounds in short self test.
e. If Mode 6 callouts are enabled and inoperative, “Callouts Inop” aural sounds in short self test

When the TAWS pilot initiated test is complete, the HSI window and 1/4 or 1/2 MFW maps automatically return to the original conditions that existed before the TAWS test.

USER SELECTABLE CALLOUTS

Various callouts are available for user selection. The callouts are:

- Radio Altimeter
- One Thousand
- Five Hundred (Smart)
- Approaching Minimums
- Minimums
- 400 ft
- 300 ft
- 200 ft
- 100 ft
- 50 ft
- 40 ft
- 30 ft
- 20 ft
- 10 ft

RESPONSE TO WARNINGS AND ALERTS

When an TAWS caution occurs, adjust the airplane flight path until the caution ceases.

If an TAWS warning occurs, immediately initiate and continue a climb which provides maximum terrain clearance or similar approved climb terrain escape maneuver, until all alerts cease. Only climb maneuvers are recommended, unless operating in visual meteorological conditions (VMC), and/or the pilot determines, based on all available information, that turning in addition to climb escape maneuver is the safest course of action.

Supplement 1

TAWS ESCAPE PROCEDURE

1. Press TOGA button
2. Disconnect the autopilot and apply thrust levers to the mechanical forward limit and press the APR pushbutton.
3. Rotate at 3° to 4° per second to increase pitch attitude until PLI is displayed.
   Continue to pull until shaker is encountered (airplane symbol passes PLI).
   Maintain 0.85-0.90 N-AOA.
4. Do not retract flaps or landing gear until safe climb-out is assured
5. After recovery and reconfigure of the aircraft deselect APR pushbutton.

"TERRAIN, TERRAIN PULL UP", or, "OBSTACLE, OBSTACLE PULL UP" aural warning: In a TAWS warning event, immediately initiate and continue a climb which provides maximum terrain clearance. Only climb maneuvers are recommended, unless operating in a visual meteorological conditions (VMC), and/or the pilot determines, based on all available information, that turning in addition to climb escape maneuver is the safest course of action.

"CAUTION TERRAIN", "DON'T SINK", "TOO LOW TERRAIN", "SINK RATE" aural caution:
When a TAWS caution occurs, adjust the airplane flight path until the caution ceases.

CAUTION

THE TERRAIN DISPLAY IS INTENDED TO SERVE AS A SITUATIONAL TOOL ONLY AND MAY NOT PROVIDE THE ACCURACY AND/OR FIDELITY ON WHICH TO SOLELY BASE TERRAIN AVOIDANCE MANEUVERING DECISIONS.

CAAI APPROVED
8 Feb 2018

GROUND PROXIMITY WARNING

When an aural “Pull Up” message sounds, execute the TAWS escape procedure until warning stops.
When an aural message other then “Pull Up” sounds, initiate corrective action to remove the cause of the warning.

NOTE

When flying under daylight VFR, should a warning threshold be deliberately exceeded or encountered due to specific terrain or operating procedures at certain locations, the warning may be regarded as caution and the approach may be continued.

BELOW GLIDESLOPE WARNING

When an aural “Glideslope” callout sounds, initiate corrective action to fly the aircraft back to the proper approach glideslope.

NOTE

1. To permit maneuvering on final approach, the aural alert can be cancelled by pressing either G/S INHIB pushbutton once the aircraft descends below 1000 ft AGL. The cancel function is automatically reset above 1000 ft or below 30 ft.
2. This warning is automatically inhibited during localizer back-course operation.

Supplement 1

WINDSHEAR ESCAPE PROCEDURE

WINDSHEAR WARNING (RED):
At any time:
When the aural warning and WINDSHEAR, WINDSHEAR, WINDSHEAR red annunciation warning comes on the PFD, or an obvious wind shear condition is encountered, the following procedure should be followed:

1. Press TOGA button.
2. Disconnect the autopilot and apply thrust levers to the mechanical forward limit and press the APR pushbutton.
3. Rotate at 3° to 4° per second to increase pitch attitude until PLI is displayed.
   Continue to pull until shaker is encountered (airplane symbol passes PLI).
   Maintain 0.85-0.90 N-AOA
4. Do not retract flaps or landing gear until safe climb-out is assured
5. After recovery and reconfigure of the aircraft deselect APR pushbutton.

(Continued)

WINDSHEAR CAUTION (AMBER):

Takeoff:

When the amber WINDSHEAR annunciation comes on the PFD during takeoff, or the crew recognizes signs of increasing performance conditions, the following procedure should be followed:

1. The crew should be alert to the possibility of subsequent decreasing performance (i.e, significant airspeed loss and down draft conditions).
2. Press TOGA button
3. Disconnect the autopilot and apply thrust levers to the mechanical forward limit
4. Maintain target pitch attitude until safe climb out is assured

Final Approach:

When the amber WINDSHEAR annunciation illuminates on the PFD during final approach, or the crew recognizes signs of increasing performance conditions, the following procedure should be followed:

1. The crew should be alert to the possibility of subsequent decreasing performance (i.e., significant airspeed loss and down draft conditions)
2. Wind and gust allowance should be added to the approach speed, increasing thrust if necessary. Consider disengaging the autopilot / auto-throttle
3. Avoid sinking below the approach glide path or letting the thrust levers remain at flight idle for extended periods of time
4. Coupled with other weather factors, the alert should be considered in determining the advisability of performing a go-around

NOTE

Use natural buffet onset to establish upper limit of pitch attitude.

Supplement 1

SYSTEM DESCRIPTION

GENERAL

The TAWS is fed from left Distribution bus through IPC 3 cb.
The following annunciators/pushbuttons are located G/S INHIB on the left and right glareshield. VOICE OVRD, TERR INHIB, RALT OVRD, FLAPS/TAWS OVRD are located on cockpit pedestal.

The TAWS incorporates the functions of the basic ground proximity warning system (GPWS) with added features including the terrain clearance floor, terrain look-ahead alerting and terrain awareness display.

With the use of accurate GPS or FMS information, the TAWS is able to determine present position, track, and ground speed. With this information the TAWS will display and advise the air crew of any potential conflict with terrain. Terrain threats are recognized and annunciated when terrain violates specific computed envelope boundaries on the projected flight path of the aircraft.

A synthetic image of terrain forward of the aircraft can be displayed on the DU's by selecting Terrain LSK from SMC HSI configuration page, when radar is displayed.

The synthetic terrain image replaces radar image and TERRAIN annunciation is displayed.

The TAWS provides visual and aural warnings only of possible terrain danger (Modes 1 through 4) and for excessive deviation below an ILS glideslope (Mode 5). The system also provides aural alerts for descent below pre-defined altitudes (AGL) during final approach, including a minimum descent altitude awareness callout and an aural alert for excessive bank angle (Mode 6), as well as windshear warning and caution alerting (Mode 7).

TERRAIN PROXIMITY WARNING

Terrain Clearance Floor

The Terrain Clearance Floor (TCF) alert function adds an additional element of protection to the standard Ground Proximity Warning System by alerting the pilot of possible premature descent for non-precision approaches regardless of aircraft configuration. It creates a terrain clearance envelope around the airport, to provide protection against Controlled Flight Into Terrain (CFIT) situations beyond that of the basic GPWS. TCF alerts are based on current aircraft location, nearest runway center point position and radar altitude. TCF is active during takeoff, cruise and final approach.

This alert mode complements the existing Mode 4 protection by providing an alert based on insufficient terrain clearance even when in the landing configuration. Alerts for TCF illuminate TERR INHIB cockpit lights and produce the aural message “Too Low Terrain”. This audio message will repeat once when initial envelope penetration occurs, and one time thereafter for each 20% degradation in radar altitude. The TERR INHIB cockpit lights will remain on until the alert envelope is exited.

Based on aircraft position, flight path angle, track and speed, look ahead algorithms are able to project a “ribbon” ahead of the aircraft. This ribbon originates below the aircraft as an added margin for safety, and uses the terrain clearance floor altitude as a baseline for looking into the database.

When conditions are such as to generate a terrain caution alert or terrain warning, a specific audio alert and light output are triggered and the background image is enhanced to highlight the terrain threats. At the start of the Terrain Caution alert (typically 30 seconds prior to potential terrain conflict), the terrain awareness function triggers the GND PROX annunciator and the caution audio message “Caution Terrain, Caution Terrain”. This is repeated every seven seconds as long as the aircraft is still in the caution envelope.

(Continued)

When conditions have been met to generate a terrain warning (typically 60 seconds prior to potential terrain conflict), the terrain awareness function triggers GND PROX annunciator and the warning audio phrase “Terrain, Terrain, Pull Up”. The phrase “Pull Up” is then The Terrain Awareness Display (TAD), if available, displays an image of surrounding terrain in varying density dot patterns of green, yellow and red. The display is generated from the aircraft altitude compared to terrain data in the TAWS computer. With terrain data available, these dot patterns represent specific terrain separation with respect to the aircraft. Areas with no terrain data available are painted with the low-density magenta. Terrain more than 2000 ft below the aircraft is not displayed.

repeated continuously while the aircraft is within the warning envelope.

TERRAIN AWARENESS DISPLAY

NOTE

1. Terrain is not shown if more than 2000 ft below the aircraft altitude, and/or:
2. Terrain is not shown if the terrain elevation is within 400 ft of the runway elevation nearest the aircraft.

When a “Caution Terrain” alert is generated (typically 60 seconds prior to potential terrain conflict), areas within ±90° of the aircraft track, where terrain penetrates the terrain caution envelope, are painted with the caution color solid yellow.

When a “Terrain, Terrain Pull Up” warning is generated (typically 30 seconds prior to potential terrain conflict), areas within ±90° from the aircraft track where terrain penetrates the terrain warning envelope, are painted with the warning color solid red.
This visual assessment of the terrain situation provides timely alerting and situational awareness for the air crew.

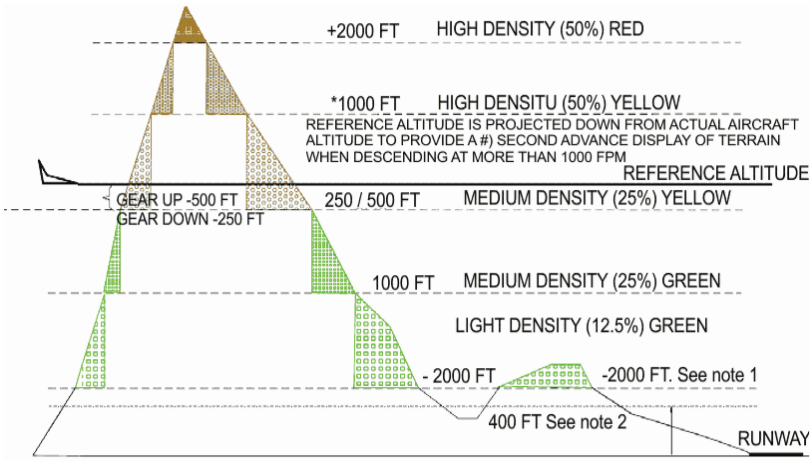


Figure 6-1-1. Terrain Background Display

NOTE

1. Terrain is not shown if more than 2000 ft below reference altitude.
2. Terrain is not shown if within 400 ft of runway elevation nearest the aircraft.

OBSTACLE ALERTING

Obstacle location information, which is integrated into the TAWS terrain database, covers the majority of the world.

The obstacle caution and warning alerts are processed identical to terrain; obstacles are presented on the cockpit displays as terrain, employing the same display coloring scheme. The start of the obstacle caution alert (typically 60 seconds prior to potential obstacle conflict) triggers the GPWS lights and the caution callout “Caution Obstacle, Caution Obstacle”. This is repeated every seven seconds as long as the aircraft is still in the caution envelope.

When conditions have been met to generate an Obstacle Warning Alert (typically 30 seconds prior to potential obstacle conflict), the warning audio phrase “Obstacle, Obstacle, Pull Up”. The phrase “Pull Up” is repeated continuously while the aircraft is within the warning envelope.

ALERTS AND WARNINGS

In flight, the TAWS provide warnings and alerts under the following conditions:

Mode 1 - Excessive Descent Rate

Mode 1 provides warnings for excessive descent rates with respect to altitude AGL. This mode has an inner and outer warning boundary. Penetration of the outer warning boundary activates the PULL UP lights and message “Sink Rate”. Further penetration to the inner boundary leaves the PULL UP lights on, but changes the message to “Pull Up”.

Mode 2 - Excessive Closure to Terrain

Mode 2 provides alerts and warnings to help protect the aircraft from impacting the ground when rapidly rising terrain with respect to the aircraft is detected. Mode 2 is based on radar altitude and on how rapidly radar altitude is decreasing (closure rate). Mode 2 exists in two forms, 2A and 2B.

Mode 2A

Mode 2A is active during climbout, cruise and initial approach (flaps not in landing configuration and aircraft not on glideslope centerline). If the aircraft penetrates the Mode 2A alerting envelope, the message “Terrain, Terrain” is generated and the cockpit GPWS annunciators come on. If the aircraft continues to penetrate the envelope, the warning message “Pull Up” is repeated continuously until the warning envelope is exited.

Upon exiting the warning envelope, if terrain clearance continues to decrease, the message “Terrain” will be given until the terrain clearance stops decreasing. In addition, the visual alert will remain on until the aircraft has gained 300 ft of barometric altitude, 45 seconds has elapsed or the flap override switch is activated.

Supplement 1

Mode 2B

Mode 2B is selected with flaps in landing configuration or when making an ILS approach with Glideslope deviation more then ± 2 dots. Warnings for Mode 2B activate the PULL UP lights and the continuous aural message “Terrain” until the terrain closure rate falls below warning levels.

Mode 3 - Altitude Loss After Takeoff or Go Around

Mode 3 provides warnings for significant altitude loss after takeoff, or low altitude go-around (less than 245 ft AGL) with gear or flaps not in landing configuration. Mode 3 is active during first, second and third segment climb-out. Mode 3 warnings activate the PULL UP lights and aural message “Don’t Sink”. The aural message is only repeated twice unless altitude loss continues to accumulate.

Mode 4 - Unsafe Terrain Clearance

Mode 4 provides alerts and warnings for insufficient terrain clearance with respect to phase of flight and speed. Mode 4 exists in three forms, 4A, 4B and 4C:

Mode 4A is active during cruise and approach with gear not in landing configuration. Warnings for mode 4A activate the PULL UP lights and the aural message “Too Low Gear”, or if airspeed is greater than 190 KCAS, “Too Low Terrain”. These messages will only be repeated twice unless terrain clearance continues to decrease.

Mode 4B is also active during cruise and approach, but with gear in landing configuration. Warnings for Mode 4B activate the PULL UP lights and the message “Too Low Flaps”, or if airspeed is greater than 159 KCAS, “Too Low Terrain”. These messages will only be repeated twice unless terrain clearance continues to decrease.

(Continued)

Mode 4C is active after takeoff or low altitude go-around (less than 245 ft AGL) with gear or flaps not in landing configuration. Mode 4C is active during first, second and third segment climb-out. Warnings for Mode 4C activate the PULL UP lights and the message “Too Low Terrain”. These messages will only be repeated twice unless terrain clearance continues to decrease.

Mode 5 - Excessive Glideslope Deviation

For normal descent rates above 500 FPM, Mode 5 Glideslope alerts are provided when the aircraft is below 1000 ft AGL with gear down and the deviation exceeds 1.3 dots below the ILS Glideslope.
For descent rates between 500 FPM and 0 FPM (level flight or descent rates), Mode 5 glideslope alerts are linearly reduced from 1000 ft to 500 ft AGL.
For level flights or climb rates, Mode 5 glideslope alerts are enabled at 500 ft AGL or less.
More deviation is required to give an alert below 150 ft AGL. The alert becomes more frequent and louder (hard alert) if the condition worsens.
Alerts for Mode 5 activate the “Glideslope” message.

Mode 6 - Advisory Callouts

The Mode 6 function provides callouts for descent through predefined altitudes AGL, including descent through DH. The Mode 6 callouts function is active during the final approach phase of flight. Each callout is only annunciated once per approach.
Radar altitude callouts currently installed include the following, in the order listed

“One Thousand” - at 1000 ft AGL
“Five Hundred” - at 500 ft AGL

Supplement 1

Minimums Callout

A “Minimums-minimums” or “Minimums” callout occurs once on descent based upon pilot radar altimeter indicator decision height (DH) bug setting. This callout is available only for DH bug settings between 1000 ft AGL and 10 ft AGL.

The “Minimums-minimums” or “Minimums” callout has a higher priority than an altitude callout. For example, if the DH bug was set at 200 ft and there is also a “Two Hundred” callout, only the “Minimums” callout would be annunciated.

A “Plus 100" at DH + 100 or “Approaching Minimums” callout may occur at decision height plus one hundred ft if this option has been enabled.

Smart 500 ft Callout

The Smart callout is designed to assist pilots conducting non-precision approaches, while remaining silent during a precision approach where vertical guidance is provided. This feature is provided in addition to the standard “Five Hundred” callout available in many of the altitude callout menus.

The Smart callout will annunciate “Five Hundred” at 500 ft AGL if the pilot instruments are not selected to an in-use ILS signal source. The “Five Hundred” callout will also occur if on an ILS glideslope with a deviation greater than 2 dots from either the glideslope or localizer centerline.

Tones

A two second tone is provided at 100 ft, a 1 second tone at 35 ft and a 1/2 second tone at 20 ft if this option has been enabled.

Bank Angle Callout

The callout “Bank Angle, Bank Angle” advises of a roll attitude that is excessive for the flight conditions. Below 150 t AGL, the callout angle is reduced progressively with altitude from ±40° at 150 ft to ± 10° at 30 ft. Below 30 ft the callout occurs at ±10° and is inhibited below 5 ft. Above 150 ft AGL, a bank angle alert will occur at ±40°. Above 150 ft AGL, the bank angle envelope is expanded linearly from ±40° at 150 ft AGL to ± 55° at 2450 ft.
The callout occurs again if roll attitude increases by 20%. When roll attitude increases to 40% above the initial callout angle, the callout repeats continuously.

Bank Angle

Use of Mode 6 can also enable bank angle warnings messages. The bank angle warning mode is provided to give the pilot a warning indication for inadvertent over banking during all phases of flight.

An aural warning consisting of “Bank Angle Bank Angle” is given once, when bank angle exceeds 55° above 2000 ft or 10° at 30 ft or below. Follow on aural messages are only allowed when the aircraft roll angle increases an additional 20% from the previous alert. After the roll angle increases 20% a third time, the “Bank Angle Bank Angle” message becomes continuous with a 3 second pause between sets of messages.

Supplement 1

Mode 7 - Excessive Windshear Detection

In flight the system provides windshear warnings and alerts under the following conditions:

Mode 7 windshear warnings and alerts are provided between 10 and 1500 ft AGL during takeoff and final approach phases of flight, when the level of windshear exceeds predetermined threshold values. The actual windshear value which is measured represents the vector sum of inertial vertical speed air mass accelerations along the flight path and perpendicular to the flight path. These shears result from vertical winds and rapidly changing horizontal winds.

Windshear warnings are given for decreasing headwind (or increasing tail wind) and severe vertical downdrafts. Windshear warnings activate the red/yellow WINDSHEAR annunciator on the PFD and the message “Windshear, Windshear, Windshear”. The message will not repeat unless another event occurs, but the warning lights stay on for as long as the decreasing headwind/downdraft condition persists. The warning threshold is normally set at 0.115g's, which represents approximately 2.2 kt per second horizontal wind change or 15 kt downdraft. A bias of 0.01 g is added during takeoff or go-around for better climb performance. The threshold is modulated as a function of flight path angle. The threshold is sensitized for unusual air temperature fluctuations typically associated with the leading edge of microburst windshear.

Windshear alerts are given for increasing headwind (or decreasing tailwind) and vertical updrafts typically associated with the leading edge of microburst windshear. Windshear alerts activate the WINDSHEAR annunciators on the DU only, no aural message is given. The alert light stays on for as long as the increasing headwind/ updraft condition persists. The warning threshold is nominally set at 0.115g's, which represents approximately 2.2 kt per second horizontal wind change or 15 kt updraft. A bias of 0.01 g is added during takeoff or go-around for better climb performance.

Taws Messages

HSI/MFD Map:

Terrain Fail advisory message - The message comes on in the overlay fault field on the right side of the HIS when the Terrain Awareness Warning System (TAWS) overlay display data is missing or invalid. The message flashes for 5 seconds and then changes to a steady-on state.

The terrain overlay is not available for selection when this message is being shown.

Supplement 1

SECTION V
PERFORMANCE WET AND DRY

No change.

SECTION VI
WEIGHT AND BALANCE

No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC

No change.

SECTION VII
UNITS CONVERSION

No change.

SECTION VIII
OPERATIONAL PLANNING MANUAL

No change.

SECTION IX
APPENDICES

No change.

SECTION XI
OPERATIONAL OPERATION SUPPLEMENTS

No change.

SECTION XII
SUPPLEMENTAL DATA

No change.

CAAI APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 2
for
GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

TCAS II TSS-4100 SYSTEM

This Supplement must be attached to CAAI approved Airplane Flight Manual dated 15 Apr 2015 when Collins TCAS (part of TSS-4100) is installed.
Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

CAAI APPROVED: T. Bar-Am

Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Date: 15 Apr 2015 Manual No._____

Supplement 2

TCAS II TSS-4100 SYSTEM

GENERAL

This supplement covers the operation of Collins TCAS system (part of TSS-4100 system).
The TCAS function provides the following capabilities:

- Transmit on 1030 MHz
- Receive on 1090 MHz
- DO-185B [73] Change 7.1 compliant and Reduced Vertical Separation Minimum (RVSM) compatible, which makes it ACAS (JAA/Eurocontrol) compatible
- Active surveillance of Air Traffic Control Radar Beacon System
- (ATCRBS) and Mode S Intruders
- Collision Avoidance tracking
- Threat detection and resolution
- Communication and coordination

The system complies with TCAS II version 7.1 TSO C119c.
The general information in the introduction section is applicable with the addition of the following:

SECTION I
LIMITATIONS

1. Pilots are authorized to deviate from their current ATC clearance to the extent necessary to comply with a TCAS II resolution advisory (RA).
2. If flight crew is advised by ATC to disable transponder altitude reporting, TCAS must be switched off using the ATC/TCAS Control Page.

ENGINE FAILURE

During an engine failure and when time permits, switch to TA ONLY mode.

SECTION II
EMERGENCY PROCEDURES

No change.

SECTION III
ABNORMAL PROCEDURES

No change.

SELF-TEST

1. The TCAS II system should be tested prior to flight. Select TCAS TEST on the SMC – TEST page.

NOTE

When the TCAS Test is activated and a MFW Map is displayed, the following shall occur:

- Map format switches to tactical
- Map reference point switches to aircraft center
- Map orientation switches to heading
- Selected range for map will be automatically be set to the 5nm half range ring
- TCAS overlay will be automatically selected on the map
- All overlays except for traffic and terrain will be removed from the MFW NAV map

2. After completion of self-test, “Tcas System Test Ok” audio message sounds
3. If “Tcas System Test Fail” sounds or a ATC 1-2/TCAS Fail advisory message comes on, log for maintenance and check MMEL for dispatch restrictions.

NOTE

TCAS self-test cannot be performed in flight.

TCAS II SYSTEM OPERATION

1. Compliance with a TCAS II resolution advisory (RA) is necessary, unless the pilot considers it unsafe to do so, or unless the pilot has better information about the cause of the RA and can maintain safe separation from a nearby aircraft, obvious TCAS II system failure, etc.

CAUTION

1. ONCE AN RA HAS BEEN ISSUED, SAFE SEPARATION COULD BE COMPROMISED IF CURRENT VERTICAL SPEED IS CHANGED, EXCEPT AS NECESSARY TO COMPLY WITH THE RA. THIS IS BECAUSE TCAS II TO TCAS II COORDINATION MAY BE IN PROGRESS WITH THE INTRUDER AIRCRAFT, AND ANY CHANGE IN VERTICAL SPEED THAT DOES NOT COMPLY WITH THE RA MAY NEGATE THE EFFECTIVENESS OF THE OTHER AIRCRAFT'S COMPLIANCE WITH THE RA.
2. THE CONSEQUENCES OF NOT FOLLOWING AN RA MAY RESULT IN ADDITIONAL RA'S IN WHICH AURAL ALERT AND VISUAL ANNUNCIATIONS MAY NOT AGREE WITH EACH OTHER.

2. Do not initiate evasive maneuvers using information from the traffic display only or on a traffic advisory (TA) without visually sighting the traffic. These displays and advisories are intended only for assistance in visually locating the traffic, and lack the flight path trends, necessary for use in evasive maneuvering. However, while climbing or descending, modest changes in vertical speed based on traffic display information are not considered evasive maneuvering

(Continued)

3. Following a TCAS II “Clear Of Conflict” advisory, expeditiously return to the applicable ATC clearance unless otherwise directed by ATC
4. Radar altimeter – ON

TCAS II SYSTEM OPERATING CHARACTERISTICS

TCAS Resolution Advisories (RA) are inhibited below some radio altitudes. The table below gives the TCAS inhibits created by the radio altimeter and the associated RA status.

RADIO ALTITUDE STATUS	RESOLUTION ADVISORY (RA)
Below 1450 FT AGL	“INcrease Descent” RA inhibited
Below 1000 FT AGL descending; Below 1200 FT AGL climbing	“Descend” RA inhibited
Below 900 FT AGL descending; Below 1100 FT AGL climbing	All RA’s inhibited (TA only) and TA aural message inhibited
Below 400 FT AGL descending Below 600 FT AGL climbing	TA aural message inhibited

The aircraft is capable of completing a “Climb” and “INcrease Climb” RA maneuver at most altitudes and weights allowed in the Limitations section of the AFM and at all cruise altitudes up to the cruise ceilings presented in the Operational Planning Manual.

RECOMMENDED INFLIGHT PROCEDURES

1. Flight director pitch commands may be followed only if they result in a vertical speed which satisfies the RA command
2. It is possible in some cases to have insufficient aircraft performance to follow the TCAS RA command without flying into stall warning or buffet. Conditions where this may occur include:
   a. Bank angle in excess of 15°
   b. Operation at airports above 15,000 ft MSL or temperatures outside ISA +20° C
   c. Speeds below 1.3 V_{S1} operating speeds
   d. Buffet margin less than 0.3 g
   e. Failure to configure for go-around following a climb RA in landing configuration
   f. Abnormal configurations which reduce performance. (e.g., gear not retractable)
   g. TCAS command reversal to a “Climb-climb Now”
   h. Structural icing which may affect aircraft performance

NOTE

1. TCAS will continue to provide RA commands during stall warning.
2. If high speed buffet is encountered when initially responding to an RA, relax pitch force as necessary to reduce buffet, but continue the maneuver.
3. TCAS mode will default automatically to TA only mode following an inflight engine shutdown.

(Continued)

If a maneuver is required:

1. Autopilot ..... DISCONNECT
2. Thrust ..... AS REQUIRED
3. Pitch ..... AS REQUIRED TO COMPLY WITH RA

If TCAS "Climb" or "Increase Climb" RA occurs when configured for landing:

1. Autopilot ..... DISCONNECT
2. Engines ..... TAKEOFF THRUST
3. Flaps lever- 20°
4. Pitch ..... AS REQUIRED TO COMPLY WITH RA
5. Gear ..... UP WITH POSITIVE RATE OF CLIMB

NOTE

If stall or TAWS warning comes on during an RA maneuver immediately abandon the RA maneuver and execute the applicable recovery procedure.

Immediate, smooth response to an RA is required to obtain maximum separation. While TCAS II RA algorithms are based upon the pilot initiating the initial maneuver within 5 seconds of the RA, and within 2½ seconds for additional corrective RA's (increase or reversal) that may be issued, any delay in responding to RA's will reduce the separation provided.

If ATC requires that transponder altitude reporting be disabled, switching to ALT OFF on ATC/TCAS Control Page automatically causes TCAS to be in standby mode (TCAS OFF on MAP/HSI).

TCAS II SYSTEM RESOLUTION ADVISORY (RA) AND TRAFFIC ADVISORIES (TA) ANNUNCIATIONS

Resolution advisories (RA) are shown on the PFD as RED and GREEN sectors. The pilot should establish rate of climb or descent as indicated by the green sector on the PFD display, according to system annunciation per the table below.
RA's and TA's audio advisories are annunciated as follows:

TCAS AURAL ADVISORY ANNUNCIATIONS
(Sheet 1 of 4)

Advisory	Version 7.1 Annunciation	Proper Pilot Response
Clear	Clear Of Conflict	Resume normal flight, apparent conflict of airspace has been resolved
Traffic	Traffic Traffic	Gain visual contact of traffic. Check TCAS display for traffic bearing and range if necessary. Assess the threat and prepare to execute the evasive maneuver TCAS issues

TCAS AURAL ADVISORY ANNUNCIATIONS
(Sheet 2 of 4)

Preventive RA	Monitor Vertical Speed	Be alert for approaching traffic. Ensure that the aircraft pitch attitude or vertical speed does not enter the red zone on the attitude display or vertical speed scale.
	Maintain Vertical Speed, Maintain	Maintain present pitch or vertical speed and direction. Ensure that the aircraft pitch or vertical speed does not enter the red zone on the attitude display or vertical speed scale.
	Maintain Vertical Speed Crossing Maintain	A flight path crossing is predicted, but being monitored by TCAS. Maintain present pitch or vertical speed and direction. Ensure that the aircraft pitch or vertical speed does not enter the red zone on the attitude display or vertical speed scale.

TCAS AURAL ADVISORY ANNUNCIATIONS
(Sheet 3 of 4)

Corrective RA	Level Off	Weakening of the RA. Reduce vertical speed to 0 fpm, as indicated on attitude display or vertical speed scale.
	Climb, Climb	Change vertical speed to 1500 fpm climbing, as indicated on attitude display or vertical speed scale.
	Climb, Crossing Climb Climb, Crossing Climb	Same as CLIMB, except that it further indicates that flight paths will cross at some altitude
	Descend, Descend	Change vertical speed to 1500 fpm descending, as indicated on attitude display or vertical speed scale.
	Descend, Crossing Descend	Same as DESCEND, except that it further indicates that flight paths will cross at some altitude

TCAS AURAL ADVISORY ANNUNCIATIONS
(Sheet 4 of 4)

Corrective RA	Increase Climb, Increase Climb	This follows Climb advisory. The climb vertical speed should be increased, typically to 2500 fpm, as shown on attitude display or vertical speed scale.
	Increase Descent, Increase Descent	This follows Descend advisory. The descent vertical speed should be increased, typically to 2500 fpm, as shown on attitude display or vertical speed scale.
	Climb, Climb Now Climb, Climb Now	This follows a Descend advisory. It indicates that a reversal of vertical speed from descent to climb is needed to provide adequate separation
	Descend, Descend Now Descend, Descend Now	This follows a Climb advisory. It indicates that a reversal of vertical speed from climb to descent is needed to provide adequate separation

TCAS II SYSTEM DESCRIPTION

GENERAL

The TCAS II System is an on-board traffic alert and collision avoidance system which monitors a radius of at least 14 nautical miles around the aircraft and, by interrogating any “intruding” aircraft's transponder, determines if a potential airspace conflict exists and sends audio alerts and displays climb/descent instructions on the HSI Map and MFD Map. Traffic data may be displayed on the MFD (Figure 6-2-1). This is done by computing the range, altitude, bearing, and closure rate of other transponder-equipped aircraft, with respect to the TCAS-equipped aircraft.

The TCAS system is fed from left Distribution bus through ATC 1/TCAS cb. It is controlled from the DU Tune page and CDUs.

The ATC/mode S transponder is a solid-state, airborne, air traffic control (ATC) transponder that responds to ATCRBS (Air Traffic Control Radar Beacon System) mode A, mode C and mode Select (MODE S) interrogations. The mode S function is capable of being discretely addressed (so that interrogation can be directed to a specific aircraft as required by TCAS II) and for receiving and sending data link messages. It is also capable of receiving and transmitting from two antennas (for use in diversity operations for improving air-to-air surveillance and communications).

TCAS requires that mode S transponder and air data computer are functional and operating.

(Continued)

The TCAS II System provides two levels of threat advisories:

If the traffic gets within approximately 48 seconds of projected Closest Point of Approach (CPA), it is then considered an intruder, and an aural and visual traffic advisory (TA) is issued. This level calls attention to a developing collision threat using the TCAS II traffic advisory indicators on the HSI Map and MFD Map, and TCAS synoptic if displayed) and voice message, “Traffic Traffic”. It permits mental and physical preparation for a possible maneuver to follow, and emphasizes the importance for the pilot to respond promptly by scanning for the intruder.

If the intruder gets within approximately 20 seconds of CPA, it is considered a threat and an aural and visual resolution advisory (RA) is issued. This level provides a recommended vertical maneuver using the TCAS II indications and messages to provide adequate vertical separation from the threat aircraft or prevents initiation of a maneuver that would place the TCAS II aircraft in jeopardy. The pilot should respond immediately to an RA even if the intruder is not in visual contact.

The TCAS II System resolves multiple aircraft encounters. The TCAS II is considered a backup system to the “See-and-avoid” concept and the ATC radar environment.

Supplement 2

ALTITUDE THRESHOLDS FOR RVSM

Vertical thresholds for traffic advisories and resolution advisories are as follows:

Description	Version 7.1	
Own Altitude	20,000 ft to 42,000 ft	above 42,000 ft
TA	850 ft	1200 ft
Preventative RA	700 ft	800 ft
Corrective RA	600 ft	700 ft

STANDARD TCAS II DEFINITIONS

1. TCAS II - Traffic Alert and Collision Avoidance System that utilizes interrogation of, and replies from transponders. It provides traffic advisories (TA) and resolution advisories (RA) in the vertical plane.
2. Other Traffic - any other traffic within the range of the display and within 2700 feet vertically.
3. Proximate Traffic - any traffic not generating an RA or TA but which is within six nautical miles (nm) slant range and within 1200 ft vertically.
4. Traffic Advisory (TA) - information given to the pilot pertaining to the position of intruding aircraft in the immediate vicinity. The information contains no suggested maneuver.
5. Threat - traffic that has satisfied the threat detection logic and requires a Resolution Advisory (RA).
6. Resolution Advisory (RA) - a display indication given to the pilot recommending a maneuver to increase vertical separation relative to an intruding (threat) aircraft.
   a. Corrective Advisory - a Resolution Advisory that instructs the pilot to deviate from current vertical rate.
   b. Preventive Advisory - a Resolution Advisory that instructs the pilot to avoid certain deviations from current vertical rate.

TCAS II CONTROLS AND INDICATORS

The TCAS II is controlled from the DU Tune page and CDUs. The ATC/TCAS Control page has the following modes:

Source display - indicates TCAS information being displayed.

Mode display - indicates the selected TCAS mode (AUTO, STBY, TA/RA, TA Only, ALT On, ALT Off)

In AUTO (normal) mode both traffic and resolution advisories may be displayed on HSI Map and MFD Map. AUTO mode changes TCAS mode to TA ONLY on takeoff, until 1200 ft, then TA/RA, and to ALT ON after landing.

In STBY mode the TCAS does not transmit.

In TA ONLY, mode only traffic advisories are displayed on the DU.

In ALT ON – Transponder only - Mode C.

In ALT OFF – Transponder only - Mode A.

ATC SEL is a multi state toggle to select the active transponder from ATC1 and ATC2.

ALT tag - ALT Tag is a multi state toggle to select the format of the altitude tag for traffic

displayed on TCAS formats and overlays. The operator can select REL (Relative) or ABS (Absolute).

ALT - ALT is a numeric display of the altitude source and reporting altitude.

TEST - press to initiate TCAS self test.

TRAFFIC display - indicates that the display of other traffic on the DU is enabled (ON) or disabled (OFF).

Other traffic is displayed as open diamond; RA, TA and proximity traffic are unaffected.

ABOVE line key - press to extend the upper limit of the protection window to +9900 ft. The lower limit stays at -2700 ft.

BELOW line key - press to extend the lower limit of the protection window to -9900 ft. The upper limit stays at +2700 ft.

(Continued)

AUTO - Sets the protection window limit to the normal ±2700 ft.
If AUTO is selected:
ABOVE will display when the aircraft climb rate is 300 fpm or greater for 5 seconds.
BELOW will display when the aircraft descent rate is 300 fpm or greater for 5 seconds.

Figure 10-2-1. DU TUNE PAGE - ATC1/TCAS Control Page

TCAS 1/4 WINDOW

The TCAS Only display is a heading-up, 360° representation that graphically depicts the relative bearing, range, altitude, and vertical direction of nearby transponder-equipped aircraft that reply to TCAS interrogations. The TCAS Only format is available for display on a Quarter MFW format.

TCAS information may be displayed on the HSI Map, MFW Map, and TCAS Only MFW formats. This section will describe the TCAS display on the TCAS Only MFW format. The TCAS Test, TCAS II traffic symbols, TCAS data tag, TCAS data block, and out of range traffic are displayed identically on the TCAS only MFW format to the HSI format. The TRAFFIC and NO ATT RA annunciations are not displayed on the TCAS Only MFW format.

Figure 10-2-2. TCAS 1/4 window Synoptic Display

TCAS II RESOLUTION ADVISORY DISPLAY

The color-coded visual advisory areas adjacent to the Vertical Speed Indicator's scale instructs the pilot to what vertical speed region is TO BE AVOIDED (red). If a change in vertical speed is necessary, the specific region of vertical speed is displayed in green. For example, if the corrective advisory message “Climb Climb, Climb” is annunciated, the prohibited red vertical speed region may extend from -6000 fpm to +1500 fpm. The green “fly-to” area appears from +1500 fpm to +2000 fpm.

A preventive resolution advisory is issued when the TCAS aircraft's present vertical speed is already outside the prohibited region. Those vertical speeds deemed unsafe are displayed in red. Preventive resolution advisory visual indications range from restricting rate of climb or descent, to prohibiting changes in vertical speed altogether. The message “Monitor Vertical Speed” accompanies the full range of preventive resolution advisories.

The TCAS pop-up feature allows graphical TCAS data to be automatically shown on the HSI when a TCAS TA or RA is detected. When the TCAS pop-up occurs, the 120° HSI format comes into view with a 5 nm half range and the Traffic overlay active, and WX overlay deselected. After a TCAS pop-up initially occurs, map controls for range selection and data selection are disabled. When a TCAS TA or RA is no longer active, the HSI automatically returns to the format, display range, and overlay states that existed before the pop-up occurred (this is referred to as pop-down).

TCAS MESSAGES

HSI/MFD map:

NO ATT RA (yellow) - A yellow NO ATT RA annunciation message is shown in the TCAS data block on the left side of the HSI if the TCAS vertical resolution advisory word cannot provide advisory information, or if pitch data is not being shown on the ADI.

Several TCAS system messages are displayed on the HSI Map and MFD Map.
Each of these messages is described below.

TCAS FAIL (Yellow) – A yellow TFC FAIL annunciation message is shown in the TCAS data block on the left side of the HSI if the TCAS system is failed. A TCAS that is turned off is considered failed. Failures related exclusively to the traffic display cause this message to be shown when the TCAS overlay is selected.

TRAFFIC - This message is displayed in red below the vertical speed scale on the PFD when the system detects RA traffic. This message is displayed in yellow below the vertical speed scale when the system detects TA traffic. If LANDING LIGHTS pushbutton is OFF, landing lights come on in PULSE mode at a rate of 45 times per minute.

TA ONLY - This message is displayed in white below the vertical speed scale on the PFD when the TCAS is operating in the TA ONLY mode. This message changes from white to yellow whenever TA intruders are detected.

TA/RA - This message is displayed in white. Normal system mode.

(Continued)

TCAS TEST - This message is displayed in white below the vertical speed scale on the PFD and in the center of the display on the MFD when the TCAS self-test is active. The self-test is selected via the RTU TCAS main display page.

TCAS OFF - This message is displayed in white below the vertical speed scale on the PFD when the TCAS system is in standby mode. Standby mode is selected via the CDU TCAS main display page. Standby mode is automatically selected when the ATC transponder mode is set to a mode other than ALT.

Supplement 2

SECTION V
PERFORMANCE WET AND DRY

No change.

SECTION VI
WEIGHT AND BALANCE

No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC

No change.

SECTION VII
UNITS CONVERSION

No change.

SECTION VIII
OPERATIONAL PLANNING MANUAL

No change.

SECTION IX
APPENDICES

No change.

SECTION XI
OPERATIONAL OPERATION SUPPLEMENTS

No change.

SECTION XII
SUPPLEMENTAL DATA

No change.

CAAI APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 3
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BRAKE KINETIC ENERGY (BKE)
AND BRAKE COOLING

This Supplement must be attached to CAAI approved Airplane Flight Manual dated 15 Apr 2015 whenever quick turnaround operations are required.
Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

CAAI APPROVED: T. Bar-Am

Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Date: 15 Apr 2015 Manual No._____

GULFSTREAM AEROSPACE LP

Supplement 3

BRAKE KINETIC ENERGY (BKE) AND BRAKE COOLING

GENERAL

The general information in the introduction section is applicable with the addition of the following:
To stop an aircraft in motion, the brakes along with other drag forces must be capable of dissipating the aircraft kinetic energy. The energy dissipated by the brakes accounts for most of this energy and generates heat, which is absorbed by the brakes and surrounding systems. High levels of heat may cause the fusible plugs in the wheels to release tire pressure to avoid system failure. Excessive heat can result in fire and damage.
This supplement provides the means to calculate brake cooling time required for safe operations.

SECTION I
LIMITATIONS

BRAKE KINETIC ENERGY (BKE) AND BRAKE COOLING

BKE LIMITS

The maximum BKE capacity of the G280 carbon brake system is certified for 50 million foot-pounds (MFP) and was demonstrated during rejected takeoff flight testing to be 54 million foot-pounds (MFP) – 1 MFP during taxi and 53MFP during RTO. The brakes must be inspected per equipment component maintenance manuals if a brake temperature exceeds 480°C as measured in the Brake Temperature Measuring System (BTMS) or when a blow out plug is triggered.

FUSE PLUG INTEGRITY ZONES

Each main wheel is equipped with fusible plugs, (subsequently referred to as fuseplugs). These fuseplugs are designed to melt to protect the tire from blowout in the event of excessive heat buildup during braking.
Three fuseplug integrity operating zones have been defined to indicate the likelihood of fuseplug release. These fuseplug integrity zones relate to the accumulated BKE levels absorbed during braking.
Appropriate actions in each zone are listed below:

NORMAL ZONE: Fuseplug release not likely; Brake temperature is below 450°C.
CAUTION ZONE: Fuseplug release is possible; Brake temperature is between 450°C and 480°C.
DANGER ZONE: Fuseplug release is probable; Brake temperature is above 480°C.

SECTION II
EMERGENCY PROCEDURES

No change.

SECTION III
ABNORMAL PROCEDURES

No change.

SECTION IV
NORMAL PROCEDURES

No change.

BKE DETERMINATION DURING LANDING OR RTO OPERATIONS

The energy that can be absorbed by the brakes during a stop is determined by the previous energy absorbed, airplane gross weight, speed at brake application, taxi operations and the cooling conditions (OAT, Wind).

There are three ways to determine the required brakes cooling time prior to next departure:

1. **FMS calculation based on BTMS Peak Temperature and Takeoff PERF**
   Using the FMS BTMS Cool Time Remained value requires installation of VDB - MOD G25-20052.
2. **Manual calculation based on Brakes Peak Temperature**
   Using the BTMS Peak Temperature to determine Landing BKE and chart to find next Takeoff BKE. Then calculate required cooling time.
3. **Manual calculation based on Brake Kinetic Energy Estimation**
   Use of the Takeoff and Landing Brake Kinetic Energy Calculation chart (Figure 10-3-1) to determine BKE absorbed and possible cool-down time requires the operator to note the gross aircraft weight, initial brake application speed, landing altitude and ambient temperature.
   The Brake Kinetic Energy (BKE) presented in the BKE/Cooling chart is based on the aircraft total kinetic energy with no credit for aerodynamic drag or reverse thrust, as these components are most often offset by unequal energy distribution throughout the four (4) brake assemblies.
   This option should be used in case BTMS is invalid.

BRAKE COOLING FOR QUICK TURN-AROUND AND MULTIPLE BRAKING OPERATIONS

When planning quick turn-around operations, pilots must take into account the brake energy that will accumulate and the limited benefit of a short cooling period. A typical scenario would be a deadhead flight to pick up passengers for a subsequent intercontinental trip. The landing at the pickup point is at maximum landing weight with the subsequent takeoff at or near maximum takeoff weight. The resulting brake takeoff temperature becomes critical if a rejected takeoff is required. For the above scenario, the pilots must read the Peak Brake Temperature after full stop or track the cumulative energy inputs into the brakes which include braking on landing, brake inputs during taxi-in and taxi-out operations, and brake requirements in the event of a rejected takeoff. A cool-down period is required between the landing and the subsequent takeoff. The required cool-down time can be determined from either the FMS calculation or by a manual calculation.

TAXI BKE

BTMS Cooling time function is assuming a constant 3 statue miles taxi distance with no downhill slope.
Taxi brake kinetic energy should be calculated only for the second method using Manual calculation based on Speed on brakes for Landing BKE.

TAXI BKE MANUAL CALCULATION

Energy levels absorbed by the brakes during taxi operations are typically low. But, during long taxi operations, the energy absorbed from such sources as engine idle thrust, stops, and turns can be a factor. To account for these considerations, an estimate of brake energy requirements of 0.45 MFP per statute mile of taxi per brake is used (use Taxi distance correction chart).
This 0.45 MFP BKE is based upon a 20 knot taxi speed and one 20 knot stop per statute mile. In addition, the presence of taxiway slope (or runway slope when used to taxi) can add significantly to the brake energy absorbed during taxi. That is, for each statute mile of taxi on a downhill slope, an additional BKE contribution of 0.5 MFP per brake should be assumed to accumulate in the brakes for each 1% of downhill slope.
Reverse idle thrust can be used on an unlimited basis to control taxi speed and to stop the airplane during taxi operations, and accountability for the then negligible taxi BKEs will not be required.

USE OF FMS BTMS FUNCTION

FMS CALCULATION BASED ON BRAKES PEAK TEMPERATURE:
The BTMS provides information to the flight crew on the amount of time required for the aircraft brakes to have the capacity to absorb a RTO (Rejected takeoff).
The systems inputs are brakes peak temperature and Takeoff plan as entered into the FMS (Runway, slope, wind, OAT, TOW).

BTMS function can be enabled and disabled by the pilot. (CDU-PERF-TAKEOFF REF 2/5)
The BTMS function used the brakes peak temperature UTC from the EICAS (displayed on the brakes synoptic) and tabular data from the VDB (Vspeed Database) for planned takeoff to determine the cool down time in minutes.

It should be emphasized the Peak Brake Temperature should be read only 5 minutes after aircraft has completed its after landing taxi and arrived to a full stop.
Cooling time will not be displayed until a peak temperature is detected. PEAK TEMP NOT AVAIL amber CDU message will be displayed until peak detected and calculation performed.

If a cooling period is required – the display cool time remaining value will count down to zero in realtime. COOL DOWN TIME REQD amber CDU message is displayed. Vspeeds cannot be sent to display as long as the cooling time is not over.

If initial calculated cooling time was zero, hence, no cooling period required, it will display 0 and Vspeed can be sent to displays.
Cooling time will be recalculated if peak temperature is updated with a higher value (i.e. relocation of aircraft on the ramp using more brakes applications).

MANUAL CALCULATION BASED ON BRAKES PEAK TEMPERATURE:

Cooling time can be manually calculated based on brake peak temperature as a representation of the cumulative BKEs from previous operations and the estimated BKE for the next operation, including taxi.

The pilot will use BTMS Peak Temperature and Ambient Temperature to find the Landing brake energy and to then calculate the next Takeoff BKE.

Steps for using BTMS Peak temperature for Landing BKE:

- Enter Figure 10-3-2 at 0°C ambient temperature and at measured BTMS Peak Temperature.
- Correct for Ambient Temperature.
- Intersect with Landing Energy curve and get the Landing BKE (Per Brake) value.

Calculating next Takeoff BKE:

- Enter Figure 10-3-1:
- Use Planned Takeoff Weight as GWT.
- Use V1+8 KCAS as Brakes ON Speed.
- Correct for Pressure Altitude.
- Correct for Ambient temperature.
- Correct for Wind Component.
- Correct for TAXI Distance.
- Correct for TAXI Slope
  +0.5 MFP per 1% Downhill slope, per statute mile.

On Figure 10-3-2 (cooling time chart) intersect Resultant Landing energy and Resultant RTO energy values to get the required cooling time.

EXAMPLE 1:

BTMS Peak Temprature =	325°C
Airport Temperature =	30°C
Resultant Landing BKE per brake =	**7 MFP**
Takeoff Gross Weight =	37,000 lb
V1 Decision Speed =	122 KCAS
Takeoff Airport Elevation =	4,000 FT
Takeoff wind component =	10 kt Headwind
Takeoff Taxi Distance =	3 mile
Takeoff Taxi slope =	1% downhill
Resultant BKE per brake for RTO =	**10.4 MFP**

Solution:
Required cooling time is 24 minutes

MANUAL CALCULATION BASED ON BRAKE KINETIC ENERGY ESTIMATION

USE OF BKE COOLING CHART

This method for estimation of the braking system capabilities consists of calculating the remaining brake capacity using known history of prior operation and projected capability. The following example solutions will illustrate this method.

Calculating Landing BKE:

- Enter Figure 10-3-1 Use Landing Weight as GWT.
- If known, Use Landing Brakes ON Speed, otherwise use Vref as Brake ON Speed.
- Correct for Pressure Altitude.
- Correct for Ambient temperature.
- Correct for Wind Component.
- Correct for TAXI Distance.
- Correct for TAXI Slope
  +0.5 MFP per 1% Downhill slope, per statute mile.

Calculating next Takeoff BKE:

- Repeat steps for Landing BKE calculation
- Use Planned Takeoff Weight as GWT.
- Use V1+8 KCAS as Brakes ON Speed.

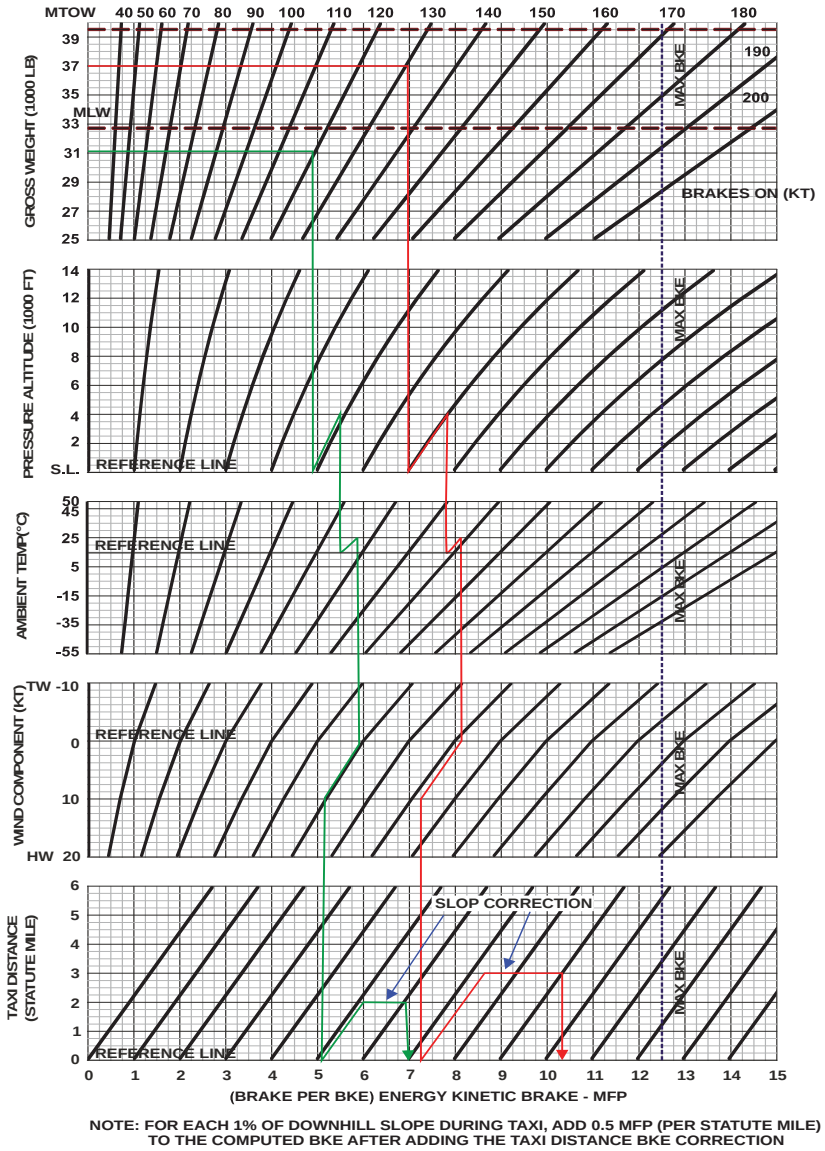
EXAMPLE 2:

Landing Gross Weight =	31,000 lb
Landing Speed =	120 KCAS
Landing Airport Temperature =	30°C
Landing Airport Elevation =	4,000 ft
Landing wind component =	10 kt Headwind
Landing Taxi Distance =	2 mile
Landing Taxi slope =	1% downhill
Resultant Landing BKE per brake =	**7.0 MFP**

Takeoff data same as Example 1.

Resultant BKE per brake for RTO =	**10.4 MFP**

Solution:
Required cooling time is 24 minutes



NOTE: FOR EACH 1% OF DOWNHILL SLOPE DURING TAXI, ADD 0.5 MFP (PER STATUTE MILE) TO THE COMPUTED BKE AFTER ADDING THE TAXI DISTANCE BKE CORRECTION

Figure 10-3-1. Takeoff and Landing Brake Kinetic Energy Calculation

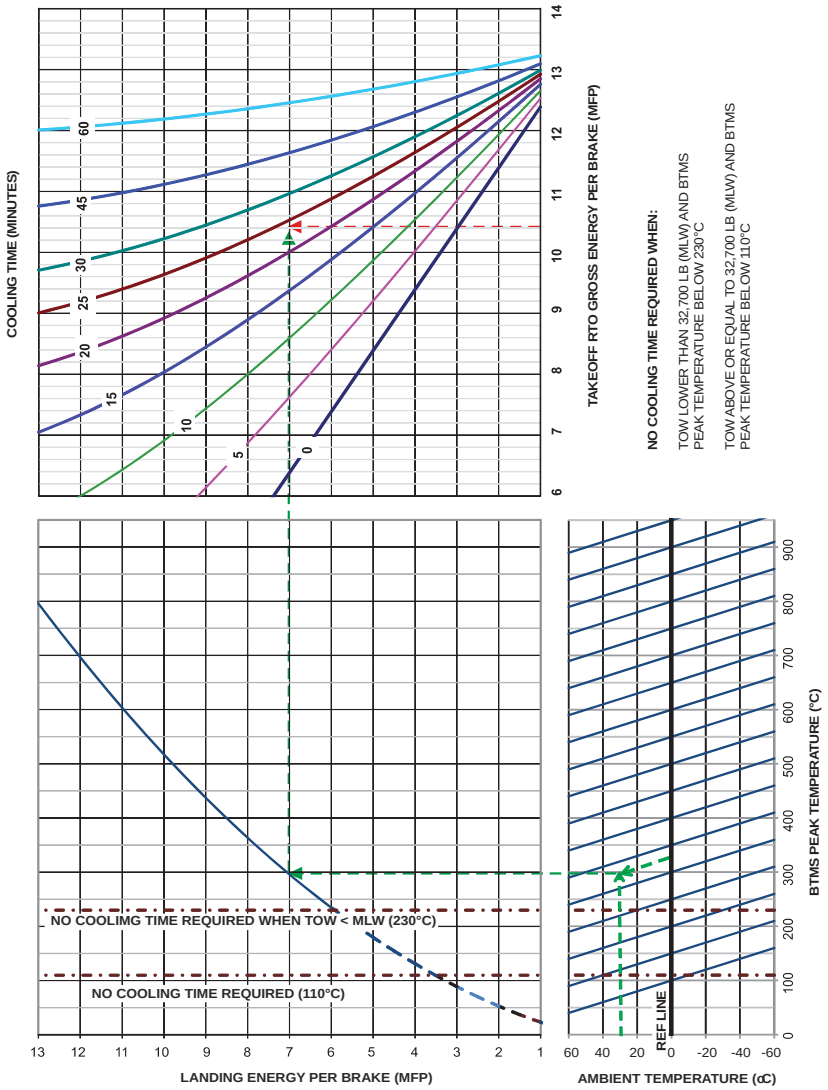


Figure 10-3-2. Cooling Time Chart

SECTION VI
WEIGHT AND BALANCE

No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC

No change.

SECTION VII
UNITS CONVERSION

SECTION VIII
OPERATIONAL PLANNING MANUAL

No change.

SECTION IX
APPENDICES

No change.

SECTION XI
OPERATIONAL OPERATION SUPPLEMENTS

No change.

SECTION XII
SUPPLEMENTAL DATA

No change

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CAAI APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 4
for
GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

ROCKWELL COLLINS PRO LINE FUSION
FMS FLIGHT MANAGEMENT SYSTEMS

This Supplement must be attached to CAAI approved Airplane Flight Manual when dual Rockwell Collins Pro Line Fusion FMS Flight Management Systems are installed.
Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

CAAI APPROVED: _____

Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Date: 21 Jan 2021 Manual No._____

GULFSTREAM AEROSPACE LP

ROCKWELL COLLINS PRO LINE FUSION FMS FLIGHT MANAGEMENT SYSTEM

GENERAL

The general information in the introduction section is applicable with the addition of the following:

NAVIGATION APPROVAL STATUS

The Rockwell Collins Pro Line Fusion FMS multi-sensor navigation system supports compliance with AC 20-138D for IFR navigation using multi-sensor inputs including GNSS for en route, terminal area, and approach operations, provided it is receiving usable navigation signals, according to the applicable navigation specification.

For the purposes of FAA Performance Based Navigation Letter of Authorizations/Operations Specifications (PBN LOAs/OpsSpecs), the Rockwell Collins Pro Line Fusion FMS multi-sensor navigation system supports compliance with the following per FAA AC 90-105A (NOTE: this does not constitute operational approval):

B035 | En Route: RNP 2, RNAV 2, RNAV 5
B036, B054 | Oceanic / Remote / SAO: RNP 2, RNP 4, RNP 10
C052* | Approach: LNAV/VNAV, LNAV, LPV LPV, and Post MOD G25-10074 - LP.
C063** | Terminal: RNP 1 / RF / RNAV 1

*The G280 is not RNP Authorization Required (RNP AR) capable

**The G280 is not “Advanced RNP” capable as described in FAA AC 90-105A. The system does not allow manual scaling and alerting limits. However, the RNP value is automatically set based on the aircraft location in Oceanic, Enroute, Terminal or Approach airspace.

RNP RNAV Operations, listed in the following table, expands upon the above capabilities and provides additional specifications.

The navigation equipment as installed has been found to support compliance with the requirements for the following navigation specifications, provided it is receiving usable navigation signals.

GNSS Fault Detection and Exclusion (FDE) availability checks are not required within an area of SBAS coverage. If the FDE unavailability exceeds the acceptable duration of the specified route of flight, the flight must be canceled, delayed or re-routed as required for the specified area of operation and associated regulations. Collins Aerospace offers a Pre-Departure GPS Coverage Predictor Program, that is based on the logic of the installed GNSS units. The latest version of the program at the time of this publication is CPN 831-4894-012.

G280 - RNP RNAV Operations

Navigation Specification	Operations Requirements / Authorizations	Required Equipment	Reference Guidance
Oceanic and Remote Areas of Operation with GNSS (formerly Class II Navigation)	GNSS FDE availability must be verified prior to flight. Maximum predicted FDE unavailability is 51 minutes.	Two FMS units must be operating and receiving usable navigation information from each of the dual GNSS sensors (see Loss of GNSS Information in System Failures for applicable indications). (or one FMS and one GNSS sensor for those routes requiring only one long range sensor).	Meets the applicable requirements of AC 20-138D AC 90-105A and AC 91-70A. This does not constitute an operational approval.
North and South Polar Areas	North Polar Area is the entire area north of N78° and South Polar Area is the entire area south of S60°. Usable signals from two AHRS and two Rockwell Collins GNSS sensors.	Two Super-AHRS or IRS units must be operating. Two FMS units must be operating and receiving usable signals from two Super-AHRS or IRS and two Rockwell Collins GNSS sensors. For routes approved for single GNSS navigation, a single FMS must be operating and receiving usable signals from the single GNSS.	Meets the applicable requirements of AC 20-138D AC 90-105A and AC 91-70A. This does not constitute an operational approval.
North Atlantic (NAT) High Level Airspace (HLA) (formerly Minimum Navigation Performance Specifications (MNPS))	GNSS FDE availability must be verified prior to flight. Maximum predicted FDE unavailability is 51 minutes.	Two FMS units must be operating and receiving usable navigation information from each of the dual GNSS sensors (or one FMS and one GNSS sensor for those routes requiring only one long range sensor).	Meets the applicable requirements of AC 91-70A and NAT Doc 007. This does not constitute an operational approval.

(Continued)

Navigation Specification	Operations Requirements / Authorizations	Required Equipment	Reference Guidance
True Heading Procedures		True heading procedures are included in the navigation database.	
Enroute, Terminal and Approach Vertical Navigation	Use of Vertical Glidepath (VGP) guidance to a published DA is approved. VNAV operations using QFE altimeter settings are prohibited.	The selected navigation system is receiving usable information for a Baro-VNAV (or SBAS, if applicable) solution.	Meets the applicable requirements of AC 20-138D, AC 90-100A, AC 90-105, EASA AMC 20-27.
RNP APCH [titled RNAV (GPS) or RNAV (GNSS)] - including RNP procedures to a minimum value of RNP-0.3 (LNAV, LNAV/VNAV, LPV and Post MOD G25-10074 - LP minimums; see LPV APCH below for additional requirements when flying LPV APPR and Post MOD G25-10074 - LV APPR.	All instrument approaches that are retrieved from the navigation system database are authorized. GNSS is required to initiate RNAV(GPS) approach procedures. For RNAV(GPS) approach procedures, a missed approach is required if both GNSS sensors become unavailable. EPU does not exceed RNP (except during missed approach procedure following loss of GNSS navigation). Maximum predicted RAIM outage is 5 minutes. For ILS, LOC, LOC-BC, LOA, and SDF approach procedures, the active navigation source must be LOC or BC (green needles) prior to crossing the final approach fix). The GPS is not authorized to provide guidance for an approach that does not have a GPS overlay.	At least one FMS is receiving usable navigation information from a GNSS sensor (required for RNAV(GPS) approach procedures) and the RNP APPR annunciation must be displayed at the final approach fix. Preflight predictions for GNSS RAIM availability may be required by the local authority. Depending on database coding, the FMS may provide approach guidance (APPR) for some VOR approaches based on a VOR/DME or VORTAC (see RNAV (VOR/DME)" and "VOR/DME or RNAV(VOR) and VOR below).	ICAO Doc 9613, AC 20-138D, AMC 20-27 AC 90-105A AC 90-108. This does not constitute an operational approval.

(Continued)

Navigation Specification	Operations Requirements / Authorizations	Required Equipment	Reference Guidance
LPV APPR Post MOD G25-10074 - LP APPR	All instrument approaches that are retrieved from the navigation system database are authorized. GNSS is required to initiate RNAV(GPS) approach procedures. For RNAV(GPS) approach procedures, a missed approach is required if both GNSS sensors become unavailable. EPU does not exceed RNP (except during missed approach procedure following loss of GNSS navigation).	Two FMS units must be operating and receiving usable navigation information from each of the dual GNSS sensors, and the LPV APPR annunciation must be displayed at the final approach fix. The associated charts do not indicate "Authorization Required".	AC 20-138D, AMC 20-28, AC 90-107. This does not constitute an operational approval.
RNAV (VOR/DME)" and "VOR/DME or RNAV(VOR) and VOR	FMS must be receiving the approach reference VOR/DME station.	GNSS sensors must be disabled in the FMS and the APPR annunciation must be displayed at the final approach fix.	AC 20-138D
Advanced RNP (A-RNP) for Radius to Fix (RF) Legs	RNAV or RNP Initial, Intermediate, and Missed approach segments of instrument approaches, for RNP Departures, RNP STARs and for RF Legs in RNAV or RNP Initial and Intermediate transitions to ILS	FMS is using GNSS and autopilot or flight director is coupled.	AC 20-138D This does not constitute approval to conduct RNP SAAAR or RNPAR instrument procedures.
RNAV-10 RNP-10	GNSS FDE availability must be verified prior to flight. Maximum predicted FDE unavailability is 34 minutes. EPU does not exceed RNP.	Two FMS units must be operating and receiving usable navigation information from each of the dual GNSS sensors. ("FMS DR" is not displayed).	FAA Order 8400.128 AC 20-138D AC 90-105A AC 91-70A This does not constitute an operational approval.

(Continued)

Navigation Specification	Operations Requirements / Authorizations	Required Equipment	Reference Guidance
B-RNAV/RNAV-5 RNP-5	GNSS FDE availability must be verified prior to flight. Maximum predicted FDE unavailability is 5 minutes. EPU does not exceed RNP.	At least one FMS is receiving usable navigation information from one or more of the following sensors: Multiple DME receivers or a GNSS receiver.	ICAO Doc 7030/5 AC 20-138D AC 90-105A AC 91-70A AC 90-96A Change 1 for European B-RNAV This does not constitute an operational approval.
RNP-4 Oceanic and Remote Area Operations.	For the segment of route intended as RNP 4, the distance between consecutive waypoints does not exceed 800NM. GNSS FDE availability must be verified prior to flight. Maximum predicted FDE unavailability is 25 minutes. EPU does not exceed RNP.	Two FMS units must be operating and receiving usable navigation information from each of the dual GNSS sensors. For RNP-4 operations, the FMS may be selected to RNP-4, such that the PFD will indicate 4 NM lateral deviation scaling and the limit annunciating "UNABLE RNP" will be 4 NM. Routes designated as RNP 4 may have additional requirements for communication. and surveillance.	AC 20-138D and ICAO Doc 9613 FAA AC 90-105A and AC 91-70A This does not constitute and operational approval.

(Continued)

Navigation Specification	Operations Requirements / Authorizations	Required Equipment	Reference Guidance
RNP-2 (Domestic and Offshore Operations)	For the segment of route intended as RNP 2, the distance between consecutive waypoints does not exceed 400NM. EPU does not exceed RNP.	At least one FMS is receiving usable navigation information from a GNSS sensor. Routes designated as RNP 4 may have additional requirements for communication.	AC 20-138D and ICAO Doc 9613 AC 90-105A and AC 91-70A This does not constitute and operational approval.
RNP-2 (Oceanic and Remote Continental Operations)	For the segment of route intended as RNP 2, the distance between consecutive waypoints does not exceed 400NM. EPU does not exceed RNP.	Two FMS units must be operating and receiving usable navigation information from each of the dual GNSS sensors. Routes designated as RNP 4 may have additional requirements for communication.	AC 20-138D and ICAO Doc 9613 AC 90-105A and AC 91-70A This does not constitute and operational approval.
RNP-1	For the segment of route intended as RNP 1, the distance between consecutive waypoints does not exceed 200NM. GNSS FDE availability must be verified prior to flight for DPs that require GNSS. EPU does not exceed RNP.	Two FMS units must be operating and receiving usable navigation information from each of the dual GNSS sensors.	AC 20-138D ICAO Doc 9613 This does not constitute and operational approval.

(Continued)

Navigation Specification	Operations Requirements / Authorizations	Required Equipment	Reference Guidance
P-RNAV	GNSS is required for takeoff in P-RNAV airspace. GNSS FDE availability must be verified for the intended route of flight. EPU does not exceed RNP.	Determine the requirements of the national, area, or local air traffic control agency. Some terminal areas may require dual operating FMS and GPS equipment.	JAA TGL-10 AC 90-96A This does not constitute and operational approval.
RNAV-2 RNAV-1 RNAV Routes (Departure Procedures (DPs), Standard Terminal Arrivals (STARS), Q and T Routes)	GNSS FDE availability must be verified prior to flight for DPs that require GNSS. EPU does not exceed RNP.	At least one FMS is receiving usable navigation information from one or more of the following sensors: Multiple DME receivers or a GNSS receiver.	ICAO Doc 9613 and FAA AC 90-100A

Supplement 4

SECTION I
LIMITATIONS

SYSTEM LIMITATIONS

1. Normal operating procedures are outlined in the Rockwell Collins Pro Line Fusion FMS Pilot's Guide, Pro Line Fusion Flight Management System for the Gulfstream G280 must be immediately available to the flight crew at all time
   Pre MOD G25-10074: P/N 523-0822069-001117, First Edition, dated January 15, 2015 (or later applicable revision) with software program version 810-0162-1G0005;
   Post MOD G25-10074: P/N 523-0822069-002117, Second Edition, dated September 19, 2019 (or later applicable revision) with software program version 810-0162-1G0006 (or later).
2. All database numbers must be verified on CDU STATUS page 2, to be current and valid.
3. For IFR enroute and terminal navigation, verify that the database is current. If the database is out of date the pilot must verify each selected waypoint for accuracy and integrity by reference to current approved data. When flying in PRNAV airspace (RNP-1) pilots must verify the database is current and confirm the correct procedure has been selected. This process includes confirmation of waypoint sequence, reasonableness of track angles, distances, and any other parameters that can be altered by the pilot such as speed constraints. A navigational system textual display or navigation map must be used.

(Continued)

4. Instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the FMS equipment database. The FMS database must incorporate the current update cycle.
   a. FMS based instrument approaches (LPV, GPS/RNP) must be conducted in FMS approach mode (LPV APPR, RNP APPR indicated on the HSI), and GPS integrity monitoring (when using GPS for approach guidance) must be available at the final approach fix. FMS approach mode is not the Flight Controls Approach Mode. The Flight Control Approach Mode selected on the Flight Control Panel (FCP) can be APPR or LNAV to fly FMS approaches. VGP is only available when APPR and VNAV are selected. GPS can only be used for approach guidance if the reference coordinate datum system for the approach is WGS-84 or NAD-83.
5. The aircraft must have other approved navigation equipment installed and operating, appropriate to the route of flight.
6. Use of Rockwell Collins Pro Line Fusion FMS navigation data that is based solely on IRS input is prohibited while in terminal areas or during departures from or approaches to airports, or flight into valleys, e.g. between peaks in mountainous terrain or below Minimum Enroute Altitude (MEA).
7. When using VNAV, each pilot altimeter must be used as the primary altitude reference for all operations.
8. The fuel display parameters are advisory only and do not replace the primary fuel quantity or fuel flow gages for loading or range/reserve planning
9. Use of FMS lateral and vertical guidance between the Final Approach Fix and Missed Approach Point on ILS approaches is prohibited.
10. Use of FMS lateral guidance between the Final Approach Fix and Missed Approach Point on localizer or localizer back-course approaches is prohibited.

(Continued)

11. Adherence to published procedure altitudes is required when using FMS for advisory vertical guidance on localizer, localizer back-course or other non-precision instrument approaches, in accordance with FAA AC 120-108().
12. Do not use QFE altimeter setting for VNAV operations.
13. Flying approach procedures designated as RNP AR or "Authorization Required" is prohibited.

SECTION II
EMERGENCY PROCEDURES

No change.

SECTION III
ABNORMAL PROCEDURES

SYSTEM FAILURES

System component failures are typically indicated by displaying a Crew Alerting System (CAS) message. The PFD, MAP and/or CDU may also display a MSG annunciation. Pressing the MSG key on the CDU displays the message page, indicating which component has failed. If a CDU goes blank, check the appropriate circuit breaker. If a CDU is inoperative, any operative CDU can be paired with any single operative FMS at a time.

Use other navigation systems (second FMS, VOR, DME, ADF) appropriate to the route of flight.

LOSS OF GNSS INFORMATION

Any of the following indications on any PFD or CDU indicate a loss of usable navigation information from the GNSS for the respective FMS:

- NO RNP
- UNABLE RNP
- FMS DR
- IRS ONLY
- V/D ONLY
- VOR/DME ONLY
- VOR/DME DIST > 40 NM
- GNSS NOT AVAILABLE
- GNSS FMS DISAGREE
- CHECK POS

POWER LOSSES

The Pro Line Fusion FMS's are installed without standby battery; power interruption to the Navigation Computer Unit blanks the display and causes the corresponding FMS flags to be displayed on the PFD (Primary Flight Display). As power supply resumes, Rockwell Collins Pro Line Fusion FMS displays time and position of power loss and duration of the power loss; afterwards, if duration of the power loss was less than 5 minutes, the system computes the approximate new position. The pilot should check this position and update the fuel display data.
.

NOTE

1. The data base, flight plans and waypoints are unaffected by power losses.
2. The fuel computation is also retained in non volatile memory. TAS, Altitude and entered fuel data are now crossfilled from one FMS to the other

FMS CAUTION MESSAGES

Yellow FMS messages require positive pilot action to correct navigation / approach accuracy problems.

All FMS annunciations (cautions and status) are outlined in Rockwell Collins Pro Line Fusion FMS Pilot's Guide, Flight Management System for the Gulfstream G280:
Pre MOD G25-10074: P/N 523-0822069-001117, First Edition, dated January 15, 2015, pages 12-5 through 12-49, (or later applicable revision) with software program version 810 -0162-1G0005;
Post MOD G25-10074: P/N 523-0822069-002117, Second Edition, dated September 19, 2019, pages 12-4 through 12-47 (or later applicable revision) with software program version 810-0162-1G0006 (or later).

SECTION IV
NORMAL PROCEDURES

Normal operating procedures are outlined in the Rockwell Collins Pro Line Fusion FMS Pilot's Guide, Flight Management System for the Gulfstream G280 must be immediately available to the flight crew at all time:
Pre MOD G25-10074: P/N 523-0822069-001117, First Edition, dated January 15, 2015 (or later applicable revision) with software program version 810-0162-1G0005;
Post MOD G25-10074: P/N 523-0822069-002117, Second Edition, dated September 19, 2019 (or later applicable revision) with software program version 810-0162-1G0006 (or later).

SYSTEM DESCRIPTION

FLIGHT DIRECTOR/AUTOPILOT INTERFACE

Rockwell Collins Pro Line Fusion FMS is brought into the active on-side navigation source by selecting NAV SOURCE on either side DCP, until FMS1 or FMS2 is displayed.
With valid leg selected on the coupled side, selecting LNAV on the FCP, FMS is displayed on the PFD.

AIR DATA COMPUTER INTERFACE

Dual ADC inputs to Rockwell Collins Pro Line Fusion FMS provide TAS, barometric and pressure altitudes, IAS and Mach number. No. 1 and No. 2 ADC's are connected to No. 1 and No. 2 FMS's, respectively. If an ADC fails, the cross-side ADC will be used as back up default.

PRO LINE FUSION FMS MESSAGES AND ANNUNCIATIONS

FMS message lines A1 and A2 appear in the upper right corner of the HSI just left of the NAV source information box. A third FMS message line, A3, appears on the HSI Map and Multifunction Window (MFW) Maps. The annunciations are shown if the FMS is the selected NAV source. The messages stay on while the condition causing them exists, or for a minimum of 5 seconds.

All FMS HSI annunciations (cautions and status) for G280 are outlined in Rockwell Collins Pro Line Fusion FMS Pilot's Guide, Flight Management System for the Gulfstream G280:

Pre MOD G25-10074: P/N 523-0822069-001117, First Edition, dated January 15, 2015, pages 12-50 through 12-57, (or later applicable revision).

Post MOD G25-10074: P/N 523-0822069-002117, Second Edition, dated September 19, 2019, pages 12-48 through 12-55(or later applicable revision)

PRO LINE FUSION FMS MESSAGES ON MAP MFW

All FMS MAP MFW messages for G280 are outlined in Rockwell Collins Pro Line Fusion FMS Pilot's Guide, Pro Line Fusion Flight Management System for the Gulfstream G280:

Pre MOD G25-10074: P/N 5523-0822069-001117, First Edition, dated January 15, 2015, pages 12-58 through 12-61, (or later applicable revision)

Post MOD G25-10074: P/N 523-0822069-002117, Second Edition, dated September 19, 2019, pages 12-56 through 12-59 (or later applicable revision)

SECTION V
PERFORMANCE WET AND DRY
No change.

SECTION VI
WEIGHT AND BALANCE
No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC
No change.

SECTION VII
UNITS CONVERSION
No change.

SECTION VIII
OPERATIONAL PLANNING MANUAL
No change.

SECTION IX APPENDICES
No change.

SECTION XI
OPERATIONAL INFORMATION SUPPLEMENTS
No change.

SECTION XII
SUPPLEMENTAL DATA
No change

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TOC Main

Gulfstream G280
AIRPLANE FLIGHT MANUAL

Temporary Revision 1

TEMPORARY REVISION NO. 1

SUBJECT: ENGINE QUALITY ADDER PERFORMANCE CORRECTIONS FOR SUPPLEMENT 5 "FLAPS 0 PERFORMANCE"

PLEASE INSERT PAGES TR1-X-5-i THROUGH TR1-X-5-8 INTO YOUR AIRPLANE FLIGHT MANUAL IN FRONT OF SUPPLEMENT 5 UNTIL NEXT REVISION REPLACES THESE PAGES.

Affected pages: X-5-23 through X-5-79 and X-5-84, X-5-86 through X-5-142 and X-5-147

Issue 1

CAAI APPROVED
25 Oct 2016

Gulfstream G280

AIRPLANE FLIGHT MANUAL

BACK

TOC Main

Temporary Revision 1

CAAI APPROVED
25 Oct 2016

TR1-X-5-ii
Issue 1

Gulfstream G280
AIRPLANE FLIGHT MANUAL
Temporary Revision 1
Supplement 5

ENGINE QUALITY ADDER PERFORMANCE CORRECTIONS

GENERAL

This supplement contains information on takeoff and landing performance correction for the G280 airplane.
The following corrections are to be applied when performing the specified performance calculations using the AFM and the FMS.
Correction charts are provided for the following performance parameters:

- TAKEOFF FIELD LENGTH (TOFL)
- TAKEOFF CLIMB GRADIENT - AVAILABLE 2nd SEGMENT CLIMB GRADIENT (GR2) AND FINAL SEGMENT CLIMB GRADIENT

These corrections cover all performance calculations available for section X-5 (Flaps 0° performance) and performance given for all abnormal procedures.

CAAI APPROVED
25 Oct 2016

TR1-X-5-1
Issue 1

USAGE OF TEMPORARY REVISION CORRECTION CHARTS

Calculating the corrected performance values using the following figures is performed in a similar manner for all correction charts.
Enter the correction chart with the calculated AFM/FMS performance value (figure X axis) and find corrected value (figure Y axis) at the intersection with the compatible correction line (see example on Figure TR1-X-5-1).

EXAMPLES

1. Determine the Takeoff field length required at the following runway conditions:
   - Gross Weight: 38,000 lb
   - Dry Runway
   - Flaps Setting: 0°
   - Pressure altitude: 1,000 ft
   - Ambient temperature: -5°C
   - Engine bleed setting: ECS-ON, Engine and Wing Anti-ice OFF
   - No Wind
   - Runway Slope: +2%

Result:
From Figure 10-5-6 we find an uncorrected TOFL of 7,680 ft.
Using Figure 5-99 no wind component correction is required, thus the corrected TOFL for the runway slope is 7,680 ft.
For ECS-ON correct the TOFL by 3%, the corrected TOFL is 7,910 ft.
Correct the TOFL using Figure TR1-X-5-2 and receive 8,200 ft.

2. For the same conditions as example 1, Determine the Available 2nd segment climb gradient:

Result:
From Figure 10-5-5 we find an uncorrected GR2 of 6.2%.
No wind component correction is required.
ECS-ON correction to GR2 of 0.6% leads to 5.6%
Correct GR2 using Figure TR1-X-5-3 and receive 5.35%.

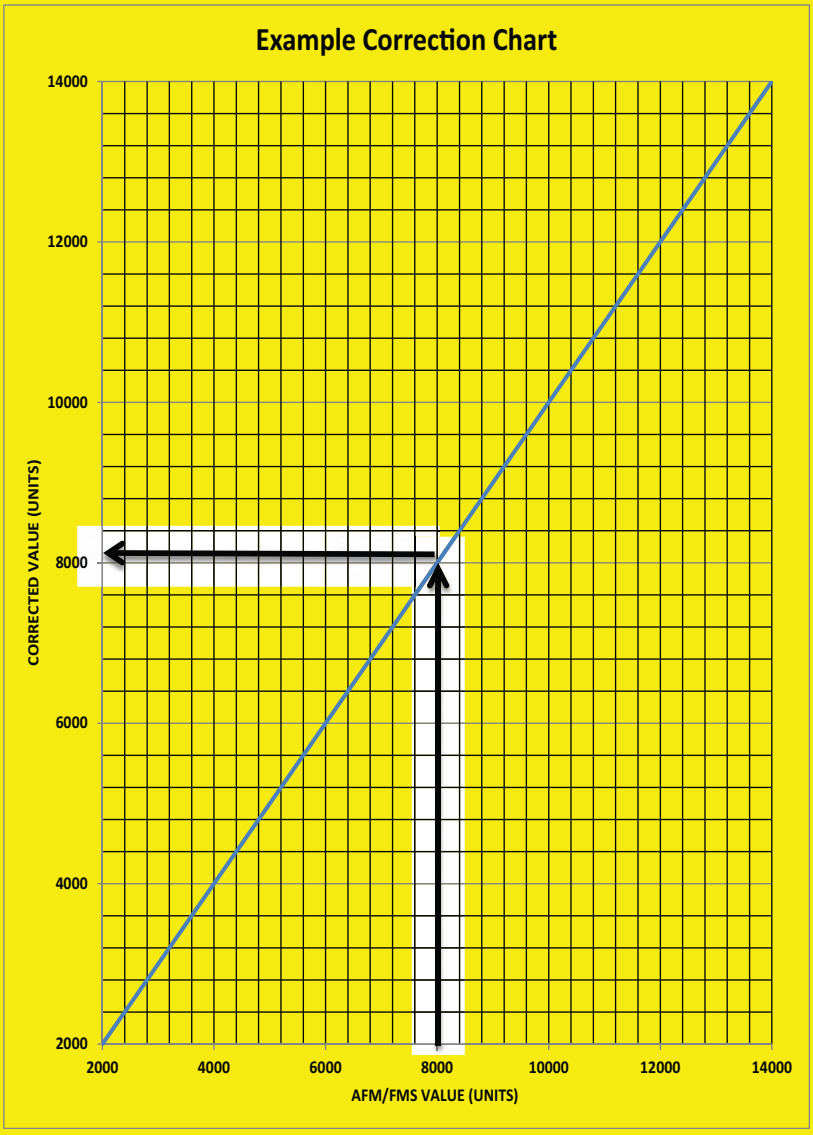

Figure TR1-X-5-1. Example Correction Chart

TAKEOFF FIELD LENGTH

Use Figure TR1-X-5-2 to correct the takeoff field length.

Figure TR1-X-5-2 presents correction lines applicable for takeoff on dry, wet and runways contaminated with compacted snow, ice or dry snow.
The correction charts contains correction lines for different runway slopes. These corrections are to be used in addition to the TOFL Runway slope correction charts presented in the AFM. First calculate the TOFL from the AFM/FMS including Wind component, Runway slope and Thrust reverser effect, and then apply the appropriate correction according to the existing runway slope.

Figure TR1-X-5-2 is applicable for:

Figure	Description	Page
10-5-5 through 10-5-19 and 10-5-21	TOFL FLAPS 0°; DRY RUNWAY ECS-OFF EAI-OFF WAI-OFF*	X-5-23 through X-5-79 and X-5-84
10-5-22 through 10-5-36 and 10-5-38	TOFL FLAPS 0°; WET RUNWAY ECS-OFF EAI-OFF WAI-OFF*	X-5-86 through X-5-142 and X-5-147

TAKEOFF CLIMB GRADIENTS

Use Figure TR1-X-5-3 to correct both the takeoff available 2nd segment climb gradient and the takeoff final segment climb gradient (same correction line applies for both parameters).
The correction chart is applicable to:

Figure	Description	Page
10-5-5 through 10-5-19 and 5-263	GR2; FLAPS 0°; DRY RUNWAY ECS-OFF EAI-OFF WAI-OFF*	X-5-23 through X-5-79 and V-755
10-5-22 through 10-5-36 and 5-263	GR2; FLAPS 0°; WET RUNWAY ECS-OFF EAI-OFF WAI-OFF*	X-5-86 through X-5-142 and V-755

* For flaps 0°, second segment gradient with engine bleed settings ECS-ON EAI-OFF WAI-OFF, ECS-ON EAI-ON WAI-ON or OFF, see instructions in Supplement 5: TAKEOFF CHARTS AND TABLES (X-5-12, X-5-13);
First apply the climb gradients reductions due to bleed, and after that apply the correction of Figure TR1-X-5-3.

BACK
TR1 Front
TOC Main

TAKEOFF FIELD LENGTH CORRECTION
DRY AND WET RUNWAYS
AND RUNWAYS CONTAMINATED BY:
COMPACTED SNOW, ICE OR DRY SNOW

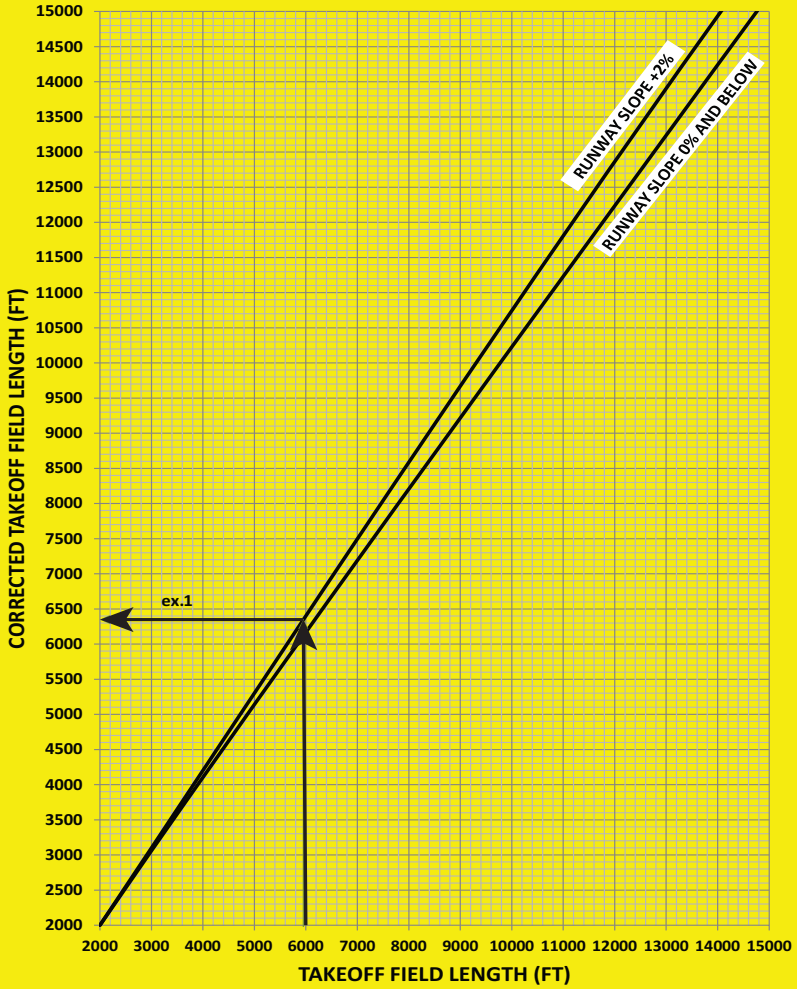

Figure TR1-X-5-2. Takeoff Field Length Correction Dry and Wet Runways And Runways Contaminated By: Compacted Snow, Ice or Dry Snow

Gulfstream G280

AIRPLANE FLIGHT MANUAL

Temporary Revision 1
Supplement 5

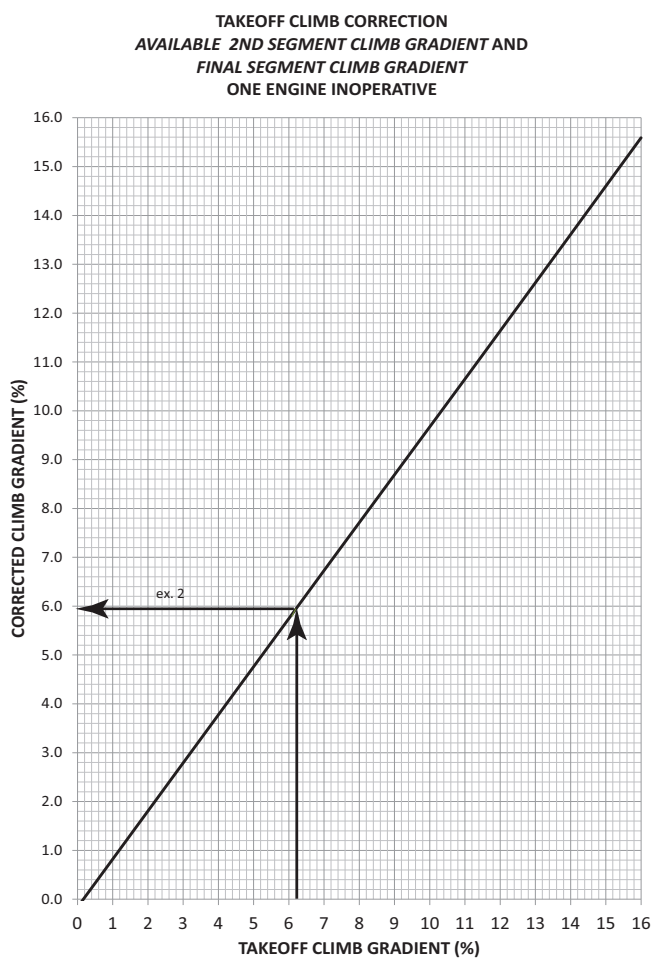

Figure TR1-X-5-3. Takeoff Climb Correction Available 2nd Segment Climb Gradient And Final Segment Climb Gradient

BACK
TR1 Front
TOC Main

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CAAI APPROVED
25 Oct 2016

CAAI APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 5
for
GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

FLAPS - 0 PERFORMANCE

This Supplement must be attached to CAAI approved Airplane Flight Manual dated 15 Apr 2015 whenever flaps - 0 performance is required. Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

CAAI APPROVED: T. Bar-Am

Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Date: 15 Apr 2015 Manual No._____

FLAPS - 0 PERFORMANCE

GENERAL X-5-10

MAXIMUM ALLOWABLE TAKEOFF WEIGHT

MAXIMUM TAKEOFF WEIGHT AS PERMITTED BY TIRE SPEED LIMITATIONS X-5-11
MAXIMUM TAKEOFF WEIGHT AS PERMITTED BY BRAKE ENERGY LIMITATIONS X-5-12
TAKEOFF CHARTS AND TABLES X-5-12
HORIZONTAL STABILIZER TRIM SETTING X-5-14

10-5-1 Determination of Overall Longitudinal Center of Gravity Location Flaps - 0° X-5-15

10-5-2 Horizontal Stabilizer Trim Setting for Takeoff; %MAC TO Degrees; Flaps - 0° X-5-16

10-5-3 Maximum Takeoff Weight As Permitted By Tire Speed Limitations X-5-20

10-5-4 Maximum Takeoff Weight As Permitted By Brake Energy Limitations X-5-21

TAKEOFF TABLES AND CHARTS; FLAPS - 0°; DRY RUNWAY

10-5-5 TAKE-OFF DATA; FLAPS - 0°; SEA LEVEL; ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; PART A; DRY RUNWAY X-5-23

10-5-5 TAKE-OFF DATA; FLAPS - 0°; SEA LEVEL; ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; PART B; DRY RUNWAY X-5-25

10-5-6 TAKE-OFF DISTANCE; FLAPS - 0°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY X-5-27

10-5-6 TAKE-OFF DISTANCE; FLAPS - 0°; 1000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY X-5-29

10-5-7 TAKE-OFF DISTANCE; FLAPS - 0°; 2000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY X-5-31

10-5-7 TAKE-OFF DISTANCE; FLAPS - 0°; 2000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY X-5-33

10-5-8 TAKE-OFF DISTANCE; FLAPS - 0°; 3000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY X-5-35

10-5-8 TAKE-OFF DISTANCE; FLAPS - 0°; 3000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY X-5-37

10-5-9 TAKE-OFF DISTANCE; FLAPS - 0°; 4000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY X-5-39

10-5-9 TAKE-OFF DISTANCE; FLAPS - 0°; 4000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY X-5-41

10-5-10 TAKE-OFF DISTANCE; FLAPS - 0°; 5000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY X-5-43

10-5-10 TAKE-OFF DISTANCE; FLAPS - 0°; 5000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY X-5-45

10-5-11 TAKE-OFF DISTANCE; FLAPS - 0°; 6000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY..... X-5-47

10-5-11 TAKE-OFF DISTANCE; FLAPS - 0°; 6000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY..... X-5-49

10-5-12 TAKE-OFF DISTANCE; FLAPS - 0°; 7000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY..... X-5-51

10-5-12 TAKE-OFF DISTANCE; FLAPS - 0°; 7000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY..... X-5-53

10-5-13 TAKE-OFF DISTANCE; FLAPS - 0°; 8000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY..... X-5-55

10-5-13 TAKE-OFF DISTANCE; FLAPS - 0°; 8000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY..... X-5-57

10-5-14 TAKE-OFF DISTANCE; FLAPS - 0°; 9000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY..... X-5-59

10-5-14 TAKE-OFF DISTANCE; FLAPS - 0°; 9000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY..... X-5-61

10-5-15 TAKE-OFF DISTANCE; FLAPS - 0°; 10000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY..... X-5-63

10-5-15 TAKE-OFF DISTANCE; FLAPS - 0°; 10000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY X-5-65

10-5-16 TAKE-OFF DISTANCE; FLAPS - 0°; 11000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY X-5-67

10-5-16 TAKE-OFF DISTANCE; FLAPS - 0°; 11000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY X-5-69

10-5-17 TAKE-OFF DISTANCE; FLAPS - 0°; 12000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY X-5-71

10-5-17 TAKE-OFF DISTANCE; FLAPS - 0°; 12000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY X-5-73

10-5-18 TAKE-OFF DISTANCE; FLAPS - 0°; 13000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY X-5-75

10-5-18 TAKE-OFF DISTANCE; FLAPS - 0°; 13000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY X-5-77

10-5-19 TAKE-OFF DISTANCE; FLAPS - 0°; 14000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY X-5-79

10-5-19 TAKE-OFF DISTANCE; FLAPS - 0°; 14000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; DRY RUNWAY X-5-81

10-5-20 V_1 Correction; Flaps - 0°; Dry Runway X-5-83

10-5-21 Takeoff Field Length Corrections;
Flaps - 0°; Dry Runway X-5-84

**TAKEOFF TABLES; AND CHARTS; FLAPS - 0°;
WET RUNWAY**

10-5-22 TAKE-OFF DISTANCE; FLAPS - 0° ; SEA LEVEL
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-86

10-5-22 TAKE-OFF DISTANCE; FLAPS - 0° ; SEA LEVEL
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-88

10-5-23 TAKE-OFF DISTANCE; FLAPS - 0° ; 1000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-90

10-5-23 TAKE-OFF DISTANCE; FLAPS - 0° ; 1000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-92

10-5-24 TAKE-OFF DISTANCE; FLAPS - 0° ; 2000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-94

10-5-24 TAKE-OFF DISTANCE; FLAPS - 0° ; 2000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-96

10-5-25 TAKE-OFF DISTANCE; FLAPS - 0° ; 3000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-98

10-5-25 TAKE-OFF DISTANCE; FLAPS - 0° ; 3000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-100

10-5-26 TAKE-OFF DISTANCE; FLAPS - 0° ; 4000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-102

10-5-26 TAKE-OFF DISTANCE; FLAPS - 0° ; 4000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-104

10-5-27 TAKE-OFF DISTANCE; FLAPS - 0° ; 5000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-106

10-5-27 TAKE-OFF DISTANCE; FLAPS - 0° ; 5000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-108

10-5-28 TAKE-OFF DISTANCE; FLAPS - 0° ; 6000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-110

10-5-28 TAKE-OFF DISTANCE; FLAPS - 0° ; 6000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-112

10-5-29 TAKE-OFF DISTANCE; FLAPS - 0° ; 7000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-114

10-5-29 TAKE-OFF DISTANCE; FLAPS - 0° ; 7000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-116

10-5-30 TAKE-OFF DISTANCE; FLAPS - 0° ; 8000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-118

10-5-30 TAKE-OFF DISTANCE; FLAPS - 0° ; 8000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-120

10-5-31 TAKE-OFF DISTANCE; FLAPS - 0° ; 9000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-122

10-5-31 TAKE-OFF DISTANCE; FLAPS - 0° ; 9000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-124

10-5-32 TAKE-OFF DISTANCE; FLAPS - 0° ; 10000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-126

10-5-32 TAKE-OFF DISTANCE; FLAPS - 0° ; 10000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-128

10-5-33 TAKE-OFF DISTANCE; FLAPS - 0° ; 11000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-130

10-5-33 TAKE-OFF DISTANCE; FLAPS - 0° ; 11000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-132

10-5-34 TAKE-OFF DISTANCE; FLAPS - 0° ; 12000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-134

10-5-34 TAKE-OFF DISTANCE; FLAPS - 0° ; 12000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-136

10-5-35 TAKE-OFF DISTANCE; FLAPS - 0° ; 13000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-138

10-5-35 TAKE-OFF DISTANCE; FLAPS - 0° ; 13000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-140

10-5-36 TAKE-OFF DISTANCE; FLAPS - 0° ; 14000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; WET RUNWAY X-5-142

10-5-36 TAKE-OFF DISTANCE; FLAPS - 0° ; 14000 ft
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART B; WET RUNWAY X-5-144

10-5-37 V_1 Correction;
Flaps - 0°; Wet Runway X-5-146

10-5-38 Takeoff Field Length Corrections;
Flaps - 0°; Wet Runway X-5-147

Supplement 5

FLAPS - 0 PERFORMANCE

GENERAL

This supplement contains information for takeoff with flaps - 0° for the G280 airplane.
Takeoff in this configuration is allowed for dispatch only. Data is presented for dry and wet runway conditions.
This data complements the data contained within the basic Airplane Flight Manual (AFM). This supplement must therefore, be used in conjunction with the basic AFM.
Flight path planning for obstacle clearance should be conducted based on information provided in the basic AFM for Flaps 10°.

SECTION I
LIMITATIONS

Flaps - 0° takeoff is prohibited with any tailwind.

SECTION II
EMERGENCY PROCEDURES

No change.

SECTION III
ABNORMAL PROCEDURES

No change.

SECTION IV
NORMAL PROCEDURES

No change.

MAXIMUM ALLOWABLE TAKEOFF WEIGHT

The maximum allowable takeoff weight (weight at brake release) is lowest value determined by each of following requirements:

1. Field length weight limitation.
2. Tire speed weight limitation.
3. Maximum brake energy weight limitation.
4. Maximum structural takeoff weight of 39,600 lb

NOTE

1. Maximum takeoff weight as permitted by climb gradient requirement is never a restricting factor, and therefore is not presented.
2. Maximum takeoff weight as permitted by obstacle clearance limitation should be established using information for flaps 10° presented in the basic AFM.

MAXIMUM TAKEOFF WEIGHT AS PERMITTED BY TIRE SPEED LIMITATIONS

Figure 10-5-3. presents the maximum allowable takeoff weight as permitted by the tire speed limitation. Correction for the reported wind is included.
The data is valid for both dry and wet runway conditions.

MAXIMUM TAKEOFF WEIGHT AS PERMITTED BY BRAKE ENERGY LIMITATIONS

Figure 10-5-4. presents the maximum allowable takeoff weight as limited by the maximum braking energy at a rejected takeoff. Corrections for the reported wind and runway gradient is included. The data is valid for all runway gradients from -2° to +2°.

TAKEOFF CHARTS AND TABLES

Takeoff data is provided for field elevations from sea level to 14,000 ft.
Each field elevation data has two tables as follows:
Part A - For OAT between -54°C and -5°C
Part B - For OAT between 0°C and 50°C
Pilot may interpolate performance values between adjacent elevation and temperature values.

Tables to determine V_1, V_R, V_2, second segment climb gradient (GR2) and takeoff field length (TOFL) for zero wind, zero runway gradient conditions:

Dry runways: Figure 10-5-5. through Figure Figure 10-5-19.
Wet runways: Figure 10-5-22. through Figure Figure 10-5-36.
The following figures are used to determine V_1, and takeoff field length. corrections for wind and runway slope:
For dry runways, use Figure Figure 10-5-20. for V_1 correction and Figure Figure 10-5-21. for takeoff field length correction.
For wet runways, use Figure Figure 10-5-37. V_1 correction and Figure Figure 10-5-38. for takeoff field length correction.

The data in the tables is presented for engine bleeds OFF.
For other engine bleed configurations use the following corrections:

For ECS ON, Engine AI OFF, Wing AI OFF:
Add 1 kt to V_1
Add 3% to takeoff field length
Reduce 2ND segment climb gradient by 0.6%

(Continued)

For ECS ON, Engine AI ON, Wing AI OFF or ON:
Add 2 knots to V_1
Add 6% to takeoff field length
Reduce 2ND segment climb gradient by 1.1%

Takeoff procedures are identical to those for normal takeoff flaps configurations defined in TAKEOFF PROCEDURES, page V-28.

HORIZONTAL STABILIZER TRIM SETTING

FOR TAKEOFF

Horizontal stabilizer trim setting for takeoff with flaps – 0° is defined in Figure 10-5-2 as a function of the aircraft zero-fuel longitudinal center of gravity location, fuel quantity and field pressure altitude.

DETERMINATION OF GROSS WEIGHT LONGITUDINAL CENTER OF GRAVITY LOCATION; FLAPS - 0°

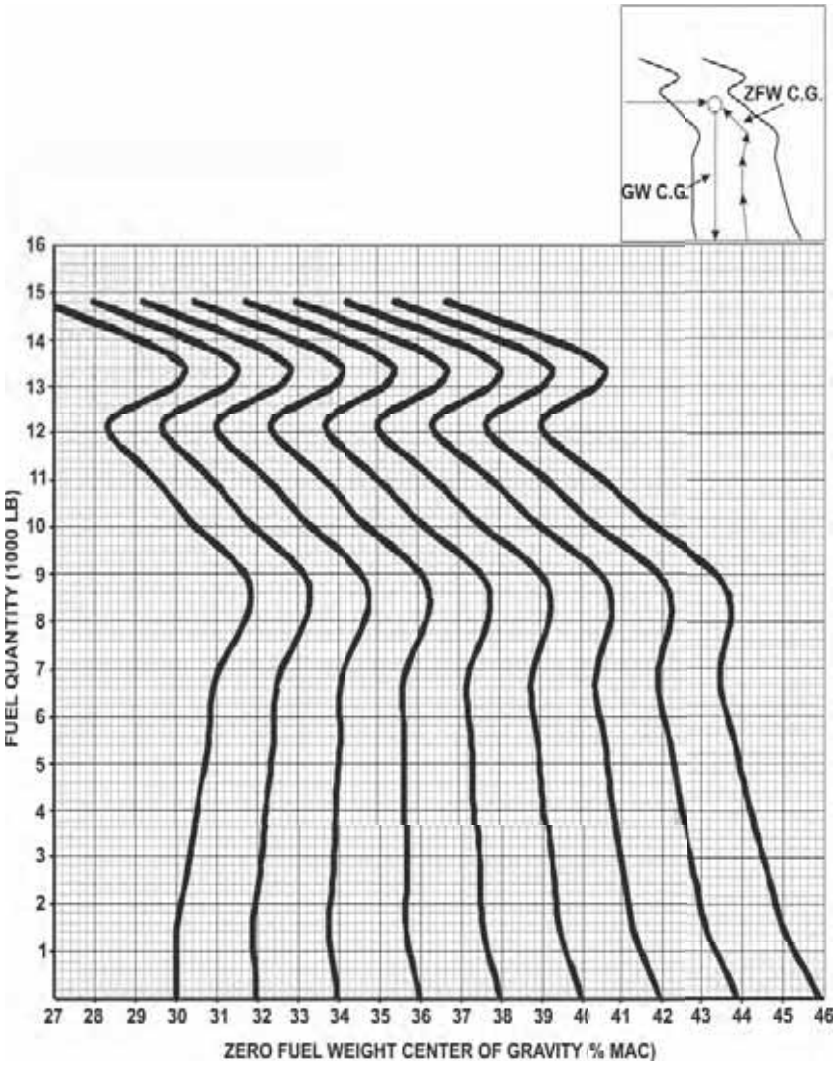

Figure 10-5-1. Determination of Overall Longitudinal Center of Gravity Location Flaps - 0°

Figure 10-5-2. Horizontal Stabilizer Trim Setting for Takeoff; %MAC TO Degrees; Flaps - 0°
(Sheet 1 of 4)

PRESSURE ALTITUDE BELOW 2,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)															
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14,600	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5
14,000	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.5	-2.4	-2.4	-2.3
13,000	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2
12,000	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4	-2.3
11,000	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2
10,000	-2.7	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.2
9,000	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.2	-2.1	-2.1
8,000	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.1	-2.1	-2.0
7,000	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.1	-2.0
6,000	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2	-2.1	-2.1	-2.0
5,000	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.4	-2.3	-2.2	-2.2	-2.1	-2.1	-2.0
4,000	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.3	-2.3	-2.2	-2.2	-2.1	-2.1	-2.0
3,000	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.3	-2.3	-2.2	-2.2	-2.1	-2.0	-2.0
2,000	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.3	-2.3	-2.2	-2.1	-2.1	-2.0	-2.0
1,000	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.5	-2.4	-2.3	-2.3	-2.2	-2.1	-2.1	-2.0	-1.9
0	-2.7	-2.7	-2.7	-2.7	-2.6	-2.6	-2.5	-2.4	-2.4	-2.3	-2.2	-2.2	-2.1	-2.0	-2.0	-1.9

Figure 10-5-2. Horizontal Stabilizer Trim Setting for Takeoff; %MAC TO Degrees; Flaps - 0°
(Sheet 2 of 4)

PRESSURE ALTITUDE: 2,000 - 6,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)															
	30	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
14,600	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.3
14,000	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.3	-2.3	-2.3	-2.3	-2.2
13,000	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.3	-2.3	-2.3	-2.2	-2.2	-2.2
12,000	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.3	-2.3	-2.3	-2.2
11,000	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.3	-2.3	-2.3	-2.2	-2.2	-2.2
10,000	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.3	-2.3	-2.3	-2.2	-2.2	-2.2	-2.1	-2.1
9,000	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.3	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.0
8,000	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.3	-2.2	-2.2	-2.1	-2.1	-2.1	-2.0	-2.0
7,000	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.0
6,000	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.2	-2.1	-2.1	-2.0	-2.0
5,000	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.2	-2.1	-2.1	-2.0	-2.0
4,000	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.1	-2.1	-2.1	-2.0	-2.0
3,000	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.1	-2.1	-2.1	-2.0	-2.0
2,000	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.1	-2.1	-2.0	-2.0	-1.9
1,000	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.1	-2.1	-2.0	-2.0	-1.9
0	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.4	-2.3	-2.3	-2.2	-2.2	-2.1	-2.1	-2.0	-2.0	-1.9

Figure 10-5-2. Horizontal Stabilizer Trim Setting for Takeoff; %MAC TO Degrees; Flaps - 0°
(Sheet 3 of 4)

PRESSURE ALTITUDE: 6,000 - 10,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)																
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14,600	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1
14,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
13,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0
12,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
11,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0
10,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0
9,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
8,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-2.0	-1.9
7,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-2.0
6,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-2.0
5,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-2.0	-1.9
4,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-2.0	-1.9
3,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-2.0	-1.9
2,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-1.9	-1.9
1,000	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-1.9	-1.9
0	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-1.9	-1.9

Figure 10-5-2. Horizontal Stabilizer Trim Setting for Takeoff; %MAC TO Degrees; Flaps - 0°
(Sheet 4 of 4)

PRESSURE ALTITUDE ABOVE 10,000 FT

FUEL QUANTITY (LB)	ZERO FUEL WEIGHT CENTER OF GRAVITY (% MAC)																
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14,600	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
14,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
13,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
12,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
11,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
10,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
9,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
8,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
7,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
6,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
5,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
4,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
3,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
2,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
1,000	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
0	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9

MAXIMUM TAKEOFF WEIGHT AS PERMITTED BY TIRE SPEED LIMITATIONS

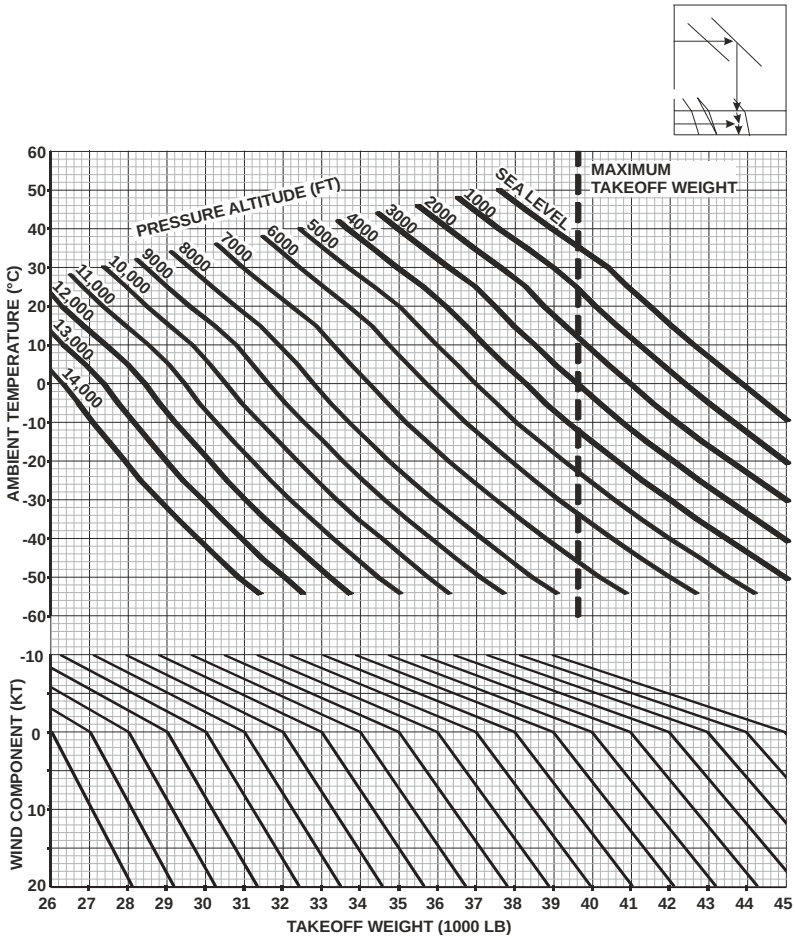

Figure 10-5-3. Maximum Takeoff Weight As Permitted By Tire Speed Limitations

MAXIMUM TAKEOFF WEIGHT AS PERMITTED BY BRAKE ENERGY LIMITATIONS

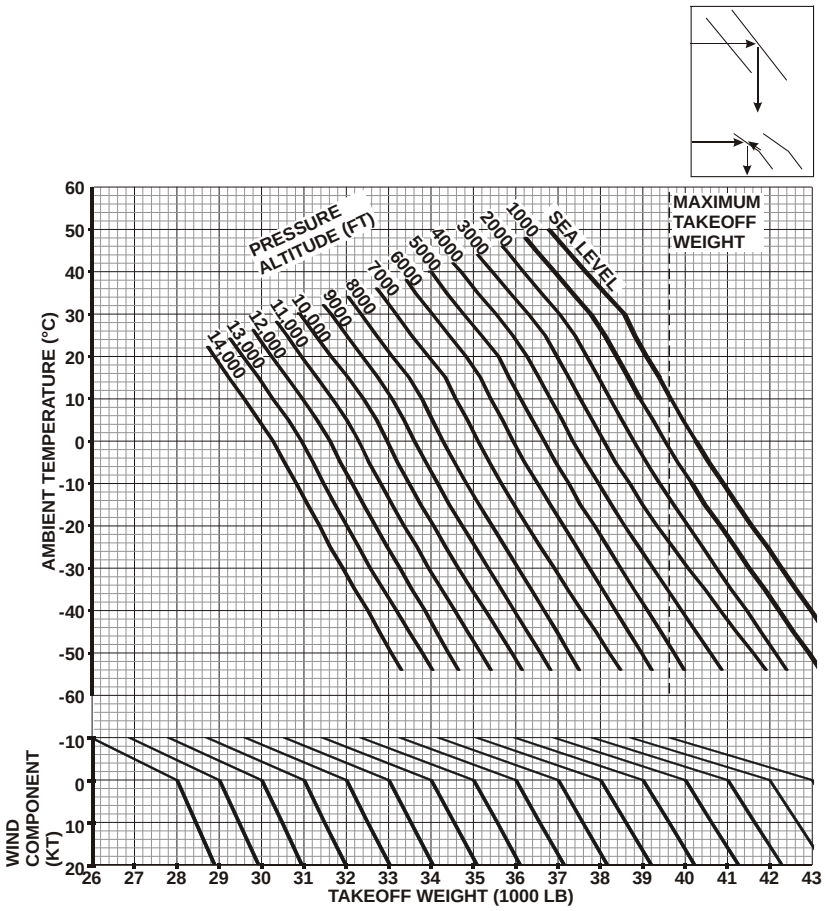

Figure 10-5-4. Maximum Takeoff Weight As Permitted By Brake Energy Limitations

TAKEOFF TABLES AND CHARTS; FLAPS - 0°; DRY RUNWAY

FIGURE 10-5-5. TAKE-OFF DATA; FLAPS - 0°; SEA LEVEL; ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
39600	TOFL	6680	6780	6900	7020	7130	7250	7360	7460	7600	7730	7860	192	192
	V1	172	172	171	171	171	171	171	171	171	171	171		
	VR	176	176	176	176	175	175	175	175	175	175	175		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	7.7	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.9	7.9		
39000	TOFL	6470	6560	6680	6790	6900	7010	7120	7220	7350	7480	7600	191	191
	V1	170	170	169	169	169	169	169	169	169	169	169		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	7.9	7.9	7.9	7.9	8	8	8.1	8.1	8.1	8.1	8.1		
38000	TOFL	6120	6210	6320	6420	6530	6630	6730	6830	6950	7070	7180	188	188
	V1	166	166	166	166	166	166	165	165	165	165	165		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	8.3	8.3	8.3	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
37000	TOFL	5790	5870	5970	6070	6170	6270	6360	6450	6570	6680	6790	185	185
	V1	163	163	163	162	162	162	162	162	162	162	162		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	8.7	8.7	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9		
36000	TOFL	5460	5540	5640	5730	5820	5910	6000	6090	6200	6300	6410	182	182
	V1	159	159	159	159	159	159	158	158	158	158	158		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	9.2	9.2	9.2	9.2	9.3	9.3	9.4	9.4	9.4	9.4	9.4		
35000	TOFL	5150	5220	5310	5400	5490	5580	5660	5740	5840	5940	6040	180	180
	V1	156	156	155	155	155	155	155	155	155	155	155		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	171	171	171	171	170	170	170	170	170	170	170		
	GR2	9.6	9.7	9.7	9.7	9.8	9.8	9.8	9.9	9.9	9.9	9.9		
34000	TOFL	4860	4930	5010	5100	5180	5260	5330	5410	5500	5600	5690	177	177
	V1	152	152	152	152	152	151	151	151	151	151	151		
	VR	159	159	159	159	159	159	159	158	158	158	158		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	10.1	10.2	10.2	10.2	10.3	10.3	10.3	10.4	10.4	10.4	10.4		
33000	TOFL	4580	4640	4720	4800	4880	4950	5020	5090	5180	5260	5350	174	174
	V1	148	148	148	148	148	148	148	147	147	147	147		
	VR	156	156	156	155	155	155	155	155	155	155	155		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.7	10.7	10.7	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9		
32000	TOFL	4310	4380	4450	4520	4590	4670	4740	4800	4880	4970	5050	171	171
	V1	145	145	145	145	144	144	144	144	144	144	144		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	11.2	11.3	11.3	11.3	11.4	11.4	11.4	11.5	11.5	11.5	11.5		
31000	TOFL	4070	4130	4200	4270	4340	4400	4470	4530	4610	4680	4750	168	168
	V1	141	141	141	141	141	141	141	140	140	140	140		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	11.8	11.9	11.9	11.9	12	12	12.1	12.1	12.1	12.1	12.1		

FIGURE 10-5-5. TAKE-OFF DATA; FLAPS - 0°; SEA LEVEL; ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
30000	TOFL	3840	3890	3960	4020	4080	4150	4210	4270	4340	4410	4480	166	166
	V1	138	138	138	138	137	137	137	137	137	137	137		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	12.5	12.5	12.5	12.6	12.6	12.7	12.7	12.8	12.8	12.8	12.8		
29000	TOFL	3610	3660	3720	3780	3840	3900	3960	4010	4080	4140	4210	163	163
	V1	134	134	134	134	134	134	133	133	133	133	133		
	VR	143	143	143	143	142	142	142	142	142	142	142		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	13.2	13.2	13.2	13.3	13.3	13.4	13.4	13.4	13.4	13.4	13.4		
28000	TOFL	3400	3440	3500	3560	3610	3670	3720	3770	3830	3890	3950	160	160
	V1	131	131	130	130	130	130	130	130	130	129	129		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	13.9	13.9	13.9	14	14	14.1	14.1	14.2	14.2	14.2	14.2		
27000	TOFL	3190	3240	3290	3340	3390	3440	3490	3540	3590	3650	3710	157	157
	V1	127	127	127	127	126	126	126	126	126	126	126		
	VR	136	136	136	136	135	135	135	135	135	135	135		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	14.7	14.7	14.7	14.8	14.8	14.9	14.9	15	15	15	15		
26000	TOFL	3000	3040	3090	3140	3180	3230	3280	3320	3370	3430	3480	154	154
	V1	123	123	123	123	123	123	122	122	122	122	122		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	15.5	15.5	15.6	15.6	15.7	15.7	15.8	15.8	15.8	15.8	15.8		

FIGURE 10-5-5. TAKE-OFF DATA; FLAPS - 0°; SEA LEVEL; ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
39600	TOFL	7990	8110	8240	8380	8510	8640	8770	9280	9950	10630	11340	192	192
	V1	171	170	170	170	170	170	170	172	173	175	176		
	VR	175	175	175	175	175	175	175	176	177	177	178		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.2	6.5	5.9	5.3		
39000	TOFL	7720	7850	7980	8100	8230	8360	8480	8970	9620	10280	10960	191	191
	V1	168	168	168	168	168	168	168	170	171	173	174		
	VR	174	174	174	174	174	174	174	174	175	175	176		
	V2	181	181	181	181	181	181	181	180	180	180	180		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	7.4	6.7	6.1	5.5		
38000	TOFL	7300	7420	7540	7660	7780	7900	8020	8470	9100	9710	10350	188	188
	V1	165	165	165	165	165	165	165	166	168	170	171		
	VR	171	171	171	171	171	171	171	171	172	173	173		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	7.8	7.1	6.5	5.9		
37000	TOFL	6900	7010	7120	7240	7350	7460	7570	8000	8580	9160	9760	185	185
	V1	162	162	162	162	161	161	161	163	165	166	168		
	VR	168	168	168	168	168	168	168	168	169	170	170		
	V2	176	176	176	176	176	176	176	175	175	175	175		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.3	7.5	6.8	6.2		
36000	TOFL	6510	6620	6720	6810	6920	7020	7140	7540	8090	8640	9200	182	182
	V1	158	158	158	158	158	158	158	160	161	163	164		
	VR	165	165	165	165	165	165	165	165	166	167	168		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	8.7	7.9	7.2	6.6		
35000	TOFL	6140	6230	6330	6430	6530	6630	6720	7090	7610	8130	8660	180	180
	V1	154	154	154	154	154	154	154	156	158	160	161		
	VR	162	162	162	162	162	162	162	162	163	164	165		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.2	8.4	7.7	7		
34000	TOFL	5780	5870	5960	6060	6150	6240	6330	6670	7160	7640	8130	177	177
	V1	151	151	151	151	151	151	151	152	154	156	158		
	VR	158	158	158	158	158	158	158	159	160	161	162		
	V2	168	168	168	168	168	168	168	167	167	167	167		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	9.7	8.8	8.1	7.4		
33000	TOFL	5440	5520	5610	5690	5780	5870	5950	6270	6710	7170	7630	174	174
	V1	147	147	147	147	147	147	147	149	151	152	154		
	VR	155	155	155	155	155	155	155	156	157	158	159		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.2	9.3	8.6	7.9		
32000	TOFL	5130	5210	5290	5370	5450	5530	5610	5890	6300	6710	7150	171	171
	V1	144	144	144	144	144	144	144	145	147	149	151		
	VR	152	152	152	152	152	152	152	153	154	155	156		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	11.5	11.5	11.5	11.5	11.5	11.5	11.5	10.7	9.9	9.1	8.4		
31000	TOFL	4830	4900	4980	5060	5130	5210	5280	5540	5910	6290	6690	168	168
	V1	140	140	140	140	140	140	140	141	143	145	147		
	VR	149	149	149	149	149	149	149	150	151	152	152		
	V2	160	160	160	160	160	160	160	160	159	159	159		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	11.3	10.4	9.6	8.9		

FIGURE 10-5-5. TAKE-OFF DATA; FLAPS - 0°; SEA LEVEL; ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF; PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
30000	TOFL	4550	4620	4690	4760	4830	4900	4970	5200	5540	5890	6250	166	166
	V1	137	137	137	137	137	137	137	138	140	141	143		
	VR	146	146	146	146	146	146	146	146	147	148	149		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	11.9	11	10.2	9.4		
29000	TOFL	4270	4340	4400	4470	4530	4600	4660	4880	5190	5510	5840	163	163
	V1	133	133	133	133	133	133	133	134	136	138	139		
	VR	142	142	142	142	142	142	142	143	144	145	146		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	13.4	13.4	13.5	13.4	13.4	13.4	13.4	12.6	11.7	10.8	10		
28000	TOFL	4010	4070	4130	4190	4250	4310	4370	4570	4860	5150	5450	160	160
	V1	129	129	129	129	129	129	129	130	132	134	135		
	VR	139	139	139	139	139	139	139	140	141	142	143		
	V2	152	152	152	152	152	152	152	151	151	151	151		
	GR2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.3	12.3	11.4	10.6		
27000	TOFL	3760	3820	3870	3930	3990	4040	4100	4280	4540	4810	5080	157	157
	V1	126	126	125	125	125	125	125	127	128	130	132		
	VR	135	135	135	135	135	135	135	136	137	138	139		
	V2	149	149	149	149	149	149	149	149	149	148	148		
	GR2	15	15	15	15	15	15	15	14.1	13.1	12.1	11.3		
26000	TOFL	3530	3580	3630	3680	3740	3790	3840	4010	4250	4490	4740	154	154
	V1	122	122	122	122	122	122	122	123	125	126	128		
	VR	132	132	132	132	132	132	132	133	134	135	136		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	15.8	15.8	15.8	15.8	15.8	15.8	15.8	14.9	13.9	12.9	12		

FIGURE 10-5-6. TAKE-OFF DISTANCE; FLAPS - 0°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.8	78.2	79.2	80.1	81.0	81.9	82.8	83.6	84.4	85.3	86.1		
39600	TOFL	7030	7140	7270	7390	7520	7640	7760	7890	8030	8160	8300	193	193
	V1	172	172	172	172	172	172	172	172	172	172	172		
	VR	176	176	176	176	176	176	176	176	176	176	176		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6		
39000	TOFL	6800	6900	7030	7150	7270	7390	7510	7630	7760	7900	8030	191	191
	V1	170	170	170	170	170	170	170	170	170	170	170		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
38000	TOFL	6430	6530	6650	6760	6880	6990	7100	7210	7340	7460	7590	188	188
	V1	167	167	167	167	167	166	166	166	166	166	166		
	VR	172	172	172	172	172	171	171	171	171	171	171		
	V2	179	179	179	179	179	179	179	179	179	178	178		
	GR2	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
37000	TOFL	6080	6170	6280	6390	6500	6600	6700	6810	6930	7050	7160	185	185
	V1	164	163	163	163	163	163	163	163	163	163	163		
	VR	169	169	169	168	168	168	168	168	168	168	168		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	8.5	8.5	8.5	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.7		
36000	TOFL	5740	5820	5930	6030	6130	6230	6320	6420	6540	6650	6760	182	183
	V1	160	160	160	160	160	159	159	159	159	159	159		
	VR	166	166	166	165	165	165	165	165	165	165	165		
	V2	174	174	174	174	174	174	173	173	173	173	173		
	GR2	9	9	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1		
35000	TOFL	5410	5480	5580	5670	5770	5860	5950	6050	6150	6260	6360	180	180
	V1	156	156	156	156	156	156	156	155	155	155	155		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	9.4	9.4	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6		
34000	TOFL	5090	5170	5260	5350	5440	5520	5610	5700	5800	5900	5990	177	177
	V1	153	153	153	152	152	152	152	152	152	152	152		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	9.9	9.9	10	10	10	10	10.1	10.1	10.1	10.1	10.1		
33000	TOFL	4800	4870	4950	5040	5120	5200	5280	5360	5450	5540	5630	174	174
	V1	149	149	149	149	149	149	148	148	148	148	148		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.5	10.5	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6		
32000	TOFL	4510	4570	4650	4730	4810	4880	4960	5040	5120	5210	5290	171	171
	V1	145	145	145	145	145	145	145	144	144	144	144		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	163	163	163	163	163	162	162	162	162	162	162		
	GR2	11	11	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2		
31000	TOFL	4250	4310	4390	4460	4530	4600	4670	4740	4820	4900	4980	168	169
	V1	142	142	142	141	141	141	141	141	141	141	141		
	VR	150	150	150	150	150	149	149	149	149	149	149		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	11.6	11.6	11.6	11.7	11.7	11.7	11.8	11.8	11.8	11.8	11.8		

FIGURE 10-5-6. TAKE-OFF DISTANCE; FLAPS - 0°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.8	78.2	79.2	80.1	81.0	81.9	82.8	83.6	84.4	85.3	86.1		
30000	TOFL	4000	4060	4130	4200	4270	4330	4400	4470	4540	4610	4690	166	166
	V1	138	138	138	138	138	138	138	137	137	137	137		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	12.3	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4		
29000	TOFL	3770	3820	3890	3950	4010	4080	4140	4200	4270	4340	4400	163	163
	V1	135	135	135	134	134	134	134	134	134	134	134		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	12.9	12.9	12.9	13	13	13	13.1	13.1	13.1	13.1	13.1		
28000	TOFL	3540	3590	3650	3710	3770	3830	3880	3940	4010	4070	4130	160	160
	V1	131	131	131	131	131	130	130	130	130	130	130		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	13.6	13.7	13.7	13.7	13.7	13.8	13.8	13.8	13.8	13.8	13.8		
27000	TOFL	3320	3370	3430	3480	3540	3590	3640	3700	3760	3820	3870	157	157
	V1	127	127	127	127	127	127	127	126	126	126	126		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	14.4	14.4	14.4	14.5	14.5	14.5	14.6	14.6	14.6	14.6	14.6		
26000	TOFL	3120	3160	3210	3260	3310	3360	3410	3460	3520	3570	3630	154	154
	V1	124	123	123	123	123	123	123	123	122	122	122		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	15.3	15.3	15.3	15.3	15.3	15.4	15.4	15.4	15.4	15.4	15.4		

FIGURE 10-5-6. TAKE-OFF DISTANCE; FLAPS - 0°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
39600	TOFL	8440	8580	8720	8850	8990	9130	9430	10020	10710	11440	11910	193	193
	V1	172	171	171	171	171	171	172	173	175	176	176		
	VR	176	176	176	176	176	176	176	177	177	178	178		
	V2	183	182	182	182	182	182	182	182	182	182	182		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.4	6.8	6.1	5.5	5.2		
39000	TOFL	8160	8290	8430	8560	8700	8830	9110	9690	10360	11060	11510	191	191
	V1	169	169	169	169	169	169	170	171	173	174	175		
	VR	174	174	174	174	174	174	175	175	176	176	177		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.6	7	6.3	5.7	5.3		
38000	TOFL	7710	7840	7960	8090	8220	8340	8610	9150	9780	10440	10860	188	188
	V1	166	166	166	166	166	166	166	168	169	171	171		
	VR	171	171	171	171	171	171	172	172	173	173	174		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8	7.4	6.7	6.1	5.7		
37000	TOFL	7280	7400	7520	7640	7760	7880	8120	8630	9230	9840	10240	185	185
	V1	163	162	162	162	162	162	163	164	166	167	168		
	VR	168	168	168	168	168	168	169	169	170	171	171		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	8.7	8.7	8.7	8.7	8.7	8.6	8.4	7.8	7.1	6.4	6.1		
36000	TOFL	6870	6980	7090	7200	7310	7430	7660	8140	8690	9270	9650	182	183
	V1	159	159	159	159	159	159	159	161	163	164	165		
	VR	165	165	165	165	165	165	166	166	167	168	168		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	8.9	8.2	7.5	6.8	6.4		
35000	TOFL	6460	6570	6670	6780	6880	6980	7210	7660	8180	8730	9070	180	180
	V1	155	155	155	155	155	155	156	158	159	161	162		
	VR	162	162	162	162	162	162	163	163	164	165	165		
	V2	171	171	171	171	171	171	171	170	170	170	170		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.3	8.7	7.9	7.2	6.8		
34000	TOFL	6090	6190	6280	6380	6480	6580	6780	7200	7680	8200	8530	177	177
	V1	152	152	152	152	152	152	152	154	156	157	158		
	VR	159	159	159	159	159	159	159	160	161	162	162		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	9.8	9.1	8.4	7.7	7.2		
33000	TOFL	5720	5820	5910	6000	6090	6180	6370	6750	7210	7690	7990	174	174
	V1	148	148	148	148	148	148	148	150	152	154	155		
	VR	156	156	156	156	156	156	156	157	158	159	159		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.4	9.6	8.8	8.1	7.7		
32000	TOFL	5380	5460	5550	5630	5720	5800	5980	6330	6740	7200	7480	171	171
	V1	144	144	144	144	144	144	145	146	148	150	151		
	VR	153	153	153	153	153	153	153	154	155	155	156		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	10.9	10.2	9.4	8.6	8.1		
31000	TOFL	5060	5140	5220	5300	5380	5460	5620	5940	6320	6730	7000	168	169
	V1	141	141	141	141	141	141	141	143	145	146	147		
	VR	149	149	149	149	149	149	150	151	151	152	153		
	V2	160	160	160	160	160	160	160	160	159	159	159		
	GR2	11.8	11.8	11.8	11.8	11.8	11.8	11.5	10.7	9.9	9.1	8.7		

FIGURE 10-5-6. TAKE-OFF DISTANCE; FLAPS - 0°; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
30000	TOFL	4760	4840	4910	4980	5060	5130	5280	5560	5920	6290	6530	166	166
	V1	137	137	137	137	137	137	138	139	141	143	144		
	VR	146	146	146	146	146	146	146	147	148	149	150		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.1	11.4	10.5	9.7	9.2		
29000	TOFL	4470	4540	4610	4680	4750	4820	4950	5220	5530	5880	6100	163	163
	V1	134	134	133	133	133	133	134	135	137	139	140		
	VR	143	143	143	143	143	143	143	144	145	146	146		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	13.1	13.1	13.1	13.1	13.1	13.1	12.8	12	11.1	10.3	9.8		
28000	TOFL	4200	4260	4320	4390	4450	4510	4640	4880	5170	5480	5690	160	160
	V1	130	130	130	130	130	130	130	132	133	135	136		
	VR	139	139	139	139	139	139	140	141	142	142	143		
	V2	152	152	152	152	152	152	152	151	151	151	151		
	GR2	13.8	13.8	13.8	13.8	13.8	13.8	13.5	12.7	11.8	10.9	10.4		
27000	TOFL	3930	3990	4050	4110	4170	4230	4340	4570	4830	5110	5290	157	157
	V1	126	126	126	126	126	126	126	128	130	131	132		
	VR	136	136	136	136	136	136	136	137	138	139	140		
	V2	149	149	149	149	149	149	149	149	149	148	148		
	GR2	14.6	14.6	14.6	14.6	14.6	14.6	14.3	13.4	12.5	11.6	11.1		
26000	TOFL	3680	3730	3790	3840	3900	3950	4060	4260	4510	4760	4930	154	154
	V1	122	122	122	122	122	122	122	124	126	127	128		
	VR	132	132	132	132	132	132	132	133	135	136	136		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	15.4	15.5	15.4	15.4	15.4	15.4	15.1	14.2	13.2	12.3	11.8		

FIGURE 10-5-7. TAKE-OFF DISTANCE; FLAPS - 0°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.3	79.0	79.9	80.8	81.7	82.6	83.4	84.3	85.1	85.9	86.8		
39600	TOFL	7370	7490	7630	7780	7920	8060	8190	8340	8490	8630	8780	193	193
	V1	173	173	173	173	173	173	173	173	173	172	172		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
39000	TOFL	7130	7240	7390	7520	7660	7790	7920	8060	8210	8350	8480	192	191
	V1	171	171	171	171	171	171	171	171	171	170	170		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	182	182	182	182	182	182	182	182	182	181	181		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6		
38000	TOFL	6740	6850	6980	7110	7240	7360	7490	7620	7750	7880	8020	189	189
	V1	168	168	168	168	167	167	167	167	167	167	167		
	VR	172	172	172	172	172	172	172	172	172	172	172		
	V2	179	179	179	179	179	179	179	179	179	179	179		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8	8	8		
37000	TOFL	6360	6470	6590	6710	6830	6950	7070	7190	7320	7440	7560	186	186
	V1	164	164	164	164	164	164	164	164	164	164	164		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	8.4	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4		
36000	TOFL	6000	6100	6220	6330	6440	6560	6660	6780	6900	7020	7130	183	183
	V1	161	161	161	160	160	160	160	160	160	160	160		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	174	174	174	174	174	174	173	173	173	173	173		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
35000	TOFL	5660	5750	5860	5970	6070	6170	6280	6380	6500	6610	6700	180	180
	V1	157	157	157	157	157	157	157	157	157	156	156		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	9.3	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3		
34000	TOFL	5320	5410	5510	5610	5710	5810	5900	6000	6110	6210	6310	177	177
	V1	153	153	153	153	153	153	153	153	153	153	153		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	9.8	9.7	9.7	9.7	9.7	9.8	9.8	9.8	9.8	9.8	9.8		
33000	TOFL	5010	5090	5180	5280	5370	5460	5550	5650	5740	5840	5940	175	175
	V1	150	150	150	150	149	149	149	149	149	149	149		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.3	10.3	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
32000	TOFL	4710	4780	4870	4960	5040	5130	5210	5300	5390	5480	5570	172	172
	V1	146	146	146	146	146	146	145	145	145	145	145		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	10.9	10.8	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9		
31000	TOFL	4430	4490	4580	4660	4740	4810	4890	4980	5060	5140	5230	169	169
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4		

FIGURE 10-5-7. TAKE-OFF DISTANCE; FLAPS - 0°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.3	79.0	79.9	80.8	81.7	82.6	83.4	84.3	85.1	85.9	86.8		
30000	TOFL	4160	4230	4300	4380	4450	4530	4600	4680	4760	4830	4910	166	166
	V1	139	139	138	138	138	138	138	138	138	138	138		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	12.1	12	12	12	12	12	12.1	12.1	12.1	12.1	12.1		
29000	TOFL	3920	3970	4050	4120	4190	4260	4320	4390	4470	4540	4610	163	163
	V1	135	135	135	135	135	135	135	134	134	134	134		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.8		
28000	TOFL	3680	3730	3800	3870	3930	3990	4060	4130	4190	4260	4330	160	160
	V1	131	131	131	131	131	131	131	131	131	131	130		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.5	13.5	13.5	13.5		
27000	TOFL	3450	3500	3560	3620	3690	3750	3800	3860	3930	3990	4050	157	157
	V1	128	128	127	127	127	127	127	127	127	127	127		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2		
26000	TOFL	3230	3280	3340	3390	3450	3500	3560	3610	3670	3730	3790	154	154
	V1	124	124	124	123	123	123	123	123	123	123	123		
	VR	133	133	133	133	133	133	132	132	132	132	132		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	15.1	15	15	15	15	15	15.1	15.1	15.1	15.1	15.1		

FIGURE 10-5-7. TAKE-OFF DISTANCE; FLAPS - 0°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.6	88.4	89.2	90.1	90.9	91.7	91.5	90.8	90.1	89.5	89.4		
39600	TOFL	8920	9070	9220	9370	9510	9660	10140	10820	11550	12340	12520	193	193
	V1	172	172	172	172	172	172	173	174	176	177	177		
	VR	177	177	177	177	177	177	177	178	178	179	179		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	6.9	6.3	5.7	5.1	5		
39000	TOFL	8620	8770	8910	9050	9200	9340	9810	10460	11160	11930	12100	192	191
	V1	170	170	170	170	170	170	171	173	174	175	175		
	VR	175	175	175	175	175	175	175	176	176	177	177		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	7.6	7.6	7.6	7.6	7.6	7.5	7.2	6.5	5.9	5.3	5.2		
38000	TOFL	8150	8280	8420	8550	8690	8820	9260	9870	10530	11250	11410	189	189
	V1	167	167	167	167	167	167	168	169	171	172	172		
	VR	172	172	172	172	172	172	172	173	174	174	174		
	V2	179	179	179	179	179	179	179	178	178	178	178		
	GR2	8	8	8	7.9	7.9	7.9	7.6	6.9	6.3	5.6	5.5		
37000	TOFL	7690	7820	7940	8070	8190	8320	8740	9310	9930	10600	10750	186	186
	V1	163	163	163	163	163	163	164	166	167	169	169		
	VR	169	169	169	169	169	169	170	170	171	171	171		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8	7.3	6.6	6	5.8		
36000	TOFL	7250	7370	7490	7600	7720	7840	8230	8770	9350	9980	10120	183	183
	V1	160	160	160	160	160	160	161	163	164	165	166		
	VR	166	166	166	166	166	166	167	167	168	168	169		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.4	7.7	7	6.4	6.2		
35000	TOFL	6810	6940	7030	7150	7260	7380	7740	8250	8790	9390	9510	180	180
	V1	156	156	156	156	156	156	157	159	161	162	162		
	VR	163	163	163	163	163	163	163	164	165	165	166		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	8.8	8.1	7.4	6.8	6.6		
34000	TOFL	6420	6520	6620	6730	6830	6940	7280	7750	8260	8820	8940	177	177
	V1	153	153	153	153	153	153	154	155	157	159	159		
	VR	160	160	160	160	160	160	160	161	162	162	163		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	9.8	9.8	9.8	9.8	9.8	9.7	9.3	8.6	7.9	7.2	7		
33000	TOFL	6030	6130	6230	6320	6420	6520	6830	7270	7750	8260	8380	175	175
	V1	149	149	149	149	149	149	150	152	154	155	155		
	VR	157	157	157	157	157	157	157	158	159	159	160		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	9.8	9.1	8.3	7.6	7.5		
32000	TOFL	5660	5750	5840	5930	6020	6110	6400	6800	7250	7730	7840	172	172
	V1	145	145	145	145	145	145	146	148	150	151	152		
	VR	153	153	153	153	153	153	154	155	156	156	156		
	V2	163	163	163	163	163	163	163	163	163	162	162		
	GR2	10.9	10.9	10.9	10.9	10.9	10.8	10.4	9.6	8.8	8.1	7.9		
31000	TOFL	5310	5400	5480	5560	5650	5730	5990	6370	6770	7230	7330	169	169
	V1	141	141	141	141	141	141	142	144	146	148	148		
	VR	150	150	150	150	150	150	151	151	152	153	153		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	10.9	10.1	9.4	8.6	8.4		

FIGURE 10-5-7. TAKE-OFF DISTANCE; FLAPS - 0°; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.6	88.4	89.2	90.1	90.9	91.7	91.5	90.8	90.1	89.5	89.4		
30000	TOFL	4990	5070	5140	5220	5300	5380	5620	5960	6330	6740	6830	166	166
	V1	138	138	138	138	138	138	139	140	142	144	144		
	VR	147	147	147	147	147	147	147	148	149	150	150		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	12.1	12.1	12.1	12.1	12.1	12	11.6	10.8	9.9	9.1	9		
29000	TOFL	4680	4760	4830	4900	4980	5050	5270	5570	5920	6290	6370	163	163
	V1	134	134	134	134	134	134	135	137	138	140	140		
	VR	143	143	143	143	143	143	144	145	146	147	147		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	12.8	12.8	12.7	12.7	12.7	12.7	12.2	11.4	10.5	9.7	9.5		
28000	TOFL	4390	4460	4530	4590	4660	4730	4930	5210	5510	5860	5940	160	160
	V1	130	130	130	130	130	130	131	133	135	136	137		
	VR	140	140	140	140	140	140	141	141	142	143	143		
	V2	152	152	152	152	152	152	152	152	151	151	151		
	GR2	13.5	13.5	13.5	13.5	13.5	13.4	12.9	12.1	11.2	10.3	10.1		
27000	TOFL	4110	4180	4240	4300	4360	4430	4610	4870	5140	5450	5520	157	157
	V1	127	127	127	126	126	126	127	129	131	132	133		
	VR	136	136	136	136	136	136	137	138	139	140	140		
	V2	149	149	149	149	149	149	149	149	149	148	148		
	GR2	14.2	14.2	14.2	14.2	14.2	14.2	13.7	12.8	11.9	11	10.8		
26000	TOFL	3840	3900	3960	4020	4070	4130	4310	4540	4790	5070	5130	154	154
	V1	123	123	123	123	123	123	124	125	127	128	129		
	VR	132	132	132	132	132	132	133	134	135	136	137		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	15.1	15.1	15.1	15.1	15.1	15	14.5	13.6	12.6	11.7	11.5		

FIGURE 10-5-8. TAKE-OFF DISTANCE; FLAPS - 0°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.4	82.3	83.2	84.1	84.9	85.7	86.6	87.4		
39600	TOFL	7720	7890	8050	8210	8360	8510	8670	8820	8980	9130	9290	193	193
	V1	174	174	174	174	174	174	174	173	173	173	173		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	7.1	7	7	7	7	7	7.1	7.1	7.1	7.1	7.1		
39000	TOFL	7470	7630	7790	7940	8090	8230	8380	8530	8680	8830	8980	192	192
	V1	172	172	172	172	172	172	172	171	171	171	171		
	VR	176	176	176	176	176	176	176	176	176	176	176		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
38000	TOFL	7060	7220	7360	7500	7640	7780	7920	8060	8200	8340	8480	189	189
	V1	168	168	168	168	168	168	168	168	168	168	168		
	VR	173	173	173	173	173	173	173	173	173	173	173		
	V2	179	179	179	179	179	179	179	179	179	179	179		
	GR2	7.8	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7		
37000	TOFL	6670	6810	6950	7090	7220	7350	7480	7610	7740	7870	8010	186	186
	V1	165	165	165	165	165	165	165	165	165	164	164		
	VR	170	170	170	170	170	170	170	170	170	170	170		
	V2	177	177	177	177	177	177	177	176	176	176	176		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
36000	TOFL	6290	6420	6550	6680	6800	6920	7040	7170	7290	7420	7540	183	183
	V1	161	161	161	161	161	161	161	161	161	161	161		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
35000	TOFL	5910	6040	6160	6280	6390	6500	6610	6730	6850	6970	7080	181	181
	V1	158	158	158	158	157	157	157	157	157	157	157		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	9.1	8.9	8.9	8.9	8.9	8.9	9	9	9	9	9		
34000	TOFL	5560	5680	5790	5900	6010	6120	6220	6330	6440	6550	6660	178	178
	V1	154	154	154	154	154	154	154	154	154	154	153		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	9.6	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
33000	TOFL	5240	5350	5450	5560	5660	5750	5850	5960	6060	6160	6260	175	175
	V1	150	150	150	150	150	150	150	150	150	150	150		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	10.1	9.9	9.9	9.9	9.9	9.9	10	10	10	10	10		
32000	TOFL	4920	5020	5120	5210	5310	5400	5490	5590	5690	5780	5880	172	172
	V1	147	147	147	147	146	146	146	146	146	146	146		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
31000	TOFL	4620	4710	4800	4890	4980	5060	5150	5240	5330	5420	5500	169	169
	V1	143	143	143	143	143	143	142	142	142	142	142		
	VR	151	151	151	151	151	150	150	150	150	150	150		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	11.2	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 10-5-8. TAKE-OFF DISTANCE; FLAPS - 0°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.4	82.3	83.2	84.1	84.9	85.7	86.6	87.4		
30000	TOFL	4330	4420	4500	4590	4670	4750	4830	4910	5000	5080	5160	167	166
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	11.8	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
29000	TOFL	4070	4150	4230	4310	4380	4460	4530	4610	4680	4760	4840	164	163
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	12.5	12.3	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4		
28000	TOFL	3820	3900	3970	4040	4110	4180	4250	4320	4390	4460	4530	161	160
	V1	132	132	132	132	132	131	131	131	131	131	131		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	152	152	152	151	151	151	151	151	151	151	152		
	GR2	13.2	13	13	13	13	13.1	13.1	13.1	13.1	13.1	13.1		
27000	TOFL	3580	3650	3720	3790	3850	3920	3980	4050	4110	4180	4240	157	157
	V1	128	128	128	128	128	128	128	128	127	127	127		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	13.9	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8		
26000	TOFL	3360	3420	3480	3540	3600	3660	3720	3780	3840	3900	3960	154	154
	V1	124	124	124	124	124	124	124	124	124	124	123		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	14.8	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6		

FIGURE 10-5-8. TAKE-OFF DISTANCE; FLAPS - 0°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
39600	TOFL	9440	9600	9760	9920	10070	10320	10980	11710	12510	13210		193	193
	V1	173	173	173	173	173	173	175	176	177	178			
	VR	177	177	177	177	177	177	178	179	179	179			
	V2	183	183	183	183	183	183	183	183	183	183			
	GR2	7.1	7.1	7.1	7.1	7	6.9	6.4	5.8	5.3	4.8			
39000	TOFL	9130	9280	9440	9590	9740	9980	10600	11320	12080	12760		192	192
	V1	171	171	171	171	171	171	173	174	175	176			
	VR	176	176	176	176	176	176	176	177	177	178			
	V2	182	182	182	182	182	182	182	182	182	182			
	GR2	7.3	7.3	7.3	7.3	7.3	7.1	6.7	6.1	5.5	5			
38000	TOFL	8620	8770	8910	9050	9200	9420	10010	10680	11400	12030		189	189
	V1	168	168	168	168	168	168	169	171	172	173			
	VR	173	173	173	173	173	173	173	174	175	175			
	V2	179	179	179	179	179	179	179	179	179	179			
	GR2	7.7	7.7	7.7	7.7	7.6	7.5	7	6.4	5.8	5.3			
37000	TOFL	8140	8270	8410	8540	8680	8890	9440	10060	10730	11340		186	186
	V1	164	164	164	164	164	165	166	167	169	170			
	VR	170	170	170	170	170	170	170	171	172	172			
	V2	176	176	176	176	176	176	176	176	176	176			
	GR2	8.1	8.1	8.1	8.1	8.1	7.9	7.4	6.8	6.2	5.6			
36000	TOFL	7670	7790	7920	8050	8170	8370	8890	9470	10100	10660		183	183
	V1	161	161	161	161	161	161	162	164	165	166			
	VR	167	167	167	167	167	167	167	168	169	169			
	V2	174	174	174	174	174	174	174	174	174	174			
	GR2	8.5	8.5	8.5	8.5	8.5	8.3	7.8	7.2	6.5	6			
35000	TOFL	7200	7320	7440	7550	7670	7880	8360	8910	9490	10020		181	181
	V1	157	157	157	157	157	157	159	160	162	163			
	VR	163	163	163	163	163	164	164	165	166	166			
	V2	171	171	171	171	171	171	171	171	171	171			
	GR2	9	9	9	9	8.9	8.8	8.3	7.6	6.9	6.4			
34000	TOFL	6770	6880	6990	7100	7210	7390	7850	8370	8910	9400		178	178
	V1	153	153	153	153	153	154	155	157	158	160			
	VR	160	160	160	160	160	160	161	162	163	163			
	V2	168	168	168	168	168	168	168	168	168	168			
	GR2	9.4	9.4	9.4	9.4	9.4	9.2	8.8	8	7.4	6.8			
33000	TOFL	6370	6470	6570	6670	6780	6940	7360	7840	8360	8810		175	175
	V1	150	150	150	150	150	150	152	153	155	156			
	VR	157	157	157	157	157	157	158	159	160	160			
	V2	166	166	166	166	166	166	166	166	166	166			
	GR2	10	10	9.9	9.9	9.9	9.7	9.2	8.5	7.8	7.2			
32000	TOFL	5970	6070	6160	6260	6360	6510	6890	7330	7820	8240		172	172
	V1	146	146	146	146	146	146	148	149	151	153			
	VR	154	154	154	154	154	154	155	155	156	157			
	V2	163	163	163	163	163	163	163	163	163	163			
	GR2	10.5	10.5	10.5	10.5	10.5	10.3	9.8	9	8.3	7.7			
31000	TOFL	5590	5680	5770	5860	5950	6090	6450	6850	7290	7700		169	169
	V1	142	142	142	142	142	142	144	146	147	149			
	VR	150	150	150	150	150	151	151	152	153	154			
	V2	160	160	160	160	160	160	160	160	160	160			
	GR2	11.1	11.1	11.1	11.1	11	10.8	10.3	9.5	8.8	8.2			

FIGURE 10-5-8. TAKE-OFF DISTANCE; FLAPS - 0°; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
30000	TOFL	5240	5330	5410	5490	5580	5700	6020	6400	6800	7160		167	166
	V1	138	138	138	138	138	139	140	142	143	145			
	VR	147	147	147	147	147	147	148	149	150	150			
	V2	157	157	157	157	157	157	157	157	157	157			
	GR2	11.7	11.7	11.7	11.7	11.7	11.4	10.9	10.1	9.3	8.7			
29000	TOFL	4910	4990	5070	5140	5220	5340	5640	5980	6350	6670		164	163
	V1	135	135	135	135	135	135	136	138	140	141			
	VR	144	144	144	144	144	144	145	146	146	147			
	V2	154	154	154	154	154	154	154	154	154	154			
	GR2	12.4	12.4	12.4	12.4	12.3	12.1	11.5	10.7	9.9	9.3			
28000	TOFL	4600	4670	4750	4820	4890	5000	5270	5570	5910	6220		161	160
	V1	131	131	131	131	131	131	133	134	136	137			
	VR	140	140	140	140	140	140	141	142	143	144			
	V2	152	152	152	152	152	152	152	152	152	152			
	GR2	13.1	13.1	13.1	13.1	13	12.8	12.2	11.4	10.5	9.9			
27000	TOFL	4310	4380	4440	4510	4570	4670	4920	5200	5500	5780		157	157
	V1	127	127	127	127	127	127	129	130	132	133			
	VR	137	137	137	137	137	137	138	139	140	140			
	V2	149	149	149	149	149	149	149	149	149	148			
	GR2	13.8	13.8	13.8	13.8	13.8	13.5	12.9	12.1	11.2	10.5			
26000	TOFL	4020	4090	4150	4210	4270	4360	4590	4840	5110	5360		154	154
	V1	123	123	123	123	123	124	125	126	128	129			
	VR	133	133	133	133	133	133	134	135	136	137			
	V2	146	146	146	146	146	146	146	146	146	146			
	GR2	14.6	14.6	14.6	14.6	14.6	14.3	13.7	12.8	11.9	11.2			

FIGURE 10-5-9. TAKE-OFF DISTANCE; FLAPS - 0°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
39600	TOFL	8190	8370	8540	8700	8870	9030	9190	9360	9520	9690	9850	194	194
	V1	175	175	175	175	174	174	174	174	174	174	174		
	VR	178	178	178	178	178	178	178	178	178	178	178		
	V2	184	184	184	184	184	184	184	184	184	184	184		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
39000	TOFL	7920	8090	8250	8410	8570	8720	8880	9040	9200	9360	9520	193	192
	V1	173	173	173	173	173	172	172	172	172	172	172		
	VR	176	176	176	176	176	176	176	176	176	176	176		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	7.1	7	7	7	7	7	7	7	7	7	7		
38000	TOFL	7480	7640	7800	7950	8100	8240	8390	8540	8690	8840	8990	190	189
	V1	169	169	169	169	169	169	169	169	169	169	169		
	VR	173	173	173	173	173	173	173	173	173	173	173		
	V2	180	180	180	180	180	180	180	179	179	179	179		
	GR2	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
37000	TOFL	7070	7220	7360	7500	7640	7780	7920	8060	8200	8340	8490	187	187
	V1	166	166	166	166	166	166	166	166	166	165	165		
	VR	170	170	170	170	170	170	170	170	170	170	170		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
36000	TOFL	6660	6810	6940	7080	7210	7330	7470	7600	7730	7870	8000	184	184
	V1	162	162	162	162	162	162	162	162	162	162	162		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
35000	TOFL	6260	6390	6520	6640	6760	6880	7010	7130	7260	7380	7510	181	181
	V1	159	159	159	159	158	158	158	158	158	158	158		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	8.7	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7		
34000	TOFL	5890	6010	6120	6240	6360	6480	6590	6710	6830	6940	7060	178	178
	V1	155	155	155	155	155	155	155	155	155	155	155		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
33000	TOFL	5530	5650	5760	5860	5970	6080	6180	6290	6400	6510	6620	176	175
	V1	151	151	151	151	151	151	151	151	151	151	151		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
32000	TOFL	5190	5300	5400	5510	5610	5700	5810	5910	6010	6110	6210	173	172
	V1	147	147	147	147	147	147	147	147	147	147	147		
	VR	155	155	155	155	155	154	154	154	154	154	154		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	10.3	10.2	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
31000	TOFL	4870	4970	5070	5160	5250	5340	5440	5530	5630	5720	5820	170	169
	V1	144	144	144	144	143	143	143	143	143	143	143		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7		

FIGURE 10-5-9. TAKE-OFF DISTANCE; FLAPS - 0°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
30000	TOFL	4570	4660	4740	4830	4920	5000	5090	5180	5270	5350	5440	167	166
	V1	140	140	140	140	140	140	139	139	139	139	139		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	11.4	11.3	11.3	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.4		
29000	TOFL	4280	4360	4440	4520	4600	4680	4760	4850	4930	5010	5090	164	163
	V1	136	136	136	136	136	136	136	136	136	136	135		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	12.1	12	12	12	12	12	12	12	12	12	12		
28000	TOFL	4010	4090	4160	4240	4310	4380	4460	4540	4610	4680	4760	161	160
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	151	151	151	151	151	151	151	152	152	152	152		
	GR2	12.8	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7		
27000	TOFL	3760	3830	3900	3970	4040	4110	4180	4250	4310	4380	4450	157	157
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	13.5	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4		
26000	TOFL	3520	3580	3650	3710	3780	3840	3900	3970	4030	4100	4160	154	154
	V1	125	125	125	125	124	124	124	124	124	124	124		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	14.3	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2		

FIGURE 10-5-9. TAKE-OFF DISTANCE; FLAPS - 0°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
39600	TOFL	10020	10190	10350	10520	10700	11190	11940	12740	13610	14010		194	194
	V1	174	174	174	174	174	175	176	177	178	179			
	VR	178	178	178	178	178	178	179	179	180	180			
	V2	183	183	183	183	183	183	183	183	183	183			
	GR2	6.8	6.8	6.8	6.8	6.7	6.4	5.9	5.4	4.8	4.6			
39000	TOFL	9680	9850	10010	10170	10340	10810	11530	12310	13150	13530		193	192
	V1	172	172	172	172	172	173	174	175	176	177			
	VR	176	176	176	176	176	177	177	178	178	178			
	V2	182	182	182	182	182	182	182	182	182	182			
	GR2	7	7	7	7	6.9	6.6	6.2	5.6	5	4.8			
38000	TOFL	9140	9300	9450	9600	9760	10200	10880	11600	12400	12750		190	189
	V1	169	169	169	169	169	170	171	172	173	174			
	VR	173	173	173	173	173	174	174	175	175	176			
	V2	179	179	179	179	179	179	179	179	179	179			
	GR2	7.4	7.4	7.4	7.4	7.3	7	6.5	5.9	5.3	5.1			
37000	TOFL	8630	8770	8920	9060	9210	9610	10240	10930	11670	12000		187	187
	V1	165	165	165	165	165	166	167	169	170	170			
	VR	170	170	170	170	170	171	171	172	172	173			
	V2	177	177	177	177	177	177	177	177	177	177			
	GR2	7.8	7.8	7.8	7.8	7.7	7.4	6.9	6.3	5.7	5.4			
36000	TOFL	8130	8270	8400	8540	8680	9060	9640	10280	10980	11290		184	184
	V1	162	162	162	162	162	163	164	165	167	167			
	VR	167	167	167	167	167	168	168	169	170	170			
	V2	174	174	174	174	174	174	174	174	174	174			
	GR2	8.2	8.2	8.2	8.2	8.1	7.8	7.3	6.7	6.1	5.8			
35000	TOFL	7630	7760	7880	8010	8140	8520	9060	9650	10310	10600		181	181
	V1	158	158	158	158	158	159	161	162	163	164			
	VR	164	164	164	164	164	165	165	166	167	167			
	V2	171	171	171	171	171	171	171	171	171	171			
	GR2	8.7	8.7	8.7	8.7	8.5	8.2	7.7	7.1	6.4	6.2			
34000	TOFL	7180	7290	7410	7530	7660	8000	8510	9060	9660	9930		178	178
	V1	155	155	155	155	155	156	157	158	160	161			
	VR	161	161	161	161	161	162	162	163	163	164			
	V2	169	169	169	169	168	168	168	168	168	168			
	GR2	9.1	9.1	9.1	9.1	9	8.7	8.1	7.5	6.8	6.6			
33000	TOFL	6730	6840	6950	7060	7180	7490	7980	8500	9050	9300		176	175
	V1	151	151	151	151	151	152	153	155	156	157			
	VR	158	158	158	158	158	158	159	160	160	161			
	V2	166	166	166	166	166	166	166	166	166	166			
	GR2	9.6	9.6	9.6	9.6	9.5	9.2	8.6	8	7.3	7			
32000	TOFL	6310	6420	6520	6620	6730	7010	7450	7950	8470	8700		173	172
	V1	147	147	147	147	147	148	149	151	153	153			
	VR	154	154	154	154	154	155	156	157	157	158			
	V2	163	163	163	163	163	163	163	163	163	163			
	GR2	10.2	10.2	10.2	10.2	10	9.7	9.1	8.4	7.8	7.4			
31000	TOFL	5910	6010	6100	6190	6300	6570	6970	7400	7910	8130		170	169
	V1	143	143	143	143	143	144	146	147	149	150			
	VR	151	151	151	151	151	152	152	153	154	154			
	V2	160	160	160	160	160	160	160	160	160	160			
	GR2	10.7	10.7	10.7	10.7	10.6	10.2	9.6	9	8.2	7.9			

FIGURE 10-5-9. TAKE-OFF DISTANCE; FLAPS - 0°; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
30000	TOFL	5530	5620	5710	5790	5890	6130	6510	6910	7360	7560		167	166
	V1	139	139	139	139	139	140	142	143	145	146			
	VR	148	148	148	148	148	148	149	150	151	151			
	V2	157	157	157	157	157	157	157	157	157	157			
	GR2	11.4	11.4	11.3	11.3	11.2	10.8	10.2	9.5	8.8	8.4			
29000	TOFL	5170	5250	5330	5420	5500	5730	6060	6440	6840	7030		164	163
	V1	135	135	135	135	135	136	138	140	141	142			
	VR	144	144	144	144	144	145	146	146	147	148			
	V2	154	154	154	154	154	154	154	154	154	154			
	GR2	12	12	12	12	11.8	11.4	10.8	10.1	9.3	9			
28000	TOFL	4840	4910	4990	5060	5140	5350	5660	6000	6370	6540		161	160
	V1	132	132	132	132	132	132	134	136	137	138			
	VR	141	141	141	141	141	141	142	143	144	144			
	V2	152	152	152	152	152	152	152	152	152	152			
	GR2	12.7	12.7	12.7	12.7	12.5	12.1	11.5	10.7	9.9	9.6			
27000	TOFL	4520	4590	4660	4730	4810	4990	5270	5580	5920	6070		157	157
	V1	128	128	128	128	128	129	130	132	133	134			
	VR	137	137	137	137	137	138	139	140	141	141			
	V2	149	149	149	149	149	149	149	149	149	149			
	GR2	13.4	13.4	13.4	13.4	13.2	12.8	12.2	11.4	10.6	10.2			
26000	TOFL	4220	4290	4350	4420	4490	4660	4910	5190	5490	5630		154	154
	V1	124	124	124	124	124	125	126	128	129	130			
	VR	133	133	133	133	133	134	135	136	137	137			
	V2	146	146	146	146	146	146	146	146	146	146			
	GR2	14.2	14.2	14.2	14.2	14	13.6	12.9	12.1	11.3	10.9			

FIGURE 10-5-10. TAKE-OFF DISTANCE; FLAPS - 0°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.0	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5		
39600	TOFL	8650	8800	8980	9160	9330	9500	9680	9850	10030	10210	10380	194	194
	V1	175	175	175	175	175	175	175	175	175	175	175		
	VR	178	178	178	178	178	178	178	178	178	178	178		
	V2	184	184	184	184	184	184	184	184	184	184	184		
	GR2	6.6	6.6	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6		
39000	TOFL	8370	8510	8680	8860	9020	9190	9360	9530	9700	9870	10040	193	193
	V1	173	173	173	173	173	173	173	173	173	173	173		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	6.8	6.8	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
38000	TOFL	7910	8040	8210	8370	8530	8680	8840	9000	9160	9320	9480	190	190
	V1	170	170	170	170	170	170	170	170	170	170	170		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	180	180	180	180	180	180	180	180	179	179	179		
	GR2	7.2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
37000	TOFL	7460	7590	7740	7900	8040	8190	8340	8490	8640	8790	8940	187	187
	V1	167	167	167	167	167	166	166	166	166	166	166		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
36000	TOFL	7040	7160	7300	7440	7580	7720	7860	8000	8140	8280	8420	184	184
	V1	163	163	163	163	163	163	163	163	163	163	163		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	8	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
35000	TOFL	6620	6730	6870	7000	7130	7260	7390	7520	7660	7790	7920	181	181
	V1	159	159	159	159	159	159	159	159	159	159	159		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	172	172	172	171	171	171	171	171	171	171	171		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
34000	TOFL	6210	6320	6440	6560	6690	6810	6930	7050	7180	7300	7420	178	178
	V1	156	156	156	156	156	155	155	155	155	155	155		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	8.9	8.9	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9		
33000	TOFL	5830	5930	6040	6160	6270	6390	6500	6620	6730	6850	6960	176	176
	V1	152	152	152	152	152	152	152	152	152	152	151		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	9.4	9.4	9.3	9.3	9.3	9.4	9.3	9.4	9.4	9.4	9.4		
32000	TOFL	5470	5560	5670	5780	5890	5990	6100	6210	6310	6420	6530	173	173
	V1	148	148	148	148	148	148	148	148	148	148	148		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	9.9	9.9	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
31000	TOFL	5130	5210	5310	5420	5520	5610	5710	5810	5910	6010	6110	170	170
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		

FIGURE 10-5-10. TAKE-OFF DISTANCE; FLAPS - 0°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.0	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5		
30000	TOFL	4800	4880	4970	5070	5160	5250	5340	5430	5530	5620	5710	167	167
	V1	140	140	140	140	140	140	140	140	140	140	140		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	11.1	11	11	11	11	11	11	11	11	11	11		
29000	TOFL	4490	4570	4650	4740	4830	4910	5000	5080	5170	5250	5340	164	164
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	11.7	11.7	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7		
28000	TOFL	4210	4270	4350	4430	4510	4590	4670	4750	4830	4910	4980	161	161
	V1	133	133	133	133	132	132	132	132	132	132	132		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	151	151	151	151	151	152	152	152	152	152	152		
	GR2	12.4	12.4	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3		
27000	TOFL	3930	3990	4070	4140	4220	4290	4360	4430	4510	4580	4650	157	157
	V1	129	129	129	129	129	129	128	128	128	128	128		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	13.1	13.1	13	13	13	13.1	13.1	13.1	13.1	13.1	13.1		
26000	TOFL	3680	3730	3800	3870	3940	4010	4070	4140	4210	4270	4340	154	154
	V1	125	125	125	125	125	125	125	125	125	124	124		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	13.9	13.9	13.8	13.8	13.8	13.9	13.9	13.9	13.9	13.9	13.9		

FIGURE 10-5-10. TAKE-OFF DISTANCE; FLAPS - 0°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	40.1		Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	104.25			
	N1 (%)	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
39600	TOFL	10560	10740	10910	11090	11300	12070	12900	13760	14730	14750		194	194
	V1	175	175	175	175	175	176	177	178	179	179			
	VR	178	178	178	178	178	179	180	180	181	181			
	V2	184	184	184	184	184	184	184	184	184	184			
	GR2	6.6	6.6	6.6	6.5	6.3	6	5.5	5	4.4	4.4			
39000	TOFL	10200	10380	10550	10720	10930	11670	12460	13300	14230	14250		193	193
	V1	173	173	173	173	173	174	175	176	177	177			
	VR	177	177	177	177	177	177	178	178	179	179			
	V2	182	182	182	182	182	182	182	182	182	182			
	GR2	6.8	6.8	6.8	6.8	6.5	6.2	5.7	5.2	4.6	4.6			
38000	TOFL	9640	9800	9960	10130	10320	11020	11760	12550	13420	13440		190	190
	V1	170	170	170	170	170	171	172	173	174	174			
	VR	174	174	174	174	174	175	175	176	176	176			
	V2	179	179	179	179	179	180	180	180	180	180			
	GR2	7.1	7.1	7.1	7.1	6.9	6.5	6	5.5	4.9	4.9			
37000	TOFL	9090	9240	9390	9550	9730	10380	11080	11810	12630	12650		187	187
	V1	166	166	166	166	166	168	169	170	171	171			
	VR	171	171	171	171	171	172	172	173	173	173			
	V2	177	177	177	177	177	177	177	177	177	177			
	GR2	7.5	7.5	7.5	7.5	7.3	6.9	6.4	5.8	5.2	5.2			
36000	TOFL	8560	8710	8850	8990	9170	9760	10410	11110	11870	11880		184	184
	V1	163	163	163	163	163	164	166	167	168	168			
	VR	168	168	168	168	168	169	169	170	170	170			
	V2	174	174	174	174	174	174	174	174	174	174			
	GR2	7.9	7.9	7.9	7.9	7.7	7.3	6.8	6.2	5.6	5.6			
35000	TOFL	8050	8180	8320	8450	8620	9180	9780	10420	11140	11160		181	181
	V1	159	159	159	159	159	161	162	163	165	165			
	VR	165	165	165	165	165	166	166	167	167	167			
	V2	171	171	171	171	171	172	172	172	172	172			
	GR2	8.4	8.4	8.4	8.4	8.1	7.7	7.2	6.6	6	5.9			
34000	TOFL	7550	7670	7800	7920	8080	8620	9170	9770	10450	10460		178	178
	V1	155	155	155	155	156	157	158	160	161	161			
	VR	161	161	161	161	161	162	163	164	164	164			
	V2	169	169	169	169	169	169	169	169	169	169			
	GR2	8.9	8.9	8.9	8.8	8.5	8.1	7.6	7	6.4	6.3			
33000	TOFL	7080	7190	7310	7420	7580	8070	8600	9150	9770	9780		176	176
	V1	151	151	151	151	152	153	155	156	158	158			
	VR	158	158	158	158	158	159	160	161	161	161			
	V2	166	166	166	166	166	166	166	166	166	166			
	GR2	9.4	9.3	9.3	9.3	9	8.6	8.1	7.4	6.8	6.8			
32000	TOFL	6640	6740	6850	6960	7100	7540	8040	8560	9130	9140		173	173
	V1	148	148	148	148	148	149	151	153	154	154			
	VR	155	155	155	155	155	156	157	157	158	158			
	V2	163	163	163	163	163	163	163	163	163	163			
	GR2	9.9	9.9	9.9	9.9	9.5	9.1	8.6	7.9	7.2	7.2			
31000	TOFL	6210	6310	6410	6510	6640	7050	7490	7990	8520	8530		170	170
	V1	144	144	144	144	144	146	147	149	150	150			
	VR	152	152	152	152	152	153	153	154	155	155			
	V2	160	160	160	160	160	160	160	160	160	160			
	GR2	10.4	10.4	10.4	10.4	10	9.6	9.1	8.4	7.7	7.7			

FIGURE 10-5-10. TAKE-OFF DISTANCE; FLAPS - 0°; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	40.1		Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	104.25			
	N1 (%)	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
30000	TOFL	5800	5900	5990	6080	6210	6580	6990	7430	7940	7950		167	167
	V1	140	140	140	140	140	142	143	145	147	147			
	VR	148	148	148	148	148	149	150	151	152	152			
	V2	157	157	157	157	157	157	158	158	158	158			
	GR2	11	11	11	11	10.6	10.2	9.6	8.9	8.2	8.2			
29000	TOFL	5430	5510	5600	5690	5790	6140	6510	6910	7370	7380		164	164
	V1	136	136	136	136	136	138	139	141	143	143			
	VR	145	145	145	145	145	146	147	147	148	148			
	V2	154	154	154	154	154	154	155	155	155	155			
	GR2	11.7	11.6	11.6	11.6	11.2	10.8	10.2	9.5	8.8	8.7			
28000	TOFL	5060	5140	5220	5300	5400	5720	6060	6430	6830	6840		161	161
	V1	132	132	132	132	132	134	135	137	139	139			
	VR	141	141	141	141	141	142	143	144	145	145			
	V2	152	152	152	152	152	152	152	152	152	152			
	GR2	12.3	12.3	12.3	12.3	11.9	11.4	10.9	10.1	9.3	9.3			
27000	TOFL	4730	4800	4880	4950	5040	5330	5630	5970	6350	6350		157	157
	V1	128	128	128	128	128	130	131	133	135	135			
	VR	137	137	137	137	137	139	140	140	141	141			
	V2	149	149	149	149	149	149	149	149	149	149			
	GR2	13.1	13.1	13.1	13	12.6	12.1	11.5	10.8	9.9	9.9			
26000	TOFL	4410	4480	4550	4620	4700	4960	5240	5540	5880	5890		154	154
	V1	124	124	124	124	124	126	127	129	131	131			
	VR	134	134	134	134	134	135	136	137	138	138			
	V2	146	146	146	146	146	146	146	146	146	146			
	GR2	13.9	13.9	13.8	13.8	13.4	12.9	12.3	11.5	10.6	10.6			

FIGURE 10-5-11. TAKE-OFF DISTANCE; FLAPS - 0°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.3	82.0	83.0	83.9	84.8	85.6	86.5	87.4	88.2	89.1		
39600	TOFL	9130	9350	9600	9780	9950	10120	10310	10500	10690	10880	11060	195	195
	V1	176	176	176	176	176	176	176	176	176	176	176		
	VR	179	179	179	179	179	179	179	179	179	179	179		
	V2	184	184	184	184	184	184	184	184	184	184	184		
	GR2	6.4	6.3	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3		
39000	TOFL	8820	9050	9280	9450	9620	9790	9970	10150	10330	10510	10690	193	193
	V1	174	174	174	174	174	174	174	174	174	174	174		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	183	183	183	183	183	183	183	183	183	183	182		
	GR2	6.6	6.5	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5		
38000	TOFL	8340	8540	8770	8930	9080	9240	9410	9580	9750	9920	10090	190	190
	V1	171	171	171	171	171	171	171	171	171	171	171		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	180	180	180	180	180	180	180	180	180	180	180		
	GR2	7	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
37000	TOFL	7870	8060	8270	8420	8570	8720	8880	9040	9200	9360	9520	187	187
	V1	168	168	168	168	168	167	167	167	167	167	167		
	VR	172	172	172	172	172	172	172	172	172	172	172		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	7.4	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
36000	TOFL	7420	7600	7790	7930	8070	8210	8360	8510	8660	8810	8960	184	185
	V1	164	164	164	164	164	164	164	164	164	164	164		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	175	175	175	175	175	174	174	174	174	174	174		
	GR2	7.8	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
35000	TOFL	6980	7150	7330	7460	7590	7720	7860	8000	8150	8290	8430	181	182
	V1	160	160	160	160	160	160	160	160	160	160	160		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	8.2	8.1	8	8	8	8.1	8.1	8.1	8.1	8.1	8.1		
34000	TOFL	6560	6710	6880	7010	7130	7250	7390	7520	7650	7780	7910	178	179
	V1	157	157	157	157	157	157	157	157	157	157	157		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	8.7	8.5	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
33000	TOFL	6140	6290	6460	6570	6680	6790	6910	7040	7160	7280	7410	176	176
	V1	153	153	153	153	153	153	153	153	153	153	153		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	9.2	9	8.9	8.9	9	9	9	9	9	9	9		
32000	TOFL	5760	5890	6040	6150	6250	6360	6470	6590	6700	6820	6930	173	173
	V1	149	149	149	149	149	149	149	149	149	149	149		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	9.7	9.5	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
31000	TOFL	5390	5520	5650	5750	5850	5950	6060	6170	6270	6380	6490	170	170
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	10.3	10.1	10	10	10	10.1	10.1	10.1	10.1	10.1	10.1		

FIGURE 10-5-11. TAKE-OFF DISTANCE; FLAPS - 0°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.3	82.0	83.0	83.9	84.8	85.6	86.5	87.4	88.2	89.1		
30000	TOFL	5040	5160	5290	5380	5470	5560	5660	5760	5860	5960	6060	167	167
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	10.8	10.7	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
29000	TOFL	4720	4820	4940	5020	5110	5200	5290	5380	5470	5560	5650	164	164
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	11.5	11.3	11.2	11.2	11.2	11.3	11.3	11.3	11.3	11.3	11.3		
28000	TOFL	4410	4500	4610	4690	4770	4850	4940	5020	5100	5190	5270	161	161
	V1	134	134	134	134	133	133	133	133	133	133	133		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	12.1	12	11.8	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		
27000	TOFL	4120	4210	4300	4380	4450	4520	4600	4680	4760	4840	4910	157	158
	V1	130	130	130	130	130	129	129	129	129	129	129		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	12.9	12.7	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6		
26000	TOFL	3840	3920	4020	4080	4150	4220	4290	4360	4430	4500	4580	154	155
	V1	126	126	126	126	126	125	125	125	125	125	125		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	13.6	13.4	13.3	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4		

FIGURE 10-5-11. TAKE-OFF DISTANCE; FLAPS - 0°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.3				
39600	TOFL	11250	11440	11640	11860	12320	13170	14070					195	195
	V1	176	176	176	176	176	177	178						
	VR	179	179	179	179	179	180	180						
	V2	184	184	184	184	184	184	184						
	GR2	6.3	6.3	6.2	6.1	5.8	5.5	5						
39000	TOFL	10870	11060	11240	11460	11910	12730	13600	14540				193	193
	V1	174	174	174	174	175	176	177	178					
	VR	177	177	177	177	178	178	179	179					
	V2	182	182	182	182	182	182	183	183					
	GR2	6.5	6.5	6.4	6.3	6	5.7	5.2	4.6					
38000	TOFL	10270	10440	10610	10820	11240	12010	12830	13710	14300			190	190
	V1	171	171	171	171	171	173	174	175	175				
	VR	175	175	175	175	175	176	176	177	177				
	V2	180	180	180	180	180	180	180	180	180				
	GR2	6.8	6.8	6.8	6.7	6.4	6	5.5	5	4.6				
37000	TOFL	9680	9850	10010	10200	10600	11320	12090	12910	13470			187	187
	V1	167	167	167	167	168	169	170	171	172				
	VR	172	172	172	172	172	173	173	174	174				
	V2	177	177	177	177	177	177	177	177	177				
	GR2	7.2	7.2	7.2	7.1	6.7	6.3	5.9	5.3	4.9				
36000	TOFL	9120	9270	9420	9600	9980	10650	11360	12140	12660			184	185
	V1	164	164	164	164	165	166	167	168	169				
	VR	169	169	169	169	169	170	170	171	171				
	V2	174	174	174	174	174	175	175	175	175				
	GR2	7.6	7.6	7.6	7.4	7.1	6.7	6.2	5.7	5.3				
35000	TOFL	8570	8710	8860	9030	9380	10000	10660	11390	11870			181	182
	V1	160	160	160	160	161	162	164	165	166				
	VR	165	165	165	165	166	166	167	168	168				
	V2	172	172	172	172	172	172	172	172	172				
	GR2	8.1	8.1	8	7.9	7.5	7.1	6.6	6	5.7				
34000	TOFL	8040	8180	8310	8470	8800	9380	10000	10670	11130			178	179
	V1	157	157	157	157	157	159	160	161	162				
	VR	162	162	162	162	163	163	164	165	165				
	V2	169	169	169	169	169	169	169	169	169				
	GR2	8.5	8.5	8.5	8.3	7.9	7.6	7	6.4	6				
33000	TOFL	7530	7650	7780	7930	8250	8780	9360	9980	10410			176	176
	V1	153	153	153	153	154	155	157	158	159				
	VR	159	159	159	159	159	160	161	162	162				
	V2	166	166	166	166	166	166	166	166	167				
	GR2	9	9	9	8.8	8.4	8	7.5	6.8	6.4				
32000	TOFL	7050	7160	7280	7420	7710	8210	8740	9320	9720			173	173
	V1	149	149	149	149	150	151	153	154	155				
	VR	156	156	156	156	156	157	158	158	159				
	V2	163	163	163	163	163	163	163	163	163				
	GR2	9.5	9.5	9.5	9.3	8.9	8.5	7.9	7.3	6.9				
31000	TOFL	6590	6700	6810	6940	7200	7660	8160	8700	9060			170	170
	V1	145	145	145	145	146	147	149	150	151				
	VR	152	152	152	152	153	154	154	155	156				
	V2	160	160	160	160	160	161	161	161	161				
	GR2	10.1	10.1	10	9.8	9.4	9	8.4	7.8	7.3				

FIGURE 10-5-11. TAKE-OFF DISTANCE; FLAPS - 0°; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.3				
30000	TOFL	6160	6260	6360	6480	6720	7140	7600	8100	8430			167	167
	V1	141	141	141	141	142	143	145	147	148				
	VR	149	149	149	149	149	150	151	152	152				
	V2	158	158	158	158	158	158	158	158	158				
	GR2	10.6	10.6	10.6	10.4	10	9.5	9	8.3	7.8				
29000	TOFL	5750	5840	5930	6040	6260	6650	7060	7530	7840			164	164
	V1	137	137	137	137	138	140	141	143	144				
	VR	145	145	145	145	146	147	148	148	149				
	V2	155	155	155	155	155	155	155	155	155				
	GR2	11.3	11.3	11.2	11	10.6	10.1	9.5	8.8	8.4				
28000	TOFL	5360	5440	5530	5630	5830	6180	6560	6970	7270			161	161
	V1	133	133	133	133	134	136	137	139	140				
	VR	142	142	142	142	142	143	144	145	146				
	V2	152	152	152	152	152	152	152	152	152				
	GR2	11.9	11.9	11.9	11.6	11.2	10.7	10.1	9.4	8.9				
27000	TOFL	4990	5070	5150	5240	5420	5740	6080	6460	6720			157	158
	V1	129	129	129	129	130	131	133	135	136				
	VR	138	138	138	138	139	140	141	141	142				
	V2	149	149	149	149	149	149	149	149	149				
	GR2	12.6	12.6	12.6	12.3	11.9	11.4	10.8	10	9.6				
26000	TOFL	4650	4720	4800	4880	5040	5330	5640	5980	6220			154	155
	V1	125	125	125	125	126	127	129	131	132				
	VR	134	134	134	134	135	136	137	138	138				
	V2	146	146	146	146	146	146	146	146	146				
	GR2	13.4	13.4	13.4	13.1	12.6	12.1	11.5	10.7	10.2				

FIGURE 10-5-12. TAKE-OFF DISTANCE; FLAPS - 0°; 7000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.3	81.7	82.5	83.4	84.4	85.3	86.2	87.0	87.9	88.7	89.6		
39600	TOFL	9790	10100	10330	10520	10690	10890	11100	11300	11500	11700	11910	195	195
	V1	178	178	178	178	178	178	178	178	178	178	178		
	VR	181	181	181	181	181	181	181	181	181	181	181		
	V2	185	185	185	185	185	185	185	185	185	185	185		
	GR2	6.1	5.9	5.9	5.9	5.9	6	6	6	6	6	6		
39000	TOFL	9460	9770	9990	10160	10340	10530	10720	10920	11120	11310	11510	193	193
	V1	176	176	176	176	176	176	176	176	176	176	176		
	VR	179	179	179	179	179	179	179	179	179	179	179		
	V2	184	184	184	184	184	184	184	184	184	183	183		
	GR2	6.3	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
38000	TOFL	8940	9220	9430	9600	9760	9940	10130	10310	10490	10670	10860	191	191
	V1	173	173	173	173	173	173	173	172	172	172	172		
	VR	176	176	176	176	176	176	176	176	176	176	176		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	6.7	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
37000	TOFL	8440	8700	8900	9050	9200	9370	9550	9720	9890	10070	10240	188	188
	V1	169	169	169	169	169	169	169	169	169	169	169		
	VR	173	173	173	173	173	173	173	173	173	173	173		
	V2	179	179	179	179	179	178	178	178	178	178	178		
	GR2	7.1	6.9	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	7950	8200	8390	8530	8670	8830	8990	9160	9320	9480	9650	185	185
	V1	166	166	166	166	166	166	166	166	166	166	166		
	VR	170	170	170	170	170	170	170	170	170	170	170		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	7.5	7.3	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	7480	7710	7890	8020	8150	8300	8450	8610	8760	8910	9060	182	182
	V1	162	162	162	162	162	162	162	162	162	162	162		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	7.9	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
34000	TOFL	7020	7230	7400	7530	7650	7790	7930	8070	8220	8360	8500	179	179
	V1	159	159	159	159	159	159	158	158	158	158	158		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	8.4	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
33000	TOFL	6580	6780	6940	7060	7170	7300	7440	7570	7700	7830	7970	176	176
	V1	155	155	155	155	155	155	155	155	155	155	155		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	8.8	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
32000	TOFL	6150	6350	6500	6610	6710	6840	6960	7080	7210	7330	7450	174	173
	V1	151	151	151	151	151	151	151	151	151	151	151		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	9.4	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	5760	5930	6060	6170	6270	6380	6490	6610	6720	6840	6950	171	170
	V1	147	147	147	147	147	147	147	147	147	147	147		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	9.9	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7		

FIGURE 10-5-12. TAKE-OFF DISTANCE; FLAPS - 0°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.3	81.7	82.5	83.4	84.4	85.3	86.2	87.0	87.9	88.7	89.6		
30000	TOFL	5380	5540	5660	5760	5850	5960	6060	6170	6280	6380	6490	167	167
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	10.5	10.2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3		
29000	TOFL	5020	5170	5280	5370	5460	5550	5650	5750	5850	5950	6050	164	164
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	11.1	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
28000	TOFL	4690	4820	4920	5010	5090	5180	5270	5360	5450	5540	5630	161	161
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	11.8	11.5	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		
27000	TOFL	4370	4490	4590	4660	4740	4820	4900	4990	5070	5150	5240	158	158
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	12.5	12.2	12.1	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2		
26000	TOFL	4070	4180	4270	4340	4410	4480	4560	4640	4710	4790	4870	155	155
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	13.2	12.9	12.9	12.9	13	13	13	13	13	13	13		

FIGURE 10-5-12. TAKE-OFF DISTANCE; FLAPS - 0°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
39600	TOFL	12110	12320	12540	12830	13590	14540						195	195
	V1	178	178	178	178	179	180							
	VR	181	181	181	181	181	182							
	V2	185	185	185	185	185	185							
	GR2	6	6	5.9	5.7	5.3	5							
39000	TOFL	11710	11910	12110	12400	13130	14040						193	193
	V1	176	176	176	176	177	178							
	VR	179	179	179	179	179	180							
	V2	183	183	183	183	183	183							
	GR2	6.2	6.2	6.1	5.8	5.5	5.2							
38000	TOFL	11050	11230	11430	11710	12380	13240	14160					191	191
	V1	172	172	172	173	174	175	176						
	VR	176	176	176	176	177	177	178						
	V2	181	181	181	181	181	181	181						
	GR2	6.5	6.5	6.4	6.2	5.9	5.5	5						
37000	TOFL	10420	10590	10780	11040	11670	12460	13340	14260	14490			188	188
	V1	169	169	169	169	170	171	173	173	174				
	VR	173	173	173	173	174	174	175	175	175				
	V2	178	178	178	178	178	178	179	179	179				
	GR2	6.9	6.9	6.8	6.5	6.2	5.8	5.3	4.8	4.7				
36000	TOFL	9810	9980	10150	10400	10980	11730	12530	13410	13620			185	185
	V1	166	166	166	166	167	168	169	170	171				
	VR	170	170	170	170	171	171	172	172	172				
	V2	176	176	176	176	176	176	176	176	176				
	GR2	7.3	7.3	7.2	6.9	6.6	6.2	5.7	5.1	5				
35000	TOFL	9220	9370	9540	9770	10330	11010	11760	12580	12780			182	182
	V1	162	162	162	163	164	165	166	167	167				
	VR	167	167	167	167	168	168	169	169	170				
	V2	173	173	173	173	173	173	173	173	173				
	GR2	7.7	7.7	7.6	7.3	7	6.6	6.1	5.5	5.3				
34000	TOFL	8650	8790	8950	9170	9680	10320	11020	11770	11960			179	179
	V1	158	158	158	159	160	161	163	164	164				
	VR	164	164	164	164	165	165	166	166	167				
	V2	170	170	170	170	170	170	170	170	170				
	GR2	8.2	8.2	8.1	7.8	7.4	7	6.4	5.9	5.7				
33000	TOFL	8100	8240	8380	8590	9060	9660	10300	11010	11180			176	176
	V1	155	155	155	155	156	158	159	160	160				
	VR	161	161	161	161	161	162	163	163	163				
	V2	167	167	167	167	167	167	167	167	168				
	GR2	8.6	8.6	8.5	8.2	7.8	7.4	6.9	6.3	6.1				
32000	TOFL	7580	7700	7840	8040	8470	9020	9620	10270	10430			174	173
	V1	151	151	151	151	152	154	155	157	157				
	VR	157	157	157	157	158	159	159	160	160				
	V2	164	164	164	164	164	165	165	165	165				
	GR2	9.1	9.1	9	8.7	8.3	7.9	7.3	6.7	6.6				
31000	TOFL	7070	7180	7310	7490	7900	8410	8970	9580	9720			171	170
	V1	147	147	147	147	149	150	151	153	153				
	VR	154	154	154	154	155	155	156	157	157				
	V2	161	161	161	161	161	162	162	162	162				
	GR2	9.7	9.7	9.5	9.2	8.8	8.4	7.8	7.2	7				

FIGURE 10-5-12. TAKE-OFF DISTANCE; FLAPS - 0°; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
30000	TOFL	6600	6700	6820	6990	7360	7830	8340	8910	9040			167	167
	V1	143	143	143	143	145	146	148	149	149				
	VR	150	150	150	150	151	152	153	154	154				
	V2	158	158	158	158	158	159	159	159	159				
	GR2	10.3	10.3	10.1	9.7	9.3	8.9	8.3	7.6	7.5				
29000	TOFL	6140	6250	6360	6510	6850	7270	7760	8270	8390			164	164
	V1	139	139	139	139	140	142	144	145	146				
	VR	147	147	147	147	148	149	149	150	150				
	V2	156	156	155	155	155	156	156	156	156				
	GR2	10.9	10.9	10.7	10.3	9.9	9.5	8.9	8.2	8				
28000	TOFL	5720	5810	5920	6050	6370	6750	7180	7670	7780			161	161
	V1	135	135	135	135	136	138	139	141	141				
	VR	143	143	143	143	144	145	146	147	147				
	V2	153	153	152	152	152	153	153	153	153				
	GR2	11.5	11.5	11.3	10.9	10.5	10.1	9.4	8.7	8.6				
27000	TOFL	5320	5410	5500	5620	5910	6260	6650	7080	7180			158	158
	V1	131	131	131	131	132	134	135	137	137				
	VR	139	139	139	140	140	141	142	143	143				
	V2	150	150	149	149	149	150	150	150	150				
	GR2	12.2	12.2	12	11.6	11.2	10.7	10.1	9.3	9.2				
26000	TOFL	4950	5020	5110	5220	5480	5800	6150	6540	6630			155	155
	V1	127	127	127	127	128	130	131	133	133				
	VR	136	136	136	136	137	138	139	139	140				
	V2	146	146	146	146	146	147	147	147	147				
	GR2	13	13	12.8	12.3	11.9	11.4	10.8	10	9.8				

FIGURE 10-5-13. TAKE-OFF DISTANCE; FLAPS - 0°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.7	82.1	83.0	84.0	84.9	85.8	86.7	87.5	88.4	89.3	90.1		
39600	TOFL	10560	10920	11120	11320	11510	11730	11950	12180	12390	12620	12840	195	195
	V1	180	180	180	180	180	180	179	179	179	179	179		
	VR	182	182	182	182	182	182	182	182	182	182	182		
	V2	186	186	186	186	186	186	186	186	186	186	186		
	GR2	5.8	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	10210	10550	10750	10930	11120	11340	11550	11760	11970	12190	12400	194	194
	V1	178	178	178	178	178	178	177	177	177	177	177		
	VR	180	180	180	180	180	180	180	180	180	180	180		
	V2	185	185	185	185	185	185	185	185	184	184	184		
	GR2	6	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	9640	9960	10140	10320	10490	10690	10890	11100	11290	11490	11690	191	191
	V1	174	174	174	174	174	174	174	174	174	174	174		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	6.4	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
37000	TOFL	9090	9390	9560	9730	9890	10080	10270	10460	10650	10830	11020	188	188
	V1	171	171	171	171	171	171	171	171	171	171	171		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	180	180	180	180	180	179	179	179	179	179	179		
	GR2	6.7	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	8570	8850	9010	9160	9320	9500	9670	9850	10030	10200	10380	185	185
	V1	168	168	168	168	168	168	168	168	168	168	168		
	VR	172	172	172	172	172	172	172	172	172	172	172		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	7.1	6.9	6.9	7	7	7	7	7	7	7	7		
35000	TOFL	8050	8320	8470	8610	8760	8930	9100	9260	9420	9590	9750	182	183
	V1	164	164	164	164	164	164	164	164	164	164	164		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	7.6	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	7560	7810	7950	8090	8220	8380	8530	8690	8840	8990	9150	179	180
	V1	161	161	161	161	160	160	160	160	160	160	160		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
33000	TOFL	7080	7310	7440	7570	7700	7850	7990	8130	8280	8420	8560	177	177
	V1	157	157	157	157	157	157	157	157	157	157	157		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	8.5	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
32000	TOFL	6630	6840	6970	7090	7210	7340	7480	7610	7740	7880	8010	174	174
	V1	153	153	153	153	153	153	153	153	153	153	153		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	9	8.7	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	6200	6390	6510	6620	6730	6850	6980	7100	7230	7350	7470	171	171
	V1	149	149	149	149	149	149	149	149	149	149	149		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	9.5	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 10-5-13. TAKE-OFF DISTANCE; FLAPS - 0°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.7	82.1	83.0	84.0	84.9	85.8	86.7	87.5	88.4	89.3	90.1		
30000	TOFL	5780	5960	6060	6170	6270	6390	6500	6620	6730	6840	6960	168	168
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	10.1	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
29000	TOFL	5390	5550	5650	5750	5840	5950	6060	6160	6270	6370	6480	165	165
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	10.7	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
28000	TOFL	5010	5170	5250	5340	5430	5530	5630	5730	5820	5920	6020	162	161
	V1	137	137	137	137	137	137	136	136	136	136	136		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	11.3	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1		
27000	TOFL	4660	4800	4890	4970	5050	5140	5230	5320	5410	5500	5590	158	158
	V1	133	133	133	133	132	132	132	132	132	132	132		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	12	11.7	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8		
26000	TOFL	4340	4470	4540	4620	4690	4780	4860	4940	5030	5110	5190	155	155
	V1	129	129	129	128	128	128	128	128	128	128	128		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	12.8	12.4	12.5	12.5	12.5	12.5	12.6	12.6	12.6	12.6	12.6		

FIGURE 10-5-13. TAKE-OFF DISTANCE; FLAPS - 0°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.6					
39600	TOFL	13060	13290	13560	14040								195	195
	V1	179	179	180	180									
	VR	182	182	182	182									
	V2	186	186	186	186									
	GR2	5.7	5.7	5.5	5.2									
39000	TOFL	12620	12840	13100	13570	14500							194	194
	V1	177	177	178	178	179								
	VR	180	180	180	181	181								
	V2	184	184	184	184	184								
	GR2	5.9	5.8	5.7	5.4	5.1								
38000	TOFL	11900	12100	12360	12790	13670	14620						191	191
	V1	174	174	174	175	176	177							
	VR	177	177	177	178	178	179							
	V2	182	182	182	182	182	182							
	GR2	6.2	6.2	6	5.7	5.4	5							
37000	TOFL	11210	11410	11650	12060	12860	13770	14740					188	188
	V1	171	171	171	172	173	174	175						
	VR	175	175	175	175	175	176	176						
	V2	179	179	179	179	179	179	180						
	GR2	6.6	6.6	6.4	6	5.7	5.3	4.8						
36000	TOFL	10560	10740	10970	11350	12090	12930	13850	14660				185	185
	V1	168	168	168	168	169	170	171	172					
	VR	172	172	172	172	172	173	174	174					
	V2	177	177	176	176	176	177	177	177					
	GR2	7	6.9	6.7	6.4	6.1	5.7	5.2	4.7					
35000	TOFL	9920	10090	10310	10680	11360	12130	13000	13750				182	183
	V1	164	164	164	165	166	167	168	169					
	VR	169	169	169	169	169	170	171	171					
	V2	174	174	174	174	174	174	174	174					
	GR2	7.4	7.4	7.1	6.8	6.4	6.1	5.5	5.1					
34000	TOFL	9310	9470	9670	10010	10660	11370	12170	12880				179	180
	V1	160	160	161	161	162	164	165	166					
	VR	165	165	165	166	166	167	168	168					
	V2	171	171	171	171	171	171	171	172					
	GR2	7.8	7.8	7.5	7.2	6.8	6.4	5.9	5.4					
33000	TOFL	8710	8860	9050	9370	9980	10630	11360	12020				177	177
	V1	157	157	157	158	159	160	161	162					
	VR	162	162	162	162	163	164	164	165					
	V2	168	168	168	168	168	169	169	169					
	GR2	8.3	8.3	8	7.6	7.3	6.9	6.3	5.8					
32000	TOFL	8140	8280	8470	8760	9310	9930	10610	11210				174	174
	V1	153	153	153	154	155	156	158	159					
	VR	159	159	159	159	160	161	161	162					
	V2	165	165	165	165	165	166	166	166					
	GR2	8.8	8.8	8.5	8.1	7.7	7.3	6.7	6.2					
31000	TOFL	7600	7730	7900	8180	8680	9250	9890	10440				171	171
	V1	149	149	149	150	151	152	154	155					
	VR	155	155	156	156	156	157	158	158					
	V2	163	163	162	162	162	163	163	163					
	GR2	9.3	9.3	9	8.6	8.2	7.8	7.2	6.7					

FIGURE 10-5-13. TAKE-OFF DISTANCE; FLAPS - 0°; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.6					
30000	TOFL	7070	7190	7350	7600	8090	8600	9190	9710				168	168
	V1	145	145	145	146	147	148	150	151					
	VR	152	152	152	152	153	154	155	155					
	V2	159	159	159	159	159	160	160	160					
	GR2	9.9	9.8	9.5	9.1	8.7	8.3	7.7	7.1					
29000	TOFL	6590	6700	6840	7070	7500	7990	8520	9000				165	165
	V1	141	141	141	142	143	144	146	147					
	VR	148	148	148	149	149	150	151	152					
	V2	157	156	156	156	156	157	157	157					
	GR2	10.5	10.4	10.1	9.7	9.3	8.8	8.2	7.6					
28000	TOFL	6120	6220	6360	6570	6970	7390	7900	8330				162	161
	V1	136	136	137	138	139	140	142	143					
	VR	145	145	145	145	146	147	148	148					
	V2	153	153	153	153	153	154	154	154					
	GR2	11.1	11.1	10.7	10.3	9.8	9.4	8.8	8.2					
27000	TOFL	5680	5780	5900	6090	6460	6850	7300	7700				158	158
	V1	132	132	132	133	135	136	138	139					
	VR	141	141	141	141	142	143	144	145					
	V2	150	150	150	150	150	150	151	151					
	GR2	11.8	11.7	11.4	10.9	10.5	10	9.4	8.8					
26000	TOFL	5270	5360	5470	5640	5970	6330	6730	7100				155	155
	V1	128	128	128	129	130	132	133	135					
	VR	137	137	137	138	139	140	140	141					
	V2	147	147	147	147	147	147	148	148					
	GR2	12.6	12.5	12.1	11.6	11.2	10.7	10	9.4					

FIGURE 10-5-14. TAKE-OFF DISTANCE; FLAPS - 0°; 9000 FT
ECS - OFF; ENGINE ANTI-ICE - OFF;
WING ANTI-ICE - OFF
PART A; DRY RUNWAY
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
39600	TOFL	11350	11630	11850	12070	12300	12540	12770	13010	13240	13480	13720	195	196
	V1	181	181	181	180	180	180	180	180	180	180	180		
	VR	183	183	183	183	183	183	183	183	183	183	183		
	V2	187	187	187	187	187	187	187	187	186	186	186		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
39000	TOFL	10970	11230	11450	11660	11880	12110	12340	12560	12790	13020	13250	194	194
	V1	179	179	179	179	179	178	178	178	178	178	178		
	VR	181	181	181	181	181	181	181	181	181	181	181		
	V2	185	185	185	185	185	185	185	185	185	185	185		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
38000	TOFL	10340	10600	10800	10990	11200	11420	11630	11850	12060	12270	12490	192	191
	V1	175	175	175	175	175	175	175	175	175	175	175		
	VR	178	178	178	178	178	178	178	178	178	178	178		
	V2	183	183	183	182	182	182	182	182	182	182	182		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6	6	6		
37000	TOFL	9750	9980	10170	10360	10550	10750	10950	11150	11350	11560	11760	189	189
	V1	172	172	172	172	172	172	172	172	172	172	172		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	180	180	180	180	180	180	180	180	180	180	180		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
36000	TOFL	9180	9400	9580	9750	9930	10120	10310	10490	10680	10870	11060	186	186
	V1	169	169	169	169	169	168	168	168	168	168	168		
	VR	172	172	172	172	172	172	172	172	172	172	172		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
35000	TOFL	8630	8840	9000	9160	9340	9510	9690	9870	10040	10220	10400	183	183
	V1	165	165	165	165	165	165	165	165	165	165	165		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
34000	TOFL	8100	8290	8450	8600	8760	8930	9090	9260	9420	9590	9750	180	180
	V1	162	162	162	162	162	161	161	161	161	161	161		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
33000	TOFL	7590	7770	7920	8060	8210	8360	8520	8670	8830	8980	9130	177	177
	V1	158	158	158	158	158	158	158	158	158	158	158		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	8.1	7.9	7.9	8	8	8	8	8	8	8	8		
32000	TOFL	7100	7270	7400	7540	7680	7820	7960	8110	8250	8390	8530	175	174
	V1	154	154	154	154	154	154	154	154	154	154	154		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	8.5	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
31000	TOFL	6630	6790	6910	7040	7160	7300	7430	7560	7700	7830	7960	172	171
	V1	150	150	150	150	150	150	150	150	150	150	150		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	9.1	8.9	8.9	9	9	9	9	9	9	9	9		

FIGURE 10-5-14. TAKE-OFF DISTANCE; FLAPS - 0°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
30000	TOFL	6170	6330	6430	6550	6670	6790	6910	7030	7160	7280	7400	168	168
	V1	146	146	146	146	146	146	146	146	146	146	146		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	5750	5880	5990	6100	6210	6320	6430	6550	6660	6770	6890	165	165
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
28000	TOFL	5350	5470	5570	5670	5770	5870	5980	6080	6190	6290	6400	162	162
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.8	10.8	10.8		
27000	TOFL	4970	5080	5170	5260	5350	5450	5550	5640	5740	5840	5930	159	159
	V1	134	134	134	134	134	133	133	133	133	133	133		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	11.5	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
26000	TOFL	4610	4710	4800	4880	4970	5060	5140	5230	5320	5410	5500	156	155
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	12.2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		

FIGURE 10-5-14. TAKE-OFF DISTANCE; FLAPS - 0°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

	OAT (°C)	0	5	10	15	20	25	30	32				Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
GW	OAT (°F)	32	41	50	59	68	77	86	89					
(LB)	N1 (%)	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
39600	TOFL	13960	14220	14610									195	196
	V1	180	180	181										
	VR	183	183	183										
	V2	186	186	186										
	GR2	5.4	5.3	5										
39000	TOFL	13480	13740	14110	14840								194	194
	V1	178	178	179	179									
	VR	181	181	181	182									
	V2	185	185	185	185									
	GR2	5.6	5.5	5.2	4.9									
38000	TOFL	12710	12950	13300	13990	14950							192	191
	V1	175	175	176	176	177								
	VR	178	178	178	179	179								
	V2	182	182	182	182	182								
	GR2	5.9	5.8	5.5	5.2	4.9								
37000	TOFL	11960	12190	12530	13170	14070							189	189
	V1	172	172	172	173	174								
	VR	175	175	175	176	176								
	V2	180	179	179	179	179								
	GR2	6.3	6.2	5.9	5.5	5.2								
36000	TOFL	11250	11470	11790	12380	13210	14150						186	186
	V1	168	168	169	170	171	172							
	VR	172	172	172	173	173	174							
	V2	177	177	177	177	177	177							
	GR2	6.7	6.5	6.2	5.9	5.6	5.2							
35000	TOFL	10570	10780	11080	11630	12400	13270	14220	14650				183	183
	V1	165	165	166	166	167	168	169	170					
	VR	169	169	169	170	170	171	171	172					
	V2	174	174	174	174	174	174	175	175					
	GR2	7.1	6.9	6.6	6.3	5.9	5.5	5	4.8					
34000	TOFL	9920	10110	10400	10910	11620	12420	13320	13720				180	180
	V1	161	162	162	163	164	165	166	167					
	VR	166	166	166	167	167	168	168	169					
	V2	171	171	171	171	171	172	172	172					
	GR2	7.5	7.3	7	6.7	6.3	5.9	5.4	5.1					
33000	TOFL	9290	9470	9740	10220	10880	11620	12440	12820				177	177
	V1	158	158	158	159	160	162	163	163					
	VR	163	163	163	163	164	165	165	166					
	V2	169	168	168	168	169	169	169	169					
	GR2	8	7.8	7.4	7.1	6.7	6.3	5.8	5.5					
32000	TOFL	8680	8850	9100	9550	10160	10840	11590	11950				175	174
	V1	154	154	155	155	157	158	159	160					
	VR	160	160	160	160	161	162	162	162					
	V2	166	166	166	166	166	166	166	166					
	GR2	8.4	8.2	7.9	7.5	7.2	6.7	6.2	5.9					
31000	TOFL	8100	8260	8490	8910	9470	10100	10790	11110				172	171
	V1	150	150	151	152	153	154	155	156					
	VR	156	156	156	157	157	158	159	159					
	V2	163	163	163	163	163	163	163	163					
	GR2	9	8.7	8.4	8	7.6	7.2	6.6	6.3					

FIGURE 10-5-14. TAKE-OFF DISTANCE; FLAPS - 0°; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

	OAT (°C)	0	5	10	15	20	25	30	32				Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
GW	OAT (°F)	32	41	50	59	68	77	86	89					
(LB)	N1 (%)	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
30000	TOFL	7530	7670	7910	8290	8800	9390	10030	10330				168	168
	V1	146	146	147	148	149	150	152	152					
	VR	153	153	153	153	154	155	155	156					
	V2	160	160	160	160	160	160	160	160					
	GR2	9.5	9.3	8.9	8.5	8.1	7.7	7.1	6.8					
29000	TOFL	7000	7140	7340	7690	8180	8710	9300	9580				165	165
	V1	142	142	142	143	145	146	148	148					
	VR	149	149	149	150	151	151	152	152					
	V2	157	156	156	156	157	157	157	157					
	GR2	10.1	9.8	9.4	9	8.6	8.2	7.6	7.3					
28000	TOFL	6500	6630	6820	7130	7560	8060	8610	8860				162	162
	V1	138	138	138	139	141	142	144	144					
	VR	145	145	146	146	147	148	149	149					
	V2	154	153	153	153	154	154	154	154					
	GR2	10.7	10.4	10	9.6	9.2	8.7	8.1	7.8					
27000	TOFL	6030	6140	6310	6610	7000	7450	7950	8180				159	159
	V1	133	133	134	135	136	138	140	140					
	VR	142	142	142	142	143	144	145	145					
	V2	151	150	150	150	151	151	151	151					
	GR2	11.4	11.1	10.7	10.2	9.8	9.3	8.7	8.4					
26000	TOFL	5590	5690	5840	6110	6470	6870	7320	7540				156	155
	V1	129	129	130	131	132	134	135	136					
	VR	138	138	138	139	140	141	141	142					
	V2	147	147	147	147	147	148	148	148					
	GR2	12.1	11.8	11.4	10.9	10.5	10	9.3	9					

FIGURE 10-5-15. TAKE-OFF DISTANCE; FLAPS - 0°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.5	83.2	84.1	85.1	86.0	86.9	87.7	88.6	89.5	90.4	91.2		
39600	TOFL	12170	12380	12640	12890	13150	13400	13660	13910	14170	14420	14670	196	196
	V1	181	181	181	181	181	181	181	181	181	181	181		
	VR	184	184	184	184	184	184	184	184	184	184	184		
	V2	187	187	187	187	187	187	187	187	187	187	187		
	GR2	5.2	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	11760	11960	12200	12450	12700	12940	13190	13430	13670	13920	14170	194	194
	V1	180	180	180	179	179	179	179	179	179	179	179		
	VR	182	182	182	182	182	182	182	182	182	182	182		
	V2	186	186	186	186	186	186	186	185	185	185	185		
	GR2	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.4	5.3		
38000	TOFL	11080	11270	11510	11730	11960	12200	12420	12650	12880	13110	13340	192	192
	V1	176	176	176	176	176	176	176	176	176	176	176		
	VR	179	179	179	179	179	179	179	179	179	179	179		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	10440	10620	10830	11050	11270	11480	11700	11910	12130	12340	12560	189	189
	V1	173	173	173	173	173	173	173	173	173	173	173		
	VR	176	176	176	176	176	176	176	176	176	176	176		
	V2	180	180	180	180	180	180	180	180	180	180	180		
	GR2	6.1	6	6	6	6	6	6	6	6.1	6.1	6		
36000	TOFL	9820	9980	10190	10390	10590	10790	11000	11200	11400	11600	11800	186	186
	V1	170	170	170	170	169	169	169	169	169	169	169		
	VR	173	173	173	173	173	173	173	173	173	173	173		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
35000	TOFL	9220	9380	9570	9750	9950	10140	10330	10510	10700	10890	11080	183	183
	V1	166	166	166	166	166	166	166	166	166	166	166		
	VR	170	170	170	170	170	170	170	170	170	170	170		
	V2	175	175	174	174	174	174	174	174	174	174	174		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
34000	TOFL	8660	8800	8980	9150	9330	9510	9690	9860	10040	10210	10390	180	180
	V1	162	162	162	162	162	162	162	162	162	162	162		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
33000	TOFL	8110	8250	8410	8580	8740	8910	9070	9240	9400	9570	9730	177	177
	V1	159	159	159	159	159	159	159	159	159	159	159		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
32000	TOFL	7590	7720	7870	8030	8180	8330	8490	8640	8790	8940	9100	175	175
	V1	155	155	155	155	155	155	155	155	155	155	155		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	7090	7200	7350	7490	7630	7770	7920	8060	8200	8340	8480	172	172
	V1	151	151	151	151	151	151	151	151	151	151	151		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.7	8.6		

FIGURE 10-5-15. TAKE-OFF DISTANCE; FLAPS - 0°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.5	83.2	84.1	85.1	86.0	86.9	87.7	88.6	89.5	90.4	91.2		
30000	TOFL	6600	6710	6840	6970	7100	7230	7370	7500	7630	7760	7890	168	168
	V1	147	147	147	147	147	147	147	147	147	147	147		
	VR	154	154	154	154	154	153	153	153	153	153	153		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
29000	TOFL	6130	6230	6350	6470	6600	6720	6840	6960	7080	7200	7320	165	165
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
28000	TOFL	5700	5790	5900	6010	6130	6240	6350	6460	6570	6690	6800	162	162
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
27000	TOFL	5280	5370	5470	5570	5680	5780	5890	5990	6090	6190	6300	159	159
	V1	135	135	135	135	134	134	134	134	134	134	134		
	VR	143	143	143	143	143	143	143	142	142	142	142		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	11.1	11	11	11	11	11.1	11	11.1	11.1	11.1	11.1		
26000	TOFL	4900	4980	5070	5170	5260	5360	5450	5550	5640	5730	5830	156	156
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	11.8	11.7	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8		

FIGURE 10-5-15. TAKE-OFF DISTANCE; FLAPS - 0°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	30.2				Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	86.4					
	N1 (%)	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
39600	TOFL	14940											196	196
	V1	181												
	VR	184												
	V2	187												
	GR2	5.1												
39000	TOFL	14420	14720										194	194
	V1	179	180											
	VR	182	182											
	V2	185	185											
	GR2	5.3	5											
38000	TOFL	13590	13870	14390									192	192
	V1	176	176	177										
	VR	179	179	179										
	V2	183	182	182										
	GR2	5.7	5.3	5										
37000	TOFL	12780	13060	13550	14390								189	189
	V1	173	173	174	174									
	VR	176	176	176	177									
	V2	180	180	180	180									
	GR2	6	5.7	5.4	5.1									
36000	TOFL	12010	12280	12740	13530	14460							186	186
	V1	169	170	170	171	172								
	VR	173	173	173	174	174								
	V2	177	177	177	177	177								
	GR2	6.4	6	5.7	5.4	5.1								
35000	TOFL	11280	11530	11970	12690	13560	14540						183	183
	V1	166	166	167	168	169	170							
	VR	170	170	170	171	171	172							
	V2	174	174	174	174	175	175							
	GR2	6.8	6.4	6.1	5.8	5.4	5							
34000	TOFL	10580	10810	11220	11890	12700	13610	14590	14630				180	180
	V1	162	163	163	164	165	166	167	167					
	VR	167	167	167	167	168	169	169	169					
	V2	172	171	171	171	172	172	172	172					
	GR2	7.2	6.8	6.5	6.1	5.8	5.4	4.8	4.8					
33000	TOFL	9910	10130	10520	11130	11870	12710	13620	13660				177	177
	V1	159	159	160	161	162	163	164	164					
	VR	164	164	164	164	165	166	166	166					
	V2	169	169	169	169	169	169	169	169					
	GR2	7.6	7.2	6.9	6.5	6.2	5.8	5.2	5.2					
32000	TOFL	9260	9480	9840	10410	11080	11860	12700	12740				175	175
	V1	155	155	156	157	158	159	161	161					
	VR	160	160	160	161	162	162	163	163					
	V2	166	166	166	166	166	166	166	166					
	GR2	8.1	7.7	7.3	6.9	6.6	6.2	5.6	5.6					
31000	TOFL	8640	8840	9180	9710	10330	11030	11820	11850				172	172
	V1	151	151	152	153	155	156	157	157					
	VR	157	157	157	158	159	159	160	160					
	V2	163	163	163	163	163	163	163	163					
	GR2	8.6	8.1	7.8	7.4	7.1	6.6	6	6					

FIGURE 10-5-15. TAKE-OFF DISTANCE; FLAPS - 0°; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	30.2				Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	86.4					
	N1 (%)	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
30000	TOFL	8040	8220	8540	9030	9600	10250	10970	11000				168	168
	V1	147	147	148	149	151	152	153	153					
	VR	153	153	154	154	155	156	156	156					
	V2	160	160	160	160	160	160	160	160					
	GR2	9.1	8.6	8.3	7.9	7.5	7.1	6.5	6.4					
29000	TOFL	7460	7620	7930	8380	8910	9500	10160	10190				165	165
	V1	143	143	144	145	147	148	149	149					
	VR	150	150	150	151	152	152	153	153					
	V2	157	157	157	157	157	157	157	157					
	GR2	9.6	9.2	8.8	8.4	8	7.6	7	6.9					
28000	TOFL	6920	7080	7340	7760	8250	8800	9400	9420				162	162
	V1	139	139	140	141	143	144	145	145					
	VR	146	146	146	147	148	149	150	150					
	V2	154	153	153	154	154	154	154	154					
	GR2	10.3	9.8	9.4	9	8.6	8.1	7.5	7.4					
27000	TOFL	6410	6560	6800	7170	7620	8120	8680	8700				159	159
	V1	134	135	136	137	138	140	141	141					
	VR	142	142	143	144	145	145	146	146					
	V2	151	150	150	150	151	151	151	151					
	GR2	10.9	10.4	10	9.6	9.2	8.7	8	8					
26000	TOFL	5930	6060	6280	6630	7020	7480	7990	8010				156	156
	V1	130	130	131	133	134	135	137	137					
	VR	139	139	139	140	141	142	142	142					
	V2	148	147	147	147	148	148	148	148					
	GR2	11.6	11.1	10.6	10.2	9.8	9.3	8.6	8.6					

FIGURE 10-5-16. TAKE-OFF DISTANCE; FLAPS - 0°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.1	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	91.8		
39600	TOFL	12940	13270	13520	13790	14060	14330	14600	14870				196	197
	V1	182	182	182	182	182	182	182	182					
	VR	184	184	184	184	184	184	184	184					
	V2	188	188	188	188	188	188	188	187					
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9					
39000	TOFL	12490	12810	13050	13310	13570	13830	14100	14360	14620	14890		195	195
	V1	180	180	180	180	180	180	180	180	180	180			
	VR	183	183	183	183	183	183	183	183	183	183			
	V2	186	186	186	186	186	186	186	186	186	186			
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1			
38000	TOFL	11770	12070	12300	12540	12780	13030	13280	13520	13770	14020	14270	192	192
	V1	177	177	177	177	177	177	177	177	177	177	177		
	VR	180	180	180	180	180	180	180	180	180	180	180		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
37000	TOFL	11070	11360	11570	11790	12020	12260	12480	12720	12950	13180	13420	189	189
	V1	174	174	174	174	174	174	174	174	174	174	174		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	181	181	181	181	180	180	180	180	180	180	180		
	GR2	5.8	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7		
36000	TOFL	10410	10680	10870	11080	11300	11510	11730	11950	12160	12380	12610	186	187
	V1	170	170	170	170	170	170	170	170	170	170	170		
	VR	173	173	173	173	173	173	173	173	173	173	173		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
35000	TOFL	9780	10020	10210	10400	10600	10810	11010	11210	11410	11620	11830	183	184
	V1	167	167	167	167	167	167	167	167	167	167	167		
	VR	170	170	170	170	170	170	170	170	170	170	170		
	V2	175	175	175	175	175	175	175	175	175	175	175		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
34000	TOFL	9170	9400	9570	9750	9940	10130	10320	10510	10700	10890	11090	180	181
	V1	163	163	163	163	163	163	163	163	163	163	163		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
33000	TOFL	8580	8800	8960	9130	9310	9490	9660	9840	10010	10190	10380	177	178
	V1	160	160	160	160	160	160	160	160	160	160	160		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	7.4	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3		
32000	TOFL	8030	8230	8380	8540	8700	8870	9030	9190	9360	9520	9700	175	175
	V1	156	156	156	156	156	156	156	156	156	156	156		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	167	167	167	167	167	167	167	167	167	167	166		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
31000	TOFL	7490	7680	7820	7970	8120	8270	8420	8580	8730	8880	9040	172	172
	V1	152	152	152	152	152	152	152	152	152	152	152		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 10-5-16. TAKE-OFF DISTANCE; FLAPS - 0°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.1	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	91.8		
30000	TOFL	6980	7150	7280	7420	7560	7700	7840	7980	8120	8260	8410	168	169
	V1	148	148	148	148	148	148	148	148	148	148	148		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.9	8.9	8.8		
29000	TOFL	6480	6640	6770	6880	7010	7150	7280	7410	7530	7660	7790	165	166
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	158	158	158	158	158	158	158	158	158	158	157		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.3		
28000	TOFL	6020	6160	6270	6390	6510	6630	6750	6870	6980	7100	7230	162	162
	V1	140	140	140	140	140	140	140	140	140	140	140		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	10.1	10	10	10	10	10	10	10	10	10	9.9		
27000	TOFL	5580	5710	5810	5920	6030	6140	6250	6360	6470	6580	6700	159	159
	V1	136	136	136	136	136	136	136	135	135	135	135		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	10.7	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.7	10.7	10.6		
26000	TOFL	5160	5280	5380	5470	5580	5680	5780	5880	5980	6080	6190	156	156
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	11.4	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.3		

FIGURE 10-5-16. TAKE-OFF DISTANCE; FLAPS - 0°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
39600	TOFL												196	197
	V1													
	VR													
	V2													
	GR2													
39000	TOFL												195	195
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	14560	15000										192	192
	V1	177	178											
	VR	180	180											
	V2	183	183											
	GR2	5.2	4.9											
37000	TOFL	13690	14110	14830									189	189
	V1	174	174	175										
	VR	177	177	177										
	V2	180	180	180										
	GR2	5.5	5.2	4.9										
36000	TOFL	12860	13270	13940	14820								186	187
	V1	171	171	172	173									
	VR	173	174	174	175									
	V2	177	177	177	178									
	GR2	5.9	5.5	5.2	4.9									
35000	TOFL	12070	12450	13080	13900	14870							183	184
	V1	167	168	168	169	170								
	VR	170	171	171	172	172								
	V2	175	175	175	175	175								
	GR2	6.3	5.9	5.6	5.3	4.9								
34000	TOFL	11320	11670	12260	13020	13920	14920						180	181
	V1	164	164	165	166	167	168							
	VR	167	167	168	168	169	170							
	V2	172	172	172	172	172	172							
	GR2	6.7	6.3	5.9	5.6	5.3	4.9							
33000	TOFL	10600	10930	11470	12170	13000	13940	14600					177	178
	V1	160	161	161	162	163	164	165						
	VR	164	164	165	165	166	167	167						
	V2	169	169	169	169	169	170	170						
	GR2	7.1	6.7	6.3	6	5.7	5.2	4.9						
32000	TOFL	9900	10220	10720	11370	12130	13000	13610					175	175
	V1	156	157	158	159	160	161	162						
	VR	161	161	161	162	163	163	164						
	V2	166	166	166	166	167	167	167						
	GR2	7.5	7.1	6.8	6.4	6.1	5.6	5.3						
31000	TOFL	9240	9530	10010	10600	11290	12090	12660					172	172
	V1	152	153	154	155	156	157	158						
	VR	158	158	158	159	160	160	161						
	V2	163	163	163	163	164	164	164						
	GR2	8	7.6	7.2	6.8	6.5	6.1	5.7						

FIGURE 10-5-16. TAKE-OFF DISTANCE; FLAPS - 0°; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
30000	TOFL	8600	8870	9310	9860	10500	11230	11750					168	169
	V1	148	149	150	151	152	154	154						
	VR	154	154	155	155	156	157	157						
	V2	160	160	160	160	161	161	161						
	GR2	8.5	8.1	7.7	7.3	6.9	6.5	6.1						
29000	TOFL	7970	8240	8640	9150	9730	10400	10880					165	166
	V1	144	145	146	147	148	150	151						
	VR	151	151	151	152	153	153	154						
	V2	157	157	157	157	158	158	158						
	GR2	9	8.6	8.2	7.8	7.4	7	6.6						
28000	TOFL	7390	7620	8000	8460	9010	9620	10060					162	162
	V1	140	141	142	143	144	146	147						
	VR	147	147	148	148	149	150	150						
	V2	154	154	154	154	154	155	155						
	GR2	9.6	9.1	8.7	8.4	8	7.5	7.1						
27000	TOFL	6840	7050	7390	7820	8310	8870	9270					159	159
	V1	136	136	137	139	140	141	142						
	VR	143	143	144	145	146	146	147						
	V2	151	151	151	151	151	152	152						
	GR2	10.2	9.8	9.3	8.9	8.5	8	7.6						
26000	TOFL	6310	6510	6830	7200	7650	8160	8530					156	156
	V1	131	132	133	134	136	137	138						
	VR	139	140	140	141	142	143	143						
	V2	148	148	148	148	148	148	148						
	GR2	10.9	10.4	10	9.6	9.1	8.6	8.2						

FIGURE 10-5-17. TAKE-OFF DISTANCE; FLAPS - 0°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.5	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.4		
39600	TOFL	13920	14170	14450	14750								197	197
	V1	183	183	183	183									
	VR	185	185	185	185									
	V2	188	188	188	188									
	GR2	4.7	4.7	4.6	4.6									
39000	TOFL	13430	13680	13950	14230	14510	14800						195	196
	V1	181	181	181	181	181	181							
	VR	183	183	183	183	183	183							
	V2	187	187	187	186	186	186							
	GR2	4.9	4.8	4.8	4.8	4.8	4.8							
38000	TOFL	12660	12880	13130	13400	13660	13930	14190	14460	14720	14990		193	193
	V1	178	178	178	178	178	178	178	178	178	178			
	VR	180	180	180	180	180	180	180	180	180	180			
	V2	184	184	184	184	184	184	184	184	184	184			
	GR2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1			
37000	TOFL	11900	12110	12350	12600	12850	13100	13340	13590	13840	14090	14360	190	190
	V1	175	175	175	175	175	175	175	175	175	175	175		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.3		
36000	TOFL	11180	11380	11600	11830	12060	12290	12530	12760	12990	13220	13480	187	187
	V1	171	171	171	171	171	171	171	171	171	171	171		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7		
35000	TOFL	10490	10680	10880	11100	11310	11530	11750	11960	12180	12400	12640	184	184
	V1	168	168	168	168	168	168	168	168	168	168	168		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	175	175	175	175	175	175	175	175	175	175	175		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1		
34000	TOFL	9830	10000	10200	10400	10600	10810	11010	11210	11410	11610	11840	181	181
	V1	164	164	164	164	164	164	164	164	164	164	164		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.4		
33000	TOFL	9200	9360	9540	9730	9920	10110	10300	10490	10670	10870	11080	178	178
	V1	161	161	161	161	161	161	161	161	161	161	161		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	170	170	170	170	170	170	170	170	170	170	169		
	GR2	7.1	7	7	7	7	7	7	7	7	7	6.9		
32000	TOFL	8600	8750	8920	9090	9270	9450	9620	9790	9970	10140	10350	175	175
	V1	157	157	157	157	157	157	157	157	157	157	157		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.4	7.5	7.5	7.5	7.3		
31000	TOFL	8020	8160	8320	8480	8640	8810	8970	9130	9290	9460	9650	172	172
	V1	153	153	153	153	153	153	153	153	153	153	153		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	8	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.8		

FIGURE 10-5-17. TAKE-OFF DISTANCE; FLAPS - 0°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.5	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.4		
30000	TOFL	7470	7600	7740	7900	8040	8200	8350	8500	8640	8800	8980	169	169
	V1	149	149	149	149	149	149	149	149	149	149	149		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.3		
29000	TOFL	6940	7060	7200	7330	7470	7610	7750	7890	8030	8170	8340	166	166
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	9	9	9	9	9	9	9	9	9	9	8.8		
28000	TOFL	6430	6540	6660	6790	6920	7050	7170	7300	7430	7560	7700	163	163
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	155	155	155	155	155	155	155	155	155	155	154		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.4		
27000	TOFL	5960	6060	6170	6290	6410	6520	6640	6760	6870	6990	7130	160	160
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	10.3	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10		
26000	TOFL	5510	5600	5700	5810	5920	6030	6130	6240	6350	6450	6580	156	156
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.6		

