

PILOT'S OPERATING HANDBOOK

AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

PIPER LANCE II



FAA APPROVED IN NORMAL CATEGORY BASED ON CAR 3 AND FAR PART 21, SUBPART J. THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY CAR 3 AND FAR PART 21, SUBPART J AND CONSTITUTES THE APPROVED AIRPLANE FLIGHT MANUAL AND MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES.

PA-32RT-300
REPORT: VB-890

FAA APPROVED BY: Ward Evans
WARD EVANS
D.O.A. NO. SO-1
PIPER AIRCRAFT CORPORATION
VERO BEACH, FLORIDA

AIRPLANE SERIAL NO. 32R-7885090
AIRPLANE REGISTRATION NO. N30927
N432NC

DATE OF APPROVAL
AND ADVANCE ISSUE: DECEMBER 13, 1977

DATE OF HANDBOOK ISSUE: JANUARY 18, 1978



WARNING

EXTREME CARE MUST BE EXERCISED TO LIMIT THE USE OF THIS HANDBOOK TO APPLICABLE AIRCRAFT. THIS HANDBOOK REVISED AS INDICATED BELOW OR SUBSEQUENTLY REVISED IS VALID FOR USE WITH THE AIRPLANE IDENTIFIED ON THE FACE OF THE TITLE PAGE WHEN OFFICIALLY APPROVED. SUBSEQUENT REVISIONS SUPPLIED BY PIPER AIRCRAFT CORPORATION MUST BE PROPERLY INSERTED.

MODEL PA-32RT-300, LANCE II

PILOT'S OPERATING HANDBOOK, REPORT: VB-890 REVISION _____

PIPER AIRCRAFT CORPORATION

APPROVAL SIGNATURE AND STAMP

J. M. Hall

Published by
PUBLICATIONS DEPARTMENT
Piper Aircraft Corporation
Issued: January 18, 1978

REPORT: VB-890

APPLICABILITY

Application of this handbook is limited to the specific Piper PA-32RT-300 model airplane designated by serial number and registration number on the face of the title page of this handbook.

This handbook cannot be used for operational purposes unless kept in a current status.

REVISIONS

The information compiled in the Pilot's Operating Handbook will be kept current by revisions distributed to the airplane owners.

Revision material will consist of information necessary to update the text of the present handbook and/or to add information to cover added airplane equipment.

I. Revisions

Revisions will be distributed whenever necessary as complete page replacements or additions and shall be inserted into the handbook in accordance with the instructions given below:

1. Revision pages will replace only pages with the same page number.
2. Insert all additional pages in proper numerical order within each section.
3. Page numbers followed by a small letter shall be inserted in direct sequence with the same common numbered page.

II. Identification of Revised Material

Revised text and illustrations shall be indicated by a black vertical line along the outside margin of the page, opposite revised, added or deleted material. A line along the outside margin of the page opposite the page number will indicate that an entire page was added.

Black lines will indicate only current revisions with changes and additions to or deletions of existing text and illustrations. Changes in capitalization, spelling, punctuation or the physical location of material on a page will not be identified.

ORIGINAL PAGES ISSUED

The original pages issued for this handbook prior to revision are given below:

Title, ii through v, 1-1 through 1-12, 2-1 through 2-9, 3-1 through 3-11, 4-1 through 4-17, 5-1 through 5-30, 6-1 through 6-40, 7-1 through 7-26, 8-1 through 8-13, 9-1 through 9-19 and 10-1 through 10-2.

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS

Current Revisions to the PA-32RT-300 Lance II Pilot's Operating Handbook, REPORT; VB-890 issued January 18, 1978.

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 1 - 761 637 (PR780327)	4-15	Corrected item 4.29.	
	5-4	Corrected item 5.5 (b) (5).	
	5-10	Revised Figure 5-3, Stall Speed vs Angle of Bank.	
	5-13	Revised Figure 5-9, Flaps Up Takeoff Performance.	
	5-27	Revised Figure 5-33, Landing Performance.	
	5-29	Revised Figure 5-37, Landing Performance (Heavy Duty Group).	
	6-3	Revised Figure 6-3, Leveling Diagram Items A and B.	
	6-12	Added moment change information to Figure 6-15, CG Range and Weight.	
	6-15	Revised para.; revised item (3) Weight and Moment; revised item (5) Hartzell number.	
	6-16	Revised item (13), Weight and Moment.	
	6-17	Revised item (31), Weight and Moment.	
	6-22	Revised item (121 c (a)), Weight and Moment.	
	6-28	Revised item (195), Piper Dwg. number, revised item 197, Airborne P/N.	
	6-33	Revised item 257.	
	7-16	Revised Figure 7-19.	
	9-9	Revised Section 3 Emergency Procedures. item (a) (2) was removed and item (e) was added; relocated item to pg. 9-10.	
	9-10	Added item from 9-9; revised item (1) (a); relocated items (2) and (3) to 9-11.	
	9-11	Added items (2) and (3), revised (2) (a) and (3) (a).	
	9-13	Revised item (d), added item (a) (1) from pg. 9-14.	
	9-14	Relocated item (a) (1) to 9-13, added item (b) (5); added new item (b) under Emergency Operation; changed old item (b) to (c) and revised; changed old item (c) to (d) and revised.	
	9-15	Added new item, revised paragraph under General.	
	9-16	Revised (c) (3); revised (d) (3).	
			Ward Evans Ward Evans March 27, 1978

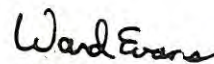
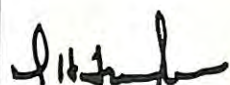
PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 2 - 761 637 (PR780907)	1-1, 1-6	Revised spelling.	<i>Ward Evans</i> Ward Evans Sept. 7, 1978
	1-10	Revised ft.-lb and kg conversions.	
	1-11	Revised spelling.	
	2-9	Added writing table placard.	
	5-14	Revised Figure 5-11, example	
	6-1	Revised para. 6.1 info.	
	6-29	Added items 217 and 219.	
	6-30	Revised items 221 and 223.	
	6-32	Revised items 243 and 245; relocated items to pg. 6-33.	
	6-33	Added items from pg. 6-32; added items 248, 249 and 254; revised item nos.; relocated item to pg. 6-34.	
	6-34	Added item from pg. 6-33.	
	6-40	Added item 380.	
	7-15	Revised para. 7.17 info.	
	7-21, 7-22	Added work table description.	
	9-i	Added Supplements 6 and 7.	
	9-20	Added pg. (Int. left blank)	
	9-21 thru	Added pgs. (Added Supplement 6, KFC 200 AFCS with F/D.)	
	9-30	Added pgs. (Added Supplement 7, KFC 200 AFCS without F/D.)	
	9-31 thru		
	9-40		
Rev. 3 - 761 637 (PR781215)	3-4	Revised Spin Recovery info.	<i>Ward Evans</i> Ward Evans Dec. 15, 1978
	5-1	Revised para. 5.1, General.	
	6-16	Revised item 19.	
	6-19	Revised item 79.	
	6-21	Revised item 107; added item 111c.	
	6-27	Revised items 185c. and 187b.	
	6-28	Revised item 193.	
	6-30	Added item 230.	
	6-35	Revised item 293b.	
	6-36	Revised item 311a.; added item 314.	
	7-i	Added para. 7.41, Radar.	
	7-3	Revised para. 7.9 info.	
	7-18	Revised item 11. nomenclature.	
	7-24	Revised para. 7.35 info.	
	7-27	Added pg. (Added para. 7.41, Radar.)	
	8-8	Revised para. 8.15 info.	
	9-11	Revised item (d)(2)b.	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 4 - 761 637 (PR790131)	6-18 7-12 7-18	Revised items 55 and 63. Revised para. 7.15 info. Revised item 31.	<i>Ward Evans</i> Ward Evans Jan. 31, 1979
Rev. 5 - 761 637 (PR790413)	6-36 7-25, 7-26 7-27	Revised item 313; added new item 315; renumbered existing item 314 to 317. Revised para. 7.39. Added para. 7.39 info.	<i>Ward Evans</i> Ward Evans April 13, 1979
Rev. 6 - 761 637 (PR810422)	ii iii 2-1 3-1 4-1 4-5 6-1 6-2 6-16 6-26 6-36, 6-37 7-10 7-15 7-25 9-29 9-32 9-38	Revised Warning. Added serial no. effectivities. Revised para. 2.1 info. Revised para. 3.1 info. Revised para. 4.1 info. Revised take-off procedure. Revised para. 6.1 info. Added Caution notice to para. 6.3 (a) (3). Revised item 19. Added item 180. Corrected numbering of existing items 314, 315, 316. Removed sentence para. 7.15 step 2. Revised and upgraded Note to Warning. Revised para. 7.39 info. Revised sec. 4 (j). Revised sec. 3 (b). Revised sec. 4 (j).	<i>Ward Evans</i> Ward Evans April 22, 1981
Rev. 7 - 761 637 (PR840629)	v 1-3 1-6 1-7 2-2 3-i 3-1 4-i 4-1 4-3 4-4	Revised Table of Contents. Revised para. 1.7. Revised para. 1.19 (b). Revised para. 1.19 (e). Revised para. 2.7 (g). Revised Table of Contents. Revised para. 3.1. Revised Table of Contents. Revised para. 4.1 and para. 4.3. Revised para. 4.5 (Preflight Check). Revised para. 4.5 info. (Before Starting Engine, Taxiing and Ground Check).	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 7 (cont.)	4-5	Revised para. 4.5 info. (Before Takeoff).	
	4-7	Revised para. 4.9.	
	4-8	Revised para. 4.9 info. and para. 4.11.	
	4-11	Revised para. 4.17 and para. 4.19.	
	4-12	Revised para. 4.21.	
	5-1	Revised para. 5.1 and para. 5.3.	
	5-3,		
	5-4,		
	5-5,		
	5-6	Revised para. 5.5.	
	6-1	Revised para. 6.1.	
	6-2	Revised para. 6.3.	
	6-4	Revised para. 6.5.	
	6-5	Revised Fig. 6-5.	
	6-7	Revised Fig. 6-7.	
	6-13	Revised para. 6.9.	
	6-15	Revised para. 6.11.	
	6-16	Revised item 15.	
	7-24	Revised para. 7.33.	
	8-2	Revised para. 8-5.	
	8-3	Deleted para. 8.5 info.	
	8-9	Revised para. 8.21 (b).	
	10-i	Revised Table of Contents.	
	10-1	Revised Title; revised para. 10.1 and para. 10.3.	
	10-2	Revised Title.	
Rev. 8 - 761 637 (PR851122)	3-i	Revised Table of Contents.	 Ward Evans June 29, 1984
	3-2	Relocated info from 3-3. Revised Power Off Landing. Added Gear Down Landing. Added Gear Up Landing.	
	3-3	Relocated info from 3-4.	
	3-4	Revised para. 3.3.	
	3-6	Revised para. 3.11.	
	3-7	Revised para. 3.13.	
	3-8	Revised para. 3.13(b).	
Rev. 9 - 761 637 (PR870131)	2-8	Revised para. 2.25.	 D.H. Trompler Nov. 22, 1985
	3-2	Revised Engine Power Loss During Takeoff. Revised Power Off Landing.	
	3-3	Revised Emergency Landing Gear Extension.	
	3-5	Revised para. 3.9.	
	3-7,	Revised para. 3.13.	
	3-8		