FIGURE 10-5-17. TAKE-OFF DISTANCE; FLAPS - 0°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	93.0	93.0	93.0	92.6	92.0	91.3	91.2						
39600	TOFL												197	197
	V1													
	VR													
	V2													
	GR2													
39000	TOFL												195	196
	V1													
	VR													
	V2													
	GR2													
38000	TOFL												193	193
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	14730											190	190
	V1	175												
	VR	177												
	V2	180												
	GR2	5.1												
36000	TOFL	13830	14450										187	187
	V1	172	172											
	VR	174	174											
	V2	178	178											
	GR2	5.4	5.1											
35000	TOFL	12980	13560	14320									184	184
	V1	168	169	170										
	VR	171	171	172										
	V2	175	175	175										
	GR2	5.7	5.4	5.1										
34000	TOFL	12160	12700	13410	14270								181	181
	V1	165	165	166	167									
	VR	168	168	169	169									
	V2	172	172	172	172									
	GR2	6.1	5.8	5.4	5.1									
33000	TOFL	11380	11890	12540	13330	14270							178	178
	V1	161	162	163	164	165								
	VR	165	165	166	166	167								
	V2	169	169	169	170	170								
	GR2	6.5	6.2	5.8	5.5	5.2								
32000	TOFL	10630	11110	11700	12440	13300	14290	14550					175	175
	V1	158	158	159	160	161	162	162						
	VR	162	162	162	163	164	164	164						
	V2	166	166	166	167	167	167	167						
	GR2	6.9	6.6	6.2	5.9	5.6	5.1	4.9						
31000	TOFL	9910	10360	10920	11590	12370	13290	13530					172	172
	V1	154	155	156	157	158	159	159						
	VR	158	159	159	160	160	161	161						
	V2	163	163	163	164	164	164	164						
	GR2	7.4	7	6.6	6.3	6	5.5	5.3						

FIGURE 10-5-17. TAKE-OFF DISTANCE; FLAPS - 0°; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	93.0	93.0	93.0	92.6	92.0	91.3	91.2						
30000	TOFL	9230	9640	10160	10780	11490	12330	12560					169	169
	V1	150	151	152	153	154	155	155						
	VR	155	155	156	156	157	158	158						
	V2	160	160	160	161	161	161	161						
	GR2	7.9	7.5	7.1	6.8	6.4	5.9	5.7						
29000	TOFL	8570	8960	9420	10000	10660	11420	11630					166	166
	V1	146	147	148	149	150	151	152						
	VR	151	152	152	153	154	154	155						
	V2	157	157	157	158	158	158	158						
	GR2	8.4	8	7.6	7.2	6.9	6.3	6.2						
28000	TOFL	7940	8290	8720	9250	9850	10550	10740					163	163
	V1	142	142	144	145	146	147	148						
	VR	148	148	149	149	150	151	151						
	V2	154	154	154	155	155	155	155						
	GR2	8.9	8.5	8.1	7.8	7.4	6.8	6.7						
27000	TOFL	7330	7660	8050	8530	9080	9730	9900					160	160
	V1	137	138	139	140	142	143	144						
	VR	144	145	145	146	147	147	148						
	V2	151	151	151	151	152	152	152						
	GR2	9.6	9.1	8.7	8.3	7.9	7.4	7.2						
26000	TOFL	6770	7060	7410	7860	8350	8940	9100					156	156
	V1	133	134	135	136	137	139	139						
	VR	140	141	141	142	143	144	144						
	V2	148	148	148	148	148	149	149						
	GR2	10.2	9.7	9.3	8.9	8.5	7.9	7.8						

FIGURE 10-5-18. TAKE-OFF DISTANCE; FLAPS - 0°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.4	85.0	85.7	86.7	87.6	88.4	89.3	90.2	91.2	92.1	92.9		
39600	TOFL	14750											198	198
	V1	184												
	VR	186												
	V2	189												
	GR2	4.5												
39000	TOFL	14240	14570	14980									196	196
	V1	182	182	183										
	VR	184	184	184										
	V2	187	187	187										
	GR2	4.7	4.6	4.5										
38000	TOFL	13400	13720	14090	14380	14680	15000						193	193
	V1	179	179	179	179	179	179							
	VR	181	181	181	181	181	181							
	V2	184	184	184	184	184	184							
	GR2	5	4.9	4.8	4.8	4.8	4.8							
37000	TOFL	12610	12890	13250	13520	13800	14100	14400	14620	14860			190	190
	V1	176	176	176	176	176	176	176	176	176				
	VR	178	178	178	178	178	178	178	178	178				
	V2	181	181	181	181	181	181	181	181	181				
	GR2	5.3	5.2	5.2	5.2	5.2	5.1	5.1	5.1	5.2				
36000	TOFL	11830	12110	12440	12690	12950	13230	13510	13730	13940	14200	14510	187	187
	V1	172	172	172	172	172	172	172	172	172	172	173		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	179	179	179	179	179	179	179	179	178	178	178		
	GR2	5.7	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.3		
35000	TOFL	11100	11350	11660	11900	12140	12400	12660	12860	13060	13310	13600	184	185
	V1	169	169	169	169	169	169	169	169	169	169	169		
	VR	172	172	172	172	172	172	172	172	172	172	172		
	V2	176	176	176	176	176	176	176	176	176	176	175		
	GR2	6	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.9	5.8	5.6		
34000	TOFL	10400	10630	10920	11140	11360	11610	11850	12040	12230	12450	12730	181	182
	V1	165	165	165	165	165	165	165	165	165	165	166		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	6.4	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.3	6.2	6		
33000	TOFL	9720	9940	10210	10410	10620	10850	11080	11250	11430	11630	11900	178	179
	V1	162	162	162	162	162	162	162	162	162	162	162		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	6.8	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.7	6.6	6.4		
32000	TOFL	9090	9290	9540	9730	9920	10130	10340	10500	10670	10860	11110	176	176
	V1	158	158	158	158	158	158	158	158	158	158	158		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	7.2	7.2	7.1	7.1	7.1	7.1	7	7.1	7.1	7	6.8		
31000	TOFL	8480	8670	8890	9070	9250	9450	9640	9790	9940	10120	10360	173	173
	V1	154	154	154	154	154	154	154	154	154	154	155		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	7.7	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.2		

FIGURE 10-5-18. TAKE-OFF DISTANCE; FLAPS - 0°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.4	85.0	85.7	86.7	87.6	88.4	89.3	90.2	91.2	92.1	92.9		
30000	TOFL	7900	8070	8280	8440	8610	8790	8970	9110	9250	9420	9640	169	169
	V1	150	150	150	150	150	150	150	150	150	150	150		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	8.2	8.1	8	8	8	8	8	8	8	8	7.7		
29000	TOFL	7340	7500	7690	7840	8000	8160	8330	8450	8590	8740	8950	166	166
	V1	146	146	146	146	146	146	146	146	146	146	146		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.6	8.5	8.2		
28000	TOFL	6790	6930	7110	7250	7400	7550	7700	7820	7940	8080	8280	163	163
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	148	148	148	148	148	148	149	148	148	148	148		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	9.3	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	8.8		
27000	TOFL	6290	6420	6580	6710	6840	6980	7120	7220	7340	7470	7640	160	160
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	151	152	152	152	152	152	152	152	152	152	151		
	GR2	9.9	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.6	9.4		
26000	TOFL	5810	5930	6070	6190	6310	6440	6560	6660	6770	6890	7050	157	157
	V1	133	133	133	133	133	133	133	133	133	133	134		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	10.6	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10		

FIGURE 10-5-18. TAKE-OFF DISTANCE; FLAPS - 0°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	93.0	93.0	93.0	92.4	91.8	91.2							
39600	TOFL												198	198
	V1													
	VR													
	V2													
	GR2													
39000	TOFL												196	196
	V1													
	VR													
	V2													
	GR2													
38000	TOFL												193	193
	V1													
	VR													
	V2													
	GR2													
37000	TOFL												190	190
	V1													
	VR													
	V2													
	GR2													
36000	TOFL												187	187
	V1													
	VR													
	V2													
	GR2													
35000	TOFL	14090	14850										184	185
	V1	170	170											
	VR	172	172											
	V2	175	175											
	GR2	5.2	4.9											
34000	TOFL	13200	13900	14720									181	182
	V1	166	167	168										
	VR	169	169	170										
	V2	172	172	172										
	GR2	5.6	5.3	4.9										
33000	TOFL	12340	13000	13750	14680								178	179
	V1	163	163	164	165									
	VR	166	166	167	167									
	V2	170	170	170	170									
	GR2	6	5.6	5.3	5									
32000	TOFL	11520	12130	12830	13680	14660							176	176
	V1	159	160	161	162	163								
	VR	162	163	163	164	165								
	V2	167	167	167	167	167								
	GR2	6.4	6	5.7	5.4	5								
31000	TOFL	10740	11300	11940	12730	13640	14520						173	173
	V1	155	156	157	158	159	160							
	VR	159	160	160	161	161	162							
	V2	164	164	164	164	164	164							
	GR2	6.8	6.4	6.1	5.8	5.4	5							

FIGURE 10-5-18. TAKE-OFF DISTANCE; FLAPS - 0°; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	93.0	93.0	93.0	92.4	91.8	91.2							
30000	TOFL	10000	10520	11100	11820	12660	13480						169	169
	V1	151	152	153	154	155	156							
	VR	156	156	157	157	158	159							
	V2	161	161	161	161	161	161							
	GR2	7.3	6.9	6.5	6.2	5.8	5.4							
29000	TOFL	9290	9770	10300	10960	11720	12470						166	166
	V1	147	148	149	150	152	153							
	VR	152	153	153	154	155	155							
	V2	158	158	158	158	158	158							
	GR2	7.8	7.4	7	6.7	6.3	5.8							
28000	TOFL	8610	9050	9540	10150	10830	11520						163	163
	V1	143	144	145	147	148	149							
	VR	149	149	150	151	151	152							
	V2	155	155	155	155	155	155							
	GR2	8.3	7.9	7.5	7.2	6.8	6.3							
27000	TOFL	7930	8360	8800	9360	9980	10600						160	160
	V1	139	140	141	142	144	145							
	VR	145	146	146	147	148	148							
	V2	151	151	152	152	152	152							
	GR2	8.9	8.5	8.1	7.7	7.3	6.8							
26000	TOFL	7310	7680	8090	8610	9180	9740						157	157
	V1	134	135	137	138	139	141							
	VR	141	142	142	143	144	145							
	V2	148	148	148	149	149	149							
	GR2	9.5	9.1	8.7	8.3	7.9	7.4							

FIGURE 10-5-19. TAKE-OFF DISTANCE; FLAPS - 0°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	85.3	85.6	86.3	87.2	88.2	89.0	89.8	90.8	91.7	92.6	93.0		
39600	TOFL												198	198
	V1													
	VR													
	V2													
	GR2													
39000	TOFL												196	197
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	14290	14750										194	194
	V1	180	180											
	VR	182	182											
	V2	185	185											
	GR2	4.8	4.6											
37000	TOFL	13440	13870	14280	14580	14870							191	191
	V1	177	177	177	177	177								
	VR	179	179	179	179	179								
	V2	182	182	182	182	182								
	GR2	5.1	4.9	4.9	4.9	4.9								
36000	TOFL	12620	13020	13410	13680	13960	14290	14570	14790				188	188
	V1	173	173	173	173	173	173	173	173					
	VR	176	176	176	176	176	176	176	176					
	V2	179	179	179	179	179	179	179	179					
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2					
35000	TOFL	11830	12200	12560	12820	13080	13390	13650	13850	14080	14360	14760	185	185
	V1	170	170	170	170	170	170	170	170	170	170	171		
	VR	173	173	173	173	173	173	173	173	173	173	173		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	5.8	5.6	5.6	5.6	5.6	5.5	5.5	5.6	5.5	5.4	5.1		
34000	TOFL	11080	11420	11750	11990	12240	12520	12770	12950	13170	13440	13810	182	182
	V1	166	166	166	166	166	166	166	167	167	167	167		
	VR	169	169	169	169	169	170	170	170	170	170	170		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	6.2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.4		
33000	TOFL	10350	10670	10980	11210	11430	11700	11930	12090	12300	12550	12910	179	179
	V1	163	163	163	163	163	163	163	163	163	163	163		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	6.6	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.1	5.8		
32000	TOFL	9660	9960	10240	10450	10660	10910	11120	11280	11470	11700	12040	176	176
	V1	159	159	159	159	159	159	159	159	159	159	160		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	7	6.8	6.7	6.7	6.8	6.7	6.7	6.7	6.7	6.5	6.2		
31000	TOFL	9020	9280	9540	9740	9930	10160	10350	10500	10680	10900	11210	173	173
	V1	155	155	155	155	155	156	156	156	156	156	156		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	7.4	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7	6.7		

FIGURE 10-5-19. TAKE-OFF DISTANCE; FLAPS - 0°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	85.3	85.6	86.3	87.2	88.2	89.0	89.8	90.8	91.7	92.6	93.0		
30000	TOFL	8400	8640	8880	9060	9250	9450	9630	9770	9940	10140	10440	170	170
	V1	151	152	152	152	152	152	152	152	152	152	152		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	7.9	7.8	7.7	7.7	7.7	7.7	7.6	7.7	7.6	7.4	7.1		
29000	TOFL	7810	8030	8250	8420	8590	8780	8950	9070	9230	9420	9690	167	167
	V1	147	147	148	148	148	148	148	148	148	148	148		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	8.4	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.1	7.9	7.6		
28000	TOFL	7240	7440	7650	7800	7960	8130	8280	8400	8550	8720	8980	164	164
	V1	143	143	144	144	144	144	144	144	144	144	144		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	9	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.4	8.1		
27000	TOFL	6680	6870	7050	7200	7340	7500	7640	7740	7880	8040	8280	161	160
	V1	139	139	139	139	139	139	139	139	139	139	140		
	VR	145	145	146	146	146	146	146	146	146	146	146		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	9.6	9.4	9.3	9.3	9.3	9.3	9.3	9.3	9.2	9	8.7		
26000	TOFL	6170	6340	6510	6630	6760	6910	7040	7140	7260	7400	7620	157	157
	V1	134	135	135	135	135	135	135	135	135	135	135		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	149	149	149	149	149	149	149	149	149	148	148		
	GR2	10.2	10.1	9.9	10	10	9.9	9.9	9.9	9.9	9.6	9.3		

FIGURE 10-5-19. TAKE-OFF DISTANCE; FLAPS - 0°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	22						Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	72							
	N1 (%)	93.0	93.0	92.8	92.2	91.5	91.2							
39600	TOFL												198	198
	V1													
	VR													
	V2													
	GR2													
39000	TOFL												196	197
	V1													
	VR													
	V2													
	GR2													
38000	TOFL												194	194
	V1													
	VR													
	V2													
	GR2													
37000	TOFL												191	191
	V1													
	VR													
	V2													
	GR2													
36000	TOFL												188	188
	V1													
	VR													
	V2													
	GR2													
35000	TOFL												185	185
	V1													
	VR													
	V2													
	GR2													
34000	TOFL	14440											182	182
	V1	168												
	VR	170												
	V2	173												
	GR2	5.1												
33000	TOFL	13490	14260										179	179
	V1	164	165											
	VR	167	167											
	V2	170	170											
	GR2	5.5	5.1											
32000	TOFL	12590	13300	14130									176	176
	V1	160	161	162										
	VR	163	164	164										
	V2	167	167	167										
	GR2	5.9	5.5	5.2										
31000	TOFL	11720	12380	13150	14060								173	173
	V1	157	158	159	160									
	VR	160	161	161	162									
	V2	164	164	164	165									
	GR2	6.3	5.9	5.6	5.3									

FIGURE 10-5-19. TAKE-OFF DISTANCE; FLAPS - 0°; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; DRY RUNWAY (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	22						Flap 0° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	72							
	N1 (%)	93.0	93.0	92.8	92.2	91.5	91.2							
30000	TOFL	10900	11500	12220	13050	14010	14490						170	170
	V1	153	154	155	156	157	157							
	VR	157	157	158	158	159	159							
	V2	161	161	161	162	162	162							
	GR2	6.7	6.3	6	5.7	5.3	5.1							
29000	TOFL	10130	10670	11310	12080	12960	13410						167	167
	V1	149	150	151	152	153	154							
	VR	153	154	154	155	156	156							
	V2	158	158	158	159	159	159							
	GR2	7.2	6.8	6.5	6.1	5.7	5.5							
28000	TOFL	9380	9890	10470	11160	11970	12370						164	164
	V1	145	146	147	148	149	150							
	VR	150	150	151	152	152	153							
	V2	155	155	155	155	156	156							
	GR2	7.7	7.3	6.9	6.6	6.2	6							
27000	TOFL	8670	9130	9670	10290	11020	11400						161	160
	V1	141	142	143	144	145	146							
	VR	146	147	147	148	149	149							
	V2	152	152	152	152	153	153							
	GR2	8.3	7.8	7.5	7.1	6.7	6.5							
26000	TOFL	7960	8400	8900	9470	10120	10450						157	157
	V1	136	138	139	140	141	142							
	VR	142	143	144	144	145	145							
	V2	148	148	149	149	149	150							
	GR2	8.9	8.4	8	7.7	7.2	7							

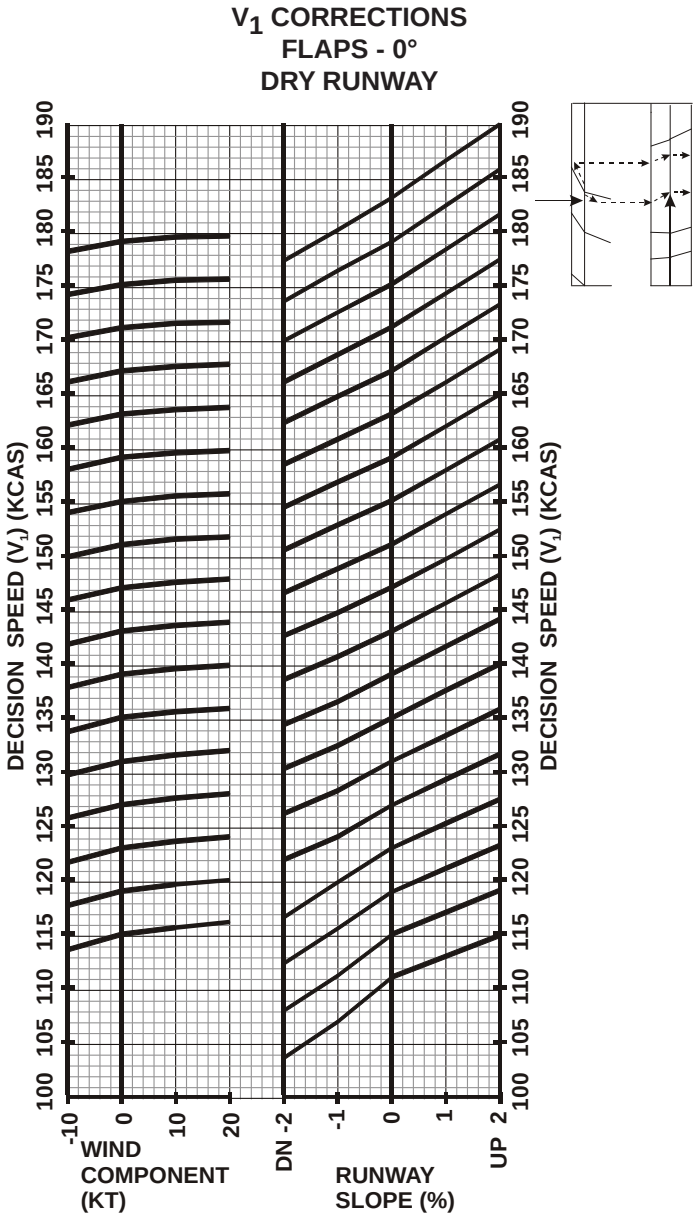

Figure 10-5-20. V_1 Correction; Flaps - 0°; Dry Runway

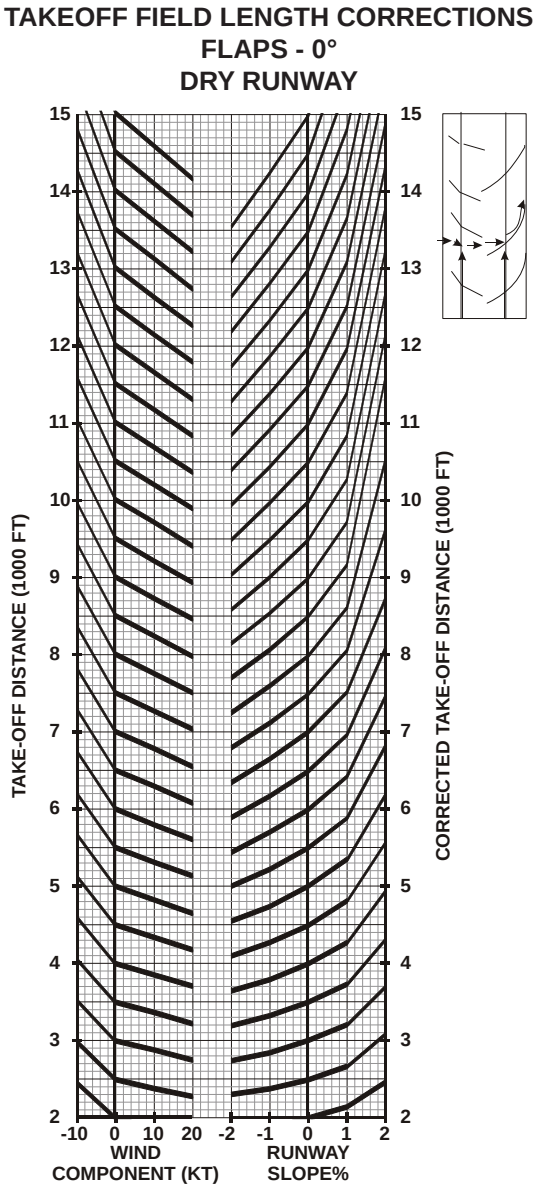

Figure 10-5-21. Takeoff Field Length Corrections; Flaps - 0°; Dry Runway

TAKEOFF TABLES; AND CHARTS; FLAPS - 0°; WET RUNWAY

FIGURE 10-5-22. TAKE-OFF DISTANCE; FLAPS - 0° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
39600	TOFL	8290	8420	8590	8750	8910	9060	9210	9350	9530	9720	9900	192	192
	V1	156	156	155	155	155	154	154	154	153	153	153		
	VR	176	176	176	176	176	176	176	176	176	176	176		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	7.4	7.4	7.5	7.5	7.5	7.6	7.6	7.7	7.7	7.7	7.7		
39000	TOFL	7970	8100	8260	8410	8560	8710	8850	8990	9170	9340	9520	191	191
	V1	154	153	153	153	152	152	152	151	151	151	151		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9		
38000	TOFL	7470	7580	7730	7870	8010	8150	8280	8410	8580	8740	8900	188	188
	V1	150	149	149	149	148	148	148	147	147	147	147		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.3	8.3	8.3	8.3		
37000	TOFL	6980	7090	7230	7360	7490	7620	7740	7860	8020	8170	8320	185	185
	V1	146	146	145	145	144	144	144	143	143	143	143		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	8.5	8.5	8.5	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7		
36000	TOFL	6520	6620	6750	6870	6990	7110	7230	7340	7480	7620	7760	182	182
	V1	142	142	141	141	141	140	140	139	139	139	139		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	8.9	8.9	9	9	9	9.1	9.1	9.2	9.2	9.2	9.2		
35000	TOFL	6080	6180	6290	6400	6510	6620	6730	6830	6970	7090	7230	180	180
	V1	138	138	137	137	136	136	136	135	135	135	135		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	9.4	9.4	9.4	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6		
34000	TOFL	5660	5750	5860	5970	6070	6170	6270	6370	6490	6610	6730	177	177
	V1	134	134	133	133	133	132	132	131	131	131	131		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	9.9	9.9	9.9	10	10	10.1	10.1	10.1	10.1	10.1	10.1		
33000	TOFL	5270	5350	5460	5550	5650	5740	5840	5930	6040	6150	6260	174	174
	V1	130	130	129	129	129	128	128	127	127	127	127		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.4	10.4	10.5	10.5	10.5	10.6	10.6	10.7	10.7	10.7	10.7		
32000	TOFL	4910	4980	5070	5170	5260	5340	5430	5520	5620	5720	5830	171	171
	V1	126	126	125	125	125	124	124	124	123	123	123		
	VR	153	153	153	153	153	153	153	152	152	152	152		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	11	11	11	11.1	11.1	11.1	11.2	11.2	11.2	11.3	11.3		

FIGURE 10-5-22. TAKE-OFF DISTANCE; FLAPS - 0° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	77.3	77.5	78.4	79.4	80.3	81.2	82.1	83.0	83.8	84.6	85.4		
31000	TOFL	4570	4640	4730	4820	4900	4980	5060	5140	5240	5330	5430	168	168
	V1	122	122	122	121	121	121	120	120	120	120	119		
	VR	150	150	150	150	149	149	149	149	149	149	149		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	11.6	11.6	11.6	11.6	11.7	11.7	11.8	11.8	11.8	11.9	11.9		
30000	TOFL	4260	4320	4400	4480	4560	4640	4710	4780	4870	4960	5050	166	166
	V1	118	118	118	118	117	117	117	116	116	116	116		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	12.2	12.2	12.2	12.3	12.3	12.4	12.4	12.5	12.5	12.5	12.5		
29000	TOFL	3960	4020	4090	4170	4240	4310	4380	4440	4520	4600	4690	163	163
	V1	115	115	114	114	114	113	113	113	112	112	112		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	155	155	155	155	155	155	154	154	154	154	154		
	GR2	12.9	12.9	12.9	13	13	13.1	13.1	13.2	13.2	13.2	13.2		
28000	TOFL	3680	3730	3800	3870	3930	3990	4060	4120	4190	4270	4340	160	160
	V1	111	111	110	110	110	109	109	109	109	108	108		
	VR	140	140	140	139	139	139	139	139	139	139	139		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	13.6	13.6	13.6	13.7	13.7	13.8	13.8	13.9	13.9	13.9	13.9		
27000	TOFL	3410	3460	3520	3580	3640	3700	3760	3820	3880	3950	4020	157	157
	V1	107	107	106	106	106	106	105	105	105	105	104		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	14.4	14.4	14.4	14.5	14.5	14.6	14.6	14.7	14.7	14.7	14.7		
26000	TOFL	3170	3210	3270	3330	3380	3450	3520	3600	3670	3730	3800	154	154
	V1	103	103	102	102	102	102	102	102	102	102	102		
	VR	133	132	132	132	132	132	132	132	132	132	132		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	15.2	15.2	15.3	15.3	15.3	15.4	15.5	15.5	15.5	15.5	15.5		

FIGURE 10-5-22. TAKE-OFF DISTANCE; FLAPS - 0° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	45	50	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	113	122		
	N1	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
39600	TOFL	10080	10260	10440	10630	10820	11000	11180	12050	13160	14310	15510	192	192
	V1	153	153	153	152	152	152	152	155	159	162	165		
	VR	176	176	176	176	176	176	176	176	177	177	178		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7	6.3	5.7	5.2		
39000	TOFL	9690	9870	10040	10220	10390	10570	10750	11580	12640	13750	14890	191	191
	V1	151	150	150	150	150	150	150	153	156	160	163		
	VR	174	174	174	174	174	174	174	174	175	176	176		
	V2	181	181	181	181	181	181	181	180	180	180	180		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.3	6.6	5.9	5.4		
38000	TOFL	9070	9230	9390	9550	9720	9890	10050	10820	11820	12850	13900	188	188
	V1	147	146	146	146	146	146	146	149	152	156	159		
	VR	171	171	171	171	171	171	171	172	172	173	173		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	7.7	6.9	6.3	5.7		
37000	TOFL	8470	8620	8770	8930	9080	9240	9390	10100	11030	11990	12970	185	185
	V1	143	142	142	142	142	142	142	145	148	151	154		
	VR	168	168	168	168	168	168	168	169	169	170	171		
	V2	176	176	176	176	176	176	176	175	175	175	175		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.1	7.3	6.7	6.1		
36000	TOFL	7900	8050	8190	8330	8470	8610	8750	9410	10280	11180	12080	182	182
	V1	139	138	138	138	138	138	138	141	144	147	150		
	VR	165	165	165	165	165	165	165	166	166	167	168		
	V2	173	173	173	173	173	173	173	173	173	173	172		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	8.5	7.7	7.1	6.4		
35000	TOFL	7360	7490	7620	7750	7880	8010	8140	8760	9560	10390	11240	180	180
	V1	135	134	134	134	134	134	134	137	140	143	146		
	VR	162	162	162	162	162	162	162	163	163	164	165		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9	8.2	7.5	6.8		
34000	TOFL	6850	6970	7090	7220	7340	7460	7580	8120	8880	9650	10430	177	177
	V1	131	131	130	130	130	130	130	132	136	139	142		
	VR	159	159	159	159	159	159	159	159	160	161	162		
	V2	168	168	168	168	168	168	168	167	167	167	167		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	9.4	8.6	7.9	7.3		
33000	TOFL	6370	6480	6590	6710	6820	6930	7040	7550	8210	8940	9660	174	174
	V1	127	127	126	126	126	126	126	128	132	135	138		
	VR	156	156	156	156	156	156	156	156	157	158	159		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10	9.1	8.4	7.7		
32000	TOFL	5930	6030	6130	6240	6340	6450	6550	7000	7620	8290	8950	171	171
	V1	123	123	123	122	122	122	122	124	128	131	134		
	VR	152	152	152	152	152	152	152	153	154	155	156		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	10.5	9.6	8.9	8.2		

FIGURE 10-5-22. TAKE-OFF DISTANCE; FLAPS - 0° ; SEA LEVEL ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	45	50	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	113	122		
	N1	86.2	87.0	87.8	88.7	89.5	90.3	91.1	90.8	90.1	89.5	88.9		
31000	TOFL	5520	5620	5710	5810	5910	6000	6100	6490	7060	7650	8260	168	168
	V1	119	119	119	119	119	118	118	120	124	127	129		
	VR	149	149	149	149	149	149	149	150	151	152	153		
	V2	160	160	160	160	160	160	160	160	159	159	159		
	GR2	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.1	10.2	9.4	8.7		
30000	TOFL	5130	5220	5310	5400	5490	5580	5660	6030	6520	7070	7620	166	166
	V1	116	115	115	115	115	115	115	117	120	122	125		
	VR	146	146	146	146	146	146	146	147	148	149	149		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	11.7	10.8	9.9	9.2		
29000	TOFL	4770	4850	4930	5010	5090	5170	5250	5580	6030	6510	7020	163	163
	V1	112	112	111	111	111	111	111	113	116	118	121		
	VR	143	143	143	143	143	143	143	143	144	145	146		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	12.4	11.4	10.6	9.8		
28000	TOFL	4420	4490	4560	4640	4710	4790	4860	5160	5570	6000	6450	160	160
	V1	108	108	108	108	107	107	107	109	112	114	117		
	VR	139	139	139	139	139	139	139	140	141	142	143		
	V2	152	152	152	152	152	152	152	151	151	151	151		
	GR2	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.1	12.1	11.2	10.4		
27000	TOFL	4090	4160	4220	4290	4360	4430	4500	4760	5140	5530	5930	157	157
	V1	104	104	104	104	104	103	103	105	108	110	113		
	VR	136	136	136	136	136	136	136	136	138	139	140		
	V2	149	149	149	149	149	149	149	149	149	148	148		
	GR2	14.7	14.7	14.7	14.7	14.7	14.7	14.7	13.8	12.8	11.9	11.1		
26000	TOFL	3870	3940	4010	4080	4150	4230	4300	4400	4730	5090	5450	154	154
	V1	102	102	102	102	102	102	102	101	104	106	109		
	VR	132	132	132	132	132	132	132	133	134	135	136		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	15.5	15.5	15.5	15.5	15.5	15.5	15.5	14.6	13.6	12.6	11.8		

FIGURE 10-5-23. TAKE-OFF DISTANCE; FLAPS - 0° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	77.8	78.2	79.2	80.1	81.0	81.9	82.8	83.6	84.4	85.3	86.1		
39600	TOFL	8790	8940	9130	9300	9470	9640	9810	9980	10180	10370	10560	193	193
	V1	157	157	157	156	156	156	155	155	155	155	154		
	VR	177	177	177	177	176	176	176	176	176	176	176		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	7.2	7.3	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4		
39000	TOFL	8460	8600	8770	8940	9110	9270	9420	9590	9780	9970	10150	191	191
	V1	155	154	154	154	153	153	153	153	152	152	152		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6		
38000	TOFL	7910	8040	8210	8360	8520	8660	8810	8970	9140	9320	9490	188	188
	V1	151	150	150	150	150	149	149	149	148	148	148		
	VR	172	172	172	172	172	172	172	172	172	172	172		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	7.9	7.9	7.9	7.9	7.9	8	8	8	8	8	8		
37000	TOFL	7390	7520	7670	7810	7950	8100	8230	8380	8540	8700	8860	185	185
	V1	147	146	146	146	145	145	145	144	144	144	144		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
36000	TOFL	6900	7020	7160	7290	7430	7560	7680	7810	7970	8120	8270	183	183
	V1	143	142	142	142	142	141	141	141	140	140	140		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	8.7	8.7	8.8	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9		
35000	TOFL	6430	6540	6670	6790	6920	7040	7150	7280	7420	7560	7700	180	180
	V1	139	138	138	138	137	137	137	136	136	136	136		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.4	9.4	9.4	9.4		
34000	TOFL	5980	6080	6200	6320	6430	6540	6650	6770	6900	7030	7160	177	177
	V1	135	134	134	134	133	133	133	132	132	132	132		
	VR	160	160	160	160	159	159	159	159	159	159	159		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	9.7	9.7	9.7	9.7	9.8	9.8	9.8	9.9	9.9	9.9	9.9		
33000	TOFL	5570	5660	5770	5880	5980	6090	6190	6290	6410	6530	6650	174	174
	V1	131	130	130	130	129	129	129	128	128	128	128		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.4	10.4	10.4	10.4	10.4		
32000	TOFL	5170	5250	5360	5460	5550	5650	5740	5840	5950	6060	6170	171	171
	V1	127	126	126	126	125	125	125	124	124	124	124		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	10.8	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9		

FIGURE 10-5-23. TAKE-OFF DISTANCE; FLAPS - 0° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	77.8	78.2	79.2	80.1	81.0	81.9	82.8	83.6	84.4	85.3	86.1		
31000	TOFL	4810	4880	4980	5070	5160	5250	5340	5430	5530	5630	5730	169	169
	V1	123	122	122	122	122	121	121	121	120	120	120		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	11.3	11.4	11.4	11.4	11.4	11.4	11.5	11.5	11.5	11.5	11.5		
30000	TOFL	4470	4540	4630	4720	4800	4880	4960	5050	5140	5230	5330	166	166
	V1	119	119	118	118	118	117	117	117	117	117	116		
	VR	147	147	147	147	147	147	147	146	146	146	146		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	12	12	12	12	12.1	12.1	12.1	12.1	12.1	12.2	12.2		
29000	TOFL	4160	4220	4300	4380	4460	4530	4610	4690	4770	4860	4940	163	163
	V1	115	115	115	114	114	114	113	113	113	113	113		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	12.6	12.6	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8		
28000	TOFL	3860	3920	3990	4060	4130	4200	4270	4340	4420	4500	4580	160	160
	V1	111	111	111	111	110	110	110	109	109	109	109		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	13.3	13.4	13.4	13.4	13.4	13.5	13.5	13.5	13.6	13.6	13.6		
27000	TOFL	3570	3630	3700	3760	3830	3890	3950	4020	4090	4160	4230	157	157
	V1	107	107	107	107	106	106	106	106	105	105	105		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	14.1	14.1	14.1	14.2	14.2	14.2	14.3	14.3	14.3	14.3	14.3		
26000	TOFL	3310	3360	3420	3480	3540	3600	3660	3710	3780	3840	3910	154	154
	V1	103	103	103	103	102	102	102	102	101	101	101		
	VR	133	133	133	133	133	133	133	132	132	132	132		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	14.9	14.9	15	15	15	15.1	15.1	15.1	15.1	15.1	15.2		

FIGURE 10-5-23. TAKE-OFF DISTANCE; FLAPS - 0° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	45	48	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	113	118		
	N1	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
39600	TOFL	10760	10950	11150	11350	11540	11740	12200	13180	14360	15610	16420	193	193
	V1	154	154	154	154	154	154	155	158	161	164	166		
	VR	176	176	176	176	176	176	177	177	178	178	179		
	V2	183	183	183	183	183	183	182	182	182	182	182		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.2	6.6	6	5.4	5		
39000	TOFL	10340	10520	10710	10900	11090	11280	11720	12660	13790	14980	15770	191	191
	V1	152	152	152	151	151	151	152	155	159	162	164		
	VR	175	175	175	175	175	175	175	175	176	177	177		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.4	6.8	6.2	5.6	5.2		
38000	TOFL	9660	9840	10010	10190	10360	10540	10950	11840	12880	13990	14710	188	188
	V1	148	148	147	147	147	147	148	151	155	158	160		
	VR	172	172	172	172	172	172	172	173	173	174	174		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	8	8	8	8	8	8	7.8	7.2	6.5	5.9	5.5		
37000	TOFL	9020	9180	9350	9510	9670	9840	10220	11040	12020	13050	13710	185	185
	V1	144	144	143	143	143	143	144	147	150	154	156		
	VR	169	169	169	169	169	169	169	170	170	171	171		
	V2	176	176	176	176	176	176	176	176	176	175	175		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.2	7.6	6.9	6.3	5.9		
36000	TOFL	8420	8570	8720	8870	9020	9180	9520	10280	11200	12150	12770	183	183
	V1	140	140	139	139	139	139	140	143	146	149	151		
	VR	166	166	166	166	166	166	166	167	167	168	168		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.7	8	7.3	6.6	6.3		
35000	TOFL	7830	7980	8120	8240	8380	8520	8870	9560	10410	11300	11870	180	180
	V1	136	136	135	135	135	135	136	139	142	145	147		
	VR	163	163	163	162	162	162	163	164	164	165	165		
	V2	171	171	171	171	171	171	171	171	170	170	170		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.1	8.5	7.7	7	6.6		
34000	TOFL	7280	7410	7540	7670	7800	7930	8230	8880	9660	10480	11020	177	177
	V1	132	132	131	131	131	131	132	135	138	141	143		
	VR	159	159	159	159	159	159	160	160	161	162	162		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.6	8.9	8.2	7.5	7.1		
33000	TOFL	6770	6890	7010	7130	7250	7370	7640	8220	8950	9710	10200	174	174
	V1	128	128	127	127	127	127	128	130	134	137	139		
	VR	156	156	156	156	156	156	156	157	158	159	159		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.1	9.4	8.6	7.9	7.5		
32000	TOFL	6280	6390	6500	6610	6720	6830	7080	7620	8260	8980	9430	171	171
	V1	124	124	123	123	123	123	124	126	129	133	134		
	VR	153	153	153	153	153	153	153	154	155	156	156		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.7	10	9.1	8.4	7.9		

FIGURE 10-5-23. TAKE-OFF DISTANCE; FLAPS - 0° ; 1000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	45	48	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	113	118		
	N1	86.9	87.7	88.5	89.4	90.2	91.0	91.5	90.8	90.1	89.5	89.2		
31000	TOFL	5840	5940	6040	6140	6240	6340	6570	7050	7640	8280	8710	169	169
	V1	120	120	120	119	119	119	120	122	125	128	130		
	VR	150	150	150	150	150	150	150	151	152	152	153		
	V2	160	160	160	160	160	160	160	160	160	159	159		
	GR2	11.5	11.5	11.5	11.5	11.5	11.5	11.3	10.5	9.7	8.9	8.4		
30000	TOFL	5420	5510	5610	5700	5800	5890	6090	6520	7060	7640	8020	166	166
	V1	116	116	116	116	116	116	116	118	121	124	126		
	VR	146	146	146	146	146	146	147	148	148	149	150		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	12.2	12.2	12.2	12.2	12.2	12.2	11.9	11.1	10.3	9.4	9		
29000	TOFL	5030	5120	5200	5290	5380	5460	5650	6030	6510	7040	7380	163	163
	V1	112	112	112	112	112	112	112	114	117	120	122		
	VR	143	143	143	143	143	143	143	144	145	146	147		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.6	11.8	10.9	10	9.6		
28000	TOFL	4660	4740	4820	4890	4970	5050	5220	5570	6000	6470	6780	160	160
	V1	109	108	108	108	108	108	108	111	113	116	117		
	VR	140	140	140	140	140	140	140	141	142	143	143		
	V2	152	152	152	152	152	152	152	152	151	151	151		
	GR2	13.6	13.6	13.6	13.6	13.6	13.6	13.3	12.4	11.5	10.7	10.2		
27000	TOFL	4310	4380	4450	4520	4590	4670	4820	5140	5530	5940	6220	157	157
	V1	105	105	105	104	104	104	105	107	109	112	113		
	VR	136	136	136	136	136	136	136	137	138	139	140		
	V2	149	149	149	149	149	149	149	149	149	148	148		
	GR2	14.3	14.3	14.3	14.3	14.3	14.3	14	13.2	12.2	11.3	10.8		
26000	TOFL	3970	4040	4110	4180	4250	4330	4440	4730	5080	5460	5700	154	154
	V1	101	101	101	101	101	101	101	103	105	108	109		
	VR	132	132	132	132	132	132	133	134	135	136	136		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	15.2	15.2	15.2	15.2	15.2	15.2	14.9	14	13	12.1	11.5		

FIGURE 10-5-24. TAKE-OFF DISTANCE; FLAPS - 0° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS)	VSE (KCAS)
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23	Flap 0°	Clean
	N1	78.3	79.0	79.9	80.8	81.7	82.6	83.4	84.3	85.1	85.9	86.8		
39600	TOFL	9290	9460	9670	9870	10070	10260	10450	10660	10870	11070	11280	193	193
	V1	158	158	158	157	157	157	157	156	156	156	156		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
39000	TOFL	8940	9100	9300	9490	9680	9860	10050	10240	10440	10640	10840	191	191
	V1	156	155	155	155	155	154	154	154	154	154	153		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.4	7.4		
38000	TOFL	8360	8510	8690	8870	9050	9220	9390	9570	9760	9940	10130	189	189
	V1	152	151	151	151	151	150	150	150	150	150	149		
	VR	172	172	172	172	172	172	172	172	172	172	172		
	V2	179	179	179	179	179	179	179	179	179	179	179		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.8	7.8	7.8		
37000	TOFL	7800	7940	8120	8280	8450	8610	8760	8930	9110	9280	9450	186	186
	V1	148	147	147	147	147	146	146	146	146	146	145		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2		
36000	TOFL	7280	7410	7570	7720	7870	8020	8170	8330	8490	8650	8810	183	183
	V1	143	143	143	143	143	142	142	142	142	141	141		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	8.5	8.5	8.5	8.5	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
35000	TOFL	6780	6900	7050	7190	7340	7470	7610	7760	7900	8050	8200	180	180
	V1	139	139	139	139	139	138	138	138	138	137	137		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	9	9	9	9	9	9	9.1	9.1	9.1	9.1	9.1		
34000	TOFL	6300	6410	6550	6680	6810	6940	7060	7200	7340	7470	7610	177	177
	V1	135	135	135	135	134	134	134	134	133	133	133		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.6	9.6		
33000	TOFL	5860	5970	6090	6210	6330	6450	6570	6690	6820	6950	7070	175	175
	V1	131	131	131	131	130	130	130	130	129	129	129		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10	10	10	10	10	10	10.1	10.1	10.1	10.1	10.1		
32000	TOFL	5440	5540	5650	5770	5880	5990	6090	6210	6320	6440	6560	172	172
	V1	127	127	127	126	126	126	126	125	125	125	125		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	10.5	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6	10.6		

FIGURE 10-5-24. TAKE-OFF DISTANCE; FLAPS - 0° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	78.3	79.0	79.9	80.8	81.7	82.6	83.4	84.3	85.1	85.9	86.8		
31000	TOFL	5040	5130	5240	5340	5440	5540	5640	5750	5860	5960	6070	169	169
	V1	123	123	123	122	122	122	122	121	121	121	121		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	11.1	11.1	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2		
30000	TOFL	4690	4770	4860	4960	5050	5150	5240	5340	5430	5530	5630	166	166
	V1	119	119	119	119	118	118	118	118	117	117	117		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	11.7	11.7	11.7	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8		
29000	TOFL	4350	4420	4510	4600	4690	4780	4860	4950	5040	5130	5220	163	163
	V1	115	115	115	115	115	114	114	114	114	113	113		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	154	154	154	154	155	155	155	155	155	155	155		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.5		
28000	TOFL	4030	4100	4190	4270	4350	4420	4500	4580	4670	4750	4830	160	160
	V1	112	111	111	111	111	110	110	110	110	110	109		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	13.1	13.1	13.1	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2		
27000	TOFL	3740	3800	3870	3950	4020	4090	4160	4240	4310	4390	4470	157	157
	V1	108	108	107	107	107	107	106	106	106	106	106		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	13.8	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9		
26000	TOFL	3460	3510	3580	3650	3710	3780	3840	3910	3980	4050	4120	154	154
	V1	104	103	103	103	103	103	102	102	102	102	102		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.8	14.8	14.8	14.8		

FIGURE 10-5-24. TAKE-OFF DISTANCE; FLAPS - 0° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	45	46	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	113	114		
	N1	87.6	88.4	89.2	90.1	90.9	91.7	91.5	90.8	90.1	89.5	89.4		
39600	TOFL	11490	11700	11910	12120	12330	12550	13300	14430	15690	17090	17400	193	193
	V1	156	156	155	155	155	155	157	160	164	167	168		
	VR	177	177	177	177	177	177	177	178	178	179	179		
	V2	183	183	183	183	183	183	183	183	182	182	182		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	6.8	6.2	5.5	4.9	4.8		
39000	TOFL	11040	11240	11440	11650	11850	12060	12780	13860	15060	16400	16700	191	191
	V1	153	153	153	153	153	153	155	158	161	165	165		
	VR	175	175	175	175	175	175	176	176	177	177	177		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	7.4	7.4	7.4	7.4	7.4	7.3	7	6.4	5.7	5.1	5		
38000	TOFL	10310	10500	10690	10880	11070	11260	11940	12940	14060	15300	15580	189	189
	V1	149	149	149	149	149	149	150	154	157	160	161		
	VR	172	172	172	172	172	172	173	173	174	174	175		
	V2	179	179	179	179	179	179	179	179	178	178	178		
	GR2	7.8	7.8	7.8	7.8	7.8	7.7	7.4	6.7	6.1	5.5	5.3		
37000	TOFL	9620	9800	9970	10150	10320	10500	11130	12070	13110	14260	14510	186	186
	V1	145	145	145	145	145	144	146	150	153	156	157		
	VR	169	169	169	169	169	169	170	170	171	172	172		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	7.8	7.1	6.5	5.8	5.7		
36000	TOFL	8970	9130	9290	9450	9620	9790	10360	11240	12210	13270	13500	183	183
	V1	141	141	141	141	140	140	142	145	149	152	153		
	VR	166	166	166	166	166	166	167	168	168	169	169		
	V2	174	174	174	174	174	174	174	173	173	173	173		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.2	7.5	6.8	6.2	6.1		
35000	TOFL	8350	8500	8650	8800	8950	9110	9640	10450	11350	12330	12550	180	180
	V1	137	137	137	137	136	136	138	141	144	148	148		
	VR	163	163	163	163	163	163	164	164	165	166	166		
	V2	171	171	171	171	171	171	171	171	171	171	170		
	GR2	9.1	9.1	9.1	9.1	9.1	9	8.6	7.9	7.3	6.6	6.4		
34000	TOFL	7750	7890	8030	8170	8300	8450	8950	9690	10520	11440	11640	177	177
	V1	133	133	132	132	132	132	134	137	140	143	144		
	VR	160	160	160	160	160	160	161	161	162	163	163		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	9.6	9.6	9.6	9.6	9.6	9.5	9.1	8.4	7.7	7	6.8		
33000	TOFL	7200	7330	7460	7590	7710	7850	8290	8980	9740	10590	10780	175	175
	V1	129	129	128	128	128	128	130	133	136	139	140		
	VR	157	157	157	157	157	157	157	158	159	160	160		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	10.1	10.1	10.1	10.1	10.1	10	9.6	8.9	8.1	7.4	7.3		
32000	TOFL	6680	6790	6910	7030	7150	7270	7680	8290	9010	9780	9950	172	172
	V1	125	125	124	124	124	124	126	128	132	135	135		
	VR	154	154	154	154	154	154	154	155	156	157	157		
	V2	163	163	163	163	163	163	163	163	163	162	162		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.2	9.4	8.6	7.9	7.7		

FIGURE 10-5-24. TAKE-OFF DISTANCE; FLAPS - 0° ; 2000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	45	46	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	113	114		
	N1	87.6	88.4	89.2	90.1	90.9	91.7	91.5	90.8	90.1	89.5	89.4		
31000	TOFL	6180	6290	6390	6500	6610	6730	7100	7660	8290	9020	9180	169	169
	V1	121	120	120	120	120	120	121	124	127	130	131		
	VR	150	150	150	150	150	150	151	152	153	153	154		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	10.7	9.9	9.1	8.4	8.2		
30000	TOFL	5730	5830	5930	6030	6130	6240	6570	7080	7650	8290	8440	166	166
	V1	117	117	117	116	116	116	118	120	123	126	127		
	VR	147	147	147	147	147	147	148	149	149	150	150		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	11.8	11.8	11.8	11.8	11.8	11.8	11.3	10.5	9.7	8.9	8.8		
29000	TOFL	5310	5410	5500	5590	5680	5780	6070	6520	7050	7630	7760	163	163
	V1	113	113	113	113	112	112	114	116	119	122	122		
	VR	144	144	144	144	144	144	144	145	146	147	147		
	V2	155	155	155	155	155	155	155	154	154	154	154		
	GR2	12.5	12.5	12.5	12.5	12.5	12.4	12	11.1	10.3	9.5	9.3		
28000	TOFL	4920	5000	5080	5170	5250	5340	5620	6020	6480	7010	7130	160	160
	V1	109	109	109	109	109	109	110	112	115	118	118		
	VR	140	140	140	140	140	140	141	142	143	144	144		
	V2	152	152	152	152	152	152	152	152	152	151	151		
	GR2	13.2	13.2	13.2	13.2	13.2	13.1	12.7	11.8	10.9	10.1	9.9		
27000	TOFL	4540	4620	4700	4770	4850	4930	5180	5540	5960	6430	6530	157	157
	V1	105	105	105	105	105	105	106	108	111	113	114		
	VR	137	137	137	137	137	137	137	138	139	140	140		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	13.9	13.9	13.9	14	14	13.9	13.4	12.5	11.6	10.8	10.6		
26000	TOFL	4190	4260	4330	4400	4470	4540	4770	5100	5470	5880	5970	154	154
	V1	102	101	101	101	101	101	102	104	107	109	110		
	VR	133	133	133	133	133	133	134	135	136	137	137		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	14.8	14.8	14.8	14.8	14.8	14.7	14.2	13.3	12.4	11.4	11.3		

FIGURE 10-5-25. TAKE-OFF DISTANCE; FLAPS - 0° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	79.1	79.7	80.6	81.4	82.3	83.2	84.1	84.9	85.7	86.6	87.4		
39600	TOFL	9890	10070	10300	10520	10740	10960	11170	11400	11620	11850	12070	193	193
	V1	159	159	159	159	158	158	158	158	158	158	157		
	VR	178	178	178	178	178	178	178	178	178	178	178		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9	6.9		
39000	TOFL	9500	9680	9900	10110	10320	10530	10740	10950	11170	11380	11590	192	192
	V1	157	157	156	156	156	156	156	155	155	155	155		
	VR	176	176	176	176	176	176	176	176	176	176	176		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	7	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
38000	TOFL	8890	9050	9250	9450	9650	9840	10030	10230	10430	10630	10830	189	189
	V1	153	153	152	152	152	152	151	151	151	151	151		
	VR	173	173	173	173	173	173	173	173	173	173	173		
	V2	179	179	179	179	179	179	179	179	179	179	179		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5		
37000	TOFL	8300	8450	8640	8830	9010	9190	9360	9550	9740	9920	10110	186	186
	V1	149	148	148	148	148	148	147	147	147	147	147		
	VR	170	170	170	170	170	170	170	170	170	170	170		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9		
36000	TOFL	7740	7880	8060	8230	8400	8560	8730	8900	9070	9250	9420	183	183
	V1	145	144	144	144	144	144	143	143	143	143	143		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
35000	TOFL	7200	7330	7500	7660	7810	7970	8120	8280	8440	8600	8760	181	181
	V1	140	140	140	140	140	139	139	139	139	139	138		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.8		
34000	TOFL	6700	6820	6960	7110	7260	7400	7540	7690	7840	7970	8110	178	178
	V1	136	136	136	136	135	135	135	135	135	134	134		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	169	169	169	169	169	169	169	169	169	168	168		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
33000	TOFL	6210	6320	6460	6600	6730	6860	6990	7130	7260	7400	7540	175	175
	V1	132	132	132	132	131	131	131	131	130	130	130		
	VR	158	158	158	158	158	158	158	158	157	157	157		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
32000	TOFL	5760	5870	6000	6120	6240	6360	6480	6610	6740	6860	6980	172	172
	V1	128	128	128	127	127	127	127	127	126	126	126		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3		

FIGURE 10-5-25. TAKE-OFF DISTANCE; FLAPS - 0° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	79.1	79.7	80.6	81.4	82.3	83.2	84.1	84.9	85.7	86.6	87.4		
31000	TOFL	5340	5430	5550	5660	5780	5890	6000	6120	6230	6340	6460	169	169
	V1	124	124	124	123	123	123	123	122	122	122	122		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
30000	TOFL	4940	5030	5140	5240	5350	5450	5550	5660	5760	5870	5970	166	166
	V1	120	120	120	119	119	119	119	118	118	118	118		
	VR	148	148	148	148	148	148	148	148	147	147	147		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
29000	TOFL	4580	4660	4760	4860	4950	5040	5140	5240	5330	5430	5530	163	163
	V1	116	116	116	115	115	115	115	114	114	114	114		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	12	12	12	12	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
28000	TOFL	4240	4320	4410	4500	4580	4670	4760	4850	4930	5020	5110	160	160
	V1	112	112	112	111	111	111	111	111	110	110	110		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	12.7	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8	12.8		
27000	TOFL	3930	3990	4070	4160	4240	4320	4390	4470	4560	4640	4720	157	157
	V1	108	108	108	108	107	107	107	107	107	106	106		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5		
26000	TOFL	3630	3690	3760	3840	3910	3980	4050	4130	4200	4270	4350	154	154
	V1	104	104	104	104	104	103	103	103	103	103	102		
	VR	134	134	134	134	134	133	133	133	133	133	133		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3		

FIGURE 10-5-25. TAKE-OFF DISTANCE; FLAPS - 0° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	44		Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	111			
	N1	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
39600	TOFL	12290	12520	12750	12970	13210	13600	14590	15870	17250	18530		193	193
	V1	157	157	157	157	157	157	160	163	167	170			
	VR	178	178	178	178	178	178	178	179	179	180			
	V2	183	183	183	183	183	183	183	183	183	183			
	GR2	6.9	6.9	6.9	6.9	6.8	6.7	6.3	5.7	5.1	4.6			
39000	TOFL	11810	12030	12240	12460	12690	13060	14010	15230	16560	17770		192	192
	V1	155	155	154	154	154	155	157	161	164	167			
	VR	176	176	176	176	176	176	177	177	178	178			
	V2	182	182	182	182	182	182	182	181	181	181			
	GR2	7.1	7.1	7.1	7.1	7.1	6.9	6.5	5.9	5.3	4.8			
38000	TOFL	11030	11230	11430	11640	11850	12200	13080	14220	15450	16570		189	189
	V1	151	150	150	150	150	151	153	156	160	163			
	VR	173	173	173	173	173	173	174	174	175	175			
	V2	179	179	179	179	179	179	179	179	179	179			
	GR2	7.5	7.5	7.5	7.5	7.4	7.3	6.9	6.2	5.6	5.1			
37000	TOFL	10290	10480	10670	10860	11060	11380	12190	13250	14390	15430		186	186
	V1	147	146	146	146	146	147	149	152	155	158			
	VR	170	170	170	170	170	170	171	171	172	172			
	V2	177	177	177	177	177	177	177	176	176	176			
	GR2	7.9	7.9	7.9	7.9	7.9	7.7	7.3	6.6	6	5.5			
36000	TOFL	9590	9760	9940	10110	10300	10610	11350	12330	13390	14350		183	183
	V1	142	142	142	142	142	142	145	148	151	154			
	VR	167	167	167	167	167	167	168	168	169	169			
	V2	174	174	174	174	174	174	174	174	174	174			
	GR2	8.3	8.3	8.3	8.3	8.3	8.1	7.7	7	6.4	5.8			
35000	TOFL	8920	9080	9240	9400	9570	9860	10550	11450	12430	13320		181	181
	V1	138	138	138	138	138	138	140	144	147	150			
	VR	164	164	164	164	164	164	165	165	166	166			
	V2	171	171	171	171	171	171	171	171	171	171			
	GR2	8.8	8.8	8.8	8.8	8.7	8.6	8.1	7.4	6.8	6.2			
34000	TOFL	8260	8410	8560	8710	8860	9150	9790	10630	11520	12340		178	178
	V1	134	134	134	133	133	134	136	139	143	145			
	VR	161	161	161	161	161	161	162	162	163	163			
	V2	168	168	168	168	168	168	168	168	168	168			
	GR2	9.2	9.2	9.2	9.2	9.2	9	8.6	7.8	7.2	6.6			
33000	TOFL	7670	7810	7950	8080	8230	8470	9070	9840	10670	11420		175	175
	V1	130	130	130	129	129	130	132	135	138	141			
	VR	157	157	157	157	157	158	158	159	160	160			
	V2	166	166	166	166	166	166	166	166	166	165			
	GR2	9.7	9.7	9.7	9.7	9.7	9.5	9	8.3	7.6	7			
32000	TOFL	7110	7240	7370	7490	7630	7850	8370	9090	9860	10550		172	172
	V1	126	126	126	125	125	126	128	131	134	137			
	VR	154	154	154	154	154	154	155	156	157	157			
	V2	163	163	163	163	163	163	163	163	163	163			
	GR2	10.3	10.3	10.3	10.3	10.3	10	9.6	8.8	8.1	7.5			

FIGURE 10-5-25. TAKE-OFF DISTANCE; FLAPS - 0° ; 3000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	44		Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	111			
	N1	88.2	89.1	89.9	90.7	91.5	92.2	91.5	90.7	90.1	89.7			
31000	TOFL	6580	6690	6810	6920	7050	7260	7740	8360	9070	9720		169	169
	V1	122	122	121	121	121	122	124	126	129	132			
	VR	151	151	151	151	151	151	152	153	153	154			
	V2	160	160	160	160	160	160	160	160	160	160			
	GR2	10.8	10.8	10.8	10.8	10.8	10.6	10.1	9.3	8.6	8			
30000	TOFL	6080	6190	6290	6400	6510	6700	7140	7710	8340	8920		166	166
	V1	118	118	117	117	117	118	119	122	125	128			
	VR	147	147	147	147	147	148	148	149	150	151			
	V2	157	157	157	157	157	157	157	157	157	157			
	GR2	11.4	11.4	11.4	11.4	11.4	11.2	10.7	9.9	9.1	8.5			
29000	TOFL	5620	5720	5820	5920	6020	6200	6590	7100	7670	8190		163	163
	V1	114	114	113	113	113	114	115	118	121	123			
	VR	144	144	144	144	144	144	145	146	147	147			
	V2	154	154	154	154	154	154	154	154	154	154			
	GR2	12.1	12.1	12.1	12.1	12.1	11.8	11.3	10.5	9.7	9.1			
28000	TOFL	5200	5290	5380	5470	5560	5720	6080	6530	7050	7520		160	160
	V1	110	110	110	109	109	110	111	114	117	119			
	VR	141	141	141	141	141	141	142	143	143	144			
	V2	152	152	152	152	152	152	152	152	152	151			
	GR2	12.8	12.8	12.8	12.8	12.8	12.5	12	11.1	10.3	9.6			
27000	TOFL	4800	4880	4960	5050	5130	5280	5600	6000	6460	6890		157	157
	V1	106	106	106	106	106	106	108	110	112	115			
	VR	137	137	137	137	137	137	138	139	140	141			
	V2	149	149	149	149	149	149	149	149	149	149			
	GR2	13.5	13.5	13.5	13.5	13.5	13.2	12.7	11.8	11	10.3			
26000	TOFL	4420	4500	4570	4650	4730	4860	5150	5510	5920	6290		154	154
	V1	102	102	102	102	102	102	104	106	108	110			
	VR	133	133	133	133	133	134	135	136	137	137			
	V2	146	146	146	146	146	146	146	146	146	146			
	GR2	14.3	14.3	14.3	14.3	14.3	14	13.4	12.6	11.7	11			

FIGURE 10-5-26. TAKE-OFF DISTANCE; FLAPS - 0° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
39600	TOFL	10610	10810	11050	11290	11520	11750	11990	12230	12470	12710	12950	194	194
	V1	161	161	160	160	160	160	160	160	159	159	159		
	VR	178	178	178	178	178	178	178	178	178	178	178		
	V2	184	184	184	184	184	184	184	184	184	184	184		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
39000	TOFL	10190	10380	10610	10850	11070	11290	11510	11750	11980	12210	12440	192	192
	V1	158	158	158	158	158	157	157	157	157	157	157		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
38000	TOFL	9520	9700	9920	10130	10340	10540	10750	10970	11180	11390	11610	189	189
	V1	154	154	154	154	153	153	153	153	153	153	152		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	179	179	179	179	179	179	179	179	179	179	179		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
37000	TOFL	8890	9050	9250	9450	9640	9840	10030	10230	10430	10630	10830	187	187
	V1	150	150	150	149	149	149	149	149	148	148	148		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
36000	TOFL	8290	8440	8630	8810	9000	9170	9350	9540	9720	9910	10100	184	184
	V1	146	146	146	145	145	145	145	145	144	144	144		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	8	8	8	8	8	8	8	8	8	8	8		
35000	TOFL	7710	7850	8030	8200	8360	8530	8690	8870	9040	9210	9380	181	181
	V1	142	142	141	141	141	141	141	140	140	140	140		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.5		
34000	TOFL	7140	7270	7440	7590	7740	7890	8050	8210	8370	8520	8680	178	178
	V1	137	137	137	137	137	136	136	136	136	136	135		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
33000	TOFL	6630	6750	6890	7040	7180	7320	7460	7610	7750	7900	8050	175	175
	V1	133	133	133	133	132	132	132	132	132	131	131		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
32000	TOFL	6150	6260	6400	6530	6660	6790	6920	7060	7190	7330	7460	172	172
	V1	129	129	129	129	128	128	128	128	128	127	127		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 10-5-26. TAKE-OFF DISTANCE; FLAPS - 0° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	79.6	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.3	87.1	88.0		
31000	TOFL	5690	5800	5920	6040	6160	6280	6400	6530	6650	6770	6900	169	169
	V1	125	125	125	124	124	124	124	124	123	123	123		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
30000	TOFL	5260	5350	5470	5580	5690	5800	5910	6020	6140	6250	6360	166	166
	V1	121	121	121	120	120	120	120	119	119	119	119		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1		
29000	TOFL	4860	4950	5050	5160	5260	5360	5460	5560	5670	5770	5870	163	163
	V1	117	117	117	116	116	116	116	115	115	115	115		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
28000	TOFL	4490	4570	4670	4760	4860	4950	5040	5130	5230	5320	5420	160	160
	V1	113	113	113	112	112	112	112	111	111	111	111		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
27000	TOFL	4150	4230	4310	4400	4480	4570	4650	4740	4830	4910	5000	157	157
	V1	109	109	109	108	108	108	108	108	107	107	107		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.2	13.2		
26000	TOFL	3830	3900	3980	4060	4130	4210	4290	4370	4450	4520	4600	154	154
	V1	105	105	105	105	104	104	104	104	103	103	103		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9		

FIGURE 10-5-26. TAKE-OFF DISTANCE; FLAPS - 0° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	42		Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	107			
	N1	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
39600	TOFL	13200	13440	13680	13920	14240	14980	16160	17530	19090	19810		194	194
	V1	159	159	159	159	159	160	163	166	170	171			
	VR	178	178	178	178	178	179	179	180	180	181			
	V2	184	184	184	184	184	184	184	184	183	183			
	GR2	6.6	6.6	6.6	6.6	6.5	6.3	5.8	5.2	4.7	4.4			
39000	TOFL	12670	12910	13140	13370	13670	14390	15520	16830	18320	19000		192	192
	V1	156	156	156	156	156	158	161	164	167	169			
	VR	177	177	177	177	177	177	178	178	179	179			
	V2	182	182	182	182	182	182	182	182	182	182			
	GR2	6.8	6.8	6.8	6.8	6.7	6.5	6	5.4	4.9	4.6			
38000	TOFL	11830	12050	12260	12480	12760	13420	14480	15700	17080	17710		189	189
	V1	152	152	152	152	152	154	156	159	163	164			
	VR	174	174	174	174	174	174	175	175	176	176			
	V2	179	179	179	179	179	179	179	179	179	179			
	GR2	7.2	7.2	7.2	7.2	7.1	6.8	6.3	5.8	5.2	4.9			
37000	TOFL	11030	11240	11440	11640	11910	12510	13490	14620	15900	16480		187	187
	V1	148	148	148	148	148	149	152	155	158	160			
	VR	171	171	171	171	171	171	172	172	173	173			
	V2	177	177	177	177	177	177	177	177	177	177			
	GR2	7.6	7.6	7.6	7.6	7.5	7.2	6.7	6.1	5.5	5.3			
36000	TOFL	10280	10470	10660	10850	11100	11650	12540	13590	14770	15310		184	184
	V1	144	144	144	144	144	145	148	151	154	156			
	VR	168	168	168	168	168	168	169	169	170	170			
	V2	174	174	174	174	174	174	174	174	174	174			
	GR2	8	8	8	8	7.9	7.6	7.1	6.5	5.9	5.6			
35000	TOFL	9550	9730	9900	10080	10310	10840	11650	12610	13710	14210		181	181
	V1	140	140	139	139	140	141	143	146	150	151			
	VR	165	165	165	165	165	165	166	166	167	167			
	V2	171	171	171	171	171	171	171	171	171	171			
	GR2	8.5	8.5	8.5	8.5	8.3	8	7.5	6.9	6.3	6			
34000	TOFL	8840	9000	9160	9320	9540	10050	10810	11690	12690	13160		178	178
	V1	135	135	135	135	135	137	139	142	145	147			
	VR	161	161	161	161	161	162	163	163	164	164			
	V2	169	169	169	169	169	169	169	169	169	169			
	GR2	8.9	8.9	8.9	8.9	8.8	8.5	7.9	7.3	6.7	6.4			
33000	TOFL	8190	8340	8490	8640	8840	9290	10010	10820	11740	12160		175	175
	V1	131	131	131	131	131	132	135	138	141	142			
	VR	158	158	158	158	158	159	160	160	161	161			
	V2	166	166	166	166	166	166	166	166	166	166			
	GR2	9.4	9.4	9.4	9.4	9.3	8.9	8.4	7.8	7.1	6.8			
32000	TOFL	7600	7730	7870	8000	8190	8590	9220	10000	10840	11220		172	172
	V1	127	127	127	127	127	128	130	133	136	138			
	VR	155	155	155	155	155	155	156	157	158	158			
	V2	163	163	163	163	163	163	163	163	163	163			
	GR2	9.9	9.9	9.9	9.9	9.8	9.4	8.9	8.3	7.6	7.3			

FIGURE 10-5-26. TAKE-OFF DISTANCE; FLAPS - 0° ; 4000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	42		Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	107			
	N1	88.8	89.6	90.5	91.3	92.1	92.1	91.4	90.7	90.1	89.9			
31000	TOFL	7020	7150	7270	7400	7570	7940	8510	9190	10000	10350		169	169
	V1	123	123	123	123	123	124	126	129	132	133			
	VR	152	152	152	152	152	152	153	154	155	155			
	V2	160	160	160	160	160	160	160	160	160	160			
	GR2	10.5	10.5	10.5	10.5	10.4	10	9.4	8.8	8.1	7.7			
30000	TOFL	6480	6590	6710	6820	6980	7320	7840	8450	9160	9510		166	166
	V1	119	119	118	118	119	120	122	124	127	129			
	VR	148	148	148	148	148	149	149	150	151	152			
	V2	157	157	157	157	157	157	157	157	157	157			
	GR2	11.1	11.1	11.1	11.1	10.9	10.6	10	9.3	8.6	8.3			
29000	TOFL	5980	6080	6190	6290	6440	6740	7210	7770	8400	8690		163	163
	V1	115	115	114	114	114	116	118	120	123	124			
	VR	145	145	145	145	145	145	146	147	148	148			
	V2	155	155	155	155	154	154	155	155	155	154			
	GR2	11.7	11.7	11.7	11.8	11.6	11.2	10.6	9.9	9.1	8.8			
28000	TOFL	5510	5610	5710	5800	5930	6210	6630	7130	7700	7960		160	160
	V1	111	111	110	110	110	112	114	116	119	120			
	VR	141	141	141	141	141	142	143	143	144	145			
	V2	152	152	152	152	152	152	152	152	152	152			
	GR2	12.4	12.4	12.4	12.4	12.2	11.8	11.2	10.5	9.7	9.4			
27000	TOFL	5090	5170	5260	5350	5470	5720	6100	6530	7060	7290		157	157
	V1	107	107	107	107	107	108	110	112	114	116			
	VR	138	138	138	138	138	138	139	140	141	141			
	V2	149	149	149	149	149	149	149	149	149	149			
	GR2	13.2	13.2	13.2	13.2	13	12.5	11.9	11.2	10.4	10			
26000	TOFL	4680	4760	4840	4920	5030	5260	5590	5990	6440	6660		154	154
	V1	103	103	103	103	103	104	106	108	110	111			
	VR	134	134	134	134	134	135	136	137	137	138			
	V2	146	146	146	146	146	146	146	146	146	146			
	GR2	13.9	13.9	13.9	13.9	13.7	13.3	12.7	11.9	11.1	10.7			

FIGURE 10-5-27. TAKE-OFF DISTANCE; FLAPS - 0° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	80.0	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5		
39600	TOFL	11270	11480	11740	12000	12250	12500	12760	13010	13270	13520	13780	194	194
	V1	162	162	162	161	161	161	161	161	161	160	160		
	VR	179	179	179	179	179	179	179	179	179	179	179		
	V2	184	184	184	184	184	184	184	184	184	184	184		
	GR2	6.3	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4		
39000	TOFL	10830	11030	11280	11530	11770	12010	12260	12500	12750	12990	13240	193	193
	V1	159	159	159	159	159	159	158	158	158	158	158		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
38000	TOFL	10120	10310	10540	10780	11000	11220	11450	11680	11910	12140	12370	190	190
	V1	155	155	155	155	155	154	154	154	154	154	154		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	180	180	180	180	180	180	180	180	180	180	180		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
37000	TOFL	9440	9610	9830	10050	10260	10460	10680	10890	11110	11320	11530	187	187
	V1	151	151	151	151	150	150	150	150	150	150	149		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
36000	TOFL	8800	8960	9160	9360	9550	9750	9950	10140	10340	10540	10740	184	184
	V1	147	147	147	146	146	146	146	146	146	145	145		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.8	7.8		
35000	TOFL	8190	8340	8520	8710	8890	9060	9250	9430	9610	9800	9980	181	181
	V1	143	143	143	142	142	142	142	142	141	141	141		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	8.1	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2		
34000	TOFL	7600	7740	7910	8080	8250	8410	8580	8750	8920	9090	9260	178	178
	V1	139	138	138	138	138	138	137	137	137	137	137		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
33000	TOFL	7030	7150	7310	7470	7620	7770	7930	8090	8240	8390	8550	176	176
	V1	134	134	134	134	133	133	133	133	133	132	132		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
32000	TOFL	6510	6630	6770	6920	7060	7200	7340	7490	7630	7770	7910	173	173
	V1	130	130	130	129	129	129	129	129	128	128	128		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-5-27. TAKE-OFF DISTANCE; FLAPS - 0° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	80.0	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5		
31000	TOFL	6030	6130	6270	6400	6530	6660	6790	6920	7050	7180	7310	170	170
	V1	126	126	125	125	125	125	125	124	124	124	124		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
30000	TOFL	5560	5660	5790	5910	6030	6140	6260	6380	6500	6620	6750	167	167
	V1	122	121	121	121	121	121	120	120	120	120	120		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	10.7	10.7	10.7	10.7	10.7	10.8	10.8	10.8	10.8	10.8	10.8		
29000	TOFL	5140	5230	5340	5450	5560	5660	5780	5890	6000	6110	6220	164	164
	V1	117	117	117	117	117	116	116	116	116	116	116		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
28000	TOFL	4740	4820	4920	5020	5120	5220	5320	5420	5520	5620	5720	161	161
	V1	113	113	113	113	113	112	112	112	112	112	111		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	12	12	12	12	12	12.1	12.1	12.1	12.1	12.1	12.1		
27000	TOFL	4370	4440	4540	4630	4720	4810	4900	4990	5090	5180	5270	157	157
	V1	109	109	109	109	109	108	108	108	108	108	108		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	12.7	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8	12.8		
26000	TOFL	4030	4100	4180	4270	4350	4430	4510	4600	4680	4760	4850	154	154
	V1	105	105	105	105	105	104	104	104	104	104	104		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	13.5	13.5	13.5	13.5	13.5	13.6	13.6	13.6	13.6	13.6	13.6		

FIGURE 10-5-27. TAKE-OFF DISTANCE; FLAPS - 0° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	40.1		Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	104			
	N1	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
39600	TOFL	14040	14300	14560	14820	15280	16380	17710	19200				194	194
	V1	160	160	160	160	161	163	166	169					
	VR	179	179	179	179	179	180	180	181					
	V2	184	184	184	184	184	184	184	184					
	GR2	6.4	6.4	6.4	6.4	6.1	5.8	5.3	4.8					
39000	TOFL	13490	13740	13990	14240	14680	15740	17010	18430				193	193
	V1	158	158	157	157	158	160	163	166					
	VR	177	177	177	177	177	178	178	179					
	V2	182	182	182	182	182	182	182	182					
	GR2	6.6	6.6	6.6	6.6	6.3	6	5.5	5					
38000	TOFL	12600	12840	13070	13300	13720	14710	15880	17210	18760	18790		190	190
	V1	153	153	153	153	154	156	159	162	166	166			
	VR	174	174	174	174	174	175	176	176	177	177			
	V2	180	180	180	180	180	180	180	180	180	180			
	GR2	6.9	6.9	6.9	6.9	6.7	6.4	5.9	5.3	4.8	4.7			
37000	TOFL	11750	11960	12180	12390	12790	13700	14790	16020	17450	17480		187	187
	V1	149	149	149	149	150	152	155	158	161	161			
	VR	171	171	171	171	171	172	173	173	174	174			
	V2	177	177	177	177	177	177	177	177	177	177			
	GR2	7.3	7.3	7.3	7.3	7.1	6.7	6.2	5.7	5.1	5.1			
36000	TOFL	10940	11140	11340	11540	11910	12750	13740	14890	16210	16240		184	184
	V1	145	145	145	145	146	148	150	153	157	157			
	VR	168	168	168	168	168	169	170	170	171	171			
	V2	174	174	174	174	174	175	175	175	174	174			
	GR2	7.8	7.8	7.8	7.7	7.5	7.1	6.6	6	5.4	5.4			
35000	TOFL	10160	10350	10540	10730	11080	11840	12760	13810	15030	15060		181	181
	V1	141	141	141	141	141	143	146	149	152	152			
	VR	165	165	165	165	165	166	167	167	168	168			
	V2	172	172	172	172	172	172	172	172	172	172			
	GR2	8.2	8.2	8.2	8.2	7.9	7.5	7	6.4	5.8	5.8			
34000	TOFL	9420	9600	9770	9940	10270	10990	11820	12790	13920	13940		178	178
	V1	136	136	136	136	137	139	142	144	148	148			
	VR	162	162	162	162	162	163	163	164	165	165			
	V2	169	169	169	169	169	169	169	169	169	169			
	GR2	8.6	8.6	8.6	8.6	8.3	7.9	7.4	6.8	6.2	6.2			
33000	TOFL	8710	8870	9030	9190	9490	10170	10940	11820	12860	12880		176	176
	V1	132	132	132	132	133	135	137	140	143	143			
	VR	159	159	159	159	159	160	160	161	162	162			
	V2	166	166	166	166	166	166	166	166	166	166			
	GR2	9.1	9.1	9.1	9.1	8.8	8.4	7.9	7.3	6.6	6.6			
32000	TOFL	8060	8210	8350	8500	8770	9380	10100	10910	11860	11880		173	173
	V1	128	128	128	128	128	130	133	136	139	139			
	VR	155	155	155	155	155	156	157	158	158	158			
	V2	163	163	163	163	163	163	163	163	163	163			
	GR2	9.6	9.6	9.6	9.6	9.3	8.9	8.4	7.7	7	7			

FIGURE 10-5-27. TAKE-OFF DISTANCE; FLAPS - 0° ; 5000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	40	40.1		Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	104	104			
	N1	89.4	90.2	91.0	91.9	92.7	92.1	91.3	90.7	90.1	90.1			
31000	TOFL	7450	7580	7710	7850	8110	8650	9280	10060	10920	10940		170	170
	V1	124	124	123	123	124	126	128	131	134	134			
	VR	152	152	152	152	152	153	154	155	155	155			
	V2	160	160	160	160	160	160	161	161	161	161			
	GR2	10.2	10.2	10.2	10.2	9.8	9.4	8.9	8.2	7.5	7.5			
30000	TOFL	6870	6990	7110	7240	7470	7970	8540	9220	10030	10050		167	167
	V1	120	119	119	119	120	122	124	127	130	130			
	VR	149	149	149	149	149	150	150	151	152	152			
	V2	158	158	158	158	158	158	158	158	158	158			
	GR2	10.8	10.8	10.8	10.8	10.4	10	9.4	8.8	8	8			
29000	TOFL	6330	6440	6550	6670	6870	7330	7850	8450	9190	9210		164	164
	V1	115	115	115	115	116	118	120	122	125	125			
	VR	145	145	145	145	145	146	147	148	149	149			
	V2	155	155	155	155	155	155	155	155	155	155			
	GR2	11.4	11.4	11.4	11.4	11	10.6	10	9.3	8.6	8.5			
28000	TOFL	5820	5930	6030	6130	6320	6730	7190	7750	8380	8400		161	161
	V1	111	111	111	111	112	113	115	118	121	121			
	VR	142	142	142	142	142	143	144	144	145	145			
	V2	152	152	152	152	152	152	152	152	152	152			
	GR2	12.1	12.1	12.1	12.1	11.6	11.2	10.6	9.9	9.1	9.1			
27000	TOFL	5360	5460	5550	5640	5810	6180	6590	7090	7660	7680		157	157
	V1	107	107	107	107	108	109	111	113	116	116			
	VR	138	138	138	138	138	139	140	141	142	142			
	V2	149	149	149	149	149	149	149	149	149	149			
	GR2	12.8	12.8	12.8	12.8	12.3	11.9	11.3	10.6	9.7	9.7			
26000	TOFL	4930	5020	5100	5190	5340	5670	6040	6480	7000	7010		154	154
	V1	103	103	103	103	104	105	107	109	112	112			
	VR	134	134	134	134	134	135	136	137	138	138			
	V2	146	146	146	146	146	146	146	146	146	146			
	GR2	13.6	13.6	13.6	13.5	13.1	12.6	12	11.2	10.4	10.4			

FIGURE 10-5-28. TAKE-OFF DISTANCE; FLAPS - 0° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	80.7	81.3	82.0	83.0	83.9	84.8	85.6	86.5	87.4	88.2	89.1		
39600	TOFL	12200	12430	12700	12960	13210	13460	13740	14020	14300	14570	14850	194	194
	V1	164	164	164	163	163	163	163	162	162	162	162		
	VR	180	180	180	180	180	180	180	180	180	180	180		
	V2	184	184	184	184	184	184	184	184	184	184	184		
	GR2	6	6	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1		
39000	TOFL	11720	11940	12210	12450	12690	12940	13210	13470	13730	14000	14270	193	193
	V1	161	161	161	161	161	160	160	160	160	160	160		
	VR	178	178	178	178	178	178	178	178	178	178	178		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
38000	TOFL	10960	11160	11400	11630	11850	12080	12330	12580	12830	13070	13320	190	190
	V1	157	157	157	157	156	156	156	156	156	156	155		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	180	180	180	180	180	180	180	180	180	180	180		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
37000	TOFL	10220	10410	10640	10850	11060	11270	11500	11730	11960	12190	12420	187	187
	V1	153	153	153	152	152	152	152	152	151	151	151		
	VR	172	172	172	172	172	172	172	172	172	172	172		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	6.9	6.9	6.9	7	7	7	7	7	7	7	7		
36000	TOFL	9520	9690	9910	10100	10290	10490	10710	10920	11130	11350	11560	185	185
	V1	149	149	148	148	148	148	147	147	147	147	147		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	175	175	175	175	175	175	175	175	175	175	175		
	GR2	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
35000	TOFL	8850	9010	9210	9390	9560	9750	9950	10140	10340	10540	10740	182	182
	V1	145	144	144	144	144	143	143	143	143	143	143		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
34000	TOFL	8210	8360	8540	8710	8870	9040	9220	9410	9590	9770	9950	179	179
	V1	140	140	140	140	139	139	139	139	139	138	138		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
33000	TOFL	7610	7750	7910	8070	8220	8380	8550	8710	8880	9050	9220	176	176
	V1	136	136	136	135	135	135	135	134	134	134	134		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	8.7	8.7	8.7	8.7	8.7	8.8	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	7020	7150	7300	7440	7580	7720	7880	8030	8190	8340	8490	173	173
	V1	132	131	131	131	131	130	130	130	130	130	129		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 10-5-28. TAKE-OFF DISTANCE; FLAPS - 0° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	80.7	81.3	82.0	83.0	83.9	84.8	85.6	86.5	87.4	88.2	89.1		
31000	TOFL	6490	6600	6740	6880	7000	7130	7280	7420	7560	7700	7840	170	170
	V1	127	127	127	127	126	126	126	126	126	125	125		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	9.7	9.7	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
30000	TOFL	5990	6100	6220	6340	6460	6580	6710	6840	6970	7100	7230	167	167
	V1	123	123	123	122	122	122	122	121	121	121	121		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	10.3	10.3	10.3	10.3	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
29000	TOFL	5520	5610	5730	5840	5950	6060	6180	6290	6410	6530	6650	164	164
	V1	119	119	118	118	118	118	117	117	117	117	117		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	10.9	10.9	10.9	10.9	11	11	11	11	11	11	11		
28000	TOFL	5080	5170	5280	5380	5480	5580	5690	5800	5900	6010	6120	161	161
	V1	115	115	114	114	114	114	113	113	113	113	113		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	11.6	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7		
27000	TOFL	4680	4760	4850	4940	5030	5130	5230	5320	5420	5520	5620	158	158
	V1	111	110	110	110	110	109	109	109	109	109	108		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	12.3	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	4300	4370	4460	4540	4630	4710	4800	4890	4980	5070	5160	155	155
	V1	107	106	106	106	106	105	105	105	105	105	104		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	13	13	13	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1		

FIGURE 10-5-28. TAKE-OFF DISTANCE; FLAPS - 0° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	38			Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	100				
	N1	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.2				
39600	TOFL	15130	15410	15700	16090	16890	18180	19670					194	194
	V1	162	162	162	162	164	166	169						
	VR	180	180	180	180	180	181	181						
	V2	184	184	184	184	184	184	184						
	GR2	6.1	6.1	6.1	5.9	5.7	5.3	4.8						
39000	TOFL	14530	14800	15080	15470	16240	17450	18880					193	193
	V1	160	159	159	160	161	164	167						
	VR	178	178	178	178	178	179	179						
	V2	183	183	183	183	183	183	183						
	GR2	6.3	6.3	6.3	6.1	5.8	5.5	5						
38000	TOFL	13570	13820	14080	14450	15180	16300	17620	19140				190	190
	V1	155	155	155	156	157	160	162	166					
	VR	175	175	175	175	175	176	177	177					
	V2	180	180	180	180	180	180	180	180					
	GR2	6.6	6.6	6.6	6.5	6.2	5.8	5.3	4.8					
37000	TOFL	12660	12890	13130	13480	14160	15210	16420	17830	18820			187	187
	V1	151	151	151	151	153	155	158	161	163				
	VR	172	172	172	172	173	173	174	174	175				
	V2	178	178	178	177	177	178	178	178	178				
	GR2	7	7	7	6.9	6.6	6.2	5.7	5.1	4.8				
36000	TOFL	11780	12000	12220	12540	13180	14150	15260	16570	17480			185	185
	V1	147	147	147	147	149	151	154	157	159				
	VR	169	169	169	169	169	170	171	171	171				
	V2	175	175	175	175	175	175	175	175	175				
	GR2	7.4	7.4	7.4	7.3	6.9	6.5	6.1	5.5	5.1				
35000	TOFL	10940	11140	11350	11650	12240	13130	14160	15360	16200			182	182
	V1	142	142	142	143	144	146	149	152	154				
	VR	166	166	166	166	166	167	168	168	169				
	V2	172	172	172	172	172	172	172	172	172				
	GR2	7.8	7.8	7.8	7.7	7.3	6.9	6.4	5.9	5.5				
34000	TOFL	10140	10320	10520	10810	11350	12160	13110	14220	14990			179	179
	V1	138	138	138	138	140	142	145	148	150				
	VR	163	163	163	163	163	164	165	165	165				
	V2	169	169	169	169	169	169	169	169	169				
	GR2	8.3	8.3	8.3	8.1	7.8	7.4	6.8	6.3	5.9				
33000	TOFL	9390	9560	9740	10000	10500	11250	12110	13130	13850			176	176
	V1	134	134	134	134	136	138	140	143	145				
	VR	160	160	160	160	160	161	161	162	162				
	V2	167	167	167	166	166	167	167	167	167				
	GR2	8.8	8.8	8.8	8.6	8.2	7.8	7.3	6.7	6.3				
32000	TOFL	8650	8810	8980	9220	9680	10380	11170	12110	12760			173	173
	V1	129	129	129	130	131	133	136	139	141				
	VR	156	156	156	156	157	158	158	159	159				
	V2	164	164	164	163	163	164	164	164	164				
	GR2	9.3	9.3	9.3	9.1	8.7	8.3	7.8	7.1	6.7				

FIGURE 10-5-28. TAKE-OFF DISTANCE; FLAPS - 0° ; 6000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	38			Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	100				
	N1	89.9	90.8	91.6	92.4	92.6	92.0	91.3	90.6	90.2				
31000	TOFL	7990	8130	8290	8510	8920	9570	10280	11140	11730			170	170
	V1	125	125	125	125	127	129	131	134	136				
	VR	153	153	153	153	153	154	155	156	156				
	V2	161	161	161	161	161	161	161	161	161				
	GR2	9.8	9.8	9.8	9.6	9.2	8.8	8.2	7.6	7.2				
30000	TOFL	7360	7490	7640	7840	8220	8770	9450	10230	10770			167	167
	V1	121	121	121	121	122	124	127	130	131				
	VR	149	149	149	149	150	151	152	152	153				
	V2	158	158	158	158	158	158	158	158	158				
	GR2	10.4	10.4	10.4	10.1	9.7	9.3	8.8	8.1	7.7				
29000	TOFL	6770	6890	7020	7210	7550	8060	8640	9370	9860			164	164
	V1	117	116	116	117	118	120	122	125	127				
	VR	146	146	146	146	146	147	148	149	149				
	V2	155	155	155	155	155	155	155	155	155				
	GR2	11	11	11	10.8	10.3	9.9	9.3	8.6	8.2				
28000	TOFL	6230	6340	6460	6630	6930	7390	7920	8550	9020			161	161
	V1	112	112	112	113	114	116	118	120	122				
	VR	142	142	142	142	143	144	145	145	146				
	V2	152	152	152	152	152	152	152	152	152				
	GR2	11.7	11.7	11.6	11.4	10.9	10.5	9.9	9.2	8.7				
27000	TOFL	5720	5820	5930	6080	6350	6760	7230	7800	8200			158	158
	V1	108	108	108	108	110	111	113	116	117				
	VR	139	139	139	139	139	140	141	142	142				
	V2	149	149	149	149	149	149	149	149	149				
	GR2	12.4	12.4	12.3	12.1	11.6	11.1	10.6	9.8	9.3				
26000	TOFL	5250	5340	5440	5580	5820	6190	6610	7120	7470			155	155
	V1	104	104	104	104	105	107	109	111	113				
	VR	135	135	135	135	135	137	137	138	139				
	V2	146	146	146	146	146	146	146	146	146				
	GR2	13.1	13.1	13.1	12.8	12.3	11.9	11.3	10.5	10				

FIGURE 10-5-29. TAKE-OFF DISTANCE; FLAPS - 0° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	81.3	81.7	82.5	83.4	84.4	85.3	86.2	87.0	87.9	88.7	89.6		
39600	TOFL	13350	13590	13870	14140	14400	14690	14990	15300	15600	15900	16200	195	195
	V1	167	167	166	166	166	166	166	165	165	165	165		
	VR	181	181	181	181	181	181	181	181	181	181	181		
	V2	185	185	185	185	185	185	185	185	185	185	185		
	GR2	5.7	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
39000	TOFL	12810	13060	13330	13580	13820	14110	14400	14690	14970	15270	15560	193	193
	V1	164	164	164	164	163	163	163	163	163	163	162		
	VR	180	180	180	180	180	180	180	180	180	180	180		
	V2	184	184	184	184	184	184	184	184	184	184	184		
	GR2	5.9	5.9	5.9	5.9	6	6	6	6	6	6	6		
38000	TOFL	11970	12190	12440	12680	12910	13170	13440	13710	13980	14250	14520	191	191
	V1	160	160	160	159	159	159	159	159	158	158	158		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	11170	11370	11600	11830	12040	12280	12530	12790	13040	13290	13540	188	188
	V1	156	156	155	155	155	155	154	154	154	154	154		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	179	179	179	179	179	179	179	179	179	179	179		
	GR2	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
36000	TOFL	10400	10590	10810	11020	11210	11440	11670	11910	12140	12370	12610	185	185
	V1	152	151	151	151	151	150	150	150	150	150	150		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
35000	TOFL	9670	9840	10040	10230	10410	10630	10840	11060	11270	11490	11710	182	182
	V1	147	147	147	147	146	146	146	146	145	145	145		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
34000	TOFL	8960	9120	9310	9480	9650	9850	10040	10240	10440	10640	10840	179	179
	V1	143	143	142	142	142	141	141	141	141	141	141		
	VR	165	165	165	165	164	164	164	164	164	164	164		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	7.8	7.8	7.9	7.9	7.9	7.9	7.9	8	8	8	8		
33000	TOFL	8290	8440	8610	8770	8930	9110	9290	9470	9660	9840	10030	176	176
	V1	138	138	138	138	137	137	137	137	137	136	136		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	8.3	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
32000	TOFL	7670	7800	7960	8110	8250	8420	8590	8760	8930	9100	9260	173	173
	V1	134	134	134	133	133	133	133	132	132	132	132		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 10-5-29. TAKE-OFF DISTANCE; FLAPS - 0° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	81.3	81.7	82.5	83.4	84.4	85.3	86.2	87.0	87.9	88.7	89.6		
31000	TOFL	7050	7180	7320	7460	7590	7740	7900	8050	8210	8360	8520	170	170
	V1	130	129	129	129	128	128	128	128	128	127	127		
	VR	155	155	155	154	154	154	154	154	154	154	154		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.5	9.5		
30000	TOFL	6500	6620	6750	6880	7000	7130	7280	7420	7560	7700	7840	167	167
	V1	125	125	125	124	124	124	124	124	123	123	123		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	9.9	9.9	9.9	9.9	10	10	10	10	10	10	10		
29000	TOFL	5990	6090	6210	6320	6430	6560	6690	6820	6950	7080	7210	164	164
	V1	121	121	120	120	120	120	119	119	119	119	119		
	VR	148	148	148	148	147	147	147	147	147	147	147		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
28000	TOFL	5500	5590	5700	5810	5910	6020	6140	6260	6370	6490	6610	161	161
	V1	116	116	116	116	115	115	115	115	115	114	114		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	11.1	11.1	11.2	11.2	11.2	11.3	11.3	11.3	11.3	11.3	11.3		
27000	TOFL	5050	5130	5240	5330	5420	5530	5630	5740	5850	5950	6060	158	158
	V1	112	112	112	112	111	111	111	111	110	110	110		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	11.8	11.8	11.9	11.9	11.9	11.9	11.9	11.9	12	12	12		
26000	TOFL	4630	4710	4800	4890	4970	5070	5160	5260	5360	5450	5550	155	155
	V1	108	108	108	107	107	107	107	106	106	106	106		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	12.6	12.6	12.6	12.6	12.7	12.7	12.7	12.7	12.7	12.7	12.7		

FIGURE 10-5-29. TAKE-OFF DISTANCE; FLAPS - 0° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	36			Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	97				
	N1	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
39600	TOFL	16510	16810	17170	17800	18970							195	195
	V1	165	165	165	166	168								
	VR	181	181	181	181	182								
	V2	185	185	185	185	185								
	GR2	5.8	5.8	5.7	5.5	5.2								
39000	TOFL	15850	16140	16500	17090	18220	19630						193	193
	V1	162	162	163	164	166	168							
	VR	180	180	180	180	180	181							
	V2	184	184	184	184	184	184							
	GR2	6	6	5.9	5.7	5.4	5							
38000	TOFL	14800	15070	15410	15970	17010	18320	19860					191	191
	V1	158	158	158	159	161	164	167						
	VR	177	177	177	177	177	178	178						
	V2	181	181	181	181	181	181	181						
	GR2	6.3	6.3	6.3	6	5.7	5.3	4.8						
37000	TOFL	13800	14050	14370	14900	15860	17050	18490					188	188
	V1	154	154	154	155	157	159	162						
	VR	174	174	174	174	174	175	175						
	V2	179	179	179	179	179	179	179						
	GR2	6.7	6.7	6.6	6.4	6	5.7	5.2						
36000	TOFL	12850	13090	13390	13890	14770	15860	17180	18690	19060			185	185
	V1	149	149	150	151	153	155	158	161	162				
	VR	171	171	171	171	171	172	172	173	173				
	V2	176	176	176	176	176	176	176	176	176				
	GR2	7.1	7.1	7	6.7	6.4	6	5.5	5	4.8				
35000	TOFL	11930	12150	12430	12900	13730	14720	15930	17340	17670			182	182
	V1	145	145	145	146	148	151	153	157	157				
	VR	168	168	168	168	168	169	169	170	170				
	V2	173	173	173	173	173	173	173	173	173				
	GR2	7.5	7.5	7.4	7.1	6.8	6.4	5.9	5.3	5.2				
34000	TOFL	11050	11250	11520	11950	12720	13630	14740	16020	16340			179	179
	V1	140	140	141	142	144	146	149	152	153				
	VR	164	164	164	165	165	166	166	167	167				
	V2	170	170	170	170	170	171	171	171	171				
	GR2	8	8	7.9	7.6	7.2	6.8	6.3	5.7	5.6				
33000	TOFL	10210	10400	10650	11050	11750	12600	13610	14780	15070			176	176
	V1	136	136	136	137	139	141	144	147	148				
	VR	161	161	161	161	162	163	163	164	164				
	V2	168	168	168	167	167	168	168	168	168				
	GR2	8.4	8.4	8.3	8	7.6	7.2	6.7	6.1	6				
32000	TOFL	9440	9610	9840	10210	10840	11610	12550	13620	13880			173	173
	V1	132	132	132	133	135	137	140	143	143				
	VR	158	158	158	158	159	159	160	161	161				
	V2	165	165	165	165	165	165	165	165	165				
	GR2	8.9	8.9	8.8	8.5	8.1	7.7	7.1	6.5	6.4				

FIGURE 10-5-29. TAKE-OFF DISTANCE; FLAPS - 0° ; 7000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	35	36			Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	95	97				
	N1	90.4	91.3	92.1	93.0	92.5	91.8	91.2	90.5	90.4				
31000	TOFL	8670	8830	9050	9380	9990	10680	11530	12520	12760			170	170
	V1	127	127	127	128	130	132	135	138	139				
	VR	154	154	154	154	155	156	157	157	157				
	V2	162	162	162	162	162	162	162	162	162				
	GR2	9.5	9.5	9.3	9	8.6	8.2	7.6	7	6.8				
30000	TOFL	7990	8130	8330	8630	9160	9810	10580	11480	11700			167	167
	V1	123	123	123	124	126	128	130	133	134				
	VR	151	151	151	151	152	153	153	154	154				
	V2	159	159	159	159	159	159	159	159	159				
	GR2	10	10	9.9	9.5	9.1	8.7	8.1	7.5	7.3				
29000	TOFL	7340	7470	7650	7930	8410	8970	9690	10500	10700			164	164
	V1	118	118	119	119	121	123	126	129	129				
	VR	147	147	147	148	148	149	150	151	151				
	V2	156	156	156	156	156	156	156	156	156				
	GR2	10.6	10.6	10.5	10.1	9.7	9.3	8.6	8	7.8				
28000	TOFL	6730	6850	7010	7270	7700	8220	8840	9590	9770			161	161
	V1	114	114	114	115	117	119	121	124	125				
	VR	144	144	144	144	145	146	146	147	147				
	V2	153	153	153	153	153	153	153	153	153				
	GR2	11.3	11.3	11.1	10.7	10.3	9.8	9.2	8.5	8.4				
27000	TOFL	6170	6280	6430	6650	7040	7500	8060	8720	8900			158	158
	V1	110	110	110	111	112	114	116	119	120				
	VR	140	140	140	140	141	142	143	144	144				
	V2	150	150	150	150	150	150	150	150	150				
	GR2	12	12	11.8	11.4	10.9	10.5	9.9	9.1	8.9				
26000	TOFL	5650	5750	5880	6080	6430	6840	7340	7920	8070			155	155
	V1	106	106	106	107	108	110	112	114	115				
	VR	136	136	136	136	137	138	139	140	140				
	V2	147	147	147	146	146	147	147	147	147				
	GR2	12.7	12.7	12.5	12.1	11.6	11.2	10.5	9.8	9.6				

FIGURE 10-5-30. TAKE-OFF DISTANCE; FLAPS - 0° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	81.7	82.1	83.0	84.0	84.9	85.8	86.7	87.5	88.4	89.3	90.1		
39600	TOFL	14590	14850	15150	15440	15720	16060	16380	16720	17050	17370	17710	195	195
	V1	170	170	169	169	169	169	169	168	168	168	168		
	VR	183	183	183	183	183	183	183	183	183	183	183		
	V2	187	187	187	187	187	187	187	187	187	187	187		
	GR2	5.4	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	14000	14250	14540	14810	15080	15410	15720	16040	16350	16670	16990	194	194
	V1	167	167	167	166	166	166	166	166	166	165	165		
	VR	181	181	181	181	181	181	181	181	181	181	181		
	V2	185	185	185	185	185	185	185	185	185	185	185		
	GR2	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	13060	13300	13560	13810	14070	14370	14660	14960	15250	15550	15850	191	191
	V1	163	163	162	162	162	162	161	161	161	161	161		
	VR	178	178	178	178	178	178	178	178	178	178	178		
	V2	182	182	182	182	182	182	182	182	182	182	182		
	GR2	6	6	6	6	6	6	6	6	6	6.1	6.1		
37000	TOFL	12170	12390	12630	12870	13110	13390	13660	13940	14220	14490	14760	188	188
	V1	158	158	158	158	157	157	157	157	157	157	157		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	180	180	180	180	180	180	180	180	180	180	180		
	GR2	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	11330	11530	11760	11990	12210	12470	12720	12980	13230	13490	13740	185	185
	V1	154	154	154	153	153	153	153	153	152	152	152		
	VR	172	172	172	172	172	172	172	172	172	172	172		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	10540	10730	10940	11150	11350	11590	11830	12060	12300	12540	12770	183	183
	V1	150	150	149	149	149	149	148	148	148	148	148		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
34000	TOFL	9770	9940	10140	10330	10520	10740	10960	11170	11390	11610	11830	180	180
	V1	145	145	145	145	144	144	144	144	144	143	143		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
33000	TOFL	9030	9190	9370	9540	9720	9920	10120	10320	10520	10720	10930	177	177
	V1	141	141	140	140	140	140	139	139	139	139	139		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	8	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
32000	TOFL	8330	8480	8640	8810	8970	9160	9340	9520	9710	9890	10080	174	174
	V1	136	136	136	135	135	135	135	135	134	134	134		
	VR	160	160	160	159	159	159	159	159	159	159	159		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	8.5	8.5	8.5	8.5	8.6	8.6	8.6	8.6	8.6	8.6	8.6		

FIGURE 10-5-30. TAKE-OFF DISTANCE; FLAPS - 0° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	81.7	82.1	83.0	84.0	84.9	85.8	86.7	87.5	88.4	89.3	90.1		
31000	TOFL	7680	7820	7970	8120	8270	8440	8610	8780	8950	9120	9290	171	171
	V1	132	132	131	131	131	131	130	130	130	130	130		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
30000	TOFL	7050	7180	7320	7450	7590	7740	7900	8050	8210	8360	8520	168	168
	V1	127	127	127	126	126	126	126	126	125	125	125		
	VR	153	153	153	152	152	152	152	152	152	152	152		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
29000	TOFL	6480	6600	6730	6850	6970	7110	7260	7400	7540	7680	7820	165	165
	V1	123	123	122	122	122	122	121	121	121	121	121		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
28000	TOFL	5950	6050	6170	6280	6390	6520	6650	6780	6910	7030	7160	161	161
	V1	118	118	118	118	117	117	117	117	117	116	116		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
27000	TOFL	5450	5540	5650	5750	5850	5970	6090	6200	6320	6430	6550	158	158
	V1	114	114	113	113	113	113	112	112	112	112	112		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	11.4	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.6	11.6		
26000	TOFL	4990	5070	5170	5260	5350	5460	5570	5670	5780	5880	5990	155	155
	V1	110	109	109	109	109	108	108	108	108	108	107		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	12.1	12.1	12.2	12.2	12.3	12.3	12.3	12.3	12.3	12.3	12.3		

FIGURE 10-5-30. TAKE-OFF DISTANCE; FLAPS - 0° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	34				Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	93					
	N1	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.5					
39600	TOFL	18040	18400	18940	19870								195	195
	V1	168	168	169	171									
	VR	183	183	183	183									
	V2	187	187	187	187									
	GR2	5.5	5.5	5.3	5									
39000	TOFL	17310	17660	18190	19070								194	194
	V1	165	165	166	168									
	VR	181	181	181	181									
	V2	185	185	185	185									
	GR2	5.7	5.7	5.5	5.2									
38000	TOFL	16140	16470	16980	17800	19130							191	191
	V1	161	161	162	164	166								
	VR	178	178	178	178	179								
	V2	182	182	182	182	182								
	GR2	6.1	6	5.8	5.5	5.2								
37000	TOFL	15050	15350	15830	16590	17810	19190						188	188
	V1	156	157	157	159	161	164							
	VR	175	175	175	175	176	177							
	V2	180	180	180	180	180	180							
	GR2	6.4	6.4	6.2	5.8	5.5	5.2							
36000	TOFL	14010	14290	14750	15460	16560	17830	19380					185	185
	V1	152	152	153	155	157	159	162						
	VR	172	172	172	172	173	174	174						
	V2	177	177	177	177	177	177	177						
	GR2	6.8	6.8	6.5	6.2	5.9	5.5	5						
35000	TOFL	13020	13280	13720	14370	15380	16530	17970	19280				183	183
	V1	148	148	149	150	152	155	158	161					
	VR	169	169	169	169	170	171	171	172					
	V2	174	174	174	174	174	175	175	175					
	GR2	7.2	7.2	6.9	6.6	6.3	5.9	5.3	4.9					
34000	TOFL	12050	12300	12710	13330	14260	15300	16620	17840				180	180
	V1	143	143	144	146	148	150	153	156					
	VR	166	166	166	166	167	168	168	169					
	V2	172	172	171	171	172	172	172	172					
	GR2	7.6	7.6	7.3	7	6.6	6.3	5.7	5.3					
33000	TOFL	11130	11360	11740	12310	13190	14130	15320	16440				177	177
	V1	139	139	140	141	143	145	148	151					
	VR	163	163	163	163	164	164	165	165					
	V2	169	169	168	168	169	169	169	169					
	GR2	8.1	8.1	7.8	7.4	7.1	6.7	6.1	5.6					
32000	TOFL	10270	10480	10840	11350	12150	13030	14110	15120				174	174
	V1	134	134	135	136	139	141	144	146					
	VR	159	159	159	160	160	161	162	162					
	V2	166	166	166	166	166	166	166	166					
	GR2	8.6	8.5	8.3	7.9	7.5	7.1	6.6	6.1					

FIGURE 10-5-30. TAKE-OFF DISTANCE; FLAPS - 0° ; 8000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	34				Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	93					
	N1	91.0	91.8	92.7	93.0	92.4	91.7	91.1	90.5					
31000	TOFL	9460	9650	9980	10450	11170	11980	12970	13890				171	171
	V1	129	130	130	132	134	136	139	141					
	VR	156	156	156	156	157	158	159	159					
	V2	163	163	163	163	163	163	163	163					
	GR2	9.1	9	8.7	8.4	8	7.6	7	6.5					
30000	TOFL	8670	8850	9150	9610	10260	10980	11890	12740				168	168
	V1	125	125	126	127	129	131	134	137					
	VR	152	152	152	153	154	154	155	156					
	V2	160	160	160	160	160	160	160	160					
	GR2	9.6	9.6	9.3	8.9	8.5	8.1	7.5	6.9					
29000	TOFL	7960	8130	8400	8780	9400	10050	10860	11640				165	165
	V1	120	120	121	123	125	127	129	132					
	VR	149	149	149	149	150	151	152	152					
	V2	157	157	156	156	157	157	157	157					
	GR2	10.2	10.2	9.8	9.4	9	8.6	8	7.4					
28000	TOFL	7290	7440	7690	8040	8580	9190	9910	10610				161	161
	V1	116	116	117	118	120	122	124	127					
	VR	145	145	145	146	147	147	148	149					
	V2	154	154	153	153	154	154	154	154					
	GR2	10.9	10.8	10.4	10	9.6	9.2	8.6	8					
27000	TOFL	6670	6800	7020	7340	7830	8360	9030	9650				158	158
	V1	112	112	112	113	115	117	120	122					
	VR	142	142	142	142	143	144	145	145					
	V2	151	151	150	150	150	151	151	151					
	GR2	11.6	11.5	11.1	10.7	10.2	9.8	9.2	8.6					
26000	TOFL	6100	6220	6410	6690	7120	7610	8190	8760				155	155
	V1	107	107	108	109	111	113	115	117					
	VR	138	138	138	138	139	140	141	142					
	V2	147	147	147	147	147	148	148	148					
	GR2	12.3	12.2	11.8	11.4	10.9	10.4	9.8	9.2					

FIGURE 10-5-31. TAKE-OFF DISTANCE; FLAPS - 0° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
39600	TOFL	15710	15990	16320	16640	16990	17350	17700	18060	18410	18760	19130	196	196
	V1	172	171	171	171	171	171	171	170	170	170	170		
	VR	184	184	184	184	184	184	184	184	184	184	184		
	V2	187	187	187	187	187	187	187	187	187	187	187		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	15070	15340	15660	15970	16300	16640	16990	17320	17670	18010	18350	194	194
	V1	169	169	168	168	168	168	168	168	168	168	167		
	VR	182	182	182	182	182	182	182	182	182	182	182		
	V2	186	186	186	186	186	186	186	186	186	186	186		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	14050	14300	14600	14880	15190	15510	15830	16150	16470	16790	17110	191	191
	V1	164	164	164	164	164	164	163	163	163	163	163		
	VR	179	179	179	179	179	179	179	179	179	179	179		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	13080	13320	13590	13860	14150	14440	14740	15040	15330	15630	15930	189	189
	V1	160	160	160	159	159	159	159	159	159	158	158		
	VR	176	176	176	176	176	176	176	176	176	176	176		
	V2	180	180	180	180	180	180	180	180	180	180	180		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	12170	12380	12640	12890	13160	13430	13710	13980	14260	14530	14810	186	186
	V1	156	155	155	155	155	155	154	154	154	154	154		
	VR	173	173	173	173	173	173	173	173	173	173	173		
	V2	177	177	177	177	177	177	177	177	177	177	177		
	GR2	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	11310	11500	11740	11980	12220	12470	12730	12990	13240	13500	13750	183	183
	V1	151	151	151	151	150	150	150	150	150	150	149		
	VR	170	170	170	170	170	170	170	170	170	170	170		
	V2	175	175	175	175	175	175	175	175	175	175	175		
	GR2	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
34000	TOFL	10490	10670	10890	11100	11330	11560	11800	12040	12270	12510	12750	180	180
	V1	147	147	146	146	146	146	146	145	145	145	145		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	9700	9870	10070	10270	10480	10700	10920	11130	11350	11570	11790	177	177
	V1	142	142	142	142	141	141	141	141	141	141	140		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
32000	TOFL	8950	9110	9290	9470	9670	9870	10070	10270	10460	10670	10870	174	174
	V1	138	138	137	137	137	137	136	136	136	136	136		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.3		

FIGURE 10-5-31. TAKE-OFF DISTANCE; FLAPS - 0° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	82.1	82.6	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7		
31000	TOFL	8240	8390	8560	8720	8900	9080	9260	9450	9630	9810	10000	171	171
	V1	133	133	133	133	132	132	132	132	132	131	131		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.8	8.8		
30000	TOFL	7580	7710	7860	8010	8170	8340	8510	8680	8840	9010	9180	168	168
	V1	129	128	128	128	128	127	127	127	127	127	127		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
29000	TOFL	6940	7060	7200	7340	7490	7640	7790	7950	8100	8250	8400	165	165
	V1	124	124	124	123	123	123	123	122	122	122	122		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	9.8	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	6360	6470	6600	6730	6860	7000	7140	7280	7420	7550	7690	162	162
	V1	120	119	119	119	119	118	118	118	118	118	117		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
27000	TOFL	5820	5920	6030	6150	6270	6390	6520	6650	6770	6900	7020	159	159
	V1	115	115	115	114	114	114	114	114	113	113	113		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.2	11.2		
26000	TOFL	5320	5410	5510	5620	5730	5840	5960	6070	6180	6300	6410	155	155
	V1	111	111	110	110	110	109	109	109	109	109	109		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	11.8	11.8	11.8	11.8	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 10-5-31. TAKE-OFF DISTANCE; FLAPS - 0° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	32				Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	89					
	N1	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
39600	TOFL	19490	19990										196	196
	V1	170	171											
	VR	184	184											
	V2	187	187											
	GR2	5.2	5.1											
39000	TOFL	18700	19190	19970									194	194
	V1	167	168	170										
	VR	182	182	182										
	V2	186	185	185										
	GR2	5.4	5.3	5										
38000	TOFL	17430	17900	18630	19780								191	191
	V1	163	164	165	167									
	VR	179	179	179	179									
	V2	183	183	183	183									
	GR2	5.8	5.6	5.3	5									
37000	TOFL	16230	16680	17360	18420	19790							189	189
	V1	158	159	161	163	165								
	VR	176	176	176	176	177								
	V2	180	180	180	180	180								
	GR2	6.1	6	5.7	5.4	5.1								
36000	TOFL	15090	15520	16160	17130	18390	19870						186	186
	V1	154	154	156	158	160	163							
	VR	173	173	173	173	174	175							
	V2	177	177	177	177	178	178							
	GR2	6.5	6.3	6	5.7	5.4	5							
35000	TOFL	14020	14410	15020	15910	17060	18420						183	183
	V1	149	150	151	153	156	158							
	VR	170	170	170	170	171	172							
	V2	175	175	174	174	175	175							
	GR2	6.9	6.7	6.4	6.1	5.8	5.3							
34000	TOFL	12990	13360	13930	14750	15800	17040	18520	19220				180	180
	V1	145	145	147	149	151	153	157	158					
	VR	167	167	167	167	168	169	169	169					
	V2	172	172	172	172	172	172	172	172					
	GR2	7.3	7.1	6.8	6.5	6.1	5.7	5.2	5					
33000	TOFL	12010	12360	12890	13650	14610	15730	17090	17750				177	177
	V1	140	141	142	144	146	149	152	153					
	VR	164	164	164	164	165	165	166	166					
	V2	169	169	169	169	169	169	169	169					
	GR2	7.8	7.6	7.2	6.9	6.5	6.1	5.6	5.3					
32000	TOFL	11080	11400	11890	12590	13470	14490	15720	16320				174	174
	V1	136	136	138	139	142	144	147	148					
	VR	160	160	160	161	162	162	163	163					
	V2	166	166	166	166	166	166	166	166					
	GR2	8.2	8	7.7	7.3	6.9	6.5	6	5.7					

FIGURE 10-5-31. TAKE-OFF DISTANCE; FLAPS - 0° ; 9000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	32				Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	89					
	N1	91.5	92.4	93.0	92.9	92.3	91.6	91.0	90.7					
31000	TOFL	10190	10490	10940	11580	12380	13320	14430	14970				171	171
	V1	131	132	133	135	137	139	142	143					
	VR	157	157	157	157	158	159	159	160					
	V2	163	163	163	163	163	164	164	164					
	GR2	8.7	8.5	8.1	7.8	7.4	7	6.4	6.2					
30000	TOFL	9350	9630	10040	10620	11350	12210	13220	13710				168	168
	V1	126	127	128	130	132	134	137	138					
	VR	153	153	154	154	155	155	156	156					
	V2	160	160	160	160	160	161	161	161					
	GR2	9.3	9	8.6	8.3	7.9	7.5	6.9	6.6					
29000	TOFL	8560	8810	9170	9730	10390	11160	12080	12530				165	165
	V1	122	122	124	125	127	129	132	134					
	VR	150	150	150	151	151	152	153	153					
	V2	157	157	157	157	157	157	158	158					
	GR2	9.9	9.6	9.2	8.8	8.4	8	7.4	7.1					
28000	TOFL	7840	8070	8400	8870	9490	10170	11010	11420				162	162
	V1	117	118	119	121	123	125	127	129					
	VR	146	146	146	147	148	149	149	150					
	V2	154	154	154	154	154	154	154	154					
	GR2	10.5	10.2	9.8	9.4	9	8.5	7.9	7.6					
27000	TOFL	7160	7360	7660	8100	8630	9260	10010	10370				159	159
	V1	113	113	114	116	118	120	122	124					
	VR	142	142	142	143	144	145	146	146					
	V2	151	151	151	151	151	151	151	151					
	GR2	11.1	10.9	10.4	10	9.6	9.1	8.5	8.2					
26000	TOFL	6530	6710	6970	7360	7850	8400	9080	9400				155	155
	V1	108	109	110	111	113	115	118	119					
	VR	139	139	139	139	140	141	142	142					
	V2	148	148	147	147	148	148	148	148					
	GR2	11.8	11.6	11.1	10.7	10.2	9.8	9.1	8.8					

FIGURE 10-5-32. TAKE-OFF DISTANCE; FLAPS - 0° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	82.5	83.2	84.1	85.1	86.0	86.9	87.7	88.6	89.5	90.4	91.2		
39600	TOFL	16880	17200	17590	17970	18360	18750	19130	19510	19890			196	196
	V1	173	173	173	173	173	173	173	173	172				
	VR	185	185	185	185	185	185	185	185	185				
	V2	188	188	188	188	188	188	188	188	188				
	GR2	4.9	4.9	5	5	5	5	5	5	5				
39000	TOFL	16190	16490	16870	17230	17610	17980	18350	18710	19080	19450	19820	194	194
	V1	171	170	170	170	170	170	170	170	170	170	170		
	VR	183	183	183	183	183	183	183	183	183	183	183		
	V2	186	186	186	186	186	186	186	186	186	186	186		
	GR2	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	15090	15370	15720	16060	16410	16760	17100	17440	17780	18130	18470	192	192
	V1	166	166	166	166	166	166	165	165	165	165	165		
	VR	180	180	180	180	180	180	180	180	180	180	180		
	V2	183	183	183	183	183	183	183	183	183	183	183		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	14040	14310	14630	14940	15270	15590	15910	16230	16550	16870	17190	189	189
	V1	162	161	161	161	161	161	161	161	161	160	160		
	VR	177	177	177	177	177	177	177	177	177	177	177		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	13050	13300	13600	13890	14190	14490	14790	15080	15380	15670	15980	186	186
	V1	157	157	157	157	157	156	156	156	156	156	156		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	12120	12340	12620	12890	13170	13450	13720	14000	14270	14540	14820	183	183
	V1	153	152	152	152	152	152	152	152	151	151	151		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	175	175	175	175	175	175	175	175	175	175	175		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	11230	11440	11690	11940	12200	12460	12710	12970	13220	13470	13730	180	180
	V1	148	148	148	148	148	147	147	147	147	147	147		
	VR	168	168	167	167	167	167	167	167	167	167	167		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	10390	10580	10820	11050	11280	11520	11750	11990	12220	12450	12690	177	177
	V1	144	144	143	143	143	143	143	142	142	142	142		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5		
32000	TOFL	9590	9770	9990	10200	10420	10640	10850	11070	11280	11490	11720	175	175
	V1	139	139	139	139	138	138	138	138	138	138	137		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		

FIGURE 10-5-32. TAKE-OFF DISTANCE; FLAPS - 0° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	82.5	83.2	84.1	85.1	86.0	86.9	87.7	88.6	89.5	90.4	91.2		
31000	TOFL	8830	8990	9190	9390	9590	9790	9980	10180	10380	10570	10780	172	172
	V1	135	134	134	134	134	134	133	133	133	133	133		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
30000	TOFL	8110	8260	8440	8620	8800	8980	9160	9340	9520	9700	9890	168	168
	V1	130	130	130	129	129	129	129	129	128	128	128		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
29000	TOFL	7420	7550	7720	7880	8040	8210	8370	8540	8700	8860	9030	165	165
	V1	125	125	125	125	124	124	124	124	124	123	123		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
28000	TOFL	6800	6920	7070	7210	7370	7520	7660	7810	7960	8110	8260	162	162
	V1	121	120	120	120	120	120	119	119	119	119	119		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
27000	TOFL	6210	6320	6460	6590	6730	6860	7000	7130	7270	7400	7540	159	159
	V1	116	116	116	115	115	115	115	115	115	114	114		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	10.7	10.7	10.7	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	5660	5760	5890	6010	6130	6250	6380	6500	6620	6740	6870	156	156
	V1	112	111	111	111	111	111	110	110	110	110	110		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	11.4	11.4	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 10-5-32. TAKE-OFF DISTANCE; FLAPS - 0° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	30.2				Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	86					
	N1	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	18860	19540										192	192
	V1	165	167											
	VR	180	180											
	V2	183	183											
	GR2	5.5	5.2											
37000	TOFL	17560	18200	19130									189	189
	V1	160	162	164										
	VR	177	177	177										
	V2	181	180	180										
	GR2	5.8	5.5	5.2										
36000	TOFL	16320	16930	17800	19020								186	186
	V1	156	157	159	161									
	VR	174	174	174	175									
	V2	178	178	178	178									
	GR2	6.2	5.9	5.5	5.2									
35000	TOFL	15150	15720	16530	17650	18960							183	183
	V1	151	153	155	157	159								
	VR	171	171	171	171	172								
	V2	175	175	175	175	175								
	GR2	6.6	6.2	5.9	5.6	5.3								
34000	TOFL	14040	14570	15320	16350	17540	18960						180	180
	V1	147	148	150	152	154	157							
	VR	167	167	168	168	169	169							
	V2	172	172	172	172	172	173							
	GR2	6.9	6.6	6.3	5.9	5.6	5.2							
33000	TOFL	12980	13480	14170	15120	16200	17490	19070	19130				177	177
	V1	142	144	145	147	149	152	155	155					
	VR	164	164	165	165	166	166	167	167					
	V2	170	169	169	169	170	170	170	170					
	GR2	7.4	7	6.7	6.3	6	5.6	5.1	5					
32000	TOFL	11990	12450	13090	13950	14940	16110	17550	17610				175	175
	V1	138	139	141	143	145	147	150	150					
	VR	161	161	161	162	162	163	164	164					
	V2	167	166	166	166	167	167	167	167					
	GR2	7.8	7.5	7.1	6.8	6.4	6	5.4	5.4					

FIGURE 10-5-32. TAKE-OFF DISTANCE; FLAPS - 0° ; 10000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	30	30.2				Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	86	86					
	N1	92.1	93.0	93.0	92.8	92.2	91.6	90.9	90.9					
31000	TOFL	11030	11460	12050	12840	13740	14790	16100	16160				172	172
	V1	133	134	136	138	140	142	145	145					
	VR	158	158	158	159	159	160	160	160					
	V2	164	163	163	163	164	164	164	164					
	GR2	8.3	7.9	7.6	7.2	6.9	6.4	5.9	5.8					
30000	TOFL	10120	10510	11050	11780	12590	13540	14730	14780				168	168
	V1	128	130	131	133	135	137	140	140					
	VR	154	154	154	155	156	157	157	157					
	V2	161	160	160	160	161	161	161	161					
	GR2	8.8	8.4	8.1	7.7	7.3	6.9	6.3	6.3					
29000	TOFL	9250	9600	10110	10770	11520	12370	13450	13490				165	165
	V1	123	125	126	128	130	132	135	135					
	VR	150	150	151	152	152	153	154	154					
	V2	158	157	157	157	158	158	158	158					
	GR2	9.4	9	8.6	8.2	7.8	7.4	6.8	6.8					
28000	TOFL	8460	8780	9210	9820	10500	11280	12250	12290				162	162
	V1	119	120	121	123	125	127	130	130					
	VR	147	147	147	148	149	150	150	150					
	V2	154	154	154	154	155	155	155	155					
	GR2	10	9.6	9.1	8.8	8.4	7.9	7.3	7.3					
27000	TOFL	7720	8010	8400	8920	9550	10250	11130	11160				159	159
	V1	114	115	117	118	120	122	125	125					
	VR	143	143	143	144	145	146	147	147					
	V2	151	151	151	151	151	152	152	152					
	GR2	10.6	10.2	9.8	9.3	8.9	8.5	7.8	7.8					
26000	TOFL	7030	7280	7640	8120	8650	9290	10080	10110				156	156
	V1	110	111	112	114	116	118	120	120					
	VR	139	139	140	141	141	142	143	143					
	V2	148	147	147	148	148	149	149	149					
	GR2	11.3	10.9	10.4	10	9.6	9.1	8.4	8.4					

FIGURE 10-5-33. TAKE-OFF DISTANCE; FLAPS - 0° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS)	VSE (KCAS)
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	83.1	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	91.8	Flap 0°	Clean
39600	TOFL	18350	18680	19060	19450	19870							197	197
	V1	176	176	175	175	175								
	VR	185	185	185	185	185								
	V2	188	188	188	188	188								
	GR2	4.7	4.7	4.7	4.7	4.7								
39000	TOFL	17590	17900	18270	18650	19050	19450	19850					195	195
	V1	173	173	173	172	172	172	172						
	VR	184	184	184	184	184	184	184						
	V2	187	187	187	187	187	187	187						
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9						
38000	TOFL	16380	16670	17020	17370	17740	18120	18490	18850	19220	19590		192	192
	V1	168	168	168	168	168	168	168	167	167	167			
	VR	181	181	181	181	181	181	181	181	181	181			
	V2	184	184	184	184	184	184	184	184	184	184			
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2			
37000	TOFL	15230	15500	15820	16150	16490	16840	17190	17530	17870	18220	18610	189	189
	V1	164	164	163	163	163	163	163	163	163	163	163		
	VR	178	178	178	178	178	178	178	178	178	178	178		
	V2	181	181	181	181	181	181	181	181	181	181	181		
	GR2	5.5	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5		
36000	TOFL	14140	14400	14690	14990	15320	15640	15960	16280	16600	16920	17290	186	186
	V1	159	159	159	159	158	158	158	158	158	158	158		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	178	178	178	178	178	178	178	178	178	178	178		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
35000	TOFL	13120	13350	13620	13910	14210	14500	14800	15100	15390	15690	16040	184	184
	V1	155	154	154	154	154	154	154	153	153	153	153		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	12150	12360	12610	12870	13150	13430	13700	13980	14250	14520	14850	181	181
	V1	150	150	150	149	149	149	149	149	149	149	149		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
33000	TOFL	11230	11430	11660	11900	12160	12410	12660	12920	13170	13420	13730	178	178
	V1	145	145	145	145	145	144	144	144	144	144	144		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.2	7.2	7.1		
32000	TOFL	10360	10540	10750	10970	11210	11440	11670	11910	12140	12370	12660	175	175
	V1	141	141	140	140	140	140	140	139	139	139	139		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.5		

FIGURE 10-5-33. TAKE-OFF DISTANCE; FLAPS - 0° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	83.1	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	91.8		
31000	TOFL	9530	9700	9900	10100	10310	10530	10740	10960	11170	11380	11650	172	172
	V1	136	136	136	136	135	135	135	135	135	135	135		
	VR	159	159	158	158	158	158	158	158	158	158	158		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8		
30000	TOFL	8750	8900	9080	9270	9460	9660	9860	10050	10240	10440	10680	169	169
	V1	131	131	131	131	131	130	130	130	130	130	130		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.5		
29000	TOFL	8010	8150	8310	8480	8660	8830	9010	9190	9370	9540	9770	166	166
	V1	127	127	126	126	126	126	125	125	125	125	125		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	9.1	9.1	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2	9.1		
28000	TOFL	7310	7430	7580	7730	7900	8060	8220	8380	8540	8700	8900	162	162
	V1	122	122	122	121	121	121	121	121	120	120	120		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	9.7	9.7	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.7		
27000	TOFL	6670	6790	6920	7060	7200	7350	7500	7640	7790	7930	8120	159	159
	V1	117	117	117	117	116	116	116	116	116	116	116		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3		
26000	TOFL	6070	6180	6300	6420	6550	6690	6820	6950	7080	7210	7380	156	156
	V1	113	112	112	112	112	112	111	111	111	111	111		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	149	149	149	149	149	149	149	149	149	149	148		
	GR2	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11		

FIGURE 10-5-33. TAKE-OFF DISTANCE; FLAPS - 0° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	28					Vref	VSE
	OAT	32	41	50	59	68	77	82						
	N1	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	19180												
	V1	164												
	VR	178											189	189
	V2	181												
	GR2	5.3												
36000	TOFL	17830	18640	19780										
	V1	159	161	163										
	VR	175	175	175									186	186
	V2	178	178	178										
	GR2	5.7	5.4	5.1										
35000	TOFL	16550	17310	18360	19640									
	V1	154	156	158	160									
	VR	171	171	172	172								184	184
	V2	175	175	175	176									
	GR2	6.1	5.7	5.4	5.1									
34000	TOFL	15330	16040	17000	18180	19550								
	V1	150	151	153	155	158								
	VR	168	168	169	169	170							181	181
	V2	172	172	172	173	173								
	GR2	6.4	6.1	5.8	5.4	5.1								
33000	TOFL	14180	14840	15720	16800	18050	19550							
	V1	145	146	148	150	153	155							
	VR	165	165	165	166	167	167						178	178
	V2	170	169	169	170	170	170							
	GR2	6.9	6.5	6.2	5.8	5.5	5.1							
32000	TOFL	13080	13690	14510	15490	16620	18000	19050						
	V1	140	142	144	146	148	151	153						
	VR	162	162	162	163	164	164	164					175	175
	V2	167	167	167	167	167	167	167						
	GR2	7.3	6.9	6.6	6.2	5.9	5.4	5.1						

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FIGURE 10-5-33. TAKE-OFF DISTANCE; FLAPS - 0° ; 11000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	28					Vref	VSE
	OAT	32	41	50	59	68	77	82						
	N1	92.7	93.0	93.0	92.7	92.1	91.4	91.0						
31000	TOFL	12040	12600	13360	14250	15280	16520	17490					172	172
	V1	136	137	139	141	143	146	148						
	VR	158	159	159	160	160	161	161						
	V2	164	164	164	164	164	164	164						
	GR2	7.8	7.4	7	6.7	6.3	5.9	5.5						
30000	TOFL	11050	11570	12260	13080	14010	15130	16000					169	169
	V1	131	132	134	136	138	141	143						
	VR	155	155	156	156	157	158	158						
	V2	161	161	161	161	161	161	161						
	GR2	8.2	7.8	7.5	7.1	6.8	6.3	5.9						
29000	TOFL	10110	10580	11210	11950	12800	13810	14600					166	166
	V1	126	127	129	131	133	136	138						
	VR	151	152	152	153	153	154	154						
	V2	158	158	158	158	158	158	158						
	GR2	8.8	8.4	8	7.6	7.3	6.8	6.4						
28000	TOFL	9210	9660	10220	10890	11660	12570	13280					162	162
	V1	121	123	124	126	128	130	132						
	VR	148	148	148	149	150	151	151						
	V2	154	154	154	155	155	155	155						
	GR2	9.4	8.9	8.5	8.1	7.8	7.3	6.9						
27000	TOFL	8400	8780	9300	9900	10590	11410	12050					159	159
	V1	116	118	119	121	123	125	127						
	VR	144	144	145	145	146	147	147						
	V2	151	151	151	151	152	152	152						
	GR2	10	9.5	9.1	8.7	8.3	7.8	7.4						
26000	TOFL	7640	7980	8430	8960	9600	10330	10900					156	156
	V1	112	113	114	116	118	120	122						
	VR	140	140	141	142	143	143	144						
	V2	148	148	148	148	149	149	149						
	GR2	10.6	10.2	9.7	9.3	8.9	8.4	8						

FIGURE 10-5-34. TAKE-OFF DISTANCE; FLAPS - 0° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	83.5	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.4		
39600	TOFL	19840											197	197
	V1	178												
	VR	186												
	V2	189												
	GR2	4.4												
39000	TOFL	19010	19340	19750									195	195
	V1	175	175	175										
	VR	185	185	185										
	V2	187	187	187										
	GR2	4.6	4.6	4.6										
38000	TOFL	17690	18000	18380	18780	19180	19590	19990					193	193
	V1	170	170	170	170	170	170	170						
	VR	181	181	181	181	181	181	181						
	V2	185	185	185	185	185	185	185						
	GR2	4.9	5	5	5	5	5	5						
37000	TOFL	16430	16730	17080	17460	17830	18210	18580	18950	19320	19700		190	190
	V1	166	165	165	165	165	165	165	165	165	165			
	VR	178	178	178	178	178	178	178	178	178	178			
	V2	182	182	182	182	182	182	182	182	182	182			
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3			
36000	TOFL	15240	15510	15840	16190	16540	16890	17230	17580	17920	18270	18790	187	187
	V1	161	161	161	161	160	160	160	160	160	160	161		
	VR	175	175	175	175	175	175	175	175	175	175	175		
	V2	179	179	179	179	179	179	179	179	179	179	179		
	GR2	5.6	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.7	5.7	5.5		
35000	TOFL	14130	14380	14680	15000	15330	15650	15970	16290	16610	16940	17430	184	184
	V1	156	156	156	156	156	156	155	155	155	155	156		
	VR	172	172	172	172	172	172	172	172	172	172	172		
	V2	176	176	176	176	176	176	176	176	176	176	176		
	GR2	6	6	6	6	6	6	6	6	6	6	5.9		
34000	TOFL	13070	13300	13580	13880	14180	14480	14780	15070	15370	15670	16140	181	181
	V1	152	151	151	151	151	151	151	151	150	150	151		
	VR	169	169	169	169	169	169	169	169	169	169	169		
	V2	173	173	173	173	173	173	173	173	173	173	173		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3		
33000	TOFL	12080	12290	12550	12830	13100	13380	13650	13930	14200	14480	14910	178	178
	V1	147	147	147	146	146	146	146	146	146	146	146		
	VR	166	166	166	166	166	166	166	166	166	166	166		
	V2	170	170	170	170	170	170	170	170	170	170	170		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7		
32000	TOFL	11140	11340	11570	11830	12080	12330	12580	12840	13090	13340	13750	175	175
	V1	142	142	142	142	142	141	141	141	141	141	142		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	168	168	167	167	167	167	167	167	167	167	167		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.1		

FIGURE 10-5-34. TAKE-OFF DISTANCE; FLAPS - 0° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	83.5	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.4		
31000	TOFL	10250	10420	10640	10880	11110	11340	11570	11800	12030	12270	12650	172	172
	V1	138	137	137	137	137	137	136	136	136	136	137		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	165	165	165	165	165	165	165	165	165	165	164		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.6		
30000	TOFL	9400	9560	9770	9980	10190	10400	10610	10820	11030	11250	11600	169	169
	V1	133	133	132	132	132	132	132	132	131	131	132		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	162	162	162	162	162	162	162	162	162	162	161		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8		
29000	TOFL	8610	8760	8940	9130	9330	9520	9710	9900	10100	10290	10620	166	166
	V1	128	128	128	127	127	127	127	127	127	127	127		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	159	159	159	159	159	159	159	159	159	159	158		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.6		
28000	TOFL	7860	8000	8160	8340	8490	8670	8840	9020	9190	9370	9660	163	163
	V1	123	123	123	123	122	122	122	122	122	122	122		
	VR	149	149	149	149	148	148	148	148	148	148	148		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.1		
27000	TOFL	7160	7280	7430	7590	7750	7900	8060	8220	8380	8540	8800	160	160
	V1	119	118	118	118	118	118	117	117	117	117	118		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	10	10	10	10	10	10	10	10	10	10	9.8		
26000	TOFL	6510	6620	6760	6900	7050	7190	7330	7470	7620	7760	8000	156	156
	V1	114	114	113	113	113	113	113	112	112	112	113		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.4		

FIGURE 10-5-34. TAKE-OFF DISTANCE; FLAPS - 0° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	25	26					Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	79						
	N1	93.0	93.0	93.0	92.6	92.0	91.3	91.1						
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL	19560											187	187
	V1	162												
	VR	175												
	V2	179												
	GR2	5.2												
35000	TOFL	18150	19180										184	184
	V1	157	159											
	VR	172	172											
	V2	176	176											
	GR2	5.6	5.2											
34000	TOFL	16820	17770	18910									181	181
	V1	153	154	157										
	VR	169	169	170										
	V2	173	173	173										
	GR2	5.9	5.6	5.3										
33000	TOFL	15550	16430	17470	18700								178	178
	V1	148	150	152	154									
	VR	166	166	167	167									
	V2	170	170	170	170									
	GR2	6.3	6	5.6	5.3									
32000	TOFL	14350	15160	16110	17230	18520							175	175
	V1	143	145	147	149	151								
	VR	163	163	163	164	165								
	V2	167	167	167	167	168								
	GR2	6.7	6.4	6	5.7	5.4								

FIGURE 10-5-34. TAKE-OFF DISTANCE; FLAPS - 0° ; 12000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	25	26					Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	77	79						
	N1	93.0	93.0	93.0	92.6	92.0	91.3	91.1						
31000	TOFL	13200	13950	14820	15840	17010	18520	18940					172	172
	V1	138	140	142	144	146	149	150						
	VR	159	159	160	161	161	162	162						
	V2	164	164	164	164	165	165	165						
	GR2	7.2	6.8	6.5	6.1	5.8	5.3	5.1						
30000	TOFL	12110	12800	13600	14530	15590	16950	17330					169	169
	V1	133	135	137	139	141	144	145						
	VR	156	156	157	157	158	159	159						
	V2	161	161	161	161	162	162	162						
	GR2	7.7	7.3	6.9	6.6	6.2	5.7	5.6						
29000	TOFL	11080	11710	12440	13290	14250	15470	15810					166	166
	V1	128	130	132	134	136	139	140						
	VR	152	153	153	154	155	155	155						
	V2	158	158	158	158	159	159	159						
	GR2	8.2	7.8	7.4	7	6.7	6.2	6						
28000	TOFL	10110	10680	11330	12100	12980	14070	14370					163	163
	V1	124	125	127	129	131	134	134						
	VR	149	149	150	150	151	152	152						
	V2	155	155	155	155	156	156	156						
	GR2	8.7	8.3	7.9	7.6	7.2	6.7	6.5						
27000	TOFL	9180	9710	10300	10990	11770	12760	13030					160	160
	V1	119	120	122	124	126	129	129						
	VR	145	145	146	147	147	148	148						
	V2	151	151	152	152	152	153	153						
	GR2	9.3	8.9	8.5	8.1	7.7	7.2	7						
26000	TOFL	8350	8800	9320	9960	10650	11530	11780					156	156
	V1	114	115	117	119	121	123	124						
	VR	141	141	142	143	144	144	145						
	V2	148	148	148	149	149	149	149						
	GR2	9.9	9.5	9.1	8.7	8.3	7.7	7.6						

FIGURE 10-5-35. TAKE-OFF DISTANCE; FLAPS - 0° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	84.4	85.0	85.7	86.7	87.6	88.4	89.3	90.2	91.2	92.1	92.9		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	19120	19480	19960									193	193
	V1	172	172	172										
	VR	182	182	182										
	V2	185	185	185										
	GR2	4.7	4.7	4.7										
37000	TOFL	17750	18090	18540	18950	19370	19830						190	190
	V1	168	168	168	168	168	168							
	VR	179	179	179	179	179	179							
	V2	182	182	182	182	182	182							
	GR2	5	5	5	5	5	5							
36000	TOFL	16460	16770	17190	17570	17960	18390	18810	19120	19440	19860		187	187
	V1	163	163	163	163	163	163	163	163	162	162			
	VR	176	176	176	176	176	176	176	176	176	176			
	V2	180	180	180	180	180	180	180	180	180	180			
	GR2	5.4	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3			
35000	TOFL	15230	15520	15910	16260	16620	17020	17410	17700	18000	18390	19100	184	184
	V1	158	158	158	158	158	158	158	158	158	158	159		
	VR	173	173	173	173	173	173	173	173	173	173	173		
	V2	177	177	177	177	177	177	177	177	177	177	176		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.4		
34000	TOFL	14080	14350	14710	15040	15370	15740	16100	16360	16640	17010	17680	181	181
	V1	153	153	153	153	153	153	153	153	153	153	154		
	VR	170	170	170	170	170	170	170	170	170	170	170		
	V2	174	174	174	174	174	174	174	174	174	174	173		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.8		
33000	TOFL	13000	13240	13580	13880	14190	14530	14860	15100	15360	15710	16330	179	179
	V1	149	148	148	148	148	148	148	148	148	148	149		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.2		
32000	TOFL	11980	12200	12510	12790	13070	13380	13690	13920	14150	14480	15050	176	176
	V1	144	144	144	144	143	143	143	143	143	143	144		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	7	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.6		

FIGURE 10-5-35. TAKE-OFF DISTANCE; FLAPS - 0° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	84.4	85.0	85.7	86.7	87.6	88.4	89.3	90.2	91.2	92.1	92.9		
31000	TOFL	11010	11220	11500	11760	12020	12300	12580	12790	13010	13310	13840	173	173
	V1	139	139	139	139	139	139	139	138	138	138	139		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3	7		
30000	TOFL	10110	10300	10560	10790	11030	11290	11540	11740	11940	12220	12700	170	170
	V1	134	134	134	134	134	134	134	133	133	133	135		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.5		
29000	TOFL	9260	9430	9670	9880	10100	10330	10560	10740	10930	11180	11630	166	166
	V1	130	129	129	129	129	129	129	129	129	129	130		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8		
28000	TOFL	8460	8610	8830	9020	9220	9430	9640	9810	9980	10210	10610	163	163
	V1	125	125	125	124	124	124	124	124	124	124	125		
	VR	149	149	149	149	149	150	150	149	149	149	149		
	V2	156	156	156	156	156	156	156	156	156	156	155		
	GR2	9	9	9	9	9	9	9	9	9	8.9	8.5		
27000	TOFL	7680	7820	8020	8190	8370	8560	8750	8900	9050	9270	9620	160	160
	V1	120	120	120	120	119	119	119	119	119	119	120		
	VR	145	145	145	145	146	146	146	146	145	145	145		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5	9.1		
26000	TOFL	6980	7110	7280	7440	7600	7780	7950	8080	8220	8420	8730	157	157
	V1	115	115	115	115	115	115	114	114	114	114	115		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	10.3	10.3	10.2	10.2	10.2	10.2	10.2	10.2	10.3	10.1	9.8		

FIGURE 10-5-35. TAKE-OFF DISTANCE; FLAPS - 0° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	0	5	10	15	20	24						Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	75							
	N1	93.0	93.0	93.0	92.4	91.8	91.2							
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL													
	V1													
	VR													
	V2													
	GR2													
34000	TOFL	18610	19760										181	181
	V1	156	158											
	VR	170	170											
	V2	173	173											
	GR2	5.4	5.1											
33000	TOFL	17190	18260	19470									179	179
	V1	151	153	155										
	VR	167	167	168										
	V2	170	170	171										
	GR2	5.8	5.5	5.2										
32000	TOFL	15850	16830	17940	19250								176	176
	V1	146	148	150	152									
	VR	163	164	164	165									
	V2	167	167	168	168									
	GR2	6.2	5.8	5.5	5.2									

FIGURE 10-5-35. TAKE-OFF DISTANCE; FLAPS - 0° ; 13000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	24						Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	75							
	N1	93.0	93.0	93.0	92.4	91.8	91.2							
31000	TOFL	14580	15480	16500	17680	19060							173	173
	V1	141	143	145	147	150								
	VR	160	160	161	162	162								
	V2	164	164	165	165	165								
	GR2	6.6	6.3	5.9	5.6	5.3								
30000	TOFL	13390	14210	15130	16210	17460	18820						170	170
	V1	136	138	140	142	144	147							
	VR	157	157	158	158	159	159							
	V2	161	161	162	162	162	162							
	GR2	7.1	6.7	6.4	6	5.7	5.2							
29000	TOFL	12250	13010	13830	14810	15940	17170						166	166
	V1	131	133	135	137	139	142							
	VR	153	154	154	155	156	156							
	V2	158	158	159	159	159	159							
	GR2	7.6	7.2	6.8	6.5	6.1	5.7							
28000	TOFL	11180	11870	12620	13500	14520	15620						163	163
	V1	126	128	130	132	134	137							
	VR	150	150	151	151	152	153							
	V2	155	155	155	156	156	156							
	GR2	8.1	7.7	7.3	7	6.6	6.1							
27000	TOFL	10160	10780	11460	12260	13170	14140						160	160
	V1	121	123	125	127	129	131							
	VR	146	146	147	148	148	149							
	V2	152	152	152	152	153	153							
	GR2	8.7	8.3	7.9	7.5	7.1	6.6							
26000	TOFL	9180	9770	10380	11100	11910	12760						157	157
	V1	116	118	120	122	124	126							
	VR	142	143	143	144	145	145							
	V2	148	149	149	149	150	150							
	GR2	9.3	8.9	8.4	8.1	7.7	7.2							

FIGURE 10-5-36. TAKE-OFF DISTANCE; FLAPS - 0° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 1 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	85.3	85.6	86.3	87.2	88.2	89.0	89.8	90.8	91.7	92.6	93.0		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	19370	19740											
	V1	170	170											
	VR	180	180										191	191
	V2	183	183											
	GR2	4.8	4.8											
36000	TOFL	17960	18300	18720	19130	19560								
	V1	165	165	165	165	165								
	VR	177	177	177	177	177							188	188
	V2	180	180	180	180	180								
	GR2	5.1	5.1	5.1	5.1	5.1								
35000	TOFL	16630	16940	17330	17710	18110	18590	18980	19270	19630				
	V1	161	160	160	160	160	160	160	160	160				
	VR	174	174	174	174	174	174	174	174	174			185	185
	V2	177	177	177	177	177	177	177	177	177				
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4				
34000	TOFL	15360	15650	16000	16360	16730	17170	17530	17800	18140	18690	19540		
	V1	156	156	155	155	155	155	155	155	155	156	157		
	VR	171	171	171	171	171	171	171	171	171	171	171	182	182
	V2	174	174	174	174	174	174	174	174	174	174	174		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.6	5.3		
33000	TOFL	14170	14440	14760	15100	15430	15830	16170	16420	16740	17250	18040		
	V1	151	151	151	151	150	150	150	150	150	151	152		
	VR	167	167	167	167	167	167	167	167	167	167	167	179	179
	V2	171	171	171	171	171	171	171	171	171	171	171		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6	5.7		
32000	TOFL	13050	13290	13590	13900	14210	14580	14890	15120	15420	15890	16630		
	V1	146	146	146	146	146	146	145	145	145	146	147		
	VR	164	164	164	164	164	164	164	164	164	164	164	176	176
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.4	6.1		

FIGURE 10-5-36. TAKE-OFF DISTANCE; FLAPS - 0° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1	85.3	85.6	86.3	87.2	88.2	89.0	89.8	90.8	91.7	92.6	93.0		
31000	TOFL	11990	12210	12490	12770	13050	13390	13680	13890	14170	14600	15280	173	173
	V1	141	141	141	141	141	141	141	140	140	141	142		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	165	165	165	165	165	165	165	165	165	165	165		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	6.8	6.5		
30000	TOFL	11000	11200	11460	11710	11970	12280	12540	12730	13000	13400	14020	170	170
	V1	136	136	136	136	136	136	136	135	135	136	137		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.3	6.9		
29000	TOFL	10080	10260	10490	10730	10960	11240	11480	11660	11900	12270	12840	167	167
	V1	132	131	131	131	131	131	131	130	130	131	133		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	8.1	8.1	8.1	8.1	8.1	8	8	8	8	7.8	7.4		
28000	TOFL	9200	9370	9580	9790	10000	10260	10470	10640	10860	11200	11710	164	164
	V1	127	127	126	126	126	126	126	126	126	126	128		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.5	8.3	7.9		
27000	TOFL	8360	8510	8700	8890	9080	9320	9510	9650	9860	10160	10630	160	160
	V1	122	122	121	121	121	121	121	121	121	121	122		
	VR	146	146	146	146	146	147	147	146	146	146	147		
	V2	153	153	153	153	153	153	153	153	153	153	152		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.1	8.9	8.5		
26000	TOFL	7580	7720	7890	8060	8240	8450	8620	8750	8940	9210	9620	157	157
	V1	117	117	117	116	116	116	116	116	116	116	117		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	150	150	150	150	150	150	150	150	149	149	149		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.7	9.5	9.1		

FIGURE 10-5-36. TAKE-OFF DISTANCE; FLAPS - 0° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 1 of 2)

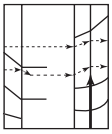
GW (LB)	OAT	0	5	10	15	20	22						Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	72							
	N1	93.0	93.0	92.8	92.2	91.5	91.2							
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL													
	V1													
	VR													
	V2													
	GR2													
34000	TOFL													
	V1													
	VR													
	V2													
	GR2													
33000	TOFL	19120											179	179
	V1	154												
	VR	168												
	V2	171												
	GR2	5.3												
32000	TOFL	17620	18760										176	176
	V1	149	152											
	VR	164	165											
	V2	168	168											
	GR2	5.7	5.3											

FIGURE 10-5-36. TAKE-OFF DISTANCE; FLAPS - 0° ; 14000 FT ECS - OFF; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; WET RUNWAY

(Sheet 2 of 2)

GW (LB)	OAT	0	5	10	15	20	22						Vref (KCAS) Flap 0°	VSE (KCAS) Clean
	OAT	32	41	50	59	68	72							
	N1	93.0	93.0	92.8	92.2	91.5	91.2							
31000	TOFL	16200	17250	18450	19820								173	173
	V1	144	146	149	151									
	VR	161	162	162	163									
	V2	165	165	165	166									
	GR2	6.1	5.7	5.4	5.1									
30000	TOFL	14850	15810	16910	18150	19660							170	170
	V1	139	141	144	146	148								
	VR	158	158	159	159	160								
	V2	162	162	162	163	163								
	GR2	6.5	6.2	5.8	5.5	5.1								
29000	TOFL	13590	14450	15450	16580	17940	18660						167	167
	V1	134	136	138	140	143	144							
	VR	154	155	155	156	157	157							
	V2	159	159	159	159	160	160							
	GR2	7	6.6	6.3	6	5.6	5.3							
28000	TOFL	12410	13190	14070	15100	16320	16960						164	164
	V1	129	131	133	135	138	139							
	VR	151	151	152	153	153	153							
	V2	156	156	156	156	157	157							
	GR2	7.5	7.1	6.8	6.4	6	5.8							
27000	TOFL	11290	12000	12800	13700	14800	15380						160	160
	V1	124	126	128	130	132	134							
	VR	147	148	148	149	150	150							
	V2	152	153	153	153	153	154							
	GR2	8.1	7.7	7.3	6.9	6.5	6.3							
26000	TOFL	10220	10860	11590	12400	13360	13870						157	157
	V1	119	121	123	125	127	128							
	VR	143	144	145	145	146	146							
	V2	149	149	150	150	150	150							
	GR2	8.6	8.2	7.8	7.5	7.1	6.8							

V_1 CORRECTIONS
FLAPS - 0°
WET RUNWAY



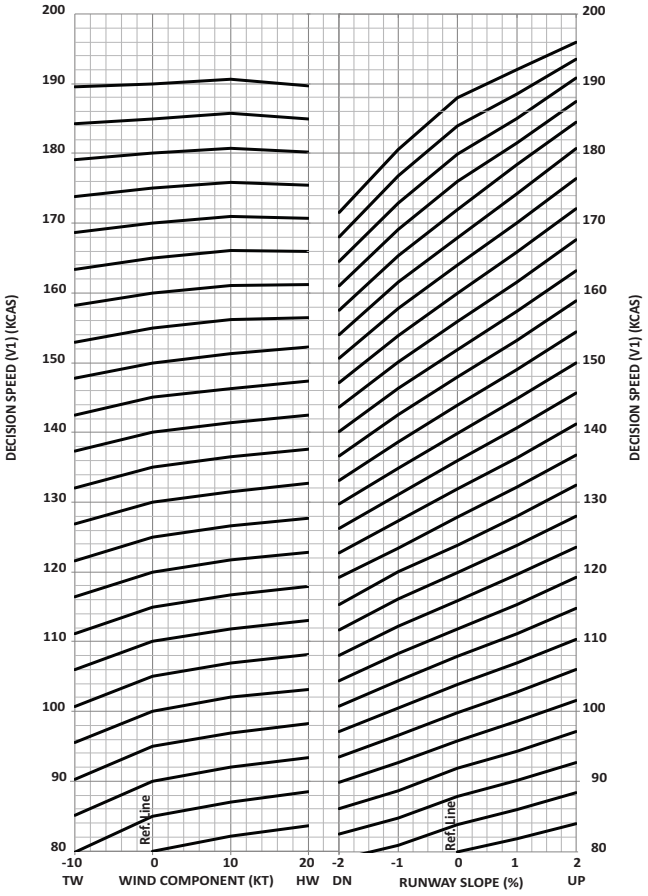


Figure 10-5-37. V_1 Correction;
Flaps - 0°; Wet Runway

TAKEOFF FIELD LENGTH CORRECTIONS
FLAPS - 0°
WET RUNWAY

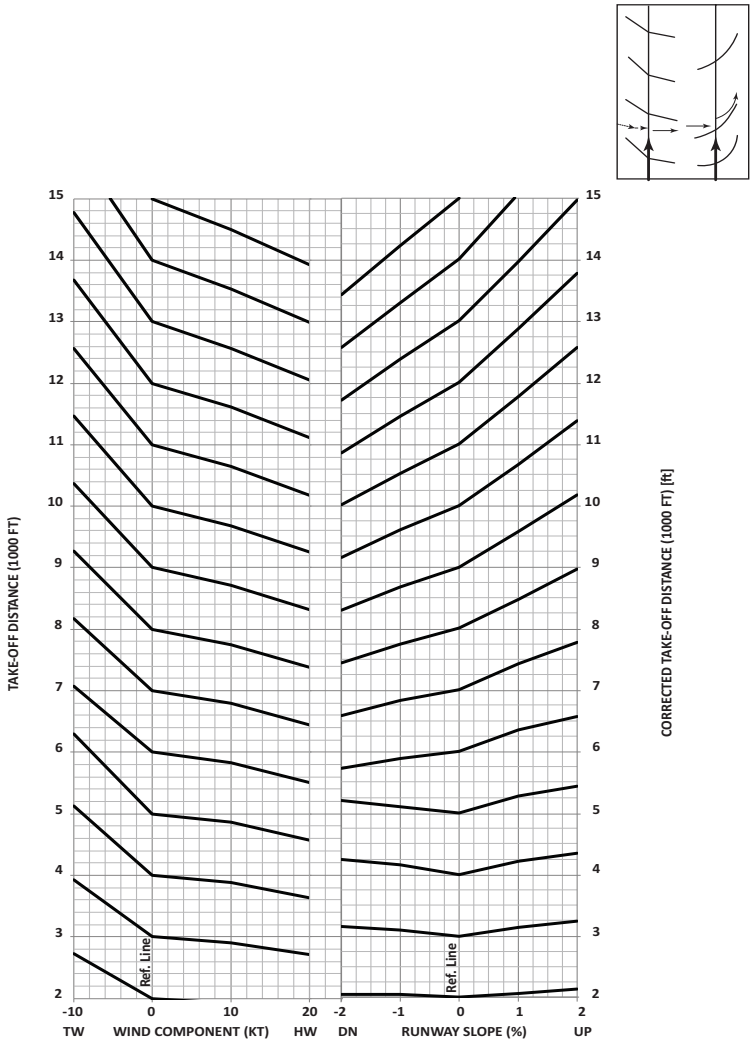


Figure 10-5-38. Takeoff Field Length Corrections; Flaps - 0°; Wet Runway

Supplement 5

SECTION VI
WEIGHT AND BALANCE

No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC

No change.

SECTION VII
UNITS CONVERSION

SECTION VIII
OPERATIONAL PLANNING MANUAL

SECTION IX
APPENDICES

No change.

SECTION XI
OPERATIONAL OPERATION SUPPLEMENTS

No change.

SECTION XII
SUPPLEMENTAL DATA

No change

CAAI APPROVED
29 Oct 2015

CAAI APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 6
for
GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

CATEGORY II OPERATIONS

This Supplement must be attached to CAAI approved Airplane Flight Manual dated 15 Apr 2015 when oconducting category II operations. Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

CAAI APPROVED: T. Bar-Am

Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Date: 15 Apr 2015 Manual No._____

GULFSTREAM AEROSPACE LP

Supplement 6

CATEGORY II OPERATIONS

GENERAL

This supplement is required for category II operation of the aircraft. It comprises the operation section of the category II manual.

Category II is a precision instrument approach and landing with a decision height lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range not less than 350 m (1200 ft).

The aircraft must have all required instruments and equipment installed and operative.

Approval of this supplement is effective only as the listed instruments and items of equipment are inspected and maintained in accordance with an approved maintenance program.

Compliance with this supplement does not constitute authorization to conduct category ii operations. Such authorization must be obtained by the operator from the appropriate authority.

The general information in the introduction section of the AFM is applicable with the addition of the following limitations:

SECTION I
LIMITATIONS

CATEGORY II LIMITATIONS

1. FCS-5000 autopilot and autothrottle system installed in the G280 aircraft complies with the relevant certification requirements of FAR 25, and EASA CS-25, JAR, and recommendations of FAA AC 120-29A, AC 91-16 and CS-AWO AMC-231, that pertain to the certification for coupled approaches to Category II minima.
2. Category II approaches shall be carried out only with:
   a. Both engines operating.
   b. Yaw damper engaged.
   c. Autopilot engaged
   d. Auto-throttles connected or disconnected.
3. CAT II shall be continued below 1000 AGL only when CAT2 green flag is annunciated on the ADI.
4. Landing from CAT II approach is approved with flaps in LND position only.
5. The autopilot is certified for CAAI/FAA and EASA Category II Minimum Use Heights (MUH) for precision approach of 80 ft AGL.
6. Demonstrated wind velocities:
   - Crosswind: 15 kt
   - Headwind: 21 kt
   - Tailwind: 10 kt

   The above winds were demonstrated during category II certification flight test and are not considered limitations.

(Continued)

7. Category II field lengths
   a. When auto brake systems are used for category II, information must be available to the flight crew to assist in making the proper selection of a suitable auto brake setting consistent with the field length available for landing and the runway condition, including braking action.
   b. Category II operations should not normally be conducted with braking action less than “fair” unless the operator has a method to ensure that timely updates of field conditions are provided to the flight crew, and, if applicable, also provided to the dispatcher, and that the flight crew considers that sufficient runway length is available.

SECTION II
EMERGENCY PROCEDURES

No change.

SECTION III
ABNORMAL PROCEDURES

ENGINE FAILURE

After trimming and stabilizing the aircraft, continue approach, to category I landing minima. If engine failure occurs below 600 ft RA (Radar Altitude), perform go-around.

FLIGHT CONTROL SYSTEM OR INSTRUMENTS FAILURE

Go-around should be initiated during category II approach below 600 ft RA, if any of the following is annunciated:

- Yellow CAT2 annunciators flashes,
- Red standby ATT flag on ADI,
- Any EFIS comparator advisory,
- PFD/MFD failure on the flying pilot side or with any of the following red flags appearing on the PFD/MFD: ATT, FD, RA, LOC, GS, or HDG and there is no visual contact with runway or approach lights.

Go-around attitude is 9° to 17.5°

With RA higher than 600 ft, revert to category I landing minima.

AUTOPILOT DISENGAGED DURING APPROACH

Revert to category I landing minima.

CATEGORY II EXCESSIVE DEVIATION

The excessive localizer deviation appears as flashing at a standard flash rate LOC deviation pointer, and the pointer turns amber for the duration of the excessive deviation. The excessive glideslope deviation appears as flashing at a standard flash rate GS deviation pointer, and

the pointer turns amber for the duration of the excessive deviation). Excessive localizer and glideslope cues become active at 600 ft radio altitude; the localizer cue is active to touchdown and the glideslope cue is active to 90 ft radio altitude.

If IAS deviates by more than +10 kt or -5 kt from the set V_{REF}, a yellow flashing arrow appears adjacent to and above or below the IAS pointer (on the left side of the PFD), pointing to the direction of the required correction. The excessive IAS cue is active between 600 ft and 30 ft radio altitude.

SECTION IV
NORMAL PROCEDURES

CATEGORY II APPROACH PREPARATIONS

CAT 2 flag will be displayed when the following conditions are met:

- Left ADI active NAV source is LOC1 and right ADI active NAV Source is LOC2
- both sides LOC Frequencies are identical and valid
- Radio Altimeter is valid and Radio Height is below 1000 ft
- Not in BACK COURSE on the on-side PFD
- Neither FG is in GO-AROUND
- RA MIN is selected ON and RA MIN is below 200 ft

CATEGORY II APPROACH PREPARATION

1. ILS frequency..... SELECT ON BOTH NAV SOURCES
2. Compare attitude, air data and heading systems:
   a. Pitch and roll difference must not exceed 3°
   b. Heading difference must not exceed 6°
   c. Airspeed difference must not exceed 3 kt
   d. Altitude difference should not exceed 40 ft.
3. Course arrow ..... SET INBOUND COURSE
4. Marker switches .....ON
5. Plan localizer intercept prior to reaching outer marker

CATEGORY II APPROACH PROCEDURE

1. Decision Height (DH) .....SELECT (BELOW 200 ft)
2. APPR mode ..... SELECT

Observe LOC arm annunciator (white) on both PFD'S

3. Approach speed ..... V_{REF} + 10 KT
4. Normal landing checklist ..... COMPLETE
5. Intercept localizer and verify ILS capture;
   APPR LOC annunciator is green, GS (arm) is annunciated in white
6. Intercept glideslope and verify capture
   GS annunciators green
7. Airspeed ..... V_{REF} + 5 KT
8. Missed approach heading ..... SET
9. PFDs and MFDs .....NO FLAGS
10. CAT 2 annunciations ..... VERIFY GREEN, ON BOTH PFDS AT 1000 FT RA

NOTE

If amber CAT2 annunciator comes on discontinue Category II approach.
Below 600 ft RA - Go around.
Above 600 ft RA - continue to CAT 1 minima.

11. Autopilot ..... DISENGAGED, at 80 ft minimum

CATEGORY II EQUIPMENT

General

The EFIS system provides category II output, whenever DH of less than 200 ft is selected. To indicate when Category II approach monitoring requirements are not met, the output drives amber CAT2 annunciator near the flight mode annunciation field on the PFDs if one or more of the following conditions are true:

1. AHRS failure
2. ADC failure
3. RADALT failure
4. ILS failure
5. Flight director failure
6. DCP failure
7. AHRS reversion selected
8. ADC reversion selected
9. Roll comparator
10. Pitch comparator caution annunciation
11. HDG comparator caution annunciation
12. LOC comparator caution annunciation
13. G/S comparator caution annunciation
14. RA comparator caution annunciation
15. Back course condition exists
16. A/P not engaged
17. Onside APPR NAV source (LOC) not selected
18. NAV source not tuned the same
19. Selected course not the same
20. LOC not received
21. G/S not received
22. RADALT not received
23. G/S not captured

Supplement 6

CATEGORY II CHECKLIST DISPLAY

General

The PFDs can perform an automatic category II checklist. A CAT2 annunciator provides a “single glance” indication of whether the CAT2 Checklist is complete. The CAT2 Checklist provides a single line, prioritized, display of exception messages that indicate exceptions to the CAT 2 Checklist. The exceptions must be cleared in order to receive a green CAT2 annunciation.

Functional Description

Category II checklist are enabled when:
1. Approach Mode is armed or captured and
2. RA MIN is selected ON and RA MIN is below 200 ft and
3. Expanded localizer is enabled and
4. Radio altitude is higher than RA MIN and
5. The aircraft is weight off wheels and.
6. The cross-side PFD also declares all of the above are true.

The Category II (CAT2) annunciation shall be displayed near the Flight Mode Annunciation field when the CAT2 Checklist is enabled.

CAT2 **Annunciation:**

CAT2 is annunciated in green if the CAT2 checklist is enabled and no checklist exceptions exist and therefore no exception messages are being displayed on either PFD.
CAT2 is annunciated in amber above 200 ft AGL if the CAT2 checklist is enabled, checklist exceptions exist and corresponding exception messages are being displayed on either PFD, unless a red CAT2 annunciation exists on the other PFD.
CAT2 is annunciated in red below 200 ft AGL if the CAT2 checklist is enabled, checklist exceptions exist and corresponding exception messages are being displayed on either PFD

CAT2 Exception Messages:

CAT2 checklist exception messages are listed in the checklist exception messages table below.
CAT2 checklist exceptions are displayed as mutually exclusive exception messages presented in the priority listed.
CAT2 checklist exception messages are displayed in amber, in a message field below the altitude display on the ADI portion of the PFD. An exception is required to be cleared to go further down the checklist.

CATEGORY II CHECKLIST EXCEPTION MESSAGES

(Sheet 1 of 3)

Item	PFD Text
Either PFD's selected source for PITCH ANGLE, or ROLL ANGLE or AIRCRAFT HEADING: NCD, FAIL or missing	AHS FAILURE
On-side FD PITCH, FD ROLL, FGC MODE and/or Status Data: NCD, FAIL or missing	FD FAILURE
Either PFD's selected source for ALTITUDE or AIR SPEED: NCD, FAIL or missing	ADS FAILURE
ATTITUDE/HEADING REVERSION is common source	AHS REVERSION
AIR DATA REVERSION is common source	ADC REVERSION

CATEGORY II CHECKLIST EXCEPTION MESSAGES

(Sheet 2 of 3)

Left display NAV SOURCE not LOC1 or right display NAV SOURCE not LOC2	SEL APPR NAV
If LOC1/2 are the active NAV Sources: Either PFDs source for LOC DEVIATION: FAIL or missing OR Either PFDs source for GS DEVIATION: FAIL or missing	ILS FAILURE
NAV SOURCE LOC and both sides VOR/ILS FREQUENCY words not NORM or TEST or not identical	CHECK LOC TUNE
Left SELECTED COURSE not equal to RIGHT SELECTED COURSE	CHECK COURSE
Either PFD has BACK COURSE as the Active NAV Source	BACK COURSE
ATTITUDE Comparator Yellow Flag displayed	ATT COMPARATOR
ROLL Comparator Yellow Flag displayed	ROLL COMPARATOR
PITCH Comparator Yellow Flag displayed	PIT COMPARATOR
HEADING Comparator Yellow Flag displayed	HDG COMPARATOR
LOC DEV Comparator Yellow Flag displayed	LOC COMPARATOR
GS DEV Comparator Yellow Flag displayed	GS COMPARATOR
RA Comparator Yellow Flag displayed	RA COMPARATOR (Note: Not Applicable if single RAD ALT installed)
NAV SOURCE LOC and Left or Right LOC DEVIATION: NCD OR NAV SOURCE	LOC NOT VALID
NAV SOURCE LOC and Left or Right GS DEVIATION: NCD	GS NOT VALID
Flight Guidance steering commands are invalid	FD INVALID

CATEGORY II CHECKLIST EXCEPTION MESSAGES

(Sheet 3 of 3)

Flight Guidance is declaring that Glideslope is not captured	GS NOT CAPTURED
FLIGHT DIRECTOR Comparator Yellow Flag displayed	FD COMPARATOR
Single source flight director caution flag is displayed	FD NOT INDEP

Supplement 6

SECTION V
PERFORMANCE WET AND DRY

No change.

SECTION VI
WEIGHT AND BALANCE

No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC

No change.

SECTION VII
UNITS CONVERSION

No change.

SECTION VIII
OPERATIONAL PLANNING MANUAL

No change.

SECTION IX
APPENDICES

No change.

SECTION XI
OPERATIONAL OPERATION SUPPLEMENTS

No change.

SECTION XII
SUPPLEMENTAL DATA

No change.

EASA APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 7
for
GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

EUROPEAN AVIATION SAFETY AGENCY
FLIGHT MANUAL SUPPLEMENT

This Airplane Flight Manual Supplement is approved by the Civil Aviation Authority, Israel (CAAI) on behalf of European Aviation Safety Agency (EASA) using the working arrangement between the Civil Aviation Authority, Israel and the European Aviation Safety Agency. This Airplane Flight Manual Supplement was prepared in accordance with European requirements.

This Supplement must be attached to the approved basic Gulfstream G280 Airplane Flight Manual Issue 1, dated April 15, 2015 for Gulfstream series G280 airplanes serial number (S/N) 2001 and subsequent, having European Aviation Safety Agency (EASA) certification.

The information contained herein supplements or supersedes the information of the basic Airplane Flight Manual. For Limitations, Normal Procedures, Abnormal Procedures, Emergency Procedures and Performance information not contained in this supplement, consult the basic Airplane Flight Manual.

CAAI APPROVED: _____
16-12-2020
Mr. Tamir Bar-Am,
Manager
Engineering Branch
Civil Aviation Authority, Israel

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EUROPEAN AVIATION SAFETY AGENCY FLIGHT MANUAL SUPPLEMENT

INTRODUCTION

GENERAL

Add the following:

Data provided in this supplement shall be attached to the GULFSTREAM G280 Airplane Flight Manual (AFM) Issue 1, for European Aviation Safety Agency (EASA) operations, and used in lieu of similar Civil Aviation Authority of Israel (CAAI) approved data presented in the basic Gulfstream G280 AFM latest released revision.

Operation in compliance with the Limitations presented in Section 1 of this Airplane Flight Manual is required by the European Aviation Safety Agency.

Use of Metric Values for Fuel-Related Displays (Option)

A. Fuel Quantity:
Fuel quantity displays have been modified to show fuel quantity in metric units. Kilograms (kg) are displayed instead of pounds (lb).

B. Fuel Flow:
Fuel flow displays have been modified to show fuel flow in metric units. Kilograms per hour (KGPH) are displayed instead of pounds per hour (PPH).

Flight Management System (FMS) (Option)

A. Multifunction Control Display Unit (MCDU) Data:
The FMS MCDU has been modified to display metric data consistent with the metric data used and displayed by other aircraft systems.

Supplement 7

SECTION I
LIMITATIONS

01-00-00: GENERAL

01-00-10: Conditions of Operations

Amend second paragraph to read:

THE PERFORMANCE LIMITATIONS AND INFORMATION PRESENTED IN THE AIRPLANE FLIGHT MANUAL SHOW COMPLIANCE WITH EUROPEAN AVIATION SAFETY AGENCY (EASA) REQUIREMENTS.

Add the following:

01-00-20: G280 Noise Standards (EASA)

The following noise levels comply with part 36, appendix B, Stage 5 maximum noise level requirements and were obtained by analysis of approved data from noise tests conducted under the provisions of part 36, Amendment 31. The noise measurement and evaluation procedures used to obtain these noise levels are considered by the FAA to be equivalent to the Chapter 14 noise levels required by the International Civil Aviation Organization (ICAO) in Annex 16, Volume 1, Aircraft Noise, Seventh Edition, July 2014, Amendment 11-B, applicable January 1, 2015.

The noise measurement and evaluation procedures used to obtain these noise levels are considered by the European Aviation Safety Agency (EASA) to be compliant with the Chapter 14 noise levels required by the International Civil Aviation Organization (ICAO) in Annex 16, Volume I, Eighth Edition.

The Effective Perceived Noise Levels (EPNL) for the Gulfstream G280 airplane equipped with Honeywell HTF7250G engines, at a maximum takeoff gross weight of 39,600 lbs and a maximum landing gross weight of 32,700 lbs are:

	Actual Noise Levels (EPNdB)
Lateral (Flaps 20°)	89.5
Flyover Lateral (Flaps 20°)	75.2
Approach Lateral (Flaps 39°)	90.5

No determination has been made by the European Aviation Safety Agency that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

Supplement 7

01-03-00: PERFORMANCE

01-03-10: Types of Airplane Operations Permitted

Insert the following NOTE before item 1:

NOTE

Airworthiness approval for P-RNAV, MNPS, and RVSM does not authorize flight into airspace for which operational approval is required by ICAO Regional Navigational Agreement.

Revise item 14 to read:

14. RNAV Approach to Localizer Performance with Vertical Guidance (LPV) Minima

    With the limitations and exceptions defined in Section 01-34-60: Flight Management System (FMS).

GPS/SBAS Navigation System — SBAS Augmented GPS System Limitations:

The Gulfstream G280 has been evaluated and approved in accordance with, AMC 20-27, and AMC 20-28 with the following limitations:

- EGPWS must be operational when conducting LPV approaches

Add item 16 as follows:

16. VNAV system is approved for approach operations

    The VNAV system has been demonstrated capable of and has been shown to meet the accuracy requirements of: VFR/IFR en route, terminal, and approach BARO VNAV operation in accordance with the criteria of AC 20-129 and AMC 20-27.

NOTE

VNAV operations using QFE altimeter settings are prohibited.

01-03-10: Air Speed Limitations

Add the following statement under "LANDING GEAR OPERATION SPEEDS (V_{LO})":

V_{LO} is the maximum speed at which it is safe to extend or retract the landing gear.

Add the following statement under "LANDING GEAR EXTENDED SPEED (V_{LE})":

V_{LE} is the maximum speed at which the aeroplane can be safely flown with landing gear extended and locked.

01-21-20: INTERNAL BAGGAGE DOOR

Pre MOD G25-10066

Internal baggage door must be closed during taxi, takeoff and landing. In flight, access to the baggage compartment above 40,000 ft is prohibited except by flight crew members for emergency purposes only.

Post MOD G25-10066

Internal baggage door must be closed during taxi, takeoff and landing. In flight, access to the baggage compartment is permitted during cruise.

01-27-00: FLIGHT CONTROL SYSTEM (FCS)

Add the following:

01-27-30: Automatic Ground Spoilers

On dry runways takeoff is permitted with Automatic Ground Spoilers inoperative provided 10º or 20º flaps are used. Takeoff with Automatic Ground Spoilers inoperative is not permitted on contaminated runways under any circumstances.

01-27-50: Use of Flaps While Enroute

The use of flaps while “enroute” is prohibited. Per ACJ 25.345 (c), “Enroute includes holding in designated areas outside the terminal area of the airport and flight with flaps extended from top of descent.”

01-31-00: INDICATION AND RECORDING SYSTEMS

Add the following limitation:

01-31-40: Vertical Situation Display (VSD)

The use of the Vertical Situation Display during QFE operations is prohibited. The VSD has been demonstrated for terrain awareness only. The VSD shall not be used for navigation.

Add the following section and limitation:

01-32-00: LANDING GEAR

01-32-41: Main Tires

The use of the retreaded tires is prohibited.

1-34-60: FLIGHT MANAGEMENT SYSTEM (FMS)

Add new limitation
SBAS – LNAV/VNAV approaches

Use of SBAS to fly LNAV/VNAV approaches is prohibited.

Add following paragraph:
Instrument Approaches using FMS:

- The following instrument approach procedures may be flown using the FMS:
  - RNAV (GPS) using FAA approved approaches or RNAV (GNSS) using approaches approved outside FAA authority/influence.
  - GPS
  - VOR/DME RNAV
  - VOR/DME
  - VOR
  - TACAN
  - NDB

NOTE

If the approach is a non-GPS based RNAV approach, the procedure-based NAVAID must be monitored by one of the pilots during the approach.

Supplement 7

SECTION II
EMERGENCY PROCEDURES
No change.

SECTION III
ABNORMAL PROCEDURES

In the “CAUTION MESSAGES (AMBER)” table of Section IIIA make the following change:
In the “Corrective Action” column for the “WING TEMP LOW, L-R WING TEMP LOW, L WING TEMP LOW, R” message replace the “On ground” instructions with the following:

On ground:
1. Engine thrust.....INCREASE
2. Wing temperature..... MONITOR

If failure persists:
3. Do not dispatch

2. Replace existing message “Internal Baggage Door” with following:

Message	Triggered by	Corrective Action
Internal Baggage Door	Internal baggage door is open above 39,500 ft or below 9,500 ft, or, Aircraft on ground and one engine is running and parking brake is off	**PRE MOD G25-10066:** Verify baggage compartment unoccupied and close the door **POST MOD G25-10066:** 1. If the aircraft is below 9,500 feet verify baggage compartment unoccupied and close the door 2. If aircraft is above 40,000 minimize access to baggage compartment. Close the door when access completed. One flight crew to don oxygen mask

SECTION IV
NORMAL PROCEDURES

Before Takeoff

Add step 10 and NOTE to read:
10. Cockpit / Cabin Electrical Outlets..... NOT POWERED / NOT IN USE

Climb Transition

Add step 8 and NOTE to read:
8.Cockpit / Cabin Electrical Outlets .....AUTHORIZED FOR USE

Before Landing

Add step 7 and NOTE to read:
7. Cockpit / Cabin Electrical Outlets.....NOT POWERED / NOT IN USE

Supplement 7

BARO VNAV Operations

RNAV (GPS/GNSS) APPROACH PROCEDURE TO LNAV/VNAV MINIMUMS

1. Published approach .....REVIEW
2. Approach.....SELECT FROM DATA BASE AND EXECUTE
3. FMS - ARRIVAL DATA..... REVIEW APPR MODE, RNP AND GP
4. GP (Glide Path) Mode.....SELECT BARO
5. BARO minima .....SET
6. FMS.....VERIFY IN SYNC MODE
7. NAV Source.....EACH SIDE HAS ON SIDE FMS SELECTED
8. Verify that RNP values switch from 2 NM to 1 NM approximately 30 nm from airport.
9. When cleared for the approach, arm the APPR and VNAV mode on the FCP and set the altitude preselector to the appropriate altitude.
10. When within 2 nm of the FAF (Final Approach Fix), RNP APPR will be displayed on the PFD. This is confirmation the approach can be continued to the established minimums.
    If RNP APPR does not display, the approach shall be abandoned.
11. Verify RWY is annunciated when within 500 ft (approx 2 dots) of the glide path.
12. Verify VGP is annunciated in green in the FMA on each PFD after glide path capture.

<<END>>

SECTION V
PERFORMANCE WET AND DRY

DEFINITIONS

Distances

Replace the existing definition of "Dry Runway" with the following:

Dry Runway - Runways which are not "Wet" or "Contaminated" according to the definitions contained in EU-OPS 1.

FINAL APPROACH AND LANDING PERFORMANCE

Operating Rules for Commercial Operators

Replace the entire section with the following:

The following operating rule applies to all commercial operators required to observe the regulations of EUIR-OPS.CAT and IR-OPS.NCC

1. Intended Destination and Alternate, Dry: No airplane shall takeoff at weight in excess of that which, in accordance with landing distances shown in the Operations Manual for the airport elevation and for wind conditions anticipated there at the time of landing, would allow full stop landing within 60% of the effective length of the runway from a point 50 feet directly above the intersection of obstruction clearance plane and the runway.

2. Intended Destination and Alternate, Wet: No airplane shall takeoff when appropriate weather reports and forecasts, or a combination thereof, indicate that runways may be wet or slippery at the estimated time of arrival unless the landing distance available for the wet or slippery runway at the intended and alternate destinations is at least 115% of the respective dry runway length at each destination as determined per the guidance in paragraph 1 above.
   Note that wet runway distances are valid only for 0.125 in (3 mm) or less of standing water.

LANDING FIELD LENGTH OPERATIONAL FACTOR

CORRECTIONS

Figure 5-284 - Landing Field Length Operational Factor Corrections

In the annotations on the graph, in two locations replace the reference to “PART 121 AND 135” with “IR-OPS.CAT.POL.A.” for the DRY RUNWAY dotted line and with “IR-OPS.CAT.POL.A.235” for the WET RUNWAY dotted line.

TAKE OFF FIELD LENGTH CORRECTIONS WITH AUTOMATIC GROUND SPOILER SYSTEM INOPERATIVE

With CAS message GND Spoiler Auto Fail On apply the following corrections to calculated take off distances.
Correction Factors apply for take off. Apply whichever is greater:

Runway Cond.	MAN Spoiler Factor
DRY	+7%
WET	600 FT or 14%
COMPACT SNOW	700 FT or 12%
ICE	1000 FT or 15%
Standing water SLUSH or WET SNOW	500 FT or 7%
DRY SNOW	500 FT or 8%
Add the Greater Correction of X ft or Y %	

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CAAI APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 8
for
GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

CONTAMINATED RUNWAY OPERATIONS

This Supplement must be attached to CAAI approved Airplane Flight Manual dated 15 Apr 2015 whenever conducting take-off or landing operation on a contaminated runway.
Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

CAAI APPROVED: T. Bar-Am

For/Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Date: 15 Apr 2015 Manual No._____

GULFSTREAM AEROSPACE LP.

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CROSSWIND LIMITATIONS FOR OPERATIONS ON CONTAMINATED RUNWAYS X-8-50

10-8-1 Runway Surface Contaminated (RSC) & CRFI Equivalent X-8-51

10-8-2 Canadian Runway Friction Index (CRFI) Crosswind Limits X-8-52

UNITS CONVERSION X-8-53

TAKE-OFF DISTANCE - FLAPS 20° X-8-54

10-8-3 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-55

10-8-4 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-57

10-8-5 TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-59

10-8-6 TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-61

10-8-7 TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-63

10-8-8 TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-65

10-8-9 TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-67

10-8-10 TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-69

10-8-11 TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-71

10-8-12 TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-73

10-8-13 TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-75

10-8-14 TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-77

10-8-15 TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-79

10-8-16 TAKE-OFF DATA; FLAPS - 20°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-81

10-8-17 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-83

10-8-18 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-85

10-8-19 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-87

10-8-20 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-89

10-8-21 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-91

10-8-22 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-93

10-8-23 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-95

10-8-24 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-97

10-8-25 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-99

10-8-26 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-101

10-8-27 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-103

10-8-28 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-105

10-8-29 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-107

10-8-30 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-109

10-8-31 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-111

10-8-32 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-113

10-8-33 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-115

10-8-34 TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-117

10-8-35 TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-119

10-8-36 TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-121

10-8-37 TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-123

10-8-38 TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-125

10-8-39 TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-127

10-8-40 TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-129

10-8-41 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-131

10-8-42 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-133

10-8-43 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-135

10-8-44 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-137

10-8-45 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-139

10-8-46 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-141

10-8-47 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-143

10-8-48 V1 CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY STANDING WATER, SLUSH
AND WET SNOW..... X-8-145

10-8-49 TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 20° RUNWAY CONTAMINATED BY STANDING WATER, SLUSH AND WET SNOW.....X-8-146

10-8-50 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-147

10-8-51 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-149

10-8-52 TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-151

10-8-53 TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-153

10-8-54 TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-155

10-8-55 TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-157

10-8-56 TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-159

10-8-57 TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-161

10-8-58 TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-163

10-8-59 TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-165

10-8-60 TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-167

10-8-61 TAKE-OFF DATA; FLAPS - 20°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-169

10-8-62 TAKE-OFF DATA; FLAPS - 20°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-171

10-8-63 TAKE-OFF DATA; FLAPS - 20°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-173

10-8-64 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-175

10-8-65 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-177

10-8-66 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-179

10-8-67 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-181

10-8-68 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-183

10-8-69 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-185

10-8-70 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-187

10-8-71 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-189

10-8-72 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-191

10-8-73 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-193

10-8-74 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-195

10-8-75 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-197

10-8-76 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-199

10-8-77 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-201

10-8-78 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-203

10-8-79 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-205

10-8-80 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-207

10-8-81 TAKE-OFF DATA; FLAPS - 20°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-209

10-8-82 TAKE-OFF DATA; FLAPS - 20°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-211

10-8-83 TAKE-OFF DATA; FLAPS - 20°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-213

10-8-84 TAKE-OFF DATA; FLAPS - 20°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-215

10-8-85 TAKE-OFF DATA; FLAPS - 20°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-217

10-8-86 TAKE-OFF DATA; FLAPS - 20°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-219

10-8-87 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-221

10-8-88 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-223

10-8-89 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-225

10-8-90 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-227

10-8-91 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-229

10-8-92 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-231

10-8-93 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-233

10-8-94 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-235

10-8-95 V1 CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-237

10-8-96 TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-238

10-8-97 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-239

10-8-98 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-241

10-8-99 TAKE-OFF DATA; FLAPS - 20°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-243

10-8-100 TAKE-OFF DATA; FLAPS - 20°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-245

10-8-101 TAKE-OFF DATA; FLAPS - 20°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-247

10-8-102 TAKE-OFF DATA; FLAPS - 20°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-249

10-8-103 TAKE-OFF DATA; FLAPS - 20°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-251

10-8-104 TAKE-OFF DATA; FLAPS - 20°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-253

10-8-105 TAKE-OFF DATA; FLAPS - 20°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-255

10-8-106 TAKE-OFF DATA; FLAPS - 20°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-257

10-8-107 TAKE-OFF DATA; FLAPS - 20°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-259

10-8-108 TAKE-OFF DATA; FLAPS - 20°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-261

10-8-109 TAKE-OFF DATA; FLAPS - 20°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-263

10-8-110 TAKE-OFF DATA; FLAPS - 20°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-265

10-8-111 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-267

10-8-112 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-269

10-8-113 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-271

10-8-114 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-273

10-8-115 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-275

10-8-116 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-277

10-8-117 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-279

10-8-118 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-281

10-8-119 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-283

10-8-120 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-285

10-8-121 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-287

10-8-122 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-289

10-8-123 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-291

10-8-124 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-293

10-8-125 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-295

10-8-126 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-297

10-8-127 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-299

10-8-128 TAKE-OFF DATA; FLAPS - 20°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF RUNWAY
CONTAMINATED BY COMPACTED SNOW X-8-301

10-8-129 TAKE-OFF DATA; FLAPS - 20°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-303

10-8-130 TAKE-OFF DATA; FLAPS - 20°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-305

10-8-131 TAKE-OFF DATA; FLAPS - 20°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-307

10-8-132 TAKE-OFF DATA; FLAPS - 20°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-309

10-8-133 TAKE-OFF DATA; FLAPS - 20°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-311

10-8-134 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-313

10-8-135 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-315

10-8-136 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-317

10-8-137 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-319

10-8-138 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-321

10-8-139 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-323

10-8-140 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-325

10-8-141 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-327

10-8-142 V1 CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-329

10-8-143 TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-330

10-8-144 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-331

10-8-145 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE..... X-8-333

10-8-146 TAKE-OFF DATA; FLAPS - 20°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-335

10-8-147 TAKE-OFF DATA; FLAPS - 20°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE..... X-8-337

10-8-148 TAKE-OFF DATA; FLAPS - 20°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-339

10-8-149 TAKE-OFF DATA; FLAPS - 20°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE..... X-8-341

10-8-150 TAKE-OFF DATA; FLAPS - 20°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-343

10-8-151 TAKE-OFF DATA; FLAPS - 20°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE.....X-8-345

10-8-152 TAKE-OFF DATA; FLAPS - 20°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-347

10-8-153 TAKE-OFF DATA; FLAPS - 20°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE.....X-8-349

10-8-154 TAKE-OFF DATA; FLAPS - 20°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-351

10-8-155 TAKE-OFF DATA; FLAPS - 20°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE.....X-8-353

10-8-156 TAKE-OFF DATA; FLAPS - 20°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-355

10-8-157 TAKE-OFF DATA; FLAPS - 20°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE.....X-8-357

10-8-158 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-359

10-8-159 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE.....X-8-361

10-8-160 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-363

10-8-161 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE.....X-8-365

10-8-162 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-367

10-8-163 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE..... X-8-369

10-8-164 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-371

10-8-165 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE..... X-8-373

10-8-166 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-375

10-8-167 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE..... X-8-377

10-8-168 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-379

10-8-169 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE..... X-8-381

10-8-170 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-383

10-8-171 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE..... X-8-385

10-8-172 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-387

10-8-173 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART B; RUNWAY CONTAMINATED BY ICE..... X-8-389

10-8-174 TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-391

10-8-175 TAKE-OFF DATA; FLAPS - 20°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-393

10-8-176 TAKE-OFF DATA; FLAPS - 20°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-395

10-8-177 TAKE-OFF DATA; FLAPS - 20°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-397

10-8-178 TAKE-OFF DATA; FLAPS - 20°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-399

10-8-179 TAKE-OFF DATA; FLAPS - 20°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-401

10-8-180 TAKE-OFF DATA; FLAPS - 20°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-403

10-8-181 TAKE-OFF DATA; FLAPS - 20°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-405

10-8-182 TAKE-OFF DATA; FLAPS - 20°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-407

10-8-183 TAKE-OFF DATA; FLAPS - 20°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-409

10-8-184 TAKE-OFF DATA; FLAPS - 20°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-411

10-8-185 TAKE-OFF DATA; FLAPS - 20°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR
OFF RUNWAY CONTAMINATED BY ICE X-8-413

10-8-186 TAKE-OFF DATA; FLAPS - 20°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-415

10-8-187 TAKE-OFF DATA; FLAPS - 20°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-417

10-8-188 TAKE-OFF DATA; FLAPS - 20°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-419

10-8-189 V1 CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY ICE X-8-421

10-8-190 TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY ICE X-8-422

TAKE-OFF DISTANCE - FLAPS 10° X-8-423

10-8-191 TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-424

10-8-193 TAKE-OFF DATA; FLAPS - 10°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-428

10-8-195 TAKE-OFF DATA; FLAPS - 10°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-432

10-8-197 TAKE-OFF DATA; FLAPS - 10°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-436

10-8-199 TAKE-OFF DATA; FLAPS - 10°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR
STANDING WATER OR WET SNOW X-8-440

10-8-201 TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-444

10-8-203 TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-448

10-8-205 TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-452

10-8-207 TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-456

10-8-209 TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-460

10-8-212 TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-468

10-8-214 TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-472

10-8-216 TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-476

10-8-218 TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW X-8-480

10-8-220 TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-484

10-8-221 TAKE-OFF DATA; FLAPS - 10°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-486

10-8-222 TAKE-OFF DATA; FLAPS - 10°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-488

10-8-223 TAKE-OFF DATA; FLAPS - 10°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-490

10-8-224 TAKE-OFF DATA; FLAPS - 10°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-492

10-8-225 TAKE-OFF DATA; FLAPS - 10°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-494

10-8-226 TAKE-OFF DATA; FLAPS - 10°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-496

10-8-227 TAKE-OFF DATA; FLAPS - 10°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW X-8-498

10-8-228 TAKE-OFF DATA; FLAPS - 10°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW X-8-500

10-8-229 TAKE-OFF DATA; FLAPS - 10°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW X-8-502

10-8-230 TAKE-OFF DATA; FLAPS - 10°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW X-8-504

10-8-231 TAKE-OFF DATA; FLAPS - 10°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW X-8-506

10-8-232 TAKE-OFF DATA; FLAPS - 10°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW X-8-508

10-8-233 TAKE-OFF DATA; FLAPS - 10°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW X-8-510

10-8-234 TAKE-OFF DATA; FLAPS - 10°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY SLUSH
OR STANDING WATER OR WET SNOW..... X-8-512

10-8-235 V1 CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY STANDING WATER,
SLUSH AND WET SNOW X-8-514

10-8-236 TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY STANDING WATER,
SLUSH AND WET SNOW X-8-515

10-8-237 TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A;
RUNWAY CONTAMINATED BY DRY SNOW X-8-516

10-8-239 TAKE-OFF DATA; FLAPS - 10°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A;
RUNWAY CONTAMINATED BY DRY SNOW X-8-520

10-8-241 TAKE-OFF DATA; FLAPS - 10°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A;
RUNWAY CONTAMINATED BY DRY SNOW X-8-524

10-8-243 TAKE-OFF DATA; FLAPS - 10°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A;
RUNWAY CONTAMINATED BY DRY SNOW X-8-528

10-8-245 TAKE-OFF DATA; FLAPS - 10°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-532

10-8-247 TAKE-OFF DATA; FLAPS - 10°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-536

10-8-249 TAKE-OFF DATA; FLAPS - 10°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-540

10-8-251 TAKE-OFF DATA; FLAPS - 10°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-544

10-8-253 TAKE-OFF DATA; FLAPS - 10°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-548

10-8-255 TAKE-OFF DATA; FLAPS - 10°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-552

10-8-257 TAKE-OFF DATA; FLAPS - 10°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-556

10-8-259 TAKE-OFF DATA; FLAPS - 10°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-560

10-8-261 TAKE-OFF DATA; FLAPS - 10°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-564

10-8-263 TAKE-OFF DATA; FLAPS - 10°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-568

10-8-265 TAKE-OFF DATA; FLAPS - 10°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY DRY SNOW X-8-572

10-8-267 TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-576

10-8-268 TAKE-OFF DATA; FLAPS - 10°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-578

10-8-269 TAKE-OFF DATA; FLAPS - 10°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-580

10-8-270 TAKE-OFF DATA; FLAPS - 10°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-582

10-8-271 TAKE-OFF DATA; FLAPS - 10°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-584

10-8-272 TAKE-OFF DATA; FLAPS - 10°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-586

10-8-273 TAKE-OFF DATA; FLAPS - 10°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-588

10-8-274 TAKE-OFF DATA; FLAPS - 10°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-590

10-8-275 TAKE-OFF DATA; FLAPS - 10°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-592

10-8-276 TAKE-OFF DATA; FLAPS - 10°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-594

10-8-277 TAKE-OFF DATA; FLAPS - 10°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-596

10-8-278 TAKE-OFF DATA; FLAPS - 10°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-598

10-8-279 TAKE-OFF DATA; FLAPS - 10°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW X-8-600

10-8-280 TAKE-OFF DATA; FLAPS - 10°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-602

10-8-281 TAKE-OFF DATA; FLAPS - 10°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-604

10-8-282 V1 CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-606

10-8-283 TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY DRY SNOW.....X-8-607

10-8-284 TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-608

10-8-286 TAKE-OFF DATA; FLAPS - 10°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-612

10-8-288 TAKE-OFF DATA; FLAPS - 10°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-616

10-8-290 TAKE-OFF DATA; FLAPS - 10°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-620

10-8-292 TAKE-OFF DATA; FLAPS - 10°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-624

10-8-294 TAKE-OFF DATA; FLAPS - 10°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW.....X-8-628

10-8-296 TAKE-OFF DATA; FLAPS - 10°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-632

10-8-298 TAKE-OFF DATA; FLAPS - 10°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-636

10-8-300 TAKE-OFF DATA; FLAPS - 10°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-640

10-8-302 TAKE-OFF DATA; FLAPS - 10°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-644

10-8-304 TAKE-OFF DATA; FLAPS - 10°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-648

10-8-306 TAKE-OFF DATA; FLAPS - 10°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-652

10-8-308 TAKE-OFF DATA; FLAPS - 10°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-656

10-8-310 TAKE-OFF DATA; FLAPS - 10°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-660

10-8-312 TAKE-OFF DATA; FLAPS - 10°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED
BY COMPACTED SNOW X-8-664

10-8-314 TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-668

10-8-315 TAKE-OFF DATA; FLAPS - 10°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-670

10-8-316 TAKE-OFF DATA; FLAPS - 10°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-672

10-8-317 TAKE-OFF DATA; FLAPS - 10°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-674

10-8-318 TAKE-OFF DATA; FLAPS - 10°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-676

10-8-319 TAKE-OFF DATA; FLAPS - 10°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-678

10-8-320 TAKE-OFF DATA; FLAPS - 10°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-680

10-8-321 TAKE-OFF DATA; FLAPS - 10°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-682

10-8-322 TAKE-OFF DATA; FLAPS - 10°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-684

10-8-323 TAKE-OFF DATA; FLAPS - 10°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-686

10-8-324 TAKE-OFF DATA; FLAPS - 10°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-688

10-8-325 TAKE-OFF DATA; FLAPS - 10°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-690

10-8-326 TAKE-OFF DATA; FLAPS - 10°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-692

10-8-327 TAKE-OFF DATA; FLAPS - 10°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-694

10-8-328 TAKE-OFF DATA; FLAPS - 10°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-696

10-8-329 V1 CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-698

10-8-330 TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY COMPACTED SNOW X-8-699

10-8-331 TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-700

10-8-333 TAKE-OFF DATA; FLAPS - 10°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-704

10-8-335 TAKE-OFF DATA; FLAPS - 10°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE..... X-8-708

10-8-337 TAKE-OFF DATA; FLAPS - 10°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-712

10-8-339 TAKE-OFF DATA; FLAPS - 10°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-716

10-8-341 TAKE-OFF DATA; FLAPS - 10°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-720

10-8-343 TAKE-OFF DATA; FLAPS - 10°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-724

10-8-345 TAKE-OFF DATA; FLAPS - 10°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-728

10-8-347 TAKE-OFF DATA; FLAPS - 10°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-732

10-8-349 TAKE-OFF DATA; FLAPS - 10°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-736

10-8-351 TAKE-OFF DATA; FLAPS - 10°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-740

10-8-353 TAKE-OFF DATA; FLAPS - 10°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-744

10-8-355 TAKE-OFF DATA; FLAPS - 10°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-748

10-8-357 TAKE-OFF DATA; FLAPS - 10°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-752

10-8-359 TAKE-OFF DATA; FLAPS - 10°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY ICE.....X-8-756

10-8-361 TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-760

10-8-362 TAKE-OFF DATA; FLAPS - 10°; 1000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-762

10-8-363 TAKE-OFF DATA; FLAPS - 10°; 2000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-764

10-8-364 TAKE-OFF DATA; FLAPS - 10°; 3000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-766

10-8-365 TAKE-OFF DATA; FLAPS - 10°; 4000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-768

10-8-366 TAKE-OFF DATA; FLAPS - 10°; 5000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-770

10-8-367 TAKE-OFF DATA; FLAPS - 10°; 6000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-772

10-8-368 TAKE-OFF DATA; FLAPS - 10°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-774

10-8-369 TAKE-OFF DATA; FLAPS - 10°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE X-8-776

10-8-370 TAKE-OFF DATA; FLAPS - 10°; 9000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE.....X-8-778

10-8-371 TAKE-OFF DATA; FLAPS - 10°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE.....X-8-780

10-8-372 TAKE-OFF DATA; FLAPS - 10°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE.....X-8-782

10-8-373 TAKE-OFF DATA; FLAPS - 10°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE.....X-8-784

10-8-374 TAKE-OFF DATA; FLAPS - 10°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE.....X-8-786

10-8-375 TAKE-OFF DATA; FLAPS - 10°; 14000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE.....X-8-788

10-8-376 V1 CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY ICE.....X-8-790

10-8-377 TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY ICE.....X-8-791

LANDING DISTANCE..... X-8-792

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10-8-404 VAPP, VREF AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY DRY SNOW X-8-910

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CONTAMINATED RUNWAY OPERATIONS

INTRODUCTION

GENERAL

The general information in the introduction section of the basic AFM is applicable with the addition of the following:

The information in this supplement has been prepared by the manufacturer and approved as guidance material, to assist operators in developing suitable guidance, recommendations or instructions for use by their flight crews when operating on contaminated runway surface conditions.

The data in this supplement are not based on flight test data, but rather based on analytical guidance material prescribed by EASA (European Aviation Safety Agency).

The performance information assumes any slush, standing water or wet snow to be of uniform depth and density.

The level of safety is decreased when operating on contaminated runways and therefore every effort should be made to ensure that the runway surface is cleared of any significant contaminate.

The provision of performance information for contaminated runways should not be taken as implying that ground handling characteristics on these surfaces will be as good as can be achieved on dry or wet runways, in particular, in cross-winds and when using reverse thrust.

CONTAMINATED RUNWAY LIMITATIONS

The limitations in Section I are applicable with the addition of the following:

The following material does not address multiple contaminant types such as wet snow covering compacted snow or slush covering an icy runway. Pilots should be especially cautious about conducting take-off and landing operations when multiple contaminant types are present.

Airport operations on wet snow and slush-covered runways are treated in a similar manner as operations on a runway contaminated with standing water.

The maximum depth of runway contaminants covering an appreciable part of the runway are:

Contaminant	**Maximum Contaminant Depth**
Standing Water	6.4 mm / 0.25 in
Slush	7.4 mm / 0.29 in
Wet Snow	12.7 mm / 0.5 in
Dry Snow	30 mm / 1.18 in

SECTION II
EMERGENCY PROCEDURES
No change.

SECTION III
ABNORMAL PROCEDURES
No change.

SECTION IV
NORMAL PROCEDURES
No change.

SECTION V
PERFORMANCE

DEFINITIONS

The performance data in section V and compatible supplements are applicable with the addition of the following:

Runway contaminated by slush, standing water or wet snow - A runway is considered to be contaminated when more than 25% of the runway surface area (whether in isolated areas or not) within the required length and width being used, is covered by surface water, more than 3 mm (0.125 inch) of standing water, or by slush or wet snow, equivalent to more than 3 mm (0.125 inch) of water.

Runway contaminated by dry snow - A runway is to be considered contaminated by dry snow when covered by fresh snow which can be blown, or if compacted by hand, will fall apart upon release.

Runway contaminated by compacted snow - A runway is to be considered contaminated by compacted snow when covered by snow which has been compacted into a solid mass which resists further compression.

Runway contaminated by Ice - A runway is considered to be contaminated by ice when braking action is expected to be very low, due to the presence of ice.

Equivalent Water Depth

Airport operations on loose wet snow and slush-covered runways are treated in a similar manner as operations on a runway contaminated with standing water. The only difference is due to different densities of the contaminant. A measurable depth of loose wet snow (50% the density of water) or slush (85% the density of water) may be converted to an equivalent depth of standing as follows:

Standing Water Depth	Slush Depth	Loose Wet Snow Depth
3.0 mm / 0.12 in	3.5 mm / 0.14 in	6.0 mm / 0.24 in
6.4 mm / 0.25 in	7.4 mm / 0.29 in	12.7 mm / 0.5 in

PERFORMANCE

TAKE-OFF PERFORMANCE

Distances for runways contaminated with standing water, slush, wet snow, dry snow, compacted snow and ice have been calculated assuming that the runway is completely contaminated.

All contaminated runway takeoff performance is based on the following performance conditions:

Braking	–	Maximum until full stop
APR	–	NOT INHIBITED
Ground Spoilers	–	NOT INHIBITED
Thrust Reversers	–	Maximum Reverse down to 40 KIAS, then set to Reverse Idle until full stop.

Contaminated runway charts are provided for the following runway conditions:

Standing water, slush and wet snow
Dry Snow
Compacted snow
Ice

The determination of the takeoff field length and of the takeoff speeds on a contaminated runway must follow the same procedure as described in the section V of the AFM for dry and wet runway.
The contaminated runway charts are presented for the flap 10° and 20° configurations. The presented contaminated runway takeoff data is based on the use of thrust reversers for rejected takeoff.

(Continued)

Takeoff performance data are provided for the following engine bleed configurations:
1. ECS bleed on, engine anti-ice and wing anti-ice off
2. ECS bleed on, engine anti-ice on and wing anti-ice on or off.

For configuration: ECS bleed off, engine anti-ice and wing anti-ice off, use performance data from configuration 1.
For configuration: ECS bleed and wing anti-ice off, engine anti-ice on, use performance data from configuration 2.

The takeoff performance data are shown in terms of airport pressure altitude, surface temperature, and aircraft weight. Correction charts are included for the effect of runway slope, reported wind, and availability of thrust reversers at dispatch.
For dispatch with one or both thrust reverser inoperative, use the included corrections for V1 and TOFL.

NOTE

Operations on an icy runway require a minimum of one operational thrust reverser. In the case of dispatch with one thrust reverser inoperative, if the engine with an operating thrust reverser fails, no thrust reverser is available for rejected takeoff. Therefore dispatch with one or both thrust reversers inoperative on an icy runway is prohibited.

Take-Off Charts

The following charts should be used to determine V1, VR, V2, second segment climb gradient (GR2) and takeoff field length (TOFL):

Flaps - 20°

	Zero Wind and Runway Slope	V1 Correction	TOFL Correction
Runway Contaminated by Slush or Standing Water or Wet Snow	10-8-3 through 10-8-47	10-8-48	10-8-49
Runway Contaminated by Dry Snow	10-8-50 through 10-8-94	10-8-95	10-8-96
Runway Contaminated by Compacted Snow	10-8-97 through 10-8-141	10-8-142	10-8-143
Runway Contaminated by Ice	10-8-144 through 10-8-188	10-8-189	10-8-190

Flaps - 10°

	Zero Wind and Runway Slope	V1 Correction	TOFL Correction
Runway Contaminated by Slush or Standing Water or Wet Snow	10-8-191 through 10-8-234	10-8-235	10-8-236
Runway Contaminated by Dry Snow	10-8-237 through 10-8-281	10-8-282	10-8-283
Runway Contaminated by Compacted Snow	10-8-284 through 10-8-328	10-8-329	10-8-330
Runway Contaminated by Ice	10-8-331 through 10-8-375	10-8-376	10-8-377

(Continued)

Example:

Define the takeoff data for the following conditions:
Weight: 38000 Lb
Flaps - 20°
Airport pressure altitude: 2,000 ft
Ambient temperature: 0°C
ECS: ON
Engine Anti-ice: ON
Wing Anti-ice: ON
Wind: 10 knots (headwind)
Runway condition: Compacted Snow
Runway slope: +1% (uphill)

1. From Figure 10-8-129 determine the takeoff data for zero wind and zero runway slope:

   TOFL = 5210 Ft
   V1 = 108 KIAS
   VR = 127 KIAS
   V2 = 135 KIAS

2. From Figure 10-8-142 and figure 10-8-143 determine the V1 and TOFL corrected for the reported wind and runway slope:

   V1 = 113 KIAS
   TOFL = 5400 Ft

LANDING PERFORMANCE

This Supplement includes charts to obtain the actual landing distance on a contaminated runway for the following contaminants:

Standing water, slush and wet snow
Dry Snow
Compacted snow
Ice

Landing Limitations

The following limitations apply to landing operations on contaminated runways:

1. Flap setting - 39 degrees.
2. Maximum Contaminant Depth, see table on page X-8-39.
3. All AFM limitations apply.
4. Anti-skid Operative.

While these limitations must be observed, additional data for overweight and abnormal flaps landings have been provided for reference in emergency situations.

(Continued)

Landing Procedures

The landing distances provided in this supplement are based on the following procedure:

- V_{REF} is established by 50 feet above the runway.
- Ground spoiler deployment is initiated automatically when the WOW signal is active and the engine throttles are at Idle.
- Immediately after touchdown, the nose is lowered, brakes are applied, reversers are deployed and the power levers are moved to the maximum reverse thrust position.
- Maximum braking is maintained until the aircraft comes to a complete stop.
- At 40 KCAS, power levers are reduced to reverse idle, and the reverse idle thrust is maintained until the aircraft comes to a complete stop (reverser doors remain deployed).

NOTE

1. Credit on landing distance on contaminated runways is taken for one thrust reverser operating. Correction factors are provided for the case when both thrust reversers are inoperative.
2. For runways contaminated with standing water/slush/wet snow or dry snow, landing performance data were based on the minimum contaminant depth (0.125 inch/3 mm of standing water or 0.04 inch/1 mm of dry snow), with correspondingly lower contaminant drag, thus providing longer landing distances.

(Continued)

Landing Charts

The following charts should be used to determine the final approach speed (VAPP), the reference landing speed (VREF) and the actual landing distance (ALD) for different types of runway contaminants:

Flaps 39°

Runway Contaminated by:	Zero Wind Conditions	Wind Correction
Slush or Standing Water or Wet Snow	10-8-378	10-8-379
Dry Snow	10-8-380	10-8-381
Compacted Snow	10-8-382	10-8-383
Ice	10-8-384	10-8-385

Flaps 20°

Runway Contaminated by:	Zero Wind Conditions	Wind Correction
Slush or Standing Water or Wet Snow	10-8-386	10-8-387
Dry Snow	10-8-388	10-8-389
Compacted Snow	10-8-390	10-8-391
Ice	10-8-392	10-8-393

Flaps 10°

Runway Contaminated by:	Zero Wind Conditions	Wind Correction
Slush or Standing Water or Wet Snow	10-8-394	10-8-395
Dry Snow	10-8-396	10-8-397
Compacted Snow	10-8-398	10-8-399
Ice	10-8-400	10-8-401

Flaps 0°

Runway Contaminated by:	Zero Wind Conditions	Wind Correction
Slush or Standing Water or Wet Snow	10-8-402	10-8-403
Dry Snow	10-8-404	10-8-405
Compacted Snow	10-8-406	10-8-407
Ice	10-8-408	10-8-409

(Continued)

Correction for the effect of inoperative thrust reversers

The presented contaminated actual landing distances assume one thrust reverser is operational.
If both thrust reversers are inoperative, the presented actual landing distance should be increased, depending on the flap configuration, by the following factors:

Contaminant	Flap 39°	Flaps 20°, 10° or 0°
Standing water, slush and wet snow	1.13	1.17
Dry Snow	1.12	1.15
Compacted Snow	1.10	1.12
Ice	2.0	2.0

Correction for the effect of ambient temperature

The presented contaminated actual landing distances are based on ISA conditions.
Applicable regulations do not require actual landing distance to be corrected for temperature effects. If required, the operator may use the following ALD temperature corrections:

Increase ALD by 4.5% for every 10°C above ISA.
Decrease ALD by 3% for every 10°C below ISA.

ALD Runway Slope Corrections:

Increase dry ALD by 16% for every 1% DOWNHILL runway slope.
Decrease dry ALD by 5% for every 1% UPHILL runway slope.

CROSSWIND LIMITATIONS FOR OPERATIONS ON CONTAMINATED RUNWAYS

Crosswind capabilities for takeoffs and landings on wet or contaminated runways may be reduced relative to demonstrated crosswind capabilities on dry runways. For the G280, the maximum crosswind demonstrated on a dry runway was 25 knots. It should be noted that this is not a dry runway limit, but rather a maximum demonstrated value. Although Gulfstream has not conducted dedicated flight testing to determine crosswind capabilities for wet and contaminated runways, Transport Canada has published a generic chart that can be used to determine crosswind capabilities as a function of the runway surface condition. To use this chart, it is first necessary to enter table on page X-8-51 to determine the Canadian Runway Friction Index (CRFI) corresponding to a given contaminant type.

Once the CRFI has been identified, the crosswind chart (Figure 10-8-2.) can be entered at this CRFI value to determine an allowable crosswind component.
Note that the CFRI scale at the bottom of this chart has different scale intervals between 0.3 and 0.4 and between 0.6 and 0.7 when compared to the scale intervals on the rest of the CRFI scale.
This is by design and not an error.

The following example illustrates how to determine the allowable crosswind limit when taking off or landing on a runway covered by snow. Using table on page X-8-51, the CRFI range for a snow-covered runway is between 0.25 and 0.30. From Figure 10-8-2., the corresponding crosswind limit for this CRFI range is 5 to 10 knots.