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

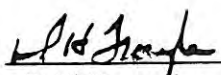
Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 9 (cont.)	3-10	Revised para. 3.23 and 3.27. Added Note.	 D.H. Trompler <u>5/14/87</u> Date
	4-5	Revised Takeoff, Short or Soft Field, Obstacle Clearance.	
	4-12	Revised para. 4.21. Relocated info. from 4-13.	
	4-13	Revised para. 4.23.	
		Info. relocated to 4-12.	
		Revised para. 4.23.	
	4-17	Revised para. 4.25.	
		Relocated info.	
	7-4	Revised para. 4.41.	
	7-5	Revised fig. 7-1.	
	7-6	Revised fig. 7-3.	
		Revised para. 7.9.	
	7-7	Revised para. 7.9.	
	7-8	Revised fig. 7-5.	
	7-9	Revised fig. 7-7.	
	7-18	Revised fig. 7-9.	
		Revised fig. 7-21.	

TABLE OF CONTENTS

SECTION 1	GENERAL
SECTION 2	LIMITATIONS
SECTION 3	EMERGENCY PROCEDURES
SECTION 4	NORMAL PROCEDURES
SECTION 5	PERFORMANCE
SECTION 6	WEIGHT AND BALANCE
SECTION 7	DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS
SECTION 8	AIRPLANE HANDLING, SERVICING AND MAINTENANCE
SECTION 9	SUPPLEMENTS
SECTION 10	OPERATING TIPS

TABLE OF CONTENTS

SECTION 1

GENERAL

Paragraph No.		Page No.
1.1	Introduction	1-1
1.3	Engine	1-3
1.5	Propeller	1-3
1.7	Fuel	1-3
1.9	Oil	1-3
1.11	Maximum Weights	1-4
1.13	Standard Airplane Weights	1-4
1.15	Baggage Space	1-4
1.17	Specific Loadings	1-4
1.19	Symbols, Abbreviations and Terminology	1-5
1.21	Conversion Factors	1-9

SECTION 1

GENERAL

1.1 INTRODUCTION

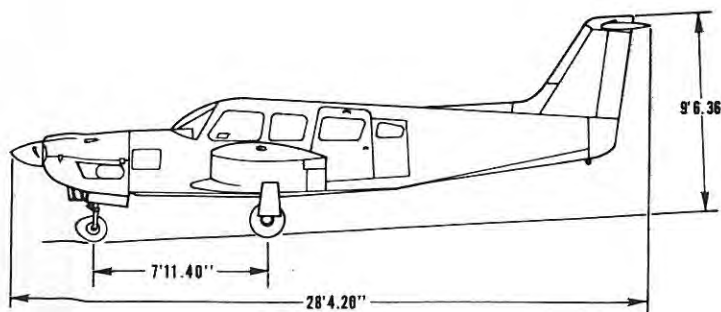
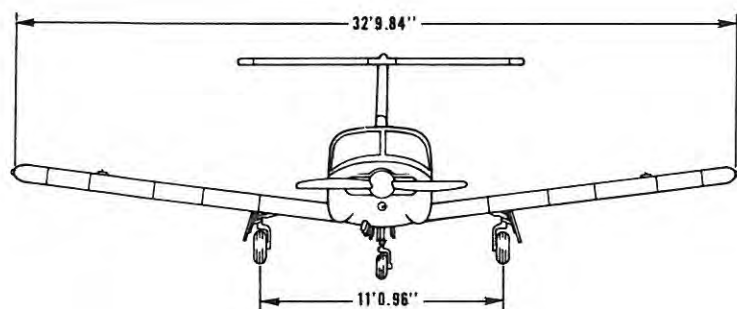
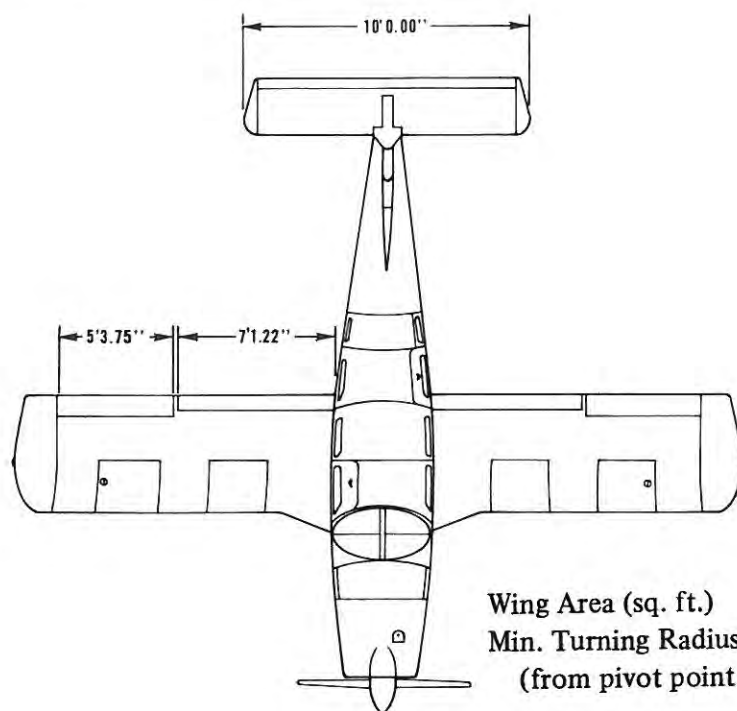
This Pilot's Operating Handbook is designed for maximum utilization as an operating guide for the pilot. It includes the material required to be furnished to the pilot by C.A.R. 3 and FAR Part 21 Subpart J. It also contains supplemental data supplied by the airplane manufacturer.

This handbook is not designed as a substitute for adequate and competent flight instruction, knowledge of current airworthiness directives, applicable federal air regulations or advisory circulars. It is not intended to be a guide for basic flight instruction or a training manual and should not be used for operational purposes unless kept in a current status.

Assurance that the airplane is in an airworthy condition is the responsibility of the owner. The pilot in command is responsible for determining that the airplane is safe for flight. The pilot is also responsible for remaining within the operating limitations as outlined by instrument markings, placards, and this handbook.

Although the arrangement of this handbook is intended to increase its in-flight capabilities, it should not be used solely as an occasional operating reference. The pilot should study the entire handbook to familiarize himself with the limitations, performance, procedures and operational handling characteristics of the airplane before flight.

The handbook has been divided into numbered (arabic) sections each provided with a "finger-tip" tab divider for quick reference. The limitations and emergency procedures have been placed ahead of the normal procedures, performance and other sections to provide easier access to information that may be required in flight. The "Emergency Procedures" Section has been furnished with a red tab divider to present an instant reference to the section. Provisions for expansion of the handbook have been made by the deliberate omission of certain paragraph numbers, figure numbers, item numbers and pages noted as being intentionally left blank.



THREE VIEW

Figure 1-1

1.3 ENGINE

(a) Number of Engines	1
(b) Engine Manufacturer	Lycoming
(c) Engine Model Number	IO-540-K1G5D
(d) Rated Horsepower	300
(e) Rated Speed (rpm)	2700
(f) Bore (inches)	5.125
(g) Stroke (inches)	4.375
(h) Displacement (cubic inches)	541.5
(i) Compression Ratio	8.7:1
(j) Engine Type	Six Cylinder, Direct Drive, Horizontally Opposed, Air Cooled

1.5 PROPELLER

(a) Number of Propellers	1
(b) Propeller Manufacturer	Hartzell
(c) Blade Model	F8475D-4
(d) Number of Blades	2
(e) Hub Model	HC-C2YK-1()F
(f) Propeller Diameter (inches)	
(1) Maximum	80
(2) Minimum	78.5
(g) Propeller Type	Constant Speed, Hydraulically Actuated

1.7 FUEL

AVGAS ONLY

(a) Fuel Capacity (U.S. gal.) (total)	98
(b) Usable Fuel (U.S. gal.) (total)	94
(c) Fuel Grade, Aviation	
(1) Minimum Octane	100/130 - Green
(2) Specified Octane	100/130 - Green
(3) Alternate Fuels	Refer to latest revision of Lycoming Service Instruction 1070.

1.9 OIL

(a) Oil Capacity (U.S. quarts)	12
(b) Oil Specification	Refer to latest issue of Lycoming Service Instruction 1014.
(c) Oil Viscosity per Average Ambient Temp. for Starting	
(1) Above 60°F	SINGLE 50 MULTI 40 or 50
(2) 30°F to 90°F	40 40
(3) 0°F to 70°F	30 40 or 20W-30
(4) Below 10°F	20 20W-30

1.11 MAXIMUM WEIGHTS

(a) Maximum Takeoff Weight (lbs.)		3600
(b) Maximum Landing Weight (lbs.)		3600
(c) Maximum Weights in Baggage Compartments	FORWARD	AFT
	100	100

1.13 STANDARD AIRPLANE WEIGHTS*

(a) Standard Empty Weight (lbs.): Weight of a standard airplane including unusable fuel, full operating fluids and full oil.	2003
(b) Maximum Useful Load (lbs.) : The difference between the Maximum Takeoff Weight and the Standard Empty Weight.	1597

1.15 BAGGAGE SPACE

	FORWARD	AFT
(a) Compartment Volume (cubic feet)	7.0	17.3
(b) Entry Width (inches)	16.0	48.0
(c) Entry Height (inches)	22.0	26.0

1.17 SPECIFIC LOADING

(a) Wing Loading (lbs. per sq. ft.)	20.6
(b) Power Loading (lbs. per hp)	12.0

*These values are approximate and vary from one aircraft to another. Refer to Figure 6-5 for the Standard Empty Weight value and the Useful Load value to be used C.G. calculations for the aircraft specified.

1.19 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

The following definitions are of symbols, abbreviations and terminology used throughout the handbook and those which may be of added operational significance to the pilot.

(a) General Airspeed Terminology and Symbols

CAS	Calibrated Airspeed means the indicated speed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KCAS	Calibrated Airspeed expressed in "Knots."
GS	Ground Speed is the speed of an airplane relative to the ground.
IAS	Indicated Airspeed is the speed of an aircraft as shown on the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.
KIAS	Indicated Airspeed expressed in "Knots."
M	Mach Number is the ratio of true airspeed to the speed of sound.
TAS	True Airspeed is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature and compressibility.
V_A	Maneuvering Speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.
V_{FE}	Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
V_{LE}	Maximum Landing Gear Extended Speed is the maximum speed at which an aircraft can be safely flown with the landing gear extended.
V_{LO}	Maximum Landing Gear Operating Speed is the maximum speed at which the landing gear can be safely extended or retracted.
V_{NE}/M_{NE}	Never Exceed Speed or Mach Number is the speed limit that may not be exceeded at any time.
V_{NO}	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.
V_S	Stalling Speed or the minimum steady flight speed at which the airplane is controllable.

V_{SO} Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration.

V_X Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.

V_Y Best Rate-of-Climb Speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

(b) Meteorological Terminology

ISA International Standard Atmosphere in which:
The air is a dry perfect gas;
The temperature at sea level is 15° Celsius (59° Fahrenheit);
The pressure at sea level is 29.92 inches Hg (1013.2 mb);
The temperature gradient from sea level to the altitude at which the temperature is -56.5° C (-69.7°) is -0.00198° C (-0.003564° F) per foot and zero above that altitude.

OAT Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications or ground meteorological sources, adjusted for instrument error and compressibility effects.

Indicated Pressure Altitude The number actually read from an altimeter when the barometric subscale has been set to 29.92 inches of mercury (1013.2 millibars).

Pressure Altitude Altitude measured from standard sea-level pressure (29.92 in. Hg) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero.

Station Pressure Actual atmospheric pressure at field elevation.

Wind The wind velocities recorded as variables on the charts of this handbook are to be understood as the headwind or tailwind components of the reported winds.

(c) Power Terminology

Takeoff Power	Maximum power permissible for takeoff.
Maximum Continuous Power	Maximum power permissible continuously during flight.
Maximum Climb Power	Maximum power permissible during climb.
Maximum Cruise Power	Maximum power permissible during cruise.

(d) Engine Instruments

EGT Gauge	Exhaust Gas Temperature Gauge
-----------	-------------------------------

(e) Airplane Performance and Flight Planning Terminology

Climb Gradient	The demonstrated ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval.
Demonstrated Crosswind Velocity	The demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests.
Accelerate-Stop Distance	The distance required to accelerate an airplane to a specified speed and, assuming failure of an engine at the instant that speed is attained, to bring the airplane to a stop.
Route Segment	A part of a route. Each end of that part is identified by: (1) a geographical location; or (2) a point at which a definite radio fix can be established.

(f) Weight and Balance Terminology

Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Moment	The product of the weight of an item multiplied by its arm. (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)
Center of Gravity (C.G.)	The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight.
Usable Fuel	Fuel available for flight planning.
Unusable Fuel	Fuel remaining after a runout test has been completed in accordance with governmental regulations.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.
Basic Empty Weight	Standard empty weight plus optional equipment.
Payload	Weight of occupants, cargo and baggage.
Useful Load	Difference between takeoff weight, or ramp weight if applicable, and basic empty weight.
Maximum Ramp Weight	Maximum weight approved for ground maneuver. (It includes weight of start, taxi and run up fuel.)
Maximum Takeoff Weight	Maximum weight approved for the start of the takeoff run.
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.

1.21 CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN	MULTIPLY	BY	TO OBTAIN
acres	0.4047 43560 0.0015625	ha sq. ft. sq. mi.	cubic inches (cu. in.)	16.39 1.639×10^{-5} 5.787×10^{-4} 0.5541 0.01639 4.329×10^{-3} 0.01732	cm ³ m ³ cu. ft. fl. oz. l U.S. gal. U.S. qt.
atmospheres (atm)	76 29.92 1.0133 1.033 14.70 2116	cm Hg in. Hg bar kg/cm ² lb./sq. in. lb./sq. ft.	cubic meters (m ³)	61024 1.308 35.3147 264.2	cu. in. cu. yd. cu. ft. U.S. gal.
bars (bar)	0.98692 14.503768	atm. lb./sq. in.	cubic meters per minute (m ³ /min.)	35.3147	cu. ft./min.
British Thermal Unit (BTU)	0.2519958	kg-cal	cubic yards (cu. yd.)	27 0.7646 202	cu. ft. m ³ U.S. gal.
centimeters (cm)	0.3937 0.032808	in. ft.	degrees (arc)	0.01745	radians
centimeters of mercury at 0°C (cm Hg)	0.01316 0.3937 0.1934 27.85 135.95	atm in. Hg lb./sq. in. lb./sq. ft. kg/m ²	degrees per second (deg./sec.)	0.01745	radians/sec.
centimeters per second (cm/sec.)	0.032808 1.9685 0.02237	ft./sec. ft./min. mph	drams, fluid (dr. fl.)	0.125	fl. oz.
cubic centimeters (cm ³)	0.03381 0.06102 3.531×10^{-5} 0.001 2.642×10^{-4}	fl. oz. cu. in. cu. ft. l U.S. gal.	drams, avdp. (dr. avdp.)	0.0625	oz. avdp.
cubic feet (cu.ft.)	28317 0.028317 1728 0.037037 7.481 28.32	cm ³ m ³ cu. in. cu. yd. U.S. gal. l	feet (ft.)	30.48 0.3048 12 0.33333 0.0606061 1.894×10^{-4} 1.645×10^{-4}	cm m in. yd. rod mi. NM
cubic feet per minute (cu. ft./min.)	0.472 0.028317	l/sec. m ³ /min.	feet per minute (ft./min.)	0.01136 0.01829 0.508 0.00508	mph km/hr. cm/sec. m/sec.