Runway Surface Contamination	CRFI Equivalent
Bare and Dry	≥ 0.80
Damp – Less than 0.01 inch of water	0.60 – 0.70
Very light snow patches	0.55 – 0.60
Wet concrete – 0.01 to 0.03 inch of water	0.40 – 0.55
Wet Asphalt – 0.01 to 0.03 inch of water	0.30 – 0.60
Compacted snow – below – 15°C	0.40
Sanded, packed snow or ice	0.40 – 0.50
Heavy rain – 0.03 to 0.10 inch of water	0.28 – 0.30
Snow covered	0.25 – 0.30
Compacted snow – above -15°C	0.20 – 0.25
Cold ice – below – 10°C	0.10 – 0.20
Wet ice – above -10°C	0.05 -0.10
Hydroplaning – standing water ≥ 0.10	0.05

Figure 10-8-1. Runway Surface Contaminated (RSC) & CRFI Equivalent

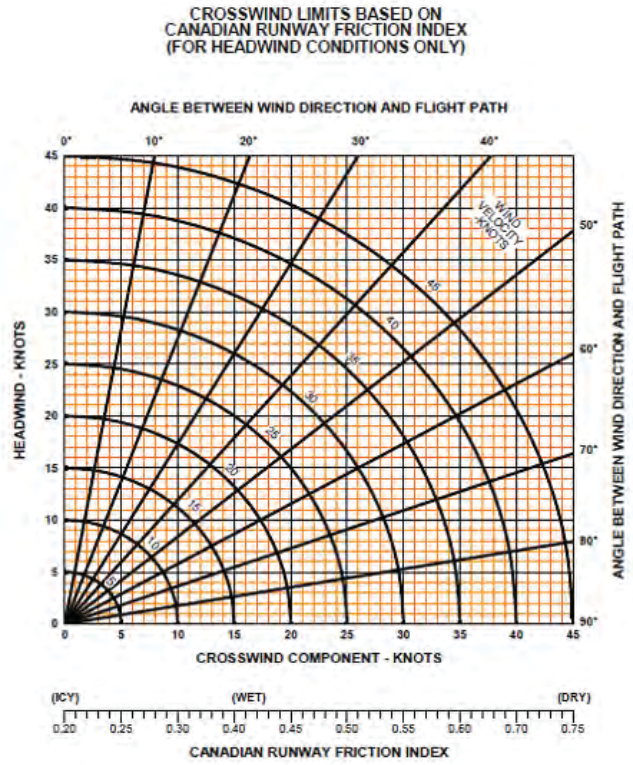


Figure 10-8-2. Canadian Runway Friction Index (CRFI) Crosswind Limits

UNITS CONVERSION

Weight Conversion

The following table enables aircraft weight conversion:

LB	15,500	16,000	16,500	17,000	17,500	18,000	18,500	19,000	19,500	20,000	20,500	21,000
KG	7,031	7,258	7,484	7,711	7,938	8,165	8,392	8,618	8,845	9,072	9,299	9,526
LB	21,500	21,700	22,000	22,500	23,000	23,500	24,000	24,500	25,000	25,500	26,000	26,500
KG	9,752	9,843	9,979	10,206	10,433	10,660	10,886	11,113	11,340	11,567	11,794	12,020
LB	27,000	27,500	28,000	28,500	29,000	29,500	30,000	30,500	31,000	31,500	32,000	32,500
KG	12,247	12,474	12,701	12,928	13,154	13,381	13,608	13,835	14,062	14,288	14,515	14,742
LB	33,000	33,500	34,000	34,500	35,000	35,500	36,000	36,500	37,000	37,500	38,000	38,500
KG	14,969	15,196	15,422	15,649	15,876	16,103	16,329	16,556	16,783	17,010	17,237	17,463
LB	39,000	39,500	40,000	40,500	41,000	41,500	42,000	42,500	43,000	43,500	44,000	44,500
KG	17,690	17,917	18,144	18,371	18,597	18,824	19,051	19,278	19,505	19,731	19,958	20,185

Distance Conversion

The following table enables take-off, flight path and landing distance conversion:

FT	1000	2000	3000	4000	5000	6000	7000	8000	9000	10,000
M	305	610	914	1219	1524	1829	2134	2438	2743	3048
FT	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000	20,000
M	3353	3658	3962	4267	4572	4877	5182	5486	5791	6096
FT	21,000	22,000	23,000	24,000	25,000	26,000	27,000	28,000	29,000	30,000
M	6401	6705	7010	7315	7620	7925	8230	8534	8839	9144
FT	31,000	32,000	33,000	34,000	35,000	36,000	37,000	38,000	39,000	40,000
M	9449	9753	10,058	10,363	10,668	10,973	11,278	11,582	11,887	12,192
FT	41,000	42,000	43,000	44,000	45,000	46,000	47,000	48,000	49,000	50,000
M	12,497	12,802	13,106	13,411	13,716	14,021	14,326	14,630	14,935	15,240

TAKE-OFF DISTANCE - FLAPS 20°

FIGURE 10-8-3. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	TOFL	4750	4830	4940	5050	5150	5250	5350	5450	5580	5710	5830	139	192
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.7	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
39000	TOFL	4550	4630	4730	4840	4930	5030	5130	5220	5340	5460	5580	138	191
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.9	5.9	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1		
38000	TOFL	4240	4310	4410	4500	4590	4680	4770	4860	4970	5080	5190	136	188
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5		
37000	TOFL	3980	4060	4150	4240	4330	4420	4510	4590	4700	4800	4900	135	185
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.7	6.7	6.7	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	3780	3850	3930	4020	4100	4190	4270	4350	4450	4540	4640	133	182
	V1	110	110	110	110	110	110	110	110	110	110	111		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.1	7.1	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	3570	3630	3720	3790	3870	3950	4030	4100	4190	4280	4370	131	180
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.6	7.6	7.6	7.6	7.7	7.7	7.8	7.8	7.8	7.8	7.8		
34000	TOFL	3370	3430	3500	3570	3650	3720	3800	3870	3950	4040	4120	129	177
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8	8.1	8.1	8.1	8.1	8.2	8.2	8.3	8.3	8.3	8.3		
33000	TOFL	3190	3250	3330	3400	3470	3540	3610	3680	3760	3840	3910	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	3260	3310	3370	3440	3500	3570	3640	3700	3770	3830	3910	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.1	9.1	9.1	9.2	9.2	9.3	9.3	9.4	9.4	9.4	9.4		
31000	TOFL	3220	3270	3340	3400	3470	3520	3590	3650	3720	3790	3870	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.7	9.7	9.7	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 10-8-3. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
30000	TOFL	3170	3220	3290	3360	3410	3480	3540	3600	3670	3730	3810	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.3	10.3	10.4	10.4	10.4	10.5	10.5	10.6	10.6	10.6	10.6		
29000	TOFL	3120	3170	3240	3310	3360	3430	3480	3540	3610	3690	3750	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11	11	11	11.1	11.1	11.1	11.2	11.3	11.3	11.3	11.3		
28000	TOFL	3080	3130	3190	3240	3310	3370	3430	3490	3560	3630	3690	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	11.7	11.7	11.8	11.8	11.8	11.9	11.9	12	12	12	12		
27000	TOFL	3030	3080	3140	3190	3260	3310	3380	3430	3500	3560	3630	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.4	12.5	12.5	12.6	12.6	12.6	12.7	12.7	12.7	12.7	12.7		
26000	TOFL	2970	3020	3080	3140	3200	3260	3310	3370	3430	3500	3570	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.3	13.3	13.3	13.4	13.4	13.5	13.5	13.6	13.6	13.6	13.6		

FIGURE 10-8-4. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
39600	TOFL	5960	6090	6220	6360	6490	6630	6790	7450	8400	9310	10120	139	192
	V1	122	122	123	123	123	123	123	126	130	133	135		
	VR	129	129	129	129	129	129	129	130	132	134	135		
	V2	137	137	137	137	137	137	137	137	138	140	140		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.3	4.7	4	3.5		
39000	TOFL	5700	5830	5950	6080	6210	6340	6470	7080	8010	8910	9700	138	191
	V1	120	120	120	120	121	121	121	124	128	131	133		
	VR	127	127	127	127	127	127	127	128	130	132	133		
	V2	135	135	135	135	135	135	135	136	137	138	138		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.5	4.8	4.2	3.7		
38000	TOFL	5300	5420	5530	5650	5760	5880	6000	6500	7330	8260	9050	136	188
	V1	116	116	116	117	117	117	117	120	124	128	130		
	VR	124	124	124	124	124	124	124	125	127	129	130		
	V2	133	133	133	133	133	133	133	133	134	135	136		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.4	5.9	5.2	4.6	4		
37000	TOFL	5010	5110	5220	5330	5440	5550	5660	6030	6720	7550	8360	135	185
	V1	113	113	114	114	114	114	114	116	120	124	127		
	VR	122	122	122	122	122	122	122	122	124	126	127		
	V2	131	131	131	131	131	131	131	131	131	132	134		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.2	5.5	4.9	4.3		
36000	TOFL	4740	4840	4940	5040	5140	5240	5350	5680	6240	6920	7720	133	182
	V1	111	111	111	111	111	111	112	113	116	120	123		
	VR	120	120	120	120	120	120	120	120	121	123	125		
	V2	130	130	130	130	130	130	130	130	130	130	131		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	6.7	5.9	5.3	4.7		
35000	TOFL	4460	4550	4650	4740	4840	4930	5030	5360	5800	6400	7060	131	180
	V1	108	108	108	108	108	108	109	111	113	116	120		
	VR	118	118	118	118	118	118	118	118	119	120	122		
	V2	128	128	128	128	128	128	128	128	127	127	128		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.1	6.3	5.6	5		
34000	TOFL	4210	4290	4380	4470	4550	4640	4730	5030	5450	5910	6500	129	177
	V1	105	105	105	105	105	106	106	108	110	113	116		
	VR	116	116	116	116	116	116	116	116	117	117	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	8.2	7.6	6.8	6	5.4		
33000	TOFL	3990	4070	4160	4240	4320	4400	4490	4730	5120	5520	5990	127	174
	V1	103	103	103	103	103	103	103	105	107	109	112		
	VR	114	114	114	114	114	114	114	114	115	115	116		
	V2	125	125	125	125	125	125	125	124	124	123	123		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.1	7.3	6.5	5.8		
32000	TOFL	3970	4030	4090	4160	4230	4290	4350	4470	4790	5180	5550	125	171
	V1	102	102	102	102	102	102	102	102	104	107	109		
	VR	112	112	112	112	112	112	112	112	113	113	113		
	V2	124	124	124	124	124	124	124	123	122	122	121		
	GR2	9.4	9.4	9.3	9.3	9.3	9.3	9.3	8.6	7.8	7	6.3		
31000	TOFL	3930	3990	4070	4140	4200	4270	4340	4250	4510	4840	5190	123	168
	V1	102	102	102	102	102	102	102	100	101	104	106		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	122	121	120	120		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.2	8.3	7.5	6.8		

FIGURE 10-8-4. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
30000	TOFL	3880	3930	4000	4080	4150	4210	4270	4250	4260	4530	4850	121	166
	V1	102	102	102	102	102	102	102	100	99	100	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	121	119	118	118		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.5	9.8	8.9	8	7.3		
29000	TOFL	3820	3880	3940	4010	4080	4150	4210	4190	4100	4260	4510	119	163
	V1	102	102	102	102	102	102	102	100	97	98	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	121	121	121	121	121	121	121	120	118	117	116		
	GR2	11.3	11.3	11.2	11.2	11.2	11.2	11.2	10.4	9.5	8.6	7.8		
28000	TOFL	3760	3820	3880	3950	4020	4080	4150	4120	4080	4010	4240	117	160
	V1	102	102	102	102	102	102	102	100	97	95	97		
	VR	106	106	106	106	106	106	106	106	105	105	105		
	V2	120	120	120	120	120	120	120	119	117	116	115		
	GR2	12	12	12	11.9	11.9	11.9	11.9	11.1	10.2	9.3	8.4		
27000	TOFL	3700	3760	3820	3880	3950	4020	4080	4050	4010	3960	3980	115	157
	V1	102	102	102	102	102	102	102	100	97	95	94		
	VR	104	104	104	104	104	104	104	104	104	103	103		
	V2	119	119	119	119	119	119	119	118	116	115	114		
	GR2	12.7	12.7	12.7	12.7	12.7	12.7	12.7	11.9	10.9	9.9	9.1		
26000	TOFL	3640	3690	3750	3820	3890	3950	4010	3990	3940	3900	3820	113	154
	V1	102	102	102	102	102	102	102	100	97	95	92		
	VR	103	103	103	103	103	103	103	102	102	102	101		
	V2	118	118	118	118	118	118	118	116	115	114	112		
	GR2	13.6	13.6	13.6	13.5	13.5	13.5	13.5	12.7	11.6	10.7	9.8		

FIGURE 10-8-5. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	TOFL	5140	5230	5350	5480	5600	5710	5830	5950	6090	6230	6370	139	193
	V1	124	124	124	124	124	124	124	124	124	125	125		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	4920	5010	5130	5240	5350	5470	5580	5700	5830	5960	6100	138	191
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	4570	4660	4760	4870	4970	5080	5180	5280	5410	5530	5650	136	188
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.2		
37000	TOFL	4250	4330	4430	4530	4630	4720	4820	4920	5030	5140	5250	135	185
	V1	114	114	114	114	114	114	114	114	114	115	115		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	3980	4060	4150	4240	4340	4430	4510	4610	4710	4820	4920	133	183
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.9	6.9	6.9	7	7	7	7	7	7	7	7		
35000	TOFL	3760	3830	3910	4000	4080	4170	4250	4340	4440	4530	4630	131	180
	V1	108	108	108	108	108	108	108	108	108	108	109		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
34000	TOFL	3540	3610	3690	3770	3850	3930	4010	4090	4180	4270	4360	129	177
	V1	105	105	105	105	105	105	105	105	105	106	106		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.8	7.8	7.9	7.9	7.9	7.9	7.9	8	8	8	8		
33000	TOFL	3350	3410	3490	3570	3640	3720	3790	3870	3960	4040	4130	127	174
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.3	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	3280	3320	3400	3470	3530	3610	3680	3740	3820	3880	3950	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.9	8.9	8.9	8.9	8.9	9	9	9	9	9	9		
31000	TOFL	3300	3350	3420	3490	3560	3620	3690	3760	3820	3900	3980	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.5	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-5. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
30000	TOFL	3250	3300	3370	3440	3500	3560	3630	3700	3770	3840	3920	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.1	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		
29000	TOFL	3200	3250	3320	3380	3450	3520	3580	3640	3720	3780	3850	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.7	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9		
28000	TOFL	3150	3200	3270	3330	3400	3460	3520	3580	3660	3730	3790	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
27000	TOFL	3100	3150	3210	3280	3340	3410	3460	3530	3600	3670	3730	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.2	12.2	12.2	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	3040	3090	3160	3230	3290	3340	3410	3470	3540	3600	3670	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13	13	13	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2		

FIGURE 10-8-6. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (SHEET 1 OF 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
39600	TOFL	6520	6670	6830	7000	7180	7350	7750	8560	9520	10390	10930	139	193
	V1	125	125	125	125	126	126	127	130	133	135	136		
	VR	130	130	130	130	130	130	131	132	134	136	136		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.4	4.9	4.3	3.7	3.3		
39000	TOFL	6230	6380	6510	6660	6820	6990	7360	8180	9100	9950	10480	138	191
	V1	123	123	123	123	123	123	125	128	131	133	134		
	VR	128	128	128	128	128	128	129	130	132	134	135		
	V2	136	136	136	136	136	136	136	137	138	139	139		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.1	4.5	3.9	3.5		
38000	TOFL	5780	5900	6030	6160	6290	6420	6740	7490	8440	9250	9760	136	188
	V1	119	119	119	119	119	119	121	124	128	130	131		
	VR	125	125	125	125	125	125	126	127	129	131	132		
	V2	134	134	134	134	134	134	134	134	135	136	137		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6	5.4	4.8	4.2	3.8		
37000	TOFL	5370	5490	5600	5720	5840	5960	6210	6830	7690	8560	9040	135	185
	V1	115	115	115	115	116	116	117	120	124	127	128		
	VR	122	122	122	122	122	122	123	124	126	128	129		
	V2	131	131	131	131	131	131	131	132	133	134	134		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.4	5.8	5.1	4.5	4.1		
36000	TOFL	5020	5130	5240	5350	5460	5570	5790	6280	6990	7850	8350	133	183
	V1	112	112	112	112	112	112	113	116	120	123	125		
	VR	120	120	120	120	120	120	120	121	123	125	126		
	V2	129	129	129	129	129	129	129	129	130	131	132		
	GR2	7	7	7	7	7	7	6.8	6.2	5.5	4.9	4.5		
35000	TOFL	4730	4830	4930	5030	5130	5240	5430	5850	6450	7170	7680	131	180
	V1	109	109	109	109	109	109	110	113	116	119	122		
	VR	118	118	118	118	118	118	118	119	120	122	123		
	V2	128	128	128	128	128	128	128	128	128	128	129		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.2	6.6	5.9	5.2	4.8		
34000	TOFL	4450	4550	4640	4730	4830	4920	5110	5480	5960	6580	7000	129	177
	V1	106	106	106	106	106	106	107	109	112	116	118		
	VR	116	116	116	116	116	116	116	117	117	119	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8	8	7.9	7.9	7.9	7.9	7.7	7.1	6.3	5.6	5.2		
33000	TOFL	4210	4300	4380	4470	4560	4650	4810	5130	5560	6060	6430	127	174
	V1	103	103	103	104	104	104	104	106	109	112	114		
	VR	114	114	114	114	114	114	114	114	115	116	117		
	V2	125	125	125	125	125	125	124	124	124	124	124		
	GR2	8.5	8.5	8.5	8.5	8.4	8.4	8.2	7.5	6.8	6	5.6		
32000	TOFL	4020	4090	4160	4250	4330	4410	4550	4810	5190	5620	5910	125	171
	V1	101	101	101	101	101	101	102	103	106	108	110		
	VR	112	112	112	112	112	112	112	112	113	114	114		
	V2	124	124	124	124	124	124	123	122	122	122	121		
	GR2	9	9	9	9	9	9	8.7	8	7.3	6.5	6.1		
31000	TOFL	4040	4120	4180	4250	4320	4370	4340	4540	4860	5230	5490	123	169
	V1	101	101	101	101	101	101	100	101	103	105	106		
	VR	111	111	111	111	111	111	111	111	111	111	112		
	V2	122	122	122	122	122	122	122	121	120	120	120		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.3	8.6	7.8	7	6.5		

FIGURE 10-8-6. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (SHEET 2 OF 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
30000	TOFL	3990	4050	4130	4200	4270	4320	4330	4300	4560	4880	5100	121	166
	V1	101	101	101	101	101	101	100	98	100	102	103		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	120	119	118	118		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	9.9	9.2	8.3	7.5	7		
29000	TOFL	3930	4000	4060	4140	4210	4250	4270	4230	4300	4560	4750	119	163
	V1	101	101	101	101	101	101	100	98	97	99	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	119	117	116	116		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.6	9.8	8.9	8.1	7.6		
28000	TOFL	3870	3940	4010	4070	4140	4190	4200	4180	4090	4290	4440	117	160
	V1	101	101	101	101	101	101	100	98	95	96	97		
	VR	106	106	106	106	106	106	106	105	105	105	105		
	V2	119	119	119	119	119	119	119	118	116	115	115		
	GR2	11.6	11.6	11.6	11.6	11.6	11.6	11.3	10.5	9.6	8.7	8.2		
27000	TOFL	3800	3870	3940	4000	4070	4120	4130	4110	4070	4050	4170	115	157
	V1	101	101	101	101	101	101	100	98	95	94	94		
	VR	104	104	104	104	104	104	104	104	104	103	103		
	V2	118	118	118	118	118	118	118	117	115	114	113		
	GR2	12.4	12.4	12.4	12.3	12.3	12.3	12	11.2	10.3	9.4	8.8		
26000	TOFL	3740	3810	3880	3940	4010	4060	4060	4050	4000	3940	3940	113	154
	V1	101	101	101	101	101	101	100	98	95	93	92		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	115	114	113	112		
	GR2	13.2	13.2	13.2	13.1	13.1	13.1	12.8	12	11	10.1	9.5		

FIGURE 10-8-7. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	TOFL	5530	5650	5800	5940	6080	6220	6360	6510	6670	6830	7020	140	193
	V1	126	126	126	126	127	127	127	127	127	127	127		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
39000	TOFL	5300	5410	5550	5680	5820	5950	6080	6230	6380	6530	6680	139	191
	V1	124	124	124	124	124	124	124	125	125	125	125		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.6	5.6		
38000	TOFL	4920	5020	5150	5270	5390	5520	5640	5770	5900	6040	6180	137	189
	V1	120	120	120	120	120	120	120	121	121	121	121		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
37000	TOFL	4560	4660	4770	4890	5000	5110	5220	5340	5460	5590	5710	135	186
	V1	116	116	116	116	116	116	116	117	117	117	117		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.4	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	4240	4320	4430	4530	4640	4740	4840	4950	5070	5180	5290	133	183
	V1	112	112	112	112	112	113	113	113	113	113	113		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.8	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	3940	4020	4120	4220	4310	4410	4500	4600	4700	4810	4910	131	180
	V1	108	109	109	109	109	109	109	109	109	109	109		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
34000	TOFL	3720	3790	3880	3970	4060	4150	4240	4330	4430	4530	4620	129	177
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7		
33000	TOFL	3510	3570	3660	3750	3830	3910	4000	4090	4180	4270	4360	127	175
	V1	103	103	103	103	103	103	103	103	103	104	104		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
32000	TOFL	3330	3400	3480	3560	3640	3720	3800	3880	3960	4050	4130	125	172
	V1	100	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.7	8.7	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	3360	3420	3490	3550	3610	3690	3740	3810	3880	3950	4010	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 10-8-7. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
30000	TOFL	3320	3380	3450	3520	3590	3650	3710	3790	3870	3940	4000	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
29000	TOFL	3270	3330	3400	3460	3530	3600	3660	3730	3810	3880	3940	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
28000	TOFL	3220	3280	3340	3410	3480	3550	3610	3670	3750	3820	3880	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
27000	TOFL	3170	3230	3290	3360	3420	3480	3550	3610	3690	3760	3810	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	11.9	11.9	11.9	11.9	12	12	12	12	12	12		
26000	TOFL	3110	3170	3240	3300	3360	3430	3480	3550	3630	3700	3750	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.7	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 10-8-8. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
39600	TOFL	7200	7390	7580	7770	7960	8150	8820	9760	10680	11650	11870	140	193
	V1	128	128	128	128	128	128	131	134	136	138	138		
	VR	132	132	132	132	132	132	133	135	136	138	138		
	V2	139	139	139	139	139	139	140	141	141	142	142		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.1	4.5	3.9	3.3	3.2		
39000	TOFL	6850	7030	7210	7400	7580	7770	8420	9330	10220	11130	11340	139	191
	V1	125	125	126	126	126	126	129	132	134	136	136		
	VR	130	130	130	130	130	130	131	133	135	136	136		
	V2	137	137	137	137	137	137	138	139	140	141	141		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.3	4.7	4.1	3.5	3.3		
38000	TOFL	6320	6460	6610	6770	6940	7110	7740	8650	9480	10350	10540	137	189
	V1	121	122	122	122	122	122	125	128	131	133	133		
	VR	127	127	127	127	127	127	128	130	131	133	133		
	V2	135	135	135	135	135	135	135	136	137	138	138		
	GR2	6	6	6	6	6	6	5.6	5	4.4	3.8	3.7		
37000	TOFL	5840	5970	6100	6230	6370	6500	7050	7900	8780	9600	9760	135	186
	V1	117	117	118	118	118	118	121	124	127	129	130		
	VR	124	124	124	124	124	124	125	126	128	130	130		
	V2	132	132	132	132	132	132	133	133	134	135	135		
	GR2	6.4	6.4	6.3	6.3	6.3	6.3	6	5.4	4.7	4.1	4		
36000	TOFL	5410	5530	5650	5770	5890	6010	6440	7170	8050	8860	9040	133	183
	V1	113	113	114	114	114	114	116	120	124	126	127		
	VR	121	121	121	121	121	121	122	123	125	127	127		
	V2	130	130	130	130	130	130	130	130	131	132	132		
	GR2	6.8	6.8	6.8	6.7	6.7	6.7	6.4	5.7	5.1	4.4	4.3		
35000	TOFL	5020	5130	5230	5340	5450	5570	5940	6520	7270	8130	8310	131	180
	V1	109	110	110	110	110	110	112	116	119	122	123		
	VR	118	118	118	118	118	118	119	120	122	123	124		
	V2	127	127	127	127	127	127	127	128	128	129	130		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	6.8	6.1	5.4	4.8	4.7		
34000	TOFL	4720	4820	4920	5030	5130	5230	5530	6030	6650	7440	7620	129	177
	V1	107	107	107	107	107	107	109	112	115	119	120		
	VR	116	116	116	116	116	116	116	117	119	120	121		
	V2	126	126	126	126	126	126	126	126	126	127	127		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.2	6.5	5.8	5.2	5		
33000	TOFL	4450	4540	4640	4730	4830	4920	5180	5600	6120	6770	6920	127	175
	V1	104	104	104	104	104	105	106	108	111	115	116		
	VR	114	114	114	114	114	114	114	115	116	117	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	7.7	7	6.3	5.6	5.4		
32000	TOFL	4220	4310	4390	4480	4570	4660	4870	5220	5660	6220	6350	125	172
	V1	101	102	102	102	102	102	103	105	108	111	112		
	VR	112	112	112	112	112	112	112	113	113	115	115		
	V2	123	123	123	123	123	123	122	122	122	122	122		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.2	7.5	6.7	6	5.9		
31000	TOFL	4080	4150	4220	4280	4350	4430	4610	4890	5250	5730	5830	123	169
	V1	100	100	100	100	100	100	101	102	104	107	108		
	VR	111	111	111	111	111	111	111	111	111	112	112		
	V2	122	122	122	122	122	122	121	120	120	120	120		
	GR2	9.3	9.3	9.3	9.2	9.2	9.2	8.8	8	7.2	6.5	6.3		

FIGURE 10-8-8. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
30000	TOFL	4080	4140	4220	4290	4350	4390	4370	4600	4910	5280	5380	121	166
	V1	100	100	100	100	100	100	98	99	101	103	104		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	120	119	118	117	117		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.4	8.6	7.8	7	6.8		
29000	TOFL	4010	4090	4150	4220	4300	4330	4340	4360	4600	4920	4990	119	163
	V1	100	100	100	100	100	100	98	97	98	100	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	119	118	117	116	116		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10	9.2	8.3	7.5	7.3		
28000	TOFL	3950	4020	4100	4150	4230	4270	4270	4230	4340	4600	4660	117	160
	V1	100	100	100	100	100	100	98	96	96	97	98		
	VR	106	106	106	106	106	106	106	105	105	105	105		
	V2	119	119	119	119	119	119	118	117	115	114	114		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	10.7	9.9	9	8.1	7.9		
27000	TOFL	3880	3960	4030	4080	4150	4200	4200	4180	4110	4320	4370	115	157
	V1	100	100	100	100	100	100	98	96	94	95	95		
	VR	104	104	104	104	104	104	104	104	103	103	103		
	V2	118	118	118	118	118	118	117	116	114	113	113		
	GR2	12	12	12	11.9	11.9	11.9	11.4	10.6	9.7	8.8	8.6		
26000	TOFL	3820	3890	3960	4020	4080	4120	4130	4110	4040	4080	4120	113	154
	V1	100	100	100	100	100	100	98	96	93	92	92		
	VR	102	102	102	102	102	102	102	102	102	102	101		
	V2	117	117	117	117	117	117	116	115	113	112	112		
	GR2	12.8	12.8	12.8	12.8	12.8	12.7	12.2	11.3	10.4	9.5	9.3		

FIGURE 10-8-9. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	TOFL	5980	6170	6330	6500	6670	6830	7010	7210	7420	7620	7820	141	193
	V1	128	129	129	129	129	130	130	130	130	130	130		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	5730	5910	6070	6230	6390	6540	6700	6870	7070	7260	7450	140	192
	V1	126	127	127	127	127	127	127	128	128	128	128		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	5310	5480	5620	5770	5910	6060	6200	6360	6510	6670	6840	137	189
	V1	122	123	123	123	123	123	124	124	124	124	124		
	VR	128	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	4920	5070	5200	5330	5460	5590	5720	5860	6000	6140	6280	135	186
	V1	118	119	119	119	119	119	119	120	120	120	120		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	4550	4680	4800	4920	5040	5160	5280	5400	5530	5660	5780	133	183
	V1	114	114	115	115	115	115	115	115	115	116	116		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	4220	4340	4450	4560	4670	4780	4880	5000	5110	5230	5340	131	181
	V1	110	110	111	111	111	111	111	111	111	112	112		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
34000	TOFL	3930	4030	4130	4230	4330	4430	4530	4630	4740	4840	4950	129	178
	V1	106	107	107	107	107	107	107	107	108	108	108		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	3700	3790	3890	3980	4070	4170	4260	4360	4450	4550	4650	127	175
	V1	104	104	104	104	104	104	104	105	105	105	105		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
32000	TOFL	3500	3580	3670	3760	3850	3930	4020	4110	4200	4290	4380	125	172
	V1	101	101	101	101	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
31000	TOFL	3370	3440	3500	3570	3650	3740	3820	3900	3990	4070	4160	123	169
	V1	99	99	99	99	99	99	99	100	100	100	100		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 10-8-9. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
30000	TOFL	3380	3460	3520	3600	3680	3740	3810	3880	3940	4010	4070	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	3330	3400	3470	3550	3620	3680	3760	3830	3900	3970	4030	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	119	119	119	119	119	119	119	119	119	119		
	GR2	10.3	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
28000	TOFL	3270	3350	3410	3490	3570	3620	3700	3780	3830	3910	3980	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
27000	TOFL	3220	3290	3360	3430	3510	3560	3640	3720	3770	3850	3910	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.6	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	3170	3240	3300	3380	3450	3500	3580	3650	3710	3780	3840	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.5	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3		

FIGURE 10-8-10. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
39600	TOFL	8020	8230	8430	8640	8840	9180	10110	11040	12050	12970		141	193
	V1	130	131	131	131	131	132	135	137	138	140			
	VR	134	134	134	134	134	134	136	137	139	140			
	V2	140	140	140	140	140	140	142	142	143	144			
	GR2	5.2	5.2	5.2	5.2	5.2	5.1	4.6	4	3.4	3			
39000	TOFL	7650	7850	8060	8250	8450	8770	9670	10600	11510	12440		140	192
	V1	128	129	129	129	129	130	133	135	136	138			
	VR	132	132	132	132	132	132	134	135	137	138			
	V2	139	139	139	139	139	139	140	141	141	142			
	GR2	5.4	5.4	5.4	5.4	5.3	5.3	4.8	4.2	3.6	3.2			
38000	TOFL	7020	7210	7400	7590	7790	8100	8960	9810	10700	11490		137	189
	V1	124	125	125	125	125	126	129	132	133	135			
	VR	129	129	129	129	129	129	131	132	134	135			
	V2	136	136	136	136	136	136	137	138	139	139			
	GR2	5.7	5.7	5.7	5.7	5.7	5.6	5.2	4.5	3.9	3.5			
37000	TOFL	6430	6570	6740	6910	7090	7370	8210	9100	9900	10650		135	186
	V1	120	121	121	121	121	122	125	128	130	132			
	VR	125	125	125	125	125	126	127	129	131	132			
	V2	133	133	133	133	133	133	134	135	136	136			
	GR2	6.1	6.1	6.1	6.1	6.1	6	5.5	4.9	4.3	3.8			
36000	TOFL	5910	6050	6180	6320	6450	6690	7450	8360	9160	9830		133	183
	V1	116	116	116	117	117	118	121	125	127	128			
	VR	122	122	122	122	122	122	124	126	127	129			
	V2	130	130	130	130	130	131	131	132	133	134			
	GR2	6.5	6.5	6.5	6.4	6.4	6.3	5.9	5.2	4.6	4.1			
35000	TOFL	5460	5580	5700	5830	5950	6150	6740	7560	8420	9070		131	181
	V1	112	112	112	112	113	113	116	120	123	125			
	VR	119	119	119	119	119	120	121	122	124	125			
	V2	128	128	128	128	128	128	129	129	130	131			
	GR2	6.9	6.9	6.9	6.9	6.8	6.8	6.3	5.6	5	4.5			
34000	TOFL	5060	5170	5280	5390	5500	5660	6170	6820	7650	8340		129	178
	V1	108	108	108	109	109	109	112	116	119	122			
	VR	116	116	116	116	116	117	118	119	121	122			
	V2	126	126	126	126	126	126	126	127	127	128			
	GR2	7.3	7.3	7.3	7.3	7.3	7.2	6.7	6	5.3	4.8			
33000	TOFL	4750	4850	4950	5050	5160	5300	5690	6250	6920	7610		127	175
	V1	105	105	105	105	106	106	108	111	115	118			
	VR	114	114	114	114	114	114	115	116	118	119			
	V2	124	124	124	124	124	124	124	124	125	125			
	GR2	7.8	7.8	7.8	7.8	7.8	7.7	7.1	6.4	5.8	5.2			
32000	TOFL	4480	4570	4670	4760	4860	5000	5310	5760	6340	6900		125	172
	V1	102	103	103	103	103	103	105	108	111	114			
	VR	112	112	112	112	112	112	113	113	115	116			
	V2	123	123	123	123	123	123	122	122	122	122			
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	7.6	6.9	6.2	5.6			
31000	TOFL	4250	4340	4420	4510	4600	4720	4980	5350	5820	6300		123	169
	V1	100	100	100	100	101	101	102	104	107	110			
	VR	111	111	111	111	111	111	111	111	112	113			
	V2	122	122	121	121	121	121	121	120	120	120			
	GR2	8.9	8.9	8.9	8.9	8.9	8.7	8.1	7.4	6.7	6.1			

FIGURE 10-8-10. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
30000	TOFL	4130	4200	4270	4340	4390	4480	4700	4990	5360	5770		121	166
	V1	99	99	99	99	99	99	100	101	103	106			
	VR	109	109	109	109	109	109	109	109	109	110			
	V2	121	121	121	121	121	120	119	118	118	118			
	GR2	9.5	9.5	9.5	9.5	9.5	9.3	8.7	7.9	7.2	6.6			
29000	TOFL	4110	4190	4240	4320	4380	4360	4450	4690	5000	5300		119	163
	V1	99	99	99	99	99	98	97	98	100	102			
	VR	107	107	107	107	107	107	107	107	107	107			
	V2	119	119	119	119	119	119	118	117	116	116			
	GR2	10.1	10.1	10.1	10.1	10.1	10	9.3	8.5	7.7	7.1			
28000	TOFL	4040	4120	4180	4250	4310	4300	4320	4420	4680	4930		117	160
	V1	99	99	99	99	99	98	96	96	97	99			
	VR	106	106	106	106	106	106	106	105	105	105			
	V2	118	118	118	118	118	118	117	116	115	114			
	GR2	10.8	10.8	10.8	10.8	10.8	10.6	10	9.1	8.3	7.7			
27000	TOFL	3970	4050	4110	4190	4230	4230	4260	4220	4400	4610		115	157
	V1	99	99	99	99	99	98	96	94	95	96			
	VR	104	104	104	104	104	104	104	104	103	103			
	V2	117	117	117	117	117	117	116	115	113	112			
	GR2	11.6	11.5	11.5	11.5	11.5	11.4	10.7	9.8	9	8.3			
26000	TOFL	3920	3980	4040	4120	4170	4150	4190	4170	4160	4330		113	154
	V1	99	99	99	99	99	98	96	94	93	93			
	VR	102	102	102	102	102	102	102	102	102	101			
	V2	116	116	116	116	116	116	115	114	112	111			
	GR2	12.3	12.3	12.3	12.3	12.3	12.1	11.5	10.6	9.7	8.9			

FIGURE 10-8-11. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	TOFL	6600	6800	6990	7210	7430	7640	7860	8080	8300	8520	8740	142	194
	V1	131	132	132	132	132	132	132	133	133	133	133		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
39000	TOFL	6320	6510	6690	6870	7070	7270	7480	7690	7910	8120	8340	141	192
	V1	129	130	130	130	130	130	130	131	131	131	131		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
38000	TOFL	5870	6050	6220	6380	6540	6700	6880	7090	7280	7490	7690	138	189
	V1	125	126	126	126	126	127	127	127	127	127	128		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	5420	5590	5740	5890	6040	6180	6340	6490	6650	6830	7020	136	187
	V1	121	122	122	122	122	122	123	123	123	123	123		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	5000	5150	5280	5420	5550	5690	5820	5960	6110	6250	6400	133	184
	V1	117	117	118	118	118	118	118	118	119	119	119		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	4610	4740	4860	4980	5110	5220	5350	5480	5610	5740	5870	131	181
	V1	113	113	113	113	114	114	114	114	114	114	115		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	4260	4370	4480	4590	4700	4810	4930	5040	5160	5270	5390	129	178
	V1	109	109	109	109	109	110	110	110	110	110	110		
	VR	117	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	3960	4060	4170	4270	4370	4470	4570	4680	4780	4890	5000	127	175
	V1	105	105	106	106	106	106	106	106	106	106	107		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
32000	TOFL	3720	3820	3910	4000	4100	4190	4290	4380	4480	4580	4680	125	172
	V1	102	102	102	103	103	103	103	103	103	103	103		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.1	8	8	8	8	8	8	8	8	8	8		
31000	TOFL	3530	3610	3700	3790	3880	3960	4050	4140	4240	4330	4420	123	169
	V1	100	100	100	100	100	100	100	100	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 10-8-11. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
30000	TOFL	3430	3490	3560	3620	3690	3770	3850	3930	4020	4110	4190	121	166
	V1	98	98	98	98	98	98	98	98	98	98	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
29000	TOFL	3420	3500	3570	3640	3720	3790	3860	3930	4000	4070	4140	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
28000	TOFL	3370	3440	3510	3580	3660	3730	3800	3870	3940	4010	4090	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
27000	TOFL	3310	3390	3450	3520	3600	3670	3730	3810	3880	3940	4020	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.1		
26000	TOFL	3260	3330	3400	3460	3540	3600	3670	3750	3820	3880	3950	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 10-8-12. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
39600	TOFL	8960	9180	9410	9650	9890	10510	11520	12580	13760	14300		142	194
	V1	134	134	134	134	135	136	138	140	141	141			
	VR	136	136	136	136	136	137	138	140	141	141			
	V2	142	142	142	142	142	143	143	144	145	145			
	GR2	4.9	4.9	4.9	4.9	4.9	4.6	4.1	3.6	3	2.8			
39000	TOFL	8550	8770	8980	9200	9430	10050	11000	12010	13190	13690		141	192
	V1	131	132	132	132	133	134	136	138	139	139			
	VR	134	134	134	134	134	135	136	138	139	140			
	V2	140	140	140	140	140	141	142	142	143	143			
	GR2	5.1	5.1	5.1	5.1	5.1	4.8	4.3	3.8	3.2	3			
38000	TOFL	7900	8100	8310	8510	8730	9320	10210	11150	12200	12690		138	189
	V1	128	128	128	129	129	131	133	134	136	137			
	VR	130	130	130	130	130	131	133	135	136	137			
	V2	137	137	137	137	137	138	139	140	140	141			
	GR2	5.5	5.5	5.5	5.4	5.4	5.2	4.7	4.1	3.5	3.3			
37000	TOFL	7200	7400	7590	7790	8000	8630	9440	10300	11270	11730		136	187
	V1	124	124	124	124	125	127	129	131	133	133			
	VR	127	127	127	127	127	128	130	132	133	134			
	V2	134	134	134	134	134	135	137	137	137	138			
	GR2	5.8	5.8	5.8	5.8	5.8	5.5	5	4.4	3.8	3.6			
36000	TOFL	6540	6710	6890	7060	7250	7820	8730	9520	10400	10810		133	184
	V1	119	119	120	120	120	122	126	128	130	130			
	VR	124	124	124	124	124	125	127	128	130	130			
	V2	132	132	132	132	132	132	133	134	135	135			
	GR2	6.2	6.2	6.2	6.2	6.2	5.9	5.3	4.8	4.2	3.9			
35000	TOFL	6000	6140	6270	6410	6560	7070	7930	8790	9560	9940		131	181
	V1	115	115	115	115	116	118	121	124	126	127			
	VR	121	121	121	121	121	122	123	125	127	127			
	V2	129	129	129	129	129	129	130	131	132	132			
	GR2	6.6	6.6	6.6	6.6	6.5	6.3	5.7	5.1	4.5	4.3			
34000	TOFL	5510	5640	5760	5880	6020	6400	7140	8020	8810	9140		129	178
	V1	110	111	111	111	111	113	117	120	123	124			
	VR	118	118	118	118	118	118	120	122	123	124			
	V2	126	126	126	126	126	127	127	128	129	129			
	GR2	7	7	7	7	7	6.7	6.1	5.5	4.9	4.6			
33000	TOFL	5110	5220	5330	5440	5560	5860	6450	7200	8040	8380		127	175
	V1	107	107	107	107	107	109	112	116	119	120			
	VR	115	115	115	115	115	115	117	118	120	121			
	V2	124	124	124	124	124	124	125	125	126	126			
	GR2	7.5	7.5	7.5	7.5	7.4	7.1	6.5	5.9	5.3	5			
32000	TOFL	4780	4880	4990	5090	5200	5450	5900	6510	7280	7650		125	172
	V1	104	104	104	104	104	105	108	111	115	116			
	VR	113	113	113	113	113	113	114	115	117	117			
	V2	122	122	122	122	122	122	122	122	123	124			
	GR2	8	8	8	8	7.9	7.6	7	6.3	5.7	5.4			
31000	TOFL	4520	4610	4710	4810	4910	5110	5470	5960	6590	6890		123	169
	V1	101	101	101	101	102	102	104	107	111	112			
	VR	111	111	111	111	111	111	111	112	114	114			
	V2	121	121	121	121	121	121	120	120	121	121			
	GR2	8.5	8.5	8.5	8.5	8.5	8.1	7.5	6.8	6.1	5.9			

FIGURE 10-8-12. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
30000	TOFL	4280	4370	4460	4550	4650	4820	5110	5480	6010	6260		121	166
	V1	99	99	99	99	99	100	101	103	106	108			
	VR	109	109	109	109	109	109	109	109	111	111			
	V2	120	120	120	120	120	119	118	118	118	118			
	GR2	9.1	9.1	9.1	9.1	9.1	8.7	8	7.3	6.6	6.3			
29000	TOFL	4200	4270	4340	4380	4400	4560	4800	5110	5490	5720		119	163
	V1	98	98	98	97	97	98	99	100	102	104			
	VR	107	107	107	107	107	107	107	107	108	108			
	V2	119	119	119	119	119	118	117	116	116	116			
	GR2	9.8	9.8	9.8	9.7	9.7	9.3	8.6	7.9	7.1	6.8			
28000	TOFL	4160	4220	4300	4330	4350	4350	4530	4780	5100	5260		117	160
	V1	98	98	98	97	97	96	96	97	99	100			
	VR	106	106	106	106	106	106	106	106	106	106			
	V2	118	118	118	118	118	117	116	115	114	114			
	GR2	10.4	10.4	10.4	10.4	10.4	10	9.3	8.5	7.7	7.4			
27000	TOFL	4100	4150	4230	4270	4280	4300	4300	4500	4760	4880		115	157
	V1	98	98	98	97	97	96	94	95	96	97			
	VR	104	104	104	104	104	104	104	103	103	103			
	V2	117	117	117	117	117	116	115	114	113	112			
	GR2	11.1	11.1	11.1	11.1	11.1	10.7	10	9.1	8.3	8			
26000	TOFL	4030	4080	4160	4190	4210	4220	4250	4240	4470	4570		113	154
	V1	98	98	98	97	97	96	94	92	94	94			
	VR	102	102	102	102	102	102	102	102	101	101			
	V2	116	116	116	116	115	115	114	113	111	111			
	GR2	11.9	11.9	11.9	11.9	11.8	11.4	10.7	9.9	9	8.7			

FIGURE 10-8-13. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	TOFL	7310	7510	7750	7990	8230	8460	8700	8940	9180	9410	9660	143	194
	V1	134	134	134	135	135	135	135	135	136	136	136		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	6950	7140	7370	7600	7830	8060	8290	8520	8750	8980	9210	142	193
	V1	132	132	132	132	133	133	133	133	133	134	134		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	6450	6600	6790	6990	7200	7410	7630	7850	8070	8280	8500	139	190
	V1	128	128	129	129	129	129	129	129	130	130	130		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.3	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	5970	6110	6280	6450	6610	6780	6990	7200	7400	7610	7820	137	187
	V1	124	124	125	125	125	125	125	126	126	126	126		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	5490	5610	5770	5920	6070	6220	6380	6540	6700	6890	7080	134	184
	V1	120	120	120	120	121	121	121	121	121	122	122		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6	6	5.9	5.9	5.9	6	6	6	6	6	6		
35000	TOFL	5040	5150	5290	5430	5560	5700	5840	5980	6130	6270	6420	132	181
	V1	115	115	116	116	116	116	116	117	117	117	117		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	4630	4730	4860	4980	5100	5220	5350	5480	5610	5740	5870	129	178
	V1	111	111	111	111	112	112	112	112	112	112	113		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.8	6.8	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	4260	4350	4470	4580	4690	4800	4910	5030	5150	5260	5380	127	176
	V1	107	107	107	107	107	107	108	108	108	108	108		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
32000	TOFL	3980	4060	4170	4270	4370	4470	4580	4680	4790	4900	5010	125	173
	V1	103	104	104	104	104	104	104	104	105	105	105		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
31000	TOFL	3730	3810	3910	4000	4100	4190	4290	4390	4480	4580	4680	123	170
	V1	100	101	101	101	101	101	101	101	101	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 10-8-13. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
30000	TOFL	3540	3610	3700	3790	3880	3960	4060	4150	4240	4330	4430	121	167
	V1	98	98	98	98	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	3500	3550	3630	3700	3770	3840	3910	3990	4050	4130	4190	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
28000	TOFL	3450	3510	3600	3670	3750	3810	3890	3980	4060	4130	4190	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
27000	TOFL	3390	3450	3530	3610	3680	3760	3830	3910	3990	4070	4120	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	3330	3400	3470	3550	3620	3690	3760	3830	3920	4000	4050	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.6	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 10-8-14. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104				
	N1 (%)	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5				
39600	TOFL	9900	10130	10350	10590	10810	11900	13070	14300	15730			143	194
	V1	136	137	137	137	137	139	141	142	143				
	VR	137	137	137	137	137	139	141	142	143				
	V2	143	143	143	143	143	144	145	146	146				
	GR2	4.7	4.7	4.7	4.7	4.6	4.2	3.7	3.2	2.6				
39000	TOFL	9450	9680	9910	10110	10340	11360	12480	13670	15010			142	193
	V1	134	134	135	135	135	137	139	140	141				
	VR	135	135	135	135	135	137	139	140	141				
	V2	141	142	142	142	142	143	143	145	145				
	GR2	4.9	4.9	4.9	4.9	4.8	4.4	3.8	3.3	2.8				
38000	TOFL	8720	8950	9180	9370	9600	10510	11540	12640	13910			139	190
	V1	130	131	131	131	131	133	135	137	138				
	VR	132	132	132	132	132	134	136	137	138				
	V2	138	138	139	139	139	140	140	141	142				
	GR2	5.2	5.2	5.2	5.2	5.1	4.7	4.2	3.6	3.1				
37000	TOFL	8030	8250	8460	8670	8880	9730	10640	11690	12800			137	187
	V1	127	127	127	128	128	130	132	134	135				
	VR	129	129	129	129	129	131	132	134	135				
	V2	135	135	135	135	136	137	137	139	139				
	GR2	5.6	5.6	5.6	5.6	5.4	5.1	4.5	4	3.4				
36000	TOFL	7270	7470	7670	7870	8090	8990	9830	10740	11800			134	184
	V1	122	122	122	123	123	127	129	130	132				
	VR	125	125	125	125	125	127	129	131	132				
	V2	133	133	133	133	133	134	134	135	136				
	GR2	5.9	5.9	5.9	5.9	5.8	5.4	4.9	4.3	3.7				
35000	TOFL	6570	6740	6920	7100	7310	8200	9060	9870	10820			132	181
	V1	117	118	118	118	119	122	125	127	129				
	VR	122	122	122	122	122	124	126	127	129				
	V2	130	130	130	130	130	131	132	132	133				
	GR2	6.3	6.3	6.3	6.3	6.2	5.8	5.2	4.7	4.1				
34000	TOFL	6010	6150	6280	6420	6610	7370	8300	9080	9920			129	178
	V1	113	113	113	114	114	117	121	123	125				
	VR	119	119	119	119	119	121	122	124	125				
	V2	127	127	127	127	127	128	129	129	130				
	GR2	6.8	6.8	6.8	6.7	6.6	6.2	5.6	5	4.4				
33000	TOFL	5500	5630	5750	5870	6030	6620	7460	8310	9100			127	176
	V1	108	109	109	109	109	113	116	120	122				
	VR	116	116	116	116	116	117	119	120	122				
	V2	124	124	124	124	124	125	126	127	127				
	GR2	7.2	7.2	7.2	7.2	7	6.6	6	5.4	4.8				
32000	TOFL	5120	5230	5340	5460	5600	6020	6670	7490	8310			125	173
	V1	105	105	105	106	106	108	112	115	118				
	VR	113	113	113	113	113	114	115	117	119				
	V2	122	122	122	122	122	122	123	124	124				
	GR2	7.7	7.7	7.7	7.7	7.5	7.1	6.4	5.8	5.2				
31000	TOFL	4790	4890	4990	5100	5230	5560	6060	6700	7530			123	170
	V1	102	102	102	102	103	104	107	111	114				
	VR	111	111	111	111	111	111	112	114	115				
	V2	121	121	121	121	121	121	121	121	122				
	GR2	8.2	8.2	8.2	8.2	8	7.6	6.9	6.3	5.6				

FIGURE 10-8-14. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104				
	N1 (%)	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5				
30000	TOFL	4520	4620	4710	4810	4930	5190	5580	6110	6770			121	167
	V1	99	100	100	100	100	101	103	106	110				
	VR	109	109	109	109	109	109	109	111	112				
	V2	119	119	119	119	119	119	118	118	119				
	GR2	8.8	8.8	8.8	8.8	8.6	8.1	7.4	6.8	6.1				
29000	TOFL	4280	4370	4460	4550	4660	4880	5190	5580	6150			119	164
	V1	97	97	97	97	98	99	100	102	105				
	VR	107	107	107	107	107	107	107	108	109				
	V2	118	118	118	118	118	117	116	116	116				
	GR2	9.4	9.4	9.4	9.4	9.2	8.7	8	7.3	6.6				
28000	TOFL	4280	4340	4400	4420	4410	4610	4870	5180	5580			117	161
	V1	97	97	97	96	95	96	97	99	101				
	VR	106	106	106	106	106	106	106	106	106				
	V2	117	117	117	117	117	116	115	114	114				
	GR2	10.1	10.1	10.1	10.1	9.8	9.4	8.6	7.8	7.1				
27000	TOFL	4200	4270	4330	4360	4330	4360	4570	4840	5160			115	157
	V1	97	97	97	96	95	94	95	96	98				
	VR	104	104	104	104	104	104	104	104	104				
	V2	116	116	116	116	116	115	114	113	112				
	GR2	10.8	10.8	10.8	10.8	10.5	10.1	9.2	8.5	7.7				
26000	TOFL	4130	4200	4260	4280	4250	4300	4320	4530	4800			113	154
	V1	97	97	97	96	95	94	92	93	95				
	VR	102	102	102	102	102	102	102	102	101				
	V2	115	115	115	115	115	114	113	112	111				
	GR2	11.5	11.5	11.5	11.5	11.3	10.8	10	9.2	8.4				

FIGURE 10-8-15. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	TOFL	8120	8450	8800	9030	9270	9520	9780	10020	10270	10510	10750	144	195
	V1	137	137	138	138	138	138	139	139	139	139	139		
	VR	139	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
39000	TOFL	7720	8030	8370	8610	8830	9070	9320	9570	9810	10040	10270	143	193
	V1	134	135	136	136	136	136	136	137	137	137	137		
	VR	137	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.8	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	7090	7370	7680	7900	8120	8350	8600	8830	9080	9280	9510	140	190
	V1	131	131	132	132	132	132	133	133	133	133	133		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.1	5	4.9	4.9	4.9	5	5	5	5	5	4.9		
37000	TOFL	6540	6770	7040	7250	7450	7670	7900	8120	8350	8580	8800	138	187
	V1	127	127	128	128	128	128	129	129	129	130	130		
	VR	130	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.5	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	6010	6230	6460	6620	6780	6970	7190	7390	7610	7830	8040	135	185
	V1	122	123	124	124	124	124	124	125	125	125	126		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.8	5.7	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
35000	TOFL	5510	5700	5910	6060	6200	6350	6510	6680	6860	7060	7250	133	182
	V1	118	119	119	119	119	120	120	120	120	120	121		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.2	6.1	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
34000	TOFL	5040	5210	5400	5530	5650	5790	5930	6080	6230	6380	6530	130	179
	V1	113	114	115	115	115	115	115	115	116	116	116		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.6	6.5	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5		
33000	TOFL	4610	4770	4930	5050	5160	5280	5410	5540	5670	5810	5940	127	176
	V1	109	109	110	110	110	110	110	111	111	111	111		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	7.1	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
32000	TOFL	4270	4390	4530	4630	4740	4850	4970	5080	5200	5320	5440	125	173
	V1	105	105	106	106	106	106	106	106	107	107	107		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.5	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
31000	TOFL	3970	4080	4210	4310	4410	4510	4610	4720	4830	4940	5050	123	170
	V1	101	102	102	102	102	103	103	103	103	103	103		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		

FIGURE 10-8-15. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
30000	TOFL	3730	3820	3930	4030	4120	4210	4310	4410	4510	4610	4710	121	167
	V1	99	99	99	99	99	99	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.6	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	3530	3610	3720	3800	3890	3980	4070	4160	4250	4350	4440	119	164
	V1	96	96	97	97	97	97	97	97	97	97	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.2	9.1	8.9	9	9	9	9	9	9	9	9		
28000	TOFL	3500	3590	3680	3750	3820	3900	3970	4040	4120	4180	4250	117	161
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.9	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
27000	TOFL	3450	3540	3630	3700	3770	3850	3930	3990	4070	4140	4210	115	158
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	115	115	115	115	115	115	115	115	115		
	GR2	10.6	10.4	10.3	10.3	10.3	10.4	10.4	10.4	10.3	10.3	10.3		
26000	TOFL	3380	3480	3570	3640	3710	3780	3860	3930	4000	4070	4150	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	114	114	114	114	114	114	114	114	114	114		
	GR2	11.3	11.1	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 10-8-16. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
39600	TOFL	11000	11260	11530	11780	12430	13680	15060					144	195
	V1	139	139	139	139	140	142	143						
	VR	140	140	140	140	141	142	143						
	V2	145	145	145	145	145	146	150						
	GR2	4.4	4.4	4.4	4.3	4.1	3.7	3.2						
39000	TOFL	10520	10750	10990	11240	11880	13060	14380	15820				143	193
	V1	137	137	137	137	138	140	141	142					
	VR	138	138	138	138	139	140	142	143					
	V2	143	143	143	143	143	145	146	146					
	GR2	4.6	4.6	4.6	4.5	4.3	3.9	3.4	2.8					
38000	TOFL	9730	9950	10170	10430	10950	12060	13300	14620				140	190
	V1	133	134	134	134	135	137	138	139					
	VR	134	134	134	134	135	137	138	140					
	V2	140	140	140	140	140	142	143	143					
	GR2	4.9	4.9	4.9	4.9	4.6	4.2	3.7	3.1					
37000	TOFL	9010	9190	9410	9630	10130	11130	12240	13470	14340			138	187
	V1	130	130	130	130	131	133	135	136	137				
	VR	131	131	131	131	132	133	135	136	137				
	V2	138	138	138	138	138	138	139	140	141				
	GR2	5.3	5.3	5.3	5.2	5	4.5	4	3.5	3.1				
36000	TOFL	8270	8490	8680	8890	9360	10240	11230	12360	13150			135	185
	V1	126	126	126	127	128	130	131	133	134				
	VR	127	127	127	127	128	130	132	133	134				
	V2	134	134	134	134	134	135	136	137	138				
	GR2	5.7	5.7	5.7	5.6	5.3	4.9	4.3	3.8	3.4				
35000	TOFL	7450	7650	7850	8090	8600	9430	10330	11330	12060			133	182
	V1	121	121	122	122	124	126	128	130	131				
	VR	124	124	124	124	125	126	128	130	131				
	V2	131	131	131	131	132	133	133	134	135				
	GR2	6.1	6.1	6	5.9	5.7	5.3	4.7	4.1	3.8				
34000	TOFL	6700	6880	7060	7270	7770	8670	9460	10360	10980			130	179
	V1	116	116	117	117	119	122	124	126	127				
	VR	120	120	120	120	121	123	125	126	127				
	V2	128	128	128	128	128	130	130	131	132				
	GR2	6.4	6.4	6.4	6.3	6.1	5.7	5.1	4.5	4.1				
33000	TOFL	6080	6220	6360	6530	6970	7830	8700	9480	10030			127	176
	V1	111	112	112	112	114	118	121	123	124				
	VR	117	117	117	117	118	120	121	123	124				
	V2	125	125	125	125	125	127	128	128	129				
	GR2	6.9	6.9	6.9	6.8	6.5	6.1	5.5	4.9	4.5				
32000	TOFL	5570	5690	5820	5960	6280	6990	7890	8680	9160			125	173
	V1	107	107	107	108	109	113	117	119	120				
	VR	114	114	114	114	114	116	118	119	120				
	V2	123	123	123	123	123	124	124	125	126				
	GR2	7.3	7.3	7.3	7.2	6.9	6.5	5.9	5.3	4.9				
31000	TOFL	5160	5270	5390	5520	5770	6280	7020	7870	8360			123	170
	V1	104	104	104	104	105	108	112	115	117				
	VR	111	111	111	111	112	113	114	116	117				
	V2	121	121	121	121	121	121	121	123	123				
	GR2	7.8	7.8	7.8	7.7	7.4	6.9	6.3	5.7	5.3				

FIGURE 10-8-16. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
30000	TOFL	4810	4920	5020	5150	5350	5720	6300	7020	7560			121	167
	V1	100	100	101	101	102	104	107	110	113				
	VR	109	109	109	109	109	109	111	112	113				
	V2	119	119	119	119	119	119	119	119	120				
	GR2	8.4	8.4	8.4	8.3	7.9	7.4	6.8	6.1	5.7				
29000	TOFL	4540	4630	4730	4840	5030	5320	5740	6330	6770			119	164
	V1	98	98	98	98	99	100	102	106	108				
	VR	107	107	107	107	107	107	108	109	110				
	V2	118	118	118	118	117	116	116	117	117				
	GR2	9	9	9	8.9	8.5	8	7.3	6.6	6.2				
28000	TOFL	4320	4390	4470	4570	4730	4980	5320	5730	6110			117	161
	V1	96	96	96	96	97	98	99	101	104				
	VR	106	106	106	106	106	106	106	106	107				
	V2	117	117	116	116	116	115	114	114	114				
	GR2	9.6	9.6	9.6	9.5	9.1	8.6	7.9	7.2	6.7				
27000	TOFL	4280	4360	4420	4410	4470	4680	4960	5290	5550			115	158
	V1	96	96	95	95	94	95	96	98	99				
	VR	104	104	104	104	104	104	104	104	104				
	V2	115	115	115	115	115	114	113	112	112				
	GR2	10.3	10.3	10.3	10.2	9.8	9.2	8.5	7.8	7.3				
26000	TOFL	4210	4290	4340	4340	4320	4410	4640	4920	5120			113	155
	V1	96	96	95	95	93	92	94	95	96				
	VR	102	102	102	102	102	102	102	102	102				
	V2	114	114	114	114	114	113	112	111	110				
	GR2	11.1	11.1	11.1	10.9	10.6	9.9	9.2	8.4	7.9				

FIGURE 10-8-17. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	TOFL	9120	9580	9870	10120	10350	10610	10890	11150	11420	11690	11970	145	195
	V1	140	141	141	141	141	141	141	141	141	142	142		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	147	147	147	147	147	147	147	147	147	147		
	GR2	4.3	4.2	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
39000	TOFL	8680	9130	9440	9660	9880	10130	10390	10670	10900	11160	11420	144	193
	V1	138	139	139	139	139	139	139	139	139	139	139		
	VR	139	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.5	4.3	4.3	4.3	4.3	4.4	4.4	4.3	4.3	4.3	4.3		
38000	TOFL	7980	8390	8700	8930	9150	9370	9600	9850	10090	10340	10560	141	191
	V1	134	135	135	135	135	136	136	136	136	136	136		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	142	142	142	142	142	142	142	142	142	142		
	GR2	4.9	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
37000	TOFL	7300	7680	7970	8180	8410	8650	8860	9090	9300	9540	9750	139	188
	V1	130	131	131	131	132	132	132	132	132	132	132		
	VR	132	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.2	5	5	5	5	5	5	5	5	5	5		
36000	TOFL	6680	7020	7290	7480	7690	7930	8160	8380	8590	8800	9000	136	185
	V1	126	127	127	128	128	128	128	128	129	129	129		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
35000	TOFL	6110	6400	6600	6760	6930	7140	7360	7580	7800	8020	8240	134	182
	V1	121	122	123	123	123	123	123	124	124	124	125		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6	5.8	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
34000	TOFL	5570	5830	6020	6160	6300	6450	6620	6810	7000	7200	7400	131	179
	V1	116	118	118	118	118	118	119	119	119	119	120		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.4	6.2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
33000	TOFL	5080	5310	5480	5600	5720	5860	6010	6170	6320	6470	6630	128	176
	V1	112	113	113	113	113	114	114	114	114	114	115		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.8	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
32000	TOFL	4640	4840	4990	5100	5210	5340	5470	5600	5740	5870	6010	126	173
	V1	107	108	109	109	109	109	109	109	109	110	110		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	124	124	124	124	124	124	124	124	124	124		
	GR2	7.2	7	7	7	7	7	7	7	7	7	7		
31000	TOFL	4280	4450	4570	4680	4780	4890	5010	5130	5250	5370	5500	123	170
	V1	103	104	104	104	104	105	105	105	105	105	105		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.7	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		

FIGURE 10-8-17. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
30000	TOFL	3980	4100	4220	4320	4410	4510	4620	4730	4840	4950	5060	121	167
	V1	100	100	100	101	101	101	101	101	101	101	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.3	8	8	8	8	8	8	8	8	8	8		
29000	TOFL	3720	3840	3940	4030	4120	4220	4320	4420	4520	4620	4720	119	164
	V1	97	97	97	97	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.8	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	3550	3630	3730	3820	3900	3990	4080	4180	4270	4360	4460	117	161
	V1	95	95	95	95	95	95	95	96	96	96	96		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.5	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
27000	TOFL	3520	3620	3700	3780	3860	3930	4000	4070	4150	4220	4290	115	158
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
26000	TOFL	3450	3560	3650	3710	3790	3870	3930	4010	4100	4170	4240	113	155
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.9	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		

FIGURE 10-8-18. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
39600	TOFL	12250	12510	12820	13190	14320	15840	17530					145	195
	V1	142	142	142	142	143	145	146						
	VR	142	142	142	142	143	145	146						
	V2	147	147	147	147	147	148	149						
	GR2	4.2	4.2	4.1	4	3.7	3.2	2.7						
39000	TOFL	11680	11950	12230	12590	13680	15100	16690					144	193
	V1	139	140	140	140	141	143	144						
	VR	140	140	140	140	141	143	144						
	V2	145	145	145	145	146	146	147						
	GR2	4.3	4.3	4.3	4.1	3.8	3.4	2.9						
38000	TOFL	10810	11050	11300	11630	12610	13930	15430					141	191
	V1	136	136	136	136	138	139	141						
	VR	136	136	136	137	138	140	141						
	V2	142	142	142	142	142	143	145						
	GR2	4.7	4.7	4.7	4.4	4.2	3.7	3.2						
37000	TOFL	9970	10190	10420	10720	11600	12850	14190					139	188
	V1	132	132	132	133	134	136	138						
	VR	133	133	133	133	135	136	138						
	V2	139	139	139	139	139	141	144						
	GR2	5	5	5	4.8	4.5	4	3.5						
36000	TOFL	9210	9420	9620	9890	10660	11760	13000					136	185
	V1	129	129	129	129	131	133	134						
	VR	129	129	129	130	131	133	134						
	V2	136	136	136	136	136	137	138						
	GR2	5.4	5.4	5.4	5.1	4.8	4.3	3.8						
35000	TOFL	8460	8650	8850	9110	9830	10760	11890					134	182
	V1	125	125	125	126	127	129	131						
	VR	126	126	126	126	127	129	131						
	V2	133	133	133	133	133	134	135						
	GR2	5.8	5.8	5.7	5.5	5.2	4.7	4.2						
34000	TOFL	7610	7810	8020	8350	9020	9880	10830	11980				131	179
	V1	120	120	120	121	124	125	127	129					
	VR	122	122	122	123	124	126	127	129					
	V2	129	129	129	129	130	131	132	133					
	GR2	6.2	6.2	6.1	5.9	5.6	5.1	4.5	4					
33000	TOFL	6810	7000	7180	7480	8250	9050	9900	10880	11100			128	176
	V1	115	115	115	116	119	122	124	125	126				
	VR	119	119	119	119	120	122	124	126	126				
	V2	126	126	126	126	128	128	129	130	130				
	GR2	6.6	6.6	6.6	6.3	6	5.5	4.9	4.3	4.2				
32000	TOFL	6150	6300	6440	6700	7360	8260	9050	9890	10100			126	173
	V1	110	110	111	111	114	118	120	122	122				
	VR	115	115	115	115	117	119	120	122	122				
	V2	124	124	124	124	124	126	126	127	127				
	GR2	7	7	7	6.7	6.4	5.9	5.3	4.7	4.6				
31000	TOFL	5620	5750	5880	6080	6560	7370	8230	9010	9200			123	170
	V1	106	106	106	107	109	113	116	118	118				
	VR	112	112	112	112	113	115	117	118	119				
	V2	121	121	121	121	121	122	123	124	124				
	GR2	7.5	7.5	7.5	7.2	6.8	6.3	5.7	5.1	5				

FIGURE 10-8-18. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
30000	TOFL	5170	5290	5400	5580	5960	6560	7370	8180	8340			121	167
	V1	102	102	102	103	105	108	112	114	115				
	VR	109	109	109	109	110	111	113	115	115				
	V2	119	119	119	119	119	119	120	121	121				
	GR2	8	8	8	7.7	7.3	6.8	6.2	5.6	5.4				
29000	TOFL	4820	4930	5040	5190	5460	5910	6540	7340	7520			119	164
	V1	99	99	99	100	101	103	106	110	111				
	VR	107	107	107	107	107	108	109	111	111				
	V2	117	117	117	117	117	117	117	117	118				
	GR2	8.6	8.6	8.6	8.3	7.8	7.3	6.7	6	5.9				
28000	TOFL	4560	4650	4750	4890	5110	5450	5920	6570	6730			117	161
	V1	96	96	97	97	98	99	102	105	106				
	VR	105	105	105	105	105	105	106	108	108				
	V2	116	116	116	115	115	115	115	115	115				
	GR2	9.2	9.2	9.2	8.9	8.4	7.9	7.2	6.5	6.4				
27000	TOFL	4370	4420	4490	4630	4810	5070	5430	5920	6060			115	158
	V1	94	94	94	95	95	96	98	101	102				
	VR	104	104	104	104	104	104	104	105	105				
	V2	115	115	115	114	114	113	112	112	112				
	GR2	9.9	9.9	9.9	9.6	9.1	8.5	7.8	7.1	6.9				
26000	TOFL	4320	4370	4390	4380	4540	4750	5030	5400	5500			113	155
	V1	94	94	94	93	93	94	95	97	97				
	VR	102	102	102	102	102	102	102	102	102				
	V2	114	114	114	113	113	112	111	110	110				
	GR2	10.6	10.6	10.6	10.3	9.8	9.2	8.4	7.7	7.5				

FIGURE 10-8-19. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	TOFL	10270	10730	11000	11280	11520	11820	12120	12440	12730	13030	13350	147	195
	V1	143	144	144	144	144	144	144	144	144	144	144		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	4	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	TOFL	9790	10260	10540	10760	11010	11300	11590	11880	12170	12460	12750	145	194
	V1	141	142	142	142	142	142	142	142	142	142	142		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4.2	4	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	TOFL	9040	9470	9710	9940	10180	10450	10680	10950	11220	11480	11740	142	191
	V1	137	138	138	138	138	138	138	138	138	138	138		
	VR	138	139	139	139	139	139	139	139	139	139	139		
	V2	143	144	144	144	144	144	144	144	144	144	144		
	GR2	4.6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	TOFL	8290	8720	8940	9160	9380	9620	9860	10110	10340	10590	10820	140	188
	V1	133	134	134	134	134	134	134	135	135	135	135		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.9	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.7	4.7		
36000	TOFL	7580	7990	8230	8430	8630	8860	9100	9310	9540	9740	9970	137	185
	V1	129	130	131	131	131	131	131	131	131	131	131		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
35000	TOFL	6860	7260	7470	7690	7910	8130	8350	8560	8770	8970	9170	135	183
	V1	125	126	126	127	127	127	127	127	127	127	127		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.6	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
34000	TOFL	6240	6550	6720	6890	7080	7300	7530	7750	7980	8200	8410	132	180
	V1	120	121	122	122	122	122	122	123	123	123	123		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
33000	TOFL	5670	5950	6100	6240	6380	6550	6730	6930	7130	7330	7540	129	177
	V1	115	117	117	117	117	117	117	118	118	118	118		
	VR	120	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.4	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
32000	TOFL	5150	5400	5530	5660	5780	5940	6090	6240	6390	6550	6730	127	174
	V1	110	112	112	112	112	112	112	113	113	113	113		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
31000	TOFL	4690	4910	5020	5130	5250	5380	5510	5650	5780	5920	6070	124	171
	V1	106	107	107	107	107	107	107	108	108	108	108		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.3	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		

FIGURE 10-8-19. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
30000	TOFL	4310	4480	4590	4690	4800	4920	5040	5160	5280	5400	5530	121	168
	V1	101	102	103	103	103	103	103	103	103	104	104		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.8	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
29000	TOFL	3990	4120	4220	4320	4420	4520	4630	4740	4850	4960	5080	119	165
	V1	98	98	99	99	99	99	99	99	99	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.4	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
28000	TOFL	3730	3850	3940	4030	4120	4220	4320	4420	4520	4620	4730	117	161
	V1	95	95	96	96	96	96	96	96	96	96	97		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	9	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
27000	TOFL	3610	3680	3760	3820	3910	4000	4090	4190	4280	4380	4470	115	158
	V1	94	93	93	93	94	94	94	94	94	94	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.7	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
26000	TOFL	3550	3670	3730	3800	3880	3960	4030	4110	4200	4270	4340	113	155
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		

FIGURE 10-8-20. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
39600	TOFL	13690	13980	14340	15040	16670							147	195
	V1	144	144	144	145	146								
	VR	144	144	144	145	146								
	V2	149	149	149	149	150								
	GR2	3.9	3.9	3.8	3.5	3.2								
39000	TOFL	13060	13360	13690	14330	15890							145	194
	V1	142	142	142	143	144								
	VR	142	142	142	143	144								
	V2	147	147	147	147	148								
	GR2	4.1	4.1	4	3.7	3.4								
38000	TOFL	12020	12320	12600	13210	14640	16310						142	191
	V1	138	138	138	139	141	142							
	VR	139	139	139	139	141	142							
	V2	144	144	144	144	145	146							
	GR2	4.4	4.4	4.3	4	3.7	3.2							
37000	TOFL	11100	11330	11640	12160	13440	14950						140	188
	V1	135	135	135	135	137	139							
	VR	135	135	135	136	138	139							
	V2	140	140	140	140	142	143							
	GR2	4.7	4.7	4.6	4.3	4	3.5							
36000	TOFL	10190	10430	10690	11160	12300	13680						137	185
	V1	131	131	131	132	134	135							
	VR	131	131	132	132	134	136							
	V2	137	137	137	137	138	140							
	GR2	5.1	5.1	5	4.7	4.3	3.8							
35000	TOFL	9390	9590	9820	10270	11240	12470						135	183
	V1	127	128	128	128	130	132							
	VR	128	128	128	129	130	132							
	V2	134	134	134	134	135	136							
	GR2	5.5	5.4	5.3	5	4.7	4.2							
34000	TOFL	8610	8800	9010	9420	10280	11350						132	180
	V1	124	124	124	125	126	128							
	VR	124	124	124	125	127	128							
	V2	131	131	131	131	132	133							
	GR2	5.9	5.8	5.7	5.4	5.1	4.6							
33000	TOFL	7750	7960	8220	8630	9410	10320	11390					129	177
	V1	119	119	120	121	123	125	126						
	VR	121	121	121	121	123	125	126						
	V2	128	128	128	128	129	130	131						
	GR2	6.3	6.3	6.1	5.8	5.4	4.9	4.4						
32000	TOFL	6920	7110	7330	7800	8620	9410	10350	11210				127	174
	V1	113	114	114	116	119	121	123	124					
	VR	117	117	117	118	119	121	123	124					
	V2	125	125	125	125	126	127	128	128					
	GR2	6.7	6.7	6.6	6.2	5.8	5.3	4.8	4.3					
31000	TOFL	6210	6360	6540	6960	7760	8590	9400	10160				124	171
	V1	109	109	109	111	114	117	119	120					
	VR	113	113	114	114	116	118	119	121					
	V2	122	122	122	122	123	124	124	125					
	GR2	7.2	7.1	7	6.6	6.3	5.8	5.2	4.7					

FIGURE 10-8-20. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
30000	TOFL	5660	5780	5950	6250	6890	7770	8540	9200				121	168
	V1	104	104	105	106	109	113	115	117					
	VR	110	110	110	111	112	114	116	117					
	V2	119	119	119	119	120	121	121	122					
	GR2	7.7	7.6	7.5	7.1	6.7	6.2	5.6	5.1					
29000	TOFL	5190	5310	5440	5680	6170	6850	7700	8330				119	165
	V1	100	100	101	102	104	108	111	113					
	VR	107	107	107	108	109	110	112	113					
	V2	117	117	117	117	117	117	119	119					
	GR2	8.2	8.2	8	7.6	7.2	6.7	6.1	5.6					
28000	TOFL	4830	4940	5060	5270	5590	6110	6800	7480				117	161
	V1	97	97	97	98	100	102	106	109					
	VR	105	105	105	105	105	107	108	109					
	V2	115	115	115	114	114	114	115	116					
	GR2	8.8	8.8	8.6	8.2	7.8	7.2	6.6	6					
27000	TOFL	4570	4670	4780	4950	5190	5570	6120	6680				115	158
	V1	95	95	95	96	97	98	101	104					
	VR	104	104	104	104	104	104	105	106					
	V2	114	114	114	113	112	112	112	113					
	GR2	9.5	9.4	9.3	8.9	8.4	7.8	7.1	6.6					
26000	TOFL	4410	4460	4520	4680	4870	5140	5550	5980				113	155
	V1	93	93	93	94	94	95	97	99					
	VR	102	102	102	102	102	102	102	103					
	V2	113	113	113	112	111	110	110	110					
	GR2	10.2	10.2	10	9.6	9.1	8.4	7.7	7.1					

FIGURE 10-8-21. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	TOFL	11570	11960	12230	12570	12880	13220	13550	13910	14270	14620	14990	148	196
	V1	146	146	146	146	146	147	147	147	147	147	147		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	151	151	151	151	151	151	151	151	151	151		
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
39000	TOFL	11050	11420	11700	11990	12300	12640	12940	13270	13600	13950	14290	146	194
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	148	149	149	149	149	149	149	149	149	149	149		
	GR2	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
38000	TOFL	10230	10550	10810	11090	11370	11680	11970	12260	12580	12870	13180	144	191
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
37000	TOFL	9400	9730	9950	10200	10450	10730	11020	11270	11530	11820	12110	141	189
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
36000	TOFL	8640	8940	9160	9400	9610	9870	10110	10350	10590	10850	11110	138	186
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
35000	TOFL	7900	8180	8390	8620	8830	9050	9270	9500	9720	9960	10180	136	183
	V1	129	129	129	129	129	129	130	130	130	130	130		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
34000	TOFL	7100	7400	7630	7850	8070	8270	8500	8720	8920	9140	9330	133	180
	V1	124	125	125	125	125	125	126	126	126	126	126		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
33000	TOFL	6400	6630	6810	7010	7220	7440	7670	7910	8110	8320	8530	130	177
	V1	119	120	120	120	120	121	121	121	122	122	122		
	VR	122	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
32000	TOFL	5780	5990	6140	6300	6450	6630	6820	7020	7230	7440	7650	127	174
	V1	114	115	115	115	115	116	116	116	116	117	117		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
31000	TOFL	5240	5420	5550	5690	5830	5990	6140	6300	6450	6620	6810	125	171
	V1	109	110	110	110	110	111	111	111	111	112	112		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8		

FIGURE 10-8-21. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
30000	TOFL	4760	4910	5030	5150	5280	5420	5550	5690	5830	5970	6110	122	168
	V1	104	105	105	105	105	106	106	106	106	106	107		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
29000	TOFL	4340	4480	4580	4690	4810	4930	5050	5170	5290	5420	5540	119	165
	V1	100	100	101	101	101	101	101	101	102	102	102		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8		
28000	TOFL	4030	4130	4230	4330	4440	4550	4660	4770	4880	4990	5110	117	162
	V1	96	97	97	97	97	97	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.6	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
27000	TOFL	3770	3870	3960	4050	4150	4250	4350	4450	4560	4660	4760	115	159
	V1	94	94	94	94	94	94	95	95	95	95	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
26000	TOFL	3660	3730	3810	3880	3960	4030	4120	4220	4310	4410	4510	113	155
	V1	92	92	92	92	92	92	93	93	93	93	93		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 10-8-22. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89					
	N1 (%)	90.8	91.7	92.5	92.2	91.5	90.9	90.2	90.0					
39600	TOFL	15340	15740	16300									148	196
	V1	147	147	147										
	VR	147	147	147										
	V2	151	151	151										
	GR2	3.6	3.5	3.3										
39000	TOFL	14630	15000	15540									146	194
	V1	144	145	145										
	VR	145	145	145										
	V2	149	149	149										
	GR2	3.8	3.7	3.5										
38000	TOFL	13510	13820	14320	15420								144	191
	V1	141	141	141	142									
	VR	141	141	141	142									
	V2	145	145	145	146									
	GR2	4.1	4.1	3.8	3.5									
37000	TOFL	12390	12670	13120	14170								141	189
	V1	137	137	138	139									
	VR	137	137	138	139									
	V2	142	142	142	143									
	GR2	4.5	4.4	4.2	3.9									
36000	TOFL	11360	11610	12010	12930	14400							138	186
	V1	134	134	134	135	137								
	VR	134	134	134	135	137								
	V2	139	139	139	139	141								
	GR2	4.8	4.7	4.5	4.2	3.8								
35000	TOFL	10410	10640	11000	11810	13120							136	183
	V1	130	130	130	131	133								
	VR	130	130	130	132	133								
	V2	136	136	136	136	138								
	GR2	5.2	5.1	4.9	4.5	4.2								
34000	TOFL	9560	9760	10060	10770	11870							133	180
	V1	126	126	126	128	129								
	VR	126	126	127	128	129								
	V2	133	133	133	133	134								
	GR2	5.6	5.5	5.2	4.9	4.5								
33000	TOFL	8720	8910	9200	9850	10790	11970						130	177
	V1	122	122	122	124	126	127							
	VR	123	123	123	124	126	128							
	V2	129	129	129	129	131	132							
	GR2	6	5.9	5.6	5.3	4.9	4.4							
32000	TOFL	7860	8100	8400	8970	9820	10810						127	174
	V1	117	118	118	120	122	124							
	VR	119	119	119	120	122	124							
	V2	126	126	126	126	127	128							
	GR2	6.4	6.3	6	5.7	5.3	4.8							
31000	TOFL	7000	7210	7550	8170	8950	9820	10820	11310				125	171
	V1	112	112	114	116	118	120	122	122					
	VR	115	115	116	117	118	120	122	123					
	V2	123	123	123	124	124	125	126	127					
	GR2	6.8	6.7	6.5	6.1	5.7	5.2	4.6	4.4					

FIGURE 10-8-22. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89					
	N1 (%)	90.8	91.7	92.5	92.2	91.5	90.9	90.2	90.0					
30000	TOFL	6260	6420	6710	7290	8090	8910	9770	10200				122	168
	V1	107	107	108	111	114	116	118	119					
	VR	112	112	112	113	115	116	118	119					
	V2	120	120	120	120	122	122	123	123					
	GR2	7.3	7.2	6.9	6.6	6.2	5.7	5.1	4.8					
29000	TOFL	5670	5820	6050	6480	7210	8040	8830	9200				119	165
	V1	102	103	104	106	109	112	114	115					
	VR	108	108	108	109	111	113	114	115					
	V2	117	117	117	117	118	119	120	120					
	GR2	7.8	7.7	7.4	7.1	6.7	6.1	5.5	5.2					
28000	TOFL	5220	5350	5540	5850	6390	7140	7940	8270				117	162
	V1	98	99	100	101	104	107	110	111					
	VR	106	106	106	106	107	109	111	111					
	V2	115	115	115	115	115	116	116	117					
	GR2	8.4	8.3	8	7.6	7.2	6.6	6	5.7					
27000	TOFL	4870	4990	5140	5380	5740	6320	7060	7400				115	159
	V1	95	96	96	97	99	102	105	107					
	VR	104	104	104	104	104	105	107	107					
	V2	114	113	113	112	112	113	113	114					
	GR2	9.1	8.9	8.6	8.2	7.7	7.1	6.5	6.2					
26000	TOFL	4610	4720	4860	5040	5290	5710	6300	6590				113	155
	V1	93	94	94	95	95	97	101	102					
	VR	102	102	102	102	102	102	103	104					
	V2	113	113	112	111	111	111	111	111					
	GR2	9.8	9.6	9.3	8.8	8.3	7.7	7.1	6.8					

FIGURE 10-8-23. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	TOFL	13010	13320	13710	14080	14480	14880	15270	15680	16100	16500	16950	149	196
	V1	149	149	149	149	149	149	149	149	149	149	149		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	153	153	153	153	153	153	153	153	153	153		
	GR2	3.4	3.3	3.3	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3		
39000	TOFL	12400	12700	13070	13420	13800	14180	14580	14950	15330	15730	16120	147	194
	V1	147	147	147	147	147	147	147	147	147	147	147		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	151	151	151	151	151	151	151		
	GR2	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
38000	TOFL	11470	11740	12060	12400	12740	13060	13410	13760	14120	14460	14830	145	192
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	148		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	TOFL	10600	10820	11110	11420	11730	12040	12340	12670	12970	13300	13640	142	189
	V1	140	140	140	140	140	140	140	140	140	140	140		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
36000	TOFL	9710	9920	10200	10460	10730	11020	11300	11570	11860	12180	12440	139	186
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
35000	TOFL	8890	9090	9330	9600	9840	10080	10340	10580	10850	11110	11370	137	183
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	137	137	137	137	137	137	137	137	137	137		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
34000	TOFL	8110	8310	8540	8790	9000	9220	9470	9690	9900	10130	10360	134	180
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	134	134	134	134	134	134	134	134	134		
	GR2	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
33000	TOFL	7300	7500	7740	7970	8190	8410	8620	8830	9030	9240	9460	131	177
	V1	123	123	124	124	124	124	124	124	124	124	124		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
32000	TOFL	6520	6670	6880	7100	7330	7560	7800	8020	8210	8420	8620	128	175
	V1	118	118	118	119	119	119	120	120	120	120	120		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
31000	TOFL	5860	6000	6170	6330	6510	6690	6890	7090	7300	7520	7730	126	172
	V1	113	113	113	113	114	114	114	114	115	115	115		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		

FIGURE 10-8-23. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
30000	TOFL	5290	5420	5570	5710	5870	6020	6180	6340	6500	6670	6860	123	168
	V1	108	108	108	108	109	109	109	109	110	110	110		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	7	7		
29000	TOFL	4800	4900	5030	5160	5300	5440	5570	5710	5850	5990	6140	120	165
	V1	103	103	103	103	104	104	104	104	104	105	105		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.5		
28000	TOFL	4350	4440	4560	4670	4790	4910	5030	5150	5280	5400	5530	117	162
	V1	98	98	98	99	99	99	99	99	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
27000	TOFL	4050	4130	4240	4350	4460	4570	4680	4790	4900	5010	5130	115	159
	V1	95	95	95	95	96	96	96	96	96	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
26000	TOFL	3810	3890	3980	4080	4180	4280	4380	4490	4590	4690	4800	113	156
	V1	92	92	93	93	93	93	93	93	94	94	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 10-8-24. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86						
	N1 (%)	91.3	92.2	92.6	92.0	91.4	90.8	90.1						
39600	TOFL	17410	17840										149	196
	V1	149	149											
	VR	149	149											
	V2	153	153											
	GR2	3.3	3.2											
39000	TOFL	16550	16990										147	194
	V1	147	147											
	VR	147	147											
	V2	151	151											
	GR2	3.5	3.4											
38000	TOFL	15230	15620	16400									145	192
	V1	143	144	144										
	VR	144	144	144										
	V2	148	148	148										
	GR2	3.8	3.7	3.4										
37000	TOFL	13990	14310	15010									142	189
	V1	140	140	140										
	VR	140	140	141										
	V2	144	144	144										
	GR2	4.2	4	3.7										
36000	TOFL	12740	13060	13720									139	186
	V1	136	136	137										
	VR	136	136	137										
	V2	141	141	141										
	GR2	4.5	4.3	4										
35000	TOFL	11630	11900	12480									137	183
	V1	132	132	133										
	VR	132	132	133										
	V2	137	137	137										
	GR2	4.9	4.7	4.4										
34000	TOFL	10610	10860	11350	12500								134	180
	V1	128	128	129	131									
	VR	129	129	129	131									
	V2	134	134	134	135									
	GR2	5.3	5.1	4.7	4.4									
33000	TOFL	9670	9890	10330	11330								131	177
	V1	124	124	125	127									
	VR	125	125	125	127									
	V2	131	131	131	132									
	GR2	5.7	5.4	5.1	4.8									
32000	TOFL	8830	9020	9400	10250	11350							128	175
	V1	120	120	121	123	125								
	VR	121	121	121	123	125								
	V2	127	127	127	128	130								
	GR2	6.1	5.8	5.5	5.2	4.8								
31000	TOFL	7950	8180	8560	9310	10230	11370						126	172
	V1	116	116	117	119	121	123							
	VR	117	117	117	119	121	123							
	V2	124	124	124	125	126	127							
	GR2	6.6	6.3	5.9	5.6	5.2	4.7							

FIGURE 10-8-24. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86						
	N1 (%)	91.3	92.2	92.6	92.0	91.4	90.8	90.1						
30000	TOFL	7060	7310	7770	8450	9250	10240						123	168
	V1	110	111	113	115	117	119							
	VR	113	113	114	115	117	119							
	V2	121	121	121	122	123	124							
	GR2	7	6.7	6.4	6	5.7	5.1							
29000	TOFL	6290	6490	6880	7620	8390	9220	10180					120	165
	V1	105	106	108	111	113	115	117						
	VR	110	110	110	112	113	115	117						
	V2	118	118	118	118	119	120	122						
	GR2	7.5	7.2	6.8	6.5	6.1	5.5	4.9						
28000	TOFL	5660	5840	6150	6730	7510	8290	9130					117	162
	V1	100	101	102	105	108	111	113						
	VR	106	106	107	108	109	111	113						
	V2	115	115	115	115	116	117	118						
	GR2	8.1	7.8	7.3	7	6.6	6	5.4						
27000	TOFL	5250	5410	5620	6010	6600	7400	8160					115	159
	V1	97	98	98	100	103	106	109						
	VR	104	104	104	104	106	107	109						
	V2	113	113	113	113	113	114	115						
	GR2	8.7	8.4	7.9	7.5	7.1	6.5	5.9						
26000	TOFL	4910	5050	5230	5480	5880	6520	7260					113	156
	V1	94	95	95	96	98	101	104						
	VR	102	102	102	102	102	104	105						
	V2	112	112	111	111	111	111	111						
	GR2	9.4	9	8.6	8.1	7.7	7.1	6.4						

FIGURE 10-8-25. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	TOFL	14580	15090	15510	15940	16410	16870	17370	17840	18350			150	197
	V1	152	152	152	152	152	152	152	152	152				
	VR	152	152	152	152	152	152	152	152	152				
	V2	155	155	155	155	155	155	155	155	155				
	GR2	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1				
39000	TOFL	13920	14420	14820	15230	15650	16120	16550	17020	17480			148	195
	V1	150	150	150	150	150	150	150	150	150				
	VR	150	150	150	150	150	150	150	150	150				
	V2	153	153	153	153	153	153	153	153	153				
	GR2	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3				
38000	TOFL	12840	13310	13650	14020	14430	14820	15230	15630	16070			146	192
	V1	146	146	146	146	146	146	146	146	146				
	VR	146	146	146	146	146	146	146	146	146				
	V2	150	150	150	150	150	150	150	150	150				
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6				
37000	TOFL	11830	12230	12560	12910	13260	13630	13990	14370	14750	15130	15540	143	189
	V1	142	143	143	143	143	143	143	143	143	143	143		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	146	146	146	146	146	146	146	147	147	147	147		
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
36000	TOFL	10840	11230	11520	11820	12150	12470	12800	13120	13460	13820	14180	140	187
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
35000	TOFL	9910	10280	10530	10810	11090	11390	11660	11960	12280	12570	12880	138	184
	V1	134	135	135	135	135	135	135	135	135	135	135		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	139	140	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6		
34000	TOFL	9040	9340	9590	9820	10090	10340	10600	10860	11120	11410	11660	135	181
	V1	130	131	131	131	131	131	131	131	131	131	131		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5	5.1	5.1	5.1	5	5	5	5	5	5		
33000	TOFL	8230	8520	8750	8960	9180	9420	9660	9890	10110	10350	10590	132	178
	V1	126	127	127	127	127	127	127	127	127	127	127		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	133	133	133	133	133	133	133	133	133	132		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
32000	TOFL	7400	7690	7910	8120	8350	8560	8780	8980	9180	9420	9630	129	175
	V1	122	122	122	123	123	123	123	123	123	123	123		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	129	129	129	129	129		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8		
31000	TOFL	6560	6830	7030	7250	7490	7730	7940	8140	8350	8560	8740	127	172
	V1	116	117	117	118	118	118	118	118	119	119	119		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		

FIGURE 10-8-25. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
30000	TOFL	5880	6100	6260	6420	6600	6800	7010	7220	7430	7650	7880	124	169
	V1	111	112	112	112	112	113	113	113	113	114	114		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
29000	TOFL	5290	5480	5620	5760	5920	6080	6240	6400	6570	6760	6950	121	166
	V1	106	106	107	107	107	107	108	108	108	108	109		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
28000	TOFL	4770	4930	5050	5180	5320	5460	5600	5730	5880	6020	6170	118	162
	V1	101	101	102	102	102	102	102	103	103	103	103		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
27000	TOFL	4350	4470	4580	4690	4820	4940	5060	5180	5310	5440	5570	115	159
	V1	96	97	97	97	97	97	98	98	98	98	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
26000	TOFL	4020	4130	4240	4340	4450	4560	4670	4780	4900	5010	5130	113	156
	V1	93	93	93	94	94	94	94	94	95	95	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	111	111	111	111	111	111	111	111	111	111	111		
	GR2	9.2	9	9.1	9.1	9.1	9.1	9.1	9.1	9	9	9		

FIGURE 10-8-26. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	15930											143	189
	V1	143												
	VR	143												
	V2	147												
	GR2	3.8												
36000	TOFL	14520											140	187
	V1	139												
	VR	139												
	V2	143												
	GR2	4.2												
35000	TOFL	13210	13680										138	184
	V1	135	135											
	VR	135	135											
	V2	140	140											
	GR2	4.5	4.2											
34000	TOFL	11960	12360										135	181
	V1	131	131											
	VR	131	131											
	V2	136	136											
	GR2	4.9	4.6											
33000	TOFL	10850	11200										132	178
	V1	127	127											
	VR	127	127											
	V2	132	132											
	GR2	5.3	4.9											
32000	TOFL	9850	10180	10860									129	175
	V1	123	123	124										
	VR	123	124	125										
	V2	129	129	129										
	GR2	5.7	5.3	5										
31000	TOFL	8940	9260	9840	10830								127	172
	V1	119	119	120	122									
	VR	119	120	121	122									
	V2	126	126	126	127									
	GR2	6.1	5.8	5.4	5.1									

FIGURE 10-8-26. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
30000	TOFL	8090	8400	8920	9750	10760							124	169
	V1	114	115	116	118	120								
	VR	115	116	117	118	120								
	V2	122	122	123	124	125								
	GR2	6.6	6.2	5.8	5.5	5.1								
29000	TOFL	7180	7560	8080	8810	9680	10730						121	166
	V1	109	111	112	114	116	118							
	VR	112	112	113	114	116	118							
	V2	119	119	119	120	122	123							
	GR2	7.1	6.7	6.3	6	5.5	5							
28000	TOFL	6350	6670	7220	7940	8700	9580	10260					118	162
	V1	104	105	108	110	112	114	115						
	VR	108	108	109	111	112	114	115						
	V2	116	116	116	118	118	119	120						
	GR2	7.6	7.2	6.8	6.4	6	5.4	5						
27000	TOFL	5720	5960	6370	7060	7800	8590	9150					115	159
	V1	99	100	102	105	108	110	111						
	VR	105	105	105	107	108	110	111						
	V2	113	113	113	114	115	116	116						
	GR2	8.2	7.7	7.3	7	6.5	5.9	5.5						
26000	TOFL	5270	5460	5750	6230	6900	7670	8160					113	156
	V1	95	96	97	100	103	106	107						
	VR	102	102	102	103	105	106	107						
	V2	111	111	111	111	112	112	113						
	GR2	8.8	8.4	7.9	7.5	7.1	6.4	6						

FIGURE 10-8-27. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	TOFL	16700	17150	17650	18220								151	197
	V1	155	155	155	155									
	VR	155	155	155	155									
	V2	157	157	159	161									
	GR2	2.9	2.8	2.8	2.8									
39000	TOFL	15920	16350	16820	17360	17870							150	196
	V1	153	153	153	153	153								
	VR	153	153	153	153	153								
	V2	155	155	155	155	155								
	GR2	3.1	3	3	3	3								
38000	TOFL	14710	15090	15520	15980	16470	16930						147	193
	V1	149	149	149	149	149	149							
	VR	149	149	149	149	149	149							
	V2	152	152	152	152	152	152							
	GR2	3.4	3.4	3.3	3.3	3.3	3.3							
37000	TOFL	13490	13840	14230	14660	15070	15520	15960					144	190
	V1	145	145	145	145	145	145	145						
	VR	146	146	146	146	146	146	146						
	V2	149	149	149	149	149	149	149						
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6						
36000	TOFL	12350	12680	13030	13390	13770	14180	14570	14980	15370	15810		142	187
	V1	142	142	142	142	142	142	142	142	142	142			
	VR	142	142	142	142	142	142	142	142	142	142			
	V2	145	146	146	146	146	146	146	146	146	146			
	GR2	4.1	4	4	4	4	4	4	4	4	4			
35000	TOFL	11290	11570	11910	12220	12560	12920	13250	13630	13970	14350	14710	139	184
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3		
34000	TOFL	10280	10520	10810	11100	11420	11710	12000	12340	12630	12960	13280	136	181
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7		
33000	TOFL	9320	9530	9790	10050	10300	10570	10850	11110	11390	11670	11950	133	178
	V1	129	129	129	129	129	129	129	129	130	130	130		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1		
32000	TOFL	8440	8660	8900	9150	9360	9590	9830	10070	10310	10550	10810	130	175
	V1	125	125	125	125	125	125	125	126	126	126	126		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5		
31000	TOFL	7610	7820	8030	8260	8480	8700	8910	9110	9330	9560	9780	128	172
	V1	121	121	121	121	121	121	121	121	121	121	122		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.1	6	6	6	6	6	6	6	6	6	5.9		

FIGURE 10-8-27. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
30000	TOFL	6730	6930	7150	7380	7630	7840	8040	8240	8450	8650	8840	125	169
	V1	115	116	116	116	117	117	117	117	117	117	117		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4		
29000	TOFL	6010	6150	6320	6500	6690	6900	7110	7330	7550	7770	7970	122	166
	V1	110	110	110	111	111	111	112	112	112	113	113		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7	7	7	7	7	6.9	6.9	6.9	6.9	6.9	6.9		
28000	TOFL	5370	5500	5650	5800	5970	6130	6290	6450	6630	6820	7020	119	163
	V1	105	105	105	105	106	106	106	106	107	107	107		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4		
27000	TOFL	4810	4920	5050	5180	5320	5460	5600	5740	5880	6030	6190	116	160
	V1	99	99	100	100	100	100	101	101	101	101	102		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.1	8.1	8	8	8	8	8	8	8	8	7.9		
26000	TOFL	4370	4460	4580	4700	4820	4940	5060	5180	5310	5440	5580	113	156
	V1	95	95	95	95	95	96	96	96	96	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	111	111	111	111	111	111	111	111	111	111	111		
	GR2	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		

FIGURE 10-8-28. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	92.4	93.0	92.4	91.7	91.1	90.4	90.3						
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL													
	V1													
	VR													
	V2													
	GR2													
34000	TOFL													
	V1													
	VR													
	V2													
	GR2													
33000	TOFL	12270											133	178
	V1	130												
	VR	130												
	V2	135												
	GR2	4.8												
32000	TOFL	11060	11620										130	175
	V1	126	126											
	VR	126	126											
	V2	131	131											
	GR2	5.2	4.8											
31000	TOFL	9990	10500	11490									128	172
	V1	122	122	124										
	VR	122	122	124										
	V2	128	128	129										
	GR2	5.6	5.2	4.9										

FIGURE 10-8-28. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	26					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	79						
	N1 (%)	92.4	93.0	92.4	91.7	91.1	90.4	90.3						
30000	TOFL	9050	9500	10320	11430								125	169
	V1	117	118	120	122									
	VR	118	118	120	122									
	V2	124	124	125	126									
	GR2	6.1	5.7	5.3	5									
29000	TOFL	8190	8580	9300	10200								122	166
	V1	113	114	116	117									
	VR	114	114	116	118									
	V2	121	121	121	123									
	GR2	6.5	6.1	5.8	5.4									
28000	TOFL	7320	7740	8400	9170	10110							119	163
	V1	108	110	111	113	115								
	VR	110	110	112	113	115								
	V2	117	117	118	119	120								
	GR2	7	6.6	6.3	5.9	5.4								
27000	TOFL	6410	6850	7540	8220	9030	10020	10300					116	160
	V1	103	104	107	109	111	113	113						
	VR	106	107	108	109	111	113	113						
	V2	114	114	115	116	117	118	118						
	GR2	7.6	7.1	6.8	6.4	5.9	5.3	5.2						
26000	TOFL	5770	6070	6620	7360	8060	8890	9130					113	156
	V1	98	99	102	105	107	109	109						
	VR	103	103	104	106	107	109	109						
	V2	111	111	111	113	113	114	114						
	GR2	8.2	7.7	7.3	7	6.4	5.8	5.7						

FIGURE 10-8-29. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
39600	TOFL	18810											152	198
	V1	158												
	VR	158												
	V2	160												
	GR2	2.7												
39000	TOFL	17890	18580										151	196
	V1	156	156											
	VR	156	156											
	V2	158	158											
	GR2	2.9	2.8											
38000	TOFL	16430	17030	17800									148	193
	V1	152	152	152										
	VR	152	152	152										
	V2	155	155	155										
	GR2	3.2	3.1	3										
37000	TOFL	15050	15640	16310									145	190
	V1	148	148	148										
	VR	148	149	149										
	V2	151	151	151										
	GR2	3.5	3.5	3.4										
36000	TOFL	13720	14250	14870									143	187
	V1	144	144	144										
	VR	144	144	145										
	V2	148	148	148										
	GR2	3.9	3.8	3.7										
35000	TOFL	12520	12970	13510	13920	14360	14860						140	185
	V1	140	140	140	141	141	141							
	VR	140	141	141	141	141	141							
	V2	144	144	144	144	144	144							
	GR2	4.2	4.2	4.1	4.1	4.1	4							
34000	TOFL	11380	11770	12260	12630	13030	13430	13840					137	182
	V1	136	136	137	137	137	137	137						
	VR	136	136	137	137	137	137	137						
	V2	140	141	141	141	141	141	141						
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4						
33000	TOFL	10290	10660	11080	11390	11720	12100	12470	12730	13000			134	179
	V1	132	132	132	132	132	133	133	133	133				
	VR	132	132	133	133	133	133	133	133	133				
	V2	137	137	137	137	137	137	137	137	137				
	GR2	5	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8				
32000	TOFL	9300	9610	9990	10260	10540	10880	11190	11410	11640	11970		131	176
	V1	128	128	128	128	128	128	128	128	128	128			
	VR	128	128	128	128	128	128	128	128	128	128			
	V2	133	133	133	133	133	133	133	133	133	133			
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2			
31000	TOFL	8410	8700	9030	9270	9530	9810	10070	10270	10500	10740	11000	128	173
	V1	123	124	124	124	124	124	124	124	124	124	124		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	5.8	5.8	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.6	5.5		

FIGURE 10-8-29. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
30000	TOFL	7560	7830	8140	8370	8610	8850	9090	9270	9450	9690	9900	126	169
	V1	119	119	120	120	120	120	120	120	120	120	120		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	126	126	126	126	126	126	126		
	GR2	6.3	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.9		
29000	TOFL	6670	6930	7260	7500	7720	7960	8190	8370	8520	8740	8910	123	166
	V1	113	114	115	115	115	115	116	116	116	116	116		
	VR	115	116	116	116	116	116	116	116	116	116	116		
	V2	122	122	122	123	123	123	123	122	122	122	122		
	GR2	6.8	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.4		
28000	TOFL	5920	6130	6380	6570	6790	7030	7270	7460	7640	7830	8040	120	163
	V1	107	108	109	109	110	110	111	111	111	111	111		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.3	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	6.9		
27000	TOFL	5270	5450	5660	5820	6000	6180	6360	6500	6660	6860	7090	117	160
	V1	102	103	103	104	104	104	105	105	105	105	106		
	VR	107	108	108	108	108	108	108	108	108	108	108		
	V2	115	115	116	116	116	116	116	116	116	116	116		
	GR2	7.8	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
26000	TOFL	4720	4860	5030	5170	5320	5470	5630	5750	5880	6030	6220	114	157
	V1	97	97	98	98	98	99	99	99	99	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	8.4	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	7.9		

FIGURE 10-8-30. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	92.9	92.8	92.2	91.5	90.9	90.3							
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL													
	V1													
	VR													
	V2													
	GR2													
34000	TOFL													
	V1													
	VR													
	V2													
	GR2													
33000	TOFL													
	V1													
	VR													
	V2													
	GR2													
32000	TOFL													
	V1													
	VR													
	V2													
	GR2													
31000	TOFL	11330											128	173
	V1	124												
	VR	124												
	V2	129												
	GR2	5.1												

FIGURE 10-8-30. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	24						Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	75							
	N1 (%)	92.9	92.8	92.2	91.5	90.9	90.3							
30000	TOFL	10200	10970										126	169
	V1	120	121											
	VR	120	121											
	V2	126	126											
	GR2	5.5	5.2											
29000	TOFL	9190	9850	10890									123	166
	V1	116	117	119										
	VR	116	117	119										
	V2	122	122	124										
	GR2	6	5.6	5.3										
28000	TOFL	8290	8840	9720	10730								120	163
	V1	112	113	115	117									
	VR	112	113	115	117									
	V2	119	119	120	122									
	GR2	6.5	6.1	5.7	5.4									
27000	TOFL	7440	7950	8710	9550	10590							117	160
	V1	107	109	110	112	114								
	VR	108	109	111	113	114								
	V2	116	116	117	118	119								
	GR2	7	6.6	6.2	5.9	5.3								
26000	TOFL	6480	7090	7800	8520	9380	10320						114	157
	V1	101	104	106	108	110	111							
	VR	104	105	107	108	110	112							
	V2	112	112	113	114	115	116							
	GR2	7.5	7.1	6.8	6.4	5.8	5.3							

FIGURE 10-8-31. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	18560											149	194
	V1	155												
	VR	155												
	V2	157												
	GR2	3												
37000	TOFL	16990											147	191
	V1	151												
	VR	151												
	V2	154												
	GR2	3.3												
36000	TOFL	15440	16380										144	188
	V1	147	147											
	VR	147	147											
	V2	150	150											
	GR2	3.6	3.5											
35000	TOFL	13990	14780										141	185
	V1	142	143											
	VR	143	143											
	V2	146	147											
	GR2	4	3.8											
34000	TOFL	12660	13360	14050									138	182
	V1	138	139	139										
	VR	138	139	139										
	V2	142	143	143										
	GR2	4.3	4.2	4.1										
33000	TOFL	11450	12040	12640	13050								135	179
	V1	134	135	135	135									
	VR	134	135	135	135									
	V2	139	139	139	139									
	GR2	4.7	4.6	4.5	4.5									
32000	TOFL	10330	10830	11360	11710	12070							133	176
	V1	130	130	131	131	131								
	VR	130	131	131	131	131								
	V2	135	135	136	136	136								
	GR2	5.1	5	4.9	4.9	4.9								
31000	TOFL	9300	9740	10170	10460	10810	11200	11480	11650				130	173
	V1	126	126	127	127	127	127	127	127					
	VR	126	126	127	127	127	127	127	127					
	V2	131	131	132	132	132	132	132	132					
	GR2	5.6	5.4	5.3	5.3	5.3	5.3	5.3	5.3					

FIGURE 10-8-31. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
30000	TOFL	8400	8790	9160	9410	9710	10030	10270	10450	10660	10920	11180	127	170
	V1	121	122	122	122	123	123	123	123	123	123	123		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	127	128	128	128	128	128	128	128	128	128	128		
	GR2	6	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.6	5.4		
29000	TOFL	7530	7880	8220	8470	8730	9010	9220	9370	9570	9790	10020	124	167
	V1	117	117	118	118	118	118	118	118	118	118	118		
	VR	117	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.5	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	5.8		
28000	TOFL	6620	6980	7330	7560	7800	8060	8260	8400	8580	8780	8980	121	164
	V1	111	112	113	113	114	114	114	114	114	114	114		
	VR	113	114	114	114	114	114	114	114	114	114	114		
	V2	120	120	121	121	121	121	121	121	121	120	120		
	GR2	6.9	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.3		
27000	TOFL	5850	6130	6400	6610	6850	7140	7350	7490	7670	7860	8060	118	160
	V1	105	106	107	108	108	109	109	109	109	109	109		
	VR	109	109	110	110	110	110	110	110	110	110	110		
	V2	116	117	117	117	117	117	117	117	117	117	117		
	GR2	7.5	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	6.8		
26000	TOFL	5180	5420	5650	5820	6010	6220	6380	6500	6670	6900	7160	115	157
	V1	99	100	101	102	102	103	103	103	103	104	104		
	VR	105	105	106	106	106	106	106	106	106	106	106		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.6	7.3		

FIGURE 10-8-32. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15								Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59									
	N1 (%)	93.0	92.6	92.0	91.3									
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL													
	V1													
	VR													
	V2													
	GR2													
34000	TOFL													
	V1													
	VR													
	V2													
	GR2													
33000	TOFL													
	V1													
	VR													
	V2													
	GR2													
32000	TOFL													
	V1													
	VR													
	V2													
	GR2													
31000	TOFL													
	V1													
	VR													
	V2													
	GR2													

FIGURE 10-8-32. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15								Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59									
	N1 (%)	93.0	92.6	92.0	91.3									
30000	TOFL													
	V1													
	VR													
	V2													
	GR2													
29000	TOFL	10550											124	167
	V1	119												
	VR	119												
	V2	124												
	GR2	5.4												
28000	TOFL	9440	10330										121	164
	V1	115	116											
	VR	115	116											
	V2	120	121											
	GR2	5.9	5.5											
27000	TOFL	8480	9210	10170									118	160
	V1	110	112	114										
	VR	111	112	114										
	V2	117	118	119										
	GR2	6.4	6	5.7										
26000	TOFL	7580	8230	9040	9990								115	157
	V1	106	107	109	111									
	VR	106	108	110	111									
	V2	113	114	115	116									
	GR2	6.9	6.6	6.2	5.8									

FIGURE 10-8-33. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	5150	5260	5370	5480	5580	5710	5850	5990	6120	6230	6360	139	192
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.8		
39000	TOFL	4940	5040	5140	5240	5340	5470	5590	5730	5850	5960	6080	138	191
	V1	120	120	120	120	120	121	121	121	121	121	121		
	VR	128	127	127	127	127	127	127	127	127	127	127		
	V2	136	136	135	135	135	135	135	135	135	135	135		
	GR2	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6		
38000	TOFL	4600	4690	4780	4880	4970	5080	5200	5320	5440	5530	5640	136	188
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	125	125	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	4300	4390	4480	4570	4660	4770	4880	4990	5100	5190	5290	135	185
	V1	113	113	113	113	113	114	114	114	114	114	114		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
36000	TOFL	4070	4160	4250	4330	4420	4520	4620	4720	4820	4910	5000	133	182
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	130	130	130	130	130	130	130	130	130		
	GR2	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.2		
35000	TOFL	3850	3930	4010	4090	4170	4260	4360	4450	4550	4630	4720	131	180
	V1	108	108	108	108	108	108	108	108	109	109	109		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.4	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
34000	TOFL	3630	3700	3780	3850	3920	4010	4100	4190	4280	4360	4440	129	177
	V1	105	105	105	105	105	105	105	106	106	106	106		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.9	7.9	8	8	8.1	8.1	8	8	8	8	8.1		
33000	TOFL	3430	3500	3580	3650	3720	3800	3880	3970	4050	4120	4200	127	174
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.4	8.5	8.5	8.5	8.6	8.6	8.6	8.5	8.5	8.6	8.6		
32000	TOFL	3440	3500	3570	3630	3700	3770	3840	3910	3970	4030	4090	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	3420	3490	3550	3610	3680	3750	3810	3900	3960	4020	4090	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	123	123	123	123	123	123	123	123	123		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		

FIGURE 10-8-33. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
30000	TOFL	3370	3440	3500	3560	3620	3690	3770	3840	3910	3960	4030	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	122	122	122	122	122	122	122	122		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.4		
29000	TOFL	3320	3390	3440	3510	3560	3640	3710	3780	3850	3910	3960	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	121	121		
	GR2	10.8	10.9	10.9	10.9	11	11	11	11	11	11	11		
28000	TOFL	3270	3330	3390	3450	3510	3580	3650	3720	3790	3840	3900	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.5	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
27000	TOFL	3220	3280	3330	3400	3450	3520	3590	3660	3730	3780	3830	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.3	12.3	12.4	12.4	12.5	12.5	12.4	12.4	12.4	12.4	12.5		
26000	TOFL	3160	3220	3280	3330	3400	3460	3530	3600	3670	3720	3770	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.1	13.2	13.2	13.3	13.3	13.3	13.2	13.2	13.3	13.3		

FIGURE 10-8-34. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	5590	5720	5840	5960	6090	6240	6390	6540	6690	6830	6990	139	193
	V1	125	125	125	125	125	125	126	126	126	126	126		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	5350	5470	5580	5700	5820	5960	6110	6260	6400	6520	6650	138	191
	V1	123	123	123	123	123	123	123	123	124	124	124		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	136	136	136	136	136	136	136	136	136		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	4970	5080	5180	5290	5400	5530	5660	5800	5920	6040	6150	136	188
	V1	119	119	119	119	119	119	119	120	120	120	120		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
37000	TOFL	4610	4710	4810	4900	5010	5120	5240	5360	5480	5580	5690	135	185
	V1	115	115	115	115	115	115	115	116	116	116	116		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.5		
36000	TOFL	4310	4400	4500	4590	4680	4790	4900	5010	5120	5220	5320	133	183
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9		
35000	TOFL	4060	4140	4230	4320	4410	4510	4610	4710	4810	4900	5000	131	180
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
34000	TOFL	3820	3910	3990	4070	4150	4250	4340	4440	4530	4620	4700	129	177
	V1	106	106	106	106	106	106	106	106	106	106	107		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
33000	TOFL	3600	3680	3760	3850	3920	4010	4100	4180	4270	4360	4440	127	174
	V1	103	103	103	103	103	103	104	104	104	104	104		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	125	125		
	GR2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.3	8.3		
32000	TOFL	3470	3540	3600	3670	3750	3820	3890	3960	4050	4120	4200	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	3510	3580	3640	3710	3770	3850	3930	3990	4060	4120	4200	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 10-8-34. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
30000	TOFL	3450	3520	3590	3650	3720	3790	3870	3940	4010	4080	4150	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	10	10	10	10	10	10	10	10	10		
29000	TOFL	3400	3470	3530	3590	3670	3730	3810	3890	3950	4020	4090	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.7		
28000	TOFL	3350	3410	3480	3550	3610	3680	3750	3830	3890	3950	4020	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.3	11.3	11.4	11.4		
27000	TOFL	3290	3360	3420	3480	3550	3620	3690	3760	3830	3890	3950	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	12	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	3240	3310	3370	3420	3480	3550	3620	3700	3760	3820	3890	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.8	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 10-8-35. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	6060	6210	6360	6500	6660	6830	7020	7220	7400	7570	7750	140	193
	V1	127	127	128	128	128	128	128	128	129	129	129		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	TOFL	5800	5940	6080	6220	6380	6530	6690	6870	7050	7210	7380	139	191
	V1	125	125	125	125	126	126	126	126	126	126	127		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.5		
38000	TOFL	5370	5510	5630	5760	5900	6040	6190	6340	6480	6610	6750	137	189
	V1	121	121	121	121	122	122	122	122	122	122	123		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	4980	5100	5210	5330	5460	5590	5720	5860	5990	6100	6230	135	186
	V1	117	117	117	117	118	118	118	118	118	118	118		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
36000	TOFL	4610	4720	4830	4930	5050	5170	5290	5410	5530	5640	5750	133	183
	V1	113	113	113	113	114	114	114	114	114	114	114		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
35000	TOFL	4290	4390	4480	4580	4680	4790	4900	5020	5120	5220	5320	131	180
	V1	109	110	110	110	110	110	110	110	110	110	111		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
34000	TOFL	4020	4110	4200	4300	4390	4490	4590	4700	4800	4890	4990	129	177
	V1	106	106	106	107	107	107	107	107	107	107	107		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.4	7.4	7.4	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.5		
33000	TOFL	3790	3880	3960	4050	4140	4230	4330	4420	4520	4600	4690	127	175
	V1	104	104	104	104	104	104	104	104	104	104	105		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8		
32000	TOFL	3590	3670	3750	3830	3910	4000	4090	4180	4270	4350	4430	125	172
	V1	101	101	101	101	101	101	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
31000	TOFL	3560	3630	3690	3750	3820	3900	3970	4020	4100	4160	4230	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9	9	9	9.1	9.1	9.1	9	9	9	9	9.1		

FIGURE 10-8-35. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
30000	TOFL	3530	3610	3670	3730	3810	3890	3950	4030	4100	4170	4240	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.7		
29000	TOFL	3470	3550	3620	3670	3750	3830	3900	3970	4040	4100	4170	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	120	120	120	120	120	120	120	120	120		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	3420	3490	3560	3620	3690	3770	3840	3900	3980	4040	4110	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11	11	11	11	11	11	11	11	11	11	11		
27000	TOFL	3360	3440	3500	3560	3630	3700	3780	3840	3910	3980	4040	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.8		
26000	TOFL	3310	3380	3440	3500	3570	3640	3710	3770	3840	3910	3970	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5		

FIGURE 10-8-36. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	6640	6800	6980	7180	7400	7600	7820	8040	8250	8430	8620	141	193
	V1	130	130	130	130	131	131	131	131	131	132	132		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5	5	5	5	5	5	5	5	5	5	5		
39000	TOFL	6360	6520	6680	6850	7040	7250	7450	7660	7870	8050	8230	140	192
	V1	128	128	128	128	129	129	129	129	129	129	130		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	5890	6050	6200	6350	6510	6670	6850	7040	7240	7400	7580	137	189
	V1	124	124	124	125	125	125	125	125	126	126	126		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
37000	TOFL	5440	5580	5720	5850	6000	6150	6300	6450	6600	6740	6900	135	186
	V1	120	120	120	120	121	121	121	121	121	121	122		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	5020	5150	5270	5390	5520	5660	5790	5930	6070	6190	6310	133	183
	V1	116	116	116	116	116	116	117	117	117	117	117		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
35000	TOFL	4640	4750	4870	4980	5100	5220	5340	5460	5590	5700	5800	131	181
	V1	112	112	112	112	112	112	112	113	113	113	113		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
34000	TOFL	4290	4400	4500	4600	4710	4820	4930	5040	5160	5250	5350	129	178
	V1	108	108	108	108	108	108	108	109	109	109	109		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
33000	TOFL	4030	4130	4220	4320	4420	4520	4620	4720	4830	4920	5010	127	175
	V1	105	105	105	105	105	105	105	106	106	106	106		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	3800	3890	3980	4070	4160	4250	4350	4440	4540	4630	4730	125	172
	V1	102	102	102	102	102	102	103	103	103	103	103		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	123		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	3600	3690	3770	3850	3940	4030	4120	4210	4290	4380	4460	123	169
	V1	99	100	100	100	100	100	100	100	100	100	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.7	8.7		

FIGURE 10-8-36. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
30000	TOFL	3610	3690	3740	3810	3880	3940	4010	4080	4140	4220	4280	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.2	9.2	9.3	9.3		
29000	TOFL	3570	3630	3700	3770	3850	3920	3990	4060	4140	4210	4260	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	3510	3580	3640	3720	3790	3850	3930	3990	4070	4140	4200	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
27000	TOFL	3450	3520	3580	3660	3740	3790	3860	3930	4000	4070	4130	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
26000	TOFL	3400	3460	3520	3600	3670	3730	3800	3870	3940	4000	4060	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		

FIGURE 10-8-37. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	7390	7610	7840	8060	8300	8530	8760	9000	9220	9420	9640	142	194
	V1	133	133	133	133	134	134	134	134	135	135	135		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.8	4.8		
39000	TOFL	7030	7240	7460	7680	7900	8130	8350	8590	8800	8990	9190	141	192
	V1	131	131	131	131	131	132	132	132	132	133	133		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5	5	5	5	5	4.9	4.9	4.9	4.9	4.9	5		
38000	TOFL	6530	6690	6860	7070	7280	7480	7700	7930	8130	8310	8510	138	189
	V1	127	127	128	128	128	128	128	129	129	129	129		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	6020	6180	6340	6500	6660	6840	7040	7250	7440	7610	7800	136	187
	V1	123	123	123	124	124	124	124	125	125	125	125		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.7		
36000	TOFL	5550	5690	5820	5970	6120	6270	6420	6580	6750	6900	7070	133	184
	V1	119	119	119	119	120	120	120	120	120	120	121		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
35000	TOFL	5090	5220	5340	5470	5610	5740	5880	6030	6160	6290	6410	131	181
	V1	114	115	115	115	115	115	115	116	116	116	116		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
34000	TOFL	4690	4800	4920	5030	5150	5280	5400	5530	5650	5760	5880	129	178
	V1	110	110	110	111	111	111	111	111	112	112	112		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	4330	4430	4530	4640	4750	4860	4970	5090	5200	5300	5410	127	175
	V1	106	106	106	107	107	107	107	107	107	107	108		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.3	7.3		
32000	TOFL	4060	4150	4250	4350	4450	4550	4650	4760	4860	4960	5060	125	172
	V1	103	103	103	103	104	104	104	104	104	104	104		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
31000	TOFL	3830	3920	4000	4100	4190	4290	4380	4480	4580	4660	4760	123	169
	V1	100	100	101	101	101	101	101	101	101	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 10-8-37. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
30000	TOFL	3630	3720	3800	3890	3970	4060	4150	4240	4330	4420	4500	121	166
	V1	98	98	98	98	98	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
29000	TOFL	3660	3740	3810	3870	3940	4010	4070	4150	4220	4290	4360	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
28000	TOFL	3600	3680	3740	3810	3890	3970	4040	4110	4180	4240	4320	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.2	10.2		
27000	TOFL	3540	3610	3690	3750	3830	3910	3970	4050	4120	4180	4250	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	3480	3550	3630	3690	3760	3840	3900	3980	4050	4110	4180	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.7	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7		

FIGURE 10-8-38. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	8210	8460	8700	8940	9200	9450	9690	9950	10170	10380	10590	143	194
	V1	136	136	136	136	137	137	137	137	137	137	137		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	144	144	144	144	144		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
39000	TOFL	7810	8050	8280	8530	8760	9010	9250	9500	9710	9920	10120	142	193
	V1	133	133	134	134	134	135	135	135	135	135	135		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
38000	TOFL	7170	7400	7610	7840	8070	8310	8530	8770	9000	9180	9370	139	190
	V1	130	130	130	130	130	131	131	131	132	132	132		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5	5	5.1		
37000	TOFL	6610	6790	6980	7200	7410	7630	7850	8080	8300	8480	8680	137	187
	V1	126	126	126	126	127	127	127	128	128	128	128		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
36000	TOFL	6070	6230	6390	6560	6730	6920	7120	7330	7530	7710	7890	134	184
	V1	121	122	122	122	122	123	123	123	123	123	124		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.8		
35000	TOFL	5570	5710	5850	6000	6150	6300	6460	6620	6800	6960	7130	132	181
	V1	117	117	117	118	118	118	118	119	119	119	119		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.2	6.2		
34000	TOFL	5100	5230	5350	5490	5620	5760	5900	6050	6190	6310	6440	129	178
	V1	113	113	113	113	113	113	114	114	114	114	114		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.6	6.6		
33000	TOFL	4680	4790	4910	5030	5150	5270	5400	5530	5650	5760	5880	127	176
	V1	108	108	108	109	109	109	109	109	110	110	110		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
32000	TOFL	4340	4440	4540	4650	4760	4870	4990	5100	5220	5320	5430	125	173
	V1	104	105	105	105	105	105	105	106	106	106	106		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.5		
31000	TOFL	4050	4140	4240	4340	4440	4540	4650	4750	4860	4950	5050	123	170
	V1	101	101	101	102	102	102	102	102	102	102	103		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8	8	8	8	8	8	8	7.9	7.9	7.9	8		

FIGURE 10-8-38. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
30000	TOFL	3830	3920	4010	4100	4190	4290	4380	4480	4580	4670	4760	121	167
	V1	99	99	99	99	99	99	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.5	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.6		
29000	TOFL	3700	3780	3840	3920	3990	4070	4150	4240	4330	4410	4500	119	164
	V1	97	97	97	97	97	97	97	97	97	97	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.1	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9.2		
28000	TOFL	3700	3780	3840	3920	4000	4070	4150	4220	4300	4360	4420	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	3640	3720	3780	3860	3940	4010	4090	4160	4240	4290	4350	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	3570	3640	3700	3790	3870	3950	4020	4090	4160	4230	4290	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.2	11.2	11.3	11.3		

FIGURE 10-8-39. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	9280	9530	9760	10020	10290	10530	10790	11070	11320	11540	11780	144	195
	V1	139	139	139	139	140	140	140	140	140	140	140		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	145	145	145	145	145		
	GR2	4.2	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.3		
39000	TOFL	8840	9080	9330	9570	9820	10050	10310	10560	10800	11030	11240	143	193
	V1	137	137	137	137	137	138	138	138	138	138	138		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	143	143	143		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
38000	TOFL	8130	8350	8590	8840	9080	9300	9520	9780	10000	10180	10390	140	190
	V1	133	133	133	134	134	134	134	134	134	134	134		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	141	141	141	141	141	141	141		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
37000	TOFL	7450	7660	7880	8120	8360	8610	8820	9030	9230	9420	9630	138	187
	V1	129	129	130	130	130	130	131	131	131	131	131		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	138	138	138	138	138	138		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
36000	TOFL	6800	6980	7190	7410	7630	7860	8090	8340	8540	8710	8880	135	185
	V1	125	125	125	126	126	126	127	127	127	127	127		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	135	135	135	135		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.5		
35000	TOFL	6220	6370	6520	6700	6890	7090	7300	7510	7730	7900	8090	133	182
	V1	120	121	121	121	121	122	122	122	122	123	123		
	VR	125	125	125	125	125	125	125	125	125	125	124		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.9		
34000	TOFL	5670	5810	5940	6100	6260	6410	6570	6750	6940	7100	7270	130	179
	V1	116	116	116	116	117	117	117	117	118	118	118		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.3	6.3		
33000	TOFL	5180	5290	5420	5560	5690	5830	5980	6130	6270	6400	6530	127	176
	V1	111	111	111	112	112	112	112	113	113	113	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
32000	TOFL	4720	4830	4940	5060	5190	5310	5440	5570	5700	5810	5930	125	173
	V1	107	107	107	107	107	107	108	108	108	108	108		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
31000	TOFL	4380	4480	4580	4690	4800	4910	5030	5150	5260	5370	5480	123	170
	V1	103	103	103	103	103	104	104	104	104	104	104		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		

FIGURE 10-8-39. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
30000	TOFL	4080	4180	4270	4370	4480	4580	4680	4790	4900	5000	5100	121	167
	V1	100	100	100	100	100	100	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.1	8.1	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.2		
29000	TOFL	3850	3930	4020	4120	4210	4310	4400	4500	4600	4690	4790	119	164
	V1	97	97	97	97	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.7	8.8	8.8	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.8		
28000	TOFL	3760	3840	3910	3990	4050	4120	4190	4270	4340	4420	4510	117	161
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
27000	TOFL	3720	3790	3870	3960	4020	4100	4170	4250	4320	4390	4440	115	158
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10.1	10.1		
26000	TOFL	3660	3740	3810	3890	3960	4030	4090	4170	4240	4320	4360	113	155
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-40. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	10370	10610	10880	11160	11440	11720	12030	12310	12620	12860	13140	145	195
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	147	147	147	147	147		
	GR2	4	4	4	4	4	4	4	4	4	4	4		
39000	TOFL	9890	10130	10390	10650	10920	11180	11470	11740	12030	12260	12520	144	193
	V1	140	140	140	140	140	140	140	140	140	140	140		
	VR	141	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.2	4.2		
38000	TOFL	9150	9350	9600	9840	10100	10350	10590	10850	11100	11320	11560	141	191
	V1	136	136	136	136	136	137	137	137	137	137	137		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
37000	TOFL	8430	8640	8860	9090	9320	9540	9790	10050	10230	10450	10650	139	188
	V1	132	133	133	133	133	133	133	133	133	133	133		
	VR	134	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	140		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
36000	TOFL	7700	7910	8150	8370	8590	8810	9030	9240	9450	9630	9830	136	185
	V1	129	129	129	129	129	129	129	130	130	130	130		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
35000	TOFL	6960	7150	7360	7600	7830	8070	8280	8500	8690	8870	9050	134	182
	V1	124	124	124	125	125	125	126	126	126	126	126		
	VR	127	127	127	127	127	127	127	127	127	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.6	5.6		
34000	TOFL	6320	6470	6640	6820	7030	7240	7450	7680	7890	8070	8270	131	179
	V1	119	119	120	120	120	120	121	121	121	121	122		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.9	6	6	6	6	6	5.9	5.9	5.9	5.9	6		
33000	TOFL	5750	5880	6030	6190	6350	6510	6680	6870	7060	7220	7400	128	176
	V1	114	115	115	115	115	115	116	116	116	116	117		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.4	6.4		
32000	TOFL	5230	5340	5480	5620	5760	5900	6050	6200	6350	6470	6620	126	173
	V1	110	110	110	110	110	111	111	111	111	111	112		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
31000	TOFL	4760	4870	4990	5110	5230	5360	5490	5630	5750	5870	6000	123	170
	V1	105	105	105	105	106	106	106	106	107	107	107		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.3	7.3		

FIGURE 10-8-40. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
30000	TOFL	4390	4490	4600	4710	4820	4940	5050	5170	5290	5400	5510	121	167
	V1	101	101	101	102	102	102	102	102	103	103	103		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
29000	TOFL	4080	4170	4270	4370	4470	4580	4680	4790	4900	5000	5100	119	164
	V1	98	98	98	98	98	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.3	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.4		
28000	TOFL	3850	3930	4020	4120	4210	4310	4410	4510	4600	4700	4790	117	161
	V1	95	95	95	96	96	96	96	96	96	97	97		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.9	9	9	9	9	9	8.9	8.9	8.9	8.9	9		
27000	TOFL	3800	3870	3950	4010	4090	4160	4230	4310	4380	4440	4530	115	158
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.7		
26000	TOFL	3740	3820	3890	3960	4040	4120	4200	4270	4350	4400	4420	113	155
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.3	10.4	10.4		

FIGURE 10-8-41. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	11530	11790	12100	12420	12740	13060	13380	13720	14060	14350	14690	147	195
	V1	144	144	144	144	145	145	145	145	145	145	145		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		
39000	TOFL	11030	11270	11560	11860	12180	12490	12800	13110	13410	13690	14020	145	194
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
38000	TOFL	10180	10420	10710	10970	11240	11520	11800	12100	12370	12630	12920	142	191
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
37000	TOFL	9390	9600	9870	10110	10370	10610	10870	11140	11400	11630	11920	140	188
	V1	135	135	135	135	135	135	135	135	135	135	136		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	141	141	141	141	141	141	141	141	141	141		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5		
36000	TOFL	8630	8840	9080	9300	9550	9780	10000	10250	10480	10690	10930	137	185
	V1	131	131	131	132	132	132	132	132	132	132	132		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	137	137	137	137	137	137	137	137		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
35000	TOFL	7910	8120	8340	8570	8790	8990	9190	9420	9630	9820	10040	135	183
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	128	128	128	128	128	129	129	129	129	129	129		
	V2	135	135	135	135	134	134	134	134	134	134	134		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.2	5.3	5.3		
34000	TOFL	7100	7300	7540	7780	8020	8220	8430	8640	8840	9020	9210	132	180
	V1	123	123	123	124	124	124	124	124	124	124	124		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6		
33000	TOFL	6410	6560	6750	6950	7160	7380	7600	7830	8050	8230	8430	129	177
	V1	118	118	118	119	119	119	119	120	120	120	121		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	129		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6.1	6.1		
32000	TOFL	5800	5940	6100	6260	6430	6590	6770	6980	7170	7340	7540	127	174
	V1	113	113	113	113	114	114	114	115	115	115	115		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
31000	TOFL	5260	5380	5530	5670	5810	5960	6110	6260	6410	6540	6720	124	171
	V1	108	108	108	109	109	109	109	110	110	110	110		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.9	7	7	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9		

FIGURE 10-8-41. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
30000	TOFL	4790	4900	5030	5150	5280	5410	5540	5670	5810	5920	6060	121	168
	V1	103	104	104	104	104	104	105	105	105	105	105		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
29000	TOFL	4380	4480	4590	4700	4820	4930	5050	5170	5290	5400	5520	119	165
	V1	99	99	99	100	100	100	100	100	101	101	101		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8	8	8	8	8	7.9	7.9	7.9	7.9	7.9	7.9		
28000	TOFL	4080	4170	4270	4380	4480	4580	4690	4800	4910	5000	5110	117	161
	V1	96	96	96	96	97	97	97	97	97	97	98		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5		
27000	TOFL	3850	3940	4040	4130	4230	4320	4420	4520	4620	4710	4810	115	158
	V1	94	94	94	94	94	94	95	95	95	95	95		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
26000	TOFL	3830	3910	3990	4060	4140	4210	4280	4360	4430	4470	4550	113	155
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 10-8-42. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	12860	13210	13560	13920	14290	14650	15080	15480	15850	16170	16730	148	196
	V1	147	147	147	147	147	147	147	147	147	147	147		
	VR	147	147	147	147	147	147	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	153		
	GR2	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.3		
39000	TOFL	12260	12600	12950	13290	13610	14000	14340	14730	15070	15410	15940	146	194
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5		
38000	TOFL	11370	11640	11960	12280	12590	12910	13240	13570	13900	14200	14680	144	191
	V1	141	141	141	141	141	141	142	142	142	142	142		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	4	4	4	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	TOFL	10480	10740	11030	11330	11600	11890	12190	12510	12790	13050	13490	141	189
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	143		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2		
36000	TOFL	9600	9840	10120	10370	10620	10890	11160	11440	11690	11930	12330	138	186
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	134	134	134	134	134	134	134	134	134	134	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.7	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
35000	TOFL	8820	9040	9280	9500	9750	9990	10230	10480	10700	10920	11270	136	183
	V1	130	130	130	130	130	130	130	130	130	130	131		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	136	136	136	136	136	136	136	136	136	136		
	GR2	5	5	5	5	5	5	5	4.9	4.9	5	4.8		
34000	TOFL	8060	8270	8500	8740	8940	9140	9380	9590	9800	9990	10290	133	180
	V1	126	126	126	127	127	127	127	127	127	127	127		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.4	5.2		
33000	TOFL	7220	7450	7690	7920	8130	8340	8570	8770	8960	9130	9420	130	177
	V1	121	122	122	122	122	122	123	123	123	123	123		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	129	129	129	129		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.6		
32000	TOFL	6470	6650	6840	7060	7280	7490	7720	7960	8150	8320	8590	127	174
	V1	116	117	117	117	117	118	118	119	119	119	119		
	VR	119	119	119	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	127	127	127	127		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6		
31000	TOFL	5840	5990	6160	6320	6490	6650	6850	7060	7250	7430	7730	125	171
	V1	111	111	112	112	112	113	113	113	113	114	114		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5		

FIGURE 10-8-42. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
30000	TOFL	5280	5420	5560	5700	5850	6000	6150	6310	6460	6600	6870	122	168
	V1	106	106	107	107	107	107	108	108	108	108	109		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.9		
29000	TOFL	4800	4920	5040	5170	5300	5430	5560	5700	5840	5950	6160	119	165
	V1	102	102	102	102	102	103	103	103	103	104	104		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
28000	TOFL	4390	4500	4610	4720	4840	4950	5070	5190	5310	5420	5580	117	162
	V1	97	98	98	98	98	98	99	99	99	99	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8		
27000	TOFL	4090	4190	4290	4390	4500	4600	4710	4820	4930	5030	5170	115	159
	V1	94	95	95	95	95	95	95	96	96	96	96		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.6		
26000	TOFL	3890	3970	4060	4160	4260	4350	4450	4550	4650	4750	4880	113	155
	V1	92	92	93	93	93	93	93	93	94	94	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4	9.5	9.3		

FIGURE 10-8-43. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	14420	14840	15260	15670	16110	16560	17010					149	196
	V1	149	149	149	149	150	150	150						
	VR	150	150	150	150	150	150	150						
	V2	153	153	153	153	153	153	155						
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.1						
39000	TOFL	13760	14150	14560	14960	15380	15800	16230	16680	17120	17490	18370	147	194
	V1	147	147	147	148	148	148	148	148	148	148	148		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.1		
38000	TOFL	12720	13060	13420	13780	14170	14520	14900	15330	15730	16050	16860	145	192
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	144	144	144	144	144	144	144	144	144	144	145		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.7	3.4		
37000	TOFL	11690	12010	12360	12670	13010	13340	13690	14080	14440	14720	15440	142	189
	V1	140	140	140	140	140	140	140	141	141	141	141		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4	4	4	4	4	4	4	4	4	4	3.7		
36000	TOFL	10750	11040	11330	11630	11930	12230	12540	12880	13200	13460	14120	139	186
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	141	141	141	141	141	141	141	141	141	142	142		
	GR2	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4		
35000	TOFL	9840	10090	10350	10610	10880	11150	11420	11720	12000	12230	12830	137	183
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	133	133	133	133	133	133	133	133	133	133	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.4		
34000	TOFL	8990	9210	9440	9700	9950	10180	10420	10680	10940	11160	11640	134	180
	V1	129	129	129	129	129	129	129	129	129	129	130		
	VR	129	129	129	129	129	129	129	129	129	129	130		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5.1	4.8		
33000	TOFL	8170	8410	8630	8850	9060	9280	9530	9740	9960	10150	10600	131	177
	V1	125	125	125	125	125	125	125	125	125	125	126		
	VR	125	125	125	125	125	125	125	125	125	125	126		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.1		
32000	TOFL	7340	7580	7820	8030	8230	8450	8660	8880	9070	9230	9650	128	175
	V1	120	120	121	121	121	121	121	121	121	121	122		
	VR	121	121	121	121	121	121	121	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.5		
31000	TOFL	6520	6710	6920	7140	7350	7580	7810	8030	8230	8390	8750	126	172
	V1	115	115	115	115	116	116	116	117	117	117	118		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	125	125	125	125		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	5.9		

FIGURE 10-8-43. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
30000	TOFL	5870	6030	6200	6370	6530	6710	6910	7130	7330	7500	7930	123	168
	V1	109	110	110	110	111	111	111	112	112	112	113		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.4		
29000	TOFL	5290	5440	5580	5720	5870	6020	6180	6340	6500	6640	7040	120	165
	V1	104	105	105	105	105	106	106	106	107	107	108		
	VR	110	110	110	110	110	110	110	110	110	110	111		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	6.9		
28000	TOFL	4790	4910	5040	5170	5290	5430	5560	5710	5840	5960	6260	117	162
	V1	100	100	100	100	100	101	101	101	102	102	103		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.4		
27000	TOFL	4400	4510	4620	4740	4850	4970	5090	5210	5330	5450	5660	115	159
	V1	96	96	96	96	97	97	97	97	97	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.3	8.3	7.9		
26000	TOFL	4110	4210	4320	4420	4530	4630	4740	4850	4960	5070	5240	113	156
	V1	93	93	93	93	94	94	94	94	94	95	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	111	111	111	111		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9	9	9	8.6		

FIGURE 10-8-44. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	16380	16890	17400	17890	18420	18960						150	197
	V1	152	152	152	152	152	152							
	VR	152	152	152	152	153	153							
	V2	155	155	155	155	155	155							
	GR2	2.9	2.9	2.9	2.9	2.9	2.9							
39000	TOFL	15650	16100	16580	17070	17560	18080						148	195
	V1	150	150	150	150	150	150							
	VR	150	150	150	150	150	150							
	V2	153	153	153	153	153	153							
	GR2	3.1	3.1	3.1	3.1	3.1	3							
38000	TOFL	14440	14870	15280	15720	16170	16630						146	192
	V1	147	147	147	147	147	147							
	VR	147	147	147	147	147	147							
	V2	150	150	150	150	150	150							
	GR2	3.4	3.4	3.4	3.4	3.4	3.4							
37000	TOFL	13250	13630	14020	14420	14820	15220						143	189
	V1	143	143	143	143	143	143							
	VR	143	143	143	143	143	143							
	V2	146	146	147	147	147	147							
	GR2	3.8	3.7	3.7	3.7	3.7	3.7							
36000	TOFL	12170	12500	12860	13200	13550	13920	14330	14700	15070			140	187
	V1	139	139	139	139	139	139	140	140	140				
	VR	140	140	140	140	140	140	140	140	140				
	V2	144	144	144	144	144	144	144	144	144				
	GR2	4.1	4.1	4.1	4.1	4.1	4	4	4	4				
35000	TOFL	11100	11410	11720	12050	12380	12700	13030	13380	13710	14180		138	184
	V1	136	136	136	136	136	136	136	136	136	136			
	VR	136	136	136	136	136	136	136	136	136	136			
	V2	140	140	140	140	140	140	140	140	140	140			
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.2			
34000	TOFL	10100	10370	10650	10950	11220	11500	11790	12100	12410	12780		135	181
	V1	131	131	131	132	132	132	132	132	132	132			
	VR	132	132	132	132	132	132	132	132	132	132			
	V2	136	136	136	136	136	136	136	136	136	136			
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.6			
33000	TOFL	9210	9430	9700	9950	10190	10430	10700	10980	11220	11550		132	178
	V1	128	128	128	128	128	128	128	128	128	128			
	VR	128	128	128	128	128	128	128	128	128	128			
	V2	133	133	133	133	133	133	133	133	133	133			
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	4.9			
32000	TOFL	8360	8590	8820	9040	9240	9490	9720	9950	10160	10480	11190	129	175
	V1	123	123	124	124	124	124	124	124	124	124	125		
	VR	124	124	124	124	124	124	124	124	124	124	125		
	V2	130	130	130	130	130	130	129	129	129	129	130		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.3	5		
31000	TOFL	7540	7750	7980	8190	8410	8620	8830	9030	9240	9500	10110	127	172
	V1	119	119	119	119	119	120	120	120	120	120	121		
	VR	120	120	120	120	120	120	120	120	120	120	121		
	V2	127	127	127	127	127	126	126	126	126	126	127		
	GR2	6.1	6.1	6.1	6.1	6	6	6	6	5.9	5.8	5.4		

FIGURE 10-8-44. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
30000	TOFL	6640	6850	7070	7290	7520	7760	7960	8160	8370	8620	9140	124	169
	V1	113	114	114	114	115	115	115	115	116	116	117		
	VR	116	116	116	116	116	116	116	116	116	116	117		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.2	5.9		
29000	TOFL	5950	6120	6290	6460	6640	6840	7050	7260	7480	7790	8280	121	166
	V1	108	108	109	109	109	110	110	110	111	112	113		
	VR	112	112	112	112	112	112	112	112	112	113	113		
	V2	120	120	120	120	120	120	120	120	120	120	121		
	GR2	7	7	7	7	7	7	6.9	6.9	6.8	6.7	6.3		
28000	TOFL	5340	5490	5640	5780	5940	6090	6250	6420	6590	6860	7420	118	162
	V1	103	103	103	104	104	104	105	105	105	106	108		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	116	116	116	116	116	116	116	116	116	116	117		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.4	7.4	7.2	6.8		
27000	TOFL	4800	4930	5050	5180	5310	5450	5590	5730	5880	6090	6520	115	159
	V1	98	98	98	99	99	99	99	100	100	101	103		
	VR	105	105	105	105	105	105	105	105	105	105	106		
	V2	113	113	113	113	113	113	113	113	113	113	114		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8	8	7.9	7.7	7.3		
26000	TOFL	4410	4520	4630	4750	4870	4990	5110	5230	5370	5530	5810	113	156
	V1	94	94	94	95	95	95	95	96	96	96	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	111	111	111	111	111	111	111	111	111	111	111		
	GR2	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.6	8.5	8.3	7.9		

FIGURE 10-8-45. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	18820	19420										151	197
	V1	155	155											
	VR	155	155											
	V2	157	157											
	GR2	2.7	2.6											
39000	TOFL	17920	18490										150	196
	V1	153	153											
	VR	153	153											
	V2	156	156											
	GR2	2.8	2.8											
38000	TOFL	16510	17020										147	193
	V1	150	150											
	VR	150	150											
	V2	152	153											
	GR2	3.1	3.1											
37000	TOFL	15160	15610	16090	16560								144	190
	V1	146	146	146	146									
	VR	146	146	146	146									
	V2	149	149	149	149									
	GR2	3.5	3.5	3.5	3.4									
36000	TOFL	13850	14260	14690	15120	15560							142	187
	V1	142	142	142	142	142								
	VR	142	142	142	142	142								
	V2	146	146	146	146	146								
	GR2	3.8	3.8	3.8	3.8	3.8								
35000	TOFL	12630	12990	13380	13760	14160	14540						139	184
	V1	138	138	138	138	138	138							
	VR	138	138	139	139	139	139							
	V2	142	142	143	143	143	143							
	GR2	4.2	4.2	4.2	4.1	4.1	4.1							
34000	TOFL	11500	11810	12130	12480	12820	13150	13520					136	181
	V1	134	134	135	135	135	135	135						
	VR	135	135	135	135	135	135	135						
	V2	139	139	139	139	139	139	139						
	GR2	4.6	4.6	4.5	4.5	4.5	4.5	4.5						
33000	TOFL	10410	10680	10980	11280	11590	11880	12180	12510				133	178
	V1	130	130	131	131	131	131	131	131					
	VR	131	131	131	131	131	131	131	131					
	V2	135	135	135	135	135	135	135	135					
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.8					
32000	TOFL	9410	9660	9910	10160	10420	10680	10970	11240	11500			130	175
	V1	126	126	126	126	126	126	126	126	126				
	VR	126	126	126	126	127	127	127	127	127				
	V2	132	132	132	132	132	132	132	132	132				
	GR2	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.2	5.1				
31000	TOFL	8530	8770	8990	9200	9440	9670	9910	10150	10400	10870		128	172
	V1	122	122	122	122	122	122	122	122	123	123			
	VR	122	122	123	123	123	123	123	123	123	123			
	V2	128	128	128	128	128	128	128	128	128	128			
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.6	5.5	5.3			

FIGURE 10-8-45. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
30000	TOFL	7670	7890	8120	8330	8540	8750	8950	9180	9390	9800	10680	125	169
	V1	118	118	118	118	118	118	118	118	118	119	121		
	VR	118	118	119	119	119	119	119	119	119	119	121		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.1	6	5.7	5.3		
29000	TOFL	6750	6970	7200	7430	7670	7870	8070	8300	8490	8850	9600	122	166
	V1	112	112	113	113	113	114	114	114	114	115	116		
	VR	114	114	114	114	114	114	114	114	114	115	117		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6.1	5.8		
28000	TOFL	6020	6190	6360	6540	6730	6940	7150	7390	7630	7980	8640	119	163
	V1	107	107	107	108	108	108	109	109	110	110	112		
	VR	111	111	111	111	111	111	111	111	111	111	113		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	7.3	7.3	7.2	7.2	7.2	7.2	7.2	7.1	6.9	6.6	6.3		
27000	TOFL	5370	5510	5660	5810	5970	6130	6300	6480	6680	7090	7760	116	160
	V1	101	102	102	102	102	103	103	104	104	106	108		
	VR	107	107	107	107	107	107	107	107	107	107	109		
	V2	115	115	115	115	115	115	115	115	115	115	116		
	GR2	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.6	7.5	7.1	6.8		
26000	TOFL	4810	4930	5060	5190	5330	5460	5600	5750	5920	6220	6830	113	156
	V1	96	96	96	97	97	97	98	98	99	100	103		
	VR	103	103	103	103	103	103	103	103	103	103	105		
	V2	111	111	111	111	111	111	111	111	111	111	112		
	GR2	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.2	8	7.7	7.3		

FIGURE 10-8-46. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL	14480											140	185
	V1	141												
	VR	141												
	V2	145												
	GR2	3.9												
34000	TOFL	13130	13540	14000									137	182
	V1	137	137	137										
	VR	137	138	138										
	V2	141	141	141										
	GR2	4.3	4.3	4.2										
33000	TOFL	11850	12210	12610	13030								134	179
	V1	133	133	133	133									
	VR	133	133	133	134									
	V2	138	138	138	138									
	GR2	4.7	4.7	4.6	4.6									
32000	TOFL	10670	11000	11340	11680	11940							131	176
	V1	129	129	129	129	129								
	VR	129	129	129	129	129								
	V2	134	134	134	134	134								
	GR2	5.1	5.1	5	5	5								
31000	TOFL	9620	9890	10190	10490	10710	10950	11220	11500				128	173
	V1	125	125	125	125	125	125	125	125					
	VR	125	125	125	125	125	125	125	125					
	V2	130	130	130	131	131	131	131	131					
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.3					

FIGURE 10-8-46. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
30000	TOFL	8680	8930	9170	9440	9650	9850	10080	10350	10670	11410		126	169
	V1	121	121	121	121	121	121	121	121	121	122			
	VR	121	121	121	121	121	121	121	121	121	122			
	V2	127	127	127	127	127	127	127	127	127	127			
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.5	5.1			
29000	TOFL	7780	8020	8270	8510	8680	8860	9060	9310	9580	10200	11310	123	166
	V1	116	116	117	117	117	117	117	117	117	118	120		
	VR	117	117	117	117	117	117	117	117	117	118	120		
	V2	123	123	123	123	123	123	123	123	123	123	125		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.2	5.9	5.6	5.3		
28000	TOFL	6850	7090	7350	7600	7780	7950	8160	8380	8630	9150	10080	120	163
	V1	111	111	112	112	112	112	112	112	113	114	116		
	VR	113	113	113	113	113	113	113	113	113	114	116		
	V2	120	120	120	120	120	120	120	120	120	120	121		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.7	6.4	6	5.7		
27000	TOFL	6060	6240	6440	6650	6820	7000	7210	7480	7740	8230	9010	117	160
	V1	105	105	106	106	106	107	107	108	108	109	111		
	VR	109	109	109	109	109	109	109	109	109	110	111		
	V2	116	116	116	116	116	116	116	116	116	116	117		
	GR2	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.2	6.9	6.6	6.2		
26000	TOFL	5370	5530	5700	5870	6000	6140	6310	6510	6800	7370	8040	114	157
	V1	99	100	100	101	101	101	101	102	103	105	107		
	VR	105	105	105	105	105	105	105	105	105	106	107		
	V2	113	113	113	113	113	113	113	113	113	113	114		
	GR2	8.1	8	8	8	8	8	7.9	7.8	7.5	7.1	6.8		

FIGURE 10-8-47. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL													
	V1													
	VR													
	V2													
	GR2													
34000	TOFL													
	V1													
	VR													
	V2													
	GR2													
33000	TOFL													
	V1													
	VR													
	V2													
	GR2													
32000	TOFL	12220												
	V1	132												
	VR	132											133	176
	V2	136												
	GR2	4.8												
31000	TOFL	10930	11300											
	V1	128	128											
	VR	128	128										130	173
	V2	133	135											
	GR2	5.2	5.2											

FIGURE 10-8-47. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
30000	TOFL	9820	10110	10450	10720	10930	11180	11470					127	170
	V1	123	124	124	124	124	124	124						
	VR	124	124	124	124	124	124	124						
	V2	129	129	129	129	129	129	129						
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5						
29000	TOFL	8800	9060	9380	9610	9780	9990	10240	10540	11120			124	167
	V1	119	119	119	119	119	119	119	119	120				
	VR	119	119	119	119	119	119	119	120	120				
	V2	125	125	125	125	125	125	125	125	125				
	GR2	6.1	6.1	6	6	6	6	5.9	5.7	5.4				
28000	TOFL	7880	8110	8400	8620	8760	8950	9190	9430	9910	10810		121	164
	V1	115	115	115	115	115	115	115	115	116	117			
	VR	115	115	115	115	115	115	115	115	116	117			
	V2	123	122	122	122	121	121	121	121	121	122			
	GR2	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.2	5.8	5.5			
27000	TOFL	6940	7200	7480	7670	7830	8010	8220	8440	8860	9630	10590	118	160
	V1	109	110	110	110	110	110	111	111	111	113	115		
	VR	111	111	111	111	111	111	111	111	112	113	115		
	V2	118	118	118	118	118	118	118	118	118	118	120		
	GR2	7.1	7.1	7	7	7	7	6.9	6.7	6.3	6	5.6		
26000	TOFL	6080	6280	6510	6710	6850	7040	7270	7510	7940	8570	9380	115	157
	V1	103	104	104	105	105	105	105	106	107	109	110		
	VR	107	107	107	107	107	107	107	107	107	109	111		
	V2	114	114	114	114	114	114	114	114	114	115	116		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.3	6.9	6.5	6.1		

V1 CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY STANDING WATER, SLUSH AND WET SNOW

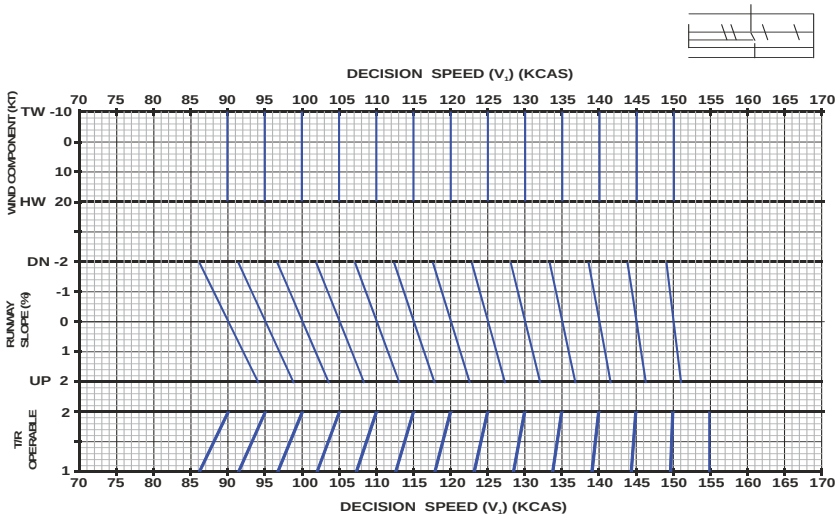
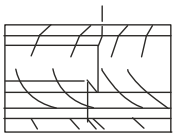


Figure 10-8-48. V1 Corrections Flaps 20° Runway Contaminated By Standing Water, Slush And Wet Snow

TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 20° RUNWAY CONTAMINATED BY STANDING WATER, SLUSH AND WET SNOW



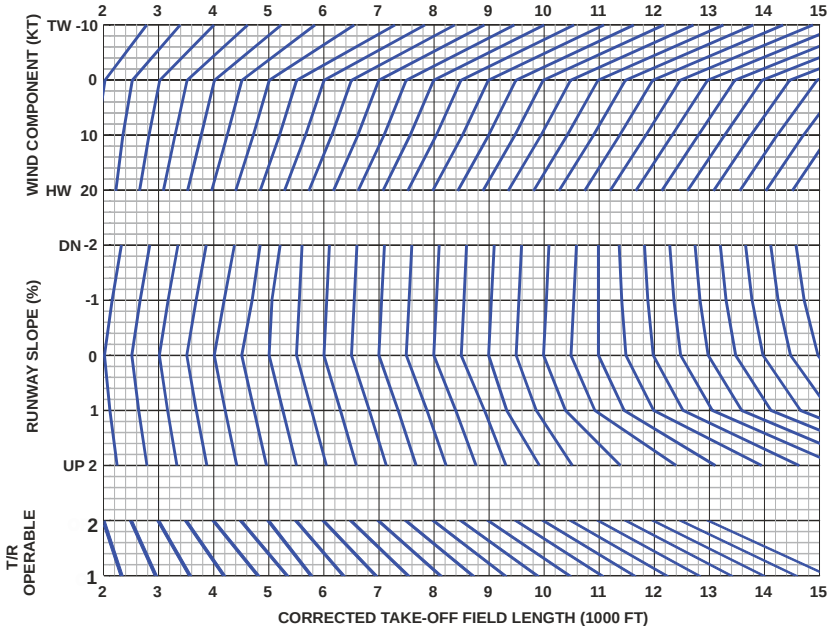


Figure 10-8-49. Takeoff Field Length Corrections Flaps 20° Runway Contaminated By Standing Water, Slush And Wet Snow

FIGURE 10-8-50. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	TOFL	4540	4600	4680	4760	4830	4910	4980	5050	5140	5230	5320	139	192
	V1	112	112	112	112	112	112	111	111	111	111	111		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.7	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
39000	TOFL	4360	4420	4500	4570	4640	4710	4780	4850	4940	5020	5110	138	191
	V1	110	110	110	110	109	109	109	109	109	109	109		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.9	5.9	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1		
38000	TOFL	4070	4130	4200	4270	4340	4410	4470	4540	4620	4700	4780	136	188
	V1	106	106	106	106	106	105	105	105	105	105	105		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5		
37000	TOFL	3840	3900	3970	4030	4100	4170	4230	4300	4380	4450	4530	135	185
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.7	6.7	6.7	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	3820	3880	3950	4030	4100	4180	4240	4310	4380	4450	4510	133	182
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.1	7.1	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	3820	3870	3940	4000	4070	4140	4200	4260	4330	4400	4470	131	180
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.6	7.6	7.6	7.6	7.7	7.7	7.8	7.8	7.8	7.8	7.8		
34000	TOFL	3780	3830	3890	3960	4020	4080	4140	4200	4280	4340	4420	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	127	127	127	127		
	GR2	8	8.1	8.1	8.1	8.1	8.2	8.2	8.3	8.3	8.3	8.3		
33000	TOFL	3720	3780	3850	3910	3970	4040	4100	4160	4220	4290	4360	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	3670	3730	3790	3850	3920	3980	4040	4100	4170	4230	4310	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.1	9.1	9.1	9.2	9.2	9.3	9.3	9.4	9.4	9.4	9.4		
31000	TOFL	3620	3680	3740	3800	3870	3920	3980	4040	4110	4180	4250	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.7	9.7	9.7	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 10-8-50. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
30000	TOFL	3570	3620	3690	3750	3810	3870	3930	3980	4050	4120	4190	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.3	10.3	10.4	10.4	10.4	10.5	10.5	10.6	10.6	10.6	10.6		
29000	TOFL	3520	3570	3640	3690	3760	3810	3870	3920	4000	4060	4130	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	121	121	121	121	121	121	121	121	121	121		
	GR2	11	11	11	11.1	11.1	11.1	11.2	11.3	11.3	11.3	11.3		
28000	TOFL	3470	3520	3570	3640	3690	3760	3810	3870	3940	4000	4070	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	120	120	120	120	120	120	120	120		
	GR2	11.7	11.7	11.8	11.8	11.8	11.9	11.9	12	12	12	12		
27000	TOFL	3410	3460	3520	3570	3640	3690	3750	3810	3870	3940	4010	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	119	119	119	119	119	119	119		
	GR2	12.4	12.5	12.5	12.6	12.6	12.6	12.7	12.7	12.7	12.7	12.7		
26000	TOFL	3360	3400	3460	3520	3570	3640	3690	3740	3810	3870	3940	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	102	102	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	119	119	119	119	119		
	GR2	13.3	13.3	13.3	13.4	13.4	13.5	13.5	13.6	13.6	13.6	13.6		

FIGURE 10-8-51. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
39600	TOFL	5410	5500	5590									139	192
	V1	111	111	111										
	VR	129	129	129										
	V2	137	137	137										
	GR2	5.9	5.9	5.9										
39000	TOFL	5190	5280	5370									138	191
	V1	109	109	109										
	VR	127	127	127										
	V2	135	135	135										
	GR2	6.1	6.1	6.1										
38000	TOFL	4860	4940	5020									136	188
	V1	105	105	105										
	VR	124	124	124										
	V2	133	133	133										
	GR2	6.5	6.5	6.5										
37000	TOFL	4600	4680	4760									135	185
	V1	103	103	103										
	VR	122	122	122										
	V2	131	131	131										
	GR2	6.9	6.9	6.9										
36000	TOFL	4590	4650	4720									133	182
	V1	102	102	102										
	VR	120	120	120										
	V2	130	130	130										
	GR2	7.3	7.3	7.3										
35000	TOFL	4540	4600	4670									131	180
	V1	102	102	102										
	VR	118	118	118										
	V2	128	128	128										
	GR2	7.8	7.8	7.8										
34000	TOFL	4480	4550	4610									129	177
	V1	102	102	102										
	VR	116	116	116										
	V2	127	127	127										
	GR2	8.3	8.3	8.3										
33000	TOFL	4430	4490	4560									127	174
	V1	102	102	102										
	VR	114	114	114										
	V2	125	125	125										
	GR2	8.8	8.8	8.8										
32000	TOFL	4370	4430	4500									125	171
	V1	102	102	102										
	VR	112	112	112										
	V2	124	124	124										
	GR2	9.4	9.4	9.3										
31000	TOFL	4310	4370	4440									123	168
	V1	102	102	102										
	VR	111	111	111										
	V2	123	123	123										
	GR2	9.9	9.9	9.9										

FIGURE 10-8-51. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
30000	TOFL	4260	4310	4380									121	166
	V1	102	102	102										
	VR	109	109	109										
	V2	122	122	122										
	GR2	10.6	10.6	10.6										
29000	TOFL	4200	4250	4320									119	163
	V1	102	102	102										
	VR	107	107	107										
	V2	121	121	121										
	GR2	11.3	11.3	11.2										
28000	TOFL	4130	4180	4250									117	160
	V1	102	102	102										
	VR	106	106	106										
	V2	120	120	120										
	GR2	12	12	12										
27000	TOFL	4060	4120	4180									115	157
	V1	102	102	102										
	VR	104	104	104										
	V2	119	119	119										
	GR2	12.7	12.7	12.7										
26000	TOFL	4000	4050	4120									113	154
	V1	102	102	102										
	VR	103	103	103										
	V2	119	119	119										
	GR2	13.6	13.6	13.6										

FIGURE 10-8-52. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	TOFL	4850	4920	5010	5100	5180	5260	5340	5430	5530	5630	5720	139	193
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	131	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	4650	4720	4810	4890	4980	5050	5130	5210	5310	5400	5490	138	191
	V1	112	112	112	112	112	111	111	111	111	111	111		
	VR	129	129	129	129	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	4350	4410	4490	4570	4650	4720	4790	4870	4950	5040	5130	136	188
	V1	108	108	108	108	108	108	107	107	107	107	107		
	VR	126	126	126	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.2		
37000	TOFL	4060	4120	4200	4270	4340	4410	4480	4550	4640	4720	4800	135	185
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	123	123	123	123	123	123	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	3840	3900	3980	4050	4130	4200	4280	4350	4430	4500	4570	133	183
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.9	6.9	6.9	7	7	7	7	7	7	7	7		
35000	TOFL	3900	3960	4030	4090	4160	4220	4300	4360	4430	4500	4580	131	180
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
34000	TOFL	3850	3900	3970	4040	4110	4180	4240	4310	4370	4450	4520	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.8	7.8	7.9	7.9	7.9	7.9	7.9	8	8	8	8		
33000	TOFL	3800	3860	3930	3990	4060	4120	4190	4250	4330	4390	4470	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.3	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	3750	3810	3870	3940	4000	4070	4130	4200	4270	4340	4410	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	124	124	124	124	124		
	GR2	8.9	8.9	8.9	8.9	8.9	9	9	9	9	9	9		
31000	TOFL	3700	3750	3820	3890	3950	4020	4070	4140	4220	4280	4350	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.5	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-52. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
30000	TOFL	3650	3700	3770	3830	3890	3960	4020	4080	4160	4220	4290	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.1	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		
29000	TOFL	3590	3650	3710	3780	3840	3900	3960	4020	4100	4160	4230	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.7	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9		
28000	TOFL	3540	3590	3660	3720	3780	3840	3900	3960	4040	4100	4170	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
27000	TOFL	3480	3530	3590	3660	3720	3780	3840	3910	3970	4040	4110	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.2	12.2	12.2	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	3430	3480	3540	3600	3660	3720	3770	3840	3910	3970	4030	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13	13	13	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2		

FIGURE 10-8-53. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
39600	TOFL	5820	5920	6020									139	193
	V1	114	114	114										
	VR	130	130	130										
	V2	138	138	138										
	GR2	5.7	5.7	5.7										
39000	TOFL	5590	5680	5780									138	191
	V1	111	111	111										
	VR	128	128	128										
	V2	136	136	136										
	GR2	5.9	5.9	5.9										
38000	TOFL	5210	5300	5390									136	188
	V1	107	107	107										
	VR	125	125	125										
	V2	134	134	134										
	GR2	6.2	6.2	6.2										
37000	TOFL	4880	4960	5040									135	185
	V1	104	104	104										
	VR	122	122	122										
	V2	131	131	131										
	GR2	6.6	6.6	6.6										
36000	TOFL	4640	4710	4790									133	183
	V1	101	101	101										
	VR	120	120	120										
	V2	129	129	129										
	GR2	7	7	7										
35000	TOFL	4650	4720	4790									131	180
	V1	101	101	101										
	VR	118	118	118										
	V2	128	128	128										
	GR2	7.5	7.5	7.5										
34000	TOFL	4600	4660	4740									129	177
	V1	101	101	101										
	VR	116	116	116										
	V2	126	126	126										
	GR2	8	8	7.9										
33000	TOFL	4530	4610	4680									127	174
	V1	101	101	101										
	VR	114	114	114										
	V2	125	125	125										
	GR2	8.5	8.5	8.5										
32000	TOFL	4480	4540	4620									125	171
	V1	101	101	101										
	VR	112	112	112										
	V2	124	124	124										
	GR2	9	9	9										
31000	TOFL	4420	4490	4550									123	169
	V1	101	101	101										
	VR	111	111	111										
	V2	122	122	122										
	GR2	9.6	9.6	9.6										

FIGURE 10-8-53. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
30000	TOFL	4350	4430	4500									121	166
	V1	101	101	101										
	VR	109	109	109										
	V2	121	121	121										
	GR2	10.2	10.2	10.2										
29000	TOFL	4290	4360	4430									119	163
	V1	101	101	101										
	VR	107	107	107										
	V2	120	120	120										
	GR2	10.9	10.9	10.9										
28000	TOFL	4230	4300	4370									117	160
	V1	101	101	101										
	VR	106	106	106										
	V2	119	119	119										
	GR2	11.6	11.6	11.6										
27000	TOFL	4170	4230	4300									115	157
	V1	101	101	101										
	VR	104	104	104										
	V2	118	118	118										
	GR2	12.4	12.4	12.4										
26000	TOFL	4100	4160	4230									113	154
	V1	101	101	101										
	VR	102	102	102										
	V2	117	117	117										
	GR2	13.2	13.2	13.2										

FIGURE 10-8-54. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	TOFL	5170	5260	5360	5460	5560	5660	5750	5860	5970	6070	6180	140	193
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
39000	TOFL	4960	5040	5140	5240	5330	5430	5510	5610	5720	5820	5920	139	191
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.6	5.6		
38000	TOFL	4620	4700	4790	4880	4970	5060	5140	5230	5330	5420	5520	137	189
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
37000	TOFL	4310	4380	4470	4550	4630	4710	4790	4880	4960	5050	5140	135	186
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.4	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	4020	4090	4170	4250	4330	4400	4480	4560	4640	4720	4800	133	183
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.8	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	3960	4020	4090	4160	4230	4310	4370	4440	4510	4590	4640	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
34000	TOFL	3920	3980	4060	4120	4190	4260	4320	4400	4470	4550	4610	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7		
33000	TOFL	3870	3930	4000	4070	4140	4210	4270	4340	4420	4490	4550	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
32000	TOFL	3820	3880	3960	4020	4090	4150	4210	4280	4360	4430	4490	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.7	8.7	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	3770	3830	3900	3960	4030	4100	4150	4230	4300	4370	4430	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 10-8-54. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
30000	TOFL	3720	3770	3850	3900	3980	4050	4090	4170	4250	4310	4370	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
29000	TOFL	3660	3720	3790	3850	3920	3990	4040	4110	4180	4250	4310	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
28000	TOFL	3610	3660	3740	3790	3850	3930	3970	4050	4120	4180	4250	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
27000	TOFL	3550	3610	3670	3730	3800	3860	3910	3990	4050	4120	4180	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	11.9	11.9	11.9	11.9	12	12	12	12	12	12		
26000	TOFL	3490	3540	3610	3670	3740	3800	3850	3920	3990	4060	4110	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.7	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 10-8-55. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
39600	TOFL	6290	6390	6500									140	193
	V1	116	116	116										
	VR	132	132	132										
	V2	139	139	139										
	GR2	5.4	5.4	5.4										
39000	TOFL	6020	6130	6230									139	191
	V1	114	114	114										
	VR	130	130	130										
	V2	137	137	137										
	GR2	5.6	5.6	5.6										
38000	TOFL	5610	5710	5810									137	189
	V1	110	110	110										
	VR	127	127	127										
	V2	135	135	135										
	GR2	6	6	6										
37000	TOFL	5230	5320	5410									135	186
	V1	106	106	106										
	VR	124	124	124										
	V2	132	132	132										
	GR2	6.4	6.4	6.3										
36000	TOFL	4880	4960	5050									133	183
	V1	102	102	102										
	VR	121	121	121										
	V2	130	130	130										
	GR2	6.8	6.8	6.8										
35000	TOFL	4710	4780	4860									131	180
	V1	100	100	100										
	VR	118	118	118										
	V2	127	127	127										
	GR2	7.2	7.2	7.2										
34000	TOFL	4680	4750	4830									129	177
	V1	100	100	100										
	VR	116	116	116										
	V2	126	126	126										
	GR2	7.6	7.6	7.6										
33000	TOFL	4620	4700	4760									127	175
	V1	100	100	100										
	VR	114	114	114										
	V2	124	124	124										
	GR2	8.1	8.1	8.1										
32000	TOFL	4570	4630	4710									125	172
	V1	100	100	100										
	VR	112	112	112										
	V2	123	123	123										
	GR2	8.7	8.7	8.7										
31000	TOFL	4500	4580	4640									123	169
	V1	100	100	100										
	VR	111	111	111										
	V2	122	122	122										
	GR2	9.3	9.3	9.3										

FIGURE 10-8-55. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
30000	TOFL	4440	4510	4570									121	166
	V1	100	100	100										
	VR	109	109	109										
	V2	121	121	121										
	GR2	9.9	9.9	9.9										
29000	TOFL	4370	4440	4520									119	163
	V1	100	100	100										
	VR	107	107	107										
	V2	120	120	120										
	GR2	10.5	10.5	10.5										
28000	TOFL	4310	4380	4450									117	160
	V1	100	100	100										
	VR	106	106	106										
	V2	119	119	119										
	GR2	11.2	11.2	11.2										
27000	TOFL	4240	4310	4380									115	157
	V1	100	100	100										
	VR	104	104	104										
	V2	118	118	118										
	GR2	12	12	12										
26000	TOFL	4180	4250	4310									113	154
	V1	100	100	100										
	VR	102	102	102										
	V2	117	117	117										
	GR2	12.8	12.8	12.8										

FIGURE 10-8-56. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	TOFL	5530	5660	5780	5900	6020	6130	6240	6360	6470	6590	6710	141	193
	V1	118	119	119	119	119	119	119	119	119	119	119		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	5300	5430	5550	5660	5770	5870	5980	6090	6200	6310	6420	140	192
	V1	116	116	116	116	117	117	117	117	117	117	117		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	4930	5060	5160	5270	5370	5470	5560	5670	5770	5870	5980	137	189
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	128	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	4590	4710	4800	4900	4990	5080	5170	5270	5370	5460	5560	135	186
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	4280	4380	4470	4560	4640	4730	4810	4900	4990	5080	5160	133	183
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	3990	4080	4170	4250	4330	4410	4490	4570	4650	4730	4810	131	181
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
34000	TOFL	3990	4070	4130	4210	4280	4350	4420	4500	4560	4630	4710	129	178
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	3930	4010	4080	4160	4230	4290	4370	4440	4500	4580	4640	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
32000	TOFL	3890	3960	4020	4100	4170	4240	4310	4390	4450	4530	4580	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
31000	TOFL	3830	3910	3980	4040	4120	4180	4250	4330	4380	4460	4520	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 10-8-56. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
30000	TOFL	3780	3850	3920	3980	4060	4120	4200	4260	4330	4400	4460	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	3720	3800	3860	3940	4000	4060	4140	4200	4270	4330	4400	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	119	119	119	119	119	119	119	119	119	119		
	GR2	10.3	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
28000	TOFL	3660	3740	3800	3870	3940	4000	4070	4140	4200	4270	4330	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
27000	TOFL	3610	3680	3750	3810	3880	3940	4010	4080	4140	4200	4270	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.6	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	3540	3620	3680	3750	3810	3880	3940	4010	4070	4140	4200	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.5	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3		

FIGURE 10-8-57. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
39600	TOFL	6820	6940	7060									141	193
	V1	119	119	119										
	VR	134	134	134										
	V2	140	140	140										
	GR2	5.2	5.2	5.2										
39000	TOFL	6540	6650	6760									140	192
	V1	117	117	117										
	VR	132	132	132										
	V2	139	139	139										
	GR2	5.4	5.4	5.4										
38000	TOFL	6080	6180	6290									137	189
	V1	112	112	113										
	VR	129	129	129										
	V2	136	136	136										
	GR2	5.7	5.7	5.7										
37000	TOFL	5650	5750	5850									135	186
	V1	108	108	108										
	VR	125	125	125										
	V2	133	133	133										
	GR2	6.1	6.1	6.1										
36000	TOFL	5250	5340	5430									133	183
	V1	104	104	104										
	VR	122	122	122										
	V2	130	130	130										
	GR2	6.5	6.5	6.5										
35000	TOFL	4890	4980	5060									131	181
	V1	100	100	101										
	VR	119	119	119										
	V2	128	128	128										
	GR2	6.9	6.9	6.9										
34000	TOFL	4770	4850	4910									129	178
	V1	99	99	99										
	VR	116	116	116										
	V2	126	126	126										
	GR2	7.3	7.3	7.3										
33000	TOFL	4720	4790	4850									127	175
	V1	99	99	99										
	VR	114	114	114										
	V2	124	124	124										
	GR2	7.8	7.8	7.8										
32000	TOFL	4650	4730	4790									125	172
	V1	99	99	99										
	VR	112	112	112										
	V2	123	123	123										
	GR2	8.3	8.3	8.3										
31000	TOFL	4590	4660	4730									123	169
	V1	99	99	99										
	VR	111	111	111										
	V2	122	122	122										
	GR2	8.9	8.9	8.9										

FIGURE 10-8-57. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
30000	TOFL	4530	4600	4660									121	166
	V1	99	99	99										
	VR	109	109	109										
	V2	121	121	121										
	GR2	9.5	9.5	9.5										
29000	TOFL	4460	4540	4600									119	163
	V1	99	99	99										
	VR	107	107	107										
	V2	119	119	119										
	GR2	10.1	10.1	10.1										
28000	TOFL	4400	4470	4530									117	160
	V1	99	99	99										
	VR	106	106	106										
	V2	118	118	118										
	GR2	10.8	10.8	10.8										
27000	TOFL	4340	4400	4460									115	157
	V1	99	99	99										
	VR	104	104	104										
	V2	117	117	117										
	GR2	11.6	11.5	11.5										
26000	TOFL	4260	4330	4390									113	154
	V1	99	99	99										
	VR	102	102	102										
	V2	116	116	116										
	GR2	12.3	12.3	12.3										

FIGURE 10-8-58. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	TOFL	6020	6170	6300	6430	6550	6670	6800	6930	7060	7180	7310	142	194
	V1	121	122	122	122	122	122	122	122	122	122	122		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
39000	TOFL	5770	5910	6030	6150	6270	6390	6510	6630	6750	6880	7000	141	192
	V1	119	119	119	119	119	119	119	119	120	120	120		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
38000	TOFL	5370	5500	5620	5730	5840	5940	6060	6170	6280	6390	6510	138	189
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	4990	5110	5220	5320	5420	5520	5620	5730	5830	5940	6040	136	187
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	4630	4740	4840	4940	5030	5120	5220	5310	5410	5510	5600	133	184
	V1	106	107	107	107	107	107	107	107	107	107	107		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	4300	4400	4490	4580	4670	4750	4840	4930	5020	5100	5190	131	181
	V1	102	102	102	103	103	103	103	103	103	103	103		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	4000	4090	4180	4260	4340	4420	4500	4580	4660	4740	4820	129	178
	V1	98	98	99	99	99	99	99	99	99	99	99		
	VR	117	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	4020	4100	4170	4240	4320	4400	4460	4540	4610	4680	4750	127	175
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
32000	TOFL	3970	4050	4110	4190	4260	4330	4410	4480	4560	4620	4700	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.1	8	8	8	8	8	8	8	8	8	8		
31000	TOFL	3910	3990	4060	4130	4200	4280	4340	4420	4490	4560	4630	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 10-8-58. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
30000	TOFL	3860	3940	4000	4070	4150	4220	4280	4360	4440	4490	4570	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
29000	TOFL	3800	3880	3950	4020	4090	4160	4230	4300	4370	4430	4500	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	108	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
28000	TOFL	3740	3820	3890	3960	4030	4100	4170	4230	4310	4360	4440	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
27000	TOFL	3690	3760	3830	3890	3970	4040	4100	4170	4240	4300	4370	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.1		
26000	TOFL	3630	3700	3770	3830	3910	3970	4030	4100	4180	4230	4300	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 10-8-59. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
39600	TOFL	7440	7570	7700									142	194
	V1	122	122	122										
	VR	136	136	136										
	V2	142	142	142										
	GR2	4.9	4.9	4.9										
39000	TOFL	7120	7250	7370									141	192
	V1	120	120	120										
	VR	134	134	134										
	V2	140	140	140										
	GR2	5.1	5.1	5.1										
38000	TOFL	6620	6740	6850									138	189
	V1	115	116	116										
	VR	130	130	130										
	V2	137	137	137										
	GR2	5.5	5.5	5.5										
37000	TOFL	6150	6250	6360									136	187
	V1	111	111	111										
	VR	127	127	127										
	V2	134	134	134										
	GR2	5.8	5.8	5.8										
36000	TOFL	5700	5800	5900									133	184
	V1	107	107	107										
	VR	124	124	124										
	V2	132	132	132										
	GR2	6.2	6.2	6.2										
35000	TOFL	5280	5370	5460									131	181
	V1	103	103	103										
	VR	121	121	121										
	V2	129	129	129										
	GR2	6.6	6.6	6.6										
34000	TOFL	4910	4990	5070									129	178
	V1	99	99	99										
	VR	118	118	118										
	V2	126	126	126										
	GR2	7	7	7										
33000	TOFL	4830	4890	4970									127	175
	V1	98	98	98										
	VR	115	115	115										
	V2	124	124	124										
	GR2	7.5	7.5	7.5										
32000	TOFL	4760	4830	4900									125	172
	V1	98	98	98										
	VR	113	113	113										
	V2	122	122	122										
	GR2	8	8	8										
31000	TOFL	4710	4760	4840									123	169
	V1	98	98	98										
	VR	111	111	111										
	V2	121	121	121										
	GR2	8.5	8.5	8.5										

FIGURE 10-8-59. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
30000	TOFL	4640	4710	4770									121	166
	V1	98	98	98										
	VR	109	109	109										
	V2	120	120	120										
	GR2	9.1	9.1	9.1										
29000	TOFL	4570	4640	4710									119	163
	V1	98	98	98										
	VR	107	107	107										
	V2	119	119	119										
	GR2	9.8	9.8	9.8										
28000	TOFL	4510	4570	4640									117	160
	V1	98	98	98										
	VR	106	106	106										
	V2	118	118	118										
	GR2	10.4	10.4	10.4										
27000	TOFL	4440	4500	4570									115	157
	V1	98	98	98										
	VR	104	104	104										
	V2	117	117	117										
	GR2	11.1	11.1	11.1										
26000	TOFL	4360	4430	4500									113	154
	V1	98	98	98										
	VR	102	102	102										
	V2	116	116	116										
	GR2	11.9	11.9	11.9										

FIGURE 10-8-60. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	TOFL	6540	6660	6800	6940	7080	7210	7350	7490	7630	7770	7910	143	194
	V1	124	124	124	125	125	125	125	125	125	125	125		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	6260	6370	6510	6640	6770	6900	7030	7170	7300	7430	7570	142	193
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	5820	5920	6050	6170	6290	6410	6530	6660	6780	6900	7020	139	190
	V1	117	118	118	118	118	118	118	118	118	118	118		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.3	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	5400	5500	5610	5730	5840	5950	6060	6180	6290	6400	6520	137	187
	V1	113	113	113	113	113	113	113	113	114	114	114		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	135	135	135	135	135	135		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	5010	5100	5200	5310	5410	5510	5620	5720	5830	5930	6030	134	184
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6	6	5.9	5.9	5.9	6	6	6	6	6	6		
35000	TOFL	4640	4720	4820	4910	5010	5100	5200	5290	5390	5480	5580	132	181
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	4300	4370	4460	4550	4640	4720	4810	4900	4990	5070	5160	129	178
	V1	100	100	100	100	101	101	101	101	101	101	101		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.8	6.8	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	4070	4140	4210	4290	4360	4430	4510	4580	4670	4740	4810	127	176
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
32000	TOFL	4060	4120	4210	4280	4360	4420	4510	4580	4660	4730	4800	125	173
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
31000	TOFL	4000	4070	4150	4230	4300	4370	4440	4520	4590	4670	4730	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 10-8-60. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
30000	TOFL	3940	4000	4080	4150	4250	4310	4380	4460	4540	4610	4680	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	3880	3950	4020	4090	4170	4230	4310	4380	4470	4540	4610	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
28000	TOFL	3820	3890	3960	4030	4110	4170	4250	4320	4390	4470	4530	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
27000	TOFL	3760	3830	3900	3970	4050	4110	4180	4250	4330	4400	4460	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	3710	3770	3840	3910	3990	4040	4120	4180	4260	4330	4390	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.6	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 10-8-61. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
39600	TOFL	8050	8200	8340									143	194
	V1	125	125	125										
	VR	137	137	137										
	V2	143	143	143										
	GR2	4.7	4.7	4.7										
39000	TOFL	7700	7840	7980									142	193
	V1	122	122	122										
	VR	135	135	135										
	V2	141	141	141										
	GR2	4.9	4.9	4.9										
38000	TOFL	7150	7280	7400									139	190
	V1	118	118	118										
	VR	132	132	132										
	V2	138	138	138										
	GR2	5.2	5.2	5.2										
37000	TOFL	6630	6750	6860									137	187
	V1	114	114	114										
	VR	129	129	129										
	V2	135	135	135										
	GR2	5.6	5.6	5.6										
36000	TOFL	6140	6250	6350									134	184
	V1	109	109	109										
	VR	125	125	125										
	V2	133	133	133										
	GR2	5.9	5.9	5.9										
35000	TOFL	5680	5780	5870									132	181
	V1	105	105	105										
	VR	122	122	122										
	V2	130	130	130										
	GR2	6.3	6.3	6.3										
34000	TOFL	5260	5340	5430									129	178
	V1	101	101	101										
	VR	119	119	119										
	V2	127	127	127										
	GR2	6.8	6.8	6.8										
33000	TOFL	4890	4950	5030									127	176
	V1	97	97	97										
	VR	116	116	116										
	V2	124	124	124										
	GR2	7.2	7.2	7.2										
32000	TOFL	4870	4950	5010									125	173
	V1	97	97	97										
	VR	113	113	113										
	V2	122	122	122										
	GR2	7.7	7.7	7.7										
31000	TOFL	4810	4880	4950									123	170
	V1	97	97	97										
	VR	111	111	111										
	V2	121	121	121										
	GR2	8.2	8.2	8.2										

FIGURE 10-8-61. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
30000	TOFL	4750	4810	4870									121	167
	V1	97	97	97										
	VR	109	109	109										
	V2	119	119	119										
	GR2	8.8	8.8	8.8										
29000	TOFL	4670	4740	4810									119	164
	V1	97	97	97										
	VR	107	107	107										
	V2	118	118	118										
	GR2	9.4	9.4	9.4										
28000	TOFL	4610	4670	4740									117	161
	V1	97	97	97										
	VR	106	106	106										
	V2	117	117	117										
	GR2	10.1	10.1	10.1										
27000	TOFL	4530	4590	4660									115	157
	V1	97	97	97										
	VR	104	104	104										
	V2	116	116	116										
	GR2	10.8	10.8	10.8										
26000	TOFL	4460	4520	4580									113	154
	V1	97	97	97										
	VR	102	102	102										
	V2	115	115	115										
	GR2	11.5	11.5	11.5										

FIGURE 10-8-62. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	TOFL	7070	7280	7500	7640	7770	7920	8070	8230	8380	8540	8690	144	195
	V1	127	128	128	128	128	128	128	128	128	128	128		
	VR	139	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
39000	TOFL	6760	6960	7170	7300	7430	7570	7720	7860	8010	8160	8310	143	193
	V1	124	125	125	125	125	125	125	125	125	125	126		
	VR	137	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.8	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	6280	6460	6650	6770	6890	7010	7150	7290	7420	7560	7700	140	190
	V1	120	121	121	121	121	121	121	121	121	121	121		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.1	5	4.9	4.9	4.9	5	5	5	5	5	4.9		
37000	TOFL	5820	5990	6160	6280	6390	6500	6630	6750	6880	7000	7130	138	187
	V1	116	116	117	117	117	117	117	117	117	117	117		
	VR	130	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.5	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	5390	5550	5710	5810	5910	6020	6140	6250	6370	6480	6600	135	185
	V1	111	112	112	112	112	112	112	112	112	112	112		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.8	5.7	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
35000	TOFL	4990	5130	5280	5370	5470	5560	5670	5780	5880	5990	6090	133	182
	V1	107	107	108	108	108	108	108	108	108	108	108		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.2	6.1	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
34000	TOFL	4610	4740	4870	4960	5050	5130	5230	5330	5430	5520	5620	130	179
	V1	102	103	103	103	103	103	103	103	103	103	103		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.6	6.5	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5		
33000	TOFL	4260	4380	4500	4580	4660	4740	4830	4920	5010	5090	5180	127	176
	V1	98	99	99	99	99	99	99	99	99	99	99		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	7.1	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
32000	TOFL	4110	4180	4260	4330	4420	4500	4570	4640	4710	4780	4860	125	173
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.5	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
31000	TOFL	4050	4140	4230	4310	4380	4460	4530	4610	4680	4750	4820	123	170
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		

FIGURE 10-8-62. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
30000	TOFL	3990	4080	4170	4240	4320	4390	4480	4540	4620	4680	4760	121	167
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.6	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	3940	4030	4120	4190	4260	4330	4410	4470	4550	4610	4690	119	164
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.2	9.1	8.9	9	9	9	9	9	9	9	9		
28000	TOFL	3880	3970	4060	4130	4200	4270	4340	4410	4480	4550	4620	117	161
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.9	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
27000	TOFL	3820	3900	3990	4070	4140	4210	4280	4340	4410	4480	4550	115	158
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	115	115	115	115	115	115	115	115	115		
	GR2	10.6	10.4	10.3	10.3	10.3	10.4	10.4	10.4	10.3	10.3	10.3		
26000	TOFL	3750	3830	3930	4000	4070	4140	4210	4280	4340	4410	4480	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	114	114	114	114	114	114	114	114	114	114		
	GR2	11.3	11.1	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 10-8-63. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
39600	TOFL	8850	9010	9170									144	195
	V1	128	128	128										
	VR	140	140	140										
	V2	145	145	145										
	GR2	4.4	4.4	4.4										
39000	TOFL	8460	8610	8760									143	193
	V1	126	126	126										
	VR	138	138	138										
	V2	143	143	143										
	GR2	4.6	4.6	4.6										
38000	TOFL	7840	7970	8110									140	190
	V1	121	121	121										
	VR	134	134	134										
	V2	140	140	140										
	GR2	4.9	4.9	4.9										
37000	TOFL	7260	7380	7510									138	187
	V1	117	117	117										
	VR	131	131	131										
	V2	137	137	137										
	GR2	5.3	5.3	5.3										
36000	TOFL	6710	6830	6950									135	185
	V1	112	112	113										
	VR	127	127	127										
	V2	134	134	134										
	GR2	5.7	5.7	5.7										
35000	TOFL	6200	6310	6420									133	182
	V1	108	108	108										
	VR	124	124	124										
	V2	131	131	131										
	GR2	6.1	6.1	6										
34000	TOFL	5720	5820	5920									130	179
	V1	104	104	104										
	VR	120	120	120										
	V2	128	128	128										
	GR2	6.4	6.4	6.4										
33000	TOFL	5280	5370	5450									127	176
	V1	99	99	99										
	VR	117	117	117										
	V2	125	125	125										
	GR2	6.9	6.9	6.9										
32000	TOFL	4930	5010	5050									125	173
	V1	96	96	95										
	VR	114	114	114										
	V2	123	123	123										
	GR2	7.3	7.3	7.3										
31000	TOFL	4900	4970	5020									123	170
	V1	96	96	95										
	VR	111	111	111										
	V2	121	121	121										
	GR2	7.8	7.8	7.8										

FIGURE 10-8-63. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
30000	TOFL	4820	4900	4940									121	167
	V1	96	96	95										
	VR	109	109	109										
	V2	119	119	119										
	GR2	8.4	8.4	8.4										
29000	TOFL	4760	4830	4880									119	164
	V1	96	96	95										
	VR	107	107	107										
	V2	118	118	118										
	GR2	9	9	9										
28000	TOFL	4690	4760	4810									117	161
	V1	96	96	95										
	VR	106	106	106										
	V2	117	117	117										
	GR2	9.6	9.6	9.6										
27000	TOFL	4620	4690	4730									115	158
	V1	96	96	95										
	VR	104	104	104										
	V2	115	115	115										
	GR2	10.3	10.3	10.3										
26000	TOFL	4540	4620	4650									113	155
	V1	96	96	95										
	VR	102	102	102										
	V2	114	114	114										
	GR2	11.1	11.1	11.1										

FIGURE 10-8-64. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	TOFL	7740	8060	8260	8400	8540	8710	8880	9060	9230	9400	9580	145	195
	V1	130	131	132	132	132	132	132	132	132	132	132		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	147	147	147	147	147	147	147	147	147	147		
	GR2	4.3	4.2	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
39000	TOFL	7400	7700	7890	8030	8160	8320	8480	8650	8810	8980	9140	144	193
	V1	128	129	129	129	129	129	129	129	129	129	129		
	VR	139	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.5	4.3	4.3	4.3	4.3	4.4	4.4	4.3	4.3	4.3	4.3		
38000	TOFL	6860	7130	7310	7430	7560	7700	7850	8010	8160	8310	8460	141	191
	V1	123	124	124	124	124	124	124	124	124	124	125		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	142	142	142	142	142	142	142	142	142	142		
	GR2	4.9	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
37000	TOFL	6350	6600	6760	6880	6990	7120	7260	7400	7540	7680	7820	139	188
	V1	119	120	120	120	120	120	120	120	120	120	120		
	VR	132	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.2	5	5	5	5	5	5	5	5	5	5		
36000	TOFL	5870	6100	6250	6360	6460	6590	6710	6840	6970	7100	7220	136	185
	V1	114	115	115	115	115	115	115	115	115	115	115		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
35000	TOFL	5420	5630	5770	5870	5970	6080	6200	6310	6430	6550	6660	134	182
	V1	110	111	111	111	111	111	111	111	111	111	111		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6	5.8	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
34000	TOFL	5000	5200	5320	5410	5500	5600	5710	5820	5920	6030	6140	131	179
	V1	105	106	106	106	106	106	106	106	106	106	106		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.4	6.2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
33000	TOFL	4610	4790	4900	4990	5070	5160	5260	5360	5450	5550	5650	128	176
	V1	101	102	102	102	102	102	102	102	102	102	102		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	126	126	126	126	126	126	126		
	GR2	6.8	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
32000	TOFL	4260	4410	4520	4590	4670	4750	4840	4930	5020	5110	5200	126	173
	V1	96	97	97	97	97	97	97	97	97	97	98		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	124	124	124	124	124	124	124	124	124	124		
	GR2	7.2	7	7	7	7	7	7	7	7	7	7		
31000	TOFL	4120	4220	4300	4370	4460	4540	4610	4680	4750	4830	4900	123	170
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.7	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		

FIGURE 10-8-64. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
30000	TOFL	4060	4160	4250	4320	4400	4480	4550	4620	4710	4780	4850	121	167
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.3	8	8	8	8	8	8	8	8	8	8		
29000	TOFL	4010	4100	4190	4270	4330	4420	4480	4560	4630	4710	4780	119	164
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.8	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	3940	4050	4130	4200	4270	4350	4410	4490	4560	4650	4710	117	161
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.5	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
27000	TOFL	3880	3990	4060	4140	4210	4280	4340	4420	4500	4570	4640	115	158
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
26000	TOFL	3830	3920	4000	4070	4150	4220	4280	4350	4430	4500	4570	113	155
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.9	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		

FIGURE 10-8-65. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
39600	TOFL	9760	9930	10110									145	195
	V1	132	132	132										
	VR	142	142	142										
	V2	147	147	147										
	GR2	4.2	4.2	4.1										
39000	TOFL	9310	9480	9650									144	193
	V1	129	129	129										
	VR	140	140	140										
	V2	145	145	145										
	GR2	4.3	4.3	4.3										
38000	TOFL	8610	8770	8930									141	191
	V1	125	125	125										
	VR	136	136	136										
	V2	142	142	142										
	GR2	4.7	4.7	4.7										
37000	TOFL	7960	8100	8250									139	188
	V1	120	120	120										
	VR	133	133	133										
	V2	138	138	138										
	GR2	5	5	5										
36000	TOFL	7350	7480	7610									136	185
	V1	115	116	116										
	VR	129	129	129										
	V2	135	135	135										
	GR2	5.4	5.4	5.4										
35000	TOFL	6780	6900	7020									134	182
	V1	111	111	111										
	VR	126	126	126										
	V2	132	132	132										
	GR2	5.8	5.8	5.7										
34000	TOFL	6250	6360	6470									131	179
	V1	106	107	107										
	VR	122	122	122										
	V2	129	129	129										
	GR2	6.2	6.2	6.1										
33000	TOFL	5750	5850	5950									128	176
	V1	102	102	102										
	VR	119	119	119										
	V2	126	126	126										
	GR2	6.6	6.6	6.6										
32000	TOFL	5290	5380	5470									126	173
	V1	98	98	98										
	VR	115	115	115										
	V2	124	124	124										
	GR2	7	7	7										
31000	TOFL	4980	5030	5060									123	170
	V1	94	94	94										
	VR	112	112	112										
	V2	121	121	121										
	GR2	7.5	7.5	7.5										

FIGURE 10-8-65. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
30000	TOFL	4930	4990	5000									121	167
	V1	94	94	94										
	VR	109	109	109										
	V2	119	119	119										
	GR2	8	8	8										
29000	TOFL	4860	4910	4930									119	164
	V1	94	94	94										
	VR	107	107	107										
	V2	117	117	117										
	GR2	8.6	8.6	8.6										
28000	TOFL	4790	4850	4860									117	161
	V1	94	94	94										
	VR	105	105	105										
	V2	116	116	116										
	GR2	9.2	9.2	9.2										
27000	TOFL	4710	4770	4780									115	158
	V1	94	94	94										
	VR	104	104	104										
	V2	115	115	115										
	GR2	9.9	9.9	9.9										
26000	TOFL	4640	4690	4700									113	155
	V1	94	94	94										
	VR	102	102	102										
	V2	114	114	114										
	GR2	10.6	10.6	10.6										

FIGURE 10-8-66. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	TOFL	8570	8920	9090	9250	9410	9610	9800	10000	10190	10380	10580	147	195
	V1	134	135	135	135	135	135	135	135	135	135	135		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	4	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	TOFL	8180	8530	8690	8840	9000	9190	9370	9550	9740	9920	10110	145	194
	V1	131	133	133	133	133	133	133	133	133	133	133		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	147	147	147	147	147	147	147	147	147	147		
	GR2	4.2	4	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	TOFL	7560	7880	8030	8170	8310	8480	8650	8820	8980	9150	9320	142	191
	V1	127	128	128	128	128	128	128	128	128	128	128		
	VR	138	139	139	139	139	139	139	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	TOFL	6990	7280	7420	7550	7680	7830	7990	8140	8290	8450	8600	140	188
	V1	122	123	123	123	123	123	123	123	123	123	123		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.9	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.7	4.7		
36000	TOFL	6460	6720	6850	6960	7080	7230	7370	7510	7650	7790	7930	137	185
	V1	118	119	119	119	119	119	119	119	119	119	119		
	VR	131	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
35000	TOFL	5960	6200	6310	6420	6530	6660	6790	6920	7050	7180	7310	135	183
	V1	113	114	114	114	114	114	114	114	114	114	114		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.6	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
34000	TOFL	5490	5710	5810	5910	6010	6130	6250	6370	6480	6600	6720	132	180
	V1	108	109	109	109	109	109	109	109	109	109	109		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
33000	TOFL	5050	5250	5340	5430	5530	5630	5740	5850	5960	6060	6170	129	177
	V1	104	105	105	105	105	105	105	105	105	105	105		
	VR	120	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.4	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
32000	TOFL	4640	4830	4910	4990	5080	5180	5270	5370	5470	5570	5670	127	174
	V1	99	100	100	100	100	100	100	100	100	100	100		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
31000	TOFL	4270	4440	4510	4590	4670	4760	4850	4940	5020	5120	5200	124	171
	V1	95	96	96	96	96	96	96	96	96	96	96		
	VR	113	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.3	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		

FIGURE 10-8-66. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
30000	TOFL	4160	4270	4340	4410	4480	4570	4640	4720	4800	4880	4950	121	168
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.8	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
29000	TOFL	4110	4210	4290	4350	4430	4510	4580	4650	4730	4810	4880	119	165
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.4	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
28000	TOFL	4040	4140	4220	4290	4360	4440	4500	4590	4660	4740	4810	117	161
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	9	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
27000	TOFL	3980	4080	4160	4220	4290	4370	4440	4510	4600	4670	4740	115	158
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.7	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
26000	TOFL	3910	4010	4090	4160	4230	4300	4370	4440	4520	4590	4660	113	155
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		

FIGURE 10-8-67. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
39600	TOFL	10780	10980	11220									147	195
	V1	135	136	136										
	VR	144	144	144										
	V2	148	148	148										
	GR2	3.9	3.9	3.8										
39000	TOFL	10300	10490	10720									145	194
	V1	133	133	133										
	VR	142	142	142										
	V2	147	147	147										
	GR2	4.1	4.1	4										
38000	TOFL	9500	9670	9890									142	191
	V1	128	128	129										
	VR	139	139	139										
	V2	143	143	143										
	GR2	4.4	4.4	4.3										
37000	TOFL	8760	8920	9120									140	188
	V1	123	124	124										
	VR	135	135	135										
	V2	140	140	140										
	GR2	4.7	4.7	4.6										
36000	TOFL	8080	8220	8410									137	185
	V1	119	119	119										
	VR	132	132	132										
	V2	137	137	137										
	GR2	5.1	5.1	5										
35000	TOFL	7440	7570	7740									135	183
	V1	114	114	115										
	VR	128	128	128										
	V2	134	134	134										
	GR2	5.5	5.4	5.3										
34000	TOFL	6840	6960	7120									132	180
	V1	110	110	110										
	VR	124	124	124										
	V2	131	131	131										
	GR2	5.9	5.8	5.7										
33000	TOFL	6280	6390	6540									129	177
	V1	105	105	105										
	VR	121	121	121										
	V2	128	128	128										
	GR2	6.3	6.3	6.1										
32000	TOFL	5770	5870	6000									127	174
	V1	100	100	101										
	VR	117	117	117										
	V2	125	125	125										
	GR2	6.7	6.7	6.6										
31000	TOFL	5300	5390	5510									124	171
	V1	96	96	96										
	VR	114	114	114										
	V2	122	122	122										
	GR2	7.2	7.1	7										

FIGURE 10-8-67. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
30000	TOFL	5030	5070	5080									121	168
	V1	93	93	92										
	VR	110	110	110										
	V2	119	119	119										
	GR2	7.7	7.6	7.5										
29000	TOFL	4950	5000	4970									119	165
	V1	93	93	92										
	VR	107	107	107										
	V2	117	117	117										
	GR2	8.2	8.2	8										
28000	TOFL	4890	4940	4900									117	161
	V1	93	93	92										
	VR	105	105	105										
	V2	115	115	115										
	GR2	8.8	8.8	8.6										
27000	TOFL	4810	4860	4820									115	158
	V1	93	93	92										
	VR	104	104	104										
	V2	114	114	114										
	GR2	9.5	9.4	9.3										
26000	TOFL	4730	4780	4760									113	155
	V1	93	93	92										
	VR	102	102	102										
	V2	113	113	113										
	GR2	10.2	10.2	10										

FIGURE 10-8-68. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	TOFL	9550	9820	10020	10210	10420	10640	10850	11070	11290	11500	11730	148	196
	V1	138	139	139	139	139	139	139	139	139	139	139		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
39000	TOFL	9120	9380	9570	9750	9950	10150	10360	10570	10770	10980	11190	146	194
	V1	136	136	136	136	136	136	136	136	136	136	137		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	148	148	148	148		
	GR2	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
38000	TOFL	8450	8690	8860	9030	9210	9390	9580	9770	9960	10150	10340	144	191
	V1	131	132	132	132	132	132	132	132	132	132	132		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
37000	TOFL	7780	8000	8160	8310	8470	8650	8820	8990	9160	9340	9510	141	189
	V1	126	127	127	127	127	127	127	127	127	127	127		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
36000	TOFL	7170	7370	7520	7650	7800	7960	8120	8280	8430	8590	8750	138	186
	V1	121	122	122	122	122	122	122	122	122	122	122		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
35000	TOFL	6600	6780	6920	7040	7180	7320	7470	7610	7750	7900	8040	136	183
	V1	117	117	117	117	117	117	117	117	117	117	118		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
34000	TOFL	6070	6240	6350	6470	6590	6720	6860	6990	7120	7250	7380	133	180
	V1	112	112	112	112	112	112	113	113	113	113	113		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
33000	TOFL	5570	5720	5830	5940	6050	6170	6290	6410	6520	6640	6760	130	177
	V1	107	108	108	108	108	108	108	108	108	108	108		
	VR	122	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
32000	TOFL	5100	5240	5340	5440	5540	5650	5760	5860	5970	6080	6190	127	174
	V1	102	103	103	103	103	103	103	103	103	103	103		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
31000	TOFL	4680	4810	4900	4980	5080	5180	5280	5370	5470	5570	5670	125	171
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8		

FIGURE 10-8-68. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
30000	TOFL	4300	4410	4500	4580	4660	4750	4840	4930	5020	5110	5200	122	168
	V1	93	94	94	94	94	94	94	94	94	94	94		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
29000	TOFL	4210	4300	4380	4440	4530	4610	4690	4770	4850	4920	5000	119	165
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8		
28000	TOFL	4150	4230	4310	4380	4460	4550	4620	4700	4770	4850	4930	117	162
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.6	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
27000	TOFL	4090	4170	4250	4310	4390	4470	4550	4630	4700	4780	4850	115	159
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
26000	TOFL	4030	4100	4180	4250	4320	4400	4480	4560	4630	4700	4780	113	155
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 10-8-69. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
39600	TOFL	11950	12190	12610									148	196
	V1	139	140	140										
	VR	147	147	147										
	V2	150	150	150										
	GR2	3.6	3.5	3.3										
39000	TOFL	11400	11630	12030									146	194
	V1	137	137	138										
	VR	145	145	145										
	V2	148	148	148										
	GR2	3.8	3.7	3.5										
38000	TOFL	10540	10750	11120									144	191
	V1	132	132	133										
	VR	141	141	141										
	V2	145	145	145										
	GR2	4.1	4.1	3.8										
37000	TOFL	9690	9890	10230									141	189
	V1	127	127	128										
	VR	137	137	138										
	V2	142	142	142										
	GR2	4.5	4.4	4.2										
36000	TOFL	8910	9090	9410									138	186
	V1	122	123	124										
	VR	134	134	134										
	V2	139	139	139										
	GR2	4.8	4.7	4.5										
35000	TOFL	8190	8360	8650									136	183
	V1	118	118	119										
	VR	130	130	130										
	V2	136	135	135										
	GR2	5.2	5.1	4.9										
34000	TOFL	7520	7670	7930									133	180
	V1	113	113	114										
	VR	126	126	127										
	V2	132	132	132										
	GR2	5.6	5.5	5.2										
33000	TOFL	6890	7030	7270									130	177
	V1	108	108	109										
	VR	123	123	123										
	V2	129	129	129										
	GR2	6	5.9	5.6										
32000	TOFL	6300	6430	6650									127	174
	V1	103	103	104										
	VR	119	119	119										
	V2	126	126	126										
	GR2	6.4	6.3	6										
31000	TOFL	5770	5890	6090									125	171
	V1	99	99	100										
	VR	115	115	116										
	V2	123	123	123										
	GR2	6.8	6.7	6.5										

FIGURE 10-8-69. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
30000	TOFL	5290	5400	5570									122	168
	V1	94	94	95										
	VR	112	112	112										
	V2	120	120	120										
	GR2	7.3	7.2	6.9										
29000	TOFL	5060	5050	5130									119	165
	V1	92	91	91										
	VR	108	108	108										
	V2	117	117	117										
	GR2	7.8	7.7	7.4										
28000	TOFL	4990	4980	4960									117	162
	V1	92	91	90										
	VR	106	106	106										
	V2	115	115	115										
	GR2	8.4	8.3	8										
27000	TOFL	4910	4900	4880									115	159
	V1	92	91	90										
	VR	104	104	104										
	V2	114	113	113										
	GR2	9.1	8.9	8.6										
26000	TOFL	4830	4830	4820									113	155
	V1	92	91	90										
	VR	102	102	102										
	V2	113	113	112										
	GR2	9.8	9.6	9.3										

FIGURE 10-8-70. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	TOFL	10650	10850	11090	11330	11580	11820	12060	12310	12560	12800	13050	149	196
	V1	142	143	143	143	143	143	143	143	143	143	143		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	3.4	3.3	3.3	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3		
39000	TOFL	10160	10340	10580	10800	11040	11270	11500	11730	11960	12200	12440	147	194
	V1	140	140	140	140	140	140	140	140	140	140	141		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
38000	TOFL	9380	9560	9770	9980	10190	10400	10610	10820	11040	11250	11470	145	192
	V1	135	135	135	135	135	135	135	135	136	136	136		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	TOFL	8660	8820	9010	9200	9400	9590	9790	9980	10170	10370	10570	142	189
	V1	130	130	130	130	131	131	131	131	131	131	131		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
36000	TOFL	7950	8100	8270	8440	8620	8800	8980	9150	9330	9500	9680	139	186
	V1	125	125	125	125	126	126	126	126	126	126	126		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
35000	TOFL	7300	7440	7600	7750	7920	8070	8240	8390	8560	8720	8880	137	183
	V1	120	120	120	121	121	121	121	121	121	121	121		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
34000	TOFL	6700	6820	6960	7110	7250	7400	7550	7690	7840	7980	8130	134	180
	V1	115	115	116	116	116	116	116	116	116	116	116		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
33000	TOFL	6130	6240	6380	6510	6640	6770	6900	7030	7170	7300	7430	131	177
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
32000	TOFL	5610	5710	5830	5950	6070	6190	6310	6430	6550	6670	6790	128	175
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
31000	TOFL	5120	5210	5320	5420	5530	5640	5750	5860	5970	6080	6190	126	172
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		

FIGURE 10-8-70. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
30000	TOFL	4690	4780	4880	4970	5070	5170	5270	5360	5460	5560	5660	123	168
	V1	96	96	96	96	96	96	96	96	96	97	97		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	7	7		
29000	TOFL	4310	4380	4470	4550	4650	4740	4830	4910	5000	5090	5180	120	165
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.5		
28000	TOFL	4270	4350	4420	4490	4570	4650	4740	4800	4890	4960	5040	117	162
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
27000	TOFL	4210	4280	4350	4430	4500	4580	4660	4740	4810	4890	4960	115	159
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
26000	TOFL	4140	4210	4290	4360	4440	4510	4590	4660	4740	4810	4890	113	156
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 10-8-71. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
39600	TOFL	13310	13630	14260									149	196
	V1	143	144	145										
	VR	149	149	150										
	V2	152	152	152										
	GR2	3.3	3.2	2.9										
39000	TOFL	12680	12990	13610									147	194
	V1	141	141	143										
	VR	147	147	148										
	V2	150	150	150										
	GR2	3.5	3.4	3.1										
38000	TOFL	11690	11980	12550									145	192
	V1	136	136	138										
	VR	144	144	144										
	V2	147	147	147										
	GR2	3.8	3.7	3.4										
37000	TOFL	10770	11040	11560									142	189
	V1	131	132	133										
	VR	140	140	141										
	V2	144	144	144										
	GR2	4.2	4	3.7										
36000	TOFL	9870	10120	10630									139	186
	V1	126	127	128										
	VR	136	136	137										
	V2	141	141	141										
	GR2	4.5	4.3	4										
35000	TOFL	9050	9280	9720									137	183
	V1	121	122	123										
	VR	132	132	133										
	V2	137	137	137										
	GR2	4.9	4.7	4.4										
34000	TOFL	8280	8500	8910									134	180
	V1	116	117	118										
	VR	129	129	129										
	V2	134	134	134										
	GR2	5.3	5.1	4.7										
33000	TOFL	7570	7770	8140									131	177
	V1	111	112	113										
	VR	125	125	125										
	V2	131	130	130										
	GR2	5.7	5.4	5.1										
32000	TOFL	6910	7100	7430									128	175
	V1	106	107	109										
	VR	121	121	121										
	V2	127	127	127										
	GR2	6.1	5.8	5.5										
31000	TOFL	6300	6470	6770									126	172
	V1	101	102	103										
	VR	117	117	117										
	V2	124	124	124										
	GR2	6.6	6.3	5.9										

FIGURE 10-8-71. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
30000	TOFL	5760	5910	6180									123	168
	V1	97	97	99										
	VR	113	113	114										
	V2	121	121	121										
	GR2	7	6.7	6.4										
29000	TOFL	5280	5410	5640									120	165
	V1	92	93	94										
	VR	110	110	110										
	V2	118	118	118										
	GR2	7.5	7.2	6.8										
28000	TOFL	5070	5010	5160									117	162
	V1	91	89	90										
	VR	106	106	107										
	V2	115	115	115										
	GR2	8.1	7.8	7.3										
27000	TOFL	4980	4940	4930									115	159
	V1	91	89	88										
	VR	104	104	104										
	V2	113	113	112										
	GR2	8.7	8.4	7.9										
26000	TOFL	4900	4870	4870									113	156
	V1	91	89	88										
	VR	102	102	102										
	V2	112	112	111										
	GR2	9.4	9	8.6										

FIGURE 10-8-72. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	TOFL	11790	12140	12390	12650	12930	13200	13480	13760	14040	14320	14620	150	197
	V1	146	147	147	147	147	147	147	147	147	148	148		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1		
39000	TOFL	11250	11590	11830	12070	12340	12600	12870	13130	13400	13670	13940	148	195
	V1	144	144	144	144	144	144	144	145	145	145	145		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
38000	TOFL	10370	10690	10900	11120	11370	11610	11850	12090	12330	12580	12830	146	192
	V1	139	139	139	139	139	140	140	140	140	140	140		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
37000	TOFL	9550	9850	10050	10250	10480	10700	10920	11140	11360	11580	11810	143	189
	V1	134	135	135	135	135	135	135	135	135	135	135		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
36000	TOFL	8780	9050	9230	9410	9620	9820	10010	10210	10420	10620	10820	140	187
	V1	129	130	130	130	130	130	130	130	130	130	130		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
35000	TOFL	8030	8300	8460	8620	8810	8990	9170	9350	9530	9720	9900	138	184
	V1	124	125	125	125	125	125	125	125	125	125	125		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	139	140	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6		
34000	TOFL	7350	7570	7720	7870	8030	8200	8360	8530	8690	8860	9020	135	181
	V1	119	119	119	119	119	119	120	120	120	120	120		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5	5.1	5.1	5.1	5	5	5	5	5	5		
33000	TOFL	6720	6920	7050	7190	7340	7490	7640	7780	7930	8080	8240	132	178
	V1	114	114	114	114	114	114	115	115	115	115	115		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
32000	TOFL	6130	6320	6440	6560	6690	6830	6960	7100	7230	7370	7500	129	175
	V1	109	109	109	109	109	109	109	109	110	110	110		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8		
31000	TOFL	5590	5760	5860	5980	6100	6220	6340	6460	6580	6700	6830	127	172
	V1	104	104	104	104	104	104	104	104	105	105	105		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		

FIGURE 10-8-72. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
30000	TOFL	5090	5240	5340	5440	5550	5660	5770	5870	5980	6090	6210	124	169
	V1	99	99	99	99	99	99	99	99	99	99	100		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
29000	TOFL	4660	4790	4880	4970	5070	5160	5260	5360	5460	5560	5660	121	166
	V1	94	94	94	94	94	95	95	95	95	95	95		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
28000	TOFL	4330	4410	4480	4570	4630	4720	4800	4890	4980	5070	5160	118	162
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
27000	TOFL	4270	4360	4420	4510	4580	4660	4730	4820	4890	4970	5020	115	159
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
26000	TOFL	4200	4280	4360	4430	4510	4590	4660	4740	4820	4890	4930	113	156
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.2	9	9.1	9.1	9.1	9.1	9.1	9.1	9	9	9		

FIGURE 10-8-73. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
39600	TOFL	14950	15490										150	197
	V1	148	149											
	VR	152	152											
	V2	155	154											
	GR2	3	2.7											
39000	TOFL	14250	14770	15700									148	195
	V1	145	146	148										
	VR	150	150	151										
	V2	153	153	153										
	GR2	3.2	2.9	2.6										
38000	TOFL	13120	13610	14500									146	192
	V1	140	142	143										
	VR	146	147	147										
	V2	150	150	150										
	GR2	3.5	3.2	2.9										
37000	TOFL	12070	12510	13340									143	189
	V1	136	137	139										
	VR	143	143	144										
	V2	146	146	146										
	GR2	3.8	3.5	3.2										
36000	TOFL	11070	11500	12240									140	187
	V1	131	132	134										
	VR	139	139	140										
	V2	143	143	143										
	GR2	4.2	3.9	3.5										
35000	TOFL	10130	10520	11230									138	184
	V1	126	127	129										
	VR	135	135	137										
	V2	140	140	140										
	GR2	4.5	4.2	3.9										
34000	TOFL	9230	9590	10260									135	181
	V1	120	122	124										
	VR	131	131	133										
	V2	136	136	137										
	GR2	4.9	4.6	4.3										
33000	TOFL	8430	8760	9340									132	178
	V1	115	116	119										
	VR	127	127	129										
	V2	133	133	133										
	GR2	5.3	4.9	4.6										
32000	TOFL	7680	7980	8510									129	175
	V1	110	111	114										
	VR	123	124	125										
	V2	129	129	129										
	GR2	5.7	5.3	5										
31000	TOFL	6990	7270	7740									127	172
	V1	105	106	109										
	VR	119	120	121										
	V2	126	126	126										
	GR2	6.1	5.8	5.4										

FIGURE 10-8-73. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
30000	TOFL	6350	6600	7020									124	169
	V1	100	101	103										
	VR	115	116	117										
	V2	122	122	123										
	GR2	6.6	6.2	5.8										
29000	TOFL	5790	6010	6380									121	166
	V1	95	96	98										
	VR	112	112	113										
	V2	119	119	119										
	GR2	7.1	6.7	6.3										
28000	TOFL	5280	5480	5800									118	162
	V1	91	92	94										
	VR	108	108	109										
	V2	116	116	116										
	GR2	7.6	7.2	6.8										
27000	TOFL	5010	5000	5270									115	159
	V1	89	89	89										
	VR	105	105	105										
	V2	113	113	113										
	GR2	8.2	7.7	7.3										
26000	TOFL	4950	4930	4940									113	156
	V1	89	87	86										
	VR	102	102	102										
	V2	111	111	110										
	GR2	8.8	8.4	7.9										

FIGURE 10-8-74. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	TOFL	13320	13590	13890	14200	14520	14840	15160	15470	15800	16130	16450	151	197
	V1	151	151	151	151	152	152	152	152	152	152	152		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8		
39000	TOFL	12690	12950	13230	13530	13830	14130	14430	14730	15040	15340	15660	150	196
	V1	148	148	148	149	149	149	149	149	149	149	149		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	3.1	3	3	3	3	3	3	3	3	3	3		
38000	TOFL	11710	11940	12190	12470	12740	13020	13290	13570	13840	14130	14420	147	193
	V1	144	144	144	144	144	144	144	144	144	145	145		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
37000	TOFL	10760	10970	11200	11450	11700	11950	12190	12450	12700	12950	13220	144	190
	V1	139	139	139	139	139	139	139	139	139	139	140		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6		
36000	TOFL	9880	10070	10280	10500	10730	10950	11180	11410	11640	11870	12110	142	187
	V1	134	134	134	134	134	134	134	134	134	134	135		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.1	4	4	4	4	4	4	4	4	4	4		
35000	TOFL	9050	9220	9410	9620	9820	10030	10230	10440	10640	10850	11070	139	184
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3		
34000	TOFL	8260	8420	8590	8770	8960	9140	9330	9510	9700	9890	10080	136	181
	V1	123	123	123	124	124	124	124	124	124	124	124		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7		
33000	TOFL	7510	7660	7810	7980	8140	8310	8480	8640	8810	8980	9160	133	178
	V1	118	118	118	118	118	118	118	118	119	119	119		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1		
32000	TOFL	6850	6980	7120	7260	7410	7560	7710	7860	8010	8170	8330	130	175
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5		
31000	TOFL	6230	6350	6470	6610	6740	6880	7010	7150	7280	7420	7570	128	172
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.1	6	6	6	6	6	6	6	6	6	5.9		

FIGURE 10-8-74. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
30000	TOFL	5660	5760	5880	6000	6120	6240	6360	6480	6610	6730	6860	125	169
	V1	102	103	103	103	103	103	103	103	103	103	103		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4		
29000	TOFL	5140	5230	5340	5450	5560	5670	5770	5880	5990	6100	6220	122	166
	V1	97	97	97	97	97	98	98	98	98	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7	7	7	7	7	6.9	6.9	6.9	6.9	6.9	6.9		
28000	TOFL	4680	4770	4860	4960	5060	5160	5260	5350	5450	5550	5660	119	163
	V1	92	93	93	93	93	93	93	93	93	93	93		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4		
27000	TOFL	4360	4440	4510	4600	4670	4760	4830	4920	4980	5060	5130	116	160
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.1	8.1	8	8	8	8	8	8	8	8	7.9		
26000	TOFL	4290	4360	4430	4520	4600	4680	4750	4840	4910	4980	5000	113	156
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		

FIGURE 10-8-75. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
39600	TOFL	16920											151	197
	V1	153												
	VR	155												
	V2	157												
	GR2	2.6												
39000	TOFL	16100	16930										150	196
	V1	150	152											
	VR	153	153											
	V2	155	155											
	GR2	2.8	2.5	0										
38000	TOFL	14830	15580	16830									147	193
	V1	145	147	149										
	VR	149	150	151										
	V2	152	152	152										
	GR2	3.1	2.8	2.5										
37000	TOFL	13600	14320	15480									144	190
	V1	140	142	144										
	VR	146	146	147										
	V2	148	148	149										
	GR2	3.4	3.1	2.8										
36000	TOFL	12460	13120	14220									142	187
	V1	135	137	140										
	VR	142	142	144										
	V2	145	145	146										
	GR2	3.7	3.4	3.1										
35000	TOFL	11400	12000	13000									139	184
	V1	130	132	135										
	VR	138	138	140										
	V2	142	142	143										
	GR2	4.1	3.7	3.4										
34000	TOFL	10390	10950	11880									136	181
	V1	125	127	130										
	VR	134	135	136										
	V2	138	138	139										
	GR2	4.4	4.1	3.8										
33000	TOFL	9440	9950	10820									133	178
	V1	120	122	125										
	VR	130	130	132										
	V2	135	135	136										
	GR2	4.8	4.4	4.1										
32000	TOFL	8590	9050	9830									130	175
	V1	114	116	119										
	VR	126	126	128										
	V2	131	131	132										
	GR2	5.2	4.8	4.5										
31000	TOFL	7800	8220	8900									128	172
	V1	109	111	114										
	VR	122	122	124										
	V2	128	128	128										
	GR2	5.6	5.2	4.9										

FIGURE 10-8-75. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
30000	TOFL	7080	7450	8060									125	169
	V1	104	106	109										
	VR	118	118	120										
	V2	124	124	125										
	GR2	6.1	5.7	5.3										
29000	TOFL	6420	6750	7290									122	166
	V1	99	101	103										
	VR	114	114	116										
	V2	121	121	121										
	GR2	6.5	6.1	5.8										
28000	TOFL	5830	6120	6580									119	163
	V1	94	96	98										
	VR	110	110	112										
	V2	117	117	118										
	GR2	7	6.6	6.3										
27000	TOFL	5290	5550	5960									116	160
	V1	89	91	93										
	VR	106	107	108										
	V2	114	114	115										
	GR2	7.6	7.1	6.8										
26000	TOFL	4990	5040	5390									113	156
	V1	87	86	88										
	VR	103	103	104										
	V2	111	111	111										
	GR2	8.2	7.7	7.3										

FIGURE 10-8-76. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
39600	TOFL	14770	15210	15710	16090	16480	16900	17340	17640	17940			152	198
	V1	155	156	156	156	157	157	157	157	157				
	VR	158	158	158	158	158	158	158	158	158				
	V2	160	160	160	160	160	160	160	160	160				
	GR2	2.7	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5				
39000	TOFL	14050	14450	14940	15290	15650	16060	16470	16740	17040	17410	17800	151	196
	V1	152	153	153	153	154	154	154	154	154	154	155		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	2.9	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6		
38000	TOFL	12890	13250	13690	14020	14340	14710	15080	15330	15600	15930	16290	148	193
	V1	147	148	148	148	149	149	149	149	149	149	149		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	3.2	3.1	3	3	3	3	3	3	3	3	2.9		
37000	TOFL	11830	12200	12580	12870	13170	13510	13840	14070	14310	14610	14940	145	190
	V1	142	143	143	143	144	144	144	144	144	144	145		
	VR	148	149	149	149	149	149	149	149	149	149	149		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.5	3.5	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.2		
36000	TOFL	10830	11140	11510	11770	12040	12340	12650	12850	13070	13340	13640	143	187
	V1	137	138	138	138	138	139	139	139	139	139	139		
	VR	144	144	145	145	145	145	145	145	145	145	145		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.9	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6		
35000	TOFL	9910	10190	10520	10760	11000	11270	11550	11730	11930	12170	12450	140	185
	V1	132	132	133	133	133	133	134	134	134	134	134		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.1	4.1	4.1	4	4	4	4	4	3.9		
34000	TOFL	9040	9290	9600	9810	10050	10280	10520	10700	10870	11090	11350	137	182
	V1	127	127	128	128	128	128	128	128	128	129	129		
	VR	136	136	137	137	137	137	137	137	137	137	137		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.3		
33000	TOFL	8230	8460	8730	8930	9130	9350	9570	9720	9870	10070	10310	134	179
	V1	121	122	122	122	123	123	123	123	123	123	123		
	VR	132	132	133	133	133	133	133	133	133	133	133		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7		
32000	TOFL	7470	7680	7920	8100	8280	8480	8670	8810	8950	9130	9340	131	176
	V1	116	116	117	117	117	117	118	118	118	118	118		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1		
31000	TOFL	6790	6970	7190	7350	7510	7690	7870	7990	8110	8270	8470	128	173
	V1	111	111	112	112	112	112	112	112	112	112	113		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	5.8	5.8	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.6	5.5		

FIGURE 10-8-76. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
30000	TOFL	6150	6320	6520	6660	6810	6970	7130	7230	7350	7490	7670	126	169
	V1	105	106	106	106	106	107	107	107	107	107	107		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.3	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.9		
29000	TOFL	5570	5720	5900	6020	6150	6290	6440	6530	6630	6760	6930	123	166
	V1	100	100	101	101	101	101	101	101	101	102	102		
	VR	115	116	116	116	116	116	116	116	116	116	116		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.8	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.4		
28000	TOFL	5050	5180	5340	5450	5570	5690	5820	5910	6000	6110	6260	120	163
	V1	95	95	96	96	96	96	96	96	96	96	97		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.3	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	6.9		
27000	TOFL	4580	4700	4840	4940	5040	5160	5270	5350	5430	5530	5660	117	160
	V1	90	90	91	91	91	91	91	91	91	91	92		
	VR	107	108	108	108	108	108	108	108	108	108	108		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.8	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
26000	TOFL	4350	4420	4520	4600	4670	4750	4840	4910	4980	5020	5120	114	157
	V1	88	88	87	87	87	87	87	87	87	87	87		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	8.4	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	7.9		

FIGURE 10-8-77. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	16920											148	193
	V1	151												
	VR	152												
	V2	154												
	GR2	2.6												
37000	TOFL	15520	16580										145	190
	V1	146	148											
	VR	149	149											
	V2	151	151											
	GR2	2.9	2.6											
36000	TOFL	14180	15210	16580									143	187
	V1	141	143	145										
	VR	145	146	147										
	V2	147	148	148										
	GR2	3.2	2.9	2.6										
35000	TOFL	12940	13870	15170									140	185
	V1	135	138	140										
	VR	141	142	143										
	V2	144	144	145										
	GR2	3.6	3.2	2.9										
34000	TOFL	11780	12640	13840									137	182
	V1	130	132	135										
	VR	137	138	139										
	V2	140	141	142										
	GR2	3.9	3.6	3.3										
33000	TOFL	10710	11490	12580									134	179
	V1	125	127	130										
	VR	133	134	135										
	V2	137	137	138										
	GR2	4.3	4	3.6										
32000	TOFL	9700	10430	11420									131	176
	V1	119	122	125										
	VR	129	130	132										
	V2	133	133	135										
	GR2	4.7	4.3	4										
31000	TOFL	8800	9430	10340									128	173
	V1	114	116	120										
	VR	124	126	128										
	V2	129	130	131										
	GR2	5.1	4.7	4.4										

FIGURE 10-8-77. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
30000	TOFL	7970	8530	9320									126	169
	V1	109	111	114										
	VR	120	121	123										
	V2	126	126	127										
	GR2	5.5	5.2	4.8										
29000	TOFL	7190	7700	8410									123	166
	V1	103	106	109										
	VR	116	117	119										
	V2	122	122	124										
	GR2	6	5.6	5.3										
28000	TOFL	6500	6940	7570									120	163
	V1	98	100	103										
	VR	112	113	115										
	V2	119	119	120										
	GR2	6.5	6.1	5.7										
27000	TOFL	5870	6260	6800									117	160
	V1	93	95	98										
	VR	108	109	111										
	V2	115	115	117										
	GR2	7	6.6	6.2										
26000	TOFL	5300	5640	6110									114	157
	V1	88	90	93										
	VR	104	105	107										
	V2	112	112	113										
	GR2	7.5	7.1	6.8										

FIGURE 10-8-78. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
39600	TOFL	16500											154	198
	V1	160												
	VR	161												
	V2	162												
	GR2	2.5												
39000	TOFL	15650	16360	17010	17410	17830	18320	18710	18990	19330			152	197
	V1	157	158	158	159	159	159	159	159	159				
	VR	159	159	159	159	159	159	159	159	159				
	V2	160	161	161	161	161	161	161	161	161				
	GR2	2.7	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4				
38000	TOFL	14350	14980	15560	15940	16340	16810	17210	17460	17780	18190	18650	149	194
	V1	152	153	153	154	154	154	154	154	154	154	155		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	3	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.5		
37000	TOFL	13150	13720	14230	14580	14940	15370	15720	15950	16240	16620	17100	147	191
	V1	147	148	148	148	149	149	149	149	149	149	150		
	VR	151	151	152	152	152	152	152	152	152	152	152		
	V2	153	153	154	154	154	154	154	154	154	154	154		
	GR2	3.3	3.2	3.1	3.1	3.1	3	3	3	3	3	2.8		
36000	TOFL	12000	12540	13020	13330	13660	14050	14360	14570	14840	15180	15630	144	188
	V1	141	143	143	143	144	144	144	144	144	144	145		
	VR	147	147	148	148	148	148	148	148	148	148	148		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.6	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.1		
35000	TOFL	10910	11390	11850	12130	12430	12790	13070	13250	13480	13790	14200	141	185
	V1	136	137	138	138	138	138	138	138	138	139	140		
	VR	143	143	144	144	144	144	144	144	144	144	144		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	3.8	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.4		
34000	TOFL	9940	10370	10760	11010	11280	11600	11850	12010	12230	12500	12870	138	182
	V1	130	131	132	132	133	133	133	133	133	133	134		
	VR	138	139	139	140	140	140	140	140	140	140	140		
	V2	142	143	143	143	143	143	143	143	143	143	143		
	GR2	4.3	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4	3.8		
33000	TOFL	9040	9420	9780	10010	10250	10540	10760	10900	11090	11350	11670	135	179
	V1	125	126	127	127	127	127	127	127	127	128	128		
	VR	134	135	135	135	135	135	135	135	135	135	135		
	V2	138	139	139	139	139	139	139	139	139	139	139		
	GR2	4.7	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.1		
32000	TOFL	8220	8560	8870	9070	9290	9550	9750	9880	10050	10280	10570	133	176
	V1	119	120	121	122	122	122	122	122	122	122	123		
	VR	130	131	131	131	131	131	131	131	131	131	131		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.1	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.5		
31000	TOFL	7440	7740	8020	8210	8400	8650	8830	8920	9080	9290	9550	130	173
	V1	114	115	116	116	116	116	116	116	116	117	117		
	VR	126	126	127	127	127	127	127	127	127	127	127		
	V2	131	131	132	132	132	132	132	132	132	132	132		
	GR2	5.6	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	4.9		

FIGURE 10-8-78. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
30000	TOFL	6740	7010	7260	7420	7600	7810	7960	8060	8200	8390	8630	127	170
	V1	108	110	110	110	111	111	111	111	111	111	112		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	127	128	128	128	128	128	128	128	128	128	128		
	GR2	6	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.6	5.4		
29000	TOFL	6090	6330	6550	6700	6850	7040	7180	7270	7390	7560	7780	124	167
	V1	103	104	105	105	105	105	105	105	105	106	106		
	VR	117	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.5	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	5.8		
28000	TOFL	5500	5700	5900	6030	6170	6340	6460	6540	6650	6800	7000	121	164
	V1	97	99	99	99	100	100	100	100	100	100	101		
	VR	113	114	114	114	114	114	114	114	114	114	114		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	6.9	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.3		
27000	TOFL	4970	5150	5320	5430	5560	5710	5820	5890	5980	6120	6290	118	160
	V1	92	93	94	94	94	95	95	95	95	95	95		
	VR	109	109	110	110	110	110	110	110	110	110	110		
	V2	116	117	117	117	117	117	117	117	117	117	117		
	GR2	7.5	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	6.8		
26000	TOFL	4490	4640	4790	4900	5010	5140	5240	5300	5390	5510	5660	115	157
	V1	87	88	89	89	89	89	89	89	89	89	90		
	VR	105	105	106	106	106	106	106	106	106	106	106		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.6	7.3		

FIGURE 10-8-79. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	18000											147	191
	V1	151												
	VR	152												
	V2	154												
	GR2	2.5												
36000	TOFL	16490	17840										144	188
	V1	147	148											
	VR	148	149											
	V2	150	151											
	GR2	2.8	2.5											
35000	TOFL	15020	16310	17800									141	185
	V1	141	144	146										
	VR	144	145	146										
	V2	146	147	148										
	GR2	3.1	2.8	2.5										
34000	TOFL	13600	14860	16250									138	182
	V1	136	139	141										
	VR	140	142	143										
	V2	143	144	144										
	GR2	3.4	3.1	2.8										
33000	TOFL	12340	13440	14750									135	179
	V1	130	133	136										
	VR	136	137	139										
	V2	139	140	141										
	GR2	3.8	3.5	3.2										
32000	TOFL	11170	12170	13370									133	176
	V1	125	128	131										
	VR	132	133	135										
	V2	135	136	137										
	GR2	4.2	3.8	3.5										
31000	TOFL	10110	10990	12050									130	173
	V1	119	122	125										
	VR	128	129	131										
	V2	132	133	134										
	GR2	4.6	4.2	3.9										

FIGURE 10-8-79. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
30000	TOFL	9120	9920	10860									127	170
	V1	114	117	120										
	VR	123	125	127										
	V2	128	129	130										
	GR2	5	4.7	4.3										
29000	TOFL	8210	8930	9770									124	167
	V1	108	111	114										
	VR	119	121	123										
	V2	124	125	126										
	GR2	5.4	5.1	4.8										
28000	TOFL	7380	8020	8760									121	164
	V1	103	106	109										
	VR	115	116	118										
	V2	120	121	123										
	GR2	5.9	5.5	5.2										
27000	TOFL	6630	7190	7850									118	160
	V1	97	100	103										
	VR	111	112	114										
	V2	117	118	119										
	GR2	6.4	6	5.7										
26000	TOFL	5950	6440	7010									115	157
	V1	92	94	97										
	VR	106	108	110										
	V2	113	114	115										
	GR2	6.9	6.6	6.2										

FIGURE 10-8-80. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	4850	4930	5010	5080	5150	5250	5350	5450	5540	5620	5700	139	192
	V1	113	113	113	112	112	112	112	112	112	112	112		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.8		
39000	TOFL	4660	4740	4810	4880	4950	5040	5130	5230	5320	5390	5470	138	191
	V1	111	110	110	110	110	110	110	110	110	110	110		
	VR	128	127	127	127	127	127	127	127	127	127	127		
	V2	136	136	135	135	135	135	135	135	135	135	135		
	GR2	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6		
38000	TOFL	4360	4430	4500	4560	4630	4710	4800	4890	4970	5040	5110	136	188
	V1	107	107	106	106	106	106	106	106	106	106	106		
	VR	125	125	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	4090	4160	4230	4300	4360	4440	4520	4600	4680	4750	4820	135	185
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
36000	TOFL	4020	4090	4170	4230	4300	4370	4450	4510	4590	4650	4720	133	182
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	130	130	130	130	130	130	130	130	130		
	GR2	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.2		
35000	TOFL	4030	4090	4150	4230	4290	4350	4430	4500	4580	4630	4700	131	180
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.4	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
34000	TOFL	3980	4050	4110	4170	4230	4300	4380	4450	4520	4580	4630	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.9	7.9	8	8	8.1	8.1	8	8	8	8	8.1		
33000	TOFL	3920	3990	4050	4110	4180	4240	4320	4390	4460	4510	4580	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.4	8.5	8.5	8.5	8.6	8.6	8.6	8.5	8.5	8.6	8.6		
32000	TOFL	3880	3940	4010	4060	4120	4200	4260	4330	4400	4460	4520	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	3830	3880	3950	4010	4070	4140	4210	4280	4350	4400	4450	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	123	123	123	123	123	123	123	123	123		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		

FIGURE 10-8-80. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
30000	TOFL	3770	3830	3890	3950	4010	4080	4150	4220	4290	4340	4400	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	122	122	122	122	122	122	122	122		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.4		
29000	TOFL	3720	3770	3840	3890	3950	4020	4090	4160	4230	4270	4340	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	121	121		
	GR2	10.8	10.9	10.9	10.9	11	11	11	11	11	11	11		
28000	TOFL	3650	3720	3770	3840	3890	3960	4030	4100	4170	4210	4270	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.5	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
27000	TOFL	3600	3660	3710	3770	3830	3900	3960	4040	4090	4150	4200	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.3	12.3	12.4	12.4	12.5	12.5	12.4	12.4	12.4	12.4	12.5		
26000	TOFL	3530	3600	3660	3710	3760	3830	3900	3960	4030	4070	4130	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.1	13.2	13.2	13.3	13.3	13.3	13.2	13.2	13.3	13.3		

FIGURE 10-8-81. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	5200	5290	5380	5460	5550	5650	5760	5870	5970	6050	6140	139	193
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	4990	5070	5150	5230	5320	5420	5520	5620	5720	5800	5880	138	191
	V1	113	113	112	112	112	112	112	112	112	112	112		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	136	136	136	136	136	136	136	136	136		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	4650	4730	4810	4890	4970	5060	5150	5250	5340	5410	5490	136	188
	V1	109	109	109	108	108	108	108	108	108	108	108		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
37000	TOFL	4340	4420	4490	4560	4630	4720	4800	4890	4970	5040	5120	135	185
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.5		
36000	TOFL	4070	4150	4220	4280	4360	4440	4510	4600	4670	4740	4810	133	183
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9		
35000	TOFL	4110	4180	4240	4320	4390	4450	4530	4610	4680	4750	4820	131	180
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
34000	TOFL	4060	4120	4200	4260	4330	4400	4480	4550	4620	4690	4750	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
33000	TOFL	4010	4080	4140	4210	4280	4340	4420	4490	4570	4630	4700	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	125	125		
	GR2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.3	8.3		
32000	TOFL	3950	4020	4090	4150	4220	4290	4370	4440	4500	4570	4630	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	3910	3970	4030	4090	4160	4230	4310	4380	4450	4510	4580	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 10-8-81. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
30000	TOFL	3850	3910	3980	4040	4110	4170	4240	4320	4390	4440	4510	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	10	10	10	10	10	10	10	10	10		
29000	TOFL	3800	3850	3920	3980	4050	4110	4180	4250	4320	4380	4440	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.7		
28000	TOFL	3740	3800	3860	3920	3980	4050	4120	4190	4260	4320	4380	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.3	11.3	11.4	11.4		
27000	TOFL	3670	3740	3800	3860	3920	3990	4060	4130	4200	4250	4310	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	12	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	3620	3670	3730	3800	3860	3930	4000	4060	4120	4180	4250	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.8	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 10-8-82. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	5570	5670	5770	5870	5980	6100	6210	6330	6440	6530	6630	140	193
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	TOFL	5340	5440	5530	5630	5730	5840	5950	6060	6170	6250	6350	139	191
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.5		
38000	TOFL	4970	5060	5150	5240	5340	5440	5540	5650	5740	5820	5910	137	189
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	4630	4720	4800	4880	4970	5070	5160	5260	5350	5420	5500	135	186
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
36000	TOFL	4320	4400	4480	4550	4640	4720	4810	4900	4980	5050	5130	133	183
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
35000	TOFL	4140	4220	4290	4360	4420	4500	4570	4640	4710	4790	4860	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
34000	TOFL	4140	4210	4280	4350	4410	4490	4570	4640	4710	4780	4850	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.4	7.4	7.4	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.5		
33000	TOFL	4090	4160	4230	4280	4360	4430	4510	4570	4650	4710	4780	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8		
32000	TOFL	4030	4110	4180	4230	4300	4380	4450	4520	4590	4660	4720	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
31000	TOFL	3980	4050	4120	4170	4250	4320	4390	4460	4530	4590	4660	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9	9	9	9.1	9.1	9.1	9	9	9	9	9.1		

FIGURE 10-8-82. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
30000	TOFL	3920	3990	4060	4110	4190	4260	4330	4390	4470	4530	4590	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.7		
29000	TOFL	3870	3930	4000	4050	4130	4200	4270	4340	4400	4470	4530	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	120	120		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	3810	3870	3940	3990	4070	4140	4200	4270	4330	4400	4470	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11	11	11	11	11	11	11	11	11	11	11		
27000	TOFL	3740	3820	3880	3930	4010	4070	4140	4200	4270	4330	4400	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.8		
26000	TOFL	3680	3750	3820	3870	3930	4000	4070	4130	4200	4270	4320	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5		

FIGURE 10-8-83. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	6020	6140	6250	6370	6490	6620	6740	6870	6990	7090	7200	141	193
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5	5	5	5	5	5	5	5	5	5	5		
39000	TOFL	5770	5880	5990	6100	6220	6340	6460	6580	6700	6790	6890	140	192
	V1	117	118	118	118	118	118	118	118	118	118	118		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	5370	5470	5580	5680	5790	5900	6010	6120	6230	6320	6410	137	189
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
37000	TOFL	4990	5090	5180	5280	5380	5480	5580	5690	5790	5870	5950	135	186
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	4640	4730	4820	4900	5000	5090	5180	5280	5370	5450	5530	133	183
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
35000	TOFL	4320	4400	4480	4560	4650	4730	4820	4910	5000	5070	5140	131	181
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
34000	TOFL	4210	4290	4360	4430	4500	4570	4640	4700	4770	4850	4910	129	178
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
33000	TOFL	4170	4240	4310	4380	4460	4520	4600	4670	4750	4810	4870	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	4110	4190	4250	4330	4400	4470	4550	4610	4680	4750	4810	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	123		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	4060	4130	4200	4270	4350	4410	4480	4550	4620	4680	4740	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.7	8.7		

FIGURE 10-8-83. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
30000	TOFL	4010	4070	4140	4210	4290	4350	4420	4480	4550	4620	4670	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.2	9.2	9.3	9.3		
29000	TOFL	3950	4020	4080	4150	4220	4290	4360	4420	4490	4560	4620	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	3890	3960	4020	4080	4160	4220	4300	4360	4430	4490	4550	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
27000	TOFL	3830	3890	3960	4020	4100	4160	4230	4290	4350	4420	4480	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
26000	TOFL	3760	3830	3900	3960	4030	4090	4160	4220	4290	4350	4410	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		