SECTION 1
GENERAL

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>
feet per second (ft./sec.)	0.6818 1.097 30.48 0.5921	mph km/hr. cm/sec. kts.	hectares (ha)	2.471 107639 10000	acres sq. ft. m ²
foot-pounds (ft.-lb.)	0.138255 3.24 x 10 ⁻⁴	m-kg kg-cal	horsepower (hp)	33000 550 76.04 1.014	ft.-lb./min. ft.-lb./sec. m-kg/sec. metric hp
foot-pounds per minute (ft.-lb./min.)	3.030 x 10 ⁻⁵	hp	horsepower, metric	75 0.9863	m-kg/sec. hp
foot-pounds per second (ft.-lb./sec.)	1.818 x 10 ⁻⁵	hp	inches (in.)	25.40 2.540 0.0254 0.08333 0.027777	mm cm m ft. yd.
gallons, Imperial (Imperial gal.)	277.4 1.201 4.546	cu. in. U.S. gal. l	inches of mercury at 0°C (in. Hg)	0.033421 0.4912 70.73 345.3 2.540 25.40	atm lb./sq. in. lb./sq. ft. kg/m ² cm Hg mm Hg
gallons, U.S. dry (U.S. gal. dry)	268.8 1.556 x 10 ⁻¹ 1.164 4.405	cu. in. cu. ft. U.S. gal. l	inch-pounds (in.-lb.)	0.011521	m-kg
gallons, U.S. liquid (U.S. gal.)	231 0.1337 4.951 x 10 ⁻³ 3785.4 3.785 x 10 ⁻³ 3.785 0.83268 128	cu. in. cu. ft. cu. yd. cm ³ m ³ l Imperial gal. fl. oz.	kilograms (kg)	2.204622 35.27 1000	lb. oz. avdp. g
gallons per acre (gal./acre)	9.353	l/ha	kilogram-calories (kg-cal)	3.9683 3087 426.9	BTU ft.-lb. m-kg
grams (g)	0.001 0.3527 2.205 x 10 ⁻³	kg oz. avdp. lb.	kilograms per cubic meter (kg/m ³)	0.06243 0.001	lb./cu. ft. g/cm ³
grams per centimeter (g/cm)	0.1 6.721 x 10 ⁻² 5.601 x 10 ⁻³	kg/m lb./ft. lb./in.	kilograms per hectare (kg/ha)	0.892	lb./acre
grams per cubic centimeter (g/cm ³)	1000 0.03613 62.43	kg/m ³ lb./cu. in. lb./cu. ft.	kilograms per square centimeter (kg/cm ²)	0.9678 28.96 14.22 2048	atm in. Hg lb./sq. in. lb./sq. ft.

<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>
kilograms per square meter (kg/m ²)	2.896 x 10 ⁻³ 1.422 x 10 ⁻³ 0.2048	in. Hg lb./sq. in. lb./sq. ft.	meters per minute (m/min.)	0.06	km/hr.
kilometers (km)	1 x 10 ⁻⁵ 3280.8 0.6214 0.53996	cm ft. mi. NM	meters per second (m/sec.)	3.280840 196.8504 2.237 3.6	ft./sec. ft./min. mph km/hr.
kilometers per hour (km/hr.)	0.9113 58.68 0.53996 0.6214 0.27778 16.67	ft./sec. ft./min. kt mph m/sec. m/min.	microns	3.937 x 10 ⁻⁵	in.
knots (kt)	1 1.689 1.1516 1.852 51.48	nautical mph ft./sec. statute mph km/hr. m/sec.	miles, statute (mi.)	5280 1.6093 1609.3 0.8684	ft. km m NM
liters (l)	1000 61.02 0.03531 33.814 0.264172 0.2200 1.05669	cm ³ cu. in. cu. ft. fl. oz. U.S. gal. Imperial gal. qt.	miles per hour (mph)	44.7041 4.470 x 10 ⁻¹ 1.467 88 1.6093 0.8684	cm/sec. m/sec. ft./sec. ft./min. km/hr. kt
liters per hectare (l/ha)	13.69 0.107	fl. oz./acre gal./acre	miles per hour square (m/hr. sq.)	2.151	ft./sec. sq.
liters per second (l/sec.)	2.12	cu. ft./min.	millibars	2.953 x 10 ⁻²	in. Hg
meters (m)	39.37 3.280840 1.0936 0.198838 6.214 x 10 ⁻⁴ 5.3996 x 10 ⁻⁴	in. ft. yd. rod mi. NM	millimeters (mm)	0.03937	in.
meter-kilogram (m-kg)	7.23301 86.798	ft.-lb. in.-lb.	millimeters of mercury at 0°C (mm Hg)	0.03937	in. Hg
			nautical miles (NM)	6080 1.1516 1852 1.852	ft. statute mi. m km
			ounces, avdp. (oz. avdp.)	28.35 16	g dr. avdp.
			ounces, fluid (fl. oz.)	8 29.57 1.805 0.0296 0.0078	dr. fl. cm ³ cu. in. l U.S. gal.

**SECTION 1
GENERAL**

**PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II**

<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>
ounces, fluid per acre (fl. oz./ acre)	0.073	l/ha	rod	16.5 5.5 5.029	ft. yd. m
pounds (lb.)	0.453592 453.6 3.108×10^{-2}	kg g slug	slug	32.174	lb.
pounds per acre (lb./acre)	1.121	kg/ha	square centimeters (cm ²)	0.1550 0.001076	sq. in. sq. ft.
pounds per cubic foot (lb./cu. ft.)	16.02	kg/m ³	square feet (sq. ft.)	929 0.092903 144 0.1111 2.296×10^{-5}	cm ² m ² sq. in. sq. yd. acres
pounds per cubic inch (lb./cu. in.)	1728 27.68	lb./cu. ft. g/cm ³	square inches (sq. in.)	6.4516 6.944×10^{-3}	cm ² sq. ft.
pounds per square foot (lb./sq. ft.)	0.1414 4.88243 4.725×10^{-4}	in. Hg kg/m ² atm	square kilometers (km ²)	0.3861	sq. mi.
pounds per square inch (psi or lb./sq. in.)	5.1715 2.036 0.06804 0.0689476 703.1	cm Hg in. Hg atm bar kg/m ²	square meters (m ²)	10.76391 1.196 0.0001	sq. ft. sq. yd. ha
quart, U.S. (qt.)	0.94635 57.749	l cu. in.	square miles (sq. mi.)	2.590 640	km ² acres
radians	57.30 0.1592	deg. (arc) rev.	square rods (sq. rods)	30.25	sq. yd.
radians per second (radians/sec.)	57.30 0.1592 9.549	deg./sec. rev./sec. rpm	square yards (sq. yd.)	0.8361 9 0.0330579	m ² sq. ft. sq. rods
revolutions (rev.)	6.283	radians	yards (yd.)	0.9144 3 36 0.181818	m ft. in. rod
revolutions per minute (rpm or rev./min.)	0.1047	radians/sec.			
revolutions per second (rev./sec.)	6.283	radians/sec.			

TABLE OF CONTENTS

SECTION 2

LIMITATIONS

Paragraph No.		Page No.
2.1	General	2-1
2.3	Airspeed Limitations	2-1
2.5	Airspeed Indicator Markings	2-2
2.7	Power Plant Limitations	2-2
2.9	Power Plant Instrument Markings	2-3
2.11	Weight Limits	2-3
2.13	Center of Gravity Limits	2-4
2.15	Maneuver Limits	2-4
2.17	Flight Load Factors	2-4
2.19	Types of Operations	2-4
2.21	Fuel Limitations	2-5
2.23	Flight With Rear Cabin Door or Rear Cabin Door and Cargo Door Removed	2-5
2.25	Placards	2-7

SECTION 2

LIMITATIONS

2.1 GENERAL

This section provides the "FAA Approved" operating limitations, instrument markings, color coding and basic placards necessary for operation of the airplane and its systems.

Limitations associated with those optional systems and equipment which require handbook supplements can be found in Section 9 (Supplements).

2.3 AIRSPEED LIMITATIONS

SPEED	KIAS	KCAS
Never Exceed Speed (V_{NE}) - Do not exceed this speed in any operation.	191	189
Maximum Structural Cruising Speed (V_{NO}) - Do not exceed this speed except in smooth air and then only with caution.	150	150
Design Maneuvering Speed (V_A) - Do not make full or abrupt control movements above this speed.		
At 3600 LBS. G.W.	132	132
At 2188 LBS. G.W.	112	113
CAUTION Maneuvering speed decreases at lighter weight as the effects of aerodynamic forces become more pronounced. Linear interpolation may be used for intermediate gross weights. Maneuvering speed should not be exceeded while operating in rough air.		
Maximum Flaps Extended Speed (V_{FE}) - Do not exceed this speed with the flaps extended.	109	109
Maximum Landing Gear Extension Speed - Do not exceed this speed when extending the landing gear. V_{LE}	129	130
Maximum Landing Gear Retraction Speed - Do not exceed this speed when retracting the landing gear.	106	109
Maximum Landing Gear Extended Speed (V_{LE}) - Do not exceed this speed with the landing gear extended.	129	130

2.5 AIRSPEED INDICATOR MARKINGS

MARKING	IAS
Red Radial Line (Never Exceed)	191 KTS
Yellow Arc (Caution Range - Smooth Air Only)	150 KTS to 191 KTS
Green Arc (Normal Operating Range)	53 KTS to 150 KTS
White Arc (Flap Down)	52 KTS to 109 KTS