FIGURE 10-8-84. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	6570	6700	6820	6950	7090	7230	7360	7510	7640	7750	7870	142	194
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.8	4.8		
39000	TOFL	6290	6410	6530	6660	6780	6910	7050	7180	7310	7410	7530	141	192
	V1	120	121	121	121	121	121	121	121	121	121	121		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5	5	5	5	5	4.9	4.9	4.9	4.9	4.9	5		
38000	TOFL	5850	5960	6070	6190	6310	6430	6550	6680	6790	6890	6990	138	189
	V1	116	116	116	116	116	117	117	117	117	117	117		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	5430	5540	5640	5750	5860	5970	6080	6200	6310	6400	6490	136	187
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.7		
36000	TOFL	5040	5140	5230	5330	5430	5530	5640	5750	5840	5930	6020	133	184
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
35000	TOFL	4670	4760	4850	4940	5030	5120	5220	5320	5410	5490	5570	131	181
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
34000	TOFL	4340	4420	4500	4580	4670	4760	4840	4930	5020	5090	5170	129	178
	V1	99	99	99	99	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	4260	4340	4420	4480	4560	4630	4700	4770	4850	4910	4980	127	175
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.3	7.3		
32000	TOFL	4210	4280	4360	4430	4500	4580	4650	4720	4790	4860	4930	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
31000	TOFL	4150	4220	4300	4360	4440	4520	4580	4660	4730	4790	4860	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 10-8-84. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
30000	TOFL	4090	4170	4240	4310	4380	4460	4520	4600	4670	4730	4800	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
29000	TOFL	4030	4110	4180	4250	4310	4390	4460	4530	4600	4660	4730	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
28000	TOFL	3980	4050	4120	4180	4260	4320	4390	4460	4540	4590	4660	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.2	10.2		
27000	TOFL	3910	3990	4050	4120	4190	4260	4320	4390	4470	4530	4580	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	3850	3920	3990	4060	4120	4190	4250	4330	4400	4460	4510	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.7	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7		

FIGURE 10-8-85. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	7100	7250	7390	7530	7680	7830	7980	8140	8280	8400	8530	143	194
	V1	126	126	126	126	126	126	126	126	126	126	126		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
39000	TOFL	6790	6930	7060	7210	7350	7490	7630	7780	7920	8030	8160	142	193
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
38000	TOFL	6310	6430	6560	6690	6820	6950	7080	7220	7350	7450	7570	139	190
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5	5	5.1		
37000	TOFL	5860	5970	6090	6210	6330	6450	6570	6690	6810	6910	7020	137	187
	V1	114	115	115	115	115	115	115	115	115	115	115		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
36000	TOFL	5430	5540	5640	5750	5860	5970	6080	6200	6310	6400	6500	134	184
	V1	110	110	110	110	110	110	111	111	111	111	111		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.8		
35000	TOFL	5020	5120	5220	5320	5420	5520	5620	5730	5830	5920	6010	132	181
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.2	6.2		
34000	TOFL	4650	4740	4830	4920	5010	5100	5200	5300	5390	5470	5550	129	178
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.6	6.6		
33000	TOFL	4300	4390	4470	4550	4640	4720	4810	4900	4980	5060	5130	127	176
	V1	97	97	97	98	98	98	98	98	98	98	98		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
32000	TOFL	4310	4380	4450	4530	4610	4680	4760	4830	4910	4970	5030	125	173
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.5		
31000	TOFL	4250	4330	4390	4470	4540	4620	4700	4770	4840	4910	4970	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8	8	8	8	8	8	8	7.9	7.9	7.9	8		

FIGURE 10-8-85. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
30000	TOFL	4190	4260	4330	4410	4490	4560	4630	4700	4780	4830	4900	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.5	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.6		
29000	TOFL	4120	4190	4270	4340	4420	4500	4560	4630	4710	4770	4830	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.1	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9.2		
28000	TOFL	4060	4130	4200	4280	4340	4430	4510	4570	4640	4700	4760	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	4000	4060	4130	4210	4280	4350	4430	4500	4580	4630	4690	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	3930	4000	4070	4140	4210	4280	4360	4420	4490	4540	4600	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.2	11.2	11.3	11.3		

FIGURE 10-8-86. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	7820	7970	8110	8280	8440	8610	8770	8950	9110	9240	9390	144	195
	V1	129	129	129	129	129	129	130	130	130	130	130		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.3		
39000	TOFL	7480	7610	7750	7910	8070	8220	8380	8550	8700	8830	8970	143	193
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
38000	TOFL	6930	7060	7190	7330	7470	7620	7760	7920	8060	8180	8300	140	190
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
37000	TOFL	6420	6540	6660	6790	6920	7050	7190	7330	7460	7570	7680	138	187
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
36000	TOFL	5950	6050	6160	6280	6410	6530	6650	6780	6900	7000	7110	135	185
	V1	113	113	113	113	113	113	114	114	114	114	114		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.5		
35000	TOFL	5500	5600	5700	5810	5920	6030	6150	6270	6380	6470	6570	133	182
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	125	125	125	125	125	125	125	125	125	125	124		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.9		
34000	TOFL	5080	5160	5260	5360	5460	5560	5670	5780	5880	5960	6050	130	179
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.3	6.3		
33000	TOFL	4680	4760	4850	4940	5040	5130	5220	5320	5410	5490	5570	127	176
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
32000	TOFL	4330	4410	4490	4580	4640	4730	4810	4900	4990	5060	5140	125	173
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
31000	TOFL	4330	4400	4480	4560	4630	4710	4780	4860	4920	5000	5040	123	170
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		

FIGURE 10-8-86. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
30000	TOFL	4270	4350	4420	4500	4570	4650	4710	4790	4860	4930	4970	121	167
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.1	8.1	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.2		
29000	TOFL	4210	4280	4360	4440	4500	4580	4650	4720	4780	4860	4900	119	164
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.7	8.8	8.8	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.8		
28000	TOFL	4150	4220	4290	4370	4440	4510	4580	4650	4720	4780	4830	117	161
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
27000	TOFL	4080	4150	4220	4300	4370	4440	4500	4580	4650	4720	4750	115	158
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10.1	10.1		
26000	TOFL	4020	4090	4160	4240	4300	4370	4430	4510	4570	4650	4680	113	155
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-87. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	8610	8760	8940	9120	9310	9490	9680	9870	10050	10200	10370	145	195
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4	4	4	4	4	4	4	4	4	4	4		
39000	TOFL	8230	8370	8530	8710	8880	9060	9230	9420	9590	9730	9890	144	193
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	141	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.2	4.2		
38000	TOFL	7620	7740	7900	8060	8220	8380	8540	8710	8860	9000	9140	141	191
	V1	126	126	126	126	126	126	126	126	126	126	126		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
37000	TOFL	7040	7160	7300	7450	7590	7740	7890	8050	8190	8310	8440	139	188
	V1	121	121	121	121	121	121	121	121	121	121	121		
	VR	134	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
36000	TOFL	6510	6620	6750	6880	7010	7150	7290	7430	7560	7670	7790	136	185
	V1	116	116	116	116	117	117	117	117	117	117	117		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
35000	TOFL	6010	6110	6230	6350	6470	6600	6720	6850	6970	7080	7190	134	182
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	127	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.6	5.6		
34000	TOFL	5540	5630	5740	5850	5970	6080	6190	6310	6420	6520	6620	131	179
	V1	107	107	107	107	108	108	108	108	108	108	108		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.9	6	6	6	6	6	5.9	5.9	5.9	5.9	6		
33000	TOFL	5100	5180	5280	5390	5490	5590	5700	5810	5910	5990	6090	128	176
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.4	6.4		
32000	TOFL	4690	4770	4860	4960	5050	5140	5240	5340	5430	5510	5590	126	173
	V1	98	98	98	98	98	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
31000	TOFL	4370	4460	4530	4600	4680	4760	4840	4910	5000	5070	5150	123	170
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.3	7.3		

FIGURE 10-8-87. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
30000	TOFL	4350	4420	4500	4570	4650	4730	4810	4880	4960	5020	5020	121	167
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
29000	TOFL	4280	4360	4440	4510	4580	4660	4740	4810	4880	4940	4960	119	164
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.3	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.4		
28000	TOFL	4220	4300	4370	4440	4520	4590	4670	4740	4820	4860	4880	117	161
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.9	9	9	9	9	9	8.9	8.9	8.9	8.9	9		
27000	TOFL	4160	4230	4310	4370	4450	4530	4600	4660	4740	4800	4810	115	158
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.7		
26000	TOFL	4100	4160	4240	4300	4380	4460	4530	4600	4670	4720	4730	113	155
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.3	10.4	10.4		

FIGURE 10-8-88. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	9470	9640	9850	10050	10250	10460	10670	10890	11080	11250	11470	147	195
	V1	136	136	136	136	136	136	137	137	137	137	137		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		
39000	TOFL	9050	9220	9410	9600	9800	9990	10190	10400	10590	10750	10950	145	194
	V1	133	133	133	134	134	134	134	134	134	134	134		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
38000	TOFL	8370	8520	8700	8880	9060	9230	9420	9610	9780	9930	10110	142	191
	V1	129	129	129	129	129	129	129	129	129	129	130		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
37000	TOFL	7730	7870	8030	8190	8360	8520	8690	8860	9020	9160	9330	140	188
	V1	124	124	124	124	124	125	125	125	125	125	125		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5		
36000	TOFL	7130	7260	7410	7560	7710	7860	8010	8170	8310	8440	8590	137	185
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
35000	TOFL	6570	6690	6830	6960	7100	7240	7380	7520	7660	7770	7910	135	183
	V1	115	115	115	115	115	115	115	116	116	116	116		
	VR	128	128	128	128	128	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.2	5.3	5.3		
34000	TOFL	6050	6160	6280	6410	6530	6660	6780	6920	7040	7140	7270	132	180
	V1	110	110	110	110	111	111	111	111	111	111	111		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6		
33000	TOFL	5560	5660	5770	5890	6000	6110	6230	6350	6470	6560	6680	129	177
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6.1	6.1		
32000	TOFL	5110	5200	5300	5400	5510	5610	5720	5830	5930	6010	6120	127	174
	V1	101	101	101	101	101	101	101	102	102	102	102		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
31000	TOFL	4690	4770	4870	4960	5060	5150	5250	5340	5440	5520	5610	124	171
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.9	7	7	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9		

FIGURE 10-8-88. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
30000	TOFL	4430	4510	4590	4660	4730	4810	4880	4960	5040	5090	5160	121	168
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
29000	TOFL	4380	4450	4530	4600	4690	4760	4840	4910	5000	5040	5000	119	165
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8	8	8	8	8	7.9	7.9	7.9	7.9	7.9	7.9		
28000	TOFL	4310	4390	4470	4530	4610	4700	4770	4840	4920	4960	4920	117	161
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5		
27000	TOFL	4240	4320	4400	4470	4540	4620	4700	4770	4850	4890	4860	115	158
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
26000	TOFL	4170	4250	4330	4400	4470	4550	4630	4690	4770	4810	4800	113	155
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 10-8-89. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	10460	10680	10910	11130	11370	11600	11860	12100	12320	12490	12850	148	196
	V1	140	140	140	140	140	140	141	141	141	141	141		
	VR	147	147	147	147	147	147	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.3		
39000	TOFL	9990	10190	10410	10630	10850	11060	11290	11530	11730	11910	12260	146	194
	V1	137	137	137	137	137	138	138	138	138	138	138		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5		
38000	TOFL	9240	9430	9630	9830	10030	10230	10440	10650	10840	11010	11330	144	191
	V1	133	133	133	133	133	133	133	133	133	133	134		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	4	4	4	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	TOFL	8540	8710	8890	9080	9260	9440	9630	9830	10000	10160	10450	141	189
	V1	128	128	128	128	128	128	128	129	129	129	129		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2		
36000	TOFL	7850	8000	8170	8340	8510	8670	8840	9020	9180	9320	9590	138	186
	V1	123	123	123	123	123	123	124	124	124	124	124		
	VR	134	134	134	134	134	134	134	134	134	134	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.7	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
35000	TOFL	7220	7360	7510	7660	7820	7970	8130	8290	8440	8560	8810	136	183
	V1	118	118	118	119	119	119	119	119	119	119	120		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5	5	5	5	5	5	5	4.9	4.9	5	4.8		
34000	TOFL	6630	6760	6900	7040	7180	7320	7460	7610	7740	7860	8080	133	180
	V1	114	114	114	114	114	114	114	114	114	114	115		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.4	5.2		
33000	TOFL	6080	6200	6330	6450	6580	6700	6840	6970	7090	7200	7400	130	177
	V1	109	109	109	109	109	109	109	109	109	109	110		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.6		
32000	TOFL	5570	5680	5790	5910	6020	6140	6260	6380	6490	6580	6770	127	174
	V1	104	104	104	104	104	104	104	105	105	105	105		
	VR	119	119	119	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6		
31000	TOFL	5100	5200	5300	5410	5510	5610	5720	5830	5930	6020	6190	125	171
	V1	99	99	99	99	99	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5		

FIGURE 10-8-89. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
30000	TOFL	4680	4770	4860	4960	5050	5140	5240	5340	5430	5510	5660	122	168
	V1	95	95	95	95	95	95	95	95	95	95	96		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.9		
29000	TOFL	4470	4560	4630	4720	4800	4870	4950	5020	5090	5080	5190	119	165
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
28000	TOFL	4410	4490	4570	4650	4730	4800	4880	4960	5020	5000	5000	117	162
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8		
27000	TOFL	4340	4420	4500	4580	4650	4730	4810	4890	4940	4930	4930	115	159
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.6		
26000	TOFL	4270	4340	4430	4510	4590	4650	4730	4810	4870	4850	4870	113	155
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4	9.5	9.3		

FIGURE 10-8-90. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	11600	11850	12110	12370	12630	12890	13150	13450	13690	13900	14500	149	196
	V1	144	144	144	144	144	144	144	144	144	144	146		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	3.2	2.9		
39000	TOFL	11070	11320	11560	11820	12060	12310	12560	12840	13070	13260	13850	147	194
	V1	141	141	141	141	141	142	142	142	142	142	143		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.1		
38000	TOFL	10220	10450	10670	10900	11120	11350	11580	11830	12040	12220	12780	145	192
	V1	136	136	136	137	137	137	137	137	137	137	138		
	VR	144	144	144	144	144	144	144	144	144	144	145		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.7	3.4		
37000	TOFL	9430	9640	9840	10050	10250	10460	10670	10900	11090	11260	11760	142	189
	V1	132	132	132	132	132	132	132	132	132	132	134		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4	4	4	4	4	4	4	4	4	4	3.7		
36000	TOFL	8680	8870	9060	9240	9430	9620	9810	10020	10200	10350	10820	139	186
	V1	127	127	127	127	127	127	127	128	128	128	129		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4		
35000	TOFL	7960	8130	8290	8470	8640	8810	8980	9170	9340	9470	9910	137	183
	V1	122	122	122	122	122	122	122	122	122	122	124		
	VR	133	133	133	133	133	133	133	133	133	133	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.4		
34000	TOFL	7290	7450	7600	7760	7910	8070	8230	8400	8550	8670	9070	134	180
	V1	117	117	117	117	117	117	117	118	118	118	119		
	VR	129	129	129	129	129	129	129	129	129	129	130		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5.1	4.8		
33000	TOFL	6670	6820	6950	7100	7240	7380	7520	7680	7820	7930	8290	131	177
	V1	112	112	112	112	112	112	113	113	113	113	114		
	VR	125	125	125	125	125	125	125	125	125	125	126		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.1		
32000	TOFL	6100	6230	6350	6480	6610	6740	6870	7010	7130	7230	7560	128	175
	V1	107	107	107	107	107	107	108	108	108	108	109		
	VR	121	121	121	121	121	121	121	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.5		
31000	TOFL	5560	5680	5790	5910	6020	6140	6260	6390	6500	6590	6890	126	172
	V1	102	102	102	102	102	102	103	103	103	103	104		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	5.9		

FIGURE 10-8-90. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
30000	TOFL	5080	5190	5290	5390	5500	5600	5710	5830	5930	6010	6280	123	168
	V1	97	97	97	97	98	98	98	98	98	98	99		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.4		
29000	TOFL	4650	4750	4840	4940	5030	5130	5220	5330	5420	5500	5730	120	165
	V1	93	93	93	93	93	93	93	93	93	93	95		
	VR	110	110	110	110	110	110	110	110	110	110	111		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	6.9		
28000	TOFL	4530	4600	4680	4770	4830	4920	5000	5080	5100	5060	5230	117	162
	V1	91	91	91	91	91	91	91	91	91	89	90		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.4		
27000	TOFL	4460	4530	4610	4690	4770	4840	4920	5010	5020	4990	5000	115	159
	V1	91	91	91	91	91	91	91	91	91	89	88		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.3	8.3	7.9		
26000	TOFL	4380	4460	4540	4620	4690	4770	4850	4920	4950	4930	4930	113	156
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	111	111	111	111		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9	9	9	8.6		

FIGURE 10-8-91. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	12980	13270	13570	13870	14160	14460	14780	15100	15380	15810		150	197
	V1	148	148	148	148	148	149	149	149	149	149			
	VR	152	152	152	152	153	153	153	153	153	153			
	V2	155	155	155	155	155	155	155	155	155	155			
	GR2	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.7			
39000	TOFL	12390	12670	12950	13230	13510	13800	14090	14390	14670	15080	16020	148	195
	V1	145	145	145	146	146	146	146	146	146	147	148		
	VR	150	150	150	150	150	150	151	151	151	151	151		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.1	3.1	3.1	3.1	3.1	3	3	3	3	2.9	2.6		
38000	TOFL	11450	11700	11960	12210	12470	12740	13000	13290	13540	13920	14790	146	192
	V1	141	141	141	141	141	141	141	142	142	142	144		
	VR	147	147	147	147	147	147	147	147	147	147	148		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.3	3.2	2.9		
37000	TOFL	10530	10770	11000	11230	11470	11710	11950	12210	12440	12790	13630	143	189
	V1	136	136	136	136	136	136	137	137	137	137	139		
	VR	143	143	143	143	143	143	143	143	143	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.5	3.2		
36000	TOFL	9690	9900	10110	10320	10540	10760	10980	11210	11430	11750	12500	140	187
	V1	131	131	131	131	131	131	132	132	132	132	134		
	VR	140	140	140	140	140	140	140	140	140	140	141		
	V2	143	143	143	143	143	143	143	143	143	143	144		
	GR2	4.1	4.1	4.1	4.1	4.1	4	4	4	4	3.9	3.5		
35000	TOFL	8880	9080	9270	9460	9660	9860	10060	10270	10470	10770	11460	138	184
	V1	126	126	126	126	126	127	127	127	127	128	130		
	VR	136	136	136	136	136	136	136	136	136	136	137		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.2	3.9		
34000	TOFL	8110	8290	8460	8640	8810	8990	9170	9370	9550	9820	10490	135	181
	V1	121	121	121	121	121	121	122	122	122	122	125		
	VR	132	132	132	132	132	132	132	132	132	132	133		
	V2	136	136	136	136	136	136	136	136	136	136	137		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.6	4.3		
33000	TOFL	7410	7570	7730	7890	8040	8210	8370	8550	8710	8960	9540	132	178
	V1	116	116	116	116	116	116	116	117	117	117	119		
	VR	128	128	128	128	128	128	128	128	128	128	129		
	V2	133	133	133	133	133	133	133	133	133	133	134		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	4.9	4.6		
32000	TOFL	6760	6900	7050	7190	7330	7480	7630	7790	7940	8170	8690	129	175
	V1	111	111	111	111	111	111	111	111	112	112	114		
	VR	124	124	124	124	124	124	124	124	124	124	125		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.3	5		
31000	TOFL	6160	6290	6420	6550	6670	6810	6940	7090	7220	7430	7900	127	172
	V1	106	106	106	106	106	106	106	106	107	107	109		
	VR	120	120	120	120	120	120	120	120	120	120	121		
	V2	126	126	126	126	126	126	126	126	126	126	127		
	GR2	6.1	6.1	6.1	6.1	6	6	6	6	5.9	5.8	5.4		

FIGURE 10-8-91. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
30000	TOFL	5600	5710	5830	5950	6060	6180	6300	6430	6560	6750	7170	124	169
	V1	100	101	101	101	101	101	101	101	101	102	104		
	VR	116	116	116	116	116	116	116	116	116	116	117		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.2	5.9		
29000	TOFL	5100	5210	5310	5420	5520	5630	5740	5850	5960	6130	6500	121	166
	V1	96	96	96	96	96	96	96	96	97	97	99		
	VR	112	112	112	112	112	112	112	112	112	113	113		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7	7	7	7	7	7	6.9	6.9	6.8	6.7	6.3		
28000	TOFL	4650	4750	4840	4940	5030	5130	5230	5330	5440	5580	5900	118	162
	V1	91	91	91	91	91	91	92	92	92	92	94		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	116	116	116	116	116	116	116	116	116	116	117		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.4	7.4	7.2	6.8		
27000	TOFL	4540	4610	4700	4780	4850	4930	5010	5060	5040	5080	5370	115	159
	V1	90	90	90	90	90	90	90	89	88	88	90		
	VR	105	105	105	105	105	105	105	105	105	105	106		
	V2	113	113	113	113	113	113	113	113	113	113	114		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8	8	7.9	7.7	7.3		
26000	TOFL	4470	4550	4620	4700	4780	4860	4940	4980	4960	4990	5010	113	156
	V1	90	90	90	90	90	90	90	89	88	88	87		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	111	111	111	111	111	111	111	111	111	111	111		
	GR2	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.6	8.5	8.3	7.9		

FIGURE 10-8-92. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	14620	14960	15300	15640	15990	16340	16700	17080				151	197
	V1	152	153	153	153	153	153	153	154					
	VR	155	155	155	155	155	155	155	155					
	V2	157	157	157	157	157	157	157	157					
	GR2	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.5					
39000	TOFL	13930	14250	14560	14890	15220	15540	15900	16250	16580	17330		150	196
	V1	150	150	150	150	150	150	151	151	151	152			
	VR	153	153	153	153	153	153	153	153	153	154			
	V2	155	155	155	155	155	155	155	155	155	155			
	GR2	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.5			
38000	TOFL	12840	13130	13420	13720	14020	14310	14630	14960	15260	15950	17240	147	193
	V1	145	145	145	145	146	146	146	146	146	147	149		
	VR	150	150	150	150	150	150	150	150	150	150	151		
	V2	152	152	152	152	152	152	152	152	152	152	153		
	GR2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3	3	2.8	2.5		
37000	TOFL	11810	12080	12350	12620	12890	13160	13450	13760	14030	14680	15840	144	190
	V1	140	140	140	141	141	141	141	141	142	143	145		
	VR	146	146	146	146	146	146	146	146	146	147	147		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.3	3.3	3.1	2.8		
36000	TOFL	10840	11070	11320	11560	11810	12060	12320	12600	12860	13450	14550	142	187
	V1	135	135	135	136	136	136	136	136	136	138	140		
	VR	142	142	142	142	142	142	143	143	143	143	144		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.7	3.6	3.4	3.1		
35000	TOFL	9920	10130	10370	10590	10820	11040	11280	11530	11770	12310	13320	139	184
	V1	130	130	130	131	131	131	131	131	132	133	135		
	VR	138	138	139	139	139	139	139	139	139	139	140		
	V2	142	142	142	142	142	142	142	142	142	142	143		
	GR2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4	4	3.7	3.4		
34000	TOFL	9070	9270	9470	9670	9870	10080	10290	10520	10740	11250	12170	136	181
	V1	125	125	125	125	125	126	126	126	126	128	130		
	VR	135	135	135	135	135	135	135	135	135	135	137		
	V2	139	139	139	139	139	139	139	139	139	139	140		
	GR2	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.4	4.3	4.1	3.8		
33000	TOFL	8270	8440	8630	8800	8990	9170	9370	9580	9780	10240	11100	133	178
	V1	120	120	120	120	120	120	121	121	121	123	125		
	VR	131	131	131	131	131	131	131	131	131	131	133		
	V2	135	135	135	135	135	135	135	135	135	135	136		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.7	4.4	4.1		
32000	TOFL	7510	7670	7830	7990	8160	8320	8500	8690	8880	9280	10080	130	175
	V1	114	114	115	115	115	115	115	115	116	117	120		
	VR	126	126	126	126	127	127	127	127	127	127	129		
	V2	132	132	132	132	132	132	132	132	132	132	133		
	GR2	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.2	5.1	4.8	4.5		
31000	TOFL	6830	6970	7120	7260	7410	7560	7720	7890	8060	8430	9120	128	172
	V1	109	109	109	109	110	110	110	110	111	112	115		
	VR	122	122	123	123	123	123	123	123	123	123	125		
	V2	128	128	128	128	128	128	128	128	128	128	129		
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.6	5.5	5.3	4.9		

FIGURE 10-8-92. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
30000	TOFL	6200	6330	6460	6590	6720	6860	7000	7150	7310	7650	8260	125	169
	V1	104	104	104	104	104	105	105	105	105	107	109		
	VR	118	118	119	119	119	119	119	119	119	119	121		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.1	6	5.7	5.3		
29000	TOFL	5610	5730	5850	5970	6080	6210	6330	6470	6620	6920	7460	122	166
	V1	99	99	99	99	99	99	100	100	100	102	104		
	VR	114	114	114	114	114	114	114	114	114	115	117		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6.1	5.8		
28000	TOFL	5100	5210	5320	5420	5530	5640	5750	5870	6000	6260	6740	119	163
	V1	94	94	94	94	94	94	95	95	95	96	99		
	VR	111	111	111	111	111	111	111	111	111	111	113		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	7.3	7.3	7.2	7.2	7.2	7.2	7.2	7.1	6.9	6.6	6.3		
27000	TOFL	4640	4730	4830	4920	5020	5110	5210	5330	5450	5680	6080	116	160
	V1	89	89	89	89	89	90	90	90	90	92	94		
	VR	107	107	107	107	107	107	107	107	107	107	109		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.6	7.5	7.1	6.8		
26000	TOFL	4550	4630	4720	4790	4870	4950	5020	5050	5050	5140	5500	113	156
	V1	89	89	89	89	89	89	88	88	87	87	89		
	VR	103	103	103	103	103	103	103	103	103	103	105		
	V2	112	112	112	112	112	112	112	111	111	111	112		
	GR2	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.2	8	7.7	7.3		

FIGURE 10-8-93. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	15790	16180	16610	17040	17360	17680	18090					151	196
	V1	155	155	155	155	155	155	156						
	VR	156	156	157	157	157	157	157						
	V2	158	158	158	158	158	158	158						
	GR2	2.6	2.6	2.5	2.5	2.5	2.5	2.5						
38000	TOFL	14470	14820	15210	15600	15890	16180	16550	16970	17460			148	193
	V1	149	150	150	150	150	150	150	151	151				
	VR	153	153	153	153	153	153	153	153	153				
	V2	155	155	155	155	155	155	155	154	154				
	GR2	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.7	2.5				
37000	TOFL	13280	13600	13960	14310	14570	14840	15170	15560	16020	17020		145	190
	V1	145	145	145	145	145	145	146	146	147	148			
	VR	149	149	149	149	149	149	149	149	149	150			
	V2	151	151	151	151	151	151	151	151	151	151			
	GR2	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3	2.9	2.6			
36000	TOFL	12170	12460	12790	13110	13340	13580	13890	14240	14680	15600	17050	143	187
	V1	140	140	140	140	140	140	141	141	142	143	146		
	VR	145	145	145	145	145	145	145	145	145	146	147		
	V2	148	148	148	148	148	148	148	148	148	148	149		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.3	3.2	2.9	2.6		
35000	TOFL	11120	11380	11670	11970	12170	12390	12670	12990	13390	14270	15550	140	185
	V1	134	134	135	135	135	135	135	136	137	138	141		
	VR	141	141	141	141	141	141	141	141	142	142	143		
	V2	144	144	144	144	144	144	144	144	144	145	145		
	GR2	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.7	3.5	3.2	2.9		
34000	TOFL	10150	10390	10650	10910	11100	11300	11540	11840	12210	12990	14210	137	182
	V1	129	129	130	130	130	130	130	131	131	133	136		
	VR	137	138	138	138	138	138	138	138	138	139	140		
	V2	141	141	141	141	141	141	141	141	141	141	142		
	GR2	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.1	3.9	3.6	3.3		
33000	TOFL	9240	9450	9690	9930	10090	10260	10490	10750	11100	11830	12920	134	179
	V1	124	124	124	124	124	124	125	125	126	128	131		
	VR	133	133	133	133	133	133	133	134	134	135	136		
	V2	137	137	137	137	137	137	137	137	137	138	139		
	GR2	4.7	4.7	4.6	4.6	4.6	4.6	4.6	4.5	4.2	3.9	3.6		
32000	TOFL	8390	8580	8790	9010	9160	9310	9510	9760	10070	10730	11730	131	176
	V1	119	119	119	119	119	119	119	120	121	123	126		
	VR	129	129	129	129	129	129	129	129	130	131	132		
	V2	134	134	134	134	134	134	134	134	134	134	135		
	GR2	5.1	5.1	5	5	5	5	5	4.9	4.6	4.3	4		
31000	TOFL	7600	7770	7960	8150	8290	8430	8610	8830	9110	9720	10630	128	173
	V1	113	113	113	114	114	114	114	114	115	117	120		
	VR	125	125	125	125	125	125	125	125	125	126	128		
	V2	130	130	130	130	130	130	130	130	130	131	132		
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.3	5	4.7	4.4		

FIGURE 10-8-93. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
30000	TOFL	6890	7040	7210	7380	7500	7630	7790	7990	8250	8780	9600	126	169
	V1	108	108	108	108	108	108	108	109	110	112	115		
	VR	121	121	121	121	121	121	121	121	121	122	124		
	V2	127	127	127	127	127	127	127	127	127	127	128		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.5	5.1	4.8		
29000	TOFL	6230	6370	6520	6670	6780	6890	7030	7210	7450	7930	8640	123	166
	V1	102	103	103	103	103	103	103	104	104	107	110		
	VR	117	117	117	117	117	117	117	117	117	118	120		
	V2	123	123	123	123	123	123	123	123	123	123	124		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.2	5.9	5.6	5.3		
28000	TOFL	5620	5750	5880	6020	6110	6210	6340	6500	6720	7140	7770	120	163
	V1	97	97	97	98	98	98	98	98	99	101	104		
	VR	113	113	113	113	113	113	113	113	113	114	116		
	V2	119	119	119	119	119	119	119	119	119	120	121		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.7	6.4	6	5.7		
27000	TOFL	5090	5210	5330	5450	5530	5620	5740	5870	6060	6440	6980	117	160
	V1	92	92	92	93	93	93	93	93	94	96	99		
	VR	109	109	109	109	109	109	109	109	109	110	111		
	V2	116	116	116	116	116	116	116	116	116	116	117		
	GR2	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.2	6.9	6.6	6.2		
26000	TOFL	4640	4700	4810	4920	5000	5080	5180	5300	5480	5800	6270	114	157
	V1	87	87	88	88	88	88	88	88	89	91	93		
	VR	105	105	105	105	105	105	105	105	105	106	107		
	V2	113	113	113	113	113	113	113	113	113	113	114		
	GR2	8.1	8	8	8	8	8	7.9	7.8	7.5	7.1	6.8		

FIGURE 10-8-94. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	16460	16880	17400	17830	18140	18450	18850					149	194
	V1	154	155	155	155	155	155	155						
	VR	156	156	156	156	156	156	156						
	V2	157	157	157	157	157	157	157						
	GR2	2.6	2.6	2.6	2.6	2.6	2.6	2.5						
37000	TOFL	15060	15430	15910	16290	16530	16860	17280	17770	18580			147	191
	V1	149	150	150	150	150	150	151	151	152				
	VR	152	152	152	152	152	152	152	152	153				
	V2	154	154	154	154	154	154	154	154	154				
	GR2	3	3	2.9	2.9	2.9	2.9	2.8	2.7	2.4				
36000	TOFL	13770	14110	14530	14870	15100	15390	15770	16230	17070	18360		144	188
	V1	144	144	145	145	145	145	145	146	147	149			
	VR	148	148	148	148	148	148	148	148	149	150			
	V2	151	151	151	151	151	151	151	151	151	151			
	GR2	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3	2.7	2.4			
35000	TOFL	12570	12880	13270	13580	13780	14040	14380	14800	15550	16810	18300	141	185
	V1	139	139	140	140	140	140	140	141	142	144	146		
	VR	144	144	145	145	145	145	145	145	145	146	147		
	V2	147	147	147	147	147	147	147	147	147	147	148		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.3	3	2.8	2.4		
34000	TOFL	11400	11690	12030	12310	12480	12720	13020	13410	14140	15290	16740	138	182
	V1	134	134	134	134	134	134	135	135	137	139	142		
	VR	140	140	140	140	140	140	140	140	141	142	143		
	V2	143	143	143	143	143	143	143	143	143	144	145		
	GR2	4	4	4	3.9	3.9	3.9	3.9	3.7	3.4	3.1	2.7		
33000	TOFL	10370	10620	10930	11180	11340	11550	11820	12170	12830	13910	15220	135	179
	V1	128	128	129	129	129	129	129	130	132	134	137		
	VR	136	136	136	136	136	136	136	136	137	138	139		
	V2	140	140	140	140	140	140	140	140	140	141	141		
	GR2	4.4	4.4	4.3	4.3	4.3	4.3	4.2	4	3.7	3.5	3.1		
32000	TOFL	9400	9630	9910	10120	10290	10470	10720	11020	11620	12570	13810	133	176
	V1	123	123	123	124	124	124	124	125	126	129	132		
	VR	132	132	132	132	132	132	132	132	133	134	136		
	V2	136	136	136	136	136	136	136	136	136	137	138		
	GR2	4.8	4.8	4.7	4.7	4.7	4.7	4.6	4.4	4.1	3.8	3.5		
31000	TOFL	8520	8720	8980	9170	9300	9470	9680	9960	10510	11370	12440	130	173
	V1	117	117	118	118	118	118	118	119	121	123	126		
	VR	128	128	128	128	128	128	128	128	129	130	131		
	V2	132	132	132	132	132	132	132	132	132	133	134		
	GR2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	4.8	4.5	4.2	3.8		

FIGURE 10-8-94. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
30000	TOFL	7690	7880	8100	8280	8390	8540	8730	8990	9500	10260	11220	127	170
	V1	112	112	112	112	112	112	113	113	115	118	121		
	VR	124	124	124	124	124	124	124	124	124	126	127		
	V2	129	129	129	129	129	129	129	129	129	130	131		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.3	4.9	4.6	4.2		
29000	TOFL	6950	7110	7310	7470	7570	7710	7870	8100	8550	9250	10100	124	167
	V1	106	106	107	107	107	107	107	108	110	112	115		
	VR	119	119	119	119	119	119	119	120	120	122	123		
	V2	125	125	125	125	125	125	125	125	125	126	127		
	GR2	6.1	6.1	6	6	6	6	5.9	5.7	5.4	5.1	4.7		
28000	TOFL	6250	6400	6580	6720	6810	6930	7080	7280	7690	8300	9070	121	164
	V1	101	101	101	101	101	101	102	102	104	107	110		
	VR	115	115	115	115	115	115	115	115	116	117	119		
	V2	121	121	121	121	121	121	121	121	121	122	123		
	GR2	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.2	5.8	5.5	5.1		
27000	TOFL	5630	5760	5920	6040	6120	6230	6360	6540	6890	7440	8110	118	160
	V1	95	96	96	96	96	96	96	97	99	101	104		
	VR	111	111	111	111	111	111	111	111	112	113	115		
	V2	118	118	118	118	118	118	118	118	118	118	120		
	GR2	7.1	7.1	7	7	7	7	6.9	6.7	6.3	6	5.6		
26000	TOFL	5070	5190	5330	5440	5510	5610	5720	5880	6180	6660	7250	115	157
	V1	90	90	91	91	91	91	91	92	93	96	99		
	VR	107	107	107	107	107	107	107	107	107	109	111		
	V2	114	114	114	114	114	114	114	114	114	115	116		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.3	6.9	6.5	6.1		

V1 CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY DRY SNOW

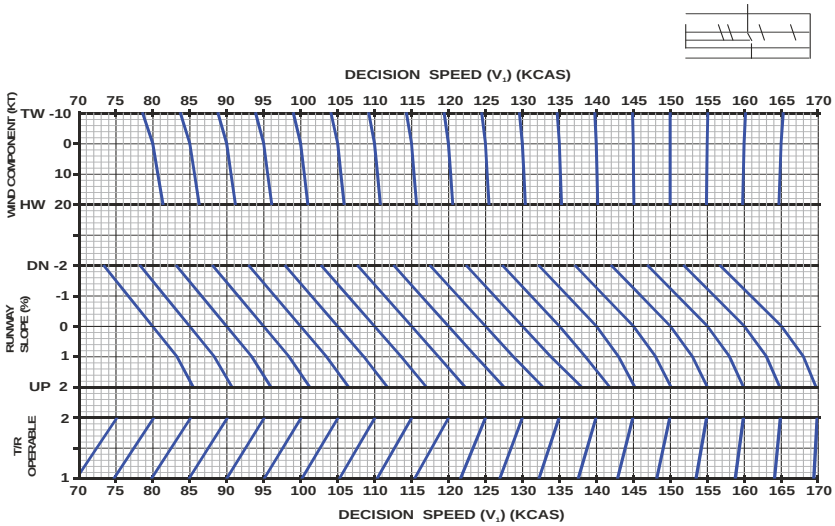
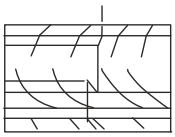


Figure 10-8-95. V1 Corrections Flaps 20° Runway Contaminated By Dry Snow

TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY DRY SNOW



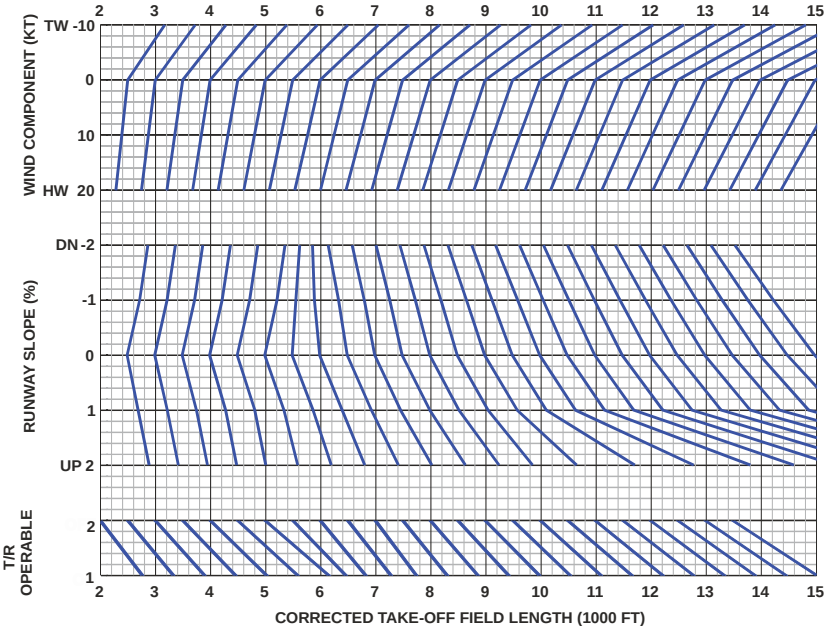


Figure 10-8-96. Takeoff Field Length Corrections Flaps 20°
Runway Contaminated By Dry Snow

FIGURE 10-8-97. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	TOFL	4080	4140	4210	4280	4350	4410	4470	4540	4620	4700	4770	139	192
	V1	110	110	110	110	110	109	109	109	109	109	109		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.7	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
39000	TOFL	3920	3980	4050	4110	4180	4240	4300	4360	4440	4510	4590	138	191
	V1	108	108	108	108	107	107	107	107	107	107	107		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.9	5.9	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1		
38000	TOFL	3670	3720	3780	3840	3900	3960	4020	4080	4150	4220	4290	136	188
	V1	104	104	104	104	104	104	103	103	103	103	103		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5		
37000	TOFL	3540	3600	3670	3740	3810	3880	3960	4020	4090	4160	4220	135	185
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.7	6.7	6.7	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	3580	3630	3690	3760	3810	3870	3930	3990	4060	4120	4200	133	182
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.1	7.1	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	3530	3580	3650	3710	3760	3830	3890	3940	4010	4080	4140	131	180
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.6	7.6	7.6	7.6	7.7	7.7	7.8	7.8	7.8	7.8	7.8		
34000	TOFL	3490	3530	3600	3660	3720	3780	3830	3890	3960	4020	4100	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8	8.1	8.1	8.1	8.1	8.2	8.2	8.3	8.3	8.3	8.3		
33000	TOFL	3450	3490	3550	3620	3670	3730	3780	3840	3910	3980	4040	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	3400	3450	3500	3570	3620	3680	3740	3790	3850	3920	3980	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.1	9.1	9.1	9.2	9.2	9.3	9.3	9.4	9.4	9.4	9.4		
31000	TOFL	3350	3390	3450	3520	3570	3620	3690	3740	3800	3870	3930	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.7	9.7	9.7	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 10-8-97. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
30000	TOFL	3290	3340	3400	3470	3520	3570	3630	3680	3750	3820	3870	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.3	10.3	10.4	10.4	10.4	10.5	10.5	10.6	10.6	10.6	10.6		
29000	TOFL	3240	3290	3350	3410	3470	3520	3570	3620	3690	3760	3820	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	121	121	121	121	121	121	121	121	121	121		
	GR2	11	11	11	11.1	11.1	11.1	11.2	11.3	11.3	11.3	11.3		
28000	TOFL	3200	3240	3300	3360	3410	3470	3520	3570	3640	3700	3760	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	120	120	120	120	120	120	120	120		
	GR2	11.7	11.7	11.8	11.8	11.8	11.9	11.9	12	12	12	12		
27000	TOFL	3140	3190	3250	3300	3360	3410	3460	3510	3570	3640	3700	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	119	119	119	119	119	119		
	GR2	12.4	12.5	12.5	12.6	12.6	12.6	12.7	12.7	12.7	12.7	12.7		
26000	TOFL	3080	3130	3190	3240	3300	3360	3410	3480	3530	3590	3640	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	102	102	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	119	119	119	119	119		
	GR2	13.3	13.3	13.3	13.4	13.4	13.5	13.5	13.6	13.6	13.6	13.6		

FIGURE 10-8-98. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
39600	TOFL	4850	4930	5010									139	192
	V1	109	109	109										
	VR	129	129	129										
	V2	137	137	137										
	GR2	5.9	5.9	5.9										
39000	TOFL	4660	4740	4810									138	191
	V1	107	107	107										
	VR	127	127	127										
	V2	135	135	135										
	GR2	6.1	6.1	6.1										
38000	TOFL	4360	4430	4500									136	188
	V1	103	103	103										
	VR	124	124	124										
	V2	133	133	133										
	GR2	6.5	6.5	6.5										
37000	TOFL	4290	4350	4410									135	185
	V1	102	102	102										
	VR	122	122	122										
	V2	131	131	131										
	GR2	6.9	6.9	6.9										
36000	TOFL	4260	4320	4380									133	182
	V1	102	102	102										
	VR	120	120	120										
	V2	130	130	130										
	GR2	7.3	7.3	7.3										
35000	TOFL	4210	4260	4330									131	180
	V1	102	102	102										
	VR	118	118	118										
	V2	128	128	128										
	GR2	7.8	7.8	7.8										
34000	TOFL	4160	4220	4280									129	177
	V1	102	102	102										
	VR	116	116	116										
	V2	126	126	126										
	GR2	8.3	8.3	8.3										
33000	TOFL	4110	4160	4230									127	174
	V1	102	102	102										
	VR	114	114	114										
	V2	125	125	125										
	GR2	8.8	8.8	8.8										
32000	TOFL	4050	4100	4170									125	171
	V1	102	102	102										
	VR	112	112	112										
	V2	124	124	124										
	GR2	9.4	9.4	9.3										
31000	TOFL	4000	4050	4110									123	168
	V1	102	102	102										
	VR	111	111	111										
	V2	123	123	123										
	GR2	9.9	9.9	9.9										

FIGURE 10-8-98. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
30000	TOFL	3940	3990	4060									121	166
	V1	102	102	102										
	VR	109	109	109										
	V2	122	122	122										
	GR2	10.6	10.6	10.6										
29000	TOFL	3880	3930	4000									119	163
	V1	102	102	102										
	VR	107	107	107										
	V2	121	121	121										
	GR2	11.3	11.3	11.2										
28000	TOFL	3820	3870	3940									117	160
	V1	102	102	102										
	VR	106	106	106										
	V2	120	120	120										
	GR2	12	12	12										
27000	TOFL	3760	3820	3870									115	157
	V1	102	102	102										
	VR	104	104	104										
	V2	119	119	119										
	GR2	12.7	12.7	12.7										
26000	TOFL	3690	3750	3810									113	154
	V1	102	102	102										
	VR	103	103	103										
	V2	119	119	119										
	GR2	13.6	13.6	13.6										

FIGURE 10-8-99. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	TOFL	4360	4420	4500	4580	4650	4720	4790	4870	4950	5040	5120	139	193
	V1	112	112	112	112	112	111	111	111	111	111	111		
	VR	131	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	4180	4240	4320	4390	4460	4530	4600	4670	4750	4840	4920	138	191
	V1	110	110	110	109	109	109	109	109	109	109	109		
	VR	129	129	129	129	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	3910	3960	4030	4100	4170	4230	4300	4360	4440	4520	4590	136	188
	V1	106	106	106	106	106	105	105	105	105	105	105		
	VR	126	126	126	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.2		
37000	TOFL	3650	3700	3770	3830	3900	3960	4020	4080	4150	4220	4300	135	185
	V1	102	102	102	102	102	102	102	101	101	101	101		
	VR	123	123	123	123	123	123	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	3650	3700	3770	3840	3900	3960	4020	4090	4160	4230	4290	133	183
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.9	6.9	6.9	7	7	7	7	7	7	7	7		
35000	TOFL	3610	3660	3730	3790	3850	3910	3980	4040	4110	4170	4250	131	180
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
34000	TOFL	3560	3610	3680	3750	3800	3870	3930	3990	4060	4130	4190	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.8	7.8	7.9	7.9	7.9	7.9	7.9	8	8	8	8		
33000	TOFL	3510	3560	3630	3690	3760	3820	3870	3940	4010	4070	4140	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.3	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	3460	3510	3580	3640	3710	3760	3830	3880	3960	4020	4090	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	124	124	124	124	124		
	GR2	8.9	8.9	8.9	8.9	8.9	9	9	9	9	9	9		
31000	TOFL	3410	3460	3530	3590	3660	3710	3780	3830	3900	3970	4030	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.5	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-99. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
30000	TOFL	3360	3420	3480	3540	3610	3660	3720	3770	3850	3910	3970	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.1	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		
29000	TOFL	3320	3370	3430	3490	3550	3610	3660	3720	3790	3850	3920	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.7	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9		
28000	TOFL	3260	3320	3380	3430	3490	3550	3600	3670	3730	3790	3860	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
27000	TOFL	3210	3260	3320	3380	3440	3490	3550	3600	3670	3740	3790	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.2	12.2	12.2	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	3150	3200	3260	3320	3380	3430	3490	3550	3610	3670	3740	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13	13	13	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2		

FIGURE 10-8-100. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
39600	TOFL	5210	5290	5380									139	193
	V1	111	111	111										
	VR	130	130	130										
	V2	138	138	138										
	GR2	5.7	5.7	5.7										
39000	TOFL	5000	5080	5160									138	191
	V1	109	109	109										
	VR	128	128	128										
	V2	136	136	136										
	GR2	5.9	5.9	5.9										
38000	TOFL	4670	4740	4820									136	188
	V1	105	105	105										
	VR	125	125	125										
	V2	134	134	134										
	GR2	6.2	6.2	6.2										
37000	TOFL	4370	4440	4510									135	185
	V1	101	101	101										
	VR	122	122	122										
	V2	131	131	131										
	GR2	6.6	6.6	6.6										
36000	TOFL	4370	4430	4500									133	183
	V1	101	101	101										
	VR	120	120	120										
	V2	129	129	129										
	GR2	7	7	7										
35000	TOFL	4310	4380	4460									131	180
	V1	101	101	101										
	VR	118	118	118										
	V2	128	128	128										
	GR2	7.5	7.5	7.5										
34000	TOFL	4260	4330	4400									129	177
	V1	101	101	101										
	VR	116	116	116										
	V2	126	126	126										
	GR2	8	8	7.9										
33000	TOFL	4210	4280	4340									127	174
	V1	101	101	101										
	VR	114	114	114										
	V2	125	125	125										
	GR2	8.5	8.5	8.5										
32000	TOFL	4160	4220	4290									125	171
	V1	101	101	101										
	VR	112	112	112										
	V2	124	124	124										
	GR2	9	9	9										
31000	TOFL	4100	4160	4230									123	169
	V1	101	101	101										
	VR	111	111	111										
	V2	122	122	122										
	GR2	9.6	9.6	9.6										

FIGURE 10-8-100. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
30000	TOFL	4040	4100	4170									121	166
	V1	101	101	101										
	VR	109	109	109										
	V2	121	121	121										
	GR2	10.2	10.2	10.2										
29000	TOFL	3990	4040	4110									119	163
	V1	101	101	101										
	VR	107	107	107										
	V2	120	120	120										
	GR2	10.9	10.9	10.9										
28000	TOFL	3920	3980	4050									117	160
	V1	101	101	101										
	VR	106	106	106										
	V2	119	119	119										
	GR2	11.6	11.6	11.6										
27000	TOFL	3860	3930	3980									115	157
	V1	101	101	101										
	VR	104	104	104										
	V2	118	118	118										
	GR2	12.4	12.4	12.4										
26000	TOFL	3790	3860	3920									113	154
	V1	101	101	101										
	VR	102	102	102										
	V2	117	117	117										
	GR2	13.2	13.2	13.2										

FIGURE 10-8-101. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	TOFL	4630	4710	4800	4890	4980	5060	5140	5230	5330	5420	5510	140	193
	V1	114	114	114	114	114	113	113	113	113	113	113		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
39000	TOFL	4440	4510	4600	4690	4770	4850	4930	5020	5110	5190	5280	139	191
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.6	5.6		
38000	TOFL	4150	4210	4290	4370	4450	4530	4600	4680	4760	4840	4930	137	189
	V1	108	108	108	107	107	107	107	107	107	107	107		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
37000	TOFL	3860	3930	4000	4080	4150	4220	4290	4360	4440	4520	4590	135	186
	V1	104	104	104	104	103	103	103	103	103	103	103		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.4	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	3640	3700	3780	3840	3910	3980	4050	4120	4200	4270	4330	133	183
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.8	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	3670	3730	3800	3870	3940	4000	4060	4130	4200	4270	4330	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
34000	TOFL	3630	3680	3760	3820	3880	3950	4000	4080	4150	4220	4270	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7		
33000	TOFL	3580	3640	3710	3760	3840	3900	3950	4020	4090	4160	4220	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
32000	TOFL	3530	3590	3660	3720	3790	3850	3910	3970	4040	4110	4170	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.7	8.7	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	3480	3540	3610	3670	3730	3800	3850	3910	3990	4050	4110	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 10-8-101. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
30000	TOFL	3430	3490	3550	3620	3680	3740	3800	3860	3930	4000	4050	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
29000	TOFL	3380	3430	3500	3550	3630	3690	3740	3800	3870	3940	3990	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
28000	TOFL	3330	3380	3450	3500	3560	3630	3690	3750	3820	3880	3930	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
27000	TOFL	3270	3330	3390	3450	3510	3570	3620	3690	3750	3820	3880	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	11.9	11.9	11.9	11.9	12	12	12	12	12	12		
26000	TOFL	3220	3270	3340	3390	3450	3510	3570	3620	3690	3750	3810	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.7	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 10-8-102. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
39600	TOFL	5600	5700	5790									140	193
	V1	113	113	113										
	VR	132	132	132										
	V2	139	139	139										
	GR2	5.4	5.4	5.4										
39000	TOFL	5370	5460	5550									139	191
	V1	111	111	111										
	VR	130	130	130										
	V2	137	137	137										
	GR2	5.6	5.6	5.6										
38000	TOFL	5010	5090	5170									137	189
	V1	107	107	107										
	VR	127	127	127										
	V2	135	135	135										
	GR2	6	6	6										
37000	TOFL	4670	4740	4820									135	186
	V1	103	103	103										
	VR	124	124	124										
	V2	132	132	132										
	GR2	6.4	6.4	6.3										
36000	TOFL	4400	4470	4540									133	183
	V1	100	100	100										
	VR	121	121	121										
	V2	130	130	130										
	GR2	6.8	6.8	6.8										
35000	TOFL	4400	4470	4530									131	180
	V1	100	100	100										
	VR	118	118	118										
	V2	127	127	127										
	GR2	7.2	7.2	7.2										
34000	TOFL	4350	4410	4480									129	177
	V1	100	100	100										
	VR	116	116	116										
	V2	126	126	126										
	GR2	7.6	7.6	7.6										
33000	TOFL	4290	4360	4420									127	175
	V1	100	100	100										
	VR	114	114	114										
	V2	124	124	124										
	GR2	8.1	8.1	8.1										
32000	TOFL	4230	4300	4370									125	172
	V1	100	100	100										
	VR	112	112	112										
	V2	123	123	123										
	GR2	8.7	8.7	8.7										
31000	TOFL	4180	4240	4310									123	169
	V1	100	100	100										
	VR	111	111	111										
	V2	122	122	122										
	GR2	9.3	9.3	9.3										

FIGURE 10-8-102. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
30000	TOFL	4120	4180	4250									121	166
	V1	100	100	100										
	VR	109	109	109										
	V2	121	121	121										
	GR2	9.9	9.9	9.9										
29000	TOFL	4060	4120	4190									119	163
	V1	100	100	100										
	VR	107	107	107										
	V2	120	120	120										
	GR2	10.5	10.5	10.5										
28000	TOFL	4000	4060	4130									117	160
	V1	100	100	100										
	VR	106	106	106										
	V2	119	119	119										
	GR2	11.2	11.2	11.2										
27000	TOFL	3930	4000	4070									115	157
	V1	100	100	100										
	VR	104	104	104										
	V2	118	118	118										
	GR2	12	12	12										
26000	TOFL	3870	3930	4000									113	154
	V1	100	100	100										
	VR	102	102	102										
	V2	117	117	117										
	GR2	12.8	12.8	12.8										

FIGURE 10-8-103. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	TOFL	4940	5060	5160	5260	5360	5460	5550	5660	5760	5860	5960	141	193
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	4740	4850	4950	5050	5140	5230	5330	5420	5520	5620	5710	140	192
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	4410	4520	4610	4700	4790	4880	4960	5050	5140	5230	5320	137	189
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	128	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	4110	4210	4290	4380	4460	4540	4620	4700	4780	4870	4950	135	186
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	3830	3910	3990	4070	4150	4220	4290	4370	4450	4520	4600	133	183
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	3730	3800	3860	3920	3990	4060	4130	4200	4260	4330	4390	131	181
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
34000	TOFL	3690	3770	3820	3900	3960	4030	4100	4180	4230	4300	4360	129	178
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	3640	3710	3780	3840	3920	3980	4040	4120	4180	4250	4300	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
32000	TOFL	3590	3660	3730	3800	3870	3920	4000	4060	4130	4190	4260	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
31000	TOFL	3540	3610	3670	3750	3810	3880	3940	4020	4070	4140	4200	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 10-8-103. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
30000	TOFL	3480	3560	3620	3690	3760	3820	3890	3960	4010	4080	4140	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	3430	3510	3570	3640	3700	3770	3830	3900	3950	4020	4080	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	119	119	119	119	119	119	119	119	119	119		
	GR2	10.3	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
28000	TOFL	3380	3450	3520	3590	3650	3700	3770	3840	3900	3970	4020	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
27000	TOFL	3330	3390	3450	3520	3590	3650	3710	3780	3840	3900	3960	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.6	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	3300	3340	3400	3470	3530	3590	3650	3720	3770	3840	3900	113	154
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.5	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3		

FIGURE 10-8-104. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
39600	TOFL	6060	6160	6260									141	193
	V1	116	116	116										
	VR	134	134	134										
	V2	140	140	140										
	GR2	5.2	5.2	5.2										
39000	TOFL	5810	5900	6000									140	192
	V1	113	113	113										
	VR	132	132	132										
	V2	139	139	139										
	GR2	5.4	5.4	5.4										
38000	TOFL	5410	5500	5590									137	189
	V1	109	109	109										
	VR	129	129	129										
	V2	136	136	136										
	GR2	5.7	5.7	5.7										
37000	TOFL	5030	5110	5200									135	186
	V1	105	105	105										
	VR	125	125	125										
	V2	133	133	133										
	GR2	6.1	6.1	6.1										
36000	TOFL	4680	4750	4830									133	183
	V1	101	101	101										
	VR	122	122	122										
	V2	130	130	130										
	GR2	6.5	6.5	6.5										
35000	TOFL	4460	4530	4590									131	181
	V1	99	99	99										
	VR	119	119	119										
	V2	128	128	128										
	GR2	6.9	6.9	6.9										
34000	TOFL	4430	4500	4570									129	178
	V1	99	99	99										
	VR	116	116	116										
	V2	126	126	126										
	GR2	7.3	7.3	7.3										
33000	TOFL	4380	4440	4510									127	175
	V1	99	99	99										
	VR	114	114	114										
	V2	124	124	124										
	GR2	7.8	7.8	7.8										
32000	TOFL	4320	4390	4460									125	172
	V1	99	99	99										
	VR	112	112	112										
	V2	123	123	123										
	GR2	8.3	8.3	8.3										
31000	TOFL	4270	4330	4390									123	169
	V1	99	99	99										
	VR	111	111	111										
	V2	122	122	121										
	GR2	8.9	8.9	8.9										

FIGURE 10-8-104. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
30000	TOFL	4210	4270	4330									121	166
	V1	99	99	99										
	VR	109	109	109										
	V2	121	121	121										
	GR2	9.5	9.5	9.5										
29000	TOFL	4150	4210	4270									119	163
	V1	99	99	99										
	VR	107	107	107										
	V2	119	119	119										
	GR2	10.1	10.1	10.1										
28000	TOFL	4090	4150	4210									117	160
	V1	99	99	99										
	VR	106	106	106										
	V2	118	118	118										
	GR2	10.8	10.8	10.8										
27000	TOFL	4030	4090	4140									115	157
	V1	99	99	99										
	VR	104	104	104										
	V2	117	117	117										
	GR2	11.6	11.5	11.5										
26000	TOFL	3960	4020	4080									113	154
	V1	99	99	99										
	VR	102	102	102										
	V2	116	116	116										
	GR2	12.3	12.3	12.3										

FIGURE 10-8-105. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	TOFL	5360	5490	5600	5710	5810	5920	6030	6140	6250	6350	6460	142	194
	V1	119	119	119	119	119	119	119	119	118	118	118		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
39000	TOFL	5140	5260	5370	5470	5570	5670	5770	5880	5980	6090	6190	141	192
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
38000	TOFL	4790	4900	5000	5100	5190	5280	5380	5480	5570	5670	5770	138	189
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	4450	4560	4650	4740	4830	4910	5000	5090	5180	5270	5360	136	187
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	4130	4230	4310	4400	4480	4560	4640	4720	4810	4890	4970	133	184
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	3840	3930	4010	4080	4160	4230	4310	4380	4460	4540	4610	131	181
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	3770	3850	3910	3990	4060	4130	4190	4260	4340	4400	4470	129	178
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	117	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	3720	3800	3870	3930	4010	4080	4140	4220	4280	4350	4410	127	175
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
32000	TOFL	3670	3740	3810	3890	3950	4020	4080	4160	4230	4290	4360	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.1	8	8	8	8	8	8	8	8	8	8		
31000	TOFL	3630	3690	3760	3830	3900	3970	4030	4100	4170	4230	4300	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 10-8-105. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
30000	TOFL	3570	3650	3700	3780	3840	3910	3980	4040	4110	4180	4240	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
29000	TOFL	3520	3590	3650	3720	3790	3850	3920	3990	4050	4120	4180	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
28000	TOFL	3460	3530	3600	3670	3730	3800	3860	3920	4000	4060	4120	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
27000	TOFL	3410	3480	3540	3600	3680	3740	3800	3860	3940	4000	4060	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.1		
26000	TOFL	3360	3420	3480	3550	3610	3680	3740	3810	3880	3930	4000	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 10-8-106. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
39600	TOFL	6580	6690	6800									142	194
	V1	118	118	118										
	VR	136	136	136										
	V2	142	142	142										
	GR2	4.9	4.9	4.9										
39000	TOFL	6300	6400	6510									141	192
	V1	116	116	116										
	VR	134	134	134										
	V2	140	140	140										
	GR2	5.1	5.1	5.1										
38000	TOFL	5860	5960	6060									138	189
	V1	112	112	112										
	VR	130	130	130										
	V2	137	137	137										
	GR2	5.5	5.5	5.5										
37000	TOFL	5450	5540	5630									136	187
	V1	108	108	108										
	VR	127	127	127										
	V2	134	134	134										
	GR2	5.8	5.8	5.8										
36000	TOFL	5060	5140	5220									133	184
	V1	104	104	104										
	VR	124	124	124										
	V2	132	132	132										
	GR2	6.2	6.2	6.2										
35000	TOFL	4690	4770	4850									131	181
	V1	100	100	100										
	VR	121	121	121										
	V2	129	129	129										
	GR2	6.6	6.6	6.6										
34000	TOFL	4540	4600	4670									129	178
	V1	98	98	98										
	VR	118	118	118										
	V2	126	126	126										
	GR2	7	7	7										
33000	TOFL	4490	4550	4620									127	175
	V1	98	98	98										
	VR	115	115	115										
	V2	124	124	124										
	GR2	7.5	7.5	7.5										
32000	TOFL	4430	4490	4560									125	172
	V1	98	98	98										
	VR	113	113	113										
	V2	122	122	122										
	GR2	8	8	8										
31000	TOFL	4370	4430	4510									123	169
	V1	98	98	98										
	VR	111	111	111										
	V2	121	121	121										
	GR2	8.5	8.5	8.5										

FIGURE 10-8-106. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
30000	TOFL	4310	4370	4440									121	166
	V1	98	98	98										
	VR	109	109	109										
	V2	120	120	120										
	GR2	9.1	9.1	9.1										
29000	TOFL	4250	4310	4380									119	163
	V1	98	98	98										
	VR	107	107	107										
	V2	119	119	119										
	GR2	9.8	9.8	9.8										
28000	TOFL	4190	4240	4310									117	160
	V1	98	98	98										
	VR	106	106	106										
	V2	118	118	118										
	GR2	10.4	10.4	10.4										
27000	TOFL	4130	4180	4250									115	157
	V1	98	98	98										
	VR	104	104	104										
	V2	117	117	117										
	GR2	11.1	11.1	11.1										
26000	TOFL	4060	4120	4190									113	154
	V1	98	98	98										
	VR	102	102	102										
	V2	116	116	116										
	GR2	11.9	11.9	11.9										

FIGURE 10-8-107. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	TOFL	5800	5900	6020	6140	6260	6370	6490	6610	6730	6850	6960	143	194
	V1	121	121	121	121	121	121	121	121	121	121	121		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	5560	5650	5770	5880	5990	6100	6220	6330	6440	6550	6670	142	193
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	5170	5250	5360	5470	5570	5670	5780	5890	5990	6090	6200	139	190
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.3	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	4800	4890	4990	5080	5180	5270	5370	5470	5570	5660	5760	137	187
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	135	135	135	135	135	135		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	4460	4530	4620	4710	4800	4890	4980	5070	5160	5250	5340	134	184
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6	6	5.9	5.9	5.9	6	6	6	6	6	6		
35000	TOFL	4130	4200	4280	4370	4450	4530	4610	4690	4780	4860	4940	132	181
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	3830	3890	3970	4050	4120	4200	4270	4350	4420	4500	4570	129	178
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.8	6.8	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	3800	3870	3940	4020	4090	4160	4230	4310	4380	4460	4520	127	176
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
32000	TOFL	3750	3810	3890	3960	4040	4100	4190	4250	4330	4400	4460	125	173
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
31000	TOFL	3690	3760	3840	3910	3980	4040	4120	4180	4260	4330	4400	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 10-8-107. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
30000	TOFL	3640	3700	3780	3860	3920	3980	4060	4130	4200	4270	4330	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	3590	3650	3720	3800	3870	3930	4000	4070	4140	4210	4270	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
28000	TOFL	3530	3590	3670	3740	3810	3860	3940	4010	4080	4150	4200	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
27000	TOFL	3480	3540	3610	3680	3750	3810	3880	3950	4020	4090	4140	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	3440	3490	3550	3620	3690	3750	3820	3880	3950	4030	4080	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.6	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 10-8-108. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
39600	TOFL	7080	7210	7330									143	194
	V1	121	121	121										
	VR	137	137	137										
	V2	143	143	143										
	GR2	4.7	4.7	4.7										
39000	TOFL	6780	6900	7010									142	193
	V1	118	118	118										
	VR	135	135	135										
	V2	141	141	141										
	GR2	4.9	4.9	4.9										
38000	TOFL	6300	6410	6520									139	190
	V1	114	114	114										
	VR	132	132	132										
	V2	138	138	138										
	GR2	5.2	5.2	5.2										
37000	TOFL	5860	5960	6050									137	187
	V1	110	110	110										
	VR	129	129	129										
	V2	135	135	135										
	GR2	5.6	5.6	5.6										
36000	TOFL	5430	5520	5610									134	184
	V1	106	106	106										
	VR	125	125	125										
	V2	133	133	133										
	GR2	5.9	5.9	5.9										
35000	TOFL	5020	5110	5190									132	181
	V1	102	102	102										
	VR	122	122	122										
	V2	130	130	130										
	GR2	6.3	6.3	6.3										
34000	TOFL	4650	4730	4810									129	178
	V1	98	98	98										
	VR	119	119	119										
	V2	127	127	127										
	GR2	6.8	6.8	6.8										
33000	TOFL	4600	4650	4720									127	176
	V1	97	97	97										
	VR	116	116	116										
	V2	124	124	124										
	GR2	7.2	7.2	7.2										
32000	TOFL	4530	4600	4660									125	173
	V1	97	97	97										
	VR	113	113	113										
	V2	122	122	122										
	GR2	7.7	7.7	7.7										
31000	TOFL	4470	4540	4590									123	170
	V1	97	97	97										
	VR	111	111	111										
	V2	121	121	121										
	GR2	8.2	8.2	8.2										

FIGURE 10-8-108. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
30000	TOFL	4410	4460	4540									121	167
	V1	97	97	97										
	VR	109	109	109										
	V2	119	119	119										
	GR2	8.8	8.8	8.8										
29000	TOFL	4340	4400	4460									119	164
	V1	97	97	97										
	VR	107	107	107										
	V2	118	118	118										
	GR2	9.4	9.4	9.4										
28000	TOFL	4280	4340	4400									117	161
	V1	97	97	97										
	VR	106	106	106										
	V2	117	117	117										
	GR2	10.1	10.1	10.1										
27000	TOFL	4220	4280	4330									115	157
	V1	97	97	97										
	VR	104	104	104										
	V2	116	116	116										
	GR2	10.8	10.8	10.8										
26000	TOFL	4150	4200	4260									113	154
	V1	97	97	97										
	VR	102	102	102										
	V2	115	115	115										
	GR2	11.5	11.5	11.5										

FIGURE 10-8-109. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	TOFL	6250	6420	6600	6720	6830	6950	7080	7220	7350	7470	7600	144	195
	V1	123	124	124	124	124	124	124	124	124	124	124		
	VR	139	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
39000	TOFL	5980	6150	6320	6430	6540	6660	6780	6910	7030	7150	7280	143	193
	V1	121	121	121	121	121	121	121	121	121	121	121		
	VR	137	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.8	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	5560	5710	5870	5970	6080	6180	6300	6410	6530	6640	6760	140	190
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.1	5	4.9	4.9	4.9	5	5	5	5	5	4.9		
37000	TOFL	5160	5300	5450	5550	5640	5740	5840	5950	6060	6160	6270	138	187
	V1	112	113	113	113	113	113	113	113	113	113	113		
	VR	130	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.5	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	4780	4920	5050	5140	5230	5320	5420	5520	5610	5710	5810	135	185
	V1	108	109	109	109	109	109	109	109	109	109	109		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.8	5.7	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
35000	TOFL	4430	4550	4670	4760	4840	4920	5010	5100	5190	5280	5370	133	182
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.2	6.1	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
34000	TOFL	4100	4200	4320	4400	4470	4550	4630	4710	4790	4880	4960	130	179
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.6	6.5	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5		
33000	TOFL	3840	3890	3990	4060	4130	4200	4280	4350	4430	4500	4580	127	176
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	7.1	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
32000	TOFL	3800	3880	3980	4050	4120	4190	4270	4330	4410	4470	4540	125	173
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.5	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
31000	TOFL	3750	3840	3930	4000	4060	4130	4210	4270	4350	4410	4490	123	170
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		

FIGURE 10-8-109. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
30000	TOFL	3700	3780	3870	3940	4010	4080	4150	4220	4290	4350	4420	121	167
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.6	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	3640	3730	3820	3880	3960	4020	4090	4160	4230	4290	4370	119	164
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.2	9.1	8.9	9	9	9	9	9	9	9	9		
28000	TOFL	3590	3670	3760	3830	3900	3960	4040	4100	4170	4230	4300	117	161
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.9	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
27000	TOFL	3550	3610	3700	3770	3840	3910	3970	4040	4110	4160	4240	115	158
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	115	115	115	115	115	115	115	115	115	115		
	GR2	10.6	10.4	10.3	10.3	10.3	10.4	10.4	10.4	10.3	10.3	10.3		
26000	TOFL	3520	3560	3640	3710	3770	3850	3910	3970	4040	4100	4160	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	114	114	114	114	114	114	114	114	114	114		
	GR2	11.3	11.1	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 10-8-110. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
39600	TOFL	7730	7870	8000									144	195
	V1	124	124	124										
	VR	140	140	140										
	V2	145	145	145										
	GR2	4.4	4.4	4.4										
39000	TOFL	7400	7530	7650									143	193
	V1	121	121	121										
	VR	138	138	138										
	V2	143	143	143										
	GR2	4.6	4.6	4.6										
38000	TOFL	6870	6990	7110									140	190
	V1	117	117	117										
	VR	134	134	134										
	V2	140	140	140										
	GR2	4.9	4.9	4.9										
37000	TOFL	6370	6480	6590									138	187
	V1	113	113	113										
	VR	131	131	131										
	V2	137	137	137										
	GR2	5.3	5.3	5.3										
36000	TOFL	5910	6010	6110									135	185
	V1	109	109	109										
	VR	127	127	127										
	V2	134	134	134										
	GR2	5.7	5.7	5.7										
35000	TOFL	5460	5560	5650									133	182
	V1	104	104	104										
	VR	124	124	124										
	V2	131	131	131										
	GR2	6.1	6.1	6										
34000	TOFL	5040	5130	5210									130	179
	V1	100	100	100										
	VR	120	120	120										
	V2	128	128	128										
	GR2	6.4	6.4	6.4										
33000	TOFL	4660	4730	4810									127	176
	V1	96	96	96										
	VR	117	117	117										
	V2	125	125	125										
	GR2	6.9	6.9	6.9										
32000	TOFL	4610	4690	4730									125	173
	V1	96	96	95										
	VR	114	114	114										
	V2	123	123	123										
	GR2	7.3	7.3	7.3										
31000	TOFL	4540	4620	4670									123	170
	V1	96	96	95										
	VR	111	111	111										
	V2	121	121	121										
	GR2	7.8	7.8	7.8										

FIGURE 10-8-110. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
30000	TOFL	4490	4560	4600									121	167
	V1	96	96	95										
	VR	109	109	109										
	V2	119	119	119										
	GR2	8.4	8.4	8.4										
29000	TOFL	4420	4500	4540									119	164
	V1	96	96	95										
	VR	107	107	107										
	V2	118	118	118										
	GR2	9	9	9										
28000	TOFL	4360	4430	4470									117	161
	V1	96	96	95										
	VR	106	106	106										
	V2	117	117	116										
	GR2	9.6	9.6	9.6										
27000	TOFL	4290	4370	4400									115	158
	V1	96	96	95										
	VR	104	104	104										
	V2	115	115	115										
	GR2	10.3	10.3	10.3										
26000	TOFL	4230	4300	4330									113	155
	V1	96	96	95										
	VR	102	102	102										
	V2	114	114	114										
	GR2	11.1	11.1	11.1										

FIGURE 10-8-111. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	TOFL	6800	7050	7220	7350	7460	7600	7740	7890	8030	8170	8310	145	195
	V1	126	127	127	127	127	127	127	127	127	127	127		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	147	147	147	147	147	147	147	147	147	147		
	GR2	4.3	4.2	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
39000	TOFL	6510	6750	6910	7030	7140	7270	7410	7550	7680	7820	7960	144	193
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	139	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.5	4.3	4.3	4.3	4.3	4.4	4.4	4.3	4.3	4.3	4.3		
38000	TOFL	6040	6270	6410	6520	6630	6750	6870	7000	7130	7250	7380	141	191
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	142	142	142	142	142	142	142	142	142	142		
	GR2	4.9	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
37000	TOFL	5600	5810	5950	6050	6140	6250	6370	6490	6600	6720	6840	139	188
	V1	115	116	116	116	116	116	116	116	116	116	116		
	VR	132	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.2	5	5	5	5	5	5	5	5	5	5		
36000	TOFL	5190	5380	5510	5600	5690	5790	5900	6010	6110	6220	6330	136	185
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
35000	TOFL	4800	4970	5090	5180	5260	5350	5450	5550	5650	5750	5850	134	182
	V1	106	107	107	107	107	107	107	107	107	107	107		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6	5.8	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
34000	TOFL	4430	4590	4700	4780	4850	4940	5030	5120	5210	5300	5390	131	179
	V1	102	103	103	103	103	103	103	103	103	103	103		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.4	6.2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
33000	TOFL	4090	4230	4330	4400	4470	4550	4640	4720	4800	4890	4970	128	176
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.8	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
32000	TOFL	3860	3930	4010	4080	4170	4240	4310	4380	4460	4530	4600	126	173
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	124	124	124	124	124	124	124	124	124	124		
	GR2	7.2	7	7	7	7	7	7	7	7	7	7		
31000	TOFL	3820	3910	4000	4070	4140	4220	4280	4350	4430	4500	4570	123	170
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.7	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		

FIGURE 10-8-111. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
30000	TOFL	3760	3870	3940	4020	4090	4160	4220	4300	4370	4450	4510	121	167
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.3	8	8	8	8	8	8	8	8	8	8		
29000	TOFL	3700	3810	3890	3960	4030	4100	4170	4240	4310	4380	4450	119	164
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.8	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	3670	3750	3830	3900	3970	4040	4110	4170	4250	4320	4390	117	161
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.5	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
27000	TOFL	3630	3690	3780	3840	3910	3980	4040	4110	4190	4250	4320	115	158
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
26000	TOFL	3590	3630	3710	3780	3850	3920	3980	4050	4120	4190	4250	113	155
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.9	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		

FIGURE 10-8-112. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
39600	TOFL	8460	8610	8750									145	195
	V1	127	127	127										
	VR	142	142	142										
	V2	147	147	147										
	GR2	4.2	4.2	4.1										
39000	TOFL	8090	8230	8370									144	193
	V1	124	124	124										
	VR	140	140	140										
	V2	145	145	145										
	GR2	4.3	4.3	4.3										
38000	TOFL	7510	7630	7760									141	191
	V1	120	120	120										
	VR	136	136	136										
	V2	142	142	142										
	GR2	4.7	4.7	4.7										
37000	TOFL	6950	7070	7190									139	188
	V1	116	116	116										
	VR	133	133	133										
	V2	138	138	138										
	GR2	5	5	5										
36000	TOFL	6440	6550	6660									136	185
	V1	111	111	111										
	VR	129	129	129										
	V2	135	135	135										
	GR2	5.4	5.4	5.4										
35000	TOFL	5950	6050	6150									134	182
	V1	107	107	107										
	VR	126	126	126										
	V2	132	132	132										
	GR2	5.8	5.8	5.7										
34000	TOFL	5490	5580	5670									131	179
	V1	103	103	103										
	VR	122	122	122										
	V2	129	129	129										
	GR2	6.2	6.2	6.1										
33000	TOFL	5050	5140	5220									128	176
	V1	98	98	98										
	VR	119	119	119										
	V2	126	126	126										
	GR2	6.6	6.6	6.6										
32000	TOFL	4680	4730	4810									126	173
	V1	94	94	94										
	VR	115	115	115										
	V2	124	124	124										
	GR2	7	7	7										
31000	TOFL	4640	4700	4710									123	170
	V1	94	94	94										
	VR	112	112	112										
	V2	121	121	121										
	GR2	7.5	7.5	7.5										

FIGURE 10-8-112. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
30000	TOFL	4590	4630	4650									121	167
	V1	94	94	94										
	VR	109	109	109										
	V2	119	119	119										
	GR2	8	8	8										
29000	TOFL	4520	4580	4580									119	164
	V1	94	94	94										
	VR	107	107	107										
	V2	117	117	117										
	GR2	8.6	8.6	8.6										
28000	TOFL	4450	4510	4510									117	161
	V1	94	94	94										
	VR	105	105	105										
	V2	116	116	116										
	GR2	9.2	9.2	9.2										
27000	TOFL	4380	4440	4470									115	158
	V1	94	94	94										
	VR	104	104	104										
	V2	115	115	115										
	GR2	9.9	9.9	9.9										
26000	TOFL	4320	4370	4420									113	155
	V1	94	94	94										
	VR	102	102	102										
	V2	114	114	114										
	GR2	10.6	10.6	10.6										

FIGURE 10-8-113. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	TOFL	7470	7750	7890	8030	8160	8320	8480	8640	8790	8950	9100	147	195
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	4	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	TOFL	7140	7430	7560	7690	7820	7970	8120	8270	8420	8570	8720	145	194
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	147	147	147	147	147	147	147	147	147	147		
	GR2	4.2	4	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	TOFL	6620	6880	7000	7120	7240	7380	7520	7660	7790	7930	8070	142	191
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	138	139	139	139	139	139	139	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	TOFL	6140	6370	6490	6600	6710	6840	6960	7090	7220	7340	7470	140	188
	V1	118	119	119	119	119	119	119	119	119	119	119		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.9	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.7	4.7		
36000	TOFL	5680	5900	6000	6100	6200	6320	6440	6560	6670	6790	6910	137	185
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
35000	TOFL	5240	5450	5540	5630	5730	5840	5950	6050	6160	6270	6380	135	183
	V1	109	110	110	110	110	110	110	110	110	110	110		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.6	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
34000	TOFL	4830	5020	5110	5190	5280	5380	5480	5580	5680	5770	5870	132	180
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
33000	TOFL	4450	4620	4700	4780	4860	4950	5040	5130	5220	5310	5400	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.4	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
32000	TOFL	4100	4250	4330	4400	4470	4550	4630	4720	4800	4890	4970	127	174
	V1	96	97	97	97	97	97	97	97	97	97	97		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
31000	TOFL	3920	4000	4090	4150	4230	4300	4370	4450	4520	4600	4670	124	171
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.3	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		

FIGURE 10-8-113. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
30000	TOFL	3860	3960	4040	4100	4170	4250	4310	4390	4460	4550	4610	121	168
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.8	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
29000	TOFL	3800	3900	3980	4040	4120	4190	4260	4330	4410	4480	4550	119	165
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.4	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
28000	TOFL	3740	3850	3920	3980	4050	4120	4190	4260	4340	4410	4480	117	161
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	9	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
27000	TOFL	3710	3790	3860	3920	3990	4060	4130	4200	4280	4340	4410	115	158
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.7	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
26000	TOFL	3670	3730	3800	3860	3930	4000	4070	4130	4210	4280	4340	113	155
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		

FIGURE 10-8-114. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
39600	TOFL	9270	9430	9620									147	195
	V1	130	130	130										
	VR	144	144	144										
	V2	148	148	148										
	GR2	3.9	3.9	3.8										
39000	TOFL	8870	9020	9210									145	194
	V1	127	127	128										
	VR	142	142	142										
	V2	147	147	147										
	GR2	4.1	4.1	4										
38000	TOFL	8210	8350	8530									142	191
	V1	123	123	123										
	VR	139	139	139										
	V2	143	143	143										
	GR2	4.4	4.4	4.3										
37000	TOFL	7600	7730	7900									140	188
	V1	119	119	119										
	VR	135	135	135										
	V2	140	140	140										
	GR2	4.7	4.7	4.6										
36000	TOFL	7030	7150	7300									137	185
	V1	114	114	114										
	VR	131	131	132										
	V2	137	137	137										
	GR2	5.1	5.1	5										
35000	TOFL	6490	6600	6740									135	183
	V1	110	110	110										
	VR	128	128	128										
	V2	134	134	134										
	GR2	5.5	5.4	5.3										
34000	TOFL	5980	6080	6210									132	180
	V1	105	105	106										
	VR	124	124	124										
	V2	131	131	131										
	GR2	5.9	5.8	5.7										
33000	TOFL	5500	5590	5710									129	177
	V1	101	101	101										
	VR	121	121	121										
	V2	128	128	128										
	GR2	6.3	6.3	6.1										
32000	TOFL	5050	5140	5250									127	174
	V1	97	97	97										
	VR	117	117	117										
	V2	125	125	125										
	GR2	6.7	6.7	6.6										
31000	TOFL	4740	4790	4820									124	171
	V1	93	93	93										
	VR	113	113	114										
	V2	122	122	122										
	GR2	7.2	7.1	7										

FIGURE 10-8-114. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
30000	TOFL	4690	4730	4700									121	168
	V1	93	93	92										
	VR	110	110	110										
	V2	119	119	119										
	GR2	7.7	7.6	7.5										
29000	TOFL	4620	4660	4640									119	165
	V1	93	93	92										
	VR	107	107	107										
	V2	117	117	117										
	GR2	8.2	8.2	8										
28000	TOFL	4550	4590	4590									117	161
	V1	93	93	92										
	VR	105	105	105										
	V2	115	115	115										
	GR2	8.8	8.8	8.6										
27000	TOFL	4490	4530	4540									115	158
	V1	93	93	92										
	VR	104	104	104										
	V2	114	114	114										
	GR2	9.5	9.4	9.3										
26000	TOFL	4420	4460	4490									113	155
	V1	93	93	92										
	VR	102	102	102										
	V2	113	113	113										
	GR2	10.2	10.2	10										

FIGURE 10-8-115. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	TOFL	8250	8470	8630	8790	8950	9130	9300	9470	9650	9820	10000	148	196
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
39000	TOFL	7900	8110	8260	8410	8570	8740	8900	9060	9230	9400	9570	146	194
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	148	148	148	148		
	GR2	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
38000	TOFL	7340	7530	7670	7810	7960	8110	8260	8420	8570	8720	8880	144	191
	V1	126	126	126	126	126	126	126	126	126	126	126		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
37000	TOFL	6780	6960	7090	7220	7350	7490	7630	7770	7910	8060	8200	141	189
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
36000	TOFL	6260	6430	6550	6660	6790	6920	7050	7180	7310	7440	7570	138	186
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
35000	TOFL	5770	5930	6040	6150	6260	6380	6500	6620	6740	6850	6970	136	183
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
34000	TOFL	5320	5460	5560	5660	5760	5870	5980	6090	6200	6310	6420	133	180
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
33000	TOFL	4890	5020	5110	5200	5290	5390	5490	5590	5690	5790	5890	130	177
	V1	103	104	104	104	104	104	104	104	104	104	104		
	VR	122	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
32000	TOFL	4480	4600	4680	4770	4850	4950	5040	5130	5220	5310	5400	127	174
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
31000	TOFL	4120	4230	4300	4380	4460	4540	4620	4710	4790	4870	4950	125	171
	V1	94	95	95	95	95	95	95	95	95	95	95		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8		

FIGURE 10-8-115. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
30000	TOFL	3960	4050	4130	4200	4270	4340	4430	4500	4570	4650	4730	122	168
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
29000	TOFL	3910	3990	4070	4130	4210	4290	4360	4440	4510	4590	4660	119	165
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8		
28000	TOFL	3860	3930	4010	4070	4150	4220	4310	4380	4450	4520	4600	117	162
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.6	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
27000	TOFL	3800	3880	3950	4010	4090	4160	4240	4310	4380	4450	4530	115	159
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
26000	TOFL	3740	3810	3880	3950	4030	4100	4170	4240	4310	4380	4460	113	155
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 10-8-116. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
39600	TOFL	10170	10360	10690									148	196
	V1	133	133	134										
	VR	147	147	147										
	V2	150	150	150										
	GR2	3.6	3.5	3.3										
39000	TOFL	9730	9910	10230									146	194
	V1	131	131	132										
	VR	145	145	145										
	V2	148	148	148										
	GR2	3.8	3.7	3.5										
38000	TOFL	9030	9200	9490									144	191
	V1	126	126	127										
	VR	141	141	141										
	V2	145	145	145										
	GR2	4.1	4.1	3.8										
37000	TOFL	8340	8500	8770									141	189
	V1	122	122	123										
	VR	137	137	138										
	V2	142	142	142										
	GR2	4.5	4.4	4.2										
36000	TOFL	7700	7850	8100									138	186
	V1	117	117	118										
	VR	134	134	134										
	V2	139	139	139										
	GR2	4.8	4.7	4.5										
35000	TOFL	7100	7230	7470									136	183
	V1	113	113	114										
	VR	130	130	130										
	V2	136	135	135										
	GR2	5.2	5.1	4.9										
34000	TOFL	6530	6650	6870									133	180
	V1	108	108	109										
	VR	126	126	127										
	V2	132	132	132										
	GR2	5.6	5.5	5.2										
33000	TOFL	5990	6110	6310									130	177
	V1	104	104	105										
	VR	123	123	123										
	V2	129	129	129										
	GR2	6	5.9	5.6										
32000	TOFL	5490	5600	5780									127	174
	V1	99	99	100										
	VR	119	119	119										
	V2	126	126	126										
	GR2	6.4	6.3	6										
31000	TOFL	5040	5140	5300									125	171
	V1	95	95	96										
	VR	115	115	116										
	V2	123	123	123										
	GR2	6.8	6.7	6.5										

FIGURE 10-8-116. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
30000	TOFL	4780	4780	4860									122	168
	V1	92	91	91										
	VR	112	112	112										
	V2	120	120	120										
	GR2	7.3	7.2	6.9										
29000	TOFL	4720	4710	4690									119	165
	V1	92	91	90										
	VR	108	108	108										
	V2	117	117	117										
	GR2	7.8	7.7	7.4										
28000	TOFL	4650	4650	4640									117	162
	V1	92	91	90										
	VR	106	106	106										
	V2	115	115	115										
	GR2	8.4	8.3	8										
27000	TOFL	4580	4580	4590									115	159
	V1	92	91	90										
	VR	104	104	103										
	V2	114	113	113										
	GR2	9.1	8.9	8.6										
26000	TOFL	4520	4520	4540									113	155
	V1	92	91	90										
	VR	102	102	102										
	V2	113	113	112										
	GR2	9.8	9.6	9.3										

FIGURE 10-8-117. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	TOFL	9110	9270	9460	9650	9850	10040	10230	10420	10610	10810	11000	149	196
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	3.4	3.3	3.3	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3		
39000	TOFL	8710	8870	9050	9230	9420	9600	9780	9960	10150	10330	10510	147	194
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
38000	TOFL	8080	8220	8390	8560	8730	8900	9070	9240	9410	9570	9740	145	192
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	TOFL	7490	7610	7770	7930	8090	8240	8400	8550	8710	8860	9020	142	189
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
36000	TOFL	6900	7010	7160	7300	7450	7590	7730	7870	8020	8160	8300	139	186
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
35000	TOFL	6350	6460	6600	6720	6860	6990	7120	7250	7380	7510	7640	137	183
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
34000	TOFL	5840	5940	6060	6180	6300	6420	6540	6660	6780	6900	7020	134	180
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
33000	TOFL	5360	5450	5560	5670	5780	5890	6000	6110	6220	6330	6440	131	177
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
32000	TOFL	4910	4990	5090	5190	5290	5390	5490	5590	5690	5790	5890	128	175
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
31000	TOFL	4490	4560	4650	4740	4830	4920	5020	5100	5200	5290	5380	126	172
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		

FIGURE 10-8-117. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
30000	TOFL	4120	4190	4270	4350	4440	4520	4600	4680	4770	4850	4930	123	168
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	7	7		
29000	TOFL	4030	4100	4160	4250	4310	4400	4470	4550	4620	4700	4770	120	165
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.5		
28000	TOFL	3970	4040	4110	4190	4260	4330	4420	4480	4560	4630	4710	117	162
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
27000	TOFL	3920	3980	4050	4120	4190	4270	4350	4410	4490	4550	4630	115	159
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
26000	TOFL	3850	3910	3990	4060	4130	4200	4280	4340	4420	4480	4560	113	156
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 10-8-118. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
39600	TOFL	11200	11450	11920									149	196
	V1	137	137	138										
	VR	149	149	150										
	V2	152	152	152										
	GR2	3.3	3.2	2.9										
39000	TOFL	10700	10950	11410									147	194
	V1	134	134	136										
	VR	147	147	148										
	V2	150	150	150										
	GR2	3.5	3.4	3.1										
38000	TOFL	9920	10140	10580									145	192
	V1	130	130	131										
	VR	144	144	144										
	V2	147	147	147										
	GR2	3.8	3.7	3.4										
37000	TOFL	9180	9390	9790									142	189
	V1	125	126	127										
	VR	140	140	141										
	V2	144	144	144										
	GR2	4.2	4	3.7										
36000	TOFL	8450	8650	9050									139	186
	V1	120	121	122										
	VR	136	136	137										
	V2	141	141	141										
	GR2	4.5	4.3	4										
35000	TOFL	7780	7970	8310									137	183
	V1	116	116	118										
	VR	132	132	133										
	V2	137	137	137										
	GR2	4.9	4.7	4.4										
34000	TOFL	7150	7320	7640									134	180
	V1	111	112	113										
	VR	129	129	129										
	V2	134	134	134										
	GR2	5.3	5.1	4.7										
33000	TOFL	6550	6710	7010									131	177
	V1	106	107	108										
	VR	125	125	125										
	V2	131	130	130										
	GR2	5.7	5.4	5.1										
32000	TOFL	5990	6140	6420									128	175
	V1	102	102	103										
	VR	121	121	121										
	V2	127	127	127										
	GR2	6.1	5.8	5.5										
31000	TOFL	5470	5610	5860									126	172
	V1	97	97	99										
	VR	117	117	117										
	V2	124	124	124										
	GR2	6.6	6.3	5.9										

FIGURE 10-8-118. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
30000	TOFL	5020	5140	5360									123	168
	V1	93	93	94										
	VR	113	113	114										
	V2	121	121	121										
	GR2	7	6.7	6.4										
29000	TOFL	4790	4750	4900									120	165
	V1	91	90	90										
	VR	110	110	110										
	V2	118	118	118										
	GR2	7.5	7.2	6.8										
28000	TOFL	4720	4700	4700									117	162
	V1	91	89	88										
	VR	106	106	107										
	V2	115	115	115										
	GR2	8.1	7.8	7.3										
27000	TOFL	4650	4640	4650									115	159
	V1	91	90	88										
	VR	104	104	104										
	V2	113	113	112										
	GR2	8.7	8.4	7.9										
26000	TOFL	4580	4590	4590									113	156
	V1	91	90	89										
	VR	102	102	102										
	V2	112	112	111										
	GR2	9.4	9	8.6										

FIGURE 10-8-119. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	TOFL	9980	10250	10440	10640	10860	11070	11290	11500	11710	11930	12140	150	197
	V1	140	140	140	140	140	140	140	140	140	140	140		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1		
39000	TOFL	9560	9810	10000	10190	10400	10600	10810	11010	11220	11420	11630	148	195
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
38000	TOFL	8850	9090	9260	9440	9630	9820	10010	10200	10390	10570	10760	146	192
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
37000	TOFL	8190	8410	8580	8750	8920	9090	9270	9440	9620	9790	9970	143	189
	V1	128	129	129	129	129	129	129	129	129	129	129		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
36000	TOFL	7560	7770	7920	8070	8230	8390	8550	8700	8860	9020	9190	140	187
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
35000	TOFL	6940	7150	7280	7420	7560	7710	7860	8000	8150	8290	8440	138	184
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6		
34000	TOFL	6370	6550	6670	6790	6930	7060	7200	7330	7460	7590	7730	135	181
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5	5.1	5.1	5.1	5	5	5	5	5	5		
33000	TOFL	5840	6000	6110	6230	6350	6470	6590	6710	6830	6950	7080	132	178
	V1	109	109	109	109	109	109	109	109	109	109	110		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
32000	TOFL	5340	5490	5590	5690	5800	5920	6030	6140	6250	6360	6470	129	175
	V1	104	105	105	105	105	105	105	105	105	105	105		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8		
31000	TOFL	4880	5010	5100	5200	5300	5400	5500	5600	5700	5800	5900	127	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		

FIGURE 10-8-119. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
30000	TOFL	4450	4570	4650	4730	4830	4920	5010	5100	5190	5280	5370	124	169
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	122	122		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
29000	TOFL	4080	4180	4260	4340	4420	4500	4590	4670	4750	4830	4920	121	166
	V1	90	91	91	91	91	91	91	91	91	91	91		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
28000	TOFL	4030	4110	4180	4260	4330	4410	4470	4560	4630	4710	4750	118	162
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
27000	TOFL	3960	4050	4120	4190	4260	4340	4410	4490	4560	4640	4690	115	159
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
26000	TOFL	3920	3980	4050	4120	4200	4280	4340	4420	4490	4570	4630	113	156
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.2	9	9.1	9.1	9.1	9.1	9.1	9.1	9	9	9		

FIGURE 10-8-120. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
39600	TOFL	12390	12790										150	197
	V1	141	141											
	VR	152	152											
	V2	155	154											
	GR2	3	2.7											
39000	TOFL	11870	12250	12910									148	195
	V1	138	139	140										
	VR	150	150	151										
	V2	153	153	153										
	GR2	3.2	2.9	2.6										
38000	TOFL	10990	11360	12000									146	192
	V1	133	134	136										
	VR	146	147	147										
	V2	149	149	150										
	GR2	3.5	3.2	2.9										
37000	TOFL	10170	10500	11110									143	189
	V1	129	130	132										
	VR	143	143	144										
	V2	146	146	146										
	GR2	3.8	3.5	3.2										
36000	TOFL	9380	9700	10260									140	187
	V1	124	125	127										
	VR	139	139	140										
	V2	143	143	143										
	GR2	4.2	3.9	3.5										
35000	TOFL	8630	8930	9460									138	184
	V1	119	121	123										
	VR	135	135	137										
	V2	139	139	140										
	GR2	4.5	4.2	3.9										
34000	TOFL	7900	8180	8690									135	181
	V1	115	116	118										
	VR	131	131	133										
	V2	136	136	137										
	GR2	4.9	4.6	4.3										
33000	TOFL	7230	7490	7950									132	178
	V1	110	111	113										
	VR	127	127	129										
	V2	132	132	133										
	GR2	5.3	4.9	4.6										
32000	TOFL	6610	6850	7270									129	175
	V1	105	106	108										
	VR	123	124	125										
	V2	129	129	129										
	GR2	5.7	5.3	5										
31000	TOFL	6030	6260	6630									127	172
	V1	100	101	103										
	VR	119	120	121										
	V2	126	126	126										
	GR2	6.1	5.8	5.4										

FIGURE 10-8-120. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
30000	TOFL	5490	5700	6040									124	169
	V1	95	97	98										
	VR	115	116	117										
	V2	122	122	123										
	GR2	6.6	6.2	5.8										
29000	TOFL	5020	5200	5490									121	166
	V1	91	92	94										
	VR	112	112	113										
	V2	119	119	119										
	GR2	7.1	6.7	6.3										
28000	TOFL	4780	4760	5000									118	162
	V1	89	89	89										
	VR	108	108	109										
	V2	116	116	116										
	GR2	7.6	7.2	6.8										
27000	TOFL	4720	4700	4720									115	159
	V1	89	88	86										
	VR	105	105	105										
	V2	113	113	113										
	GR2	8.2	7.7	7.3										
26000	TOFL	4670	4650	4660									113	156
	V1	89	88	87										
	VR	102	102	102										
	V2	111	111	111										
	GR2	8.8	8.4	7.9										

FIGURE 10-8-121. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	TOFL	11110	11320	11540	11770	12010	12250	12490	12720	12960	13200	13440	151	197
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8		
39000	TOFL	10620	10820	11030	11260	11490	11710	11940	12170	12390	12620	12850	150	196
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	3.1	3	3	3	3	3	3	3	3	3	3		
38000	TOFL	9860	10040	10240	10450	10660	10870	11080	11290	11490	11710	11920	147	193
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
37000	TOFL	9110	9270	9460	9650	9840	10040	10230	10420	10610	10810	11010	144	190
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6		
36000	TOFL	8400	8560	8730	8900	9080	9260	9430	9610	9780	9970	10150	142	187
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.1	4	4	4	4	4	4	4	4	4	4		
35000	TOFL	7740	7880	8030	8190	8350	8520	8680	8840	9000	9170	9340	139	184
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3		
34000	TOFL	7090	7220	7360	7510	7660	7810	7950	8100	8250	8400	8550	136	181
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7		
33000	TOFL	6480	6590	6720	6850	6990	7120	7260	7390	7520	7660	7800	133	178
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1		
32000	TOFL	5920	6030	6140	6260	6390	6510	6630	6750	6870	7000	7130	130	175
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5		
31000	TOFL	5400	5500	5600	5710	5820	5930	6040	6150	6260	6380	6500	128	172
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.1	6	6	6	6	6	6	6	6	6	5.9		

FIGURE 10-8-121. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
30000	TOFL	4910	5000	5100	5200	5300	5400	5500	5600	5700	5800	5910	125	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4		
29000	TOFL	4470	4550	4640	4730	4820	4910	5000	5090	5180	5270	5370	122	166
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7	7	7	7	7	6.9	6.9	6.9	6.9	6.9	6.9		
28000	TOFL	4120	4190	4260	4340	4410	4490	4560	4650	4730	4810	4900	119	163
	V1	89	89	89	89	89	89	89	89	89	89	89		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4		
27000	TOFL	4050	4120	4190	4280	4350	4430	4510	4580	4660	4720	4770	116	160
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.1	8.1	8	8	8	8	8	8	8	8	7.9		
26000	TOFL	4000	4060	4130	4210	4280	4360	4430	4510	4580	4660	4710	113	156
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		

FIGURE 10-8-122. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
39600	TOFL	13790											151	197
	V1	145												
	VR	155												
	V2	157												
	GR2	2.6												
39000	TOFL	13180	13770										150	196
	V1	142	143											
	VR	153	153											
	V2	155	155											
	GR2	2.8	2.5											
38000	TOFL	12230	12770	13630									147	193
	V1	138	139	141										
	VR	149	150	151										
	V2	152	152	152										
	GR2	3.1	2.8	2.5										
37000	TOFL	11300	11820	12630									144	190
	V1	133	134	136										
	VR	146	146	147										
	V2	148	148	149										
	GR2	3.4	3.1	2.8										
36000	TOFL	10420	10910	11690									142	187
	V1	128	130	132										
	VR	142	142	144										
	V2	145	145	146										
	GR2	3.7	3.4	3.1										
35000	TOFL	9590	10040	10760									139	184
	V1	124	125	127										
	VR	138	138	140										
	V2	142	142	143										
	GR2	4.1	3.7	3.4										
34000	TOFL	8790	9220	9900									136	181
	V1	119	120	123										
	VR	134	135	136										
	V2	138	138	139										
	GR2	4.4	4.1	3.8										
33000	TOFL	8030	8420	9070									133	178
	V1	114	115	118										
	VR	130	130	132										
	V2	134	134	136										
	GR2	4.8	4.4	4.1										
32000	TOFL	7330	7690	8290									130	175
	V1	109	110	113										
	VR	126	126	128										
	V2	131	131	132										
	GR2	5.2	4.8	4.5										
31000	TOFL	6690	7010	7540									128	172
	V1	104	105	108										
	VR	122	122	124										
	V2	127	127	128										
	GR2	5.6	5.2	4.9										

FIGURE 10-8-122. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
30000	TOFL	6080	6380	6850									125	169
	V1	99	101	103										
	VR	118	118	120										
	V2	124	124	125										
	GR2	6.1	5.7	5.3										
29000	TOFL	5530	5790	6220									122	166
	V1	94	96	98										
	VR	114	114	116										
	V2	120	120	121										
	GR2	6.5	6.1	5.8										
28000	TOFL	5030	5260	5630									119	163
	V1	89	91	93										
	VR	110	110	112										
	V2	117	117	118										
	GR2	7	6.6	6.3										
27000	TOFL	4770	4790	5110									116	160
	V1	87	86	88										
	VR	106	107	108										
	V2	114	114	115										
	GR2	7.6	7.1	6.8										
26000	TOFL	4710	4710	4740									113	156
	V1	87	86	86										
	VR	103	103	104										
	V2	111	111	111										
	GR2	8.2	7.7	7.3										

FIGURE 10-8-123. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
39600	TOFL	12160	12470	12840	13110	13390	13700	14010	14220	14450			152	198
	V1	148	148	148	148	148	148	148	148	148				
	VR	158	158	158	158	158	158	158	158	158				
	V2	160	160	160	160	160	160	160	160	160				
	GR2	2.7	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5				
39000	TOFL	11620	11910	12260	12520	12780	13080	13370	13570	13790	14050	14340	151	196
	V1	145	145	146	146	146	146	146	146	146	146	146		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	2.9	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6		
38000	TOFL	10740	11010	11330	11570	11810	12080	12350	12540	12740	12980	13240	148	193
	V1	140	141	141	141	141	141	141	141	141	141	141		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	3.2	3.1	3	3	3	3	3	3	3	3	2.9		
37000	TOFL	9920	10200	10480	10700	10930	11180	11420	11600	11780	12000	12250	145	190
	V1	136	136	136	136	136	136	136	136	136	136	137		
	VR	148	149	149	149	149	149	149	149	149	149	149		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.5	3.5	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.2		
36000	TOFL	9140	9370	9650	9850	10060	10290	10520	10670	10840	11040	11280	143	187
	V1	131	131	131	131	131	131	131	131	131	131	132		
	VR	144	144	145	145	145	145	145	145	145	145	145		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.9	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6		
35000	TOFL	8410	8620	8880	9060	9250	9460	9670	9810	9970	10150	10370	140	185
	V1	126	126	127	127	127	127	127	127	127	127	127		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.1	4.1	4.1	4	4	4	4	4	3.9		
34000	TOFL	7710	7910	8140	8310	8500	8680	8860	9000	9140	9310	9510	137	182
	V1	121	121	122	122	122	122	122	122	122	122	122		
	VR	136	136	137	137	137	137	137	137	137	137	137		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.3		
33000	TOFL	7050	7230	7450	7600	7760	7940	8110	8220	8350	8510	8690	134	179
	V1	116	116	117	117	117	117	117	117	117	117	117		
	VR	132	132	133	133	133	133	133	133	133	133	133		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7		
32000	TOFL	6420	6590	6780	6920	7070	7230	7380	7490	7600	7750	7920	131	176
	V1	111	111	111	111	111	111	111	111	111	111	112		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1		
31000	TOFL	5850	6000	6180	6310	6440	6580	6720	6820	6920	7050	7210	128	173
	V1	106	106	106	106	106	106	106	106	106	106	107		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	5.8	5.8	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.6	5.5		

FIGURE 10-8-123. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
30000	TOFL	5320	5460	5620	5730	5850	5980	6110	6200	6290	6410	6550	126	169
	V1	101	101	101	101	101	101	101	101	101	101	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.3	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.9		
29000	TOFL	4820	4940	5090	5190	5300	5420	5530	5610	5700	5800	5930	123	166
	V1	96	96	96	96	96	96	96	96	96	96	97		
	VR	115	116	116	116	116	116	116	116	116	116	116		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.8	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.4		
28000	TOFL	4390	4500	4620	4710	4810	4910	5010	5090	5160	5260	5370	120	163
	V1	91	91	91	91	91	91	91	91	91	91	92		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.3	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	6.9		
27000	TOFL	4120	4180	4280	4350	4420	4500	4600	4650	4730	4790	4880	117	160
	V1	87	87	87	87	87	87	87	87	87	87	87		
	VR	107	108	108	108	108	108	108	108	108	108	108		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.8	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
26000	TOFL	4080	4130	4210	4280	4360	4440	4520	4590	4670	4740	4770	114	157
	V1	88	88	88	87	87	87	87	87	87	87	86		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	8.4	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	7.9		

FIGURE 10-8-124. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	13700												
	V1	142												
	VR	152											148	193
	V2	154												
	GR2	2.6												
37000	TOFL	12670	13400											
	V1	138	139											
	VR	149	149										145	190
	V2	151	151											
	GR2	2.9	2.6											
36000	TOFL	11670	12390	13310										
	V1	133	135	137										
	VR	145	146	147									143	187
	V2	147	148	148										
	GR2	3.2	2.9	2.6										
35000	TOFL	10730	11390	12280										
	V1	128	130	132										
	VR	141	142	143									140	185
	V2	144	144	145										
	GR2	3.6	3.2	2.9										
34000	TOFL	9840	10460	11300										
	V1	123	125	127										
	VR	137	138	139									137	182
	V2	140	141	142										
	GR2	3.9	3.6	3.3										
33000	TOFL	9000	9580	10350										
	V1	118	120	123										
	VR	133	134	135									134	179
	V2	137	137	138										
	GR2	4.3	4	3.6										
32000	TOFL	8200	8740	9470										
	V1	113	115	118										
	VR	129	130	132									131	176
	V2	133	133	135										
	GR2	4.7	4.3	4										
31000	TOFL	7470	7950	8620										
	V1	108	110	113										
	VR	124	126	128									128	173
	V2	129	130	131										
	GR2	5.1	4.7	4.4										

FIGURE 10-8-124. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
30000	TOFL	6790	7230	7820									126	169
	V1	103	105	108										
	VR	120	121	123										
	V2	126	126	127										
	GR2	5.5	5.2	4.8										
29000	TOFL	6150	6550	7090									123	166
	V1	98	100	103										
	VR	116	117	119										
	V2	122	122	124										
	GR2	6	5.6	5.3										
28000	TOFL	5560	5910	6400									120	163
	V1	93	95	97										
	VR	112	113	115										
	V2	118	119	120										
	GR2	6.5	6.1	5.7										
27000	TOFL	5040	5350	5770									117	160
	V1	88	90	92										
	VR	108	109	111										
	V2	115	115	117										
	GR2	7	6.6	6.2										
26000	TOFL	4770	4840	5200									114	157
	V1	85	85	87										
	VR	104	105	107										
	V2	111	112	113										
	GR2	7.5	7.1	6.8										

FIGURE 10-8-125. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
39600	TOFL	13390											154	198
	V1	152												
	VR	161												
	V2	162												
	GR2	2.5												
39000	TOFL	12770	13250	13690	14000	14300	14670	14970	15170	15420			152	197
	V1	149	150	150	150	150	150	150	150	150				
	VR	159	159	159	159	159	159	159	159	159				
	V2	160	161	161	161	161	161	161	161	161				
	GR2	2.7	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4				
38000	TOFL	11790	12230	12640	12920	13200	13540	13810	14000	14230	14520	14900	149	194
	V1	144	145	145	145	145	145	145	145	145	145	146		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	3	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.5		
37000	TOFL	10900	11300	11660	11920	12180	12490	12740	12910	13120	13390	13740	147	191
	V1	139	140	140	140	140	141	141	141	141	141	141		
	VR	151	151	152	152	152	152	152	152	152	152	152		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.3	3.2	3.1	3.1	3.1	3	3	3	3	3	2.8		
36000	TOFL	10020	10410	10760	10990	11230	11510	11740	11900	12100	12350	12670	144	188
	V1	134	135	136	136	136	136	136	136	136	136	136		
	VR	147	147	148	148	148	148	148	148	148	148	148		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.6	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.1		
35000	TOFL	9180	9520	9860	10080	10300	10570	10780	10920	11090	11320	11620	141	185
	V1	129	130	131	131	131	131	131	131	131	131	131		
	VR	143	143	144	144	144	144	144	144	144	144	144		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	3.8	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.4		
34000	TOFL	8410	8730	9020	9220	9420	9660	9850	9980	10140	10350	10620	138	182
	V1	124	125	126	126	126	126	126	126	126	126	126		
	VR	138	139	139	140	140	140	140	140	140	140	140		
	V2	142	143	143	143	143	143	143	143	143	143	143		
	GR2	4.3	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4	3.8		
33000	TOFL	7690	7980	8250	8430	8620	8840	9010	9120	9270	9460	9710	135	179
	V1	119	120	120	120	120	120	120	120	120	121	121		
	VR	134	135	135	135	135	135	135	135	135	135	135		
	V2	138	139	139	139	139	139	139	139	139	139	139		
	GR2	4.7	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.1		
32000	TOFL	7020	7280	7520	7690	7860	8060	8210	8310	8450	8630	8850	133	176
	V1	114	115	115	115	115	115	115	115	115	115	116		
	VR	130	131	131	131	131	131	131	131	131	131	131		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.1	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.5		
31000	TOFL	6380	6610	6830	6980	7140	7330	7470	7550	7670	7840	8040	130	173
	V1	108	109	110	110	110	110	110	110	110	110	111		
	VR	126	126	127	127	127	127	127	127	127	127	127		
	V2	131	131	132	132	132	132	132	132	132	132	131		
	GR2	5.6	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	4.9		

FIGURE 10-8-125. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
30000	TOFL	5790	6010	6210	6340	6480	6650	6770	6850	6960	7110	7300	127	170
	V1	103	104	105	105	105	105	105	105	105	105	106		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	127	128	128	128	128	128	128	128	128	128	128		
	GR2	6	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.6	5.4		
29000	TOFL	5240	5440	5620	5740	5870	6020	6130	6200	6300	6440	6610	124	167
	V1	98	99	100	100	100	100	100	100	100	100	101		
	VR	117	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.5	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	5.8		
28000	TOFL	4750	4910	5070	5180	5290	5430	5530	5590	5680	5810	5960	121	164
	V1	93	94	95	95	95	95	95	95	95	95	95		
	VR	113	114	114	114	114	114	114	114	114	114	114		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	6.9	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.3		
27000	TOFL	4310	4450	4590	4690	4790	4910	4990	5050	5130	5240	5370	118	160
	V1	88	89	89	89	89	90	90	90	90	90	90		
	VR	109	109	110	110	110	110	110	110	110	110	110		
	V2	116	117	117	117	117	117	117	117	117	117	117		
	GR2	7.5	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	6.8		
26000	TOFL	4160	4210	4280	4360	4440	4520	4590	4670	4750	4800	4860	115	157
	V1	86	86	86	86	86	86	86	86	86	85	85		
	VR	105	105	106	106	106	106	106	106	106	106	106		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.6	7.3		

FIGURE 10-8-126. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	14390											147	191
	V1	143												
	VR	152												
	V2	153												
	GR2	2.5												
36000	TOFL	13260	14200										144	188
	V1	138	140											
	VR	148	149											
	V2	150	151											
	GR2	2.8	2.5											
35000	TOFL	12200	13070	14070									141	185
	V1	133	135	137										
	VR	144	145	146										
	V2	146	147	148										
	GR2	3.1	2.8	2.5										
34000	TOFL	11150	12020	12930									138	182
	V1	128	130	132										
	VR	140	142	143										
	V2	143	144	144										
	GR2	3.4	3.1	2.8										
33000	TOFL	10200	10970	11850									135	179
	V1	123	125	127										
	VR	136	137	139										
	V2	139	140	141										
	GR2	3.8	3.5	3.2										
32000	TOFL	9300	10010	10840									133	176
	V1	118	120	123										
	VR	132	133	135										
	V2	135	136	137										
	GR2	4.2	3.8	3.5										
31000	TOFL	8460	9120	9860									130	173
	V1	112	115	117										
	VR	128	129	131										
	V2	131	133	134										
	GR2	4.6	4.2	3.9										

FIGURE 10-8-126. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
30000	TOFL	7670	8280	8960									127	170
	V1	107	110	112										
	VR	123	125	127										
	V2	128	129	130										
	GR2	5	4.7	4.3										
29000	TOFL	6950	7490	8120									124	167
	V1	102	105	107										
	VR	119	121	123										
	V2	124	125	126										
	GR2	5.4	5.1	4.8										
28000	TOFL	6260	6760	7320									121	164
	V1	97	99	102										
	VR	115	116	118										
	V2	120	121	123										
	GR2	5.9	5.5	5.2										
27000	TOFL	5640	6080	6580									118	160
	V1	92	94	97										
	VR	111	112	114										
	V2	117	118	119										
	GR2	6.4	6	5.7										
26000	TOFL	5090	5460	5900									115	157
	V1	86	89	92										
	VR	106	108	110										
	V2	113	114	115										
	GR2	6.9	6.6	6.2										

FIGURE 10-8-127. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	4360	4430	4500	4560	4630	4710	4790	4880	4960	5030	5100	139	192
	V1	111	111	110	110	110	110	110	110	110	110	110		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.8		
39000	TOFL	4190	4250	4320	4380	4450	4530	4610	4690	4770	4830	4900	138	191
	V1	109	108	108	108	108	108	108	108	108	108	107		
	VR	128	127	127	127	127	127	127	127	127	127	127		
	V2	136	136	135	135	135	135	135	135	135	135	135		
	GR2	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6		
38000	TOFL	3910	3980	4040	4100	4150	4230	4300	4380	4460	4520	4580	136	188
	V1	105	105	104	104	104	104	104	104	104	104	104		
	VR	125	125	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	3730	3800	3880	3950	4020	4090	4150	4220	4290	4350	4420	135	185
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
36000	TOFL	3770	3840	3900	3960	4010	4090	4160	4230	4290	4350	4410	133	182
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	130	130	130	130	130	130	130	130	130		
	GR2	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.2		
35000	TOFL	3720	3790	3850	3910	3970	4030	4100	4170	4240	4290	4360	131	180
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.4	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
34000	TOFL	3680	3740	3800	3860	3920	3990	4060	4130	4190	4240	4300	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.9	7.9	8	8	8.1	8.1	8	8	8	8	8.1		
33000	TOFL	3630	3700	3750	3810	3860	3930	4000	4070	4140	4190	4250	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.4	8.5	8.5	8.5	8.6	8.6	8.6	8.5	8.5	8.6	8.6		
32000	TOFL	3580	3650	3700	3750	3810	3880	3950	4020	4080	4130	4190	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	3530	3590	3650	3700	3770	3820	3890	3960	4030	4070	4130	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	123	123	123	123	123	123	123	123	123		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		

FIGURE 10-8-127. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
30000	TOFL	3480	3540	3600	3650	3700	3770	3840	3900	3970	4010	4070	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	122	122	122	122	122	122	122	122		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.4		
29000	TOFL	3430	3480	3540	3600	3650	3720	3780	3850	3910	3960	4020	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	121	121		
	GR2	10.8	10.9	10.9	10.9	11	11	11	11	11	11	11		
28000	TOFL	3370	3430	3480	3540	3590	3660	3730	3790	3860	3900	3960	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.5	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
27000	TOFL	3320	3370	3430	3480	3530	3600	3660	3730	3790	3840	3890	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.3	12.3	12.4	12.4	12.5	12.5	12.4	12.4	12.4	12.4	12.5		
26000	TOFL	3260	3320	3370	3420	3480	3540	3600	3670	3730	3770	3830	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.1	13.2	13.2	13.3	13.3	13.3	13.2	13.2	13.3	13.3		

FIGURE 10-8-128. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	4660	4740	4810	4890	4970	5060	5150	5240	5330	5400	5480	139	193
	V1	113	113	112	112	112	112	112	112	112	112	112		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	4470	4540	4620	4690	4760	4850	4940	5030	5110	5180	5250	138	191
	V1	110	110	110	110	110	110	110	110	110	110	109		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	136	136	136	136	136	136	136	136	136		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	4170	4240	4310	4380	4450	4530	4610	4690	4770	4840	4910	136	188
	V1	107	106	106	106	106	106	106	106	106	106	106		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
37000	TOFL	3890	3960	4020	4080	4150	4220	4300	4370	4450	4510	4570	135	185
	V1	103	103	102	102	102	102	102	102	102	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.5		
36000	TOFL	3840	3900	3970	4040	4110	4180	4250	4310	4380	4450	4520	133	183
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9		
35000	TOFL	3810	3870	3930	4000	4060	4130	4200	4270	4350	4400	4470	131	180
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
34000	TOFL	3760	3820	3890	3940	4010	4080	4150	4230	4290	4350	4410	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
33000	TOFL	3710	3780	3830	3900	3960	4030	4100	4170	4240	4300	4360	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	125	125	125	125	125	125	125	125		
	GR2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.3	8.3		
32000	TOFL	3660	3730	3780	3850	3910	3970	4040	4110	4180	4240	4300	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	3610	3670	3730	3790	3850	3930	3990	4050	4120	4190	4240	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 10-8-128. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
30000	TOFL	3560	3620	3670	3740	3800	3870	3930	4010	4070	4130	4190	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	10	10	10	10	10	10	10	10	10		
29000	TOFL	3510	3570	3620	3680	3750	3810	3870	3940	4010	4070	4120	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.7		
28000	TOFL	3450	3510	3570	3620	3680	3750	3820	3880	3950	4010	4060	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.3	11.3	11.4	11.4		
27000	TOFL	3390	3450	3500	3570	3630	3690	3760	3820	3890	3940	4000	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	12	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	3330	3390	3450	3500	3560	3630	3690	3760	3820	3880	3940	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.8	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 10-8-129. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	4980	5070	5160	5240	5340	5440	5530	5640	5730	5810	5890	140	193
	V1	115	114	114	114	114	114	114	114	114	114	114		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	TOFL	4770	4860	4940	5030	5120	5210	5300	5400	5490	5570	5650	139	191
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.5		
38000	TOFL	4450	4530	4610	4680	4770	4860	4940	5030	5120	5190	5260	137	189
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	4150	4220	4290	4370	4450	4530	4610	4690	4770	4830	4900	135	186
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
36000	TOFL	3870	3940	4000	4070	4140	4220	4290	4370	4440	4500	4570	133	183
	V1	101	101	100	100	100	100	100	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
35000	TOFL	3880	3950	4010	4070	4150	4210	4290	4350	4430	4480	4550	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
34000	TOFL	3830	3900	3970	4030	4090	4170	4240	4300	4370	4430	4500	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.4	7.4	7.4	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.5		
33000	TOFL	3780	3850	3920	3970	4050	4110	4180	4240	4320	4370	4440	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8		
32000	TOFL	3730	3800	3860	3920	3990	4060	4120	4180	4260	4320	4380	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
31000	TOFL	3680	3740	3810	3860	3930	4010	4080	4140	4200	4260	4330	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9	9	9	9.1	9.1	9.1	9	9	9	9	9.1		

FIGURE 10-8-129. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
30000	TOFL	3630	3690	3760	3820	3880	3950	4020	4080	4140	4200	4270	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.7		
29000	TOFL	3570	3630	3700	3750	3820	3890	3960	4020	4080	4140	4200	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	3520	3580	3640	3690	3760	3830	3900	3960	4020	4080	4140	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11	11	11	11	11	11	11	11	11	11	11		
27000	TOFL	3460	3530	3590	3640	3710	3770	3830	3890	3960	4020	4080	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.8		
26000	TOFL	3400	3460	3520	3570	3640	3710	3780	3830	3900	3950	4010	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5		

FIGURE 10-8-130. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	5360	5460	5570	5660	5770	5880	5980	6090	6200	6280	6370	141	193
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5	5	5	5	5	5	5	5	5	5	5		
39000	TOFL	5140	5240	5330	5430	5530	5630	5730	5840	5940	6020	6110	140	192
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	4790	4880	4970	5060	5150	5240	5340	5440	5530	5610	5680	137	189
	V1	111	110	110	110	110	110	110	110	110	110	110		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
37000	TOFL	4450	4540	4620	4700	4790	4880	4970	5060	5140	5210	5290	135	186
	V1	107	107	106	106	106	106	106	106	106	106	106		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	4140	4220	4300	4370	4450	4530	4620	4700	4780	4840	4910	133	183
	V1	103	103	102	102	102	102	102	102	102	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
35000	TOFL	3910	3980	4040	4120	4180	4250	4320	4380	4450	4530	4600	131	181
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
34000	TOFL	3910	3990	4040	4110	4190	4250	4330	4380	4460	4530	4580	129	178
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
33000	TOFL	3870	3930	4000	4070	4140	4200	4270	4330	4410	4470	4520	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	3810	3890	3940	4010	4080	4150	4210	4270	4350	4410	4460	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	123		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	3760	3830	3890	3950	4030	4090	4160	4220	4280	4350	4410	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.7	8.7		

FIGURE 10-8-130. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
30000	TOFL	3700	3780	3830	3910	3970	4030	4100	4160	4230	4290	4350	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.2	9.2	9.3	9.3		
29000	TOFL	3650	3720	3780	3850	3910	3970	4040	4100	4170	4230	4280	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	3600	3670	3720	3780	3850	3910	3980	4040	4110	4170	4220	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
27000	TOFL	3540	3600	3660	3730	3800	3850	3920	3980	4050	4100	4160	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
26000	TOFL	3480	3550	3600	3670	3740	3790	3850	3910	3980	4040	4090	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		

FIGURE 10-8-131. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	5820	5930	6040	6160	6270	6380	6500	6620	6730	6830	6930	142	194
	V1	120	120	120	120	120	120	120	120	120	119	119		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.8	4.8		
39000	TOFL	5580	5690	5790	5900	6010	6120	6230	6340	6450	6540	6640	141	192
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5	5	5	5	5	4.9	4.9	4.9	4.9	4.9	5		
38000	TOFL	5200	5290	5390	5490	5590	5690	5800	5900	6000	6090	6180	138	189
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	4830	4920	5010	5100	5200	5290	5390	5490	5580	5660	5740	136	187
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.7		
36000	TOFL	4490	4570	4650	4730	4820	4910	5000	5090	5180	5250	5320	133	184
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
35000	TOFL	4160	4230	4310	4390	4470	4550	4630	4720	4800	4860	4930	131	181
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
34000	TOFL	3970	4040	4120	4190	4250	4320	4390	4460	4540	4600	4670	129	178
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	3950	4020	4100	4160	4230	4300	4370	4440	4520	4570	4640	127	175
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.3	7.3		
32000	TOFL	3900	3970	4040	4110	4180	4250	4320	4390	4450	4510	4580	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
31000	TOFL	3850	3920	3980	4050	4130	4190	4260	4330	4390	4450	4520	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 10-8-131. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
30000	TOFL	3800	3860	3940	3990	4070	4130	4190	4270	4340	4400	4450	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
29000	TOFL	3740	3810	3880	3940	4010	4080	4130	4200	4280	4330	4400	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
28000	TOFL	3690	3750	3810	3880	3950	4020	4070	4140	4220	4270	4340	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.2	10.2		
27000	TOFL	3620	3690	3750	3820	3890	3950	4010	4080	4150	4210	4270	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	3560	3630	3700	3750	3820	3890	3950	4020	4090	4130	4200	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.7	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7		

FIGURE 10-8-132. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	6270	6390	6510	6640	6760	6890	7010	7150	7270	7370	7480	143	194
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
39000	TOFL	6010	6120	6240	6360	6480	6600	6720	6840	6960	7050	7160	142	193
	V1	120	119	119	119	119	119	119	119	119	119	119		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
38000	TOFL	5590	5690	5800	5910	6020	6130	6240	6360	6460	6560	6650	139	190
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5	5	5.1		
37000	TOFL	5190	5290	5390	5490	5590	5690	5790	5900	6010	6090	6180	137	187
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
36000	TOFL	4820	4910	5000	5090	5190	5280	5380	5480	5570	5650	5730	134	184
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.8		
35000	TOFL	4460	4540	4630	4710	4800	4890	4980	5070	5150	5220	5300	132	181
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.2	6.2		
34000	TOFL	4130	4210	4280	4360	4440	4520	4600	4690	4770	4830	4900	129	178
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.6	6.6		
33000	TOFL	4040	4120	4180	4260	4330	4410	4490	4540	4620	4680	4740	127	176
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
32000	TOFL	4000	4060	4120	4200	4280	4350	4430	4490	4570	4620	4680	125	173
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.5		
31000	TOFL	3930	4000	4070	4130	4220	4300	4360	4430	4500	4560	4610	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8	8	8	8	8	8	8	7.9	7.9	7.9	8		

FIGURE 10-8-132. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
30000	TOFL	3870	3950	4010	4080	4150	4230	4310	4370	4440	4500	4560	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.5	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.6		
29000	TOFL	3820	3890	3950	4020	4100	4160	4240	4300	4380	4420	4480	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.1	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9.2		
28000	TOFL	3760	3830	3890	3970	4040	4100	4180	4240	4310	4360	4420	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	3700	3780	3830	3910	3970	4040	4110	4170	4250	4290	4350	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	3650	3710	3770	3840	3910	3980	4050	4110	4180	4230	4280	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.2	11.2	11.3	11.3		

FIGURE 10-8-133. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	6870	6990	7110	7250	7390	7520	7660	7810	7940	8050	8170	144	195
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.3		
39000	TOFL	6570	6690	6810	6940	7070	7200	7330	7470	7590	7700	7820	143	193
	V1	123	122	122	122	122	122	122	122	122	122	122		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
38000	TOFL	6110	6210	6320	6440	6560	6680	6810	6930	7050	7150	7260	140	190
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
37000	TOFL	5660	5760	5860	5980	6090	6200	6310	6430	6540	6630	6730	138	187
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
36000	TOFL	5250	5340	5440	5540	5640	5750	5850	5960	6060	6150	6240	135	185
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.5		
35000	TOFL	4860	4950	5030	5130	5220	5320	5410	5510	5610	5690	5770	133	182
	V1	106	106	106	106	106	106	106	106	106	105	105		
	VR	125	125	125	125	125	125	125	125	125	125	124		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.9		
34000	TOFL	4490	4570	4650	4730	4820	4910	5000	5090	5180	5250	5320	130	179
	V1	102	101	101	101	101	101	101	101	101	101	101		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.3	6.3		
33000	TOFL	4150	4220	4290	4370	4450	4530	4610	4690	4770	4840	4910	127	176
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
32000	TOFL	4080	4140	4220	4290	4360	4430	4500	4570	4640	4710	4750	125	173
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
31000	TOFL	4020	4090	4160	4240	4300	4380	4440	4520	4580	4650	4690	123	170
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		

FIGURE 10-8-133. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
30000	TOFL	3960	4030	4100	4180	4250	4310	4380	4460	4520	4580	4620	121	167
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.1	8.1	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.2		
29000	TOFL	3900	3970	4050	4120	4180	4260	4320	4390	4460	4530	4560	119	164
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.7	8.8	8.8	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.8		
28000	TOFL	3840	3910	3990	4060	4120	4200	4250	4330	4390	4460	4500	117	161
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.4	9.4		
27000	TOFL	3790	3850	3930	4000	4060	4130	4190	4260	4320	4390	4430	115	158
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10.1	10.1		
26000	TOFL	3730	3790	3860	3930	4000	4060	4120	4200	4260	4330	4360	113	155
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-134. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	7510	7640	7780	7930	8090	8230	8390	8550	8690	8810	8950	145	195
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4	4	4	4	4	4	4	4	4	4	4		
39000	TOFL	7190	7300	7440	7590	7730	7870	8020	8170	8310	8420	8560	144	193
	V1	126	126	125	125	125	125	125	125	125	125	125		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.2	4.2		
38000	TOFL	6670	6780	6900	7040	7170	7300	7440	7580	7700	7810	7930	141	191
	V1	121	121	121	121	121	121	121	121	121	121	121		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
37000	TOFL	6180	6280	6400	6520	6640	6770	6890	7020	7140	7240	7350	139	188
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
36000	TOFL	5720	5810	5920	6040	6150	6260	6370	6490	6600	6700	6800	136	185
	V1	113	112	112	112	112	112	112	112	112	112	112		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
35000	TOFL	5290	5370	5480	5580	5680	5780	5890	6000	6100	6190	6280	134	182
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.6	5.6		
34000	TOFL	4880	4960	5050	5150	5240	5340	5440	5540	5630	5710	5790	131	179
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.9	6	6	6	6	6	5.9	5.9	5.9	5.9	6		
33000	TOFL	4500	4570	4650	4740	4830	4920	5010	5100	5180	5260	5330	128	176
	V1	100	100	100	100	100	100	100	100	100	99	99		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.4	6.4		
32000	TOFL	4150	4210	4290	4370	4450	4530	4610	4690	4770	4840	4910	126	173
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
31000	TOFL	4090	4170	4240	4310	4380	4460	4540	4610	4680	4730	4750	123	170
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.3	7.3		

FIGURE 10-8-134. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
30000	TOFL	4030	4110	4180	4250	4330	4390	4470	4540	4620	4660	4680	121	167
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
29000	TOFL	3980	4050	4130	4180	4260	4340	4410	4470	4550	4600	4610	119	164
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.3	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.4		
28000	TOFL	3920	3990	4060	4130	4200	4270	4350	4420	4480	4530	4550	117	161
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.9	9	9	9	9	9	8.9	8.9	8.9	8.9	9		
27000	TOFL	3860	3920	4000	4070	4130	4210	4290	4350	4420	4470	4480	115	158
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.7		
26000	TOFL	3800	3860	3940	4000	4070	4150	4220	4280	4350	4400	4420	113	155
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.3	10.4	10.4		

FIGURE 10-8-135. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	8190	8340	8500	8670	8830	9000	9160	9340	9500	9640	9800	147	195
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		
39000	TOFL	7850	7990	8140	8300	8460	8620	8780	8940	9090	9230	9390	145	194
	V1	129	129	129	129	129	129	129	129	129	128	128		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
38000	TOFL	7280	7410	7550	7700	7850	7990	8140	8290	8430	8550	8710	142	191
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
37000	TOFL	6740	6860	6990	7130	7260	7400	7530	7680	7810	7920	8060	140	188
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5		
36000	TOFL	6240	6340	6470	6590	6710	6840	6960	7090	7220	7320	7440	137	185
	V1	116	115	115	115	115	115	115	115	115	115	115		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
35000	TOFL	5760	5850	5970	6080	6200	6310	6430	6550	6660	6750	6870	135	183
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	128	128	128	128	128	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.2	5.3	5.3		
34000	TOFL	5310	5400	5500	5610	5710	5820	5920	6040	6140	6220	6330	132	180
	V1	107	107	107	107	107	107	107	107	107	106	106		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6		
33000	TOFL	4890	4970	5070	5160	5260	5350	5450	5550	5650	5720	5820	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6.1	6.1		
32000	TOFL	4490	4570	4650	4740	4830	4920	5010	5100	5180	5260	5350	127	174
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
31000	TOFL	4140	4220	4290	4360	4440	4520	4600	4680	4760	4830	4910	124	171
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.9	7	7	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9		

FIGURE 10-8-135. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
30000	TOFL	4120	4200	4280	4340	4420	4490	4570	4640	4720	4750	4720	121	168
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
29000	TOFL	4060	4130	4210	4270	4350	4430	4510	4580	4650	4690	4670	119	165
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	107	107	107	107	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8	8	8	8	8	7.9	7.9	7.9	7.9	7.9	7.9		
28000	TOFL	4010	4070	4150	4220	4290	4370	4440	4510	4590	4620	4620	117	161
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5		
27000	TOFL	3950	4010	4090	4150	4230	4300	4380	4440	4520	4550	4570	115	158
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
26000	TOFL	3880	3950	4020	4090	4170	4230	4310	4370	4450	4480	4520	113	155
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 10-8-136. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	8980	9150	9330	9520	9700	9880	10080	10280	10450	10580	10860	148	196
	V1	134	134	134	134	134	134	135	135	135	135	135		
	VR	147	147	147	147	147	147	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.3		
39000	TOFL	8590	8760	8930	9100	9280	9450	9630	9820	9980	10130	10390	146	194
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5		
38000	TOFL	7980	8130	8290	8450	8620	8780	8940	9110	9260	9400	9650	144	191
	V1	127	127	127	127	127	127	127	127	127	127	128		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	4	4	4	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	TOFL	7390	7540	7680	7830	7980	8130	8280	8440	8580	8710	8940	141	189
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2		
36000	TOFL	6820	6950	7080	7220	7360	7490	7630	7780	7910	8020	8240	138	186
	V1	118	118	118	118	118	118	118	118	118	118	119		
	VR	134	134	134	134	134	134	134	134	134	134	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.7	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
35000	TOFL	6280	6400	6530	6660	6780	6910	7040	7170	7290	7390	7590	136	183
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5	5	5	5	5	5	5	4.9	4.9	5	4.8		
34000	TOFL	5780	5900	6010	6130	6240	6360	6470	6600	6710	6800	6980	133	180
	V1	109	109	109	109	109	109	109	109	109	109	110		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.4	5.2		
33000	TOFL	5320	5420	5520	5630	5730	5840	5950	6060	6160	6250	6410	130	177
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.6		
32000	TOFL	4880	4970	5060	5160	5260	5350	5450	5550	5650	5720	5880	127	174
	V1	100	100	100	100	100	100	100	100	100	100	101		
	VR	119	119	119	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6		
31000	TOFL	4470	4550	4640	4730	4810	4900	4990	5090	5170	5240	5380	125	171
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5		

FIGURE 10-8-136. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
30000	TOFL	4210	4300	4370	4440	4520	4590	4660	4750	4800	4810	4930	122	168
	V1	92	92	92	92	92	92	92	92	92	91	92		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.9		
29000	TOFL	4160	4230	4310	4400	4470	4540	4620	4700	4750	4740	4750	119	165
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
28000	TOFL	4100	4170	4250	4330	4410	4470	4550	4630	4690	4660	4690	117	162
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8		
27000	TOFL	4030	4110	4180	4260	4340	4400	4480	4560	4620	4600	4640	115	159
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.6		
26000	TOFL	3970	4050	4120	4200	4280	4340	4410	4490	4540	4550	4590	113	155
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4	9.5	9.3		

FIGURE 10-8-137. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	9850	10050	10250	10460	10660	10860	11070	11290	11470	11630	12080	149	196
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	3.2	2.9		
39000	TOFL	9430	9630	9820	10010	10210	10400	10600	10810	10990	11140	11570	147	194
	V1	135	135	135	135	135	135	135	135	135	135	136		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.1		
38000	TOFL	8750	8920	9100	9280	9460	9640	9820	10020	10180	10320	10740	145	192
	V1	131	131	131	131	131	131	131	131	131	131	132		
	VR	144	144	144	144	144	144	144	144	144	144	145		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.7	3.4		
37000	TOFL	8100	8270	8430	8600	8760	8920	9090	9270	9430	9560	9940	142	189
	V1	126	126	126	126	126	126	126	126	126	126	127		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4	4	4	4	4	4	4	4	4	4	3.7		
36000	TOFL	7490	7640	7790	7940	8090	8240	8400	8570	8710	8830	9190	139	186
	V1	122	122	122	122	122	122	122	122	122	122	123		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4		
35000	TOFL	6880	7020	7160	7300	7440	7580	7720	7870	8000	8110	8450	137	183
	V1	117	117	117	117	117	117	117	117	117	117	118		
	VR	133	133	133	133	133	133	133	133	133	133	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.4		
34000	TOFL	6330	6450	6580	6710	6840	6960	7090	7230	7360	7450	7770	134	180
	V1	112	112	112	112	112	112	112	112	112	112	114		
	VR	129	129	129	129	129	129	129	129	129	129	130		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5.1	4.8		
33000	TOFL	5800	5920	6040	6150	6270	6380	6500	6630	6740	6830	7120	131	177
	V1	108	108	108	108	108	108	108	108	108	108	109		
	VR	125	125	125	125	125	125	125	125	125	125	126		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.1		
32000	TOFL	5310	5420	5530	5630	5740	5840	5950	6070	6170	6250	6520	128	175
	V1	103	103	103	103	103	103	103	103	103	103	104		
	VR	121	121	121	121	121	121	121	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.5		
31000	TOFL	4850	4950	5050	5140	5240	5340	5430	5540	5630	5710	5950	126	172
	V1	98	98	98	98	98	98	98	98	98	98	99		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	5.9		

FIGURE 10-8-137. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
30000	TOFL	4440	4530	4620	4700	4790	4880	4960	5060	5150	5220	5430	123	168
	V1	94	94	94	94	94	94	94	94	94	94	95		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.4		
29000	TOFL	4270	4350	4420	4500	4580	4650	4720	4800	4820	4810	4970	120	165
	V1	91	91	91	91	91	91	91	91	91	90	90		
	VR	110	110	110	110	110	110	110	110	110	110	111		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	6.9		
28000	TOFL	4210	4280	4370	4440	4510	4590	4650	4740	4760	4750	4760	117	162
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.4		
27000	TOFL	4140	4220	4300	4380	4440	4520	4590	4670	4690	4700	4700	115	159
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.3	8.3	7.9		
26000	TOFL	4080	4150	4230	4310	4370	4450	4520	4600	4610	4640	4650	113	156
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	111	111	111	111		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9	9	9	8.6		

FIGURE 10-8-138. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	10880	11110	11330	11560	11780	12010	12240	12480	12690	13010		150	197
	V1	141	141	141	141	141	141	141	141	141	142			
	VR	152	152	152	152	153	153	153	153	153	153			
	V2	155	155	155	155	155	155	155	155	155	155			
	GR2	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.7			
39000	TOFL	10430	10640	10850	11070	11290	11500	11720	11950	12160	12460	13130	148	195
	V1	139	139	139	139	139	139	139	139	139	139	141		
	VR	150	150	150	150	150	150	151	151	151	151	151		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.1	3.1	3.1	3.1	3.1	3	3	3	3	2.9	2.6		
38000	TOFL	9680	9880	10080	10280	10480	10680	10880	11100	11290	11580	12190	146	192
	V1	134	134	134	134	134	134	134	135	135	135	136		
	VR	147	147	147	147	147	147	147	147	147	147	148		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.3	3.2	2.9		
37000	TOFL	8950	9130	9320	9500	9690	9870	10060	10260	10440	10700	11310	143	189
	V1	130	130	130	130	130	130	130	130	130	130	132		
	VR	143	143	143	143	143	143	143	143	143	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.5	3.2		
36000	TOFL	8270	8440	8610	8780	8950	9120	9290	9480	9640	9890	10440	140	187
	V1	125	125	125	125	125	125	125	125	125	126	128		
	VR	140	140	140	140	140	140	140	140	140	140	141		
	V2	143	143	143	143	143	143	143	143	143	143	144		
	GR2	4.1	4.1	4.1	4.1	4.1	4	4	4	4	3.9	3.5		
35000	TOFL	7620	7770	7930	8080	8240	8400	8560	8720	8880	9110	9630	138	184
	V1	121	121	121	121	121	121	121	121	121	121	123		
	VR	136	136	136	136	136	136	136	136	136	136	137		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.2	3.9		
34000	TOFL	6980	7120	7270	7410	7550	7690	7840	7990	8140	8350	8860	135	181
	V1	116	116	116	116	116	116	116	116	116	116	118		
	VR	132	132	132	132	132	132	132	132	132	132	133		
	V2	136	136	136	136	136	136	136	136	136	136	137		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.6	4.3		
33000	TOFL	6400	6530	6660	6790	6910	7050	7180	7320	7450	7650	8100	132	178
	V1	111	111	111	111	111	111	111	111	111	112	114		
	VR	128	128	128	128	128	128	128	128	128	128	129		
	V2	133	133	133	133	133	133	133	133	133	133	134		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	4.9	4.6		
32000	TOFL	5850	5970	6090	6210	6320	6440	6570	6690	6810	7000	7410	129	175
	V1	106	106	106	106	106	106	106	106	106	107	109		
	VR	124	124	124	124	124	124	124	124	124	124	125		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.3	5		
31000	TOFL	5340	5450	5560	5660	5770	5880	5990	6110	6220	6380	6760	127	172
	V1	101	101	101	101	101	101	101	102	102	102	104		
	VR	120	120	120	120	120	120	120	120	120	120	121		
	V2	126	126	126	126	126	126	126	126	126	126	127		
	GR2	6.1	6.1	6.1	6.1	6	6	6	6	5.9	5.8	5.4		

FIGURE 10-8-138. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
30000	TOFL	4860	4960	5060	5150	5250	5350	5450	5560	5660	5810	6150	124	169
	V1	96	96	96	96	96	97	97	97	97	97	99		
	VR	116	116	116	116	116	116	116	116	116	116	117		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.2	5.9		
29000	TOFL	4450	4530	4620	4710	4790	4880	4970	5060	5160	5290	5590	121	166
	V1	92	92	92	92	92	92	92	92	92	93	94		
	VR	112	112	112	112	112	112	112	112	112	113	113		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7	7	7	7	7	7	6.9	6.9	6.8	6.7	6.3		
28000	TOFL	4300	4360	4440	4520	4600	4670	4760	4790	4780	4840	5090	118	162
	V1	90	90	90	90	90	90	90	89	89	88	90		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	116	116	116	116	116	116	116	116	116	116	117		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.4	7.4	7.2	6.8		
27000	TOFL	4230	4300	4370	4450	4530	4600	4680	4720	4730	4760	4780	115	159
	V1	90	90	90	90	90	90	90	89	89	88	87		
	VR	105	105	105	105	105	105	105	105	105	105	106		
	V2	113	113	113	113	113	113	113	113	113	113	114		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8	8	7.9	7.7	7.3		
26000	TOFL	4160	4230	4320	4380	4460	4530	4610	4650	4670	4710	4720	113	156
	V1	90	90	90	90	90	90	90	89	89	88	87		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	111	111	111	111	111	111	111	111	111	111	111		
	GR2	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.6	8.5	8.3	7.9		

FIGURE 10-8-139. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	12070	12320	12580	12830	13080	13340	13600	13870				151	197
	V1	145	145	145	145	145	145	145	145					
	VR	155	155	155	155	155	155	155	155					
	V2	157	157	157	157	157	157	157	157					
	GR2	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.5					
39000	TOFL	11550	11780	12020	12270	12510	12750	13000	13260	13500	14030		150	196
	V1	143	143	143	143	143	143	143	143	143	144			
	VR	153	153	153	153	153	153	153	153	153	154			
	V2	155	155	155	155	155	155	155	155	155	155			
	GR2	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.5			
38000	TOFL	10710	10930	11150	11380	11600	11820	12060	12300	12530	13020	13890	147	193
	V1	138	138	138	138	138	138	138	138	138	139	141		
	VR	150	150	150	150	150	150	150	150	150	150	151		
	V2	152	152	152	152	152	152	152	152	152	152	153		
	GR2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3	3	2.8	2.5		
37000	TOFL	9910	10120	10330	10530	10740	10950	11160	11390	11600	12070	12860	144	190
	V1	134	134	134	134	134	134	134	134	134	135	137		
	VR	146	146	146	146	146	146	146	146	146	147	147		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.3	3.3	3.1	2.8		
36000	TOFL	9150	9340	9520	9710	9900	10090	10290	10500	10700	11140	11910	142	187
	V1	129	129	129	129	129	129	129	129	129	130	132		
	VR	142	142	142	142	142	142	143	143	143	143	144		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.7	3.6	3.4	3.1		
35000	TOFL	8420	8590	8780	8950	9120	9300	9480	9680	9860	10260	10980	139	184
	V1	124	124	124	124	124	124	124	125	125	126	128		
	VR	138	138	139	139	139	139	139	139	139	139	140		
	V2	142	142	142	142	142	142	142	142	142	142	143		
	GR2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4	4	3.7	3.4		
34000	TOFL	7730	7890	8050	8210	8370	8530	8700	8880	9050	9430	10100	136	181
	V1	119	119	119	119	119	119	120	120	120	121	123		
	VR	135	135	135	135	135	135	135	135	135	135	137		
	V2	139	139	139	139	139	139	139	139	139	139	140		
	GR2	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.4	4.3	4.1	3.8		
33000	TOFL	7080	7220	7370	7510	7660	7810	7960	8120	8280	8630	9270	133	178
	V1	114	114	114	114	114	114	115	115	115	116	119		
	VR	131	131	131	131	131	131	131	131	131	131	133		
	V2	135	135	135	135	135	135	135	135	135	135	136		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.7	4.4	4.1		
32000	TOFL	6450	6580	6720	6840	6980	7110	7250	7400	7550	7870	8470	130	175
	V1	109	109	109	109	109	109	109	110	110	111	114		
	VR	126	126	126	126	127	127	127	127	127	127	129		
	V2	132	132	132	132	132	132	132	132	132	132	133		
	GR2	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.2	5.1	4.8	4.5		
31000	TOFL	5880	6000	6120	6240	6360	6480	6610	6750	6890	7180	7700	128	172
	V1	104	104	104	104	104	105	105	105	105	106	109		
	VR	122	122	123	123	123	123	123	123	123	123	125		
	V2	128	128	128	128	128	128	128	128	128	128	129		
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.6	5.5	5.3	4.9		

FIGURE 10-8-139. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
30000	TOFL	5350	5460	5570	5680	5780	5900	6010	6140	6260	6530	7000	125	169
	V1	100	100	100	100	100	100	100	100	100	101	104		
	VR	118	118	119	119	119	119	119	119	119	119	121		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.1	6	5.7	5.3		
29000	TOFL	4860	4960	5050	5150	5250	5350	5450	5560	5680	5920	6350	122	166
	V1	95	95	95	95	95	95	95	95	95	96	99		
	VR	114	114	114	114	114	114	114	114	114	115	117		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6.1	5.8		
28000	TOFL	4430	4520	4610	4690	4780	4870	4960	5060	5170	5370	5750	119	163
	V1	90	90	90	90	90	90	90	90	90	92	94		
	VR	111	111	111	111	111	111	111	111	111	111	113		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	7.3	7.3	7.2	7.2	7.2	7.2	7.2	7.1	6.9	6.6	6.3		
27000	TOFL	4310	4380	4470	4530	4620	4700	4770	4790	4810	4890	5200	116	160
	V1	89	89	89	89	89	89	88	88	87	87	89		
	VR	107	107	107	107	107	107	107	107	107	107	109		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.6	7.5	7.1	6.8		
26000	TOFL	4240	4310	4400	4470	4550	4620	4690	4720	4760	4770	4800	113	156
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	103	103	103	103	103	103	103	103	103	103	105		
	V2	112	112	112	112	112	112	112	111	111	111	112		
	GR2	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.2	8	7.7	7.3		

FIGURE 10-8-140. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	12860	13150	13450	13760	13990	14220	14520					151	196
	V1	147	147	147	147	147	147	147						
	VR	156	156	157	157	157	157	157						
	V2	158	158	158	158	158	158	158						
	GR2	2.6	2.6	2.5	2.5	2.5	2.5	2.5						
38000	TOFL	11880	12140	12420	12700	12910	13130	13400	13700	14060			148	193
	V1	142	142	142	142	142	142	142	142	143				
	VR	153	153	153	153	153	153	153	153	153				
	V2	155	155	155	155	155	155	155	154	154				
	GR2	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.7	2.5				
37000	TOFL	10990	11230	11490	11750	11940	12140	12390	12660	13000	13690		145	190
	V1	137	137	137	138	138	138	138	138	138	140			
	VR	149	149	149	149	149	149	149	149	149	150			
	V2	151	151	151	151	151	151	151	151	151	151			
	GR2	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3	2.9	2.6			
36000	TOFL	10140	10360	10600	10850	11020	11200	11430	11690	12010	12650	13610	143	187
	V1	133	133	133	133	133	133	133	133	134	135	137		
	VR	145	145	145	145	145	145	145	145	145	146	147		
	V2	148	148	148	148	148	148	148	148	148	148	149		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.3	3.2	2.9	2.6		
35000	TOFL	9330	9530	9750	9970	10130	10290	10500	10740	11040	11660	12530	140	185
	V1	128	128	128	128	128	128	128	128	129	130	133		
	VR	141	141	141	141	141	141	141	141	142	142	143		
	V2	144	144	144	144	144	144	144	144	144	145	145		
	GR2	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.7	3.5	3.2	2.9		
34000	TOFL	8560	8750	8950	9150	9300	9450	9640	9860	10140	10700	11550	137	182
	V1	123	123	123	123	123	123	123	123	124	126	128		
	VR	137	138	138	138	138	138	138	138	138	139	140		
	V2	141	141	141	141	141	141	141	141	141	141	142		
	GR2	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.1	3.9	3.6	3.3		
33000	TOFL	7830	8000	8190	8370	8500	8640	8810	9020	9280	9810	10580	134	179
	V1	118	118	118	118	118	118	118	118	119	121	123		
	VR	133	133	133	133	133	133	133	134	134	135	136		
	V2	138	138	138	138	138	137	137	137	137	138	139		
	GR2	4.7	4.7	4.6	4.6	4.6	4.6	4.6	4.5	4.2	3.9	3.6		
32000	TOFL	7150	7300	7470	7640	7760	7880	8040	8230	8470	8960	9680	131	176
	V1	113	113	113	113	113	113	113	113	114	116	118		
	VR	129	129	129	129	129	129	129	129	130	131	132		
	V2	134	134	134	134	134	134	134	134	134	134	135		
	GR2	5.1	5.1	5	5	5	5	5	4.9	4.6	4.3	4		
31000	TOFL	6500	6640	6790	6940	7050	7160	7310	7480	7700	8170	8830	128	173
	V1	108	108	108	108	108	108	108	108	109	111	114		
	VR	125	125	125	125	125	125	125	125	125	126	128		
	V2	130	130	130	130	130	130	130	130	130	131	132		
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.3	5	4.7	4.4		

FIGURE 10-8-140. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
30000	TOFL	5910	6040	6170	6310	6410	6510	6640	6790	7000	7410	8020	126	169
	V1	103	103	103	103	103	103	103	103	104	106	108		
	VR	121	121	121	121	121	121	121	121	121	122	124		
	V2	127	127	127	127	127	127	127	127	127	127	128		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.5	5.1	4.8		
29000	TOFL	5360	5470	5600	5720	5810	5900	6010	6150	6350	6720	7260	123	166
	V1	98	98	98	98	98	98	98	98	99	101	103		
	VR	117	117	117	117	117	117	117	117	117	118	120		
	V2	123	123	123	123	123	123	123	123	123	123	124		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.2	5.9	5.6	5.3		
28000	TOFL	4850	4950	5060	5170	5250	5330	5430	5560	5730	6070	6560	120	163
	V1	93	93	93	93	93	93	93	93	94	96	98		
	VR	113	113	113	113	113	113	113	113	113	114	116		
	V2	120	120	120	120	120	120	120	119	119	120	121		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.7	6.4	6	5.7		
27000	TOFL	4410	4500	4600	4700	4770	4840	4930	5040	5190	5490	5910	117	160
	V1	88	88	88	88	88	88	88	88	89	91	93		
	VR	109	109	109	109	109	109	109	109	109	110	111		
	V2	116	116	116	116	116	116	116	116	116	116	117		
	GR2	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.2	6.9	6.6	6.2		
26000	TOFL	4320	4400	4470	4570	4630	4700	4760	4810	4820	4970	5320	114	157
	V1	87	87	87	87	87	87	87	86	86	86	88		
	VR	105	105	105	105	105	105	105	105	105	106	107		
	V2	113	113	113	113	113	113	113	113	113	113	114		
	GR2	8.1	8	8	8	8	8	7.9	7.8	7.5	7.1	6.8		

FIGURE 10-8-141. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	13270	13560	13920	14220	14420	14670	14990						
	V1	146	146	146	146	146	146	146						
	VR	156	156	156	156	156	156	156					149	194
	V2	158	158	158	158	158	157	157						
	GR2	2.6	2.6	2.6	2.6	2.6	2.6	2.5						
37000	TOFL	12240	12510	12840	13110	13300	13530	13820	14180	14810				
	V1	141	141	142	142	142	142	142	142	143				
	VR	152	152	152	152	152	152	152	152	153			147	191
	V2	154	154	154	154	154	154	154	154	154				
	GR2	3	3	2.9	2.9	2.9	2.9	2.8	2.7	2.4				
36000	TOFL	11290	11540	11840	12090	12260	12470	12740	13070	13650	14550			
	V1	137	137	137	137	137	137	137	137	138	140			
	VR	148	148	148	148	148	148	148	148	149	150		144	188
	V2	151	151	151	151	151	151	151	151	151	151			
	GR2	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3	2.7	2.4			
35000	TOFL	10390	10620	10910	11130	11280	11480	11730	12030	12550	13390	14420		
	V1	132	132	132	132	132	132	132	133	134	135	138		
	VR	144	144	145	145	145	145	145	145	145	146	147	141	185
	V2	147	147	147	147	147	147	147	147	147	147	148		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.3	3	2.8	2.4		
34000	TOFL	9500	9710	9970	10180	10310	10490	10710	11000	11510	12300	13250		
	V1	127	127	127	127	127	127	127	127	129	131	133		
	VR	140	140	140	140	140	140	140	140	141	142	143	138	182
	V2	143	143	143	143	143	143	143	143	143	144	145		
	GR2	4	4	4	3.9	3.9	3.9	3.9	3.7	3.4	3.1	2.7		
33000	TOFL	8690	8890	9120	9310	9440	9600	9800	10060	10540	11290	12170		
	V1	122	122	122	122	122	122	122	122	124	126	128		
	VR	136	136	136	136	136	136	136	136	137	138	139	135	179
	V2	140	140	140	140	140	140	140	140	140	141	141		
	GR2	4.4	4.4	4.3	4.3	4.3	4.3	4.2	4	3.7	3.5	3.1		
32000	TOFL	7930	8110	8320	8490	8620	8750	8950	9180	9620	10290	11150		
	V1	116	117	117	117	117	117	117	117	119	121	124		
	VR	132	132	132	132	132	132	132	132	133	134	136	133	176
	V2	136	136	136	136	136	136	136	136	136	137	138		
	GR2	4.8	4.8	4.7	4.7	4.7	4.7	4.6	4.4	4.1	3.8	3.5		
31000	TOFL	7220	7380	7580	7730	7830	7970	8130	8350	8760	9380	10130		
	V1	111	111	112	112	112	112	112	112	114	116	118		
	VR	128	128	128	128	128	128	128	128	129	130	131	130	173
	V2	132	132	132	132	132	132	132	132	132	133	134		
	GR2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	4.8	4.5	4.2	3.8		

FIGURE 10-8-141. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
30000	TOFL	6550	6700	6870	7010	7100	7220	7370	7570	7960	8520	9210	127	170
	V1	106	106	106	106	106	106	106	107	109	111	113		
	VR	124	124	124	124	124	124	124	124	124	126	127		
	V2	129	129	129	129	129	129	129	129	129	130	131		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.3	4.9	4.6	4.2		
29000	TOFL	5930	6070	6230	6350	6430	6540	6680	6850	7200	7720	8350	124	167
	V1	101	101	101	101	101	101	101	102	103	106	108		
	VR	119	119	119	119	119	119	119	120	120	122	123		
	V2	125	125	125	125	125	125	125	125	125	126	127		
	GR2	6.1	6.1	6	6	6	6	5.9	5.7	5.4	5.1	4.7		
28000	TOFL	5360	5480	5620	5730	5800	5900	6020	6180	6500	6960	7540	121	164
	V1	96	96	96	96	96	96	96	97	98	100	103		
	VR	115	115	115	115	115	115	115	115	116	117	119		
	V2	121	121	121	121	121	121	121	121	121	122	123		
	GR2	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.2	5.8	5.5	5.1		
27000	TOFL	4830	4940	5070	5160	5230	5320	5420	5570	5850	6270	6780	118	160
	V1	91	91	91	91	91	91	91	92	93	95	98		
	VR	111	111	111	111	111	111	111	111	112	113	115		
	V2	118	118	118	118	118	118	118	118	118	118	120		
	GR2	7.1	7.1	7	7	7	7	6.9	6.7	6.3	6	5.6		
26000	TOFL	4400	4470	4590	4670	4730	4810	4900	5030	5260	5630	6090	115	157
	V1	86	86	86	86	86	86	86	86	88	90	93		
	VR	107	107	107	107	107	107	107	107	107	109	111		
	V2	114	114	114	114	114	114	114	114	114	115	116		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.3	6.9	6.5	6.1		

V1 CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY COMPACTED SNOW

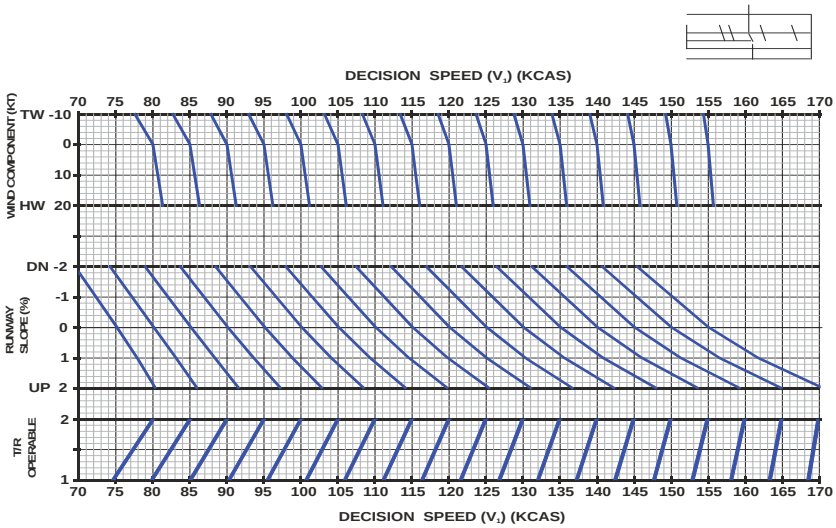
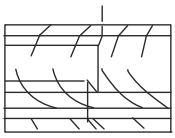


Figure 10-8-142. V1 Corrections Flaps 20° Runway Contaminated By Compacted Snow

TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY COMPACTED SNOW



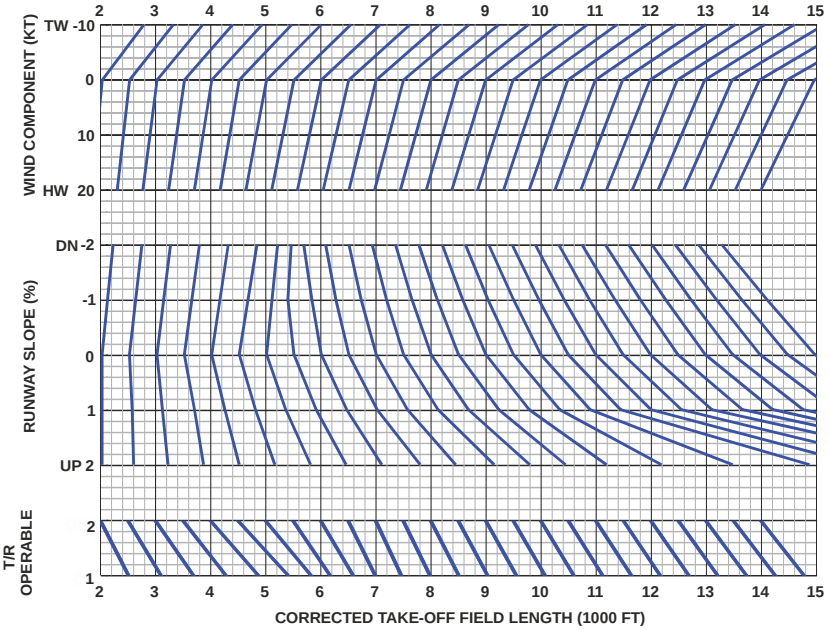


Figure 10-8-143. Takeoff Field Length Corrections Flaps 20°
Runway Contaminated By Compacted Snow

FIGURE 10-8-144. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	TOFL	6510	6610	6750	6880	7010	7140	7270	7400	7530	7660	7780	139	192
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.7	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
39000	TOFL	6470	6570	6700	6810	6930	7060	7180	7290	7420	7540	7670	138	191
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.9	5.9	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1		
38000	TOFL	6380	6490	6600	6730	6850	6960	7080	7190	7330	7460	7590	136	188
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5		
37000	TOFL	6310	6400	6530	6640	6760	6880	6990	7110	7230	7360	7480	135	185
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.7	6.7	6.7	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	6220	6320	6430	6560	6670	6780	6900	7000	7140	7250	7390	133	182
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.1	7.1	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	6130	6220	6350	6460	6580	6700	6800	6920	7040	7170	7280	131	180
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.6	7.6	7.6	7.6	7.7	7.7	7.8	7.8	7.8	7.8	7.8		
34000	TOFL	6050	6140	6260	6360	6490	6600	6700	6810	6940	7060	7180	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	127	127	127	127		
	GR2	8	8.1	8.1	8.1	8.1	8.2	8.2	8.3	8.3	8.3	8.3		
33000	TOFL	5960	6040	6160	6280	6380	6490	6610	6710	6840	6970	7080	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	5860	5950	6060	6180	6290	6390	6510	6620	6730	6860	6970	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.1	9.1	9.1	9.2	9.2	9.3	9.3	9.4	9.4	9.4	9.4		
31000	TOFL	5770	5850	5960	6080	6190	6280	6400	6510	6620	6740	6860	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.7	9.7	9.7	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 10-8-144. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
30000	TOFL	5660	5750	5860	5980	6080	6190	6280	6390	6510	6630	6740	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.3	10.3	10.4	10.4	10.4	10.5	10.5	10.6	10.6	10.6	10.6		
29000	TOFL	5570	5660	5770	5860	5980	6080	6170	6280	6400	6530	6620	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	121	121	121	121	121	121	121	121	121	121		
	GR2	11	11	11	11.1	11.1	11.1	11.2	11.3	11.3	11.3	11.3		
28000	TOFL	5460	5530	5640	5760	5860	5970	6070	6160	6290	6390	6510	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	120	120	120	120	120	120	120	120		
	GR2	11.7	11.7	11.8	11.8	11.8	11.9	11.9	12	12	12	12		
27000	TOFL	5350	5440	5550	5640	5750	5850	5940	6040	6150	6280	6370	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	119	119	119	119	119	119		
	GR2	12.4	12.5	12.5	12.6	12.6	12.6	12.7	12.7	12.7	12.7	12.7		
26000	TOFL	5230	5310	5420	5520	5630	5740	5840	5950	6060	6160	6260	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	102	102	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	119	119	119	119	119		
	GR2	13.3	13.3	13.3	13.4	13.4	13.5	13.5	13.6	13.6	13.6	13.6		

FIGURE 10-8-145. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
39600	TOFL	7850	8000	8110									139	192
	V1	102	102	102										
	VR	129	129	129										
	V2	137	137	137										
	GR2	5.9	5.9	5.9										
39000	TOFL	7800	7930	8050									138	191
	V1	102	102	102										
	VR	127	127	127										
	V2	135	135	135										
	GR2	6.1	6.1	6.1										
38000	TOFL	7710	7840	7960									136	188
	V1	102	102	102										
	VR	124	124	124										
	V2	133	133	133										
	GR2	6.5	6.5	6.5										
37000	TOFL	7610	7730	7860									135	185
	V1	102	102	102										
	VR	122	122	122										
	V2	131	131	131										
	GR2	6.9	6.9	6.9										
36000	TOFL	7500	7640	7750									133	182
	V1	102	102	102										
	VR	120	120	120										
	V2	130	130	130										
	GR2	7.3	7.3	7.3										
35000	TOFL	7410	7530	7650									131	180
	V1	102	102	102										
	VR	118	118	118										
	V2	128	128	128										
	GR2	7.8	7.8	7.8										
34000	TOFL	7300	7420	7540									129	177
	V1	102	102	102										
	VR	116	116	116										
	V2	127	127	127										
	GR2	8.3	8.3	8.3										
33000	TOFL	7210	7320	7440									127	174
	V1	102	102	102										
	VR	114	114	114										
	V2	125	125	125										
	GR2	8.8	8.8	8.8										
32000	TOFL	7090	7200	7330									125	171
	V1	102	102	102										
	VR	112	112	112										
	V2	124	124	124										
	GR2	9.4	9.4	9.3										
31000	TOFL	6980	7090	7210									123	168
	V1	102	102	102										
	VR	111	111	111										
	V2	123	123	123										
	GR2	9.9	9.9	9.9										

FIGURE 10-8-145. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
30000	TOFL	6860	6970	7090									121	166
	V1	102	102	102										
	VR	109	109	109										
	V2	122	122	122										
	GR2	10.6	10.6	10.6										
29000	TOFL	6750	6850	6970									119	163
	V1	102	102	102										
	VR	107	107	107										
	V2	121	121	121										
	GR2	11.3	11.3	11.2										
28000	TOFL	6610	6730	6850									117	160
	V1	102	102	102										
	VR	106	106	106										
	V2	120	120	120										
	GR2	12	12	12										
27000	TOFL	6500	6610	6710									115	157
	V1	102	102	102										
	VR	104	104	104										
	V2	119	119	119										
	GR2	12.7	12.7	12.7										
26000	TOFL	6360	6480	6590									113	154
	V1	102	102	102										
	VR	103	103	103										
	V2	119	119	119										
	GR2	13.6	13.6	13.6										

FIGURE 10-8-146. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	TOFL	6670	6780	6910	7040	7160	7290	7410	7550	7680	7820	7940	139	193
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	131	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	6630	6740	6850	6980	7110	7240	7360	7490	7620	7760	7890	138	191
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	129	129	129	129	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	6540	6640	6770	6910	7030	7160	7270	7400	7530	7670	7800	136	188
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	126	126	126	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.2		
37000	TOFL	6470	6570	6700	6810	6940	7060	7190	7300	7440	7570	7700	135	185
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	123	123	123	123	123	123	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	6370	6470	6600	6730	6840	6960	7080	7210	7330	7470	7590	133	183
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.9	6.9	6.9	7	7	7	7	7	7	7	7		
35000	TOFL	6290	6390	6510	6630	6750	6870	7000	7100	7250	7370	7500	131	180
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
34000	TOFL	6200	6300	6420	6550	6650	6780	6890	7020	7140	7270	7380	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.8	7.8	7.9	7.9	7.9	7.9	7.9	8	8	8	8		
33000	TOFL	6100	6200	6320	6450	6570	6670	6780	6910	7040	7150	7290	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.3	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	6000	6100	6220	6340	6460	6570	6700	6800	6930	7050	7180	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	124	124	124	124	124		
	GR2	8.9	8.9	8.9	8.9	8.9	9	9	9	9	9	9		
31000	TOFL	5910	6000	6120	6240	6360	6470	6590	6690	6820	6950	7060	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.5	9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-146. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
30000	TOFL	5800	5900	6010	6130	6250	6360	6480	6580	6710	6830	6940	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.1	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		
29000	TOFL	5710	5800	5920	6040	6150	6250	6350	6470	6590	6700	6830	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.7	10.8	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.9	10.9		
28000	TOFL	5590	5700	5810	5910	6020	6140	6240	6350	6470	6580	6710	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
27000	TOFL	5500	5580	5700	5810	5920	6010	6120	6230	6340	6470	6580	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.2	12.2	12.2	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	5370	5460	5570	5680	5790	5890	6000	6110	6220	6330	6450	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13	13	13	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2		

FIGURE 10-8-147. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
39600	TOFL	8070	8220	8340									139	193
	V1	101	101	101										
	VR	130	130	130										
	V2	138	138	138										
	GR2	5.7	5.7	5.7										
39000	TOFL	8020	8150	8290									138	191
	V1	101	101	101										
	VR	128	128	128										
	V2	136	136	136										
	GR2	5.9	5.9	5.9										
38000	TOFL	7930	8060	8190									136	188
	V1	101	101	101										
	VR	125	125	125										
	V2	134	134	134										
	GR2	6.2	6.2	6.2										
37000	TOFL	7820	7960	8090									135	185
	V1	101	101	101										
	VR	122	122	122										
	V2	131	131	131										
	GR2	6.6	6.6	6.6										
36000	TOFL	7730	7850	7980									133	183
	V1	101	101	101										
	VR	120	120	120										
	V2	129	129	129										
	GR2	7	7	7										
35000	TOFL	7620	7750	7890									131	180
	V1	101	101	101										
	VR	118	118	118										
	V2	128	128	128										
	GR2	7.5	7.5	7.5										
34000	TOFL	7520	7640	7770									129	177
	V1	101	101	101										
	VR	116	116	116										
	V2	126	126	126										
	GR2	8	8	7.9										
33000	TOFL	7410	7530	7650									127	174
	V1	101	101	101										
	VR	114	114	114										
	V2	125	125	125										
	GR2	8.5	8.5	8.5										
32000	TOFL	7300	7420	7550									125	171
	V1	101	101	101										
	VR	112	112	112										
	V2	124	124	124										
	GR2	9	9	9										
31000	TOFL	7190	7310	7430									123	169
	V1	101	101	101										
	VR	111	111	111										
	V2	122	122	122										
	GR2	9.6	9.6	9.6										

FIGURE 10-8-147. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
30000	TOFL	7070	7180	7310									121	166
	V1	101	101	101										
	VR	109	109	109										
	V2	121	121	121										
	GR2	10.2	10.2	10.2										
29000	TOFL	6950	7060	7180									119	163
	V1	101	101	101										
	VR	107	107	107										
	V2	120	120	120										
	GR2	10.9	10.9	10.9										
28000	TOFL	6820	6940	7060									117	160
	V1	101	101	101										
	VR	106	106	106										
	V2	119	119	119										
	GR2	11.6	11.6	11.6										
27000	TOFL	6690	6810	6920									115	157
	V1	101	101	101										
	VR	104	104	104										
	V2	118	118	118										
	GR2	12.4	12.4	12.4										
26000	TOFL	6560	6670	6800									113	154
	V1	101	101	101										
	VR	102	102	102										
	V2	117	117	117										
	GR2	13.2	13.2	13.2										

FIGURE 10-8-148. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	TOFL	6830	6940	7080	7210	7340	7470	7600	7730	7880	8000	8130	140	193
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
39000	TOFL	6780	6900	7020	7150	7290	7410	7550	7670	7810	7940	8080	139	191
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.6	5.6		
38000	TOFL	6700	6800	6940	7070	7200	7330	7450	7580	7720	7850	7990	137	189
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
37000	TOFL	6600	6720	6840	6980	7110	7230	7360	7500	7610	7750	7880	135	186
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.4	6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	6520	6630	6770	6880	7010	7140	7260	7400	7520	7660	7780	133	183
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.8	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	6430	6540	6660	6800	6930	7040	7170	7290	7420	7550	7680	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
34000	TOFL	6350	6440	6580	6700	6820	6940	7070	7200	7320	7450	7570	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7		
33000	TOFL	6250	6360	6480	6590	6730	6850	6960	7090	7210	7340	7450	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
32000	TOFL	6150	6260	6380	6510	6630	6740	6860	6980	7110	7220	7350	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.7	8.7	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	6050	6150	6270	6400	6520	6630	6750	6870	7000	7110	7230	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 10-8-148. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
30000	TOFL	5950	6060	6170	6290	6410	6530	6640	6760	6880	7010	7110	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
29000	TOFL	5850	5930	6070	6170	6300	6420	6520	6640	6760	6890	7000	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
28000	TOFL	5740	5830	5960	6060	6180	6300	6420	6520	6640	6760	6880	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
27000	TOFL	5630	5730	5840	5960	6060	6180	6280	6400	6510	6630	6750	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	11.9	11.9	11.9	11.9	12	12	12	12	12	12		
26000	TOFL	5520	5610	5730	5830	5940	6050	6160	6270	6390	6500	6610	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.7	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 10-8-149. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
39600	TOFL	8270	8400	8540									140	193
	V1	100	100	100										
	VR	132	132	132										
	V2	139	139	139										
	GR2	5.4	5.4	5.4										
39000	TOFL	8210	8350	8470									139	191
	V1	100	100	100										
	VR	130	130	130										
	V2	137	137	137										
	GR2	5.6	5.6	5.6										
38000	TOFL	8110	8250	8380									137	189
	V1	100	100	100										
	VR	127	127	127										
	V2	135	135	135										
	GR2	6	6	6										
37000	TOFL	8010	8140	8280									135	186
	V1	100	100	100										
	VR	124	124	124										
	V2	132	132	132										
	GR2	6.4	6.4	6.3										
36000	TOFL	7900	8040	8170									133	183
	V1	100	100	100										
	VR	121	121	121										
	V2	130	130	130										
	GR2	6.8	6.8	6.8										
35000	TOFL	7800	7940	8050									131	180
	V1	100	100	100										
	VR	118	118	118										
	V2	127	127	127										
	GR2	7.2	7.2	7.2										
34000	TOFL	7700	7820	7950									129	177
	V1	100	100	100										
	VR	116	116	116										
	V2	126	126	126										
	GR2	7.6	7.6	7.6										
33000	TOFL	7590	7720	7830									127	175
	V1	100	100	100										
	VR	114	114	114										
	V2	124	124	124										
	GR2	8.1	8.1	8.1										
32000	TOFL	7470	7600	7730									125	172
	V1	100	100	100										
	VR	112	112	112										
	V2	123	123	123										
	GR2	8.7	8.7	8.7										
31000	TOFL	7360	7480	7600									123	169
	V1	100	100	100										
	VR	111	111	111										
	V2	122	122	122										
	GR2	9.3	9.3	9.3										

FIGURE 10-8-149. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
30000	TOFL	7250	7350	7480									121	166
	V1	100	100	100										
	VR	109	109	109										
	V2	121	121	121										
	GR2	9.9	9.9	9.9										
29000	TOFL	7120	7230	7350									119	163
	V1	100	100	100										
	VR	107	107	107										
	V2	120	120	120										
	GR2	10.5	10.5	10.5										
28000	TOFL	7000	7110	7230									117	160
	V1	100	100	100										
	VR	106	106	106										
	V2	119	119	119										
	GR2	11.2	11.2	11.2										
27000	TOFL	6860	6980	7100									115	157
	V1	100	100	100										
	VR	104	104	104										
	V2	118	118	118										
	GR2	12	12	12										
26000	TOFL	6730	6840	6960									113	154
	V1	100	100	100										
	VR	102	102	102										
	V2	117	117	117										
	GR2	12.8	12.8	12.8										

FIGURE 10-8-150. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	TOFL	6980	7100	7240	7390	7510	7650	7780	7930	8060	8210	8330	141	193
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	6920	7060	7190	7340	7460	7610	7740	7870	8020	8140	8270	140	192
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	6840	6960	7100	7240	7380	7500	7640	7780	7910	8050	8170	137	189
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	128	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	6740	6880	7020	7140	7280	7420	7540	7680	7820	7960	8080	135	186
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	6670	6800	6920	7060	7180	7320	7450	7570	7710	7840	7980	133	183
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	6570	6700	6840	6970	7090	7220	7340	7480	7600	7740	7870	131	181
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
34000	TOFL	6490	6610	6730	6870	6990	7120	7250	7390	7510	7630	7760	129	178
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	6380	6510	6640	6760	6900	7010	7140	7280	7390	7530	7650	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
32000	TOFL	6280	6410	6540	6670	6790	6910	7040	7160	7300	7410	7540	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
31000	TOFL	6180	6300	6430	6570	6680	6810	6930	7070	7180	7310	7420	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 10-8-150. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
30000	TOFL	6070	6200	6330	6460	6570	6700	6820	6950	7060	7190	7300	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	5970	6090	6220	6340	6460	6590	6700	6830	6940	7060	7180	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	119	119	119	119	119	119	119	119	119	119		
	GR2	10.3	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
28000	TOFL	5870	5990	6110	6230	6350	6450	6580	6710	6820	6950	7050	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
27000	TOFL	5760	5860	5980	6110	6230	6350	6450	6580	6700	6800	6930	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.6	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	5670	5760	5870	5990	6100	6230	6330	6450	6560	6680	6800	113	154
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.5	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3		

FIGURE 10-8-151. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
39600	TOFL	8480	8610	8760									141	193
	V1	99	99	99										
	VR	134	134	134										
	V2	140	140	140										
	GR2	5.2	5.2	5.2										
39000	TOFL	8420	8540	8680									140	192
	V1	99	99	99										
	VR	132	132	132										
	V2	139	139	139										
	GR2	5.4	5.4	5.4										
38000	TOFL	8310	8440	8590									137	189
	V1	99	99	99										
	VR	129	129	129										
	V2	136	136	136										
	GR2	5.7	5.7	5.7										
37000	TOFL	8210	8340	8480									135	186
	V1	99	99	99										
	VR	125	125	125										
	V2	133	133	133										
	GR2	6.1	6.1	6.1										
36000	TOFL	8100	8240	8370									133	183
	V1	99	99	99										
	VR	122	122	122										
	V2	130	130	130										
	GR2	6.5	6.5	6.5										
35000	TOFL	8000	8120	8260									131	181
	V1	99	99	99										
	VR	119	119	119										
	V2	128	128	128										
	GR2	6.9	6.9	6.9										
34000	TOFL	7880	8020	8150									129	178
	V1	99	99	99										
	VR	116	116	116										
	V2	126	126	126										
	GR2	7.3	7.3	7.3										
33000	TOFL	7780	7900	8030									127	175
	V1	99	99	99										
	VR	114	114	114										
	V2	124	124	124										
	GR2	7.8	7.8	7.8										
32000	TOFL	7660	7790	7930									125	172
	V1	99	99	99										
	VR	112	112	112										
	V2	123	123	123										
	GR2	8.3	8.3	8.3										
31000	TOFL	7550	7670	7800									123	169
	V1	99	99	99										
	VR	111	111	111										
	V2	122	122	121										
	GR2	8.9	8.9	8.9										

FIGURE 10-8-151. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
30000	TOFL	7430	7540	7670									121	166
	V1	99	99	99										
	VR	109	109	109										
	V2	121	121	121										
	GR2	9.5	9.5	9.5										
29000	TOFL	7310	7410	7540									119	163
	V1	99	99	99										
	VR	107	107	107										
	V2	119	119	119										
	GR2	10.1	10.1	10.1										
28000	TOFL	7180	7280	7410									117	160
	V1	99	99	99										
	VR	106	106	106										
	V2	118	118	118										
	GR2	10.8	10.8	10.8										
27000	TOFL	7050	7160	7280									115	157
	V1	99	99	99										
	VR	104	104	104										
	V2	117	117	117										
	GR2	11.6	11.5	11.5										
26000	TOFL	6910	7030	7150									113	154
	V1	99	99	99										
	VR	102	102	102										
	V2	116	116	116										
	GR2	12.3	12.3	12.3										

FIGURE 10-8-152. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	TOFL	7150	7290	7440	7570	7710	7840	7990	8130	8280	8410	8550	142	194
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
39000	TOFL	7110	7230	7380	7520	7670	7800	7940	8090	8210	8350	8500	141	192
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
38000	TOFL	7010	7150	7290	7420	7560	7710	7840	7980	8120	8260	8400	138	189
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	6930	7060	7200	7340	7470	7600	7750	7890	8030	8150	8300	136	187
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	6840	6970	7110	7250	7380	7510	7640	7780	7920	8060	8180	133	184
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	6740	6870	7010	7150	7290	7410	7550	7690	7810	7950	8080	131	181
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	6650	6790	6910	7050	7180	7310	7440	7570	7710	7840	7980	129	178
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	117	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	6550	6680	6820	6950	7090	7210	7340	7480	7600	7730	7860	127	175
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
32000	TOFL	6450	6580	6710	6850	6980	7100	7230	7360	7500	7610	7750	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.1	8	8	8	8	8	8	8	8	8	8		
31000	TOFL	6360	6470	6600	6740	6870	6990	7120	7240	7380	7500	7630	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 10-8-152. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
30000	TOFL	6250	6380	6500	6640	6750	6880	7010	7120	7260	7390	7510	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
29000	TOFL	6140	6260	6390	6520	6640	6760	6890	7020	7130	7260	7380	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	108	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
28000	TOFL	6020	6150	6280	6410	6530	6640	6770	6890	7020	7140	7250	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
27000	TOFL	5910	6040	6160	6280	6410	6520	6650	6760	6890	7020	7120	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.1		
26000	TOFL	5820	5910	6040	6160	6280	6410	6510	6640	6760	6870	7000	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 10-8-153. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
39600	TOFL	8700	8830	8980									142	194
	V1	98	98	98										
	VR	136	136	136										
	V2	142	142	142										
	GR2	4.9	4.9	4.9										
39000	TOFL	8630	8780	8910									141	192
	V1	98	98	98										
	VR	134	134	134										
	V2	140	140	140										
	GR2	5.1	5.1	5.1										
38000	TOFL	8530	8680	8810									138	189
	V1	98	98	98										
	VR	130	130	130										
	V2	137	137	137										
	GR2	5.5	5.5	5.5										
37000	TOFL	8430	8560	8700									136	187
	V1	98	98	98										
	VR	127	127	127										
	V2	134	134	134										
	GR2	5.8	5.8	5.8										
36000	TOFL	8320	8460	8600									133	184
	V1	98	98	98										
	VR	124	124	124										
	V2	132	132	132										
	GR2	6.2	6.2	6.2										
35000	TOFL	8200	8340	8480									131	181
	V1	98	98	98										
	VR	121	121	121										
	V2	129	129	129										
	GR2	6.6	6.6	6.6										
34000	TOFL	8100	8240	8370									129	178
	V1	98	98	98										
	VR	118	118	118										
	V2	126	126	126										
	GR2	7	7	7										
33000	TOFL	8000	8120	8250									127	175
	V1	98	98	98										
	VR	115	115	115										
	V2	124	124	124										
	GR2	7.5	7.5	7.5										
32000	TOFL	7870	8010	8130									125	172
	V1	98	98	98										
	VR	113	113	113										
	V2	122	122	122										
	GR2	8	8	8										
31000	TOFL	7750	7880	8020									123	169
	V1	98	98	98										
	VR	111	111	111										
	V2	121	121	121										
	GR2	8.5	8.5	8.5										

FIGURE 10-8-153. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
30000	TOFL	7640	7750	7890									121	166
	V1	98	98	98										
	VR	109	109	109										
	V2	120	120	120										
	GR2	9.1	9.1	9.1										
29000	TOFL	7510	7620	7750									119	163
	V1	98	98	98										
	VR	107	107	107										
	V2	119	119	119										
	GR2	9.8	9.8	9.8										
28000	TOFL	7380	7500	7630									117	160
	V1	98	98	98										
	VR	106	106	106										
	V2	118	118	118										
	GR2	10.4	10.4	10.4										
27000	TOFL	7250	7370	7490									115	157
	V1	98	98	98										
	VR	104	104	104										
	V2	117	117	117										
	GR2	11.1	11.1	11.1										
26000	TOFL	7100	7230	7350									113	154
	V1	98	98	98										
	VR	102	102	102										
	V2	116	116	116										
	GR2	11.9	11.9	11.9										

FIGURE 10-8-154. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	TOFL	7280	7400	7560	7700	7840	8000	8140	8290	8460	8590	8730	143	194
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	7290	7410	7560	7710	7850	8000	8150	8290	8450	8590	8720	142	193
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	7200	7330	7470	7620	7770	7900	8060	8200	8350	8490	8620	139	190
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.3	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	7120	7230	7380	7520	7670	7810	7950	8100	8240	8380	8510	137	187
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	135	135	135	135	135	135		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	7010	7130	7290	7430	7580	7720	7850	8000	8140	8290	8410	134	184
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6	6	5.9	5.9	5.9	6	6	6	6	6	6		
35000	TOFL	6930	7050	7180	7330	7470	7610	7750	7890	8030	8170	8300	132	181
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	6820	6940	7100	7220	7380	7500	7660	7790	7930	8070	8190	129	178
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.8	6.8	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	6720	6830	6970	7130	7260	7410	7540	7680	7810	7950	8080	127	176
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
32000	TOFL	6610	6740	6880	7010	7150	7280	7430	7560	7710	7830	7970	125	173
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
31000	TOFL	6510	6630	6760	6900	7030	7160	7300	7430	7570	7700	7840	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 10-8-154. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
30000	TOFL	6400	6520	6650	6800	6920	7040	7180	7330	7450	7590	7710	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	6290	6400	6550	6680	6810	6940	7070	7200	7330	7460	7580	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
28000	TOFL	6180	6290	6430	6560	6690	6810	6940	7080	7200	7330	7440	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1		
27000	TOFL	6070	6180	6310	6430	6570	6690	6820	6950	7070	7200	7310	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	5970	6060	6180	6310	6440	6560	6690	6810	6940	7070	7180	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.6	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 10-8-155. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
39600	TOFL	8880	9020	9150									143	194
	V1	97	97	97										
	VR	137	137	137										
	V2	143	143	143										
	GR2	4.7	4.7	4.7										
39000	TOFL	8870	9000	9150									142	193
	V1	97	97	97										
	VR	135	135	135										
	V2	141	141	141										
	GR2	4.9	4.9	4.9										
38000	TOFL	8760	8890	9030									139	190
	V1	97	97	97										
	VR	132	132	132										
	V2	138	138	138										
	GR2	5.2	5.2	5.2										
37000	TOFL	8660	8790	8930									137	187
	V1	97	97	97										
	VR	129	129	129										
	V2	135	135	135										
	GR2	5.6	5.6	5.6										
36000	TOFL	8540	8680	8800									134	184
	V1	97	97	97										
	VR	125	125	125										
	V2	133	133	133										
	GR2	5.9	5.9	5.9										
35000	TOFL	8440	8570	8700									132	181
	V1	97	97	97										
	VR	122	122	122										
	V2	130	130	130										
	GR2	6.3	6.3	6.3										
34000	TOFL	8320	8450	8580									129	178
	V1	97	97	97										
	VR	119	119	119										
	V2	127	127	127										
	GR2	6.8	6.8	6.8										
33000	TOFL	8220	8340	8470									127	176
	V1	97	97	97										
	VR	116	116	116										
	V2	124	124	124										
	GR2	7.2	7.2	7.2										
32000	TOFL	8090	8220	8340									125	173
	V1	97	97	97										
	VR	113	113	113										
	V2	122	122	122										
	GR2	7.7	7.7	7.7										
31000	TOFL	7960	8100	8210									123	170
	V1	97	97	97										
	VR	111	111	111										
	V2	121	121	121										
	GR2	8.2	8.2	8.2										

FIGURE 10-8-155. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
30000	TOFL	7830	7950	8090									121	167
	V1	97	97	97										
	VR	109	109	109										
	V2	119	119	119										
	GR2	8.8	8.8	8.8										
29000	TOFL	7710	7820	7950									119	164
	V1	97	97	97										
	VR	107	107	107										
	V2	118	118	118										
	GR2	9.4	9.4	9.4										
28000	TOFL	7580	7700	7810									117	161
	V1	97	97	97										
	VR	106	106	106										
	V2	117	117	117										
	GR2	10.1	10.1	10.1										
27000	TOFL	7440	7560	7670									115	157
	V1	97	97	97										
	VR	104	104	104										
	V2	116	116	116										
	GR2	10.8	10.8	10.8										
26000	TOFL	7300	7410	7530									113	154
	V1	97	97	97										
	VR	102	102	102										
	V2	115	115	115										
	GR2	11.5	11.5	11.5										

FIGURE 10-8-156. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	TOFL	7700	7930	8160	8310	8450	8600	8760	8930	9090	9250	9420	144	195
	V1	99	100	100	100	100	100	100	100	100	100	100		
	VR	139	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
39000	TOFL	7360	7580	7800	7940	8070	8210	8370	8530	8680	8840	8990	143	193
	V1	96	97	97	97	97	97	97	97	97	97	97		
	VR	137	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.8	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	7330	7490	7650	7800	7950	8100	8230	8390	8520	8680	8820	140	190
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5.1	5	4.9	4.9	4.9	5	5	5	5	5	4.9		
37000	TOFL	7250	7380	7550	7700	7850	8000	8140	8290	8420	8580	8710	138	187
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	130	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.5	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	7140	7300	7460	7610	7760	7900	8030	8180	8330	8460	8610	135	185
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.8	5.7	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
35000	TOFL	7050	7200	7380	7520	7640	7790	7940	8070	8220	8360	8500	133	182
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.2	6.1	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
34000	TOFL	6960	7100	7270	7410	7550	7690	7840	7970	8090	8240	8380	130	179
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.6	6.5	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5		
33000	TOFL	6860	7000	7160	7300	7450	7580	7720	7870	7990	8120	8260	127	176
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	7.1	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
32000	TOFL	6750	6890	7060	7200	7340	7480	7610	7740	7890	8010	8140	125	173
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.5	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
31000	TOFL	6650	6800	6960	7090	7220	7360	7500	7620	7760	7880	8030	123	170
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		

FIGURE 10-8-156. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
30000	TOFL	6550	6680	6840	6980	7110	7240	7380	7520	7630	7770	7890	121	167
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.6	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	6430	6570	6740	6870	7000	7130	7250	7390	7530	7640	7780	119	164
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.2	9.1	8.9	9	9	9	9	9	9	9	9		
28000	TOFL	6320	6460	6620	6750	6880	7010	7140	7260	7390	7510	7650	117	161
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	106	106	106	106	105	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.9	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
27000	TOFL	6230	6340	6500	6630	6750	6880	6990	7130	7260	7380	7510	115	158
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	115	115	115	115	115	115	115	115	115	115		
	GR2	10.6	10.4	10.3	10.3	10.3	10.4	10.4	10.4	10.3	10.3	10.3		
26000	TOFL	6140	6220	6370	6500	6620	6750	6870	7000	7120	7250	7360	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	114	114	114	114	114	114	114	114	114	114		
	GR2	11.3	11.1	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 10-8-157. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
39600	TOFL	9580	9750	9910									144	195
	V1	100	100	100										
	VR	140	140	140										
	V2	145	145	145										
	GR2	4.4	4.4	4.4										
39000	TOFL	9150	9310	9470									143	193
	V1	97	97	97										
	VR	138	138	138										
	V2	143	143	143										
	GR2	4.6	4.6	4.6										
38000	TOFL	8960	9110	9210									140	190
	V1	96	96	95										
	VR	134	134	134										
	V2	140	140	140										
	GR2	4.9	4.9	4.9										
37000	TOFL	8850	8990	9100									138	187
	V1	96	96	95										
	VR	131	131	131										
	V2	137	137	137										
	GR2	5.3	5.3	5.3										
36000	TOFL	8740	8890	8990									135	185
	V1	96	96	95										
	VR	127	127	127										
	V2	134	134	134										
	GR2	5.7	5.7	5.7										
35000	TOFL	8630	8780	8870									133	182
	V1	96	96	95										
	VR	124	124	124										
	V2	131	131	131										
	GR2	6.1	6.1	6										
34000	TOFL	8520	8650	8760									130	179
	V1	96	96	95										
	VR	120	120	120										
	V2	128	128	128										
	GR2	6.4	6.4	6.4										
33000	TOFL	8400	8530	8630									127	176
	V1	96	96	95										
	VR	117	117	117										
	V2	125	125	125										
	GR2	6.9	6.9	6.9										
32000	TOFL	8280	8420	8510									125	173
	V1	96	96	95										
	VR	114	114	114										
	V2	123	123	123										
	GR2	7.3	7.3	7.3										
31000	TOFL	8150	8290	8390									123	170
	V1	96	96	95										
	VR	111	111	111										
	V2	121	121	121										
	GR2	7.8	7.8	7.8										

FIGURE 10-8-157. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
30000	TOFL	8030	8150	8260									121	167
	V1	96	96	95										
	VR	109	109	109										
	V2	119	119	119										
	GR2	8.4	8.4	8.4										
29000	TOFL	7900	8040	8120									119	164
	V1	96	96	95										
	VR	107	107	107										
	V2	118	118	118										
	GR2	9	9	9										
28000	TOFL	7760	7900	7980									117	161
	V1	96	96	95										
	VR	106	106	106										
	V2	117	117	116										
	GR2	9.6	9.6	9.6										
27000	TOFL	7630	7760	7840									115	158
	V1	96	96	95										
	VR	104	104	104										
	V2	115	115	115										
	GR2	10.3	10.3	10.3										
26000	TOFL	7490	7620	7690									113	155
	V1	96	96	95										
	VR	102	102	102										
	V2	114	114	114										
	GR2	11.1	11.1	11.1										

FIGURE 10-8-158. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	TOFL	8420	8750	8970	9120	9260	9440	9620	9800	9980	10160	10340	145	195
	V1	103	104	104	104	104	104	104	104	104	104	104		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	147	147	147	147	147	147	147	147	147	147		
	GR2	4.3	4.2	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
39000	TOFL	8040	8360	8560	8710	8840	9010	9180	9350	9520	9690	9860	144	193
	V1	100	101	101	101	101	101	101	101	101	101	101		
	VR	139	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.5	4.3	4.3	4.3	4.3	4.4	4.4	4.3	4.3	4.3	4.3		
38000	TOFL	7450	7730	7920	8050	8180	8330	8490	8650	8800	8960	9120	141	191
	V1	95	96	96	96	96	96	96	96	96	96	96		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	142	142	142	142	142	142	142	142	142	142		
	GR2	4.9	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
37000	TOFL	7400	7580	7730	7890	8020	8180	8330	8470	8630	8780	8930	139	188
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	132	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	138	138	138	138	138	138		
	GR2	5.2	5	5	5	5	5	5	5	5	5	5		
36000	TOFL	7300	7480	7640	7780	7930	8070	8230	8370	8530	8680	8800	136	185
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	135	135	135	135	135	135	135		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
35000	TOFL	7210	7370	7540	7680	7820	7970	8120	8260	8410	8560	8690	134	182
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	132	132	132	132	132	132	132		
	GR2	6	5.8	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
34000	TOFL	7100	7280	7450	7580	7730	7870	8010	8160	8300	8460	8580	131	179
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	129	129	129	129	129	129	129		
	GR2	6.4	6.2	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
33000	TOFL	7010	7190	7340	7480	7610	7760	7900	8040	8190	8330	8470	128	176
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	126	126	126	126	126	126	126		
	GR2	6.8	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
32000	TOFL	6900	7080	7240	7360	7510	7650	7800	7930	8060	8220	8340	126	173
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	124	124	124	124	124	124	124	124	124	124		
	GR2	7.2	7	7	7	7	7	7	7	7	7	7		
31000	TOFL	6800	6960	7120	7270	7390	7540	7670	7810	7950	8090	8220	123	170
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.7	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		

FIGURE 10-8-158. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
30000	TOFL	6690	6870	7010	7150	7290	7410	7550	7690	7820	7970	8090	121	167
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.3	8	8	8	8	8	8	8	8	8	8		
29000	TOFL	6570	6750	6910	7020	7160	7300	7440	7570	7710	7840	7970	119	164
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.8	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	6490	6630	6790	6900	7040	7170	7310	7440	7580	7710	7840	117	161
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.5	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
27000	TOFL	6400	6510	6660	6780	6910	7040	7180	7300	7440	7570	7700	115	158
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
26000	TOFL	6310	6380	6530	6660	6780	6910	7040	7170	7300	7430	7550	113	155
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.9	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		

FIGURE 10-8-159. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
39600	TOFL	10520	10700	10890									145	195
	V1	104	104	104										
	VR	142	142	142										
	V2	147	147	147										
	GR2	4.2	4.2	4.1										
39000	TOFL	10040	10220	10390									144	193
	V1	101	101	101										
	VR	140	140	140										
	V2	145	145	145										
	GR2	4.3	4.3	4.3										
38000	TOFL	9280	9440	9600									141	191
	V1	96	96	96										
	VR	136	136	136										
	V2	142	142	142										
	GR2	4.7	4.7	4.7										
37000	TOFL	9070	9190	9260									139	188
	V1	94	94	94										
	VR	133	133	133										
	V2	138	138	138										
	GR2	5	5	5										
36000	TOFL	8960	9080	9150									136	185
	V1	94	94	94										
	VR	129	129	129										
	V2	135	135	135										
	GR2	5.4	5.4	5.4										
35000	TOFL	8850	8960	9030									134	182
	V1	94	94	94										
	VR	126	126	126										
	V2	132	132	132										
	GR2	5.8	5.8	5.7										
34000	TOFL	8740	8850	8910									131	179
	V1	94	94	94										
	VR	122	122	122										
	V2	129	129	129										
	GR2	6.2	6.2	6.1										
33000	TOFL	8610	8730	8780									128	176
	V1	94	94	94										
	VR	119	119	119										
	V2	126	126	126										
	GR2	6.6	6.6	6.6										
32000	TOFL	8490	8600	8670									126	173
	V1	94	94	94										
	VR	115	115	115										
	V2	124	124	124										
	GR2	7	7	7										
31000	TOFL	8360	8470	8530									123	170
	V1	94	94	94										
	VR	112	112	112										
	V2	121	121	121										
	GR2	7.5	7.5	7.5										

FIGURE 10-8-159. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
30000	TOFL	8230	8340	8410									121	167
	V1	94	94	94										
	VR	109	109	109										
	V2	119	119	119										
	GR2	8	8	8										
29000	TOFL	8100	8210	8270									119	164
	V1	94	94	94										
	VR	107	107	107										
	V2	117	117	117										
	GR2	8.6	8.6	8.6										
28000	TOFL	7960	8070	8120									117	161
	V1	94	94	94										
	VR	105	105	105										
	V2	116	116	116										
	GR2	9.2	9.2	9.2										
27000	TOFL	7820	7940	8010									115	158
	V1	94	94	94										
	VR	104	104	104										
	V2	115	115	115										
	GR2	9.9	9.9	9.9										
26000	TOFL	7680	7790	7890									113	155
	V1	94	94	94										
	VR	102	102	102										
	V2	114	114	114										
	GR2	10.6	10.6	10.6										

FIGURE 10-8-160. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	TOFL	9290	9660	9830	10000	10170	10370	10570	10770	10960	11160	11360	147	195
	V1	107	108	108	108	108	108	108	108	108	108	108		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	4	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	TOFL	8860	9230	9400	9560	9720	9910	10100	10290	10480	10670	10860	145	194
	V1	104	105	105	105	105	105	105	105	105	105	105		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	147	147	147	147	147	147	147	147	147	147		
	GR2	4.2	4	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	TOFL	8190	8530	8680	8820	8970	9150	9320	9490	9670	9840	10010	142	191
	V1	99	100	100	100	100	100	100	100	100	100	100		
	VR	138	139	139	139	139	139	139	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	TOFL	7560	7870	8010	8140	8280	8440	8600	8760	8920	9080	9240	140	188
	V1	94	95	95	95	95	95	95	95	95	95	95		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.9	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.7	4.7		
36000	TOFL	7510	7690	7830	7990	8130	8280	8420	8580	8730	8890	9040	137	185
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
35000	TOFL	7400	7590	7740	7880	8010	8170	8320	8480	8630	8770	8920	135	183
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.6	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
34000	TOFL	7310	7480	7630	7760	7920	8070	8220	8350	8510	8660	8810	132	180
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
33000	TOFL	7220	7390	7540	7670	7820	7950	8100	8250	8400	8540	8680	129	177
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	120	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.4	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
32000	TOFL	7100	7270	7420	7570	7690	7850	7980	8130	8270	8420	8570	127	174
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
31000	TOFL	7000	7170	7320	7450	7580	7720	7870	8010	8160	8290	8440	124	171
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.3	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		

FIGURE 10-8-160. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
30000	TOFL	6890	7060	7200	7330	7470	7610	7740	7890	8030	8180	8300	121	168
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.8	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
29000	TOFL	6770	6940	7080	7220	7350	7490	7630	7760	7900	8040	8180	119	165
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.4	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
28000	TOFL	6650	6840	6950	7090	7220	7360	7500	7630	7780	7900	8040	117	161
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	9	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
27000	TOFL	6560	6710	6830	6970	7100	7220	7370	7500	7640	7760	7900	115	158
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.7	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
26000	TOFL	6470	6580	6710	6840	6970	7090	7230	7360	7500	7630	7770	113	155
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		

FIGURE 10-8-161. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
39600	TOFL	11560	11770	12040									147	195
	V1	108	108	108										
	VR	144	144	144										
	V2	148	148	148										
	GR2	3.9	3.9	3.8										
39000	TOFL	11050	11250	11500									145	194
	V1	105	105	105										
	VR	142	142	142										
	V2	147	147	147										
	GR2	4.1	4.1	4										
38000	TOFL	10190	10370	10610									142	191
	V1	100	100	100										
	VR	139	139	139										
	V2	143	143	143										
	GR2	4.4	4.4	4.3										
37000	TOFL	9400	9570	9790									140	188
	V1	95	95	95										
	VR	135	135	135										
	V2	140	140	140										
	GR2	4.7	4.7	4.6										
36000	TOFL	9180	9290	9290									137	185
	V1	93	93	92										
	VR	131	131	132										
	V2	137	137	137										
	GR2	5.1	5.1	5										
35000	TOFL	9070	9180	9170									135	183
	V1	93	93	92										
	VR	128	128	128										
	V2	134	134	134										
	GR2	5.5	5.4	5.3										
34000	TOFL	8940	9060	9050									132	180
	V1	93	93	92										
	VR	124	124	124										
	V2	131	131	131										
	GR2	5.9	5.8	5.7										
33000	TOFL	8830	8940	8930									129	177
	V1	93	93	92										
	VR	121	121	121										
	V2	128	128	128										
	GR2	6.3	6.3	6.1										
32000	TOFL	8720	8800	8810									127	174
	V1	93	93	92										
	VR	117	117	117										
	V2	125	125	125										
	GR2	6.7	6.7	6.6										
31000	TOFL	8580	8680	8670									124	171
	V1	93	93	92										
	VR	113	113	114										
	V2	122	122	122										
	GR2	7.2	7.1	7										

FIGURE 10-8-161. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
30000	TOFL	8450	8560	8540									121	168
	V1	93	93	92										
	VR	110	110	110										
	V2	119	119	119										
	GR2	7.7	7.6	7.5										
29000	TOFL	8320	8420	8410									119	165
	V1	93	93	92										
	VR	107	107	107										
	V2	117	117	117										
	GR2	8.2	8.2	8										
28000	TOFL	8170	8270	8300									117	161
	V1	93	93	92										
	VR	105	105	105										
	V2	115	115	115										
	GR2	8.8	8.8	8.6										
27000	TOFL	8040	8150	8180									115	158
	V1	93	93	92										
	VR	104	104	104										
	V2	114	114	114										
	GR2	9.5	9.4	9.3										
26000	TOFL	7900	8000	8060									113	155
	V1	93	93	92										
	VR	102	102	102										
	V2	113	113	113										
	GR2	10.2	10.2	10										

FIGURE 10-8-162. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	TOFL	10310	10590	10800	10990	11200	11420	11640	11860	12080	12300	12520	148	196
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
39000	TOFL	9850	10120	10310	10500	10700	10910	11120	11330	11540	11750	11960	146	194
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	148	148	148	148		
	GR2	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8		
38000	TOFL	9120	9370	9540	9710	9900	10090	10290	10480	10670	10870	11060	144	191
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
37000	TOFL	8390	8620	8780	8940	9110	9290	9470	9640	9820	10000	10180	141	189
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
36000	TOFL	7720	7940	8080	8230	8380	8550	8710	8870	9030	9190	9360	138	186
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
35000	TOFL	7630	7790	7940	8090	8250	8400	8560	8710	8860	9020	9170	136	183
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
34000	TOFL	7530	7690	7840	7980	8140	8280	8430	8600	8750	8900	9050	133	180
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
33000	TOFL	7440	7570	7720	7870	8020	8180	8330	8490	8630	8770	8930	130	177
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	122	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
32000	TOFL	7320	7470	7620	7770	7920	8050	8210	8360	8510	8660	8810	127	174
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
31000	TOFL	7220	7370	7500	7650	7790	7950	8090	8240	8380	8530	8670	125	171
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.9	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8		

FIGURE 10-8-162. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
30000	TOFL	7100	7250	7390	7540	7670	7820	7970	8110	8260	8400	8550	122	168
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
29000	TOFL	6990	7120	7270	7410	7560	7700	7830	7990	8120	8270	8410	119	165
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8		
28000	TOFL	6880	7010	7140	7290	7430	7570	7720	7860	8010	8130	8290	117	162
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.6	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
27000	TOFL	6750	6890	7030	7150	7300	7440	7580	7720	7860	8000	8140	115	159
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
26000	TOFL	6630	6760	6890	7020	7180	7300	7440	7580	7720	7850	7990	113	155
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 10-8-163. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
39600	TOFL	12750	13010	13490									148	196
	V1	112	112	114										
	VR	147	147	147										
	V2	150	150	150										
	GR2	3.6	3.5	3.3										
39000	TOFL	12170	12420	12880									146	194
	V1	109	109	111										
	VR	145	145	145										
	V2	148	148	148										
	GR2	3.8	3.7	3.5										
38000	TOFL	11260	11490	11920									144	191
	V1	104	104	105										
	VR	141	141	141										
	V2	145	145	145										
	GR2	4.1	4.1	3.8										
37000	TOFL	10360	10570	10970									141	189
	V1	98	99	100										
	VR	137	137	138										
	V2	142	142	142										
	GR2	4.5	4.4	4.2										
36000	TOFL	9520	9730	10090									138	186
	V1	93	93	95										
	VR	134	134	134										
	V2	139	139	139										
	GR2	4.8	4.7	4.5										
35000	TOFL	9310	9330	9330									136	183
	V1	92	91	90										
	VR	130	130	130										
	V2	136	135	135										
	GR2	5.2	5.1	4.9										
34000	TOFL	9180	9210	9200									133	180
	V1	92	91	90										
	VR	126	126	127										
	V2	132	132	132										
	GR2	5.6	5.5	5.2										
33000	TOFL	9050	9100	9090									130	177
	V1	92	91	90										
	VR	123	123	123										
	V2	129	129	129										
	GR2	6	5.9	5.6										
32000	TOFL	8930	8960	8950									127	174
	V1	92	91	90										
	VR	119	119	119										
	V2	126	126	126										
	GR2	6.4	6.3	6										
31000	TOFL	8810	8820	8820									125	171
	V1	92	91	90										
	VR	115	115	116										
	V2	123	123	123										
	GR2	6.8	6.7	6.5										

FIGURE 10-8-163. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
30000	TOFL	8660	8700	8690									122	168
	V1	92	91	90										
	VR	112	112	112										
	V2	120	120	120										
	GR2	7.3	7.2	6.9										
29000	TOFL	8540	8550	8570									119	165
	V1	92	91	90										
	VR	108	108	108										
	V2	117	117	117										
	GR2	7.8	7.7	7.4										
28000	TOFL	8390	8430	8450									117	162
	V1	92	91	90										
	VR	106	106	106										
	V2	115	115	115										
	GR2	8.4	8.3	8										
27000	TOFL	8240	8280	8330									115	159
	V1	92	91	90										
	VR	104	104	103										
	V2	114	113	113										
	GR2	9.1	8.9	8.6										
26000	TOFL	8110	8160	8210									113	155
	V1	92	91	90										
	VR	102	102	102										
	V2	113	113	112										
	GR2	9.8	9.6	9.3										

FIGURE 10-8-164. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	TOFL	11430	11640	11880	12120	12360	12610	12860	13100	13340	13580	13830	149	196
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	3.4	3.3	3.3	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3		
39000	TOFL	10910	11100	11330	11560	11800	12030	12260	12490	12730	12960	13200	147	194
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
38000	TOFL	10080	10260	10470	10680	10900	11110	11330	11540	11760	11970	12190	145	192
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	TOFL	9300	9470	9660	9860	10060	10250	10450	10640	10840	11040	11240	142	189
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
36000	TOFL	8540	8690	8870	9040	9230	9410	9590	9760	9940	10130	10310	139	186
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
35000	TOFL	7830	7970	8130	8290	8460	8630	8790	8950	9120	9280	9450	137	183
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
34000	TOFL	7770	7900	8060	8220	8370	8530	8680	8830	9000	9140	9300	134	180
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
33000	TOFL	7670	7800	7940	8100	8260	8400	8570	8710	8870	9020	9170	131	177
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
32000	TOFL	7570	7680	7840	7980	8140	8290	8450	8600	8740	8900	9040	128	175
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
31000	TOFL	7450	7580	7720	7880	8020	8170	8320	8480	8620	8780	8910	126	172
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		

FIGURE 10-8-164. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
30000	TOFL	7340	7450	7610	7750	7910	8040	8200	8350	8500	8640	8790	123	168
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	7	7		
29000	TOFL	7220	7350	7480	7640	7770	7930	8060	8220	8360	8510	8640	120	165
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.5		
28000	TOFL	7100	7220	7380	7510	7660	7790	7940	8090	8230	8370	8520	117	162
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
27000	TOFL	6980	7090	7240	7370	7520	7650	7800	7940	8090	8220	8370	115	159
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
26000	TOFL	6840	6960	7110	7240	7390	7520	7660	7800	7940	8070	8210	113	156
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 10-8-165. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
39600	TOFL	14080	14480	15170									149	196
	V1	117	118	120										
	VR	149	149	150										
	V2	152	152	152										
	GR2	3.3	3.2	2.9										
39000	TOFL	13440	13810	14500									147	194
	V1	113	114	117										
	VR	147	147	148										
	V2	150	150	150										
	GR2	3.5	3.4	3.1										
38000	TOFL	12410	12760	13400									145	192
	V1	108	109	111										
	VR	144	144	144										
	V2	147	147	147										
	GR2	3.8	3.7	3.4										
37000	TOFL	11440	11780	12360									142	189
	V1	103	104	106										
	VR	140	140	141										
	V2	144	144	144										
	GR2	4.2	4	3.7										
36000	TOFL	10490	10800	11370									139	186
	V1	97	98	100										
	VR	136	136	137										
	V2	141	141	141										
	GR2	4.5	4.3	4										
35000	TOFL	9620	9910	10410									137	183
	V1	92	93	95										
	VR	132	132	133										
	V2	137	137	137										
	GR2	4.9	4.7	4.4										
34000	TOFL	9360	9340	9530									134	180
	V1	91	89	89										
	VR	129	129	129										
	V2	134	134	134										
	GR2	5.3	5.1	4.7										
33000	TOFL	9240	9220	9220									131	177
	V1	91	89	88										
	VR	125	125	125										
	V2	131	130	130										
	GR2	5.7	5.4	5.1										
32000	TOFL	9120	9070	9100									128	175
	V1	91	89	88										
	VR	121	121	121										
	V2	127	127	127										
	GR2	6.1	5.8	5.5										
31000	TOFL	8990	8950	8960									126	172
	V1	91	89	88										
	VR	117	117	117										
	V2	124	124	124										
	GR2	6.6	6.3	5.9										

FIGURE 10-8-165. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
30000	TOFL	8840	8820	8840									123	168
	V1	91	89	88										
	VR	113	113	114										
	V2	121	121	121										
	GR2	7	6.7	6.4										
29000	TOFL	8710	8690	8720									120	165
	V1	91	89	88										
	VR	110	110	110										
	V2	118	118	118										
	GR2	7.5	7.2	6.8										
28000	TOFL	8570	8570	8600									117	162
	V1	91	89	88										
	VR	106	106	107										
	V2	115	115	115										
	GR2	8.1	7.8	7.3										
27000	TOFL	8430	8450	8480									115	159
	V1	91	90	88										
	VR	104	104	104										
	V2	113	113	112										
	GR2	8.7	8.4	7.9										
26000	TOFL	8280	8320	8360									113	156
	V1	91	90	89										
	VR	102	102	102										
	V2	112	112	111										
	GR2	9.4	9	8.6										

FIGURE 10-8-166. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	TOFL	12540	12900	13150	13400	13680	13950	14220	14500	14770	15050	15330	150	197
	V1	121	122	122	122	122	122	122	122	122	122	122		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1		
39000	TOFL	11990	12330	12570	12810	13070	13330	13590	13850	14110	14370	14640	148	195
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
38000	TOFL	11060	11380	11600	11820	12070	12300	12540	12780	13020	13260	13510	146	192
	V1	112	113	113	113	113	113	113	113	113	113	113		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		
37000	TOFL	10190	10490	10700	10910	11130	11350	11570	11790	12010	12230	12460	143	189
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
36000	TOFL	9370	9650	9830	10020	10220	10420	10620	10820	11030	11230	11440	140	187
	V1	101	102	102	102	102	102	102	102	102	102	102		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
35000	TOFL	8570	8840	9000	9180	9360	9550	9730	9910	10100	10280	10470	138	184
	V1	95	96	96	96	96	96	96	96	96	96	96		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	139	140	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6		
34000	TOFL	7920	8060	8210	8380	8540	8710	8870	9040	9200	9370	9540	135	181
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5	5.1	5.1	5.1	5	5	5	5	5	5		
33000	TOFL	7830	7970	8140	8290	8450	8600	8760	8920	9080	9230	9340	132	178
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
32000	TOFL	7710	7870	8020	8180	8320	8490	8630	8800	8940	9100	9200	129	175
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8		
31000	TOFL	7610	7740	7890	8050	8210	8360	8520	8660	8820	8980	9070	127	172
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		

FIGURE 10-8-166. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
30000	TOFL	7490	7640	7780	7930	8090	8240	8390	8540	8690	8840	8940	124	169
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	122	123	123	123	123	123	123	123	123	122	122		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
29000	TOFL	7380	7510	7650	7810	7950	8110	8260	8410	8550	8700	8790	121	166
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
28000	TOFL	7250	7390	7540	7680	7830	7970	8120	8260	8420	8560	8650	118	162
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
27000	TOFL	7120	7270	7400	7540	7690	7840	7980	8130	8270	8420	8520	115	159
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
26000	TOFL	7020	7130	7270	7410	7550	7700	7850	7980	8130	8260	8390	113	156
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.2	9	9.1	9.1	9.1	9.1	9.1	9.1	9	9	9		

FIGURE 10-8-167. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
39600	TOFL	15690	16320										150	197
	V1	122	124											
	VR	152	152											
	V2	155	154											
	GR2	3	2.7											
39000	TOFL	14990	15600	16510									148	195
	V1	119	121	123										
	VR	150	150	151										
	V2	153	153	153										
	GR2	3.2	2.9	2.6										
38000	TOFL	13840	14420	15290									146	192
	V1	113	115	118										
	VR	146	147	147										
	V2	150	150	150										
	GR2	3.5	3.2	2.9										
37000	TOFL	12760	13290	14110									143	189
	V1	108	110	112										
	VR	143	143	144										
	V2	146	146	146										
	GR2	3.8	3.5	3.2										
36000	TOFL	11720	12230	12980									140	187
	V1	102	104	107										
	VR	139	139	140										
	V2	143	143	143										
	GR2	4.2	3.9	3.5										
35000	TOFL	10730	11210	11930									138	184
	V1	96	98	101										
	VR	135	135	137										
	V2	140	140	140										
	GR2	4.5	4.2	3.9										
34000	TOFL	9790	10230	10910									135	181
	V1	91	93	96										
	VR	131	131	133										
	V2	136	136	137										
	GR2	4.9	4.6	4.3										
33000	TOFL	9360	9360	9930									132	178
	V1	88	87	90										
	VR	127	127	129										
	V2	133	133	133										
	GR2	5.3	4.9	4.6										
32000	TOFL	9240	9230	9260									129	175
	V1	88	87	86										
	VR	123	124	125										
	V2	129	129	129										
	GR2	5.7	5.3	5										
31000	TOFL	9090	9090	9140									127	172
	V1	88	87	86										
	VR	119	120	121										
	V2	126	126	126										
	GR2	6.1	5.8	5.4										

FIGURE 10-8-167. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
30000	TOFL	8970	8970	9020									124	169
	V1	89	87	86										
	VR	115	116	117										
	V2	122	122	122										
	GR2	6.6	6.2	5.8										
29000	TOFL	8850	8850	8910									121	166
	V1	89	87	86										
	VR	112	112	113										
	V2	119	119	119										
	GR2	7.1	6.7	6.3										
28000	TOFL	8730	8730	8780									118	162
	V1	89	88	86										
	VR	108	108	109										
	V2	116	116	116										
	GR2	7.6	7.2	6.8										
27000	TOFL	8600	8600	8660									115	159
	V1	89	88	86										
	VR	105	105	105										
	V2	113	113	113										
	GR2	8.2	7.7	7.3										
26000	TOFL	8480	8480	8530									113	156
	V1	89	88	87										
	VR	102	102	102										
	V2	111	111	110										
	GR2	8.8	8.4	7.9										

FIGURE 10-8-168. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	TOFL	14040	14300	14590	14890	15200	15500	15810	16110	16410	16730	17050	151	197
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8		
39000	TOFL	13390	13650	13920	14210	14500	14790	15080	15370	15660	15950	16260	150	196
	V1	123	123	123	123	123	123	123	123	123	123	124		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	3.1	3	3	3	3	3	3	3	3	3	3		
38000	TOFL	12380	12610	12860	13130	13400	13670	13930	14200	14460	14740	15020	147	193
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
37000	TOFL	11390	11610	11840	12080	12330	12570	12820	13060	13300	13550	13820	144	190
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6		
36000	TOFL	10470	10670	10880	11100	11330	11550	11770	12000	12220	12450	12690	142	187
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.1	4	4	4	4	4	4	4	4	4	4		
35000	TOFL	9600	9780	9970	10180	10380	10590	10790	10990	11200	11410	11630	139	184
	V1	100	100	100	100	100	100	100	100	100	100	101		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3		
34000	TOFL	8770	8930	9100	9290	9480	9660	9840	10030	10220	10410	10610	136	181
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7		
33000	TOFL	8010	8140	8310	8470	8630	8790	8960	9130	9280	9460	9640	133	178
	V1	89	89	89	89	89	89	89	89	89	89	89		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1		
32000	TOFL	7920	8050	8210	8360	8530	8680	8850	9010	9170	9310	9390	130	175
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5		
31000	TOFL	7810	7930	8090	8250	8400	8560	8710	8880	9020	9180	9250	128	172
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.1	6	6	6	6	6	6	6	6	6	5.9		

FIGURE 10-8-168. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
30000	TOFL	7680	7810	7960	8120	8270	8440	8580	8760	8890	9040	9120	125	169
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4		
29000	TOFL	7570	7680	7840	7990	8150	8290	8460	8610	8760	8900	8970	122	166
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7	7	7	7	7	6.9	6.9	6.9	6.9	6.9	6.9		
28000	TOFL	7440	7570	7710	7870	8010	8170	8310	8480	8610	8760	8850	119	163
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4		
27000	TOFL	7310	7430	7570	7730	7890	8030	8190	8330	8480	8600	8720	116	160
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	8.1	8.1	8	8	8	8	8	8	8	8	7.9		
26000	TOFL	7190	7310	7450	7600	7740	7890	8040	8180	8320	8470	8590	113	156
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		

FIGURE 10-8-169. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
39600	TOFL	17630											151	197
	V1	128												
	VR	155												
	V2	157												
	GR2	2.6												
39000	TOFL	16820	17680										150	196
	V1	125	127											
	VR	153	153											
	V2	155	155											
	GR2	2.8	2.5											
38000	TOFL	15550	16350	17470									147	193
	V1	119	122	125										
	VR	149	150	151										
	V2	152	152	152										
	GR2	3.1	2.8	2.5										
37000	TOFL	14310	15080	16120									144	190
	V1	114	116	119										
	VR	146	146	147										
	V2	148	148	149										
	GR2	3.4	3.1	2.8										
36000	TOFL	13150	13860	14870									142	187
	V1	108	110	113										
	VR	142	142	144										
	V2	145	145	146										
	GR2	3.7	3.4	3.1										
35000	TOFL	12060	12710	13640									139	184
	V1	102	105	108										
	VR	138	138	140										
	V2	142	142	143										
	GR2	4.1	3.7	3.4										
34000	TOFL	11010	11630	12500									136	181
	V1	96	99	102										
	VR	134	135	136										
	V2	138	138	139										
	GR2	4.4	4.1	3.8										
33000	TOFL	10010	10570	11410									133	178
	V1	90	93	96										
	VR	130	130	132										
	V2	134	134	136										
	GR2	4.8	4.4	4.1										
32000	TOFL	9380	9620	10380									130	175
	V1	87	87	90										
	VR	126	126	128										
	V2	131	131	132										
	GR2	5.2	4.8	4.5										
31000	TOFL	9240	9260	9390									128	172
	V1	87	85	84										
	VR	122	122	124										
	V2	127	127	128										
	GR2	5.6	5.2	4.9										

FIGURE 10-8-169. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
30000	TOFL	9110	9130	9220									125	169
	V1	87	85	84										
	VR	118	118	120										
	V2	124	124	125										
	GR2	6.1	5.7	5.3										
29000	TOFL	8990	9010	9100									122	166
	V1	87	86	84										
	VR	114	114	116										
	V2	120	120	121										
	GR2	6.5	6.1	5.8										
28000	TOFL	8870	8890	8970									119	163
	V1	87	86	84										
	VR	110	110	112										
	V2	117	117	118										
	GR2	7	6.6	6.3										
27000	TOFL	8740	8770	8850									116	160
	V1	87	86	85										
	VR	106	107	108										
	V2	114	114	115										
	GR2	7.6	7.1	6.8										
26000	TOFL	8620	8640	8720									113	156
	V1	87	86	85										
	VR	103	103	104										
	V2	111	111	111										
	GR2	8.2	7.7	7.3										

FIGURE 10-8-170. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
39600	TOFL	15460	15850	16320	16670	17030	17430	17840	18110	18400			152	198
	V1	132	132	133	133	133	133	133	133	133				
	VR	158	158	158	158	158	158	158	158	158				
	V2	160	160	160	160	160	160	160	160	160				
	GR2	2.7	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5				
39000	TOFL	14730	15100	15550	15880	16220	16600	16990	17250	17520	17860	18290	151	196
	V1	128	129	129	129	129	129	129	129	129	129	130		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	2.9	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6		
38000	TOFL	13560	13900	14310	14620	14930	15270	15620	15870	16120	16430	16830	148	193
	V1	122	123	123	123	123	123	123	123	123	123	124		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	3.2	3.1	3	3	3	3	3	3	3	3	2.9		
37000	TOFL	12490	12840	13190	13480	13760	14080	14390	14620	14850	15140	15510	145	190
	V1	116	117	117	117	117	117	117	117	117	117	118		
	VR	148	149	149	149	149	149	149	149	149	149	149		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.5	3.5	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.2		
36000	TOFL	11460	11750	12100	12360	12620	12910	13200	13400	13620	13880	14230	143	187
	V1	110	111	111	111	111	111	111	111	111	111	112		
	VR	144	144	145	145	145	145	145	145	145	145	145		
	V2	148	148	148	148	148	148	148	148	148	148	147		
	GR2	3.9	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6		
35000	TOFL	10500	10770	11090	11320	11560	11830	12090	12280	12470	12710	13040	140	185
	V1	104	105	105	105	105	105	105	105	105	105	106		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.1	4.1	4.1	4	4	4	4	4	3.9		
34000	TOFL	9590	9840	10130	10350	10580	10810	11040	11220	11390	11610	11910	137	182
	V1	98	99	99	100	100	100	100	100	100	100	100		
	VR	136	136	137	137	137	137	137	137	137	137	137		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.3		
33000	TOFL	8730	8960	9230	9420	9620	9840	10060	10210	10370	10570	10850	134	179
	V1	92	93	93	93	93	94	94	94	94	94	94		
	VR	132	132	133	133	133	133	133	133	133	133	133		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7		
32000	TOFL	8060	8220	8380	8550	8730	8920	9120	9260	9400	9580	9840	131	176
	V1	88	88	88	88	88	88	88	88	88	88	88		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1		
31000	TOFL	7960	8100	8280	8440	8590	8750	8920	9060	9210	9310	9380	128	173
	V1	88	88	87	87	87	87	87	87	87	87	86		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	5.8	5.8	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.6	5.5		

FIGURE 10-8-170. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
30000	TOFL	7850	7990	8150	8300	8470	8630	8790	8940	9080	9170	9250	126	169
	V1	88	88	87	87	87	87	87	87	87	87	86		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.3	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	5.9		
29000	TOFL	7710	7860	8020	8190	8340	8490	8660	8790	8930	9040	9130	123	166
	V1	88	88	87	87	87	87	87	87	87	87	86		
	VR	115	116	116	116	116	116	116	116	116	116	116		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.8	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.4		
28000	TOFL	7590	7730	7900	8050	8200	8370	8520	8660	8800	8920	9000	120	163
	V1	88	88	87	87	87	87	87	87	87	87	86		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.3	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7	6.9		
27000	TOFL	7480	7600	7760	7920	8070	8220	8390	8510	8660	8790	8870	117	160
	V1	88	88	87	87	87	87	87	87	87	87	86		
	VR	107	108	108	108	108	108	108	108	108	108	108		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.8	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
26000	TOFL	7370	7480	7630	7780	7930	8080	8230	8370	8520	8660	8740	114	157
	V1	88	88	88	87	87	87	87	87	87	87	86		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	8.4	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	7.9		

FIGURE 10-8-171. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	17580											148	193
	V1	126												
	VR	152												
	V2	154												
	GR2	2.6												
37000	TOFL	16200	17220										145	190
	V1	120	123											
	VR	149	149											
	V2	151	151											
	GR2	2.9	2.6											
36000	TOFL	14870	15860	17030									143	187
	V1	114	117	120										
	VR	145	146	147										
	V2	147	148	148										
	GR2	3.2	2.9	2.6										
35000	TOFL	13620	14520	15650									140	185
	V1	108	111	114										
	VR	141	142	143										
	V2	144	144	145										
	GR2	3.6	3.2	2.9										
34000	TOFL	12440	13290	14340									137	182
	V1	102	105	109										
	VR	137	138	139										
	V2	140	141	142										
	GR2	3.9	3.6	3.3										
33000	TOFL	11330	12120	13090									134	179
	V1	96	99	103										
	VR	133	134	135										
	V2	136	137	138										
	GR2	4.3	4	3.6										
32000	TOFL	10280	11010	11920									131	176
	V1	90	93	97										
	VR	129	130	132										
	V2	133	133	135										
	GR2	4.7	4.3	4										
31000	TOFL	9390	9970	10810									128	173
	V1	85	87	91										
	VR	124	126	128										
	V2	129	130	131										
	GR2	5.1	4.7	4.4										

FIGURE 10-8-171. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
30000	TOFL	9270	9320	9760									126	169
	V1	85	85	85										
	VR	120	121	123										
	V2	126	126	127										
	GR2	5.5	5.2	4.8										
29000	TOFL	9150	9190	9290									123	166
	V1	85	84	83										
	VR	116	117	119										
	V2	122	122	124										
	GR2	6	5.6	5.3										
28000	TOFL	9030	9070	9170									120	163
	V1	85	84	83										
	VR	112	113	115										
	V2	118	119	120										
	GR2	6.5	6.1	5.7										
27000	TOFL	8900	8940	9040									117	160
	V1	85	84	83										
	VR	108	109	111										
	V2	115	115	117										
	GR2	7	6.6	6.2										
26000	TOFL	8770	8810	8910									114	157
	V1	85	84	83										
	VR	104	105	107										
	V2	111	112	113										
	GR2	7.5	7.1	6.8										

FIGURE 10-8-172. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	16280	16900	17470	17850	18240	18710	19100	19370	19700			152	197
	V1	133	135	136	136	136	136	136	136	136				
	VR	159	159	159	159	159	159	159	159	159				
	V2	160	161	161	161	161	161	161	161	161				
	GR2	2.7	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4				
38000	TOFL	14980	15540	16060	16410	16770	17200	17550	17800	18110	18520	19140	149	194
	V1	127	129	129	129	129	129	129	129	129	130	131		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	3	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.5		
37000	TOFL	13790	14290	14760	15080	15410	15810	16130	16360	16640	17020	17590	147	191
	V1	121	122	123	123	123	123	123	123	123	124	125		
	VR	151	151	152	152	152	152	152	152	152	152	152		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.3	3.2	3.1	3.1	3.1	3	3	3	3	3	2.8		
36000	TOFL	12630	13120	13570	13860	14160	14520	14820	15030	15280	15640	16160	144	188
	V1	115	116	117	117	117	117	117	117	117	118	119		
	VR	147	147	148	148	148	148	148	148	148	148	148		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.6	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.1		
35000	TOFL	11530	11970	12400	12660	12940	13280	13550	13730	13960	14290	14770	141	185
	V1	109	110	111	111	111	111	111	111	111	111	113		
	VR	143	143	144	144	144	144	144	144	144	144	144		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	3.8	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.4		
34000	TOFL	10520	10930	11290	11540	11790	12100	12340	12510	12720	13020	13450	138	182
	V1	102	104	105	105	105	105	105	105	105	105	106		
	VR	138	139	139	140	140	140	140	140	140	140	140		
	V2	142	143	143	143	143	143	143	143	143	143	142		
	GR2	4.3	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4	3.8		
33000	TOFL	9580	9950	10290	10510	10740	11020	11240	11390	11570	11850	12250	135	179
	V1	96	98	98	98	98	99	99	99	99	99	100		
	VR	134	135	135	135	135	135	135	135	135	135	135		
	V2	138	139	139	139	139	139	139	139	139	139	139		
	GR2	4.7	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.1		
32000	TOFL	8700	9030	9340	9540	9750	10000	10200	10340	10510	10760	11120	133	176
	V1	90	92	92	92	92	93	93	93	93	93	94		
	VR	130	131	131	131	131	131	131	131	131	131	131		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.1	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.5		
31000	TOFL	8100	8260	8450	8640	8820	9070	9250	9350	9500	9740	10060	130	173
	V1	86	86	86	86	86	87	87	87	87	87	88		
	VR	126	126	127	127	127	127	127	127	127	127	127		
	V2	131	131	132	132	132	132	132	132	132	132	131		
	GR2	5.6	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	4.9		

FIGURE 10-8-172. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
30000	TOFL	7990	8150	8330	8480	8650	8820	8980	9120	9230	9340	9400	127	170
	V1	86	86	86	86	86	86	86	86	85	85	84		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	127	128	128	128	128	128	128	128	128	128	128		
	GR2	6	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.6	5.4		
29000	TOFL	7880	8010	8190	8360	8510	8690	8850	8980	9100	9210	9280	124	167
	V1	86	86	86	86	86	86	86	86	85	85	84		
	VR	117	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.5	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	5.8		
28000	TOFL	7780	7890	8070	8220	8380	8540	8700	8850	8980	9090	9150	121	164
	V1	86	86	86	86	86	86	86	86	85	85	84		
	VR	113	114	114	114	114	114	114	114	114	114	114		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	6.9	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.3		
27000	TOFL	7670	7770	7930	8090	8240	8410	8560	8690	8850	8960	9020	118	160
	V1	87	86	86	86	86	86	86	86	86	85	85		
	VR	109	109	110	110	110	110	110	110	110	110	110		
	V2	117	117	117	117	117	117	117	117	117	117	116		
	GR2	7.5	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	6.8		
26000	TOFL	7560	7660	7800	7960	8120	8270	8420	8570	8720	8830	8890	115	157
	V1	87	86	86	86	86	86	86	86	86	85	85		
	VR	105	105	106	106	106	106	106	106	106	106	106		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.6	7.3		

FIGURE 10-8-173. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	18560											147	191
	V1	127												
	VR	152												
	V2	153												
	GR2	2.5												
36000	TOFL	17040	18280										144	188
	V1	121	124											
	VR	148	149											
	V2	150	151											
	GR2	2.8	2.5											
35000	TOFL	15600	16760	18030									141	185
	V1	115	118	122										
	VR	144	145	146										
	V2	146	147	148										
	GR2	3.1	2.8	2.5										
34000	TOFL	14210	15350	16500									138	182
	V1	109	112	116										
	VR	140	142	143										
	V2	143	144	144										
	GR2	3.4	3.1	2.8										
33000	TOFL	12940	13940	15070									135	179
	V1	103	106	109										
	VR	136	137	139										
	V2	139	140	141										
	GR2	3.8	3.5	3.2										
32000	TOFL	11750	12680	13730									133	176
	V1	96	100	103										
	VR	132	133	135										
	V2	135	136	137										
	GR2	4.2	3.8	3.5										
31000	TOFL	10650	11490	12430									130	173
	V1	90	94	97										
	VR	128	129	131										
	V2	131	133	134										
	GR2	4.6	4.2	3.9										

FIGURE 10-8-173. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
30000	TOFL	9610	10390	11240									127	170
	V1	84	88	91										
	VR	123	125	127										
	V2	128	129	130										
	GR2	5	4.7	4.3										
29000	TOFL	9330	9400	10130									124	167
	V1	83	82	85										
	VR	119	121	123										
	V2	124	125	126										
	GR2	5.4	5.1	4.8										
28000	TOFL	9200	9270	9370									121	164
	V1	83	82	81										
	VR	115	116	118										
	V2	120	121	123										
	GR2	5.9	5.5	5.2										
27000	TOFL	9070	9140	9240									118	160
	V1	83	82	81										
	VR	111	112	114										
	V2	117	118	119										
	GR2	6.4	6	5.7										
26000	TOFL	8940	9010	9110									115	157
	V1	84	82	81										
	VR	106	108	110										
	V2	113	114	115										
	GR2	6.9	6.6	6.2										

FIGURE 10-8-174. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	6890	7020	7140	7250	7380	7510	7630	7770	7910	8020	8150	139	192
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.8		
39000	TOFL	6840	6970	7080	7200	7320	7460	7590	7720	7840	7970	8080	138	191
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	128	127	127	127	127	127	127	127	127	127	127		
	V2	136	136	135	135	135	135	135	135	135	135	135		
	GR2	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6		
38000	TOFL	6750	6870	7000	7120	7230	7370	7490	7620	7750	7860	7990	136	188
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	125	125	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	6680	6790	6900	7030	7150	7270	7400	7530	7660	7770	7900	135	185
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
36000	TOFL	6580	6710	6820	6930	7040	7170	7310	7440	7560	7670	7790	133	182
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	130	130	130	130	130	130	130	130	130		
	GR2	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.2		
35000	TOFL	6480	6610	6720	6840	6960	7080	7200	7330	7450	7570	7680	131	180
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.4	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
34000	TOFL	6400	6510	6640	6740	6850	6980	7110	7240	7340	7460	7580	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.9	7.9	8	8	8.1	8.1	8	8	8	8	8.1		
33000	TOFL	6300	6420	6530	6630	6750	6870	7000	7130	7250	7350	7470	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.4	8.5	8.5	8.5	8.6	8.6	8.6	8.5	8.5	8.6	8.6		
32000	TOFL	6200	6320	6430	6540	6640	6770	6890	7010	7130	7240	7350	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	6110	6230	6320	6430	6550	6660	6780	6900	7020	7130	7240	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	123	123	123	123	123	123	123	123	123		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		

FIGURE 10-8-174. TAKE-OFF DATA; FLAPS - 20°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
30000	TOFL	6010	6120	6220	6320	6430	6550	6670	6780	6910	7010	7120	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	122	122	122	122	122	122	122	122		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.4		
29000	TOFL	5900	6000	6120	6210	6310	6430	6550	6680	6790	6880	7000	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	121	121	121	121	121	121	121		
	GR2	10.8	10.9	10.9	10.9	11	11	11	11	11	11	11		
28000	TOFL	5780	5890	5990	6100	6200	6320	6440	6560	6670	6760	6870	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.5	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
27000	TOFL	5680	5770	5880	5970	6080	6190	6300	6430	6540	6650	6740	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.3	12.3	12.4	12.4	12.5	12.5	12.4	12.4	12.4	12.4	12.5		
26000	TOFL	5560	5660	5750	5850	5960	6070	6170	6300	6410	6500	6610	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	102	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.1	13.2	13.2	13.3	13.3	13.3	13.2	13.2	13.3	13.3		

FIGURE 10-8-175. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	7070	7190	7320	7440	7570	7720	7850	7980	8130	8240	8380	139	193
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	7020	7130	7260	7390	7520	7660	7800	7930	8060	8180	8320	138	191
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	136	136	136	136	136	136	136	136	136		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	6930	7050	7180	7300	7430	7570	7690	7830	7970	8080	8210	136	188
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
37000	TOFL	6840	6970	7080	7210	7340	7460	7610	7740	7860	7990	8120	135	185
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.5		
36000	TOFL	6750	6870	7000	7100	7230	7380	7510	7650	7770	7900	8000	133	183
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9		
35000	TOFL	6650	6780	6890	7020	7150	7270	7400	7530	7660	7780	7910	131	180
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
34000	TOFL	6570	6680	6810	6910	7040	7180	7310	7430	7550	7670	7790	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
33000	TOFL	6470	6590	6700	6830	6950	7070	7190	7330	7450	7570	7690	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	125	125	125	125	125	125	125	125		
	GR2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.3	8.3		
32000	TOFL	6360	6480	6600	6720	6840	6950	7080	7210	7340	7450	7570	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	6270	6390	6490	6610	6730	6860	6970	7090	7220	7340	7450	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		

FIGURE 10-8-175. TAKE-OFF DATA; FLAPS - 20°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
30000	TOFL	6160	6280	6380	6500	6610	6750	6860	7000	7110	7230	7340	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.9	9.9	10	10	10	10	10	10	10	10	10		
29000	TOFL	6060	6170	6280	6390	6510	6630	6740	6860	6990	7100	7200	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.7		
28000	TOFL	5940	6050	6160	6260	6370	6500	6620	6750	6860	6980	7080	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.3	11.3	11.4	11.4		
27000	TOFL	5830	5940	6040	6150	6260	6380	6500	6620	6740	6840	6950	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12	12	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	5700	5810	5920	6010	6120	6250	6360	6490	6600	6710	6820	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.8	12.8	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 10-8-176. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	7230	7360	7490	7620	7760	7900	8040	8170	8300	8430	8570	140	193
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	TOFL	7170	7320	7450	7580	7710	7850	7970	8110	8260	8370	8500	139	191
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.5		
38000	TOFL	7090	7210	7350	7470	7610	7740	7880	8010	8150	8270	8400	137	189
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	7000	7130	7250	7390	7520	7650	7790	7920	8040	8170	8310	135	186
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
36000	TOFL	6900	7040	7170	7300	7420	7550	7690	7820	7940	8080	8190	133	183
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
35000	TOFL	6820	6940	7060	7190	7330	7440	7570	7700	7850	7960	8080	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
34000	TOFL	6710	6850	6970	7090	7220	7350	7480	7610	7730	7850	7980	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.4	7.4	7.4	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.5		
33000	TOFL	6630	6740	6870	6990	7120	7230	7360	7490	7620	7740	7850	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8		
32000	TOFL	6520	6640	6760	6880	7010	7140	7250	7370	7510	7630	7730	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
31000	TOFL	6420	6540	6650	6770	6900	7020	7150	7270	7390	7500	7630	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9	9	9	9.1	9.1	9.1	9	9	9	9	9.1		

FIGURE 10-8-176. TAKE-OFF DATA; FLAPS - 20°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
30000	TOFL	6310	6430	6550	6670	6780	6910	7030	7150	7270	7390	7500	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.7		
29000	TOFL	6210	6310	6430	6540	6660	6790	6910	7030	7140	7260	7370	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	120	120	120	120	120	120	120	120	120		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	6100	6200	6310	6430	6550	6680	6800	6920	7020	7130	7250	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	11	11	11	11	11	11	11	11	11	11	11		
27000	TOFL	5970	6100	6200	6310	6430	6530	6650	6770	6900	7010	7120	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.8		
26000	TOFL	5860	5960	6070	6180	6300	6420	6540	6650	6770	6860	6980	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5		

FIGURE 10-8-177. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	7410	7540	7680	7820	7950	8090	8240	8380	8510	8640	8770	141	193
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	5	5	5	5	5	5	5	5	5	5	5		
39000	TOFL	7360	7490	7630	7760	7900	8040	8180	8320	8460	8580	8710	140	192
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	7260	7400	7540	7670	7810	7940	8080	8220	8350	8480	8600	137	189
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
37000	TOFL	7180	7300	7440	7580	7700	7840	7980	8100	8240	8380	8500	135	186
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	7080	7220	7340	7470	7610	7750	7870	8010	8140	8260	8400	133	183
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
35000	TOFL	6990	7110	7250	7370	7510	7640	7770	7910	8040	8160	8280	131	181
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
34000	TOFL	6890	7020	7140	7270	7410	7530	7670	7790	7930	8050	8160	129	178
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
33000	TOFL	6790	6910	7050	7170	7300	7430	7560	7680	7810	7930	8060	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	6690	6810	6940	7060	7190	7320	7440	7570	7700	7820	7930	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	123		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	6580	6710	6830	6950	7080	7200	7330	7460	7580	7700	7820	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.7	8.7		

FIGURE 10-8-177. TAKE-OFF DATA; FLAPS - 20°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
30000	TOFL	6470	6600	6710	6840	6960	7090	7220	7340	7460	7570	7690	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.2	9.2	9.3	9.3		
29000	TOFL	6360	6490	6610	6730	6840	6970	7100	7220	7350	7450	7560	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	6240	6370	6490	6600	6720	6850	6970	7090	7220	7320	7430	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
27000	TOFL	6140	6240	6370	6480	6600	6720	6840	6960	7090	7190	7300	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
26000	TOFL	6000	6120	6240	6360	6480	6590	6710	6820	6940	7050	7170	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		

FIGURE 10-8-178. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	7610	7740	7880	8030	8160	8310	8450	8590	8740	8870	9000	142	194
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.8	4.8		
39000	TOFL	7540	7680	7840	7970	8110	8250	8400	8540	8670	8820	8950	141	192
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	5	5	5	5	5	4.9	4.9	4.9	4.9	4.9	5		
38000	TOFL	7460	7590	7730	7880	8000	8150	8290	8440	8570	8710	8850	138	189
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	7360	7500	7640	7780	7910	8060	8200	8330	8470	8610	8730	136	187
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.7		
36000	TOFL	7270	7410	7540	7680	7820	7960	8080	8220	8370	8480	8620	133	184
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
35000	TOFL	7170	7310	7450	7570	7710	7850	7980	8120	8250	8380	8510	131	181
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
34000	TOFL	7080	7210	7340	7480	7600	7740	7880	8010	8140	8270	8400	129	178
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
33000	TOFL	6970	7100	7250	7370	7500	7630	7770	7900	8030	8150	8270	127	175
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.3	7.3		
32000	TOFL	6860	7000	7130	7270	7390	7520	7660	7790	7910	8040	8170	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
31000	TOFL	6770	6890	7020	7150	7290	7400	7530	7660	7790	7910	8040	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 10-8-178. TAKE-OFF DATA; FLAPS - 20°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
30000	TOFL	6660	6780	6920	7030	7170	7290	7420	7550	7670	7800	7900	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
29000	TOFL	6540	6670	6800	6910	7040	7170	7290	7420	7550	7670	7790	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
28000	TOFL	6430	6550	6670	6790	6920	7050	7160	7290	7420	7530	7650	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.2	10.2		
27000	TOFL	6300	6430	6550	6680	6800	6910	7040	7160	7290	7410	7520	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	6180	6300	6430	6530	6660	6780	6900	7030	7150	7250	7370	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.7	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7		

FIGURE 10-8-179. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	7740	7890	8040	8200	8350	8510	8670	8840	8990	9110	9250	143	194
	V1	98	98	98	98	98	98	98	98	98	97	97		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
39000	TOFL	7750	7880	8040	8180	8330	8480	8620	8750	8910	9040	9170	142	193
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
38000	TOFL	7650	7790	7940	8090	8240	8380	8520	8670	8800	8940	9080	139	190
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5	5	5.1		
37000	TOFL	7560	7700	7830	7990	8140	8280	8430	8560	8700	8840	8950	137	187
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
36000	TOFL	7450	7600	7740	7890	8030	8170	8330	8450	8590	8720	8840	134	184
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.8		
35000	TOFL	7360	7510	7650	7770	7930	8070	8210	8340	8490	8600	8730	132	181
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.2	6.2		
34000	TOFL	7260	7400	7530	7680	7820	7950	8100	8240	8370	8490	8620	129	178
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.6	6.6		
33000	TOFL	7150	7310	7430	7580	7710	7850	7990	8110	8250	8380	8490	127	176
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
32000	TOFL	7060	7190	7320	7460	7600	7730	7870	8010	8140	8250	8370	125	173
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.5		
31000	TOFL	6930	7060	7210	7330	7480	7630	7740	7880	8010	8130	8240	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	8	8	8	8	8	8	8	7.9	7.9	7.9	8		

FIGURE 10-8-179. TAKE-OFF DATA; FLAPS - 20°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
30000	TOFL	6820	6960	7090	7220	7350	7480	7640	7760	7890	8010	8120	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.5	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.6		
29000	TOFL	6700	6840	6960	7100	7240	7370	7500	7620	7760	7850	7970	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.1	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9.2		
28000	TOFL	6580	6730	6840	6980	7120	7240	7370	7490	7620	7730	7830	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	6470	6600	6730	6860	6980	7110	7240	7360	7480	7590	7690	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	6350	6470	6600	6720	6850	6970	7100	7230	7340	7450	7560	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.2	11.2	11.3	11.3		

FIGURE 10-8-180. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	8510	8660	8810	8990	9160	9330	9510	9690	9850	9990	10140	144	195
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.3		
39000	TOFL	8130	8270	8420	8580	8740	8910	9080	9250	9410	9540	9680	143	193
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
38000	TOFL	7830	7980	8120	8280	8410	8570	8710	8870	9000	9150	9250	140	190
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
37000	TOFL	7740	7880	8030	8180	8320	8470	8620	8750	8900	9040	9140	138	187
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
36000	TOFL	7640	7780	7930	8080	8220	8360	8500	8650	8790	8930	9020	135	185
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.5	5.5		
35000	TOFL	7540	7690	7830	7960	8110	8260	8390	8530	8680	8810	8910	133	182
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	125	125	125	125	125	125	125	125	125	125	124		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	5.8	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.9		
34000	TOFL	7450	7570	7730	7860	8010	8140	8280	8430	8550	8700	8790	130	179
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.3	6.3		
33000	TOFL	7340	7480	7620	7760	7890	8030	8180	8300	8440	8580	8670	127	176
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
32000	TOFL	7230	7360	7510	7640	7790	7910	8050	8190	8320	8440	8540	125	173
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
31000	TOFL	7130	7260	7400	7530	7660	7800	7930	8070	8200	8330	8430	123	170
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		

FIGURE 10-8-180. TAKE-OFF DATA; FLAPS - 20°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
30000	TOFL	7010	7140	7280	7420	7550	7670	7810	7940	8080	8190	8290	121	167
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	8.1	8.1	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.2		
29000	TOFL	6890	7020	7160	7290	7430	7550	7680	7820	7940	8080	8150	119	164
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.7	8.8	8.8	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.8		
28000	TOFL	6770	6900	7050	7160	7300	7430	7550	7680	7820	7940	8030	117	161
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
27000	TOFL	6640	6770	6920	7030	7170	7300	7410	7540	7680	7790	7880	115	158
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10.1	10.1		
26000	TOFL	6530	6660	6780	6900	7030	7150	7280	7400	7530	7650	7740	113	155
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-181. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	9340	9500	9680	9870	10060	10250	10440	10650	10830	10980	11150	145	195
	V1	106	106	105	105	105	105	105	105	105	105	105		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	4	4	4	4	4	4	4	4	4	4	4		
39000	TOFL	8920	9060	9240	9420	9600	9780	9960	10160	10330	10480	10640	144	193
	V1	103	102	102	102	102	102	102	102	102	102	102		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.2	4.2		
38000	TOFL	8240	8380	8540	8710	8870	9040	9210	9390	9550	9680	9830	141	191
	V1	98	97	97	97	97	97	97	97	97	97	97		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
37000	TOFL	7910	8070	8210	8370	8520	8670	8820	8960	9120	9230	9310	139	188
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
36000	TOFL	7820	7970	8110	8250	8410	8570	8710	8850	9010	9120	9180	136	185
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
35000	TOFL	7710	7860	8010	8150	8310	8450	8600	8740	8880	9000	9070	134	182
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.6	5.6		
34000	TOFL	7620	7750	7890	8040	8200	8330	8490	8630	8770	8890	8950	131	179
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.9	6	6	6	6	6	5.9	5.9	5.9	5.9	6		
33000	TOFL	7500	7650	7790	7940	8080	8230	8370	8500	8650	8770	8820	128	176
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.4	6.4		
32000	TOFL	7410	7530	7680	7820	7960	8100	8250	8380	8540	8640	8690	126	173
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
31000	TOFL	7290	7430	7570	7710	7850	7990	8140	8270	8400	8510	8580	123	170
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.3	7.3		

FIGURE 10-8-181. TAKE-OFF DATA; FLAPS - 20°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
30000	TOFL	7170	7310	7440	7590	7730	7860	8000	8130	8290	8380	8430	121	167
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.8	7.8		
29000	TOFL	7070	7180	7330	7460	7600	7750	7870	8000	8150	8260	8290	119	164
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8.3	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.4		
28000	TOFL	6940	7060	7210	7350	7480	7620	7750	7880	8010	8110	8170	117	161
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.9	9	9	9	9	9	8.9	8.9	8.9	8.9	9		
27000	TOFL	6820	6940	7080	7220	7340	7480	7620	7740	7870	7970	8020	115	158
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.6	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.7		
26000	TOFL	6690	6810	6950	7070	7210	7340	7470	7600	7720	7830	7900	113	155
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.3	10.4	10.4		

FIGURE 10-8-182. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	10230	10400	10620	10820	11040	11240	11460	11680	11880	12050	12270	147	195
	V1	110	109	109	109	109	109	109	109	109	109	109		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		
39000	TOFL	9780	9950	10150	10350	10550	10750	10950	11170	11360	11510	11720	145	194
	V1	107	106	106	106	106	106	106	106	106	106	106		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
38000	TOFL	9040	9190	9380	9560	9750	9930	10120	10320	10500	10640	10830	142	191
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2		
37000	TOFL	8340	8480	8650	8820	8990	9160	9330	9510	9680	9810	9990	140	188
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5		
36000	TOFL	8010	8170	8330	8470	8620	8770	8930	9090	9240	9340	9320	137	185
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
35000	TOFL	7920	8060	8210	8360	8520	8660	8810	8970	9120	9230	9200	135	183
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	128	128	128	128	128	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.2	5.3	5.3		
34000	TOFL	7810	7960	8090	8250	8390	8550	8700	8850	9000	9100	9080	132	180
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6		
33000	TOFL	7710	7840	7990	8140	8290	8440	8570	8720	8870	8980	8960	129	177
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6.1	6.1		
32000	TOFL	7590	7740	7890	8020	8170	8310	8460	8610	8760	8850	8830	127	174
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
31000	TOFL	7490	7610	7760	7910	8040	8190	8340	8480	8620	8730	8690	124	171
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	6.9	7	7	7	6.9	6.9	6.9	6.9	6.9	6.9	6.9		

FIGURE 10-8-182. TAKE-OFF DATA; FLAPS - 20°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
30000	TOFL	7370	7500	7650	7780	7930	8070	8210	8350	8500	8590	8580	121	168
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
29000	TOFL	7240	7380	7530	7650	7800	7940	8080	8230	8360	8460	8460	119	165
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	107	107	107	107	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	8	8	8	8	8	7.9	7.9	7.9	7.9	7.9	7.9		
28000	TOFL	7130	7250	7400	7540	7660	7800	7950	8080	8220	8320	8350	117	161
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5		
27000	TOFL	7010	7120	7260	7400	7540	7670	7810	7950	8090	8170	8230	115	158
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	114	114	114	114	114	114	114	114	114	114	114		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
26000	TOFL	6870	6990	7130	7270	7410	7530	7670	7810	7940	8020	8100	113	155
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		

FIGURE 10-8-183. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	11250	11470	11700	11940	12170	12400	12660	12910	13130	13290	13670	148	196
	V1	114	114	114	114	114	114	114	114	114	114	115		
	VR	147	147	147	147	147	147	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.3		
39000	TOFL	10740	10950	11170	11390	11620	11840	12070	12310	12510	12690	13060	146	194
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5		
38000	TOFL	9940	10130	10340	10540	10750	10950	11170	11380	11570	11730	12080	144	191
	V1	105	105	105	105	105	105	105	106	106	106	106		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	4	4	4	4	3.9	3.9	3.9	3.9	3.9	3.9	3.8		
37000	TOFL	9180	9360	9550	9730	9920	10110	10310	10510	10690	10830	11150	141	189
	V1	100	100	100	100	100	100	100	100	100	100	101		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2		
36000	TOFL	8430	8590	8770	8940	9110	9280	9460	9650	9810	9940	10240	138	186
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	134	134	134	134	134	134	134	134	134	134	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	4.7	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5		
35000	TOFL	8120	8290	8440	8600	8740	8910	9070	9230	9350	9370	9400	136	183
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	5	5	5	5	5	5	5	4.9	4.9	5	4.8		
34000	TOFL	8010	8160	8320	8480	8630	8790	8940	9090	9230	9250	9230	133	180
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.4	5.2		
33000	TOFL	7910	8060	8220	8370	8520	8680	8810	8980	9100	9120	9110	130	177
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.6		
32000	TOFL	7790	7950	8090	8250	8400	8550	8700	8850	8960	9000	9000	127	174
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	119	119	119	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6		
31000	TOFL	7680	7830	7980	8140	8270	8430	8580	8730	8840	8870	8880	125	171
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5		

FIGURE 10-8-183. TAKE-OFF DATA; FLAPS - 20°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
30000	TOFL	7560	7710	7850	8000	8160	8300	8440	8590	8720	8730	8770	122	168
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.9		
29000	TOFL	7450	7580	7730	7890	8020	8170	8310	8470	8580	8590	8650	119	165
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.4		
28000	TOFL	7320	7460	7610	7750	7900	8040	8180	8320	8440	8450	8530	117	162
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8		
27000	TOFL	7190	7340	7470	7620	7760	7900	8040	8180	8300	8310	8410	115	159
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.6		
26000	TOFL	7060	7200	7340	7480	7620	7760	7890	8030	8150	8190	8280	113	155
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	112	112	112	112		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4	9.5	9.3		

FIGURE 10-8-184. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	12390	12650	12910	13170	13420	13680	13950	14240	14470	14670	15320	149	196
	V1	118	118	118	118	118	118	118	118	118	118	120		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	3.2	2.9		
39000	TOFL	11850	12090	12340	12590	12830	13080	13330	13610	13830	14020	14650	147	194
	V1	115	115	115	115	115	115	115	115	115	115	117		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.1		
38000	TOFL	10940	11170	11390	11620	11850	12080	12310	12570	12780	12950	13550	145	192
	V1	110	110	110	110	110	110	110	110	110	110	112		
	VR	144	144	144	144	144	144	144	144	144	144	145		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.7	3.4		
37000	TOFL	10100	10310	10510	10730	10930	11140	11360	11590	11780	11950	12500	142	189
	V1	104	104	104	104	104	104	104	104	104	104	106		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	4	4	4	4	4	4	4	4	4	4	3.7		
36000	TOFL	9290	9490	9680	9870	10060	10260	10450	10670	10840	10990	11520	139	186
	V1	99	99	99	99	99	99	99	99	99	99	101		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4		
35000	TOFL	8510	8690	8860	9040	9210	9390	9570	9760	9930	10060	10550	137	183
	V1	93	93	93	93	93	93	93	93	93	93	95		
	VR	133	133	133	133	133	133	133	133	133	133	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.4		
34000	TOFL	8250	8400	8570	8720	8870	9040	9200	9340	9420	9390	9660	134	180
	V1	91	91	91	91	91	91	91	91	91	89	90		
	VR	129	129	129	129	129	129	129	129	129	129	130		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5.1	4.8		
33000	TOFL	8140	8290	8450	8600	8760	8910	9060	9220	9290	9250	9280	131	177
	V1	91	91	91	91	91	91	91	91	91	89	88		
	VR	125	125	125	125	125	125	125	125	125	125	126		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.1		
32000	TOFL	8020	8180	8320	8480	8640	8790	8930	9080	9160	9130	9170	128	175
	V1	91	91	91	91	91	91	91	91	91	89	88		
	VR	121	121	121	121	121	121	121	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.5		
31000	TOFL	7910	8070	8210	8370	8500	8660	8810	8960	9040	9010	9050	126	172
	V1	91	91	91	91	91	91	91	91	91	89	88		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	5.9		

FIGURE 10-8-184. TAKE-OFF DATA; FLAPS - 20°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
30000	TOFL	7780	7940	8100	8230	8390	8540	8690	8830	8900	8900	8940	123	168
	V1	91	91	91	91	91	91	91	91	91	89	88		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.4		
29000	TOFL	7670	7820	7960	8110	8270	8400	8550	8690	8760	8780	8820	120	165
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	110	110	110	110	110	110	110	110	110	110	111		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	6.9		
28000	TOFL	7540	7690	7830	7980	8130	8280	8400	8560	8620	8650	8690	117	162
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.4		
27000	TOFL	7410	7560	7710	7840	7980	8130	8280	8410	8470	8530	8570	115	159
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	113	113	113	113	113	113	113	113	113	113	113		
	GR2	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.3	8.3	7.9		
26000	TOFL	7270	7420	7570	7710	7840	7980	8130	8260	8330	8400	8440	113	156
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	112	112	112	112	112	112	112	111	111	111	111		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9	9	9	8.6		

FIGURE 10-8-185. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	13740	14030	14320	14610	14900	15190	15500	15810	16090	16530		150	197
	V1	123	123	123	123	123	123	124	124	124	124			
	VR	152	152	152	152	153	153	153	153	153	153			
	V2	155	155	155	155	155	155	155	155	155	155			
	GR2	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.7			
39000	TOFL	13130	13410	13680	13960	14240	14520	14810	15100	15370	15800	16710	148	195
	V1	120	120	120	120	120	120	120	120	120	121	124		
	VR	150	150	150	150	150	150	151	151	151	151	151		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	3.1	3.1	3.1	3.1	3.1	3	3	3	3	2.9	2.6		
38000	TOFL	12150	12400	12660	12920	13170	13430	13700	13980	14230	14630	15470	146	192
	V1	115	115	115	115	115	115	115	115	115	116	118		
	VR	147	147	147	147	147	147	147	147	147	147	148		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.3	3.2	2.9		
37000	TOFL	11200	11430	11660	11900	12130	12370	12620	12870	13110	13490	14310	143	189
	V1	109	109	109	109	109	109	109	109	109	110	113		
	VR	143	143	143	143	143	143	143	143	143	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.5	3.2		
36000	TOFL	10300	10520	10730	10950	11160	11380	11610	11840	12070	12410	13160	140	187
	V1	103	103	103	103	104	104	104	104	104	105	107		
	VR	140	140	140	140	140	140	140	140	140	140	141		
	V2	143	143	143	143	143	143	143	143	143	143	144		
	GR2	4.1	4.1	4.1	4.1	4.1	4	4	4	4	3.9	3.5		
35000	TOFL	9450	9650	9840	10040	10240	10440	10640	10860	11070	11390	12090	138	184
	V1	98	98	98	98	98	98	98	98	98	99	102		
	VR	136	136	136	136	136	136	136	136	136	136	137		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.2	3.9		
34000	TOFL	8630	8800	8980	9160	9340	9520	9710	9910	10100	10400	11070	135	181
	V1	92	92	92	92	92	92	92	92	92	93	96		
	VR	132	132	132	132	132	132	132	132	132	132	133		
	V2	136	136	136	136	136	136	136	136	136	136	137		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.6	4.3		
33000	TOFL	8340	8490	8650	8820	8970	9130	9280	9380	9410	9490	10090	132	178
	V1	90	90	90	90	90	90	90	89	88	88	90		
	VR	128	128	128	128	128	128	128	128	128	128	129		
	V2	133	133	133	133	133	133	133	133	133	133	134		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	4.9	4.6		
32000	TOFL	8210	8380	8530	8690	8840	9000	9160	9260	9290	9310	9370	129	175
	V1	90	90	90	90	90	90	90	89	88	87	86		
	VR	124	124	124	124	124	124	124	124	124	124	125		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.3	5		
31000	TOFL	8090	8250	8420	8560	8720	8880	9030	9120	9140	9190	9250	127	172
	V1	90	90	90	90	90	90	90	89	88	88	86		
	VR	120	120	120	120	120	120	120	120	120	120	121		
	V2	126	126	126	126	126	126	126	126	126	126	127		
	GR2	6.1	6.1	6.1	6.1	6	6	6	6	5.9	5.8	5.4		

FIGURE 10-8-185. TAKE-OFF DATA; FLAPS - 20°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
30000	TOFL	7980	8120	8280	8440	8600	8740	8890	9000	9010	9070	9130	124	169
	V1	90	90	90	90	90	90	90	89	88	88	87		
	VR	116	116	116	116	116	116	116	116	116	116	117		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.2	5.9		
29000	TOFL	7850	8000	8160	8300	8460	8610	8750	8850	8870	8950	9010	121	166
	V1	90	90	90	90	90	90	90	89	88	88	87		
	VR	112	112	112	112	112	112	112	112	112	113	113		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	7	7	7	7	7	7	6.9	6.9	6.8	6.7	6.3		
28000	TOFL	7730	7870	8020	8180	8320	8470	8620	8720	8740	8820	8880	118	162
	V1	90	90	90	90	90	90	90	89	89	88	87		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	116	116	116	116	116	116	116	116	116	116	117		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.4	7.4	7.2	6.8		
27000	TOFL	7600	7750	7880	8030	8180	8320	8470	8560	8610	8700	8760	115	159
	V1	90	90	90	90	90	90	90	89	89	88	87		
	VR	105	105	105	105	105	105	105	105	105	105	106		
	V2	113	113	113	113	113	113	113	113	113	113	114		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8	8	7.9	7.7	7.3		
26000	TOFL	7460	7610	7760	7890	8030	8180	8320	8430	8490	8570	8630	113	156
	V1	90	90	90	90	90	90	90	89	89	88	87		
	VR	102	102	102	102	102	102	102	102	102	102	102		
	V2	111	111	111	111	111	111	111	111	111	111	111		
	GR2	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.6	8.5	8.3	7.9		

FIGURE 10-8-186. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	15300	15630	15960	16280	16610	16950	17300	17670				151	197
	V1	128	129	129	129	129	129	129	129					
	VR	155	155	155	155	155	155	155	155					
	V2	157	157	157	157	157	157	157	157					
	GR2	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.5					
39000	TOFL	14600	14910	15220	15530	15850	16160	16500	16850	17200	17940		150	196
	V1	125	125	125	125	125	125	126	126	126	128			
	VR	153	153	153	153	153	153	153	153	153	154			
	V2	155	155	155	155	155	155	155	155	155	155			
	GR2	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.5			
38000	TOFL	13490	13770	14060	14350	14640	14930	15240	15570	15890	16580	17730	147	193
	V1	119	120	120	120	120	120	120	120	120	122	125		
	VR	150	150	150	150	150	150	150	150	150	150	151		
	V2	152	152	152	152	152	152	152	152	152	152	153		
	GR2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3	3	2.8	2.5		
37000	TOFL	12440	12700	12970	13230	13500	13770	14050	14360	14670	15320	16360	144	190
	V1	114	114	114	114	114	114	114	115	115	117	120		
	VR	146	146	146	146	146	146	146	146	146	147	147		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.3	3.3	3.1	2.8		
36000	TOFL	11430	11670	11910	12150	12400	12650	12910	13190	13480	14090	15080	142	187
	V1	108	108	108	108	108	108	108	109	109	111	114		
	VR	142	142	142	142	142	142	143	143	143	143	144		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.7	3.6	3.4	3.1		
35000	TOFL	10480	10690	10930	11150	11380	11600	11840	12110	12380	12930	13860	139	184
	V1	102	102	102	102	103	103	103	103	103	105	108		
	VR	138	138	139	139	139	139	139	139	139	139	140		
	V2	142	142	142	142	142	142	142	142	142	142	143		
	GR2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4	4	3.7	3.4		
34000	TOFL	9580	9780	9980	10190	10390	10600	10810	11060	11310	11840	12700	136	181
	V1	96	96	96	97	97	97	97	97	98	100	103		
	VR	135	135	135	135	135	135	135	135	135	135	137		
	V2	139	139	139	139	139	139	139	139	139	139	140		
	GR2	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.4	4.3	4.1	3.8		
33000	TOFL	8730	8910	9090	9280	9460	9650	9850	10070	10310	10790	11610	133	178
	V1	91	91	91	91	91	91	91	91	92	94	97		
	VR	131	131	131	131	131	131	131	131	131	131	133		
	V2	135	135	135	135	135	135	135	135	135	135	136		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.7	4.4	4.1		
32000	TOFL	8410	8580	8740	8890	9060	9210	9360	9450	9440	9800	10560	130	175
	V1	89	89	89	89	89	89	88	88	88	88	91		
	VR	126	126	126	126	127	127	127	127	127	127	129		
	V2	132	132	132	132	132	132	132	132	132	132	133		
	GR2	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.2	5.1	4.8	4.5		
31000	TOFL	8290	8460	8620	8770	8930	9080	9240	9320	9310	9370	9560	128	172
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	122	122	123	123	123	123	123	123	123	123	125		
	V2	128	128	128	128	128	128	128	128	128	128	129		
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.6	5.5	5.3	4.9		

FIGURE 10-8-186. TAKE-OFF DATA; FLAPS - 20°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
30000	TOFL	8180	8330	8490	8640	8810	8960	9110	9180	9190	9250	9340	125	169
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	118	118	119	119	119	119	119	119	119	119	121		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.1	6	5.7	5.3		
29000	TOFL	8040	8190	8350	8520	8670	8820	8970	9040	9070	9120	9210	122	166
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	114	114	114	114	114	114	114	114	114	115	117		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6.1	5.8		
28000	TOFL	7910	8070	8210	8370	8530	8670	8810	8900	8940	9000	9080	119	163
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	111	111	111	111	111	111	111	111	111	111	113		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	7.3	7.3	7.2	7.2	7.2	7.2	7.2	7.1	6.9	6.6	6.3		
27000	TOFL	7780	7930	8080	8220	8380	8540	8680	8740	8810	8870	8950	116	160
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	107	107	107	107	107	107	107	107	107	107	109		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.6	7.5	7.1	6.8		
26000	TOFL	7640	7780	7940	8090	8240	8380	8520	8600	8680	8740	8820	113	156
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	103	103	103	103	103	103	103	103	103	103	105		
	V2	111	111	111	111	111	111	111	111	111	111	112		
	GR2	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.2	8	7.7	7.3		

FIGURE 10-8-187. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	16330	16690	17100	17510	17800	18100	18500						
	V1	131	131	131	131	131	131	131						
	VR	156	156	157	157	157	157	157					151	196
	V2	158	158	158	158	158	158	158						
	GR2	2.6	2.6	2.5	2.5	2.5	2.5	2.5						
38000	TOFL	15020	15350	15720	16090	16360	16630	16990	17430	17970				
	V1	125	125	125	125	125	125	125	126	127				
	VR	153	153	153	153	153	153	153	153	153			148	193
	V2	155	155	155	155	155	155	155	154	154				
	GR2	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.7	2.5				
37000	TOFL	13840	14140	14470	14820	15060	15310	15640	16050	16560	17500			
	V1	119	119	119	119	119	119	119	120	121	123			
	VR	149	149	149	149	149	149	149	149	149	150		145	190
	V2	151	151	151	151	151	151	151	151	151	151			
	GR2	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3	2.9	2.6			
36000	TOFL	12720	12990	13300	13620	13840	14070	14370	14750	15240	16110	17350		
	V1	113	113	113	113	113	113	114	114	115	118	121		
	VR	145	145	145	145	145	145	145	145	145	146	147	143	187
	V2	148	148	148	148	148	148	148	148	148	148	149		
	GR2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.3	3.2	2.9	2.6		
35000	TOFL	11650	11900	12180	12470	12670	12880	13160	13500	13960	14800	15900		
	V1	107	107	107	107	107	107	107	108	109	112	115		
	VR	141	141	141	141	141	141	141	141	142	142	143	140	185
	V2	144	144	144	144	144	144	144	144	144	145	145		
	GR2	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.7	3.5	3.2	2.9		
34000	TOFL	10650	10880	11140	11400	11580	11780	12030	12340	12770	13530	14600		
	V1	101	101	101	101	101	101	102	102	103	106	109		
	VR	137	138	138	138	138	138	138	138	138	139	140	137	182
	V2	141	141	141	141	141	141	141	141	141	141	142		
	GR2	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.1	3.9	3.6	3.3		
33000	TOFL	9700	9910	10140	10380	10550	10720	10950	11240	11640	12360	13330		
	V1	95	95	95	95	95	95	96	96	97	100	103		
	VR	133	133	133	133	133	133	133	134	134	135	136	134	179
	V2	137	137	137	137	137	137	137	137	137	138	139		
	GR2	4.7	4.7	4.6	4.6	4.6	4.6	4.6	4.5	4.2	3.9	3.6		
32000	TOFL	8820	9010	9220	9430	9580	9740	9940	10210	10580	11240	12140		
	V1	89	89	89	89	89	89	90	90	91	94	98		
	VR	129	129	129	129	129	129	129	129	130	131	132	131	176
	V2	134	134	134	134	134	134	134	134	134	134	135		
	GR2	5.1	5.1	5	5	5	5	5	4.9	4.6	4.3	4		
31000	TOFL	8500	8650	8830	8980	9130	9280	9380	9460	9580	10190	11020		
	V1	87	87	87	87	87	87	87	86	85	88	92		
	VR	125	125	125	125	125	125	125	125	125	126	128	128	173
	V2	130	130	130	130	130	130	130	130	130	131	132		
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.3	5	4.7	4.4		

FIGURE 10-8-187. TAKE-OFF DATA; FLAPS - 20°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
30000	TOFL	8370	8530	8690	8860	9010	9150	9240	9330	9370	9410	9970	126	169
	V1	87	87	87	87	87	87	87	86	85	84	86		
	VR	121	121	121	121	121	121	121	121	121	122	124		
	V2	127	127	127	127	127	127	127	127	127	127	128		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.5	5.1	4.8		
29000	TOFL	8240	8410	8560	8710	8860	9010	9110	9200	9250	9290	9410	123	166
	V1	87	87	87	87	87	87	87	86	85	84	83		
	VR	117	117	117	117	117	117	117	117	117	118	120		
	V2	123	123	123	123	123	123	123	123	123	123	124		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.2	5.9	5.6	5.3		
28000	TOFL	8120	8260	8420	8580	8730	8870	8950	9070	9120	9160	9280	120	163
	V1	87	87	87	87	87	87	87	86	85	84	83		
	VR	113	113	113	113	113	113	113	113	113	114	116		
	V2	119	119	119	119	119	119	119	119	119	120	121		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.7	6.4	6	5.7		
27000	TOFL	7970	8130	8290	8430	8580	8720	8820	8940	8990	9030	9150	117	160
	V1	87	87	87	87	87	87	87	86	85	84	83		
	VR	109	109	109	109	109	109	109	109	109	110	111		
	V2	116	116	116	116	116	116	116	116	116	116	117		
	GR2	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.2	6.9	6.6	6.2		
26000	TOFL	7830	7990	8130	8300	8430	8560	8690	8810	8860	8900	9010	114	157
	V1	87	87	87	87	87	87	87	86	86	84	83		
	VR	105	105	105	105	105	105	105	105	105	106	107		
	V2	113	113	113	113	113	113	113	113	113	113	114		
	GR2	8.1	8	8	8	8	8	7.9	7.8	7.5	7.1	6.8		

FIGURE 10-8-188. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	16840	17210	17680	18070	18340	18670	19110					149	194
	V1	130	131	131	131	131	131	131						
	VR	156	156	156	156	156	156	156						
	V2	157	157	157	157	157	157	157						
	GR2	2.6	2.6	2.6	2.6	2.6	2.6	2.5						
37000	TOFL	15470	15820	16250	16600	16840	17150	17550	18100	19020			147	191
	V1	124	124	125	125	125	125	125	126	128				
	VR	152	152	152	152	152	152	152	152	153				
	V2	154	154	154	154	154	154	154	154	154				
	GR2	3	3	2.9	2.9	2.9	2.9	2.8	2.7	2.4				
36000	TOFL	14210	14530	14920	15240	15470	15750	16110	16610	17460	18630		144	188
	V1	118	118	119	119	119	119	119	120	122	125			
	VR	148	148	148	148	148	148	148	148	149	150			
	V2	151	151	151	151	151	151	151	151	151	151			
	GR2	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3	2.7	2.4			
35000	TOFL	13030	13320	13690	13990	14180	14440	14770	15240	16000	17080	18440	141	185
	V1	112	112	113	113	113	113	113	114	116	119	123		
	VR	144	144	145	145	145	145	145	145	145	146	147		
	V2	147	147	147	147	147	147	147	147	147	147	148		
	GR2	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.3	3	2.8	2.4		
34000	TOFL	11870	12140	12470	12730	12920	13150	13440	13870	14620	15630	16870	138	182
	V1	106	106	106	106	106	106	107	108	110	113	116		
	VR	140	140	140	140	140	140	140	140	141	142	143		
	V2	143	143	143	143	143	143	143	143	143	144	145		
	GR2	4	4	4	3.9	3.9	3.9	3.9	3.7	3.4	3.1	2.7		
33000	TOFL	10820	11070	11360	11600	11770	11980	12250	12630	13320	14290	15420	135	179
	V1	100	100	100	100	100	100	101	102	104	107	111		
	VR	136	136	136	136	136	136	136	136	137	138	139		
	V2	140	140	140	140	140	140	140	140	140	141	141		
	GR2	4.4	4.4	4.3	4.3	4.3	4.3	4.2	4	3.7	3.5	3.1		
32000	TOFL	9830	10050	10320	10530	10710	10880	11140	11480	12110	12970	14070	133	176
	V1	94	94	94	94	94	94	95	95	98	101	105		
	VR	132	132	132	132	132	132	132	132	133	134	136		
	V2	136	136	136	136	136	136	136	136	136	137	138		
	GR2	4.8	4.8	4.7	4.7	4.7	4.7	4.6	4.4	4.1	3.8	3.5		
31000	TOFL	8910	9110	9360	9550	9690	9860	10080	10390	10970	11770	12730	130	173
	V1	88	88	88	88	88	88	88	89	92	95	98		
	VR	128	128	128	128	128	128	128	128	129	130	131		
	V2	132	132	132	132	132	132	132	132	132	133	134		
	GR2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	4.8	4.5	4.2	3.8		

FIGURE 10-8-188. TAKE-OFF DATA; FLAPS - 20°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
30000	TOFL	8560	8720	8890	9050	9200	9320	9420	9510	9920	10640	11530	127	170
	V1	86	86	86	86	86	85	85	84	86	89	92		
	VR	124	124	124	124	124	124	124	124	124	126	127		
	V2	129	129	129	129	129	129	129	129	129	130	131		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.3	4.9	4.6	4.2		
29000	TOFL	8420	8580	8760	8910	9060	9170	9290	9390	9440	9600	10390	124	167
	V1	86	86	86	86	86	85	85	84	84	84	86		
	VR	119	119	119	119	119	119	119	120	120	122	123		
	V2	125	125	125	125	125	125	125	125	125	126	127		
	GR2	6.1	6.1	6	6	6	6	5.9	5.7	5.4	5.1	4.7		
28000	TOFL	8290	8460	8610	8780	8920	9020	9160	9260	9310	9380	9450	121	164
	V1	86	86	86	86	86	85	85	85	83	82	81		
	VR	115	115	115	115	115	115	115	115	116	117	119		
	V2	121	121	121	121	121	121	121	121	121	122	123		
	GR2	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.2	5.8	5.5	5.1		
27000	TOFL	8150	8310	8480	8630	8770	8880	9030	9120	9180	9250	9310	118	160
	V1	86	86	86	86	86	85	85	85	84	82	81		
	VR	111	111	111	111	111	111	111	111	112	113	115		
	V2	118	118	118	118	118	118	118	118	118	118	120		
	GR2	7.1	7.1	7	7	7	7	6.9	6.7	6.3	6	5.6		
26000	TOFL	8010	8180	8330	8490	8610	8750	8900	8990	9040	9110	9180	115	157
	V1	86	86	86	86	86	85	85	85	84	82	81		
	VR	107	107	107	107	107	107	107	107	107	109	111		
	V2	114	114	114	114	114	114	114	114	114	115	116		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.3	6.9	6.5	6.1		

V1 CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY ICE

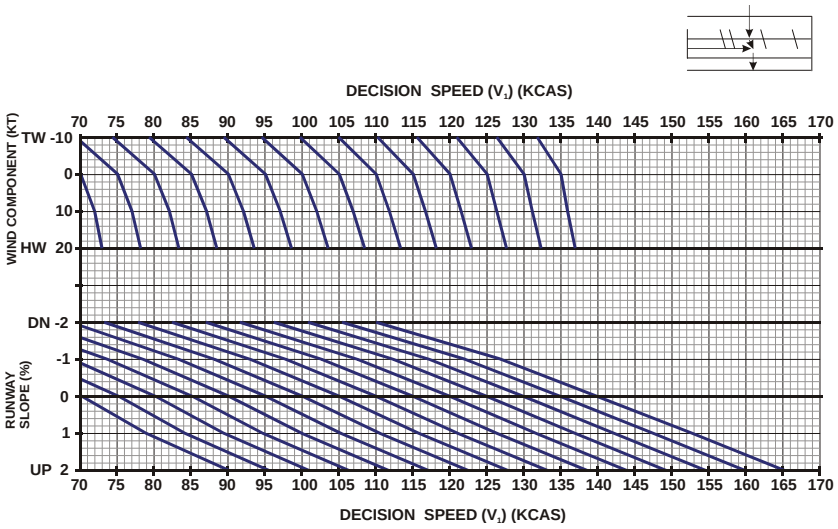
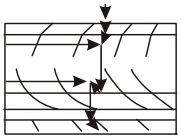


Figure 10-8-189. V1 Corrections Flaps 20° Runway Contaminated By Ice

TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 20°
RUNWAY CONTAMINATED BY ICE



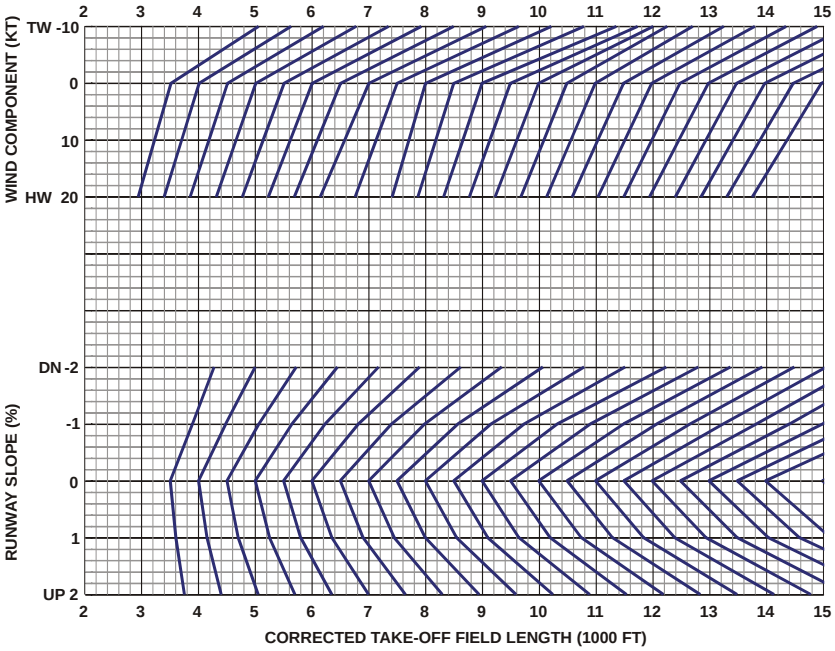


Figure 10-8-190. Takeoff Field Length Corrections Flaps 20°
Runway Contaminated By Ice

Gulfstream G280
AIRPLANE FLIGHT MANUAL

CAAI APPROVED

TAKE-OFF DISTANCE - FLAPS 10°

FIGURE 10-8-191. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	TOFL	5390	5490	5620	5740	5860	5990	6110	6220	6370	6520	6690	139	192
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
39000	TOFL	5190	5290	5410	5530	5650	5760	5870	5990	6130	6270	6420	138	191
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.9	7	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1		
38000	TOFL	4860	4950	5060	5170	5280	5390	5500	5600	5730	5870	6000	136	188
	V1	125	125	125	125	125	125	125	125	125	126	126		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.3	7.3	7.3	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
37000	TOFL	4530	4620	4720	4830	4930	5030	5130	5230	5350	5470	5600	135	185
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9		
36000	TOFL	4230	4300	4400	4490	4590	4680	4770	4860	4970	5090	5200	133	182
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	8.1	8.1	8.1	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3		
35000	TOFL	3930	4000	4090	4180	4270	4350	4440	4520	4620	4730	4830	131	180
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.5	8.6	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8		
34000	TOFL	3660	3730	3810	3890	3970	4040	4120	4200	4290	4390	4480	129	177
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	9	9	9	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2		
33000	TOFL	3400	3460	3540	3620	3690	3760	3830	3900	3990	4080	4170	127	174
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9.5	9.5	9.5	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7		
32000	TOFL	3170	3230	3300	3370	3430	3500	3560	3630	3710	3790	3870	125	171
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	10	10	10.1	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.2		
31000	TOFL	3210	3270	3320	3390	3460	3520	3580	3640	3710	3790	3850	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.6	10.6	10.6	10.6	10.7	10.7	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-191. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
30000	TOFL	3170	3220	3280	3340	3410	3470	3530	3590	3660	3730	3800	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11.2	11.2	11.2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.4		
29000	TOFL	3120	3170	3220	3290	3360	3410	3470	3540	3600	3670	3740	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.8	11.8	11.9	11.9	11.9	12	12	12.1	12.1	12.1	12.1		
28000	TOFL	3060	3110	3180	3240	3310	3360	3420	3480	3540	3610	3690	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.5	12.5	12.6	12.6	12.7	12.7	12.8	12.8	12.8	12.8	12.8		
27000	TOFL	3010	3060	3130	3190	3240	3310	3360	3420	3490	3560	3630	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	119	119	119	119	119	119	119		
	GR2	13.3	13.3	13.4	13.4	13.4	13.5	13.6	13.6	13.6	13.6	13.6		
26000	TOFL	2960	3010	3070	3130	3190	3250	3310	3360	3430	3500	3560	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	14.1	14.2	14.2	14.3	14.3	14.4	14.4	14.5	14.5	14.5	14.5		

FIGURE 10-8-192. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
39600	TOFL	6870	7050	7230	7410	7590	7770	7940	8680	9750	10780	11740	139	192
	V1	131	131	132	132	132	132	132	135	139	142	144		
	VR	138	138	138	138	138	138	138	139	141	143	144		
	V2	145	145	145	145	145	145	145	146	147	148	149		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.3	5.7	5	4.5		
39000	TOFL	6570	6750	6920	7090	7270	7440	7620	8330	9350	10370	11310	138	191
	V1	129	129	130	130	130	130	130	134	137	140	142		
	VR	137	137	137	137	137	137	137	138	139	141	143		
	V2	144	144	144	144	144	144	144	144	145	146	147		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.5	5.8	5.2	4.7		
38000	TOFL	6140	6280	6420	6580	6750	6920	7080	7770	8720	9690	10550	136	188
	V1	126	126	126	127	127	127	127	130	134	137	139		
	VR	134	134	134	134	134	134	134	135	137	138	140		
	V2	141	141	141	141	141	141	141	142	143	144	145		
	GR2	7.5	7.5	7.5	7.5	7.5	7.5	7.5	6.9	6.2	5.6	5		
37000	TOFL	5720	5850	5980	6120	6250	6390	6550	7200	8120	9040	9880	135	185
	V1	122	123	123	123	123	123	124	127	131	134	137		
	VR	131	131	131	131	131	131	131	132	134	135	137		
	V2	139	139	139	139	139	139	139	139	140	141	142		
	GR2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.3	6.6	5.9	5.3		
36000	TOFL	5320	5430	5550	5680	5800	5920	6050	6630	7520	8400	9180	133	182
	V1	118	119	119	119	119	119	120	123	127	131	133		
	VR	128	128	128	128	128	128	128	129	131	132	134		
	V2	136	136	136	136	136	136	136	137	138	138	139		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	7.7	6.9	6.3	5.7		
35000	TOFL	4940	5040	5150	5260	5370	5490	5600	6090	6890	7780	8540	131	180
	V1	114	115	115	115	115	115	116	119	123	128	130		
	VR	125	125	125	125	125	125	125	126	128	129	131		
	V2	134	134	134	134	134	134	134	134	135	136	137		
	GR2	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.1	7.3	6.7	6		
34000	TOFL	4580	4680	4770	4870	4970	5080	5180	5620	6280	7090	7930	129	177
	V1	110	111	111	111	111	111	112	115	119	123	127		
	VR	122	122	122	122	122	122	122	123	125	126	128		
	V2	132	132	132	132	132	132	132	132	132	133	134		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	8.5	7.8	7.1	6.4		
33000	TOFL	4250	4340	4430	4520	4620	4710	4800	5190	5780	6440	7220	127	174
	V1	107	107	107	107	107	107	108	111	115	119	123		
	VR	120	120	120	120	120	120	120	120	122	124	125		
	V2	129	129	129	129	129	129	129	129	130	131	131		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9	8.2	7.5	6.8		
32000	TOFL	3950	4030	4110	4200	4280	4370	4450	4790	5320	5900	6530	125	171
	V1	103	103	103	103	103	104	104	107	111	115	119		
	VR	117	117	117	117	117	117	117	118	119	121	122		
	V2	127	127	127	127	127	127	127	127	128	128	129		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	9.5	8.7	7.9	7.3		
31000	TOFL	3930	3990	4050	4130	4190	4260	4320	4430	4890	5410	5960	123	168
	V1	102	102	102	102	102	102	102	103	107	110	114		
	VR	114	114	114	114	114	114	114	115	116	118	119		
	V2	125	125	125	125	125	125	125	125	125	126	126		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.1	9.2	8.4	7.7		

FIGURE 10-8-192. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	50	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	122		
	N1 (%)	85.8	86.6	87.4	88.2	89.0	89.8	90.6	90.3	89.6	89.0	88.5		
30000	TOFL	3870	3930	4000	4070	4130	4210	4270	4210	4500	4950	5440	121	166
	V1	102	102	102	102	102	102	102	100	102	106	110		
	VR	111	111	111	111	111	111	111	112	113	115	116		
	V2	123	123	123	123	123	123	123	123	123	123	124		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	10.6	9.8	9	8.2		
29000	TOFL	3810	3870	3940	4010	4080	4140	4200	4180	4150	4540	4970	119	163
	V1	102	102	102	102	102	102	102	100	98	102	105		
	VR	109	109	109	109	109	109	109	110	111	112	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12	11.3	10.4	9.5	8.8		
28000	TOFL	3760	3810	3880	3950	4010	4080	4140	4120	4080	4170	4540	117	160
	V1	102	102	102	102	102	102	102	100	97	98	101		
	VR	107	107	107	107	107	107	107	107	108	109	110		
	V2	120	120	120	120	120	120	120	119	119	119	119		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	11.9	11	10.1	9.3		
27000	TOFL	3690	3750	3810	3880	3950	4010	4070	4050	4010	3930	4150	115	157
	V1	102	102	102	102	102	102	102	100	97	95	97		
	VR	105	105	105	105	105	105	105	105	105	106	107		
	V2	119	119	119	119	119	119	119	118	117	116	116		
	GR2	13.6	13.6	13.6	13.6	13.6	13.6	13.6	12.7	11.7	10.8	9.9		
26000	TOFL	3630	3680	3750	3820	3880	3930	4000	3980	3940	3890	3810	113	154
	V1	102	102	102	102	102	102	102	100	97	95	92		
	VR	103	103	103	103	103	103	103	103	103	103	104		
	V2	118	118	118	118	118	118	118	116	115	115	114		
	GR2	14.4	14.4	14.4	14.4	14.4	14.4	14.4	13.5	12.5	11.5	10.6		

FIGURE 10-8-193. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	TOFL	5800	5910	6050	6200	6340	6470	6610	6780	6970	7160	7350	139	193
	V1	132	133	133	133	133	133	133	133	133	133	133		
	VR	140	140	140	140	140	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7		
39000	TOFL	5580	5690	5820	5960	6090	6220	6350	6490	6670	6850	7040	138	191
	V1	130	131	131	131	131	131	131	131	131	131	131		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
38000	TOFL	5220	5320	5450	5580	5700	5820	5950	6080	6220	6370	6520	136	188
	V1	127	127	127	127	127	127	127	127	128	128	128		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3		
37000	TOFL	4870	4970	5090	5200	5320	5430	5550	5670	5800	5940	6080	135	185
	V1	123	123	124	124	124	124	124	124	124	124	124		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	139	139	139	139	139	139	139		
	GR2	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7		
36000	TOFL	4530	4620	4730	4840	4950	5050	5150	5270	5390	5520	5640	133	183
	V1	120	120	120	120	120	120	120	120	120	120	121		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.9	7.9	8	8	8	8	8	8.1	8.1	8.1	8.1		
35000	TOFL	4210	4290	4390	4490	4590	4680	4780	4880	4990	5110	5230	131	180
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
34000	TOFL	3920	3990	4080	4170	4260	4350	4440	4530	4630	4740	4840	129	177
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
33000	TOFL	3630	3700	3780	3870	3950	4030	4110	4190	4290	4380	4480	127	174
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.3	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
32000	TOFL	3370	3440	3510	3590	3670	3740	3810	3890	3980	4060	4150	125	171
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
31000	TOFL	3220	3280	3350	3420	3490	3560	3640	3700	3770	3840	3900	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5		

FIGURE 10-8-193. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
30000	TOFL	3240	3300	3360	3430	3490	3560	3630	3690	3760	3840	3910	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.9	10.9	11	11	11	11	11.1	11.1	11.1	11.1	11.1		
29000	TOFL	3190	3250	3310	3380	3450	3510	3570	3640	3700	3780	3850	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
28000	TOFL	3140	3200	3260	3330	3380	3450	3520	3580	3650	3720	3790	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	120	120	120	120	120	120	120		
	GR2	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
27000	TOFL	3090	3140	3200	3270	3330	3400	3460	3520	3590	3660	3730	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13	13.1	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2	13.2		
26000	TOFL	3040	3090	3150	3210	3280	3340	3390	3460	3530	3600	3670	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.9	13.9	13.9	13.9	14	14	14	14.1	14.1	14.1	14.1		

FIGURE 10-8-194. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
39600	TOFL	7550	7740	7930	8110	8300	8490	8920	9870	10960	12000	12670	139	193
	V1	133	134	134	134	134	134	136	139	142	144	145		
	VR	139	139	139	139	139	139	140	141	143	145	146		
	V2	146	146	146	146	146	146	146	147	148	149	149		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.5	5.9	5.3	4.7	4.3		
39000	TOFL	7220	7410	7600	7780	7970	8160	8570	9470	10520	11550	12130	138	191
	V1	131	132	132	132	132	132	134	137	141	143	144		
	VR	138	138	138	138	138	138	138	140	141	143	144		
	V2	144	144	144	144	144	144	145	145	147	148	148		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.7	6.1	5.5	4.9	4.5		
38000	TOFL	6700	6880	7060	7240	7410	7600	7990	8820	9850	10770	11370	136	188
	V1	128	128	129	129	129	129	131	134	138	140	141		
	VR	135	135	135	135	135	135	135	137	138	140	141		
	V2	142	142	142	142	142	142	142	143	144	145	145		
	GR2	7.3	7.3	7.3	7.3	7.3	7.2	7	6.5	5.8	5.2	4.8		
37000	TOFL	6220	6360	6520	6690	6870	7040	7420	8210	9170	10040	10610	135	185
	V1	125	125	125	125	125	126	127	131	134	137	138		
	VR	132	132	132	132	132	132	132	134	136	137	138		
	V2	139	139	139	139	139	139	140	140	141	143	143		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.4	6.8	6.2	5.5	5.2		
36000	TOFL	5770	5910	6040	6170	6310	6470	6840	7610	8520	9370	9860	133	183
	V1	121	121	121	122	122	122	123	127	131	134	135		
	VR	129	129	129	129	129	129	129	131	133	134	135		
	V2	137	137	137	137	137	137	137	138	139	139	140		
	GR2	8.1	8.1	8	8	8	8	7.8	7.2	6.5	5.9	5.5		
35000	TOFL	5340	5460	5580	5710	5830	5960	6240	6970	7890	8710	9170	131	180
	V1	117	117	117	117	118	118	119	123	127	130	132		
	VR	126	126	126	126	126	126	126	128	130	131	132		
	V2	134	134	134	134	134	134	135	135	136	137	137		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.2	7.6	6.9	6.3	5.9		
34000	TOFL	4950	5060	5170	5280	5390	5500	5760	6330	7170	8070	8510	129	177
	V1	113	113	113	113	113	114	115	119	123	127	128		
	VR	123	123	123	123	123	123	123	125	126	128	129		
	V2	132	132	132	132	132	132	132	133	133	135	135		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.7	8.1	7.3	6.7	6.3		
33000	TOFL	4570	4670	4770	4870	4980	5080	5310	5820	6490	7330	7860	127	174
	V1	108	109	109	109	109	109	111	114	119	123	125		
	VR	120	120	120	120	120	120	121	122	123	125	126		
	V2	130	130	130	130	130	130	130	130	131	132	132		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.2	8.5	7.8	7.1	6.7		
32000	TOFL	4240	4330	4420	4510	4600	4700	4900	5350	5940	6620	7130	125	171
	V1	105	105	105	105	105	105	107	110	114	118	121		
	VR	117	117	117	117	117	117	118	119	120	122	123		
	V2	128	128	128	128	128	128	128	128	128	129	129		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.7	9	8.2	7.5	7.1		
31000	TOFL	3960	4040	4100	4170	4260	4340	4530	4920	5440	6030	6420	123	169
	V1	101	101	101	101	101	101	103	106	110	114	116		
	VR	115	115	115	115	115	115	115	116	118	119	120		
	V2	125	125	125	125	125	125	125	126	126	126	127		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.2	9.5	8.7	8	7.6		

FIGURE 10-8-194. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	48	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	118		
	N1 (%)	86.5	87.3	88.1	88.9	89.7	90.5	91.0	90.3	89.6	89.0	88.7		
30000	TOFL	3980	4050	4130	4190	4260	4320	4310	4530	4990	5500	5850	121	166
	V1	101	101	101	101	101	101	100	102	105	109	112		
	VR	112	112	112	112	112	112	112	113	115	116	117		
	V2	123	123	123	123	123	123	123	123	124	124	124		
	GR2	11.1	11.1	11.1	11.1	11.1	11.1	10.8	10.1	9.3	8.5	8		
29000	TOFL	3920	3990	4060	4130	4200	4250	4270	4190	4570	5020	5330	119	163
	V1	101	101	101	101	101	101	100	98	101	105	107		
	VR	109	109	109	109	109	109	110	110	112	113	114		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.4	10.7	9.8	9	8.6		
28000	TOFL	3860	3920	4000	4070	4140	4180	4200	4170	4190	4580	4850	117	160
	V1	101	101	101	101	101	101	100	98	97	100	103		
	VR	107	107	107	107	107	107	107	108	109	110	111		
	V2	120	120	120	120	120	120	119	119	119	119	119		
	GR2	12.4	12.4	12.4	12.4	12.4	12.4	12.1	11.3	10.4	9.6	9.1		
27000	TOFL	3800	3860	3930	4000	4070	4110	4130	4100	4060	4190	4420	115	157
	V1	101	101	101	101	101	101	100	98	95	96	98		
	VR	105	105	105	105	105	105	105	105	106	107	108		
	V2	118	118	118	118	118	118	118	117	117	117	117		
	GR2	13.2	13.2	13.2	13.2	13.2	13.2	12.9	12.1	11.1	10.2	9.7		
26000	TOFL	3730	3800	3870	3930	4000	4040	4060	4030	4000	3930	4030	113	154
	V1	101	101	101	101	101	101	100	98	95	93	94		
	VR	103	103	103	103	103	103	103	103	103	104	104		
	V2	117	117	117	117	117	117	117	116	115	114	114		
	GR2	14.1	14	14	14	14	14	13.7	12.8	11.9	10.9	10.4		

FIGURE 10-8-195. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	TOFL	6210	6340	6510	6680	6880	7070	7250	7460	7660	7870	8070	140	193
	V1	134	134	135	135	135	135	135	135	135	135	136		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
39000	TOFL	5970	6100	6260	6420	6580	6760	6940	7140	7330	7530	7730	139	191
	V1	132	132	132	133	133	133	133	133	133	133	134		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7		
38000	TOFL	5590	5710	5860	6010	6160	6300	6440	6610	6800	6990	7180	137	189
	V1	129	129	129	129	129	129	130	130	130	130	130		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
37000	TOFL	5220	5330	5470	5610	5740	5880	6010	6160	6310	6460	6640	135	186
	V1	125	125	125	126	126	126	126	126	126	127	127		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
36000	TOFL	4850	4960	5080	5210	5340	5460	5590	5720	5860	6000	6140	133	183
	V1	121	121	122	122	122	122	122	122	123	123	123		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
35000	TOFL	4500	4590	4710	4830	4940	5060	5170	5290	5420	5550	5670	131	180
	V1	117	117	117	118	118	118	118	118	118	119	119		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
34000	TOFL	4170	4260	4370	4470	4580	4680	4780	4900	5010	5130	5240	129	177
	V1	113	113	113	114	114	114	114	114	114	114	115		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.6	8.6		
33000	TOFL	3870	3950	4040	4140	4240	4330	4420	4520	4630	4730	4840	127	175
	V1	109	109	109	110	110	110	110	110	110	110	110		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
32000	TOFL	3580	3650	3740	3830	3920	4000	4090	4180	4270	4370	4460	125	172
	V1	105	105	105	105	105	106	106	106	106	106	106		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
31000	TOFL	3320	3380	3460	3540	3620	3700	3780	3860	3950	4040	4120	123	169
	V1	101	101	101	101	102	102	102	102	102	102	102		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.2	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		

FIGURE 10-8-195. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
30000	TOFL	3310	3370	3450	3500	3580	3650	3710	3780	3860	3930	3990	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.8	10.8	10.7	10.7		
29000	TOFL	3260	3320	3390	3450	3530	3590	3650	3730	3790	3870	3940	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.4	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
28000	TOFL	3210	3270	3340	3400	3470	3540	3590	3670	3740	3810	3870	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12	12	12	12	12	12.1	12.1	12.1	12.1	12.1		
27000	TOFL	3150	3210	3290	3340	3420	3480	3540	3610	3680	3750	3810	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		
26000	TOFL	3100	3160	3220	3290	3350	3420	3480	3550	3610	3680	3750	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6		

FIGURE 10-8-196. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
39600	TOFL	8260	8470	8670	8880	9090	9310	10080	11180	12220	13350	13600	140	193
	V1	136	136	136	137	137	137	140	143	145	146	147		
	VR	141	141	141	141	141	141	142	143	145	146	147		
	V2	147	147	147	147	147	147	147	149	149	150	150		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.1	5.5	4.9	4.3	4.2		
39000	TOFL	7930	8130	8330	8530	8730	8930	9670	10740	11760	12830	13080	139	191
	V1	134	134	134	135	135	135	138	141	143	145	145		
	VR	139	139	139	139	139	139	140	142	143	145	145		
	V2	145	145	145	145	145	145	146	147	148	149	149		
	GR2	6.7	6.7	6.6	6.6	6.6	6.6	6.3	5.7	5.1	4.5	4.3		
38000	TOFL	7370	7560	7760	7950	8130	8320	9010	10030	10970	12010	12240	137	189
	V1	130	131	131	131	131	132	134	138	140	142	142		
	VR	136	136	136	136	136	136	137	139	140	142	142		
	V2	143	143	143	143	143	143	143	144	145	146	146		
	GR2	7	7	7	7	7	7	6.6	6	5.4	4.8	4.7		
37000	TOFL	6820	7010	7190	7370	7560	7740	8380	9330	10230	11210	11410	135	186
	V1	127	127	127	128	128	128	131	134	137	139	139		
	VR	133	133	133	133	133	133	134	136	137	139	140		
	V2	140	140	140	140	140	140	141	142	143	144	144		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7	6.4	5.7	5.1	5		
36000	TOFL	6290	6450	6620	6800	6970	7150	7770	8660	9530	10390	10600	133	183
	V1	123	124	124	124	124	124	127	131	134	136	136		
	VR	130	130	130	130	130	130	131	133	134	136	136		
	V2	138	138	138	138	138	138	138	139	140	141	141		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.4	6.8	6.1	5.5	5.3		
35000	TOFL	5810	5940	6080	6210	6360	6520	7120	8010	8870	9670	9850	131	180
	V1	119	119	120	120	120	120	123	127	131	133	133		
	VR	127	127	127	127	127	127	128	130	131	133	133		
	V2	135	135	135	135	135	135	136	136	138	138	138		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	7.8	7.2	6.5	5.8	5.7		
34000	TOFL	5360	5480	5610	5730	5860	5980	6470	7280	8230	8970	9130	129	177
	V1	115	115	115	116	116	116	119	123	127	129	130		
	VR	124	124	124	124	124	124	125	127	128	130	130		
	V2	133	133	133	133	133	133	133	134	135	135	135		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.2	7.6	6.9	6.2	6.1		
33000	TOFL	4950	5060	5170	5280	5390	5510	5920	6590	7450	8300	8460	127	175
	V1	111	111	111	111	112	112	114	118	123	126	127		
	VR	121	121	121	121	121	121	122	124	125	127	127		
	V2	130	130	130	130	130	130	131	131	132	133	133		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	8.7	8	7.3	6.6	6.5		
32000	TOFL	4560	4660	4760	4860	4960	5070	5440	6000	6710	7600	7780	125	172
	V1	106	107	107	107	107	107	110	114	118	122	123		
	VR	118	118	118	118	118	118	119	120	122	124	124		
	V2	128	128	128	128	128	128	128	129	129	130	130		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.2	8.5	7.8	7	6.9		
31000	TOFL	4210	4300	4390	4480	4570	4670	5000	5500	6090	6830	7000	123	169
	V1	102	102	103	103	103	103	106	109	113	117	118		
	VR	115	115	115	115	115	115	116	118	119	120	121		
	V2	125	125	125	125	125	125	126	126	127	127	127		
	GR2	10.2	10.2	10.1	10.1	10.1	10.1	9.7	9	8.2	7.5	7.3		

FIGURE 10-8-196. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	45	46	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	113	114		
	N1 (%)	87.1	87.9	88.8	89.6	90.4	91.2	91.0	90.2	89.6	89.0	88.9		
30000	TOFL	4060	4120	4190	4240	4320	4350	4590	5030	5560	6160	6310	121	166
	V1	100	100	100	100	100	100	101	105	109	113	114		
	VR	112	112	112	112	112	112	113	115	116	117	118		
	V2	123	123	123	123	123	123	123	124	124	124	125		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.3	9.5	8.7	8	7.8		
29000	TOFL	4000	4080	4150	4220	4280	4330	4310	4610	5070	5600	5720	119	163
	V1	100	100	100	100	100	100	98	101	104	108	109		
	VR	110	110	110	110	110	110	110	111	113	114	114		
	V2	121	121	121	121	121	121	121	121	122	122	122		
	GR2	11.4	11.4	11.4	11.4	11.4	11.3	10.9	10.1	9.3	8.5	8.3		
28000	TOFL	3950	4010	4080	4150	4210	4260	4260	4220	4620	5090	5200	117	160
	V1	100	100	100	100	100	100	98	96	100	104	104		
	VR	107	107	107	107	107	107	108	108	110	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12.1	12	12	12	12	11.5	10.7	9.9	9.1	8.9		
27000	TOFL	3880	3940	4020	4080	4150	4190	4190	4170	4220	4630	4720	115	157
	V1	100	100	100	100	100	100	98	96	95	99	100		
	VR	105	105	105	105	105	105	105	106	107	108	108		
	V2	118	118	118	118	118	118	117	117	117	117	117		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.3	11.4	10.5	9.7	9.5		
26000	TOFL	3820	3880	3950	4010	4080	4110	4120	4090	4030	4210	4290	113	154
	V1	100	100	100	100	100	100	98	96	93	94	95		
	VR	103	103	103	103	103	103	103	103	104	105	105		
	V2	117	117	117	117	117	117	116	115	115	114	114		
	GR2	13.6	13.6	13.6	13.6	13.6	13.6	13.1	12.1	11.2	10.3	10.1		

FIGURE 10-8-197. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	TOFL	6730	6980	7210	7430	7640	7860	8070	8290	8510	8730	8950	141	193
	V1	136	137	137	137	137	138	138	138	138	138	139		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
39000	TOFL	6440	6640	6850	7070	7280	7480	7690	7910	8130	8330	8540	140	192
	V1	134	135	135	135	135	135	135	136	136	136	136		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
38000	TOFL	5990	6170	6340	6510	6690	6890	7090	7290	7490	7700	7900	137	189
	V1	130	131	131	131	131	132	132	132	132	132	133		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
37000	TOFL	5590	5760	5920	6080	6240	6390	6550	6750	6940	7130	7330	135	186
	V1	127	127	128	128	128	128	128	129	129	129	129		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
36000	TOFL	5200	5360	5510	5650	5800	5950	6090	6240	6400	6580	6760	133	183
	V1	123	124	124	124	124	125	125	125	125	125	126		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
35000	TOFL	4820	4960	5100	5230	5370	5500	5630	5770	5910	6060	6200	131	181
	V1	119	120	120	120	120	120	121	121	121	121	122		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
34000	TOFL	4460	4590	4710	4830	4960	5070	5190	5320	5450	5580	5710	129	178
	V1	115	115	116	116	116	116	116	117	117	117	117		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.5	8.3	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.3	8.3		
33000	TOFL	4130	4250	4360	4470	4580	4690	4790	4910	5020	5140	5260	127	175
	V1	111	111	111	112	112	112	112	112	112	113	113		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	3810	3920	4020	4120	4220	4320	4420	4520	4630	4730	4840	125	172
	V1	106	107	107	107	107	108	108	108	108	108	109		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.4	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
31000	TOFL	3520	3620	3710	3800	3890	3980	4070	4170	4260	4350	4450	123	169
	V1	102	103	103	103	103	103	103	104	104	104	104		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 10-8-197. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
30000	TOFL	3350	3390	3450	3520	3590	3670	3750	3840	3920	4010	4100	121	166
	V1	99	99	99	99	99	99	99	100	100	100	100		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
29000	TOFL	3320	3400	3470	3540	3610	3680	3750	3830	3890	3960	4030	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11	11	11	11	11	11	11	11	11	11		
28000	TOFL	3270	3340	3410	3490	3550	3620	3690	3760	3830	3910	3960	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.8	11.6	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.6		
27000	TOFL	3220	3290	3360	3430	3500	3560	3630	3700	3770	3840	3900	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	117	117		
	GR2	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	3150	3240	3300	3370	3440	3500	3570	3640	3710	3780	3830	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.4	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2		

FIGURE 10-8-198. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
39600	TOFL	9170	9400	9640	9880	10110	10510	11610	12680	13840	14890		141	193
	V1	139	139	140	140	140	141	144	146	147	148			
	VR	143	143	143	143	143	143	145	146	148	149			
	V2	148	148	148	148	148	148	150	150	151	152			
	GR2	6.2	6.2	6.2	6.2	6.2	6.1	5.6	5	4.5	4			
39000	TOFL	8760	8970	9200	9430	9660	10030	11090	12150	13240	14260		140	192
	V1	137	137	137	138	138	139	142	144	145	146			
	VR	141	141	141	141	141	141	143	144	146	147			
	V2	146	146	146	146	146	147	148	149	149	150			
	GR2	6.4	6.4	6.4	6.4	6.4	6.3	5.8	5.2	4.6	4.2			
38000	TOFL	8100	8310	8520	8720	8930	9280	10300	11260	12330	13240		137	189
	V1	133	133	133	134	134	135	138	140	142	143			
	VR	137	137	137	137	137	137	139	141	142	144			
	V2	143	143	143	143	143	144	145	145	147	147			
	GR2	6.7	6.7	6.7	6.7	6.7	6.6	6.2	5.5	4.9	4.5			
37000	TOFL	7520	7720	7920	8110	8310	8630	9570	10530	11480	12350		135	186
	V1	129	130	130	130	131	131	135	137	139	140			
	VR	134	134	134	134	134	134	136	138	140	141			
	V2	141	141	141	141	141	141	142	143	144	145			
	GR2	7.1	7.1	7.1	7.1	7.1	7	6.5	5.9	5.3	4.8			
36000	TOFL	6950	7130	7330	7520	7710	8000	8860	9770	10650	11490		133	183
	V1	126	126	126	127	127	128	131	134	136	138			
	VR	131	131	131	131	131	131	133	135	136	138			
	V2	138	138	138	138	138	138	139	141	141	142			
	GR2	7.5	7.5	7.5	7.5	7.5	7.4	6.9	6.2	5.6	5.1			
35000	TOFL	6350	6530	6710	6880	7060	7360	8200	9080	9890	10630		131	181
	V1	122	122	122	123	123	124	128	131	133	134			
	VR	128	128	128	128	128	128	130	132	133	135			
	V2	136	136	136	136	136	136	137	138	138	139			
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.3	6.6	6	5.5			
34000	TOFL	5840	5980	6120	6260	6420	6680	7470	8430	9170	9850		129	178
	V1	117	118	118	118	119	119	123	128	130	131			
	VR	125	125	125	125	125	125	127	129	130	132			
	V2	133	133	133	133	133	133	134	135	136	137			
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	7.7	7	6.4	5.8			
33000	TOFL	5380	5500	5630	5750	5880	6090	6760	7630	8500	9100		127	175
	V1	113	113	114	114	114	115	119	123	126	128			
	VR	122	122	122	122	122	122	124	125	127	128			
	V2	131	131	131	131	131	131	132	132	133	134			
	GR2	8.8	8.8	8.8	8.8	8.8	8.7	8.2	7.5	6.8	6.3			
32000	TOFL	4950	5060	5170	5280	5400	5580	6130	6880	7770	8400		125	172
	V1	109	109	109	109	110	110	114	118	122	125			
	VR	119	119	119	119	119	119	121	122	124	125			
	V2	128	128	128	128	128	128	129	130	130	132			
	GR2	9.3	9.3	9.3	9.3	9.3	9.2	8.6	7.9	7.2	6.7			
31000	TOFL	4550	4650	4750	4850	4950	5120	5600	6200	6970	7700		123	169
	V1	104	105	105	105	105	106	109	113	118	121			
	VR	116	116	116	116	116	116	118	119	121	122			
	V2	126	126	126	126	126	126	127	127	127	128			
	GR2	9.8	9.8	9.8	9.8	9.8	9.7	9.1	8.4	7.7	7.1			

FIGURE 10-8-198. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	44		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	111			
	N1 (%)	87.7	88.5	89.4	90.2	91.0	91.7	90.9	90.2	89.6	89.1			
30000	TOFL	4190	4270	4370	4460	4550	4690	5120	5660	6270	6910		121	166
	V1	100	100	100	101	101	102	105	109	113	116			
	VR	113	113	113	113	113	113	115	116	117	119			
	V2	123	123	123	123	123	123	124	124	125	125			
	GR2	10.4	10.4	10.4	10.4	10.3	10.2	9.7	8.9	8.2	7.6			
29000	TOFL	4110	4170	4240	4320	4370	4330	4680	5150	5690	6200		119	163
	V1	99	99	99	99	99	98	100	104	108	111			
	VR	110	110	110	110	110	110	112	113	114	115			
	V2	121	121	121	121	121	121	122	122	122	123			
	GR2	11	11	11	11	10.9	10.8	10.2	9.5	8.7	8.1			
28000	TOFL	4040	4110	4170	4250	4300	4290	4290	4700	5170	5620		117	160
	V1	99	99	99	99	99	98	96	100	103	107			
	VR	108	108	108	108	108	108	108	110	111	112			
	V2	119	119	119	119	119	119	119	119	120	120			
	GR2	11.6	11.6	11.6	11.6	11.6	11.5	10.9	10.1	9.3	8.6			
27000	TOFL	3970	4050	4110	4180	4230	4230	4250	4280	4690	5080		115	157
	V1	99	99	99	99	99	98	96	95	99	102			
	VR	105	105	105	105	105	105	106	107	108	109			
	V2	117	117	117	117	117	117	117	117	117	117			
	GR2	12.4	12.4	12.4	12.4	12.3	12.2	11.6	10.7	9.9	9.2			
26000	TOFL	3910	3980	4040	4110	4160	4150	4190	4160	4260	4600		113	154
	V1	99	99	99	99	99	98	96	94	94	97			
	VR	103	103	103	103	103	103	103	104	105	106			
	V2	116	116	116	116	116	116	115	115	115	115			
	GR2	13.2	13.2	13.2	13.2	13.1	13	12.3	11.4	10.5	9.9			

FIGURE 10-8-199. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	TOFL	7570	7840	8080	8320	8550	8780	9010	9260	9500	9760	10010	142	194
	V1	139	140	140	140	141	141	141	141	142	142	142		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	5.9	5.9	5.9	5.9	6	6	6	6	5.9	5.9		
39000	TOFL	7200	7450	7690	7930	8150	8370	8600	8830	9060	9300	9550	141	192
	V1	137	138	138	138	138	139	139	139	139	140	140		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.2	6.2	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.1		
38000	TOFL	6600	6830	7060	7280	7490	7710	7930	8150	8360	8590	8810	138	189
	V1	133	134	134	134	134	135	135	135	135	136	136		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
37000	TOFL	6110	6300	6470	6650	6860	7060	7270	7480	7690	7900	8110	136	187
	V1	129	130	130	130	130	131	131	131	131	132	132		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
36000	TOFL	5680	5860	6030	6190	6350	6510	6700	6900	7100	7300	7500	133	184
	V1	126	126	126	127	127	127	127	128	128	128	128		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
35000	TOFL	5270	5430	5580	5730	5880	6030	6180	6340	6510	6700	6890	131	181
	V1	122	122	122	123	123	123	123	124	124	124	124		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
34000	TOFL	4860	5010	5150	5280	5420	5550	5690	5830	5980	6120	6270	129	178
	V1	117	118	118	118	119	119	119	119	120	120	120		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
33000	TOFL	4490	4620	4740	4870	4990	5110	5230	5360	5490	5620	5760	127	175
	V1	113	114	114	114	114	114	115	115	115	115	116		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	4140	4260	4370	4480	4590	4700	4810	4930	5040	5160	5280	125	172
	V1	109	109	110	110	110	110	110	111	111	111	111		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9.1	9	9	9	9	9	9	9	9	9	9		
31000	TOFL	3810	3920	4020	4120	4220	4320	4420	4520	4630	4730	4840	123	169
	V1	105	105	105	105	106	106	106	106	106	106	107		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		

FIGURE 10-8-199. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
30000	TOFL	3510	3610	3700	3790	3880	3970	4060	4150	4250	4340	4440	121	166
	V1	100	101	101	101	101	101	101	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.1	10	10	10	10	10	10.1	10.1	10	10	10		
29000	TOFL	3410	3480	3550	3610	3680	3750	3810	3870	3950	4000	4080	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.7	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
28000	TOFL	3350	3430	3500	3580	3650	3720	3780	3860	3940	4010	4080	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
27000	TOFL	3300	3370	3440	3520	3590	3660	3730	3800	3880	3940	4010	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12	12	12	12	12	12	12	12	12	12		
26000	TOFL	3240	3320	3380	3460	3520	3600	3670	3730	3810	3870	3950	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 10-8-200. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
39600	TOFL	10270	10530	10800	11070	11360	12090	13260	14470	15860	16500		142	194
	V1	143	143	143	143	144	145	147	149	150	150			
	VR	145	145	145	145	145	146	148	149	150	151			
	V2	150	150	150	150	150	151	153	153	153	153			
	GR2	5.9	5.9	5.9	5.9	5.9	5.7	5.2	4.6	4.1	3.8			
39000	TOFL	9800	10050	10300	10560	10840	11560	12680	13850	15170	15780		141	192
	V1	140	140	141	141	142	143	145	147	148	148			
	VR	143	143	143	143	143	144	146	147	148	149			
	V2	148	148	148	148	148	149	150	151	151	152			
	GR2	6.1	6.1	6.1	6.1	6.1	5.9	5.3	4.8	4.2	4			
38000	TOFL	9030	9270	9500	9750	9990	10700	11730	12830	14070	14630		138	189
	V1	136	136	137	137	137	139	141	143	145	145			
	VR	139	139	139	139	139	140	142	144	145	145			
	V2	145	145	145	145	145	146	147	148	148	149			
	GR2	6.5	6.5	6.5	6.5	6.4	6.2	5.7	5.1	4.5	4.3			
37000	TOFL	8320	8530	8740	8970	9200	9890	10850	11870	12990	13500		136	187
	V1	132	132	133	133	133	136	138	140	141	142			
	VR	135	135	135	135	135	137	138	140	142	142			
	V2	142	142	142	142	142	143	144	145	145	146			
	GR2	6.8	6.8	6.8	6.8	6.8	6.5	6	5.4	4.8	4.6			
36000	TOFL	7710	7910	8110	8310	8520	9150	10060	10990	12070	12540		133	184
	V1	129	129	129	129	130	132	135	136	138	139			
	VR	132	132	132	132	132	133	135	137	139	139			
	V2	139	139	139	139	139	140	141	141	143	143			
	GR2	7.2	7.2	7.2	7.2	7.2	6.9	6.4	5.8	5.2	4.9			
35000	TOFL	7080	7280	7480	7670	7880	8470	9340	10210	11170	11640		131	181
	V1	125	125	125	126	126	128	131	133	135	136			
	VR	129	129	129	129	129	130	132	134	135	136			
	V2	136	136	136	136	136	137	138	139	140	140			
	GR2	7.6	7.6	7.6	7.6	7.6	7.3	6.8	6.1	5.5	5.3			
34000	TOFL	6430	6610	6790	6970	7160	7740	8670	9450	10330	10720		129	178
	V1	120	121	121	121	121	124	128	130	132	133			
	VR	126	126	126	126	126	127	129	131	132	133			
	V2	134	134	134	134	134	134	136	136	137	138			
	GR2	8.1	8	8	8	8	7.7	7.2	6.5	5.9	5.7			
33000	TOFL	5890	6030	6170	6320	6490	7010	7890	8740	9530	9890		127	175
	V1	116	116	116	117	117	119	124	127	129	129			
	VR	123	123	123	123	123	124	126	127	129	130			
	V2	131	131	131	131	131	132	133	133	134	135			
	GR2	8.5	8.5	8.5	8.5	8.4	8.2	7.6	6.9	6.3	6			
32000	TOFL	5410	5530	5660	5780	5920	6330	7110	8050	8780	9110		125	172
	V1	111	112	112	112	113	115	119	123	125	126			
	VR	120	120	120	120	120	121	123	124	126	126			
	V2	129	129	129	129	129	129	130	131	131	132			
	GR2	9	9	9	9	8.9	8.6	8	7.4	6.7	6.4			
31000	TOFL	4950	5060	5170	5290	5410	5770	6390	7200	8060	8370		123	169
	V1	107	107	107	108	108	110	114	118	122	123			
	VR	117	117	117	117	117	118	119	121	122	123			
	V2	126	126	126	126	126	127	127	128	129	129			
	GR2	9.5	9.5	9.5	9.5	9.4	9.1	8.5	7.8	7.2	6.9			

FIGURE 10-8-200. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40	42		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104	107			
	N1 (%)	88.3	89.1	89.9	90.7	91.5	91.6	90.8	90.2	89.5	89.3			
30000	TOFL	4530	4630	4730	4830	4940	5260	5800	6440	7280	7650		121	166
	V1	102	102	103	103	103	105	109	113	117	119			
	VR	114	114	114	114	114	115	116	118	119	120			
	V2	124	124	124	124	124	124	125	125	126	126			
	GR2	10	10	10	10	10	9.6	9	8.3	7.7	7.4			
29000	TOFL	4160	4250	4340	4430	4530	4800	5280	5840	6490	6840		119	163
	V1	98	98	98	98	99	101	104	108	112	114			
	VR	111	111	111	111	111	112	113	115	116	117			
	V2	121	121	121	121	121	122	122	123	123	123			
	GR2	10.6	10.6	10.6	10.6	10.5	10.2	9.6	8.9	8.2	7.9			
28000	TOFL	4150	4220	4290	4330	4350	4390	4800	5290	5860	6130		117	160
	V1	98	98	98	97	97	96	100	103	107	109			
	VR	108	108	108	108	108	109	110	111	113	113			
	V2	119	119	119	119	119	119	120	120	120	121			
	GR2	11.3	11.3	11.3	11.3	11.2	10.8	10.2	9.4	8.7	8.4			
27000	TOFL	4080	4150	4230	4250	4270	4290	4370	4790	5290	5530		115	157
	V1	98	98	98	97	97	96	95	99	102	104			
	VR	106	106	106	106	106	106	107	108	109	110			
	V2	117	117	117	117	117	117	117	117	118	118			
	GR2	12	12	12	12	11.9	11.5	10.8	10.1	9.3	9			
26000	TOFL	4010	4080	4160	4180	4200	4220	4240	4350	4780	4980		113	154
	V1	98	98	98	97	97	96	94	94	98	99			
	VR	103	103	103	103	103	103	104	105	106	107			
	V2	116	116	116	116	116	115	115	115	115	115			
	GR2	12.8	12.8	12.8	12.7	12.7	12.3	11.5	10.7	9.9	9.6			

FIGURE 10-8-201. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	TOFL	8460	8680	8950	9210	9470	9730	10000	10280	10560	10840	11130	143	194
	V1	143	143	143	144	144	144	145	145	145	145	146		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	8070	8280	8530	8780	9030	9280	9540	9810	10070	10340	10620	142	193
	V1	140	141	141	141	142	142	142	142	143	143	143		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	7400	7610	7860	8100	8330	8560	8800	9040	9290	9540	9790	139	190
	V1	136	137	137	137	137	138	138	138	139	139	139		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	6770	6960	7190	7420	7650	7870	8100	8320	8550	8770	9010	137	187
	V1	132	133	133	133	133	134	134	134	134	135	135		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	6240	6390	6570	6780	7000	7200	7420	7630	7850	8060	8280	134	184
	V1	128	129	129	129	129	130	130	130	130	131	131		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.1	7	7	7	7	7	7	7	7	7	7		
35000	TOFL	5770	5900	6070	6240	6410	6590	6800	7000	7210	7420	7620	132	181
	V1	124	125	125	125	125	126	126	126	126	127	127		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.4	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	5320	5440	5590	5750	5900	6050	6210	6370	6560	6750	6940	129	178
	V1	120	120	121	121	121	121	122	122	122	122	123		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
33000	TOFL	4890	5010	5140	5280	5420	5550	5700	5840	5990	6130	6280	127	176
	V1	116	116	116	116	117	117	117	117	118	118	118		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
32000	TOFL	4500	4600	4730	4850	4970	5090	5220	5350	5480	5610	5750	125	173
	V1	111	112	112	112	112	112	113	113	113	113	114		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	4130	4220	4340	4450	4560	4670	4780	4900	5010	5130	5250	123	170
	V1	107	107	107	107	108	108	108	108	109	109	109		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		

FIGURE 10-8-201. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
30000	TOFL	3800	3880	3980	4080	4180	4270	4380	4480	4580	4690	4800	121	167
	V1	102	103	103	103	103	103	103	104	104	104	104		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
29000	TOFL	3480	3550	3650	3730	3820	3910	4000	4100	4190	4280	4380	119	164
	V1	98	98	98	99	99	99	99	99	99	99	100		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	3430	3500	3580	3670	3750	3810	3890	3960	4040	4120	4180	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
27000	TOFL	3380	3440	3520	3600	3680	3740	3830	3910	3980	4050	4120	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	3320	3380	3460	3540	3620	3680	3750	3830	3920	3980	4050	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.5	12.4	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4		

FIGURE 10-8-202. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104				
	N1 (%)	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5				
39600	TOFL	11410	11680	11940	12210	12490	13760	15090	16540	18220			143	194
	V1	146	146	146	146	146	149	150	151	152				
	VR	147	147	147	147	147	149	150	152	152				
	V2	152	152	152	152	152	153	154	155	155				
	GR2	5.7	5.7	5.7	5.7	5.6	5.3	4.7	4.2	3.6				
39000	TOFL	10900	11160	11420	11670	11930	13150	14410	15810	17410			142	193
	V1	144	144	144	144	144	146	148	149	150				
	VR	145	145	145	145	145	147	148	150	151				
	V2	150	150	150	150	150	151	152	153	153				
	GR2	5.9	5.9	5.9	5.9	5.8	5.4	4.9	4.4	3.8				
38000	TOFL	10050	10310	10570	10800	11050	12190	13350	14630	16120			139	190
	V1	140	140	140	140	141	143	145	146	147				
	VR	141	141	141	141	141	143	145	146	147				
	V2	147	147	147	147	147	148	149	150	150				
	GR2	6.3	6.3	6.3	6.2	6.1	5.8	5.2	4.7	4.1				
37000	TOFL	9250	9490	9740	9980	10210	11210	12340	13510	14880			137	187
	V1	135	136	136	136	137	139	141	143	144				
	VR	137	137	137	137	137	140	141	143	144				
	V2	143	143	143	144	144	145	146	147	147				
	GR2	6.6	6.6	6.6	6.6	6.5	6.1	5.5	5	4.4				
36000	TOFL	8500	8720	8940	9170	9420	10350	11330	12460	13680			134	184
	V1	131	132	132	132	133	135	137	139	141				
	VR	134	134	134	134	134	136	138	139	141				
	V2	140	140	140	140	140	142	143	144	144				
	GR2	7	7	7	6.9	6.8	6.5	5.9	5.3	4.7				
35000	TOFL	7830	8040	8250	8450	8700	9570	10480	11480	12630			132	181
	V1	127	128	128	128	129	132	134	136	137				
	VR	130	130	130	130	131	132	134	136	137				
	V2	137	137	137	137	137	138	140	141	142				
	GR2	7.4	7.3	7.3	7.3	7.2	6.8	6.2	5.7	5.1				
34000	TOFL	7140	7340	7540	7740	7980	8860	9690	10590	11650			129	178
	V1	123	123	124	124	125	128	130	132	134				
	VR	127	127	127	127	127	129	131	133	134				
	V2	135	135	135	135	135	136	136	138	139				
	GR2	7.8	7.8	7.8	7.8	7.6	7.3	6.6	6.1	5.4				
33000	TOFL	6460	6640	6820	7000	7220	8110	8960	9790	10690			127	176
	V1	118	119	119	119	120	124	127	129	131				
	VR	124	124	124	124	124	126	128	129	131				
	V2	132	132	132	132	132	133	134	135	136				
	GR2	8.2	8.2	8.2	8.2	8.1	7.7	7.1	6.5	5.8				
32000	TOFL	5880	6020	6160	6320	6520	7300	8260	9000	9840			125	173
	V1	114	114	114	115	115	119	123	126	128				
	VR	121	121	121	121	121	123	124	126	128				
	V2	129	129	129	129	129	130	131	132	133				
	GR2	8.7	8.7	8.7	8.7	8.5	8.1	7.5	6.9	6.2				
31000	TOFL	5370	5500	5620	5750	5910	6560	7420	8290	9020			123	170
	V1	109	109	110	110	111	114	118	122	124				
	VR	118	118	118	118	118	120	121	123	124				
	V2	127	127	127	127	127	128	128	129	130				
	GR2	9.2	9.2	9.2	9.2	9	8.6	7.9	7.3	6.7				

FIGURE 10-8-202. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	40			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	104				
	N1 (%)	88.8	89.6	90.4	91.3	92.1	91.5	90.7	90.1	89.5				
30000	TOFL	4900	5010	5130	5240	5380	5920	6630	7490	8280			121	167
	V1	105	105	105	105	106	109	113	118	120				
	VR	115	115	115	115	115	116	118	119	121				
	V2	124	124	124	124	124	125	126	126	127				
	GR2	9.7	9.7	9.7	9.7	9.5	9.1	8.4	7.8	7.1				
29000	TOFL	4470	4580	4670	4770	4900	5370	5960	6660	7540			119	164
	V1	100	100	100	100	101	104	109	112	117				
	VR	111	111	112	112	112	113	115	116	118				
	V2	121	121	121	121	121	122	123	123	124				
	GR2	10.3	10.3	10.3	10.3	10.1	9.7	9	8.3	7.6				
28000	TOFL	4260	4310	4360	4380	4490	4880	5390	5980	6690			117	161
	V1	97	97	97	96	97	100	104	107	112				
	VR	108	108	108	108	108	110	111	113	114				
	V2	119	119	119	119	119	120	120	121	121				
	GR2	10.9	10.9	10.9	10.9	10.7	10.3	9.5	8.9	8.1				
27000	TOFL	4190	4260	4330	4360	4320	4430	4880	5380	5980			115	157
	V1	97	97	97	96	95	95	99	102	106				
	VR	106	106	106	106	106	107	108	110	111				
	V2	117	117	117	117	117	117	118	118	119				
	GR2	11.6	11.6	11.6	11.6	11.4	10.9	10.2	9.4	8.7				
26000	TOFL	4130	4190	4250	4280	4240	4300	4410	4850	5370			113	154
	V1	97	97	97	96	95	94	94	97	101				
	VR	103	103	103	103	103	104	105	106	108				
	V2	115	115	115	115	115	115	115	115	116				
	GR2	12.4	12.4	12.3	12.3	12.1	11.6	10.8	10.1	9.3				

FIGURE 10-8-203. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	TOFL	9390	9760	10160	10440	10720	11010	11320	11620	11890	12170	12450	144	195
	V1	146	147	148	148	148	148	149	149	149	149	149		
	VR	149	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.6	5.5	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	8960	9310	9690	9960	10220	10500	10810	11100	11360	11630	11920	143	193
	V1	144	145	145	145	146	146	146	147	147	147	147		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.7	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	8250	8570	8920	9160	9410	9660	9940	10220	10500	10740	11010	140	190
	V1	140	140	141	141	141	142	142	142	143	143	143		
	VR	143	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	149	149	149		
	GR2	6.2	6	6	6	6	6	6	6	6	6	6		
37000	TOFL	7560	7880	8210	8430	8650	8890	9150	9400	9660	9930	10170	138	187
	V1	135	136	137	137	137	138	138	138	139	139	139		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	146	146		
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
36000	TOFL	6900	7190	7500	7720	7930	8160	8400	8630	8860	9110	9360	135	185
	V1	131	132	133	133	133	133	134	134	134	135	135		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
35000	TOFL	6320	6550	6840	7040	7240	7450	7680	7910	8130	8350	8570	133	182
	V1	127	128	129	129	129	129	129	130	130	130	131		
	VR	132	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
34000	TOFL	5790	6010	6240	6400	6570	6770	6990	7200	7420	7630	7850	130	179
	V1	123	123	124	124	125	125	125	125	126	126	126		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.5	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
33000	TOFL	5320	5510	5720	5860	6010	6150	6320	6500	6690	6890	7090	127	176
	V1	118	119	120	120	120	120	120	121	121	121	122		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.1	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
32000	TOFL	4880	5050	5230	5360	5490	5620	5770	5920	6070	6220	6380	125	173
	V1	113	114	115	115	115	115	116	116	116	117	117		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.6	8.4	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
31000	TOFL	4470	4620	4790	4900	5020	5140	5270	5400	5530	5670	5800	123	170
	V1	109	110	110	111	111	111	111	111	112	112	112		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.1	8.9	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 10-8-203. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
30000	TOFL	4090	4230	4370	4470	4580	4680	4800	4920	5030	5150	5280	121	167
	V1	104	105	106	106	106	106	106	107	107	107	107		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.6	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
29000	TOFL	3740	3870	4000	4090	4180	4280	4380	4480	4590	4690	4800	119	164
	V1	100	101	101	101	101	101	102	102	102	102	102		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.1	10	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	3490	3530	3640	3730	3810	3890	3980	4080	4170	4260	4360	117	161
	V1	96	96	96	97	97	97	97	97	97	97	98		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
27000	TOFL	3440	3520	3610	3690	3760	3850	3920	3990	4070	4130	4210	115	158
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.3	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
26000	TOFL	3380	3460	3550	3630	3710	3780	3860	3920	4000	4070	4140	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 10-8-204. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
39600	TOFL	12760	13050	13340	13650	14390	15840	17470					144	195
	V1	149	149	149	149	150	152	153						
	VR	150	150	150	150	150	152	153						
	V2	154	154	154	154	155	156	156						
	GR2	5.5	5.5	5.5	5.4	5.2	4.8	4.2						
39000	TOFL	12190	12460	12740	13060	13750	15140	16690	18420				143	193
	V1	147	147	147	147	148	150	151	152					
	VR	147	147	147	148	148	150	151	152					
	V2	152	152	152	153	153	154	154	154					
	GR2	5.7	5.7	5.7	5.6	5.3	4.9	4.4	3.9					
38000	TOFL	11260	11520	11770	12060	12730	14030	15430	17040				140	190
	V1	143	143	143	143	144	146	148	149					
	VR	144	144	144	144	145	146	148	149					
	V2	149	149	149	149	149	151	151	152					
	GR2	6	6	6	5.9	5.7	5.3	4.7	4.2					
37000	TOFL	10400	10640	10870	11130	11720	12950	14240	15710	16770			138	187
	V1	139	139	139	139	140	143	144	145	146				
	VR	140	140	140	140	141	143	144	146	146				
	V2	146	146	146	146	146	147	148	149	149				
	GR2	6.3	6.3	6.3	6.3	6	5.6	5	4.5	4.1				
36000	TOFL	9580	9800	10030	10270	10810	11910	13110	14440	15400			135	185
	V1	135	135	135	136	137	139	141	142	143				
	VR	136	136	136	136	137	139	141	142	143				
	V2	142	142	142	142	143	144	145	146	146				
	GR2	6.7	6.7	6.7	6.6	6.3	5.9	5.4	4.8	4.5				
35000	TOFL	8800	9040	9250	9460	9950	10910	12010	13230	14070			133	182
	V1	131	132	132	132	133	135	137	138	139				
	VR	133	133	133	133	133	135	137	139	140				
	V2	139	139	139	139	139	141	142	144	143				
	GR2	7.1	7.1	7.1	7	6.7	6.3	5.7	5.2	4.8				
34000	TOFL	8070	8290	8510	8730	9170	10020	11000	12110	12900			130	179
	V1	127	127	128	128	129	131	133	135	136				
	VR	129	129	129	129	130	132	133	135	136				
	V2	136	136	136	136	136	138	138	139	140				
	GR2	7.5	7.5	7.5	7.4	7.1	6.7	6.1	5.5	5.2				
33000	TOFL	7290	7500	7700	7950	8490	9290	10140	11110	11830			127	176
	V1	122	122	123	123	126	128	130	132	133				
	VR	126	126	126	126	127	128	130	132	133				
	V2	133	133	133	133	134	134	136	136	137				
	GR2	7.9	7.9	7.9	7.8	7.5	7.1	6.5	5.9	5.5				
32000	TOFL	6570	6750	6930	7160	7660	8550	9340	10200	10820			125	173
	V1	117	117	118	118	121	124	126	128	129				
	VR	123	123	123	123	123	125	127	128	129				
	V2	130	130	130	130	130	132	133	134	134				
	GR2	8.4	8.4	8.4	8.3	8	7.5	6.9	6.3	5.9				
31000	TOFL	5940	6090	6230	6430	6880	7760	8600	9360	9900			123	170
	V1	112	113	113	113	115	120	123	125	126				
	VR	119	119	119	119	120	122	123	125	126				
	V2	127	127	127	127	128	129	130	131	131				
	GR2	8.9	8.9	8.9	8.7	8.4	8	7.4	6.7	6.3				

FIGURE 10-8-204. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	38			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	100				
	N1 (%)	89.3	90.1	91.0	91.8	92.0	91.3	90.6	90.0	89.6				
30000	TOFL	5400	5530	5650	5810	6160	6910	7870	8600	9060			121	167
	V1	107	108	108	109	111	114	119	121	122				
	VR	116	116	116	116	117	118	120	122	123				
	V2	125	125	125	125	125	126	127	128	128				
	GR2	9.4	9.4	9.4	9.3	8.9	8.5	7.8	7.2	6.8				
29000	TOFL	4910	5020	5140	5270	5580	6170	6970	7840	8300			119	164
	V1	103	103	103	104	106	109	114	117	119				
	VR	113	113	113	113	113	115	117	118	119				
	V2	122	122	122	122	122	123	124	125	125				
	GR2	9.9	9.9	9.9	9.8	9.5	9	8.3	7.7	7.3				
28000	TOFL	4460	4550	4650	4770	5040	5560	6200	6990	7530			117	161
	V1	98	98	98	99	101	104	108	112	115				
	VR	109	109	109	109	110	112	113	115	116				
	V2	119	119	119	119	120	120	121	122	122				
	GR2	10.5	10.5	10.5	10.4	10.1	9.6	8.9	8.2	7.8				
27000	TOFL	4280	4350	4400	4390	4580	5020	5560	6200	6670			115	158
	V1	96	96	95	95	96	99	103	107	110				
	VR	106	106	106	106	107	108	110	111	112				
	V2	117	117	117	117	117	118	118	119	119				
	GR2	11.2	11.2	11.2	11.1	10.7	10.2	9.5	8.8	8.3				
26000	TOFL	4210	4290	4330	4340	4320	4520	5000	5540	5930			113	155
	V1	96	96	95	95	93	94	98	102	104				
	VR	104	104	104	104	104	105	106	108	109				
	V2	115	115	115	115	115	115	116	116	116				
	GR2	11.9	11.9	11.9	11.8	11.4	10.8	10.1	9.4	8.9				

FIGURE 10-8-205. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	TOFL	10570	11030	11480	11740	12030	12340	12650	12960	13280	13590	13900	145	195
	V1	150	151	152	152	152	152	152	152	152	152	152		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.4	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	10090	10610	10970	11240	11490	11790	12090	12380	12690	12990	13300	144	193
	V1	148	149	149	149	149	149	149	150	150	150	150		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	155		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	9310	9780	10130	10410	10640	10910	11180	11470	11750	12030	12310	141	191
	V1	143	145	145	145	145	146	146	146	146	146	146		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	151	151	151	151	151	151	151	151	151	151		
	GR2	5.9	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	8560	9010	9330	9590	9840	10100	10350	10600	10870	11120	11380	139	188
	V1	139	141	141	141	142	142	142	142	142	142	142		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	147	148	148	148	148	148	148	148	148	148	148		
	GR2	6.3	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	7830	8250	8550	8780	9000	9260	9530	9750	10000	10230	10480	136	185
	V1	135	136	137	137	137	138	138	138	138	138	138		
	VR	138	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.6	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
35000	TOFL	7130	7520	7800	8020	8230	8470	8710	8970	9190	9400	9630	134	182
	V1	131	132	132	133	133	133	133	134	134	134	134		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	141	141	141	141	141	141	141	141	141	141		
	GR2	7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
34000	TOFL	6480	6830	7090	7290	7490	7720	7950	8190	8420	8650	8840	131	179
	V1	126	128	128	128	128	129	129	130	130	130	130		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
33000	TOFL	5870	6170	6370	6540	6720	6930	7150	7370	7600	7820	8050	128	176
	V1	121	123	123	123	123	124	124	124	125	125	126		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.8	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	5360	5620	5810	5950	6090	6240	6420	6620	6820	7010	7220	126	173
	V1	116	118	118	118	119	119	119	119	120	120	120		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.3	8.1	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	4900	5130	5290	5410	5540	5680	5830	5980	6130	6290	6470	123	170
	V1	112	113	113	114	114	114	114	115	115	115	115		
	VR	120	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 10-8-205. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
30000	TOFL	4470	4670	4820	4930	5030	5160	5290	5430	5560	5700	5840	121	167
	V1	107	108	109	109	109	109	109	110	110	110	110		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	126	126	126	126	126	126	126	126	126	126		
	GR2	9.3	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9		
29000	TOFL	4080	4250	4380	4480	4580	4690	4800	4920	5040	5160	5280	119	164
	V1	102	103	104	104	104	104	104	105	105	105	105		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.8	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
28000	TOFL	3710	3870	3990	4070	4160	4260	4360	4460	4570	4670	4780	117	161
	V1	97	99	99	99	99	99	99	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.4	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
27000	TOFL	3500	3600	3660	3740	3820	3880	3960	4050	4140	4230	4330	115	158
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	3450	3550	3630	3710	3790	3860	3930	4010	4080	4170	4240	113	155
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.8	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 10-8-206. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
39600	TOFL	14230	14570	14910	15340	16660	18420						145	195
	V1	152	152	152	152	153	155							
	VR	152	152	152	152	154	155							
	V2	156	156	157	157	157	157							
	GR2	5.2	5.2	5.2	5	4.7	4.3							
39000	TOFL	13610	13910	14230	14660	15900	17620	19520					144	193
	V1	150	150	150	150	151	153	154						
	VR	150	150	150	150	152	153	154						
	V2	155	155	155	155	155	156	156						
	GR2	5.4	5.4	5.4	5.2	4.9	4.4	3.9						
38000	TOFL	12590	12890	13160	13550	14700	16230	18010					141	191
	V1	146	146	146	146	148	149	150						
	VR	146	146	146	147	148	149	151						
	V2	151	151	151	151	152	154	155						
	GR2	5.7	5.7	5.7	5.5	5.2	4.7	4.2						
37000	TOFL	11640	11910	12170	12530	13560	14980	16600					139	188
	V1	142	142	142	143	144	146	147						
	VR	143	143	143	143	144	146	147						
	V2	148	148	148	148	149	150	150						
	GR2	6.1	6.1	6.1	5.8	5.6	5.1	4.5						
36000	TOFL	10720	10950	11200	11520	12500	13790	15220					136	185
	V1	138	138	138	139	140	142	143						
	VR	139	139	139	139	141	142	144						
	V2	144	144	144	144	145	146	147						
	GR2	6.4	6.4	6.4	6.2	5.9	5.4	4.9						
35000	TOFL	9850	10070	10300	10590	11450	12650	13950					134	182
	V1	134	134	134	135	136	138	140						
	VR	135	135	135	135	137	138	140						
	V2	141	141	141	141	142	143	144						
	GR2	6.8	6.8	6.8	6.6	6.3	5.8	5.2						
34000	TOFL	9040	9260	9460	9720	10520	11570	12740					131	179
	V1	130	131	131	131	133	135	136						
	VR	131	131	131	131	133	135	136						
	V2	137	137	137	137	139	140	141						
	GR2	7.2	7.2	7.2	6.9	6.6	6.1	5.6						
33000	TOFL	8280	8480	8670	8930	9610	10530	11600	12830				128	176
	V1	126	126	127	127	129	131	132	134					
	VR	127	127	127	128	129	131	133	134					
	V2	134	134	134	134	135	136	137	138					
	GR2	7.6	7.6	7.6	7.3	7	6.5	5.9	5.4					
32000	TOFL	7430	7640	7850	8200	8860	9680	10630	11730	11990			126	173
	V1	121	121	122	123	125	127	129	131	131				
	VR	124	124	124	124	126	127	129	131	131				
	V2	131	131	131	131	133	133	134	135	135				
	GR2	8.1	8.1	8	7.8	7.4	6.9	6.4	5.8	5.6				
31000	TOFL	6660	6840	7030	7350	8140	8910	9740	10700	10950			123	170
	V1	116	116	116	118	121	124	126	127	128				
	VR	121	121	121	121	122	124	126	128	128				
	V2	128	128	128	128	129	130	131	132	133				
	GR2	8.5	8.5	8.5	8.2	7.9	7.4	6.8	6.2	6				

FIGURE 10-8-206. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	35	36			Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	95	97				
	N1 (%)	89.8	90.6	91.5	92.3	91.8	91.2	90.5	89.8	89.7				
30000	TOFL	5980	6130	6280	6570	7240	8160	8910	9750	9960			121	167
	V1	111	111	111	112	116	120	122	124	124				
	VR	117	117	117	118	119	121	122	124	124				
	V2	126	126	126	126	126	128	129	129	130				
	GR2	9	9	9	8.7	8.4	7.9	7.3	6.6	6.5				
29000	TOFL	5410	5540	5670	5890	6440	7290	8170	8900	9070			119	164
	V1	106	106	106	107	110	115	118	120	121				
	VR	114	114	114	114	115	117	119	120	121				
	V2	123	123	123	123	123	124	125	126	127				
	GR2	9.6	9.6	9.6	9.3	8.9	8.4	7.7	7.1	6.9				
28000	TOFL	4890	5000	5120	5310	5770	6450	7330	8100	8290			117	161
	V1	101	101	101	102	105	109	114	116	117				
	VR	110	110	110	111	112	114	115	117	117				
	V2	120	120	120	120	121	121	122	123	124				
	GR2	10.1	10.1	10.1	9.8	9.4	8.9	8.3	7.6	7.4				
27000	TOFL	4430	4520	4620	4780	5190	5760	6440	7320	7490			115	158
	V1	96	96	96	97	100	104	108	112	113				
	VR	107	107	107	107	108	110	112	113	114				
	V2	117	117	117	117	118	119	119	120	121				
	GR2	10.8	10.8	10.8	10.4	10	9.5	8.8	8.1	8				
26000	TOFL	4310	4370	4390	4400	4670	5160	5740	6420	6600			113	155
	V1	94	94	94	93	95	99	103	107	108				
	VR	104	104	104	104	105	107	108	110	110				
	V2	115	115	115	115	115	116	116	117	117				
	GR2	11.5	11.5	11.5	11.1	10.7	10.1	9.4	8.7	8.6				

FIGURE 10-8-207. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	TOFL	11950	12490	12810	13110	13430	13760	14120	14490	14830	15200	15570	147	195
	V1	154	154	154	154	154	154	155	155	155	155	155		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	159	159	159	159	159	159	159	159	159	159	160		
	GR2	5.1	4.9	4.9	4.9	5	5	5	5	5	5	4.9		
39000	TOFL	11410	11930	12240	12530	12830	13170	13490	13830	14170	14500	14860	145	194
	V1	151	152	152	152	152	152	152	152	152	152	152		
	VR	152	153	153	153	153	153	153	153	153	153	153		
	V2	156	157	157	157	157	157	157	157	157	157	157		
	GR2	5.3	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.1	5.1		
38000	TOFL	10580	11060	11340	11600	11880	12190	12500	12800	13120	13430	13740	142	191
	V1	148	148	148	148	148	148	148	148	149	149	149		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	154	154	154	154	154		
	GR2	5.6	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	9760	10220	10480	10740	10980	11280	11550	11840	12120	12410	12710	140	188
	V1	144	145	145	145	145	145	145	145	145	145	145		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	150	150	150	150	150	150	150	150	150	150		
	GR2	6	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	8970	9440	9680	9920	10150	10420	10690	10940	11190	11460	11730	137	185
	V1	140	141	141	141	141	141	141	141	141	141	141		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	146	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	8170	8640	8890	9100	9300	9550	9800	10040	10270	10510	10750	135	183
	V1	135	136	137	137	137	137	137	137	137	137	137		
	VR	137	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
34000	TOFL	7420	7850	8080	8310	8530	8750	8980	9200	9420	9640	9860	132	180
	V1	130	132	132	132	133	133	133	133	133	133	133		
	VR	133	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	140	140	140	140	140	140	140		
	GR2	7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
33000	TOFL	6700	7100	7320	7530	7750	7990	8220	8420	8630	8820	9030	129	177
	V1	126	127	128	128	128	128	129	129	129	129	129		
	VR	129	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.5	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
32000	TOFL	6000	6320	6490	6670	6870	7100	7320	7550	7780	8010	8230	127	174
	V1	120	122	122	122	122	123	123	124	124	124	125		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	133		
	GR2	7.9	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
31000	TOFL	5440	5720	5860	6010	6150	6320	6510	6720	6910	7120	7330	124	171
	V1	115	117	117	117	117	117	118	118	118	119	119		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.4	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 10-8-207. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
30000	TOFL	4940	5190	5320	5440	5570	5720	5870	6030	6180	6350	6530	121	168
	V1	110	112	112	112	112	112	113	113	113	114	114		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.9	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
29000	TOFL	4490	4710	4820	4930	5040	5180	5310	5440	5580	5720	5860	119	165
	V1	105	107	107	107	107	107	107	108	108	108	109		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.4	9.2	9.2	9.2	9.3	9.3	9.3	9.2	9.2	9.2	9.2		
28000	TOFL	4070	4260	4360	4460	4560	4680	4790	4910	5030	5150	5270	117	161
	V1	100	102	102	102	102	102	102	103	103	103	103		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	3690	3860	3950	4040	4120	4230	4330	4430	4530	4640	4750	115	158
	V1	95	97	97	97	97	97	97	97	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.3	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
26000	TOFL	3550	3650	3730	3800	3880	3950	4020	4080	4160	4240	4310	113	155
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 10-8-208. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
39600	TOFL	15930	16310	16740	17560	19470							147	195
	V1	155	155	155	155	157								
	VR	155	155	155	156	157								
	V2	160	160	160	160	160								
	GR2	4.9	4.9	4.9	4.6	4.3								
39000	TOFL	15220	15580	15990	16740	18580							145	194
	V1	152	152	152	153	155								
	VR	153	153	153	153	155								
	V2	157	157	157	157	157								
	GR2	5.1	5.1	5.1	4.8	4.4								
38000	TOFL	14070	14400	14770	15470	17100							142	191
	V1	149	149	149	149	151								
	VR	149	149	149	150	151								
	V2	154	154	154	154	154								
	GR2	5.5	5.4	5.4	5.1	4.7								
37000	TOFL	13000	13310	13630	14270	15730	17540						140	188
	V1	145	145	145	146	147	148							
	VR	145	145	145	146	147	149							
	V2	150	150	150	150	151	152							
	GR2	5.8	5.8	5.7	5.4	5.1	4.6							
36000	TOFL	12000	12270	12580	13160	14460	16060						137	185
	V1	141	141	141	142	143	145							
	VR	142	142	142	142	144	145							
	V2	147	147	147	147	147	147							
	GR2	6.2	6.2	6.1	5.7	5.4	4.9							
35000	TOFL	11000	11250	11520	12070	13290	14700						135	183
	V1	137	137	137	138	140	141							
	VR	138	138	138	138	140	141							
	V2	143	143	143	143	144	145							
	GR2	6.5	6.5	6.4	6.1	5.8	5.3							
34000	TOFL	10080	10310	10560	11040	12170	13430						132	180
	V1	133	133	133	134	136	138							
	VR	134	134	134	134	136	138							
	V2	140	140	140	140	141	142							
	GR2	6.9	6.9	6.8	6.5	6.1	5.6							
33000	TOFL	9240	9440	9660	10080	11060	12230						129	177
	V1	129	129	129	130	132	134							
	VR	130	130	130	130	132	134							
	V2	136	136	136	136	138	139							
	GR2	7.3	7.3	7.2	6.8	6.5	6							
32000	TOFL	8410	8610	8820	9220	10070	11090	12260					127	174
	V1	125	125	125	126	128	130	132						
	VR	126	126	126	126	128	130	132						
	V2	133	133	133	134	134	135	136						
	GR2	7.7	7.7	7.6	7.3	6.9	6.4	5.8						
31000	TOFL	7550	7760	8030	8460	9220	10110	11170					124	171
	V1	120	120	121	122	124	126	128						
	VR	122	122	122	123	125	127	128						
	V2	129	129	129	130	132	132	133						
	GR2	8.2	8.2	8.1	7.7	7.3	6.8	6.2						

FIGURE 10-8-208. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	34				Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	93					
	N1 (%)	90.3	91.2	92.0	92.3	91.7	91.0	90.4	89.8					
30000	TOFL	6720	6910	7150	7650	8450	9260	10150	11040				121	168
	V1	114	114	115	117	121	123	125	126					
	VR	119	119	119	119	121	123	125	126					
	V2	126	126	126	126	128	129	130	131					
	GR2	8.7	8.7	8.6	8.2	7.8	7.3	6.7	6.2					
29000	TOFL	6010	6150	6360	6790	7630	8460	9250	9990				119	165
	V1	109	109	110	112	116	119	121	122					
	VR	115	115	115	116	118	119	121	123					
	V2	124	124	124	124	125	126	127	128					
	GR2	9.2	9.2	9.1	8.7	8.3	7.8	7.2	6.6					
28000	TOFL	5400	5530	5690	6030	6740	7670	8430	9060				117	161
	V1	104	104	105	107	110	115	117	119					
	VR	112	112	112	112	114	116	118	119					
	V2	121	121	121	121	122	123	124	125					
	GR2	9.8	9.8	9.6	9.2	8.8	8.3	7.7	7.1					
27000	TOFL	4860	4970	5110	5400	5970	6730	7610	8220				115	158
	V1	98	99	99	101	105	109	113	115					
	VR	108	108	108	109	110	112	114	115					
	V2	118	118	118	118	119	120	120	121					
	GR2	10.4	10.4	10.2	9.8	9.4	8.8	8.2	7.6					
26000	TOFL	4410	4510	4630	4840	5330	5940	6700	7410				113	155
	V1	94	94	94	96	99	103	108	111					
	VR	105	105	105	105	107	109	110	112					
	V2	115	115	115	115	116	117	117	119					
	GR2	11.1	11	10.9	10.4	10	9.4	8.8	8.2					

FIGURE 10-8-209. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	TOFL	13560	14020	14380	14740	15120	15530	15950	16350	16780	17180	17630	148	196
	V1	157	158	158	158	158	158	158	158	158	158	158		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	12930	13350	13700	14050	14410	14810	15180	15570	15960	16380	16790	146	194
	V1	155	155	155	155	155	155	155	155	155	155	155		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	11960	12370	12690	12990	13320	13680	14040	14380	14760	15130	15480	144	191
	V1	151	152	152	152	152	152	152	152	152	152	152		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	11060	11420	11720	12000	12300	12620	12950	13280	13600	13940	14290	141	189
	V1	147	148	148	148	148	148	148	148	148	148	148		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	153	153	153	152	152	152	152	152	152	152	152		
	GR2	5.6	5.5	5.5	5.5	5.6	5.6	5.5	5.5	5.5	5.5	5.5		
36000	TOFL	10190	10530	10800	11060	11350	11660	11950	12230	12540	12850	13140	138	186
	V1	143	144	144	144	144	144	144	144	144	144	144		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
35000	TOFL	9370	9690	9930	10170	10440	10720	10980	11240	11510	11800	12070	136	183
	V1	139	140	140	140	140	140	140	140	140	140	140		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	8580	8880	9120	9340	9580	9820	10060	10310	10540	10790	11040	133	180
	V1	135	136	136	136	136	136	136	136	136	136	136		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.7	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6		
33000	TOFL	7780	8090	8310	8510	8740	8960	9170	9390	9610	9840	10060	130	177
	V1	130	131	131	131	132	132	132	132	132	132	132		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		
32000	TOFL	6960	7270	7510	7740	7940	8160	8370	8580	8770	8980	9180	127	174
	V1	125	126	127	127	127	127	127	128	128	128	128		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
31000	TOFL	6160	6390	6580	6790	7000	7230	7470	7700	7920	8140	8330	125	171
	V1	119	120	121	121	121	122	122	122	123	123	123		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		

FIGURE 10-8-209. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
30000	TOFL	5530	5740	5890	6040	6200	6380	6580	6790	6990	7200	7420	122	168
	V1	114	115	115	115	115	116	116	116	117	117	118		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	5000	5180	5310	5440	5590	5740	5890	6050	6210	6380	6570	119	165
	V1	109	109	110	110	110	110	111	111	111	112	112		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
28000	TOFL	4520	4670	4790	4900	5030	5160	5300	5430	5570	5710	5850	117	162
	V1	103	104	104	105	105	105	105	106	106	106	107		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4		
27000	TOFL	4080	4220	4320	4420	4530	4650	4760	4880	5000	5120	5240	115	159
	V1	98	99	99	99	100	100	100	100	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.2	10	10	10.1	10.1	10.1	10.1	10.1	10.1	10	10		
26000	TOFL	3690	3800	3890	3980	4080	4180	4280	4390	4490	4600	4700	113	155
	V1	93	94	94	94	94	95	95	95	95	95	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7		

FIGURE 10-8-210. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32	0	0	0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89	0	0	0		
	N1 (%)	90.8	91.7	92.5	92.2	91.5	90.9	90.2	90.0	0.0	0.0	0.0		
39600	TOFL	18070	18520	19190									148	196
	V1	158	158	158										
	VR	158	158	158										
	V2	163	163	163										
	GR2	4.7	4.6	4.4										
39000	TOFL	17190	17630	18270	19740								146	194
	V1	155	155	156	157									
	VR	156	156	156	157									
	V2	160	160	160	160									
	GR2	4.9	4.8	4.6	4.3									
38000	TOFL	15870	16250	16850	18180								144	191
	V1	152	152	152	153									
	VR	152	152	152	153									
	V2	156	156	156	156									
	GR2	5.2	5.1	4.9	4.6									
37000	TOFL	14610	14970	15490	16710	18650							141	189
	V1	148	148	148	149	151								
	VR	148	148	148	149	151								
	V2	152	152	152	153	154								
	GR2	5.5	5.5	5.3	4.9	4.6								
36000	TOFL	13450	13780	14250	15300	17030							138	186
	V1	144	144	144	145	147								
	VR	144	144	144	145	147								
	V2	149	149	149	149	150								
	GR2	5.9	5.8	5.6	5.3	4.9								
35000	TOFL	12360	12630	13070	14000	15540							136	183
	V1	140	140	140	141	143								
	VR	140	140	141	142	143								
	V2	145	145	145	146	147								
	GR2	6.3	6.2	5.9	5.6	5.2								
34000	TOFL	11300	11560	11950	12850	14150							133	180
	V1	136	136	136	138	139								
	VR	136	136	137	138	139								
	V2	142	142	142	142	143								
	GR2	6.6	6.6	6.3	6	5.6								
33000	TOFL	10290	10520	10900	11700	12890							130	177
	V1	132	132	132	134	135								
	VR	132	132	133	134	136								
	V2	138	138	138	139	140								
	GR2	7	7	6.7	6.4	6								
32000	TOFL	9380	9580	9900	10590	11680							127	174
	V1	128	128	128	129	131								
	VR	128	128	128	130	132								
	V2	134	134	134	135	137								
	GR2	7.5	7.4	7.1	6.8	6.4								
31000	TOFL	8510	8710	9010	9610	10550	11700						125	171
	V1	123	123	124	125	127	129							
	VR	124	124	124	126	127	129							
	V2	131	131	131	132	133	134							
	GR2	7.9	7.8	7.5	7.2	6.8	6.3							

FIGURE 10-8-210. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30	32	0	0	0	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86	89	0	0	0		
	N1 (%)	90.8	91.7	92.5	92.2	91.5	90.9	90.2	90.0	0.0	0.0	0.0		
30000	TOFL	7630	7880	8200	8760	9590	10580						122	168
	V1	118	119	120	121	123	125							
	VR	120	120	121	122	124	126							
	V2	127	127	128	128	130	131							
	GR2	8.4	8.3	8	7.6	7.2	6.7							
29000	TOFL	6760	6980	7340	8000	8740	9610	10630					119	165
	V1	112	113	114	117	120	122	124						
	VR	117	117	117	118	120	122	124						
	V2	124	124	124	125	126	128	129						
	GR2	8.9	8.8	8.5	8.1	7.7	7.2	6.6						
28000	TOFL	6000	6170	6480	7100	7960	8730	9590	10000				117	162
	V1	107	107	109	112	116	118	120	121					
	VR	113	113	113	115	116	118	120	121					
	V2	121	121	121	122	123	124	125	128					
	GR2	9.4	9.3	9	8.6	8.2	7.7	7.1	6.8					
27000	TOFL	5370	5510	5760	6240	7030	7890	8660	9010				115	159
	V1	101	102	103	106	110	114	116	117					
	VR	109	109	110	111	113	114	116	117					
	V2	118	118	118	119	120	121	122	123					
	GR2	10	9.9	9.6	9.2	8.8	8.2	7.6	7.3					
26000	TOFL	4810	4930	5140	5550	6160	7000	7810	8140				113	155
	V1	96	96	98	100	104	109	112	113					
	VR	106	106	106	107	109	111	112	113					
	V2	115	115	115	116	117	118	119	119					
	GR2	10.7	10.5	10.2	9.8	9.4	8.8	8.1	7.8					

TAKE-OFF DATA; FLAPS - 10°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	TOFL	15380	15750	16220	16670	17140	17590	18090	18570	19070	19560		149	196
	V1	161	161	161	161	161	161	161	161	161	161			
	VR	161	161	161	161	161	161	161	161	161	161			
	V2	165	164	164	164	164	164	164	164	164	164			
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4			
39000	TOFL	14670	15020	15470	15890	16340	16790	17230	17700	18170	18650	19120	147	194
	V1	159	159	159	159	159	159	159	159	159	159	159		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	13550	13870	14270	14660	15070	15480	15880	16310	16730	17160	17600	145	192
	V1	155	155	155	155	155	155	155	155	155	155	155		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
37000	TOFL	12470	12760	13130	13480	13850	14220	14590	14980	15370	15750	16160	142	189
	V1	151	151	151	151	151	151	151	151	151	151	151		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	11480	11750	12080	12400	12730	13080	13430	13760	14110	14450	14820	139	186
	V1	147	147	147	147	147	147	147	147	147	147	147		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
35000	TOFL	10550	10790	11090	11390	11700	12010	12300	12620	12940	13240	13570	137	183
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
34000	TOFL	9680	9890	10160	10440	10710	10990	11270	11540	11820	12110	12390	134	180
	V1	138	139	139	139	139	139	139	139	139	139	139		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
33000	TOFL	8840	9050	9290	9540	9780	10030	10290	10550	10780	11030	11300	131	177
	V1	134	134	134	135	135	135	135	135	135	135	135		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	141	141	141	141	141	141	141	141	141		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
32000	TOFL	8020	8220	8450	8670	8900	9130	9350	9560	9780	10010	10240	128	175
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
31000	TOFL	7150	7370	7620	7840	8060	8270	8480	8670	8880	9080	9280	126	172
	V1	124	125	125	126	126	126	126	126	126	126	126		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.6		

TAKE-OFF DATA; FLAPS - 10°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF
PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
30000	TOFL	6260	6420	6650	6870	7100	7340	7580	7810	8020	8210	8400	123	168
	V1	118	119	119	119	120	120	121	121	121	121	121		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
29000	TOFL	5580	5720	5890	6050	6230	6410	6620	6820	7030	7240	7460	120	165
	V1	112	113	113	113	114	114	114	115	115	115	116		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	5020	5140	5280	5430	5580	5730	5890	6040	6200	6380	6570	117	162
	V1	107	107	107	108	108	108	109	109	109	110	110		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
27000	TOFL	4510	4610	4740	4860	5000	5130	5260	5400	5530	5670	5820	115	159
	V1	101	102	102	102	102	103	103	103	104	104	104		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
26000	TOFL	4060	4150	4260	4370	4480	4590	4710	4830	4940	5060	5190	113	156
	V1	96	96	97	97	97	97	98	98	98	98	99		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3		

FIGURE 10-8-211. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86						
	N1 (%)	91.3	92.2	92.6	92.0	91.4	90.8	90.1						
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	19640											147	194
	V1	159												
	VR	159												
	V2	164												
	GR2	4.6												
38000	TOFL	18060	18540	19500									145	192
	V1	155	155	155										
	VR	155	155	156										
	V2	158	158	158										
	GR2	4.9	4.8	4.5										
37000	TOFL	16580	16990	17840									142	189
	V1	151	151	151										
	VR	151	151	151										
	V2	155	155	155										
	GR2	5.3	5.1	4.8										
36000	TOFL	15190	15590	16350									139	186
	V1	147	147	147										
	VR	147	147	148										
	V2	151	151	151										
	GR2	5.6	5.4	5.1										
35000	TOFL	13910	14260	14930									137	183
	V1	143	143	143										
	VR	143	143	144										
	V2	148	148	148										
	GR2	6	5.8	5.5										
34000	TOFL	12700	13000	13660	15000								134	180
	V1	139	139	140	141									
	VR	139	139	140	141									
	V2	144	144	144	145									
	GR2	6.4	6.2	5.8	5.5									
33000	TOFL	11570	11830	12370	13630								131	177
	V1	135	135	135	137									
	VR	135	135	136	137									
	V2	141	141	141	141									
	GR2	6.8	6.6	6.2	5.9									
32000	TOFL	10480	10710	11220	12340								128	175
	V1	130	131	131	133									
	VR	131	131	131	133									
	V2	137	137	137	138									
	GR2	7.2	6.9	6.6	6.3									
31000	TOFL	9480	9710	10140	11120								126	172
	V1	126	126	127	129									
	VR	126	127	127	129									
	V2	133	133	133	134									
	GR2	7.6	7.4	7	6.7									

FIGURE 10-8-211. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	30					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	86						
	N1 (%)	91.3	92.2	92.6	92.0	91.4	90.8	90.1						
30000	TOFL	8600	8800	9170	10010	11070							123	168
	V1	122	122	122	124	127								
	VR	122	122	123	125	127								
	V2	129	129	129	130	132								
	GR2	8.1	7.8	7.4	7.1	6.7								
29000	TOFL	7680	7970	8330	9060	9960	11080						120	165
	V1	116	117	118	120	122	124							
	VR	118	118	119	120	123	125							
	V2	125	125	125	127	128	129							
	GR2	8.6	8.3	7.9	7.6	7.2	6.6							
28000	TOFL	6760	7030	7530	8250	9030	9990						117	162
	V1	110	111	114	116	118	121							
	VR	114	114	115	117	119	121							
	V2	122	122	122	124	125	126							
	GR2	9.1	8.8	8.4	8.1	7.7	7.1							
27000	TOFL	5970	6170	6600	7410	8190	9000	9940					115	159
	V1	105	106	108	112	114	117	119						
	VR	111	111	111	113	115	117	119						
	V2	119	119	119	120	121	123	124						
	GR2	9.7	9.4	9	8.6	8.2	7.6	7						
26000	TOFL	5310	5490	5820	6450	7320	8110	8930					113	156
	V1	99	100	102	105	110	112	115						
	VR	107	107	108	109	111	113	115						
	V2	116	116	116	117	118	119	121						
	GR2	10.3	10	9.6	9.2	8.8	8.2	7.5						

FIGURE 10-8-212. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	TOFL	17240	17860	18340	18860	19420							150	197
	V1	164	164	164	164	164								
	VR	164	164	164	164	164								
	V2	167	167	167	167	167								
	GR2	4.3	4.2	4.2	4.2	4.2								
39000	TOFL	16440	17040	17490	17970	18500	19050	19570					148	195
	V1	162	162	162	162	162	162	162						
	VR	162	162	162	162	162	162	162						
	V2	166	166	166	164	164	164	164						
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.3						
38000	TOFL	15150	15690	16120	16570	17050	17520	18020	18500	19020			146	192
	V1	158	158	158	158	158	158	158	158	158				
	VR	158	158	158	158	158	158	158	158	158				
	V2	161	161	161	161	161	161	161	161	161				
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7				
37000	TOFL	13920	14420	14800	15200	15630	16080	16520	16970	17410	17900	18390	143	189
	V1	153	154	154	154	154	154	154	154	154	154	154		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	5.1	5	5	5	5	5	5	5	5	5	5		
36000	TOFL	12760	13220	13560	13940	14310	14720	15100	15510	15930	16340	16770	140	187
	V1	149	149	149	149	149	149	149	149	149	149	149		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	153	153	153	153	153	153	153	153		
	GR2	5.5	5.3	5.3	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3		
35000	TOFL	11710	12120	12420	12750	13100	13470	13810	14180	14550	14940	15300	138	184
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	145	146	146	146	146	146	146	146	146	146	146		
	V2	151	151	151	150	150	150	150	150	150	150	150		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
34000	TOFL	10720	11080	11370	11660	11980	12300	12610	12940	13270	13590	13940	135	181
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
33000	TOFL	9770	10100	10360	10620	10900	11190	11480	11750	12050	12350	12650	132	178
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	142	142	142	142	142	142	142	142	142	142		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
32000	TOFL	8910	9200	9430	9660	9900	10170	10420	10680	10940	11200	11460	129	175
	V1	132	133	133	133	133	133	133	133	133	133	133		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	139	139	139	139	139	139	139	139	139	139		
	GR2	7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
31000	TOFL	8060	8340	8550	8750	8980	9210	9440	9640	9870	10110	10340	127	172
	V1	128	128	128	128	128	128	128	128	128	128	129		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3		

FIGURE 10-8-212. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
30000	TOFL	7140	7480	7680	7880	8100	8320	8510	8710	8930	9130	9330	124	169
	V1	122	123	124	124	124	124	124	124	124	124	124		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	130	131	131	131	131	131	131	131	131	131	131		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
29000	TOFL	6220	6480	6690	6900	7140	7380	7620	7840	8040	8230	8420	121	166
	V1	116	117	117	117	118	118	119	119	119	119	119		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
28000	TOFL	5510	5730	5880	6040	6220	6400	6610	6820	7030	7240	7470	118	162
	V1	110	110	111	111	111	112	112	113	113	113	114		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8		
27000	TOFL	4930	5120	5250	5390	5540	5690	5850	6010	6160	6340	6530	115	159
	V1	104	105	105	105	106	106	106	107	107	107	108		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
26000	TOFL	4420	4570	4690	4810	4940	5070	5200	5340	5470	5610	5760	113	156
	V1	98	99	99	100	100	100	100	101	101	102	102		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10	10.1	10.1	10.1	10.1	10.1	10	10	10	10		

FIGURE 10-8-213. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	18870	19620										143	189
	V1	154	154											
	VR	154	154											
	V2	157	157											
	GR2	4.9	4.6											
36000	TOFL	17320	17870										140	187
	V1	149	150											
	VR	150	150											
	V2	153	153											
	GR2	5.2	5											
35000	TOFL	15710	16300										138	184
	V1	145	146											
	VR	146	146											
	V2	149	149											
	GR2	5.6	5.3											
34000	TOFL	14300	14810										135	181
	V1	141	142											
	VR	142	142											
	V2	146	146											
	GR2	6	5.7											
33000	TOFL	12970	13420										132	178
	V1	137	137											
	VR	137	138											
	V2	142	142											
	GR2	6.4	6											
32000	TOFL	11730	12140										129	175
	V1	133	133											
	VR	133	133											
	V2	138	138											
	GR2	6.8	6.4											
31000	TOFL	10570	10940	11760									127	172
	V1	129	129	130										
	VR	129	129	130										
	V2	135	135	135										
	GR2	7.2	6.8	6.5										

FIGURE 10-8-213. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20	25	28					Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68	77	82						
	N1 (%)	91.9	92.7	92.5	91.9	91.3	90.6	90.2						
30000	TOFL	9540	9860	10530									124	169
	V1	124	124	126										
	VR	124	125	126										
	V2	131	131	131										
	GR2	7.7	7.3	6.9										
29000	TOFL	8620	8910	9470	10420								121	166
	V1	120	120	121	123									
	VR	120	120	122	123									
	V2	127	127	127	129									
	GR2	8.1	7.7	7.4	7									
28000	TOFL	7740	8050	8550	9350	10330							118	162
	V1	115	115	117	119	121								
	VR	116	116	117	119	121								
	V2	123	123	124	125	126								
	GR2	8.6	8.2	7.8	7.5	7.1								
27000	TOFL	6770	7170	7750	8480	9310	10300						115	159
	V1	109	110	113	115	117	119							
	VR	112	112	113	115	117	119							
	V2	120	120	121	122	123	124							
	GR2	9.2	8.8	8.4	8	7.6	7							
26000	TOFL	5940	6250	6840	7640	8390	9230	9890					113	156
	V1	103	104	107	111	113	115	116						
	VR	108	109	110	111	113	115	116						
	V2	117	117	117	119	119	121	122						
	GR2	9.8	9.4	8.9	8.6	8.1	7.5	7.1						

FIGURE 10-8-214. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	TOFL	19770											151	197
	V1	167												
	VR	168												
	V2	169												
	GR2	4												
39000	TOFL	18820	19330	19900									150	196
	V1	165	165	165										
	VR	165	165	165										
	V2	169	167	167										
	GR2	4.2	4.1	4.1										
38000	TOFL	17330	17790	18300	18850	19430							147	193
	V1	161	161	161	161	161								
	VR	161	161	161	161	161								
	V2	163	163	163	163	163								
	GR2	4.5	4.4	4.4	4.4	4.4								
37000	TOFL	15900	16320	16780	17300	17800	18340	18860					144	190
	V1	157	157	157	157	157	157	157						
	VR	157	157	157	157	157	157	157						
	V2	159	159	159	159	159	159	159						
	GR2	4.8	4.8	4.8	4.7	4.7	4.7	4.7						
36000	TOFL	14540	14910	15330	15800	16240	16730	17190					142	187
	V1	152	152	152	152	152	152	152						
	VR	153	153	153	153	153	153	153						
	V2	156	156	156	156	155	155	155						
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1						
35000	TOFL	13320	13640	14010	14420	14820	15250	15660	16120	16570	17010		139	184
	V1	148	148	148	148	148	148	148	148	148	148			
	VR	148	148	148	148	148	148	148	148	148	148			
	V2	155	152	152	152	152	152	152	152	152	152			
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4			
34000	TOFL	12110	12400	12730	13100	13470	13860	14230	14630	15000	15400	15820	136	181
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
33000	TOFL	11020	11300	11600	11930	12260	12570	12920	13250	13590	13960	14310	133	178
	V1	139	140	140	140	140	140	140	140	140	140	140		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
32000	TOFL	10000	10230	10520	10790	11070	11370	11680	11960	12260	12580	12890	130	175
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
31000	TOFL	9050	9280	9510	9760	10020	10280	10520	10790	11050	11330	11590	128	172
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		

FIGURE 10-8-214. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
30000	TOFL	8170	8380	8580	8790	9040	9250	9480	9700	9940	10180	10410	125	169
	V1	126	126	126	126	126	126	126	126	126	126	127		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
29000	TOFL	7280	7490	7700	7910	8140	8350	8550	8750	8950	9160	9360	122	166
	V1	121	121	121	122	122	122	122	122	122	122	122		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	129	129	129	129	129	129	129	129	129	129		
	GR2	8.1	8.1	8	8	8	8	8	8	8	8	7.9		
28000	TOFL	6290	6470	6690	6920	7150	7400	7640	7830	8030	8220	8410	119	163
	V1	114	115	115	115	116	116	117	117	117	117	117		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4		
27000	TOFL	5540	5690	5850	6020	6190	6380	6580	6790	7000	7220	7460	116	160
	V1	108	108	108	109	109	110	110	110	111	111	112		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9		
26000	TOFL	4940	5060	5200	5340	5490	5640	5800	5950	6110	6280	6480	113	156
	V1	102	102	103	103	103	104	104	104	105	105	105		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.8	9.7	9.7	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-215. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20							Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68								
	N1 (%)	92.4	93.0	92.4	91.7	91.1								
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL													
	V1													
	VR													
	V2													
	GR2													
34000	TOFL													
	V1													
	VR													
	V2													
	GR2													
33000	TOFL													
	V1													
	VR													
	V2													
	GR2													
32000	TOFL	13230												
	V1	135												
	VR	136											130	175
	V2	140												
	GR2	6.3												
31000	TOFL	11880												
	V1	131												
	VR	131											128	172
	V2	136												
	GR2	6.7												

FIGURE 10-8-215. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15	20							Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59	68								
	N1 (%)	92.4	93.0	92.4	91.7	91.1								
30000	TOFL	10630	11200										125	169
	V1	127	127											
	VR	127	127											
	V2	132	132											
	GR2	7.1	6.8											
29000	TOFL	9570	10050	10970									122	166
	V1	122	123	125										
	VR	122	123	125										
	V2	129	129	130										
	GR2	7.6	7.2	6.9										
28000	TOFL	8610	9030	9820	10820								119	163
	V1	117	118	120	122									
	VR	118	119	120	122									
	V2	125	125	126	127									
	GR2	8.1	7.7	7.3	7									
27000	TOFL	7750	8140	8800	9640	10720							116	160
	V1	113	114	116	118	120								
	VR	114	114	116	118	120								
	V2	121	121	122	123	125								
	GR2	8.6	8.2	7.8	7.5	7								
26000	TOFL	6790	7330	7980	8690	9570							113	156
	V1	107	109	111	113	115								
	VR	110	110	112	114	116								
	V2	118	118	119	120	121								
	GR2	9.2	8.7	8.4	8	7.5								

FIGURE 10-8-216. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	19390											148	193
	V1	164												
	VR	164												
	V2	166												
	GR2	4.3												
37000	TOFL	17780	18430	19260									145	190
	V1	159	160	160										
	VR	160	160	160										
	V2	164	162	162										
	GR2	4.6	4.6	4.5										
36000	TOFL	16220	16830	17570									143	187
	V1	155	155	156										
	VR	155	156	156										
	V2	158	158	159										
	GR2	5	4.9	4.8										
35000	TOFL	14770	15310	15960	16470	16970	17570	18180					140	185
	V1	151	151	151	151	151	151	151						
	VR	151	151	151	151	151	151	151						
	V2	154	154	154	154	154	154	154						
	GR2	5.3	5.3	5.2	5.2	5.2	5.1	5.1						
34000	TOFL	13430	13930	14500	14950	15390	15920	16460					137	182
	V1	146	147	147	147	147	147	147						
	VR	147	147	147	147	147	147	147						
	V2	150	150	150	150	150	150	150						
	GR2	5.7	5.6	5.5	5.5	5.5	5.5	5.5						
33000	TOFL	12180	12620	13130	13520	13930	14370	14840	15170				134	179
	V1	142	142	142	142	142	142	142	142					
	VR	142	142	143	143	143	143	143	143					
	V2	146	146	147	147	147	147	147	147					
	GR2	6.1	6	5.9	5.9	5.9	5.9	5.9	5.9					
32000	TOFL	11040	11420	11880	12230	12590	13000	13400	13690	14000			131	176
	V1	138	138	138	138	138	138	138	138	138				
	VR	138	138	138	138	138	138	138	138	138				
	V2	142	143	143	143	143	143	143	143	143				
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3				
31000	TOFL	9970	10310	10710	11010	11320	11680	12050	12270	12530	12890		128	173
	V1	133	133	134	134	134	134	134	134	134	134			
	VR	133	134	134	134	134	134	134	134	134	134			
	V2	139	139	139	139	139	139	139	139	139	139			
	GR2	6.9	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.7	6.7			

FIGURE 10-8-216. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
30000	TOFL	8960	9290	9630	9900	10180	10480	10780	10990	11210	11520	11790	126	169
	V1	128	129	129	129	129	129	129	129	129	129	129		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	135	135	135	135	135	135	135	135	135	135		
	GR2	7.4	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7		
29000	TOFL	8050	8320	8640	8870	9100	9370	9620	9810	10020	10250	10480	123	166
	V1	124	124	124	124	124	125	125	125	125	125	125		
	VR	124	124	125	125	125	125	125	125	125	125	125		
	V2	130	130	131	131	131	131	131	131	131	131	131		
	GR2	7.8	7.8	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.5		
28000	TOFL	7150	7430	7720	7950	8180	8410	8620	8790	8970	9180	9380	120	163
	V1	118	119	119	120	120	120	120	120	120	120	120		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	127	127	127	127	127	127	127	127	127	127		
	GR2	8.3	8.3	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	7.9		
27000	TOFL	6150	6380	6710	6940	7210	7480	7690	7850	8030	8210	8400	117	160
	V1	111	112	113	114	114	115	115	115	115	115	115		
	VR	115	115	116	116	116	116	116	116	116	116	116		
	V2	122	122	122	122	122	123	123	123	123	123	123		
	GR2	8.9	8.8	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.4		
26000	TOFL	5380	5580	5820	6000	6180	6400	6640	6800	6990	7220	7500	114	157
	V1	105	105	106	107	107	108	108	108	109	109	110		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	118	118	119	119	119	119	119	119	119	119	119		
	GR2	9.4	9.4	9.3	9.3	9.3	9.2	9.2	9.2	9.2	9.2	9		

FIGURE 10-8-217. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10	15								Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59									
	N1 (%)	92.9	92.8	92.2	91.5									
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL													
	V1													
	VR													
	V2													
	GR2													
34000	TOFL													
	V1													
	VR													
	V2													
	GR2													
33000	TOFL													
	V1													
	VR													
	V2													
	GR2													
32000	TOFL													
	V1													
	VR													
	V2													
	GR2													
31000	TOFL													
	V1													
	VR													
	V2													
	GR2													

FIGURE 10-8-217. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10	15								Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50	59									
	N1 (%)	92.9	92.8	92.2	91.5									
30000	TOFL													
	V1													
	VR													
	V2													
	GR2													
29000	TOFL	10800											123	166
	V1	125												
	VR	125												
	V2	131												
	GR2	7.1												
28000	TOFL	9650	10380										120	163
	V1	120	122											
	VR	120	122											
	V2	126	127											
	GR2	7.5	7.1											
27000	TOFL	8640	9250	10220									117	160
	V1	115	117	119										
	VR	116	117	119										
	V2	123	123	124										
	GR2	8	7.6	7.3										
26000	TOFL	7750	8280	9090	9990								114	157
	V1	111	112	114	116									
	VR	111	113	115	116									
	V2	119	119	120	122									
	GR2	8.6	8.1	7.8	7.4									

FIGURE 10-8-218. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL	18250	19320										144	188
	V1	158	159											
	VR	158	159											
	V2	160	161											
	GR2	4.7	4.6											
35000	TOFL	16550	17520	18460									141	185
	V1	153	154	154										
	VR	154	154	154										
	V2	156	157	157										
	GR2	5.1	4.9	4.9										
34000	TOFL	15010	15840	16660									138	182
	V1	149	149	150										
	VR	149	150	150										
	V2	152	153	153										
	GR2	5.4	5.3	5.2										
33000	TOFL	13580	14290	15010	15530								135	179
	V1	144	145	145	145									
	VR	145	145	145	146									
	V2	148	149	149	149									
	GR2	5.8	5.7	5.6	5.6									
32000	TOFL	12300	12900	13520	13970								133	176
	V1	140	141	141	141									
	VR	140	141	141	141									
	V2	145	145	145	145									
	GR2	6.2	6.1	6	6									
31000	TOFL	11070	11630	12180	12560	12970							130	173
	V1	136	136	137	137	137								
	VR	136	136	137	137	137								
	V2	140	141	141	142	142								
	GR2	6.7	6.5	6.4	6.4	6.4								

FIGURE 10-8-218. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
30000	TOFL	9940	10430	10900	11200	11550	12000						127	170
	V1	131	132	132	132	132	132							
	VR	131	132	132	132	132	133							
	V2	138	137	137	137	137	137							
	GR2	7.1	6.9	6.9	6.9	6.9	6.8							
29000	TOFL	8870	9300	9730	10010	10330	10680	10940	11140	11380			124	167
	V1	126	127	127	127	128	128	128	128	127				
	VR	126	127	128	128	128	128	128	128	128				
	V2	132	133	133	133	133	133	133	133	133				
	GR2	7.6	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3				
28000	TOFL	7940	8300	8650	8900	9170	9480	9700	9850	10060	10300	10540	121	164
	V1	121	122	122	122	123	123	123	123	123	123	123		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	128	128	129	129	129	129	129	129	129	129	129		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.4		
27000	TOFL	7000	7380	7700	7950	8180	8450	8640	8780	8970	9170	9370	118	160
	V1	115	117	117	117	118	118	118	118	118	118	118		
	VR	117	117	118	118	118	118	118	118	118	118	118		
	V2	123	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.1	7.9		
26000	TOFL	6020	6340	6700	6950	7240	7480	7680	7810	7990	8170	8370	115	157
	V1	108	110	111	112	112	113	113	113	113	113	113		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	119	120	120	120	120	120	120	120	120	120	120		
	GR2	9.1	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.7	8.4		

FIGURE 10-8-219. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5										Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41											
	N1 (%)	93.0	92.6											
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL													
	V1													
	VR													
	V2													
	GR2													
34000	TOFL													
	V1													
	VR													
	V2													
	GR2													
33000	TOFL													
	V1													
	VR													
	V2													
	GR2													
32000	TOFL													
	V1													
	VR													
	V2													
	GR2													
31000	TOFL													
	V1													
	VR													
	V2													
	GR2													

FIGURE 10-8-219. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5										Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41											
	N1 (%)	93.0	92.6											
30000	TOFL													
	V1													
	VR													
	V2													
	GR2													
29000	TOFL													
	V1													
	VR													
	V2													
	GR2													
28000	TOFL													
	V1													
	VR													
	V2													
	GR2													
27000	TOFL	9880												
	V1	119												
	VR	119											118	160
	V2	124												
	GR2	7.5												
26000	TOFL	8790	9570											
	V1	114	116											
	VR	114	116										115	157
	V2	120	121											
	GR2	8	7.6											

FIGURE 10-8-220. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	5860	5990	6120	6250	6370	6520	6700	6890	7070	7230	7400	139	192
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	145	145	145	145	145	145	145	145	145		
	GR2	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8	6.8		
39000	TOFL	5640	5770	5890	6010	6130	6280	6430	6590	6770	6920	7080	138	191
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.8	6.9	6.9	6.9	7	7	6.9	6.9	6.9	7	7		
38000	TOFL	5290	5400	5510	5620	5730	5870	6020	6170	6300	6420	6570	136	188
	V1	126	126	126	126	126	127	127	127	127	127	127		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	142	142	142	141	141	141	141	141	141	141	141		
	GR2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
37000	TOFL	4930	5040	5140	5250	5350	5480	5610	5750	5880	5990	6110	135	185
	V1	123	123	123	123	123	123	123	123	124	124	124		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
36000	TOFL	4590	4690	4780	4880	4970	5090	5220	5340	5460	5570	5670	133	182
	V1	119	119	119	119	119	119	119	119	120	120	120		
	VR	129	128	128	128	128	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
35000	TOFL	4270	4360	4440	4530	4620	4730	4840	4950	5060	5160	5260	131	180
	V1	115	115	115	115	115	115	115	115	116	116	116		
	VR	126	126	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.4	8.5	8.5	8.5	8.6	8.6	8.5	8.5	8.5	8.6	8.6		
34000	TOFL	3970	4050	4130	4210	4290	4390	4490	4600	4700	4780	4870	129	177
	V1	111	111	111	111	111	111	111	112	112	112	112		
	VR	123	123	123	123	123	123	123	123	123	123	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.9	8.9	8.9	9	9	9	9	9	9	9	9		
33000	TOFL	3680	3760	3840	3910	3980	4070	4170	4260	4350	4430	4510	127	174
	V1	107	107	107	107	107	107	107	108	108	108	108		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.4	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
32000	TOFL	3430	3500	3570	3630	3700	3790	3870	3960	4040	4110	4190	125	171
	V1	103	103	103	103	103	103	104	104	104	104	104		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.9	9.9	9.9	10	10	10	10	10	10	10	10.1		
31000	TOFL	3410	3480	3540	3600	3660	3740	3800	3880	3940	4000	4070	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	115	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6	10.6		

FIGURE 10-8-220. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
30000	TOFL	3370	3420	3490	3550	3620	3680	3750	3830	3900	3950	4020	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11	11.1	11.1	11.1	11.2	11.2	11.2	11.1	11.1	11.2	11.2		
29000	TOFL	3320	3370	3440	3490	3560	3630	3690	3770	3850	3890	3960	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.7	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.9		
28000	TOFL	3250	3320	3380	3440	3510	3580	3650	3720	3790	3830	3900	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	120	120	120	120	120	120	120	120	120	120		
	GR2	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.6		
27000	TOFL	3200	3270	3330	3390	3440	3510	3580	3660	3720	3770	3830	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.2	13.2	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.4		
26000	TOFL	3150	3220	3270	3330	3380	3450	3520	3590	3650	3710	3770	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	14	14	14.1	14.1	14.2	14.2	14.1	14.1	14.1	14.1	14.2		

FIGURE 10-8-221. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	6320	6470	6610	6770	6950	7150	7350	7560	7760	7920	8090	139	193
	V1	134	134	134	134	134	134	134	134	134	134	135		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
39000	TOFL	6080	6220	6360	6490	6640	6840	7040	7240	7430	7590	7760	138	191
	V1	132	132	132	132	132	132	132	132	132	133	133		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8		
38000	TOFL	5690	5820	5950	6080	6220	6370	6530	6710	6890	7050	7210	136	188
	V1	128	128	128	128	128	129	129	129	129	129	129		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
37000	TOFL	5310	5430	5550	5670	5800	5940	6090	6240	6380	6520	6680	135	185
	V1	125	125	125	125	125	125	125	126	126	126	126		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.5	7.5		
36000	TOFL	4940	5050	5160	5270	5390	5520	5650	5800	5930	6050	6170	133	183
	V1	121	121	121	121	121	121	122	122	122	122	122		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.8	7.8	7.9	7.9		
35000	TOFL	4580	4690	4790	4880	4990	5110	5230	5360	5480	5590	5700	131	180
	V1	117	117	117	117	117	117	117	118	118	118	118		
	VR	127	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
34000	TOFL	4250	4350	4440	4530	4630	4740	4850	4960	5070	5170	5270	129	177
	V1	113	113	113	113	113	113	113	114	114	114	114		
	VR	124	124	124	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.7	8.7	8.7	8.7	8.8	8.8	8.7	8.7	8.7	8.7	8.8		
33000	TOFL	3940	4020	4110	4190	4280	4380	4480	4590	4690	4770	4860	127	174
	V1	109	109	109	109	109	109	109	109	110	110	110		
	VR	121	121	121	121	121	121	121	121	121	121	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
32000	TOFL	3650	3730	3810	3890	3970	4060	4150	4250	4330	4410	4500	125	171
	V1	105	105	105	105	105	105	105	105	106	106	106		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.8		
31000	TOFL	3400	3470	3540	3610	3680	3760	3840	3930	4010	4090	4160	123	169
	V1	101	101	101	101	101	101	101	102	102	102	102		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		

FIGURE 10-8-221. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
30000	TOFL	3450	3510	3580	3650	3710	3790	3860	3940	4010	4070	4140	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.8	10.8	10.9	10.9		
29000	TOFL	3400	3460	3520	3590	3650	3730	3800	3870	3950	4020	4070	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		
28000	TOFL	3340	3410	3470	3530	3600	3670	3740	3810	3880	3950	4020	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12.1	12.1	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2		
27000	TOFL	3280	3350	3410	3480	3540	3610	3680	3750	3820	3890	3950	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	13		
26000	TOFL	3230	3290	3360	3420	3480	3550	3620	3690	3760	3820	3890	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.7	13.7	13.8	13.8	13.8	13.8	13.7	13.7	13.8	13.8		

FIGURE 10-8-222. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	6830	7030	7230	7420	7640	7860	8070	8280	8480	8660	8860	140	193
	V1	135	136	136	136	136	136	136	137	137	137	137		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
39000	TOFL	6550	6720	6920	7110	7310	7520	7730	7950	8140	8310	8500	139	191
	V1	134	134	134	134	134	134	134	135	135	135	135		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
38000	TOFL	6130	6280	6440	6590	6780	6980	7180	7380	7570	7740	7930	137	189
	V1	130	130	130	130	131	131	131	131	131	131	132		
	VR	137	137	137	137	137	137	137	137	137	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9		
37000	TOFL	5720	5860	6010	6150	6300	6460	6640	6830	7020	7170	7350	135	186
	V1	127	127	127	127	127	127	128	128	128	128	128		
	VR	134	134	134	134	134	134	134	134	134	133	133		
	V2	141	141	141	141	141	141	141	141	141	140	140		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
36000	TOFL	5320	5450	5580	5710	5850	6000	6150	6310	6450	6610	6780	133	183
	V1	123	123	123	123	123	124	124	124	124	124	125		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
35000	TOFL	4930	5050	5170	5280	5410	5550	5680	5830	5960	6080	6200	131	180
	V1	119	119	119	119	119	120	120	120	120	120	121		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8	8	8	8	8	8	8	8	8	8	8.1		
34000	TOFL	4560	4670	4770	4880	5000	5120	5240	5370	5490	5600	5720	129	177
	V1	114	115	115	115	115	115	116	116	116	116	116		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
33000	TOFL	4220	4320	4420	4510	4620	4730	4840	4960	5070	5170	5270	127	175
	V1	110	111	111	111	111	111	111	112	112	112	112		
	VR	122	122	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
32000	TOFL	3900	3990	4080	4170	4260	4360	4460	4570	4670	4760	4850	125	172
	V1	106	106	106	107	107	107	107	107	108	108	108		
	VR	119	119	119	119	119	119	119	119	119	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
31000	TOFL	3610	3690	3770	3850	3940	4030	4120	4220	4310	4390	4470	123	169
	V1	102	102	102	102	103	103	103	103	103	103	104		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.9	10	10	10	10	10	10	9.9	9.9	10	10		

FIGURE 10-8-222. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
30000	TOFL	3520	3590	3660	3710	3780	3840	3910	3970	4040	4110	4180	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.6		
29000	TOFL	3470	3540	3610	3670	3750	3810	3890	3950	4030	4100	4170	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11.1	11.1	11.2	11.2	11.1	11.1	11.1	11.1	11.1	11.2		
28000	TOFL	3410	3480	3560	3610	3690	3760	3840	3900	3960	4030	4100	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.9		
27000	TOFL	3360	3420	3500	3550	3630	3700	3770	3840	3910	3960	4030	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	118	118	118	118	118	118	118	118	118		
	GR2	12.5	12.5	12.6	12.6	12.6	12.6	12.6	12.5	12.5	12.6	12.6		
26000	TOFL	3310	3370	3430	3500	3570	3630	3700	3770	3840	3900	3960	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.3	13.3	13.4	13.4		

FIGURE 10-8-223. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.0	89.0		
39600	TOFL	7600	7830	8050	8270	8500	8730	8960	9200	9430	9640	9850	141	193
	V1	138	138	138	139	139	139	140	140	140	140	140		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
39000	TOFL	7230	7450	7670	7890	8110	8330	8550	8780	9010	9200	9410	140	192
	V1	136	136	136	136	137	137	137	138	138	138	138		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
38000	TOFL	6650	6860	7060	7260	7480	7700	7910	8130	8330	8520	8700	137	189
	V1	132	132	133	133	133	133	133	134	134	134	134		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.6	6.6		
37000	TOFL	6210	6370	6530	6710	6920	7120	7330	7540	7740	7910	8090	135	186
	V1	129	129	129	129	130	130	130	130	131	131	131		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	5780	5930	6080	6230	6390	6570	6760	6960	7150	7320	7500	133	183
	V1	125	125	126	126	126	126	127	127	127	127	127		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	5350	5490	5620	5760	5910	6060	6220	6380	6550	6710	6870	131	181
	V1	121	121	121	122	122	122	123	123	123	123	123		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
34000	TOFL	4940	5060	5190	5310	5450	5580	5720	5860	6000	6120	6250	129	178
	V1	117	117	117	117	118	118	118	118	119	119	119		
	VR	126	126	126	126	126	126	126	126	126	126	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.2		
33000	TOFL	4550	4670	4780	4900	5020	5140	5260	5390	5520	5630	5740	127	175
	V1	112	113	113	113	113	113	114	114	114	114	114		
	VR	123	123	123	123	123	123	123	123	123	123	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
32000	TOFL	4200	4310	4410	4510	4620	4730	4840	4960	5070	5170	5270	125	172
	V1	108	108	109	109	109	109	109	110	110	110	110		
	VR	120	120	120	120	120	120	120	120	120	120	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	3870	3960	4060	4150	4250	4350	4450	4550	4660	4740	4840	123	169
	V1	104	104	104	104	105	105	105	105	105	106	106		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-223. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
30000	TOFL	3570	3660	3740	3820	3910	4000	4100	4190	4280	4360	4440	121	166
	V1	100	100	100	100	100	101	101	101	101	101	101		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.2	10.2		
29000	TOFL	3550	3630	3690	3770	3850	3910	3990	4060	4130	4190	4250	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.7	10.7	10.7	10.7	10.8		
28000	TOFL	3500	3570	3640	3710	3780	3850	3930	3990	4070	4140	4190	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
27000	TOFL	3440	3510	3580	3650	3720	3790	3860	3920	4000	4070	4130	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	3380	3460	3510	3590	3660	3720	3800	3860	3930	4000	4060	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 10-8-224. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	8530	8770	9010	9250	9510	9780	10040	10330	10590	10820	11070	142	194
	V1	141	142	142	142	142	143	143	143	144	144	144		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
39000	TOFL	8130	8360	8590	8830	9070	9320	9580	9850	10100	10320	10570	141	192
	V1	139	139	140	140	140	140	141	141	141	142	142		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6	6	6	6	6	6	6	5.9	5.9	6	6		
38000	TOFL	7470	7700	7920	8150	8370	8600	8840	9080	9320	9520	9750	138	189
	V1	135	135	136	136	136	136	137	137	137	138	138		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	6830	7040	7250	7470	7690	7910	8130	8360	8580	8760	8970	136	187
	V1	131	131	132	132	132	132	133	133	133	133	134		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.7	6.7		
36000	TOFL	6330	6500	6680	6880	7090	7300	7510	7730	7940	8110	8300	133	184
	V1	128	128	128	128	129	129	129	129	130	130	130		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
35000	TOFL	5870	6020	6180	6340	6510	6710	6910	7120	7320	7490	7680	131	181
	V1	124	124	124	125	125	125	125	126	126	126	126		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	5400	5550	5680	5830	5980	6140	6290	6470	6650	6810	6970	129	178
	V1	119	120	120	120	120	121	121	121	122	122	122		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.9		
33000	TOFL	4980	5100	5230	5360	5500	5630	5770	5920	6060	6180	6310	127	175
	V1	115	115	116	116	116	116	117	117	117	117	118		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
32000	TOFL	4580	4690	4810	4920	5050	5170	5300	5430	5550	5670	5780	125	172
	V1	111	111	111	111	112	112	112	112	113	113	113		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	4210	4310	4410	4520	4630	4740	4850	4970	5080	5190	5290	123	169
	V1	106	107	107	107	107	107	108	108	108	108	108		
	VR	118	118	118	118	118	118	118	118	118	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 10-8-224. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
30000	TOFL	3870	3960	4050	4150	4250	4340	4440	4550	4650	4740	4830	121	166
	V1	102	102	102	102	103	103	103	103	104	104	104		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
29000	TOFL	3580	3660	3720	3810	3900	3990	4080	4170	4260	4340	4430	119	163
	V1	98	98	98	98	98	98	99	99	99	99	99		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
28000	TOFL	3590	3670	3740	3810	3890	3960	4030	4100	4180	4240	4310	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	11	11	11	11	11	11	11	11	11		
27000	TOFL	3530	3610	3680	3750	3830	3900	3960	4040	4110	4170	4240	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
26000	TOFL	3480	3550	3620	3690	3760	3840	3900	3970	4040	4100	4170	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.4	12.4	12.5	12.5		

FIGURE 10-8-225. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	9470	9750	10020	10310	10610	10910	11210	11480	11740	11990	12240	143	194
	V1	145	145	145	146	146	146	147	147	147	147	147		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	153	153	153	153	153		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
39000	TOFL	9020	9280	9540	9820	10100	10380	10680	10960	11220	11430	11670	142	193
	V1	142	143	143	143	144	144	144	145	145	145	145		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	151	151	150		
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.8		
38000	TOFL	8320	8560	8800	9060	9310	9580	9840	10120	10370	10590	10810	139	190
	V1	138	139	139	139	140	140	140	141	141	141	141		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6.1	6.1		
37000	TOFL	7630	7870	8090	8330	8570	8810	9050	9310	9560	9770	9980	137	187
	V1	134	134	135	135	135	136	136	136	137	137	137		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	6970	7190	7400	7630	7860	8090	8310	8550	8770	8970	9180	134	184
	V1	130	130	131	131	131	132	132	132	133	133	133		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	6400	6580	6790	7000	7210	7430	7650	7870	8090	8270	8460	132	181
	V1	126	127	127	127	127	128	128	128	129	129	129		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.2	7.2		
34000	TOFL	5900	6060	6220	6380	6570	6780	6980	7190	7400	7580	7770	129	178
	V1	122	122	123	123	123	124	124	124	125	125	125		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
33000	TOFL	5410	5560	5700	5850	6010	6160	6320	6500	6690	6850	7020	127	176
	V1	118	118	118	118	119	119	119	120	120	120	120		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8	8	8	8	8	8	8	8	8	8	8		
32000	TOFL	4970	5090	5220	5360	5490	5630	5770	5920	6070	6190	6330	125	173
	V1	113	113	114	114	114	114	115	115	115	115	116		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
31000	TOFL	4550	4670	4780	4900	5020	5150	5270	5410	5540	5650	5760	123	170
	V1	109	109	109	109	110	110	110	110	111	111	111		
	VR	118	118	118	118	118	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9	9	9	9	9	9	9	8.9	8.9	9	9		

FIGURE 10-8-225. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
30000	TOFL	4170	4270	4370	4480	4590	4700	4810	4930	5050	5150	5250	121	167
	V1	104	104	104	105	105	105	105	106	106	106	106		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	3820	3910	4000	4100	4200	4300	4390	4500	4600	4690	4780	119	164
	V1	100	100	100	100	100	100	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10.1	10.1		
28000	TOFL	3680	3760	3830	3910	3970	4030	4100	4160	4240	4300	4370	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.6	10.6	10.6	10.6	10.7		
27000	TOFL	3630	3700	3770	3850	3930	4000	4080	4150	4220	4290	4350	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.3	11.3	11.4		
26000	TOFL	3560	3630	3700	3790	3870	3940	4010	4080	4150	4210	4280	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		

FIGURE 10-8-226. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	10730	11240	11320	11600	11900	12210	12500	12820	13110	13370	13650	144	195
	V1	149	149	149	149	149	150	150	150	150	150	150		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	155	155	155	155	155	155	155	155	155		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	TOFL	10240	10510	10820	11090	11370	11660	11940	12240	12520	12780	13030	143	193
	V1	147	147	147	147	147	147	147	148	148	148	148		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	153	153	153	153	153	153	153		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
38000	TOFL	9440	9700	9970	10280	10520	10790	11060	11330	11590	11830	12080	140	190
	V1	142	143	143	143	143	144	144	144	144	144	144		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	150	150	150		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	8670	8900	9150	9420	9700	9950	10200	10450	10680	10900	11120	138	187
	V1	138	138	139	139	139	140	140	140	140	140	140		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	145	145		
	GR2	6.1	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.2	6.2		
36000	TOFL	7940	8170	8400	8650	8890	9150	9400	9630	9860	10050	10260	135	185
	V1	134	134	134	135	135	136	136	136	136	136	136		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	143	143	143	143	143		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	7230	7450	7670	7910	8140	8380	8610	8860	9070	9250	9440	133	182
	V1	130	130	130	131	131	131	132	132	132	132	132		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8	6.9	6.9		
34000	TOFL	6580	6780	6990	7210	7430	7660	7890	8120	8340	8540	8710	130	179
	V1	126	126	126	126	127	127	127	128	128	129	129		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	6020	6170	6330	6510	6720	6930	7130	7360	7570	7750	7950	127	176
	V1	121	121	121	122	122	122	123	123	124	124	124		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
32000	TOFL	5500	5640	5780	5940	6090	6250	6420	6620	6810	6970	7150	125	173
	V1	116	117	117	117	117	118	118	118	119	119	119		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	130	130	130	130	130	130	130	130	130		
	GR2	8.1	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.2	8.2		
31000	TOFL	5030	5150	5270	5410	5550	5690	5840	5990	6140	6260	6420	123	170
	V1	112	112	112	112	113	113	113	114	114	114	114		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.6	8.6	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.7		

FIGURE 10-8-226. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
30000	TOFL	4590	4690	4800	4930	5050	5180	5300	5440	5570	5680	5800	121	167
	V1	107	107	107	107	108	108	108	109	109	109	109		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.1	9.2	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.2		
29000	TOFL	4190	4280	4380	4490	4600	4710	4820	4940	5060	5160	5260	119	164
	V1	102	102	103	103	103	103	103	104	104	104	104		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
28000	TOFL	3810	3900	3990	4080	4180	4280	4380	4480	4590	4680	4770	117	161
	V1	98	98	98	98	98	98	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
27000	TOFL	3710	3790	3860	3940	4010	4090	4160	4230	4290	4360	4400	115	158
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	3650	3720	3810	3880	3950	4020	4090	4170	4240	4310	4360	113	155
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7		

FIGURE 10-8-227. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	12020	12300	12620	12940	13270	13600	13950	14290	14630	14920	15260	145	195
	V1	152	152	152	152	152	152	152	152	152	152	153		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	5	5.1	5.1	5.1	5	5	5	5	5	5	5.1		
39000	TOFL	11490	11770	12070	12380	12690	13000	13320	13660	13980	14260	14580	144	193
	V1	150	150	150	150	150	150	150	150	150	150	150		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	10640	10890	11170	11460	11750	12050	12340	12650	12930	13190	13470	141	191
	V1	146	146	146	146	146	147	147	147	147	147	147		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.5	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
37000	TOFL	9840	10080	10330	10610	10880	11140	11410	11690	11960	12190	12460	139	188
	V1	142	142	142	143	143	143	143	143	143	143	143		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	9030	9270	9510	9760	10000	10260	10520	10770	11000	11230	11450	136	185
	V1	138	138	138	139	139	139	139	139	139	139	139		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	145	145	145	145	145	145	145	145		
	GR2	6.2	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.3		
35000	TOFL	8260	8480	8730	8960	9190	9430	9660	9900	10120	10320	10540	134	182
	V1	134	134	134	135	135	135	135	135	135	135	135		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	7500	7710	7950	8200	8440	8650	8860	9080	9280	9480	9670	131	179
	V1	129	130	130	130	131	131	131	131	131	131	131		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	139		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	6760	6950	7170	7400	7640	7880	8130	8330	8510	8680	8870	128	176
	V1	125	125	125	126	126	126	127	127	127	127	127		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	135	135	135	135	135		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
32000	TOFL	6120	6260	6430	6640	6850	7060	7280	7510	7720	7910	8110	126	173
	V1	120	120	120	120	121	121	122	122	123	123	123		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	7.8	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.9		
31000	TOFL	5560	5690	5840	6000	6160	6320	6510	6720	6900	7070	7260	123	170
	V1	115	115	115	116	116	116	117	117	117	117	118		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 10-8-227. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
30000	TOFL	5060	5170	5310	5440	5590	5730	5880	6040	6180	6320	6480	121	
	V1	110	110	110	111	111	111	112	112	112	112	113		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	4590	4700	4810	4940	5060	5190	5320	5460	5580	5700	5820	119	167
	V1	105	105	105	106	106	106	106	107	107	107	107		
	VR	115	115	115	115	115	115	115	115	115	115	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.3	9.4	9.4	9.4	9.4	9.4	9.3	9.3	9.3	9.4	9.4		
28000	TOFL	4180	4260	4370	4480	4590	4700	4810	4930	5040	5150	5250	117	161
	V1	100	100	100	101	101	101	101	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
27000	TOFL	3780	3860	3960	4050	4150	4250	4350	4450	4550	4640	4740	115	158
	V1	95	95	96	96	96	96	96	97	97	97	97		
	VR	108	108	108	108	108	108	108	108	108	108	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.5	10.6	10.6	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	3740	3800	3890	3960	4040	4110	4190	4260	4340	4400	4410	113	155
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	105	105	105	105	105	105	105	105	105	105	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		

FIGURE 10-8-228. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	13410	13730	14090	14470	14850	15220	15600	16000	16400	16740	17150	147	195
	V1	155	155	155	155	155	155	155	155	155	155	155		
	VR	155	155	155	155	155	155	156	156	156	156	156		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
39000	TOFL	12810	13110	13460	13810	14170	14530	14890	15290	15630	15970	16360	145	194
	V1	153	153	153	153	153	153	153	153	153	153	153		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	5	5	5	5	5	5	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	11860	12150	12470	12800	13130	13450	13780	14120	14470	14770	15120	142	191
	V1	149	149	149	149	149	149	149	149	149	149	149		
	VR	149	149	149	149	149	149	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	10970	11220	11530	11830	12130	12420	12730	13080	13350	13620	13940	140	188
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	10140	10380	10650	10920	11190	11480	11750	12040	12310	12570	12860	137	185
	V1	142	142	142	142	142	142	142	142	142	142	142		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	146	147	147	147	147	147	147	147	147	147	147		
	GR2	6	6	6	6	6	6	5.9	5.9	5.9	6	6		
35000	TOFL	9330	9560	9810	10060	10320	10570	10810	11080	11340	11560	11820	135	183
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.3	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	8540	8740	8970	9210	9430	9670	9890	10130	10360	10560	10810	132	180
	V1	133	133	133	134	134	134	134	134	134	134	134		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
33000	TOFL	7760	7980	8210	8420	8630	8840	9050	9270	9480	9660	9880	129	177
	V1	129	129	129	129	130	130	130	130	130	130	130		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
32000	TOFL	6900	7100	7350	7590	7830	8060	8260	8470	8660	8820	9030	127	174
	V1	124	124	124	125	125	125	126	126	126	126	126		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
31000	TOFL	6180	6330	6530	6750	6960	7180	7400	7640	7860	8050	8260	124	171
	V1	118	118	119	119	120	120	120	121	121	122	122		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8	8	8	8	8	8	8	8	8	8	8		

FIGURE 10-8-228. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
30000	TOFL	5590	5730	5890	6050	6210	6380	6580	6790	6990	7160	7370	121	168
	V1	113	113	114	114	114	115	115	115	116	116	116		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
29000	TOFL	5060	5180	5320	5470	5610	5760	5910	6060	6220	6360	6540	119	165
	V1	108	108	108	109	109	109	110	110	111	111	111		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	9	9	9	9	9	9	9	9	9	9		
28000	TOFL	4580	4680	4810	4930	5060	5180	5310	5450	5590	5700	5840	117	161
	V1	103	103	103	104	104	104	104	105	105	105	106		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5	9.5	9.5	9.5		
27000	TOFL	4140	4230	4340	4450	4560	4670	4780	4900	5020	5120	5240	115	158
	V1	98	98	98	98	99	99	99	100	100	100	100		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.1		
26000	TOFL	3790	3860	3950	4010	4110	4210	4310	4410	4510	4600	4700	113	155
	V1	93	93	93	93	94	94	94	94	95	95	95		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-229. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	15100	15490	15930	16360	16800	17250	17710	18180	18610	19030	19680	148	196
	V1	158	158	158	158	158	158	158	158	158	158	158		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	162	162	162	162	162	162	162	162	162	162	161		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4		
39000	TOFL	14370	14770	15180	15570	15980	16410	16890	17330	17710	18110	18770	146	194
	V1	156	156	156	156	156	156	156	156	156	156	156		
	VR	156	156	156	156	156	156	156	156	156	156	157		
	V2	159	159	159	159	159	159	159	159	161	161	161		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6		
38000	TOFL	13300	13640	14020	14390	14770	15150	15550	15950	16340	16710	17280	144	191
	V1	152	152	152	152	152	152	152	152	152	152	152		
	VR	152	152	152	152	152	152	152	152	152	152	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5	5	5	5	5	5	5	5	5	5	4.9		
37000	TOFL	12270	12580	12950	13280	13610	13960	14340	14700	15040	15360	15900	141	189
	V1	148	148	148	148	148	148	148	148	148	148	149		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.2		
36000	TOFL	11310	11590	11930	12230	12540	12860	13190	13510	13830	14130	14590	138	186
	V1	144	144	144	144	144	144	144	144	144	144	145		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6		
35000	TOFL	10410	10690	10970	11240	11530	11810	12110	12410	12700	12960	13380	136	183
	V1	140	141	141	141	141	141	141	141	141	141	141		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6	6.1	5.9		
34000	TOFL	9550	9800	10050	10320	10570	10830	11080	11370	11630	11870	12230	133	180
	V1	136	137	137	137	137	137	137	137	137	137	137		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3		
33000	TOFL	8720	8940	9190	9410	9630	9880	10110	10370	10580	10800	11150	130	177
	V1	132	132	132	132	133	133	133	133	133	133	133		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	139	139	139	139	139	139	139	139		
	GR2	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7		
32000	TOFL	7930	8150	8370	8590	8780	9000	9210	9430	9640	9820	10120	127	174
	V1	128	128	128	128	128	128	128	128	128	128	129		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	7.3	7.1		
31000	TOFL	7020	7260	7500	7750	7970	8170	8360	8570	8750	8940	9200	125	171
	V1	122	123	123	124	124	124	124	124	124	124	125		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.5		

FIGURE 10-8-229. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
30000	TOFL	6220	6400	6610	6830	7040	7270	7510	7750	7980	8130	8400	122	168
	V1	117	117	117	118	118	118	119	120	120	120	120		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8		
29000	TOFL	5600	5750	5920	6080	6250	6430	6630	6840	7040	7210	7530	119	165
	V1	111	112	112	112	113	113	113	114	114	114	115		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.7	8.5		
28000	TOFL	5040	5180	5320	5460	5600	5750	5910	6070	6220	6360	6640	117	162
	V1	106	106	106	107	107	107	108	108	109	109	110		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9		
27000	TOFL	4540	4650	4780	4900	5030	5160	5290	5430	5560	5670	5880	115	159
	V1	101	101	101	101	102	102	102	103	103	103	104		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.6		
26000	TOFL	4090	4190	4290	4400	4510	4620	4740	4860	4970	5070	5250	113	155
	V1	95	96	96	96	96	97	97	97	97	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.2		

FIGURE 10-8-230. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	17070	17540	18040	18560	19090	19590						149	196
	V1	161	161	161	161	161	161							
	VR	162	162	162	162	162	162							
	V2	164	164	164	164	164	165							
	GR2	4.3	4.3	4.3	4.3	4.2	4.2							
39000	TOFL	16260	16740	17220	17700	18210	18680	19190	19760				147	194
	V1	159	159	159	159	159	159	159	159					
	VR	159	159	159	159	159	159	160	160					
	V2	162	162	162	162	162	162	162	162					
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4					
38000	TOFL	15020	15440	15880	16330	16770	17230	17700	18200	18670	19060		145	192
	V1	155	155	155	155	155	155	155	155	155	155			
	VR	156	156	156	156	156	156	156	156	156	156			
	V2	159	159	159	159	159	159	159	159	159	159			
	GR2	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7			
37000	TOFL	13810	14190	14580	14990	15400	15800	16230	16700	17090	17480		142	189
	V1	151	151	151	151	151	151	151	151	151	151			
	VR	151	151	151	151	151	151	152	152	152	152			
	V2	155	155	155	155	155	155	155	155	155	155			
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5.1			
36000	TOFL	12710	13060	13420	13780	14130	14500	14880	15290	15680	16000		139	186
	V1	147	147	147	147	147	147	147	147	147	147			
	VR	148	148	148	148	148	148	148	148	148	148			
	V2	151	151	151	151	151	151	151	151	151	151			
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4			
35000	TOFL	11650	11970	12290	12630	12950	13280	13640	14010	14330	14640	15340	137	183
	V1	143	143	143	143	143	143	144	144	144	144	144		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	148	148	148	148	148	148	148	148	148	148		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.5		
34000	TOFL	10700	10990	11270	11570	11870	12160	12460	12780	13090	13360	13970	134	180
	V1	139	139	139	139	139	139	139	139	139	139	140		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	5.8		
33000	TOFL	9770	10020	10280	10550	10810	11070	11360	11650	11910	12150	12700	131	177
	V1	135	135	135	135	135	135	135	135	135	135	136		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.5	6.2		
32000	TOFL	8890	9110	9360	9590	9820	10060	10310	10570	10810	11010	11530	128	175
	V1	131	131	131	131	131	131	131	131	131	131	132		
	VR	131	131	131	131	131	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7	7	7	7	7	7	6.9	6.9	6.9	6.9	6.6		
31000	TOFL	8050	8280	8490	8690	8900	9120	9330	9560	9780	9960	10400	126	172
	V1	126	127	127	127	127	127	127	127	127	127	128		
	VR	127	127	127	127	127	127	127	127	127	127	128		
	V2	134	134	133	133	133	133	133	133	133	133	133		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7.4	7		

FIGURE 10-8-230. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
30000	TOFL	7120	7380	7630	7830	8050	8250	8440	8650	8840	9010	9390	123	168
	V1	121	121	122	122	122	122	122	122	122	122	123		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	130	130	130	130	130	130	130	130	130		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.5		
29000	TOFL	6250	6440	6660	6880	7100	7330	7560	7830	8010	8160	8510	120	165
	V1	115	115	115	116	116	117	117	118	118	118	119		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3	7.9		
28000	TOFL	5590	5760	5920	6090	6250	6440	6640	6860	7060	7230	7730	117	162
	V1	109	109	110	110	111	111	111	112	112	112	115		
	VR	115	115	115	115	115	115	115	115	115	115	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.5		
27000	TOFL	5010	5150	5290	5430	5570	5720	5880	6040	6200	6340	6760	115	159
	V1	103	104	104	104	105	105	106	106	106	107	109		
	VR	111	111	111	111	111	111	111	111	111	111	112		
	V2	119	119	119	119	119	119	119	119	119	119	120		
	GR2	9.5	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9		
26000	TOFL	4490	4610	4730	4850	4980	5100	5230	5380	5510	5620	5940	113	156
	V1	98	98	99	99	99	100	100	100	101	101	103		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10	10	9.6		

FIGURE 10-8-231. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	19380											150	197
	V1	164												
	VR	165												
	V2	169												
	GR2	4												
39000	TOFL	18460	19020	19600									148	195
	V1	162	162	162										
	VR	162	162	162										
	V2	164	164	164										
	GR2	4.2	4.2	4.2										
38000	TOFL	17030	17540	18040	18570	19110							146	192
	V1	158	158	158	158	158								
	VR	158	158	158	158	159								
	V2	161	161	161	161	161								
	GR2	4.5	4.5	4.5	4.5	4.4								
37000	TOFL	15640	16090	16580	17050	17510							143	189
	V1	154	154	154	154	154								
	VR	154	154	154	154	154								
	V2	157	157	157	157	158								
	GR2	4.8	4.8	4.8	4.8	4.8								
36000	TOFL	14310	14730	15150	15580	16010	16480	16950	17440	17860	18530		140	187
	V1	150	150	150	150	150	150	150	150	150	150			
	VR	150	150	150	150	150	150	150	150	150	151			
	V2	153	153	153	153	153	154	154	154	154	154			
	GR2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5			
35000	TOFL	13100	13500	13850	14230	14620	15050	15450	15890	16290	16850		138	184
	V1	146	146	146	146	146	146	146	146	146	146			
	VR	146	146	146	146	146	146	146	146	146	146			
	V2	150	150	150	150	150	150	150	150	150	150			
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.3			
34000	TOFL	11970	12300	12640	12990	13330	13700	14070	14450	14810	15290		135	181
	V1	142	142	142	142	142	142	142	142	142	142			
	VR	142	142	142	142	142	142	142	142	142	142			
	V2	146	146	146	146	146	146	146	146	146	146			
	GR2	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.7			
33000	TOFL	10910	11200	11510	11810	12110	12420	12790	13130	13440	13880		132	178
	V1	138	138	138	138	138	138	138	138	138	138			
	VR	138	138	138	138	138	138	138	138	138	138			
	V2	143	143	143	143	143	143	143	143	143	143			
	GR2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.1			
32000	TOFL	9930	10190	10460	10730	11010	11280	11570	11860	12150	12550		129	175
	V1	133	133	133	134	134	134	134	134	134	134			
	VR	134	134	134	134	134	134	134	134	134	134			
	V2	139	139	139	139	139	139	139	139	139	140			
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.4			
31000	TOFL	8990	9240	9480	9710	9940	10200	10440	10720	10950	11300	12100	127	172
	V1	129	129	129	129	129	129	129	129	129	130	131		
	VR	129	130	130	130	130	130	130	130	130	130	131		
	V2	135	135	135	135	135	135	135	135	135	135	136		
	GR2	7.2	7.2	7.1	7.1	7.1	7.1	7.1	7	7	6.9	6.5		

FIGURE 10-8-231. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
30000	TOFL	8130	8350	8550	8770	8980	9200	9430	9650	9880	10160	10840	124	169
	V1	125	125	125	125	125	125	125	125	125	125	126		
	VR	125	125	125	125	125	125	125	125	125	126	127		
	V2	131	131	131	131	131	131	131	131	131	131	132		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.5	7.4	7.3	6.9		
29000	TOFL	7210	7470	7680	7900	8100	8310	8510	8700	8900	9160	9730	121	166
	V1	119	120	120	120	120	120	120	121	121	121	122		
	VR	121	121	121	121	121	121	121	121	121	121	122		
	V2	127	127	127	127	127	127	127	127	127	127	128		
	GR2	8.1	8.1	8.1	8.1	8.1	8	8	8	7.9	7.8	7.4		
28000	TOFL	6270	6460	6690	6910	7140	7370	7610	7830	8020	8270	8780	118	162
	V1	113	113	113	114	114	115	115	116	116	116	118		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.4	8.2	7.9		
27000	TOFL	5590	5750	5910	6080	6250	6450	6660	6870	7090	7410	7970	115	159
	V1	107	107	108	108	109	109	109	110	110	112	114		
	VR	113	113	113	113	113	113	113	113	113	113	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9	9	8.8	8.4		
26000	TOFL	4980	5120	5260	5400	5550	5700	5860	6020	6190	6450	7060	113	156
	V1	101	102	102	102	103	103	103	104	104	105	108		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	117	117	117	117	117	117	117	117	117	117	118		
	GR2	9.8	9.8	9.8	9.8	9.7	9.7	9.7	9.6	9.6	9.4	9		

FIGURE 10-8-232. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	17850												
	V1	157												
	VR	157											144	190
	V2	160												
	GR2	4.5												
36000	TOFL	16310												
	V1	153												
	VR	153											142	187
	V2	156												
	GR2	4.9												
35000	TOFL	14880	15330	15780	16250	16730								
	V1	149	149	149	149	149								
	VR	149	149	149	149	149							139	184
	V2	152	152	152	152	152								
	GR2	5.3	5.2	5.2	5.2	5.2								
34000	TOFL	13530	13920	14310	14740	15160								
	V1	144	144	144	144	144								
	VR	145	145	145	145	145							136	181
	V2	148	148	148	148	148								
	GR2	5.6	5.6	5.6	5.6	5.6								
33000	TOFL	12300	12640	13000	13370	13740	14120	14510						
	V1	140	140	140	140	140	140	140						
	VR	140	140	140	140	140	140	141					133	178
	V2	145	145	145	145	145	145	145						
	GR2	6	6	6	6	6	5.9	5.9						
32000	TOFL	11150	11450	11760	12080	12400	12740	13080	13440					
	V1	136	136	136	136	136	136	136	136					
	VR	136	136	136	136	136	136	136	136				130	175
	V2	141	141	141	141	141	141	141	141					
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3					
31000	TOFL	10070	10340	10610	10890	11190	11460	11770	12080	12370				
	V1	132	132	132	132	132	132	132	132	132				
	VR	132	132	132	132	132	132	132	132	132			128	172
	V2	137	137	137	137	137	137	137	137	137				
	GR2	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.7	6.6				

FIGURE 10-8-232. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
30000	TOFL	9070	9330	9560	9790	10050	10300	10550	10830	11080			125	169
	V1	127	127	127	127	127	127	127	127	127				
	VR	127	127	127	127	128	128	128	128	128				
	V2	133	133	133	133	133	133	133	133	133				
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7				
29000	TOFL	8190	8390	8610	8820	9040	9270	9490	9710	9940	10380		122	166
	V1	123	123	123	123	123	123	123	123	123	124			
	VR	123	123	123	123	123	123	123	123	123	124			
	V2	129	129	129	129	129	129	129	129	129	129			
	GR2	7.8	7.8	7.8	7.8	7.7	7.7	7.7	7.6	7.5	7.2			
28000	TOFL	7260	7510	7710	7920	8140	8330	8530	8740	8940	9320	10140	119	163
	V1	117	118	118	118	118	118	118	118	119	119	121		
	VR	119	119	119	119	119	119	119	119	119	119	121		
	V2	125	125	125	125	125	125	125	125	125	125	127		
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.1	8	7.7	7.3		
27000	TOFL	6270	6470	6690	6910	7150	7390	7630	7830	8040	8380	9080	116	160
	V1	111	111	111	112	112	113	113	114	114	115	116		
	VR	114	114	114	114	114	114	114	114	114	115	117		
	V2	121	121	121	121	121	121	121	121	122	122	123		
	GR2	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.7	8.5	8.2	7.8		
26000	TOFL	5560	5720	5890	6060	6230	6420	6640	6870	7120	7560	8200	113	156
	V1	105	105	105	106	106	107	107	108	109	110	112		
	VR	111	111	111	111	111	111	111	111	111	111	113		
	V2	118	118	118	118	118	118	118	118	118	119	119		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.1	8.8	8.4		

FIGURE 10-8-233. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL	18810	19450										143	187
	V1	156	156											
	VR	156	156											
	V2	158	158											
	GR2	4.6	4.6											
35000	TOFL	17090	17660										140	185
	V1	152	152											
	VR	152	152											
	V2	155	155											
	GR2	5	5											
34000	TOFL	15500	16000	16570									137	182
	V1	147	147	147										
	VR	148	148	148										
	V2	151	151	151										
	GR2	5.4	5.4	5.3										
33000	TOFL	14030	14460	14960									134	179
	V1	143	143	143										
	VR	143	143	143										
	V2	147	147	147										
	GR2	5.8	5.7	5.7										
32000	TOFL	12670	13060	13520	13940								131	176
	V1	139	139	139	139									
	VR	139	139	139	139									
	V2	143	143	143	143									
	GR2	6.2	6.2	6.1	6.1									
31000	TOFL	11430	11770	12140	12530	12800							128	173
	V1	134	134	135	135	135								
	VR	135	135	135	135	135								
	V2	139	139	139	139	139								
	GR2	6.6	6.6	6.6	6.5	6.5								

FIGURE 10-8-233. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
30000	TOFL	10260	10560	10900	11200	11460	11720	12030					126	169
	V1	130	130	130	130	130	130	130						
	VR	130	130	130	130	130	130	130						
	V2	135	135	135	135	135	135	135						
	GR2	7.1	7	7	7	7	7	6.9						
29000	TOFL	9200	9460	9740	10040	10230	10450	10710	10990	11360			123	166
	V1	125	126	126	126	126	126	126	126	126				
	VR	126	126	126	126	126	126	126	126	126				
	V2	132	132	132	132	132	131	131	131	131				
	GR2	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.3	7				
28000	TOFL	8230	8460	8710	8960	9140	9320	9550	9780	10090	10790		120	163
	V1	121	121	121	121	121	121	121	121	121	122			
	VR	121	121	121	121	121	121	121	121	121	123			
	V2	127	127	127	127	127	127	127	127	127	128			
	GR2	8	8	8	7.9	7.9	7.9	7.9	7.8	7.5	7.1			
27000	TOFL	7320	7530	7760	8000	8170	8350	8540	8760	9020	9600	10620	117	160
	V1	116	116	116	116	116	116	116	116	117	118	120		
	VR	117	117	117	117	117	117	117	117	117	118	120		
	V2	124	124	124	124	124	124	124	124	124	124	125		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.3	8	7.6	7.3		
26000	TOFL	6260	6480	6730	6980	7180	7390	7610	7820	8080	8580	9400	114	157
	V1	108	109	110	110	110	111	111	111	112	113	115		
	VR	112	112	112	112	112	112	112	112	112	113	115		
	V2	119	119	119	119	119	119	120	120	120	120	121		
	GR2	9.1	9.1	9.1	9	9	9	9	8.9	8.5	8.1	7.8		

FIGURE 10-8-234. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41			
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4			
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL													
	V1													
	VR													
	V2													
	GR2													
34000	TOFL													
	V1													
	VR													
	V2													
	GR2													
33000	TOFL													
	V1													
	VR													
	V2													
	GR2													
32000	TOFL													
	V1													
	VR													
	V2													
	GR2													
31000	TOFL	13090											130	173
	V1	137												
	VR	137												
	V2	142												
	GR2	6.3												

FIGURE 10-8-234. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY SLUSH OR STANDING WATER OR WET SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5		Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41			
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4			
30000	TOFL	11700	12090										127	170
	V1	133	133											
	VR	133	133											
	V2	138	138											
	GR2	6.7	6.7											
29000	TOFL	10430	10770	11140									124	167
	V1	128	128	129										
	VR	129	129	129										
	V2	134	134	134										
	GR2	7.2	7.2	7.2										
28000	TOFL	9280	9560	9900	10180	10330	10560	10820	11120				121	164
	V1	124	124	124	124	124	124	124	124					
	VR	124	124	124	124	124	124	124	124					
	V2	130	130	130	130	130	130	130	129					
	GR2	7.7	7.7	7.6	7.6	7.6	7.6	7.5	7.3					
27000	TOFL	8270	8510	8790	9000	9160	9350	9590	9840	10400			118	160
	V1	119	119	119	119	119	119	119	119	120				
	VR	119	119	119	119	119	119	119	119	120				
	V2	125	125	125	125	125	125	125	125	125				
	GR2	8.2	8.2	8.1	8.1	8.1	8.1	8	7.8	7.4				
26000	TOFL	7300	7530	7800	8010	8160	8330	8530	8750	9210	10000		115	157
	V1	113	114	114	114	114	114	114	114	115	117			
	VR	114	114	114	114	114	114	114	114	115	117			
	V2	122	122	122	122	122	121	121	121	121	121			
	GR2	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.3	7.9	7.6			

V1 CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY STANDING WATER, SLUSH AND WET SNOW

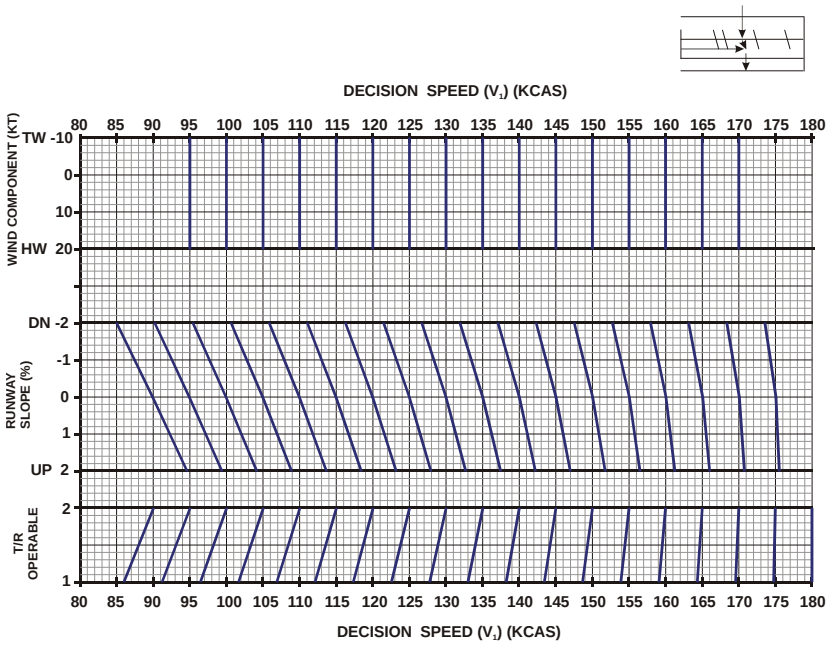
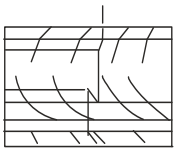


Figure 10-8-235. V1 Corrections Flaps 10° Runway Contaminated By Standing Water, Slush And Wet Snow

TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 10° RUNWAY CONTAMINATED BY STANDING WATER, SLUSH AND WET SNOW



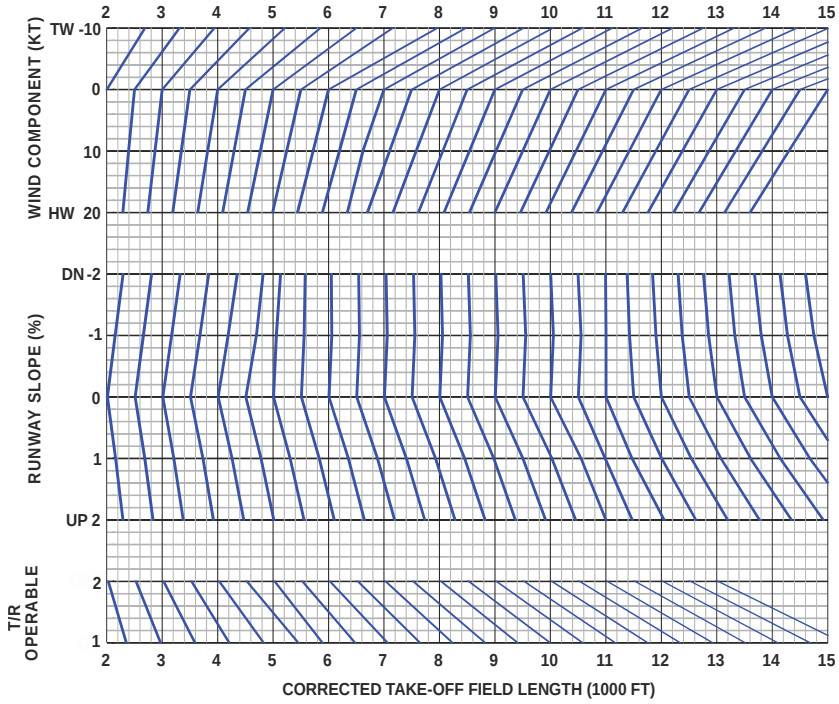


Figure 10-8-236. Takeoff Field Length Corrections Flaps 10° Runway Contaminated By Standing Water, Slush And Wet Snow

FIGURE 10-8-237. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	TOFL	5100	5170	5260	5350	5440	5520	5600	5680	5780	5890	5990	139	192
	V1	121	121	121	121	120	120	120	120	120	120	120		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
39000	TOFL	4900	4970	5060	5140	5230	5310	5380	5460	5560	5660	5760	138	191
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.9	7	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1		
38000	TOFL	4590	4660	4740	4820	4890	4970	5040	5110	5200	5300	5390	136	188
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.3	7.3	7.3	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
37000	TOFL	4290	4350	4430	4500	4570	4640	4710	4780	4870	4950	5040	135	185
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9		
36000	TOFL	4020	4070	4140	4210	4280	4350	4410	4470	4550	4640	4720	133	182
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	8.1	8.1	8.1	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3		
35000	TOFL	3760	3810	3880	3940	4000	4070	4130	4190	4260	4340	4410	131	180
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.5	8.6	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8		
34000	TOFL	3760	3820	3890	3950	4020	4080	4140	4200	4260	4340	4400	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	9	9	9	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2		
33000	TOFL	3720	3770	3830	3900	3960	4020	4080	4140	4220	4280	4360	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9.5	9.5	9.5	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7		
32000	TOFL	3670	3730	3780	3850	3910	3970	4040	4100	4160	4230	4300	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	10	10	10.1	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.2		
31000	TOFL	3620	3670	3730	3800	3860	3920	3980	4040	4100	4170	4240	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.6	10.6	10.6	10.6	10.7	10.7	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-237. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
30000	TOFL	3570	3620	3680	3740	3800	3870	3920	3980	4040	4110	4190	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11.2	11.2	11.2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.4		
29000	TOFL	3520	3560	3620	3690	3750	3800	3870	3920	3980	4060	4120	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.8	11.8	11.9	11.9	11.9	12	12	12.1	12.1	12.1	12.1		
28000	TOFL	3460	3510	3570	3630	3690	3750	3800	3860	3930	4000	4060	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.5	12.5	12.6	12.6	12.7	12.7	12.8	12.8	12.8	12.8	12.8		
27000	TOFL	3410	3460	3510	3570	3630	3690	3740	3800	3870	3930	4000	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	13.3	13.3	13.4	13.4	13.4	13.5	13.6	13.6	13.6	13.6	13.6		
26000	TOFL	3350	3390	3460	3510	3570	3620	3680	3730	3800	3870	3920	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	14.1	14.2	14.2	14.3	14.3	14.4	14.4	14.5	14.5	14.5	14.5		

FIGURE 10-8-238. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
39600	TOFL	6090	6200	6310									139	192
	V1	120	120	120										
	VR	138	138	138										
	V2	145	145	145										
	GR2	6.9	6.9	6.9										
39000	TOFL	5860	5960	6060									138	191
	V1	118	118	118										
	VR	137	137	137										
	V2	144	144	144										
	GR2	7.1	7.1	7.1										
38000	TOFL	5480	5570	5670									136	188
	V1	114	114	114										
	VR	134	134	134										
	V2	141	141	141										
	GR2	7.5	7.5	7.5										
37000	TOFL	5120	5210	5300									135	185
	V1	110	110	110										
	VR	131	131	131										
	V2	139	139	139										
	GR2	7.9	7.9	7.9										
36000	TOFL	4800	4880	4960									133	182
	V1	106	106	106										
	VR	128	128	128										
	V2	136	136	136										
	GR2	8.3	8.3	8.3										
35000	TOFL	4490	4560	4640									131	180
	V1	103	103	103										
	VR	125	125	125										
	V2	134	134	134										
	GR2	8.8	8.8	8.7										
34000	TOFL	4480	4530	4610									129	177
	V1	102	102	102										
	VR	122	122	122										
	V2	132	132	132										
	GR2	9.2	9.2	9.2										
33000	TOFL	4420	4480	4550									127	174
	V1	102	102	102										
	VR	120	120	120										
	V2	129	129	129										
	GR2	9.7	9.7	9.7										
32000	TOFL	4370	4420	4490									125	171
	V1	102	102	102										
	VR	117	117	117										
	V2	127	127	127										
	GR2	10.2	10.2	10.2										
31000	TOFL	4310	4370	4430									123	168
	V1	102	102	102										
	VR	114	114	114										
	V2	125	125	125										
	GR2	10.8	10.8	10.8										

FIGURE 10-8-238. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
30000	TOFL	4250	4310	4370									121	166
	V1	102	102	102										
	VR	111	111	111										
	V2	123	123	123										
	GR2	11.4	11.4	11.4										
29000	TOFL	4190	4250	4300									119	163
	V1	102	102	102										
	VR	109	109	109										
	V2	121	121	121										
	GR2	12.1	12.1	12.1										
28000	TOFL	4120	4180	4240									117	160
	V1	102	102	102										
	VR	107	107	107										
	V2	120	120	120										
	GR2	12.8	12.8	12.8										
27000	TOFL	4060	4110	4180									115	157
	V1	102	102	102										
	VR	105	105	105										
	V2	119	119	119										
	GR2	13.6	13.6	13.6										
26000	TOFL	3990	4050	4100									113	154
	V1	102	102	102										
	VR	103	103	103										
	V2	118	118	118										
	GR2	14.4	14.4	14.4										

FIGURE 10-8-239. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	TOFL	5420	5510	5610	5710	5800	5900	5990	6090	6200	6310	6420	139	193
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7		
39000	TOFL	5220	5300	5390	5490	5580	5670	5760	5850	5960	6070	6170	138	191
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
38000	TOFL	4880	4960	5050	5140	5220	5310	5390	5470	5570	5670	5770	136	188
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3		
37000	TOFL	4560	4630	4720	4800	4880	4950	5030	5110	5210	5300	5390	135	185
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7		
36000	TOFL	4260	4320	4400	4480	4550	4630	4700	4780	4860	4950	5030	133	183
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.9	7.9	8	8	8	8	8	8.1	8.1	8.1	8.1		
35000	TOFL	3980	4040	4110	4190	4260	4320	4390	4460	4540	4620	4700	131	180
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
34000	TOFL	3760	3810	3890	3970	4040	4110	4180	4260	4320	4400	4470	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
33000	TOFL	3790	3850	3920	3990	4050	4120	4180	4250	4320	4390	4460	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.3	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
32000	TOFL	3740	3800	3860	3930	4000	4060	4130	4190	4260	4330	4400	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
31000	TOFL	3700	3750	3820	3880	3950	4000	4070	4140	4200	4280	4340	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5		

FIGURE 10-8-239. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
30000	TOFL	3650	3700	3770	3820	3890	3950	4010	4080	4140	4220	4280	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.9	10.9	11	11	11	11	11.1	11.1	11.1	11.1	11.1		
29000	TOFL	3580	3640	3700	3770	3830	3890	3960	4020	4080	4160	4220	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
28000	TOFL	3530	3580	3650	3710	3780	3830	3900	3950	4020	4100	4160	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
27000	TOFL	3480	3530	3590	3660	3710	3780	3830	3890	3960	4030	4090	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13	13.1	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2	13.2		
26000	TOFL	3420	3470	3530	3590	3660	3710	3770	3840	3890	3960	4030	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.9	13.9	13.9	13.9	14	14	14	14.1	14.1	14.1	14.1		

FIGURE 10-8-240. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
39600	TOFL	6540	6650	6760									139	193
	V1	122	122	122										
	VR	139	139	139										
	V2	146	146	146										
	GR2	6.7	6.7	6.7										
39000	TOFL	6280	6390	6500									138	191
	V1	120	120	120										
	VR	138	138	138										
	V2	144	144	144										
	GR2	6.9	6.9	6.9										
38000	TOFL	5870	5980	6080									136	188
	V1	116	116	116										
	VR	135	135	135										
	V2	142	142	142										
	GR2	7.3	7.3	7.3										
37000	TOFL	5480	5580	5670									135	185
	V1	112	112	112										
	VR	132	132	132										
	V2	139	139	139										
	GR2	7.7	7.6	7.6										
36000	TOFL	5120	5210	5300									133	183
	V1	108	108	108										
	VR	129	129	129										
	V2	137	137	137										
	GR2	8.1	8.1	8										
35000	TOFL	4780	4860	4940									131	180
	V1	104	104	104										
	VR	126	126	126										
	V2	134	134	134										
	GR2	8.5	8.5	8.5										
34000	TOFL	4540	4600	4680									129	177
	V1	101	101	101										
	VR	123	123	123										
	V2	132	132	132										
	GR2	8.9	8.9	8.9										
33000	TOFL	4530	4600	4670									127	174
	V1	101	101	101										
	VR	120	120	120										
	V2	130	130	130										
	GR2	9.4	9.4	9.4										
32000	TOFL	4470	4540	4610									125	171
	V1	101	101	101										
	VR	117	117	117										
	V2	128	128	128										
	GR2	9.9	9.9	9.9										
31000	TOFL	4410	4480	4550									123	169
	V1	101	101	101										
	VR	115	115	115										
	V2	125	125	125										
	GR2	10.5	10.5	10.5										

FIGURE 10-8-240. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
30000	TOFL	4350	4420	4480									121	166
	V1	101	101	101										
	VR	112	112	112										
	V2	123	123	123										
	GR2	11.1	11.1	11.1										
29000	TOFL	4290	4360	4420									119	163
	V1	101	101	101										
	VR	109	109	109										
	V2	121	121	121										
	GR2	11.7	11.7	11.7										
28000	TOFL	4230	4300	4360									117	160
	V1	101	101	101										
	VR	107	107	107										
	V2	120	120	120										
	GR2	12.4	12.4	12.4										
27000	TOFL	4160	4220	4290									115	157
	V1	101	101	101										
	VR	105	105	105										
	V2	118	118	118										
	GR2	13.2	13.2	13.2										
26000	TOFL	4090	4160	4230									113	154
	V1	101	101	101										
	VR	103	103	103										
	V2	117	117	117										
	GR2	14.1	14	14										

FIGURE 10-8-241. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	TOFL	5750	5850	5960	6080	6190	6300	6410	6530	6650	6770	6890	140	193
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
39000	TOFL	5530	5620	5740	5850	5960	6060	6160	6280	6390	6510	6630	139	191
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7		
38000	TOFL	5170	5260	5370	5470	5570	5670	5760	5870	5980	6090	6190	137	189
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
37000	TOFL	4830	4910	5010	5110	5200	5290	5380	5480	5580	5680	5780	135	186
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
36000	TOFL	4500	4580	4670	4760	4850	4930	5010	5110	5200	5290	5390	133	183
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
35000	TOFL	4200	4270	4360	4440	4520	4600	4680	4760	4850	4930	5020	131	180
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
34000	TOFL	3920	3990	4070	4140	4220	4290	4360	4440	4520	4600	4680	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.6	8.6		
33000	TOFL	3870	3920	4000	4060	4130	4200	4260	4340	4410	4480	4540	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
32000	TOFL	3810	3880	3950	4010	4080	4150	4210	4280	4360	4420	4490	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
31000	TOFL	3760	3820	3890	3960	4030	4090	4150	4220	4290	4370	4420	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.2	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		

FIGURE 10-8-241. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
30000	TOFL	3710	3770	3850	3900	3970	4030	4090	4170	4230	4310	4360	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.8	10.8	10.7	10.7		
29000	TOFL	3650	3710	3780	3850	3910	3980	4030	4110	4170	4240	4300	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.4	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
28000	TOFL	3600	3660	3720	3790	3850	3920	3970	4050	4110	4180	4230	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12	12	12	12	12	12.1	12.1	12.1	12.1	12.1		
27000	TOFL	3540	3600	3670	3720	3800	3860	3910	3980	4050	4120	4170	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		
26000	TOFL	3480	3540	3600	3670	3730	3790	3840	3920	3990	4050	4110	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6		

FIGURE 10-8-242. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
39600	TOFL	7020	7140	7260									140	193
	V1	124	125	125										
	VR	141	141	141										
	V2	147	147	147										
	GR2	6.4	6.4	6.4										
39000	TOFL	6740	6860	6980									139	191
	V1	122	122	122										
	VR	139	139	139										
	V2	145	145	145										
	GR2	6.7	6.7	6.6										
38000	TOFL	6300	6410	6520									137	189
	V1	118	118	118										
	VR	136	136	136										
	V2	143	143	143										
	GR2	7	7	7										
37000	TOFL	5880	5980	6090									135	186
	V1	114	114	114										
	VR	133	133	133										
	V2	140	140	140										
	GR2	7.4	7.4	7.4										
36000	TOFL	5480	5570	5670									133	183
	V1	110	110	110										
	VR	130	130	130										
	V2	138	138	138										
	GR2	7.8	7.8	7.8										
35000	TOFL	5110	5200	5290									131	180
	V1	106	106	106										
	VR	127	127	127										
	V2	135	135	135										
	GR2	8.2	8.2	8.2										
34000	TOFL	4770	4850	4930									129	177
	V1	102	102	102										
	VR	124	124	124										
	V2	133	133	133										
	GR2	8.6	8.6	8.6										
33000	TOFL	4610	4680	4740									127	175
	V1	100	100	100										
	VR	121	121	121										
	V2	130	130	130										
	GR2	9.1	9.1	9.1										
32000	TOFL	4550	4630	4690									125	172
	V1	100	100	100										
	VR	118	118	118										
	V2	128	128	128										
	GR2	9.6	9.6	9.6										
31000	TOFL	4500	4560	4640									123	169
	V1	100	100	100										
	VR	115	115	115										
	V2	125	125	125										
	GR2	10.2	10.2	10.1										

FIGURE 10-8-242. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
30000	TOFL	4430	4500	4570									121	166
	V1	100	100	100										
	VR	112	112	112										
	V2	123	123	123										
	GR2	10.7	10.7	10.7										
29000	TOFL	4370	4440	4510									119	163
	V1	100	100	100										
	VR	110	110	110										
	V2	121	121	121										
	GR2	11.4	11.4	11.4										
28000	TOFL	4310	4380	4440									117	160
	V1	100	100	100										
	VR	107	107	107										
	V2	119	119	119										
	GR2	12.1	12.1	12										
27000	TOFL	4240	4300	4370									115	157
	V1	100	100	100										
	VR	105	105	105										
	V2	118	118	118										
	GR2	12.8	12.8	12.8										
26000	TOFL	4170	4240	4310									113	154
	V1	100	100	100										
	VR	103	103	103										
	V2	117	117	117										
	GR2	13.6	13.6	13.6										

FIGURE 10-8-243. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	TOFL	6160	6320	6450	6590	6710	6840	6970	7100	7230	7370	7500	141	193
	V1	127	127	127	127	127	127	127	127	127	128	128		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
39000	TOFL	5890	6040	6170	6300	6420	6540	6660	6790	6920	7050	7170	140	192
	V1	124	124	125	125	125	125	125	125	125	125	125		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
38000	TOFL	5480	5620	5740	5850	5970	6080	6190	6310	6430	6540	6660	137	189
	V1	119	120	120	120	120	120	120	120	120	120	120		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
37000	TOFL	5110	5240	5360	5460	5570	5670	5780	5890	5990	6100	6210	135	186
	V1	115	116	116	116	116	116	116	116	116	116	116		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
36000	TOFL	4770	4890	4990	5090	5190	5290	5380	5480	5580	5690	5790	133	183
	V1	111	112	112	112	112	112	112	112	112	112	112		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
35000	TOFL	4440	4550	4650	4740	4830	4920	5010	5100	5200	5290	5380	131	181
	V1	107	108	108	108	108	108	108	108	108	108	108		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
34000	TOFL	4140	4240	4330	4420	4500	4580	4670	4750	4840	4930	5010	129	178
	V1	103	104	104	104	104	104	104	104	104	104	104		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.5	8.3	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.3	8.3		
33000	TOFL	3860	3950	4040	4120	4200	4270	4350	4430	4510	4590	4670	127	175
	V1	99	100	100	100	100	100	100	100	100	100	100		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	3870	3950	4020	4100	4170	4230	4310	4370	4440	4510	4580	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.4	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
31000	TOFL	3820	3900	3960	4040	4110	4180	4250	4320	4380	4460	4510	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 10-8-243. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
30000	TOFL	3770	3850	3910	3980	4060	4120	4180	4260	4320	4390	4450	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
29000	TOFL	3720	3790	3850	3920	4000	4060	4120	4200	4260	4330	4390	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11	11	11	11	11	11	11	11	11	11		
28000	TOFL	3650	3730	3790	3870	3940	4000	4060	4140	4190	4270	4330	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.8	11.6	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.6		
27000	TOFL	3600	3670	3730	3810	3870	3940	4000	4070	4130	4200	4250	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	117	117		
	GR2	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	3540	3620	3680	3740	3810	3870	3940	4000	4070	4140	4190	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.4	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2		