2.7 POWER PLANT LIMITATIONS

(a) Number of Engines	1
(b) Engine Manufacturer	Lycoming
(c) Engine Model No.	IO-540-K1G5D
(d) Engine Operating Limits	
(1) Maximum Horsepower	300
(2) Maximum Rotation Speed (RPM)	2700
(3) Maximum Oil Temperature	245°F
(e) Oil Pressure	
Minimum (red line)	25 PSI
Maximum (red line)	100 PSI
(f) Fuel Pressure	
Minimum (red line)	12 PSI
Maximum (red line)	40 PSI
(g) Fuel Grade (AVGAS ONLY) (minimum octane)	100/130 - Green
(h) Number of Propellers	1
(i) Propeller Manufacturer	Hartzell
(j) Propeller Hub and Blade Model	HC-C2YK-1()F/F8475D-4
(k) Propeller Diameter	
Minimum	78.5 IN.
Maximum	80 IN.
(l) Blade Angle Limits	
Low Pitch Stop	13.5° ± .2°
High Pitch Stop	34° ± 1°

2.9 POWER PLANT INSTRUMENT MARKINGS

(a) Tachometer	
Green Arc (Normal Operating Range)	500 to 2700 RPM
Red Line (Maximum Continuous Power)	2700 RPM
(b) Oil Temperature	
Green Arc (Normal Operating Range)	75° to 245°F
Red Line (Maximum)	245°F
(c) Oil Pressure	
Green Arc (Normal Operating Range)	60 PSI to 90 PSI
Yellow Arc (Caution Range) (Idle)	25 PSI to 60 PSI
Yellow Arc (Caution Range) (Start and Warm Up)	90 PSI to 100 PSI
Red Line (Minimum)	25 PSI
Red Line (Maximum)	100 PSI
(d) Fuel Pressure	
Green Arc (Normal Operating Range)	18 PSI to 40 PSI
Red Line (Minimum)	12 PSI
Red Line (Maximum)	40 PSI
Yellow Arc (Idle Range)	12 PSI to 18 PSI

2.11 WEIGHT LIMITS

(a) Maximum Weight	3600 LBS.
(b) Maximum Baggage (100 lbs. each compartment)	200 LBS.

NOTE

Refer to Section 5 (Performance) for maximum weight as limited by performance.

2.13 CENTER OF GRAVITY LIMITS

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
3600	91.4	96.0
3000	84.0	96.0
2500	82.0	96.0

NOTES

Straight line variation between points given.

The datum used is 78.4 inches ahead of the wing leading edge at the intersection of the straight and tapered section.

It is the responsibility of the airplane owner and the pilot to insure that the airplane is properly loaded. See Section 6 (Weight and Balance) for proper loading instructions.

2.15 MANEUVER LIMITS

No acrobatic maneuvers including spins approved.

2.17 FLIGHT LOAD FACTORS

- | | |
|------------------------------------|--------------------------------|
| (a) Positive Load Factor (Maximum) | 3.8 G |
| (b) Negative Load Factor (Maximum) | No inverted maneuvers approved |

2.19 TYPES OF OPERATIONS

The airplane is approved for the following operations when equipped in accordance with FAR 91 or FAR 135.

- (a) Day V.F.R.
- (b) Night V.F.R.
- (c) Day I.F.R.
- (d) Night I.F.R.
- (e) Non icing

2.21 FUEL LIMITATIONS

- | | |
|--|--------------|
| (a) Total Capacity | 98 U.S. GAL. |
| (b) Unusable Fuel | 4 U.S. GAL. |
| The unusable fuel for this airplane has been determined as 2.0 gallons in each wing in critical flight attitudes (2.0 gallons is the total per side, each side having two interconnected tanks). | |
| (c) Usable Fuel | 94 U.S. GAL. |
| The usable fuel in this airplane has been determined as 47.0 gallons in each wing (47.0 gallons is the total per side, each side having two interconnected tanks). | |

2.23 FLIGHT WITH REAR CABIN DOOR OR REAR CABIN DOOR AND CARGO DOOR REMOVED

The following limitations must be observed in the operation of this airplane with the rear cabin door or rear cabin door and cargo door removed:

- (a) The airplane may be flown with the rear cabin door or rear cabin door and cargo door removed. Flight with the front door removed is not approved.
- (b) Maximum speed - 144 KIAS
- (c) No smoking.
- (d) All loose articles must be tied down and stowed.
- (e) Jumper's static lines must be kept free of pilot's controls and control surfaces.
- (f) Operation approved VFR flight conditions only.

THIS PAGE INTENTIONALLY LEFT BLANK

2.25 PLACARDS

In full view of the pilot:

"THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS. NO ACROBATIC MANEUVERS INCLUDING SPINS, APPROVED."

THIS AIRCRAFT APPROVED FOR V.F.R., I.F.R., DAY AND NIGHT NON-ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH FAR 91 OR FAR 135.

In full view of the pilot, the following takeoff and landing check lists will be installed:

TAKEOFF CHECK LIST

Fuel on Proper Tank	Mixture - Set	Flaps - Set
Electric Fuel Pump - On	Propeller - Set	Trim Tab - Set
Engine Gauges - Checked	Fasten Belts/Harness	Controls - Free
Alternate Air - Closed		Doors - Latched
Seat Backs Erect		Air Conditioner - Off

LANDING CHECK LIST

Fuel on Proper Tank	Electric Fuel Pump - On	Gear Down (129 KIAS Max.)
Seat Backs Erect	Mixture - Rich	Flaps - Set (WHITE ARC)
Fasten Belts/Harness	Propeller - Set	Air Conditioner - Off

The "AIR CONDITIONER OFF" item in the above takeoff and landing check lists is mandatory for air conditioned aircraft only.

On the instrument panel in full view of the pilot:

MANEUVERING SPEED

132 KIAS AT 3600
LBS. (SEE P.O.H.)

On the instrument panel in full view of the pilot:

"DEMONSTRATED CROSSWIND COMPONENT 17 KTS"

In full view of the pilot: (For operation with the rear door removed)

"FOR FLIGHT WITH THE DOOR REMOVED, SEE THE
LIMITATIONS AND PROCEDURES SECTIONS OF THE
AIRPLANE FLIGHT MANUAL."

On instrument panel in full view of the pilot:

"GEAR DOWN	129 KIAS (MAX)"
"GEAR UP	106 KIAS (MAX)"
"EXTENDED	129 KIAS (MAX)"

Near emergency gear lever:

"EMERGENCY DOWN"

| Near emergency gear lever: (aircraft equipped with backup gear extender)

"OVERRIDE ENGAGED"

TO ENGAGE OVERRIDE:
LEVER UP, LATCH DOWN
TO RELEASE OVERRIDE:
LEVER FULL UP & RELEASE"

| On gear override latch: (aircraft equipped with backup gear extender)

"GEAR OVERRIDE LATCH"

Near gear selector switch:

"GEAR UP	106 KIAS MAX"
"DOWN	129 KIAS MAX"

Adjacent to upper door latch (front and rear doors):

"ENGAGE LATCH BEFORE FLIGHT"

On the instrument panel in full view of the pilot:

"WARNING — TURN OFF STROBE LIGHTS WHEN
TAXIING IN VICINITY OF OTHER AIRCRAFT, OR DURING
FLIGHT THROUGH CLOUD, FOG OR HAZE."

In full view of the pilot, in the area of the air conditioner controls when the air conditioner is installed:

“WARNING – AIR CONDITIONER MUST BE OFF TO INSURE
NORMAL TAKEOFF CLIMB PERFORMANCE.”

On the inside of the forward baggage compartment:

“MAXIMUM BAGGAGE THIS COMPARTMENT 100 LBS. SEE
THE LIMITATIONS SECTION OF THE PILOT’S OPERATING
HANDBOOK.”

On aft baggage closeout:

“MAXIMUM BAGGAGE THIS COMPARTMENT 100 LBS. NO
HEAVY OBJECTS ON HAT SHELF.”

On storm window:

“DO NOT OPEN ABOVE 129 KIAS”

Adjacent to fuel tank filler caps:

“FUEL – 100/130 AVIATION GRADE – USABLE CAPACITY
47.0 GAL.”

On executive writing table:

“CAUTION - THIS TABLE MUST BE STOWED DURING
TAKEOFF AND LANDING.”

TABLE OF CONTENTS

SECTION 3

EMERGENCY PROCEDURES

Paragraph No.		Page No.
3.1	General	3-1
3.3	Emergency Procedures Check List	3-2
	Engine Fire During Start	3-2
	Engine Power Loss During Takeoff	3-2
	Engine Power Loss In Flight	3-2
	Power Off Landing	3-2
	Gear Down Landing	3-2
	Gear Up Landing	3-2
	Loss of Oil Pressure	3-3
	Loss of Fuel Pressure	3-3
	High Oil Temperature	3-3
	Alternator Failure	3-3
	Propeller Overspeed	3-3
	Emergency Landing Gear Extension	3-3
	Spin Recovery	3-3
	Open Door	3-4
3.5	Amplified Emergency Procedures (General)	3-5
3.7	Engine Fire During Start	3-5
3.9	Engine Power Loss During Takeoff	3-5
3.11	Engine Power Loss In Flight	3-6
3.13	Power Off Landing	3-7
3.15	Fire In Flight	3-8
3.17	Loss of Air Pressure	3-9
3.19	Loss of Fuel Pressure	3-9
3.21	High Oil Temperature	3-9
3.23	Alternator Failure	3-10
3.25	Propeller Overspeed	3-10
3.27	Emergency Landing Gear Extension	3-10
3.29	Spin Recovery	3-11
3.31	Open Door	3-11
3.33	Engine Roughness	3-11

**SECTION 3
EMERGENCY PROCEDURES**

3.1 GENERAL

The recommended procedures for coping with various types of emergencies and critical situations are provided by this section. All of the required (FAA regulations) emergency procedures and those necessary for operation of the airplane as determined by the operating and design features of the airplane are presented.

Emergency procedures associated with those optional systems and equipment which require handbook supplements are provided in Section 9 (Supplements).

The first portion of this section consists of an abbreviated emergency check list which supplies an action sequence for critical situations with little emphasis on the operation of systems.

The remainder of the section is devoted to amplified emergency procedures containing additional information to provide the pilot with a more complete understanding of the procedures.

These procedures are suggested as a course of action for coping with the particular condition described, but are not a substitute for sound judgement and common sense. Pilots should familiarize themselves with the procedures given in this section and be prepared to take appropriate action should an emergency arise.

Most basic emergency procedures, such as power off landings, are a normal part of pilot training. Although these emergencies are discussed here, this information is not intended to replace such training, but only to provide a source of reference and review, and to provide information on procedures which are not the same for all aircraft. It is suggested that the pilot review standard emergency procedures periodically to remain proficient in them.

3.3 EMERGENCY PROCEDURES CHECK LIST

ENGINE FIRE DURING START

Starter crank engine
Mixture idle cut-off
Throttle open
Electric fuel pump OFF
Fuel selector OFF
Abandon if fire continues

ENGINE POWER LOSS DURING TAKEOFF

If sufficient runway remains for a normal landing, leave gear down and land straight ahead.

If area ahead is rough, or if it is necessary to clear obstructions:

Gear selector switch UP
Emergency gear lever (aircraft equipped with backup gear extender) ... latched in OVERRIDE ENGAGED position

If sufficient altitude has been gained to attempt a restart:

Maintain safe airspeed
Fuel selector switch to tank containing fuel
Electric fuel pump check ON
Mixture check RICH
Alternate air OPEN
Emergency gear lever as required
If power is not regained, proceed with power off landing.

ENGINE POWER LOSS IN FLIGHT

Fuel selector switch to tank containing fuel
Electric fuel pump ON
Mixture RICH
Alternate air OPEN
Engine gauges check for indication of cause of power loss
If no fuel flow is indicated, check tank selector position to be sure it is on a tank containing fuel.

When power is restored:

Alternate air CLOSED
Electric fuel pump OFF
If power is not restored, prepare for power off landing.

POWER OFF LANDING

On aircraft equipped with backup gear extender, lock emergency gear lever in OVERRIDE ENGAGED position before airspeed drops to 106 KIAS to prevent landing gear from inadvertently free falling.

Trim for 92 KIAS.

Locate suitable field.

Establish spiral pattern. 1000 ft above field at downwind position for normal landing approach. When field can easily be reached slow to 75 KIAS for shortest landing.

Touchdowns should normally be made at lowest possible airspeed with full flaps.

GEAR DOWN LANDING

For gear down landing, proceed as follows when committed to landing:

Landing Gear Selector DOWN
Ignition OFF
Master switch OFF
Fuel selector OFF
Mixture idle cut-off
Seat belt and harness tight

GEAR UP LANDING

For gear up landing, proceed as follows when committed to landing:

Ignition OFF
Master switch OFF
Fuel selector OFF
Mixture idle cut-off
Seat belt and harness tight

**SECTION 3
EMERGENCY PROCEDURES**

**PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II**

FIRE IN FLIGHT

Source of fire check

Electrical fire (smoke in cabin):

Master switch OFF

Vents open

Cabin heat OFF

Land as soon as practicable.

Engine fire:

Fuel selector OFF

Throttle CLOSED

Mixture idle cut-off

Electric fuel pump check OFF

Heater and defroster OFF

Proceed with power off landing procedure.

LOSS OF OIL PRESSURE

Land as soon as possible and investigate cause.

Prepare for power off landing.

LOSS OF FUEL PRESSURE

Electric fuel pump ON

Fuel selector check on full tank

HIGH OIL TEMPERATURE

Land at nearest airport and investigate the problem.

Prepare for power off landing.

ALTERNATOR FAILURE

Verify failure

Reduce electrical load as much as possible.

Alternator circuit breakers check

Alt switch OFF (for 1 second),
then on

If no output:

Alt switch OFF

Reduce electrical load and land as soon as practical.

If battery is fully discharged, the gear will have to be lowered using the emergency gear extension procedure. Position lights will not illuminate.

PROPELLER OVERSPEED

Throttle retard

Oil pressure check

Prop control full DECREASE rpm,
then set if any
control available

Airspeed reduce

Throttle as required to remain
below 2700 rpm

EMERGENCY LANDING GEAR EXTENSION

Prior to emergency extension procedure:

Master switch check ON

Circuit breakers check

Radio lights off (in daytime)

Gear indicator bulbs check

If landing gear does not check down and locked:

Airspeed below 87 KIAS

Landing gear selector DOWN

Emergency gear lever (on aircraft equipped with
backup gear extender) . OVERRIDE ENGAGED
(while fishtailing airplane)

If landing gear still does not check down and locked:

Emergency gear lever . . . EMERGENCY DOWN
(while fishtailing airplane)

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

SPIN RECOVERY

Throttle idle

Ailerons neutral

Rudder full opposite to
direction of rotation

Control wheel full forward 2 seconds
after anti-spin
rudder input

Rudder neutral (when
rotation stops)

Control wheel as required to smoothly
regain level flight attitude

**ISSUED: JANUARY 18, 1978
REVISED: JANUARY 31, 1987**

**REPORT: VB-890
3-3**

OPEN DOOR

If both upper and side latches are open, the door will trail slightly open and airspeeds will be reduced slightly.

To close the door in flight:

Slow airplane to 87 KIAS

Cabin vents close

Storm window open

If upper latch is open latch

If side latch is open pull on armrest while
moving latch handle
to latched position

If both latches are open latch side latch
then top latch

3-5. AMPLIFIED EMERGENCY PROCEDURES (GENERAL)

The following paragraphs are presented to supply additional information for the purpose of providing the pilot with a more complete understanding of the recommended course of action and probable cause of an emergency situation.

3-7. ENGINE FIRE DURING START

Engine fires during start are usually the result of overpriming. The first attempt to extinguish the fire is to try to start the engine and draw the excess fuel back into the induction system.

If a fire is present before the engine has started, move the mixture control to idle cut-off, open the throttle and crank the engine. This is an attempt to draw the fire back into the engine.

If the engine has started, continue operating to try to pull the fire into the engine.

In either case (above), if fire continues more than a few seconds, the fire should be extinguished by the best available external means.

The fuel selector valve should be OFF and the mixture at idle cut-off if an external fire extinguishing method is to be used.

3-9. ENGINE POWER LOSS DURING TAKEOFF

The proper action to be taken if loss of power occurs during takeoff will depend on the circumstances of the particular situation.

If sufficient runway remains to complete a normal landing, leave the landing gear down and land straight ahead.

If the area ahead is rough, or if it is necessary to clear obstructions, move the gear selector switch to the UP position. On aircraft equipped with the backup gear extender, latch the emergency gear lever in the OVERRIDE ENGAGED position.

If sufficient altitude has been gained to attempt a restart, maintain a safe airspeed and switch the fuel selector to another tank containing fuel. Check the electric fuel pump to ensure that it is ON and that the mixture is RICH. The alternate air should be OPEN.

On aircraft equipped with the backup gear extender, the landing gear will extend automatically when engine power fails at speeds below approximately 103 KIAS. The glide distance with the landing gear extended is roughly halved. If the situation dictates, the landing gear can be retained in the retracted position by latching the emergency gear lever in the OVERRIDE ENGAGED position.

If engine failure was caused by fuel exhaustion, power will not be regained after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds.

If power is not regained, proceed with the Power Off Landing procedure (refer to the emergency check list and paragraph 3.15).

3.11 ENGINE POWER LOSS IN FLIGHT

Complete engine power loss is usually caused by fuel flow interruption and power will be restored shortly after fuel flow is restored. If power loss occurs at a low altitude, the first step is to prepare for an emergency landing (refer to paragraph 3.13). An airspeed of at least 92 KIAS should be maintained.

If altitude permits, switch the fuel selector to another tank containing fuel and turn the electric fuel pump "ON." Move the mixture control to "RICH" and the alternate air to "OPEN." Check the engine gauges for an indication of the cause of the power loss. If no fuel pressure is indicated, check the tank selector position to be sure it is on a tank containing fuel.

When power is restored move the alternate air to the "CLOSED" position and turn "OFF" the electric fuel pump.

If the preceding steps do not restore power, prepare for an emergency landing.

If time permits, turn the ignition switch to "L" then to "R" then back to "BOTH." Move the throttle and mixture control levers to different settings. This may restore power if the problem is too rich or too lean a mixture or if there is a partial fuel system restriction. Try other fuel tanks. Water in the fuel could take some time to be used up, and allowing the engine to windmill may restore power. If power loss is due to water, fuel pressure indications will be normal.