FIGURE 10-8-244. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
39600	TOFL	7630	7770	7910									141	193
	V1	128	128	128										
	VR	143	143	143										
	V2	148	148	148										
	GR2	6.2	6.2	6.2										
39000	TOFL	7300	7430	7560									140	192
	V1	125	125	125										
	VR	141	141	141										
	V2	146	146	146										
	GR2	6.4	6.4	6.4										
38000	TOFL	6780	6900	7020									137	189
	V1	120	121	121										
	VR	137	137	137										
	V2	143	143	143										
	GR2	6.7	6.7	6.7										
37000	TOFL	6320	6430	6540									135	186
	V1	116	116	117										
	VR	134	134	134										
	V2	141	141	141										
	GR2	7.1	7.1	7.1										
36000	TOFL	5890	5990	6090									133	183
	V1	112	112	112										
	VR	131	131	131										
	V2	138	138	138										
	GR2	7.5	7.5	7.5										
35000	TOFL	5480	5570	5670									131	181
	V1	108	108	108										
	VR	128	128	128										
	V2	136	136	136										
	GR2	7.9	7.9	7.9										
34000	TOFL	5100	5190	5280									129	178
	V1	104	104	104										
	VR	125	125	125										
	V2	133	133	133										
	GR2	8.3	8.3	8.3										
33000	TOFL	4750	4830	4910									127	175
	V1	100	100	100										
	VR	122	122	122										
	V2	131	131	131										
	GR2	8.8	8.8	8.8										
32000	TOFL	4650	4720	4780									125	172
	V1	99	99	99										
	VR	119	119	119										
	V2	128	128	128										
	GR2	9.3	9.3	9.3										
31000	TOFL	4590	4660	4720									123	169
	V1	99	99	99										
	VR	116	116	116										
	V2	126	126	126										
	GR2	9.8	9.8	9.8										

FIGURE 10-8-244. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
30000	TOFL	4520	4590	4650									121	166
	V1	99	99	99										
	VR	113	113	113										
	V2	123	123	123										
	GR2	10.4	10.4	10.4										
29000	TOFL	4460	4530	4590									119	163
	V1	99	99	99										
	VR	110	110	110										
	V2	121	121	121										
	GR2	11	11	11										
28000	TOFL	4390	4470	4520									117	160
	V1	99	99	99										
	VR	108	108	108										
	V2	119	119	119										
	GR2	11.6	11.6	11.6										
27000	TOFL	4330	4400	4450									115	157
	V1	99	99	99										
	VR	105	105	105										
	V2	117	117	117										
	GR2	12.4	12.4	12.4										
26000	TOFL	4260	4330	4380									113	154
	V1	99	99	99										
	VR	103	103	103										
	V2	116	116	116										
	GR2	13.2	13.2	13.2										

FIGURE 10-8-245. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	TOFL	6730	6910	7050	7200	7340	7480	7620	7770	7920	8060	8210	142	194
	V1	130	131	131	131	131	131	131	131	131	131	131		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	5.9	5.9	5.9	5.9	6	6	6	6	5.9	5.9		
39000	TOFL	6440	6600	6740	6880	7020	7150	7280	7420	7560	7700	7840	141	192
	V1	127	128	128	128	128	128	128	128	128	128	128		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.2	6.2	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.1		
38000	TOFL	5970	6120	6250	6370	6500	6620	6750	6870	7000	7130	7260	138	189
	V1	123	123	123	123	123	123	123	123	123	123	124		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
37000	TOFL	5520	5660	5780	5900	6010	6120	6240	6360	6470	6590	6710	136	187
	V1	118	118	118	119	119	119	119	119	119	119	119		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
36000	TOFL	5140	5270	5380	5490	5590	5700	5800	5910	6020	6130	6240	133	184
	V1	114	114	114	114	114	114	114	114	114	115	115		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
35000	TOFL	4780	4900	5000	5100	5200	5300	5400	5500	5600	5700	5800	131	181
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
34000	TOFL	4450	4560	4650	4750	4840	4930	5020	5110	5210	5300	5390	129	178
	V1	105	106	106	106	106	106	106	106	106	106	106		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
33000	TOFL	4140	4240	4330	4420	4500	4580	4670	4750	4840	4920	5010	127	175
	V1	101	102	102	102	102	102	102	102	102	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	3930	3990	4050	4120	4190	4260	4340	4420	4500	4580	4660	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9.1	9	9	9	9	9	9	9	9	9	9		
31000	TOFL	3910	3990	4050	4130	4200	4270	4340	4410	4490	4550	4630	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		

FIGURE 10-8-245. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
30000	TOFL	3860	3930	3990	4070	4140	4220	4280	4360	4420	4490	4560	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.1	10	10	10	10	10	10.1	10.1	10	10	10		
29000	TOFL	3800	3880	3940	4010	4090	4160	4220	4290	4360	4430	4490	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.7	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
28000	TOFL	3740	3820	3880	3950	4030	4100	4150	4230	4290	4360	4430	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
27000	TOFL	3690	3760	3820	3890	3960	4030	4090	4170	4230	4290	4370	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12	12	12	12	12	12	12	12	12	12		
26000	TOFL	3620	3690	3760	3830	3900	3960	4030	4100	4160	4230	4290	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 10-8-246. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
39600	TOFL	8360	8510	8660									142	194
	V1	131	131	131										
	VR	145	145	145										
	V2	150	150	150										
	GR2	5.9	5.9	5.9										
39000	TOFL	7980	8130	8270									141	192
	V1	128	128	128										
	VR	143	143	143										
	V2	148	148	148										
	GR2	6.1	6.1	6.1										
38000	TOFL	7390	7520	7650									138	189
	V1	124	124	124										
	VR	139	139	139										
	V2	145	145	145										
	GR2	6.5	6.5	6.5										
37000	TOFL	6830	6950	7070									136	187
	V1	119	119	119										
	VR	135	135	135										
	V2	142	142	142										
	GR2	6.8	6.8	6.8										
36000	TOFL	6350	6460	6570									133	184
	V1	115	115	115										
	VR	132	132	132										
	V2	139	139	139										
	GR2	7.2	7.2	7.2										
35000	TOFL	5900	6010	6110									131	181
	V1	111	111	111										
	VR	129	129	129										
	V2	136	136	136										
	GR2	7.6	7.6	7.6										
34000	TOFL	5490	5580	5680									129	178
	V1	106	107	107										
	VR	126	126	126										
	V2	134	134	134										
	GR2	8.1	8	8										
33000	TOFL	5100	5190	5270									127	175
	V1	102	102	102										
	VR	123	123	123										
	V2	131	131	131										
	GR2	8.5	8.5	8.5										
32000	TOFL	4740	4820	4900									125	172
	V1	98	98	98										
	VR	120	120	120										
	V2	129	129	129										
	GR2	9	9	9										
31000	TOFL	4690	4760	4830									123	169
	V1	98	98	98										
	VR	117	117	117										
	V2	126	126	126										
	GR2	9.5	9.5	9.5										

FIGURE 10-8-246. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
30000	TOFL	4630	4690	4770									121	166
	V1	98	98	98										
	VR	114	114	114										
	V2	124	124	124										
	GR2	10	10	10										
29000	TOFL	4570	4630	4700									119	163
	V1	98	98	98										
	VR	111	111	111										
	V2	121	121	121										
	GR2	10.6	10.6	10.6										
28000	TOFL	4500	4560	4630									117	160
	V1	98	98	98										
	VR	108	108	108										
	V2	119	119	119										
	GR2	11.3	11.3	11.3										
27000	TOFL	4430	4500	4560									115	157
	V1	98	98	98										
	VR	106	106	106										
	V2	117	117	117										
	GR2	12	12	12										
26000	TOFL	4360	4430	4490									113	154
	V1	98	98	98										
	VR	103	103	103										
	V2	116	116	116										
	GR2	12.8	12.8	12.8										

FIGURE 10-8-247. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	TOFL	7360	7490	7660	7820	7980	8130	8290	8460	8620	8770	8940	143	194
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	7030	7160	7310	7470	7620	7760	7920	8070	8220	8380	8530	142	193
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	6510	6630	6770	6910	7050	7180	7330	7470	7610	7750	7890	139	190
	V1	126	126	126	126	126	126	126	126	126	127	127		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	6020	6130	6260	6390	6510	6640	6770	6900	7030	7150	7290	137	187
	V1	121	121	121	121	121	121	122	122	122	122	122		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	5560	5660	5780	5900	6020	6130	6250	6370	6490	6600	6720	134	184
	V1	116	117	117	117	117	117	117	117	117	117	117		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.1	7	7	7	7	7	7	7	7	7	7		
35000	TOFL	5150	5240	5360	5460	5570	5680	5790	5900	6010	6110	6220	132	181
	V1	112	112	112	112	112	112	112	112	112	112	113		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.4	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	4790	4870	4970	5070	5170	5270	5370	5470	5570	5670	5780	129	178
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
33000	TOFL	4440	4520	4620	4710	4800	4890	4990	5080	5170	5260	5360	127	176
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
32000	TOFL	4130	4200	4290	4380	4460	4540	4630	4720	4800	4890	4970	125	173
	V1	99	100	100	100	100	100	100	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	3990	4050	4140	4220	4290	4360	4420	4500	4570	4630	4700	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		

FIGURE 10-8-247. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
30000	TOFL	3940	3990	4070	4150	4220	4300	4380	4460	4520	4600	4660	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
29000	TOFL	3880	3940	4010	4090	4160	4230	4300	4380	4450	4540	4600	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	3820	3880	3950	4030	4110	4170	4250	4310	4390	4460	4520	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
27000	TOFL	3760	3810	3890	3970	4040	4100	4170	4250	4320	4390	4460	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	3690	3760	3830	3910	3970	4040	4110	4180	4260	4320	4390	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.5	12.4	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4		

FIGURE 10-8-248. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
39600	TOFL	9100	9270	9430									143	194
	V1	134	134	135										
	VR	147	147	147										
	V2	152	152	152										
	GR2	5.7	5.7	5.7										
39000	TOFL	8690	8850	9000									142	193
	V1	131	132	132										
	VR	145	145	145										
	V2	150	150	150										
	GR2	5.9	5.9	5.9										
38000	TOFL	8030	8180	8320									139	190
	V1	127	127	127										
	VR	141	141	141										
	V2	147	147	147										
	GR2	6.3	6.3	6.3										
37000	TOFL	7420	7550	7680									137	187
	V1	122	122	122										
	VR	137	137	137										
	V2	143	143	143										
	GR2	6.6	6.6	6.6										
36000	TOFL	6840	6970	7090									134	184
	V1	117	117	117										
	VR	134	134	134										
	V2	140	140	140										
	GR2	7	7	7										
35000	TOFL	6330	6450	6560									132	181
	V1	113	113	113										
	VR	130	130	130										
	V2	137	137	137										
	GR2	7.4	7.3	7.3										
34000	TOFL	5880	5980	6080									129	178
	V1	108	108	109										
	VR	127	127	127										
	V2	135	135	135										
	GR2	7.8	7.8	7.8										
33000	TOFL	5450	5550	5640									127	176
	V1	104	104	104										
	VR	124	124	124										
	V2	132	132	132										
	GR2	8.2	8.2	8.2										
32000	TOFL	5060	5150	5230									125	173
	V1	100	100	100										
	VR	121	121	121										
	V2	129	129	129										
	GR2	8.7	8.7	8.7										
31000	TOFL	4770	4830	4900									123	170
	V1	97	97	97										
	VR	118	118	118										
	V2	127	127	127										
	GR2	9.2	9.2	9.2										

FIGURE 10-8-248. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
30000	TOFL	4740	4800	4870									121	167
	V1	97	97	97										
	VR	115	115	115										
	V2	124	124	124										
	GR2	9.7	9.7	9.7										
29000	TOFL	4670	4740	4800									119	164
	V1	97	97	97										
	VR	111	111	112										
	V2	121	121	121										
	GR2	10.3	10.3	10.3										
28000	TOFL	4590	4670	4730									117	161
	V1	97	97	97										
	VR	108	108	108										
	V2	119	119	119										
	GR2	10.9	10.9	10.9										
27000	TOFL	4520	4590	4650									115	157
	V1	97	97	97										
	VR	106	106	106										
	V2	117	117	117										
	GR2	11.6	11.6	11.6										
26000	TOFL	4450	4520	4580									113	154
	V1	97	97	97										
	VR	103	103	103										
	V2	115	115	115										
	GR2	12.4	12.4	12.3										

FIGURE 10-8-249. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	TOFL	8010	8260	8510	8670	8830	8990	9170	9350	9530	9710	9890	144	195
	V1	137	138	138	138	138	138	138	138	138	138	138		
	VR	149	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.6	5.5	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	7650	7880	8120	8280	8430	8580	8750	8920	9100	9270	9440	143	193
	V1	134	135	135	135	135	135	135	135	135	135	136		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.7	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	7070	7280	7500	7640	7770	7920	8080	8230	8390	8550	8700	140	190
	V1	129	130	130	130	130	130	130	130	130	130	131		
	VR	143	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.2	6	6	6	6	6	6	6	6	6	6		
37000	TOFL	6530	6720	6920	7050	7180	7310	7450	7600	7740	7880	8030	138	187
	V1	124	125	125	125	125	125	125	125	125	125	126		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
36000	TOFL	6020	6200	6390	6500	6620	6740	6870	7000	7130	7260	7400	135	185
	V1	119	120	120	120	120	120	120	120	120	121	121		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
35000	TOFL	5550	5710	5880	5990	6100	6210	6330	6450	6570	6690	6810	133	182
	V1	114	115	116	116	116	116	116	116	116	116	116		
	VR	132	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
34000	TOFL	5120	5270	5420	5520	5620	5720	5830	5940	6050	6160	6270	130	179
	V1	110	110	111	111	111	111	111	111	111	111	111		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.5	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
33000	TOFL	4750	4880	5020	5120	5200	5300	5400	5500	5600	5700	5810	127	176
	V1	105	106	107	107	107	107	107	107	107	107	107		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.1	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
32000	TOFL	4400	4530	4660	4740	4820	4910	5000	5100	5190	5280	5380	125	173
	V1	101	102	102	102	102	102	102	102	102	102	103		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.6	8.4	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
31000	TOFL	4080	4190	4310	4390	4470	4540	4630	4720	4800	4890	4970	123	170
	V1	97	98	98	98	98	98	98	98	98	98	98		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.1	8.9	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 10-8-249. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
30000	TOFL	3990	4080	4170	4240	4320	4390	4460	4540	4610	4680	4750	121	167
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.6	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
29000	TOFL	3930	4010	4110	4180	4250	4330	4410	4470	4550	4610	4690	119	164
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.1	10	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	3870	3950	4040	4120	4190	4260	4340	4400	4480	4540	4620	117	161
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
27000	TOFL	3810	3890	3980	4050	4130	4200	4270	4330	4410	4480	4550	115	158
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.3	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
26000	TOFL	3750	3830	3920	3990	4060	4130	4210	4260	4340	4400	4470	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 10-8-250. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
39600	TOFL	10080	10270	10450									144	195
	V1	139	139	139										
	VR	150	150	150										
	V2	154	154	154										
	GR2	5.5	5.5	5.5										
39000	TOFL	9610	9790	9970									143	193
	V1	136	136	136										
	VR	147	147	147										
	V2	152	152	152										
	GR2	5.7	5.7	5.7										
38000	TOFL	8860	9030	9190									140	190
	V1	131	131	131										
	VR	144	144	144										
	V2	148	148	148										
	GR2	6	6	6										
37000	TOFL	8180	8320	8470									138	187
	V1	126	126	126										
	VR	140	140	140										
	V2	145	145	145										
	GR2	6.3	6.3	6.3										
36000	TOFL	7530	7670	7800									135	185
	V1	121	121	121										
	VR	136	136	136										
	V2	142	142	142										
	GR2	6.7	6.7	6.7										
35000	TOFL	6930	7060	7180									133	182
	V1	116	116	116										
	VR	133	133	133										
	V2	139	139	139										
	GR2	7.1	7.1	7.1										
34000	TOFL	6390	6500	6610									130	179
	V1	111	111	111										
	VR	129	129	129										
	V2	136	136	136										
	GR2	7.5	7.5	7.5										
33000	TOFL	5910	6010	6120									127	176
	V1	107	107	107										
	VR	126	126	126										
	V2	133	133	133										
	GR2	7.9	7.9	7.9										
32000	TOFL	5470	5570	5660									125	173
	V1	103	103	103										
	VR	123	123	123										
	V2	130	130	130										
	GR2	8.4	8.4	8.4										
31000	TOFL	5060	5150	5240									123	170
	V1	98	99	99										
	VR	119	119	119										
	V2	127	127	127										
	GR2	8.9	8.9	8.9										

FIGURE 10-8-250. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
30000	TOFL	4820	4890	4940									121	167
	V1	96	96	95										
	VR	116	116	116										
	V2	125	125	125										
	GR2	9.4	9.4	9.4										
29000	TOFL	4750	4830	4870									119	164
	V1	96	96	95										
	VR	113	113	113										
	V2	122	122	122										
	GR2	9.9	9.9	9.9										
28000	TOFL	4680	4750	4800									117	161
	V1	96	96	95										
	VR	109	109	109										
	V2	119	119	119										
	GR2	10.5	10.5	10.5										
27000	TOFL	4610	4680	4730									115	158
	V1	96	96	95										
	VR	106	106	106										
	V2	117	117	117										
	GR2	11.2	11.2	11.2										
26000	TOFL	4540	4610	4650									113	155
	V1	96	96	95										
	VR	104	104	104										
	V2	115	115	115										
	GR2	11.9	11.9	11.9										

FIGURE 10-8-251. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	TOFL	8820	9180	9420	9590	9760	9950	10150	10350	10560	10760	10960	145	195
	V1	141	142	142	142	142	142	142	142	142	142	142		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.4	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	8420	8770	8990	9160	9310	9490	9690	9880	10070	10260	10450	144	193
	V1	138	139	139	139	139	139	139	139	139	139	140		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	7790	8100	8310	8460	8600	8770	8950	9120	9300	9470	9650	141	191
	V1	133	134	134	134	134	134	134	134	134	135	135		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	151	151	151	151	151	151	151	151	151	151		
	GR2	5.9	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	7190	7490	7680	7810	7940	8100	8260	8420	8580	8750	8910	139	188
	V1	128	129	129	129	129	129	130	130	130	130	130		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	6620	6880	7060	7180	7300	7440	7590	7740	7880	8030	8180	136	185
	V1	123	124	124	124	124	124	124	124	125	125	125		
	VR	138	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.6	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
35000	TOFL	6090	6330	6490	6600	6710	6840	6980	7110	7240	7380	7510	134	182
	V1	118	119	119	119	119	119	119	119	119	119	120		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
34000	TOFL	5600	5820	5960	6060	6160	6280	6400	6530	6650	6770	6890	131	179
	V1	113	114	114	114	114	114	114	114	114	114	115		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
33000	TOFL	5140	5340	5470	5560	5650	5760	5870	5980	6090	6210	6320	128	176
	V1	108	109	109	109	109	109	109	109	109	109	110		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.8	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	4750	4930	5050	5140	5220	5320	5420	5520	5630	5730	5830	126	173
	V1	104	105	105	105	105	105	105	105	105	105	105		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.3	8.1	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	4400	4560	4670	4750	4820	4910	5010	5100	5200	5290	5380	123	170
	V1	99	100	101	101	101	101	101	101	101	101	101		
	VR	120	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 10-8-251. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
30000	TOFL	4050	4210	4310	4380	4450	4530	4620	4710	4790	4880	4960	121	167
	V1	95	96	96	96	96	96	96	96	96	96	96		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	126	126	126	126	126	126	126	126	126	126		
	GR2	9.3	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9		
29000	TOFL	3990	4100	4190	4250	4330	4410	4480	4550	4630	4700	4780	119	164
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.8	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
28000	TOFL	3940	4040	4120	4200	4270	4340	4410	4480	4560	4630	4700	117	161
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.4	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
27000	TOFL	3880	3970	4060	4130	4200	4280	4340	4420	4490	4570	4630	115	158
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	3830	3910	4000	4070	4130	4210	4270	4350	4420	4500	4560	113	155
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.8	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 10-8-252. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
39600	TOFL	11170	11380	11590									145	195
	V1	143	143	143										
	VR	152	152	152										
	V2	156	156	156										
	GR2	5.2	5.2	5.2										
39000	TOFL	10650	10850	11050									144	193
	V1	140	140	140										
	VR	150	150	150										
	V2	154	154	154										
	GR2	5.4	5.4	5.4										
38000	TOFL	9830	10010	10200									141	191
	V1	135	135	135										
	VR	146	146	146										
	V2	151	151	151										
	GR2	5.7	5.7	5.7										
37000	TOFL	9070	9240	9410									139	188
	V1	130	130	130										
	VR	143	143	143										
	V2	147	147	147										
	GR2	6.1	6.1	6.1										
36000	TOFL	8330	8480	8640									136	185
	V1	125	125	125										
	VR	139	139	139										
	V2	144	144	144										
	GR2	6.4	6.4	6.4										
35000	TOFL	7650	7790	7930									134	182
	V1	120	120	120										
	VR	135	135	135										
	V2	141	141	141										
	GR2	6.8	6.8	6.8										
34000	TOFL	7020	7150	7270									131	179
	V1	115	115	115										
	VR	131	131	131										
	V2	137	137	137										
	GR2	7.2	7.2	7.2										
33000	TOFL	6430	6550	6660									128	176
	V1	110	110	110										
	VR	127	127	127										
	V2	134	134	134										
	GR2	7.6	7.6	7.6										
32000	TOFL	5930	6040	6150									126	173
	V1	105	105	105										
	VR	124	124	124										
	V2	131	131	131										
	GR2	8.1	8.1	8										
31000	TOFL	5480	5580	5670									123	170
	V1	101	101	101										
	VR	121	121	121										
	V2	128	128	128										
	GR2	8.5	8.5	8.5										

FIGURE 10-8-252. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
30000	TOFL	5050	5140	5230									121	167
	V1	97	97	97										
	VR	117	117	117										
	V2	126	126	126										
	GR2	9	9	9										
29000	TOFL	4850	4910	4920									119	164
	V1	94	94	94										
	VR	114	114	114										
	V2	123	123	123										
	GR2	9.6	9.6	9.6										
28000	TOFL	4780	4830	4850									117	161
	V1	94	94	94										
	VR	110	110	110										
	V2	120	120	120										
	GR2	10.1	10.1	10.1										
27000	TOFL	4710	4760	4780									115	158
	V1	94	94	94										
	VR	107	107	107										
	V2	117	117	117										
	GR2	10.8	10.8	10.8										
26000	TOFL	4630	4690	4700									113	155
	V1	94	94	94										
	VR	104	104	104										
	V2	115	115	115										
	GR2	11.5	11.5	11.5										

FIGURE 10-8-253. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	TOFL	9810	10220	10420	10610	10810	11040	11260	11490	11720	11940	12180	147	195
	V1	145	146	146	146	146	146	146	146	147	147	147		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5.1	4.9	4.9	4.9	5	5	5	5	5	5	4.9		
39000	TOFL	9360	9750	9940	10120	10300	10520	10730	10950	11170	11380	11600	145	194
	V1	142	143	143	143	143	143	143	143	144	144	144		
	VR	152	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.3	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.1	5.1		
38000	TOFL	8650	9010	9180	9340	9520	9710	9910	10110	10300	10500	10700	142	191
	V1	137	138	138	138	138	138	138	139	139	139	139		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.6	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	7980	8310	8470	8620	8780	8960	9140	9320	9500	9680	9860	140	188
	V1	132	133	133	133	133	133	133	134	134	134	134		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	7360	7670	7820	7960	8100	8260	8430	8590	8760	8920	9090	137	185
	V1	127	129	129	129	129	129	129	129	129	129	129		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.3	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	6750	7040	7170	7290	7420	7570	7720	7870	8020	8170	8320	135	183
	V1	122	123	123	123	123	123	123	123	123	124	124		
	VR	137	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
34000	TOFL	6190	6450	6570	6680	6800	6940	7070	7210	7340	7480	7620	132	180
	V1	117	118	118	118	118	118	118	118	118	118	118		
	VR	133	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
33000	TOFL	5670	5910	6010	6120	6220	6350	6470	6590	6720	6840	6970	129	177
	V1	112	113	113	113	113	113	113	113	113	113	113		
	VR	129	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.5	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
32000	TOFL	5180	5400	5490	5590	5680	5800	5910	6020	6130	6250	6360	127	174
	V1	107	108	108	108	108	108	108	108	108	108	108		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.9	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
31000	TOFL	4770	4960	5050	5140	5230	5330	5430	5530	5640	5740	5840	124	171
	V1	102	103	103	103	103	103	103	103	103	103	103		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.4	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 10-8-253. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
30000	TOFL	4400	4570	4660	4730	4810	4910	5000	5100	5190	5280	5380	121	168
	V1	98	99	99	99	99	99	99	99	99	99	99		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.9	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
29000	TOFL	4100	4210	4280	4350	4430	4510	4600	4690	4770	4850	4940	119	165
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.4	9.2	9.2	9.2	9.3	9.3	9.3	9.2	9.2	9.2	9.2		
28000	TOFL	4040	4140	4220	4280	4350	4440	4500	4580	4660	4730	4800	117	161
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	3980	4080	4150	4210	4290	4370	4430	4510	4580	4670	4730	115	158
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.3	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
26000	TOFL	3910	4010	4090	4140	4220	4300	4360	4440	4510	4590	4650	113	155
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 10-8-254. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
39600	TOFL	12410	12650	12940									147	195
	V1	147	147	147										
	VR	155	155	155										
	V2	158	158	158										
	GR2	4.9	4.9	4.9										
39000	TOFL	11830	12050	12320									145	194
	V1	144	144	144										
	VR	153	153	153										
	V2	156	156	156										
	GR2	5.1	5.1	5.1										
38000	TOFL	10910	11110	11360									142	191
	V1	139	139	139										
	VR	149	149	149										
	V2	153	153	153										
	GR2	5.5	5.4	5.4										
37000	TOFL	10050	10240	10460									140	188
	V1	134	134	134										
	VR	145	145	145										
	V2	149	149	149										
	GR2	5.8	5.8	5.7										
36000	TOFL	9260	9430	9640									137	185
	V1	129	129	129										
	VR	142	142	142										
	V2	146	146	146										
	GR2	6.2	6.2	6.1										
35000	TOFL	8480	8630	8830									135	183
	V1	124	124	124										
	VR	138	138	138										
	V2	143	143	143										
	GR2	6.5	6.5	6.4										
34000	TOFL	7760	7900	8080									132	180
	V1	119	119	119										
	VR	134	134	134										
	V2	139	139	139										
	GR2	6.9	6.9	6.8										
33000	TOFL	7090	7220	7390									129	177
	V1	113	113	114										
	VR	130	130	130										
	V2	136	136	136										
	GR2	7.3	7.3	7.2										
32000	TOFL	6480	6590	6740									127	174
	V1	108	108	109										
	VR	126	126	126										
	V2	132	132	132										
	GR2	7.7	7.7	7.6										
31000	TOFL	5950	6050	6190									124	171
	V1	103	104	104										
	VR	122	122	122										
	V2	129	129	129										
	GR2	8.2	8.2	8.1										

FIGURE 10-8-254. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
30000	TOFL	5470	5570	5700									121	168
	V1	99	99	99										
	VR	119	119	119										
	V2	126	126	126										
	GR2	8.7	8.7	8.6										
29000	TOFL	5030	5120	5230									119	165
	V1	95	95	95										
	VR	115	115	115										
	V2	124	124	124										
	GR2	9.2	9.2	9.1										
28000	TOFL	4880	4920	4900									117	161
	V1	93	93	92										
	VR	112	112	112										
	V2	121	121	121										
	GR2	9.8	9.8	9.6										
27000	TOFL	4810	4850	4820									115	158
	V1	93	93	92										
	VR	108	108	108										
	V2	118	118	118										
	GR2	10.4	10.4	10.2										
26000	TOFL	4730	4780	4760									113	155
	V1	93	93	92										
	VR	105	105	105										
	V2	115	115	115										
	GR2	11.1	11	10.9										

FIGURE 10-8-255. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	TOFL	11060	11410	11650	11870	12120	12380	12640	12900	13160	13420	13690	148	196
	V1	150	151	151	151	151	151	151	151	152	152	152		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	10540	10840	11070	11280	11520	11760	12000	12250	12490	12740	13000	146	194
	V1	147	148	148	148	148	148	148	148	148	148	149		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	9710	9990	10200	10390	10610	10830	11050	11280	11500	11730	11960	144	191
	V1	142	143	143	143	143	143	143	143	143	143	143		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	8950	9200	9390	9570	9760	9960	10170	10370	10570	10780	10990	141	189
	V1	137	138	138	138	138	138	138	138	138	138	138		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.6	5.5	5.5	5.5	5.6	5.6	5.5	5.5	5.5	5.5	5.5		
36000	TOFL	8230	8460	8630	8810	8980	9170	9360	9540	9730	9920	10110	138	186
	V1	132	132	133	133	133	133	133	133	133	133	133		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
35000	TOFL	7560	7780	7930	8080	8240	8410	8580	8750	8920	9090	9260	136	183
	V1	127	127	127	127	127	127	128	128	128	128	128		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	6920	7130	7270	7400	7550	7700	7860	8010	8170	8320	8480	133	180
	V1	121	122	122	122	122	122	122	122	122	123	123		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.7	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6		
33000	TOFL	6320	6500	6630	6750	6880	7020	7160	7300	7440	7580	7720	130	177
	V1	116	117	117	117	117	117	117	117	117	117	117		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		
32000	TOFL	5770	5930	6040	6150	6270	6400	6520	6650	6780	6900	7030	127	174
	V1	111	111	111	111	111	111	111	112	112	112	112		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
31000	TOFL	5250	5400	5500	5600	5710	5820	5940	6050	6160	6280	6390	125	171
	V1	105	106	106	106	106	106	106	106	106	106	106		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		

FIGURE 10-8-255. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
30000	TOFL	4810	4940	5030	5120	5220	5330	5430	5530	5630	5740	5840	122	168
	V1	100	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	4420	4530	4620	4700	4790	4890	4980	5070	5170	5260	5350	119	165
	V1	96	96	96	96	96	97	97	97	97	97	97		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
28000	TOFL	4150	4210	4290	4370	4440	4520	4600	4670	4750	4820	4900	117	162
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4		
27000	TOFL	4080	4170	4240	4310	4390	4470	4540	4630	4690	4780	4850	115	159
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.2	10	10	10.1	10.1	10.1	10.1	10.1	10.1	10	10		
26000	TOFL	4010	4100	4180	4240	4320	4400	4470	4550	4620	4700	4770	113	155
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7		

FIGURE 10-8-256. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
39600	TOFL	13960	14240	14750									148	196
	V1	152	152	153										
	VR	158	158	158										
	V2	161	161	161										
	GR2	4.7	4.6	4.4										
39000	TOFL	13250	13520	14000									146	194
	V1	149	149	150										
	VR	156	156	156										
	V2	159	159	159										
	GR2	4.9	4.8	4.6										
38000	TOFL	12190	12430	12870									144	191
	V1	143	144	145										
	VR	152	152	152										
	V2	155	155	155										
	GR2	5.2	5.1	4.9										
37000	TOFL	11200	11430	11830									141	189
	V1	138	139	140										
	VR	148	148	148										
	V2	152	152	152										
	GR2	5.5	5.5	5.3										
36000	TOFL	10300	10500	10860									138	186
	V1	133	134	134										
	VR	144	144	144										
	V2	148	148	148										
	GR2	5.9	5.8	5.6										
35000	TOFL	9440	9630	9970									136	183
	V1	128	128	129										
	VR	140	140	141										
	V2	145	145	145										
	GR2	6.3	6.2	5.9										
34000	TOFL	8630	8810	9130									133	180
	V1	123	123	124										
	VR	136	136	137										
	V2	141	141	141										
	GR2	6.6	6.6	6.3										
33000	TOFL	7860	8030	8310									130	177
	V1	117	118	119										
	VR	132	132	133										
	V2	138	138	138										
	GR2	7	7	6.7										
32000	TOFL	7160	7310	7570									127	174
	V1	112	112	113										
	VR	128	128	128										
	V2	134	134	134										
	GR2	7.5	7.4	7.1										
31000	TOFL	6510	6640	6880									125	171
	V1	106	107	108										
	VR	124	124	124										
	V2	131	131	131										
	GR2	7.9	7.8	7.5										

FIGURE 10-8-256. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
30000	TOFL	5940	6070	6280									122	168
	V1	102	102	103										
	VR	120	120	121										
	V2	127	127	127										
	GR2	8.4	8.3	8										
29000	TOFL	5450	5560	5750									119	165
	V1	97	97	98										
	VR	117	117	117										
	V2	124	124	124										
	GR2	8.9	8.8	8.5										
28000	TOFL	4980	5090	5260									117	162
	V1	92	93	94										
	VR	113	113	113										
	V2	121	121	121										
	GR2	9.4	9.3	9										
27000	TOFL	4910	4900	4870									115	159
	V1	92	91	91										
	VR	109	109	110										
	V2	118	118	118										
	GR2	10	9.9	9.6										
26000	TOFL	4830	4820	4810									113	155
	V1	92	91	90										
	VR	106	106	106										
	V2	115	115	115										
	GR2	10.7	10.5	10.2										

FIGURE 10-8-257. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	TOFL	12530	12770	13060	13350	13650	13950	14250	14550	14850	15150	15460	149	196
	V1	156	156	156	156	156	156	157	157	157	157	157		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
39000	TOFL	11900	12140	12420	12690	12970	13250	13530	13810	14100	14380	14670	147	194
	V1	153	153	153	153	153	153	153	154	154	154	154		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	10930	11140	11400	11640	11900	12150	12410	12660	12920	13180	13440	145	192
	V1	147	147	147	148	148	148	148	148	148	148	148		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
37000	TOFL	10020	10210	10440	10670	10900	11130	11370	11590	11830	12060	12300	142	189
	V1	142	142	142	142	142	142	142	143	143	143	143		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	9200	9370	9580	9780	10000	10210	10420	10630	10840	11050	11270	139	186
	V1	136	137	137	137	137	137	137	137	137	137	138		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
35000	TOFL	8440	8590	8780	8970	9160	9350	9540	9730	9920	10110	10310	137	183
	V1	131	131	131	132	132	132	132	132	132	132	132		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
34000	TOFL	7720	7860	8030	8200	8380	8550	8720	8890	9070	9240	9420	134	180
	V1	126	126	126	126	126	126	126	127	127	127	127		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
33000	TOFL	7050	7180	7340	7490	7650	7800	7960	8120	8280	8430	8590	131	177
	V1	120	121	121	121	121	121	121	121	121	121	121		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
32000	TOFL	6410	6530	6670	6810	6950	7090	7230	7370	7510	7650	7800	128	175
	V1	115	115	115	115	115	115	115	115	116	116	116		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
31000	TOFL	5820	5930	6050	6180	6300	6430	6560	6680	6810	6940	7070	126	172
	V1	109	109	110	110	110	110	110	110	110	110	110		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.6		

FIGURE 10-8-257. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
30000	TOFL	5280	5370	5490	5600	5720	5830	5940	6050	6170	6280	6400	123	168
	V1	104	104	104	104	104	104	104	104	104	104	105		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
29000	TOFL	4810	4890	5000	5100	5200	5300	5400	5500	5610	5710	5820	120	165
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	4400	4470	4570	4660	4750	4840	4940	5030	5120	5210	5310	117	162
	V1	94	94	94	94	94	94	94	94	94	95	95		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
27000	TOFL	4200	4280	4340	4420	4500	4580	4660	4730	4810	4880	4960	115	159
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
26000	TOFL	4140	4210	4270	4360	4420	4510	4580	4660	4730	4800	4880	113	156
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3		

FIGURE 10-8-258. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
39600	TOFL	15770	16160	16930									149	196
	V1	157	158	159										
	VR	161	161	162										
	V2	164	164	164										
	GR2	4.4	4.3	4										
39000	TOFL	14970	15340	16090									147	194
	V1	154	155	156										
	VR	159	159	159										
	V2	161	161	161										
	GR2	4.6	4.5	4.2										
38000	TOFL	13710	14050	14750									145	192
	V1	149	149	151										
	VR	155	155	156										
	V2	158	158	158										
	GR2	4.9	4.8	4.5										
37000	TOFL	12540	12850	13480									142	189
	V1	143	144	145										
	VR	151	151	151										
	V2	154	154	154										
	GR2	5.3	5.1	4.8										
36000	TOFL	11480	11780	12350									139	186
	V1	138	138	140										
	VR	147	147	148										
	V2	151	151	151										
	GR2	5.6	5.4	5.1										
35000	TOFL	10510	10780	11300									137	183
	V1	132	133	135										
	VR	143	143	144										
	V2	147	147	147										
	GR2	6	5.8	5.5										
34000	TOFL	9600	9850	10350									134	180
	V1	127	128	129										
	VR	139	139	140										
	V2	144	144	144										
	GR2	6.4	6.2	5.8										
33000	TOFL	8750	8980	9420									131	177
	V1	122	122	124										
	VR	135	135	136										
	V2	140	140	140										
	GR2	6.8	6.6	6.2										
32000	TOFL	7940	8150	8560									128	175
	V1	116	117	118										
	VR	131	131	131										
	V2	136	136	136										
	GR2	7.2	6.9	6.6										
31000	TOFL	7200	7390	7760									126	172
	V1	110	111	113										
	VR	126	127	127										
	V2	133	133	133										
	GR2	7.6	7.4	7										

FIGURE 10-8-258. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
30000	TOFL	6520	6690	7020									123	168
	V1	105	105	107										
	VR	122	122	123										
	V2	129	129	129										
	GR2	8.1	7.8	7.4										
29000	TOFL	5920	6080	6370									120	165
	V1	99	100	102										
	VR	118	118	119										
	V2	125	125	125										
	GR2	8.6	8.3	7.9										
28000	TOFL	5400	5550	5810									117	162
	V1	95	95	97										
	VR	114	114	115										
	V2	122	122	122										
	GR2	9.1	8.8	8.4										
27000	TOFL	4980	5050	5290									115	159
	V1	91	91	92										
	VR	111	111	111										
	V2	119	119	119										
	GR2	9.7	9.4	9										
26000	TOFL	4900	4870	4870									113	156
	V1	91	89	88										
	VR	107	107	108										
	V2	116	116	116										
	GR2	10.3	10	9.6										

FIGURE 10-8-259. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	TOFL	13960	14400	14710	15020	15370	15710	16050	16400	16750	17090	17450	150	197
	V1	160	161	161	161	161	161	162	162	162	162	162		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1		
39000	TOFL	13260	13670	13960	14260	14580	14900	15230	15550	15880	16210	16550	148	195
	V1	157	158	158	158	158	158	158	158	159	159	159		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
38000	TOFL	12140	12520	12780	13050	13340	13630	13930	14220	14510	14810	15120	146	192
	V1	152	152	152	152	152	153	153	153	153	153	153		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6		
37000	TOFL	11090	11440	11670	11920	12180	12440	12710	12980	13240	13510	13780	143	189
	V1	146	147	147	147	147	147	147	147	147	147	148		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.1	5	5	5	5	5	5	5	5	5	5		
36000	TOFL	10130	10450	10660	10880	11120	11360	11600	11830	12070	12310	12560	140	187
	V1	140	141	141	141	141	141	141	141	142	142	142		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.5	5.3	5.3	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3		
35000	TOFL	9270	9550	9740	9940	10160	10370	10590	10800	11020	11240	11460	138	184
	V1	135	135	135	136	136	136	136	136	136	136	136		
	VR	145	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
34000	TOFL	8470	8720	8900	9080	9270	9470	9660	9850	10050	10250	10450	135	181
	V1	129	130	130	130	130	130	130	130	131	131	131		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
33000	TOFL	7710	7950	8100	8270	8440	8620	8790	8960	9140	9320	9500	132	178
	V1	124	124	124	124	125	125	125	125	125	125	125		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
32000	TOFL	7020	7230	7370	7520	7680	7830	7990	8150	8310	8470	8630	129	175
	V1	118	119	119	119	119	119	119	119	119	119	120		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
31000	TOFL	6350	6550	6670	6800	6950	7090	7230	7370	7510	7650	7800	127	172
	V1	112	113	113	113	113	113	113	113	114	114	114		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3		

FIGURE 10-8-259. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
30000	TOFL	5750	5920	6040	6150	6280	6410	6530	6660	6790	6920	7050	124	169
	V1	107	107	107	107	107	108	108	108	108	108	108		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
29000	TOFL	5210	5360	5460	5560	5680	5790	5910	6020	6130	6250	6360	121	166
	V1	101	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
28000	TOFL	4720	4860	4950	5040	5140	5250	5350	5450	5550	5650	5760	118	162
	V1	96	96	96	96	97	97	97	97	97	97	97		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8		
27000	TOFL	4300	4420	4510	4590	4680	4780	4870	4960	5050	5140	5240	115	159
	V1	91	92	92	92	92	92	92	92	92	92	92		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
26000	TOFL	4200	4270	4340	4430	4500	4580	4650	4740	4810	4890	4930	113	156
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10	10.1	10.1	10.1	10.1	10.1	10	10	10	10		

FIGURE 10-8-260. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
39600	TOFL	17860	18510	19560									150	197
	V1	162	163	165										
	VR	164	165	165										
	V2	166	166	167										
	GR2	4.1	3.8	3.6										
39000	TOFL	16930	17560	18700									148	195
	V1	159	160	162										
	VR	162	162	163										
	V2	164	164	164										
	GR2	4.3	4	3.7										
38000	TOFL	15470	16060	17120									146	192
	V1	154	155	157										
	VR	158	158	159										
	V2	160	160	160										
	GR2	4.6	4.3	4										
37000	TOFL	14100	14640	15650									143	189
	V1	148	149	151										
	VR	154	154	155										
	V2	156	156	157										
	GR2	4.9	4.6	4.3										
36000	TOFL	12850	13340	14270									140	187
	V1	142	143	146										
	VR	150	150	151										
	V2	153	153	153										
	GR2	5.2	5	4.7										
35000	TOFL	11730	12180	12990									138	184
	V1	137	138	140										
	VR	146	146	147										
	V2	149	149	149										
	GR2	5.6	5.3	5										
34000	TOFL	10690	11100	11840									135	181
	V1	131	132	135										
	VR	142	142	143										
	V2	146	146	146										
	GR2	6	5.7	5.3										
33000	TOFL	9720	10110	10780									132	178
	V1	126	127	129										
	VR	137	138	139										
	V2	142	142	142										
	GR2	6.4	6	5.7										
32000	TOFL	8830	9190	9800									129	175
	V1	120	121	124										
	VR	133	133	134										
	V2	138	138	139										
	GR2	6.8	6.4	6.1										
31000	TOFL	7990	8310	8890									127	172
	V1	114	116	118										
	VR	129	129	130										
	V2	134	134	135										
	GR2	7.2	6.8	6.5										

FIGURE 10-8-260. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
30000	TOFL	7210	7510	8020									124	169
	V1	108	110	112										
	VR	124	125	126										
	V2	131	131	131										
	GR2	7.7	7.3	6.9										
29000	TOFL	6510	6780	7220									121	166
	V1	103	104	107										
	VR	120	120	122										
	V2	127	127	127										
	GR2	8.1	7.7	7.4										
28000	TOFL	5890	6130	6520									118	162
	V1	97	99	101										
	VR	116	116	117										
	V2	123	123	123										
	GR2	8.6	8.2	7.8										
27000	TOFL	5360	5580	5920									115	159
	V1	93	94	96										
	VR	112	112	113										
	V2	120	120	120										
	GR2	9.2	8.8	8.4										
26000	TOFL	4950	5060	5370									113	156
	V1	89	89	91										
	VR	108	109	110										
	V2	117	117	117										
	GR2	9.8	9.4	8.9										

FIGURE 10-8-261. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	TOFL	15930	16260	16630	17020	17410	17810	18210	18590	18950	19340	19700	151	197
	V1	166	166	166	166	167	167	167	167	167	167	167		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	TOFL	15080	15400	15750	16110	16490	16870	17230	17610	17990	18370	18770	150	196
	V1	163	163	163	163	163	163	163	164	164	164	164		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	TOFL	13780	14070	14380	14710	15040	15390	15720	16060	16400	16750	17100	147	193
	V1	157	157	157	157	157	158	158	158	158	158	158		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	TOFL	12570	12830	13110	13410	13710	14010	14310	14620	14920	15240	15550	144	190
	V1	151	151	151	152	152	152	152	152	152	152	153		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
36000	TOFL	11430	11660	11920	12190	12450	12730	13000	13270	13540	13830	14110	142	187
	V1	145	145	145	146	146	146	146	146	146	146	147		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5		
35000	TOFL	10430	10630	10860	11100	11350	11590	11830	12080	12320	12580	12840	139	184
	V1	140	140	140	140	140	140	140	140	141	141	141		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
34000	TOFL	9470	9660	9860	10080	10300	10520	10740	10960	11180	11400	11640	136	181
	V1	134	134	134	134	134	134	134	135	135	135	135		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
33000	TOFL	8620	8790	8970	9170	9370	9560	9760	9960	10160	10360	10570	133	178
	V1	128	128	128	128	128	129	129	129	129	129	129		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
32000	TOFL	7820	7970	8140	8310	8490	8670	8840	9020	9200	9370	9560	130	175
	V1	122	122	123	123	123	123	123	123	123	123	123		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
31000	TOFL	7090	7220	7370	7530	7690	7840	8000	8160	8320	8480	8650	128	172
	V1	117	117	117	117	117	117	117	117	117	117	118		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		

FIGURE 10-8-261. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
30000	TOFL	6400	6520	6650	6790	6930	7070	7210	7350	7500	7640	7790	125	169
	V1	111	111	111	111	111	111	111	111	111	111	112		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
29000	TOFL	5770	5880	6000	6120	6250	6380	6500	6630	6750	6880	7020	122	166
	V1	105	105	105	105	105	105	105	106	106	106	106		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.1	8.1	8	8	8	8	8	8	8	8	7.9		
28000	TOFL	5210	5300	5410	5520	5630	5750	5860	5970	6080	6200	6320	119	163
	V1	99	99	99	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4		
27000	TOFL	4700	4790	4880	4980	5080	5190	5280	5380	5490	5590	5700	116	160
	V1	94	94	94	94	94	94	94	94	94	95	95		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9		
26000	TOFL	4270	4350	4430	4530	4620	4710	4800	4890	4980	5070	5170	113	156
	V1	89	89	89	89	89	89	89	89	90	90	90		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.8	9.7	9.7	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-262. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	19190											150	196
	V1	164												
	VR	165												
	V2	167												
	GR2	3.9												
38000	TOFL	17600	18500	19780									147	193
	V1	159	161	162										
	VR	161	161	162										
	V2	163	163	164										
	GR2	4.2	3.9	3.6										
37000	TOFL	16010	16880	18280									144	190
	V1	153	155	157										
	VR	157	157	158										
	V2	159	159	160										
	GR2	4.5	4.2	3.9										
36000	TOFL	14530	15320	16630									142	187
	V1	148	149	152										
	VR	153	153	154										
	V2	155	155	156										
	GR2	4.8	4.5	4.2										
35000	TOFL	13220	13940	15130									139	184
	V1	142	144	146										
	VR	148	149	150										
	V2	151	151	152										
	GR2	5.2	4.8	4.5										
34000	TOFL	11990	12640	13740									136	181
	V1	136	138	141										
	VR	144	145	146										
	V2	148	148	148										
	GR2	5.5	5.2	4.9										
33000	TOFL	10890	11480	12440									133	178
	V1	130	132	135										
	VR	140	140	142										
	V2	144	144	145										
	GR2	5.9	5.5	5.2										
32000	TOFL	9870	10390	11270									130	175
	V1	124	126	129										
	VR	136	136	138										
	V2	140	140	141										
	GR2	6.3	5.9	5.6										
31000	TOFL	8930	9410	10210									128	172
	V1	119	121	124										
	VR	131	132	133										
	V2	136	136	137										
	GR2	6.7	6.3	6										

FIGURE 10-8-262. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
30000	TOFL	8050	8490	9220									125	169
	V1	113	115	118										
	VR	127	127	129										
	V2	132	132	133										
	GR2	7.1	6.8	6.4										
29000	TOFL	7250	7640	8290									122	166
	V1	107	109	112										
	VR	122	123	125										
	V2	128	128	129										
	GR2	7.6	7.2	6.9										
28000	TOFL	6520	6870	7440									119	163
	V1	101	103	106										
	VR	118	119	120										
	V2	125	125	125										
	GR2	8.1	7.7	7.3										
27000	TOFL	5880	6180	6680									116	160
	V1	96	97	100										
	VR	114	114	116										
	V2	121	121	122										
	GR2	8.6	8.2	7.8										
26000	TOFL	5330	5610	6040									113	156
	V1	91	92	95										
	VR	110	110	112										
	V2	118	118	118										
	GR2	9.2	8.7	8.4										

FIGURE 10-8-263. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
39600	TOFL	17570	18040	18610	19010	19450							152	198
	V1	170	170	170	170	170								
	VR	171	171	171	171	171								
	V2	172	172	172	172	172								
	GR2	3.8	3.7	3.6	3.6	3.6								
39000	TOFL	16770	17230	17760	18180	18590	19040	19480	19820				151	196
	V1	167	167	168	168	168	168	168	168					
	VR	168	168	168	168	168	168	168	168					
	V2	169	170	170	170	170	170	170	170					
	GR2	4	3.9	3.8	3.8	3.8	3.8	3.8	3.8					
38000	TOFL	15300	15750	16280	16680	17080	17540	18010	18335	18660	19030	19400	148	193
	V1	161	162	162	163	163	163	163	163	164	164	164		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.3	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4		
37000	TOFL	13920	14330	14800	15160	15520	15930	16350	16630	16920	17290	17700	145	190
	V1	156	156	157	157	157	157	158	158	158	158	158		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.6	4.6	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.3		
36000	TOFL	12630	13000	13440	13760	14090	14460	14830	15080	15340	15670	16040	143	187
	V1	150	150	151	151	151	151	152	152	152	152	152		
	VR	155	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7		
35000	TOFL	11460	11790	12180	12470	12760	13090	13420	13640	13880	14170	14500	140	185
	V1	143	144	145	145	145	145	145	145	145	146	146		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5		
34000	TOFL	10410	10710	11060	11320	11580	11870	12170	12360	12570	12840	13140	137	182
	V1	138	138	139	139	139	139	140	140	140	140	140		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.7	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4		
33000	TOFL	9450	9710	10020	10250	10490	10750	11010	11190	11380	11610	11890	134	179
	V1	132	132	133	133	133	133	134	134	134	134	134		
	VR	142	142	143	143	143	143	143	143	143	143	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.1	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8		
32000	TOFL	8570	8810	9100	9310	9520	9750	9990	10150	10310	10530	10780	131	176
	V1	126	127	127	127	127	128	128	128	128	128	128		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2		
31000	TOFL	7750	7970	8230	8410	8600	8810	9030	9160	9310	9490	9720	128	173
	V1	120	121	121	121	121	122	122	122	122	122	122		
	VR	133	134	134	134	134	134	134	134	134	134	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.9	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.7	6.7	6.6		

FIGURE 10-8-263. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
30000	TOFL	6980	7190	7430	7590	7760	7950	8130	8260	8390	8560	8770	126	169
	V1	114	115	115	115	116	116	116	116	116	116	117		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.4	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7		
29000	TOFL	6280	6450	6660	6810	6960	7130	7290	7400	7520	7670	7860	123	166
	V1	108	108	109	109	109	110	110	110	110	110	110		
	VR	124	124	125	125	125	125	125	125	125	125	125		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.8	7.8	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.5		
28000	TOFL	5650	5800	5980	6110	6250	6390	6540	6640	6740	6880	7040	120	163
	V1	102	103	103	103	103	104	104	104	104	104	104		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.3	8.3	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	7.9		
27000	TOFL	5080	5210	5370	5490	5610	5740	5860	5950	6050	6170	6310	117	160
	V1	96	97	97	97	98	98	98	98	98	98	98		
	VR	115	115	116	116	116	116	116	116	116	116	116		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.9	8.8	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.4		
26000	TOFL	4570	4690	4830	4930	5040	5150	5270	5340	5430	5530	5670	114	157
	V1	91	91	92	92	92	92	92	92	92	92	93		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.4	9.4	9.3	9.3	9.3	9.2	9.2	9.2	9.2	9.2	9		

FIGURE 10-8-264. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	19910											148	193
	V1	164												
	VR	164												
	V2	166												
	GR2	3.7												
37000	TOFL	18400	19400										145	190
	V1	159	160											
	VR	160	161											
	V2	162	162											
	GR2	4	3.7											
36000	TOFL	16690	18690	19290									143	187
	V1	154	156	157										
	VR	156	157	157										
	V2	158	158	159										
	GR2	4.3	4	3.7										
35000	TOFL	15090	16210	17720									140	185
	V1	147	150	152										
	VR	151	152	153										
	V2	154	154	155										
	GR2	4.7	4.3	4.1										
34000	TOFL	13670	14660	16080									137	182
	V1	142	144	147										
	VR	147	148	149										
	V2	150	150	151										
	GR2	5	4.7	4.4										
33000	TOFL	12370	13280	14530									134	179
	V1	136	138	141										
	VR	143	144	145										
	V2	146	146	147										
	GR2	5.4	5.1	4.7										
32000	TOFL	11210	12000	13130									131	176
	V1	130	132	135										
	VR	139	139	141										
	V2	142	142	143										
	GR2	5.8	5.4	5.1										
31000	TOFL	10130	10850	11840									128	173
	V1	124	126	129										
	VR	134	135	137										
	V2	138	139	140										
	GR2	6.2	5.8	5.5										

FIGURE 10-8-264. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
30000	TOFL	9120	9780	10690									126	169
	V1	118	120	124										
	VR	130	131	132										
	V2	134	135	136										
	GR2	6.6	6.2	5.9										
29000	TOFL	8180	8800	9630									123	166
	V1	112	115	118										
	VR	125	126	128										
	V2	130	131	132										
	GR2	7.1	6.7	6.4										
28000	TOFL	7330	7860	8630									120	163
	V1	106	108	112										
	VR	120	122	124										
	V2	126	127	128										
	GR2	7.5	7.1	6.8										
27000	TOFL	6550	7030	7690									117	160
	V1	100	102	106										
	VR	116	117	119										
	V2	122	123	124										
	GR2	8	7.6	7.3										
26000	TOFL	5880	6290	6850									114	157
	V1	94	96	100										
	VR	111	113	115										
	V2	118	119	120										
	GR2	8.6	8.1	7.8										

FIGURE 10-8-265. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
39600	TOFL	19270											154	198
	V1	173												
	VR	174												
	V2	175												
	GR2	3.6												
39000	TOFL	18410	19170	19860									152	197
	V1	170	171	171										
	VR	171	171	172										
	V2	172	172	173										
	GR2	3.8	3.6	3.5										
38000	TOFL	17040	17700	18320	18750	19200	19710						149	194
	V1	166	166	167	167	167	167							
	VR	167	167	167	167	167	167							
	V2	168	168	169	169	169	169							
	GR2	4.1	3.9	3.8	3.8	3.8	3.8							
37000	TOFL	15530	16220	16870	17290	17740	18220	18600	18890	19230	19610		147	191
	V1	160	161	162	162	162	163	163	163	163	163			
	VR	163	163	163	163	163	163	163	163	163	163			
	V2	164	164	165	165	165	165	165	165	165	165			
	GR2	4.4	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1			
36000	TOFL	14080	14710	15280	15660	16040	16520	16900	17170	17500	17900	18450	144	188
	V1	154	155	156	156	156	157	157	157	157	157	158		
	VR	158	159	159	159	159	159	159	159	159	159	159		
	V2	160	160	161	161	161	161	161	161	161	161	161		
	GR2	4.7	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.2		
35000	TOFL	12720	13290	13810	14150	14500	14930	15280	15500	15790	16160	16660	141	185
	V1	148	149	150	150	150	151	151	151	151	151	152		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.1	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.5		
34000	TOFL	11510	12010	12470	12770	13080	13460	13770	13970	14220	14560	15000	138	182
	V1	142	143	144	144	144	144	145	145	145	145	146		
	VR	149	150	150	150	150	150	150	150	150	150	150		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	4.9		
33000	TOFL	10410	10860	11270	11540	11820	12160	12420	12600	12830	13130	13530	135	179
	V1	136	137	138	138	138	138	138	138	138	139	140		
	VR	145	145	145	146	146	146	146	146	146	146	146		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.8	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.3		
32000	TOFL	9450	9830	10190	10430	10680	10980	11220	11370	11580	11850	12210	133	176
	V1	130	131	132	132	132	132	132	132	132	133	134		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.1	6	6	6	6	6	6	6	5.9	5.6		
31000	TOFL	8530	8890	9220	9430	9660	9940	10150	10280	10470	10710	11030	130	173
	V1	124	125	126	126	126	127	127	127	127	127	128		
	VR	136	136	137	137	137	137	137	137	137	137	137		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6		

FIGURE 10-8-265. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
30000	TOFL	7690	8010	8300	8490	8680	8940	9130	9230	9400	9620	9910	127	170
	V1	118	119	120	120	120	120	120	120	120	121	122		
	VR	131	132	132	132	132	132	132	132	132	132	132		
	V2	136	136	137	137	137	137	137	137	137	137	137		
	GR2	7.1	6.9	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.7	6.5		
29000	TOFL	6880	7170	7460	7630	7810	8040	8200	8300	8450	8640	8900	124	167
	V1	111	113	114	114	114	114	114	114	114	115	116		
	VR	126	127	128	128	128	128	128	128	128	128	128		
	V2	132	132	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	6.9		
28000	TOFL	6160	6410	6650	6810	6970	7160	7310	7400	7520	7700	7930	121	164
	V1	105	106	107	107	107	108	108	108	108	108	109		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	127	128	128	128	128	128	128	128	128	128	128		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.4		
27000	TOFL	5530	5740	5950	6080	6230	6400	6520	6600	6710	6870	7070	118	160
	V1	99	100	101	101	101	102	102	102	102	102	103		
	VR	117	117	118	118	118	118	118	118	118	118	118		
	V2	123	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.1	7.9		
26000	TOFL	4960	5140	5320	5440	5560	5710	5830	5900	6000	6130	6310	115	157
	V1	93	94	95	95	95	96	96	96	96	96	97		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	119	120	120	120	120	120	120	120	120	120	120		
	GR2	9.1	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.7	8.4		

FIGURE 10-8-266. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL	19210											144	188
	V1	159												
	VR	159												
	V2	161												
	GR2	3.9												
35000	TOFL	17630	18900										141	185
	V1	154	155											
	VR	155	156											
	V2	156	157											
	GR2	4.2	3.9											
34000	TOFL	15880	17290	18710									138	182
	V1	148	150	152										
	VR	150	152	152										
	V2	152	153	154										
	GR2	4.6	4.2	3.9										
33000	TOFL	14310	15570	17060									135	179
	V1	142	144	147										
	VR	146	147	148										
	V2	148	149	150										
	GR2	4.9	4.6	4.3										
32000	TOFL	12920	14040	15390									133	176
	V1	136	138	141										
	VR	142	143	144										
	V2	144	145	146										
	GR2	5.3	4.9	4.6										
31000	TOFL	11650	12630	13840									130	173
	V1	130	132	135										
	VR	137	138	140										
	V2	140	141	142										
	GR2	5.7	5.3	5										

FIGURE 10-8-266. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
30000	TOFL	10480	11390	12440									127	170
	V1	124	126	129										
	VR	133	134	136										
	V2	137	137	138										
	GR2	6.1	5.7	5.4										
29000	TOFL	9410	10230	11170									124	167
	V1	118	120	124										
	VR	128	130	131										
	V2	133	133	134										
	GR2	6.5	6.2	5.8										
28000	TOFL	8390	9180	10030									121	164
	V1	111	115	118										
	VR	124	125	127										
	V2	128	130	131										
	GR2	7	6.6	6.3										
27000	TOFL	7470	8160	8960									118	160
	V1	105	108	112										
	VR	119	121	123										
	V2	124	125	127										
	GR2	7.5	7.1	6.8										
26000	TOFL	6650	7230	7940									115	157
	V1	99	102	105										
	VR	114	116	118										
	V2	120	121	123										
	GR2	8	7.6	7.3										

FIGURE 10-8-267. TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	5460	5550	5640	5720	5810	5920	6030	6140	6250	6340	6430	139	192
	V1	122	122	121	121	121	121	121	121	121	121	121		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	145	145	145	145	145	145	145	145	145		
	GR2	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8	6.8		
39000	TOFL	5250	5340	5420	5500	5580	5690	5800	5910	6010	6090	6180	138	191
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.8	6.9	6.9	6.9	7	7	6.9	6.9	6.9	7	7		
38000	TOFL	4910	5000	5070	5150	5220	5320	5420	5530	5620	5700	5780	136	188
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	142	142	142	141	141	141	141	141	141	141	141		
	GR2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
37000	TOFL	4590	4670	4740	4810	4880	4970	5070	5160	5250	5320	5400	135	185
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
36000	TOFL	4290	4360	4430	4500	4570	4650	4740	4830	4910	4980	5050	133	182
	V1	108	107	107	107	107	107	107	107	107	107	107		
	VR	129	128	128	128	128	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
35000	TOFL	4010	4080	4150	4210	4270	4350	4430	4510	4590	4650	4720	131	180
	V1	104	104	103	103	103	103	103	103	103	103	103		
	VR	126	126	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.4	8.5	8.5	8.5	8.6	8.6	8.5	8.5	8.5	8.6	8.6		
34000	TOFL	3950	4030	4100	4170	4230	4300	4360	4440	4510	4570	4630	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.9	8.9	8.9	9	9	9	9	9	9	9	9		
33000	TOFL	3920	3990	4050	4110	4170	4240	4320	4390	4450	4510	4570	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.4	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
32000	TOFL	3870	3940	3990	4050	4110	4180	4260	4330	4400	4450	4510	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.9	9.9	9.9	10	10	10	10	10	10	10	10.1		
31000	TOFL	3810	3880	3940	4010	4060	4120	4200	4270	4340	4400	4450	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	115	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6	10.6		

FIGURE 10-8-267. TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
30000	TOFL	3760	3830	3880	3950	4010	4080	4140	4210	4280	4330	4390	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11	11.1	11.1	11.1	11.2	11.2	11.2	11.1	11.1	11.2	11.2		
29000	TOFL	3710	3770	3830	3890	3950	4020	4080	4150	4220	4270	4320	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.7	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.9		
28000	TOFL	3650	3720	3770	3820	3880	3950	4020	4090	4150	4210	4260	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	120	120	120	120	120	120	120	120	120	120		
	GR2	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.6		
27000	TOFL	3590	3650	3710	3770	3820	3890	3960	4020	4090	4130	4200	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.2	13.2	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.4		
26000	TOFL	3530	3600	3650	3700	3760	3820	3890	3960	4020	4070	4120	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	118	118	118	118	118	118	118	118	118		
	GR2	14	14	14.1	14.1	14.2	14.2	14.1	14.1	14.1	14.1	14.2		

FIGURE 10-8-268. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	5820	5920	6020	6110	6220	6340	6460	6580	6690	6790	6890	139	193
	V1	124	123	123	123	123	123	123	123	123	123	123		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
39000	TOFL	5600	5690	5790	5880	5980	6090	6210	6330	6440	6530	6620	138	191
	V1	121	121	121	121	121	121	121	121	121	121	121		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8		
38000	TOFL	5240	5330	5410	5500	5590	5700	5810	5920	6020	6100	6190	136	188
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
37000	TOFL	4890	4980	5060	5140	5220	5320	5420	5520	5620	5700	5780	135	185
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.5	7.5		
36000	TOFL	4560	4640	4720	4790	4870	4960	5060	5150	5240	5310	5390	133	183
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.8	7.8	7.9	7.9		
35000	TOFL	4260	4340	4410	4470	4550	4630	4720	4810	4890	4960	5030	131	180
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	127	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
34000	TOFL	3980	4050	4110	4180	4250	4330	4410	4490	4560	4630	4700	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	124	124	124	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.7	8.7	8.7	8.7	8.8	8.8	8.7	8.7	8.7	8.7	8.8		
33000	TOFL	4010	4070	4140	4200	4260	4340	4420	4490	4550	4620	4690	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	121	121	121	121	121	121	121	121	121	121	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
32000	TOFL	3950	4020	4080	4150	4220	4280	4350	4430	4500	4560	4630	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.8		
31000	TOFL	3900	3960	4030	4090	4160	4230	4290	4380	4440	4510	4560	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		

FIGURE 10-8-268. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
30000	TOFL	3840	3910	3970	4030	4100	4170	4240	4310	4380	4440	4510	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.8	10.8	10.9	10.9		
29000	TOFL	3780	3850	3920	3970	4040	4110	4180	4250	4310	4380	4440	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		
28000	TOFL	3730	3790	3850	3910	3980	4050	4120	4190	4250	4310	4380	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12.1	12.1	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2		
27000	TOFL	3670	3730	3790	3860	3920	3990	4050	4130	4190	4250	4310	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	13		
26000	TOFL	3610	3670	3730	3790	3850	3920	3990	4050	4120	4180	4240	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.7	13.7	13.8	13.8	13.8	13.8	13.7	13.7	13.8	13.8		

FIGURE 10-8-269. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	6200	6310	6430	6540	6670	6800	6930	7060	7180	7280	7400	140	193
	V1	125	125	125	125	125	125	126	126	126	126	126		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
39000	TOFL	5960	6070	6180	6290	6410	6530	6660	6790	6900	7000	7110	139	191
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
38000	TOFL	5570	5680	5780	5880	5990	6110	6220	6340	6450	6540	6650	137	189
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	137	137	137	137	137	137	137	137	137	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9		
37000	TOFL	5200	5300	5400	5490	5590	5700	5810	5920	6020	6110	6200	135	186
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	134	134	134	134	134	134	134	134	134	133	133		
	V2	141	141	141	141	141	141	141	141	141	140	140		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
36000	TOFL	4850	4940	5030	5110	5210	5310	5410	5510	5610	5690	5770	133	183
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
35000	TOFL	4520	4600	4690	4770	4860	4950	5040	5130	5220	5300	5380	131	180
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8	8	8	8	8	8	8	8	8	8	8.1		
34000	TOFL	4210	4290	4370	4440	4530	4610	4700	4780	4860	4930	5010	129	177
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
33000	TOFL	4050	4120	4190	4250	4320	4390	4470	4520	4590	4670	4740	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	122	122	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
32000	TOFL	4030	4090	4160	4220	4300	4380	4440	4510	4580	4650	4710	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	119	119	119	119	119	119	119	119	119	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
31000	TOFL	3970	4040	4110	4170	4240	4310	4390	4450	4520	4590	4650	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.9	10	10	10	10	10	10	9.9	9.9	10	10		

FIGURE 10-8-269. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
30000	TOFL	3910	3990	4060	4110	4180	4250	4330	4390	4460	4520	4590	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.6		
29000	TOFL	3860	3930	4000	4050	4120	4190	4260	4320	4400	4450	4520	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11.1	11.1	11.2	11.2	11.1	11.1	11.1	11.1	11.1	11.2		
28000	TOFL	3800	3870	3940	3990	4060	4130	4200	4260	4330	4390	4450	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.9		
27000	TOFL	3740	3800	3870	3920	3990	4070	4140	4200	4270	4320	4390	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.5	12.5	12.6	12.6	12.6	12.6	12.6	12.5	12.5	12.6	12.6		
26000	TOFL	3670	3750	3810	3860	3930	4000	4070	4130	4190	4250	4320	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.3	13.3	13.4	13.4		

FIGURE 10-8-270. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	6720	6850	6980	7120	7260	7400	7540	7690	7820	7940	8060	141	193
	V1	128	128	128	128	129	129	129	129	129	129	129		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
39000	TOFL	6430	6560	6680	6810	6940	7080	7210	7350	7480	7590	7700	140	192
	V1	126	126	126	126	126	126	126	126	126	126	126		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
38000	TOFL	5970	6090	6210	6320	6450	6570	6700	6830	6950	7050	7150	137	189
	V1	121	121	121	121	121	121	122	122	122	122	122		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.6	6.6		
37000	TOFL	5570	5680	5790	5900	6010	6130	6240	6370	6480	6570	6670	135	186
	V1	117	117	117	117	117	117	118	118	118	118	118		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	5190	5300	5400	5490	5600	5710	5820	5930	6030	6120	6210	133	183
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	4830	4930	5020	5110	5210	5310	5410	5510	5610	5690	5770	131	181
	V1	109	109	109	109	109	109	109	109	109	109	109		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
34000	TOFL	4500	4580	4670	4760	4850	4940	5030	5130	5220	5290	5370	129	178
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	126	126	126	126	126	126	126	126	126	126	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.2		
33000	TOFL	4190	4270	4350	4430	4510	4600	4680	4770	4850	4920	4990	127	175
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	123	123	123	123	123	123	123	123	123	123	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
32000	TOFL	4110	4180	4250	4320	4400	4470	4530	4590	4660	4740	4790	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	4050	4130	4190	4270	4340	4400	4480	4540	4610	4680	4740	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-270. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
30000	TOFL	3990	4070	4130	4210	4280	4340	4410	4480	4550	4610	4670	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.2	10.2		
29000	TOFL	3950	4010	4080	4140	4220	4280	4350	4410	4490	4550	4600	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.7	10.7	10.7	10.7	10.8		
28000	TOFL	3880	3950	4020	4080	4160	4210	4280	4350	4420	4490	4530	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
27000	TOFL	3820	3890	3950	4020	4090	4150	4220	4280	4350	4420	4460	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	3760	3830	3890	3950	4020	4080	4150	4210	4280	4340	4400	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 10-8-271. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	7360	7510	7650	7800	7960	8110	8270	8440	8580	8710	8850	142	194
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
39000	TOFL	7030	7170	7310	7460	7600	7750	7900	8060	8200	8320	8450	141	192
	V1	129	129	129	129	129	129	130	130	130	130	130		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6	6	6	6	6	6	6	5.9	5.9	6	6		
38000	TOFL	6520	6640	6770	6900	7040	7180	7310	7460	7590	7700	7820	138	189
	V1	124	124	124	125	125	125	125	125	125	125	125		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	6030	6150	6260	6380	6510	6630	6760	6890	7010	7110	7220	136	187
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.7	6.7		
36000	TOFL	5610	5720	5820	5940	6050	6170	6280	6410	6520	6610	6710	133	184
	V1	115	116	116	116	116	116	116	116	116	116	116		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
35000	TOFL	5210	5320	5410	5520	5620	5730	5840	5950	6060	6140	6240	131	181
	V1	111	111	111	111	111	112	112	112	112	112	112		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	4840	4940	5030	5120	5220	5320	5420	5530	5620	5700	5790	129	178
	V1	107	107	107	107	107	107	107	108	108	108	108		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.9		
33000	TOFL	4500	4590	4670	4760	4850	4940	5030	5130	5220	5300	5370	127	175
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
32000	TOFL	4180	4260	4340	4420	4510	4590	4680	4770	4850	4920	4990	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	4150	4220	4290	4360	4440	4510	4580	4650	4720	4780	4850	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	118	118	118	118	118	118	118	118	118	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 10-8-271. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
30000	TOFL	4090	4160	4240	4300	4380	4450	4510	4590	4660	4720	4780	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
29000	TOFL	4030	4110	4180	4230	4310	4390	4450	4530	4590	4650	4720	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
28000	TOFL	3970	4050	4110	4170	4250	4320	4390	4460	4520	4580	4650	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	11	11	11	11	11	11	11	11	11		
27000	TOFL	3910	3970	4050	4110	4180	4260	4320	4390	4460	4510	4580	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
26000	TOFL	3850	3910	3990	4040	4120	4190	4250	4320	4390	4440	4510	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.4	12.4	12.5	12.5		

FIGURE 10-8-272. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	8020	8180	8340	8520	8690	8860	9030	9220	9380	9520	9670	143	194
	V1	135	135	135	135	135	136	136	136	136	136	136		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
39000	TOFL	7650	7800	7960	8120	8280	8450	8610	8780	8940	9070	9220	142	193
	V1	132	132	132	132	133	133	133	133	133	133	133		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.8		
38000	TOFL	7080	7220	7360	7510	7660	7810	7960	8120	8260	8380	8520	139	190
	V1	127	127	128	128	128	128	128	128	128	128	128		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6.1	6.1		
37000	TOFL	6540	6670	6800	6940	7080	7210	7350	7500	7630	7740	7860	137	187
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	6040	6160	6270	6400	6530	6650	6780	6910	7030	7140	7250	134	184
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	5590	5700	5810	5930	6040	6160	6270	6400	6510	6600	6710	132	181
	V1	113	113	113	114	114	114	114	114	114	114	114		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.2	7.2		
34000	TOFL	5190	5290	5390	5500	5600	5710	5820	5930	6040	6120	6220	129	178
	V1	109	109	109	109	109	109	110	110	110	110	110		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
33000	TOFL	4810	4910	5000	5100	5200	5300	5390	5500	5590	5680	5760	127	176
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8	8	8	8	8	8	8	8	8	8	8		
32000	TOFL	4470	4550	4640	4730	4820	4910	5000	5100	5190	5260	5340	125	173
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
31000	TOFL	4190	4260	4330	4400	4480	4560	4630	4720	4800	4870	4940	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9	9	9	9	9	9	9	8.9	8.9	9	9		

FIGURE 10-8-272. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
30000	TOFL	4180	4260	4320	4400	4470	4550	4630	4700	4770	4830	4890	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	4110	4190	4250	4340	4420	4480	4560	4630	4700	4760	4820	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10.1	10.1		
28000	TOFL	4060	4130	4180	4260	4340	4430	4490	4560	4630	4700	4750	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.6	10.6	10.6	10.6	10.7		
27000	TOFL	3980	4060	4120	4200	4270	4350	4410	4480	4560	4620	4680	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.3	11.3	11.4		
26000	TOFL	3920	4000	4060	4130	4210	4280	4340	4410	4480	4540	4600	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		

FIGURE 10-8-273. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	8880	9040	9220	9410	9600	9790	9980	10190	10370	10530	10700	144	195
	V1	139	139	139	139	140	140	140	140	140	140	140		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	TOFL	8480	8630	8800	8980	9160	9340	9530	9720	9890	10040	10210	143	193
	V1	136	136	136	137	137	137	137	137	137	137	137		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
38000	TOFL	7840	7980	8130	8300	8470	8630	8800	8980	9140	9280	9430	140	190
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	7220	7350	7490	7650	7800	7950	8100	8270	8410	8540	8680	138	187
	V1	126	126	126	127	127	127	127	127	127	127	127		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.1	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.2	6.2		
36000	TOFL	6660	6780	6910	7050	7180	7320	7470	7610	7750	7860	7990	135	185
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	6130	6240	6360	6490	6610	6740	6870	7000	7130	7230	7350	133	182
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8	6.9	6.9		
34000	TOFL	5650	5750	5860	5980	6090	6210	6330	6450	6570	6660	6760	130	179
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	5230	5330	5420	5530	5640	5750	5860	5970	6070	6160	6260	127	176
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
32000	TOFL	4850	4930	5020	5120	5220	5320	5420	5520	5620	5700	5790	125	173
	V1	103	103	103	103	104	104	104	104	104	104	104		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.1	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.2	8.2		
31000	TOFL	4480	4560	4650	4740	4830	4920	5010	5100	5190	5270	5350	123	170
	V1	99	99	99	99	99	99	100	100	100	100	100		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.6	8.6	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.7		

FIGURE 10-8-273. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
30000	TOFL	4240	4320	4400	4470	4530	4610	4670	4750	4810	4890	4930	121	167
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.1	9.2	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.2		
29000	TOFL	4210	4280	4350	4430	4500	4570	4630	4710	4780	4860	4890	119	164
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
28000	TOFL	4140	4220	4290	4370	4430	4510	4570	4650	4710	4780	4820	117	161
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
27000	TOFL	4080	4150	4220	4300	4360	4440	4500	4580	4640	4710	4750	115	158
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	4020	4090	4160	4230	4290	4370	4430	4510	4570	4630	4670	113	155
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7		

FIGURE 10-8-274. TAKE-OFF DATA; FLAPS - 10°; 7000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	9820	9990	10190	10410	10620	10830	11050	11290	11490	11660	11860	145	195
	V1	143	143	143	143	143	144	144	144	144	144	144		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5	5.1	5.1	5.1	5	5	5	5	5	5	5.1		
39000	TOFL	9370	9540	9730	9930	10140	10340	10550	10760	10960	11130	11310	144	193
	V1	140	140	140	140	141	141	141	141	141	141	141		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	8660	8810	8990	9170	9360	9550	9740	9940	10110	10270	10440	141	191
	V1	135	135	135	136	136	136	136	136	136	136	136		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.5	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
37000	TOFL	8000	8140	8300	8470	8640	8810	8990	9170	9330	9470	9630	139	188
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	7360	7490	7640	7790	7950	8100	8260	8430	8580	8710	8850	136	185
	V1	126	126	126	126	126	126	126	126	126	126	126		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.3		
35000	TOFL	6770	6880	7020	7160	7300	7440	7590	7740	7880	7990	8120	134	182
	V1	121	121	121	121	121	121	121	121	121	121	121		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	6210	6320	6440	6570	6700	6830	6960	7100	7220	7330	7450	131	179
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	5700	5790	5900	6020	6140	6260	6380	6500	6620	6710	6820	128	176
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
32000	TOFL	5260	5340	5450	5550	5660	5770	5880	6000	6100	6190	6290	126	173
	V1	106	106	106	106	106	106	106	107	107	107	107		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	7.8	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.9		
31000	TOFL	4850	4930	5030	5130	5230	5320	5420	5530	5630	5710	5800	123	170
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 10-8-274. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
30000	TOFL	4480	4550	4640	4730	4820	4910	5000	5100	5180	5260	5340	121	167
	V1	97	97	97	97	97	98	98	98	98	98	98		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	4280	4350	4430	4500	4580	4650	4730	4800	4870	4930	4940	119	164
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	115	115	115	115	115	115	115	115	115	115	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.3	9.4	9.4	9.4	9.4	9.4	9.3	9.3	9.3	9.4	9.4		
28000	TOFL	4220	4290	4370	4440	4510	4590	4670	4730	4820	4860	4870	117	161
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
27000	TOFL	4150	4230	4300	4370	4450	4510	4590	4660	4740	4780	4800	115	158
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	108	108	108	108	108	108	108	108	108	108	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.5	10.6	10.6	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	4090	4160	4230	4300	4380	4440	4520	4590	4660	4720	4720	113	155
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	105	105	105	105	105	105	105	105	105	105	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		

FIGURE 10-8-275. TAKE-OFF DATA; FLAPS - 10°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	10870	11070	11310	11550	11790	12040	12290	12540	12770	12970	13230	147	195
	V1	147	147	147	148	148	148	148	148	148	148	148		
	VR	155	155	155	155	155	155	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
39000	TOFL	10360	10560	10780	11010	11240	11470	11700	11950	12170	12360	12600	145	194
	V1	144	144	144	145	145	145	145	145	145	145	145		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5	5	5	5	5	5	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	9570	9740	9950	10160	10370	10580	10790	11020	11220	11390	11610	142	191
	V1	139	139	140	140	140	140	140	140	140	140	140		
	VR	149	149	149	149	149	149	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	8820	8990	9180	9360	9560	9750	9940	10170	10330	10490	10690	140	188
	V1	134	134	134	135	135	135	135	135	135	135	135		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	8140	8290	8470	8640	8810	8990	9170	9350	9520	9670	9850	137	185
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	146	146	146	146	146	146	146	146	146	146		
	GR2	6	6	6	6	6	6	5.9	5.9	5.9	6	6		
35000	TOFL	7490	7620	7780	7940	8100	8260	8430	8600	8750	8880	9050	135	183
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.3	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	6850	6970	7120	7260	7410	7550	7700	7850	8000	8110	8270	132	180
	V1	119	119	119	119	120	120	120	120	120	120	120		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
33000	TOFL	6270	6380	6510	6640	6770	6900	7040	7180	7310	7420	7550	129	177
	V1	114	114	114	114	114	114	115	115	115	115	115		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
32000	TOFL	5730	5830	5950	6060	6180	6300	6430	6550	6670	6770	6890	127	174
	V1	109	109	109	109	109	109	109	109	109	109	110		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
31000	TOFL	5260	5350	5460	5570	5680	5780	5890	6010	6120	6210	6320	124	171
	V1	104	104	104	104	104	104	105	105	105	105	105		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8	8	8	8	8	8	8	8	8	8	8		

FIGURE 10-8-275. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
30000	TOFL	4840	4920	5020	5120	5220	5320	5420	5530	5620	5710	5810	121	168
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
29000	TOFL	4450	4530	4620	4710	4800	4890	4980	5080	5170	5240	5330	119	165
	V1	95	95	95	95	95	96	96	96	96	96	96		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	9	9	9	9	9	9	9	9	9	9		
28000	TOFL	4310	4380	4460	4530	4610	4680	4760	4830	4910	4950	4910	117	161
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5	9.5	9.5	9.5		
27000	TOFL	4240	4310	4400	4460	4540	4620	4690	4760	4840	4880	4850	115	158
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.1		
26000	TOFL	4170	4240	4320	4390	4460	4540	4620	4690	4760	4810	4790	113	155
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-276. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	12170	12430	12700	12980	13260	13540	13820	14120	14380	14610	15010	148	196
	V1	152	152	152	153	153	153	153	153	153	153	154		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4		
39000	TOFL	11560	11800	12060	12330	12590	12850	13150	13420	13640	13860	14310	146	194
	V1	149	149	149	149	149	150	150	150	150	150	151		
	VR	156	156	156	156	156	156	156	156	156	156	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6		
38000	TOFL	10650	10870	11110	11340	11580	11820	12070	12320	12540	12740	13120	144	191
	V1	144	144	144	144	144	144	145	145	145	145	145		
	VR	152	152	152	152	152	152	152	152	152	152	153		
	V2	155	155	155	155	155	155	155	155	155	155	156		
	GR2	5	5	5	5	5	5	5	5	5	5	4.9		
37000	TOFL	9800	10000	10220	10430	10650	10870	11090	11320	11530	11710	12050	141	189
	V1	139	139	139	139	139	139	139	140	140	140	140		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.2		
36000	TOFL	9010	9190	9390	9590	9780	9980	10190	10400	10580	10750	11060	138	186
	V1	134	134	134	134	134	134	134	135	135	135	135		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6		
35000	TOFL	8280	8450	8630	8810	8990	9170	9360	9550	9720	9870	10160	136	183
	V1	129	129	129	129	129	129	129	129	129	129	130		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6	6.1	5.9		
34000	TOFL	7590	7740	7910	8070	8230	8400	8570	8740	8900	9030	9300	133	180
	V1	123	123	124	124	124	124	124	124	124	124	125		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3		
33000	TOFL	6930	7060	7210	7360	7510	7660	7810	7970	8110	8230	8470	130	177
	V1	118	118	118	118	118	118	119	119	119	119	119		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7		
32000	TOFL	6310	6440	6570	6700	6840	6970	7110	7250	7380	7490	7710	127	174
	V1	113	113	113	113	113	113	113	113	113	113	114		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	7.3	7.1		
31000	TOFL	5740	5860	5980	6100	6220	6340	6460	6590	6710	6800	7010	125	171
	V1	107	107	107	107	108	108	108	108	108	108	109		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.5		

FIGURE 10-8-276. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
30000	TOFL	5250	5350	5460	5570	5680	5790	5900	6020	6120	6210	6390	122	168
	V1	102	102	102	102	103	103	103	103	103	103	104		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8		
29000	TOFL	4810	4910	5010	5110	5200	5300	5400	5510	5610	5690	5850	119	165
	V1	98	98	98	98	98	98	98	98	98	98	99		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.7	8.5		
28000	TOFL	4410	4490	4580	4670	4760	4850	4940	5040	5130	5200	5350	117	162
	V1	93	93	93	93	93	93	93	94	94	94	94		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9		
27000	TOFL	4340	4410	4500	4570	4650	4720	4810	4890	4940	4930	4930	115	159
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.6		
26000	TOFL	4270	4340	4420	4500	4580	4650	4730	4810	4860	4850	4870	113	155
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	106	106	106	106	106	106	106	106	106	106	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.2		

FIGURE 10-8-277. TAKE-OFF DATA; FLAPS - 10°; 10000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	13670	13980	14300	14620	14940	15260	15590	15940	16230	16490	17230	149	196
	V1	157	157	157	158	158	158	158	158	158	158	160		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.3	4		
39000	TOFL	13000	13300	13600	13900	14200	14500	14810	15150	15420	15660	16370	147	194
	V1	154	154	154	155	155	155	155	155	155	155	156		
	VR	159	159	159	159	159	159	160	160	160	160	160		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.2		
38000	TOFL	11940	12210	12480	12760	13030	13300	13580	13890	14140	14350	15030	145	192
	V1	149	149	149	149	149	149	150	150	150	150	151		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.5		
37000	TOFL	10930	11180	11420	11670	11920	12170	12420	12700	12930	13120	13750	142	189
	V1	143	143	144	144	144	144	144	144	144	144	146		
	VR	151	151	151	151	151	151	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5.1	4.8		
36000	TOFL	10030	10250	10480	10700	10930	11150	11380	11630	11840	12020	12570	139	186
	V1	138	138	138	138	138	139	139	139	139	139	141		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.1		
35000	TOFL	9190	9390	9590	9800	10000	10210	10410	10640	10830	10990	11490	137	183
	V1	133	133	133	133	133	133	134	134	134	134	135		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	148		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.5		
34000	TOFL	8430	8610	8790	8970	9160	9340	9530	9720	9900	10060	10500	134	180
	V1	128	128	128	128	128	128	128	128	128	128	130		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	5.8		
33000	TOFL	7690	7850	8020	8180	8350	8520	8690	8880	9030	9160	9590	131	177
	V1	122	122	122	122	123	123	123	123	123	123	125		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	141		
	GR2	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.5	6.2		
32000	TOFL	6990	7140	7290	7440	7590	7740	7900	8070	8210	8330	8730	128	175
	V1	117	117	117	117	117	117	117	117	117	117	119		
	VR	131	131	131	131	131	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7	7	7	7	7	7	6.9	6.9	6.9	6.9	6.6		
31000	TOFL	6340	6480	6610	6750	6880	7020	7160	7310	7440	7540	7900	126	172
	V1	111	111	111	111	111	112	112	112	112	112	114		
	VR	127	127	127	127	127	127	127	127	127	127	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7.4	7		

FIGURE 10-8-277. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
30000	TOFL	5750	5870	5990	6110	6230	6350	6470	6610	6730	6830	7140	123	168
	V1	105	106	106	106	106	106	106	106	106	106	108		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.5		
29000	TOFL	5230	5330	5440	5550	5660	5770	5880	6000	6110	6200	6480	120	165
	V1	100	100	100	100	101	101	101	101	101	101	102		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3	7.9		
28000	TOFL	4770	4870	4970	5070	5170	5270	5360	5470	5570	5650	5900	117	162
	V1	95	95	96	96	96	96	96	96	96	96	98		
	VR	115	115	115	115	115	115	115	115	115	115	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.5		
27000	TOFL	4440	4510	4590	4670	4730	4810	4880	4980	5070	5150	5370	115	159
	V1	91	91	91	91	91	91	91	91	91	91	93		
	VR	111	111	111	111	111	111	111	111	111	111	112		
	V2	119	119	119	119	119	119	119	119	119	119	120		
	GR2	9.5	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9		
26000	TOFL	4380	4460	4530	4610	4690	4770	4830	4920	4930	4920	4930	113	156
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10	10	9.6		

FIGURE 10-8-278. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	15430	15790	16150	16520	16890	17260	17650	18050	18380	18980		150	197
	V1	162	162	162	163	163	163	163	163	163	164			
	VR	165	165	165	165	165	165	165	165	165	165			
	V2	166	166	166	166	166	166	166	166	166	166			
	GR2	4	4	4	4	4	4	3.9	3.9	3.9	3.8			
39000	TOFL	14640	14980	15320	15670	16020	16370	16740	17100	17430	17930	19080	148	195
	V1	159	159	159	159	160	160	160	160	160	161	162		
	VR	162	162	162	162	162	162	162	162	162	163	163		
	V2	164	164	164	164	164	164	164	164	164	164	165		
	GR2	4.2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4	3.7		
38000	TOFL	13420	13730	14040	14350	14660	14980	15310	15650	15940	16400	17470	146	192
	V1	153	154	154	154	154	154	154	155	155	155	157		
	VR	158	158	158	158	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.3	4		
37000	TOFL	12270	12540	12820	13110	13390	13680	13980	14280	14550	14970	15970	143	189
	V1	148	148	148	148	149	149	149	149	149	150	152		
	VR	154	154	154	154	154	154	154	154	154	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.6	4.3		
36000	TOFL	11190	11440	11690	11950	12210	12490	12760	13040	13250	13670	14580	140	187
	V1	142	142	143	143	143	143	143	144	144	144	146		
	VR	150	150	150	150	150	150	150	150	150	151	151		
	V2	153	153	153	153	153	153	153	153	153	153	154		
	GR2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5	4.7		
35000	TOFL	10230	10460	10680	10920	11150	11380	11620	11880	12100	12450	13290	138	184
	V1	137	137	137	137	137	138	138	138	138	139	141		
	VR	146	146	146	146	146	146	146	146	146	146	147		
	V2	149	149	149	149	149	149	149	149	149	149	150		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.3	5		
34000	TOFL	9340	9540	9750	9960	10170	10380	10600	10820	11030	11350	12090	135	181
	V1	131	131	132	132	132	132	132	132	133	133	135		
	VR	142	142	142	142	142	142	142	142	142	142	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.3		
33000	TOFL	8510	8690	8880	9060	9250	9440	9650	9860	10050	10330	11000	132	178
	V1	126	126	126	126	126	126	127	127	127	128	130		
	VR	138	138	138	138	138	138	138	138	138	138	139		
	V2	142	142	142	142	142	142	142	142	142	142	143		
	GR2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.1	5.7		
32000	TOFL	7740	7910	8080	8250	8420	8590	8770	8960	9130	9390	10000	129	175
	V1	120	120	121	121	121	121	121	121	122	122	124		
	VR	134	134	134	134	134	134	134	134	134	134	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.4	6.1		
31000	TOFL	7020	7170	7320	7470	7620	7780	7940	8110	8260	8520	9070	127	172
	V1	115	115	115	115	115	115	115	116	116	117	119		
	VR	129	130	130	130	130	130	130	130	130	130	131		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.2	7.2	7.1	7.1	7.1	7.1	7.1	7	7	6.9	6.5		

FIGURE 10-8-278. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
30000	TOFL	6350	6480	6620	6750	6890	7030	7170	7320	7460	7680	8190	124	169
	V1	109	109	109	109	109	110	110	110	110	111	113		
	VR	125	125	125	125	125	125	125	125	125	126	127		
	V2	131	131	131	131	131	131	131	131	131	131	132		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.5	7.4	7.3	6.9		
29000	TOFL	5730	5850	5970	6100	6220	6340	6470	6600	6730	6930	7380	121	166
	V1	103	103	103	104	104	104	104	104	104	105	107		
	VR	121	121	121	121	121	121	121	121	121	121	122		
	V2	127	127	127	127	127	127	127	127	127	127	128		
	GR2	8.1	8.1	8.1	8.1	8.1	8	8	8	7.9	7.8	7.4		
28000	TOFL	5190	5300	5410	5510	5620	5740	5850	5970	6080	6260	6660	118	162
	V1	98	98	98	98	98	98	99	99	99	100	102		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.4	8.2	7.9		
27000	TOFL	4730	4830	4920	5020	5120	5220	5320	5430	5530	5700	6040	115	159
	V1	93	93	93	93	93	94	94	94	94	95	97		
	VR	113	113	113	113	113	113	113	113	113	113	114		
	V2	121	121	121	121	121	121	121	121	120	120	121		
	GR2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9	9	8.8	8.4		
26000	TOFL	4460	4530	4620	4690	4780	4840	4930	4980	5020	5170	5480	113	156
	V1	90	90	90	90	90	90	90	90	90	90	92		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	117	117	117	117	117	117	117	117	117	117	118		
	GR2	9.8	9.8	9.8	9.8	9.7	9.7	9.7	9.6	9.6	9.4	9		

FIGURE 10-8-279. TAKE-OFF DATA; FLAPS - 10°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	17480	17860	18260	18650	19050	19450	19840						
	V1	167	167	167	167	167	167	167					151	
	VR	168	168	168	168	168	168	168						197
	V2	169	169	169	169	169	169	169						
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7						
39000	TOFL	16590	16990	17380	17790	18200	18560	18940	19340	19680				
	V1	164	164	164	165	165	165	165	165	165			150	
	VR	165	165	166	166	166	166	166	166	166				196
	V2	167	167	167	167	167	167	167	167	167				
	GR2	3.9	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.8				
38000	TOFL	15140	15500	15860	16220	16590	16960	17350	17750	18100	18910			
	V1	158	159	159	159	159	159	160	160	160	161		147	
	VR	161	161	161	161	161	161	161	161	161	162			193
	V2	163	163	163	163	163	163	163	163	163	163			
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.1	3.9			
37000	TOFL	13820	14150	14470	14800	15130	15460	15810	16170	16500	17260	18680		
	V1	153	153	153	153	154	154	154	154	154	156	158		
	VR	157	157	157	157	157	157	157	157	157	158	158	144	190
	V2	159	159	159	159	159	159	159	159	159	159	160		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.2	3.9		
36000	TOFL	12570	12860	13150	13450	13740	14040	14360	14690	14990	15700	17010		
	V1	147	147	147	147	148	148	148	148	149	150	152		
	VR	153	153	153	153	153	153	153	153	153	154	154	142	187
	V2	155	155	155	155	155	155	155	155	155	156	156		
	GR2	4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.7	4.5	4.2		
35000	TOFL	11450	11710	11980	12240	12510	12780	13060	13360	13630	14280	15510		
	V1	141	141	142	142	142	142	142	143	143	144	147		
	VR	149	149	149	149	149	149	149	149	149	149	151	139	184
	V2	152	152	152	152	152	152	152	152	152	152	153		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	4.8	4.5		
34000	TOFL	10410	10640	10880	11110	11350	11590	11850	12120	12370	12960	14070		
	V1	135	136	136	136	136	136	137	137	137	138	141		
	VR	145	145	145	145	145	145	145	145	145	145	147	136	181
	V2	148	148	148	148	148	148	148	148	148	148	149		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.4	5.2	4.9		
33000	TOFL	9460	9670	9890	10100	10310	10530	10760	11000	11230	11760	12740		
	V1	130	130	130	130	130	131	131	131	131	133	136		
	VR	140	140	140	140	140	140	141	141	141	141	142	133	178
	V2	144	144	144	144	144	144	144	144	144	144	145		
	GR2	6	6	6	6	6	5.9	5.9	5.9	5.8	5.6	5.2		
32000	TOFL	8590	8780	8970	9160	9360	9550	9760	9980	10190	10670	11540		
	V1	124	124	124	125	125	125	125	125	126	127	130		
	VR	136	136	136	136	136	136	136	136	136	137	138	130	175
	V2	140	140	140	140	140	140	140	140	140	140	141		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.2	5.9	5.6		
31000	TOFL	7780	7950	8120	8290	8470	8640	8830	9030	9220	9650	10450		
	V1	118	119	119	119	119	119	119	120	120	121	124		
	VR	132	132	132	132	132	132	132	132	132	133	134	128	172
	V2	137	137	137	137	137	137	137	137	137	137	138		
	GR2	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.7	6.6	6.3	6		

FIGURE 10-8-279. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
30000	TOFL	7020	7170	7330	7480	7640	7790	7960	8140	8320	8720	9440	125	169
	V1	112	113	113	113	113	113	113	114	114	116	119		
	VR	127	127	127	127	128	128	128	128	128	128	130		
	V2	133	133	133	133	133	133	133	133	133	133	134		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7	6.8	6.4		
29000	TOFL	6330	6470	6600	6740	6880	7020	7160	7330	7490	7840	8500	122	166
	V1	107	107	107	107	107	107	108	108	108	110	113		
	VR	123	123	123	123	123	123	123	123	123	124	125		
	V2	129	129	129	129	129	129	129	129	129	129	130		
	GR2	7.8	7.8	7.8	7.8	7.7	7.7	7.7	7.6	7.5	7.2	6.9		
28000	TOFL	5700	5820	5940	6060	6190	6310	6440	6590	6730	7050	7620	119	163
	V1	101	101	101	101	102	102	102	102	103	104	107		
	VR	119	119	119	119	119	119	119	119	119	119	121		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.1	8	7.7	7.3		
27000	TOFL	5140	5250	5360	5460	5570	5690	5800	5930	6060	6340	6840	116	160
	V1	95	96	96	96	96	96	96	97	97	98	101		
	VR	114	114	114	114	114	114	114	114	114	115	117		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.7	8.5	8.2	7.8		
26000	TOFL	4670	4760	4860	4960	5060	5160	5260	5370	5500	5740	6180	113	156
	V1	91	91	91	91	91	91	91	92	92	93	96		
	VR	111	111	111	111	111	111	111	111	111	111	113		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.1	8.8	8.4		

FIGURE 10-8-280. TAKE-OFF DATA; FLAPS - 10°; 13000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY DRY SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL	19490											152	198
	V1	171												
	VR	171												
	V2	173												
	GR2	3.5												
39000	TOFL	18630	19080	19520									151	196
	V1	168	168	168										
	VR	169	169	169										
	V2	170	170	170										
	GR2	3.7	3.7	3.6										
38000	TOFL	17230	17640	18080	18500	18830	19180	19590					148	193
	V1	164	164	164	164	164	164	164						
	VR	165	165	165	165	165	165	165						
	V2	166	166	166	166	166	166	166						
	GR2	4	4	3.9	3.9	3.9	3.9	3.9						
37000	TOFL	15650	16040	16480	16920	17230	17560	17990	18460	18900	19900		145	190
	V1	158	158	158	159	159	159	159	160	160	160			
	VR	160	160	160	160	160	160	160	160	160	161			
	V2	162	162	162	162	162	162	162	162	162	163			
	GR2	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.1	4	3.7			
36000	TOFL	14230	14580	14970	15370	15640	15940	16320	16740	17230	18350	19760	143	187
	V1	152	152	153	153	153	153	153	154	154	156	157		
	VR	156	156	156	156	156	156	156	156	156	157	158		
	V2	158	158	158	158	158	158	158	158	158	158	159		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.4	4.3	4	3.7		
35000	TOFL	12890	13210	13550	13910	14160	14420	14760	15140	15600	16640	18180	140	185
	V1	146	146	147	147	147	147	147	148	148	150	153		
	VR	152	152	152	152	152	152	152	152	152	153	154		
	V2	154	154	154	154	154	154	154	154	154	154	155		
	GR2	5	5	4.9	4.9	4.9	4.9	4.9	4.8	4.6	4.3	4		
34000	TOFL	11690	11970	12290	12600	12820	13060	13360	13700	14120	15060	16480	137	182
	V1	140	140	141	141	141	141	141	142	143	144	147		
	VR	148	148	148	148	148	148	148	148	148	149	150		
	V2	150	150	150	150	150	150	150	150	150	150	151		
	GR2	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.2	5	4.7	4.4		
33000	TOFL	10590	10840	11120	11400	11600	11810	12080	12390	12780	13630	14920	134	179
	V1	134	134	135	135	135	135	135	136	137	139	142		
	VR	143	143	143	143	143	143	143	143	143	144	146		
	V2	146	146	146	146	146	146	146	146	146	147	148		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.5	5.3	5.1	4.7		
32000	TOFL	9610	9830	10080	10330	10510	10700	10940	11220	11570	12310	13480	131	176
	V1	128	129	129	129	129	129	130	130	131	133	136		
	VR	139	139	139	139	139	139	139	139	139	140	141		
	V2	143	143	143	143	143	143	143	143	143	143	144		
	GR2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	5.9	5.7	5.4	5.1		
31000	TOFL	8690	8890	9120	9350	9500	9670	9880	10140	10470	11140	12140	128	173
	V1	123	123	123	123	123	123	124	124	125	127	130		
	VR	135	135	135	135	135	135	135	135	135	136	137		
	V2	139	139	139	139	139	139	139	139	139	139	140		
	GR2	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.1	5.8	5.5		

FIGURE 10-8-280. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
30000	TOFL	7850	8030	8230	8430	8570	8710	8900	9140	9430	10050	10960	126	169
	V1	117	117	117	118	118	118	118	118	119	121	124		
	VR	130	130	130	130	130	130	130	130	131	132	133		
	V2	135	135	135	135	135	135	135	135	135	135	136		
	GR2	7.1	7	7	7	7	7	6.9	6.8	6.6	6.2	5.9		
29000	TOFL	7050	7210	7390	7590	7690	7820	7990	8200	8490	9050	9880	123	166
	V1	111	111	111	111	111	111	112	112	113	116	119		
	VR	126	126	126	126	126	126	126	126	126	127	129		
	V2	131	131	131	131	131	131	131	131	131	132	133		
	GR2	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.3	7	6.7	6.3		
28000	TOFL	6320	6460	6620	6780	6890	7010	7150	7340	7590	8100	8860	120	163
	V1	105	105	105	105	105	105	106	106	107	109	113		
	VR	121	121	121	121	121	121	121	121	121	123	124		
	V2	127	127	127	127	127	127	127	127	127	128	129		
	GR2	8	8	8	7.9	7.9	7.9	7.9	7.8	7.5	7.1	6.8		
27000	TOFL	5670	5800	5940	6080	6170	6280	6410	6570	6790	7230	7910	117	160
	V1	99	99	99	100	100	100	100	100	101	103	107		
	VR	117	117	117	117	117	117	117	117	117	118	120		
	V2	123	123	123	123	123	123	123	123	123	123	125		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.3	8	7.6	7.3		
26000	TOFL	5090	5210	5330	5450	5540	5630	5750	5890	6090	6470	7040	114	157
	V1	93	93	94	94	94	94	94	95	95	98	101		
	VR	112	112	112	112	112	112	112	112	112	113	115		
	V2	119	119	119	119	119	119	119	119	119	120	121		
	GR2	9.1	9.1	9.1	9	9	9	9	8.9	8.5	8.1	7.8		

FIGURE 10-8-281. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	19270	19710										149	194
	V1	167	167											
	VR	168	168											
	V2	169	169											
	GR2	3.7	3.7											
37000	TOFL	17790	18220	18720	19140	19440	19790						147	191
	V1	163	163	163	163	163	163							
	VR	164	164	164	164	164	164							
	V2	165	165	165	165	165	165							
	GR2	4.1	4.1	4	4	4	4							
36000	TOFL	16140	16560	17070	17490	17780	18140	18630	19030	19790			144	188
	V1	157	157	158	158	158	158	159	159	159				
	VR	159	159	159	159	159	159	159	159	160				
	V2	161	161	161	161	161	161	161	161	161				
	GR2	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.1	3.8				
35000	TOFL	14620	14980	15450	15820	16070	16400	16810	17320	18210	19410		141	185
	V1	151	151	152	152	152	152	153	153	155	155			
	VR	155	155	155	155	155	155	155	155	155	156			
	V2	157	157	157	157	157	157	157	157	157	157			
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.4	4.2	3.9			
34000	TOFL	13200	13520	13940	14280	14490	14780	15150	15610	16460	17770	19190	138	182
	V1	145	145	146	146	146	146	146	147	149	151	152		
	VR	151	151	151	151	151	151	151	151	151	152	153		
	V2	153	153	153	153	153	153	153	153	153	153	154		
	GR2	5.1	5.1	5.1	5	5	5	5	4.8	4.5	4.2	3.8		
33000	TOFL	11920	12210	12580	12880	13070	13320	13650	14060	14830	16050	17560	135	179
	V1	139	139	139	140	140	140	140	141	143	145	147		
	VR	146	146	146	146	146	146	146	146	147	148	149		
	V2	149	149	149	149	149	149	149	149	149	149	150		
	GR2	5.5	5.5	5.4	5.4	5.4	5.4	5.3	5.2	4.9	4.6	4.2		
32000	TOFL	10770	11030	11360	11620	11790	12020	12310	12680	13390	14460	15870	133	176
	V1	133	133	134	134	134	134	134	135	137	139	142		
	VR	142	142	142	142	142	142	142	142	142	143	145		
	V2	145	145	145	145	145	145	145	145	145	146	146		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.5	5.2	4.9	4.6		
31000	TOFL	9750	9990	10280	10510	10660	10870	11120	11450	12070	13030	14270	130	173
	V1	127	127	128	128	128	128	128	129	131	133	136		
	VR	137	137	138	138	138	138	138	138	138	139	140		
	V2	141	141	141	141	141	141	141	141	141	142	142		
	GR2	6.3	6.3	6.3	6.2	6.2	6.2	6.2	5.9	5.6	5.3	4.9		

FIGURE 10-8-281. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY DRY SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
30000	TOFL	8790	9010	9270	9480	9610	9790	10020	10320	10890	11730	12820	127	170
	V1	121	121	122	122	122	122	122	123	125	127	130		
	VR	133	133	133	133	133	133	133	133	134	135	136		
	V2	137	137	137	137	137	137	137	137	137	138	139		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6	5.7	5.3		
29000	TOFL	7910	8100	8340	8520	8640	8800	9000	9270	9780	10560	11500	124	167
	V1	115	115	116	116	116	116	116	117	119	122	124		
	VR	129	129	129	129	129	129	129	129	129	131	132		
	V2	133	133	133	133	133	133	133	133	133	134	135		
	GR2	7.2	7.2	7.2	7.1	7.1	7.1	7	6.8	6.5	6.2	5.8		
28000	TOFL	7070	7240	7470	7630	7720	7860	8040	8280	8770	9450	10350	121	164
	V1	109	109	110	110	110	110	110	111	113	115	119		
	VR	124	124	124	124	124	124	124	124	125	126	128		
	V2	129	129	129	129	129	129	129	129	129	130	131		
	GR2	7.7	7.7	7.6	7.6	7.6	7.6	7.5	7.3	6.9	6.6	6.2		
27000	TOFL	6310	6460	6640	6780	6870	7000	7150	7370	7790	8460	9250	118	160
	V1	103	103	103	103	103	103	104	104	106	110	113		
	VR	119	119	119	119	119	119	119	119	120	122	123		
	V2	125	125	125	125	125	125	125	125	125	126	127		
	GR2	8.2	8.2	8.1	8.1	8.1	8.1	8	7.8	7.4	7.1	6.7		
26000	TOFL	5640	5770	5930	6050	6130	6240	6380	6560	6930	7490	8230	115	157
	V1	97	97	97	97	97	97	98	98	100	103	107		
	VR	114	114	114	114	114	114	114	114	115	117	119		
	V2	121	121	121	121	121	121	121	121	121	122	124		
	GR2	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.3	7.9	7.6	7.2		

V1 CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY DRY SNOW

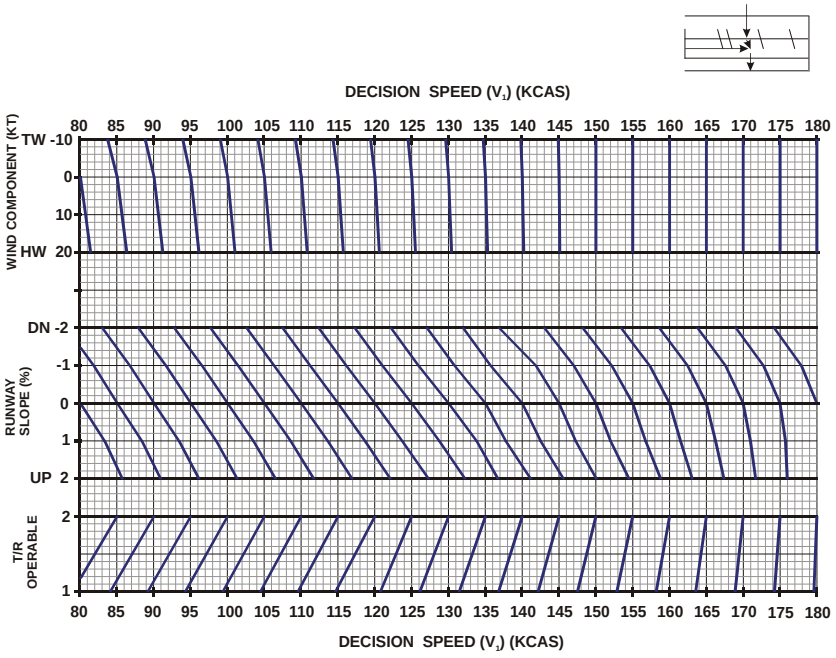
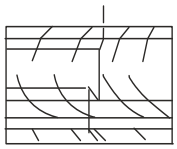


Figure 10-8-282. V1 Corrections Flaps 10° Runway Contaminated By Dry Snow

TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY DRY SNOW



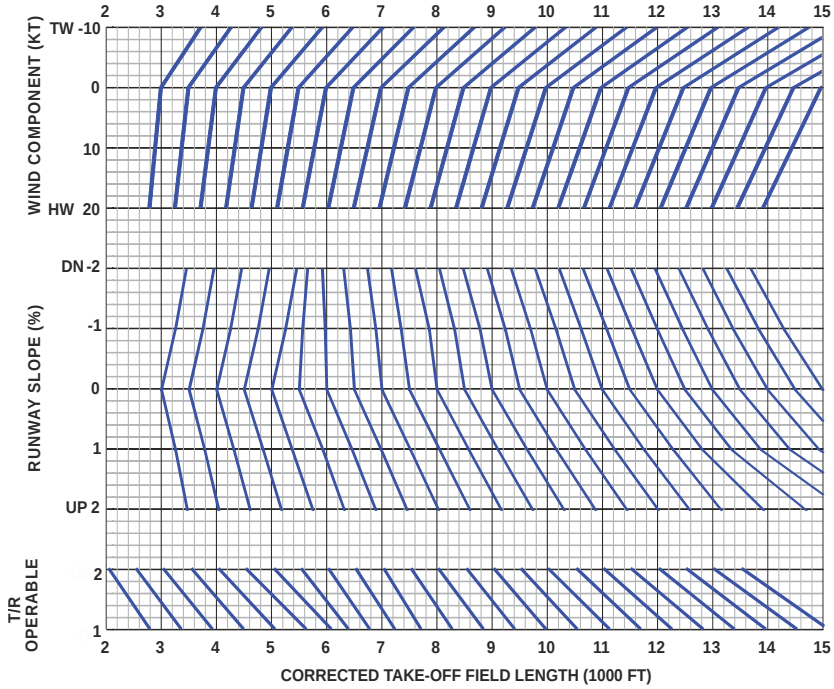


Figure 10-8-283. Takeoff Field Length Corrections Flaps 10°
Runway Contaminated By Dry Snow

FIGURE 10-8-284. TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	TOFL	4590	4660	4740	4810	4890	4960	5040	5100	5200	5290	5380	139	192
	V1	118	118	118	118	117	117	117	117	117	117	117		
	VR	139	139	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
39000	TOFL	4420	4480	4560	4630	4700	4770	4840	4910	5000	5090	5170	138	191
	V1	116	116	116	115	115	115	115	114	114	114	114		
	VR	137	137	137	137	137	137	136	136	136	136	136		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.9	7	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1		
38000	TOFL	4140	4190	4270	4340	4410	4470	4540	4600	4680	4760	4840	136	188
	V1	112	112	112	112	111	111	111	111	111	111	111		
	VR	134	134	134	134	134	134	134	133	133	133	133		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.3	7.3	7.3	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
37000	TOFL	3870	3920	3990	4060	4120	4180	4240	4300	4380	4450	4530	135	185
	V1	108	108	108	108	108	107	107	107	107	107	107		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9		
36000	TOFL	3620	3670	3740	3800	3860	3920	3970	4030	4100	4170	4240	133	182
	V1	104	104	104	104	104	104	104	103	103	103	103		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	137	137	136	136	136	136	136	136	136	136	136		
	GR2	8.1	8.1	8.1	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3		
35000	TOFL	3510	3570	3640	3720	3780	3850	3910	3960	4030	4100	4170	131	180
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.5	8.6	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8		
34000	TOFL	3510	3560	3630	3680	3740	3810	3860	3920	3980	4050	4120	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	123	123	122	122	122	122	122	122	122	122	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	9	9	9	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2		
33000	TOFL	3460	3510	3580	3630	3700	3760	3810	3870	3940	4000	4070	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	119	119	119	119	119		
	V2	130	130	130	130	130	129	129	129	129	129	129		
	GR2	9.5	9.5	9.5	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7		
32000	TOFL	3420	3470	3530	3590	3650	3710	3760	3820	3890	3950	4020	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	10	10	10.1	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.2		
31000	TOFL	3370	3420	3480	3540	3600	3660	3710	3760	3830	3890	3960	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.6	10.6	10.6	10.6	10.7	10.7	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-284. TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
30000	TOFL	3320	3370	3430	3490	3540	3600	3660	3710	3780	3840	3910	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11.2	11.2	11.2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.4		
29000	TOFL	3280	3310	3380	3440	3490	3540	3610	3660	3720	3790	3850	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.8	11.8	11.9	11.9	11.9	12	12	12.1	12.1	12.1	12.1		
28000	TOFL	3220	3270	3330	3380	3440	3490	3540	3600	3660	3730	3790	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.5	12.5	12.6	12.6	12.7	12.7	12.8	12.8	12.8	12.8	12.8		
27000	TOFL	3160	3210	3270	3330	3380	3430	3490	3550	3600	3670	3730	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	119	119	119	119	119	119	119		
	GR2	13.3	13.3	13.4	13.4	13.4	13.5	13.6	13.6	13.6	13.6	13.6		
26000	TOFL	3110	3150	3210	3270	3330	3390	3450	3510	3570	3620	3680	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	14.1	14.2	14.2	14.3	14.3	14.4	14.4	14.5	14.5	14.5	14.5		

FIGURE 10-8-285. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
39600	TOFL	5470	5560	5650									139	192
	V1	117	117	117										
	VR	138	138	138										
	V2	145	145	145										
	GR2	6.9	6.9	6.9										
39000	TOFL	5260	5350	5430									138	191
	V1	114	114	114										
	VR	136	136	136										
	V2	144	144	144										
	GR2	7.1	7.1	7.1										
38000	TOFL	4920	5000	5090									136	188
	V1	111	111	111										
	VR	133	133	133										
	V2	141	141	141										
	GR2	7.5	7.5	7.5										
37000	TOFL	4600	4680	4760									135	185
	V1	107	107	107										
	VR	131	131	131										
	V2	139	139	139										
	GR2	7.9	7.9	7.9										
36000	TOFL	4310	4380	4450									133	182
	V1	103	103	103										
	VR	128	128	128										
	V2	136	136	136										
	GR2	8.3	8.3	8.3										
35000	TOFL	4240	4300	4370									131	180
	V1	102	102	102										
	VR	125	125	125										
	V2	134	134	134										
	GR2	8.8	8.8	8.7										
34000	TOFL	4190	4240	4310									129	177
	V1	102	102	102										
	VR	122	122	122										
	V2	132	132	132										
	GR2	9.2	9.2	9.2										
33000	TOFL	4130	4190	4250									127	174
	V1	102	102	102										
	VR	119	119	119										
	V2	129	129	129										
	GR2	9.7	9.7	9.7										
32000	TOFL	4080	4140	4210									125	171
	V1	102	102	102										
	VR	117	117	117										
	V2	127	127	127										
	GR2	10.2	10.2	10.2										
31000	TOFL	4020	4080	4150									123	168
	V1	102	102	102										
	VR	114	114	114										
	V2	125	125	125										
	GR2	10.8	10.8	10.8										

FIGURE 10-8-285. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
30000	TOFL	3970	4020	4090									121	166
	V1	102	102	102										
	VR	111	111	111										
	V2	123	123	123										
	GR2	11.4	11.4	11.4										
29000	TOFL	3910	3970	4030									119	163
	V1	102	102	102										
	VR	109	109	109										
	V2	121	121	121										
	GR2	12.1	12.1	12.1										
28000	TOFL	3850	3910	3970									117	160
	V1	102	102	102										
	VR	107	107	107										
	V2	120	120	120										
	GR2	12.8	12.8	12.8										
27000	TOFL	3790	3840	3910									115	157
	V1	102	102	102										
	VR	105	105	105										
	V2	119	119	119										
	GR2	13.6	13.6	13.6										
26000	TOFL	3730	3790	3840									113	154
	V1	102	102	102										
	VR	103	103	103										
	V2	118	118	118										
	GR2	14.4	14.4	14.4										

FIGURE 10-8-286. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	TOFL	4880	4950	5040	5120	5210	5290	5370	5460	5550	5650	5750	139	193
	V1	120	120	119	119	119	119	119	119	119	119	119		
	VR	140	140	140	140	140	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7		
39000	TOFL	4690	4760	4850	4930	5010	5090	5160	5250	5340	5440	5530	138	191
	V1	117	117	117	117	117	117	116	116	116	116	116		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	144	144	144	144	144	144		
	GR2	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
38000	TOFL	4390	4460	4540	4610	4690	4760	4830	4910	5000	5090	5170	136	188
	V1	114	113	113	113	113	113	113	113	113	113	112		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3		
37000	TOFL	4100	4160	4240	4310	4380	4450	4520	4590	4670	4750	4830	135	185
	V1	110	110	110	109	109	109	109	109	109	109	109		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	139	139	139	139	139	139	139		
	GR2	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7		
36000	TOFL	3830	3890	3960	4030	4100	4160	4220	4290	4370	4440	4520	133	183
	V1	106	106	106	106	105	105	105	105	105	105	105		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.9	7.9	8	8	8	8	8	8.1	8.1	8.1	8.1		
35000	TOFL	3590	3640	3700	3770	3830	3890	3950	4010	4080	4150	4220	131	180
	V1	102	102	102	102	102	102	101	101	101	101	101		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	134	134	134	134	134	134		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
34000	TOFL	3590	3640	3710	3760	3830	3890	3960	4010	4090	4160	4220	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
33000	TOFL	3540	3590	3660	3720	3780	3850	3900	3970	4030	4100	4170	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.3	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
32000	TOFL	3490	3540	3610	3670	3730	3790	3850	3910	3990	4050	4120	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	117	117	117	117	117	117	117		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
31000	TOFL	3440	3490	3560	3620	3680	3740	3800	3860	3930	3990	4060	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	115	115	115	115	115	115	115	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5		

FIGURE 10-8-286. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
30000	TOFL	3390	3450	3510	3570	3630	3690	3740	3810	3880	3940	4010	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.9	10.9	11	11	11	11	11.1	11.1	11.1	11.1	11.1		
29000	TOFL	3340	3400	3460	3510	3580	3640	3690	3750	3810	3880	3950	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	110	110	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
28000	TOFL	3290	3340	3400	3460	3520	3580	3640	3690	3760	3830	3890	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	120	120	120	120	120	120	120		
	GR2	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
27000	TOFL	3230	3280	3340	3400	3460	3530	3580	3640	3710	3760	3830	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13	13.1	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2	13.2		
26000	TOFL	3170	3230	3290	3350	3400	3460	3520	3580	3640	3710	3760	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.9	13.9	13.9	13.9	14	14	14	14.1	14.1	14.1	14.1		

FIGURE 10-8-287. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
39600	TOFL	5840	5940	6040									139	193
	V1	119	118	118										
	VR	139	139	139										
	V2	146	146	146										
	GR2	6.7	6.7	6.7										
39000	TOFL	5620	5710	5810									138	191
	V1	116	116	116										
	VR	138	138	138										
	V2	144	144	144										
	GR2	6.9	6.9	6.9										
38000	TOFL	5260	5350	5440									136	188
	V1	112	112	112										
	VR	135	135	135										
	V2	142	142	142										
	GR2	7.3	7.3	7.3										
37000	TOFL	4910	4990	5080									135	185
	V1	109	109	109										
	VR	132	132	132										
	V2	139	139	139										
	GR2	7.7	7.6	7.6										
36000	TOFL	4590	4670	4740									133	183
	V1	105	105	105										
	VR	129	129	129										
	V2	137	137	137										
	GR2	8.1	8.1	8										
35000	TOFL	4290	4360	4430									131	180
	V1	101	101	101										
	VR	126	126	126										
	V2	134	134	134										
	GR2	8.5	8.5	8.5										
34000	TOFL	4290	4360	4430									129	177
	V1	101	101	101										
	VR	123	123	123										
	V2	132	132	132										
	GR2	8.9	8.9	8.9										
33000	TOFL	4240	4300	4370									127	174
	V1	101	101	101										
	VR	120	120	120										
	V2	130	130	130										
	GR2	9.4	9.4	9.4										
32000	TOFL	4180	4250	4310									125	171
	V1	101	101	101										
	VR	117	117	117										
	V2	127	127	127										
	GR2	9.9	9.9	9.9										
31000	TOFL	4120	4190	4260									123	169
	V1	101	101	101										
	VR	114	114	114										
	V2	125	125	125										
	GR2	10.5	10.5	10.5										

FIGURE 10-8-287. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
30000	TOFL	4070	4140	4200									121	166
	V1	101	101	101										
	VR	112	112	112										
	V2	123	123	123										
	GR2	11.1	11.1	11.1										
29000	TOFL	4010	4080	4150									119	163
	V1	101	101	101										
	VR	109	109	109										
	V2	121	121	121										
	GR2	11.7	11.7	11.7										
28000	TOFL	3950	4020	4080									117	160
	V1	101	101	101										
	VR	107	107	107										
	V2	120	120	120										
	GR2	12.4	12.4	12.4										
27000	TOFL	3900	3950	4020									115	157
	V1	101	101	101										
	VR	105	105	105										
	V2	118	118	118										
	GR2	13.2	13.2	13.2										
26000	TOFL	3830	3900	3950									113	154
	V1	101	101	101										
	VR	103	103	103										
	V2	117	117	117										
	GR2	14.1	14	14										

FIGURE 10-8-288. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	TOFL	5150	5240	5340	5440	5540	5640	5730	5830	5940	6040	6150	140	193
	V1	121	121	121	121	121	121	120	120	120	120	120		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
39000	TOFL	4960	5040	5140	5240	5330	5420	5510	5610	5710	5810	5910	139	191
	V1	119	119	119	119	118	118	118	118	118	118	118		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7		
38000	TOFL	4640	4720	4810	4900	4990	5080	5160	5250	5340	5440	5530	137	189
	V1	115	115	115	115	115	115	114	114	114	114	114		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
37000	TOFL	4340	4410	4490	4580	4660	4740	4820	4900	4990	5080	5160	135	186
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
36000	TOFL	4050	4110	4190	4270	4350	4420	4490	4570	4650	4730	4820	133	183
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
35000	TOFL	3780	3840	3910	3990	4060	4130	4190	4270	4340	4420	4500	131	180
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
34000	TOFL	3610	3670	3750	3800	3870	3940	4010	4080	4150	4200	4260	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.6	8.6		
33000	TOFL	3610	3660	3740	3790	3860	3920	3980	4060	4120	4190	4250	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
32000	TOFL	3560	3610	3690	3740	3810	3870	3930	4000	4060	4140	4190	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
31000	TOFL	3510	3560	3640	3690	3750	3830	3870	3950	4020	4080	4140	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	126	126	126	126	125	125	125	125	125	125	125		
	GR2	10.2	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		

FIGURE 10-8-288. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
30000 29000	TOFL	3460	3510	3590	3640	3700	3770	3820	3890	3960	4020	4090	121 119	166 163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.8	10.8	10.7	10.7		
28000	TOFL	3400	3460	3530	3590	3650	3710	3770	3840	3900	3970	4030	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.4	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
27000	TOFL	3350	3410	3470	3540	3600	3660	3710	3780	3840	3910	3960		157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12	12	12	12	12	12.1	12.1	12.1	12.1	12.1		
	TOFL	3290	3350	3420	3470	3530	3610	3660	3720	3790	3850	3900	115	
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		
26000	TOFL	3260	3300	3360	3420	3480	3540	3600	3660	3720	3790	3850	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6		

FIGURE 10-8-289. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
39600	TOFL	6250	6360	6460									140	193
	V1	120	120	120										
	VR	141	141	141										
	V2	147	147	147										
	GR2	6.4	6.4	6.4										
39000	TOFL	6010	6110	6220									139	191
	V1	118	118	118										
	VR	139	139	139										
	V2	145	145	145										
	GR2	6.7	6.7	6.6										
38000	TOFL	5620	5720	5810									137	189
	V1	114	114	114										
	VR	136	136	136										
	V2	143	143	143										
	GR2	7	7	7										
37000	TOFL	5250	5340	5430									135	186
	V1	111	111	111										
	VR	133	133	133										
	V2	140	140	140										
	GR2	7.4	7.4	7.4										
36000	TOFL	4900	4980	5060									133	183
	V1	107	107	107										
	VR	130	130	130										
	V2	138	138	138										
	GR2	7.8	7.8	7.8										
35000	TOFL	4570	4650	4720									131	180
	V1	103	103	103										
	VR	127	127	127										
	V2	135	135	135										
	GR2	8.2	8.2	8.2										
34000	TOFL	4330	4410	4480									129	177
	V1	100	100	100										
	VR	124	124	124										
	V2	133	133	133										
	GR2	8.6	8.6	8.6										
33000	TOFL	4320	4380	4460									127	175
	V1	100	100	100										
	VR	121	121	121										
	V2	130	130	130										
	GR2	9.1	9.1	9.1										
32000	TOFL	4260	4330	4400									125	172
	V1	100	100	100										
	VR	118	118	118										
	V2	128	128	128										
	GR2	9.6	9.6	9.6										
31000	TOFL	4200	4280	4340									123	169
	V1	100	100	100										
	VR	115	115	115										
	V2	125	125	125										
	GR2	10.2	10.2	10.1										

FIGURE 10-8-289. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
30000	TOFL	4150	4220	4290									121	166
	V1	100	100	100										
	VR	112	112	112										
	V2	123	123	123										
	GR2	10.7	10.7	10.7										
29000	TOFL	4090	4160	4230									119	163
	V1	100	100	100										
	VR	110	110	110										
	V2	121	121	121										
	GR2	11.4	11.4	11.4										
28000	TOFL	4030	4100	4160									117	160
	V1	100	100	100										
	VR	107	107	107										
	V2	119	119	119										
	GR2	12.1	12.1	12										
27000	TOFL	3970	4030	4100									115	157
	V1	100	100	100										
	VR	105	105	105										
	V2	118	118	118										
	GR2	12.8	12.8	12.8										
26000	TOFL	3900	3970	4040									113	154
	V1	100	100	100										
	VR	103	103	103										
	V2	117	117	117										
	GR2	13.6	13.6	13.6										

FIGURE 10-8-290. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	TOFL	5510	5640	5760	5870	5990	6100	6200	6320	6430	6540	6660	141	193
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
39000	TOFL	5270	5400	5510	5620	5730	5830	5940	6050	6160	6260	6370	140	192
	V1	120	121	121	121	121	121	121	121	121	121	121		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
38000	TOFL	4910	5030	5130	5230	5330	5430	5520	5620	5720	5830	5930	137	189
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
37000	TOFL	4580	4690	4790	4890	4980	5070	5160	5250	5350	5440	5530	135	186
	V1	113	113	113	113	113	113	112	112	112	112	112		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
36000	TOFL	4270	4380	4470	4560	4640	4720	4810	4900	4980	5070	5160	133	183
	V1	109	109	109	109	109	109	109	109	109	109	108		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
35000	TOFL	3990	4080	4160	4240	4320	4400	4480	4560	4640	4720	4800	131	181
	V1	104	105	105	105	105	105	105	105	105	105	105		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
34000	TOFL	3720	3810	3880	3960	4030	4100	4170	4250	4330	4400	4480	129	178
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.5	8.3	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.3	8.3		
33000	TOFL	3670	3740	3800	3870	3940	4010	4070	4150	4210	4280	4340	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	3620	3690	3760	3820	3900	3950	4020	4090	4150	4220	4280	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.4	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
31000	TOFL	3570	3640	3700	3770	3840	3900	3970	4040	4100	4170	4230	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 10-8-290. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
30000	TOFL	3520	3590	3650	3720	3790	3840	3920	3980	4050	4110	4170	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
29000	TOFL	3470	3540	3600	3660	3740	3790	3860	3930	3990	4050	4110	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11	11	11	11	11	11	11	11	11	11		
28000	TOFL	3400	3480	3540	3610	3680	3730	3800	3870	3930	3990	4050	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.8	11.6	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.6		
27000	TOFL	3360	3430	3490	3560	3620	3680	3740	3810	3860	3930	3980	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	117	117		
	GR2	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	3330	3380	3430	3490	3570	3620	3680	3750	3810	3870	3930	113	154
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.4	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2		

FIGURE 10-8-291. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
39600	TOFL	6770	6880	7000									141	193
	V1	123	123	123										
	VR	143	143	143										
	V2	148	148	148										
	GR2	6.2	6.2	6.2										
39000	TOFL	6480	6590	6700									140	192
	V1	121	121	121										
	VR	141	141	141										
	V2	146	146	146										
	GR2	6.4	6.4	6.4										
38000	TOFL	6030	6130	6230									137	189
	V1	116	116	116										
	VR	137	137	137										
	V2	143	143	143										
	GR2	6.7	6.7	6.7										
37000	TOFL	5630	5720	5820									135	186
	V1	112	112	112										
	VR	134	134	134										
	V2	141	141	141										
	GR2	7.1	7.1	7.1										
36000	TOFL	5240	5330	5420									133	183
	V1	108	108	108										
	VR	131	131	131										
	V2	138	138	138										
	GR2	7.5	7.5	7.5										
35000	TOFL	4880	4960	5050									131	181
	V1	105	105	105										
	VR	128	128	128										
	V2	136	136	136										
	GR2	7.9	7.9	7.9										
34000	TOFL	4550	4630	4700									129	178
	V1	101	101	101										
	VR	125	125	125										
	V2	133	133	133										
	GR2	8.3	8.3	8.3										
33000	TOFL	4410	4480	4530									127	175
	V1	99	99	99										
	VR	122	122	122										
	V2	131	131	131										
	GR2	8.8	8.8	8.8										
32000	TOFL	4350	4430	4480									125	172
	V1	99	99	99										
	VR	119	119	119										
	V2	128	128	128										
	GR2	9.3	9.3	9.3										
31000	TOFL	4290	4360	4420									123	169
	V1	99	99	99										
	VR	116	116	116										
	V2	126	126	126										
	GR2	9.8	9.8	9.8										

FIGURE 10-8-291. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
30000	TOFL	4230	4300	4370									121	166
	V1	99	99	99										
	VR	113	113	113										
	V2	123	123	123										
	GR2	10.4	10.4	10.4										
29000	TOFL	4170	4240	4310									119	163
	V1	99	99	99										
	VR	110	110	110										
	V2	121	121	121										
	GR2	11	11	11										
28000	TOFL	4110	4180	4240									117	160
	V1	99	99	99										
	VR	108	108	108										
	V2	119	119	119										
	GR2	11.6	11.6	11.6										
27000	TOFL	4050	4120	4170									115	157
	V1	99	99	99										
	VR	105	105	105										
	V2	117	117	117										
	GR2	12.4	12.4	12.4										
26000	TOFL	3990	4050	4110									113	154
	V1	99	99	99										
	VR	103	103	103										
	V2	116	116	116										
	GR2	13.2	13.2	13.2										

FIGURE 10-8-292. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	TOFL	6000	6140	6270	6390	6510	6630	6750	6880	7000	7120	7250	142	194
	V1	126	126	126	126	126	126	126	126	126	126	126		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	5.9	5.9	5.9	5.9	6	6	6	6	5.9	5.9		
39000	TOFL	5740	5880	6000	6120	6230	6340	6460	6580	6700	6810	6930	141	192
	V1	123	124	124	124	124	124	124	124	124	124	124		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.2	6.2	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.1		
38000	TOFL	5320	5450	5560	5670	5780	5880	5990	6100	6210	6320	6430	138	189
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
37000	TOFL	4930	5050	5150	5250	5350	5450	5550	5650	5750	5850	5950	136	187
	V1	114	115	115	115	115	115	115	115	115	115	115		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
36000	TOFL	4590	4700	4800	4890	4990	5080	5170	5260	5360	5450	5540	133	184
	V1	110	111	111	111	111	111	111	111	111	111	111		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
35000	TOFL	4280	4380	4470	4550	4640	4720	4810	4900	4980	5070	5160	131	181
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
34000	TOFL	3980	4070	4160	4240	4320	4390	4470	4560	4630	4720	4800	129	178
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
33000	TOFL	3710	3800	3870	3950	4020	4090	4170	4240	4310	4390	4460	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	3700	3770	3840	3910	3980	4050	4110	4190	4250	4320	4390	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9.1	9	9	9	9	9	9	9	9	9	9		
31000	TOFL	3650	3720	3790	3850	3930	4000	4050	4130	4210	4260	4340	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		

FIGURE 10-8-292. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
30000	TOFL	3590	3670	3730	3800	3880	3940	4010	4070	4150	4200	4280	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.1	10	10	10	10	10	10.1	10.1	10	10	10		
29000	TOFL	3540	3620	3680	3750	3820	3890	3950	4020	4090	4140	4210	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.7	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
28000	TOFL	3490	3570	3630	3690	3770	3830	3890	3960	4030	4080	4150	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
27000	TOFL	3430	3500	3570	3640	3700	3780	3830	3900	3960	4020	4090	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12	12	12	12	12	12	12	12	12	12		
26000	TOFL	3400	3450	3510	3570	3650	3710	3770	3830	3900	3960	4020	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 10-8-293. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
39600	TOFL	7370	7500	7620									142	194
	V1	126	126	126										
	VR	145	145	145										
	V2	150	150	150										
	GR2	5.9	5.9	5.9										
39000	TOFL	7050	7170	7290									141	192
	V1	124	124	124										
	VR	143	143	143										
	V2	148	148	148										
	GR2	6.1	6.1	6.1										
38000	TOFL	6540	6650	6760									138	189
	V1	119	119	119										
	VR	139	139	139										
	V2	145	145	145										
	GR2	6.5	6.5	6.5										
37000	TOFL	6060	6160	6260									136	187
	V1	115	115	115										
	VR	135	135	135										
	V2	142	142	142										
	GR2	6.8	6.8	6.8										
36000	TOFL	5640	5730	5830									133	184
	V1	111	111	111										
	VR	132	132	132										
	V2	139	139	139										
	GR2	7.2	7.2	7.2										
35000	TOFL	5240	5330	5420									131	181
	V1	107	107	107										
	VR	129	129	129										
	V2	136	136	136										
	GR2	7.6	7.6	7.6										
34000	TOFL	4880	4960	5040									129	178
	V1	103	103	103										
	VR	126	126	126										
	V2	134	134	134										
	GR2	8.1	8	8										
33000	TOFL	4540	4610	4690									127	175
	V1	99	99	99										
	VR	123	123	123										
	V2	131	131	131										
	GR2	8.5	8.5	8.5										
32000	TOFL	4460	4520	4590									125	172
	V1	98	98	98										
	VR	120	120	120										
	V2	129	129	129										
	GR2	9	9	9										
31000	TOFL	4400	4470	4530									123	169
	V1	98	98	98										
	VR	117	117	117										
	V2	126	126	126										
	GR2	9.5	9.5	9.5										

FIGURE 10-8-293. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
30000	TOFL	4340	4400	4470									121	166
	V1	98	98	98										
	VR	114	114	114										
	V2	124	124	124										
	GR2	10	10	10										
29000	TOFL	4280	4340	4420									119	163
	V1	98	98	98										
	VR	111	111	111										
	V2	121	121	121										
	GR2	10.6	10.6	10.6										
28000	TOFL	4220	4280	4350									117	160
	V1	98	98	98										
	VR	108	108	108										
	V2	119	119	119										
	GR2	11.3	11.3	11.3										
27000	TOFL	4160	4220	4290									115	157
	V1	98	98	98										
	VR	106	106	106										
	V2	117	117	117										
	GR2	12	12	12										
26000	TOFL	4100	4160	4220									113	154
	V1	98	98	98										
	VR	103	103	103										
	V2	116	116	116										
	GR2	12.8	12.8	12.8										

FIGURE 10-8-294. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	TOFL	6520	6630	6770	6910	7040	7170	7310	7440	7580	7710	7850	143	194
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	6240	6340	6480	6610	6730	6860	6990	7120	7250	7370	7500	142	193
	V1	126	126	126	126	126	126	126	126	126	126	126		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	5780	5880	6010	6130	6240	6360	6480	6600	6720	6830	6950	139	190
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	146	146		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	5360	5450	5560	5670	5780	5890	6000	6110	6220	6320	6440	137	187
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	4950	5040	5140	5250	5350	5440	5550	5650	5750	5850	5950	134	184
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.1	7	7	7	7	7	7	7	7	7	7		
35000	TOFL	4590	4670	4770	4860	4960	5050	5140	5230	5330	5420	5510	132	181
	V1	109	109	109	109	109	108	108	108	108	108	108		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.4	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	4270	4340	4430	4520	4600	4690	4770	4860	4950	5030	5120	129	178
	V1	105	105	105	105	105	104	104	104	104	104	104		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
33000	TOFL	3970	4040	4120	4200	4280	4360	4440	4520	4600	4680	4760	127	176
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
32000	TOFL	3770	3820	3880	3960	4030	4090	4170	4240	4310	4380	4440	125	173
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	3720	3790	3870	3930	4010	4070	4150	4220	4290	4360	4440	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		

FIGURE 10-8-294. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
30000	TOFL	3670	3730	3810	3880	3960	4010	4090	4160	4230	4300	4360	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
29000	TOFL	3620	3680	3760	3820	3900	3960	4030	4100	4170	4240	4300	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	112	112	112	112	112	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	3570	3630	3700	3770	3840	3900	3970	4040	4110	4190	4240	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
27000	TOFL	3510	3560	3640	3710	3790	3840	3920	3980	4050	4120	4180	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	3470	3520	3580	3660	3720	3780	3850	3920	3980	4060	4120	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.5	12.4	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4		

FIGURE 10-8-295. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
39600	TOFL	7980	8120	8260									143	194
	V1	129	129	129										
	VR	147	147	147										
	V2	152	152	152										
	GR2	5.7	5.7	5.7										
39000	TOFL	7630	7760	7890									142	193
	V1	126	126	126										
	VR	145	145	145										
	V2	150	150	150										
	GR2	5.9	5.9	5.9										
38000	TOFL	7070	7200	7320									139	190
	V1	122	122	122										
	VR	141	141	141										
	V2	146	146	146										
	GR2	6.3	6.3	6.3										
37000	TOFL	6550	6660	6770									137	187
	V1	117	117	117										
	VR	137	137	137										
	V2	143	143	143										
	GR2	6.6	6.6	6.6										
36000	TOFL	6050	6150	6260									134	184
	V1	113	113	113										
	VR	134	134	134										
	V2	140	140	140										
	GR2	7	7	7										
35000	TOFL	5610	5700	5800									132	181
	V1	108	108	108										
	VR	130	130	130										
	V2	137	137	137										
	GR2	7.4	7.3	7.3										
34000	TOFL	5210	5300	5380									129	178
	V1	104	104	104										
	VR	127	127	127										
	V2	135	135	135										
	GR2	7.8	7.8	7.8										
33000	TOFL	4840	4920	5000									127	176
	V1	101	101	101										
	VR	124	124	124										
	V2	132	132	132										
	GR2	8.2	8.2	8.2										
32000	TOFL	4510	4580	4640									125	173
	V1	97	97	97										
	VR	121	121	121										
	V2	129	129	129										
	GR2	8.7	8.7	8.7										
31000	TOFL	4500	4570	4630									123	170
	V1	97	97	97										
	VR	118	118	118										
	V2	127	127	127										
	GR2	9.2	9.2	9.2										

FIGURE 10-8-295. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
30000	TOFL	4430	4500	4570									121	167
	V1	97	97	97										
	VR	115	115	115										
	V2	124	124	124										
	GR2	9.7	9.7	9.7										
29000	TOFL	4380	4430	4500									119	164
	V1	97	97	97										
	VR	111	111	111										
	V2	121	121	121										
	GR2	10.3	10.3	10.3										
28000	TOFL	4320	4370	4430									117	161
	V1	97	97	97										
	VR	108	108	108										
	V2	119	119	119										
	GR2	10.9	10.9	10.9										
27000	TOFL	4250	4310	4370									115	157
	V1	97	97	97										
	VR	106	106	106										
	V2	117	117	117										
	GR2	11.6	11.6	11.6										
26000	TOFL	4180	4240	4300									113	154
	V1	97	97	97										
	VR	103	103	103										
	V2	115	115	115										
	GR2	12.4	12.4	12.3										

FIGURE 10-8-296. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	TOFL	7060	7260	7470	7600	7740	7870	8030	8170	8320	8470	8620	144	195
	V1	132	133	133	133	133	133	133	133	133	133	133		
	VR	149	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.6	5.5	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	6760	6940	7140	7270	7400	7530	7670	7820	7960	8100	8240	143	193
	V1	129	130	130	130	130	130	130	130	130	130	130		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.7	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	6250	6430	6610	6730	6850	6970	7100	7230	7360	7490	7620	140	190
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	143	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.2	6	6	6	6	6	6	6	6	6	6		
37000	TOFL	5780	5950	6120	6230	6330	6450	6570	6690	6810	6930	7050	138	187
	V1	120	120	121	121	121	121	121	121	121	121	121		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
36000	TOFL	5340	5500	5650	5750	5850	5950	6070	6180	6290	6400	6510	135	185
	V1	115	116	116	116	116	116	116	116	116	116	116		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
35000	TOFL	4940	5070	5220	5310	5400	5490	5600	5700	5800	5900	6010	133	182
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	132	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
34000	TOFL	4560	4680	4810	4900	4980	5070	5160	5260	5350	5450	5540	130	179
	V1	106	107	107	107	107	107	107	107	107	107	107		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.5	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
33000	TOFL	4230	4340	4460	4540	4620	4700	4790	4870	4960	5050	5130	127	176
	V1	102	103	103	103	103	103	103	103	103	103	103		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.1	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
32000	TOFL	3930	4030	4140	4210	4280	4360	4440	4520	4600	4680	4760	125	173
	V1	98	99	99	99	99	99	99	99	99	99	99		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.6	8.4	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
31000	TOFL	3770	3860	3940	4020	4090	4170	4240	4300	4370	4440	4510	123	170
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.1	8.9	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 10-8-296. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
30000	TOFL	3730	3800	3900	3960	4040	4110	4190	4240	4320	4380	4460	121	167
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.6	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
29000	TOFL	3680	3760	3850	3920	3980	4060	4130	4190	4260	4330	4390	119	164
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.1	10	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	3620	3690	3790	3860	3920	4000	4070	4130	4200	4260	4330	117	161
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
27000	TOFL	3590	3640	3730	3790	3860	3930	4010	4070	4140	4200	4270	115	158
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.3	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
26000	TOFL	3550	3590	3670	3740	3810	3870	3950	4000	4070	4130	4200	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 10-8-297. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
39600	TOFL	8770	8920	9070									144	195
	V1	133	133	133										
	VR	150	150	150										
	V2	154	154	154										
	GR2	5.5	5.5	5.5										
39000	TOFL	8380	8530	8670									143	193
	V1	130	130	130										
	VR	147	147	147										
	V2	152	152	152										
	GR2	5.7	5.7	5.7										
38000	TOFL	7750	7890	8020									140	190
	V1	125	125	125										
	VR	144	144	144										
	V2	148	148	148										
	GR2	6	6	6										
37000	TOFL	7170	7300	7420									138	187
	V1	121	121	121										
	VR	140	140	140										
	V2	145	145	145										
	GR2	6.3	6.3	6.3										
36000	TOFL	6620	6740	6850									135	185
	V1	116	116	116										
	VR	136	136	136										
	V2	142	142	142										
	GR2	6.7	6.7	6.7										
35000	TOFL	6110	6210	6320									133	182
	V1	111	111	111										
	VR	133	133	133										
	V2	139	139	139										
	GR2	7.1	7.1	7.1										
34000	TOFL	5630	5730	5830									130	179
	V1	107	107	107										
	VR	129	129	129										
	V2	136	136	136										
	GR2	7.5	7.5	7.5										
33000	TOFL	5220	5310	5400									127	176
	V1	103	103	103										
	VR	126	126	126										
	V2	133	133	133										
	GR2	7.9	7.9	7.9										
32000	TOFL	4840	4920	5000									125	173
	V1	99	99	99										
	VR	123	123	123										
	V2	130	130	130										
	GR2	8.4	8.4	8.4										
31000	TOFL	4580	4640	4680									123	170
	V1	96	96	95										
	VR	119	119	119										
	V2	127	127	127										
	GR2	8.9	8.9	8.9										

FIGURE 10-8-297. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
30000	TOFL	4520	4590	4640									121	167
	V1	96	96	95										
	VR	116	116	116										
	V2	125	125	125										
	GR2	9.4	9.4	9.4										
29000	TOFL	4460	4530	4570									119	164
	V1	96	96	95										
	VR	113	113	113										
	V2	122	122	122										
	GR2	9.9	9.9	9.9										
28000	TOFL	4400	4470	4510									117	161
	V1	96	96	95										
	VR	109	109	109										
	V2	119	119	119										
	GR2	10.5	10.5	10.5										
27000	TOFL	4330	4410	4440									115	158
	V1	96	96	95										
	VR	106	106	106										
	V2	117	117	117										
	GR2	11.2	11.2	11.2										
26000	TOFL	4270	4330	4370									113	155
	V1	96	96	95										
	VR	104	104	104										
	V2	115	115	115										
	GR2	11.9	11.9	11.9										

FIGURE 10-8-298. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	TOFL	7720	8010	8210	8350	8490	8650	8810	8970	9140	9300	9470	145	195
	V1	135	136	136	136	136	136	136	136	136	136	136		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.4	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	7390	7670	7850	7990	8110	8260	8420	8580	8740	8890	9050	144	193
	V1	133	134	134	134	134	134	134	134	134	134	134		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	6850	7100	7280	7400	7520	7660	7810	7950	8090	8240	8380	141	191
	V1	128	129	129	129	129	129	129	129	129	129	129		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	151	151	151	151	151	151	151	151	151	151		
	GR2	5.9	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	6330	6580	6740	6850	6970	7100	7230	7360	7500	7630	7770	139	188
	V1	123	124	124	124	124	124	124	124	124	124	124		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	5850	6070	6210	6320	6420	6540	6660	6780	6900	7030	7150	136	185
	V1	118	119	119	119	119	119	119	119	119	119	119		
	VR	138	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.6	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
35000	TOFL	5390	5590	5720	5820	5910	6020	6140	6250	6360	6470	6590	134	182
	V1	114	115	115	115	115	115	115	115	115	115	115		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	141	141	141	141	141	141	141	141	141	141		
	GR2	7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
34000	TOFL	4960	5140	5270	5350	5440	5540	5640	5750	5850	5950	6060	131	179
	V1	109	110	110	110	110	110	110	110	110	110	110		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
33000	TOFL	4550	4720	4840	4920	5000	5090	5180	5280	5370	5470	5560	128	176
	V1	104	105	105	105	105	105	105	105	105	105	105		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.8	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	4220	4370	4470	4550	4620	4700	4790	4880	4960	5050	5140	126	173
	V1	100	101	101	101	101	101	101	101	101	101	101		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.3	8.1	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	3910	4050	4140	4210	4270	4350	4430	4510	4590	4670	4750	123	170
	V1	96	97	97	97	97	97	97	97	97	97	97		
	VR	120	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 10-8-298. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
30000	TOFL	3790	3890	3970	4050	4110	4190	4250	4330	4400	4470	4540	121	167
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	126	126	126	126	126	126	126	126	126	126		
	GR2	9.3	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9		
29000	TOFL	3740	3830	3910	3990	4050	4130	4190	4270	4340	4420	4480	119	164
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.8	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
28000	TOFL	3700	3770	3860	3930	3990	4070	4130	4210	4280	4350	4410	117	161
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.4	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
27000	TOFL	3660	3720	3800	3870	3930	4010	4070	4150	4210	4290	4360	115	158
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	3630	3660	3740	3810	3880	3950	4010	4080	4150	4230	4280	113	155
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.8	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 10-8-299. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
39600	TOFL	9630	9800	9970									145	195
	V1	136	136	136										
	VR	152	152	152										
	V2	156	156	156										
	GR2	5.2	5.2	5.2										
39000	TOFL	9210	9370	9530									144	193
	V1	134	134	134										
	VR	150	150	150										
	V2	154	154	154										
	GR2	5.4	5.4	5.4										
38000	TOFL	8530	8680	8830									141	191
	V1	129	129	129										
	VR	146	146	146										
	V2	151	151	151										
	GR2	5.7	5.7	5.7										
37000	TOFL	7900	8040	8170									139	188
	V1	124	124	124										
	VR	143	143	143										
	V2	147	147	147										
	GR2	6.1	6.1	6.1										
36000	TOFL	7280	7400	7530									136	185
	V1	119	119	119										
	VR	139	139	139										
	V2	144	144	144										
	GR2	6.4	6.4	6.4										
35000	TOFL	6700	6810	6930									134	182
	V1	115	115	115										
	VR	135	135	135										
	V2	141	141	141										
	GR2	6.8	6.8	6.8										
34000	TOFL	6160	6270	6370									131	179
	V1	110	110	110										
	VR	131	131	131										
	V2	137	137	137										
	GR2	7.2	7.2	7.2										
33000	TOFL	5660	5750	5850									128	176
	V1	105	105	105										
	VR	127	127	127										
	V2	134	134	134										
	GR2	7.6	7.6	7.6										
32000	TOFL	5230	5320	5400									126	173
	V1	101	101	101										
	VR	124	124	124										
	V2	131	131	131										
	GR2	8.1	8.1	8										
31000	TOFL	4830	4910	5000									123	170
	V1	97	97	97										
	VR	121	121	121										
	V2	128	128	128										
	GR2	8.5	8.5	8.5										

FIGURE 10-8-299. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
30000	TOFL	4620	4670	4690									121	167
	V1	94	94	94										
	VR	117	117	117										
	V2	126	126	126										
	GR2	9	9	9										
29000	TOFL	4560	4600	4620									119	164
	V1	94	94	94										
	VR	114	114	114										
	V2	123	123	123										
	GR2	9.6	9.6	9.6										
28000	TOFL	4490	4550	4550									117	161
	V1	94	94	94										
	VR	110	110	110										
	V2	120	120	120										
	GR2	10.1	10.1	10.1										
27000	TOFL	4420	4480	4500									115	158
	V1	94	94	94										
	VR	107	107	107										
	V2	117	117	117										
	GR2	10.8	10.8	10.8										
26000	TOFL	4360	4410	4460									113	155
	V1	94	94	94										
	VR	104	104	104										
	V2	115	115	115										
	GR2	11.5	11.5	11.5										

FIGURE 10-8-300. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	TOFL	8510	8840	9000	9150	9310	9500	9680	9860	10040	10220	10400	147	195
	V1	139	140	140	140	140	140	140	140	140	140	140		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5.1	4.9	4.9	4.9	5	5	5	5	5	5	4.9		
39000	TOFL	8140	8450	8600	8750	8900	9080	9250	9420	9600	9770	9940	145	194
	V1	136	137	137	137	137	137	137	137	137	137	137		
	VR	152	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.3	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.1	5.1		
38000	TOFL	7550	7840	7980	8110	8250	8420	8580	8730	8890	9050	9210	142	191
	V1	132	132	132	132	132	132	132	132	132	132	132		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.6	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	6990	7250	7380	7510	7640	7790	7940	8080	8230	8380	8530	140	188
	V1	127	128	128	128	128	128	128	128	128	128	128		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	6460	6720	6830	6950	7070	7210	7340	7480	7610	7750	7890	137	185
	V1	122	123	123	123	123	123	123	123	123	123	123		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.3	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	5940	6180	6280	6390	6500	6620	6750	6870	6990	7120	7240	135	183
	V1	117	118	118	118	118	118	118	118	118	118	118		
	VR	137	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
34000	TOFL	5460	5670	5770	5870	5970	6080	6200	6310	6420	6540	6650	132	180
	V1	112	113	113	113	113	113	113	113	113	113	113		
	VR	133	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
33000	TOFL	5000	5200	5290	5380	5470	5580	5680	5780	5890	5990	6100	129	177
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	129	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.5	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
32000	TOFL	4580	4760	4850	4930	5010	5100	5200	5290	5390	5480	5580	127	174
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.9	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
31000	TOFL	4220	4380	4460	4530	4610	4700	4780	4870	4960	5040	5130	124	171
	V1	98	99	99	99	99	99	99	99	99	99	99		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.4	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 10-8-300. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
30000	TOFL	3900	4050	4120	4190	4260	4340	4420	4500	4570	4650	4730	121	168
	V1	94	95	95	95	95	95	95	95	95	95	95		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.9	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
29000	TOFL	3830	3930	4010	4070	4140	4220	4280	4360	4430	4510	4570	119	165
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.4	9.2	9.2	9.2	9.3	9.3	9.3	9.2	9.2	9.2	9.2		
28000	TOFL	3780	3880	3950	4010	4080	4160	4220	4300	4370	4450	4510	117	161
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	3740	3820	3890	3960	4020	4100	4170	4230	4310	4380	4450	115	158
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.3	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
26000	TOFL	3700	3760	3830	3900	3960	4030	4090	4170	4240	4320	4380	113	155
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 10-8-301. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
39600	TOFL	10590	10770	10990									147	195
	V1	140	140	140										
	VR	155	155	155										
	V2	158	158	158										
	GR2	4.9	4.9	4.9										
39000	TOFL	10120	10300	10510									145	194
	V1	137	137	137										
	VR	153	153	153										
	V2	156	156	156										
	GR2	5.1	5.1	5.1										
38000	TOFL	9380	9540	9740									142	191
	V1	132	132	132										
	VR	149	149	149										
	V2	153	153	153										
	GR2	5.5	5.4	5.4										
37000	TOFL	8680	8820	9010									140	188
	V1	128	128	128										
	VR	145	145	145										
	V2	149	149	149										
	GR2	5.8	5.8	5.7										
36000	TOFL	8020	8160	8340									137	185
	V1	123	123	123										
	VR	142	142	142										
	V2	146	146	146										
	GR2	6.2	6.2	6.1										
35000	TOFL	7370	7500	7660									135	183
	V1	118	118	118										
	VR	138	138	138										
	V2	143	143	143										
	GR2	6.5	6.5	6.4										
34000	TOFL	6770	6880	7030									132	180
	V1	113	113	113										
	VR	134	134	134										
	V2	139	139	139										
	GR2	6.9	6.9	6.8										
33000	TOFL	6200	6310	6440									129	177
	V1	108	108	108										
	VR	130	130	130										
	V2	136	136	136										
	GR2	7.3	7.3	7.2										
32000	TOFL	5670	5770	5900									127	174
	V1	103	103	103										
	VR	126	126	126										
	V2	132	132	132										
	GR2	7.7	7.7	7.6										
31000	TOFL	5220	5310	5420									124	171
	V1	99	99	99										
	VR	122	122	122										
	V2	129	129	129										
	GR2	8.2	8.2	8.1										

FIGURE 10-8-301. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
30000	TOFL	4810	4900	5000									121	168
	V1	95	95	95										
	VR	119	119	119										
	V2	126	126	126										
	GR2	8.7	8.7	8.6										
29000	TOFL	4650	4700	4670									119	165
	V1	93	93	92										
	VR	115	115	115										
	V2	124	124	124										
	GR2	9.2	9.2	9.1										
28000	TOFL	4590	4630	4630									117	161
	V1	93	93	92										
	VR	112	112	112										
	V2	121	121	121										
	GR2	9.8	9.8	9.6										
27000	TOFL	4520	4560	4580									115	158
	V1	93	93	92										
	VR	108	108	108										
	V2	118	118	118										
	GR2	10.4	10.4	10.2										
26000	TOFL	4450	4490	4530									113	155
	V1	93	93	92										
	VR	105	105	105										
	V2	115	115	115										
	GR2	11.1	11	10.9										

FIGURE 10-8-302. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	TOFL	9490	9760	9940	10130	10320	10520	10730	10930	11130	11330	11540	148	196
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	9060	9300	9480	9660	9840	10030	10230	10420	10610	10800	11000	146	194
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	8390	8620	8780	8940	9110	9290	9470	9640	9820	10000	10180	144	191
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	7760	7970	8120	8260	8420	8590	8750	8910	9080	9240	9410	141	189
	V1	131	132	132	132	132	132	132	132	132	132	132		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.6	5.5	5.5	5.5	5.6	5.6	5.5	5.5	5.5	5.5	5.5		
36000	TOFL	7170	7350	7490	7640	7780	7930	8080	8230	8390	8540	8690	138	186
	V1	126	127	127	127	127	127	127	127	127	127	127		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
35000	TOFL	6610	6780	6910	7030	7170	7310	7440	7580	7720	7860	8000	136	183
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	6060	6230	6350	6460	6580	6710	6840	6960	7090	7220	7340	133	180
	V1	116	117	117	117	117	117	117	117	117	117	117		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.7	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6		
33000	TOFL	5550	5700	5810	5910	6020	6130	6250	6360	6480	6600	6710	130	177
	V1	111	112	112	112	112	112	112	112	112	112	112		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		
32000	TOFL	5070	5210	5300	5400	5500	5600	5710	5810	5920	6020	6130	127	174
	V1	106	107	107	107	107	107	107	107	107	107	107		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
31000	TOFL	4620	4750	4840	4920	5010	5110	5200	5300	5390	5490	5580	125	171
	V1	101	102	102	102	102	102	102	102	102	102	102		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		

FIGURE 10-8-302. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
30000	TOFL	4240	4350	4430	4510	4590	4680	4770	4850	4940	5030	5110	122	168
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	3930	4010	4080	4150	4230	4310	4380	4460	4540	4620	4700	119	165
	V1	92	93	93	93	93	93	93	93	93	93	93		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
28000	TOFL	3880	3960	4040	4100	4180	4260	4330	4410	4470	4560	4630	117	162
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4		
27000	TOFL	3820	3900	3980	4040	4110	4200	4270	4350	4410	4490	4560	115	159
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.2	10	10	10.1	10.1	10.1	10.1	10.1	10.1	10	10		
26000	TOFL	3770	3840	3920	3980	4050	4130	4200	4280	4340	4420	4500	113	155
	V1	93	92	92	92	92	92	92	92	92	92	92		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7		

FIGURE 10-8-303. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
39600	TOFL	11740	11960	12330									148	196
	V1	144	144	145										
	VR	158	158	158										
	V2	161	161	161										
	GR2	4.7	4.6	4.4										
39000	TOFL	11190	11400	11760									146	194
	V1	141	141	142										
	VR	156	156	156										
	V2	159	159	159										
	GR2	4.9	4.8	4.6										
38000	TOFL	10360	10550	10890									144	191
	V1	136	136	137										
	VR	152	152	152										
	V2	155	155	155										
	GR2	5.2	5.1	4.9										
37000	TOFL	9570	9750	10060									141	189
	V1	132	132	132										
	VR	148	148	148										
	V2	152	152	152										
	GR2	5.5	5.5	5.3										
36000	TOFL	8840	9010	9290									138	186
	V1	127	127	128										
	VR	144	144	144										
	V2	148	148	148										
	GR2	5.9	5.8	5.6										
35000	TOFL	8140	8290	8570									136	183
	V1	122	122	123										
	VR	140	140	141										
	V2	145	145	145										
	GR2	6.3	6.2	5.9										
34000	TOFL	7470	7620	7870									133	180
	V1	117	117	118										
	VR	136	136	137										
	V2	141	141	141										
	GR2	6.6	6.6	6.3										
33000	TOFL	6830	6960	7190									130	177
	V1	112	112	113										
	VR	132	132	133										
	V2	138	138	138										
	GR2	7	7	6.7										
32000	TOFL	6230	6360	6570									127	174
	V1	107	107	108										
	VR	128	128	128										
	V2	134	134	134										
	GR2	7.5	7.4	7.1										
31000	TOFL	5680	5790	5990									125	171
	V1	102	102	103										
	VR	124	124	124										
	V2	131	131	130										
	GR2	7.9	7.8	7.5										

FIGURE 10-8-303. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
30000	TOFL	5200	5300	5470									122	168
	V1	97	97	98										
	VR	120	120	121										
	V2	127	127	127										
	GR2	8.4	8.3	8										
29000	TOFL	4780	4870	5030									119	165
	V1	93	93	94										
	VR	117	117	117										
	V2	124	124	124										
	GR2	8.9	8.8	8.5										
28000	TOFL	4690	4680	4680									117	162
	V1	92	91	90										
	VR	113	113	113										
	V2	121	121	121										
	GR2	9.4	9.3	9										
27000	TOFL	4620	4610	4630									115	159
	V1	92	91	90										
	VR	109	109	110										
	V2	118	118	118										
	GR2	10	9.9	9.6										
26000	TOFL	4550	4560	4580									113	155
	V1	92	91	90										
	VR	106	106	106										
	V2	115	115	115										
	GR2	10.7	10.5	10.2										

FIGURE 10-8-304. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	TOFL	10590	10780	11010	11230	11450	11680	11910	12130	12360	12590	12820	149	196
	V1	148	148	148	148	148	148	148	148	148	148	148		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
39000	TOFL	10110	10290	10500	10720	10940	11150	11360	11580	11800	12010	12220	147	194
	V1	146	146	146	146	146	146	146	146	146	146	146		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	9340	9500	9700	9900	10100	10300	10490	10690	10890	11090	11290	145	192
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
37000	TOFL	8610	8760	8940	9120	9310	9490	9670	9850	10040	10220	10400	142	189
	V1	135	135	135	135	135	135	135	135	135	135	135		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	7940	8080	8240	8410	8580	8750	8910	9080	9250	9410	9580	139	186
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
35000	TOFL	7310	7440	7590	7740	7900	8050	8200	8360	8510	8660	8820	137	183
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
34000	TOFL	6710	6830	6970	7110	7250	7390	7530	7670	7810	7950	8090	134	180
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
33000	TOFL	6150	6260	6390	6510	6640	6770	6900	7030	7150	7280	7410	131	177
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
32000	TOFL	5610	5700	5820	5930	6050	6170	6280	6400	6520	6630	6750	128	175
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
31000	TOFL	5100	5190	5290	5400	5500	5610	5710	5820	5920	6030	6140	126	172
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.6		

FIGURE 10-8-304. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
30000	TOFL	4630	4710	4810	4900	5000	5090	5190	5280	5380	5470	5570	123	168
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
29000	TOFL	4230	4300	4390	4470	4560	4650	4730	4820	4900	4990	5080	120	165
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	4000	4070	4130	4220	4280	4370	4440	4510	4590	4660	4730	117	162
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
27000	TOFL	3940	4010	4070	4160	4220	4300	4380	4450	4520	4590	4670	115	159
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
26000	TOFL	3880	3950	4010	4090	4150	4240	4320	4380	4460	4520	4600	113	156
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3		

FIGURE 10-8-305. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
39600	TOFL	13040	13330	13880									149	196
	V1	148	149	150										
	VR	161	161	162										
	V2	164	164	164										
	GR2	4.4	4.3	4										
39000	TOFL	12450	12720	13260									147	194
	V1	146	146	147										
	VR	159	159	159										
	V2	161	161	161										
	GR2	4.6	4.5	4.2										
38000	TOFL	11490	11750	12250									145	192
	V1	141	141	142										
	VR	155	155	156										
	V2	158	158	158										
	GR2	4.9	4.8	4.5										
37000	TOFL	10590	10830	11290									142	189
	V1	135	136	137										
	VR	151	151	151										
	V2	154	154	154										
	GR2	5.3	5.1	4.8										
36000	TOFL	9750	9980	10410									139	186
	V1	130	131	132										
	VR	147	147	148										
	V2	151	151	151										
	GR2	5.6	5.4	5.1										
35000	TOFL	8970	9190	9580									137	183
	V1	125	126	127										
	VR	143	143	144										
	V2	147	147	147										
	GR2	6	5.8	5.5										
34000	TOFL	8240	8440	8820									134	180
	V1	120	121	122										
	VR	139	139	140										
	V2	144	144	144										
	GR2	6.4	6.2	5.8										
33000	TOFL	7540	7730	8070									131	177
	V1	115	116	117										
	VR	135	135	136										
	V2	140	140	140										
	GR2	6.8	6.6	6.2										
32000	TOFL	6870	7040	7360									128	175
	V1	110	111	112										
	VR	131	131	131										
	V2	136	136	136										
	GR2	7.2	6.9	6.6										
31000	TOFL	6240	6400	6700									126	172
	V1	105	105	107										
	VR	126	127	127										
	V2	133	132	132										
	GR2	7.6	7.4	7										

FIGURE 10-8-305. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
30000	TOFL	5670	5810	6080									123	168
	V1	100	100	102										
	VR	122	122	123										
	V2	129	129	129										
	GR2	8.1	7.8	7.4										
29000	TOFL	5160	5290	5520									120	165
	V1	95	95	97										
	VR	118	118	119										
	V2	125	125	125										
	GR2	8.6	8.3	7.9										
28000	TOFL	4760	4850	5050									117	162
	V1	91	91	92										
	VR	114	114	115										
	V2	122	122	122										
	GR2	9.1	8.8	8.4										
27000	TOFL	4680	4680	4680									115	159
	V1	91	90	88										
	VR	111	111	111										
	V2	119	119	119										
	GR2	9.7	9.4	9										
26000	TOFL	4620	4630	4630									113	156
	V1	91	90	89										
	VR	107	107	108										
	V2	116	116	116										
	GR2	10.3	10	9.6										

FIGURE 10-8-306. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	TOFL	11640	11960	12190	12430	12680	12940	13190	13440	13690	13940	14200	150	197
	V1	152	153	153	153	153	153	153	153	153	153	153		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1		
39000	TOFL	11110	11410	11630	11860	12100	12340	12580	12820	13060	13300	13540	148	195
	V1	149	150	150	150	150	150	150	150	150	150	150		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
38000	TOFL	10250	10530	10730	10940	11160	11380	11610	11830	12040	12270	12490	146	192
	V1	144	144	144	144	144	144	144	144	144	144	144		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6		
37000	TOFL	9430	9690	9880	10070	10270	10470	10680	10880	11080	11280	11490	143	189
	V1	139	139	139	139	139	139	139	139	139	139	139		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.1	5	5	5	5	5	5	5	5	5	5		
36000	TOFL	8670	8910	9080	9250	9440	9620	9810	9990	10180	10360	10550	140	187
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.5	5.3	5.3	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3		
35000	TOFL	7960	8190	8340	8500	8670	8840	9010	9180	9350	9520	9690	138	184
	V1	128	129	129	129	129	129	129	129	129	129	129		
	VR	145	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
34000	TOFL	7310	7510	7650	7800	7960	8110	8270	8420	8580	8730	8890	135	181
	V1	123	124	124	124	124	124	124	124	124	124	124		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	145	146	146	146	146	146	146	146	146	146	146		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
33000	TOFL	6680	6870	7000	7130	7270	7410	7550	7700	7840	7980	8120	132	178
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
32000	TOFL	6100	6270	6390	6510	6640	6770	6900	7020	7150	7280	7410	129	175
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
31000	TOFL	5540	5700	5800	5910	6030	6140	6260	6370	6490	6610	6730	127	172
	V1	107	108	108	108	108	108	108	108	108	108	108		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3		

FIGURE 10-8-306. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
30000	TOFL	5020	5170	5260	5360	5470	5570	5670	5780	5880	5990	6100	124	169
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
29000	TOFL	4560	4680	4770	4860	4950	5050	5140	5240	5330	5430	5520	121	166
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
28000	TOFL	4150	4260	4340	4420	4500	4590	4670	4760	4840	4920	5010	118	162
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8		
27000	TOFL	4000	4080	4150	4230	4300	4370	4440	4530	4600	4670	4720	115	159
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
26000	TOFL	3960	4020	4090	4160	4230	4310	4380	4460	4530	4610	4670	113	156
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10	10.1	10.1	10.1	10.1	10.1	10	10	10	10		

FIGURE 10-8-307. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
39600	TOFL	14490	14950	15780									150	197
	V1	153	154	155										
	VR	164	165	165										
	V2	166	166	166										
	GR2	4.1	3.8	3.6										
39000	TOFL	13820	14260	15050									148	195
	V1	150	151	152										
	VR	162	162	163										
	V2	164	164	164										
	GR2	4.3	4	3.7										
38000	TOFL	12750	13180	13900									146	192
	V1	145	146	147										
	VR	158	158	159										
	V2	160	160	160										
	GR2	4.6	4.3	4										
37000	TOFL	11730	12120	12830									143	189
	V1	139	140	142										
	VR	154	154	155										
	V2	156	156	157										
	GR2	4.9	4.6	4.3										
36000	TOFL	10780	11140	11810									140	187
	V1	134	135	137										
	VR	150	150	151										
	V2	153	153	153										
	GR2	5.2	5	4.7										
35000	TOFL	9900	10240	10840									138	184
	V1	129	130	132										
	VR	146	146	147										
	V2	149	149	149										
	GR2	5.6	5.3	5										
34000	TOFL	9080	9400	9940									135	181
	V1	124	125	127										
	VR	142	142	143										
	V2	146	146	146										
	GR2	6	5.7	5.3										
33000	TOFL	8300	8600	9110									132	178
	V1	119	120	122										
	VR	137	138	139										
	V2	142	142	142										
	GR2	6.4	6	5.7										
32000	TOFL	7580	7850	8330									129	175
	V1	114	115	117										
	VR	133	133	134										
	V2	138	138	139										
	GR2	6.8	6.4	6.1										
31000	TOFL	6880	7140	7590									127	172
	V1	108	109	112										
	VR	129	129	130										
	V2	134	134	135										
	GR2	7.2	6.8	6.5										

FIGURE 10-8-307. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
30000	TOFL	6230	6470	6870									124	169
	V1	103	104	106										
	VR	124	125	126										
	V2	130	130	131										
	GR2	7.7	7.3	6.9										
29000	TOFL	5640	5860	6210									121	166
	V1	98	99	101										
	VR	120	120	122										
	V2	127	127	127										
	GR2	8.1	7.7	7.4										
28000	TOFL	5120	5310	5620									118	162
	V1	93	94	96										
	VR	116	116	117										
	V2	123	123	123										
	GR2	8.6	8.2	7.8										
27000	TOFL	4760	4850	5120									115	159
	V1	89	89	91										
	VR	112	112	113										
	V2	120	120	120										
	GR2	9.2	8.8	8.4										
26000	TOFL	4700	4700	4700									113	156
	V1	89	88	87										
	VR	108	109	110										
	V2	117	117	117										
	GR2	9.8	9.4	8.9										

FIGURE 10-8-308. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	TOFL	13030	13270	13540	13820	14100	14390	14670	14950	15230	15520	15800	151	197
	V1	157	157	157	157	157	157	157	157	157	157	157		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	169	169	169	169	169	169	169	169	169	169	169		
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
39000	TOFL	12410	12640	12890	13160	13430	13700	13970	14230	14500	14770	15040	150	196
	V1	154	154	154	154	154	154	154	154	154	154	154		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	TOFL	11430	11650	11880	12130	12370	12620	12870	13110	13360	13610	13860	147	193
	V1	149	149	149	149	149	149	149	149	149	149	149		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	TOFL	10520	10720	10930	11150	11380	11610	11830	12050	12280	12510	12740	144	190
	V1	143	143	143	143	143	143	143	143	143	143	143		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
36000	TOFL	9640	9820	10020	10220	10430	10640	10840	11050	11250	11460	11670	142	187
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5		
35000	TOFL	8850	9020	9200	9380	9570	9760	9950	10130	10320	10510	10710	139	184
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
34000	TOFL	8090	8240	8410	8580	8750	8920	9090	9260	9430	9600	9780	136	181
	V1	127	127	127	127	127	127	127	127	127	127	127		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
33000	TOFL	7400	7540	7690	7840	8000	8150	8310	8470	8620	8780	8940	133	178
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
32000	TOFL	6740	6870	7000	7140	7280	7420	7560	7710	7850	7990	8140	130	175
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
31000	TOFL	6130	6240	6370	6490	6620	6750	6880	7010	7130	7260	7400	128	172
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		

FIGURE 10-8-308. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
30000	TOFL	5550	5650	5760	5880	5990	6110	6220	6340	6450	6570	6690	125	169
	V1	105	105	105	105	105	105	105	105	105	105	106		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
29000	TOFL	5020	5110	5210	5320	5420	5520	5630	5730	5830	5940	6050	122	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.1	8.1	8	8	8	8	8	8	8	8	7.9		
28000	TOFL	4540	4630	4710	4810	4900	4990	5080	5180	5270	5370	5470	119	163
	V1	95	95	95	95	95	95	95	95	95	95	95		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4		
27000	TOFL	4120	4190	4270	4360	4440	4520	4610	4690	4770	4860	4950	116	160
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9		
26000	TOFL	4030	4090	4170	4240	4320	4390	4470	4550	4620	4690	4750	113	156
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.8	9.7	9.7	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-309. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
39600	TOFL	16190	16920	18080									151	197
	V1	158	159	161										
	VR	168	168	169										
	V2	169	169	170										
	GR2	3.7	3.4	3.1										
39000	TOFL	15420	16100	17210									150	196
	V1	155	156	158										
	VR	165	166	166										
	V2	167	167	167										
	GR2	3.9	3.6	3.3										
38000	TOFL	14210	14840	15850									147	193
	V1	149	151	152										
	VR	161	161	162										
	V2	163	163	163										
	GR2	4.2	3.9	3.6										
37000	TOFL	13070	13670	14590									144	190
	V1	144	145	147										
	VR	157	157	158										
	V2	159	159	159										
	GR2	4.5	4.2	3.9										
36000	TOFL	11980	12540	13420									142	187
	V1	139	140	142										
	VR	153	153	154										
	V2	155	155	156										
	GR2	4.8	4.5	4.2										
35000	TOFL	11000	11520	12340									139	184
	V1	133	135	137										
	VR	148	149	150										
	V2	151	151	152										
	GR2	5.2	4.8	4.5										
34000	TOFL	10060	10530	11310									136	181
	V1	128	129	132										
	VR	144	145	146										
	V2	148	148	148										
	GR2	5.5	5.2	4.9										
33000	TOFL	9200	9630	10330									133	178
	V1	123	124	127										
	VR	140	140	142										
	V2	144	144	145										
	GR2	5.9	5.5	5.2										
32000	TOFL	8380	8780	9420									130	175
	V1	117	119	121										
	VR	136	136	138										
	V2	140	140	141										
	GR2	6.3	5.9	5.6										
31000	TOFL	7620	7990	8590									128	172
	V1	112	114	116										
	VR	131	132	133										
	V2	136	136	137										
	GR2	6.7	6.3	6										

FIGURE 10-8-309. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
30000	TOFL	6900	7240	7800									125	169
	V1	106	108	111										
	VR	127	127	129										
	V2	132	132	133										
	GR2	7.1	6.8	6.4										
29000	TOFL	6230	6550	7050									122	166
	V1	101	103	105										
	VR	122	123	125										
	V2	128	128	129										
	GR2	7.6	7.2	6.9										
28000	TOFL	5620	5910	6350									119	163
	V1	96	97	100										
	VR	118	119	120										
	V2	124	124	125										
	GR2	8.1	7.7	7.3										
27000	TOFL	5090	5330	5720									116	160
	V1	91	92	95										
	VR	114	114	116										
	V2	121	121	122										
	GR2	8.6	8.2	7.8										
26000	TOFL	4750	4850	5190									113	156
	V1	87	87	90										
	VR	110	110	112										
	V2	118	118	118										
	GR2	9.2	8.7	8.4										

FIGURE 10-8-310. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
39600	TOFL	14240	14610	15040	15360	15690	16060	16420	16680	16940	17260	17610	152	198
	V1	161	161	161	161	161	161	161	161	161	161	162		
	VR	171	171	171	171	171	171	171	171	171	171	171		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	3.8	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5		
39000	TOFL	13570	13920	14330	14640	14950	15290	15650	15890	16140	16440	16780	151	196
	V1	158	158	158	158	158	158	158	158	158	158	158		
	VR	168	168	168	168	168	168	168	168	168	168	168		
	V2	169	170	170	170	170	170	170	170	170	170	170		
	GR2	4	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.7		
38000	TOFL	12510	12830	13200	13480	13770	14090	14410	14630	14860	15140	15450	148	193
	V1	152	153	153	153	153	153	153	153	153	153	153		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.3	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4		
37000	TOFL	11500	11790	12130	12390	12650	12940	13230	13440	13650	13910	14200	145	190
	V1	147	147	148	148	148	148	148	148	148	148	148		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.6	4.6	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.3		
36000	TOFL	10530	10810	11130	11360	11600	11870	12140	12320	12520	12750	13020	143	187
	V1	141	142	142	142	142	142	142	142	142	142	142		
	VR	155	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7		
35000	TOFL	9640	9880	10180	10390	10610	10850	11100	11260	11440	11650	11900	140	185
	V1	136	136	137	137	137	137	137	137	137	137	137		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5		
34000	TOFL	8810	9040	9310	9500	9700	9930	10150	10300	10460	10660	10890	137	182
	V1	130	131	131	131	131	131	131	131	131	131	131		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.7	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4		
33000	TOFL	8050	8250	8490	8670	8850	9060	9250	9390	9540	9720	9930	134	179
	V1	125	125	126	126	126	126	126	126	126	126	126		
	VR	142	142	143	143	143	143	143	143	143	143	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.1	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8		
32000	TOFL	7340	7530	7760	7920	8080	8270	8450	8570	8710	8870	9070	131	176
	V1	119	120	120	120	120	120	120	120	120	120	121		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2		
31000	TOFL	6670	6840	7040	7190	7340	7510	7680	7780	7900	8050	8230	128	173
	V1	114	114	115	115	115	115	115	115	115	115	115		
	VR	133	134	134	134	134	134	134	134	134	134	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.9	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.7	6.7	6.6		

FIGURE 10-8-310. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
30000	TOFL	6030	6200	6380	6520	6650	6800	6950	7060	7160	7300	7460	126	169
	V1	108	109	109	109	109	109	109	109	109	109	110		
	VR	129	129	129	130	130	130	130	130	130	130	130		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.4	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7		
29000	TOFL	5440	5580	5750	5870	5990	6130	6260	6350	6450	6570	6720	123	166
	V1	103	103	103	104	104	104	104	104	104	104	104		
	VR	124	124	125	125	125	125	125	125	125	125	125		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.8	7.8	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.5		
28000	TOFL	4900	5030	5180	5290	5400	5510	5630	5710	5800	5910	6050	120	163
	V1	97	98	98	98	98	98	98	98	98	98	98		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.3	8.3	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	7.9		
27000	TOFL	4430	4540	4670	4760	4860	4970	5070	5140	5220	5320	5440	117	160
	V1	92	92	92	93	93	93	93	93	93	93	93		
	VR	115	115	116	116	116	116	116	116	116	116	116		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.9	8.8	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.4		
26000	TOFL	4110	4170	4240	4320	4400	4480	4570	4640	4710	4790	4900	114	157
	V1	88	88	88	88	88	88	88	88	88	88	88		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.4	9.4	9.3	9.3	9.3	9.2	9.2	9.2	9.2	9.2	9		

FIGURE 10-8-311. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
39600	TOFL	18210	19290										152	198
	V1	163	164											
	VR	171	171											
	V2	172	172											
	GR2	3.3	3											
39000	TOFL	17350	18370	19800									151	196
	V1	160	161	163										
	VR	168	169	170										
	V2	170	170	170										
	GR2	3.4	3.1	2.9										
38000	TOFL	15990	16920	18210									148	193
	V1	154	156	158										
	VR	164	165	166										
	V2	166	166	166										
	GR2	3.7	3.4	3.1										
37000	TOFL	14690	15540	16700									145	190
	V1	149	151	152										
	VR	160	161	162										
	V2	162	162	162										
	GR2	4	3.7	3.4										
36000	TOFL	13480	14270	15320									143	187
	V1	144	145	147										
	VR	156	157	157										
	V2	158	158	158										
	GR2	4.3	4	3.7										
35000	TOFL	12330	13080	14050									140	185
	V1	138	140	142										
	VR	151	152	153										
	V2	154	154	155										
	GR2	4.7	4.3	4.1										
34000	TOFL	11280	11960	12900									137	182
	V1	133	134	137										
	VR	147	148	149										
	V2	150	150	151										
	GR2	5	4.7	4.4										
33000	TOFL	10290	10940	11790									134	179
	V1	127	129	132										
	VR	143	144	145										
	V2	146	146	147										
	GR2	5.4	5.1	4.7										
32000	TOFL	9390	9970	10760									131	176
	V1	122	124	126										
	VR	139	139	141										
	V2	142	142	143										
	GR2	5.8	5.4	5.1										
31000	TOFL	8550	9080	9780									128	173
	V1	116	118	121										
	VR	134	135	137										
	V2	138	139	140										
	GR2	6.2	5.8	5.5										

FIGURE 10-8-311. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
30000	TOFL	7740	8230	8900									126	169
	V1	111	113	116										
	VR	130	131	132										
	V2	134	135	136										
	GR2	6.6	6.2	5.9										
29000	TOFL	6970	7450	8070									123	166
	V1	105	108	110										
	VR	125	126	128										
	V2	130	131	132										
	GR2	7.1	6.7	6.4										
28000	TOFL	6270	6690	7280									120	163
	V1	100	102	105										
	VR	120	122	124										
	V2	126	127	128										
	GR2	7.5	7.1	6.8										
27000	TOFL	5630	6000	6510									117	160
	V1	94	96	99										
	VR	116	117	119										
	V2	122	123	124										
	GR2	8	7.6	7.3										
26000	TOFL	5070	5390	5830									114	157
	V1	89	91	93										
	VR	111	113	115										
	V2	118	119	120										
	GR2	8.6	8.1	7.8										

FIGURE 10-8-312. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
39600	TOFL	15650	16260	16820	17190	17560	18020	18390	18640	18960	19340	19840	154	198
	V1	165	166	166	166	166	166	166	166	166	166	167		
	VR	174	174	174	174	174	174	174	174	174	174	174		
	V2	174	175	175	175	175	175	175	175	175	175	175		
	GR2	3.6	3.5	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.1		
39000	TOFL	14900	15460	15990	16340	16700	17130	17480	17730	18030	18380	18870	152	197
	V1	162	162	163	163	163	163	163	163	163	163	164		
	VR	171	171	172	172	172	172	172	172	172	172	172		
	V2	172	172	172	172	172	172	172	172	172	172	172		
	GR2	3.8	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.3		
38000	TOFL	13720	14230	14710	15030	15350	15750	16070	16290	16570	16900	17350	149	194
	V1	156	157	157	157	157	158	158	158	158	158	158		
	VR	167	167	167	167	167	167	167	167	167	167	167		
	V2	168	168	168	168	168	168	168	168	168	168	168		
	GR2	4.1	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.6		
37000	TOFL	12630	13100	13530	13820	14120	14480	14780	14980	15230	15540	15960	147	191
	V1	151	152	152	152	152	152	152	152	152	152	153		
	VR	163	163	163	163	163	163	163	163	163	163	163		
	V2	164	164	165	165	165	165	165	165	165	165	165		
	GR2	4.4	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	3.9		
36000	TOFL	11580	12010	12400	12670	12940	13270	13540	13730	13960	14250	14630	144	188
	V1	145	146	147	147	147	147	147	147	147	147	147		
	VR	158	159	159	159	159	159	159	159	159	159	159		
	V2	160	160	161	161	161	161	161	161	161	161	161		
	GR2	4.7	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.2		
35000	TOFL	10570	10970	11330	11580	11840	12140	12390	12550	12760	13020	13370	141	185
	V1	139	140	141	141	141	141	141	141	141	141	142		
	VR	154	154	154	154	154	155	155	155	155	155	155		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.1	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.5		
34000	TOFL	9650	10010	10340	10560	10790	11070	11290	11440	11630	11870	12190	138	182
	V1	134	135	135	135	135	135	135	135	135	135	136		
	VR	149	150	150	150	150	150	150	150	150	150	150		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	4.9		
33000	TOFL	8780	9120	9420	9630	9840	10090	10290	10420	10600	10820	11110	135	179
	V1	128	129	130	130	130	130	130	130	130	130	130		
	VR	145	145	145	146	146	146	146	146	146	146	146		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.8	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.3		
32000	TOFL	8020	8310	8580	8770	8960	9190	9360	9490	9650	9850	10120	133	176
	V1	123	124	124	124	124	124	124	124	124	124	125		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.1	6	6	6	6	6	6	6	5.9	5.6		
31000	TOFL	7290	7560	7810	7980	8160	8370	8530	8640	8780	8970	9210	130	173
	V1	117	118	119	119	119	119	119	119	119	119	120		
	VR	136	136	137	137	137	137	137	137	137	137	137		
	V2	140	140	141	141	141	141	141	141	141	141	141		
	GR2	6.7	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6		

FIGURE 10-8-312. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
30000	TOFL	6600	6850	7080	7220	7380	7580	7730	7810	7940	8110	8340	127	170
	V1	111	112	113	113	113	113	113	113	113	113	114		
	VR	131	132	132	132	132	132	132	132	132	132	132		
	V2	136	136	137	137	137	137	137	137	137	137	137		
	GR2	7.1	6.9	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.7	6.5		
29000	TOFL	5930	6160	6380	6520	6670	6840	6980	7060	7170	7330	7530	124	167
	V1	105	106	107	107	107	108	108	108	108	108	108		
	VR	126	127	128	128	128	128	128	128	128	128	128		
	V2	132	132	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	6.9		
28000	TOFL	5330	5530	5720	5840	5970	6130	6250	6320	6420	6560	6740	121	164
	V1	100	101	101	101	101	102	102	102	102	102	102		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	127	128	128	128	128	128	128	128	128	128	128		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.4		
27000	TOFL	4790	4960	5130	5240	5360	5490	5600	5660	5750	5880	6040	118	160
	V1	94	95	96	96	96	96	96	96	96	96	97		
	VR	117	117	118	118	118	118	118	118	118	118	118		
	V2	123	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.1	7.9		
26000	TOFL	4320	4470	4610	4710	4810	4930	5020	5080	5160	5270	5410	115	157
	V1	88	89	90	90	90	90	90	90	90	90	91		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	119	120	120	120	120	120	120	120	120	120	120		
	GR2	9.1	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.7	8.4		

FIGURE 10-8-313. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	19760											152	197
	V1	165												
	VR	172												
	V2	172												
	GR2	3												
38000	TOFL	18180	19460	20940									149	194
	V1	160	161	163										
	VR	168	168	169										
	V2	168	169	169										
	GR2	3.3	3	2.7										
37000	TOFL	16720	17880	19270									147	191
	V1	154	156	158										
	VR	164	164	165										
	V2	165	165	166										
	GR2	3.6	3.3	3										
36000	TOFL	15320	16370	17620									144	188
	V1	149	151	153										
	VR	159	160	161										
	V2	161	161	161										
	GR2	3.9	3.6	3.3										
35000	TOFL	14020	14980	16100									141	185
	V1	143	145	147										
	VR	155	156	156										
	V2	156	157	157										
	GR2	4.2	3.9	3.6										
34000	TOFL	12790	13700	14710									138	182
	V1	138	140	142										
	VR	150	152	152										
	V2	152	153	153										
	GR2	4.6	4.2	3.9										
33000	TOFL	11660	12500	13450									135	179
	V1	132	134	136										
	VR	146	147	148										
	V2	148	149	150										
	GR2	4.9	4.6	4.3										
32000	TOFL	10630	11390	12280									133	176
	V1	127	129	131										
	VR	142	143	144										
	V2	144	145	146										
	GR2	5.3	4.9	4.6										
31000	TOFL	9670	10350	11170									130	173
	V1	121	123	126										
	VR	137	138	140										
	V2	141	141	142										
	GR2	5.7	5.3	5										

FIGURE 10-8-313. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
30000	TOFL	8770	9420	10150									127	170
	V1	116	118	120										
	VR	133	134	136										
	V2	137	137	138										
	GR2	6.1	5.7	5.4										
29000	TOFL	7920	8520	9190									124	167
	V1	110	113	115										
	VR	128	130	131										
	V2	133	133	134										
	GR2	6.5	6.2	5.8										
28000	TOFL	7100	7690	8320									121	164
	V1	104	107	110										
	VR	124	125	127										
	V2	128	130	131										
	GR2	7	6.6	6.3										
27000	TOFL	6360	6880	7480									118	160
	V1	98	101	104										
	VR	119	121	123										
	V2	124	125	127										
	GR2	7.5	7.1	6.8										
26000	TOFL	5670	6130	6670									115	157
	V1	93	95	98										
	VR	114	116	118										
	V2	120	121	123										
	GR2	8	7.6	7.3										

FIGURE 10-8-314. TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	4910	4990	5060	5140	5210	5310	5410	5510	5600	5670	5750	139	192
	V1	119	118	118	118	118	118	118	118	118	118	118		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	145	145	145	145	145	145	145	145	145		
	GR2	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8	6.8		
39000	TOFL	4720	4800	4870	4950	5010	5110	5200	5300	5390	5460	5540	138	191
	V1	116	116	116	116	116	116	116	116	116	115	115		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.8	6.9	6.9	6.9	7	7	6.9	6.9	6.9	7	7		
38000	TOFL	4420	4490	4560	4630	4690	4780	4870	4960	5040	5110	5180	136	188
	V1	113	112	112	112	112	112	112	112	112	112	112		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	142	142	142	141	141	141	141	141	141	141	141		
	GR2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
37000	TOFL	4130	4200	4260	4330	4390	4470	4550	4630	4710	4770	4840	135	185
	V1	109	109	108	108	108	108	108	108	108	108	108		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
36000	TOFL	3860	3930	3990	4050	4110	4180	4260	4330	4410	4470	4530	133	182
	V1	105	105	105	105	104	104	104	104	104	104	104		
	VR	129	128	128	128	128	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
35000	TOFL	3680	3760	3820	3900	3960	4030	4100	4160	4230	4290	4360	131	180
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	126	126	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.4	8.5	8.5	8.5	8.6	8.6	8.5	8.5	8.5	8.6	8.6		
34000	TOFL	3700	3770	3820	3890	3950	4010	4080	4150	4220	4260	4330	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.9	8.9	8.9	9	9	9	9	9	9	9	9		
33000	TOFL	3660	3720	3780	3840	3890	3960	4020	4100	4160	4220	4270	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.4	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
32000	TOFL	3610	3670	3730	3790	3840	3910	3980	4050	4120	4160	4220	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.9	9.9	9.9	10	10	10	10	10	10	10	10.1		
31000	TOFL	3560	3620	3680	3730	3790	3860	3930	3990	4060	4100	4170	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	115	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6	10.6		

FIGURE 10-8-314. TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
30000	TOFL	3510	3570	3630	3680	3730	3800	3870	3940	4010	4050	4110	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11	11.1	11.1	11.1	11.2	11.2	11.2	11.1	11.1	11.2	11.2		
29000	TOFL	3450	3520	3570	3630	3680	3750	3810	3880	3940	3990	4040	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.7	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.9		
28000	TOFL	3400	3450	3520	3570	3620	3690	3750	3820	3880	3930	3980	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	120	120	120	120	120	120	120	120	120	120		
	GR2	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.6		
27000	TOFL	3340	3400	3460	3520	3570	3630	3700	3760	3830	3870	3930	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.2	13.2	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.4		
26000	TOFL	3290	3340	3390	3450	3510	3570	3630	3700	3760	3810	3860	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	118	118	118	118	118	118	118	118	118	118		
	GR2	14	14	14.1	14.1	14.2	14.2	14.1	14.1	14.1	14.1	14.2		

FIGURE 10-8-315. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	5220	5310	5390	5480	5570	5670	5770	5880	5980	6060	6150	139	193
	V1	120	120	120	120	120	120	120	120	120	120	119		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
39000	TOFL	5020	5110	5190	5270	5350	5450	5550	5660	5750	5830	5910	138	191
	V1	118	118	118	117	117	117	117	117	117	117	117		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8		
38000	TOFL	4700	4780	4860	4930	5010	5100	5200	5290	5380	5450	5530	136	188
	V1	114	114	114	114	114	114	114	114	114	113	113		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
37000	TOFL	4390	4470	4540	4610	4680	4770	4860	4940	5030	5100	5170	135	185
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.5	7.5		
36000	TOFL	4100	4170	4230	4300	4370	4450	4530	4610	4690	4750	4820	133	183
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.8	7.8	7.9	7.9		
35000	TOFL	3830	3890	3960	4020	4080	4160	4230	4310	4380	4440	4510	131	180
	V1	103	103	102	102	102	102	102	102	102	102	102		
	VR	127	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
34000	TOFL	3780	3850	3920	3970	4040	4110	4170	4250	4320	4380	4440	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	124	124	124	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.7	8.7	8.7	8.7	8.8	8.8	8.7	8.7	8.7	8.7	8.8		
33000	TOFL	3730	3800	3860	3920	3980	4060	4130	4200	4260	4330	4390	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	121	121	121	121	121	121	121	121	121	121	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
32000	TOFL	3690	3750	3810	3870	3930	4000	4070	4140	4210	4270	4330	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.8		
31000	TOFL	3640	3690	3760	3820	3880	3950	4020	4090	4160	4210	4270	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		

FIGURE 10-8-315. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
30000	TOFL	3590	3640	3710	3760	3820	3890	3960	4030	4100	4150	4220	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.8	10.8	10.9	10.9		
29000	TOFL	3530	3590	3650	3710	3770	3840	3910	3970	4040	4100	4160	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		
28000	TOFL	3480	3540	3590	3650	3720	3780	3850	3920	3980	4040	4100	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12.1	12.1	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2		
27000	TOFL	3420	3480	3540	3590	3650	3720	3790	3850	3920	3980	4040	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	13		
26000	TOFL	3370	3420	3480	3540	3600	3660	3730	3800	3860	3910	3970	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.7	13.7	13.8	13.8	13.8	13.8	13.7	13.7	13.8	13.8		

FIGURE 10-8-316. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	5540	5640	5740	5840	5950	6060	6170	6280	6390	6480	6570	140	193
	V1	122	122	122	122	122	122	122	122	122	121	121		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
39000	TOFL	5330	5430	5530	5620	5720	5830	5940	6050	6140	6230	6320	139	191
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
38000	TOFL	4990	5080	5170	5260	5360	5450	5550	5660	5750	5830	5920	137	189
	V1	116	116	116	115	115	115	115	115	115	115	115		
	VR	137	137	137	137	137	137	137	137	137	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9		
37000	TOFL	4660	4750	4830	4910	5000	5090	5190	5280	5370	5440	5520	135	186
	V1	112	112	112	112	112	112	112	112	112	111	111		
	VR	134	134	134	134	134	134	134	134	134	133	133		
	V2	141	141	141	141	141	141	141	141	141	140	140		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
36000	TOFL	4350	4430	4500	4580	4660	4750	4830	4920	5000	5070	5150	133	183
	V1	108	108	108	108	108	108	108	108	108	108	107		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
35000	TOFL	4050	4130	4200	4270	4350	4430	4510	4590	4660	4730	4800	131	180
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8	8	8	8	8	8	8	8	8	8	8.1		
34000	TOFL	3780	3850	3930	3980	4050	4130	4200	4280	4350	4410	4470	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
33000	TOFL	3800	3880	3940	4000	4070	4140	4210	4280	4340	4410	4470	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	122	122	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
32000	TOFL	3760	3830	3890	3950	4020	4080	4160	4220	4290	4350	4410	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	119	119	119	119	119	119	119	119	119	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
31000	TOFL	3710	3770	3840	3890	3970	4030	4100	4160	4230	4300	4350	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.9	10	10	10	10	10	10	9.9	9.9	10	10		

FIGURE 10-8-316. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
30000	TOFL	3660	3720	3780	3840	3910	3980	4040	4100	4170	4240	4300	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.6		
29000	TOFL	3600	3670	3730	3780	3860	3920	3990	4040	4110	4180	4240	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11.1	11.1	11.2	11.2	11.1	11.1	11.1	11.1	11.1	11.2		
28000	TOFL	3540	3610	3680	3730	3790	3860	3930	3990	4050	4120	4170	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.9		
27000	TOFL	3490	3550	3610	3670	3730	3800	3870	3930	4000	4050	4110	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	118	118	118	118	118	118	118	118	118		
	GR2	12.5	12.5	12.6	12.6	12.6	12.6	12.6	12.5	12.5	12.6	12.6		
26000	TOFL	3430	3490	3560	3610	3680	3740	3800	3860	3930	3990	4050	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.3	13.3	13.4	13.4		

FIGURE 10-8-317. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	5980	6100	6210	6320	6450	6570	6690	6810	6920	7020	7130	141	193
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
39000	TOFL	5730	5840	5950	6060	6170	6280	6400	6520	6630	6720	6820	140	192
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
38000	TOFL	5330	5430	5530	5630	5740	5850	5950	6060	6170	6250	6340	137	189
	V1	118	118	118	118	118	118	118	118	118	117	117		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.6	6.6		
37000	TOFL	4980	5070	5170	5260	5360	5460	5560	5660	5760	5840	5920	135	186
	V1	114	114	114	114	114	114	114	114	114	113	113		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	4640	4730	4820	4900	5000	5090	5180	5280	5370	5440	5520	133	183
	V1	110	110	110	110	110	110	110	110	110	109	109		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	4320	4400	4480	4560	4650	4730	4820	4910	4990	5060	5130	131	181
	V1	106	106	106	106	106	106	106	106	106	106	105		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
34000	TOFL	4030	4100	4180	4250	4330	4410	4490	4570	4650	4710	4780	129	178
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	126	126	126	126	126	126	126	126	126	126	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.2		
33000	TOFL	3880	3950	4010	4080	4140	4210	4270	4330	4400	4470	4530	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	123	123	123	123	123	123	123	123	123	123	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
32000	TOFL	3840	3910	3970	4040	4110	4170	4240	4310	4380	4440	4500	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	3790	3850	3920	3980	4060	4120	4180	4250	4320	4390	4430	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-317. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
30000	TOFL	3740	3800	3860	3930	4000	4060	4140	4200	4260	4330	4380	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.2	10.2		
29000	TOFL	3680	3740	3810	3870	3940	4010	4080	4140	4200	4260	4320	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.7	10.7	10.7	10.7	10.8		
28000	TOFL	3630	3690	3750	3820	3890	3950	4010	4070	4140	4200	4260	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
27000	TOFL	3570	3640	3690	3760	3830	3880	3950	4010	4080	4140	4190	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	3510	3570	3630	3700	3760	3820	3890	3950	4020	4070	4120	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 10-8-318. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	6520	6650	6770	6900	7030	7160	7290	7430	7550	7660	7780	142	194
	V1	128	127	127	127	127	127	127	127	127	127	127		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
39000	TOFL	6240	6360	6480	6600	6730	6850	6980	7110	7230	7330	7440	141	192
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6	6	6	6	6	6	6	5.9	5.9	6	6		
38000	TOFL	5790	5900	6010	6120	6240	6350	6470	6590	6700	6800	6900	138	189
	V1	120	120	120	120	120	120	120	120	120	120	120		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	5360	5470	5570	5670	5780	5880	5990	6100	6200	6290	6380	136	187
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.7	6.7		
36000	TOFL	4990	5090	5180	5280	5380	5480	5580	5680	5770	5860	5940	133	184
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
35000	TOFL	4650	4730	4820	4910	5000	5090	5190	5280	5370	5450	5530	131	181
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	4320	4400	4480	4560	4650	4730	4820	4910	4990	5060	5130	129	178
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.9		
33000	TOFL	4020	4090	4170	4240	4320	4400	4480	4560	4640	4700	4770	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
32000	TOFL	3930	3990	4070	4130	4210	4280	4340	4410	4480	4550	4610	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	3870	3950	4020	4080	4150	4220	4290	4360	4430	4490	4550	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	118	118	118	118	118	118	118	118	118	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 10-8-318. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
30000	TOFL	3820	3890	3960	4030	4090	4170	4230	4300	4360	4420	4490	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
29000	TOFL	3760	3840	3900	3970	4030	4110	4170	4240	4310	4360	4430	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
28000	TOFL	3710	3780	3850	3910	3980	4050	4110	4180	4250	4300	4360	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	11	11	11	11	11	11	11	11	11		
27000	TOFL	3650	3720	3780	3850	3920	3990	4050	4120	4180	4240	4300	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
26000	TOFL	3590	3660	3730	3790	3860	3930	3980	4060	4120	4170	4240	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.4	12.4	12.5	12.5		

FIGURE 10-8-319. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	7070	7210	7350	7490	7630	7770	7920	8070	8200	8320	8450	143	194
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
39000	TOFL	6750	6880	7010	7150	7290	7420	7560	7700	7830	7940	8060	142	193
	V1	128	128	128	128	128	128	128	128	128	127	127		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.8		
38000	TOFL	6260	6380	6500	6630	6760	6880	7010	7140	7260	7360	7470	139	190
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6.1	6.1		
37000	TOFL	5800	5910	6020	6140	6250	6370	6480	6610	6720	6810	6910	137	187
	V1	118	118	118	118	118	118	118	118	118	118	118		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	5360	5460	5560	5670	5780	5880	5990	6100	6210	6290	6390	134	184
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	4970	5060	5160	5260	5360	5450	5550	5660	5750	5830	5920	132	181
	V1	110	110	110	110	110	110	110	110	110	110	109		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.2	7.2		
34000	TOFL	4610	4700	4790	4880	4970	5060	5150	5250	5340	5420	5500	129	178
	V1	106	106	106	106	106	106	106	106	106	106	105		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
33000	TOFL	4280	4360	4450	4530	4610	4700	4780	4870	4950	5020	5100	127	176
	V1	102	102	102	102	102	102	102	102	102	102	101		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8	8	8	8	8	8	8	8	8	8	8		
32000	TOFL	3980	4060	4130	4210	4280	4360	4440	4520	4600	4660	4730	125	173
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
31000	TOFL	3960	4030	4090	4170	4250	4320	4400	4460	4540	4590	4650	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9	9	9	9	9	9	9	8.9	8.9	9	9		

FIGURE 10-8-319. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
30000	TOFL	3900	3970	4040	4110	4180	4260	4320	4400	4470	4530	4580	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	3850	3920	3980	4050	4120	4200	4270	4340	4400	4460	4520	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10.1	10.1		
28000	TOFL	3790	3860	3930	3990	4060	4140	4210	4270	4340	4400	4450	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.6	10.6	10.6	10.6	10.7		
27000	TOFL	3730	3800	3870	3930	4000	4080	4140	4210	4270	4330	4390	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.3	11.3	11.4		
26000	TOFL	3670	3750	3800	3870	3950	4010	4080	4140	4210	4270	4320	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		

FIGURE 10-8-320. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	7770	7910	8050	8210	8370	8530	8680	8850	9000	9130	9270	144	195
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	TOFL	7430	7560	7700	7850	8000	8150	8300	8460	8600	8730	8860	143	193
	V1	131	131	131	131	131	131	131	131	131	131	131		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
38000	TOFL	6890	7010	7140	7280	7420	7550	7700	7840	7970	8090	8210	140	190
	V1	127	127	127	127	127	127	127	127	127	126	126		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	6370	6480	6600	6720	6850	6980	7110	7240	7360	7470	7580	138	187
	V1	122	122	122	122	122	122	122	122	122	122	122		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.1	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.2	6.2		
36000	TOFL	5880	5990	6090	6210	6320	6440	6560	6690	6800	6890	7000	135	185
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	5430	5520	5620	5720	5830	5940	6050	6160	6270	6360	6450	133	182
	V1	113	113	113	113	113	113	113	113	113	112	112		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8	6.9	6.9		
34000	TOFL	5010	5090	5180	5280	5380	5480	5580	5680	5780	5870	5950	130	179
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	4640	4720	4800	4900	4990	5080	5170	5270	5360	5430	5510	127	176
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
32000	TOFL	4300	4370	4450	4530	4620	4700	4790	4880	4960	5030	5100	125	173
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.1	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.2	8.2		
31000	TOFL	4000	4080	4150	4220	4290	4360	4440	4520	4590	4660	4720	123	170
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.6	8.6	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.7		

FIGURE 10-8-320. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
30000	TOFL	3990	4060	4130	4210	4270	4350	4410	4490	4550	4620	4660	121	167
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.1	9.2	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.2		
29000	TOFL	3930	4000	4070	4150	4220	4280	4350	4430	4490	4550	4590	119	164
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
28000	TOFL	3880	3950	4020	4090	4160	4220	4290	4360	4430	4490	4530	117	161
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
27000	TOFL	3820	3890	3960	4030	4100	4160	4220	4300	4360	4420	4460	115	158
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	3760	3830	3900	3970	4030	4100	4160	4230	4300	4360	4390	113	155
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7		

FIGURE 10-8-321. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	8520	8670	8830	9000	9180	9350	9530	9710	9870	10010	10170	145	195
	V1	137	137	137	137	137	137	137	137	137	137	137		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5	5.1	5.1	5.1	5	5	5	5	5	5	5.1		
39000	TOFL	8150	8290	8450	8620	8780	8940	9110	9290	9440	9580	9730	144	193
	V1	135	135	135	135	135	135	135	135	135	134	134		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	7560	7690	7830	7990	8140	8290	8450	8610	8750	8870	9010	141	191
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.5	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
37000	TOFL	7000	7120	7260	7400	7540	7680	7820	7970	8100	8220	8350	139	188
	V1	126	125	125	125	125	125	125	125	125	125	125		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	6460	6570	6690	6820	6950	7080	7210	7350	7470	7580	7700	136	185
	V1	121	121	121	121	121	121	121	121	121	120	120		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.3		
35000	TOFL	5960	6050	6170	6280	6400	6520	6640	6770	6880	6980	7090	134	182
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	5480	5560	5670	5780	5890	6000	6110	6220	6330	6420	6510	131	179
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	5030	5110	5200	5310	5410	5510	5610	5710	5810	5890	5980	128	176
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
32000	TOFL	4640	4720	4810	4900	4990	5080	5170	5270	5360	5440	5520	126	173
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	7.8	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.9		
31000	TOFL	4290	4360	4440	4530	4610	4690	4780	4870	4950	5020	5100	123	170
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 10-8-321. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
30000	TOFL	4060	4130	4210	4280	4350	4420	4490	4550	4620	4680	4700	121	167
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	4010	4080	4150	4220	4300	4360	4440	4510	4590	4630	4640	119	164
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	115	115	115	115	115	115	115	115	115	115	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.3	9.4	9.4	9.4	9.4	9.4	9.3	9.3	9.3	9.4	9.4		
28000	TOFL	3950	4020	4100	4160	4230	4310	4380	4440	4520	4570	4570	117	161
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
27000	TOFL	3890	3960	4030	4090	4170	4250	4310	4380	4450	4500	4510	115	158
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	108	108	108	108	108	108	108	108	108	108	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.5	10.6	10.6	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	3830	3900	3970	4030	4110	4170	4250	4310	4390	4440	4470	113	155
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	105	105	105	105	105	105	105	105	105	105	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		

FIGURE 10-8-322. TAKE-OFF DATA; FLAPS - 10°; 8000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY COMPACTED SNOW
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	9350	9510	9700	9890	10090	10280	10470	10670	10850	11010	11200	147	195
	V1	141	141	141	141	141	141	141	141	141	141	141		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
39000	TOFL	8940	9090	9280	9460	9640	9820	10010	10200	10370	10520	10710	145	194
	V1	138	138	138	138	138	138	138	138	138	138	138		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5	5	5	5	5	5	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	8280	8430	8600	8770	8930	9100	9270	9450	9610	9750	9920	142	191
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	149	149	149	149	149	149	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	7670	7800	7960	8110	8270	8420	8580	8760	8890	9020	9180	140	188
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	7100	7220	7370	7510	7650	7790	7940	8090	8230	8350	8490	137	185
	V1	124	124	124	124	124	124	124	124	124	124	124		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	146	146	146	146	146	146	146	146	146	146		
	GR2	6	6	6	6	6	6	5.9	5.9	5.9	6	6		
35000	TOFL	6550	6660	6790	6920	7060	7190	7320	7460	7590	7700	7830	135	183
	V1	120	119	119	119	119	119	119	119	119	119	119		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.3	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	6010	6110	6230	6350	6470	6590	6710	6840	6960	7050	7180	132	180
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
33000	TOFL	5510	5600	5710	5820	5930	6040	6150	6270	6370	6460	6580	129	177
	V1	110	109	109	109	109	109	109	109	109	109	109		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
32000	TOFL	5040	5120	5220	5330	5430	5530	5630	5730	5830	5910	6020	127	174
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
31000	TOFL	4630	4710	4800	4890	4990	5080	5170	5270	5360	5430	5530	124	171
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8	8	8	8	8	8	8	8	8	8	8		

FIGURE 10-8-322. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
30000	TOFL	4270	4340	4430	4510	4590	4680	4760	4850	4940	5000	5090	121	168
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
29000	TOFL	4090	4170	4250	4310	4390	4470	4540	4600	4680	4720	4710	119	165
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	9	9	9	9	9	9	9	9	9	9		
28000	TOFL	4030	4100	4180	4240	4320	4400	4480	4550	4610	4660	4660	117	161
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5	9.5	9.5	9.5		
27000	TOFL	3970	4040	4120	4180	4260	4340	4410	4480	4560	4590	4610	115	158
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.1		
26000	TOFL	3910	3980	4060	4120	4190	4270	4350	4410	4490	4520	4560	113	155
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-323. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	10350	10550	10760	10970	11190	11400	11620	11840	12040	12210	12510	148	196
	V1	145	145	145	145	145	145	145	145	145	145	145		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4		
39000	TOFL	9860	10060	10260	10460	10660	10870	11100	11310	11480	11650	11980	146	194
	V1	142	142	142	142	142	142	142	142	142	142	143		
	VR	156	156	156	156	156	156	156	156	156	156	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6		
38000	TOFL	9130	9310	9500	9680	9870	10060	10250	10440	10620	10780	11060	144	191
	V1	137	137	137	137	137	137	137	137	137	137	138		
	VR	152	152	152	152	152	152	152	152	152	152	153		
	V2	155	155	155	155	155	155	155	155	155	155	156		
	GR2	5	5	5	5	5	5	5	5	5	5	4.9		
37000	TOFL	8440	8610	8780	8950	9120	9300	9470	9650	9820	9960	10220	141	189
	V1	133	133	133	133	133	133	133	133	133	133	133		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.2		
36000	TOFL	7790	7950	8100	8260	8420	8580	8740	8910	9060	9190	9430	138	186
	V1	128	128	128	128	128	128	128	128	128	128	128		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6		
35000	TOFL	7190	7330	7470	7620	7770	7910	8060	8220	8350	8470	8700	136	183
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6	6.1	5.9		
34000	TOFL	6610	6740	6870	7000	7140	7270	7410	7550	7680	7790	8000	133	180
	V1	118	118	118	118	118	118	118	118	118	118	119		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3		
33000	TOFL	6050	6160	6280	6410	6530	6650	6780	6910	7020	7120	7320	130	177
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7		
32000	TOFL	5520	5630	5740	5850	5960	6070	6190	6310	6410	6500	6680	127	174
	V1	108	108	108	108	108	108	108	108	108	108	108		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	7.3	7.1		
31000	TOFL	5040	5130	5230	5330	5430	5530	5640	5750	5840	5920	6090	125	171
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.5		

FIGURE 10-8-323. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
30000	TOFL	4610	4700	4790	4880	4970	5060	5160	5250	5340	5420	5560	122	168
	V1	98	98	98	98	98	98	98	98	98	98	99		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8		
29000	TOFL	4240	4320	4400	4490	4570	4650	4730	4820	4900	4970	5100	119	165
	V1	94	94	94	94	94	94	94	94	94	94	94		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.7	8.5		
28000	TOFL	4130	4200	4280	4360	4430	4510	4580	4660	4710	4700	4730	117	162
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9		
27000	TOFL	4070	4140	4220	4300	4370	4440	4520	4590	4650	4640	4680	115	159
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.6		
26000	TOFL	4010	4080	4150	4230	4300	4370	4450	4520	4580	4590	4630	113	155
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	106	106	106	106	106	106	106	106	106	106	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.2		

FIGURE 10-8-324. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	11450	11690	11930	12170	12400	12640	12890	13140	13360	13550	14070	149	196
	V1	149	149	149	149	149	149	149	149	149	149	150		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.3	4		
39000	TOFL	10940	11170	11390	11620	11850	12070	12300	12550	12760	12940	13440	147	194
	V1	146	146	146	147	147	147	147	147	147	147	147		
	VR	159	159	159	159	159	159	160	160	160	160	160		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.2		
38000	TOFL	10120	10330	10530	10750	10960	11160	11370	11610	11800	11960	12440	145	192
	V1	142	142	142	142	142	142	142	142	142	142	143		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.5		
37000	TOFL	9320	9510	9700	9900	10090	10280	10480	10690	10870	11020	11480	142	189
	V1	136	136	136	136	136	136	137	137	137	137	138		
	VR	151	151	151	151	151	151	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5.1	4.8		
36000	TOFL	8600	8770	8950	9130	9300	9480	9660	9850	10020	10150	10570	139	186
	V1	131	131	132	132	132	132	132	132	132	132	133		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.1		
35000	TOFL	7910	8070	8230	8400	8560	8720	8880	9070	9220	9340	9730	137	183
	V1	127	127	127	127	127	127	127	127	127	127	128		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	148		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.5		
34000	TOFL	7280	7430	7580	7730	7870	8020	8170	8320	8470	8590	8940	134	180
	V1	122	122	122	122	122	122	122	122	122	122	123		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	5.8		
33000	TOFL	6670	6800	6930	7070	7210	7340	7480	7630	7760	7860	8200	131	177
	V1	116	116	116	117	117	117	117	117	117	117	118		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	141		
	GR2	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.5	6.2		
32000	TOFL	6080	6210	6330	6450	6580	6700	6820	6960	7080	7170	7490	128	175
	V1	111	111	111	111	111	111	111	112	112	112	113		
	VR	131	131	131	131	131	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7	7	7	7	7	7	6.9	6.9	6.9	6.9	6.6		
31000	TOFL	5530	5640	5750	5870	5980	6090	6200	6330	6440	6520	6810	126	172
	V1	106	106	106	106	106	106	106	106	106	106	108		
	VR	127	127	127	127	127	127	127	127	127	127	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7.4	7		

FIGURE 10-8-324. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
30000	TOFL	5020	5120	5220	5330	5430	5530	5630	5740	5840	5920	6170	123	168
	V1	101	101	101	101	101	101	101	101	101	101	102		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.5		
29000	TOFL	4580	4670	4760	4850	4940	5030	5120	5220	5310	5390	5610	120	165
	V1	96	96	96	96	96	96	96	96	96	96	97		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3	7.9		
28000	TOFL	4210	4290	4370	4440	4520	4610	4690	4780	4860	4930	5130	117	162
	V1	91	91	91	91	91	91	91	92	92	92	93		
	VR	115	115	115	115	115	115	115	115	115	115	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.5		
27000	TOFL	4180	4250	4320	4400	4480	4560	4620	4700	4720	4740	4740	115	159
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	111	111	111	111	111	111	111	111	111	111	112		
	V2	119	119	119	119	119	119	119	119	119	119	120		
	GR2	9.5	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9		
26000	TOFL	4110	4190	4270	4340	4410	4490	4560	4630	4650	4680	4690	113	156
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10	10	9.6		

FIGURE 10-8-325. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	12710	12980	13240	13510	13770	14040	14310	14590	14840	15200	16040	150	197
	V1	154	154	154	154	154	154	154	154	154	154	156		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	166	166	166	166	166	166	166	166	166	166	167		
	GR2	4	4	4	4	4	4	3.9	3.9	3.9	3.8	3.5		
39000	TOFL	12120	12370	12630	12880	13130	13390	13650	13920	14150	14500	15290	148	195
	V1	151	151	151	151	151	151	151	151	151	151	153		
	VR	162	162	162	162	162	162	162	162	162	163	163		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4	3.7		
38000	TOFL	11200	11430	11670	11900	12130	12360	12610	12850	13070	13400	14120	146	192
	V1	145	145	145	146	146	146	146	146	146	146	148		
	VR	158	158	158	158	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.3	4		
37000	TOFL	10320	10530	10740	10960	11170	11390	11610	11840	12040	12350	13040	143	189
	V1	140	140	140	140	140	140	141	141	141	141	143		
	VR	154	154	154	154	154	154	154	154	154	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.6	4.3		
36000	TOFL	9480	9670	9870	10070	10260	10480	10690	10890	11060	11370	12020	140	187
	V1	135	135	135	135	135	135	135	136	136	136	138		
	VR	150	150	150	150	150	150	150	150	150	151	151		
	V2	153	153	153	153	153	153	153	153	153	153	154		
	GR2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5	4.7		
35000	TOFL	8720	8890	9070	9260	9440	9610	9800	10000	10170	10430	11040	138	184
	V1	130	130	130	130	130	130	130	130	130	131	133		
	VR	146	146	146	146	146	146	146	146	146	146	147		
	V2	149	149	149	149	149	149	149	149	149	149	150		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.3	5		
34000	TOFL	8000	8160	8330	8490	8660	8820	8990	9170	9330	9570	10120	135	181
	V1	125	125	125	125	125	125	125	125	125	126	127		
	VR	142	142	142	142	142	142	142	142	142	142	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.3		
33000	TOFL	7320	7470	7610	7760	7910	8060	8230	8390	8540	8770	9270	132	178
	V1	120	120	120	120	120	120	120	120	120	121	122		
	VR	138	138	138	138	138	138	138	138	138	138	139		
	V2	142	142	142	142	142	142	142	142	142	142	143		
	GR2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.1	5.7		
32000	TOFL	6690	6820	6960	7100	7230	7370	7510	7660	7800	8010	8470	129	175
	V1	114	114	115	115	115	115	115	115	115	115	117		
	VR	134	134	134	134	134	134	134	134	134	134	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.4	6.1		
31000	TOFL	6080	6200	6330	6450	6580	6700	6830	6960	7090	7300	7720	127	172
	V1	109	109	109	109	109	109	109	110	110	110	112		
	VR	129	130	130	130	130	130	130	130	130	130	131		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.2	7.2	7.1	7.1	7.1	7.1	7.1	7	7	6.9	6.5		

FIGURE 10-8-325. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
30000	TOFL	5520	5630	5740	5850	5960	6080	6190	6310	6430	6610	7000	124	169
	V1	104	104	104	104	104	104	104	104	104	105	107		
	VR	125	125	125	125	125	125	125	125	125	126	127		
	V2	131	131	131	131	131	131	131	131	131	131	132		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.5	7.4	7.3	6.9		
29000	TOFL	4990	5090	5190	5290	5390	5500	5600	5710	5820	5980	6330	121	166
	V1	98	98	98	99	99	99	99	99	99	99	102		
	VR	121	121	121	121	121	121	121	121	121	121	122		
	V2	127	127	127	127	127	127	127	127	127	127	128		
	GR2	8.1	8.1	8.1	8.1	8.1	8	8	8	7.9	7.8	7.4		
28000	TOFL	4530	4620	4710	4800	4890	4980	5080	5180	5270	5420	5730	118	162
	V1	93	93	93	94	94	94	94	94	94	94	96		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.4	8.2	7.9		
27000	TOFL	4260	4330	4410	4480	4570	4640	4720	4760	4810	4940	5210	115	159
	V1	90	90	90	90	90	90	90	89	89	90	92		
	VR	113	113	113	113	113	113	113	113	113	113	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9	9	8.8	8.4		
26000	TOFL	4200	4260	4340	4410	4500	4570	4650	4680	4710	4740	4760	113	156
	V1	90	90	90	90	90	90	90	89	89	88	87		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	117	117	117	117	117	117	117	117	117	117	118		
	GR2	9.8	9.8	9.8	9.8	9.7	9.7	9.7	9.6	9.6	9.4	9		

FIGURE 10-8-326. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	14160	14460	14760	15060	15360	15660	15980	16290	16580	17230	18440	151	197
	V1	158	158	158	158	158	158	158	158	158	159	161		
	VR	168	168	168	168	168	168	168	168	168	168	169		
	V2	169	169	169	169	169	169	169	169	169	169	170		
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.4	3.1		
39000	TOFL	13480	13770	14050	14330	14620	14910	15210	15510	15780	16400	17540	150	196
	V1	155	155	155	155	155	155	155	155	155	156	158		
	VR	165	165	166	166	166	166	166	166	166	166	167		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	3.9	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.8	3.6	3.3		
38000	TOFL	12420	12680	12950	13200	13470	13730	14010	14280	14540	15110	16140	147	193
	V1	150	150	150	150	150	150	150	150	150	151	153		
	VR	161	161	161	161	161	161	161	162	162	162	163		
	V2	163	163	163	163	163	163	163	163	163	163	164		
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.1	3.9	3.6		
37000	TOFL	11450	11680	11930	12160	12410	12650	12900	13160	13400	13920	14850	144	190
	V1	144	144	144	145	145	145	145	145	145	146	148		
	VR	157	157	157	157	157	157	157	157	157	158	158		
	V2	159	159	159	159	159	159	159	159	159	159	160		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.2	3.9		
36000	TOFL	10500	10720	10940	11160	11380	11600	11830	12070	12290	12800	13660	142	187
	V1	139	139	139	139	139	139	139	139	139	141	143		
	VR	153	153	153	153	153	153	153	153	153	154	154		
	V2	155	155	155	155	155	155	155	155	155	156	156		
	GR2	4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.7	4.5	4.2		
35000	TOFL	9640	9840	10040	10240	10440	10640	10860	11080	11290	11750	12580	139	184
	V1	134	134	134	134	134	134	134	134	134	135	138		
	VR	149	149	149	149	149	149	149	149	149	149	151		
	V2	152	152	152	152	152	152	152	152	152	152	153		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	4.8	4.5		
34000	TOFL	8820	9000	9180	9360	9550	9730	9930	10130	10330	10750	11530	136	181
	V1	128	128	128	128	128	128	129	129	129	130	132		
	VR	145	145	145	145	145	145	145	145	145	145	147		
	V2	148	148	148	148	148	148	148	148	148	148	149		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.4	5.2	4.9		
33000	TOFL	8060	8230	8400	8560	8730	8900	9080	9270	9440	9830	10530	133	178
	V1	123	123	123	123	123	123	123	124	124	125	127		
	VR	140	140	140	140	140	140	141	141	141	141	142		
	V2	144	144	144	144	144	144	144	144	144	144	145		
	GR2	6	6	6	6	6	5.9	5.9	5.9	5.8	5.6	5.2		
32000	TOFL	7360	7500	7660	7810	7960	8120	8280	8450	8620	8980	9610	130	175
	V1	118	118	118	118	118	118	118	118	118	120	122		
	VR	136	136	136	136	136	136	136	136	136	137	138		
	V2	140	140	140	140	140	140	140	140	140	140	141		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.2	5.9	5.6		
31000	TOFL	6690	6830	6960	7100	7240	7380	7530	7690	7840	8170	8770	128	172
	V1	112	112	112	112	112	113	113	113	113	114	117		
	VR	132	132	132	132	132	132	132	132	132	133	134		
	V2	137	137	137	137	137	137	137	137	137	137	138		
	GR2	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.7	6.6	6.3	6		

FIGURE 10-8-326. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
30000	TOFL	6060	6180	6310	6430	6560	6680	6810	6960	7110	7420	7970	125	169
	V1	107	107	107	107	107	107	107	107	108	109	111		
	VR	127	127	127	127	128	128	128	128	128	128	130		
	V2	133	133	133	133	133	133	133	133	133	133	134		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7	6.8	6.4		
29000	TOFL	5480	5590	5700	5810	5930	6040	6160	6290	6420	6700	7210	122	166
	V1	101	102	102	102	102	102	102	102	102	104	106		
	VR	123	123	123	123	123	123	123	123	123	124	125		
	V2	129	129	129	129	129	129	129	129	129	129	130		
	GR2	7.8	7.8	7.8	7.8	7.7	7.7	7.7	7.6	7.5	7.2	6.9		
28000	TOFL	4950	5050	5150	5250	5350	5450	5560	5670	5790	6040	6490	119	163
	V1	96	96	96	96	96	96	96	97	97	98	101		
	VR	119	119	119	119	119	119	119	119	119	119	121		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.1	8	7.7	7.3		
27000	TOFL	4480	4570	4660	4750	4840	4930	5020	5120	5230	5450	5850	116	160
	V1	91	91	91	91	91	91	91	91	92	93	95		
	VR	114	114	114	114	114	114	114	114	114	115	117		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.7	8.5	8.2	7.8		
26000	TOFL	4270	4350	4430	4500	4580	4660	4730	4760	4790	4960	5300	113	156
	V1	89	89	89	89	89	89	88	88	88	88	91		
	VR	111	111	111	111	111	111	111	111	111	111	113		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.1	8.8	8.4		