If engine failure was caused by fuel exhaustion, power will not be restored after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds.

If power is not regained, proceed with the Power Off Landing procedure (refer to the emergency check list and paragraph 3.13).

3.13 POWER OFF LANDING

On aircraft equipped with the backup gear extender, if loss of power occurs at altitude, lock emergency gear lever in OVERRIDE ENGAGED position before airspeed drops to 106 KIAS to prevent landing gear from inadvertently free falling. Then trim the aircraft for best gliding angle (92 KIAS, Air Cond. off) and look for a suitable field. If measures taken to restore power are not effective, and if time permits, check your charts for airports in the immediate vicinity; it may be possible to land at one if you have sufficient altitude. At best gliding angle, with no wind, with the engine windmilling, and the propeller control in full DECREASE rpm, the aircraft will travel approximately 1.2 miles for each thousand feet of altitude. If possible, notify the FAA by radio of your difficulty and intentions. If another pilot or passenger is aboard, let him help.

CAUTION

When C.G. is forward of 82 inches, use 90 KIAS approach speed.

When you have located a suitable field, establish a spiral pattern around this field. Try to be at 1000 feet above the field at the downwind position, to make a normal landing approach. When the field can easily be reached, slow to 76 KIAS approach speed with flaps down for the shortest landing. Excess altitude may be lost by widening your pattern, using flaps or slipping, or a combination of these.

Whether to attempt a landing with gear up or down depends on many factors. If the field chosen is obviously smooth and firm, and long enough to bring the plane to a stop, the gear should be down. If there are stumps or rocks or other large obstacles in the field, the gear in the down position will better protect the occupants of the aircraft. If, however, the field is suspected to be excessively soft or short, or when landing in water of any depth, a wheels-up landing will normally be safer and do less damage to the airplane.

On aircraft equipped with the backup gear extender, the landing gear will free fall at airspeeds below approximately 103 KIAS and will take six to eight seconds to be down and locked. If a gear up landing is desired, it will be necessary to latch the override lever in the OVERRIDE ENGAGED position before the airspeed drops to 106 KIAS to prevent the landing gear from inadvertently free falling.

Touchdown should normally be made at the lowest possible airspeed.

(a) Gear Down Landing

When committed to a gear down emergency landing, select landing gear DOWN, close the throttle control and shut OFF the master and ignition switches. Flaps may be used as desired. Turn the fuel selector valve to OFF and move the mixture to idle cut-off. The seat belts and shoulder harness (if installed) should be tightened. Touchdown should be normally made at the lowest possible airspeed.

NOTE

If the master switch is OFF, the gear cannot be retracted.

(b) Gear Up Landing

On aircraft equipped with the backup gear extender, latch the emergency gear in the **OVER-RIDE ENGAGED** position, prior to reaching 106 KIAS, to prevent the gear from inadvertently extending at airspeeds below 103 KIAS.

Touchdowns should normally be made at the lowest possible airspeed with full flaps.

When committed to landing, turn **OFF** the ignition and master switch. The fuel selector should be **OFF** and the mixture at idle cut-off.

Tighten the seat belts and shoulder harness (if installed).

3.15. FIRE IN FLIGHT

The presence of fire is noted through smoke, smell and heat in the cabin. It is essential that the source of the fire be promptly identified through instrument readings, character of the smoke, or other indications since the action to be taken differs somewhat in each case.

Check for the source of the fire first.

If an electrical fire is indicated (smoke in the cabin), the master switch should be turned **OFF**. The cabin vents should be opened and the cabin heat turned **OFF**. A landing should be made as soon as possible.

If an engine fire is present, switch the fuel selector to **OFF** and close the throttle. The mixture should be at idle cut-off. Turn the electric fuel pump **OFF**. In all cases, the heater and defroster should be **OFF**. If radio communication is not required select master switch **OFF**. If the terrain permits, a landing should be made immediately.

NOTE

The possibility of an engine fire in flight is extremely remote. The procedure given is general and pilot judgment should be the determining factor for action in such an emergency.

3.17 LOSS OF OIL PRESSURE

Loss of oil pressure may be either partial or complete. A partial loss of oil pressure usually indicates a malfunction in the oil pressure regulating system, and a landing should be made as soon as possible to investigate the cause and prevent engine damage.

A complete loss of oil pressure indication may signify oil exhaustion or may be the result of a faulty gauge. In either case, proceed toward the nearest airport, and be prepared for a forced landing. If the problem is not a pressure gauge malfunction, the engine may stop suddenly. Maintain altitude until such time as a dead stick landing can be accomplished. Don't change power settings unnecessarily, as this may hasten complete power loss.

Depending on the circumstances, it may be advisable to make an off airport landing while power is still available, particularly if other indications of actual oil pressure loss, such as sudden increases in temperatures, or oil smoke, are apparent, and an airport is not close.

If engine stoppage occurs, proceed with Power Off Landing.

3.19 LOSS OF FUEL PRESSURE

If loss of fuel pressure occurs, turn "ON" the electric fuel pump and check that the fuel selector is on a full tank.

If the problem is not an empty tank, land as soon as practical and have the engine-driven fuel pump and fuel system checked.

3.21 HIGH OIL TEMPERATURE

An abnormally high oil temperature indication may be caused by a low oil level, an obstruction in the oil cooler, damaged or improper baffle seals, a defective gauge, or other causes. Land as soon as practical at an appropriate airport and have the cause investigated.

A steady, rapid rise in oil temperature is a sign of trouble. Land at the nearest airport and let a mechanic investigate the problem. Watch the oil pressure gauge for an accompanying loss of pressure.

3.23 ALTERNATOR FAILURE

Loss of alternator output is detected through zero reading on the ammeter. Before executing the following procedure, ensure that the reading is zero and not merely low by actuating an electrically powered device, such as the landing light. If no increase in the ammeter reading is noted, alternator failure can be assumed.

The electrical load should be reduced as much as possible. Check the alternator circuit breakers for a popped circuit.

The next step is to attempt to reset the overvoltage relay. This is accomplished by moving the ALT switch to OFF for one second and then to ON. If the trouble was caused by a momentary overvoltage condition (16.5 volts and up) this procedure should return the ammeter to a normal reading.

If the ammeter continues to indicate zero output, or if the alternator will not remain reset, turn off the ALT switch, maintain minimum electrical load and land as soon as practical. All electrical load is being supplied by the battery.

3.25 PROPELLER OVERSPEED

Propeller overspeed is caused by a malfunction in the propeller governor or low oil pressure which allows the propeller blades to rotate to full low pitch.

If propeller overspeed should occur, retard the throttle and check the oil pressure. The propeller control should be moved to full DECREASE rpm and then set if any control is available. Airspeed should be reduced and throttle used to maintain 2700 rpm.

3.27 EMERGENCY LANDING GEAR EXTENSION

Prior to proceeding with an emergency gear extension check to ensure that the master switch is ON and that the circuit breakers have not opened. If it is daytime, the radio lights should be turned off. Check the landing gear indicators for faulty bulbs.

NOTE

Refer to paragraph 4.41 for differences when emergency extension procedure is performed for training purposes.

If the landing gear does not check down and locked, reduce the airspeed to below 87 KIAS. Move the landing gear selector to the DOWN position. On aircraft equipped with the backup gear extender, place the emergency gear lever in the OVERRIDE ENGAGED position and fishtail the airplane.

If the landing gear still does not check down and locked move the emergency gear lever to the EMERGENCY DOWN position while fishtailing the airplane.

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

3.29 SPIN RECOVERY

Intentional spins are prohibited in this airplane. If a spin is inadvertently entered, immediately move the throttle to idle and the ailerons to neutral.

Full rudder should then be applied opposite to the direction of rotation followed two seconds later by control wheel full forward. When the rotation stops, neutralize the rudder and ease back on the control wheel as required to smoothly regain a level flight attitude.

3.31 OPEN DOOR

The cabin door is double latched, so the chances of its springing open in flight at both the top and side are remote. However, should you forget the upper latch, or not fully engage the side latch, the door may spring partially open. This will usually happen at takeoff or soon afterward. A partially open door will not affect normal flight characteristics, and a normal landing can be made with the door open.

If both upper and side latches are open, the door will trail slightly open, and airspeed will be reduced slightly.

To close the door in flight, slow the airplane to 87 KIAS, close the cabin vents and open the storm window. If the top latch is open, latch it. If the side latch is open, pull on the armrest while moving the latch handle to the latched position. If both latches are open, close the side latch then the top latch.

3.33 ENGINE ROUGHNESS

Engine roughness may be caused by dirt in the injector nozzles, induction system icing, or ignition problems.

First adjust the mixture for maximum smoothness. The engine will run rough if the mixture is too rich or too lean.

Move the alternate air to "OPEN" and then turn "ON" the electric fuel pump.

Switch the fuel selector to another tank to see if fuel contamination is the problem.

Check the engine gauges for abnormal readings. If any gauge readings are abnormal proceed accordingly.

The magneto switch should then be moved to "L" then "R," then back to "BOTH." If operation is satisfactory on either magneto, proceed on that magneto at reduced power with full "RICH" mixture to a landing at the first available airport.