FIGURE 10-8-327. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL	15780	16130	16510	16900	17180	17470	17830	18220	18660	19680		152	198
	V1	162	162	163	163	163	163	163	163	163	165			
	VR	171	171	171	171	171	171	171	171	171	172			
	V2	172	172	172	172	172	172	172	172	172	172			
	GR2	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.3	3.2	3			
39000	TOFL	15040	15360	15730	16100	16360	16640	16990	17360	17780	18740		151	196
	V1	159	159	159	160	160	160	160	160	160	161			
	VR	169	169	169	169	169	169	169	169	169	169			
	V2	170	170	170	170	170	170	170	170	170	170			
	GR2	3.7	3.7	3.6	3.6	3.6	3.6	3.6	3.5	3.4	3.1			
38000	TOFL	13850	14150	14480	14820	15060	15310	15640	15990	16380	17250	18590	148	193
	V1	154	154	154	154	154	154	154	155	155	156	158		
	VR	165	165	165	165	165	165	165	165	165	165	166		
	V2	166	166	166	166	166	166	166	166	166	166	167		
	GR2	4	4	3.9	3.9	3.9	3.9	3.9	3.8	3.7	3.4	3.1		
37000	TOFL	12720	12990	13300	13610	13830	14060	14350	14680	15050	15840	17050	145	190
	V1	149	149	149	149	149	149	149	149	150	151	153		
	VR	160	160	160	160	160	160	160	160	160	161	162		
	V2	162	162	162	162	162	162	162	162	162	162	163		
	GR2	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.1	4	3.7	3.4		
36000	TOFL	11680	11940	12210	12500	12700	12910	13180	13480	13820	14550	15630	143	187
	V1	143	143	143	143	143	143	144	144	144	146	148		
	VR	156	156	156	156	156	156	156	156	156	157	158		
	V2	158	158	158	158	158	158	158	158	158	158	159		
	GR2	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.4	4.3	4	3.7		
35000	TOFL	10690	10920	11170	11430	11620	11810	12050	12330	12660	13350	14330	140	185
	V1	138	138	138	138	138	138	138	138	139	140	142		
	VR	152	152	152	152	152	152	152	152	152	153	154		
	V2	154	154	154	154	154	154	154	154	154	154	155		
	GR2	5	5	4.9	4.9	4.9	4.9	4.9	4.8	4.6	4.3	4		
34000	TOFL	9770	9990	10220	10450	10620	10800	11020	11270	11580	12220	13150	137	182
	V1	132	132	132	132	132	132	133	133	133	135	137		
	VR	148	148	148	148	148	148	148	148	148	149	150		
	V2	150	150	150	150	150	150	150	150	150	150	151		
	GR2	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.2	5	4.7	4.4		
33000	TOFL	8920	9110	9320	9530	9690	9850	10050	10280	10570	11170	12040	134	179
	V1	127	127	127	127	127	127	127	127	128	130	132		
	VR	143	143	143	143	143	143	143	143	143	144	146		
	V2	146	146	146	146	146	146	146	146	146	147	148		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.5	5.3	5.1	4.7		
32000	TOFL	8140	8320	8510	8700	8840	8990	9170	9380	9650	10180	10990	131	176
	V1	121	121	122	122	122	122	122	122	123	124	127		
	VR	139	139	139	139	139	139	139	139	139	140	141		
	V2	143	143	143	143	143	143	143	143	143	143	144		
	GR2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	5.9	5.7	5.4	5.1		
31000	TOFL	7400	7560	7740	7920	8040	8170	8340	8540	8790	9280	9990	128	173
	V1	116	116	116	116	116	116	116	117	117	119	122		
	VR	135	135	135	135	135	135	135	135	135	136	136		
	V2	139	139	139	139	139	139	139	139	139	139	140		
	GR2	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.1	5.8	5.5		

FIGURE 10-8-327. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
30000	TOFL	6720	6860	7020	7180	7290	7410	7560	7740	7970	8430	9090	126	169
	V1	110	111	111	111	111	111	111	111	112	114	116		
	VR	130	130	130	130	130	130	130	130	131	132	133		
	V2	135	135	135	135	135	135	135	135	135	135	136		
	GR2	7.1	7	7	7	7	7	6.9	6.8	6.6	6.2	5.9		
29000	TOFL	6060	6190	6330	6490	6580	6680	6810	6980	7210	7640	8250	123	166
	V1	105	105	105	105	105	105	105	106	106	108	111		
	VR	126	126	126	126	126	126	126	126	126	127	129		
	V2	131	131	131	131	131	131	131	131	131	132	133		
	GR2	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.3	7	6.7	6.3		
28000	TOFL	5450	5570	5690	5820	5910	6010	6130	6270	6470	6870	7440	120	163
	V1	99	99	100	100	100	100	100	100	101	103	106		
	VR	121	121	121	121	121	121	121	121	121	123	124		
	V2	127	127	127	127	127	127	127	127	127	128	129		
	GR2	8	8	8	7.9	7.9	7.9	7.9	7.8	7.5	7.1	6.8		
27000	TOFL	4910	5010	5120	5240	5320	5400	5510	5640	5810	6160	6680	117	160
	V1	94	94	94	94	94	94	94	95	95	97	100		
	VR	117	117	117	117	117	117	117	117	117	118	120		
	V2	123	123	123	123	123	123	123	123	123	123	125		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.3	8	7.6	7.3		
26000	TOFL	4430	4520	4620	4720	4790	4870	4960	5080	5230	5530	5970	114	157
	V1	88	89	89	89	89	89	89	89	90	92	94		
	VR	112	112	112	112	112	112	112	112	112	113	115		
	V2	119	119	119	119	119	119	119	119	119	120	121		
	GR2	9.1	9.1	9.1	9	9	9	9	8.9	8.5	8.1	7.8		

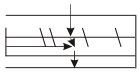
FIGURE 10-8-328. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
39600	TOFL	17640	18030	18530	18930	19200	19550						154	198
	V1	167	167	167	167	167	167							
	VR	174	174	174	174	174	174							
	V2	175	175	175	175	175	175							
	GR2	3.3	3.2	3.2	3.2	3.2	3.2							
39000	TOFL	16770	17140	17610	17990	18250	18580	18990	19460				152	197
	V1	164	164	164	164	164	164	164	165					
	VR	172	172	172	172	172	172	172	172					
	V2	173	173	173	173	173	173	173	173					
	GR2	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.2					
38000	TOFL	15410	15760	16180	16530	16770	17070	17450	17890	18650	19900		149	194
	V1	158	158	158	158	158	158	159	159	160	162			
	VR	168	168	168	168	168	168	168	168	168	169			
	V2	169	169	169	169	169	169	169	169	169	169			
	GR2	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.5	3.2	3			
37000	TOFL	14170	14480	14880	15190	15410	15680	16030	16440	17150	18280	19740	147	191
	V1	153	153	153	153	153	153	153	154	155	156	159		
	VR	164	164	164	164	164	164	164	164	164	165	165		
	V2	165	165	165	165	165	165	165	165	165	165	166		
	GR2	4.1	4.1	4	4	4	4	3.9	3.8	3.5	3.3	2.9		
36000	TOFL	12990	13270	13630	13920	14110	14370	14680	15060	15720	16730	18040	144	188
	V1	147	147	148	148	148	148	148	148	149	151	153		
	VR	159	159	159	159	159	159	159	159	160	160	161		
	V2	161	161	161	161	161	161	161	161	161	161	162		
	GR2	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.1	3.8	3.6	3.2		
35000	TOFL	11900	12160	12480	12740	12920	13150	13440	13790	14390	15300	16480	141	185
	V1	142	142	142	142	142	142	142	143	144	145	148		
	VR	155	155	155	155	155	155	155	155	155	156	157		
	V2	157	157	157	157	157	157	157	157	157	157	158		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.4	4.2	3.9	3.5		
34000	TOFL	10860	11100	11390	11630	11790	12000	12260	12590	13160	14000	15060	138	182
	V1	136	136	137	137	137	137	137	137	138	140	142		
	VR	151	151	151	151	151	151	151	151	151	152	153		
	V2	153	153	153	153	153	153	153	153	153	153	154		
	GR2	5.1	5.1	5.1	5	5	5	5	4.8	4.5	4.2	3.8		
33000	TOFL	9900	10120	10380	10600	10750	10940	11170	11470	12000	12800	13760	135	179
	V1	131	131	131	131	131	131	131	132	133	135	137		
	VR	146	146	146	146	146	146	146	146	147	148	149		
	V2	149	149	149	149	149	149	149	149	149	149	150		
	GR2	5.5	5.5	5.4	5.4	5.4	5.4	5.3	5.2	4.9	4.6	4.2		
32000	TOFL	9010	9210	9450	9650	9780	9960	10170	10440	10950	11680	12580	133	176
	V1	125	125	125	125	125	125	126	126	128	129	132		
	VR	142	142	142	142	142	142	142	142	142	143	145		
	V2	145	145	145	145	145	145	145	145	145	146	146		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.5	5.2	4.9	4.6		
31000	TOFL	8210	8400	8620	8790	8920	9070	9270	9510	9960	10630	11450	130	173
	V1	120	120	120	120	120	120	120	121	122	124	127		
	VR	137	137	138	138	138	138	138	138	138	139	140		
	V2	141	141	141	141	141	141	141	141	141	142	142		
	GR2	6.3	6.3	6.3	6.2	6.2	6.2	6.2	5.9	5.6	5.3	4.9		

FIGURE 10-8-328. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY COMPACTED SNOW (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
30000	TOFL	7450	7620	7820	7980	8090	8230	8400	8630	9060	9650	10400	127	170
	V1	114	114	115	115	115	115	115	115	117	119	121		
	VR	133	133	133	133	133	133	133	133	134	135	136		
	V2	137	137	137	137	137	137	137	137	137	138	139		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6	5.7	5.3		
29000	TOFL	6740	6890	7070	7220	7310	7440	7590	7800	8190	8760	9420	124	167
	V1	109	109	109	109	109	109	109	110	111	113	116		
	VR	129	129	129	129	129	129	129	129	129	131	132		
	V2	133	133	133	133	133	133	133	133	133	134	135		
	GR2	7.2	7.2	7.2	7.1	7.1	7.1	7	6.8	6.5	6.2	5.8		
28000	TOFL	6050	6190	6370	6490	6570	6680	6820	7010	7380	7890	8540	121	164
	V1	103	103	103	103	103	103	103	104	106	108	111		
	VR	124	124	124	124	124	124	124	124	125	126	128		
	V2	129	129	129	129	129	129	129	129	129	130	131		
	GR2	7.7	7.7	7.6	7.6	7.6	7.6	7.5	7.3	6.9	6.6	6.2		
27000	TOFL	5420	5540	5680	5800	5870	5970	6100	6260	6600	7110	7690	118	160
	V1	97	97	97	97	97	97	97	98	100	102	105		
	VR	119	119	119	119	119	119	119	119	120	122	123		
	V2	125	125	125	125	125	125	125	125	125	126	127		
	GR2	8.2	8.2	8.1	8.1	8.1	8.1	8	7.8	7.4	7.1	6.7		
26000	TOFL	4860	4970	5100	5200	5260	5350	5460	5600	5890	6320	6890	115	157
	V1	92	92	92	92	92	92	92	92	94	96	99		
	VR	114	114	114	114	114	114	114	114	115	117	119		
	V2	121	121	121	121	121	121	121	121	121	122	124		
	GR2	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.3	7.9	7.6	7.2		

V1 CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY COMPACTED SNOW



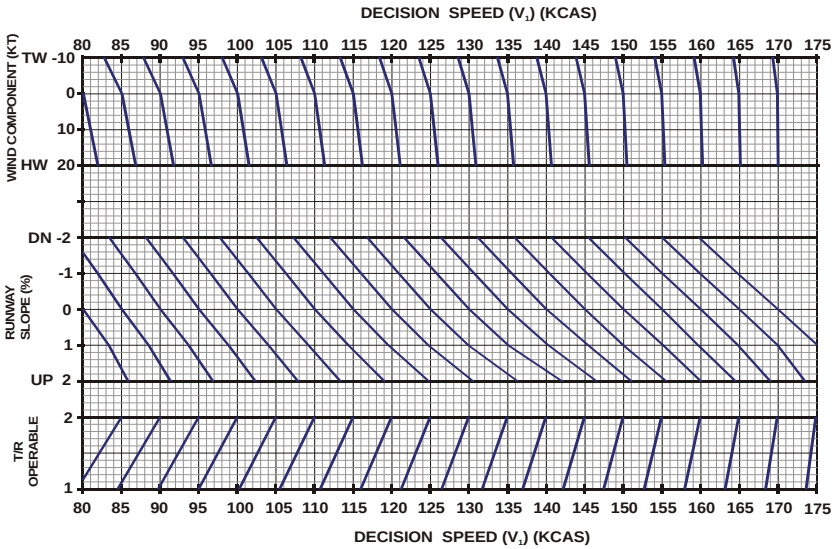
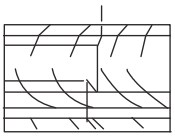


Figure 10-8-329. V1 Corrections Flaps 10° Runway Contaminated By Compacted Snow

TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY COMPACTED SNOW



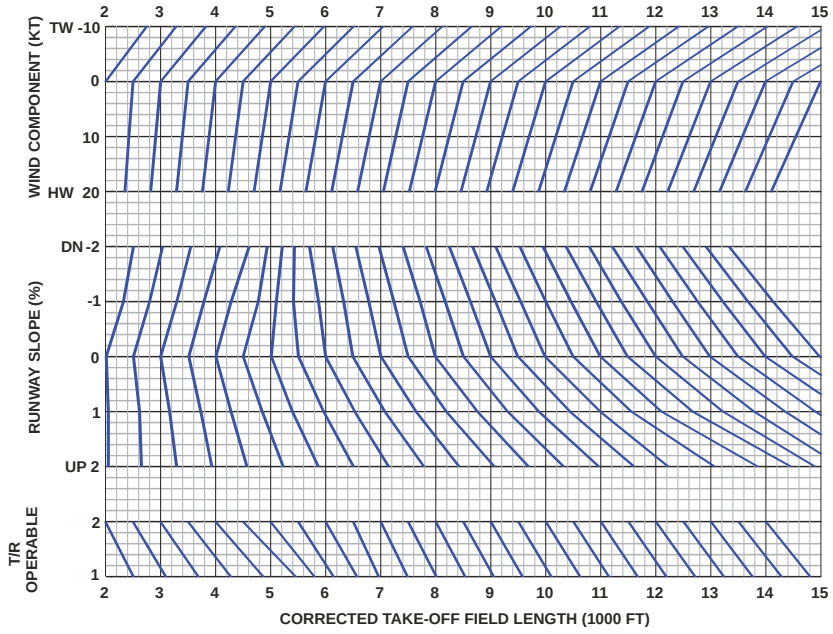


Figure 10-8-330. Takeoff Field Length Corrections Flaps 10°
Runway Contaminated By Compacted Snow

FIGURE 10-8-331. TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
39600	TOFL	6710	6820	6940	7080	7190	7320	7440	7560	7710	7830	7960	139	192
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	139	139	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
39000	TOFL	6660	6770	6880	7020	7140	7270	7380	7510	7650	7780	7910	138	191
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	137	137	137	137	137	137	136	136	136	136	136		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.9	7	7	7	7	7.1	7.1	7.1	7.1	7.1	7.1		
38000	TOFL	6580	6680	6810	6930	7070	7180	7300	7420	7550	7690	7810	136	188
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	134	134	134	134	134	134	134	133	133	133	133		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.3	7.3	7.3	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5		
37000	TOFL	6500	6610	6740	6850	6970	7080	7210	7330	7460	7590	7720	135	185
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.7	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9		
36000	TOFL	6420	6510	6640	6750	6880	7000	7120	7240	7380	7490	7640	133	182
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	137	137	136	136	136	136	136	136	136	136	136		
	GR2	8.1	8.1	8.1	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3		
35000	TOFL	6330	6430	6550	6680	6800	6900	7020	7130	7270	7400	7530	131	180
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.5	8.6	8.6	8.6	8.6	8.7	8.7	8.8	8.8	8.8	8.8		
34000	TOFL	6250	6350	6470	6580	6700	6820	6930	7050	7170	7300	7420	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	123	123	122	122	122	122	122	122	122	122	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	9	9	9	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2		
33000	TOFL	6150	6250	6380	6480	6610	6720	6840	6940	7080	7190	7330	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	119	119	119	119	119		
	V2	130	130	130	130	130	129	129	129	129	129	129		
	GR2	9.5	9.5	9.5	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7		
32000	TOFL	6060	6160	6280	6390	6510	6620	6730	6840	6970	7090	7220	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	10	10	10.1	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.2		
31000	TOFL	5960	6060	6180	6290	6410	6510	6620	6740	6860	6980	7100	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.6	10.6	10.6	10.6	10.7	10.7	10.8	10.8	10.8	10.8	10.8		

FIGURE 10-8-331. TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	76.9	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.4	84.2	85.0		
30000	TOFL	5860	5960	6080	6190	6300	6420	6520	6630	6750	6870	6990	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	111	111	111	111	111		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11.2	11.2	11.2	11.3	11.3	11.3	11.4	11.4	11.4	11.4	11.4		
29000	TOFL	5780	5850	5970	6080	6190	6290	6410	6520	6630	6750	6870	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.8	11.8	11.9	11.9	11.9	12	12	12.1	12.1	12.1	12.1		
28000	TOFL	5660	5750	5860	5970	6090	6190	6290	6400	6520	6640	6750	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	12.5	12.5	12.6	12.6	12.7	12.7	12.8	12.8	12.8	12.8	12.8		
27000	TOFL	5550	5640	5750	5860	5970	6060	6180	6280	6390	6510	6630	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	119	119	119	119	119	119	119		
	GR2	13.3	13.3	13.4	13.4	13.4	13.5	13.6	13.6	13.6	13.6	13.6		
26000	TOFL	5430	5520	5630	5750	5860	5970	6080	6200	6300	6410	6520	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	14.1	14.2	14.2	14.3	14.3	14.4	14.4	14.5	14.5	14.5	14.5		

FIGURE 10-8-332. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
39600	TOFL	8100	8220	8360									139	192
	V1	102	102	102										
	VR	138	138	138										
	V2	145	145	145										
	GR2	6.9	6.9	6.9										
39000	TOFL	8040	8180	8300									138	191
	V1	102	102	102										
	VR	136	136	136										
	V2	144	144	144										
	GR2	7.1	7.1	7.1										
38000	TOFL	7950	8070	8210									136	188
	V1	102	102	102										
	VR	133	133	133										
	V2	141	141	141										
	GR2	7.5	7.5	7.5										
37000	TOFL	7850	7980	8100									135	185
	V1	102	102	102										
	VR	131	131	131										
	V2	139	139	139										
	GR2	7.9	7.9	7.9										
36000	TOFL	7750	7890	8000									133	182
	V1	102	102	102										
	VR	128	128	128										
	V2	136	136	136										
	GR2	8.3	8.3	8.3										
35000	TOFL	7660	7780	7910									131	180
	V1	102	102	102										
	VR	125	125	125										
	V2	134	134	134										
	GR2	8.8	8.8	8.7										
34000	TOFL	7550	7670	7790									129	177
	V1	102	102	102										
	VR	122	122	122										
	V2	132	132	132										
	GR2	9.2	9.2	9.2										
33000	TOFL	7440	7570	7680									127	174
	V1	102	102	102										
	VR	119	119	119										
	V2	129	129	129										
	GR2	9.7	9.7	9.7										
32000	TOFL	7330	7460	7580									125	171
	V1	102	102	102										
	VR	117	117	117										
	V2	127	127	127										
	GR2	10.2	10.2	10.2										
31000	TOFL	7220	7340	7470									123	168
	V1	102	102	102										
	VR	114	114	114										
	V2	125	125	125										
	GR2	10.8	10.8	10.8										

FIGURE 10-8-332. TAKE-OFF DATA; FLAPS - 10°; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	85.8	86.6	87.4										
30000	TOFL	7100	7220	7350									121	166
	V1	102	102	102										
	VR	111	111	111										
	V2	123	123	123										
	GR2	11.4	11.4	11.4										
29000	TOFL	6980	7110	7240									119	163
	V1	102	102	102										
	VR	109	109	109										
	V2	121	121	121										
	GR2	12.1	12.1	12.1										
28000	TOFL	6870	6990	7090									117	160
	V1	102	102	102										
	VR	107	107	107										
	V2	120	120	120										
	GR2	12.8	12.8	12.8										
27000	TOFL	6730	6850	6980									115	157
	V1	102	102	102										
	VR	105	105	105										
	V2	119	119	119										
	GR2	13.6	13.6	13.6										
26000	TOFL	6620	6730	6830									113	154
	V1	102	102	102										
	VR	103	103	103										
	V2	118	118	118										
	GR2	14.4	14.4	14.4										

FIGURE 10-8-333. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
39600	TOFL	6870	6980	7120	7260	7370	7500	7640	7770	7910	8040	8190	139	193
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	140	140	140	140	140	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7		
39000	TOFL	6820	6920	7060	7200	7320	7460	7590	7730	7860	8000	8130	138	191
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	144	144	144	144	144	144		
	GR2	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9		
38000	TOFL	6740	6850	6990	7110	7250	7360	7500	7620	7760	7890	8040	136	188
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3		
37000	TOFL	6670	6780	6890	7020	7160	7280	7400	7530	7680	7810	7930	135	185
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	139	139	139	139	139	139	139		
	GR2	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7		
36000	TOFL	6580	6680	6810	6950	7060	7190	7310	7450	7570	7710	7840	133	183
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.9	7.9	8	8	8	8	8	8.1	8.1	8.1	8.1		
35000	TOFL	6480	6590	6720	6850	6980	7100	7210	7340	7490	7610	7750	131	180
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	134	134	134	134	134	134		
	GR2	8.4	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5		
34000	TOFL	6410	6510	6640	6750	6880	7000	7130	7230	7380	7510	7630	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
33000	TOFL	6310	6410	6540	6670	6770	6900	7020	7150	7270	7400	7520	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.3	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
32000	TOFL	6220	6320	6440	6570	6680	6810	6910	7040	7180	7300	7430	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	117	117	117	117	117	117	117		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
31000	TOFL	6120	6220	6340	6460	6580	6700	6800	6930	7070	7190	7310	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	115	115	115	115	115	115	115	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.5		

FIGURE 10-8-333. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.4	77.8	78.7	79.6	80.5	81.4	82.3	83.2	84.0	84.8	85.6		
30000	TOFL	6020	6120	6240	6360	6470	6590	6700	6830	6950	7070	7200	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.9	10.9	11	11	11	11	11.1	11.1	11.1	11.1	11.1		
29000	TOFL	5910	6020	6140	6240	6360	6480	6590	6710	6830	6950	7090	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	110	110	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
28000	TOFL	5810	5900	6020	6140	6250	6360	6480	6590	6710	6840	6950	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	120	120	120	120	120	120	120		
	GR2	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
27000	TOFL	5690	5790	5900	6020	6130	6250	6360	6470	6590	6710	6840	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13	13.1	13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.2	13.2		
26000	TOFL	5580	5680	5790	5910	6010	6130	6240	6350	6460	6580	6690	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.9	13.9	13.9	13.9	14	14	14	14.1	14.1	14.1	14.1		

FIGURE 10-8-334. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
39600	TOFL	8320	8470	8600									139	193
	V1	101	101	101										
	VR	139	139	139										
	V2	146	146	146										
	GR2	6.7	6.7	6.7										
39000	TOFL	8270	8400	8550									138	191
	V1	101	101	101										
	VR	138	138	138										
	V2	144	144	144										
	GR2	6.9	6.9	6.9										
38000	TOFL	8170	8310	8440									136	188
	V1	101	101	101										
	VR	135	135	135										
	V2	142	142	142										
	GR2	7.3	7.3	7.3										
37000	TOFL	8070	8200	8340									135	185
	V1	101	101	101										
	VR	132	132	132										
	V2	139	139	139										
	GR2	7.7	7.6	7.6										
36000	TOFL	7980	8110	8240									133	183
	V1	101	101	101										
	VR	129	129	129										
	V2	137	137	137										
	GR2	8.1	8.1	8										
35000	TOFL	7870	8000	8130									131	180
	V1	101	101	101										
	VR	126	126	126										
	V2	134	134	134										
	GR2	8.5	8.5	8.5										
34000	TOFL	7780	7900	8030									129	177
	V1	101	101	101										
	VR	123	123	123										
	V2	132	132	132										
	GR2	8.9	8.9	8.9										
33000	TOFL	7660	7780	7910									127	174
	V1	101	101	101										
	VR	120	120	120										
	V2	130	130	130										
	GR2	9.4	9.4	9.4										
32000	TOFL	7550	7680	7790									125	171
	V1	101	101	101										
	VR	117	117	117										
	V2	127	127	127										
	GR2	9.9	9.9	9.9										
31000	TOFL	7430	7570	7690									123	169
	V1	101	101	101										
	VR	114	114	114										
	V2	125	125	125										
	GR2	10.5	10.5	10.5										

FIGURE 10-8-334. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	86.5	87.3	88.1										
30000	TOFL	7310	7450	7570									121	166
	V1	101	101	101										
	VR	112	112	112										
	V2	123	123	123										
	GR2	11.1	11.1	11.1										
29000	TOFL	7200	7330	7450									119	163
	V1	101	101	101										
	VR	109	109	109										
	V2	121	121	121										
	GR2	11.7	11.7	11.7										
28000	TOFL	7080	7200	7310									117	160
	V1	101	101	101										
	VR	107	107	107										
	V2	120	120	120										
	GR2	12.4	12.4	12.4										
27000	TOFL	6960	7070	7190									115	157
	V1	101	101	101										
	VR	105	105	105										
	V2	118	118	118										
	GR2	13.2	13.2	13.2										
26000	TOFL	6820	6940	7050									113	154
	V1	101	101	101										
	VR	103	103	103										
	V2	117	117	117										
	GR2	14.1	14	14										

FIGURE 10-8-335. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
39600	TOFL	7040	7150	7280	7420	7560	7700	7830	7970	8100	8240	8380	140	193
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
39000	TOFL	6990	7090	7240	7370	7510	7640	7780	7900	8050	8180	8330	139	191
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7		
38000	TOFL	6910	7020	7150	7300	7420	7560	7690	7820	7950	8100	8220	137	189
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
37000	TOFL	6810	6930	7060	7200	7320	7450	7590	7730	7860	8000	8130	135	186
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
36000	TOFL	6740	6840	6980	7110	7240	7370	7500	7630	7770	7890	8030	133	183
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
35000	TOFL	6640	6750	6890	7020	7140	7270	7390	7530	7660	7800	7920	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
34000	TOFL	6540	6660	6780	6920	7050	7170	7300	7430	7570	7690	7820	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.6	8.6		
33000	TOFL	6460	6570	6700	6820	6950	7080	7200	7330	7460	7590	7710	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
32000	TOFL	6370	6470	6600	6730	6840	6970	7090	7220	7340	7480	7600	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
31000	TOFL	6260	6360	6500	6620	6730	6870	6990	7120	7250	7360	7490	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	126	126	126	126	125	125	125	125	125	125	125		
	GR2	10.2	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2		

FIGURE 10-8-335. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	77.9	78.6	79.5	80.4	81.2	82.1	83.0	83.8	84.6	85.5	86.3		
30000	TOFL	6170	6260	6390	6510	6640	6770	6870	7000	7130	7240	7370	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.8	10.8	10.7	10.7		
29000	TOFL	6050	6160	6300	6410	6530	6640	6760	6890	7010	7140	7260	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.4	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
28000	TOFL	5960	6060	6170	6300	6420	6530	6640	6770	6890	7010	7120	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12	12	12	12	12	12.1	12.1	12.1	12.1	12.1		
27000	TOFL	5830	5930	6070	6180	6290	6420	6530	6640	6770	6880	7010	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		
26000	TOFL	5740	5830	5950	6060	6180	6290	6410	6520	6640	6760	6880	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6		

FIGURE 10-8-336. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
39600	TOFL	8520	8650	8800									140	193
	V1	100	100	100										
	VR	141	141	141										
	V2	147	147	147										
	GR2	6.4	6.4	6.4										
39000	TOFL	8460	8590	8730									139	191
	V1	100	100	100										
	VR	139	139	139										
	V2	145	145	145										
	GR2	6.7	6.7	6.6										
38000	TOFL	8360	8490	8640									137	189
	V1	100	100	100										
	VR	136	136	136										
	V2	143	143	143										
	GR2	7	7	7										
37000	TOFL	8270	8400	8540									135	186
	V1	100	100	100										
	VR	133	133	133										
	V2	140	140	140										
	GR2	7.4	7.4	7.4										
36000	TOFL	8160	8300	8430									133	183
	V1	100	100	100										
	VR	130	130	130										
	V2	138	138	138										
	GR2	7.8	7.8	7.8										
35000	TOFL	8060	8180	8320									131	180
	V1	100	100	100										
	VR	127	127	127										
	V2	135	135	135										
	GR2	8.2	8.2	8.2										
34000	TOFL	7950	8080	8210									129	177
	V1	100	100	100										
	VR	124	124	124										
	V2	133	133	133										
	GR2	8.6	8.6	8.6										
33000	TOFL	7850	7960	8100									127	175
	V1	100	100	100										
	VR	121	121	121										
	V2	130	130	130										
	GR2	9.1	9.1	9.1										
32000	TOFL	7730	7870	7980									125	172
	V1	100	100	100										
	VR	118	118	118										
	V2	128	128	128										
	GR2	9.6	9.6	9.6										
31000	TOFL	7610	7740	7870									123	169
	V1	100	100	100										
	VR	115	115	115										
	V2	125	125	125										
	GR2	10.2	10.2	10.1										

FIGURE 10-8-336. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.1	87.9	88.8										
30000	TOFL	7490	7620	7750									121	166
	V1	100	100	100										
	VR	112	112	112										
	V2	123	123	123										
	GR2	10.7	10.7	10.7										
29000	TOFL	7370	7500	7620									119	163
	V1	100	100	100										
	VR	110	110	110										
	V2	121	121	121										
	GR2	11.4	11.4	11.4										
28000	TOFL	7260	7380	7490									117	160
	V1	100	100	100										
	VR	107	107	107										
	V2	119	119	119										
	GR2	12.1	12.1	12										
27000	TOFL	7130	7230	7360									115	157
	V1	100	100	100										
	VR	105	105	105										
	V2	118	118	118										
	GR2	12.8	12.8	12.8										
26000	TOFL	6990	7110	7240									113	154
	V1	100	100	100										
	VR	103	103	103										
	V2	117	117	117										
	GR2	13.6	13.6	13.6										

FIGURE 10-8-337. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
39600	TOFL	7170	7310	7460	7600	7740	7880	8020	8170	8310	8430	8580	141	193
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
39000	TOFL	7130	7260	7410	7560	7690	7830	7960	8110	8240	8390	8530	140	192
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
38000	TOFL	7050	7180	7320	7460	7610	7740	7880	8020	8150	8300	8420	137	189
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
37000	TOFL	6960	7100	7240	7370	7510	7650	7780	7930	8060	8190	8330	135	186
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
36000	TOFL	6880	7000	7140	7290	7410	7550	7690	7820	7960	8100	8220	133	183
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
35000	TOFL	6780	6920	7060	7180	7330	7460	7590	7730	7850	7990	8120	131	181
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
34000	TOFL	6680	6820	6960	7100	7220	7350	7500	7620	7760	7890	8020	129	178
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.5	8.3	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.3	8.3		
33000	TOFL	6600	6740	6860	6990	7110	7250	7390	7520	7640	7780	7910	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
32000	TOFL	6500	6630	6770	6890	7030	7150	7270	7410	7530	7670	7790	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.4	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		
31000	TOFL	6400	6530	6670	6780	6920	7040	7180	7300	7430	7560	7680	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		

FIGURE 10-8-337. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	78.7	79.2	80.1	81.0	81.8	82.7	83.6	84.4	85.2	86.1	86.9		
30000	TOFL	6300	6420	6560	6680	6810	6930	7070	7180	7310	7440	7570	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
29000	TOFL	6200	6320	6450	6570	6700	6820	6950	7070	7200	7320	7450	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11	11	11	11	11	11	11	11	11	11		
28000	TOFL	6070	6200	6330	6460	6590	6700	6820	6950	7080	7190	7320	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.8	11.6	11.6	11.6	11.6	11.6	11.7	11.7	11.7	11.7	11.6		
27000	TOFL	5980	6090	6220	6350	6460	6590	6700	6830	6940	7070	7180	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	117	117	117	117	117	117	117	117		
	GR2	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4		
26000	TOFL	5900	5990	6100	6220	6350	6460	6570	6700	6830	6930	7060	113	154
	V1	100	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.4	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2		

FIGURE 10-8-338. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
39600	TOFL	8720	8870	9000									141	193
	V1	99	99	99										
	VR	143	143	143										
	V2	148	148	148										
	GR2	6.2	6.2	6.2										
39000 38000	TOFL	8670	8800	8950									140	192
	V1	99	99	99										
	VR	141	141	141										
	V2	146	146	146										
	GR2	6.4	6.4	6.4										
37000	TOFL	8560	8710	8830									137	189
	V1	99	99	99										
	VR	137	137	137										
	V2	143	143	143										
	GR2	6.7	6.7	6.7										
	TOFL	8470	8600	8740									135	186
	V1	99	99	99										
	VR	134	134	134										
	V2	141	141	141										
	GR2	7.1	7.1	7.1										
36000	TOFL	8360	8490	8640									133	183
	V1	99	99	99										
	VR	131	131	131										
	V2	138	138	138										
	GR2	7.5	7.5	7.5										
35000	TOFL	8260	8390	8530									131	181
	V1	99	99	99										
	VR	128	128	128										
	V2	136	136	136										
	GR2	7.9	7.9	7.9										
34000	TOFL	8150	8290	8410									129	178
	V1	99	99	99										
	VR	125	125	125										
	V2	133	133	133										
	GR2	8.3	8.3	8.3										
33000	TOFL	8050	8170	8300									127	175
	V1	99	99	99										
	VR	122	122	122										
	V2	131	131	131										
	GR2	8.8	8.8	8.8										
32000	TOFL	7930	8060	8180									125	172
	V1	99	99	99										
	VR	119	119	119										
	V2	128	128	128										
	GR2	9.3	9.3	9.3										
31000	TOFL	7810	7940	8050									123	169
	V1	99	99	99										
	VR	116	116	116										
	V2	126	126	126										
	GR2	9.8	9.8	9.8										

FIGURE 10-8-338. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	87.7	88.5	89.4										
30000	TOFL	7680	7820	7950									121	166
	V1	99	99	99										
	VR	113	113	113										
	V2	123	123	123										
	GR2	10.4	10.4	10.4										
29000	TOFL	7560	7690	7820									119	163
	V1	99	99	99										
	VR	110	110	110										
	V2	121	121	121										
	GR2	11	11	11										
28000	TOFL	7440	7560	7690									117	160
	V1	99	99	99										
	VR	108	108	108										
	V2	119	119	119										
	GR2	11.6	11.6	11.6										
27000	TOFL	7310	7440	7550									115	157
	V1	99	99	99										
	VR	105	105	105										
	V2	117	117	117										
	GR2	12.4	12.4	12.4										
26000	TOFL	7180	7290	7410									113	154
	V1	99	99	99										
	VR	103	103	103										
	V2	116	116	116										
	GR2	13.2	13.2	13.2										

FIGURE 10-8-339. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
39600	TOFL	7390	7580	7730	7890	8040	8180	8340	8490	8650	8800	8960	142	194
	V1	99	100	100	100	100	100	100	100	100	100	100		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	5.9	5.9	5.9	5.9	6	6	6	6	5.9	5.9		
39000	TOFL	7290	7390	7540	7700	7840	7990	8140	8290	8430	8570	8720	141	192
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.2	6.2	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.1		
38000	TOFL	7230	7370	7520	7650	7790	7940	8080	8220	8370	8510	8640	138	189
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
37000	TOFL	7150	7280	7420	7570	7710	7840	7980	8130	8260	8410	8550	136	187
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
36000	TOFL	7060	7190	7340	7460	7610	7750	7880	8030	8170	8310	8440	133	184
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
35000	TOFL	6960	7100	7230	7380	7510	7650	7790	7920	8070	8200	8340	131	181
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
34000	TOFL	6880	6990	7140	7270	7420	7560	7680	7830	7960	8100	8230	129	178
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
33000	TOFL	6770	6910	7040	7190	7310	7450	7590	7710	7850	7990	8130	127	175
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
32000	TOFL	6670	6810	6950	7080	7220	7340	7480	7620	7740	7880	8010	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	9.1	9	9	9	9	9	9	9	9	9	9		
31000	TOFL	6580	6700	6840	6970	7110	7240	7360	7500	7640	7770	7900	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		

FIGURE 10-8-339. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.1	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.8	86.6	87.4		
30000	TOFL	6470	6600	6740	6860	7000	7130	7260	7380	7520	7640	7780	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.1	10	10	10	10	10	10.1	10.1	10	10	10		
29000	TOFL	6360	6490	6630	6740	6880	7010	7150	7260	7400	7520	7650	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.7	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6		
28000	TOFL	6250	6380	6520	6640	6780	6890	7020	7150	7280	7390	7530	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3		
27000	TOFL	6130	6260	6390	6520	6640	6770	6890	7030	7140	7270	7400	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12	12	12	12	12	12	12	12	12	12		
26000	TOFL	6050	6150	6280	6400	6530	6640	6770	6890	7020	7150	7260	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8		

FIGURE 10-8-340. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
39600	TOFL	9110	9270	9430									142	194
	V1	100	100	100										
	VR	145	145	145										
	V2	150	150	150										
	GR2	5.9	5.9	5.9										
39000	TOFL	8860	9010	9140									141	192
	V1	98	98	98										
	VR	143	143	143										
	V2	148	148	148										
	GR2	6.1	6.1	6.1										
38000	TOFL	8790	8930	9080									138	189
	V1	98	98	98										
	VR	139	139	139										
	V2	145	145	145										
	GR2	6.5	6.5	6.5										
37000	TOFL	8700	8830	8970									136	187
	V1	98	98	98										
	VR	135	135	135										
	V2	142	142	142										
	GR2	6.8	6.8	6.8										
36000	TOFL	8580	8730	8850									133	184
	V1	98	98	98										
	VR	132	132	132										
	V2	139	139	139										
	GR2	7.2	7.2	7.2										
35000	TOFL	8470	8620	8750									131	181
	V1	98	98	98										
	VR	129	129	129										
	V2	136	136	136										
	GR2	7.6	7.6	7.6										
34000	TOFL	8370	8500	8650									129	178
	V1	98	98	98										
	VR	126	126	126										
	V2	134	134	134										
	GR2	8.1	8	8										
33000	TOFL	8250	8390	8520									127	175
	V1	98	98	98										
	VR	123	123	123										
	V2	131	131	131										
	GR2	8.5	8.5	8.5										
32000	TOFL	8150	8270	8410									125	172
	V1	98	98	98										
	VR	120	120	120										
	V2	129	129	129										
	GR2	9	9	9										
31000	TOFL	8020	8160	8290									123	169
	V1	98	98	98										
	VR	117	117	117										
	V2	126	126	126										
	GR2	9.5	9.5	9.5										

FIGURE 10-8-340. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.3	89.1	89.9										
30000	TOFL	7900	8030	8160									121	166
	V1	98	98	98										
	VR	114	114	114										
	V2	124	124	124										
	GR2	10	10	10										
29000	TOFL	7770	7900	8040									119	163
	V1	98	98	98										
	VR	111	111	111										
	V2	121	121	121										
	GR2	10.6	10.6	10.6										
28000	TOFL	7650	7780	7910									117	160
	V1	98	98	98										
	VR	108	108	108										
	V2	119	119	119										
	GR2	11.3	11.3	11.3										
27000	TOFL	7520	7650	7780									115	157
	V1	98	98	98										
	VR	106	106	106										
	V2	117	117	117										
	GR2	12	12	12										
26000	TOFL	7380	7510	7630									113	154
	V1	98	98	98										
	VR	103	103	103										
	V2	116	116	116										
	GR2	12.8	12.8	12.8										

FIGURE 10-8-341. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
39600	TOFL	8070	8210	8390	8560	8730	8890	9060	9230	9400	9570	9740	143	194
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
39000	TOFL	7700	7840	8000	8170	8330	8480	8650	8810	8970	9130	9290	142	193
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	6	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
38000	TOFL	7420	7540	7700	7840	7990	8140	8290	8440	8590	8750	8890	139	190
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.3	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	7330	7450	7610	7750	7910	8050	8200	8350	8490	8650	8780	137	187
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
36000	TOFL	7240	7360	7500	7670	7800	7940	8100	8240	8400	8530	8680	134	184
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.1	7	6.9	7	7	7	7	7	7	7	7		
35000	TOFL	7160	7270	7420	7570	7710	7850	8000	8140	8290	8430	8570	132	181
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.4	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	7040	7170	7330	7460	7600	7750	7890	8050	8170	8330	8460	129	178
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
33000	TOFL	6940	7060	7200	7370	7510	7650	7790	7930	8080	8210	8350	127	176
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		
32000	TOFL	6840	6970	7100	7250	7390	7530	7670	7820	7960	8100	8220	125	173
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
31000	TOFL	6750	6860	7000	7140	7280	7420	7560	7690	7830	7970	8120	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		

FIGURE 10-8-341. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	79.5	80.2	81.1	82.0	82.9	83.7	84.6	85.4	86.3	87.1	87.9		
30000	TOFL	6640	6750	6890	7020	7170	7300	7440	7570	7720	7840	7980	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
29000	TOFL	6530	6640	6790	6910	7060	7180	7330	7460	7600	7720	7850	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
28000	TOFL	6420	6530	6670	6800	6940	7070	7210	7330	7470	7610	7720	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
27000	TOFL	6300	6400	6550	6680	6820	6950	7080	7210	7340	7470	7590	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6		
26000	TOFL	6210	6310	6430	6560	6690	6810	6950	7080	7200	7330	7470	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.5	12.4	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4		

FIGURE 10-8-342. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
39600	TOFL	9910	10080	10260									143	194
	V1	103	103	103										
	VR	147	147	147										
	V2	152	152	152										
	GR2	5.7	5.7	5.7										
39000	TOFL	9450	9620	9780									142	193
	V1	100	100	100										
	VR	145	145	145										
	V2	150	150	150										
	GR2	5.9	5.9	5.9										
38000	TOFL	9020	9160	9300									139	190
	V1	97	97	97										
	VR	141	141	141										
	V2	147	147	147										
	GR2	6.3	6.3	6.3										
37000	TOFL	8910	9070	9190									137	187
	V1	97	97	97										
	VR	137	137	137										
	V2	143	143	143										
	GR2	6.6	6.6	6.6										
36000	TOFL	8810	8950	9080									134	184
	V1	97	97	97										
	VR	134	134	134										
	V2	140	140	140										
	GR2	7	7	7										
35000	TOFL	8710	8840	8980									132	181
	V1	97	97	97										
	VR	130	130	130										
	V2	137	137	137										
	GR2	7.4	7.3	7.3										
34000	TOFL	8600	8730	8860									129	178
	V1	97	97	97										
	VR	127	127	127										
	V2	135	135	135										
	GR2	7.8	7.8	7.8										
33000	TOFL	8470	8620	8730									127	176
	V1	97	97	97										
	VR	124	124	124										
	V2	132	132	132										
	GR2	8.2	8.2	8.2										
32000	TOFL	8370	8490	8630									125	173
	V1	97	97	97										
	VR	121	121	121										
	V2	129	129	129										
	GR2	8.7	8.7	8.7										
31000	TOFL	8240	8380	8490									123	170
	V1	97	97	97										
	VR	118	118	118										
	V2	127	127	127										
	GR2	9.2	9.2	9.2										

FIGURE 10-8-342. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	88.8	89.6	90.4										
30000	TOFL	8100	8230	8380									121	167
	V1	97	97	97										
	VR	115	115	115										
	V2	124	124	124										
	GR2	9.7	9.7	9.7										
29000	TOFL	7990	8110	8240									119	164
	V1	97	97	97										
	VR	111	111	112										
	V2	121	121	121										
	GR2	10.3	10.3	10.3										
28000	TOFL	7860	7980	8100									117	161
	V1	97	97	97										
	VR	108	108	108										
	V2	119	119	119										
	GR2	10.9	10.9	10.9										
27000	TOFL	7720	7840	7960									115	157
	V1	97	97	97										
	VR	106	106	106										
	V2	117	117	117										
	GR2	11.6	11.6	11.6										
26000	TOFL	7580	7700	7820									113	154
	V1	97	97	97										
	VR	103	103	103										
	V2	115	115	115										
	GR2	12.4	12.4	12.3										

FIGURE 10-8-343. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
39600	TOFL	8770	9030	9300	9470	9630	9800	9990	10180	10370	10560	10740	144	195
	V1	107	108	108	108	108	108	108	108	108	108	108		
	VR	149	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.6	5.5	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
39000	TOFL	8370	8620	8870	9030	9190	9350	9530	9710	9890	10070	10250	143	193
	V1	104	105	105	105	105	105	105	105	105	105	105		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.8	5.7	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
38000	TOFL	7710	7940	8180	8320	8470	8620	8780	8950	9110	9270	9440	140	190
	V1	98	99	99	99	99	99	99	99	99	99	99		
	VR	143	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6.2	6	5.9	6	6	6	6	6	6	6	6		
37000	TOFL	7460	7610	7780	7940	8090	8240	8390	8530	8690	8820	8980	138	187
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
36000	TOFL	7370	7530	7700	7850	7990	8140	8290	8430	8590	8730	8880	135	185
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.9	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
35000	TOFL	7290	7430	7590	7740	7890	8040	8190	8330	8470	8630	8760	133	182
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	132	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.1	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
34000	TOFL	7180	7340	7510	7650	7800	7950	8080	8230	8360	8510	8660	130	179
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.5	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
33000	TOFL	7090	7240	7410	7540	7690	7830	7980	8110	8260	8390	8540	127	176
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.1	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		
32000	TOFL	6990	7130	7300	7450	7590	7730	7860	8010	8140	8290	8410	125	173
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.6	8.4	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
31000	TOFL	6880	7030	7190	7330	7470	7610	7760	7890	8030	8160	8310	123	170
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.1	8.9	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9		

FIGURE 10-8-343. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.2	80.7	81.5	82.4	83.3	84.2	85.1	85.9	86.8	87.6	88.5		
30000	TOFL	6790	6920	7090	7220	7360	7490	7640	7760	7910	8030	8180	121	167
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.6	9.4	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
29000	TOFL	6670	6810	6980	7120	7240	7390	7520	7660	7780	7920	8050	119	164
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.1	10	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
28000	TOFL	6560	6690	6870	7000	7120	7270	7390	7530	7650	7790	7920	117	161
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
27000	TOFL	6470	6570	6740	6870	7000	7140	7260	7400	7530	7660	7790	115	158
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.3	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.2		
26000	TOFL	6390	6470	6620	6750	6880	7010	7140	7260	7400	7510	7650	113	155
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.2	12	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9		

FIGURE 10-8-344. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
39600	TOFL	10930	11130	11320									144	195
	V1	108	108	108										
	VR	150	150	150										
	V2	154	154	154										
	GR2	5.5	5.5	5.5										
39000	TOFL	10430	10610	10790									143	193
	V1	105	105	105										
	VR	147	147	147										
	V2	152	152	152										
	GR2	5.7	5.7	5.7										
38000	TOFL	9610	9770	9940									140	190
	V1	99	99	99										
	VR	144	144	144										
	V2	148	148	148										
	GR2	6	6	6										
37000	TOFL	9120	9280	9380									138	187
	V1	96	96	95										
	VR	140	140	140										
	V2	145	145	145										
	GR2	6.3	6.3	6.3										
36000	TOFL	9020	9170	9270									135	185
	V1	96	96	95										
	VR	136	136	136										
	V2	142	142	142										
	GR2	6.7	6.7	6.7										
35000	TOFL	8910	9040	9160									133	182
	V1	96	96	95										
	VR	133	133	133										
	V2	139	139	139										
	GR2	7.1	7.1	7.1										
34000	TOFL	8800	8940	9050									130	179
	V1	96	96	95										
	VR	129	129	129										
	V2	136	136	136										
	GR2	7.5	7.5	7.5										
33000	TOFL	8680	8820	8920									127	176
	V1	96	96	95										
	VR	126	126	126										
	V2	133	133	133										
	GR2	7.9	7.9	7.9										
32000	TOFL	8560	8700	8800									125	173
	V1	96	96	95										
	VR	123	123	123										
	V2	130	130	130										
	GR2	8.4	8.4	8.4										
31000	TOFL	8430	8580	8670									123	170
	V1	96	96	95										
	VR	119	119	119										
	V2	127	127	127										
	GR2	8.9	8.9	8.9										

FIGURE 10-8-344. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.3	90.1	91.0										
30000	TOFL	8320	8440	8560									121	167
	V1	96	96	95										
	VR	116	116	116										
	V2	125	125	125										
	GR2	9.4	9.4	9.4										
29000	TOFL	8190	8320	8420									119	164
	V1	96	96	95										
	VR	113	113	113										
	V2	122	122	122										
	GR2	9.9	9.9	9.9										
28000	TOFL	8050	8190	8280									117	161
	V1	96	96	95										
	VR	109	109	109										
	V2	119	119	119										
	GR2	10.5	10.5	10.5										
27000	TOFL	7920	8050	8140									115	158
	V1	96	96	95										
	VR	106	106	106										
	V2	117	117	117										
	GR2	11.2	11.2	11.2										
26000	TOFL	7780	7900	7990									113	155
	V1	96	96	95										
	VR	104	104	104										
	V2	115	115	115										
	GR2	11.9	11.9	11.9										

FIGURE 10-8-345. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
39600	TOFL	9630	10020	10260	10440	10610	10810	11020	11230	11440	11640	11850	145	195
	V1	111	113	113	113	113	113	113	113	113	113	113		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.4	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
39000	TOFL	9190	9560	9790	9970	10120	10310	10510	10710	10910	11110	11300	144	193
	V1	108	109	109	109	109	109	109	109	109	109	109		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.6	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
38000	TOFL	8490	8820	9040	9190	9340	9520	9700	9880	10070	10250	10430	141	191
	V1	102	104	104	104	104	104	104	104	104	104	104		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	151	151	151	151	151	151	151	151	151	151		
	GR2	5.9	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
37000	TOFL	7810	8140	8340	8480	8620	8780	8950	9120	9280	9450	9620	139	188
	V1	97	98	98	98	98	98	98	98	98	98	98		
	VR	142	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.1	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
36000	TOFL	7530	7710	7870	8030	8180	8330	8490	8640	8780	8950	9080	136	185
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	138	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.6	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
35000	TOFL	7450	7610	7780	7930	8070	8220	8370	8530	8680	8840	8970	134	182
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	141	141	141	141	141	141	141	141	141	141		
	GR2	7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
34000	TOFL	7340	7520	7670	7830	7970	8130	8270	8410	8580	8710	8860	131	179
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
33000	TOFL	7250	7410	7580	7710	7860	8010	8160	8310	8460	8610	8740	128	176
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.8	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
32000	TOFL	7140	7320	7470	7620	7750	7910	8040	8200	8340	8500	8620	126	173
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.3	8.1	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
31000	TOFL	7030	7210	7370	7500	7650	7790	7940	8080	8230	8370	8510	123	170
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	120	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		

FIGURE 10-8-345. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	80.7	81.1	81.9	82.9	83.8	84.7	85.5	86.4	87.3	88.1	89.0		
30000	TOFL	6930	7090	7260	7400	7530	7680	7820	7960	8100	8240	8380	121	167
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	126	126	126	126	126	126	126	126	126	126		
	GR2	9.3	9	9	9	9.1	9.1	9.1	9.1	9.1	9.1	9		
29000	TOFL	6820	6980	7140	7280	7400	7560	7690	7840	7970	8130	8240	119	164
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.8	9.6	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		
28000	TOFL	6730	6870	7020	7160	7290	7440	7570	7710	7850	7990	8110	117	161
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.4	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
27000	TOFL	6650	6750	6910	7040	7170	7310	7440	7580	7720	7860	7990	115	158
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11	10.8	10.7	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8		
26000	TOFL	6560	6630	6790	6920	7040	7180	7310	7450	7580	7720	7840	113	155
	V1	95	95	95	95	95	95	95	95	95	95	94		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.8	11.5	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		

FIGURE 10-8-346. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
39600	TOFL	12070	12280	12490									145	195
	V1	113	113	113										
	VR	152	152	152										
	V2	156	156	156										
	GR2	5.2	5.2	5.2										
39000	TOFL	11510	11710	11910									144	193
	V1	109	109	109										
	VR	150	150	150										
	V2	154	154	154										
	GR2	5.4	5.4	5.4										
38000	TOFL	10620	10800	10990									141	191
	V1	104	104	104										
	VR	146	146	146										
	V2	151	151	151										
	GR2	5.7	5.7	5.7										
37000	TOFL	9790	9960	10130									139	188
	V1	98	98	98										
	VR	143	143	143										
	V2	147	147	147										
	GR2	6.1	6.1	6.1										
36000	TOFL	9230	9360	9430									136	185
	V1	94	94	94										
	VR	139	139	139										
	V2	144	144	144										
	GR2	6.4	6.4	6.4										
35000	TOFL	9130	9250	9310									134	182
	V1	94	94	94										
	VR	135	135	135										
	V2	141	141	141										
	GR2	6.8	6.8	6.8										
34000	TOFL	9000	9140	9200									131	179
	V1	94	94	94										
	VR	131	131	131										
	V2	137	137	137										
	GR2	7.2	7.2	7.2										
33000	TOFL	8890	9030	9080									128	176
	V1	94	94	94										
	VR	127	127	127										
	V2	134	134	134										
	GR2	7.6	7.6	7.6										
32000	TOFL	8780	8890	8960									126	173
	V1	94	94	94										
	VR	124	124	124										
	V2	131	131	131										
	GR2	8.1	8.1	8										
31000	TOFL	8650	8770	8830									123	170
	V1	94	94	94										
	VR	121	121	121										
	V2	128	128	128										
	GR2	8.5	8.5	8.5										

FIGURE 10-8-346. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	89.8	90.6	91.5										
30000	TOFL	8520	8640	8710									121	167
	V1	94	94	94										
	VR	117	117	117										
	V2	126	126	126										
	GR2	9	9	9										
29000	TOFL	8400	8500	8570									119	164
	V1	94	94	94										
	VR	114	114	114										
	V2	123	123	123										
	GR2	9.6	9.6	9.6										
28000	TOFL	8260	8370	8430									117	161
	V1	94	94	94										
	VR	110	110	110										
	V2	120	120	120										
	GR2	10.1	10.1	10.1										
27000	TOFL	8120	8240	8310									115	158
	V1	94	94	94										
	VR	107	107	107										
	V2	117	117	117										
	GR2	10.8	10.8	10.8										
26000	TOFL	7980	8100	8190									113	155
	V1	94	94	94										
	VR	104	104	104										
	V2	115	115	115										
	GR2	11.5	11.5	11.5										

FIGURE 10-8-347. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
39600	TOFL	10670	11110	11310	11500	11700	11940	12160	12390	12620	12850	13080	147	195
	V1	116	117	117	117	117	117	117	117	117	117	117		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5.1	4.9	4.9	4.9	5	5	5	5	5	5	4.9		
39000	TOFL	10180	10590	10790	10970	11160	11380	11600	11820	12040	12260	12480	145	194
	V1	113	114	114	114	114	114	114	114	114	114	114		
	VR	152	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.3	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.1	5.1		
38000	TOFL	9400	9780	9960	10130	10300	10500	10700	10910	11110	11310	11510	142	191
	V1	107	108	108	108	108	108	108	108	108	108	108		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.6	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
37000	TOFL	8660	9010	9180	9330	9490	9680	9870	10050	10240	10420	10610	140	188
	V1	102	103	103	103	103	103	103	103	103	103	103		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
36000	TOFL	7980	8310	8460	8600	8750	8920	9090	9260	9430	9600	9770	137	185
	V1	96	97	97	97	97	97	97	97	97	97	97		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.3	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
35000	TOFL	7640	7820	7970	8130	8270	8430	8590	8740	8900	9040	9210	135	183
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	137	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.7	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
34000	TOFL	7550	7720	7880	8020	8170	8320	8490	8630	8790	8940	9080	132	180
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	133	134	134	134	134	134	134	134	134	134	134		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
33000	TOFL	7440	7630	7770	7920	8060	8210	8360	8520	8660	8820	8970	129	177
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	129	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.5	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
32000	TOFL	7350	7520	7670	7800	7960	8110	8250	8410	8550	8700	8860	127	174
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	125	126	126	126	126	126	126	126	126	126	126		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.9	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
31000	TOFL	7240	7420	7550	7700	7850	7990	8140	8290	8420	8580	8720	124	171
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.4	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2		

FIGURE 10-8-347. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.1	81.4	82.4	83.3	84.3	85.2	86.0	86.9	87.8	88.6	89.5		
30000	TOFL	7140	7310	7460	7580	7730	7880	8020	8160	8310	8450	8600	121	168
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	118	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.9	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7		
29000	TOFL	7020	7190	7340	7480	7610	7760	7890	8040	8180	8330	8470	119	165
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.4	9.2	9.2	9.2	9.3	9.3	9.3	9.2	9.2	9.2	9.2		
28000	TOFL	6910	7070	7210	7360	7480	7630	7770	7920	8050	8190	8330	117	161
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	111	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
27000	TOFL	6810	6960	7090	7230	7350	7500	7650	7780	7930	8050	8200	115	158
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.6	10.3	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
26000	TOFL	6720	6840	6970	7100	7220	7370	7500	7650	7780	7920	8070	113	155
	V1	94	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.3	11	11	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1		

FIGURE 10-8-348. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
39600	TOFL	13320	13560	13870									147	195
	V1	117	117	118										
	VR	155	155	155										
	V2	158	158	158										
	GR2	4.9	4.9	4.9										
39000	TOFL	12700	12930	13230									145	194
	V1	114	114	114										
	VR	153	153	153										
	V2	156	156	156										
	GR2	5.1	5.1	5.1										
38000	TOFL	11720	11930	12200									142	191
	V1	108	108	108										
	VR	149	149	149										
	V2	153	153	153										
	GR2	5.5	5.4	5.4										
37000	TOFL	10800	10990	11250									140	188
	V1	103	103	103										
	VR	145	145	145										
	V2	149	149	149										
	GR2	5.8	5.8	5.7										
36000	TOFL	9950	10120	10360									137	185
	V1	97	97	98										
	VR	142	142	142										
	V2	146	146	146										
	GR2	6.2	6.2	6.1										
35000	TOFL	9360	9470	9480									135	183
	V1	93	93	92										
	VR	138	138	138										
	V2	143	143	143										
	GR2	6.5	6.5	6.4										
34000	TOFL	9240	9360	9340									132	180
	V1	93	93	92										
	VR	134	134	134										
	V2	139	139	139										
	GR2	6.9	6.9	6.8										
33000	TOFL	9120	9230	9230									129	177
	V1	93	93	92										
	VR	130	130	130										
	V2	136	136	136										
	GR2	7.3	7.3	7.2										
32000	TOFL	8990	9100	9090									127	174
	V1	93	93	92										
	VR	126	126	126										
	V2	132	132	132										
	GR2	7.7	7.7	7.6										
31000	TOFL	8870	8980	8970									124	171
	V1	93	93	92										
	VR	122	122	122										
	V2	129	129	129										
	GR2	8.2	8.2	8.1										

FIGURE 10-8-348. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.3	91.2	92.0										
30000	TOFL	8740	8840	8830									121	168
	V1	93	93	92										
	VR	119	119	119										
	V2	126	126	126										
	GR2	8.7	8.7	8.6										
29000	TOFL	8620	8720	8720									119	165
	V1	93	93	92										
	VR	115	115	115										
	V2	124	124	124										
	GR2	9.2	9.2	9.1										
28000	TOFL	8480	8580	8610									117	161
	V1	93	93	92										
	VR	112	112	112										
	V2	121	121	121										
	GR2	9.8	9.8	9.6										
27000	TOFL	8330	8430	8490									115	158
	V1	93	93	92										
	VR	108	108	108										
	V2	118	118	118										
	GR2	10.4	10.4	10.2										
26000	TOFL	8190	8290	8370									113	155
	V1	93	93	92										
	VR	105	105	105										
	V2	115	115	115										
	GR2	11.1	11	10.9										

FIGURE 10-8-349. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
39600	TOFL	11960	12320	12560	12790	13030	13290	13550	13810	14070	14320	14590	148	196
	V1	122	123	123	123	123	123	123	123	123	123	123		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
39000	TOFL	11400	11720	11940	12160	12390	12640	12890	13130	13380	13620	13870	146	194
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
38000	TOFL	10510	10810	11010	11210	11430	11650	11880	12110	12330	12560	12790	144	191
	V1	113	113	113	113	113	113	113	113	113	113	113		
	VR	152	152	152	152	152	152	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
37000	TOFL	9670	9950	10140	10320	10520	10720	10930	11140	11350	11550	11760	141	189
	V1	107	107	107	107	107	107	107	107	107	107	107		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.6	5.5	5.5	5.5	5.6	5.6	5.5	5.5	5.5	5.5	5.5		
36000	TOFL	8890	9140	9320	9490	9680	9870	10060	10250	10440	10630	10820	138	186
	V1	101	102	102	102	102	102	102	102	102	102	102		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
35000	TOFL	8160	8390	8550	8710	8870	9040	9220	9390	9570	9740	9920	136	183
	V1	96	96	96	96	96	96	96	96	96	96	96		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	7780	7940	8080	8240	8390	8550	8710	8870	9030	9180	9350	133	180
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.7	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6		
33000	TOFL	7680	7820	7970	8130	8290	8450	8600	8750	8920	9060	9220	130	177
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	7	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		
32000	TOFL	7570	7720	7870	8010	8180	8320	8490	8640	8790	8950	9100	127	174
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
31000	TOFL	7470	7610	7760	7910	8060	8220	8370	8530	8670	8820	8970	125	171
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9		

FIGURE 10-8-349. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.4	82.0	82.9	83.9	84.8	85.7	86.5	87.4	88.3	89.1	90.0		
30000	TOFL	7350	7500	7650	7790	7940	8090	8250	8400	8550	8700	8850	122	168
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4		
29000	TOFL	7240	7380	7530	7680	7830	7980	8120	8260	8420	8560	8710	119	165
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
28000	TOFL	7110	7270	7410	7550	7700	7850	7990	8150	8280	8430	8570	117	162
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.4		
27000	TOFL	6990	7150	7280	7430	7570	7720	7860	8010	8150	8300	8430	115	159
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.2	10	10	10.1	10.1	10.1	10.1	10.1	10.1	10	10		
26000	TOFL	6890	7020	7160	7300	7440	7580	7720	7870	8010	8150	8300	113	155
	V1	93	92	92	92	92	92	92	92	92	92	92		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7		

FIGURE 10-8-350. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
39600	TOFL	14850	15150	15710									148	196
	V1	123	123	124										
	VR	158	158	158										
	V2	161	161	161										
	GR2	4.7	4.6	4.4										
39000	TOFL	14120	14410	14940									146	194
	V1	119	119	121										
	VR	156	156	156										
	V2	159	159	159										
	GR2	4.9	4.8	4.6										
38000	TOFL	13020	13290	13780									144	191
	V1	113	113	115										
	VR	152	152	152										
	V2	155	155	155										
	GR2	5.2	5.1	4.9										
37000	TOFL	11980	12230	12680									141	189
	V1	107	108	109										
	VR	148	148	148										
	V2	152	152	152										
	GR2	5.5	5.5	5.3										
36000	TOFL	11010	11240	11660									138	186
	V1	102	102	103										
	VR	144	144	144										
	V2	148	148	148										
	GR2	5.9	5.8	5.6										
35000	TOFL	10090	10310	10710									136	183
	V1	96	96	98										
	VR	140	140	141										
	V2	145	145	145										
	GR2	6.3	6.2	5.9										
34000	TOFL	9470	9500	9790									133	180
	V1	92	91	92										
	VR	136	136	137										
	V2	141	141	141										
	GR2	6.6	6.6	6.3										
33000	TOFL	9350	9380	9380									130	177
	V1	92	91	90										
	VR	132	132	133										
	V2	138	138	138										
	GR2	7	7	6.7										
32000	TOFL	9230	9260	9250									127	174
	V1	92	91	90										
	VR	128	128	128										
	V2	134	134	134										
	GR2	7.5	7.4	7.1										
31000	TOFL	9110	9130	9130									125	171
	V1	92	91	90										
	VR	124	124	124										
	V2	131	131	130										
	GR2	7.9	7.8	7.5										

FIGURE 10-8-350. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	90.8	91.7	92.5										
30000	TOFL	8970	9000	8990									122	168
	V1	92	91	90										
	VR	120	120	121										
	V2	127	127	127										
	GR2	8.4	8.3	8										
29000	TOFL	8850	8860	8870									119	165
	V1	92	91	90										
	VR	117	117	117										
	V2	124	124	124										
	GR2	8.9	8.8	8.5										
28000	TOFL	8700	8720	8760									117	162
	V1	92	91	90										
	VR	113	113	113										
	V2	121	121	121										
	GR2	9.4	9.3	9										
27000	TOFL	8550	8590	8640									115	159
	V1	92	91	90										
	VR	109	109	110										
	V2	118	118	118										
	GR2	10	9.9	9.6										
26000	TOFL	8410	8470	8520									113	155
	V1	92	91	90										
	VR	106	106	106										
	V2	115	115	115										
	GR2	10.7	10.5	10.2										

FIGURE 10-8-351. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
39600	TOFL	13440	13680	13970	14250	14550	14840	15130	15420	15710	16000	16300	149	196
	V1	129	129	129	129	129	129	129	129	129	129	129		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
39000	TOFL	12790	13020	13290	13560	13840	14120	14400	14670	14950	15220	15500	147	194
	V1	125	125	125	125	125	125	125	125	125	125	125		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6		
38000	TOFL	11760	11970	12220	12470	12730	12980	13230	13480	13740	13990	14250	145	192
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	155	155	155	155	155	155	155	155	155	155	155		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
37000	TOFL	10790	10990	11220	11440	11680	11910	12140	12370	12600	12840	13070	142	189
	V1	112	112	112	112	112	112	112	112	112	112	112		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
36000	TOFL	9900	10080	10290	10500	10710	10930	11140	11350	11560	11770	11990	139	186
	V1	106	106	106	106	106	106	106	106	106	106	106		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
35000	TOFL	9080	9240	9430	9620	9820	10010	10200	10400	10590	10780	10980	137	183
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.1	6	6	6	6	6	6	6	6	6	6		
34000	TOFL	8290	8440	8620	8790	8970	9140	9320	9500	9670	9850	10030	134	180
	V1	94	95	95	95	95	95	95	95	95	95	95		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
33000	TOFL	7920	8050	8210	8360	8530	8680	8850	9000	9150	9320	9460	131	177
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
32000	TOFL	7820	7940	8100	8250	8410	8570	8720	8880	9030	9190	9350	128	175
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
31000	TOFL	7710	7840	7980	8140	8290	8440	8610	8750	8910	9060	9220	126	172
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.6		

FIGURE 10-8-351. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	81.8	82.5	83.5	84.4	85.3	86.1	87.0	87.9	88.8	89.6	90.5		
30000	TOFL	7600	7720	7880	8020	8180	8320	8480	8640	8780	8940	9080	123	168
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
29000	TOFL	7480	7590	7750	7890	8050	8200	8350	8500	8660	8800	8950	120	165
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
28000	TOFL	7360	7490	7630	7780	7920	8080	8220	8380	8520	8670	8810	117	162
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.3	9.1	9.1	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
27000	TOFL	7240	7360	7500	7650	7800	7940	8100	8240	8370	8530	8680	115	159
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
26000	TOFL	7110	7230	7380	7520	7660	7810	7950	8100	8250	8380	8530	113	156
	V1	92	91	91	91	91	91	91	91	91	91	91		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3		

FIGURE 10-8-352. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
39600	TOFL	16590	17040	17870									149	196
	V1	129	129	132										
	VR	161	161	162										
	V2	164	164	164										
	GR2	4.4	4.3	4										
39000	TOFL	15790	16220	17030									147	194
	V1	125	126	128										
	VR	159	159	159										
	V2	161	161	161										
	GR2	4.6	4.5	4.2										
38000	TOFL	14510	14920	15670									145	192
	V1	119	119	122										
	VR	155	155	156										
	V2	158	158	158										
	GR2	4.9	4.8	4.5										
37000	TOFL	13310	13690	14380									142	189
	V1	112	113	116										
	VR	151	151	151										
	V2	154	154	154										
	GR2	5.3	5.1	4.8										
36000	TOFL	12210	12570	13200									139	186
	V1	106	107	110										
	VR	147	147	148										
	V2	151	151	151										
	GR2	5.6	5.4	5.1										
35000	TOFL	11180	11510	12100									137	183
	V1	100	101	104										
	VR	143	143	144										
	V2	147	147	147										
	GR2	6	5.8	5.5										
34000	TOFL	10210	10520	11090									134	180
	V1	95	96	98										
	VR	139	139	140										
	V2	144	144	144										
	GR2	6.4	6.2	5.8										
33000	TOFL	9550	9590	10090									131	177
	V1	91	90	92										
	VR	135	135	136										
	V2	140	140	140										
	GR2	6.8	6.6	6.2										
32000	TOFL	9430	9380	9400									128	175
	V1	91	89	88										
	VR	131	131	131										
	V2	136	136	136										
	GR2	7.2	6.9	6.6										
31000	TOFL	9290	9260	9270									126	172
	V1	91	89	88										
	VR	126	127	127										
	V2	133	132	132										
	GR2	7.6	7.4	7										

FIGURE 10-8-352. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.3	92.2	92.6										
30000	TOFL	9150	9130	9150									123	168
	V1	91	89	88										
	VR	122	122	123										
	V2	129	129	129										
	GR2	8.1	7.8	7.4										
29000	TOFL	9030	9000	9030									120	165
	V1	91	89	88										
	VR	118	118	119										
	V2	125	125	125										
	GR2	8.6	8.3	7.9										
28000	TOFL	8880	8880	8920									117	162
	V1	91	89	88										
	VR	114	114	115										
	V2	122	122	122										
	GR2	9.1	8.8	8.4										
27000	TOFL	8730	8760	8800									115	159
	V1	91	90	88										
	VR	111	111	111										
	V2	119	119	119										
	GR2	9.7	9.4	9										
26000	TOFL	8600	8640	8670									113	156
	V1	91	90	89										
	VR	107	107	108										
	V2	116	116	116										
	GR2	10.3	10	9.6										

FIGURE 10-8-353. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
39600	TOFL	14820	15250	15550	15860	16180	16510	16840	17170	17490	17820	18160	150	197
	V1	134	134	134	134	134	134	134	134	134	134	134		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.1		
39000	TOFL	14100	14510	14790	15080	15390	15700	16010	16320	16630	16940	17260	148	195
	V1	130	130	130	130	130	130	130	130	130	130	130		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3		
38000	TOFL	12940	13330	13580	13850	14130	14410	14700	14980	15270	15550	15840	146	192
	V1	123	124	124	124	124	124	124	124	124	124	124		
	VR	158	158	158	158	158	158	158	158	158	158	158		
	V2	160	160	160	160	160	160	160	160	160	160	160		
	GR2	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.6		
37000	TOFL	11850	12200	12430	12680	12940	13200	13450	13710	13970	14230	14500	143	189
	V1	117	117	117	117	117	117	117	117	117	117	117		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.1	5	5	5	5	5	5	5	5	5	5		
36000	TOFL	10840	11160	11370	11590	11830	12070	12300	12540	12770	13010	13260	140	187
	V1	110	111	111	111	111	111	111	111	111	111	111		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.5	5.3	5.3	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3		
35000	TOFL	9910	10210	10400	10600	10820	11030	11250	11460	11670	11890	12110	138	184
	V1	104	105	105	105	105	105	105	105	105	105	105		
	VR	145	146	146	146	146	146	146	146	146	146	146		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7		
34000	TOFL	9050	9320	9490	9680	9870	10070	10260	10460	10660	10850	11050	135	181
	V1	98	98	98	98	98	98	98	98	99	99	99		
	VR	141	142	142	142	142	142	142	142	142	142	142		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
33000	TOFL	8230	8480	8640	8800	8980	9160	9330	9510	9690	9870	10050	132	178
	V1	92	92	92	92	92	92	92	92	92	92	92		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
32000	TOFL	7980	8130	8280	8450	8600	8770	8920	9070	9240	9410	9510	129	175
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.1	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
31000	TOFL	7850	8010	8160	8320	8490	8640	8810	8960	9120	9270	9380	127	172
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3		

FIGURE 10-8-353. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.4	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0		
30000	TOFL	7750	7910	8060	8200	8360	8530	8670	8840	8980	9140	9260	124	169
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
29000	TOFL	7630	7780	7930	8080	8240	8390	8560	8700	8860	9010	9110	121	166
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
28000	TOFL	7520	7650	7800	7960	8110	8260	8420	8570	8710	8870	8970	118	162
	V1	90	90	90	90	90	90	90	90	90	90	89		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8		
27000	TOFL	7390	7540	7680	7820	7980	8130	8270	8430	8580	8720	8840	115	159
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
26000	TOFL	7290	7410	7550	7700	7840	7990	8150	8280	8440	8580	8720	113	156
	V1	90	90	90	90	90	90	90	90	90	90	90		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.2	10	10.1	10.1	10.1	10.1	10.1	10	10	10	10		

FIGURE 10-8-354. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
39600	TOFL	18580	19320										150	197
	V1	135	137											
	VR	164	165											
	V2	166	166											
	GR2	4.1	3.8											
39000	TOFL	17670	18380	19480									148	195
	V1	131	133	136										
	VR	162	162	163										
	V2	164	164	164										
	GR2	4.3	4	3.7										
38000	TOFL	16230	16900	17910									146	192
	V1	124	126	129										
	VR	158	158	159										
	V2	160	160	160										
	GR2	4.6	4.3	4										
37000	TOFL	14850	15480	16460									143	189
	V1	118	120	123										
	VR	154	154	155										
	V2	156	156	157										
	GR2	4.9	4.6	4.3										
36000	TOFL	13580	14160	15080									140	187
	V1	112	113	116										
	VR	150	150	151										
	V2	153	153	153										
	GR2	5.2	5	4.7										
35000	TOFL	12420	12960	13780									138	184
	V1	105	107	110										
	VR	146	146	147										
	V2	149	149	149										
	GR2	5.6	5.3	5										
34000	TOFL	11340	11840	12580									135	181
	V1	99	101	104										
	VR	142	142	143										
	V2	145	145	146										
	GR2	6	5.7	5.3										
33000	TOFL	10310	10780	11470									132	178
	V1	93	95	98										
	VR	137	138	139										
	V2	142	142	142										
	GR2	6.4	6	5.7										
32000	TOFL	9530	9800	10430									129	175
	V1	88	89	92										
	VR	133	133	134										
	V2	138	138	139										
	GR2	6.8	6.4	6.1										
31000	TOFL	9400	9400	9450									127	172
	V1	88	87	86										
	VR	129	129	130										
	V2	134	134	135										
	GR2	7.2	6.8	6.5										

FIGURE 10-8-354. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	91.9	92.7	92.5										
30000	TOFL	9290	9280	9340									124	169
	V1	89	87	86										
	VR	124	125	126										
	V2	130	130	131										
	GR2	7.7	7.3	6.9										
29000	TOFL	9170	9160	9220									121	166
	V1	89	87	86										
	VR	120	120	122										
	V2	127	127	127										
	GR2	8.1	7.7	7.4										
28000	TOFL	9050	9050	9100									118	162
	V1	89	88	86										
	VR	116	116	117										
	V2	123	123	123										
	GR2	8.6	8.2	7.8										
27000	TOFL	8930	8920	8980									115	159
	V1	89	88	86										
	VR	112	112	113										
	V2	120	120	120										
	GR2	9.2	8.8	8.4										
26000	TOFL	8800	8800	8860									113	156
	V1	89	88	87										
	VR	108	109	110										
	V2	117	117	117										
	GR2	9.8	9.4	8.9										

FIGURE 10-8-355. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
39600	TOFL	16710	17030	17370	17740	18110	18480	18840	19210	19580			151	197
	V1	140	140	140	140	140	140	140	140	140				
	VR	168	168	168	168	168	168	168	168	168				
	V2	169	169	169	169	169	169	169	169	169				
	GR2	4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9				
39000	TOFL	15860	16160	16490	16830	17180	17530	17880	18230	18570	18930	19290	150	196
	V1	136	136	136	136	136	136	136	136	136	136	136		
	VR	165	165	165	165	165	165	165	165	165	165	165		
	V2	167	167	167	167	167	167	167	167	167	167	167		
	GR2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
38000	TOFL	14540	14820	15110	15430	15750	16070	16390	16700	17020	17350	17680	147	193
	V1	129	129	129	129	129	129	129	129	129	129	130		
	VR	161	161	161	161	161	161	161	161	161	161	161		
	V2	163	163	163	163	163	163	163	163	163	163	163		
	GR2	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
37000	TOFL	13300	13560	13830	14120	14400	14700	14990	15270	15560	15860	16170	144	190
	V1	123	123	123	123	123	123	123	123	123	123	123		
	VR	157	157	157	157	157	157	157	157	157	157	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		
36000	TOFL	12130	12360	12610	12870	13130	13400	13660	13920	14190	14450	14730	142	187
	V1	116	116	116	116	116	116	116	116	116	116	116		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5		
35000	TOFL	11080	11290	11510	11750	11990	12230	12470	12710	12950	13190	13450	139	184
	V1	109	109	109	109	109	109	109	109	109	109	110		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	151	151	151	151	151	151		
	GR2	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
34000	TOFL	10080	10270	10470	10690	10910	11120	11340	11550	11770	11990	12230	136	181
	V1	103	103	103	103	103	103	103	103	103	103	103		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
33000	TOFL	9170	9350	9530	9730	9920	10120	10310	10510	10710	10910	11120	133	178
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
32000	TOFL	8310	8470	8640	8810	8990	9170	9340	9520	9700	9880	10080	130	175
	V1	90	90	90	90	90	90	90	90	90	90	91		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
31000	TOFL	8060	8200	8360	8530	8680	8860	9010	9180	9330	9490	9570	128	172
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7		

FIGURE 10-8-355. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	82.7	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.7	91.5		
30000	TOFL	7950	8090	8240	8410	8560	8720	8880	9040	9200	9350	9440	125	169
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
29000	TOFL	7830	7960	8130	8270	8440	8590	8750	8920	9070	9220	9290	122	166
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.1	8.1	8	8	8	8	8	8	8	8	7.9		
28000	TOFL	7710	7850	7990	8150	8300	8460	8620	8770	8920	9070	9170	119	163
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4		
27000	TOFL	7580	7710	7860	8020	8160	8330	8470	8640	8770	8930	9040	116	160
	V1	89	89	89	89	89	89	89	89	89	88	88		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9		
26000	TOFL	7470	7590	7740	7890	8040	8190	8340	8490	8640	8790	8920	113	156
	V1	89	89	89	89	89	89	89	89	89	89	88		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	9.8	9.7	9.7	9.7	9.7	9.7	9.6	9.6	9.7	9.6	9.6		

FIGURE 10-8-356. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	18280	19240										147	193
	V1	131	134											
	VR	161	161											
	V2	163	163											
	GR2	4.2	3.9											
37000	TOFL	16740	17640	18850									144	190
	V1	124	127	130										
	VR	157	157	158										
	V2	159	159	159										
	GR2	4.5	4.2	3.9										
36000	TOFL	15270	16100	17260									142	187
	V1	118	120	124										
	VR	153	153	154										
	V2	155	155	156										
	GR2	4.8	4.5	4.2										
35000	TOFL	13950	14710	15790									139	184
	V1	111	114	117										
	VR	148	149	150										
	V2	151	151	152										
	GR2	5.2	4.8	4.5										
34000	TOFL	12690	13400	14400									136	181
	V1	105	107	111										
	VR	144	145	146										
	V2	147	147	148										
	GR2	5.5	5.2	4.9										
33000	TOFL	11550	12190	13090									133	178
	V1	98	101	104										
	VR	140	140	142										
	V2	144	144	145										
	GR2	5.9	5.5	5.2										
32000	TOFL	10470	11050	11890									130	175
	V1	92	95	98										
	VR	136	136	138										
	V2	140	140	141										
	GR2	6.3	5.9	5.6										
31000	TOFL	9560	10010	10780									128	172
	V1	87	88	92										
	VR	131	132	133										
	V2	136	136	137										
	GR2	6.7	6.3	6										

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FIGURE 10-8-356. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.4	93.0	92.4										
30000	TOFL	9430	9450	9740									125	169
	V1	87	86	86										
	VR	127	127	129										
	V2	132	132	133										
	GR2	7.1	6.8	6.4										
29000	TOFL	9310	9330	9410									122	166
	V1	87	86	84										
	VR	122	123	125										
	V2	128	128	129										
	GR2	7.6	7.2	6.9										
28000	TOFL	9190	9210	9290									119	163
	V1	87	86	84										
	VR	118	119	120										
	V2	124	124	125										
	GR2	8.1	7.7	7.3										
27000	TOFL	9070	9090	9170									116	160
	V1	87	86	85										
	VR	114	114	116										
	V2	121	121	122										
	GR2	8.6	8.2	7.8										
26000	TOFL	8940	8960	9040									113	156
	V1	87	86	85										
	VR	110	110	112										
	V2	118	118	118										
	GR2	9.2	8.7	8.4										

FIGURE 10-8-357. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
39600	TOFL	18360	18840	19410	19830								152	198
	V1	145	146	147	147									
	VR	171	171	171	171									
	V2	172	172	172	172									
	GR2	3.8	3.7	3.6	3.6									
39000	TOFL	17440	17890	18430	18830	19240	19700						151	196
	V1	141	142	142	142	142	143							
	VR	168	168	168	168	168	168							
	V2	169	170	170	170	170	170							
	GR2	4	3.9	3.8	3.8	3.8	3.8							
38000	TOFL	16000	16400	16890	17260	17630	18050	18470	18750	19050	19430	19880	148	193
	V1	134	135	135	135	136	136	136	136	136	136	136		
	VR	164	164	164	164	164	164	164	164	164	164	164		
	V2	166	166	166	166	166	166	166	166	166	166	166		
	GR2	4.3	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4		
37000	TOFL	14640	15000	15440	15780	16120	16490	16880	17140	17410	17750	18180	145	190
	V1	128	128	129	129	129	129	129	129	129	129	129		
	VR	160	160	160	160	160	160	160	160	160	160	160		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.6	4.6	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.3		
36000	TOFL	13340	13680	14090	14400	14710	15050	15400	15640	15880	16190	16590	143	187
	V1	121	121	122	122	122	122	122	122	122	122	122		
	VR	155	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	5	4.9	4.8	4.8	4.8	4.8	4.7	4.8	4.8	4.8	4.7		
35000	TOFL	12140	12450	12830	13100	13380	13690	14010	14220	14450	14730	15100	140	185
	V1	114	114	115	115	115	115	115	115	115	115	116		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5		
34000	TOFL	11050	11340	11680	11930	12180	12460	12740	12940	13150	13400	13750	137	182
	V1	107	108	108	108	108	108	108	108	108	108	109		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.7	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.4		
33000	TOFL	10040	10300	10600	10830	11060	11310	11570	11740	11930	12160	12480	134	179
	V1	101	101	102	102	102	102	102	102	102	102	102		
	VR	142	142	143	143	143	143	143	143	143	143	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.1	6	5.9	5.9	5.9	5.9	5.8	5.9	5.9	5.9	5.8		
32000	TOFL	9110	9350	9630	9840	10050	10270	10500	10670	10840	11050	11340	131	176
	V1	94	95	95	95	95	96	96	96	96	96	96		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2		
31000	TOFL	8240	8450	8700	8890	9080	9280	9500	9640	9790	9980	10240	128	173
	V1	88	88	89	89	89	89	89	89	89	89	90		
	VR	133	134	134	134	134	134	134	134	134	134	134		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.9	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.7	6.7	6.6		

FIGURE 10-8-357. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	83.6	84.2	84.9	85.9	86.8	87.6	88.4	89.4	90.3	91.2	92.1		
30000	TOFL	8100	8250	8430	8590	8770	8930	9090	9240	9400	9490	9570	126	169
	V1	88	88	87	87	87	87	87	87	87	87	86		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.4	7.3	7.2	7.2	7.2	7.2	7.1	7.2	7.2	7.2	7		
29000	TOFL	7990	8130	8300	8480	8630	8790	8950	9100	9250	9360	9450	123	166
	V1	88	88	87	87	87	87	87	87	87	87	86		
	VR	124	124	125	125	125	125	125	125	125	125	125		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	7.8	7.8	7.7	7.7	7.7	7.7	7.6	7.6	7.7	7.6	7.5		
28000	TOFL	7860	8000	8180	8340	8500	8670	8820	8970	9120	9240	9330	120	163
	V1	88	88	87	87	87	87	87	87	87	87	86		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.3	8.3	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	7.9		
27000	TOFL	7750	7890	8050	8200	8370	8520	8680	8820	8970	9120	9200	117	160
	V1	88	88	87	87	87	87	87	87	87	87	86		
	VR	115	115	116	116	116	116	116	116	116	116	116		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	8.9	8.8	8.7	8.7	8.7	8.7	8.6	8.6	8.7	8.6	8.4		
26000	TOFL	7650	7770	7920	8080	8230	8380	8550	8690	8840	8990	9070	114	157
	V1	88	88	88	87	87	87	87	87	87	87	87		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	118	118	119	119	119	119	119	119	119	119	118		
	GR2	9.4	9.4	9.3	9.3	9.3	9.2	9.2	9.2	9.2	9.2	9		

FIGURE 10-8-358. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL	19020											145	190
	V1	132												
	VR	160												
	V2	161												
	GR2	4												
36000	TOFL	17370	18480	19860									143	187
	V1	125	128	131										
	VR	156	157	157										
	V2	158	158	158										
	GR2	4.3	4	3.7										
35000	TOFL	15800	16850	18110									140	185
	V1	118	121	124										
	VR	151	152	153										
	V2	154	154	155										
	GR2	4.7	4.3	4.1										
34000	TOFL	14380	15340	16550									137	182
	V1	111	114	118										
	VR	147	148	149										
	V2	150	150	151										
	GR2	5	4.7	4.4										
33000	TOFL	13060	13960	15040									134	179
	V1	105	108	111										
	VR	143	144	145										
	V2	146	146	147										
	GR2	5.4	5.1	4.7										
32000	TOFL	11860	12650	13660									131	176
	V1	98	101	105										
	VR	139	139	141										
	V2	142	142	143										
	GR2	5.8	5.4	5.1										
31000	TOFL	10740	11470	12360									128	173
	V1	92	95	98										
	VR	134	135	137										
	V2	138	139	140										
	GR2	6.2	5.8	5.5										

FIGURE 10-8-358. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	92.9	92.8	92.2										
30000	TOFL	9670	10340	11180									126	169
	V1	85	88	92										
	VR	130	131	132										
	V2	134	135	136										
	GR2	6.6	6.2	5.9										
29000	TOFL	9470	9510	10080									123	166
	V1	85	84	86										
	VR	125	126	128										
	V2	130	131	132										
	GR2	7.1	6.7	6.4										
28000	TOFL	9350	9390	9490									120	163
	V1	85	84	83										
	VR	120	122	124										
	V2	126	127	128										
	GR2	7.5	7.1	6.8										
27000	TOFL	9220	9270	9370									117	160
	V1	85	84	83										
	VR	116	117	119										
	V2	122	123	124										
	GR2	8	7.6	7.3										
26000	TOFL	9100	9140	9240									114	157
	V1	85	84	83										
	VR	111	113	115										
	V2	118	119	120										
	GR2	8.6	8.1	7.8										

FIGURE 10-8-359. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	19280											152	197
	V1	147												
	VR	171												
	V2	172												
	GR2	3.8												
38000	TOFL	17660	18330	18950	19360	19780							149	194
	V1	140	141	142	142	142								
	VR	167	167	167	167	167								
	V2	168	168	168	168	168								
	GR2	4.1	3.9	3.8	3.8	3.8								
37000	TOFL	16180	16780	17330	17720	18100	18560	18950	19230	19560			147	191
	V1	133	134	135	135	135	135	135	135	135				
	VR	163	163	163	163	163	163	163	163	163				
	V2	164	164	165	165	165	165	165	165	165				
	GR2	4.4	4.3	4.2	4.2	4.2	4.2	4.1	4.2	4.2				
36000	TOFL	14750	15310	15810	16160	16500	16930	17280	17530	17830	18240	18870	144	188
	V1	126	127	128	128	128	128	128	128	128	128	130		
	VR	158	159	159	159	159	159	159	159	159	159	159		
	V2	160	160	161	161	161	161	161	161	161	161	161		
	GR2	4.7	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.2		
35000	TOFL	13400	13910	14380	14700	15020	15400	15730	15950	16220	16590	17170	141	185
	V1	119	120	121	121	121	121	121	121	121	121	123		
	VR	154	154	154	154	154	154	154	154	154	154	154		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5.1	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.5		
34000	TOFL	12170	12630	13050	13330	13620	13980	14260	14460	14710	15060	15580	138	182
	V1	112	113	114	114	114	114	114	114	114	114	116		
	VR	149	150	150	150	150	150	150	150	150	150	150		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.4	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.1	4.9		
33000	TOFL	11030	11460	11840	12100	12360	12680	12940	13120	13340	13660	14130	135	179
	V1	105	106	107	107	107	107	107	107	107	107	109		
	VR	145	145	145	146	146	146	146	146	146	146	146		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.8	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.3		
32000	TOFL	10020	10390	10730	10960	11200	11490	11720	11880	12080	12380	12800	133	176
	V1	98	100	100	100	100	101	101	101	101	101	102		
	VR	140	141	141	141	141	141	141	141	141	141	141		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.1	6	6	6	6	6	6	6	5.9	5.6		
31000	TOFL	9050	9400	9720	9930	10150	10410	10630	10770	10950	11220	11600	130	173
	V1	92	93	94	94	94	94	94	94	94	95	96		
	VR	136	136	137	137	137	137	137	137	137	137	137		
	V2	140	140	141	141	141	141	141	141	141	141	141		
	GR2	6.7	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6		

FIGURE 10-8-359. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART A; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-65	-58	-49	-40	-31	-22	-13	-4	5	14	23		
	N1 (%)	84.6	84.8	85.5	86.4	87.3	88.2	89.0	90.0	90.9	91.8	92.6		
30000	TOFL	8270	8470	8760	8940	9130	9380	9570	9680	9850	10100	10440	127	170
	V1	86	87	87	87	87	88	88	88	88	88	89		
	VR	131	132	132	132	132	132	132	132	132	132	132		
	V2	136	136	137	137	137	137	137	137	137	137	137		
	GR2	7.1	6.9	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.7	6.5		
29000	TOFL	8160	8290	8480	8660	8810	8990	9140	9300	9420	9540	9600	124	167
	V1	86	86	86	86	86	86	86	86	85	85	84		
	VR	126	127	128	128	128	128	128	128	128	128	128		
	V2	132	132	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	6.9		
28000	TOFL	8060	8180	8340	8520	8690	8850	9010	9170	9300	9410	9480	121	164
	V1	86	86	86	86	86	86	86	86	85	85	84		
	VR	122	122	123	123	123	123	123	123	123	123	123		
	V2	127	128	128	128	128	128	128	128	128	128	128		
	GR2	8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.4		
27000	TOFL	7950	8060	8220	8380	8540	8720	8860	9010	9170	9290	9350	118	160
	V1	87	86	86	86	86	86	86	86	86	85	85		
	VR	117	117	118	118	118	118	118	118	118	118	118		
	V2	123	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.1	7.9		
26000	TOFL	7850	7950	8100	8260	8420	8580	8730	8890	9050	9160	9220	115	157
	V1	87	86	86	86	86	86	86	86	86	85	85		
	VR	112	113	113	113	113	113	113	113	113	113	113		
	V2	119	120	120	120	120	120	120	120	120	120	120		
	GR2	9.1	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.7	8.4		

FIGURE 10-8-360. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL													
	V1													
	VR													
	V2													
	GR2													
37000	TOFL													
	V1													
	VR													
	V2													
	GR2													
36000	TOFL													
	V1													
	VR													
	V2													
	GR2													
35000	TOFL	18150	19440										141	185
	V1	126	129											
	VR	155	156											
	V2	156	157											
	GR2	4.2	3.9											
34000	TOFL	16460	17690	19000									138	182
	V1	118	122	125										
	VR	150	152	152										
	V2	152	153	153										
	GR2	4.6	4.2	3.9										
33000	TOFL	14930	16050	17270									135	179
	V1	111	115	118										
	VR	146	147	148										
	V2	148	149	150										
	GR2	4.9	4.6	4.3										
32000	TOFL	13550	14560	15690									133	176
	V1	105	108	111										
	VR	142	143	144										
	V2	144	145	146										
	GR2	5.3	4.9	4.6										
31000	TOFL	12260	13160	14200									130	173
	V1	98	101	105										
	VR	137	138	140										
	V2	141	141	142										
	GR2	5.7	5.3	5										

FIGURE 10-8-360. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - OFF; WING ANTI-ICE - OFF PART B; RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	0	5	10									Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	32	41	50										
	N1 (%)	93.0	92.6	92.0										
30000	TOFL	11050	11900	12830									127	170
	V1	92	95	98										
	VR	133	134	136										
	V2	137	137	138										
	GR2	6.1	5.7	5.4										
29000	TOFL	9930	10720	11560									124	167
	V1	85	88	92										
	VR	128	130	131										
	V2	133	133	134										
	GR2	6.5	6.2	5.8										
28000	TOFL	9530	9610	10390									121	164
	V1	83	82	85										
	VR	124	125	127										
	V2	128	130	131										
	GR2	7	6.6	6.3										
27000	TOFL	9400	9470	9570									118	160
	V1	83	82	81										
	VR	119	121	123										
	V2	124	125	127										
	GR2	7.5	7.1	6.8										
26000	TOFL	9270	9340	9440									115	157
	V1	84	82	81										
	VR	114	116	118										
	V2	120	121	123										
	GR2	8	7.6	7.3										

FIGURE 10-8-361. TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
39600	TOFL	7100	7220	7360	7480	7600	7730	7870	8000	8150	8270	8400	139	192
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	139	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	145	145	145	145	145	145	145	145	145		
	GR2	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8	6.8		
39000	TOFL	7050	7180	7300	7420	7550	7690	7810	7950	8080	8210	8330	138	191
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.8	6.9	6.9	6.9	7	7	6.9	6.9	6.9	7	7		
38000	TOFL	6970	7090	7210	7340	7460	7590	7720	7860	8000	8110	8240	136	188
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	142	142	142	141	141	141	141	141	141	141	141		
	GR2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
37000	TOFL	6880	7010	7120	7240	7360	7500	7640	7770	7890	8020	8130	135	185
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
36000	TOFL	6790	6910	7040	7150	7270	7410	7530	7660	7800	7910	8040	133	182
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	129	128	128	128	128	128	128	128	128	128	128		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
35000	TOFL	6700	6820	6940	7060	7170	7310	7440	7570	7700	7820	7930	131	180
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	126	126	125	125	125	125	125	125	125	125	125		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	8.4	8.5	8.5	8.5	8.6	8.6	8.5	8.5	8.5	8.6	8.6		
34000	TOFL	6610	6730	6840	6970	7090	7210	7340	7460	7590	7710	7830	129	177
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	123	123	123	123	123	123	123	123	123	123	122		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.9	8.9	8.9	9	9	9	9	9	9	9	9		
33000	TOFL	6520	6630	6760	6860	6980	7110	7230	7370	7490	7600	7720	127	174
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.4	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
32000	TOFL	6420	6530	6660	6770	6870	7010	7140	7260	7380	7500	7600	125	171
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9.9	9.9	9.9	10	10	10	10	10	10	10	10.1		
31000	TOFL	6330	6430	6550	6660	6760	6900	7020	7150	7270	7380	7500	123	168
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	115	114	114	114	114	114	114	114	114	114	114		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.4	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.5	10.6	10.6		

FIGURE 10-8-361. TAKE-OFF DATA; FLAPS - 10° ; SEA LEVEL ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	78.6	79.5	80.4	81.3	82.2	83.0	83.8	84.6	85.4	86.2	87.0		
30000	TOFL	6230	6320	6440	6550	6660	6790	6910	7030	7160	7260	7380	121	166
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	11	11.1	11.1	11.1	11.2	11.2	11.2	11.1	11.1	11.2	11.2		
29000	TOFL	6110	6230	6330	6450	6550	6680	6790	6930	7030	7140	7250	119	163
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.7	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.9		
28000	TOFL	6010	6100	6220	6320	6430	6550	6670	6790	6920	7020	7130	117	160
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	120	120	120	120	120	120	120	120	120	120		
	GR2	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.6		
27000	TOFL	5890	6000	6100	6210	6320	6440	6550	6680	6800	6890	7000	115	157
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	13.1	13.2	13.2	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.4		
26000	TOFL	5760	5870	5980	6090	6200	6310	6420	6540	6660	6760	6870	113	154
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	118	118	118	118	118	118	118	118	118	118		
	GR2	14	14	14.1	14.1	14.2	14.2	14.1	14.1	14.1	14.1	14.2		

FIGURE 10-8-362. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
39600	TOFL	7270	7410	7530	7660	7800	7930	8090	8220	8350	8490	8630	139	193
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
39000	TOFL	7230	7350	7490	7610	7750	7890	8020	8170	8310	8430	8570	138	191
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8		
38000	TOFL	7140	7270	7400	7530	7670	7800	7930	8070	8200	8330	8470	136	188
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
37000	TOFL	7060	7190	7310	7430	7560	7700	7850	7980	8110	8240	8370	135	185
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.4	7.4	7.5	7.5		
36000	TOFL	6960	7090	7220	7340	7470	7610	7740	7870	8020	8130	8260	133	183
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.8	7.8	7.9	7.9		
35000	TOFL	6870	7000	7120	7250	7370	7510	7640	7780	7910	8040	8170	131	180
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	127	126	126	126	126	126	126	126	126	126	126		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
34000	TOFL	6780	6910	7040	7150	7280	7420	7540	7670	7800	7920	8050	129	177
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	124	124	124	123	123	123	123	123	123	123	123		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8.7	8.7	8.7	8.7	8.8	8.8	8.7	8.7	8.7	8.7	8.8		
33000	TOFL	6680	6810	6930	7040	7170	7310	7440	7580	7700	7830	7950	127	174
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	121	121	121	121	121	121	121	121	121	121	120		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
32000	TOFL	6590	6700	6830	6940	7070	7200	7330	7460	7590	7710	7830	125	171
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.8		
31000	TOFL	6490	6600	6720	6840	6960	7090	7220	7350	7480	7590	7710	123	169
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.2	10.3	10.3		

FIGURE 10-8-362. TAKE-OFF DATA; FLAPS - 10°; 1000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	79.3	80.2	81.1	82.0	82.8	83.6	84.5	85.3	86.1	86.9	87.7		
30000	TOFL	6390	6490	6610	6720	6850	6970	7110	7230	7370	7470	7590	121	166
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.8	10.8	10.8	10.9	10.9	10.9	10.9	10.8	10.8	10.9	10.9		
29000	TOFL	6270	6390	6510	6610	6730	6870	6990	7110	7250	7350	7470	119	163
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.4	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5		
28000	TOFL	6170	6280	6380	6500	6620	6750	6870	7000	7110	7230	7350	117	160
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	12.1	12.1	12.1	12.2	12.2	12.2	12.2	12.2	12.1	12.2	12.2		
27000	TOFL	6050	6160	6280	6370	6490	6620	6740	6860	6990	7110	7220	115	157
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	13		
26000	TOFL	5940	6030	6140	6260	6370	6500	6620	6750	6860	6970	7080	113	154
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	13.7	13.7	13.7	13.8	13.8	13.8	13.8	13.7	13.7	13.8	13.8		

FIGURE 10-8-363. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
39600	TOFL	7440	7580	7720	7850	8000	8130	8280	8420	8560	8690	8810	140	193
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
39000	TOFL	7390	7530	7660	7800	7940	8070	8210	8350	8510	8630	8760	139	191
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
38000	TOFL	7310	7440	7580	7710	7850	7980	8120	8260	8400	8530	8660	137	189
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	137	137	137	137	137	137	137	137	137	136	136		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.8	6.8	6.8	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.9		
37000	TOFL	7230	7360	7480	7620	7750	7890	8040	8170	8290	8430	8550	135	186
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	134	134	134	134	134	134	134	134	134	133	133		
	V2	141	141	141	141	141	141	141	141	141	140	140		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2		
36000	TOFL	7120	7260	7390	7520	7660	7800	7920	8060	8200	8320	8450	133	183
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
35000	TOFL	7040	7170	7300	7430	7550	7690	7820	7960	8090	8220	8340	131	180
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	8	8	8	8	8	8	8	8	8	8	8.1		
34000	TOFL	6940	7070	7190	7320	7460	7600	7720	7850	7990	8110	8230	129	177
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
33000	TOFL	6840	6970	7100	7230	7350	7480	7620	7750	7870	8000	8120	127	175
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	122	122	121	121	121	121	121	121	121	121	121		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9		
32000	TOFL	6750	6880	6990	7120	7260	7370	7500	7630	7770	7880	8000	125	172
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	119	119	119	119	119	119	119	119	119	118	118		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4		
31000	TOFL	6650	6770	6880	7010	7140	7270	7400	7520	7650	7770	7890	123	169
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.9	10	10	10	10	10	10	9.9	9.9	10	10		

FIGURE 10-8-363. TAKE-OFF DATA; FLAPS - 10°; 2000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.0	80.9	81.8	82.7	83.5	84.3	85.1	86.0	86.8	87.6	88.4		
30000	TOFL	6540	6660	6780	6900	7030	7160	7280	7400	7530	7660	7770	121	166
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	10.5	10.5	10.5	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.6		
29000	TOFL	6420	6550	6670	6780	6910	7030	7160	7280	7410	7530	7650	119	163
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	11.1	11.1	11.1	11.2	11.2	11.1	11.1	11.1	11.1	11.1	11.2		
28000	TOFL	6310	6440	6560	6680	6790	6910	7040	7160	7290	7410	7510	117	160
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.9		
27000	TOFL	6210	6310	6430	6540	6670	6790	6910	7040	7170	7270	7380	115	157
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	118	118	118	118	118	118	118	118	118		
	GR2	12.5	12.5	12.6	12.6	12.6	12.6	12.6	12.5	12.5	12.6	12.6		
26000	TOFL	6080	6190	6320	6430	6560	6660	6780	6900	7020	7140	7250	113	154
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.3	13.3	13.4	13.4		

FIGURE 10-8-364. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
39600	TOFL	7580	7740	7880	8030	8160	8300	8450	8590	8720	8880	9020	141	193
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	6	6	6	6	6	6	6	6	6	6	6		
39000	TOFL	7580	7710	7860	7990	8130	8280	8430	8570	8700	8840	8970	140	192
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		
38000	TOFL	7490	7630	7760	7910	8040	8180	8330	8460	8600	8740	8860	137	189
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.6	6.6		
37000	TOFL	7390	7530	7670	7800	7950	8090	8220	8360	8500	8620	8760	135	186
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	135	135	135	135	135	135	135	135	135	135	135		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9		
36000	TOFL	7310	7430	7580	7710	7860	7980	8120	8260	8400	8530	8660	133	183
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
35000	TOFL	7220	7340	7480	7610	7750	7890	8030	8170	8290	8430	8540	131	181
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
34000	TOFL	7120	7260	7380	7520	7660	7790	7910	8050	8190	8310	8430	129	178
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	126	126	126	126	126	126	126	126	126	126	125		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.2		
33000	TOFL	7010	7150	7270	7410	7540	7680	7820	7940	8070	8200	8330	127	175
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	123	123	123	123	123	123	123	123	123	123	122		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6		
32000	TOFL	6930	7040	7180	7300	7440	7570	7700	7830	7970	8080	8200	125	172
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	120	120	120	120	120	120	120	120	120	120	119		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1		
31000	TOFL	6820	6930	7070	7200	7330	7460	7580	7710	7850	7970	8080	123	169
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6		

FIGURE 10-8-364. TAKE-OFF DATA; FLAPS - 10°; 3000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	87.4	88.2	89.0		
30000	TOFL	6710	6820	6960	7080	7220	7350	7480	7600	7720	7840	7970	121	166
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	10.2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.2	10.2		
29000	TOFL	6600	6720	6850	6970	7100	7230	7360	7490	7600	7720	7840	119	163
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.7	10.7	10.7	10.7	10.8		
28000	TOFL	6480	6600	6740	6850	6980	7110	7230	7340	7470	7600	7710	117	160
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4		
27000	TOFL	6360	6490	6610	6730	6860	6970	7100	7220	7350	7460	7570	115	157
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1		
26000	TOFL	6240	6360	6490	6600	6720	6850	6970	7100	7220	7320	7430	113	154
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		

FIGURE 10-8-365. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
39600	TOFL	8060	8220	8370	8530	8700	8860	9030	9200	9360	9490	9630	142	194
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
39000	TOFL	7700	7850	7990	8150	8300	8460	8620	8790	8930	9060	9190	141	192
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	6	6	6	6	6	6	6	5.9	5.9	6	6		
38000	TOFL	7690	7820	7970	8120	8250	8400	8540	8680	8840	8960	9110	138	189
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
37000	TOFL	7590	7740	7880	8010	8160	8310	8440	8590	8730	8860	9000	136	187
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.7	6.7		
36000	TOFL	7500	7630	7780	7920	8070	8190	8340	8480	8620	8750	8900	133	184
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
35000	TOFL	7410	7540	7670	7820	7960	8100	8240	8390	8510	8650	8780	131	181
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
34000	TOFL	7300	7450	7580	7710	7850	8000	8130	8270	8410	8540	8670	129	178
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	127	127	127	127	127	127	127	127	127	127	127		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.9		
33000	TOFL	7210	7350	7470	7610	7760	7890	8030	8170	8290	8430	8550	127	175
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	124	124	124	124	124	124	124	124	124	124	124		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		
32000	TOFL	7100	7230	7380	7500	7640	7780	7910	8050	8190	8310	8430	125	172
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
31000	TOFL	6990	7130	7260	7400	7520	7660	7800	7930	8060	8190	8320	123	169
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	118	118	118	118	118	118	118	118	118	117	117		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3		

FIGURE 10-8-365. TAKE-OFF DATA; FLAPS - 10°; 4000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0	87.9	88.7	89.5		
30000	TOFL	6890	7030	7150	7290	7410	7550	7680	7820	7940	8070	8190	121	166
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8		
29000	TOFL	6780	6910	7030	7170	7290	7430	7560	7690	7830	7940	8060	119	163
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4		
28000	TOFL	6660	6800	6920	7050	7170	7300	7430	7560	7700	7810	7930	117	160
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	11	11	11	11	11	11	11	11	11	11	11		
27000	TOFL	6550	6670	6800	6920	7050	7180	7310	7430	7560	7670	7800	115	157
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		
26000	TOFL	6420	6550	6670	6790	6920	7050	7170	7300	7420	7540	7660	113	154
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	103	103	103	103	103	103	103	103	103	103	103		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.4	12.4	12.5	12.5		

FIGURE 10-8-366. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
39600	TOFL	8780	8950	9120	9310	9480	9660	9840	10040	10210	10350	10510	143	194
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
39000	TOFL	8360	8530	8690	8860	9030	9210	9380	9560	9730	9860	10010	142	193
	V1	102	102	102	102	102	102	102	102	102	102	102		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.8		
38000	TOFL	7810	7960	8110	8250	8410	8560	8720	8860	9000	9160	9300	139	190
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	147	147	147	147	147	147	147	147	147	147		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6.1	6.1		
37000	TOFL	7780	7940	8080	8240	8390	8540	8680	8820	8970	9110	9230	137	187
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
36000	TOFL	7690	7840	7990	8130	8280	8430	8570	8720	8860	8990	9120	134	184
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		
35000	TOFL	7600	7730	7900	8030	8190	8320	8470	8610	8760	8870	9010	132	181
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	131	131	131	131	131	131	131	131	131	131	131		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.2	7.2		
34000	TOFL	7490	7640	7780	7930	8070	8220	8360	8510	8630	8770	8900	129	178
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6		
33000	TOFL	7390	7530	7680	7820	7970	8120	8250	8390	8530	8660	8770	127	176
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	132	132	132	132	132	132	132	132	132	132		
	GR2	8	8	8	8	8	8	8	8	8	8	8		
32000	TOFL	7270	7440	7580	7720	7850	8000	8140	8280	8400	8530	8650	125	173
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	122	122	122	122	122	122	122	122	122	122	122		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.5	8.5		
31000	TOFL	7180	7310	7440	7590	7740	7870	8020	8160	8290	8410	8530	123	170
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	118	118	118	118	118	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	9	9	9	9	9	9	9	8.9	8.9	9	9		

FIGURE 10-8-366. TAKE-OFF DATA; FLAPS - 10°; 5000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	88.4	89.2	90.0		
30000	TOFL	7070	7200	7340	7470	7610	7750	7880	8030	8170	8290	8400	121	167
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	115	115	115	115	115	115	115	115	115	115	115		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5		
29000	TOFL	6950	7080	7220	7350	7490	7640	7770	7900	8020	8140	8260	119	164
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10.1	10.1		
28000	TOFL	6830	6960	7100	7230	7370	7510	7640	7770	7890	8020	8130	117	161
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	10.7	10.7	10.7	10.7	10.7	10.7	10.6	10.6	10.6	10.6	10.7		
27000	TOFL	6700	6840	6990	7100	7250	7380	7500	7640	7760	7880	7990	115	157
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	106	106	106	106	106	106	106	106	106	106	106		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.3	11.3	11.4		
26000	TOFL	6580	6730	6840	6990	7120	7240	7370	7490	7620	7740	7860	113	154
	V1	97	97	97	97	97	97	97	97	97	97	97		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12	12.1	12.1		

FIGURE 10-8-367. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
39600	TOFL	9700	9870	10050	10250	10450	10640	10850	11060	11250	11410	11580	144	195
	V1	110	110	110	110	110	110	110	110	110	109	109		
	VR	150	150	150	150	150	150	150	150	150	150	150		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
39000	TOFL	9250	9420	9590	9770	9960	10160	10350	10550	10730	10880	11050	143	193
	V1	107	106	106	106	106	106	106	106	106	106	106		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5		
38000	TOFL	8540	8690	8850	9020	9200	9370	9550	9740	9900	10040	10200	140	190
	V1	101	101	101	101	101	101	101	101	101	101	101		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		
37000	TOFL	7920	8070	8220	8380	8530	8670	8830	8980	9130	9270	9380	138	187
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	6.1	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.2	6.2		
36000	TOFL	7880	8030	8180	8320	8480	8620	8770	8920	9060	9200	9310	135	185
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		
35000	TOFL	7790	7940	8080	8220	8370	8510	8660	8810	8950	9090	9200	133	182
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.8	6.8	6.9	6.9		
34000	TOFL	7680	7820	7970	8120	8250	8400	8550	8700	8830	8980	9080	130	179
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3		
33000	TOFL	7580	7730	7870	8000	8150	8300	8430	8580	8730	8860	8960	127	176
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7		
32000	TOFL	7470	7610	7750	7900	8050	8180	8320	8470	8600	8730	8830	125	173
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	131	131	130	130	130	130	130	130	130	130	130		
	GR2	8.1	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.2	8.2		
31000	TOFL	7370	7520	7660	7780	7930	8070	8200	8340	8490	8620	8700	123	170
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	120	120	120	120	120	120	120	120	120	120	120		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.6	8.6	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.7		

FIGURE 10-8-367. TAKE-OFF DATA; FLAPS - 10°; 6000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	88.9	89.7	90.5		
30000	TOFL	7260	7400	7540	7680	7800	7950	8090	8220	8350	8480	8580	121	167
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	117	117	117	117	117	117	117	117	117	117	117		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	9.1	9.2	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.2		
29000	TOFL	7140	7280	7410	7560	7700	7820	7960	8100	8230	8350	8450	119	164
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	113	113	113	113	113	113	113	113	113	113	113		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7		
28000	TOFL	7020	7160	7290	7430	7570	7690	7830	7970	8110	8220	8310	117	161
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
27000	TOFL	6900	7030	7160	7300	7440	7560	7700	7830	7970	8080	8170	115	158
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	107	107	107	107	107	107	107	107	107	107	107		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9		
26000	TOFL	6790	6920	7050	7170	7300	7430	7560	7690	7830	7940	8030	113	155
	V1	96	96	96	96	96	96	96	96	96	96	95		
	VR	104	104	104	104	104	104	104	104	104	104	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.6	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7		

FIGURE 10-8-368. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
39600	TOFL	10680	10860	11070	11290	11510	11730	11960	12190	12400	12570	12770	145	195
	V1	114	114	114	114	114	114	114	114	114	114	114		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5	5.1	5.1	5.1	5	5	5	5	5	5	5.1		
39000	TOFL	10200	10360	10560	10770	10980	11190	11410	11630	11830	12000	12190	144	193
	V1	111	111	111	111	111	111	111	111	111	111	111		
	VR	151	151	151	151	151	151	151	151	151	151	151		
	V2	154	154	154	154	154	154	154	154	154	154	154		
	GR2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2		
38000	TOFL	9410	9570	9750	9950	10140	10330	10530	10740	10920	11070	11240	141	191
	V1	105	105	105	105	105	105	105	105	105	105	105		
	VR	147	147	147	147	147	147	147	147	147	147	147		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.5	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.6		
37000	TOFL	8690	8830	9000	9170	9350	9530	9710	9900	10070	10210	10370	139	188
	V1	100	100	100	100	100	100	100	100	100	100	100		
	VR	143	143	143	143	143	143	143	143	143	143	143		
	V2	148	148	148	148	148	148	148	148	148	148	148		
	GR2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9		
36000	TOFL	7990	8160	8310	8480	8620	8780	8950	9090	9250	9380	9520	136	185
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	140	139	139	139	139	139	139	139	139	139	139		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.3		
35000	TOFL	7960	8110	8260	8410	8570	8720	8880	9020	9170	9290	9340	134	182
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	141	141	141	141	141	141	141	141	141	141	141		
	GR2	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6		
34000	TOFL	7860	8000	8150	8310	8450	8610	8770	8910	9060	9180	9230	131	179
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	132	132	132	132	132	132	132	132	132	132	132		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	7	7	7	7	7	7	7	7	7	7	7		
33000	TOFL	7750	7900	8050	8200	8350	8500	8640	8780	8940	9050	9120	128	176
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	128	128	128	128	128	128	128	128	128	128	128		
	V2	134	134	134	134	134	134	134	134	134	134	134		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
32000	TOFL	7640	7790	7930	8080	8230	8380	8530	8670	8810	8940	8990	126	173
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	132	131	131	131	131	131	131	131	131	131	131		
	GR2	7.8	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.9		
31000	TOFL	7540	7670	7830	7960	8120	8270	8410	8540	8690	8810	8860	123	170
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3		

FIGURE 10-8-368. TAKE-OFF DATA; FLAPS - 10°; 7000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.4	83.4	84.3	85.1	86.0	86.8	87.7	88.5	89.4	90.2	91.0		
30000	TOFL	7420	7570	7710	7860	7990	8140	8290	8420	8560	8670	8740	121	167
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	118	118	118	118	118	118	118	118	118	118	118		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
29000	TOFL	7300	7440	7580	7730	7870	8010	8150	8290	8440	8540	8600	119	164
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	115	115	115	115	115	115	115	115	115	115	114		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	9.3	9.4	9.4	9.4	9.4	9.4	9.3	9.3	9.3	9.4	9.4		
28000	TOFL	7190	7320	7480	7600	7750	7900	8030	8160	8300	8410	8450	117	161
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	111	111	111	111	111	111	111	111	111	111	111		
	V2	120	120	120	120	120	120	120	120	120	120	120		
	GR2	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9		
27000	TOFL	7070	7200	7330	7480	7620	7760	7890	8020	8160	8270	8330	115	158
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	107	107	107	107	108	108	108	108	108	108	108		
	V2	117	117	117	117	117	117	117	117	117	117	117		
	GR2	10.5	10.6	10.6	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
26000	TOFL	6940	7080	7210	7350	7490	7620	7750	7880	8020	8140	8210	113	155
	V1	95	95	95	95	95	95	95	94	94	94	94		
	VR	105	105	105	105	105	105	105	105	105	105	104		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2		

FIGURE 10-8-369. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
39600	TOFL	11770	11980	12220	12460	12710	12950	13200	13460	13690	13890	14140	147	195
	V1	119	119	119	119	119	119	119	119	119	119	119		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.8	4.8	4.8		
39000	TOFL	11230	11420	11660	11890	12120	12350	12590	12840	13060	13240	13480	145	194
	V1	115	115	115	115	115	115	115	115	115	115	115		
	VR	153	153	153	153	153	153	153	153	153	153	153		
	V2	156	156	156	156	156	156	156	156	156	156	156		
	GR2	5	5	5	5	5	5	4.9	4.9	4.9	5	4.9		
38000	TOFL	10360	10540	10760	10970	11190	11400	11620	11850	12050	12220	12440	142	191
	V1	110	110	110	110	110	110	110	110	110	110	110		
	VR	149	149	149	149	149	149	150	150	150	150	150		
	V2	153	153	153	153	153	153	153	153	153	153	153		
	GR2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
37000	TOFL	9550	9720	9910	10110	10310	10500	10710	10930	11100	11260	11460	140	188
	V1	104	104	104	104	104	104	104	104	104	104	104		
	VR	146	146	146	146	146	146	146	146	146	146	146		
	V2	150	150	150	150	150	150	150	150	150	150	150		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
36000	TOFL	8800	8950	9140	9320	9500	9680	9860	10050	10230	10370	10560	137	185
	V1	99	99	99	99	99	99	99	99	99	99	99		
	VR	142	142	142	142	142	142	142	142	142	142	142		
	V2	147	146	146	146	146	146	146	146	146	146	146		
	GR2	6	6	6	6	6	6	5.9	5.9	5.9	6	6		
35000	TOFL	8110	8260	8430	8580	8740	8900	9060	9230	9390	9520	9690	135	183
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	138	138	138	138	138	138	138	138	138	138	138		
	V2	143	143	143	143	143	143	143	143	143	143	143		
	GR2	6.3	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3		
34000	TOFL	8060	8200	8360	8520	8670	8830	8970	9130	9290	9390	9380	132	180
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	134	134	134	134	134	134	134	134	134	134	134		
	V2	140	140	140	140	140	140	140	140	140	140	140		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7		
33000	TOFL	7950	8100	8260	8400	8560	8700	8860	9010	9160	9270	9260	129	177
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	130	130	130	130	130	130	130	130	130	130	130		
	V2	136	136	136	136	136	136	136	136	136	136	136		
	GR2	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1		
32000	TOFL	7850	8000	8130	8290	8450	8590	8750	8900	9050	9150	9120	127	174
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	126	126	126	126	126	126	126	126	126	126	126		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5		
31000	TOFL	7730	7880	8030	8160	8320	8470	8610	8760	8910	9010	9000	124	171
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	130	130	130	130	130	130	130	130	130	130	130		
	GR2	8	8	8	8	8	8	8	8	8	8	8		

FIGURE 10-8-369. TAKE-OFF DATA; FLAPS - 10°; 8000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	82.9	83.9	84.7	85.6	86.5	87.3	88.2	89.0	89.9	90.7	91.5		
30000	TOFL	7630	7760	7910	8060	8210	8350	8500	8650	8800	8890	8890	121	168
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	127	127	127	127	127	127	127	127	127	127	127		
	GR2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.4	8.4	8.5	8.5		
29000	TOFL	7500	7650	7800	7930	8080	8230	8360	8510	8660	8750	8770	119	165
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	116	116	116	116	116	116	116	116	116	116	116		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	9	9	9	9	9	9	9	9	9	9	9		
28000	TOFL	7380	7520	7670	7800	7940	8090	8240	8380	8520	8620	8660	117	161
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	112	112	112	112	112	112	112	112	112	112	112		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.5	9.5	9.6	9.5		
27000	TOFL	7250	7390	7540	7670	7820	7960	8110	8250	8390	8480	8540	115	158
	V1	93	93	93	93	93	93	93	93	93	93	92		
	VR	109	109	109	109	109	109	109	109	109	109	109		
	V2	118	118	118	118	118	118	118	118	118	118	118		
	GR2	10.2	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.1		
26000	TOFL	7130	7260	7410	7540	7680	7820	7970	8110	8250	8330	8420	113	155
	V1	93	93	93	93	93	93	93	93	93	93	93		
	VR	105	105	105	105	105	105	105	105	105	105	105		
	V2	115	115	115	115	115	115	115	115	115	115	115		
	GR2	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.7	10.8	10.8		

FIGURE 10-8-370. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
39600	TOFL	13090	13350	13620	13900	14170	14450	14730	15020	15270	15490	15910	148	196
	V1	124	124	124	124	124	124	125	125	125	125	125		
	VR	159	159	159	159	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4		
39000	TOFL	12450	12690	12950	13210	13470	13730	14030	14310	14520	14720	15180	146	194
	V1	121	121	121	121	121	121	121	121	121	121	122		
	VR	156	156	156	156	156	156	156	156	156	156	157		
	V2	159	159	159	159	159	159	159	159	159	159	159		
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6		
38000	TOFL	11470	11700	11940	12180	12420	12660	12910	13160	13380	13570	13970	144	191
	V1	115	115	115	115	115	115	115	115	115	115	116		
	VR	152	152	152	152	152	152	152	152	152	152	153		
	V2	155	155	155	155	155	155	155	155	155	155	156		
	GR2	5	5	5	5	5	5	5	5	5	5	4.9		
37000	TOFL	10560	10770	10990	11210	11430	11650	11880	12120	12320	12490	12860	141	189
	V1	109	109	109	109	109	109	109	109	109	109	110		
	VR	149	149	149	149	149	149	149	149	149	149	149		
	V2	152	152	152	152	152	152	152	152	152	152	152		
	GR2	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.2		
36000	TOFL	9710	9900	10100	10300	10500	10710	10910	11130	11320	11470	11810	138	186
	V1	103	103	103	103	103	103	103	103	103	103	104		
	VR	145	145	145	145	145	145	145	145	145	145	145		
	V2	149	149	149	149	149	149	149	149	149	149	149		
	GR2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.6		
35000	TOFL	8920	9090	9280	9460	9650	9830	10020	10220	10390	10530	10850	136	183
	V1	98	98	98	98	98	98	98	98	98	98	98		
	VR	141	141	141	141	141	141	141	141	141	141	141		
	V2	145	145	145	145	145	145	145	145	145	145	145		
	GR2	6.1	6.1	6.1	6.1	6.1	6.1	6	6	6	6.1	5.9		
34000	TOFL	8240	8410	8560	8730	8880	9040	9200	9360	9510	9640	9930	133	180
	V1	92	92	92	92	92	92	92	92	92	92	93		
	VR	137	137	137	137	137	137	137	137	137	137	137		
	V2	142	142	142	142	142	142	142	142	142	142	142		
	GR2	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.3		
33000	TOFL	8170	8330	8470	8640	8800	8940	9100	9270	9390	9420	9410	130	177
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	133	133	133	133	133	133	133	133	133	133	133		
	V2	138	138	138	138	138	138	138	138	138	138	138		
	GR2	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7		
32000	TOFL	8050	8200	8360	8520	8670	8830	8990	9140	9260	9300	9300	127	174
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	129	129	129	129	129	129	129	129	129	129	129		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.2	7.3	7.1		
31000	TOFL	7950	8100	8260	8390	8550	8720	8850	9010	9150	9160	9190	125	171
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	125	125	125	125	125	125	125	125	125	125	125		
	V2	131	131	131	131	131	131	131	131	131	131	131		
	GR2	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.5		

FIGURE 10-8-370. TAKE-OFF DATA; FLAPS - 10°; 9000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.4	84.3	85.2	86.1	86.9	87.8	88.7	89.5	90.4	91.2	92.0		
30000	TOFL	7820	7980	8130	8280	8430	8590	8740	8890	9010	9040	9080	122	168
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	121	121	121	121	121	121	121	121	121	121	121		
	V2	128	128	128	128	128	128	128	128	128	128	128		
	GR2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8		
29000	TOFL	7720	7860	8010	8150	8310	8460	8600	8750	8880	8900	8960	119	165
	V1	92	92	92	92	92	92	92	92	92	91	90		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	125	125	125	125	125	125	125	125	125	125	125		
	GR2	8.7	8.7	8.7	8.7	8.7	8.7	8.6	8.6	8.6	8.7	8.5		
28000	TOFL	7590	7740	7890	8040	8170	8330	8480	8630	8740	8760	8840	117	162
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	114	114	114	114	114	114	114	114	114	114	114		
	V2	122	122	122	122	122	122	122	122	122	122	122		
	GR2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9		
27000	TOFL	7460	7600	7750	7900	8040	8190	8340	8480	8610	8630	8720	115	159
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	110	110	110	110	110	110	110	110	110	110	110		
	V2	119	119	119	119	119	119	119	119	119	119	119		
	GR2	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.6		
26000	TOFL	7330	7470	7620	7760	7900	8050	8190	8340	8460	8510	8600	113	155
	V1	92	92	92	92	92	92	92	92	92	91	91		
	VR	106	106	106	106	106	106	106	106	106	106	107		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.2		

FIGURE 10-8-371. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
39600	TOFL	14580	14880	15190	15500	15810	16120	16430	16770	17050	17280	18050	149	196
	V1	130	130	130	130	130	130	130	130	130	130	132		
	VR	162	162	162	162	162	162	162	162	162	162	162		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.3	4		
39000	TOFL	13880	14170	14460	14760	15060	15350	15650	15980	16230	16450	17190	147	194
	V1	126	126	126	127	127	127	127	127	127	127	128		
	VR	159	159	159	159	159	159	160	160	160	160	160		
	V2	162	162	162	162	162	162	162	162	162	162	162		
	GR2	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.2		
38000	TOFL	12780	13050	13310	13590	13860	14130	14400	14700	14940	15140	15850	145	192
	V1	120	120	120	120	120	120	120	120	120	120	122		
	VR	156	156	156	156	156	156	156	156	156	156	156		
	V2	158	158	158	158	158	158	158	158	158	158	158		
	GR2	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.5		
37000	TOFL	11720	11970	12210	12460	12710	12950	13210	13480	13700	13890	14560	142	189
	V1	114	114	114	114	114	114	114	114	114	114	116		
	VR	151	151	151	151	151	151	152	152	152	152	152		
	V2	155	155	155	155	155	155	155	155	155	155	155		
	GR2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5	5	5.1	4.8		
36000	TOFL	10760	10990	11210	11440	11660	11890	12120	12370	12580	12740	13350	139	186
	V1	108	108	108	108	108	108	108	108	108	108	110		
	VR	148	148	148	148	148	148	148	148	148	148	148		
	V2	151	151	151	151	151	151	151	151	151	151	151		
	GR2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.1		
35000	TOFL	9860	10060	10270	10480	10680	10890	11100	11330	11520	11670	12230	137	183
	V1	102	102	102	102	102	102	102	102	102	102	104		
	VR	144	144	144	144	144	144	144	144	144	144	144		
	V2	147	147	147	147	147	147	147	147	147	147	148		
	GR2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	5.7	5.8	5.5		
34000	TOFL	9030	9220	9400	9590	9780	9960	10150	10350	10530	10690	11190	134	180
	V1	96	96	96	96	96	96	96	96	96	96	98		
	VR	140	140	140	140	140	140	140	140	140	140	140		
	V2	144	144	144	144	144	144	144	144	144	144	144		
	GR2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	5.8		
33000	TOFL	8400	8550	8710	8870	9030	9190	9340	9500	9610	9740	10210	131	177
	V1	91	91	91	91	91	91	91	91	91	91	93		
	VR	136	136	136	136	136	136	136	136	136	136	136		
	V2	140	140	140	140	140	140	140	140	140	140	141		
	GR2	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.5	6.2		
32000	TOFL	8290	8450	8600	8760	8930	9080	9230	9380	9470	9440	9480	128	175
	V1	91	91	91	91	91	91	91	91	91	89	88		
	VR	131	131	131	131	131	132	132	132	132	132	132		
	V2	137	137	137	137	137	137	137	137	137	137	137		
	GR2	7	7	7	7	7	7	6.9	6.9	6.9	6.9	6.6		
31000	TOFL	8180	8320	8490	8650	8790	8950	9110	9270	9340	9330	9370	126	172
	V1	91	91	91	91	91	91	91	91	91	89	88		
	VR	127	127	127	127	127	127	127	127	127	127	128		
	V2	133	133	133	133	133	133	133	133	133	133	133		
	GR2	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7.4	7		

FIGURE 10-8-371. TAKE-OFF DATA; FLAPS - 10°; 10000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	83.9	84.8	85.7	86.6	87.4	88.3	89.2	90.0	90.9	91.7	92.2		
30000	TOFL	8060	8220	8360	8520	8680	8840	8970	9130	9200	9210	9250	123	168
	V1	91	91	91	91	91	91	91	91	91	89	88		
	VR	123	123	123	123	123	123	123	123	123	123	123		
	V2	129	129	129	129	129	129	129	129	129	129	129		
	GR2	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.5		
29000	TOFL	7950	8090	8240	8400	8540	8700	8850	9000	9070	9090	9130	120	165
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	119	119	119	119	119	119	119	119	119	119	119		
	V2	126	126	126	126	126	126	126	126	126	126	126		
	GR2	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3	7.9		
28000	TOFL	7820	7970	8110	8270	8420	8550	8710	8850	8930	8970	9010	117	162
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	115	115	115	115	115	115	115	115	115	115	116		
	V2	123	123	123	123	123	123	123	123	123	123	123		
	GR2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.5		
27000	TOFL	7690	7840	7970	8130	8280	8430	8560	8720	8790	8850	8890	115	159
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	111	111	111	111	111	111	111	111	111	111	112		
	V2	119	119	119	119	119	119	119	119	119	119	120		
	GR2	9.5	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9		
26000	TOFL	7550	7700	7850	7990	8140	8290	8430	8580	8640	8730	8770	113	156
	V1	91	91	91	91	91	91	91	91	91	90	89		
	VR	108	108	108	108	108	108	108	108	108	108	108		
	V2	116	116	116	116	116	116	116	116	116	116	116		
	GR2	10.1	10.1	10.1	10.1	10.1	10.1	10	10	10	10	9.6		

FIGURE 10-8-372. TAKE-OFF DATA; FLAPS - 10°; 11000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
39600	TOFL	16260	16610	16950	17300	17650	18000	18370	18740	19050	19570		150	197
	V1	136	136	136	136	136	136	136	136	136	137			
	VR	165	165	165	165	165	165	165	165	165	165			
	V2	166	166	166	166	166	166	166	166	166	166			
	GR2	4	4	4	4	4	4	3.9	3.9	3.9	3.8			
39000	TOFL	15460	15790	16120	16450	16780	17110	17460	17810	18110	18610	19730	148	195
	V1	132	132	132	132	132	132	132	132	132	133	136		
	VR	162	162	162	162	162	162	162	162	162	163	163		
	V2	164	164	164	164	164	164	164	164	164	164	164		
	GR2	4.2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4	3.7		
38000	TOFL	14220	14520	14820	15120	15420	15730	16050	16370	16650	17110	18130	146	192
	V1	126	126	126	126	126	126	126	126	126	127	130		
	VR	158	158	158	158	159	159	159	159	159	159	159		
	V2	161	161	161	161	161	161	161	161	161	161	161		
	GR2	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.3	4		
37000	TOFL	13030	13300	13580	13860	14130	14410	14700	15010	15270	15700	16660	143	189
	V1	119	119	119	119	119	119	119	120	120	120	123		
	VR	154	154	154	154	154	154	154	154	154	155	155		
	V2	157	157	157	157	157	157	157	157	157	157	157		
	GR2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.6	4.3		
36000	TOFL	11920	12170	12420	12670	12920	13200	13470	13740	13960	14390	15290	140	187
	V1	113	113	113	113	113	113	113	113	113	114	117		
	VR	150	150	150	150	150	150	150	150	150	151	151		
	V2	153	153	153	153	153	153	153	153	153	153	154		
	GR2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5	4.7		
35000	TOFL	10900	11130	11360	11590	11820	12060	12300	12550	12780	13150	13980	138	184
	V1	106	106	107	107	107	107	107	107	107	108	111		
	VR	146	146	146	146	146	146	146	146	146	146	147		
	V2	149	149	149	149	149	149	149	149	149	149	150		
	GR2	5.5	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	5.3	5		
34000	TOFL	9950	10160	10370	10580	10790	11000	11220	11450	11670	12010	12750	135	181
	V1	100	100	100	100	100	101	101	101	101	102	105		
	VR	142	142	142	142	142	142	142	142	142	142	143		
	V2	146	146	146	146	146	146	146	146	146	146	146		
	GR2	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.3		
33000	TOFL	9060	9250	9440	9630	9820	10010	10220	10430	10630	10950	11620	132	178
	V1	94	94	94	94	94	94	95	95	95	96	98		
	VR	138	138	138	138	138	138	138	138	138	138	139		
	V2	142	142	142	142	142	142	142	142	142	142	143		
	GR2	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.1	5.7		
32000	TOFL	8490	8660	8820	8970	9130	9290	9460	9580	9660	9950	10580	129	175
	V1	90	90	90	90	90	90	90	89	89	90	93		
	VR	134	134	134	134	134	134	134	134	134	134	135		
	V2	139	139	139	139	139	139	139	139	139	139	139		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.4	6.1		
31000	TOFL	8370	8540	8690	8850	9010	9180	9340	9430	9460	9500	9590	127	172
	V1	90	90	90	90	90	90	90	89	88	88	87		
	VR	129	130	130	130	130	130	130	130	130	130	131		
	V2	135	135	135	135	135	135	135	135	135	135	135		
	GR2	7.2	7.2	7.1	7.1	7.1	7.1	7.1	7	7	6.9	6.5		

FIGURE 10-8-372. TAKE-OFF DATA; FLAPS - 10°; 11000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.3	85.2	86.1	87.0	87.8	88.7	89.6	90.4	91.3	92.1	91.9		
30000	TOFL	8250	8400	8570	8730	8880	9040	9190	9310	9330	9390	9450	124	169
	V1	90	90	90	90	90	90	90	89	88	88	87		
	VR	125	125	125	125	125	125	125	125	125	126	127		
	V2	131	131	131	131	131	131	131	131	131	131	132		
	GR2	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.5	7.4	7.3	6.9		
29000	TOFL	8130	8290	8430	8590	8760	8910	9060	9160	9180	9270	9330	121	166
	V1	90	90	90	90	90	90	90	89	88	88	87		
	VR	121	121	121	121	121	121	121	121	121	121	122		
	V2	127	127	127	127	127	127	127	127	127	127	128		
	GR2	8.1	8.1	8.1	8.1	8.1	8	8	8	7.9	7.8	7.4		
28000	TOFL	7990	8150	8310	8470	8610	8770	8920	9030	9060	9150	9210	118	162
	V1	90	90	90	90	90	90	90	89	89	88	87		
	VR	117	117	117	117	117	117	117	117	117	117	118		
	V2	124	124	124	124	124	124	124	124	124	124	124		
	GR2	8.6	8.6	8.6	8.6	8.6	8.5	8.5	8.5	8.4	8.2	7.9		
27000	TOFL	7880	8020	8170	8330	8490	8630	8780	8880	8940	9020	9080	115	159
	V1	90	90	90	90	90	90	90	89	89	88	87		
	VR	113	113	113	113	113	113	113	113	113	113	114		
	V2	121	121	121	121	121	121	121	121	121	121	121		
	GR2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9	9	8.8	8.4		
26000	TOFL	7740	7890	8030	8190	8340	8490	8630	8730	8810	8900	8960	113	156
	V1	90	90	90	90	90	90	90	89	89	88	87		
	VR	109	109	109	109	109	109	109	109	109	109	110		
	V2	117	117	117	117	117	117	117	117	117	117	118		
	GR2	9.8	9.8	9.8	9.8	9.7	9.7	9.7	9.6	9.6	9.4	9		

FIGURE 10-8-373. TAKE-OFF DATA; FLAPS - 10°; 12000 FT
ECS - ON; ENGINE ANTI-ICE - ON;
WING ANTI-ICE - ON OR OFF
RUNWAY CONTAMINATED BY ICE
(Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
39600	TOFL	18230	18620	19020	19410	19810							151	197
	V1	142	142	142	142	142								
	VR	168	168	168	168	168								
	V2	169	169	169	169	169								
	GR2	3.7	3.7	3.7	3.7	3.7								
39000	TOFL	17300	17670	18040	18420	18790	19170	19580					150	196
	V1	138	138	138	138	138	138	139						
	VR	165	165	166	166	166	166	166						
	V2	167	167	167	167	167	167	167						
	GR2	3.9	3.9	3.9	3.9	3.8	3.8	3.8						
38000	TOFL	15850	16190	16530	16870	17220	17560	17930	18310	18670	19500		147	193
	V1	131	131	131	131	131	132	132	132	132	134			
	VR	161	161	161	161	161	161	161	161	161	162			
	V2	163	163	163	163	163	163	163	163	163	163			
	GR2	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.1	3.9			
37000	TOFL	14530	14840	15150	15460	15780	16090	16430	16780	17120	17870	19120	144	190
	V1	125	125	125	125	125	125	125	125	126	127	131		
	VR	157	157	157	157	157	157	157	157	157	158	158		
	V2	159	159	159	159	159	159	159	159	159	159	160		
	GR2	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.2	3.9		
36000	TOFL	13250	13530	13820	14100	14390	14680	14990	15320	15640	16360	17500	142	187
	V1	118	118	118	118	118	118	118	119	119	121	124		
	VR	153	153	153	153	153	153	153	153	153	154	154		
	V2	155	155	155	155	155	155	155	155	155	156	156		
	GR2	4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.7	4.5	4.2		
35000	TOFL	12110	12360	12620	12880	13140	13400	13680	13990	14290	14940	16040	139	184
	V1	111	111	111	111	112	112	112	112	112	114	118		
	VR	149	149	149	149	149	149	149	149	149	149	151		
	V2	152	152	152	152	152	152	152	152	152	152	153		
	GR2	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	4.8	4.5		
34000	TOFL	11010	11250	11480	11710	11950	12200	12450	12730	13010	13610	14630	136	181
	V1	105	105	105	105	105	105	105	106	106	108	111		
	VR	145	145	145	145	145	145	145	145	145	145	147		
	V2	148	148	148	148	148	148	148	148	148	148	149		
	GR2	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.4	5.2	4.9		
33000	TOFL	10020	10230	10440	10660	10870	11090	11320	11580	11840	12390	13300	133	178
	V1	98	99	99	99	99	99	99	99	100	102	105		
	VR	140	140	140	140	140	140	141	141	141	141	142		
	V2	144	144	144	144	144	144	144	144	144	144	145		
	GR2	6	6	6	6	6	5.9	5.9	5.9	5.8	5.6	5.2		
32000	TOFL	9090	9280	9480	9670	9860	10060	10270	10510	10750	11260	12070	130	175
	V1	92	92	92	92	92	93	93	93	93	95	99		
	VR	136	136	136	136	136	136	136	136	136	137	138		
	V2	140	140	140	140	140	140	140	140	140	140	141		
	GR2	6.4	6.4	6.4	6.4	6.4	6.4	6.3	6.3	6.2	5.9	5.6		
31000	TOFL	8580	8750	8900	9070	9240	9390	9550	9640	9730	10190	10960	128	172
	V1	89	89	89	89	89	89	88	88	87	89	92		
	VR	132	132	132	132	132	132	132	132	132	133	134		
	V2	137	137	137	137	137	137	137	137	137	137	138		
	GR2	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.7	6.6	6.3	6		

FIGURE 10-8-373. TAKE-OFF DATA; FLAPS - 10°; 12000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	84.7	85.6	86.5	87.3	88.2	89.1	90.0	90.8	91.7	92.3	91.7		
30000	TOFL	8460	8610	8780	8940	9110	9270	9420	9490	9510	9570	9900	125	169
	V1	89	89	89	89	89	89	88	88	87	86	86		
	VR	127	127	127	127	128	128	128	128	128	128	130		
	V2	133	133	133	133	133	133	133	133	133	133	134		
	GR2	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7	6.8	6.4		
29000	TOFL	8330	8480	8650	8800	8970	9120	9270	9360	9390	9440	9530	122	166
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	123	123	123	123	123	123	123	123	123	124	125		
	V2	129	129	129	129	129	129	129	129	129	129	130		
	GR2	7.8	7.8	7.8	7.8	7.7	7.7	7.7	7.6	7.5	7.2	6.9		
28000	TOFL	8200	8350	8510	8670	8830	8980	9130	9220	9270	9320	9410	119	163
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	119	119	119	119	119	119	119	119	119	119	121		
	V2	125	125	125	125	125	125	125	125	125	125	126		
	GR2	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.1	8	7.7	7.3		
27000	TOFL	8070	8220	8380	8530	8700	8840	8990	9060	9140	9200	9280	116	160
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	114	114	114	114	114	114	114	114	114	115	117		
	V2	121	121	121	121	121	121	121	121	121	121	122		
	GR2	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.7	8.5	8.2	7.8		
26000	TOFL	7930	8080	8240	8380	8540	8700	8840	8930	9010	9070	9150	113	156
	V1	89	89	89	89	89	89	88	88	87	86	85		
	VR	111	111	111	111	111	111	111	111	111	111	113		
	V2	118	118	118	118	118	118	118	118	118	118	119		
	GR2	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.1	8.8	8.4		

FIGURE 10-8-374. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL	19390	19830										151	196
	V1	144	144											
	VR	169	169											
	V2	170	170											
	GR2	3.7	3.7											
38000	TOFL	17750	18150	18600	19050	19370	19700						148	193
	V1	137	137	138	138	138	138							
	VR	165	165	165	165	165	165							
	V2	166	166	166	166	166	166							
	GR2	4	4	3.9	3.9	3.9	3.9							
37000	TOFL	16210	16570	16980	17390	17670	17980	18370	18850	19420			145	190
	V1	130	130	131	131	131	131	131	132	132				
	VR	160	160	160	160	160	160	160	160	160				
	V2	162	162	162	162	162	162	162	162	162				
	GR2	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.1	4				
36000	TOFL	14810	15140	15500	15880	16140	16420	16770	17210	17740	18750		143	187
	V1	123	123	124	124	124	124	124	125	126	128			
	VR	156	156	156	156	156	156	156	156	156	157			
	V2	158	158	158	158	158	158	158	158	158	158			
	GR2	4.6	4.6	4.6	4.5	4.6	4.6	4.5	4.4	4.3	4			
35000	TOFL	13470	13770	14100	14440	14680	14930	15250	15660	16170	17120	18400	140	185
	V1	116	116	117	117	117	117	117	118	119	121	125		
	VR	152	152	152	152	152	152	152	152	152	153	154		
	V2	154	154	154	154	154	154	154	154	154	154	155		
	GR2	5	5	4.9	4.9	4.9	4.9	4.9	4.8	4.6	4.3	4		
34000	TOFL	12260	12530	12830	13140	13350	13580	13870	14240	14710	15590	16800	137	182
	V1	110	110	110	110	110	110	110	111	112	115	118		
	VR	148	148	148	148	148	148	148	148	148	149	150		
	V2	150	150	150	150	150	150	150	150	150	150	151		
	GR2	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.2	5	4.7	4.4		
33000	TOFL	11130	11370	11640	11920	12110	12320	12580	12920	13370	14190	15310	134	179
	V1	103	103	103	104	104	104	104	104	106	108	112		
	VR	143	143	143	143	143	143	143	143	143	144	146		
	V2	146	146	146	146	146	146	146	146	146	147	148		
	GR2	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.5	5.3	5.1	4.7		
32000	TOFL	10110	10330	10570	10820	10990	11180	11420	11730	12140	12870	13900	131	176
	V1	97	97	97	97	97	97	97	98	99	102	105		
	VR	139	139	139	139	139	139	139	139	139	140	141		
	V2	143	143	143	143	143	143	143	143	143	143	144		
	GR2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	5.9	5.7	5.4	5.1		
31000	TOFL	9150	9350	9570	9800	9950	10120	10330	10610	11000	11670	12570	128	173
	V1	90	91	91	91	91	91	91	92	93	96	99		
	VR	135	135	135	135	135	135	135	135	135	136	136		
	V2	139	139	139	139	139	139	139	139	139	139	140		
	GR2	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.1	5.8	5.5		

FIGURE 10-8-374. TAKE-OFF DATA; FLAPS - 10°; 13000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.1	86.0	86.8	87.6	88.6	89.5	90.4	91.2	92.1	91.9	91.3		
30000	TOFL	8660	8820	8980	9150	9320	9470	9560	9650	9920	10550	11370	126	169
	V1	87	87	87	87	87	87	87	86	87	89	93		
	VR	130	130	130	130	130	130	130	130	131	132	133		
	V2	135	135	135	135	135	135	135	135	135	135	136		
	GR2	7.1	7	7	6.9	7	7	6.9	6.8	6.6	6.2	5.9		
29000	TOFL	8530	8700	8860	9020	9170	9330	9430	9530	9570	9610	10260	123	166
	V1	87	87	87	87	87	87	87	86	85	84	86		
	VR	126	126	126	126	126	126	126	126	126	127	129		
	V2	131	131	131	131	131	131	131	131	131	132	133		
	GR2	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.3	7	6.7	6.3		
28000	TOFL	8390	8560	8720	8890	9040	9180	9280	9400	9440	9490	9610	120	163
	V1	87	87	87	87	87	87	87	86	85	84	83		
	VR	121	121	121	121	121	121	121	121	121	123	124		
	V2	127	127	127	127	127	127	127	127	127	128	129		
	GR2	8	8	8	7.9	7.9	7.9	7.9	7.8	7.5	7.1	6.8		
27000	TOFL	8270	8430	8590	8740	8890	9040	9150	9270	9320	9360	9480	117	160
	V1	87	87	87	87	87	87	87	86	85	84	83		
	VR	117	117	117	117	117	117	117	117	117	118	120		
	V2	123	123	123	123	123	123	123	123	123	123	125		
	GR2	8.5	8.5	8.5	8.4	8.5	8.5	8.4	8.3	8	7.6	7.3		
26000	TOFL	8130	8290	8440	8590	8740	8880	9020	9140	9190	9230	9350	114	157
	V1	87	87	87	87	87	87	87	87	86	84	83		
	VR	112	112	112	112	112	112	112	112	112	113	115		
	V2	119	119	119	119	119	119	119	119	119	120	121		
	GR2	9.1	9.1	9.1	9	9	9	9	8.9	8.5	8.1	7.8		

FIGURE 10-8-375. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 1 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
39600	TOFL													
	V1													
	VR													
	V2													
	GR2													
39000	TOFL													
	V1													
	VR													
	V2													
	GR2													
38000	TOFL	19850											149	194
	V1	143												
	VR	168												
	V2	169												
	GR2	3.7												
37000	TOFL	18150	18560	19070	19490	19780							147	191
	V1	136	136	137	137	137								
	VR	164	164	164	164	164								
	V2	165	165	165	165	165								
	GR2	4.1	4.1	4	4	4								
36000	TOFL	16550	16920	17380	17760	18020	18350	18790	19390				144	188
	V1	129	129	129	129	129	129	130	131					
	VR	159	159	159	159	159	159	159	159					
	V2	161	161	161	161	161	161	161	161					
	GR2	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.1					
35000	TOFL	15080	15410	15830	16180	16420	16720	17110	17660	18550	19770		141	185
	V1	122	122	123	123	123	123	123	124	126	129			
	VR	155	155	155	155	155	155	155	155	155	156			
	V2	157	157	157	157	157	157	157	157	157	157			
	GR2	4.7	4.7	4.7	4.7	4.7	4.7	4.6	4.4	4.2	3.9			
34000	TOFL	13690	14000	14380	14690	14900	15180	15530	16030	16880	17990	19400	138	182
	V1	115	115	116	116	116	116	116	117	119	122	126		
	VR	151	151	151	151	151	151	151	151	151	152	153		
	V2	153	153	153	153	153	153	153	153	153	153	154		
	GR2	5.1	5.1	5.1	5	5	5	5	4.8	4.5	4.2	3.8		
33000	TOFL	12420	12700	13040	13330	13520	13760	14080	14540	15310	16370	17630	135	179
	V1	108	108	109	109	109	109	109	110	112	115	119		
	VR	146	146	146	146	146	146	146	146	147	148	149		
	V2	149	149	149	149	149	149	149	149	149	149	150		
	GR2	5.5	5.5	5.4	5.4	5.4	5.4	5.3	5.2	4.9	4.6	4.2		
32000	TOFL	11260	11510	11810	12070	12250	12470	12750	13170	13900	14850	16040	133	176
	V1	102	102	102	102	102	102	102	103	106	109	112		
	VR	142	142	142	142	142	142	142	142	142	143	145		
	V2	145	145	145	145	145	145	145	145	145	146	146		
	GR2	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.5	5.2	4.9	4.6		
31000	TOFL	10210	10440	10710	10940	11100	11310	11560	11930	12580	13450	14530	130	173
	V1	95	95	96	96	96	96	96	97	99	102	106		
	VR	137	137	138	138	138	138	138	138	138	139	140		
	V2	141	141	141	141	141	141	141	141	141	142	142		
	GR2	6.3	6.3	6.3	6.2	6.2	6.2	6.2	5.9	5.6	5.3	4.9		

FIGURE 10-8-375. TAKE-OFF DATA; FLAPS - 10°; 14000 FT ECS - ON; ENGINE ANTI-ICE - ON; WING ANTI-ICE - ON OR OFF RUNWAY CONTAMINATED BY ICE (Sheet 2 of 2)

GW (LB)	OAT (°C)	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	Flap 39° Vref (KCAS)	VSE (KCAS) Clean Cfg.
	OAT (°F)	-40	-31	-22	-13	-4	5	14	23	32	41	50		
	N1 (%)	85.5	86.4	87.2	88.0	89.0	89.9	90.8	91.7	92.3	91.4	90.9		
30000	TOFL	9220	9420	9680	9880	10030	10200	10430	10770	11380	12140	13120	127	170
	V1	89	89	89	89	89	89	90	91	93	96	99		
	VR	133	133	133	133	133	133	133	133	134	135	136		
	V2	137	137	137	137	137	137	137	137	137	138	139		
	GR2	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.4	6	5.7	5.3		
29000	TOFL	8710	8890	9070	9220	9380	9490	9620	9710	10220	10960	11820	124	167
	V1	86	86	86	86	86	85	85	86	86	89	93		
	VR	129	129	129	129	129	129	129	129	129	131	132		
	V2	133	133	133	133	133	133	133	133	133	134	135		
	GR2	7.2	7.2	7.2	7.1	7.1	7.1	7	6.8	6.5	6.2	5.8		
28000	TOFL	8590	8740	8920	9090	9240	9340	9490	9590	9640	9820	10650	121	164
	V1	86	86	86	86	86	85	85	85	83	83	87		
	VR	124	124	124	124	124	124	124	124	125	126	128		
	V2	129	129	129	129	129	129	129	129	129	130	131		
	GR2	7.7	7.7	7.6	7.6	7.6	7.6	7.5	7.3	6.9	6.6	6.2		
27000	TOFL	8450	8610	8790	8940	9090	9210	9360	9460	9510	9580	9640	118	160
	V1	86	86	86	86	86	85	85	85	84	82	81		
	VR	119	119	119	119	119	119	119	119	120	122	123		
	V2	125	125	125	125	125	125	125	125	125	126	127		
	GR2	8.2	8.2	8.1	8.1	8.1	8.1	8	7.8	7.4	7.1	6.7		
26000	TOFL	8310	8470	8640	8790	8940	9080	9230	9320	9380	9450	9510	115	157
	V1	86	86	86	86	86	85	85	85	84	82	81		
	VR	114	114	114	114	114	114	114	114	115	117	119		
	V2	121	121	121	121	121	121	121	121	121	122	124		
	GR2	8.7	8.7	8.7	8.6	8.6	8.6	8.6	8.3	7.9	7.6	7.2		

V1 CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY ICE

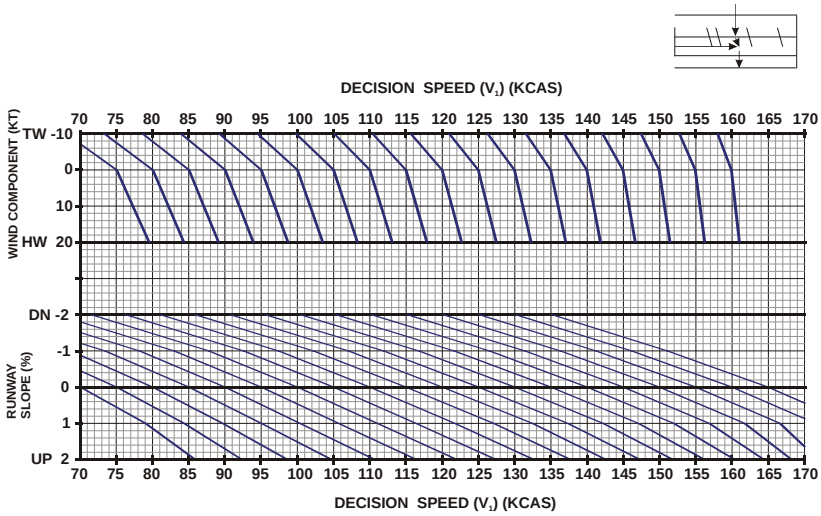
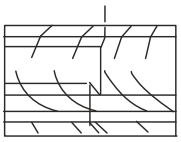


Figure 10-8-376. V1 Corrections Flaps 10° Runway Contaminated By Ice

TAKEOFF FIELD LENGTH CORRECTIONS FLAPS 10°
RUNWAY CONTAMINATED BY ICE



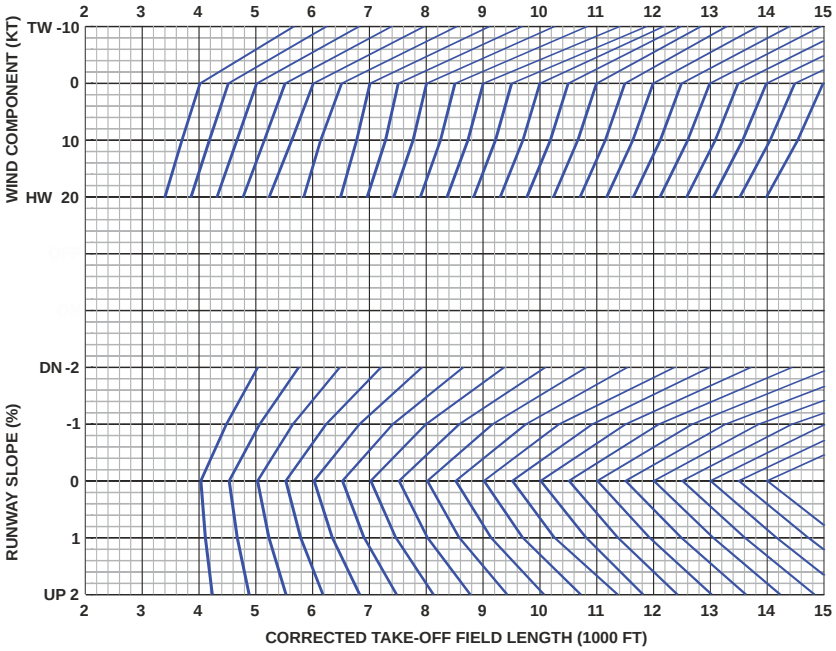


Figure 10-8-377. Takeoff Field Length Corrections Flaps 10°
Runway Contaminated By Ice

LANDING DISTANCE

FIGURE 10-8-378. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	116	111	3400
	26000	118	113	3510
	27000	120	115	3630
	28000	122	117	3740
	29000	124	119	3850
	30000	126	121	3970
	31000	128	123	4080
	32000	130	125	4200
	32700	132	127	4280
	33000	132	127	4310
	34000	134	129	4430
	35000	136	131	4540
	36000	138	133	4660
	37000	140	135	4780
	38000	141	136	4890
	39000	143	138	5010
	39600	144	139	5080
1000	25000	116	111	3490
	26000	118	113	3600
	27000	120	115	3720
	28000	122	117	3840
	29000	124	119	3960
	30000	126	121	4070
	31000	128	123	4190
	32000	130	125	4310
	32700	132	127	4390
	33000	132	127	4430
	34000	134	129	4550
	35000	136	131	4670
	36000	138	133	4790
	37000	140	135	4910
	38000	141	136	5030
	39000	143	138	5160
	39600	144	139	5250

FIGURE 10-8-378. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	116	111	3580
	26000	118	113	3700
	27000	120	115	3820
	28000	122	117	3940
	29000	124	119	4060
	30000	126	121	4190
	31000	128	123	4310
	32000	130	125	4430
	32700	132	127	4520
	33000	132	127	4550
	34000	134	129	4680
	35000	136	131	4800
	36000	138	133	4920
	37000	140	135	5050
	38000	142	137	5180
	39000	144	139	5360
	39600	145	140	5480
3000	25000	116	111	3680
	26000	118	113	3800
	27000	120	115	3930
	28000	122	117	4050
	29000	124	119	4180
	30000	126	121	4300
	31000	128	123	4430
	32000	130	125	4550
	32700	132	127	4640
	33000	132	127	4680
	34000	134	129	4810
	35000	136	131	4940
	36000	138	133	5060
	37000	140	135	5220
	38000	142	137	5410
	39000	145	140	5610
	39600	146	141	5730

FIGURE 10-8-378. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	116	111	3780
	26000	118	113	3910
	27000	120	115	4030
	28000	122	117	4160
	29000	124	119	4290
	30000	126	121	4420
	31000	128	123	4550
	32000	130	125	4680
	32700	132	127	4770
	33000	132	127	4810
	34000	134	129	4950
	35000	136	131	5080
	36000	138	133	5250
	37000	141	136	5450
	38000	143	138	5660
	39000	146	141	5870
	39600	147	142	5990
5000	25000	116	111	3880
	26000	118	113	4010
	27000	120	115	4150
	28000	122	117	4280
	29000	124	119	4410
	30000	126	121	4550
	31000	128	123	4680
	32000	130	125	4820
	32700	132	127	4910
	33000	132	127	4950
	34000	134	129	5090
	35000	137	132	5280
	36000	139	134	5490
	37000	142	137	5700
	38000	144	139	5920
	39000	147	142	6140
	39600	148	143	6270

FIGURE 10-8-378. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	116	111	3990
	26000	118	113	4130
	27000	120	115	4270
	28000	122	117	4400
	29000	124	119	4540
	30000	126	121	4680
	31000	128	123	4820
	32000	130	125	4960
	32700	132	127	5060
	33000	132	127	5110
	34000	135	130	5310
	35000	138	133	5520
	36000	140	135	5750
	37000	143	138	5970
	38000	145	140	6200
	39000	148	143	6430
	39600	149	144	6560
7000	25000	116	111	4110
	26000	118	113	4250
	27000	120	115	4390
	28000	122	117	4530
	29000	124	119	4680
	30000	126	121	4820
	31000	128	123	4960
	32000	131	126	5130
	32700	133	128	5270
	33000	133	128	5340
	34000	136	131	5560
	35000	139	134	5790
	36000	141	136	6020
	37000	144	139	6260
	38000	146	141	6490
	39000	149	144	6720
	39600	150	145	6860

FIGURE 10-8-378. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	116	111	4230
	26000	118	113	4380
	27000	120	115	4520
	28000	122	117	4670
	29000	124	119	4820
	30000	126	121	4970
	31000	129	124	5140
	32000	132	127	5360
	32700	133	128	5520
	33000	134	129	5590
	34000	137	132	5830
	35000	140	135	6070
	36000	142	137	6310
	37000	145	140	6560
	38000	147	142	6790
	39000	150	145	7030
	39600	152	147	7180
9000	25000	116	111	4350
	26000	118	113	4510
	27000	120	115	4660
	28000	122	117	4810
	29000	124	119	4960
	30000	127	122	5150
	31000	130	125	5370
	32000	132	127	5620
	32700	134	129	5790
	33000	135	130	5860
	34000	138	133	6110
	35000	141	136	6370
	36000	143	138	6610
	37000	146	141	6860
	38000	149	144	7100
	39000	151	146	7360
	39600	153	148	7520

FIGURE 10-8-378. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	116	111	4490
	26000	118	113	4640
	27000	120	115	4800
	28000	122	117	4960
	29000	125	120	5160
	30000	128	123	5380
	31000	131	126	5640
	32000	133	128	5890
	32700	135	130	6080
	33000	136	131	6150
	34000	139	134	6410
	35000	142	137	6660
	36000	144	139	6920
	37000	147	142	7180
	38000	150	145	7440
	39000	152	147	7700
	39600	154	149	7860
11000	25000	116	111	4620
	26000	118	113	4780
	27000	120	115	4950
	28000	123	118	5150
	29000	126	121	5390
	30000	129	124	5650
	31000	132	127	5920
	32000	134	129	6190
	32700	136	131	6370
	33000	137	132	6450
	34000	140	135	6710
	35000	143	138	6980
	36000	145	140	7250
	37000	148	143	7520
	38000	151	146	7790
	39000	153	148	8060
	39600	155	150	8230

FIGURE 10-8-378. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	116	111	4780
	26000	118	113	4950
	27000	121	116	5160
	28000	124	119	5400
	29000	127	122	5680
	30000	130	125	5950
	31000	133	128	6220
	32000	135	130	6500
	32700	137	132	6680
	33000	138	133	6770
	34000	141	136	7040
	35000	144	139	7320
	36000	147	142	7600
	37000	149	144	7880
	38000	152	147	8160
	39000	155	150	8440
	39600	156	151	8620
13000	25000	116	111	4930
	26000	119	114	5150
	27000	122	117	5400
	28000	125	120	5680
	29000	128	123	5970
	30000	131	126	6250
	31000	133	128	6530
	32000	136	131	6810
	32700	138	133	7010
	33000	139	134	7090
	34000	142	137	7390
	35000	145	140	7670
	36000	148	143	7960
	37000	150	145	8250
	38000	153	148	8550
	39000	156	151	8850
	39600	157	152	9030

FIGURE 10-8-378. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	117	112	5130
	26000	120	115	5380
	27000	123	118	5670
	28000	126	121	5970
	29000	129	124	6260
	30000	132	127	6550
	31000	135	130	6840
	32000	138	133	7140
	32700	140	135	7350
	33000	140	135	7440
	34000	143	138	7730
	35000	146	141	8030
	36000	149	144	8330
	37000	152	147	8650
	38000	154	149	8960
	39000	157	152	9260
	39600	159	154	9450

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR
WET SNOW**

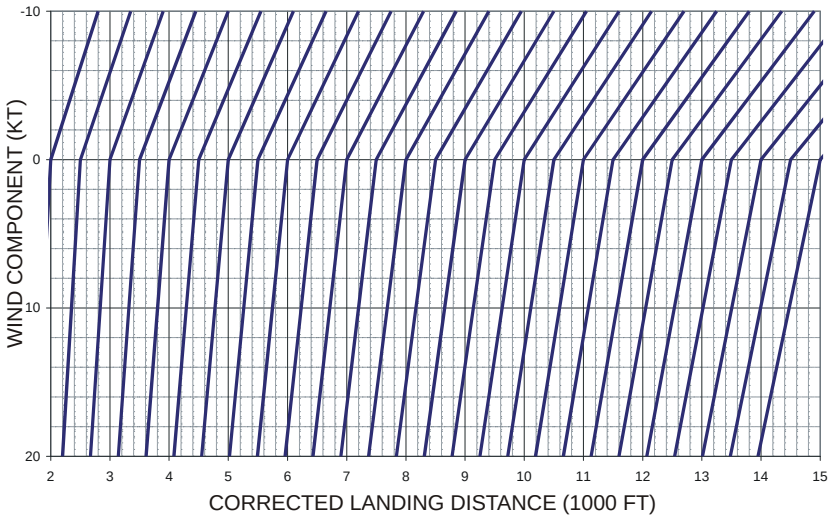


Figure 10-8-379. Actual Landing Distance From 50 FT; Flaps - 39° Wind Components Correction Runway Contaminated by Slush, Standing Water or Snow

FIGURE 10-8-380. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	116	111	3870
	26000	118	113	3990
	27000	120	115	4100
	28000	122	117	4220
	29000	124	119	4340
	30000	126	121	4460
	31000	128	123	4570
	32000	130	125	4690
	32700	132	127	4770
	33000	132	127	4810
	34000	134	129	4930
	35000	136	131	5040
	36000	138	133	5160
	37000	140	135	5280
	38000	141	136	5390
	39000	143	138	5510
	39600	144	139	5580
1000	25000	116	111	3960
	26000	118	113	4080
	27000	120	115	4200
	28000	122	117	4330
	29000	124	119	4450
	30000	126	121	4570
	31000	128	123	4690
	32000	130	125	4810
	32700	132	127	4890
	33000	132	127	4930
	34000	134	129	5050
	35000	136	131	5170
	36000	138	133	5290
	37000	140	135	5410
	38000	141	136	5530
	39000	143	138	5650
	39600	144	139	5730

FIGURE 10-8-380. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	116	111	4060
	26000	118	113	4180
	27000	120	115	4310
	28000	122	117	4430
	29000	124	119	4560
	30000	126	121	4680
	31000	128	123	4810
	32000	130	125	4930
	32700	132	127	5020
	33000	132	127	5050
	34000	134	129	5180
	35000	136	131	5300
	36000	138	133	5430
	37000	140	135	5550
	38000	142	137	5680
	39000	144	139	5830
	39600	145	140	5930
3000	25000	116	111	4160
	26000	118	113	4290
	27000	120	115	4420
	28000	122	117	4550
	29000	124	119	4670
	30000	126	121	4800
	31000	128	123	4930
	32000	130	125	5060
	32700	132	127	5150
	33000	132	127	5190
	34000	134	129	5310
	35000	136	131	5440
	36000	138	133	5570
	37000	140	135	5710
	38000	142	137	5870
	39000	145	140	6040
	39600	146	141	6130

FIGURE 10-8-380. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	116	111	4270
	26000	118	113	4400
	27000	120	115	4530
	28000	122	117	4660
	29000	124	119	4790
	30000	126	121	4930
	31000	128	123	5060
	32000	130	125	5190
	32700	132	127	5280
	33000	132	127	5320
	34000	134	129	5450
	35000	136	131	5580
	36000	138	133	5740
	37000	141	136	5910
	38000	143	138	6080
	39000	146	141	6250
	39600	147	142	6350
5000	25000	116	111	4370
	26000	118	113	4510
	27000	120	115	4650
	28000	122	117	4780
	29000	124	119	4920
	30000	126	121	5050
	31000	128	123	5190
	32000	130	125	5320
	32700	132	127	5420
	33000	132	127	5460
	34000	134	129	5600
	35000	137	132	5770
	36000	139	134	5940
	37000	142	137	6110
	38000	144	139	6290
	39000	147	142	6470
	39600	148	143	6580

FIGURE 10-8-380. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	116	111	4490
	26000	118	113	4630
	27000	120	115	4770
	28000	122	117	4910
	29000	124	119	5050
	30000	126	121	5190
	31000	128	123	5330
	32000	130	125	5470
	32700	132	127	5570
	33000	132	127	5620
	34000	135	130	5790
	35000	138	133	5970
	36000	140	135	6150
	37000	143	138	6340
	38000	145	140	6520
	39000	148	143	6710
	39600	149	144	6820
7000	25000	116	111	4610
	26000	118	113	4750
	27000	120	115	4900
	28000	122	117	5040
	29000	124	119	5190
	30000	126	121	5330
	31000	128	123	5470
	32000	131	126	5640
	32700	133	128	5760
	33000	133	128	5820
	34000	136	131	6000
	35000	139	134	6190
	36000	141	136	6380
	37000	144	139	6570
	38000	146	141	6760
	39000	149	144	6960
	39600	150	145	7080

FIGURE 10-8-380. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	116	111	4740
	26000	118	113	4880
	27000	120	115	5030
	28000	122	117	5180
	29000	124	119	5330
	30000	126	121	5480
	31000	129	124	5650
	32000	132	127	5840
	32700	133	128	5970
	33000	134	129	6030
	34000	137	132	6230
	35000	140	135	6420
	36000	142	137	6620
	37000	145	140	6820
	38000	147	142	7020
	39000	150	145	7220
	39600	152	147	7350
9000	25000	116	111	4860
	26000	118	113	5020
	27000	120	115	5170
	28000	122	117	5320
	29000	124	119	5470
	30000	127	122	5660
	31000	130	125	5860
	32000	132	127	6050
	32700	134	129	6190
	33000	135	130	6250
	34000	138	133	6460
	35000	141	136	6660
	36000	143	138	6870
	37000	146	141	7080
	38000	149	144	7290
	39000	151	146	7500
	39600	153	148	7630

FIGURE 10-8-380. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	116	111	5000
	26000	118	113	5160
	27000	120	115	5310
	28000	122	117	5470
	29000	125	120	5670
	30000	128	123	5870
	31000	131	126	6070
	32000	133	128	6280
	32700	135	130	6430
	33000	136	131	6490
	34000	139	134	6700
	35000	142	137	6920
	36000	144	139	7130
	37000	147	142	7350
	38000	150	145	7570
	39000	152	147	7790
	39600	154	149	7920
11000	25000	116	111	5140
	26000	118	113	5300
	27000	120	115	5460
	28000	123	118	5670
	29000	126	121	5880
	30000	129	124	6090
	31000	132	127	6300
	32000	134	129	6520
	32700	136	131	6670
	33000	137	132	6740
	34000	140	135	6960
	35000	143	138	7180
	36000	145	140	7410
	37000	148	143	7640
	38000	151	146	7860
	39000	153	148	8090
	39600	155	150	8220

FIGURE 10-8-380. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	116	111	5290
	26000	118	113	5460
	27000	121	116	5670
	28000	124	119	5890
	29000	127	122	6110
	30000	130	125	6330
	31000	133	128	6550
	32000	135	130	6780
	32700	137	132	6940
	33000	138	133	7010
	34000	141	136	7240
	35000	144	139	7470
	36000	147	142	7710
	37000	149	144	7940
	38000	152	147	8170
	39000	155	150	8400
	39600	156	151	8550
13000	25000	116	111	5440
	26000	119	114	5660
	27000	122	117	5890
	28000	125	120	6110
	29000	128	123	6340
	30000	131	126	6570
	31000	133	128	6810
	32000	136	131	7040
	32700	138	133	7210
	33000	139	134	7280
	34000	142	137	7530
	35000	145	140	7770
	36000	148	143	8000
	37000	150	145	8250
	38000	153	148	8490
	39000	156	151	8740
	39600	157	152	8890

FIGURE 10-8-380. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	117	112	5650
	26000	120	115	5880
	27000	123	118	6110
	28000	126	121	6350
	29000	129	124	6590
	30000	132	127	6830
	31000	135	130	7070
	32000	138	133	7320
	32700	140	135	7500
	33000	140	135	7570
	34000	143	138	7820
	35000	146	141	8070
	36000	149	144	8320
	37000	152	147	8570
	38000	154	149	8830
	39000	157	152	9080
	39600	159	154	9230

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY DRY SNOW**

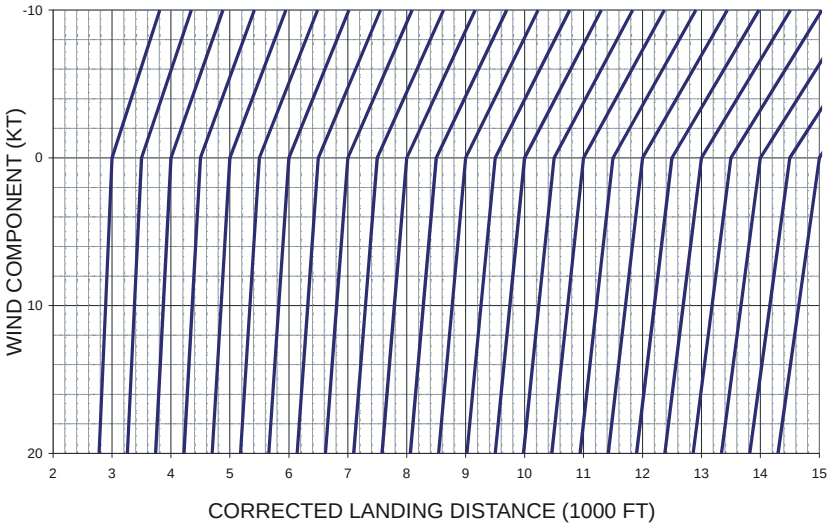


Figure 10-8-381. Actual Landing Distance From 50 FT; Flaps - 39° Wind Components Correction Runway Contaminated by Dry Snow

FIGURE 10-8-382. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	116	111	3650
	26000	118	113	3760
	27000	120	115	3870
	28000	122	117	3980
	29000	124	119	4090
	30000	126	121	4200
	31000	128	123	4300
	32000	130	125	4410
	32700	132	127	4490
	33000	132	127	4520
	34000	134	129	4630
	35000	136	131	4740
	36000	138	133	4840
	37000	140	135	4950
	38000	141	136	5060
	39000	143	138	5170
	39600	144	139	5230
1000	25000	116	111	3740
	26000	118	113	3850
	27000	120	115	3960
	28000	122	117	4070
	29000	124	119	4190
	30000	126	121	4300
	31000	128	123	4410
	32000	130	125	4520
	32700	132	127	4600
	33000	132	127	4630
	34000	134	129	4740
	35000	136	131	4850
	36000	138	133	4970
	37000	140	135	5080
	38000	141	136	5190
	39000	143	138	5300
	39600	144	139	5370

FIGURE 10-8-382. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	116	111	3830
	26000	118	113	3940
	27000	120	115	4060
	28000	122	117	4170
	29000	124	119	4290
	30000	126	121	4400
	31000	128	123	4520
	32000	130	125	4630
	32700	132	127	4710
	33000	132	127	4750
	34000	134	129	4860
	35000	136	131	4980
	36000	138	133	5090
	37000	140	135	5200
	38000	142	137	5320
	39000	144	139	5470
	39600	145	140	5550
3000	25000	116	111	3920
	26000	118	113	4040
	27000	120	115	4160
	28000	122	117	4280
	29000	124	119	4400
	30000	126	121	4510
	31000	128	123	4630
	32000	130	125	4750
	32700	132	127	4830
	33000	132	127	4870
	34000	134	129	4990
	35000	136	131	5100
	36000	138	133	5220
	37000	140	135	5350
	38000	142	137	5500
	39000	145	140	5650
	39600	146	141	5750

FIGURE 10-8-382. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	116	111	4020
	26000	118	113	4140
	27000	120	115	4260
	28000	122	117	4380
	29000	124	119	4510
	30000	126	121	4630
	31000	128	123	4750
	32000	130	125	4870
	32700	132	127	4950
	33000	132	127	4990
	34000	134	129	5110
	35000	136	131	5230
	36000	138	133	5380
	37000	141	136	5540
	38000	143	138	5690
	39000	146	141	5850
	39600	147	142	5950
5000	25000	116	111	4120
	26000	118	113	4240
	27000	120	115	4370
	28000	122	117	4490
	29000	124	119	4620
	30000	126	121	4740
	31000	128	123	4870
	32000	130	125	4990
	32700	132	127	5080
	33000	132	127	5120
	34000	134	129	5250
	35000	137	132	5400
	36000	139	134	5560
	37000	142	137	5730
	38000	144	139	5890
	39000	147	142	6060
	39600	148	143	6160

FIGURE 10-8-382. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	116	111	4220
	26000	118	113	4350
	27000	120	115	4480
	28000	122	117	4610
	29000	124	119	4740
	30000	126	121	4870
	31000	128	123	5000
	32000	130	125	5130
	32700	132	127	5220
	33000	132	127	5270
	34000	135	130	5430
	35000	138	133	5590
	36000	140	135	5760
	37000	143	138	5930
	38000	145	140	6100
	39000	148	143	6280
	39600	149	144	6380
7000	25000	116	111	4330
	26000	118	113	4470
	27000	120	115	4600
	28000	122	117	4730
	29000	124	119	4870
	30000	126	121	5000
	31000	128	123	5130
	32000	131	126	5280
	32700	133	128	5400
	33000	133	128	5450
	34000	136	131	5620
	35000	139	134	5800
	36000	141	136	5970
	37000	144	139	6150
	38000	146	141	6330
	39000	149	144	6510
	39600	150	145	6620

FIGURE 10-8-382. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	116	111	4450
	26000	118	113	4590
	27000	120	115	4720
	28000	122	117	4860
	29000	124	119	5000
	30000	126	121	5130
	31000	129	124	5300
	32000	132	127	5470
	32700	133	128	5600
	33000	134	129	5650
	34000	137	132	5830
	35000	140	135	6010
	36000	142	137	6200
	37000	145	140	6380
	38000	147	142	6570
	39000	150	145	6750
	39600	152	147	6870
9000	25000	116	111	4570
	26000	118	113	4710
	27000	120	115	4850
	28000	122	117	4990
	29000	124	119	5130
	30000	127	122	5300
	31000	130	125	5490
	32000	132	127	5670
	32700	134	129	5800
	33000	135	130	5860
	34000	138	133	6050
	35000	141	136	6230
	36000	143	138	6420
	37000	146	141	6620
	38000	149	144	6810
	39000	151	146	7010
	39600	153	148	7130

FIGURE 10-8-382. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	116	111	4690
	26000	118	113	4840
	27000	120	115	4980
	28000	122	117	5130
	29000	125	120	5310
	30000	128	123	5500
	31000	131	126	5690
	32000	133	128	5880
	32700	135	130	6020
	33000	136	131	6080
	34000	139	134	6270
	35000	142	137	6470
	36000	144	139	6670
	37000	147	142	6870
	38000	150	145	7080
	39000	152	147	7280
	39600	154	149	7400
11000	25000	116	111	4820
	26000	118	113	4970
	27000	120	115	5120
	28000	123	118	5310
	29000	126	121	5500
	30000	129	124	5700
	31000	132	127	5900
	32000	134	129	6100
	32700	136	131	6240
	33000	137	132	6300
	34000	140	135	6510
	35000	143	138	6720
	36000	145	140	6930
	37000	148	143	7140
	38000	151	146	7340
	39000	153	148	7550
	39600	155	150	7680

FIGURE 10-8-382. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	116	111	4960
	26000	118	113	5120
	27000	121	116	5310
	28000	124	119	5510
	29000	127	122	5720
	30000	130	125	5920
	31000	133	128	6130
	32000	135	130	6340
	32700	137	132	6490
	33000	138	133	6550
	34000	141	136	6770
	35000	144	139	6990
	36000	147	142	7200
	37000	149	144	7410
	38000	152	147	7630
	39000	155	150	7850
	39600	156	151	7980
13000	25000	116	111	5100
	26000	119	114	5300
	27000	122	117	5510
	28000	125	120	5720
	29000	128	123	5940
	30000	131	126	6150
	31000	133	128	6370
	32000	136	131	6590
	32700	138	133	6740
	33000	139	134	6810
	34000	142	137	7040
	35000	145	140	7260
	36000	148	143	7480
	37000	150	145	7700
	38000	153	148	7930
	39000	156	151	8160
	39600	157	152	8290

FIGURE 10-8-382. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	117	112	5290
	26000	120	115	5500
	27000	123	118	5720
	28000	126	121	5940
	29000	129	124	6160
	30000	132	127	6390
	31000	135	130	6610
	32000	138	133	6850
	32700	140	135	7010
	33000	140	135	7080
	34000	143	138	7300
	35000	146	141	7530
	36000	149	144	7770
	37000	152	147	8000
	38000	154	149	8240
	39000	157	152	8470
	39600	159	154	8610

ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY COMPACTED SNOW

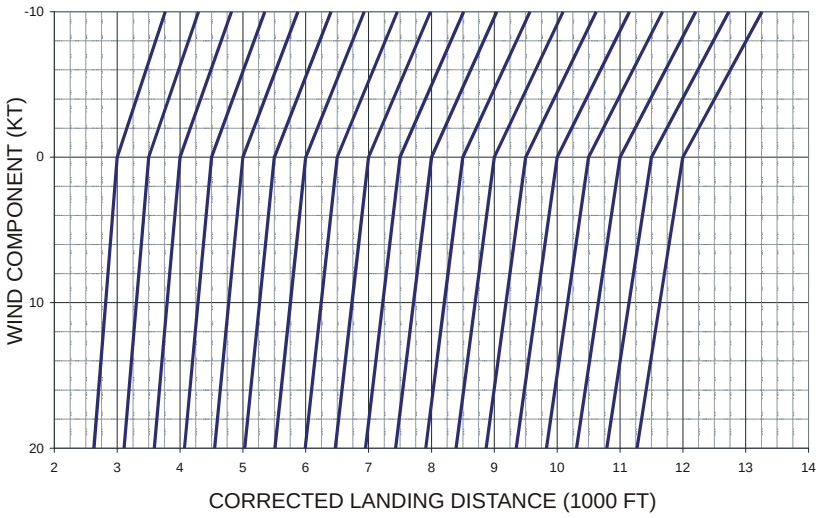


Figure 10-8-383. Actual Landing Distance From 50 FT; Flaps - 39° Wind Components Correction Runway Contaminated by Compacted Snow

FIGURE 10-8-384. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	116	111	6040
	26000	118	113	6230
	27000	120	115	6430
	28000	122	117	6630
	29000	124	119	6830
	30000	126	121	7020
	31000	128	123	7220
	32000	130	125	7420
	32700	132	127	7560
	33000	132	127	7620
	34000	134	129	7820
	35000	136	131	8020
	36000	138	133	8220
	37000	140	135	8420
	38000	142	136	8620
	39000	144	138	8820
	39600	146	139	8940
1000	25000	115	111	6200
	26000	118	113	6410
	27000	120	115	6610
	28000	122	117	6810
	29000	124	119	7020
	30000	126	121	7220
	31000	128	123	7430
	32000	130	125	7630
	32700	132	127	7780
	33000	132	127	7840
	34000	134	129	8040
	35000	136	131	8250
	36000	138	133	8460
	37000	140	135	8660
	38000	143	136	8870
	39000	145	138	9080
	39600	146	140	9220

FIGURE 10-8-384. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	115	111	6370
	26000	118	113	6580
	27000	120	115	6790
	28000	122	117	7000
	29000	124	119	7210
	30000	126	121	7430
	31000	128	123	7640
	32000	130	125	7850
	32700	132	127	8000
	33000	132	127	8060
	34000	134	129	8270
	35000	136	131	8490
	36000	139	133	8700
	37000	141	135	8910
	38000	143	137	9130
	39000	146	139	9390
	39600	147	140	9540
3000	25000	115	111	6560
	26000	118	113	6770
	27000	120	115	6990
	28000	122	117	7210
	29000	124	119	7420
	30000	126	121	7640
	31000	128	123	7860
	32000	130	125	8080
	32700	132	127	8230
	33000	132	127	8300
	34000	135	129	8520
	35000	137	131	8740
	36000	139	133	8960
	37000	142	135	9200
	38000	144	137	9460
	39000	146	140	9730
	39600	148	141	9890

FIGURE 10-8-384. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	115	111	6740
	26000	118	113	6970
	27000	120	115	7190
	28000	122	117	7420
	29000	124	119	7640
	30000	126	121	7870
	31000	128	123	8090
	32000	130	125	8320
	32700	132	127	8480
	33000	133	127	8540
	34000	135	129	8770
	35000	137	131	9000
	36000	140	133	9260
	37000	142	136	9530
	38000	145	138	9810
	39000	147	141	10090
	39600	148	142	10260
5000	25000	115	111	6940
	26000	118	113	7170
	27000	120	115	7400
	28000	122	117	7630
	29000	124	119	7860
	30000	126	121	8090
	31000	128	123	8330
	32000	131	125	8560
	32700	132	127	8720
	33000	133	127	8790
	34000	136	129	9030
	35000	138	132	9310
	36000	140	134	9590
	37000	143	137	9880
	38000	145	139	10170
	39000	148	142	10460
	39600	149	143	10640

FIGURE 10-8-384. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	115	111	7150
	26000	118	113	7380
	27000	120	115	7620
	28000	122	117	7860
	29000	124	119	8100
	30000	126	121	8340
	31000	129	123	8580
	32000	131	125	8820
	32700	133	127	8990
	33000	134	127	9080
	34000	136	130	9370
	35000	139	133	9660
	36000	141	135	9960
	37000	144	138	10260
	38000	146	140	10560
	39000	149	143	10870
	39600	150	144	11050
7000	25000	115	111	7360
	26000	118	113	7610
	27000	120	115	7860
	28000	122	117	8100
	29000	124	119	8350
	30000	127	121	8600
	31000	129	123	8850
	32000	132	126	9120
	32700	134	127	9330
	33000	134	128	9420
	34000	137	131	9720
	35000	139	133	10030
	36000	142	136	10340
	37000	144	139	10660
	38000	147	141	10970
	39000	150	144	11290
	39600	151	145	11480

FIGURE 10-8-384. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	115	111	7590
	26000	118	113	7840
	27000	120	115	8100
	28000	122	117	8350
	29000	125	119	8610
	30000	127	121	8870
	31000	130	124	9160
	32000	132	126	9470
	32700	134	128	9690
	33000	135	129	9780
	34000	137	132	10100
	35000	140	134	10420
	36000	143	137	10750
	37000	145	140	11080
	38000	148	142	11410
	39000	150	145	11740
	39600	152	146	11940
9000	25000	115	111	7820
	26000	118	113	8090
	27000	120	115	8350
	28000	122	117	8610
	29000	125	119	8880
	30000	128	122	9190
	31000	130	125	9510
	32000	133	127	9830
	32700	135	129	10060
	33000	136	130	10160
	34000	138	133	10500
	35000	141	135	10830
	36000	144	138	11170
	37000	146	141	11510
	38000	149	143	11860
	39000	152	146	12210
	39600	153	148	12420

FIGURE 10-8-384. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	115	111	8070
	26000	118	113	8340
	27000	120	115	8610
	28000	123	117	8880
	29000	126	120	9210
	30000	128	123	9540
	31000	131	125	9880
	32000	134	128	10220
	32700	136	130	10460
	33000	136	131	10560
	34000	139	134	10910
	35000	142	136	11260
	36000	145	139	11610
	37000	147	142	11970
	38000	150	144	12340
	39000	153	147	12700
	39600	154	149	12910
11000	25000	115	111	8320
	26000	118	113	8600
	27000	121	115	8880
	28000	124	118	9220
	29000	126	121	9560
	30000	129	124	9910
	31000	132	126	10270
	32000	134	129	10620
	32700	136	131	10870
	33000	137	132	10980
	34000	140	135	11340
	35000	143	137	11710
	36000	146	140	12080
	37000	148	143	12460
	38000	151	145	12830
	39000	154	148	13200
	39600	156	150	13420

FIGURE 10-8-384. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	116	111	8600
	26000	119	113	8890
	27000	121	116	9240
	28000	124	119	9590
	29000	127	122	9950
	30000	130	124	10320
	31000	133	127	10690
	32000	135	130	11060
	32700	137	132	11320
	33000	138	133	11430
	34000	141	136	11810
	35000	144	139	12200
	36000	147	141	12580
	37000	149	144	12960
	38000	152	147	13350
	39000	155	149	13740
	39600	157	151	13970
13000	25000	116	111	8880
	26000	119	114	9240
	27000	122	117	9600
	28000	125	120	9970
	29000	128	122	10350
	30000	130	125	10730
	31000	133	128	11120
	32000	136	131	11510
	32700	138	133	11780
	33000	139	134	11900
	34000	142	137	12300
	35000	145	140	12690
	36000	148	142	13090
	37000	151	145	13490
	38000	154	148	13900
	39000	157	150	14310
	39600	159	152	14550

FIGURE 10-8-384. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 39° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	V_{APP}	V_{REF}	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	117	111	9220
	26000	120	114	9600
	27000	123	117	9980
	28000	125	120	10370
	29000	128	123	10770
	30000	131	126	11160
	31000	134	129	11570
	32000	137	132	11980
	32700	139	134	12270
	33000	140	135	12390
	34000	143	138	12790
	35000	146	141	13200
	36000	149	143	13620
	37000	152	146	14040
	38000	155	149	14460
	39000	158	151	14880
	39600	160	153	15130

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 39°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY ICE**

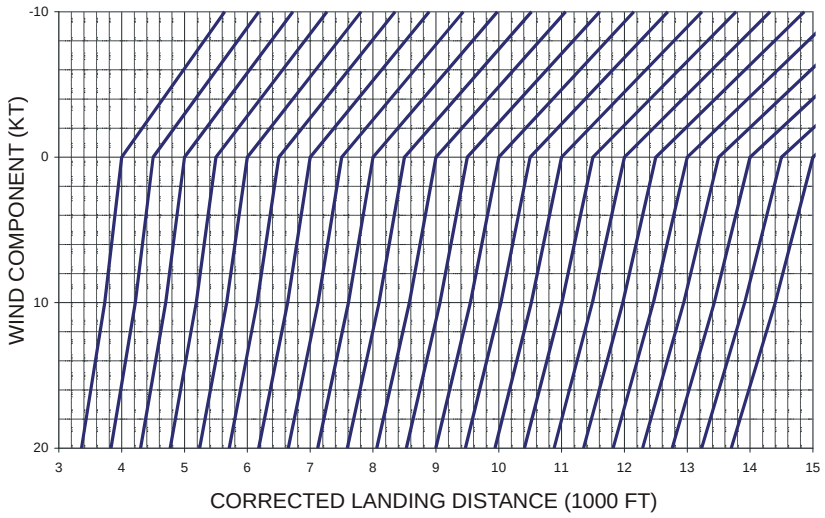


Figure 10-8-385. Actual Landing Distance From 50 FT; Flaps - 39° Wind Components Correction Runway Contaminated by Ice

FIGURE 10-8-386. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	120	115	3630
	26000	122	117	3760
	27000	125	120	3880
	28000	127	122	4000
	29000	129	124	4130
	30000	131	126	4250
	31000	133	128	4380
	32000	135	130	4500
	32700	137	132	4590
	33000	137	132	4630
	34000	139	134	4750
	35000	141	136	4880
	36000	143	138	5010
	37000	145	140	5140
	38000	147	142	5300
	39000	149	144	5480
	39600	151	146	5600
1000	25000	120	115	3730
	26000	122	117	3860
	27000	125	120	3980
	28000	127	122	4110
	29000	129	124	4240
	30000	131	126	4370
	31000	133	128	4500
	32000	135	130	4630
	32700	137	132	4720
	33000	137	132	4760
	34000	139	134	4890
	35000	141	136	5020
	36000	143	138	5150
	37000	145	140	5330
	38000	148	143	5520
	39000	150	145	5720
	39600	151	146	5840

FIGURE 10-8-386. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	120	115	3830
	26000	122	117	3960
	27000	125	120	4090
	28000	127	122	4220
	29000	129	124	4360
	30000	131	126	4490
	31000	133	128	4620
	32000	135	130	4760
	32700	137	132	4850
	33000	137	132	4890
	34000	139	134	5020
	35000	141	136	5170
	36000	144	139	5350
	37000	146	141	5560
	38000	148	143	5760
	39000	151	146	5960
	39600	152	147	6080
3000	25000	120	115	3930
	26000	122	117	4070
	27000	125	120	4210
	28000	127	122	4340
	29000	129	124	4480
	30000	131	126	4620
	31000	133	128	4750
	32000	135	130	4890
	32700	137	132	4990
	33000	137	132	5030
	34000	140	135	5190
	35000	142	137	5380
	36000	144	139	5590
	37000	147	142	5800
	38000	149	144	6010
	39000	151	146	6210
	39600	153	148	6340

FIGURE 10-8-386. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	120	115	4040
	26000	122	117	4180
	27000	125	120	4320
	28000	127	122	4460
	29000	129	124	4610
	30000	131	126	4750
	31000	133	128	4890
	32000	135	130	5030
	32700	137	132	5140
	33000	138	133	5200
	34000	140	135	5400
	35000	142	137	5610
	36000	145	140	5830
	37000	147	142	6050
	38000	150	145	6260
	39000	152	147	6480
	39600	154	149	6610
5000	25000	120	115	4160
	26000	123	118	4300
	27000	125	120	4440
	28000	127	122	4590
	29000	129	124	4740
	30000	131	126	4880
	31000	133	128	5030
	32000	136	131	5210
	32700	137	132	5350
	33000	138	133	5410
	34000	141	136	5640
	35000	143	138	5860
	36000	146	141	6080
	37000	148	143	6300
	38000	150	145	6530
	39000	153	148	6760
	39600	154	149	6890

FIGURE 10-8-386. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	120	115	4280
	26000	123	118	4430
	27000	125	120	4580
	28000	127	122	4730
	29000	129	124	4880
	30000	131	126	5030
	31000	134	129	5210
	32000	136	131	5430
	32700	138	133	5590
	33000	139	134	5660
	34000	141	136	5890
	35000	144	139	6120
	36000	146	141	6350
	37000	149	144	6580
	38000	151	146	6820
	39000	154	149	7060
	39600	155	150	7190
7000	25000	120	115	4400
	26000	123	118	4560
	27000	125	120	4710
	28000	127	122	4870
	29000	129	124	5020
	30000	132	127	5220
	31000	134	129	5440
	32000	137	132	5680
	32700	139	134	5850
	33000	139	134	5920
	34000	142	137	6150
	35000	144	139	6390
	36000	147	142	6630
	37000	150	145	6880
	38000	152	147	7120
	39000	155	150	7370
	39600	156	151	7520

FIGURE 10-8-386. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	120	115	4540
	26000	123	118	4700
	27000	125	120	4860
	28000	127	122	5020
	29000	130	125	5220
	30000	132	127	5450
	31000	135	130	5690
	32000	137	132	5940
	32700	139	134	6110
	33000	140	135	6190
	34000	143	138	6440
	35000	145	140	6690
	36000	148	143	6930
	37000	151	146	7190
	38000	153	148	7450
	39000	156	151	7710
	39600	157	152	7870
9000	25000	120	115	4670
	26000	123	118	4840
	27000	125	120	5010
	28000	128	123	5210
	29000	130	125	5440
	30000	133	128	5700
	31000	136	131	5960
	32000	138	133	6210
	32700	140	135	6390
	33000	141	136	6470
	34000	143	138	6730
	35000	146	141	6990
	36000	149	144	7250
	37000	151	146	7520
	38000	154	149	7790
	39000	157	152	8070
	39600	158	153	8240

FIGURE 10-8-386. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	120	115	4810
	26000	123	118	4990
	27000	125	120	5200
	28000	128	123	5440
	29000	131	126	5700
	30000	133	128	5970
	31000	136	131	6230
	32000	139	134	6500
	32700	141	136	6680
	33000	142	137	6760
	34000	144	139	7030
	35000	147	142	7300
	36000	150	145	7580
	37000	153	148	7870
	38000	155	150	8160
	39000	158	153	8460
	39600	160	155	8630
11000	25000	120	115	4970
	26000	123	118	5180
	27000	126	121	5430
	28000	129	124	5700
	29000	131	126	5970
	30000	134	129	6240
	31000	137	132	6520
	32000	140	135	6790
	32700	142	137	6990
	33000	143	138	7070
	34000	145	140	7350
	35000	148	143	7640
	36000	151	146	7940
	37000	154	149	8240
	38000	157	152	8550
	39000	159	154	8870
	39600	161	156	9060

FIGURE 10-8-386. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	121	116	5160
	26000	124	119	5420
	27000	127	122	5700
	28000	129	124	5980
	29000	132	127	6270
	30000	135	130	6550
	31000	138	133	6830
	32000	141	136	7120
	32700	143	138	7320
	33000	143	138	7410
	34000	146	141	7710
	35000	149	144	8020
	36000	152	147	8330
	37000	155	150	8660
	38000	158	153	8980
	39000	161	156	9320
	39600	163	158	9520
13000	25000	121	116	5390
	26000	124	119	5680
	27000	127	122	5980
	28000	130	125	6270
	29000	133	128	6560
	30000	136	131	6850
	31000	139	134	7150
	32000	142	137	7460
	32700	144	139	7670
	33000	144	139	7770
	34000	147	142	8090
	35000	150	145	8420
	36000	153	148	8750
	37000	156	151	9090
	38000	159	154	9440
	39000	162	157	9810
	39600	164	159	10020

FIGURE 10-8-386. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	122	117	5650
	26000	125	120	5960
	27000	128	123	6260
	28000	131	126	6570
	29000	134	129	6870
	30000	137	132	7180
	31000	140	135	7490
	32000	143	138	7820
	32700	145	140	8050
	33000	146	141	8150
	34000	149	144	8490
	35000	152	147	8840
	36000	155	150	9200
	37000	158	153	9560
	38000	161	156	9940
	39000	164	159	10320
	39600	166	161	10560

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR
WET SNOW**

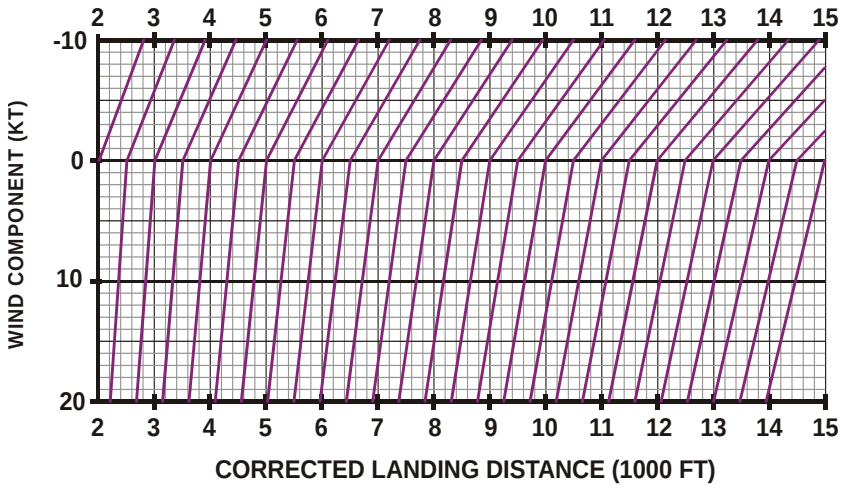


Figure 10-8-387. Actual Landing Distance From 50 FT; Flaps - 20° Wind Components Correction Runway Contaminated by Slush, Standing Water or Snow

FIGURE 10-8-388. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	120	115	4120
	26000	122	117	4250
	27000	125	120	4380
	28000	127	122	4500
	29000	129	124	4630
	30000	131	126	4760
	31000	133	128	4880
	32000	135	130	5010
	32700	137	132	5100
	33000	137	132	5140
	34000	139	134	5260
	35000	141	136	5390
	36000	143	138	5510
	37000	145	140	5640
	38000	147	142	5780
	39000	149	144	5920
	39600	151	146	6010
1000	25000	120	115	4220
	26000	122	117	4350
	27000	125	120	4490
	28000	127	122	4620
	29000	129	124	4750
	30000	131	126	4880
	31000	133	128	5010
	32000	135	130	5140
	32700	137	132	5230
	33000	137	132	5270
	34000	139	134	5400
	35000	141	136	5530
	36000	143	138	5660
	37000	145	140	5800
	38000	148	143	5950
	39000	150	145	6110
	39600	151	146	6200

FIGURE 10-8-388. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	120	115	4330
	26000	122	117	4460
	27000	125	120	4600
	28000	127	122	4730
	29000	129	124	4870
	30000	131	126	5000
	31000	133	128	5130
	32000	135	130	5270
	32700	137	132	5360
	33000	137	132	5400
	34000	139	134	5530
	35000	141	136	5670
	36000	144	139	5820
	37000	146	141	5980
	38000	148	143	6140
	39000	151	146	6300
	39600	152	147	6400
3000	25000	120	115	4440
	26000	122	117	4580
	27000	125	120	4710
	28000	127	122	4850
	29000	129	124	4990
	30000	131	126	5130
	31000	133	128	5270
	32000	135	130	5400
	32700	137	132	5500
	33000	137	132	5540
	34000	140	135	5690
	35000	142	137	5850
	36000	144	139	6010
	37000	147	142	6170
	38000	149	144	6340
	39000	151	146	6500
	39600	153	148	6600

FIGURE 10-8-388. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	120	115	4550
	26000	122	117	4690
	27000	125	120	4840
	28000	127	122	4980
	29000	129	124	5120
	30000	131	126	5260
	31000	133	128	5400
	32000	135	130	5550
	32700	137	132	5650
	33000	138	133	5700
	34000	140	135	5870
	35000	142	137	6030
	36000	145	140	6200
	37000	147	142	6370
	38000	150	145	6540
	39000	152	147	6720
	39600	154	149	6820
5000	25000	120	115	4670
	26000	123	118	4810
	27000	125	120	4960
	28000	127	122	5110
	29000	129	124	5250
	30000	131	126	5400
	31000	133	128	5540
	32000	136	131	5710
	32700	137	132	5830
	33000	138	133	5880
	34000	141	136	6050
	35000	143	138	6220
	36000	146	141	6400
	37000	148	143	6580
	38000	150	145	6760
	39000	153	148	6940
	39600	154	149	7050

FIGURE 10-8-388. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	120	115	4790
	26000	123	118	4940
	27000	125	120	5090
	28000	127	122	5240
	29000	129	124	5390
	30000	131	126	5540
	31000	134	129	5720
	32000	136	131	5890
	32700	138	133	6020
	33000	139	134	6070
	34000	141	136	6250
	35000	144	139	6430
	36000	146	141	6610
	37000	149	144	6800
	38000	151	146	6990
	39000	154	149	7190
	39600	155	150	7300
7000	25000	120	115	4920
	26000	123	118	5080
	27000	125	120	5230
	28000	127	122	5390
	29000	129	124	5540
	30000	132	127	5720
	31000	134	129	5900
	32000	137	132	6090
	32700	139	134	6220
	33000	139	134	6270
	34000	142	137	6460
	35000	144	139	6650
	36000	147	142	6850
	37000	150	145	7040
	38000	152	147	7240
	39000	155	150	7450
	39600	156	151	7570

FIGURE 10-8-388. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	120	115	5060
	26000	123	118	5220
	27000	125	120	5380
	28000	127	122	5540
	29000	130	125	5720
	30000	132	127	5910
	31000	135	130	6100
	32000	137	132	6290
	32700	139	134	6430
	33000	140	135	6490
	34000	143	138	6690
	35000	145	140	6890
	36000	148	143	7090
	37000	151	146	7300
	38000	153	148	7510
	39000	156	151	7720
	39600	157	152	7850
9000	25000	120	115	5190
	26000	123	118	5360
	27000	125	120	5530
	28000	128	123	5720
	29000	130	125	5910
	30000	133	128	6110
	31000	136	131	6310
	32000	138	133	6510
	32700	140	135	6650
	33000	141	136	6710
	34000	143	138	6920
	35000	146	141	7140
	36000	149	144	7350
	37000	151	146	7570
	38000	154	149	7790
	39000	157	152	8020
	39600	158	153	8150

FIGURE 10-8-388. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	120	115	5340
	26000	123	118	5510
	27000	125	120	5710
	28000	128	123	5910
	29000	131	126	6110
	30000	133	128	6320
	31000	136	131	6530
	32000	139	134	6740
	32700	141	136	6890
	33000	142	137	6960
	34000	144	139	7180
	35000	147	142	7400
	36000	150	145	7620
	37000	153	148	7850
	38000	155	150	8090
	39000	158	153	8330
	39600	160	155	8470
11000	25000	120	115	5490
	26000	123	118	5700
	27000	126	121	5900
	28000	129	124	6110
	29000	131	126	6320
	30000	134	129	6540
	31000	137	132	6760
	32000	140	135	6980
	32700	142	137	7140
	33000	143	138	7210
	34000	145	140	7440
	35000	148	143	7680
	36000	151	146	7920
	37000	154	149	8160
	38000	157	152	8410
	39000	159	154	8660
	39600	161	156	8810

FIGURE 10-8-388. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	121	116	5690
	26000	124	119	5900
	27000	127	122	6120
	28000	129	124	6330
	29000	132	127	6560
	30000	135	130	6790
	31000	138	133	7020
	32000	141	136	7250
	32700	143	138	7420
	33000	143	138	7490
	34000	146	141	7730
	35000	149	144	7980
	36000	152	147	8230
	37000	155	150	8490
	38000	158	153	8750
	39000	161	156	9010
	39600	163	158	9180
13000	25000	121	116	5880
	26000	124	119	6100
	27000	127	122	6330
	28000	130	125	6560
	29000	133	128	6800
	30000	136	131	7040
	31000	139	134	7280
	32000	142	137	7530
	32700	144	139	7710
	33000	144	139	7780
	34000	147	142	8040
	35000	150	145	8300
	36000	153	148	8570
	37000	156	151	8840
	38000	159	154	9120
	39000	162	157	9400
	39600	164	159	9570

FIGURE 10-8-388. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	122	117	6080
	26000	125	120	6320
	27000	128	123	6560
	28000	131	126	6800
	29000	134	129	7050
	30000	137	132	7300
	31000	140	135	7560
	32000	143	138	7820
	32700	145	140	8010
	33000	146	141	8090
	34000	149	144	8360
	35000	152	147	8640
	36000	155	150	8920
	37000	158	153	9210
	38000	161	156	9500
	39000	164	159	9810
	39600	166	161	9990

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY DRY SNOW**

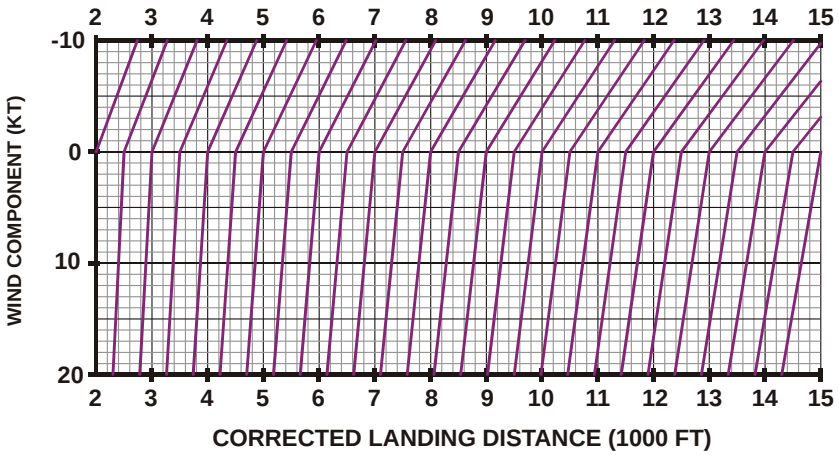


Figure 10-8-389. Actual Landing Distance From 50 FT; Flaps - 20° Wind Components Correction Runway Contaminated by Dry Snow

FIGURE 10-8-390. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	120	115	3880
	26000	122	117	3990
	27000	125	120	4110
	28000	127	122	4230
	29000	129	124	4350
	30000	131	126	4460
	31000	133	128	4580
	32000	135	130	4690
	32700	137	132	4780
	33000	137	132	4810
	34000	139	134	4930
	35000	141	136	5040
	36000	143	138	5160
	37000	145	140	5270
	38000	147	142	5400
	39000	149	144	5540
	39600	151	146	5620
1000	25000	120	115	3970
	26000	122	117	4090
	27000	125	120	4210
	28000	127	122	4330
	29000	129	124	4450
	30000	131	126	4570
	31000	133	128	4690
	32000	135	130	4810
	32700	137	132	4890
	33000	137	132	4930
	34000	139	134	5050
	35000	141	136	5170
	36000	143	138	5290
	37000	145	140	5420
	38000	148	143	5560
	39000	150	145	5700
	39600	151	146	5790

FIGURE 10-8-390. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	120	115	4070
	26000	122	117	4190
	27000	125	120	4310
	28000	127	122	4440
	29000	129	124	4560
	30000	131	126	4680
	31000	133	128	4810
	32000	135	130	4930
	32700	137	132	5020
	33000	137	132	5050
	34000	139	134	5180
	35000	141	136	5300
	36000	144	139	5440
	37000	146	141	5590
	38000	148	143	5730
	39000	151	146	5880
	39600	152	147	5970
3000	25000	120	115	4170
	26000	122	117	4290
	27000	125	120	4420
	28000	127	122	4550
	29000	129	124	4680
	30000	131	126	4800
	31000	133	128	4930
	32000	135	130	5060
	32700	137	132	5140
	33000	137	132	5180
	34000	140	135	5320
	35000	142	137	5460
	36000	144	139	5610
	37000	147	142	5760
	38000	149	144	5920
	39000	151	146	6070
	39600	153	148	6160

FIGURE 10-8-390. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	120	115	4270
	26000	122	117	4400
	27000	125	120	4530
	28000	127	122	4660
	29000	129	124	4790
	30000	131	126	4920
	31000	133	128	5060
	32000	135	130	5190
	32700	137	132	5280
	33000	138	133	5330
	34000	140	135	5480
	35000	142	137	5630
	36000	145	140	5790
	37000	147	142	5950
	38000	150	145	6100
	39000	152	147	6260
	39600	154	149	6360
5000	25000	120	115	4380
	26000	123	118	4510
	27000	125	120	4650
	28000	127	122	4780
	29000	129	124	4920
	30000	131	126	5050
	31000	133	128	5180
	32000	136	131	5330
	32700	137	132	5440
	33000	138	133	5490
	34000	141	136	5650
	35000	143	138	5810
	36000	146	141	5970
	37000	148	143	6140
	38000	150	145	6300
	39000	153	148	6470
	39600	154	149	6580

FIGURE 10-8-390. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	120	115	4490
	26000	123	118	4630
	27000	125	120	4770
	28000	127	122	4910
	29000	129	124	5040
	30000	131	126	5180
	31000	134	129	5340
	32000	136	131	5500
	32700	138	133	5620
	33000	139	134	5670
	34000	141	136	5830
	35000	144	139	6000
	36000	146	141	6170
	37000	149	144	6340
	38000	151	146	6520
	39000	154	149	6700
	39600	155	150	6810
7000	25000	120	115	4610
	26000	123	118	4750
	27000	125	120	4900
	28000	127	122	5040
	29000	129	124	5180
	30000	132	127	5350
	31000	134	129	5510
	32000	137	132	5680
	32700	139	134	5800
	33000	139	134	5860
	34000	142	137	6030
	35000	144	139	6200
	36000	147	142	6380
	37000	150	145	6570
	38000	152	147	6750
	39000	155	150	6940
	39600	156	151	7050

FIGURE 10-8-390. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	120	115	4730
	26000	123	118	4880
	27000	125	120	5030
	28000	127	122	5180
	29000	130	125	5350
	30000	132	127	5520
	31000	135	130	5700
	32000	137	132	5870
	32700	139	134	6000
	33000	140	135	6050
	34000	143	138	6240
	35000	145	140	6420
	36000	148	143	6610
	37000	151	146	6800
	38000	153	148	6990
	39000	156	151	7190
	39600	157	152	7310
9000	25000	120	115	4860
	26000	123	118	5010
	27000	125	120	5160
	28000	128	123	5340
	29000	130	125	5520
	30000	133	128	5700
	31000	136	131	5890
	32000	138	133	6070
	32700	140	135	6200
	33000	141	136	6260
	34000	143	138	6450
	35000	146	141	6650
	36000	149	144	6850
	37000	151	146	7050
	38000	154	149	7250
	39000	157	152	7460
	39600	158	153	7580

FIGURE 10-8-390. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	120	115	4990
	26000	123	118	5150
	27000	125	120	5330
	28000	128	123	5520
	29000	131	126	5710
	30000	133	128	5900
	31000	136	131	6090
	32000	139	134	6280
	32700	141	136	6420
	33000	142	137	6480
	34000	144	139	6690
	35000	147	142	6890
	36000	150	145	7100
	37000	153	148	7310
	38000	155	150	7530
	39000	158	153	7740
	39600	160	155	7880
11000	25000	120	115	5130
	26000	123	118	5320
	27000	126	121	5510
	28000	129	124	5700
	29000	131	126	5900
	30000	134	129	6100
	31000	137	132	6300
	32000	140	135	6510
	32700	142	137	6660
	33000	143	138	6720
	34000	145	140	6930
	35000	148	143	7150
	36000	151	146	7370
	37000	154	149	7590
	38000	157	152	7820
	39000	159	154	8050
	39600	161	156	8190

FIGURE 10-8-390. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	121	116	5310
	26000	124	119	5510
	27000	127	122	5710
	28000	129	124	5910
	29000	132	127	6110
	30000	135	130	6330
	31000	138	133	6540
	32000	141	136	6760
	32700	143	138	6910
	33000	143	138	6970
	34000	146	141	7200
	35000	149	144	7430
	36000	152	147	7660
	37000	155	150	7890
	38000	158	153	8130
	39000	161	156	8380
	39600	163	158	8530
13000	25000	121	116	5490
	26000	124	119	5700
	27000	127	122	5900
	28000	130	125	6120
	29000	133	128	6330
	30000	136	131	6560
	31000	139	134	6780
	32000	142	137	7010
	32700	144	139	7170
	33000	144	139	7240
	34000	147	142	7480
	35000	150	145	7720
	36000	153	148	7970
	37000	156	151	8220
	38000	159	154	8470
	39000	162	157	8730
	39600	164	159	8890

FIGURE 10-8-390. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	122	117	5680
	26000	125	120	5890
	27000	128	123	6110
	28000	131	126	6340
	29000	134	129	6570
	30000	137	132	6800
	31000	140	135	7040
	32000	143	138	7280
	32700	145	140	7450
	33000	146	141	7520
	34000	149	144	7770
	35000	152	147	8030
	36000	155	150	8290
	37000	158	153	8560
	38000	161	156	8830
	39000	164	159	9110
	39600	166	161	9280

ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY COMPACTED SNOW

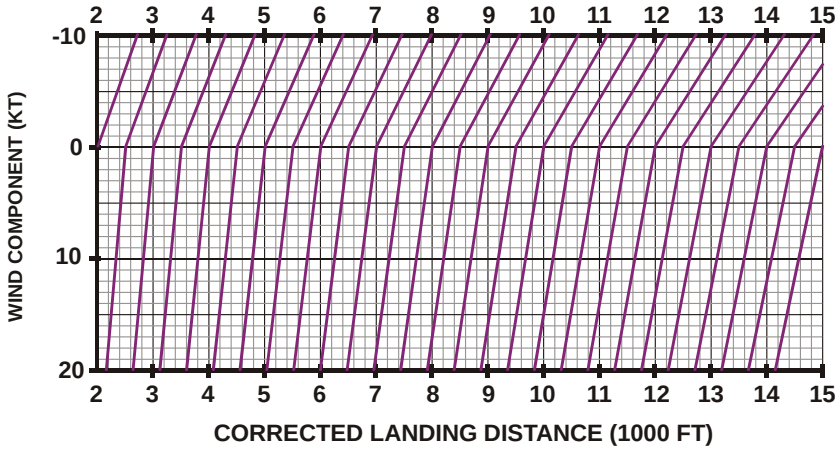


Figure 10-8-391. Actual Landing Distance From 50 FT; Flaps - 20° Wind Components Correction Runway Contaminated by Compacted Snow

FIGURE 10-8-392. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	120	115	6600
	26000	122	117	6820
	27000	125	120	7040
	28000	127	122	7260
	29000	129	124	7480
	30000	131	126	7700
	31000	133	128	7920
	32000	135	130	8140
	32700	137	132	8300
	33000	137	132	8360
	34000	139	134	8590
	35000	141	136	8810
	36000	143	138	9040
	37000	145	140	9260
	38000	147	142	9500
	39000	149	144	9750
	39600	151	146	9900
1000	25000	120	115	6790
	26000	122	117	7010
	27000	125	120	7240
	28000	127	122	7470
	29000	129	124	7690
	30000	131	126	7920
	31000	133	128	8150
	32000	135	130	8380
	32700	137	132	8540
	33000	137	132	8610
	34000	139	134	8840
	35000	141	136	9070
	36000	143	138	9300
	37000	145	140	9550
	38000	148	143	9810
	39000	150	145	10080
	39600	151	146	10240

FIGURE 10-8-392. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	120	115	6980
	26000	122	117	7210
	27000	125	120	7450
	28000	127	122	7680
	29000	129	124	7910
	30000	131	126	8150
	31000	133	128	8380
	32000	135	130	8620
	32700	137	132	8790
	33000	137	132	8860
	34000	139	134	9100
	35000	141	136	9330
	36000	144	139	9600
	37000	146	141	9870
	38000	148	143	10150
	39000	151	146	10420
	39600	152	147	10590
3000	25000	120	115	7180
	26000	122	117	7420
	27000	125	120	7660
	28000	127	122	7910
	29000	129	124	8150
	30000	131	126	8390
	31000	133	128	8630
	32000	135	130	8880
	32700	137	132	9050
	33000	137	132	9120
	34000	140	135	9380
	35000	142	137	9650
	36000	144	139	9930
	37000	147	142	10220
	38000	149	144	10500
	39000	151	146	10790
	39600	153	148	10960

FIGURE 10-8-392. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	120	115	7390
	26000	122	117	7640
	27000	125	120	7890
	28000	127	122	8140
	29000	129	124	8390
	30000	131	126	8640
	31000	133	128	8890
	32000	135	130	9140
	32700	137	132	9330
	33000	138	133	9410
	34000	140	135	9700
	35000	142	137	9990
	36000	145	140	10280
	37000	147	142	10580
	38000	150	145	10870
	39000	152	147	11170
	39600	154	149	11360
5000	25000	120	115	7610
	26000	123	118	7860
	27000	125	120	8120
	28000	127	122	8380
	29000	129	124	8640
	30000	131	126	8890
	31000	133	128	9150
	32000	136	131	9440
	32700	137	132	9640
	33000	138	133	9730
	34000	141	136	10030
	35000	143	138	10330
	36000	146	141	10640
	37000	148	143	10940
	38000	150	145	11250
	39000	153	148	11570
	39600	154	149	11770

FIGURE 10-8-392. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	120	115	7840
	26000	123	118	8100
	27000	125	120	8370
	28000	127	122	8640
	29000	129	124	8900
	30000	131	126	9170
	31000	134	129	9470
	32000	136	131	9770
	32700	138	133	9990
	33000	139	134	10080
	34000	141	136	10390
	35000	144	139	10710
	36000	146	141	11020
	37000	149	144	11350
	38000	151	146	11680
	39000	154	149	12010
	39600	155	150	12210
7000	25000	120	115	8080
	26000	123	118	8360
	27000	125	120	8630
	28000	127	122	8910
	29000	129	124	9180
	30000	132	127	9490
	31000	134	129	9810
	32000	137	132	10130
	32700	139	134	10350
	33000	139	134	10450
	34000	142	137	10770
	35000	144	139	11100
	36000	147	142	11440
	37000	150	145	11780
	38000	152	147	12130
	39000	155	150	12480
	39600	156	151	12690

FIGURE 10-8-392. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	120	115	8340
	26000	123	118	8620
	27000	125	120	8910
	28000	127	122	9190
	29000	130	125	9520
	30000	132	127	9840
	31000	135	130	10170
	32000	137	132	10500
	32700	139	134	10740
	33000	140	135	10840
	34000	143	138	11180
	35000	145	140	11530
	36000	148	143	11880
	37000	151	146	12240
	38000	153	148	12600
	39000	156	151	12970
	39600	157	152	13190
9000	25000	120	115	8600
	26000	123	118	8890
	27000	125	120	9190
	28000	128	123	9520
	29000	130	125	9860
	30000	133	128	10200
	31000	136	131	10540
	32000	138	133	10890
	32700	140	135	11140
	33000	141	136	11250
	34000	143	138	11610
	35000	146	141	11970
	36000	149	144	12340
	37000	151	146	12720
	38000	154	149	13100
	39000	157	152	13490
	39600	158	153	13720

FIGURE 10-8-392. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	120	115	8870
	26000	123	118	9180
	27000	125	120	9520
	28000	128	123	9870
	29000	131	126	10220
	30000	133	128	10580
	31000	136	131	10940
	32000	139	134	11310
	32700	141	136	11570
	33000	142	137	11680
	34000	144	139	12060
	35000	147	142	12440
	36000	150	145	12830
	37000	153	148	13230
	38000	155	150	13630
	39000	158	153	14040
	39600	160	155	14290
11000	25000	120	115	9160
	26000	123	118	9520
	27000	126	121	9870
	28000	129	124	10240
	29000	131	126	10600
	30000	134	129	10980
	31000	137	132	11360
	32000	140	135	11750
	32700	142	137	12020
	33000	143	138	12140
	34000	145	140	12540
	35000	148	143	12940
	36000	151	146	13350
	37000	154	149	13770
	38000	157	152	14190
	39000	159	154	14620
	39600	161	156	14890

FIGURE 10-8-392. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	121	116	9510
	26000	124	119	9880
	27000	127	122	10260
	28000	129	124	10640
	29000	132	127	11020
	30000	135	130	11420
	31000	138	133	11820
	32000	141	136	12220
	32700	143	138	12510
	33000	143	138	12630
	34000	146	141	13050
	35000	149	144	13480
	36000	152	147	13910
	37000	155	150	14350
	38000	158	153	14800
	39000	161	156	15250
	39600	163	158	15530
13000	25000	121	116	9870
	26000	124	119	10250
	27000	127	122	10640
	28000	130	125	11040
	29000	133	128	11450
	30000	136	131	11870
	31000	139	134	12290
	32000	142	137	12720
	32700	144	139	13020
	33000	144	139	13150
	34000	147	142	13590
	35000	150	145	14040
	36000	153	148	14500
	37000	156	151	14970
	38000	159	154	15440
	39000	162	157	15930
	39600	164	159	16220

FIGURE 10-8-392. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 20° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	122	117	10230
	26000	125	120	10640
	27000	128	123	11050
	28000	131	126	11470
	29000	134	129	11900
	30000	137	132	12340
	31000	140	135	12780
	32000	143	138	13240
	32700	145	140	13560
	33000	146	141	13700
	34000	149	144	14160
	35000	152	147	14640
	36000	155	150	15120
	37000	158	153	15620
	38000	161	156	16120
	39000	164	159	16640
	39600	166	161	16950

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 20°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY ICE**

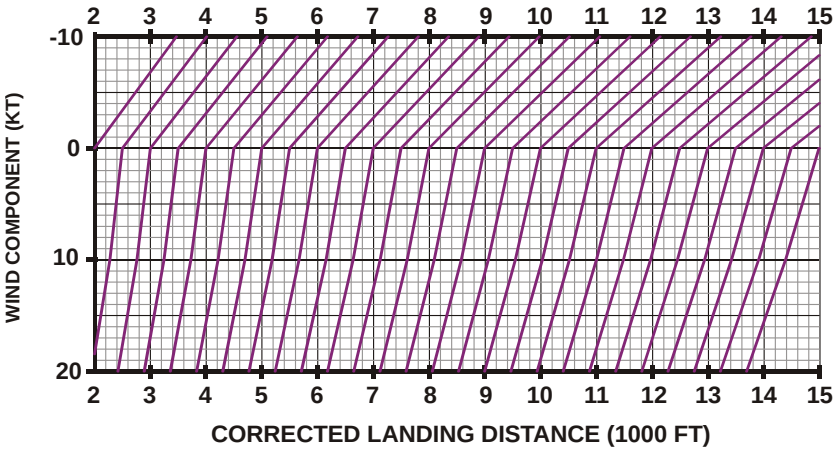


Figure 10-8-393. Actual Landing Distance From 50 FT; Flaps - 20° Wind Components Correction Runway Contaminated by Ice

FIGURE 10-8-394. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	125	120	3900
	26000	128	123	4030
	27000	130	125	4170
	28000	132	127	4300
	29000	135	130	4440
	30000	137	132	4570
	31000	139	134	4710
	32000	141	136	4850
	32700	143	138	4940
	33000	143	138	4980
	34000	145	140	5130
	35000	147	142	5300
	36000	149	144	5480
	37000	152	147	5660
	38000	154	149	5850
	39000	156	151	6030
	39600	157	152	6140
1000	25000	125	120	4000
	26000	128	123	4140
	27000	130	125	4280
	28000	132	127	4420
	29000	135	130	4560
	30000	137	132	4700
	31000	139	134	4840
	32000	141	136	4980
	32700	143	138	5090
	33000	143	138	5130
	34000	145	140	5300
	35000	148	143	5490
	36000	150	145	5680
	37000	152	147	5870
	38000	154	149	6060
	39000	156	151	6250
	39600	157	152	6360

FIGURE 10-8-394. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	125	120	4110
	26000	128	123	4250
	27000	130	125	4400
	28000	132	127	4540
	29000	135	130	4690
	30000	137	132	4830
	31000	139	134	4980
	32000	141	136	5130
	32700	143	138	5260
	33000	143	138	5310
	34000	146	141	5500
	35000	148	143	5700
	36000	150	145	5890
	37000	152	147	6090
	38000	154	149	6280
	39000	156	151	6470
	39600	157	152	6580
3000	25000	125	120	4230
	26000	128	123	4370
	27000	130	125	4520
	28000	132	127	4670
	29000	135	130	4820
	30000	137	132	4970
	31000	139	134	5130
	32000	141	136	5310
	32700	143	138	5450
	33000	143	138	5510
	34000	146	141	5710
	35000	148	143	5910
	36000	150	145	6110
	37000	152	147	6310
	38000	154	149	6510
	39000	156	151	6730
	39600	158	153	6870

FIGURE 10-8-394. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	125	120	4350
	26000	128	123	4500
	27000	130	125	4650
	28000	132	127	4800
	29000	135	130	4960
	30000	137	132	5120
	31000	139	134	5310
	32000	141	136	5510
	32700	143	138	5660
	33000	144	139	5720
	34000	146	141	5930
	35000	148	143	6140
	36000	150	145	6340
	37000	152	147	6550
	38000	155	150	6780
	39000	157	152	7020
	39600	159	154	7170
5000	25000	125	120	4470
	26000	128	123	4620
	27000	130	125	4780
	28000	132	127	4940
	29000	135	130	5110
	30000	137	132	5300
	31000	139	134	5510
	32000	142	137	5720
	32700	143	138	5870
	33000	144	139	5930
	34000	146	141	6150
	35000	148	143	6360
	36000	150	145	6580
	37000	153	148	6830
	38000	156	151	7070
	39000	158	153	7330
	39600	160	155	7480

FIGURE 10-8-394. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	125	120	4600
	26000	128	123	4760
	27000	130	125	4930
	28000	132	127	5090
	29000	135	130	5290
	30000	137	132	5500
	31000	139	134	5730
	32000	142	137	5950
	32700	143	138	6100
	33000	144	139	6160
	34000	146	141	6380
	35000	149	144	6630
	36000	151	146	6880
	37000	154	149	7130
	38000	157	152	7400
	39000	159	154	7660
	39600	161	156	7820
7000	25000	125	120	4740
	26000	128	123	4910
	27000	130	125	5080
	28000	133	128	5280
	29000	135	130	5500
	30000	137	132	5730
	31000	140	135	5960
	32000	142	137	6180
	32700	143	138	6340
	33000	144	139	6410
	34000	147	142	6660
	35000	150	145	6920
	36000	152	147	7190
	37000	155	150	7460
	38000	158	153	7740
	39000	160	155	8020
	39600	162	157	8190

FIGURE 10-8-394. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	125	120	4880
	26000	128	123	5060
	27000	130	125	5260
	28000	133	128	5490
	29000	135	130	5720
	30000	137	132	5960
	31000	140	135	6190
	32000	142	137	6440
	32700	144	139	6620
	33000	145	140	6700
	34000	148	143	6970
	35000	150	145	7250
	36000	153	148	7520
	37000	156	151	7810
	38000	159	154	8110
	39000	162	157	8410
	39600	164	159	8600
9000	25000	125	120	5030
	26000	128	123	5230
	27000	130	125	5470
	28000	133	128	5710
	29000	135	130	5960
	30000	137	132	6190
	31000	140	135	6450
	32000	143	138	6730
	32700	145	140	6920
	33000	146	141	7000
	34000	149	144	7290
	35000	151	146	7580
	36000	154	149	7880
	37000	157	152	8190
	38000	160	155	8510
	39000	163	158	8830
	39600	165	160	9030

FIGURE 10-8-394. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	126	121	5200
	26000	128	123	5440
	27000	131	126	5690
	28000	133	128	5940
	29000	135	130	6190
	30000	138	133	6470
	31000	141	136	6750
	32000	144	139	7040
	32700	146	141	7250
	33000	147	142	7330
	34000	150	145	7630
	35000	153	148	7940
	36000	156	151	8270
	37000	159	154	8600
	38000	162	157	8940
	39000	165	160	9290
	39600	167	162	9500
11000	25000	126	121	5410
	26000	128	123	5670
	27000	131	126	5930
	28000	133	128	6180
	29000	136	131	6470
	30000	139	134	6770
	31000	142	137	7070
	32000	145	140	7370
	32700	147	142	7590
	33000	148	143	7680
	34000	151	146	8010
	35000	154	149	8340
	36000	157	152	8690
	37000	160	155	9040
	38000	163	158	9410
	39000	167	162	9790
	39600	169	164	10020

FIGURE 10-8-394. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	126	121	5650
	26000	128	123	5920
	27000	131	126	6180
	28000	134	129	6480
	29000	137	132	6780
	30000	140	135	7100
	31000	143	138	7410
	32000	146	141	7740
	32700	148	143	7970
	33000	149	144	8080
	34000	152	147	8420
	35000	155	150	8770
	36000	158	153	9140
	37000	162	157	9530
	38000	165	160	9920
	39000	169	164	10340
	39600	171	166	10590
13000	25000	126	121	5890
	26000	128	123	6160
	27000	131	126	6480
	28000	135	130	6790
	29000	138	133	7110
	30000	141	136	7440
	31000	144	139	7780
	32000	147	142	8130
	32700	149	144	8380
	33000	150	145	8490
	34000	153	148	8860
	35000	157	152	9250
	36000	160	155	9650
	37000	164	159	10070
	38000	167	162	10500
	39000	171	166	10940
	39600	173	168	11200

FIGURE 10-8-394. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	126	121	6130
	26000	129	124	6460
	27000	132	127	6780
	28000	135	130	7110
	29000	139	134	7450
	30000	142	137	7810
	31000	145	140	8170
	32000	148	143	8540
	32700	151	146	8810
	33000	152	147	8930
	34000	155	150	9340
	35000	159	154	9760
	36000	162	157	10200
	37000	166	161	10650
	38000	170	165	11090
	39000	173	168	11550
	39600	175	170	11830

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW**

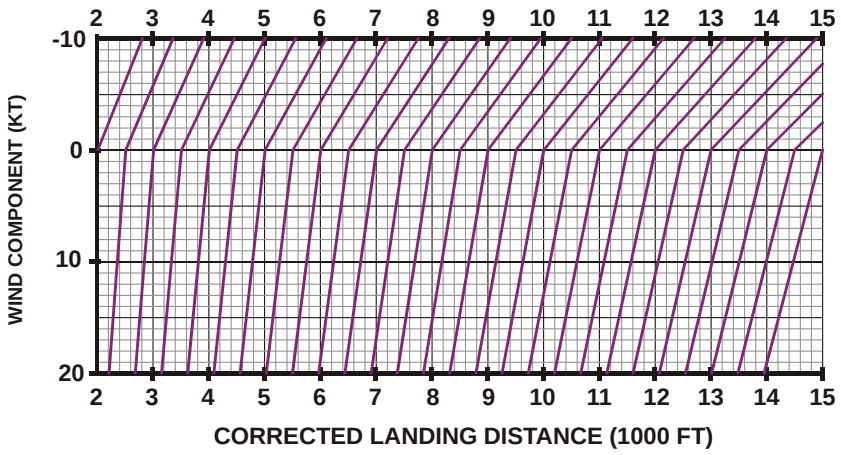


Figure 10-8-395. Actual Landing Distance From 50 FT; Flaps - 10° Wind Components Correction Runway Contaminated by Slush, Standing Water or Snow

FIGURE 10-8-396. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	125	120	4410
	26000	128	123	4540
	27000	130	125	4680
	28000	132	127	4820
	29000	135	130	4950
	30000	137	132	5090
	31000	139	134	5230
	32000	141	136	5360
	32700	143	138	5460
	33000	143	138	5500
	34000	145	140	5640
	35000	147	142	5780
	36000	149	144	5920
	37000	152	147	6060
	38000	154	149	6200
	39000	156	151	6340
	39600	157	152	6430
1000	25000	125	120	4520
	26000	128	123	4660
	27000	130	125	4800
	28000	132	127	4940
	29000	135	130	5080
	30000	137	132	5220
	31000	139	134	5360
	32000	141	136	5500
	32700	143	138	5600
	33000	143	138	5640
	34000	145	140	5790
	35000	148	143	5930
	36000	150	145	6080
	37000	152	147	6220
	38000	154	149	6370
	39000	156	151	6510
	39600	157	152	6600

FIGURE 10-8-396. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	125	120	4630
	26000	128	123	4770
	27000	130	125	4920
	28000	132	127	5060
	29000	135	130	5210
	30000	137	132	5350
	31000	139	134	5500
	32000	141	136	5640
	32700	143	138	5750
	33000	143	138	5790
	34000	146	141	5940
	35000	148	143	6090
	36000	150	145	6240
	37000	152	147	6390
	38000	154	149	6540
	39000	156	151	6690
	39600	157	152	6780
3000	25000	125	120	4750
	26000	128	123	4900
	27000	130	125	5040
	28000	132	127	5190
	29000	135	130	5340
	30000	137	132	5490
	31000	139	134	5640
	32000	141	136	5800
	32700	143	138	5900
	33000	143	138	5950
	34000	146	141	6100
	35000	148	143	6260
	36000	150	145	6410
	37000	152	147	6570
	38000	154	149	6720
	39000	156	151	6900
	39600	158	153	7010

FIGURE 10-8-396. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	125	120	4870
	26000	128	123	5020
	27000	130	125	5180
	28000	132	127	5330
	29000	135	130	5480
	30000	137	132	5640
	31000	139	134	5800
	32000	141	136	5950
	32700	143	138	6070
	33000	144	139	6110
	34000	146	141	6270
	35000	148	143	6430
	36000	150	145	6590
	37000	152	147	6750
	38000	155	150	6940
	39000	157	152	7140
	39600	159	154	7250
5000	25000	125	120	4990
	26000	128	123	5150
	27000	130	125	5310
	28000	132	127	5470
	29000	135	130	5630
	30000	137	132	5790
	31000	139	134	5950
	32000	142	137	6120
	32700	143	138	6230
	33000	144	139	6280
	34000	146	141	6440
	35000	148	143	6610
	36000	150	145	6790
	37000	153	148	6980
	38000	156	151	7180
	39000	158	153	7380
	39600	160	155	7510

FIGURE 10-8-396. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	125	120	5130
	26000	128	123	5290
	27000	130	125	5450
	28000	132	127	5620
	29000	135	130	5790
	30000	137	132	5950
	31000	139	134	6120
	32000	142	137	6290
	32700	143	138	6410
	33000	144	139	6460
	34000	146	141	6630
	35000	149	144	6820
	36000	151	146	7030
	37000	154	149	7230
	38000	157	152	7440
	39000	159	154	7650
	39600	161	156	7780
7000	25000	125	120	5270
	26000	128	123	5430
	27000	130	125	5600
	28000	133	128	5780
	29000	135	130	5950
	30000	137	132	6120
	31000	140	135	6300
	32000	142	137	6470
	32700	143	138	6590
	33000	144	139	6650
	34000	147	142	6860
	35000	150	145	7070
	36000	152	147	7280
	37000	155	150	7490
	38000	158	153	7710
	39000	160	155	7940
	39600	162	157	8080

FIGURE 10-8-396. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	125	120	5410
	26000	128	123	5590
	27000	130	125	5770
	28000	133	128	5940
	29000	135	130	6120
	30000	137	132	6300
	31000	140	135	6480
	32000	142	137	6670
	32700	144	139	6820
	33000	145	140	6890
	34000	148	143	7100
	35000	150	145	7330
	36000	153	148	7550
	37000	156	151	7780
	38000	159	154	8010
	39000	162	157	8250
	39600	164	159	8400
9000	25000	125	120	5560
	26000	128	123	5750
	27000	130	125	5930
	28000	133	128	6120
	29000	135	130	6300
	30000	137	132	6490
	31000	140	135	6690
	32000	143	138	6910
	32700	145	140	7070
	33000	146	141	7140
	34000	149	144	7360
	35000	151	146	7600
	36000	154	149	7830
	37000	157	152	8080
	38000	160	155	8330
	39000	163	158	8580
	39600	165	160	8730

FIGURE 10-8-396. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	126	121	5720
	26000	128	123	5910
	27000	131	126	6100
	28000	133	128	6300
	29000	135	130	6490
	30000	138	133	6700
	31000	141	136	6930
	32000	144	139	7160
	32700	146	141	7330
	33000	147	142	7400
	34000	150	145	7640
	35000	153	148	7890
	36000	156	151	8140
	37000	159	154	8400
	38000	162	157	8660
	39000	165	160	8930
	39600	167	162	9100
11000	25000	126	121	5890
	26000	128	123	6090
	27000	131	126	6280
	28000	133	128	6480
	29000	136	131	6710
	30000	139	134	6940
	31000	142	137	7190
	32000	145	140	7430
	32700	147	142	7600
	33000	148	143	7680
	34000	151	146	7940
	35000	154	149	8200
	36000	157	152	8470
	37000	160	155	8750
	38000	163	158	9030
	39000	167	162	9330
	39600	169	164	9510

FIGURE 10-8-396. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	126	121	6080
	26000	128	123	6280
	27000	131	126	6480
	28000	134	129	6720
	29000	137	132	6960
	30000	140	135	7210
	31000	143	138	7470
	32000	146	141	7720
	32700	148	143	7910
	33000	149	144	7990
	34000	152	147	8270
	35000	155	150	8540
	36000	158	153	8830
	37000	162	157	9130
	38000	165	160	9440
	39000	169	164	9760
	39600	171	166	9960
13000	25000	126	121	6260
	26000	128	123	6470
	27000	131	126	6710
	28000	135	130	6970
	29000	138	133	7230
	30000	141	136	7490
	31000	144	139	7760
	32000	147	142	8040
	32700	149	144	8240
	33000	150	145	8320
	34000	153	148	8610
	35000	157	152	8910
	36000	160	155	9230
	37000	164	159	9550
	38000	167	162	9890
	39000	171	166	10220
	39600	173	168	10420

FIGURE 10-8-396. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	126	121	6450
	26000	129	124	6700
	27000	132	127	6960
	28000	135	130	7230
	29000	139	134	7500
	30000	142	137	7780
	31000	145	140	8070
	32000	148	143	8370
	32700	151	146	8580
	33000	152	147	8670
	34000	155	150	8990
	35000	159	154	9320
	36000	162	157	9660
	37000	166	161	10010
	38000	170	165	10350
	39000	173	168	10700
	39600	175	170	10910

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY DRY SNOW**

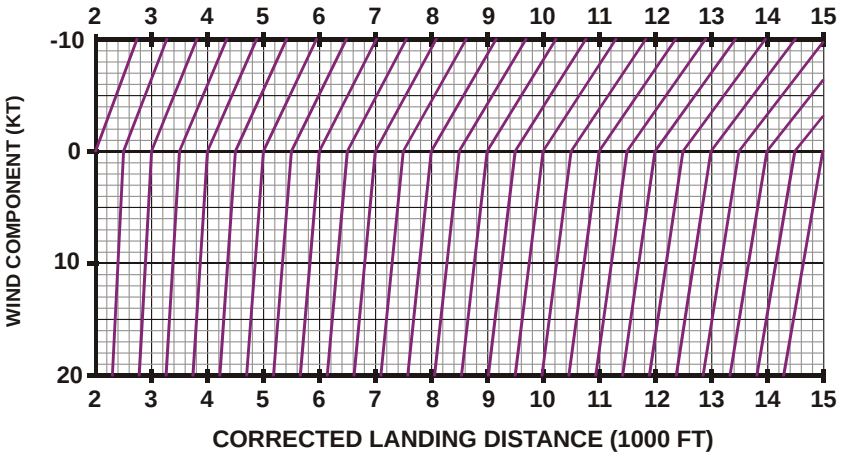


Figure 10-8-397. Actual Landing Distance From 50 FT; Flaps - 10° Wind Components Correction Runway Contaminated by Dry Snow

FIGURE 10-8-398. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	125	120	4140
	26000	128	123	4260
	27000	130	125	4390
	28000	132	127	4510
	29000	135	130	4640
	30000	137	132	4770
	31000	139	134	4890
	32000	141	136	5020
	32700	143	138	5100
	33000	143	138	5140
	34000	145	140	5270
	35000	147	142	5390
	36000	149	144	5520
	37000	152	147	5650
	38000	154	149	5780
	39000	156	151	5910
	39600	157	152	5990
1000	25000	125	120	4240
	26000	128	123	4360
	27000	130	125	4490
	28000	132	127	4620
	29000	135	130	4750
	30000	137	132	4880
	31000	139	134	5010
	32000	141	136	5140
	32700	143	138	5230
	33000	143	138	5270
	34000	145	140	5400
	35000	148	143	5540
	36000	150	145	5670
	37000	152	147	5800
	38000	154	149	5930
	39000	156	151	6070
	39600	157	152	6150

FIGURE 10-8-398. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	125	120	4340
	26000	128	123	4470
	27000	130	125	4610
	28000	132	127	4740
	29000	135	130	4870
	30000	137	132	5000
	31000	139	134	5140
	32000	141	136	5270
	32700	143	138	5370
	33000	143	138	5410
	34000	146	141	5540
	35000	148	143	5680
	36000	150	145	5820
	37000	152	147	5950
	38000	154	149	6090
	39000	156	151	6230
	39600	157	152	6310
3000	25000	125	120	4450
	26000	128	123	4580
	27000	130	125	4720
	28000	132	127	4860
	29000	135	130	5000
	30000	137	132	5130
	31000	139	134	5270
	32000	141	136	5410
	32700	143	138	5510
	33000	143	138	5550
	34000	146	141	5690
	35000	148	143	5830
	36000	150	145	5970
	37000	152	147	6120
	38000	154	149	6260
	39000	156	151	6420
	39600	158	153	6520

FIGURE 10-8-398. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	125	120	4560
	26000	128	123	4700
	27000	130	125	4840
	28000	132	127	4980
	29000	135	130	5120
	30000	137	132	5260
	31000	139	134	5410
	32000	141	136	5560
	32700	143	138	5660
	33000	144	139	5700
	34000	146	141	5850
	35000	148	143	5990
	36000	150	145	6140
	37000	152	147	6290
	38000	155	150	6460
	39000	157	152	6640
	39600	159	154	6740
5000	25000	125	120	4670
	26000	128	123	4820
	27000	130	125	4960
	28000	132	127	5110
	29000	135	130	5250
	30000	137	132	5400
	31000	139	134	5550
	32000	142	137	5700
	32700	143	138	5810
	33000	144	139	5850
	34000	146	141	6000
	35000	148	143	6150
	36000	150	145	6320
	37000	153	148	6500
	38000	156	151	6680
	39000	158	153	6860
	39600	160	155	6980

FIGURE 10-8-398. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	125	120	4790
	26000	128	123	4940
	27000	130	125	5090
	28000	132	127	5250
	29000	135	130	5400
	30000	137	132	5550
	31000	139	134	5710
	32000	142	137	5860
	32700	143	138	5970
	33000	144	139	6020
	34000	146	141	6170
	35000	149	144	6350
	36000	151	146	6540
	37000	154	149	6720
	38000	157	152	6920
	39000	159	154	7110
	39600	161	156	7230
7000	25000	125	120	4920
	26000	128	123	5080
	27000	130	125	5230
	28000	133	128	5390
	29000	135	130	5550
	30000	137	132	5710
	31000	140	135	5870
	32000	142	137	6030
	32700	143	138	6140
	33000	144	139	6190
	34000	147	142	6380
	35000	150	145	6570
	36000	152	147	6770
	37000	155	150	6970
	38000	158	153	7170
	39000	160	155	7370
	39600	162	157	7500

FIGURE 10-8-398. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	125	120	5060
	26000	128	123	5220
	27000	130	125	5380
	28000	133	128	5540
	29000	135	130	5710
	30000	137	132	5870
	31000	140	135	6040
	32000	142	137	6210
	32700	144	139	6350
	33000	145	140	6410
	34000	148	143	6610
	35000	150	145	6810
	36000	153	148	7020
	37000	156	151	7220
	38000	159	154	7440
	39000	162	157	7660
	39600	164	159	7790
9000	25000	125	120	5190
	26000	128	123	5360
	27000	130	125	5530
	28000	133	128	5700
	29000	135	130	5870
	30000	137	132	6040
	31000	140	135	6220
	32000	143	138	6430
	32700	145	140	6570
	33000	146	141	6630
	34000	149	144	6840
	35000	151	146	7060
	36000	154	149	7280
	37000	157	152	7500
	38000	160	155	7730
	39000	163	158	7960
	39600	165	160	8100

FIGURE 10-8-398. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	126	121	5340
	26000	128	123	5510
	27000	131	126	5690
	28000	133	128	5860
	29000	135	130	6040
	30000	138	133	6230
	31000	141	136	6450
	32000	144	139	6660
	32700	146	141	6810
	33000	147	142	6880
	34000	150	145	7100
	35000	153	148	7330
	36000	156	151	7560
	37000	159	154	7800
	38000	162	157	8040
	39000	165	160	8290
	39600	167	162	8440
11000	25000	126	121	5490
	26000	128	123	5670
	27000	131	126	5850
	28000	133	128	6030
	29000	136	131	6240
	30000	139	134	6460
	31000	142	137	6680
	32000	145	140	6900
	32700	147	142	7060
	33000	148	143	7130
	34000	151	146	7370
	35000	154	149	7610
	36000	157	152	7860
	37000	160	155	8110
	38000	163	158	8380
	39000	167	162	8650
	39600	169	164	8820

FIGURE 10-8-398. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	126	121	5660
	26000	128	123	5850
	27000	131	126	6030
	28000	134	129	6250
	29000	137	132	6480
	30000	140	135	6700
	31000	143	138	6940
	32000	146	141	7170
	32700	148	143	7350
	33000	149	144	7420
	34000	152	147	7670
	35000	155	150	7930
	36000	158	153	8190
	37000	162	157	8470
	38000	165	160	8750
	39000	169	164	9040
	39600	171	166	9220
13000	25000	126	121	5830
	26000	128	123	6020
	27000	131	126	6240
	28000	135	130	6480
	29000	138	133	6720
	30000	141	136	6960
	31000	144	139	7210
	32000	147	142	7460
	32700	149	144	7640
	33000	150	145	7720
	34000	153	148	7990
	35000	157	152	8270
	36000	160	155	8560
	37000	164	159	8850
	38000	167	162	9160
	39000	171	166	9470
	39600	173	168	9650

FIGURE 10-8-398. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	126	121	6000
	26000	129	124	6230
	27000	132	127	6470
	28000	135	130	6720
	29000	139	134	6970
	30000	142	137	7230
	31000	145	140	7490
	32000	148	143	7760
	32700	151	146	7960
	33000	152	147	8040
	34000	155	150	8330
	35000	159	154	8640
	36000	162	157	8950
	37000	166	161	9270
	38000	170	165	9580
	39000	173	168	9900
	39600	175	170	10100

ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY COMPACTED SNOW

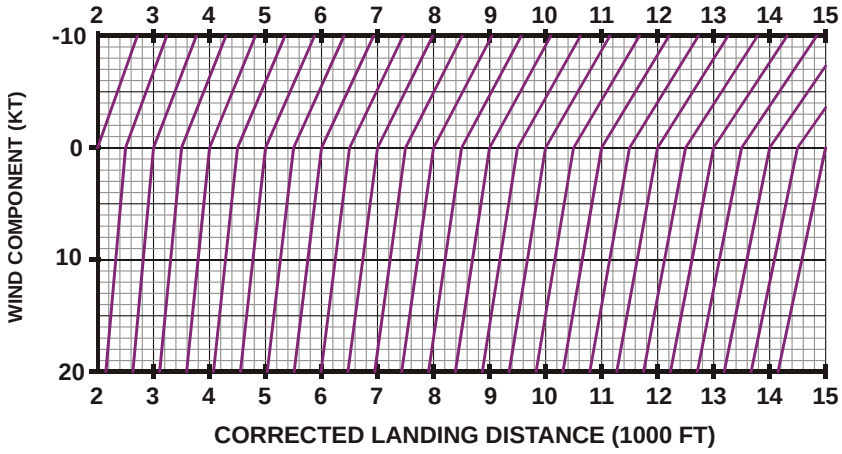


Figure 10-8-399. Actual Landing Distance From 50 FT; Flaps - 10° Wind Components Correction Runway Contaminated by Compacted Snow

FIGURE 10-8-400. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	125	120	7160
	26000	128	123	7400
	27000	130	125	7640
	28000	132	127	7880
	29000	135	130	8120
	30000	137	132	8370
	31000	139	134	8610
	32000	141	136	8860
	32700	143	138	9030
	33000	143	138	9100
	34000	145	140	9350
	35000	147	142	9600
	36000	149	144	9850
	37000	152	147	10110
	38000	154	149	10360
	39000	156	151	10620
	39600	157	152	10780
1000	25000	125	120	7360
	26000	128	123	7610
	27000	130	125	7860
	28000	132	127	8110
	29000	135	130	8360
	30000	137	132	8610
	31000	139	134	8860
	32000	141	136	9120
	32700	143	138	9290
	33000	143	138	9370
	34000	145	140	9630
	35000	148	143	9890
	36000	150	145	10150
	37000	152	147	10420
	38000	154	149	10680
	39000	156	151	10950
	39600	157	152	11100

FIGURE 10-8-400. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	125	120	7570
	26000	128	123	7830
	27000	130	125	8090
	28000	132	127	8350
	29000	135	130	8600
	30000	137	132	8860
	31000	139	134	9120
	32000	141	136	9390
	32700	143	138	9570
	33000	143	138	9650
	34000	146	141	9920
	35000	148	143	10190
	36000	150	145	10460
	37000	152	147	10740
	38000	154	149	11010
	39000	156	151	11280
	39600	157	152	11450
3000	25000	125	120	7800
	26000	128	123	8060
	27000	130	125	8330
	28000	132	127	8600
	29000	135	130	8860
	30000	137	132	9130
	31000	139	134	9400
	32000	141	136	9680
	32700	143	138	9870
	33000	143	138	9950
	34000	146	141	10230
	35000	148	143	10510
	36000	150	145	10790
	37000	152	147	11070
	38000	154	149	11360
	39000	156	151	11670
	39600	158	153	11870

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FIGURE 10-8-400. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	125	120	8030
	26000	128	123	8300
	27000	130	125	8580
	28000	132	127	8850
	29000	135	130	9130
	30000	137	132	9410
	31000	139	134	9690
	32000	141	136	9980
	32700	143	138	10180
	33000	144	139	10270
	34000	146	141	10560
	35000	148	143	10850
	36000	150	145	11140
	37000	152	147	11430
	38000	155	150	11770
	39000	157	152	12110
	39600	159	154	12310
5000	25000	125	120	8260
	26000	128	123	8550
	27000	130	125	8830
	28000	132	127	9120
	29000	135	130	9400
	30000	137	132	9700
	31000	139	134	9990
	32000	142	137	10290
	32700	143	138	10490
	33000	144	139	10580
	34000	146	141	10880
	35000	148	143	11180
	36000	150	145	11500
	37000	153	148	11850
	38000	156	151	12200
	39000	158	153	12560
	39600	160	155	12770

FIGURE 10-8-400. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	125	120	8520
	26000	128	123	8820
	27000	130	125	9110
	28000	132	127	9410
	29000	135	130	9710
	30000	137	132	10010
	31000	139	134	10320
	32000	142	137	10620
	32700	143	138	10840
	33000	144	139	10930
	34000	146	141	11240
	35000	149	144	11580
	36000	151	146	11940
	37000	154	149	12310
	38000	157	152	12670
	39000	159	154	13050
	39600	161	156	13270
7000	25000	125	120	8790
	26000	128	123	9100
	27000	130	125	9400
	28000	133	128	9710
	29000	135	130	10030
	30000	137	132	10340
	31000	140	135	10660
	32000	142	137	10970
	32700	143	138	11200
	33000	144	139	11290
	34000	147	142	11660
	35000	150	145	12030
	36000	152	147	12410
	37000	155	150	12790
	38000	158	153	13180
	39000	160	155	13570
	39600	162	157	13820

FIGURE 10-8-400. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	125	120	9070
	26000	128	123	9390
	27000	130	125	9710
	28000	133	128	10040
	29000	135	130	10360
	30000	137	132	10690
	31000	140	135	11010
	32000	142	137	11360
	32700	144	139	11620
	33000	145	140	11730
	34000	148	143	12120
	35000	150	145	12510
	36000	153	148	12910
	37000	156	151	13310
	38000	159	154	13720
	39000	162	157	14140
	39600	164	159	14400
9000	25000	125	120	9370
	26000	128	123	9700
	27000	130	125	10030
	28000	133	128	10370
	29000	135	130	10700
	30000	137	132	11040
	31000	140	135	11400
	32000	143	138	11800
	32700	145	140	12070
	33000	146	141	12190
	34000	149	144	12600
	35000	151	146	13010
	36000	154	149	13430
	37000	157	152	13860
	38000	160	155	14300
	39000	163	158	14740
	39600	165	160	15020

FIGURE 10-8-400. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	126	121	9680
	26000	128	123	10020
	27000	131	126	10370
	28000	133	128	10710
	29000	135	130	11060
	30000	138	133	11440
	31000	141	136	11850
	32000	144	139	12260
	32700	146	141	12550
	33000	147	142	12680
	34000	150	145	13100
	35000	153	148	13540
	36000	156	151	13990
	37000	159	154	14440
	38000	162	157	14910
	39000	165	160	15380
	39600	167	162	15680
11000	25000	126	121	10000
	26000	128	123	10360
	27000	131	126	10720
	28000	133	128	11080
	29000	136	131	11470
	30000	139	134	11900
	31000	142	137	12320
	32000	145	140	12760
	32700	147	142	13060
	33000	148	143	13200
	34000	151	146	13650
	35000	154	149	14120
	36000	157	152	14590
	37000	160	155	15070
	38000	163	158	15570
	39000	167	162	16090
	39600	169	164	16410

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FIGURE 10-8-400. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	126	121	10350
	26000	128	123	10720
	27000	131	126	11100
	28000	134	129	11510
	29000	137	132	11950
	30000	140	135	12390
	31000	143	138	12830
	32000	146	141	13290
	32700	148	143	13620
	33000	149	144	13760
	34000	152	147	14240
	35000	155	150	14730
	36000	158	153	15230
	37000	162	157	15760
	38000	165	160	16300
	39000	169	164	16860
	39600	171	166	17200
13000	25000	126	121	10710
	26000	128	123	11090
	27000	131	126	11520
	28000	135	130	11970
	29000	138	133	12430
	30000	141	136	12890
	31000	144	139	13370
	32000	147	142	13860
	32700	149	144	14210
	33000	150	145	14360
	34000	153	148	14870
	35000	157	152	15400
	36000	160	155	15950
	37000	164	159	16510
	38000	167	162	17100
	39000	171	166	17680
	39600	173	168	18030

FIGURE 10-8-400. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 10° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	126	121	11070
	26000	129	124	11520
	27000	132	127	11980
	28000	135	130	12460
	29000	139	134	12940
	30000	142	137	13430
	31000	145	140	13940
	32000	148	143	14460
	32700	151	146	14830
	33000	152	147	14990
	34000	155	150	15540
	35000	159	154	16120
	36000	162	157	16710
	37000	166	161	17310
	38000	170	165	17910
	39000	173	168	18520
	39600	175	170	18900

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 10°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY ICE**

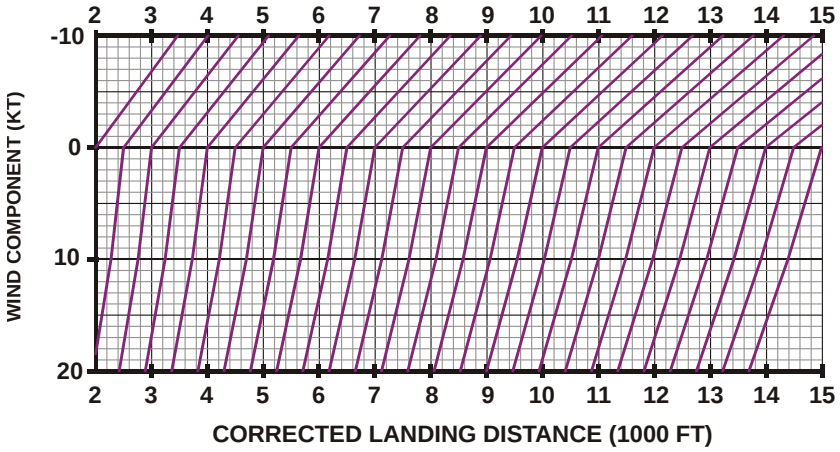


Figure 10-8-401. Actual Landing Distance From 50 FT; Flaps - 10° Wind Components Correction Runway Contaminated by Ice

FIGURE 10-8-402. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	156	151	5370
	26000	159	154	5590
	27000	162	157	5810
	28000	165	160	6040
	29000	168	163	6260
	30000	171	166	6480
	31000	173	168	6710
	32000	176	171	6940
	32700	178	173	7100
	33000	179	174	7160
	34000	182	177	7400
	35000	185	180	7640
	36000	187	182	7890
	37000	190	185	8130
	38000	193	188	8380
	39000	196	191	8630
	39600	197	192	8780
1000	25000	156	151	5540
	26000	159	154	5770
	27000	162	157	6000
	28000	165	160	6230
	29000	168	163	6460
	30000	171	166	6690
	31000	174	169	6920
	32000	176	171	7160
	32700	178	173	7330
	33000	179	174	7400
	34000	182	177	7650
	35000	185	180	7900
	36000	188	183	8150
	37000	190	185	8410
	38000	193	188	8670
	39000	196	191	8930
	39600	198	193	9090

FIGURE 10-8-402. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	156	151	5720
	26000	159	154	5960
	27000	162	157	6190
	28000	165	160	6430
	29000	168	163	6660
	30000	171	166	6910
	31000	174	169	7150
	32000	177	172	7400
	32700	179	174	7580
	33000	180	175	7660
	34000	182	177	7910
	35000	185	180	8170
	36000	188	183	8440
	37000	191	186	8700
	38000	194	189	8970
	39000	196	191	9240
	39600	198	193	9400
3000	25000	156	151	5910
	26000	159	154	6150
	27000	162	157	6390
	28000	165	160	6640
	29000	168	163	6880
	30000	171	166	7130
	31000	174	169	7390
	32000	177	172	7650
	32700	179	174	7840
	33000	180	175	7920
	34000	183	178	8190
	35000	186	181	8460
	36000	188	183	8730
	37000	191	186	9010
	38000	194	189	9290
	39000	197	192	9570
	39600	198	193	9740

FIGURE 10-8-402. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	156	151	6100
	26000	159	154	6350
	27000	162	157	6600
	28000	165	160	6860
	29000	168	163	7110
	30000	171	166	7380
	31000	174	169	7650
	32000	177	172	7920
	32700	179	174	8110
	33000	180	175	8200
	34000	183	178	8480
	35000	186	181	8760
	36000	189	184	9040
	37000	191	186	9330
	38000	194	189	9620
	39000	197	192	9920
	39600	199	194	10100
5000	25000	156	151	6300
	26000	159	154	6560
	27000	162	157	6820
	28000	165	160	7080
	29000	168	163	7350
	30000	172	167	7630
	31000	175	170	7910
	32000	177	172	8200
	32700	180	175	8390
	33000	180	175	8480
	34000	183	178	8780
	35000	186	181	9070
	36000	189	184	9360
	37000	192	187	9660
	38000	195	190	9970
	39000	197	192	10270
	39600	199	194	10450

FIGURE 10-8-402. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	156	151	6510
	26000	159	154	6780
	27000	163	158	7050
	28000	166	161	7330
	29000	169	164	7620
	30000	172	167	7910
	31000	175	170	8200
	32000	178	173	8490
	32700	180	175	8700
	33000	181	176	8790
	34000	184	179	9090
	35000	187	182	9400
	36000	189	184	9710
	37000	192	187	10020
	38000	195	190	10330
	39000	198	193	10640
	39600	199	194	10830
7000	25000	156	151	6740
	26000	160	155	7010
	27000	163	158	7300
	28000	166	161	7600
	29000	169	164	7890
	30000	172	167	8190
	31000	175	170	8500
	32000	178	173	8800
	32700	180	175	9030
	33000	181	176	9120
	34000	184	179	9430
	35000	187	182	9750
	36000	190	185	10070
	37000	192	187	10390
	38000	195	190	10710
	39000	198	193	11030
	39600	199	194	11230

FIGURE 10-8-402. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	157	152	6970
	26000	160	155	7270
	27000	163	158	7570
	28000	166	161	7880
	29000	169	164	8180
	30000	172	167	8500
	31000	175	170	8810
	32000	178	173	9140
	32700	181	176	9370
	33000	181	176	9460
	34000	184	179	9790
	35000	187	182	10120
	36000	190	185	10450
	37000	193	188	10780
	38000	196	191	11110
	39000	198	193	11450
	39600	200	195	11650
9000	25000	157	152	7220
	26000	160	155	7530
	27000	163	158	7850
	28000	166	161	8170
	29000	170	165	8480
	30000	173	168	8810
	31000	176	171	9140
	32000	179	174	9480
	32700	181	176	9720
	33000	182	177	9820
	34000	185	180	10160
	35000	188	183	10500
	36000	190	185	10840
	37000	193	188	11190
	38000	196	191	11530
	39000	199	194	11890
	39600	200	195	12100

FIGURE 10-8-402. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	157	152	7480
	26000	160	155	7810
	27000	164	159	8140
	28000	167	162	8470
	29000	170	165	8810
	30000	173	168	9150
	31000	176	171	9500
	32000	179	174	9840
	32700	181	176	10080
	33000	182	177	10180
	34000	185	180	10540
	35000	188	183	10890
	36000	191	186	11250
	37000	193	188	11610
	38000	196	191	11970
	39000	199	194	12340
	39600	200	195	12560
11000	25000	157	152	7760
	26000	161	156	8100
	27000	164	159	8440
	28000	167	162	8790
	29000	170	165	9140
	30000	173	168	9500
	31000	176	171	9850
	32000	179	174	10210
	32700	181	176	10470
	33000	182	177	10580
	34000	185	180	10940
	35000	188	183	11310
	36000	191	186	11680
	37000	194	189	12050
	38000	196	191	12430
	39000	199	194	12820
	39600	201	196	13050

FIGURE 10-8-402. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	158	153	8060
	26000	161	156	8420
	27000	164	159	8770
	28000	167	162	9130
	29000	171	166	9500
	30000	174	169	9860
	31000	177	172	10230
	32000	180	175	10600
	32700	182	177	10870
	33000	183	178	10980
	34000	186	181	11360
	35000	188	183	11750
	36000	191	186	12130
	37000	194	189	12530
	38000	197	192	12930
	39000	200	195	13330
	39600	201	196	13570
13000	25000	158	153	8380
	26000	161	156	8740
	27000	165	160	9120
	28000	168	163	9500
	29000	171	166	9880
	30000	174	169	10250
	31000	177	172	10640
	32000	180	175	11020
	32700	182	177	11300
	33000	183	178	11420
	34000	186	181	11810
	35000	189	184	12220
	36000	192	187	12620
	37000	194	189	13030
	38000	197	192	13450
	39000	200	195	13870
	39600	202	197	14120

FIGURE 10-8-402. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR WET SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	158	153	8700
	26000	162	157	9090
	27000	165	160	9470
	28000	168	163	9860
	29000	171	166	10260
	30000	174	169	10650
	31000	177	172	11050
	32000	180	175	11460
	32700	182	177	11750
	33000	183	178	11870
	34000	186	181	12290
	35000	189	184	12710
	36000	192	187	13130
	37000	195	190	13560
	38000	198	193	13990
	39000	201	196	14430
	39600	202	197	14700

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY SLUSH, STANDING WATER OR
WET SNOW**

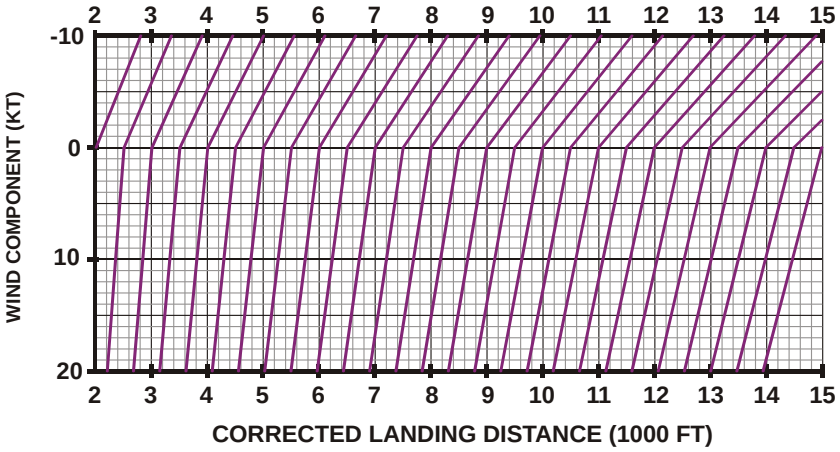


Figure 10-8-403. Actual Landing Distance From 50 FT; Flaps - 0° Wind Components Correction Runway Contaminated by Slush, Standing Water or Snow

FIGURE 10-8-404. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	156	151	5790
	26000	159	154	5970
	27000	162	157	6160
	28000	165	160	6350
	29000	168	163	6540
	30000	171	166	6730
	31000	173	168	6920
	32000	176	171	7110
	32700	178	173	7250
	33000	179	174	7310
	34000	182	177	7500
	35000	185	180	7700
	36000	187	182	7900
	37000	190	185	8110
	38000	193	188	8310
	39000	196	191	8510
	39600	197	192	8630
1000	25000	156	151	5930
	26000	159	154	6120
	27000	162	157	6320
	28000	165	160	6510
	29000	168	163	6710
	30000	171	166	6910
	31000	174	169	7110
	32000	176	171	7300
	32700	178	173	7450
	33000	179	174	7510
	34000	182	177	7710
	35000	185	180	7920
	36000	188	183	8130
	37000	190	185	8330
	38000	193	188	8540
	39000	196	191	8750
	39600	198	193	8880

FIGURE 10-8-404. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	156	151	6080
	26000	159	154	6280
	27000	162	157	6480
	28000	165	160	6690
	29000	168	163	6890
	30000	171	166	7090
	31000	174	169	7300
	32000	177	172	7510
	32700	179	174	7660
	33000	180	175	7720
	34000	182	177	7930
	35000	185	180	8140
	36000	188	183	8360
	37000	191	186	8570
	38000	194	189	8790
	39000	196	191	9010
	39600	198	193	9140
3000	25000	156	151	6240
	26000	159	154	6450
	27000	162	157	6660
	28000	165	160	6870
	29000	168	163	7080
	30000	171	166	7290
	31000	174	169	7500
	32000	177	172	7720
	32700	179	174	7870
	33000	180	175	7940
	34000	183	178	8160
	35000	186	181	8380
	36000	188	183	8600
	37000	191	186	8820
	38000	194	189	9050
	39000	197	192	9270
	39600	198	193	9410

FIGURE 10-8-404. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	156	151	6410
	26000	159	154	6620
	27000	162	157	6840
	28000	165	160	7050
	29000	168	163	7270
	30000	171	166	7500
	31000	174	169	7720
	32000	177	172	7940
	32700	179	174	8100
	33000	180	175	8170
	34000	183	178	8400
	35000	186	181	8630
	36000	189	184	8860
	37000	191	186	9090
	38000	194	189	9320
	39000	197	192	9550
	39600	199	194	9690
5000	25000	156	151	6580
	26000	159	154	6800
	27000	162	157	7020
	28000	165	160	7250
	29000	168	163	7480
	30000	172	167	7710
	31000	175	170	7940
	32000	177	172	8170
	32700	180	175	8340
	33000	180	175	8410
	34000	183	178	8640
	35000	186	181	8880
	36000	189	184	9120
	37000	192	187	9350
	38000	195	190	9590
	39000	197	192	9830
	39600	199	194	9970

FIGURE 10-8-404. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	156	151	6760
	26000	159	154	6990
	27000	163	158	7220
	28000	166	161	7460
	29000	169	164	7700
	30000	172	167	7940
	31000	175	170	8180
	32000	178	173	8420
	32700	180	175	8590
	33000	181	176	8660
	34000	184	179	8900
	35000	187	182	9150
	36000	189	184	9390
	37000	192	187	9640
	38000	195	190	9880
	39000	198	193	10120
	39600	199	194	10270
7000	25000	156	151	6960
	26000	160	155	7200
	27000	163	158	7440
	28000	166	161	7680
	29000	169	164	7930
	30000	172	167	8180
	31000	175	170	8420
	32000	178	173	8670
	32700	180	175	8850
	33000	181	176	8930
	34000	184	179	9180
	35000	187	182	9430
	36000	190	185	9680
	37000	192	187	9930
	38000	195	190	10180
	39000	198	193	10430
	39600	199	194	10580

FIGURE 10-8-404. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	157	152	7160
	26000	160	155	7410
	27000	163	158	7660
	28000	166	161	7920
	29000	169	164	8170
	30000	172	167	8430
	31000	175	170	8680
	32000	178	173	8940
	32700	181	176	9120
	33000	181	176	9200
	34000	184	179	9460
	35000	187	182	9720
	36000	190	185	9980
	37000	193	188	10230
	38000	196	191	10490
	39000	198	193	10750
	39600	200	195	10910
9000	25000	157	152	7370
	26000	160	155	7630
	27000	163	158	7900
	28000	166	161	8160
	29000	170	165	8420
	30000	173	168	8690
	31000	176	171	8950
	32000	179	174	9220
	32700	181	176	9410
	33000	182	177	9490
	34000	185	180	9750
	35000	188	183	10020
	36000	190	185	10280
	37000	193	188	10550
	38000	196	191	10820
	39000	199	194	11090
	39600	200	195	11250

FIGURE 10-8-404. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	157	152	7600
	26000	160	155	7870
	27000	164	159	8140
	28000	167	162	8410
	29000	170	165	8680
	30000	173	168	8960
	31000	176	171	9230
	32000	179	174	9510
	32700	181	176	9700
	33000	182	177	9780
	34000	185	180	10050
	35000	188	183	10330
	36000	191	186	10600
	37000	193	188	10880
	38000	196	191	11160
	39000	199	194	11440
	39600	200	195	11600
11000	25000	157	152	7830
	26000	161	156	8110
	27000	164	159	8390
	28000	167	162	8670
	29000	170	165	8960
	30000	173	168	9240
	31000	176	171	9520
	32000	179	174	9800
	32700	181	176	10000
	33000	182	177	10090
	34000	185	180	10370
	35000	188	183	10650
	36000	191	186	10940
	37000	194	189	11220
	38000	196	191	11510
	39000	199	194	11800
	39600	201	196	11980

FIGURE 10-8-404. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	158	153	8080
	26000	161	156	8370
	27000	164	159	8660
	28000	167	162	8950
	29000	171	166	9240
	30000	174	169	9530
	31000	177	172	9820
	32000	180	175	10110
	32700	182	177	10320
	33000	183	178	10400
	34000	186	181	10700
	35000	188	183	10990
	36000	191	186	11290
	37000	194	189	11590
	38000	197	192	11890
	39000	200	195	12190
	39600	201	196	12370
13000	25000	158	153	8340
	26000	161	156	8640
	27000	165	160	8940
	28000	168	163	9240
	29000	171	166	9540
	30000	174	169	9840
	31000	177	172	10140
	32000	180	175	10440
	32700	182	177	10650
	33000	183	178	10740
	34000	186	181	11050
	35000	189	184	11350
	36000	192	187	11660
	37000	194	189	11970
	38000	197	192	12280
	39000	200	195	12590
	39600	202	197	12780

FIGURE 10-8-404. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY DRY SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	158	153	8600
	26000	162	157	8920
	27000	165	160	9230
	28000	168	163	9540
	29000	171	166	9840
	30000	174	169	10150
	31000	177	172	10460
	32000	180	175	10780
	32700	182	177	11000
	33000	183	178	11090
	34000	186	181	11410
	35000	189	184	11730
	36000	192	187	12050
	37000	195	190	12370
	38000	198	193	12690
	39000	201	196	13020
	39600	202	197	13210

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY DRY SNOW**

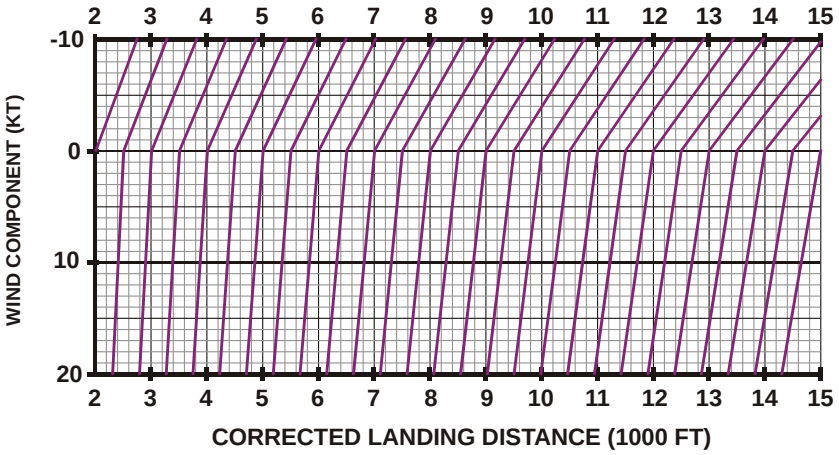


Figure 10-8-405. Actual Landing Distance From 50 FT; Flaps - 0° Wind Components Correction Runway Contaminated by Dry Snow

FIGURE 10-8-406. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	156	151	5440
	26000	159	154	5610
	27000	162	157	5790
	28000	165	160	5960
	29000	168	163	6140
	30000	171	166	6310
	31000	173	168	6490
	32000	176	171	6660
	32700	178	173	6790
	33000	179	174	6840
	34000	182	177	7020
	35000	185	180	7210
	36000	187	182	7390
	37000	190	185	7570
	38000	193	188	7760
	39000	196	191	7940
	39600	197	192	8060
1000	25000	156	151	5570
	26000	159	154	5750
	27000	162	157	5930
	28000	165	160	6110
	29000	168	163	6290
	30000	171	166	6480
	31000	174	169	6660
	32000	176	171	6840
	32700	178	173	6970
	33000	179	174	7030
	34000	182	177	7210
	35000	185	180	7400
	36000	188	183	7590
	37000	190	185	7780
	38000	193	188	7970
	39000	196	191	8170
	39600	198	193	8280

FIGURE 10-8-406. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	156	151	5710
	26000	159	154	5900
	27000	162	157	6080
	28000	165	160	6270
	29000	168	163	6460
	30000	171	166	6650
	31000	174	169	6830
	32000	177	172	7030
	32700	179	174	7160
	33000	180	175	7220
	34000	182	177	7410
	35000	185	180	7610
	36000	188	183	7810
	37000	191	186	8000
	38000	194	189	8200
	39000	196	191	8400
	39600	198	193	8520
3000	25000	156	151	5860
	26000	159	154	6050
	27000	162	157	6240
	28000	165	160	6440
	29000	168	163	6630
	30000	171	166	6820
	31000	174	169	7020
	32000	177	172	7220
	32700	179	174	7360
	33000	180	175	7420
	34000	183	178	7620
	35000	186	181	7820
	36000	188	183	8030
	37000	191	186	8230
	38000	194	189	8440
	39000	197	192	8640
	39600	198	193	8770

FIGURE 10-8-406. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	156	151	6010
	26000	159	154	6210
	27000	162	157	6410
	28000	165	160	6610
	29000	168	163	6810
	30000	171	166	7010
	31000	174	169	7220
	32000	177	172	7430
	32700	179	174	7570
	33000	180	175	7630
	34000	183	178	7840
	35000	186	181	8050
	36000	189	184	8260
	37000	191	186	8470
	38000	194	189	8680
	39000	197	192	8900
	39600	199	194	9020
5000	25000	156	151	6170
	26000	159	154	6380
	27000	162	157	6580
	28000	165	160	6790
	29000	168	163	7000
	30000	172	167	7210
	31000	175	170	7420
	32000	177	172	7640
	32700	180	175	7790
	33000	180	175	7850
	34000	183	178	8070
	35000	186	181	8280
	36000	189	184	8500
	37000	192	187	8720
	38000	195	190	8940
	39000	197	192	9150
	39600	199	194	9280

FIGURE 10-8-406. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	156	151	6340
	26000	159	154	6550
	27000	163	158	6760
	28000	166	161	6980
	29000	169	164	7200
	30000	172	167	7420
	31000	175	170	7640
	32000	178	173	7860
	32700	180	175	8010
	33000	181	176	8080
	34000	184	179	8300
	35000	187	182	8530
	36000	189	184	8750
	37000	192	187	8980
	38000	195	190	9200
	39000	198	193	9420
	39600	199	194	9550
7000	25000	156	151	6520
	26000	160	155	6740
	27000	163	158	6960
	28000	166	161	7190
	29000	169	164	7410
	30000	172	167	7640
	31000	175	170	7870
	32000	178	173	8090
	32700	180	175	8250
	33000	181	176	8320
	34000	184	179	8550
	35000	187	182	8790
	36000	190	185	9010
	37000	192	187	9240
	38000	195	190	9470
	39000	198	193	9700
	39600	199	194	9840

FIGURE 10-8-406. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	157	152	6700
	26000	160	155	6930
	27000	163	158	7170
	28000	166	161	7400
	29000	169	164	7630
	30000	172	167	7870
	31000	175	170	8100
	32000	178	173	8340
	32700	181	176	8510
	33000	181	176	8580
	34000	184	179	8820
	35000	187	182	9050
	36000	190	185	9290
	37000	193	188	9520
	38000	196	191	9760
	39000	198	193	9990
	39600	200	195	10140
9000	25000	157	152	6900
	26000	160	155	7140
	27000	163	158	7380
	28000	166	161	7620
	29000	170	165	7860
	30000	173	168	8100
	31000	176	171	8350
	32000	179	174	8590
	32700	181	176	8770
	33000	182	177	8840
	34000	185	180	9080
	35000	188	183	9320
	36000	190	185	9570
	37000	193	188	9810
	38000	196	191	10050
	39000	199	194	10300
	39600	200	195	10440

FIGURE 10-8-406. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	157	152	7100
	26000	160	155	7350
	27000	164	159	7600
	28000	167	162	7850
	29000	170	165	8100
	30000	173	168	8350
	31000	176	171	8610
	32000	179	174	8860
	32700	181	176	9030
	33000	182	177	9110
	34000	185	180	9350
	35000	188	183	9610
	36000	191	186	9860
	37000	193	188	10110
	38000	196	191	10360
	39000	199	194	10610
	39600	200	195	10770
11000	25000	157	152	7320
	26000	161	156	7570
	27000	164	159	7830
	28000	167	162	8090
	29000	170	165	8350
	30000	173	168	8610
	31000	176	171	8870
	32000	179	174	9130
	32700	181	176	9310
	33000	182	177	9380
	34000	185	180	9640
	35000	188	183	9900
	36000	191	186	10160
	37000	194	189	10420
	38000	196	191	10680
	39000	199	194	10950
	39600	201	196	11110

FIGURE 10-8-406. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	158	153	7550
	26000	161	156	7810
	27000	164	159	8080
	28000	167	162	8350
	29000	171	166	8610
	30000	174	169	8880
	31000	177	172	9140
	32000	180	175	9410
	32700	182	177	9590
	33000	183	178	9670
	34000	186	181	9940
	35000	188	183	10210
	36000	191	186	10480
	37000	194	189	10750
	38000	197	192	11020
	39000	200	195	11300
	39600	201	196	11470
13000	25000	158	153	7780
	26000	161	156	8060
	27000	165	160	8340
	28000	168	163	8610
	29000	171	166	8890
	30000	174	169	9160
	31000	177	172	9430
	32000	180	175	9710
	32700	182	177	9900
	33000	183	178	9980
	34000	186	181	10260
	35000	189	184	10540
	36000	192	187	10820
	37000	194	189	11100
	38000	197	192	11380
	39000	200	195	11670
	39600	202	197	11840

FIGURE 10-8-406. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY COMPACTED SNOW

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	158	153	8030
	26000	162	157	8310
	27000	165	160	8600
	28000	168	163	8880
	29000	171	166	9160
	30000	174	169	9440
	31000	177	172	9730
	32000	180	175	10010
	32700	182	177	10210
	33000	183	178	10300
	34000	186	181	10590
	35000	189	184	10880
	36000	192	187	11170
	37000	195	190	11460
	38000	198	193	11760
	39000	201	196	12050
	39600	202	197	12230

ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY COMPACTED SNOW

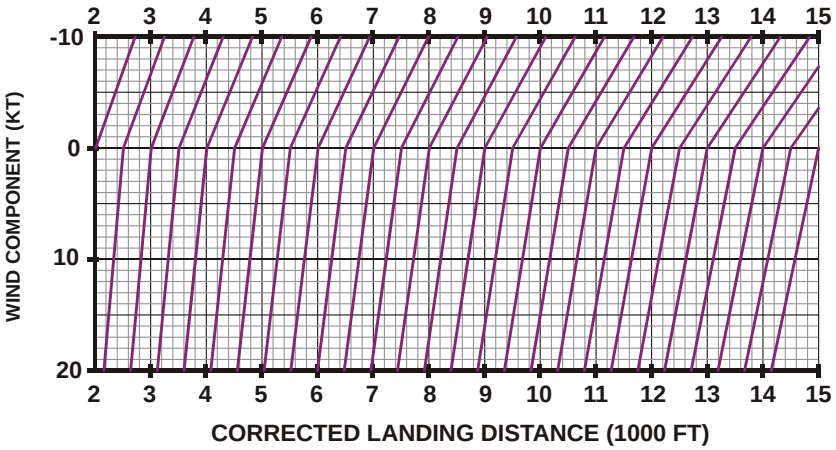


Figure 10-8-407. Actual Landing Distance From 50 FT; Flaps - 0° Wind Components Correction Runway Contaminated by Compacted Snow

FIGURE 10-8-408. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
SEA LEVEL	25000	156	151	9090
	26000	159	154	9410
	27000	162	157	9730
	28000	165	160	10050
	29000	168	163	10380
	30000	171	166	10720
	31000	173	168	11050
	32000	176	171	11390
	32700	178	173	11620
	33000	179	174	11720
	34000	182	177	12070
	35000	185	180	12420
	36000	187	182	12780
	37000	190	185	13130
	38000	193	188	13490
	39000	196	191	13850
	39600	197	192	14070
1000	25000	156	151	9350
	26000	159	154	9680
	27000	162	157	10020
	28000	165	160	10350
	29000	168	163	10700
	30000	171	166	11040
	31000	174	169	11380
	32000	176	171	11730
	32700	178	173	11980
	33000	179	174	12090
	34000	182	177	12450
	35000	185	180	12810
	36000	188	183	13180
	37000	190	185	13550
	38000	193	188	13920
	39000	196	191	14290
	39600	198	193	14520

FIGURE 10-8-408. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
2000	25000	156	151	9620
	26000	159	154	9970
	27000	162	157	10320
	28000	165	160	10670
	29000	168	163	11020
	30000	171	166	11370
	31000	174	169	11730
	32000	177	172	12100
	32700	179	174	12360
	33000	180	175	12470
	34000	182	177	12850
	35000	185	180	13220
	36000	188	183	13600
	37000	191	186	13980
	38000	194	189	14370
	39000	196	191	14760
	39600	198	193	14990
3000	25000	156	151	9910
	26000	159	154	10270
	27000	162	157	10630
	28000	165	160	10990
	29000	168	163	11360
	30000	171	166	11730
	31000	174	169	12110
	32000	177	172	12490
	32700	179	174	12760
	33000	180	175	12870
	34000	183	178	13260
	35000	186	181	13650
	36000	188	183	14040
	37000	191	186	14440
	38000	194	189	14840
	39000	197	192	15240
	39600	198	193	15480

FIGURE 10-8-408. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
4000	25000	156	151	10220
	26000	159	154	10590
	27000	162	157	10960
	28000	165	160	11340
	29000	168	163	11720
	30000	171	166	12110
	31000	174	169	12500
	32000	177	172	12900
	32700	179	174	13180
	33000	180	175	13300
	34000	183	178	13700
	35000	186	181	14100
	36000	189	184	14510
	37000	191	186	14920
	38000	194	189	15340
	39000	197	192	15750
	39600	199	194	16000
5000	25000	156	151	10530
	26000	159	154	10910
	27000	162	157	11300
	28000	165	160	11690
	29000	168	163	12090
	30000	172	167	12490
	31000	175	170	12900
	32000	177	172	13310
	32700	180	175	13600
	33000	180	175	13720
	34000	183	178	14140
	35000	186	181	14560
	36000	189	184	14980
	37000	192	187	15410
	38000	195	190	15840
	39000	197	192	16260
	39600	199	194	16520

FIGURE 10-8-408. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
6000	25000	156	151	10870
	26000	159	154	11270
	27000	163	158	11670
	28000	166	161	12080
	29000	169	164	12500
	30000	172	167	12910
	31000	175	170	13340
	32000	178	173	13760
	32700	180	175	14060
	33000	181	176	14190
	34000	184	179	14620
	35000	187	182	15060
	36000	189	184	15500
	37000	192	187	15940
	38000	195	190	16380
	39000	198	193	16820
	39600	199	194	17080
7000	25000	156	151	11220
	26000	160	155	11640
	27000	163	158	12060
	28000	166	161	12490
	29000	169	164	12920
	30000	172	167	13360
	31000	175	170	13790
	32000	178	173	14240
	32700	180	175	14550
	33000	181	176	14680
	34000	184	179	15130
	35000	187	182	15590
	36000	190	185	16040
	37000	192	187	16490
	38000	195	190	16940
	39000	198	193	17390
	39600	199	194	17670

FIGURE 10-8-408. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
8000	25000	157	152	11600
	26000	160	155	12030
	27000	163	158	12470
	28000	166	161	12920
	29000	169	164	13370
	30000	172	167	13820
	31000	175	170	14280
	32000	178	173	14730
	32700	181	176	15060
	33000	181	176	15200
	34000	184	179	15660
	35000	187	182	16130
	36000	190	185	16590
	37000	193	188	17060
	38000	196	191	17530
	39000	198	193	18000
	39600	200	195	18290
9000	25000	157	152	11990
	26000	160	155	12450
	27000	163	158	12900
	28000	166	161	13360
	29000	170	165	13830
	30000	173	168	14300
	31000	176	171	14770
	32000	179	174	15250
	32700	181	176	15590
	33000	182	177	15730
	34000	185	180	16210
	35000	188	183	16690
	36000	190	185	17170
	37000	193	188	17650
	38000	196	191	18140
	39000	199	194	18630
	39600	200	195	18930

FIGURE 10-8-408. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
10000	25000	157	152	12400
	26000	160	155	12870
	27000	164	159	13350
	28000	167	162	13830
	29000	170	165	14310
	30000	173	168	14800
	31000	176	171	15290
	32000	179	174	15790
	32700	181	176	16130
	33000	182	177	16280
	34000	185	180	16770
	35000	188	183	17270
	36000	191	186	17770
	37000	193	188	18270
	38000	196	191	18780
	39000	199	194	19290
	39600	200	195	19600
11000	25000	157	152	12830
	26000	161	156	13320
	27000	164	159	13820
	28000	167	162	14320
	29000	170	165	14820
	30000	173	168	15330
	31000	176	171	15840
	32000	179	174	16340
	32700	181	176	16700
	33000	182	177	16850
	34000	185	180	17360
	35000	188	183	17880
	36000	191	186	18400
	37000	194	189	18920
	38000	196	191	19450
	39000	199	194	19980
	39600	201	196	20300

FIGURE 10-8-408. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
12000	25000	158	153	13290
	26000	161	156	13800
	27000	164	159	14310
	28000	167	162	14830
	29000	171	166	15350
	30000	174	169	15870
	31000	177	172	16390
	32000	180	175	16920
	32700	182	177	17290
	33000	183	178	17450
	34000	186	181	17980
	35000	188	183	18520
	36000	191	186	19060
	37000	194	189	19600
	38000	197	192	20150
	39000	200	195	20710
	39600	201	196	21040
13000	25000	158	153	13770
	26000	161	156	14300
	27000	165	160	14830
	28000	168	163	15370
	29000	171	166	15910
	30000	174	169	16450
	31000	177	172	16990
	32000	180	175	17540
	32700	182	177	17920
	33000	183	178	18080
	34000	186	181	18640
	35000	189	184	19190
	36000	192	187	19760
	37000	194	189	20330
	38000	197	192	20900
	39000	200	195	21470
	39600	202	197	21820

FIGURE 10-8-408. V_{APP}, V_{REF} AND ACTUAL LANDING DISTANCE FROM 50 FT FLAPS - 0° RUNWAY CONTAMINATED BY ICE

PRESSURE ALTITUDE	GROSS WEIGHT	VAPP	VREF	ACTUAL LANDING DISTANCE
(FT)	(LB)	(KCAS)	(KCAS)	(FT)
14000	25000	158	153	14260
	26000	162	157	14810
	27000	165	160	15370
	28000	168	163	15920
	29000	171	166	16480
	30000	174	169	17040
	31000	177	172	17600
	32000	180	175	18170
	32700	182	177	18570
	33000	183	178	18740
	34000	186	181	19320
	35000	189	184	19900
	36000	192	187	20490
	37000	195	190	21080
	38000	198	193	21680
	39000	201	196	22280
	39600	202	197	22640

**ACTUAL LANDING DISTANCE FROM 50 FT; FLAPS - 0°
WIND COMPONENTS CORRECTION
RUNWAY CONTAMINATED BY ICE**

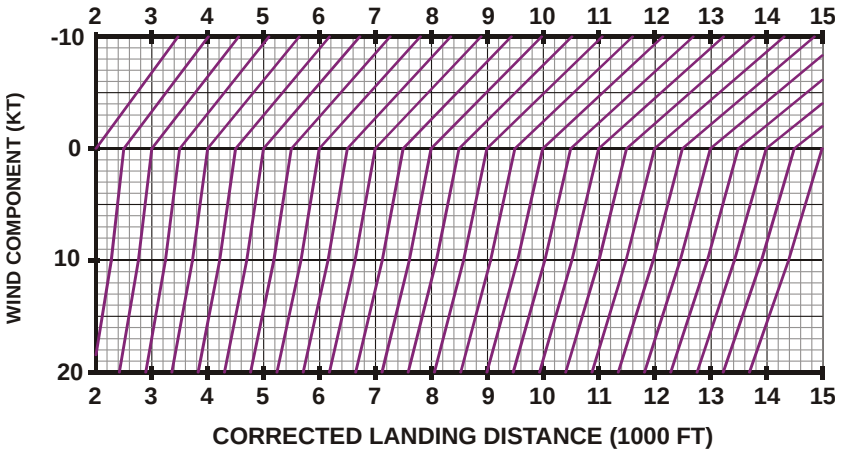


Figure 10-8-409. Actual Landing Distance From 50 FT; Flaps - 0° Wind Components Correction Runway Contaminated by Ice

TRANSPORT CANADA CIVIL AVIATION APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT No. 9 for GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

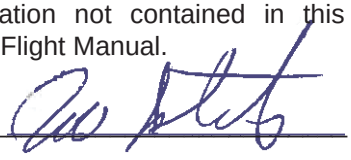
REGISTRATION No. _____

TRANSPORT CANADA CIVIL AVIATION FLIGHT MANUAL SUPPLEMENT

This Airplane Flight Manual Supplement is approved by Transport Canada Civil Aviation (TCCA).

This Supplement must be attached to the approved basic Gulfstream G280 Airplane Flight Manual, dated August 26, 2012, or later approved revisions, for Gulfstream series G280 airplanes serial number (S/N) 2001 and subsequent, operated under Canadian registry.

The information contained herein supplements or supersedes the information of the basic Airplane Flight Manual. For Limitations, Normal Procedures, Abnormal Procedures, Emergency Procedures and Performance information not contained in this supplement, consult the basic Airplane Flight Manual.

TCCA APPROVED: 

Chief, Flight Test
for Director, National Aircraft Certification
TRANSPORT CANADA

Date: 9/4/2013 Manual No.....
GULFSTREAM AEROSPACE LP.

TCCA APPROVED
28 Mar 2013

TRANSPORT CANADA CIVIL AVIATION FLIGHT MANUAL SUPPLEMENT

INTRODUCTION

GENERAL

Add the following:

Data provided in this supplement shall be attached to the GULFSTREAM G280 Airplane Flight Manual (AFM) for operators under TCCA registry, and used in lieu of similar Civil Aviation Authority of Israel (CAAI) approved data presented in the basic Gulfstream G280 AFM latest released revision.

Operation in compliance with the Limitations presented in Section I of this Airplane Flight Manual is required by the Transport Canada Civil Aviation.

SECTION I
LIMITATIONS

01-30-00: ICE AND RAIN PROTECTION

1-30-20: Wing Anti-Icing

NOTE

When SAE Type II, Type III or Type IV anti-icing fluids have been applied, the wing anti-ice system must only be selected ON, if required, just prior to thrust increase for take-off.

Add the above limitation in the location indicated:

TAKEOFF INTO KNOWN OR FORECAST ICING CONDITIONS - immediately above

SECTION IV
NORMAL PROCEDURES

CAUTION

WHEN FLYING IN ICING CONDITIONS, CREWS SHOULD PAY PARTICULAR ATTENTION TO ANY CAS MESSAGE THAT APPEARS. DO NOT ASSUME THAT IT IS JUST ANOTHER "ICE DETECTED" MESSAGE.

Add the above Caution note to the following procedures in the location indicated:

AFTER TAKEOFF - immediately following step 7
CLIMB TRANSITION - immediately following step 4
BEFORE DESCENT - immediately following step 2
DESCENT TRANSITION - immediately following step 2

COLD WEATHER OPERATIONS

Add the following note immediate prior to the "PRE FLIGHT" procedure of this section:

NOTE

Perform the following to prepare the airplane for flight after a prolonged cold soak at temperatures below -20° C.

1. Use GPU to assist the batteries for APU start.
2. Use of preheat capability, if available, to warm up the avionics in the nose compartment.
3. Warm up the cabin to temperature of +15° C using APU and Pack running and MED closed.
4. Once everything is warmed up, if spurious indications, faults or failures have occurred, during power up, shut down to a "black" airplane and power back up to reboot and clear these spurious indications, faults or failures.

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ANAC APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 10
for
GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

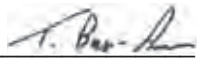
REGISTRATION No. _____

BRAZILIAN AIRCRAFT
FLIGHT MANUAL SUPPLEMENT

This Airplane Flight Manual Supplement is approved by the Civil Aviation Authority of Israel on behalf of the "Agência Nacional de Aviação Civil"- ANAC for Brazilian registered aircraft, in accordance with the "Regulamento Brasileiros da Aviação Civil" - RBAC 21, Section 21.29.

This Supplement must be attached to the approved basic Gulfstream G280 Airplane Flight Manual, dated February 26, 2015 for Gulfstream series G280 airplanes serial number (S/N) 2001 and subsequent, having Brazilian certification.

The information contained herein supplements or supersedes the information of the basic Airplane Flight Manual. For Limitations, Normal Procedures, Abnormal Procedures, Emergency Procedures and Performance information not contained in this supplement, consult the basic Airplane Flight Manual.



Date 9 Dec 2015

Mr. Tamir Bar-Am, Manager
Engineering BranchCivil Aviation Authority, Israel

Manual No. _____

GULFSTREAM AEROSPACE LP.

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AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL- ANAC FLIGHT MANUAL SUPPLEMENT

INTRODUCTION

GENERAL

Add the following:

Data provided in this supplement shall be attached to the Gulfstream G280 Airplane Flight Manual (AFM) for Agência Nacional de Aviação Civil- (ANAC) operations, and used in lieu of similar Civil Aviation Authority of Israel (CAAI) approved data presented in the basic Gulfstream G280 AFM latest released revision.

Operation in compliance with the Limitations presented in Section 1 of this Airplane Flight Manual is required by Agência Nacional de Aviação Civil in accordance with the "Regulamento Brasileiros da Aviação Civil" - RBAC 21, Section 21.29.

SECTION I
LIMITATIONS
Add the following:

01-00-20: G280 Noise Standards (ANAC)

The following noise levels comply with RBAC part 36, corresponding to Title 14 CFR part 36, Appendix B, Stage 4 maximum noise level requirements and were obtained by analysis of approved data from noise tests conducted under the provisions of part 36, Amendment 36-28. The noise measurement and evaluation procedures used to obtain these noise levels are considered by the FAA to be equivalent to the Chapter 4 noise level required by the International Civil Aviation Organization (ICAO, Annex 16, Volume I, Appendix 2, Amendment 7, and effective March 21, 2002). For the Gulfstream G280 Jet, equipped with two Honeywell HTFG250 turbofan engines, the EPNLs at MTOW and MLW are: (noise levels are given in EPNdb)

Lateral	89.5
Flyover	75.2
Approach	90.5

No determination has been made by the Brazilian National Civil Aviation Agency (ANAC) that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

Lateral and flyover noise levels were obtained at the maximum takeoff weight (MTOW) of 39,600 lb, takeoff flaps - 10° and anti-ice system off. Thrust reduction in accordance with Title 14 CFR Part 36 and ICAO Annex 16 was used to determine flyover noise level.

Approach noise levels were established on a 3° glide-slope, with landing gear down, flaps - 39°, APU - on, at the maximum landing weight of 32,700 lb.

Add new limitation
01-12-20: Aircraft Towing

1. Towing speed should not exceed 3 MPH.
2. Apply aircraft brakes only in emergency situations.
3. Do not exceed 84±3° angle between the tow and the aircraft.
4. Towing without the tow bar is allowed only with the following types of tugs
   - Lektro Tug AP8750CX series
   - Lektro Tug AP8850SDA series

Add new limitation
01-49-10: APU OPERATION

APU operations on the ground are allowed only for main Engine Starting.
Turn off the APU after completing Engine Starting.

NOTE

APU may be started and operated in-flight in accordance with the instructions and limitations of the Airplane Flight Manual.

Add new limitation
01-73-20: Automatic Power Reserve (APR)

Takeoff from contaminated runways with APR INHIBIT is prohibited.

SECTION II
EMERGENCY PROCEDURES
No Change.

SECTION III
ABNORMAL PROCEDURES
Change caution message to read as below:
IIIA-43 Caution Messages (amber)

Message	Triggered by	Corrective Action
FADEC Fail, L FADEC Fail, R FADEC Fail, L-R	Affected engine FADEC has failed.	In Flight: 1. Monitor engine parameters. 2. Avoid rapid thrust lever movements. ***NOTE***: If FADEC Fail Message appears, APR function might not be available, use APR – OFF performance and limitations outlined below in this supplement. **On Ground:** 1. Do not dispatch.

ANAC APPROVED
9 Dec 2015

SECTION V
PERFORMANCE WET AND DRY

No Change.

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CAAI APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 11
for
GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

APR OFF CORRECTIONS

This Supplement must be attached to CAAI approved Airplane Flight Manual dated 15 Apr 2015.
Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

CAAI APPROVED: _____

Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Date: _____ Manual No._____

GULFSTREAM AEROSPACE LP

Supplement 11

APR - OFF PERFORMANCE

The general information in the introduction section is applicable with the addition of the following:
This supplement should be used whenever performance data is to be obtained from Section V of this AFM and the engine APR system is INHIBITED.
APR OFF is only possible when pilot is selecting APR INHIBIT option through the SMC.

SECTION I
LIMITATIONS
Takeoff from contaminated runways with APR INHIBIT is prohibited.

SECTION II
EMERGENCY PROCEDURES
No change.

SECTION III
ABNORMAL PROCEDURES
No change.

SECTION IV
NORMAL PROCEDURES
To select APR INHIBIT –

1. SMC – THRST – Select APR Inhibit (long selection)
   Auto APR Inhibit caution CAS will come on.
   RSK 4 selection button will appear on SMC.
2. SMC – THRST – Select APR INH ACK
   The Auto APR Inhibit caution CAS will turn to a status Auto APR Inhibit CAS.

To de select APR INHIBIT –

1. SMC – THRST – Deselect APR Inhibit
   Auto APR Inhibit caution CAS will clear.

   SMC – THRST – Deselect APR INH ACK
   The Auto APR Inhibit status CAS will turn to a caution Auto APR Inhibit CAS.

CAAI APPROVED
29 Oct 2015

APR - OFF PERFORMANCE

With APR INHIBITED, the performance data in Section V Performance Wet and Dry are applicable with the addition of corrections as presented in Figure X-11-1. through Figure X-11-4.
All other performance data in section V remain unchanged.

Procedure -

1. Calculate aircraft performance with APR ON according to Section V.
2. Apply relevant corrections to step 1 according to Figure X-11-1. through Figure X-11-4.

BALKED LANDING / APPROACH CLIMB THRUST
N1 SETTING; ONE ENGINE INOPERATIVE
AIRSPEED - 120 KCAS, APR - OFF, ENGINE ANTI-ICE - OFF, WING ANTI-ICE - OFF, ECS - OFF

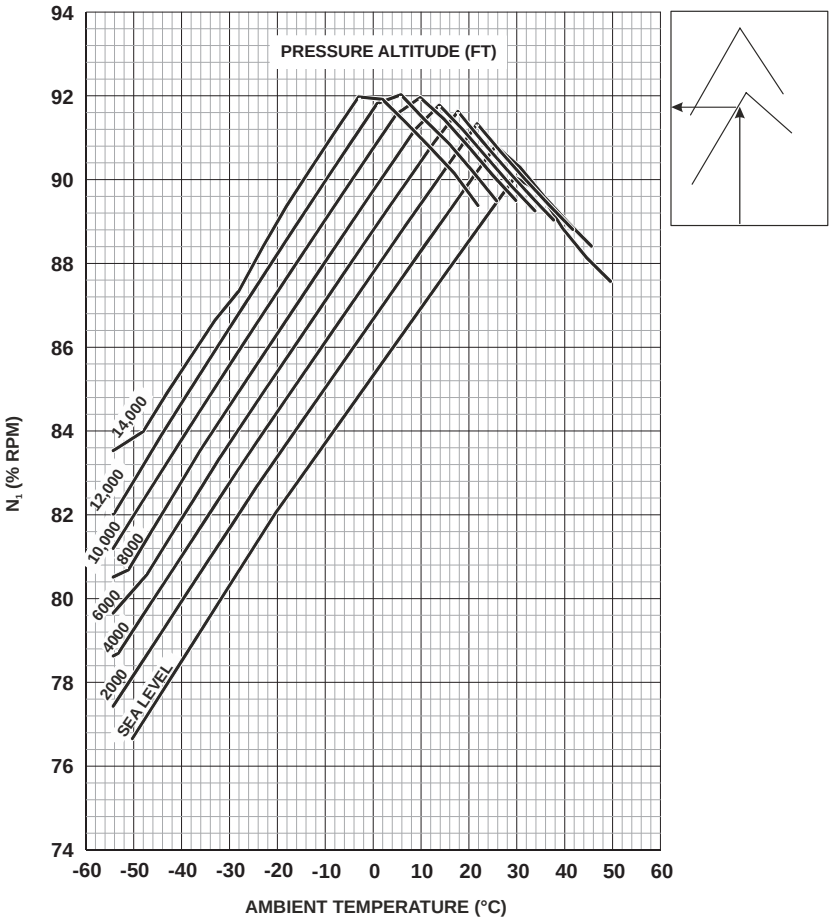

Figure X-11-1. APR OFF PERFORMANCE CORRECTIONS
N1 SETTING; ENGINE ANTI-ICE - OFF, WING ANTI-ICE - OFF, ECS - OFF

BALKED LANDING / APPROACH CLIMB THRUST
N1 SETTING; ONE ENGINE INOPERATIVE
AIRSPEED - 120 KCAS, APR - OFF, ENGINE ANTI-ICE - OFF, WING ANTI-ICE - OFF, ECS - ON

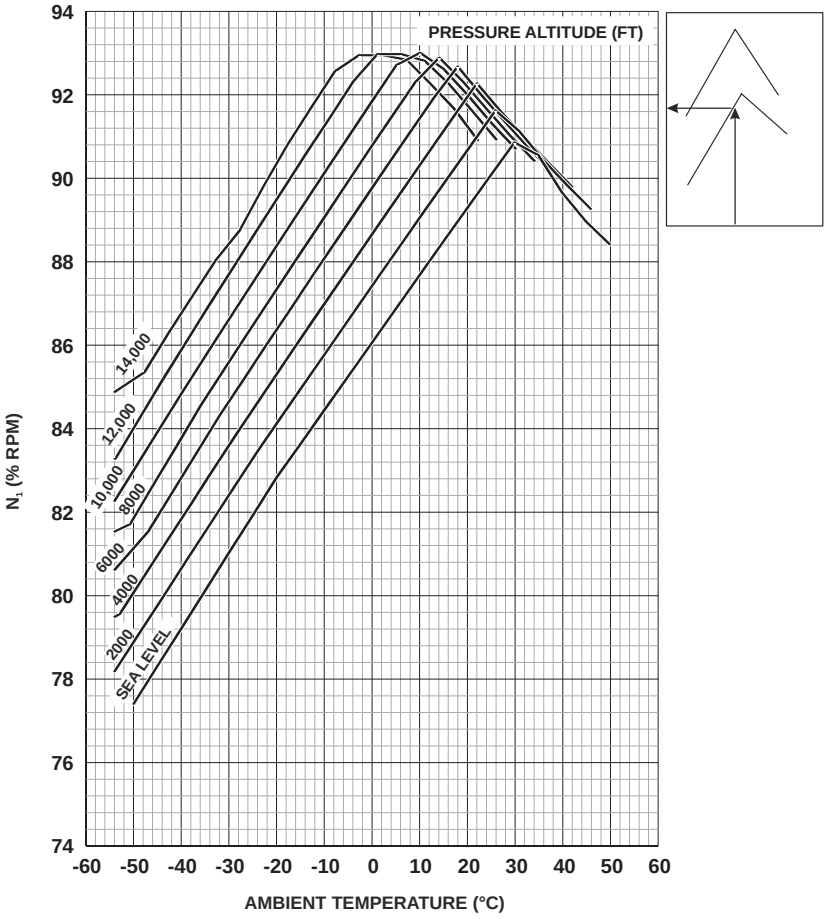

Figure X-11-2. APR OFF PERFORMANCE CORRECTIONS
N1 SETTING; ENGINE ANTI-ICE - OFF, WING ANTI-ICE - OFF, ECS - ON

BALKED LANDING / APPROACH CLIMB THRUST
N1 SETTING; ONE ENGINE INOPERATIVE
AIRSPEED - 120 KCAS, APR - OFF, ENGINE ANTI-ICE - ON, WING ANTI-ICE - OFF, ECS - ON

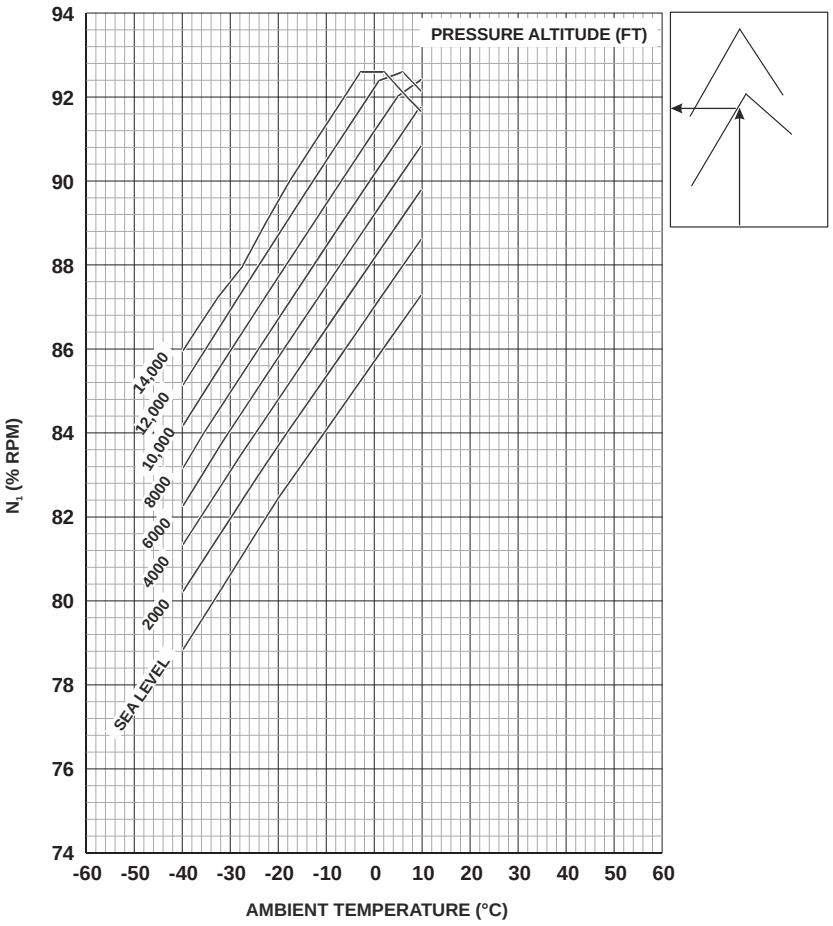

Figure X-11-3. APR OFF PERFORMANCE CORRECTIONS
N1 SETTING; ENGINE ANTI-ICE - ON, WING ANTI-ICE - OFF, ECS - ON

BALKED LANDING / APPROACH CLIMB THRUST
N1 SETTING; ONE ENGINE INOPERATIVE
AIRSPEED - 120 KCAS, APR - OFF, ENGINE ANTI-ICE - ON, WING ANTI-ICE - ON, ECS - ON

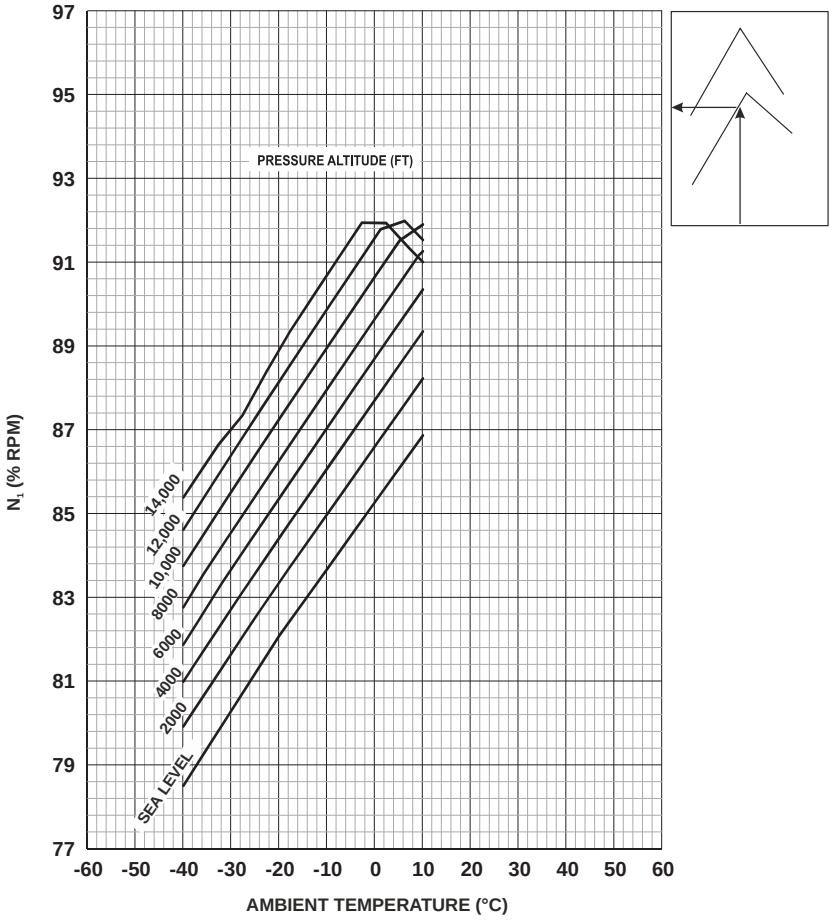

Figure X-11-4. APR OFF PERFORMANCE CORRECTIONS
N1 SETTING; ENGINE ANTI-ICE - ON, WING ANTI-ICE - ON, ECS - ON

PERFORMANCE DATA	SECTION V (APR ON) FIGURE NUMBER	APR OFF CORRECTION
BALKED LANDING/ APPROACH CLIMB THRUST N1 SETTING	Figures 5-19 through 5-19	Use Figure X-11-1. through Figure X-11-4..
TAKEOFF WEIGHT LIMITATIONS (AS PERMITTED BY CLIMB REQUIREMENTS)	For flaps - 20°: Figures 5-48 through 5-51 & Figures 5-101 through 5-104 For flaps - 10°: Figures 5-154 through 5-157 & Figures 5-207 through 5-210	Figure X-11-5
TAKE-OFF FIELD LENGTH (TOFL)	For flaps - 20°, dry runways: ECS - OFF, EAI - OFF, WAI - OFF Figures 5-54 through 5-68 ECS - ON, EAI - OFF, WAI - OFF Figures 5-69 through 5-83 ECS - ON, EAI - ON, WAI - ON or OFF Figures 5-86 through 5-100 For flaps - 20°, wet runways: ECS - OFF, EAI - OFF, WAI - OFF Figures 5-107 through 5-121 ECS - ON, EAI - OFF, WAI - OFF Figures 5-122 through 5-136 ECS - ON, EAI - ON, WAI - ON or OFF Figures 5-137 through 5-151 For flaps - 10°, dry runways: ECS - OFF, EAI - OFF, WAI - OFF Figures 5-160 through 5-174 ECS - ON, EAI - OFF, WAI - OFF Figures 5-175 through 5-189 ECS - ON, EAI - ON, WAI - ON or OFF Figures 5-190 through 5-204 For flaps - 10°, wet runways: ECS - OFF, EAI - OFF, WAI - OFF Figures 5-213 through 5-227 ECS - ON, EAI - OFF, WAI - OFF Figures 5-228 through 5-242 ECS - ON, EAI - ON, WAI - ON or OFF Figures 5-243 through 5-257	Increase TOFL by 3%.
AVAILABLE 2ND SEGMENT GROSS CLIMB GRADIENT		Figure X-11-6
APPROACH CLIMB GRADIENTS	Figure 5-272	Figure X-11-7

PERFORMANCE DATA	SECTION V (APR ON) FIGURE NUMBER	APR OFF CORRECTION
LANDING WEIGHT LIMITATIONS (AS PERMITTED BY CLIMB REQUIREMENTS)	Figures 5-273 through Fig 5-275	Figure X-11-8

FIGURE X-11-5. TAKEOFF WEIGHT LIMITATION CORRECTION (LB)

TAKEOFF WEIGHT LIMITATION CORRECTION (LB)	TAKEOFFF PRESSURE ALTITUDE (FT)			
	≤4,000	7,000	10,000	14,000
WAI ON	-6,600	-7,400	-9,200	-10,200
WAI OFF	-2,200			

FIGURE X-11-6. AVAILABLE 2ND SEGMENT CLIMB GRADIENT CORRECTION

AVAILABLE 2ND SEGMENT CLIMB GRADIENT CORRECTION		TAKEOFFF PRESSURE ALTITUDE (FT)			
		0	5,000	10,000	14,000
GROSS WEIGHT (LB)	26,000	-1.3%	-1.2%	-1.0%	-0.9%
	30,000	-1.1%	-1.0%	-0.9%	-0.8%
	34,000	-1.0%	-0.9%	-0.8%	-0.7%
	≥38,000	-0.9%	-0.8%	-0.7%	-0.6%

FIGURE X-11-7. APPROACH CLIMB GRADIENT CORRECTION

APPROACH CLIMB GRADIENT CORRECTION		LANDING FIELD PRESSURE ALTITUDE (FT)			
		0	5,000	10,000	14,000
GROSS WEIGHT (LB)	25,000	-1.4%	-1.2%	-1.1%	-1.0%
	30,000	-1.1%	-1.0%	-0.9%	-0.8%
	≥35000	-1.0%	-0.9%	-0.8%	-0.7%

FIGURE X-11-8. LANDING WEIGHT LIMITATION CORRECTION (LB)

LANDING WEIGHT LIMITATION CORRECTION (LB)	LANDING FIELD PRESSURE ALTITUDE (FT)			
	0	9,000	12,000	14,000
WAI ON	-6,400	-7,100	-9,600	-10,000
WAI OFF	-2,100			

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CAAI APPROVED
15 Apr 2015

CAAI APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT No. 15 for GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

VERTICAL WEATHER DISPLAY (VWX) AND PREDICTIVE WINDSHEAR (PWS)

This Supplement must be attached to latest CAAI approved Airplane Flight Manual for operation of a G280 aircraft equipped with certified software version 3.6.1 (MOD G25-10074), RTA-4218 and with VWX and PWS functionality enabled.

Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

CAAI APPROVED: _____

Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Date: 15 May 2021 Manual No._____

GULFSTREAM AEROSPACE LP

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LOG OF REVISIONS

Revision	Description	Signature/date
1	Added Log of Revisions. Added Log of Effective Pages. Revised Predictive Windshear Warning Escape Procedure	15 May 2021

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LOG OF EFFECTIVE PAGES

All currently effective pages of this Supplement are listed below. An asterisk (*) precedes those listed pages affected by current revision.

*X-15-1	15 May 2021
*X-15-2	15 May 2021
*X-15-3	15 May 2021
*X-15-4	15 May 2021
*X-15-5	15 May 2021
*X-15-6	15 May 2021
*X-15-7	15 May 2021
*X-15-8	15 May 2021
*X-15-9	15 May 2021
*X-15-10	15 May 2021
*X-15-11	15 May 2021
*X-15-12	15 May 2021
*X-15-13	15 May 2021
*X-15-14	15 May 2021
*X-15-15	15 May 2021
*X-15-16	15 May 2021
*X-15-17	15 May 2021
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*X-15-21	15 May 2021
*X-15-22	15 May 2021

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VERTICAL WEATHER DISPLAY (VWX)

GENERAL

This supplement is required for operation of a G280 aircraft equipped with certified software version 3.6.1 (MOD G25-10074), RTA-4218 and with VWX and PWS functionality enabled.

SYSTEM DESCRIPTION

Vertical Weather (VWX) radar uses vertical scans to display weather returns on the VSD format.
The VWX display range limit is 100 NM.

VWX shall be active when:

- WX is On
- VSD/VWX is selected on MAP
- WX control mode AUTO
- WX mode is WX or WX+T

To display VWX information, the VSD/VWX Map View should be selected in the MAP menu.

NOTE

Turbulence will not be depicted on VWX
VWX data will not available when the WXR is Off, or in Ground mapping mode.
When VWX is Off there will be no indication of a lack of VWX data.

Figure X-15-1. VWX display selection

The VWX display includes indications of Azimuth control indicator, Lateral reference annunciation and VSD overlay annunciation:

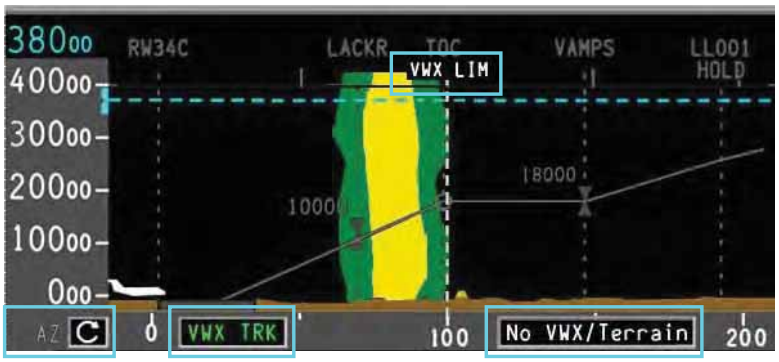

Figure X-15-2. VSD/VWX display indications

Lateral Reference Annunciation:

VWX TRK Radar scan aligned with aircraft track
When in "VWX AZ" and the pilot clicks the cursor anywhere on the VSD - the Lateral Reference will change back to TRK.

VWX AZ Radar scan aligned with Azimuth setting
Controlled by CCD scroll knob (rate aided)
VWX AZ shall default back to VWX TRK after 30 seconds since last azimuth selected.

VSD Overlay Annunciation:

"NO Terrain" Terrain data is not available (VWX on or OFF)

"NO VWX" VWX is ON + VWX data is not available

"NO VWX/Terrain" VWX is ON + VWX data is not available + terrain data is not displayed

Supplement 15

Azimuth Information:

Azimuth scan angle is displayed on the MFW map
Range is ± 60° when PWS is inactive (± 45° when PWS is active)
VWX scans are not always possible or allowed.

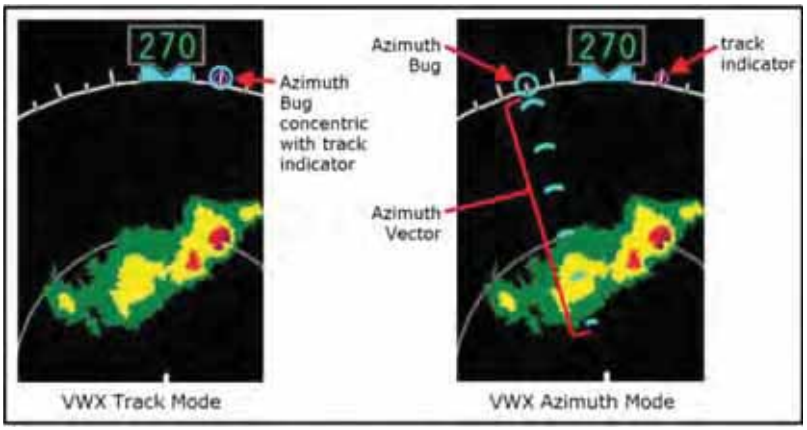

Figure X-15-3. Vertical azimuth indicator on lateral MAP

SECTION I
LIMITATIONS

The intended function of the vertical weather display is to depict the vertical profile of weather radar returns shown on the horizontal MAP display along the azimuth that has been selected by the pilot. Vertical weather echoes in the absence of a corresponding return on the horizontal MAP display are not associated with actual weather. These echoes are short time events, and are discernable as the MAP lateral weather display shows no corresponding echoes at that range.

These echoes may appear at any range when flying at any altitude but will most likely occur when below 15000ft in the following way:

- For a few seconds as a vertical thin line at a range equal to the altitude (0.5 to 3NM).
- As a large echo, rising from ground, when flying directly ("nose-on") toward a large city comprised of numerous high-rise buildings by a large body of water. The echo will be collocated geographically with the city.

Turning off the vertical weather display when weather returns do not appear on the MAP will prevent the display of returns not associated with actual weather.

Supplement 15

PREDICTIVE WINDSHEAR (PWS)

GENERAL

This supplement is required for operation of a G280 aircraft equipped with certified software version 3.6.1 (MOD G25-10074) and RTA-4218 and PWS functionality enabled.

SYSTEM DESCRIPTION

Predictive windshear radar uses Doppler processing techniques to detect:

- Performance decreasing conditions
- Increasing tailwind
- Decreasing headwind

The PWS radar provides visual and aural indications to help pilots avoid windshear areas during takeoff, approach and landing.

The PWS provides similar windshear warning and caution alerts as the TAWS. When PWS alerts are triggered, the MAP MFW and HSI shall default to 5 NM range and show PWS icons aligned to the hazardous azimuth.

NOTE

The PWS does not provide Flight Director escape guidance.

Takeoff Mode:

The PWS function is activated while on the ground when either:

- WX STBY and engines running and takeoff thrust applied, or
- Any other WX mode

The PWS alerts are inhibited, on takeoff, between 80kts and 50 feet AGL.
PWS is active after takeoff until the radio altitude is greater than 2400 feet AGL.

Landing Mode:

PWS will start scanning for windshear below 2300 feet AGL and alert for windshear below 1200 feet AGL until touchdown. The PWS alerts are inhibited during landing roll.

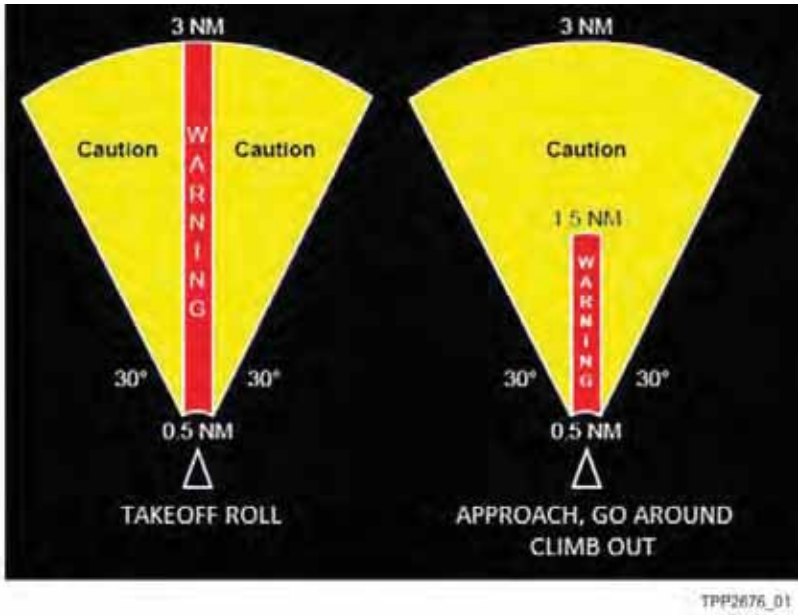

Figure X-15-4. PWS alert regions
Detects a windshear Alert from 3 to 5 nm.

NOTE

For details system description see RTA-4218 MultiScan™ Weather Radar operator's guide, PN 5230818856, Second edition, 27 March 2018 (or later applicable revision), pages 3-17 to 3-22 (or later applicable revision).

SECTION II
EMERGENCY PROCEDURES

PWS WINDSHEAR WARNING ESCAPE PROCEDURE (RED):

On takeoff:
When the aural warning "WINDSHEAR AHEAD, WINDSHEAR AHEAD" is sounded and W/S AHEAD red annunciation warning comes on the PFD.
On the ground:
1. Abort takeoff (if possible)

NOTE

The PWS alerts are inhibited, on takeoff, between 80kts and 50 feet AGL. Therefore, the abort will be performed below 80kts.

Once airborne:
1. Avoid depicted windshear areas on radar display.
2. Be prepared to execute a windshear escape procedure if the TAWS Warning reactive windshear alerting occurs.

On approach and landing:

When "GO AROUND WINDSHEAR AHEAD" is sounded and W/S AHEAD red annunciation warning comes on the PFD:
1. Press TOGA button and execute normal go around.
2. Avoid depicted windshear areas on radar display.
3. Be prepared to execute a windshear escape procedure if the TAWS Warning reactive windshear alerting occurs.

NOTE

The TAWS Warning reactive windshear escape procedure is on AFM Supplement No.1, G280 Terrain Awareness and Warning System (TAWS), page X-1-12

PWS WINDSHEAR CAUTION PROCEDURE (AMBER):

At any phase of flight:
When the aural caution and "MONITOR RADAR DISPLAY" is sounded and W/S AHEAD amber annunciation alert comes on the PFD , or, the crew recognizes early signs of windshear conditions, the following procedure should be followed:

1. The crew should be alert to the possibility of subsequent decreasing performance (i.e, significant airspeed loss and down draft conditions)
2. Adjust heading according to MAP MFW to keep clear of danger azimuth.

Advisory Windshear Alert

In advisory mode the system detects a windshear Alert from 3 to 5 nm. No textual or aural alerts are issued, only the PWS Icon is displayed.

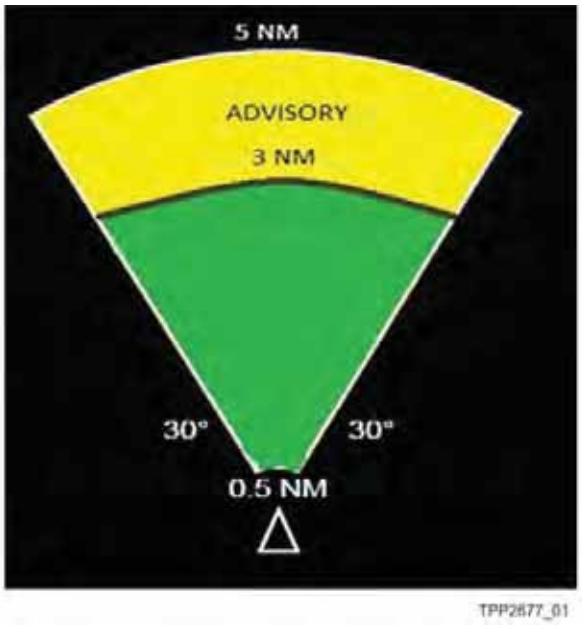

Figure X-15-5. PWS Advisory Alert Area

NOTE

PWS advisories may be enabled or disabled in the APM Options partition.

Advisory CAS Messages

Message	Cause(s)	Corrective Action
PRED Windshear Fail	Predictive Windshear function has failed. **NOTE:** PWS is not available when radio altimeter is failed.	Log for Maintenance

PRO LINE FUSION PWS MESSAGE ON MAP MFW

PWS FAULT amber legend on MAP MFW shows to indicate that the PWS function has failed. The radar will exit the PWS function and will not attempt to display windshear data.

SYSTEM ACTIVATION

The PWS does not use any dedicated controls. PWS is active when at least one engine is running and WX is not failed.

SELF-TEST

The PWS should be tested prior to flight. Select RDR TEST on the SMC - WX page.

When the WX test is activated, the following occur:

1. Within approximately 15 seconds the display system will display the radar test pattern.

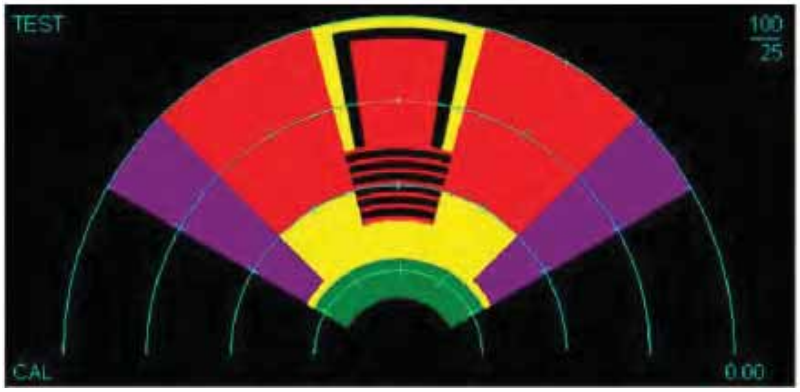

Figure X-15-6. WX test pattern with PWS enabled

Figure X-15-7. WX test pattern with PWS enabled on vertical weather display (VWX)

2. The PWS Windshear Caution textual alert shows for 3 seconds and the Monitor Radar Display caution aural from the aural warning system can be heard. The PWS Caution textual typical shows in yellow or amber.
3. A PWS Fault shows on the display for 3 seconds
4. The PWS Windshear Warning textual alert shows for 3 seconds the Go Around Windshear Ahead warning aural from the aural warning system can be heard. The PWS warning textual typically shows in red.
5. A 3 second delay occurs.
6. The PWS Windshear Warning textual alert shows for 3 seconds and the Windshear Ahead, Windshear Ahead warning aural from the aural warning system can be heard. The PWS warning textual typically shows in red.
7. A 3 second delay occurs.
8. After approximately 18 seconds, the radar test pattern in Figure X-15-4 and Figure X-15-6 are displayed.

NOTE

Expanded WX test is outlined in RTA-4218 MultiScan™ Weather Radar operator's guide, PN 5230818856, Second edition, 27 March 2018 (or later applicable revision), pages 3-22 to 3-27 (or later applicable revision).

Add step to BEFORE STARTING ENGINES procedure:

38. SMC:

    d. WX RDR TEST

SECTION V
PERFORMANCE WET AND DRY
No change.

SECTION VI
WEIGHT AND BALANCE
No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC
No change.

SECTION VII
UNITS CONVERSION
No change.

SECTION VIII
OPERATIONAL PLANNING MANUAL
No change.

SECTION IX APPENDICES
No change.

SECTION XI
OPERATIONAL INFORMATION SUPPLEMENTS
No change.

SECTION XII
SUPPLEMENTAL DATA
No change.

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CAAI APPROVED
AIRPLANE FLIGHT MANUAL
SUPPLEMENT No. 16
for
GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

ROCKWELL COLLINS PRO LINE FUSION
SURFACE MANAGEMENT SYSTEM (SMS)

This Supplement must be attached to CAAI approved Airplane Flight Manual for operation of a G280 aircraft equipped with certified software version 3.6.1 (MOD G25-10074; Service Bulletin #280-34-290) and SMS functionality enabled.

Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

CAAI APPROVED: _____

Mr. Tamir Bar-Am, Manager
Engineering Branch
Civil Aviation Authority, Israel

Date: 15 May 2021 Manual No._____

GULFSTREAM AEROSPACE LP

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LOG OF REVISIONS

Revision	Description	Signature/date
1	Added Log of Revisions. Added Log of Effective Pages. Revised System Description and added a procedure to intentionally disable SMS.	15 May 2021

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LOG OF EFFECTIVE PAGES

All currently effective pages of this Supplement are listed below. An asterisk (*) precedes those listed pages affected by current revision.

*X-16-1	15 May 2021
*X-16-2	15 May 2021
*X-16-3	15 May 2021
*X-16-4	15 May 2021
*X-16-5	15 May 2021
*X-16-6	15 May 2021
*X-16-7	15 May 2021
*X-16-8	15 May 2021
*X-16-9	15 May 2021
*X-16-10	15 May 2021
*X-16-11	15 May 2021
*X-16-12	15 May 2021
*X-16-13	15 May 2021
*X-16-14	15 May 2021
*X-16-15	15 May 2021
*X-16-16	15 May 2021

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ROCKWELL COLLINS PRO LINE FUSION SURFACE MANAGEMENT SYSTEM (SMS)

GENERAL

This supplement is required for operation of a G280 aircraft equipped with certified software version 3.6.1 (MOD G25-10074) and Service Bulletins #280-34-273; 280-34-290; 280-34-291; 280-34-292 and SMS functionality enabled.

SYSTEM DESCRIPTION

General

The SMS Takeoff/Landing Awareness Function (TLAF) is designed to provide surface situational awareness at airports.

The SMS is a software which resides in the FMS.

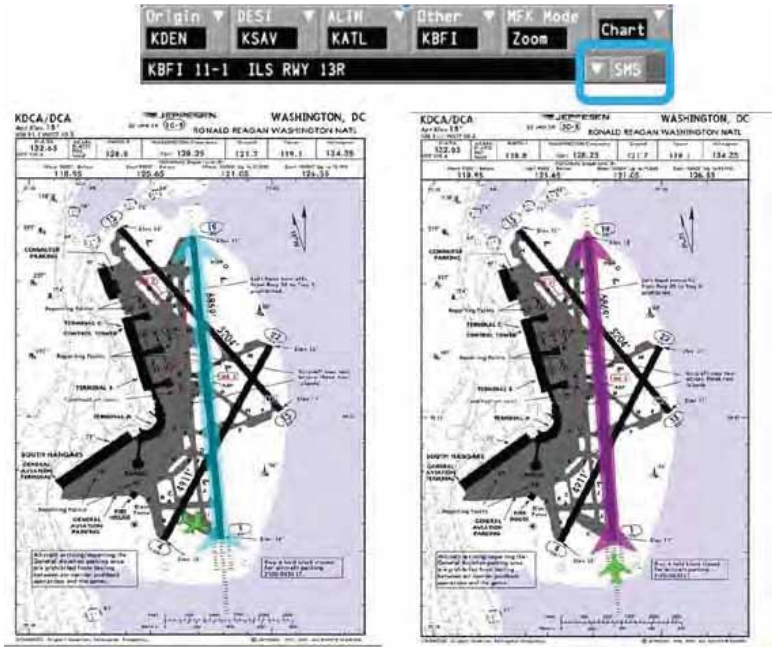
The Surface Management System (SMS) uses information from the FMS and IFIS to show the crew if the aircraft is using the correct runway for takeoff and landing, or if the runway is too short for takeoff or landing. The SMS uses the RIU to play warning aurals, and the DU to show alert messages. The SMS may be inhibited using an installer-supplied pushbutton.
The V1 (or 60 kts if V1 is not computed) threshold is used to disable the alerts if they were triggered and the takeoff was continued.

Runway Highlighting

On a geo-referenced airport diagram, the aircraft's position can be correlated to a particular place on the airport chart. Using the FMS database and flight plan, the SMS highlights the runway that is in the FMS flight plan on one of these geo-referenced airport diagrams. The takeoff runway is showed in cyan and landing runway is showed in magenta colors, with arrows to show the aircraft direction on the runway.

The SMS selection button activates the runway highlighting on the chart.

The following figure shows a 1/2 Multi Function Window with Chart displayed, and takeoff and landing runways highlighted with aircraft ownship position:



Takeoff Runway Highlighted Landing Runway Highlighted

Figure X-16-1. Highlighted Runways

SMS Alerts

The SMS provides aural alerts and associated Engine Indication and Crew Alert System (EICAS) messages before a commitment to takeoff or land has been reached to help ensure that the aircraft can takeoff or land safely. This functionality is called Takeoff and Landing Alert Function (TLAF). TLAF checks the following situations:

- Upon starting and during takeoff, is the aircraft lined up with a runway.
- Upon starting takeoff, is the remaining runway long enough.
- Upon starting takeoff, is the runway the aircraft is on the same runway that is programmed in the flight plan.
- Before landing, is the aircraft lined up with a runway.
- Before landing, is the aircraft lined up with a runway that is long enough.

If the answer to any of the above questions is NO, a notification in the form of an aural annunciation and associated message EICAS is produced. The annunciation should be given with enough time for either the takeoff or landing to be aborted. GPS data is used to determine the position and track of the aircraft as well as the ground speed. The FMS database is used to determine the position of the runways.

Takeoff Alert mode 1 - NOT A TAKEOFF RUNWAY

The SMS TLAF compares the current aircraft position and heading with all the runways at the departure airport.

The alert is generated if Takeoff thrust is applied or ground speed is greater than 35 knots, while the aircraft is not aligned with any runway. The alert will trigger a continuous aural "NOT A RUNWAY" callout, and a Not A Runway warning CAS message.

The alert will clear once ground speed is below 25 knots and thrust levers are back.

NOTE

Attempting to comply with an Immediate take-off clearance by promptly starting an uninterrupted roll from taxiway (rolling takeoff) may generate a Mode 1 Take-off Alert even though the correct runway is being engaged if the N1 exceeds 70% or the ground speed exceeds 35kts prior to aircraft being aligned on runway heading.

Takeoff Alert mode 2 -TAKEOFF RUNWAY TOO SHORT

The SMS TLAF compares the takeoff field length (computed by the FMS) to the actual runway distance remaining based on the current aircraft position (from the GPS) and the end of the runway.

The alert is generated if Takeoff thrust is applied or ground speed is greater than 35 knots, and runway distance remaining is insufficient for takeoff.

The alert will trigger a continuous aural "SHORT RUNWAY " callout, and a Short Runway warning CAS message.
The alert will clear once ground speed is below 25 knots and thrust levers are back.

NOTE

Changing Line-up distance or manually shortening the takeoff runway will reduce runway length. An updated runway length which is shorter than BFL, will result in the SHORT RUNWAY warning when the takeoff roll begins (while there may be enough runway length for a safe takeoff).

Takeoff Alert mode 3 -TAKEOFF RUNWAY MISCOMPARE

The SMS TLAF compares the actual takeoff runway, based on the aircraft's position and heading, to the programmed departure airport.

The alert is generated if Takeoff thrust is applied or ground speed is greater than 35 knots, and aircraft is on a runway different than the FMS programmed departure runway.

The alert will trigger twice an aural “NOT FMS RUNWAY” callout, and a Not FMS Runway caution CAS message.
The alert will clear once ground speed is below 25 knots and thrust levers are back.

Landing Alert mode 4 -LANDING NOT A RUNWAY

The SMS TLAF compares the aircraft's position and track to the runways of the nearest airport.

The alert is generated if the aircraft is below 250 feet above the airport and not aligned with a runway.

The alert will trigger a continuous aural "NOT A RUNWAY" callout, and a Landing Not a Runway warning CAS message.
The alert will clear once TOGA switch is pressed, or aircraft climbs to 500 feet above airport elevation.

NOTE

The TLAF landing mode 4 does not alert from landing on a runway different than the programmed one. It alerts from landing on a taxiway or anywhere that is not a runway. The system is designed for flexibility of performing a side step landing and an approach to a circle for landing without nuisances.

Landing Alert mode 5 -LANDING RUNWAY TOO SHORT

The SMS TLAF compares the aligned landing runway to the required landing length as computed by the FMS.

The alert is generated if the aircraft is below 250 feet above the airport and aircraft is aligned with a runway that is too short.

The alert will trigger a continuous aural "SHORT RUNWAY" callout, and a Short Runway warning CAS message.
The alert will clear once TOGA switch is pressed, or aircraft climbs to 500 feet above airport elevation.

Alerts Inhibition

SMS aural alerts and EICAS messages can be inhibited by selection of SMS OVRD pushbutton on TAWS pedestal panel. When the SMS alerts are inhibited by the pushbutton, the SMS Override Status CAS message is displayed.

When Takeoff Field Length (TOFL) or Landing Field Length (LFL) is not calculated, the SMS short runway calculations are invalid and the SMS - Input PERF Data advisory CAS is displayed.

NOTE

Manually changing the landing runway to a value shorter than LDA, will result in the SHORT RUNWAY warning at short final.

SECTION I LIMITATIONS
No Change

SECTION II
EMERGENCY PROCEDURES

Warning CAS Messages

Message	Cause(s)	Corrective Action
Not A Runway "Not a Runway" aural (continuous)	Attempting a takeoff or landing not on a runway	On takeoff - 1. Abort takeoff On Landing - 1. Reject landing
Short Runway "Short Runway" aural (continuous)	Attempting a takeoff or landing on a runway which is too short	On takeoff - 1. Abort takeoff On Landing - 1. Reject landing

SECTION III
ABNORMAL PROCEDURES

Caution CAS Messages

Message	Cause(s)	Corrective Action
Not FMS Runway "Not FMS Runway" aural (twice)	Takeoff runway disagrees with departure runway	On takeoff - 1.Abort takeoff

Advisory CAS Messages

Message	Cause(s)	Corrective Action
SMS - Input PERF Data	Both SMS Takeoff and Landing Advisories not available due to lack of information available for FMS to perform calculations (e.g. system supplied data and/or pilot supplied data) The message is inhibited when parking brake is on and when 2400 feet above destination altitude.	1. FMS PERF Data - CHECK
SMS Fail	SMS related functionality has failed	Log for Maintenance

Status CAS Messages

Message	Cause(s)	Corrective Action
SMS Override	SMS alerts are inhibited via TAWS panel SMS OVRD pushbutton	None

To intentionally disable SMS:

SMS OVRD PushbuttonOVRD

NOTE

SMS Override status CAS message is displayed.
All SMS Aural and Visual alerts are inhibited.

If intentionally landing on a surface other than a runway in the FMS Database, disable SMS.

If actual available runway length does not match the runway length in the FMS Database, Disable SMS or Manually Update FMS RWY LENGTH

Manually Updating FMS RWY LENGTH:

For takeoff:
If the runway threshold is correct, but the runway is shortened, insert a new shortened runway length on FMS TAKEOFF REF Performance Page 1/5.
If the runway is shortened due to a displaced threshold, insert the correct lineup distance on FMS TAKEOFF REF Performance Page 2/5. This same method can be used for an intersection takeoff.

For landing:
Update RWY LENGTH on the FMS APPROACH REF Performance Page 1/5 to match the actual landing runway length available.

NOTE

Verify updated runway length matches aircraft performance.

Supplement 16

SECTION V
PERFORMANCE WET AND DRY
No change.

SECTION VI
WEIGHT AND BALANCE
No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC
No change.

SECTION VII
UNITS CONVERSION
No change.

SECTION VIII
OPERATIONAL PLANNING MANUAL
No change.

SECTION IX
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No change.

SECTION XI
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No change.

SECTION XII
SUPPLEMENTAL DATA
No change

CAAI APPROVED
15 May 2021

LIST OF SUPPLEMENTS

OPERATIONAL INFORMATION SUPPLEMENTS

Supplements marked with ✓ are applicable to your aircraft.

Supplement No.		Title	Page
☐	1	Mitigation of Potentially Explosive Device	XI-1-1
☐	2	Takeoff and Landing in Crosswind Conditions	XI-2-1
☐	3	Elevators Manual Reversion	XI-3-1
☐	4	Known CAS/OMS Message Issues	XI-4-1
☐	5	Operational Issues List For Rockwell Collins Proline Fusion Planeview 280 Avionics V3.6 And V3.6.1	XI-5-1
☐	6	Takeoff and Landing Operations at Ulaanbaatar, Mongolia (ZMUB)	XI-6-1
☐	7	Runway Condition Assessment Matrix (RCAM)	XI-7-1

LIST OF SUPPLEMENTS (CONTINUED)

Supplements marked with ✓ are applicable to your aircraft.

Supplement No.	Title	Page

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OPERATIONAL INFORMATION SUPPLEMENT No. 1 GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

MITIGATION OF POTENTIALLY EXPLOSIVE DEVICE

This supplement provides additional procedures, techniques, or information recommended for the operation of G280 aircraft under normal or emergency conditions.

Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

Date: 15 Apr 2015 Manual No._____

OIS 1

MITIGATION OF POTENTIALLY EXPLOSIVE DEVICE

GENERAL

The general information in the introduction section is applicable with the addition of the following:

SECTION I
LIMITATIONS

No change.

SECTION II
EMERGENCY PROCEDURES

MITIGATION OF POTENTIALLY EXPLOSIVE DEVICE

If an object suspected to be an explosive device is discovered in the aircraft in flight:

1. Declare emergency, inform Air Traffic Control of the nature of the emergency, request immediate descent and landing at the nearest suitable airport
2. Place the object against the right emergency exit window and cover it with materials such as clothing, cushions and blankets
3. Crew and passengers - Withdraw as far away from the object as possible

NOTE

If all occupants are in the forward cabin, expect forward CG on landing.

4. Descend to as low an altitude as practicable
5. Depressurize the cabin as soon as possible
6. Land as soon as possible
7. Request parking in an isolated area
8. Vacate aircraft as soon as possible (see EMERGENCY EVACUATION, page II-87)

SECTION III
ABNORMAL PROCEDURES

No change.

SECTION IV
NORMAL PROCEDURES

No change.

SECTION V
PERFORMANCE WET AND DRY

No change.

SECTION VI
WEIGHT AND BALANCE

No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC

No change.

SECTION VII
UNITS CONVERSION

SECTION VIII
OPERATIONAL PLANNING MANUAL

SECTION IX
APPENDICES

No change.

OIS 1

SECTION X
SUPPLEMENTS

No change.

SECTION XI
OPERATIONAL OPERATION SUPPLEMENTS

No change.

SECTION XII
SUPPLEMENTAL DATA

No change.

SECTION XIII
SYSTEMS

No change.

OPERATIONAL INFORMATION SUPPLEMENT No. 2 GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

TAKEOFF AND LANDING IN CROSSWIND CONDITIONS

This supplement provides additional procedures, techniques, or information recommended for the operation of G280 aircraft under normal or emergency conditions. Information contained herein supplements information in basic Airplane Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Airplane Flight Manual.

Date: 26 Aug 2012 Manual No._____

OIS 2

TAKEOFF AND LANDING IN CROSSWIND CONDITIONS

GENERAL

This supplement provides additional information and guidance for takeoff and landing in crosswind conditions. The maximum demonstrated crosswind component for takeoff and landing is that component of crosswind that was demonstrated during certification testing. For the G280, for maximum demonstrated crosswind, see DEMONSTRATED CROSSWIND, page V-13.

The general information in the introduction section is applicable with the addition of the following:

SECTION I
LIMITATIONS

No change.

SECTION II
EMERGENCY PROCEDURES

No change.

SECTION III
ABNORMAL PROCEDURES

No change.

CROSSWIND TAKEOFF PROCEDURE

The crosswind technique for takeoff requires that the copilot hold aileron into the wind with slight forward pressure on the control wheel to maintain nosewheel contact with the runway throughout the takeoff roll. The recommended pilot technique is to use nosewheel steering (NWS) to align with the runway and then to rely on pedal steering for the takeoff.

For high crosswinds, the pilot normally uses NWS to maintain runway alignment until the combination of pedal nosewheel steering and aerodynamic rudder control becomes effective enough to provide steering. The rate of transfer from NWS to rudder steering is a function of runway condition (wet, icy, etc.) and the magnitude of the crosswind. The nosewheel steering available using rudder pedals is 3° either side of center. This is sufficient to handle most crosswind situations but may require the pilot to use full rudder pedal deflection. As a result of the larger than normal rudder pedal deflections required, pilots tend to use NWS more in a crosswind takeoff. For crosswind, the point of sufficient control to counter the yawing is at a higher speed than the no wind condition. The important point to remember is that nosewheel steering is very effective in providing directional control and that to be effective, the nose wheel has to maintain contact with the runway.

(Continued)

The transfer of control wheel control during crosswind takeoff may be delayed due to the necessity of maintaining control using the NWS. Once it is assured that there is sufficient aerodynamic rudder control, the transfer of control of the control wheel to the pilot can proceed. The pilot should still maintain forward pressure on the control wheel sufficient to maintain nose wheel contact with the runway and aileron deflected into the wind throughout the takeoff roll until liftoff is achieved. For takeoff on wet or icy runways, the crosswind component is reduced as indicated in Figure 11-2-1.

NOTE

The contaminated runway crosswind components chart is not based on actual test results. It was developed from a wide variety of landing operations for various aircraft at varying landing conditions. Landing on precipitation covered runways can have significant additional risks and should not be casually made. See contaminated runways supplement.

CROSSWIND LANDING PROCEDURE

The Pilot Flying should evaluate the crosswind conditions. If the crosswind component is near maximum demonstrated crosswind of 25 knots, consideration should be given to using flaps 20 vs flaps LND for the approach and landing. Using flaps 20 will increase the approach speed by approximately 5 knots which will reduce the sideslip angle required during the approach (recalculate VREF and LDA for flap 20, note that actual landing distance increases 12% per 10 knots above VREF). If using flaps 20, select TAWS FLAPS OVRD ON. Flaps 20 landing distance is approximately 4% greater than Flaps LND and actual landing distance increases 12% per 10 knots above VREF.

During the final approach phase of crosswind landing, fly aligned with or slightly upwind of the runway center line utilizing crab into the wind technique sufficient to stabilize the aircraft in drift. Due to the varying crosswind components, change the amount of crab angle as the aircraft descends. Maintain airspeed during the approach at VREF + half the steady wind component + the full gust value not to exceed a 20 kt addition to VREF. Maintain this speed until the flare.

The flare should be a minimal pitch change to arrest the descent once the aircraft is in ground effect. A prolonged float after flare increases pilot workload during touchdown. Drift correction during touchdown is far easier when the pilot can control the timing of the touchdown. See ACTUAL LANDING DISTANCE, Page V-53, for landing distance increase.

Approaching touchdown, rudder is applied to align the aircraft with the runway and simultaneous opposite aileron is applied to achieve zero drift. This combination of wing down/opposite rudder will be coordinated throughout the last portion of the landing approach until touchdown. Touchdown with the upwind landing gear first then set the other main landing gear on the runway without delay. Use the rudder as needed to keep the aircraft on the runway centerline. Use aileron into the wind as necessary early during landing to keep the upwind landing gear on the runway. Immediately on touchdown, lower the nosewheel to the runway and apply sufficient forward pressure on the control wheel to maintain nosewheel contact with the runway. Use

aerodynamic corrective rudder and aileron inputs throughout the landing roll. As rollout speed decreases to the point where rudder effectiveness decreases, shift directional control to NWS and normal braking. The copilot, when directed by the pilot, takes control of the control wheel and maintain forward pressure and aileron into the wind. The use of thrust reversers is optional, but be aware that in crosswind landing, thrust reversers are destabilizing.

Do not deploy the thrust reversers at the expense of keeping the aircraft on the runway centerline. For landing on wet or icy runways, the contaminated runway crosswind component is reduced as indicated in Figure 11-2-1.

USE OF CROSSWIND CHART

The contaminated runway crosswind components chart (Figure 11-2-1) is applicable only to headwind conditions. Operation with any tailwind component on contaminated runways is not recommended due to the inherent hazards of operating on such runways.

To find the crosswind component associated with the reported runway condition, enter the Canadian Runway Friction Index (CRFI) scale or Braking Coefficient scale and read upward on the crosswind component scale.

CONTAMINATED RUNWAY CROSSWIND COMPONENTS
CANADIAN RUNWAY FRICTION INDEX (CRFI)
OR BRAKING COEFFICIENT

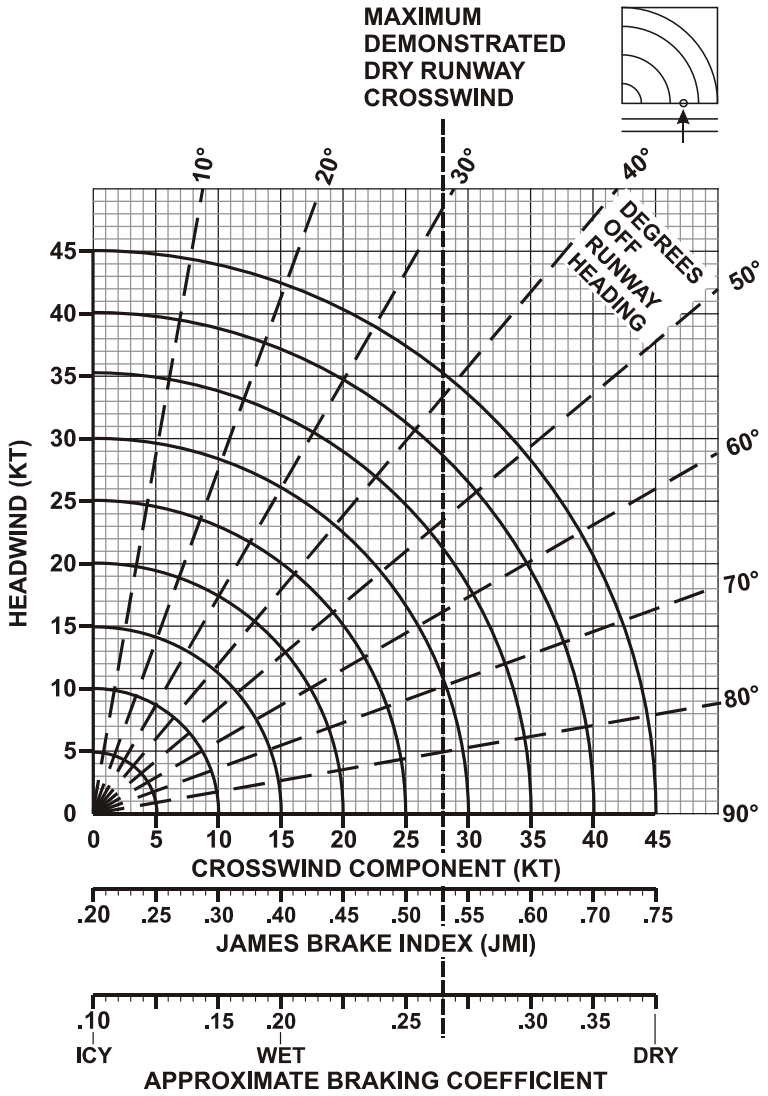

Figure 11-2-1. Contaminated Runway Crosswind Components

RUNWAY SURFACE CONTAMINATION (RSC), CANADIAN RUNWAY FRICTION INDEX (CRFI) EQUIVALENT AND ESTIMATED LANDING BRAKING COEFFICIENT

RSC	CRFI EQUIVALENT	APPROXIMATE BRAKING COEFFICIENT
Bare and dry	0.80 and above	0.404
Damp - less than 0.01 to 0.03 in. water	0.60 to 0.70	-
Very light snow patches	0.55 to 0.60	-
Wet concrete - 0.01 to 0.03 in. water	0.40 to 0.55	0.202
Wet asphalt - 0.01 to 0.03 in. water	0.30 to 0.60	0.202
Compacted snow - below - 15°C	0.40	-
Sanded, packed snow or ice	0.40 to 0.50	-
Heavy rain - 0.03 to 0.10 in. water	0.28 to 0.30	-
Snow covered	0.25 to 0.30	-
Compacted snow - above - 15°C	0.20 to 0.25	-
Cold ice - below - 10°C	0.10 to 0.20	-
Wet ice - above - 10°C	0.05 to 0.10	0.050
Hydroplaning - standing water (depth of 0.10 in. or more)	0.05	-

OIS 2

SECTION V
PERFORMANCE WET AND DRY

No change.

SECTION VI
WEIGHT AND BALANCE

No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC

No change.

SECTION VII
UNITS CONVERSION

SECTION VIII
OPERATIONAL PLANNING MANUAL

SECTION IX
APPENDICES

No change.

SECTION X
SUPPLEMENTS

No change.

SECTION XI
OPERATIONAL OPERATION SUPPLEMENTS

No change.

SECTION XII
SUPPLEMENTAL DATA

No change.

SECTION XIII
SYSTEMS

No change.

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OPERATIONAL INFORMATION SUPPLEMENT No. 3 GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

ELEVATORS MANUAL REVERSION

This supplement provides additional procedures, techniques, or information recommended for the operation of G280 aircraft under normal or emergency conditions.

Information contained herein supplements information in basic Aircraft Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Aircraft Flight Manual.

Date: 15 Apr 2015 Manual No._____

GULFSTREAM AEROSPACE LP

OIS 3

ELEVATORS MANUAL REVERSION

GENERAL

The general information in the introduction section is applicable with the addition of the following:

SECTION I
LIMITATIONS

No change.

SECTION II
EMERGENCY PROCEDURES

No change.

SECTION III
ABNORMAL PROCEDURES

ELEVATORS MANUAL REVERSION

1. During the loss of both hydraulic pressure to the elevator actuators, the pilot can fly the aircraft using the manual linkage between pilot and copilot columns to the elevators.
2. If one hydraulic system has failed, the control wheel forces for elevator operations may be slightly higher or transparent to the pilot. When the second hydraulic system pressure is dropped, both elevators surfaces move down up to 2°, until they are in balance with aerodynamic loads and gravity. The pilot first reaction is to take the control wheel backwards to eliminate the aircraft pitch-down tendency. The control wheel forces may be up to 150 lb at that moment. Using stabilizer pitch trim reduces the control wheel forces up to zero.
3. When flying with zero pitch forces, any change to speed, configuration, engine thrust, pitch correction or passenger movement (cg shift), may cause the aircraft to develop small pitch attitude change, depending on the cause of change. The pilot should initially react with the control wheel opposite to the pitch trend and then use the stabilizer trim for control wheel force reduction. If the pilot moves the control wheel from aft input to forward input, a backlash of a few millimeters between these two points is felt.
4. For safe return to landing:
   a. Stabilize the pitch trend using the control wheel
   b. Trim the aircraft to minimize pitch forces
   c. Reduce speed to 200-220 KIAS
   d. Advise ATC and declare intentions
   e. Recommended, at a distance of 30 nm from FAF, reduce speed gradually to flaps 20°

(Continued)

f. Recommended, at 5 nm before FAF, lower the landing gear then lower flaps to LND and maintain V_{REF} + 20 kt (use stabilizer trim to counter control wheel forces for any configuration change)
g. Below 500 ft, reduce speed to V_{REF} + 10 kt, trim the aircraft for small control wheel back pressure. (to avoid free play in the backlash area)
h. At 30 ft, maintain approach thrust until the aircraft rate of descent is reducing slightly. Now, reduce thrust to idle and maintain control wheel position. The aircraft raises the nose for flare due to the reduction of pitch down moment due to engine thrust change, and wait for firm touch-down
i. After touchdown, release the control wheel back pressure, transfer controls to the copilot, move hand to the tiller and continue a normal landing

5. During missed approach, raise flaps to 20° and simultaneously increase engine thrust gradually. Use stabilizer trim to compensate for pitch-down moment that the aircraft may develop due to the increase of engine thrust. Using the engine slow acceleration technique, the aircraft can be easily controlled. Maintain this configuration during the whole missed approach procedure until reaching the FAF and perform step 4,f.

NOTE

The initial pitch-down moment when the failure occurs, may surprise the crew. Workload is reduced significantly when stabilizer trim is used. Perform any change gradually to ensure comfortable handling of the aircraft.

<<END>>

SECTION IV
NORMAL PROCEDURES

SECTION V
PERFORMANCE WET AND DRY

No change.

SECTION VI
WEIGHT AND BALANCE

No change.

SECTION VI-M
WEIGHT AND BALANCE - METRIC

No change.

SECTION VII
UNITS CONVERSION

SECTION VIII
OPERATIONAL PLANNING MANUAL

SECTION IX
APPENDICES

No change.

SECTION X
SUPPLEMENTS

No change.

OIS 3

SECTION XI
OPERATIONAL OPERATION SUPPLEMENTS

No change.

SECTION XII
SUPPLEMENTAL DATA

No change.

SECTION XIII
SYSTEMS

No change.

OPERATIONAL INFORMATION SUPPLEMENT No. 4 GULFSTREAM G280 AIRPLANE

MFR SERIAL No. _____

REGISTRATION No. _____

KNOWN CAS/OMS MESSAGE ISSUES

This Supplement provides additional procedures, techniques or information recommended for the operation of the G280 aircraft under normal or abnormal conditions. This OIS contains information approved by the CAAI in Engineering Order 30P000/130999.

The information contained herein supplements the information of the Airplane Flight Manual (AFM), latest revision. For Limitations, Normal Procedures, Abnormal Procedures, Emergency Procedures and Performance information not contained in this supplement, consult the AFM, latest revision.

Date: 21 Jan 2021 Manual No._____

GULFSTREAM AEROSPACE LP

OIS 4

KNOWN CAS/OMS MESSAGE ISSUES

INTRODUCTION

GENERAL

The G280 was certified with a number of known CAS / OMS messages that may be displayed during power up on the ground or during flight. These CAS messages normally extinguish without any pilot action after a short time. There is no requirement for the flight crew to log the occurrence of any of these messages for maintenance action, if they are displayed according to the guidance in this supplement.

SECTION A: AVIONICS 3.6

SECTION IIIA – CAUTION MESSAGES

The following amber caution CAS messages may appear during power up or in flight. Generally, no pilot action is required to clear the message except as noted under Corrective Action column.

Message	Triggered By	Corrective Action
APU Door Failed Open	On battery power during power up.	Self clears when APU Master is selected ON.
APU Generator Fail	Generator fails to come on line after start.	Push RESET. Refer to AFM.
BAS OFF	Temporary closure of the MPRSOV, typically when high thrust is set during initial climb after takeoff.	Self-clearing when thrust lever setting is reduced during cruise. **NOTE**: CAS message is inhibited with TLA>= 40 degrees with the aircraft below 28k feet; therefore, it is most likely to appear when climbing with thrust levers set slightly less than CLB. **NOTE**: The manifold duct on the synoptic will show the condition of the BAS system at all times, even when the CAS message is inhibited. It will indicate amber when the BAS OFF condition exists.

Message	Triggered By	Corrective Action
Check SMC – Heading	On ground caused by iron in taxiway or runway	Taxi to another area to clear message. Perform fast erect.
ENG Oil Level Check, L ENG Oil Level Check, R	During engine start.	Self-clearing.
Fuel Transfer Fault	May occur during taxi due to fuel slosh in forward fuel tank. May occur during prolonged APU operation on ground. May occur during initial climb after takeoff due to fuel migration into center tank.	Self-clearing. Transfer fuel to right feed tank as needed. Self-clearing when wings level and fuel returns to wing tanks.
Gear Bottle PRESS Low	Occurs on long flights when bottle gets cold soaked.	Self-clearing after bottle warms up after landing. Do not take off if message is displayed.
HYD QTY Refill, L HYD QTY Refill, R	Momentary after high demand on hydraulic system	Self-clearing

Message	Triggered By	Corrective Action
Q-Feel Fail	Simultaneous activation of both hydraulic EMPs during initial power up when distribution bus not powered (generator or external power not on line.)	If still displayed after airplane power up with both engines running: 1. Perform FCECU reset - Pull two (2) FCECU 2 CBs (F14, and G14) for 10 seconds and then reset simultaneously. 2. Do not interfere with flight controls for 40 seconds. 3. Perform full flight control sweep.
Rudder Fail	Activation of left or right hydraulic EMP.	Self-clearing.
WAI System Fail, R	Distribution bus not powered (generator or external power not on line.).	Self-clearing when generator or external power is on line.
Yaw Damper Off	On ground during taxi.	Select YD - ON

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SECTION IIIB - ADVISORY MESSAGES

The following cyan advisory CAS messages may appear during power up or in flight. Generally, no pilot action is required to clear the message except as noted under Corrective Action column.

Message	Triggered By	Corrective Action
APU Door Failed Close	Momentary when APU Master selected ON.	Self-clearing.
Autobrake Disarmed	Applying brakes when throttle is above idle.	Autobrake – AS REQUIRED.
Check OMS	Faults are active and recorded by the OMS. Ground only message.	Record active faults in MAINT MGR - MENU, ACTIVE FAULTS. Message extinguishes after. takeoff
CVR 1 Fail	Improper feedback during recurring CVR power check. May appear repeatedly for several minutes (Pre MOD G25-20029 only).	Self-clearing within 5 minutes.
Datalink COM In Voice	Momentary timing sequence in software.	Self-clearing.

Message	Triggered By	Corrective Action
FDR Interface Maintenance	Control column is pulled back past 13.4° during preflight control checks. **NOTE**: There is no need to hit the aft stop during preflight control checks. Only pull the control column slowly aft until the elevators fill with green on the flight. controls synoptic.	Self-clearing.
MED Maintenance REQD	Red push plate in MED operating handle is not fully depressed when door is open.	Press the red push plate until it latches in position.
TAWS Fail	Momentary on ground due to poor GPS signal.	Self-clearing when airplane is moved away from structures causing interference with GPS signals.
Terrain Fail	Momentary on ground due to poor GPS signal.	Self-clearing when airplane is moved away from structures causing interference with GPS signals.
WWS Maintenance REQD	Improper signal from WWS components.	Message may remain on the entire flight or appear intermittently. Do not log for maintenance if system is operating normally.

SECTION IIID - OMS MESSAGES

The following OMS messages will be active after power up with the engines running. No action required to dispatch.

Message	Triggered By	Corrective Action
ADC1 has an internal fault	Software initialization issue	None required. Self-clearing before take off
ADC2 has an internal fault	Software initialization issue	None required. Self-clearing before take off
ATC/TCAS1 Output Bus L-TSS-XT is Disconnected / Failed	Software initialization issue	None required.
ECU 9284 FWD Heating Device Failure	Software initialization issue	None required.
G540DA51 Drain Valve 4" Heating Device Failure	Software initialization issue	None required.
HF RX/TX 1 Internal Fault Label 351/27	Software initialization issue	None required.
Pack Inlet Valve Fail Closed	Software initialization issue	None required.
PS9283_Aft Pressure Sensor Defect	Software initialization issue	None required.
PWP 9282 FWD Heating Device Failure	Software initialization issue	None required.

Message	Triggered By	Corrective Action
Reference Mesh Sensor Defect Degraded Measurement Accuracy	Software initialization issue	None required.
TA is not visible on CAN bus	Software initialization issue	None required.
WCU internal failure minor	Software initialization issue	None required.
WCU Shop Mode Pin Failure	Software initialization issue	None required.
WWP CAN bus failure	Software initialization issue	None required.
WWS System Vacuum Waste Maintenance Required	Software initialization issue	None required.
WWS System Potable Water Maintenance Required	Software initialization issue	None required.

SECTION B: AVIONICS 3.6.1

SECTION IIIA – CAUTION MESSAGES

The following amber caution CAS messages may appear during power up or in flight. Generally, no pilot action is required to clear the message except as noted under Corrective Action column.

Message	Triggered By	Corrective Action
APU Generator Fail	Generator fails to come on line after start.	Push RESET. Refer to AFM.
Check SMC – Heading	On ground caused by iron in taxiway or runway	Taxi to another area to clear message. Perform fast erect.
Gear Bottle PRESS Low	Occurs on long flights when bottle gets cold soaked.	Self-clearing after bottle warms up after landing. Do not take off if message is displayed.
HYD QTY Refill, L HYD QTY Refill, R	Momentary after high demand on hydraulic system	Self-clearing

Message	Triggered By	Corrective Action
Q-Feel Fail	Simultaneous activation of both hydraulic EMPs during initial power up when distribution bus not powered (generator or external power not on line.)	If still displayed after airplane power up with both engines running: 1. Perform FCECU reset - Pull two (2) FCECU 2 CBs (F14, and G14) for 10 seconds and then reset simultaneously. 2. Do not interfere with flight controls for 40 seconds. 3. Perform full flight control sweep.
Rudder Fail	Activation of left or right hydraulic EMP.	Self-clearing.

SECTION IIIB - ADVISORY MESSAGES

The following cyan advisory CAS messages may appear during power up or in flight. Generally, no pilot action is required to clear the message except as noted under Corrective Action column.

Message	Triggered By	Corrective Action
Autobrake Disarmed	Applying brakes when throttle is above idle.	Autobrake – AS REQUIRED.
Check OMS	Faults are active and recorded by the OMS. Ground only message.	Record active faults in MAINT MGR - MENU, ACTIVE FAULTS. Message extinguishes after. takeoff
CVR 1 Fail	Improper feedback during recurring CVR power check. May appear repeatedly for several minutes (Pre MOD G25-20029 only).	Self-clearing within 5 minutes.
SMS Fail	Momentary due to poor GPS signal below 2000 ft AGL	Self-clearing when GPS reception is sufficient for SMS operation
TAWS Fail	Momentary on ground due to poor GPS signal.	Self-clearing when airplane is moved away from structures causing interference with GPS signals.
Terrain Fail	Momentary on ground due to poor GPS signal.	Self-clearing when airplane is moved away from structures causing interference with GPS signals.

Message	Triggered By	Corrective Action
WWS Maintenance REQD	Improper signal from WWS components.	Message may remain on the entire flight or appear intermittently. Do not log for maintenance if system is operating normally.

SECTION IIIC - STATUS MESSAGES

The following white status CAS messages may appear during power up or in flight. Generally, no pilot action is required to clear the message except as noted under Corrective Action column.

Message	Triggered By	Corrective Action
APU Door Open	May appear for up to approximately 30 seconds following power up of aircraft.	None required if message clears within approximately 30 seconds following power up of aircraft.

SECTION IIID - OMS MESSAGES

The following OMS messages will be active after power up with the engines running. No action required to dispatch.

Message	Triggered By	Corrective Action
ADC1 has an internal fault	Software initialization issue	None required. Self-clearing before take off
ADC2 has an internal fault	Software initialization issue	None required. Self-clearing before take off
ATC/TCAS1 Output Bus L-TSS-XT is Disconnected / Failed	Software initialization issue	None required.
ECU 9284 FWD Heating Device Failure	Software initialization issue	None required.
G540DA51 Drain Valve 4" Heating Device Failure	Software initialization issue	None required.
HF RX/TX 1 Internal Fault Label 351/27	Software initialization issue	None required.
Pack Inlet Valve Failed Closed	Software initialization issue	None required.
PS9283_Aft Pressure Sensor Defect	Software initialization issue	None required.
PWP 9282 FWD Heating Device Failure	Software initialization issue	None required.

Message	Triggered By	Corrective Action
Reference Mesh Sensor Defect Degraded Measurement Accuracy	Software initialization issue	None required.
TA is not visible on CAN bus	Software initialization issue	None required.
WCU internal failure minor	Software initialization issue	None required.
WCU Shop Mode Pin Failure	Software initialization issue	None required.
WWP CAN bus failure	Software initialization issue	None required.
WWS System Vacuum Waste Maintenance Required	Software initialization issue	None required.
WWS System Potable Water Maintenance Required	Software initialization issue	None required.

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OPERATIONAL INFORMATION SUPPLEMENT No. 5 GULFSTREAM G280 AIRPLANE G280-OIS-05 Basic Issue

MFR SERIAL No. _____

REGISTRATION No. _____

OPERATIONAL ISSUES LIST FOR ROCKWELL COLLINS PROLINE FUSION PLANEVIEW 280 AVIONICS V3.6 AND V3.6.1

This supplement provides additional procedures, techniques or information recommended for operation of the G280 aircraft under normal or abnormal conditions. This OIS contains information provided by Rockwell Collins about known flight deck issues and workarounds with the G280 V3.6 avionics software (MOD-G25-10032) and the G280 V3.6.1 avionics software (MOD G25-10074).

The information contained herein supplements the information of the Airplane Flight Manual (AFM), latest revision. For Limitations, Normal Procedures, Abnormal Procedures, Emergency Procedures and Performance information not contained in this supplement, consult the AFM, latest revision.

Date: 21 Jan 2021 Manual No._____

GULFSTREAM AEROSPACE LP

AVIONICS VERSION 3.6 AND V3.6.1 ISSUES

INTRODUCTION

GENERAL

This document provides both a list of known software issues and operational advice covering all current certifications.
The document includes restrictions, flight deck effects and suggested work around for flight operation.

FMS:

The FMS has not implemented RNP AR or RNP SAAAR Functions. The airplane is not authorized to perform RNAV (RNP) approach procedures.

Calculated landing weight and Vspeeds do not update when the same approach has been re-entered following a missed approach.

- To re-post approach Vspeeds a second time, change one of the APPROACH REF input parameters (OAT, Wind, etc), leave the APPROACH REF pages, come back to the APPROACH REF pages to post the approach speed.

FMS Constant Speed Targets (CST) function:

Continual Speed Target does not fly appropriate departure speeds when you takeoff within the arrival area of the destination airport.

- If the origin airport is within the arrival area (default 15nm) the CST mode will transfer through approach mode during the departure.
- Crew can select MAN speed for departure until out of the destination arrival area.

If the CST mode is WPT LIM speed and then the WPT causing that limit is deleted from the flight plan the CST speed limit persists.

- The WPT speed constraint can be deleted by pressing DELETE on the CDU and the selecting the left LSK next to TGT SPD on the CDU PERF page.

- Pilot can select MAN speed to stop CST WPT LIM speed command.

Autospeeds do not transition from takeoff to approach mode while on a SID or when returning to the origin airport before exiting the departure aerodrome area with the flaps up.

- Use manual speed control for return to origin APT, if within departure aerodrome or flaps are not retracted. The takeoff mode is exited after leaving the departure aerodrome and flaps are cleaned up.

If a FMS power cycle occurs while in INDEP mode, the FMS will power up in independent mode but will sync to the latest FPLN.

- Re-enter the FPLN on the power-cycled FMS if a different flight plan is desired.

When flying under the speed/altitude limit (default–250/10000), the speed limit is applied even when Long Range Cruise (LRC), Maximum Range Cruise (MRC), or Maximum Cruise (MCRZ) is the selected speed mode and is calculated to be faster or slower than the speed limit.

- Crew must use manual speed to fly desired LRC, MRC or MCRZ when under the altitude/speed limit.

CST will momentarily command the standard cruise speed before commanding RTA speed when flying RTA speeds as the aircraft levels off at the cruise altitude.

- This is a transient effect and CST will recalculate the correct RTA cruise speed once the aircraft levels off at the cruise altitude.

When an RTA is entered for a flight plan waypoint that occurs after a holding procedure, the RTA Arrival page on the CDU displays dashes and the ability to achieve the RTA is not being evaluated while in holding.

- The RTA time is continuously displayed on the lateral and the CDU legs info page. The amber or white display of the RTA readout is not evaluated during the hold.

RTA speeds are not commanded when CRZ SPD MODE on the ACT VNAV CRUISE page of the CDU is in other than SEL

- If after entering an RTA, a computed speed mode is selected or an RTA is entered while in a computed speed mode, the wrong speed is targeted, resulting in not achieving the RTA.
- Do not select a computed speed mode (LRC/MCRZ/MRC/ENDUR) when an RTA exists in the flight plan and do not enter an RTA when in a computed speed mode.

If a TO WPT exist with both a WPT speed constraint and a RTA, the speed target changes so neither goal is accomplished.

- Crew should not enter both a waypoint speed constraint and a required time of arrival on the same waypoint.

On PERF TAKEOFF REF or PERF APPROACH REF pages, the OAT entries over 70°F on the CDU display as 70°C on the ¼ format FMS Data Takeoff report page.

- Enter OAT temperature in Celsius or reference the CDU for the correct Fahrenheit temperature.
- Correct temperature is displayed on the CDU and used for FMS calculations.

Takeoff Perf Parameters Do Not Accept Meters Appropriately.

- Pressure Altitude, Obstacle Height, Level Off Altitude, Max Altitude are only displayed in feet on the Takeoff pages even when other parameters are displayed in meters.
- Manually convert those parameters into feet before entering the values.

When both sides have FMS 3 as the selected NAV source, an automatic NAV to NAV transfer will only happen on the pilot side of the cockpit.

- When FMS 3 is the selected NAV source on both sides of the cockpit, set the flight director XFR side to the pilot side as shown on the Flight Control Panel and by the arrow on the Flight Mode Annunciator on the PFDs.

- The co-pilot (non-XFR side), must manually change NAV source from FMS to NAV to intercept the Localizer course and manually change NAV source from NAV to FMS to fly the missed approach from a Localizer based approach.

The VOR info dialog box cannot be accessed while flying a VOR approach that does not include the VOR as a flight plan waypoint prior to the missed approach segment.

- All desired information required for performing the approach is available on the electronic chart.
- Graphical tuning of the VOR is still available to the crew.

If the VPA (Vertical Path Angle) for a non-Type 1 approach (localizer or other approaches with a zero VPA at the MAP or runway threshold) is manually changed, executing the clear-all button on the crossing dialog box does not clear the entered value or revert the VPA to the database value.

- Do not change the VPA of published approaches.

ISA deviation of zero is indicated in as amber within the temperature compensation dialog box.

- If the ISA deviation is zero then temperature compensation is unnecessary.

When using the GFP Reroute function started on a conditional waypoint adds the first waypoints in a reversed order when creating multiple waypoints.

- Use the CDU to modify the flight plan route from a conditional waypoint

TTG value on ROUTE PROGRESS pages of ¼ FMS Data displays has an erroneous Z after the time.

- TTG (Time To Go) are enroute times, not time of arrival in Zulu. Disregard the Z displayed after the time.

The Time-to-Go value may change continuously during GPS initialization.

- This is a transient effect that stabilizes once system is initialized.

Selecting Direct-To a history leg (previous waypoint) after entering holding on an approach will remove the holding pattern from the approach.

- The Approach must be reentered in the FMS.

Interaction between VNAV, flight plan sequencing, and approach monitor functions in response to the specific execution of some approach geometries leads to one FMS detecting that the conditions for maintaining the approach descent path have not been met. When this occurs vertical deviation is removed and a red VNV flag is displayed in place of the vertical deviation on the side couple to the FMS that has determined the approach condition was not met.

- While the VNAV is failed, the Yellow FMS miscompare annunciation is displayed near the bottom of the ADI part of the PFD. The PATH flight director mode turns yellow. The FMS No Approach message is displayed in the A1 message line and on the CDU
- This issue affects only one side of the flight deck, the crew can transfer the flight director to the opposite side of the flight deck and continue on as long as they still meet the legal requirement to continue the approach
- Depending on phase of flight reloading the approach is also an acceptable workaround to resolve the issue if it occurs.

When attempting to upload a flight plan of approximately 160 waypoints or more, the onside FMS will reset.

- Do not upload flight plans with approximately 160 waypoints or more. They must be manually entered.

When temperature compensation is selected ON, a STAR altitude constraint may be temperature compensated (STAR altitudes should not be temperature compensated, only approach procedure altitudes).

- Verify STAR altitudes in the FMS are not temperature compensated when function is selected on.
- If STAR altitude is temperature compensated, the correct altitude can be entered manually.

- If the altitude constraint is at or above, the constraint will not be violated. The aircraft will follow a steeper compensated vertical path than if the altitude was not compensated.

Saving Pilot ROUTES will save the way point WIND data too.

- Review LEG Wind after recall of a stored flight plan.

During MCRZ mode, TGT speed mode alternates between PERF LIM and MCRZ.

- Aircraft speed is correct. Ignore TGT speed when this changes intermittently.

Flyover waypoint changed to flyby when new destination is entered and down track approach removed from flight plan.

- Re-designate waypoint as flyover
- Always verify that the displayed chart matches the desired actual arrival/procedure to be flown.

When an arrival without an associated database chart is programmed into the FMS and an arrival was previously programmed that has a chart in the database, that chart will remain erroneously displayed.

- The associated menu title of the erroneously displayed chart will be incorrectly displayed in magenta, wrongly indicating it matches the arrival currently programmed in the FMS.

VNAV Path Guidance issue with Flashing FPTA: In some rare and specific cases (“T-approach with turn course reversal) of an LNAV/VNAV approach, after PATH has been armed for descent, the reference altitude (FPTA) MIGHT flash erratically and the armed Path be removed (and a message “No VNAV path” is displayed in FMS).
All other VNAV vertical deviation indications and guidance will operate normally.

- Crew shall deselect and re-select VNAV mode at the subsequent waypoint, once the desired procedure altitude has been captured.

OIS 5

CDU:

Tune by IDENT (entering the NAVAID identifier instead of the frequency) is not authorized when more than one NAVAID selection is displayed (more than one NAVAID has the same identifier). The latitude and/or longitude displayed on the SELECT NAVAID page of the CDU may be incorrect.

- If the CDU displays a choice of NAVAIDS after tuning by IDENT, return to the TUNE page and enter the NAVAID frequency instead of the identifier.

When the pilot enters a valid speed constraint at an ILS approach runway, it will not display next to the Runway Waypoint on the CDU LEGS page.

- The FMS will honor the entered speed even though it is not displayed on the CDU.
- The pilot can verify the entered speed by selecting the right CDU button associated with the runway waypoint and check the speed constraint value that appears in the scratchpad.

Flight ID character length is not consistent between TUNE and FANS/ATN pages.

- Crew should not enter a flight ID greater than seven characters.

DATA and COM are alternating in the CDU.

- Select desired mode.

No Indication of why CDU message VSPD Out Of Range is displayed.

- Confer with Gulfstream 280 Pro Line Fusion FMS OG, MESSAGES AND ANNUNCIATORS chapter.

Autopilot:

The throttles may advance to the target limit (TO/GA, CLB or CRZ setting) potentially causing an Overspeed condition when the selected AFCS/AT is changed within 5 minutes of a DCU channel being powered (would only happen if DCU fails and resets).

- If the auto throttles are not operating as expected, disengage and re-engage the Auto throttle.

The thrust mode may not change back to CRZ mode after capturing an altitude during a shallow climb.

- Manually select CRZ on the SMC-THRST page if required.

FMA changes from ALTS to ALT upon PFD failure.

- A vertical mode change is required to return to ALTS mode.

Yaw Damper Off message will come on when changing AFCS cabinets.

- Re-engage Yaw Damper.

If the preselect altitude is changed in the same moment when ALT SELECT (ALTS) is activated, ALTS will use the newly dialed in preselect altitude rather than the one that was originally intended to be captured.

- Flight crews should monitor the flight director to ensure its climb/descent guidance is as expected for the current leg. If it is commanding an unexpectedly large climb or descent, or a climb/descent that would take the aircraft beyond the expected altitude, the crew can select any other vertical mode on the FCP, such as FLC, to deactivate ALT SEL and fly toward the desired altitude

Electronic Flight Information System (EFIS):

Selecting the aircraft symbol on the map has priority over selecting other map items near the aircraft symbol.

- To select map items near the aircraft symbol, reduce the map range to maximize distance between the desired map item and the aircraft symbol.

Selection of a map symbol while the map data task menu is still displayed will cause the resultant task menu's button selections to not open the associated dialog box.

- Wait until the Map Data task menu has timed out, prior to selecting another task menu from the map.
- If this issue has already occurred the reselecting the map element will resolve the issue.

Cancel and Execute was rarely may not display after selecting DIR-TO on a full or half map.

- The flight plan edit can be achieved via the CDU or moving the cursor to a different display format and then returning.

Obstacles not selectable on the ¼ MFW map format.

- Obstacle information can be accessed on the ½ or full map formats.

Obstacles Info dialog box missing title.

TCAS targets are not displayed on a full map if the aircraft symbol is panned outside of the width of the map menu bar.

- A TCAS traffic threat will cause automatic pop-up to occur and the targets are displayed.

After Panning the MAP, the airport airspace (Class C for example) may not center appropriately over some airports.

- Select A/C Center, HDG or North on the MAP to correctly display airport airspace overlay.

IPC 2 Failure causes Chart Home Button on R DCP to not be functional.

- Use the 1/2 or 1/4 data menu on the Right SMC or the CCD on screen menus to access the chart page.

Flight Plan Target Altitude (FPTA) is displayed momentarily before TOD is reached or the FCP altitude is lowered. Transient effect.

The map elements displayed in the HSI CONFIG dialog box are removed or displayed incorrectly while one side of the cockpit has the 240 HSI format selected and the cross-side of the cockpit is on the same navigation source.

- Swap navigation sources or change HSI compass to 120 or 180 to resolve the issue.

VORs on the map can exceed the max map symbols.

- The max map symbols apply to low NAVAIDS and high NAVAIDS separately allowing for up to double the max map symbols. Decrease the max map symbols as desired.

The next FMS altitude target (FPTA) is shown to the crew on the PFDs correctly but it is not identified as being temperature compensated following a vertical discontinuity.

- The crew can either resolve the vertical discontinuity in the flight plan or continue to and level-off at the uncompensated altitude until intercepting the compensated path.

Via -To/Airways Functionality Not working via GFP.

- Use CDU FPLN page to intercept an airway.

When ATC 2 and TA/RA are selected, the HSI may display TCAS STBY.

- Selection indication is correct on MAP and on CDU-TUNE page.
- Selecting ATC 1 and then ATC 2 will correct the indication

A Lateral deviation miscompare amber flag may momentarily appear on the PFD when HSI changes annunciation from LPV ARM to LPV APPR.

- Miscompare flag clears within 2 seconds. Transition effect only. Continue approach if no flag.

SMC:

Full Chart Button on SMC Disappears upon repeated selection of the button.

- Full chart can be selected on the DU or close and reopen the menu on the SMC.

Rapidly pushing LSK 1L twice on the Weather Radar menu to change the mode from On to STBY may cause the Tilt readout to continuously toggle between two values.

- The toggling has no effect on the radar since it is in STBY
- Turning the radar back on will stop the toggling
- Pausing in Test momentarily when going to STBY from On prevents the toggling from occurring.

During system power up and initialization the SUA and CTRLD selections are not available on the SMC.

- Selections can be accomplished using the overlay selections available on the lateral maps.

FPV on SMC displays incorrect pitch during turns with a crosswind.

- During a dual AFD failure, remove the FPV from display and/or use VBars or XPointer FD

Vertical Situational Display (VSD):

VSD update rate lag may be noticed by the flight crew when the aircraft is operated outside of the flight plan or the performance specified by the Performance Data Base (PDB).

- The information presented is still accurate but may take up to 5 seconds to update.

Approach procedures that do not specifically list the runway as a leg within the NAV DB based procedure (non-precision type) do not display the runway on the lateral map or the VSD.

- These procedure leg types are by design and the FMS flight plan will operate correctly.

The VSD draws the takeoff profile based on aircraft present position for departures with non-fixed first leg type (first waypoint is conditional, i.e. waypoint is based on reaching an altitude instead of a geographical location).

- When first waypoint in flight plan is conditional, the VSD top of climb indication is not accurate while on ground until on the runway in takeoff position.

When approaching a waypoint with an altitude constraint that is higher than the current altitude, the VSD leg color and altitude constraint color on the CDU legs page may continue to be green or change between green and amber when the altitude constraint is not achievable. This scenario occurs when the preselector is limiting the planned VNAV operations.

VSD glide path representation is incorrect if the Flight Plan Destination is changed while within the FAF of an Origin Approach.

- Crew should not make edits to the flight plan destination while inside of the FAF on an LPV approach to the origin airport. If a go-around is executed the VSD removes the glide path and the issue is resolved.

Approach feathers greater than 9.5 NM in length are removed from display on the VSD during approaches when using a 1/2 map range of 1 or 2 NM.

- Increasing the map 1/2 range to 3 NM or more causes the feather to be re-displayed correctly on the VSD.

VSD Obstacles are incorrectly displayed if the obstacle distance is entered in meters.

- Obstacles are displayed correctly when obstacle distance is entered in feet. Do not enter an obstacle distance using the meters format.
- Performance calculations are performed correctly when distance is either format.

Glideslope/Glidepath intercept depicted on the VSD is lower than actual intercept when using temperature compensation.

- Navigate aircraft using the vertical deviation indicator on the PFD.

DU Radio Tuning:

Graphical VHF radio tuning on a DU2 map is sometimes unavailable. The COM FREQS and ARTCC button exists in the task menu, but selecting the button may not bring up the ARTCC dialog box.

- If radios cannot be tuned graphically, tune through the CDU or 1/4 DU Tune format.

1/4 DU Tune format Preset Frequencies list scrolls backwards.

- Crew can scroll list in the opposite direction or used CDU to tune presets.

Automatic NAV frequency tuning of a cross side radio is being attempted when only one FMS is operational, but actual radio frequency is not being changed.

- Only the one side FMS will NAV to NAV in a single FMS operation. The cross side will have to manually select FREQ and NAV SOURCE to LOC.
- DU Tune page may indicate autotune but the actual frequency will not change.

Electronic Checklist:

The Auto Synoptic Selection Defaults to OFF on power up.

The focus box around the checklist line items lags the cursor movement when stepping through the checklist. Trigger selecting on the CCD affects the line surrounded by the focus box, not the line where the cursor is.

- Before trigger selecting a checklist step, wait for the focus box to outline the desired step. Trigger selecting too quickly will deselect the previous step where the focus box is instead of selecting the step where the cursor is.

The SMC cannot select a NOTE if the focus box was moved to the note manually. When the focus box is on the NOTE, pushing select on the SMC will not advance the focus box to the next step of the checklist.

- When using the SMC to select checklist steps, always select the step prior to a NOTE so the focus box moves to the note automatically.
- Using the CCD to run the checklist instead of the SMC will avoid this issue.

ECL occasionally draws a box around a checklist item either in the 3rd or 4th row.

- Move the box to desired line item and continue to use checklist.

GWX:

The scaling of the DLGWX NEXRAD image on a map is double the scale. Result is an incorrect representation of DLGWX on lateral maps and color streaking may occur at map ranges at or greater than 150nm.

- DLGWX NEXRAD images should not be view on lateral map formats.
- DLGWX NEXRAD images can be viewed with the ¼ MFW DLGWX Format.
- When available XM NEXRAD images can be viewed on lateral maps.

DATA LINK / CPDLC FANS / Link +2000:

(Dual DATALINK Option only) When RIU2 is the active data link source, selecting DL for Data link on the CDU INDEX Menu goes to the MCDU Menu.

- Select the data link button on the MCDU Menu when it is displayed or use the DATALINK hot key on the CDU instead of the IDX hot key.

Pre-MOD G25-10074: XM GWX zoom does not operate when the CCD cursor is placed directly inside the control box.

A double press of the VERIFY prompt at LSK 5R will send the message prior to verifying it since the SEND prompt is also at LSK 5R on the verify page.

When checking CDU messages (pressing MSG hot key button) when on the CDU FANS menu page, a second selection of the MSG button does not cause a return to the FANS page.

- Manually navigate back to the desired page by selecting the ATC/ATS button on the CDU.

(Dual DATALINK Option only) Changing the selected datalink radio may set and latch the ATN ATC Alert CAS message.

- The ATN Aural will not sound when future ATN Alert messages are received if the ATN ATC Alert CAS message is latched on
- Before changing the designated DL radio, select DISABLE CPDLC on the ATN LINK STATUS page. Verify CPDLC is ENABLED on the ATN LINK STATUS page after changing the designated DL radio. Flight ID may need to be re-entered
- If the ATN ATC Alert CAS message is latched on (does not clear after all Alert messages have been viewed), visually monitor the ATN CDU page as much as possible when conducting ATN operations to watch for the ATC Alert prompt appearing next to LSK 6R. This will be the only indication of new ATC Alert messages.

OIS 5

SVS:

Pre MOD G25-10074: The magenta SVS destination runway highlight will not be displayed for an arrival programmed to the origin airport.

- When returning to origin, change the destination airport in the FMS and set the arrival to the destination airport.

The extended centerline is not displayed from the intended landing runway when flying a circling approach procedure.

- The extended centerline is drawn based on the approach programmed in the FMS, not the runway programmed for landing.

OPERATIONAL INFORMATION SUPPLEMENT No. 6 for GULFSTREAM G280 AIRPLANE G280-OIS-6

MFR SERIAL No. _____

REGISTRATION No. _____

TAKEOFF AND LANDING OPERATIONS AT ULAANBAATAR, MONGOLIA (ZMUB)

This Supplement must be attached to CAAI Approved Airplane Flight Manual for take-off and landing operations at Ulaanbaatar, Mongolia (ZMUB), runways 14 and 32 only. Information contained herein supplements information in basic Airplane Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Airplane Flight Manual.

Date: 8 Feb 2018 Manual No._____

This approval is applicable to Airplane Flight Manuals of U.S. registered aircraft in accordance with provisions of FAR 21.29 and is incorporated under FAA Type Certificate No. A53NM.

GULFSTREAM AEROSPACE LP

OIS 6

TAKE-OFF AND LANDING OPERATIONS AT ULAANBAATAR, MONGOLIA (ZMUB)

GENERAL

This supplement allows take-off and landing operations at Ulaanbaatar, Mongolia, (ZMUB).

Since the overall runway slope at Ulaanbaatar airport (ZMUB) exceeds 2%, it is necessary to use a reduced take-off and landing runway length that does not exceed the AFM runway slope limitations. This supplement details the reduced runway length and performance criteria to satisfy take-off and landing operations at this airport.

The general information in the introduction section is applicable with the addition of the following:

SECTION I
LIMITATIONS

1. Landing operations at Ulaanbaatar (ZMUB) airport are limited to runway 14. Take-off operations are limited to runway 32.
2. The Transition Level at this airport is FL098 (3000 m) and the Transition Altitude is 8210 ft (2500 m).
3. The first 800 M (2625 ft) of runway 32 are at a slope of 2.5%. The remaining 2300 M (7550 ft) has an average slope of 2.0%. To avoid exceeding the maximum runway slope limitation of 2%, the first 800 M for take-off on runway 32 and the last 800 M for landing on runway 14 should not be used (see Figure Figure XI-6-1, page XI-6-5). Therefore, both take-off and landing distance performance should be based on not exceeding an available runway length of 2300 M (7550 ft).

SECTION II
EMERGENCY PROCEDURES

No change.

SECTION III
ABNORMAL PROCEDURES

No change.

SECTION IV
NORMAL PROCEDURES

No change.

SECTION V
SYSTEMS

No change.

OIS 6

SECTION VII
PERFORMANCE

TAKE-OFF REQUIREMENTS

Take-off on Runway 32 only. Runway available for take-off distance planning is 2300 M (7550 ft). Start the take-off roll 800 meters from runway 32 threshold. Use 2% downhill slope to compute take-off performance. After take-off, current published SID's require a climb rate of 207 ft/nm (3.4%) to 5250 ft MSL.

LANDING REQUIREMENTS

Land on Runway 14 only. Runway available for landing distance planning is 2300 M (7550 ft). Cross runway threshold at height of 50 ft and touchdown approximately 1000 ft from threshold. Although landing is uphill, runway slope is not to used in computing required landing distance. The last 800 meters (2625 ft) of runway should not be used for landing operations.

ULAANBAATAR, MONGOLIA - ZMUB / ULN

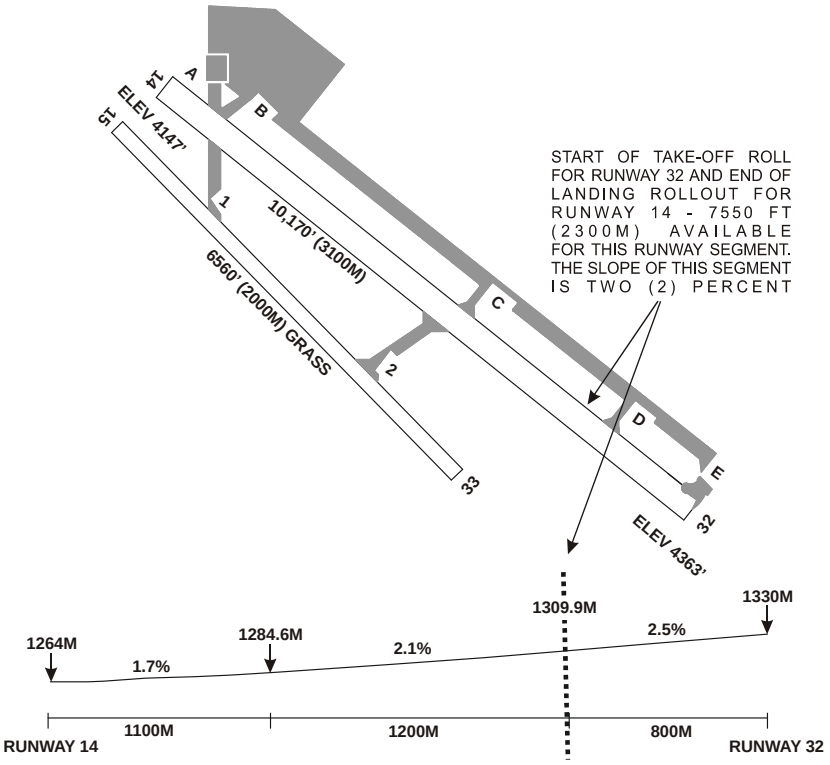

Figure XI-6-1 Ulaanbaatar Airport (ZMUB) Layout

OIS 6

SECTION VIII
WEIGHT AND BALANCE

No change.

OPERATIONAL INFORMATION SUPPLEMENT No. 7 for GULFSTREAM G280 AIRPLANE G280-OIS-7

MFR SERIAL No. _____

REGISTRATION No. _____

RUNWAY CONDITION ASSESSMENT MATRIX (RCAM)

This Supplement must be attached to CAAI Approved Airplane Flight Manual. Information contained herein supplements information in basic Airplane Flight Manual. For limitations, procedures and performance information not contained in this Supplement, consult basic Airplane Flight Manual.

Date: 2 February 2020 Manual No._____

This approval is applicable to Airplane Flight Manuals of U.S. registered aircraft in accordance with provisions of FAR 21.29 and is incorporated under FAA Type Certificate No. A53NM.

GULFSTREAM AEROSPACE LP

RUNWAY CONDITION ASSESSMENT MATRIX (RCAM)

The following table provides guidance for reference material for takeoff and landing computations while complying with Takeoff And Landing Performance Assessment (TALPA) standards utilizing Runway Condition Assessment Matrix (RCAM) numerical values. If the RCAM Runway Condition Code (RwyCC) value is given, utilize the table below to locate the correct performance information in the Airplane Flight Manual or appropriate Airplane Flight Manual Supplement. Additional information can be found in the Aeronautical Information Manual, section AIM 4-3-9.

CAUTION

A RwyCC of “0” represents wet ice, slush over ice, etc. and is used to delineate a braking action of “NIL”. An RwyCC value of “0” is prohibited from being reported in a FICON NOTAM. G280 performance charts do not provide information for operations under these conditions.

Runway Condition Description	RwyCC	Pilot Reported Braking Action / Directional Control	Takeoff Performance Computation Reference	Landing Performance Computation Reference
Dry	6	N/A	AFM Section V	AFM Section V
Frost or 3mm (1/8 inch) or less of water, slush, wet snow or dry snow. Includes damp runway.	5	Good / Braking deceleration is normal for the wheel braking effort applied AND direction control is normal.	AFM Section V	AFM Section V
OAT -15°C (5°F) or colder with compacted snow	4	Good to medium / Braking deceleration OR directional control is between good and medium	AFM Supplement 8 (Compacted Snow)	AFM Supplement 8 (Compacted Snow)

Table 1: Takeoff and Landing Performance Computation References

Runway Condition Description	RwyCC	Pilot Reported Braking Action / Directional Control	Takeoff Performance Computation Reference	Landing Performance Computation Reference
Dry or wet snow over compacted snow. Compacted snow with OAT warmer than -15°C (5°F). More than 3mm (1/8 inch) of dry or wet snow. Wet runway (slippery when wet)	3	Medium / Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced	AFM Supplement 8 (Slush, Standing Water or Wet Snow; or Dry Snow)	AFM Supplement 8 (Slush, Standing Water or Wet Snow; or Dry Snow)
Greater than 3mm (1/8 inch) of water or slush	2	Medium to poor / Braking deceleration OR directional control between medium and poor	AFM Supplement 8 (Slush, Standing Water or Wet Snow)	AFM Supplement 8 (Slush, Standing Water or Wet Snow)

Table 1: Takeoff and Landing Performance Computation References (Continued)

Runway Condition Description	RwyCC	Pilot Reported Braking Action / Directional Control	Takeoff Performance Computation Reference	Landing Performance Computation Reference
Ice	1	Poor / Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced	AFM Supplement 8 (Ice)	AFM Supplement 8 (Ice)

Table 1: Takeoff and Landing Performance Computation References (Continued)

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BUS LOAD DISTRIBUTION

RIGHT EMERGENCY BUS CIRCUIT BREAKERS

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SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ANTI ICE	Wing Anti Ice	E19	R WAI VALVE	28Vdc to right WAI Valve solenoid, Right WAI On/Off Command to the GADC II, Right WAI control relay and right ice detection relay.	Right wing anti-ice valve remains closed or moves to closed position. (When the switch is either in auto or in on position).
	AOA Control	E16	R AOA CTRL	Powers right AOA control and monitoring circuit.	AOA Probe Fail, R advisory message comes on. the system remain operate properly with the second AOA sensor.
	AOA Heat	D16	R AOA HT	Powers right vane heater and right case heater.	**On ground:** AOA Heat Fail, R advisory message comes on. In flight: advisory message. In icing conditions, the system ignores the right AOA indication and AOA Probe Fail, R advisory message comes on.

RIGHT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 2 of 8)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ANTI ICE	Bleed Leak Detection	J17	R BLD LOOP	28Vdc to Overheat Detection Controller Channel A.	No bleed leak detection for zones connected to channel B and no smoke detection. FPCU ODC card channel A failure. The following overheat zones detections are unavailable: R pylon R WAI R ENG bleed R ATS APU bleed pack. Bleed Leak CH A Fail caution message comes on.
	Engine Anti Ice	E17	R ENG A/I	Power to nacelle heater and solenoid.	R nacelle anti-ice system fails.
	Temperature Control, Bleed Air and Wing Anti-ice	K16	GADC 3 AUTO	28Vdc to cabin temperature control, right WAI control and right bleed air control (GADC II No. 3)	Loss of ability to control the cabin temperature in auto mode, right bleed air system and right anti-ice.
ECS	Bleed Air System	J19	R BLD VALVE	28Vdc to the right MPRSOV solenoid and right bleed on/off command to the GADC II.	Loss of right bleed source. Right MPRSOV remains closed.
	Bleed Air System	K19	ISOL VALVE	28Vdc to the Isolation Valve solenoid.	Isolation valve remains closed or moves to the closed position.
	Cabin Pressure Control	J16	MAN PRESS	28Vdc to CPC monitor channel and manual control and manual dump function.	Manual cabin pressure control is disabled.

RIGHT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 3 of 8)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ECS	Baggage Smoke Protection	K18	BAG SMOKE	28Vdc to smoke detector, baggage isolation valve, baggage dump valve and smoke alarm command to the overheat detection card.	Baggage isolation valve and baggage dump valve remain in their last position (closed or open). No smoke detection is available.
	Fire	K16	LAV SMOKE	28 Vdc to lavatory smoke detector	Internal
COMM	VHF System	L17	VHF1	28 Vdc to VHF No. 1 Transceiver	Loss of VHF No. 1 system VHF COM 1 Fail caution message comes on. Single data link configuration. loss of data link capability.
	Cabin	L18	PA		
	Digital Audio System	L19	ACP2	28Vdc to ACP No. 2	Loss of ACP No. 2. Loss of all copilot communications, except for EMG 121.5 through VHF. ACP 2 Fail advisory message comes on.
NAV	Flight Management System	M18	GPS 1	28Vdc to GPS No. 1	Loss of GPS No. 1. CAS message.
	Flight Management System	N18	CDU 1	28Vdc to CDU No. 1	Loss of pilot CDU. Automatic reversion to CDU No. 3, if installed.
	TCAS/ Transponder System	M19	ATC 2	28Vdc to ATC No. 2	Loss of ATC No. 2 ATC 2 Fail advisory message comes on.
	eFlight	O11	Printer (O)		
	HUD	O12	HUD PWR 2 (O)		

RIGHT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 4 of 8)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
DU / AP	EICAS	P18	DCU 2A B/U	28Vdc to DCU No. 2 channel A - backup.	No effect. Pulling the cb and the DCU 2A causes loss of DCU 2 channel A.
	EICAS	P19	DCU 2B B/U	28VDC to DCU2 ch B - backup	No effect. Pulling the cb and the DCU 2B causes loss of DCU 2 channel B.
ENG / FUEL	Fuel	I13	FUEL X FLOW	Enable the cross-flow valve operation (open and close).	Inability to activate the cross-flow valve. The valve remain in last position (open, close or in transit).
	Fuel (APU)	H14	APU FUEL SOV	Enables the APU shutoff valve operation (open and close).	Inability to activate the APU shutoff valve. The valve remain in his last position (open, close or in transit).
	Fuel	I14	R FQMS	Connects 28Vdc to the right channel of the FQMC.	Loss of right channel of the FQMC and ROLS (Remote Oil Level Sensor). The displays remain without any change since the left channel remains valid.
	Fire Indication	H15	FIRE CH B	Controls electrical power to FPCU fire detection circuit channel B.	FPCU fire extinguishing circuit channel A failure: No fire indication in lights. No fire indication in ARINC 429. No fire shutoff lever solenoid release (can be released manually).

RIGHT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 5 of 8)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ENG / FUEL	Fire Indication	H16	R FIRE IND	Controls electrical power to: right engine fire indication relays red indication light and solenoid of the right engine fire shutoff lever.	No red LED indication on left engine fire shut-off lever. No fire shutoff lever solenoid release (can be released manually).
	Fire Extinguishing	H17	R FIRE XTING	Controls electrical power to FPCU fire extinguishing circuit Channel B Left engine cartridge in fire bottle No. 2 Right engine cartridge in fire bottle No. 2 APU cartridge (BW B) in Fire bottle No. 2	FPCU fire extinguishing circuit channel B failure: Inability to discharge bottle No. 2 to left engine Inability to discharge bottle No. 1 to right engine.
	Engine	I15	R T/R WST	Power and control to right thrust reverser system, the thrust reverser system triggered by weight on wheel signal from DCU.	No effect on right T/R operation unless WOW signal invalid. ENG Minor Fault, L advisory message may come on.
	Engine	I16	R T/R WOW	Power and control to right thrust reverser system, the thrust reverser system triggered by weight on wheel signal from DCU.	No effect on the already deployed right T/R based on WSU signals.

RIGHT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 6 of 8)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ENG / FUEL	Engine	I19	L FADEC B	Powers L.H. FADEC A, L.H fire lever, one of two poles for right engines shutdown, left engine run on/off toggle switch, one of two poles for left engines, right engine run on/off toggle switch, one of two poles for right engines, left engine start pushbutton, one of poles for left engine, right engine start pushbutton, one of two poles for right engine, continuous ignition two of four poles, one for left engine the other for right engine.	No effect in flight and on ground. ENG Minor Fault, L advisory message comes on.
	Engine	H19	R FADEC B	Powers R.H. FADEC B, R.H fire lever one of two poles for right engines shutdown.	During normal operation: no effect in flight and on ground.ENG Minor Fault, R advisory message comes on. If engine fails: no power to ATS. Engine will not start in flight or on ground.
	Fuel	H18	R FUEL SOV	Enables the R.H shutoff valve operation (open and close).	Inability to activate the right shutoff valve. The valve remain in last position (open, close or in transit).

RIGHT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 7 of 8)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ENG / FUEL	Fuel	I17	R PUMP PWR	Enables the R.H standby electrical pump operation when the pressure drops and reports this situation to the DCU.	Inability to automatically operate the right standby electrical pump at pressure drop. The DCU considers the line pressure as normal. During fuel jettison or pilot command (setting the pushbutton to on) the pump operates.
	Fuel (Jettison)	I18	R JETTISON	Enables the R jettison valve operation (open and close).	Inability to activate the right jettison valve. The valve remains in last position (open, closed or in transit).
	Distribution	A17	REB PWR B/U	Provides power to R emergency bus in emergency.	No power to R EMERG bus in emergency. EMER Bus Fail (C), R caution message comes on.
	Distribution	A18	FEED REB PWR	Provides power to R emergency bus during normal flight	No power to R EMERG bus during normal flight. EMER Bus Fail (C), R caution message comes on.
	Distribution	A19	REB TIE PWR	Provides power to emergency bus tie contactor that will be energized in case of right emergency feeder fault.	Emergency bus tie contactor does not operate in case of right emergency feeder fault. EMER Bus Fail (C), L caution message comes on.

RIGHT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 8 of 8)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
EPS / APU	Distribution	C16	HOT BUS TIE	Controls HOT BUS TIE RCCB.	During emergency after selection EMERG BUS switch HOT BUS TIE contactor does not energize, EMERG BUS TIE closes. No light on EMERG BUS switch. EMP's operation faults.
	Distribution	C17	REB CTRL B/U	Controls operation of REB contactor during emergency flight after selection EMERG BUS switch.	During emergency after selection EMERG BUS switch, REB contactor does not energize, no direct connection of right emergency bus to right battery. Right emergency bus stays connected to R main bus. No automatic load shedding for right main bus. No light on EMERG BUS switch.
	Distribution	C18	REB FEED CTRL	Provides power to REBFC that is energized during normal operation.	REBFC opens, right emergency bus connects automatically to right side. EMER Bus ALT Feed, R caution message comes on.
	Distribution	C19	REB REDUCT	Controls REDR relay providing R battery disconnection from R main bus during emergency after selection EMERG BUS switch.	R emergency bus connected to R main bus and to R battery. No automatic load shedding for R main bus. Detection only by synoptic.
LTS	Emergency Lights	B15	EMER SW	landing gear lever light, and 7 lighted switches (dedicated to emergency).	If EMER switch is on, removes landing gear lever light, and 7 lighted switches (dedicated to emergency).

LEFT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 1 of 10)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ANTI-ICE	Wing Anti Ice	E9	L WAI VALVE	28Vdc to left WAI valve solenoid, left wai on/off command to the GADC II, left WAI control relay and left Ice Detection relay.	Left wing anti-ice valve remains closed or moves to the closed position. (When the switch is either in Auto or in On position).
	STBY Pitot Heat	E6	STBY PITOT HT	feed STBY Pitot heat left static 3 heat and right static 3 heat	If STBY PITOT HT will pull out the STBY Pitot heat left static No. 3 heat and right static No. 3 heat are inoperative.
	Engine Anti Ice	E7	L ENG A/I	Power to nacelle heater and solenoid.	L nacelle anti-ice system fails.
	Bleed Leak Detection	J7	L BLD LOOP	28Vdc to Overheat Detection Controller Channel B	No bleed leak detection for zones connected to channel B. Detection of the following is unavailable: L pylon, L WAI, L ENG bleed, L ATS, WAI Common. Bleed Leak CH B Fail caution message comes on.
ECS	Temperature Control and Wing Anti Ice	K6	GADC 1 AUTO	28Vdc to cockpit temperature control and left wai control (GADC II No. 1)	Loss of ability to control the cockpit temperature in auto mode and the Left Anti-Icing ability.
	Temperature Control and Bleed Air	K8	GADC 2	28Vdc to Left Bleed Air control and Pack control (GADC II No. 2)	Loss of ability to control the Left Bleed Air System and the Pack.
	Temperature Control	K9	PACK VALVE	28Vdc to the Pack Valve solenoid and Pack on/off command to the GADC II.	Inability to shut-off the pack valve.

LEFT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 2 of 10)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ECS	Bleed Air System	J9	L BLD VALVE	28Vdc to the Left MPRSOV solenoid and Left Bleed On/Off command to the GADC II.	Loss of left bleed source. Left MPRSOV remains closed.
	Bleed Air System	J6	DEFOG AIR	28Vdc to the Defog Air Valve.	Defog air valve remains in its last position.
	CVR / FDR	L7	RECORDER 1	28Vdc to Flight Recorder System	Loss of flight recorder system CVR 1 Fail and FDR 1 Fail advisory messages come on.
COMM	Radio Management	L8	RIU1B	28Vdc to RIU No. 1 Channel B	Loss of RIU No. 1 Channel B. Loss of tuning capabilities to on-side radios from L-CDU. Still have radio tuning from other CDU's/displays. RIU 1B Fail caution message comes on.
	Digital Audio System	L9	ACP1	28Vdc to ACP No. 1	Loss of ACP No. 1. Loss of all Pilot communication, except of EMG 121.5 through VHF. ACP 1 Fail advisory message comes on.

LEFT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 3 of 10)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
NAV	Integrated Processing System	M8	IPC 1	28Vdc to IPC No. 1	FMS No. 1, OMS and IFIS. IPC 1 Fail (C) caution message comes on.
	VOR / ILS System	N8	NAV1	28Vdc to NAV No. 1	Loss of VOR / ILS / MB / ADF No. 1. NAV 1 Fail and ACP 1 Fail advisory messages come on. If installed, NAV No. 3 automatically replaces NAV No. 1.
	AHRS System	M9	AHS 1B	Secondary 28Vdc to AHRS No. 1	AHRS No. 1 still gets power from AHS-1A CAS Message (secondary power failure).
	Air Data System	N9	ADC 1	28Vdc to ADC No. 1 System	Loss of ADC No. 1 system ADC 1 Fail caution message come on. Automatic reversion to ADC No. 2 Flag on PFD.
	EICAS	P8	DCU 1A B/U	28VDC to DCU1 ch A - backup	No effect. Pulling the cb and DCU 1A causes loss of DCU 1 CH A.
	Primary Displays and Control	O9	CCD 1	28VDC to Left CCD	Loss of left CCD. CCD Fail, L advisory message comes on. Use SMC/ CDU control instead.
	Primary Displays and Control	O8	DU 1	28VDC to left primary display	Loss of left primary display DU 1 Fail advisory message comes on. Automatic reversion of left PFD to DU2 and force left ISI.
	EICAS	P9	DCU 1B B/U	28VDC to DCU1 ch B - backup	No effect. Pulling the cb and the DCU 1B causes loss of DCU 1 ch B.

LEFT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 4 of 10)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
		H3	SPARE		
ENG / FUEL	Fire Indication	H4	APU FIRE IND	Controls electrical power to APU Fire Indication time relay, ground. Crew horn. during fire condition. Provides power supply, in order to close APU Fuel shut off valve. During fire condition provide via relay fire status to APU controller. During fire condition APU FIRE pushbutton will be illuminated via APU fire indication relay.	Fire condition: 1.APU FIRE pushbutton does not illuminate. 2. APU fuel shut off valve does not be close. 3. APU controller is not aware about fire condition. 4. ground crew horn (alert) not available during APU unattended operation mode.
	Fuel	I4	L FQMS	Connect 28Vdc to the left channel of the FQMC.	Loss of FQMC left channel. Note: The displays remain without any changes since the right channel remains valid.
	Engine	I5	L T/R WST	Power and control for left thrust reverser system, the thrust reverser system triggered by wheel speed up signal from BCU	No effect on L T/R operation unless WOW signal is invalid. ENG Minor Fault, L advisory message may come on.
	Engine	I6	L T/R WOW	Power and control for left thrust reverser system, the thrust reverser system triggered by weight on wheel signal from DCU	No effect on the L T/R already deployed based on WSU signals.

LEFT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 5 of 10)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ENG / FUEL	Fire Indication	H5	FIRE CH A	Controls electrical power to FPCU fire detection circuit Channel A	FPCU fire detection circuit channel A failure: FPCU FIDEX card ARINC failure Fire SYS CH A Fail caution message comes on (on ground) / Fire SYS CH A Fail advisory message comes on (in flight).
	Fire Indication	H6	L FIRE IND	Controls electrical power to: left engine fire indication relay. red indication light and solenoid of the left engine Fire shutoff lever.	No red LED indication on left engine fire shutoff lever. No fire shutoff lever solenoid release (can be released manually).
	Fire Extinguishing	H7	L FIRE XTING	Controls electrical power to FPCU fire extinguishing circuit Channel A Left engine cartridge in Fire bottle No. 1 Right engine cartridge in Fire bottle No. 1 APU cartridge (BW A) in fire bottle No. 2.	FPCU fire extinguishing circuit channel A failure: Inability to discharge bottle No. 1 to left engine. Inability to discharge bottle No. 1 to right engine.
	Fuel	H8	L FUEL SOV	Enable the L.H shutoff valve operation (open and close)	Inability to activate the left shutoff valve. The valve remain in last position (open, closed or in transit).

LEFT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 6 of 10)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ENG / FUEL	Fuel	I7	L PUMP PWR	Enable the L.H standby electrical pump operation while the pressure drops and to report this situation to the DCU.	Inability to operate the left standby electrical pump as pressure drops. The DCU considers the line pressure OK. Note: during fuel jettison or pilot command (setting the pushbutton to ON) the pump operates.
	Engine	H9	R FADEC A	Powers L.H. FADEC A, R.H fire handle one of two poles for left engines shutdown	In normal operation: no effect in flight and on ground. ENG Minor Fault, R advisory message comes on. If engine fails: no power to ATS. Engine will not start in flight or on ground.
	Engine	I9	L FADEC A	Powers L.H. FADEC B, L.H fire lever one of two poles for left engine shutdown, left engine run on/off toggle switch one of two poles for left engine, right engine run on/off toggle switch one of two poles for right engine, left engine start pushbutton one of poles for left engine, right engine start pushbutton one of two poles for right engine, continuous ignition two of four poles, one for left engine the other for right engine,	no effect in flight and on ground. ENG Minor Fault, L advisory message comes on.

LEFT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 7 of 10)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
EPS / APU	Fuel (Jettison)	I8	L JETTISON	Enables the L jettison valve operation (open and close).	Inability to activate the left jettison valve. The valve remain in last position (open, closed or in transit).
	Distribution	A7	LEB PWR B/U	Provides power to L EMERG bus during emergency flight.	No power to L EMERG bus during inflight emergency. EMER Bus Fail (C), L caution message comes on.
	Distribution	A8	LEB PWR FEED	Provides power to L EMERG bus during normal flight.	No power to L EMERG bus during normal flight. EMER Bus Fail (C), L caution message comes on.
	Distribution	A9	LEB TIE PWR	Provides power to EMERG bus tie contactor, that will be energized during left emergency feeder fault.	EMERG bus tie contactor does not operate during left emergency feeder fault. EMER Bus Fail (C), R caution message comes on.
	APU	B9	APU START	Provides power to ECU and all start circuit	No APU start.
	Distribution	C6	EMER BUS TIE	Connects L & R emergency buses during left/right emergency feeder fault.	No connection between L & R emergency buses during left/right emergency feeder fault. EMER Bus Fail (C), L or EMER Bus Fail (C), R caution message comes on.

LEFT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 8 of 10)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
EPS / APU	Distribution	C7	LEB CTRL B/U	Controls operation of LEB contactor during emergency flight after selection EMERG BUS switch	During inflight emergency, after selection EMERG BUS pushbutton, LEB contactor is not energized. No direct connection of left emergency bus to left battery. Left emergency bus stays connected to left main bus. No automatic load shedding for left main bus. No light on EMERG BUS pushbutton.
	Distribution	C8	LEB CTRL FEED	Provides power to LEBFC, that is energized during normal operation	LEBFC opens, left emergency bus connects automatically to right side. EMER Bus ALT Feed, L caution message comes on.
	Distribution	C9	LEB REDUCT	Control of LEDR relay providing L battery disconnection from L main bus during emergency flight after selection EMERG BUS switch	Left emergency bus connects to left main bus and to left battery. No automatic load shedding for left main bus. Detection only by synoptic.
	Rudder, Spoiler, HSTA, Elevator Monitor, Aileron Trim Indication	F4	FCECU 1 CMD	28Vdc to FCECU 1 command path, upper rudder SOV, OTBD MFS SOV, GND spoiler SOV's (2),HSTA brake.	Similar to FCECU1 fail, Systems not available: Stabilizer Rudder – single Ground + outboard spoilers Ailerons – panels and trim.

LEFT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 9 of 10)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
FGCS / HYD	Rudder, Spoiler, HSTA, Elevator Monitor, Aileron Trim indication	G4	FCECU 1 MON	28Vdc to FCECU 1 Monitor path.	Systems not available: L elevator monitor Flap/STAB sync AP - pitch axis. If both FCECU not available - See FCECU 2 CMD description.
	Aileron Trim	F5	AIL TRIM	28Vdc to Aileron Trim Actuator.	Aileron trim is not available.
	Flaps	F6	ALTN FLAPS	28Vdc to Alternate Flaps channel, ALT Flaps SOV.	Alternate flaps channel is not available.
	Stick Shaker	G5	L STK SHKR	Power for left stick shaker.	During SPS IBIT the system detects that the circuit breaker is out. In flight, the failure is detected just after stick shaker is commanded. Stick Shaker Fail, L advisory message comes on. No left stick shaker.
FGCS / HYD	Outboard Brakes Channel	G6	OUTBD BRKS	28Vdc to brakes outboard channel, Outboard emergency line pressure transducer and Outboard accumulator pressure transducer.	Outboard braking channel is not available. No indication of available pressure in the outboard accumulator. No indication of pressure via emergency outboard line pressure transducer.
	Left Analog Hydraulic Pressure	G7	L HYD PRESS	28Vdc to hydraulic pressure transducer (analog).	Amber dashes appear on EICAS analog hydraulic pressure display.
	Hydraulic Fire SOV	G8	L HYD SOV	28Vdc to L hydraulic fire SOV.	Cannot close hydraulic fire SOV (FSOV).

LEFT EMERGENCY BUS CIRCUIT BREAKERS

(Sheet 10 of 10)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
FGCS / HYD	HSTA	F7	STAB MCU	28Vdc to HMCU channel A, HSTA primary motor.	Amber CAS for failed channel and cyan CAS (maintenance) for pressure transducers failure condition.
	Elevator	F8	ELEV SOV L	28Vdc to L HYD Elevator pistons SOV's.	The ability to shut down the HYD to these pistons is lost. HOPS is not available.
FGCS / HYD	L Main Landing Gear	G9	L LG POS	28Vdc to all components of L MLG: Uplock proximity switch, uplock relays downlock relays WOW relays.	In flight (LG up and locked mechanically): 1. EICAS – FC synoptic page – LH MLG = AMBER. 2. LG Maintenance REQD **advisory** message comes on as a result of L MLG FAIL INDICATION (internal bit). The follow customers of landing gear system signals revert to the default condition of the relays (downlock relay = LG not down and locked, Uplock relay = LG not up and locked, WOW relay = aircraft in flight): Uplock relay – EICAS (same as paragraph 1 above), hydraulic system. WOW relays – bleed leak, fire, fuel, windshield, APU, waste system, power (discharge, galley, inverter, distribution).
LTS	Internal Lights	B5	L DOME	Left Dome.	Left dome light does not operate.

RIGHT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 1 of 9)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ANTI ICE	Windshield Heat	D12	R WS HT CTRL	28Vdc to right main windshield de-icing control channel and 28Vdc to right side window defog control channel.	No right main windshield de-icing and right side window electrical de-fogging.
	Ice Detection	E14	R ICE DET	28Vdc to right ice detector.	Right ice detection is not available.
	Right Pitot Heat	E14	R PITOT HT	Feeds right pitot heat, left static 2 heat and right static 2 heat.	If R PITOT HT is out, the right pitot heat, left static 2 heat and right static 2 heat do not operate.
ECS	Equipment Cooling	J11	R NOSE FAN	28Vdc to right nose equipment cooling.	No right nose equipment cooling, if needed.
ECS	Equipment Cooling	J12	AFT R/R FAN	28Vdc to AFT radio rack equipment cooling.	No aft radio rack equipment cooling, if needed.
	Temperature Control	K15	GADC 3 MAN	28Vdc to manual circuit of cabin temperature control (GADC II, No. 3).	Loss of ability to control the cabin temperature in manual mode.
	Bleed Air System	J14	ALTN PRESS	28Vdc to alternate pressurization valve solenoid.	Alternate pressurization valve remains closed or moves to the closed position.
	Bleed Air System	J13	PILOT AIR	28Vdc to he foot warmer valve.	Foot warmer valve remains in its last position.
	Cabin Pressure Control	J15	AUTO PRESS	28Vdc to CPC auto channel and OFV auto enable command.	Auto cabin pressure control is disabled.

RIGHT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 2 of 9)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
COMM	Air to Ground (ATG) Internet	K14	ATG HSD	28Vdc to Aircell High Speed Internet (AHSI)	Loss of AHSI system
	ELT System	K11	ELT	28Vdc to ELT System	Loss of ELT system.
	Radio management	L11	RIU 2A	28Vdc to RIU No. 2 channel A	Loss of RIU No. 2 channel A. CAS Message.
	eFlight System	K12	IMS	28Vdc to eFlight System.	Loss of eFlight system CAS Message.
	Radio Management	L12	RIU 2B	28Vdc to RIU No. 2 Channel B.	Loss of RIU No. 2 channel B. Loss of tuning capabilities to on-side radios from R-CDU. Still have radio tuning from other CDU's/displays. RIU 2B Fail caution message comes on.
	HF System	K13	HF RX/TX 2	28Vdc to HF No. 2 Transceiver, if installed	If installed: Loss of HF No. 2 system HF 2 Fail advisory message comes on.
	HF System	L13	HF CPLR 2	28Vdc to HF No. 2 coupler, if installed.	If installed: Loss of HF No. 2 system HF 2 Fail advisory message comes on.
	CVR / FDR	L15	RECORDER 2		
	VHF System	L16	VHF2	28Vdc to VHF No. 2 Transceiver.	Loss of VHF No. 2 system VHF COM 2 Fail advisory message comes on.
NAV	DME System	M11	DME 2	28Vdc to DME No. 2 System.	Loss of DME No. 2 system DME 2 Fail advisory message comes on.
	AHRS System	M14	AHS 3B (I)	Secondary 28Vdc to AHRS No. 3, if installed.	If installed: IRS No. 3 still gets power from AHS 3A. AHS 3 Secondary Power advisory message comes on.

RIGHT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 3 of 9)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
NAV	AHRS System	M15	AHS 2A	28Vdc to AHRS No. 2.	AHRS No. 2 still gets power from AHS-2B. AHS 2 Secondary Power advisory message comes on.
		M13	IPC 4(O)		
	Air Data System	N15	ADC 2	28Vdc to ADC No. 2.	Loss of ADC No. 2 system ADC 2 Fail caution message comes on. Automatic reversion to ADC No. 1 flag on PFD.
	Integrated Processing System	M16	IPC 2	28Vdc to IPC No. 2.	Loss of and FMS No. 1. IPC 2 Fail (C) caution message message comes on. automatic reversion to FMS No. 1 and AFCS No. 1.
	Flight Management System	N16	CDU 2	28Vdc to CDU No. 2.	Loss of copilot CDU. Automatic reversion to CDU No. 3, if installed.
	Flight Management System	M17	GPS 2	28Vdc to GPS No. 2.	Loss of GPS No. 2.CAS message comes on.
	VOR/ ILS System	N17	NAV 2	28Vdc to NAV No. 2.	Loss of VOR/ ILS/ MB/ ADF No. 2. NAV 2 Fail advisory message comes on. If installed, NAV No. 3 automatically replaces NAV No. 2.
	Radio Altimeter System	M12	RA 2 (I)	28Vdc to radio altimeter No. 2, if installed.	If installed: Loss of RA No. 2 system RAD ALT 2 Fail advisory message comes on. Automatic reversion to RA No. 1 flag on PFD.

RIGHT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 4 of 9)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
NAV	EVS	N12	EVS HTR (O)		
	EVS	N13	EVS PROC (O)		
	EVS	N14	EVS CAM (O)		
	HUD	O13	HUD ACCY (O)		
DU / AP	Primary Displays and control	O16	CCD 2	28Vdc to right CCD.	Loss of right CCD. CCD Fail, R advisory message comes on. Use SMC/ CDU control instead.
	EICAS	P16	DCU 2A	28Vdc to DCU2 CH A - primary.	No effect. Pulling the cb and the DCU 2A B/U cause to loss of DCU 2 channel A.
	Primary Displays and Control	O17	DU3	28Vdc to right primary display	Loss of right primary display CAS message comes on. Automatic reversion of right PFD to DU2 and force right ISI.
	EICAS	P17	DCU 2B	28Vdc to DCU2 ch B - Primary	No effect. Pulling the cb and the DCU 2B B/U cause loss of DCU 2 ch B.
ANTI ICE	Battery Sys	A14	R BATT HT	Control of relay providing power to R battery heaters.	No R battery heat, Battery Cold, R caution message comes on below 0°C.
FGCS / HYD	Q-FEEL	G12	Q FEEL	28Vdc to Q-FEEL SOV.	Q-FEEL HYD shut off.

RIGHT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 5 of 9)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
FGCS / HYD	Stick Shaker.	G13	R STK SHKR	Power to right stick shaker.	During SPS IBIT the system recognizes that the circuit breaker is out. In flight the failure is be recognized just after stick shaker commanded and after Stick Shaker Fail, R advisory message comes on. No right stick shaker.
	Rudder, Spoiler, Flaps, Elevator Monitor, Q-FEEL	F14	FCECU 2 CMD	28Vdc to FCECU 2 command path, lower Rudder SOV, INBD MFS SOV.	Similar to FCECU2 fail, Systems not available: Flaps Rudder – single Mid spoilers Q-feel R elevator monitor Flap/STAB sync.
	Rudder, Spoiler, Flaps, Elevator Monitor, Q-FEEL	G14	FCECU 2 MON	28Vdc to FCECU monitor path.	
	Nose Wheel Steering System	F15	NWS	28Vdc to the nosewheel steering controller and for inputs for NWS controller via pedal disconnect push batten.	Nosewheel steering is not available. Amber NWS INOP caution message comes on. The differential breaking for steering is available.
	Flaps	F16	FLAPS SOV	28Vdc to flaps primary SOV.	Primary flaps channel is not available.

RIGHT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 6 of 9)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
FGCS / HYD	Inboard Brakes Channel	G16	INBD BRKS	28Vdc to brakes inboard channel, inboard emergency line pressure transducer and Inboard accumulator pressure transducer.	Inboard braking channel is not available. No indication of available pressure in the inboard accumulator. No indication of pressure via emergency inboard line pressure transducer.
	HSTA	F17	ALTN STAB	28Vdc to alternate STAB channel, HMCU channel B, HSTA secondary motor.	Alternate STAB Fail caution message comes on for failed channel and advisory message (maintenance) for pressure transducers failure.
	Right Analog Hydraulic Pressure	G17	R HYD PRESS	28Vdc to hydraulic pressure transducer (analog)	Amber dashes appear on EICAS for analog hydraulic pressure.
	Elevator	F18	ELEV SOV R	28Vdc to R HYD elevator actuators SOV's.	The ability to shut down the hydraulic pressure elevator actuators is lost. HOPS is not available.
	Hydraulic Fire SOV	G18	R HYD SOV	28Vdc to L hydraulic fire SOV	Cannot close hydraulic fire SOV (FSOV).

RIGHT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 7 of 9)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
FGCS / HYD	Nose Landing Gear	F19	LG NOSE POS	28Vdc for all components of NOSE LG: Up-lock relays, Down-lock relays, WOW relays.	In flight (LG up and locked mechanically): 1. EICAS – FC synoptic page – NOSE LG = AMBER. 2. LG Maintenance REQD advisory message comes on as a result of NOSE GEAR FAIL INDICATION (internal bit). During landing or taxi (LG down and locked mechanically): 1. EICAS – FC synoptic page – NOSE LG = AMBER. 2. Gear Not Down caution message comes on. No indication of downlock for this LG. The following landing gear system consumers signals revert into the default relay conditions (downlock relay = LG not down and locked, uplock relay = LG not up and locked, WOW relay = A/C in flight), uplock relay – internal lights, EICAS (same as paragraph 1 above, for flight conditions) downlock relay – taxi lights, nosewheel steering, Avionics (TSS), EICAS (same as paragraph 1 above for landing and taxi conditions) WOW relays – avionics (ADS No. 2, IPC No. 1, IPC No. 2, DU No. 1, and DCP No. 1), nose wheel steering, probes, pulse lights.

RIGHT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 8 of 9)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
FGCS / HYD	RH Main Landing Gear	G19	R LG POS	28Vdc to all components of RH MLG: Uplock proximity switch, uplock relays, downlock relays, WOW relays.	In flight (LG up and locked mechanically): 1. EICAS – FC synoptic page – RH MLG = AMBER. 2. LG Maintenance REQD advisory message comes on (1) as a result of RH MLG FAIL INDICATION (internal bit). The following consumers signals revert into the default relay conditions (downlock relay = LG not down and locked, uplock relay = LG not up and locked, WOW relay = A/C in flight) uplock relay – EICAS (same as paragraph 1 above), Hydraulic system. WOW relays – Avionics (SRT, flight recorder No. 1), power (distribution, cabin), fuel system, windshield, waste system.
LTS	Emergency Lights	C11	R EMER	Feeds both Emergency Distribution Light Unit (ELDU)	If ELDU batteries are charged: 1. If both L EMER and R EMER cb's are out and the system armed, the emergency batteries will not be charged and the emergency lights will illuminate. 2. If one of the cb's is out and the system armed the batteries will be charged (no change in operation).

RIGHT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 9 of 9)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
LTS	Internal lights	C12	R INST DIM	Right console, right glareshield circuit breaker panel and switching panel.	If R INST DIM cb is out, the right console, right glareshield circuit breaker panel and switching panel lights are inoperative.
	Internal lights	B13	R SW LIGHT	Lighted switches and circuit breaker panel	Lighted switches and circuit breaker panel.
	Internal lights	B14	R DOME/MAP	Right dome light, left and right map lights, step lights and pedestal flood light	If R DOME/MAP cb is out, the right dome light, left and right map lights, step lights and pedestal flood lights are inoperative.
	External lights	C13	R TAXI/LDG CTRL	Control to right taxi light and right landing light	If R TAXI/LDG CRTL cb is out, the right taxi light and right landing light are inoperative.
	External lights	C14	PWR R TAXI/LDG	Power to right taxi light and right landing light	If PWR R TAXI/LDG cb is out, the right taxi light and right landing light are inoperative.
	External lights	C15	NAV	Forward position lights (wingtip) and aft position light	If NAV cb is out, the forward position lights (wingtip) and aft position light are inoperative.

LEFT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 1 of 7)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ANTI-ICE	Windshield Heat	D2	L WS HT CTRL	28Vdc to left main windshield de-icing control channel.	No left main windshield de-icing.
	Windshield Heat	D3	L SIDE WDO HT	28Vdc to Left Side Window De-fog Control Channel and 28Vdc to Left Side Window De-Icing.	No Left Side Window Electrical De-fogging and De-Icing.
	Ice Detection	E4	L ICE DET	28Vdc to left ice detector.	Left Ice detection is not available.
	SAT/TAT HT	E3	SAT/TAT HT	Feed temperature sensor heat.	SAT/TAT temperature sensor heat does not operate.
	Left Pitot Heat	D4	L PITOT HT	Feed left Pitot heat left static 1 heat and right static 1 heat	Left pitot heat, left static port No. 1 heat and right static port No. 1 heat do not operate.
	AOA Control	E5	L AOA CTRL	Powers left AOA control and monitoring circuit.	AOA Probe Fail, L-R caution message comes on. the system operates properly with the second AOA sensor.
	AOA Heat	D5	L AOA HT	Power left vane heater and left case heater.	On ground: AOA Heat Fail, L advisory message comes on. in flight: advisory. In icing conditions the system ignores left AOA indication and AOA Probe Fail, R advisory message comes on.
ECS	Equipment Cooling	J1	L NOSE FAN	28Vdc to left nose equipment cooling.	No left nose equipment cooling, if needed.

LEFT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 2 of 7)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ECS	Equipment Cooling	J2	CKPT FAN	28Vdc to FWD radio rack equipment and display cooling.	No FWD radio rack equipment and display cooling, if needed.
	Temperature Control	K5	GADC 1 MAN	28Vdc to manual circuit of cockpit temperature control (GADC II No. 1)	Loss of cockpit temperature control in manual mode.
	Oxygen Control	J5	OXY CTRL	Oxygen feed stops, passenger oxygen controller, pressure transducer.	Oxygen stops, passenger oxygen controller, pressure transducer do not operate. Bypass switch overrides the electrical system
		K1	HST 1 (O)		
		K2	HST 2 (O)		

LEFT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 3 of 7)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
COMM	Radio Management	L1	RIU1A	28Vdc to RIU No. 1 Channel A.	Loss of RIU No. 1 Channel A. Loss of data link capabilities in single data link configuration. RIU 1 Fail caution message comes on.
	SATCOM System	L2	SATCOM (I)	28Vdc to SATCOM System	Loss of SATCOM system
	HF System	K3	HF RX/TR1	28Vdc to HF No. 1 Transceiver.	Loss of HF No. 1 system HF 1 Fail advisory message comes on.
	HF System	L3	HF CPLR1	28Vdc to HF No. 1 Coupler	Loss of HF No. 1 system HF 1 Fail advisory message comes on.
	Digital Audio System	L5	ACP3 (I)	28Vdc to ACP No. 3, if installed.	If installed: Loss of ACP No. 3. ACP 3 Fail advisory message comes on.
	VHF System	L6	VHF3	28Vdc to VHF No. 3 Transceiver.	Loss of VHF No. 3 system VHF COM 1-2-3 Fail caution message comes on.
	Satellite Internet	K4	SAT HSD	28 Vdc to Swift Broadband (SBB) system.	Loss of SBB system.
NAV	DME System	M1	DME1	28Vdc to DME No. 1 System.	Loss of DME No. 1 system DME 1 Fail advisory message comes on.
	Radio Altimeter System	M2	RA 1	28Vdc to radio altimeter No. 1.	Loss of RA No. 1 system RAD ALT 1 Fail advisory message comes on. Automatic reversion to RA No. 2 if installed. Flag on PFD.

LEFT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 4 of 7)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
NAV	Weather Radar System	N2	WX	28Vdc to weather radar System.	Loss of weather radar system. WX Fail advisory message comes on. Annunciation of failure in HSI and MFW map if the WX overlay is selected.
	TCAS/ Transponder System	M3	ATC/ TCAS	28Vdc to TSS System	Loss of TCAS and ATC No. 1. ATC 1 Fail caution message comes on. Annunciation of failure in HSI and MFW map if TCAS overlay is selected.
		N3	SPARE		
		N4	SPARE		
	AHRS System	M4	AHS 3A (I)	28Vdc to IRS No. 3, if installed	If installed: IRS No. 3 still receives power from AHS-3B AHS 3 Fail advisory message comes on (secondary power failure).
	AHRS System	M5	AHS 2B	Secondary 28Vdc to AHRS No. 2.	AHRS No. 2 still gets power from AHS 2A. AHS 2-3 Fail caution message comes on (secondary power failure).
	AHRS System	M6	AHS 1A	28Vdc to AHRS No. 1.	AHRS No. 1 still gets power from AHS-1B AHS 1-3 Fail caution message comes on (secondary power failure).
	Flight Management System	N6	CDU 3	28Vdc to CDU No. 3, if installed.	Loss of CDU No. 3, if installed FMS 3 Fail advisory message comes on.

LEFT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 5 of 7)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
NAV	Integrated Processing System	M7	IPC 3	28Vdc to IPC No. 3	Loss of TAWS and FMS No. 3, if installed. IPC 3 Fail (C) advisory message comes on. Annunciation of failure in HSI and MFW map if the TAWS overlay is selected.
	VOR/ ILS System	N7	NAV 3	28Vdc to NAV No. 3, if installed	If installed: Loss of VOR/ILS No. 3. NAV 3 Fail advisory message comes on.
	XM Weather	N5	XM-WR	28Vdc to XM Weather system.	Loss of XM Weather system.
DU / AP	Autothrottle	O1	TQA	28Vdc to Throttle Quadrant Assembly	No auto throttle function,
	HUD	O2	HUD PWR 1 (O)		
	Autopilot System	O3	AP AIL SVO	28Vdc to Aileron servo.	Loss of Aileron Servo AP 1-2 Fail - AIL SRVO caution message comes on. Autopilot disengages.
	Autopilot System	O4	AP ELEV SVO	28Vdc to Elevator servo.	Loss of elevator servo AP 1-2 Fail - ELEV SRVO caution message comes on. Autopilot disengages.
		O5	SPARE		
		O6	TAIL CAM		
	EICAS	P6	DCU 1A	28Vdc to DCU1 ch A – Primary.	No effect. Pulling the cb and the DCU 1A B/U causes loss of DCU 1 channel A.
	EICAS	P7	DCU 1B	28Vdc to DCU1 CH B - Primary.	No effect. Pulling the cb and the DCU 1B B/U causes loss of DCU 1 channel B.

LEFT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 6 of 7)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
FUEL	Fuel	I3	WING INTER	Enable the wing interconnect valve operation (open and close).	Inability to activate the wing interconnect valve. The valve remain in last position (open, close or in transit).
	Primary Displays and control	O7	DU 2	28Vdc to central primary display.	Loss of central primary display CAS message. Automatic reversion of EICAS to DU1.
EPS/ APU	Battery Sys	A4	L BATT HT	Control of relay providing power to L battery heaters.	No left battery heat. Battery Cold, L caution message comes on.
FGCS / HYD	Rudder	G2	PEDAL FDBK	28Vdc to RPFA.	No feedback to pilot's pedals during rudder trim or auto thrust compensation.
	Gear Control Panel Interlock	G3	LG OVRD	28Vdc to the LG control panel interlock solenoid. The solenoid inside control panel prevents the retraction of landing gear with aircraft on the ground by inhibiting lever movement. Pressure transducer of landing gear emergency extension bottle.	Inability to move landing gear lever up (locked by solenoid) in order to retract landing gear.
	Internal Lights	C1	L EMER	Feeds both Emergency Distribution Light Units (ELDU).	If ELDU batteries charged: 1. If both L EMER and R EMER cb's out and the system armed, the emergency batteries will not be charged and the emergency lights will illuminate. 2. if one of the cb's is out and the system armed the batteries will be charged (no change in operation).

LEFT DISTRIBUTION BUS CIRCUIT BREAKERS

(Sheet 7 of 7)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
LTS	Internal Lights	C2	L INST DIM	Left console, left glareshield, pedestal	If L INST DIM cb is out, the left console, left glareshield and pedestal lights do not operate.
LTS	Internal Lights	B3	L SW LIGHT	Lighted switches and switching panel.	Lighted switches and switching panel.
	Internal Lights	C5	SIGNS	Seat belt lights and no smoke lights.	If SIGNS cb is out the seat belt lights and no smoke lights do not operate.
	External Lights	C3	PWR L TAXI / LDG	Power to left taxi light and left landing light	If PWR L TAXI/LDG cb is out the left taxi light and left landing light do not operate.
	External Lights	B4	STROBE	Forward anti collision lights (wingtip) and aft anti collision light.	If STROBE cb is out the forward anti collision lights (Wing tip) and aft anti collision Light do not operate.
	External Lights	C4	L TAXI / LDG CTRL	Controls left taxi light and left landing light.	if L TAXI/LDG CRTL cb is out the left taxi light and left landing light do not operate.

LEFT MAIN BUS CIRCUIT BREAKERS

(Sheet 1 of 2)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ANTI-ICE	Windshield Heating	D1	L WS HT CTRL	Left side window and main windshield RCCB control.	No left main windshield de-icing and left side window electrical de-fogging.
EPS/APU	Distribution	A2	L MAIN TIE	Control of L BTC RCCB providing connection between main buses.	No connection between main buses if one generator is operative or external power supply.
	Generator System	A3	L GCU	Relevant only if pulled	Trips L GCU and L GEN cb's. No generator output voltage.
	Interior Power Supply	B1	60 HZ	Controls 60 HZ RCCB	No 60 H_Z inverter. Detection only by Synoptic.
	Distribution	B2	L DISTR	Controls L DISTR RCCB.	DISTR Bus Fail (C), L caution or advisory message comes on,

LEFT MAIN BUS CIRCUIT BREAKERS

(Sheet 2 of 2)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
FUEL	Fuel STBY Pump	H1	L PUMP CTRL	Left Pump Control – 1) Supply ground signal for ON or jettison commands by the pilot to the left HECS. 2. Provides ground signal to Left ON and NOT ARM pushbuttons lights and to the FQMC if set (the ON is pressed and the NOT ARM is not pressed). 3. Provides ground signal to the Left HECS during low pressure. 4. Provides ground signal to left NOT ARM pushbutton light during both generators failure in flight (even if NOT ARM pushbutton is pressed to ARM).	1. No electrical left STBY pump operation if pilot command ON or jettison. 2. The Left ON and NOT ARM pushbuttons do not illuminate. 3. The FQMC does not get indication of left pump ON or left pump ARM even if selected (pressed ON and NOT ARM not pressed). 4. No electrical left standby pump automatic operation during pressure drop. 5. The left NOT ARM pushbutton does not illuminate if of both generators fail in flight (even if the NOT ARM pushbutton is pressed to ARM).
INST	STBY INST	A1	STBY INT PWR	Power connection to STBY instrument battery charge.	STBY instruments battery starts depleting.

RIGHT MAIN BUS CIRCUIT BREAKERS

(Sheet 1 of 2)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
ANTI-ICE	Windshield Heating	D11	R WS HT CTRL	Right side window and main windshield RCCB control.	No right main windshield de-icing and right side window electrical de-fogging.
EPS/APU	Interior Power Supply	A11	CABIN	Control of cabin RCCB.	No Cabin bus, galley and 60H_Z. Detection only by Synoptic.
	Distribution	A12	R MAIN TIE	Control of R BTC RCCB providing connection between main buses	No connection between main buses if one generator is operative or external power supply.
	Generator System	A13	R GCU	Relevant only if pulled.	Trips R GCU and R GEN - No generator output voltage.
	Interior Power Supply	B11	GALLEY	Controls galley RCCB.	No galley. Detection only by synoptic.
	Distribution	B12	R DISTR	Controls of R DISTR RCCB.	DISTR Bus Fail (C), R caution or advisory message comes on,

RIGHT MAIN BUS CIRCUIT BREAKERS

(Sheet 2 of 2)

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
FUEL	Fuel STBY Pump	H11	R PUMP CTRL	Right pump control: 1. Provides ground signal for ON or jettison commands by the pilot to the right HECS. 2. Provides ground signal to right ON and NOT ARM pushbuttons lights and to the FQMC if ON is pressed and NOT ARM is not pressed). 3. Provides ground signal to the right HECS during low pressure. 4. Provides ground signal to right NOT ARM pushbutton light during generators failure in flight (even if NOT ARM pushbutton is pressed ARM).	1. No electrical right standby pump operation for p ON or jettison command. 2. The right ON and NOT ARM pushbuttons do not illuminate. 3. The FQMC does not get indication of right pump ON or Right pump ARM even if selected (pressed ON and not pressed NOT ARM). 4. No electrical right standby pump automatic operation if pressure drops. 5. The right NOT ARM pushbutton will not illuminate if both generators fail in flight (even if the NOT ARM pushbutton is pressed ARM).

STANDBY BUS CIRCUIT BREAKERS

SYSTEM	SUB-SYSTEM	CB	LEGEND	CB FUNCTION	RESULT OF CB OUT
SMC	SMC	P2	DSP 1	28Vdc to DSP No. 1.	Loss of pilot menu and range control on AFD's. Use CCD No. 1 instead.
	SMC	P3	DCP 1	28Vdc to DCP No. 1. Loss of left ISI and Pilot menu and range control on AFD's. Use CCD No. 1 instead	Loss of left ISI and Pilot menu and range control on AFD's. Use CCD No. 1 instead.SMC 1 Fail advisory Message comes on.
	SMC	P12	DSP 2	28Vdc to DSP No. 2.	Loss of copilot menu and range control on FAD's. Use CCD No. 2 instead.
	SMC	P13	DCP 2	28Vdc to DCP No. 2.	Loss of right ISI and pilot menu and range control on AFD's. Use CCD No. 2 instead SMC 2 Fail advisory message comes on.
STBY INST	Standby Instrument	P14	HSU	28Vdc to Magnetometer.	Loss of magnetometer Pilot can select AHRS as a sensor.
	Standby Instrument	P15	RSE	28Vdc to standby instruments.	Loss of both ISI's.
FCP	Autopilot System	P1	FCP A	28Vdc to flight control panel channel A.	AP 1-2 Fail - FCP caution Message comes on. Channel B still available.
	Autopilot System	P11	FCP B	28Vdc to flight control panel channel B.	AP 1-2 Fail - FCP caution Message comes on. Channel A still available.