If roughness persists, prepare for a precautionary landing at pilot's discretion.

TABLE OF CONTENTS

SECTION 4

NORMAL PROCEDURES

Paragraph No.		Page No.
4.1	General	4-1
4.3	Airspeeds for Safe Operations	4-1
4.5	Normal Procedures Check List.....	4-3
	Preflight Check	4-4
	Before Starting Engine	4-4
	Starting Engine when Cold	4-4
	Starting Engine When Hot	4-4
	Starting Engine When Flooded	4-4
	Starting With External Power Source.....	4-4
	Warm-Up	4-4
	Taxiing	4-4
	Ground Check	4-4
	Before Takeoff.....	4-5
	Takeoff	4-5
	Climb	4-5
	Cruising	4-5
	Approach and Landing	4-5
	Go-Around.....	4-6
	Stopping Engine	4-6
	Parking.....	4-6
4.7	Amplified Normal Procedures (General)	4-7
4.9	Preflight Check	4-7
4.11	Before Starting Engine	4-8
4.13	Starting Engine	4-9
4.15	Warm-Up	4-10
4.17	Taxiing	4-11
4.19	Ground Check	4-11
4.21	Before Takeoff	4-12
4.23	Takeoff	4-13
4.25	Climb	4-13
4.27	Cruising	4-14
4.29	Approach and Landing	4-15
4.31	Go - Around	4-16
4.33	Stopping Engine	4-16
4.35	Parking	4-16
4.37	Stalls	4-16
4.39	Turbulent Air Operation	4-16
4.41	Landing Gear	4-17
4.43	Weight and Balance	4-17

SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This section describes the recommended procedures for the conduct of normal operations for the Lance II. All of the required (FAA regulations) procedures and those necessary for operation of the airplane as determined by the operating and design features of the airplane are presented.

Normal procedures associated with those optional systems and equipment which require handbook supplements are provided in Section 9 (Supplements).

These procedures are provided to present a source of reference and review and to supply information on procedures which are not the same for all aircraft. Pilots should familiarize themselves with the procedures given in this section in order to become proficient in the normal operations of the airplane.

The first portion of this section consists of a short form check list which supplies an action sequence for normal operations with little emphasis on the operation of the systems.

The remainder of the section is devoted to amplified normal procedures which provide detailed information and explanations of the procedures and how to perform them. This portion of the section is not intended for use as an in-flight reference due to the lengthy explanations. The short form check list should be used for this purpose.

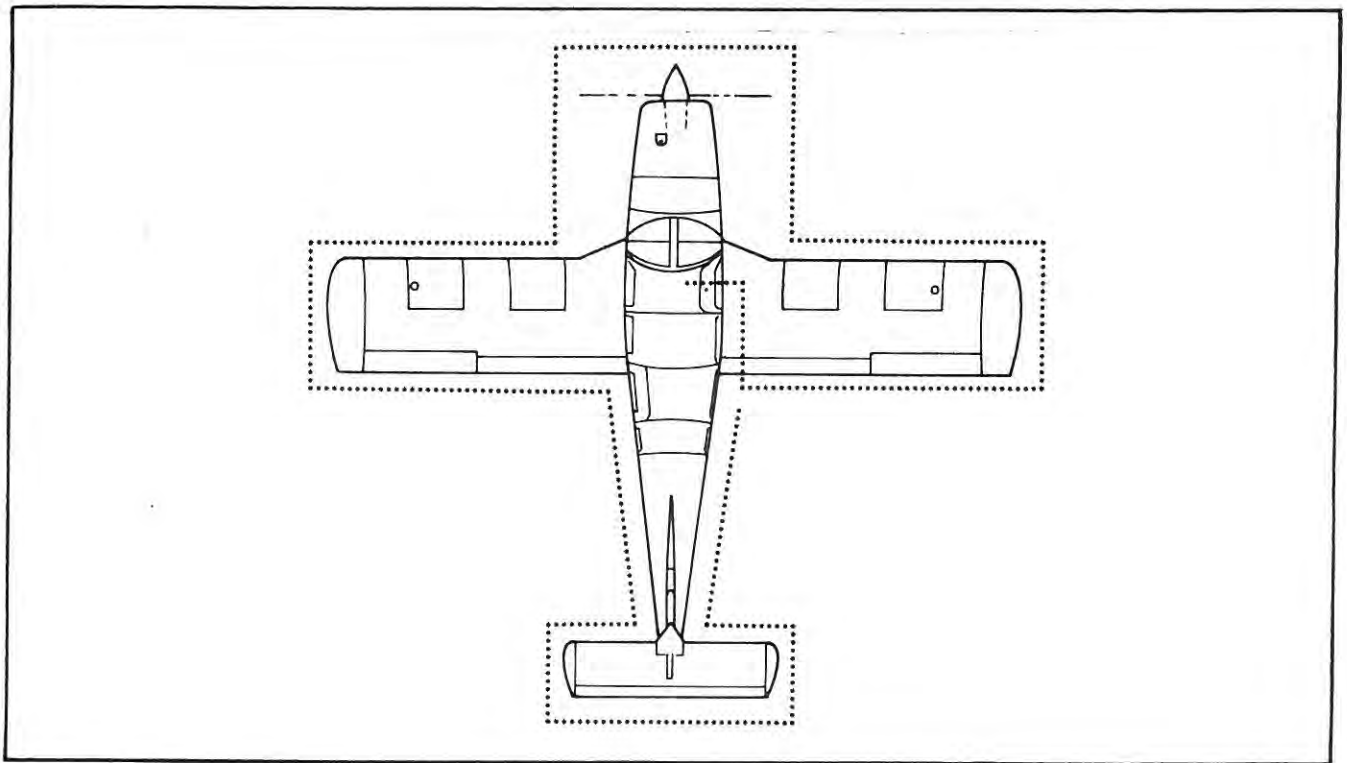
4.3 AIRSPEEDS FOR SAFE OPERATIONS

The following airspeeds are those which are significant to the operation of the airplane. These figures are for standard airplanes flown at gross weight under standard conditions at sea level.

Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of the engine, airplane and equipment, atmospheric conditions and piloting technique.

(a) Best Rate of Climb Speed V_y	
gear up, flaps up	92 KIAS
gear down, flaps up	87 KIAS
(b) Best Angle of Climb Speed V_x	
gear up, flaps up	87 KIAS
gear down, flaps up	68 KIAS
(c) Turbulent Air Operating Speed (See Subsection 2.3) V_A	132 KIAS
(d) Maximum Flap Speed V_{FE}	109 KIAS
(e) Landing Final Approach Speed (Full Flaps)	75 KIAS
(f) Maximum Demonstrated Crosswind Velocity	17 KTS

THIS PAGE INTENTIONALLY LEFT BLANK



WALK-AROUND

PREFLIGHT CHECK

Control wheel	release belts
Parking brake	set
Master switch	ON
Fuel quantity gauges	check
Master switch	OFF
Ignition	OFF
Exterior	check for damage
Control surfaces	check for interference - free of ice, snow, frost
Hinges	check for interference
Wings	free of ice, snow, frost
Stall warning	check
Navigation lights	check
Fuel tanks	check supply visually - secure caps
Fuel tank sumps	drain and check for water, sediment and proper fuel
Fuel vents	open
Main gear struts	proper inflation (4.0 in.)
Tires	check
Brake blocks	check

Pitot head	remove cover - holes clear
Windshield	clean
Propeller and spinner	check
Fuel and oil	check for leaks
Oil	check level
Dipstick	properly seated
Cowling	secure
Inspection covers	secure
Nose wheel tire	check
Nose gear strut	proper inflation (2.60 in.)
Air inlets	clear
Alternator belt	check tension
Tow bar and control locks	stow
Baggage	stowed properly - secure
Baggage door	close and secure
Fuel strainer	drain and check for water, sediment and proper fuel
Primary flight controls	proper operation
Cabin doors	close and secure
Required papers	on board
Seat belts and harness	fastened - check inertia reel

BEFORE STARTING ENGINE

Parking brake set
Propeller full INCREASE rpm
Fuel selector desired tank

STARTING ENGINE WHEN COLD

Throttle 1/2" open
Master switch ON
Electric fuel pump ON
Mixture prime - then idle
cut-off
Starter engage
Mixture full RICH
Throttle adjust
Oil pressure check

STARTING ENGINE WHEN HOT

Throttle 1/2" open
Master switch ON
Electric fuel pump ON
Mixture idle cut-off
Starter engage
Mixture advance
Throttle adjust
Oil pressure check

STARTING ENGINE WHEN FLOODED

Throttle open full
Master switch ON
Electric fuel pump OFF
Mixture idle cut-off
Starter engage
Mixture advance
Throttle retard
Oil pressure check

STARTING WITH EXTERNAL POWER SOURCE

Master switch OFF
All electrical equipment OFF
Terminals connect
External power plug insert in
fuselage

Proceed with normal start

Throttle lowest possible
RPM

External power plug disconnect from
fuselage

Master switch ON - check ammeter
Oil pressure check

WARM-UP

Throttle 1000 to 1200 RPM

TAXIING

Chocks removed
Parking brake release
Taxi area clear
Throttle apply slowly
Prop high RPM
Brakes check
Steering check

GROUND CHECK

Parking brake set
Propeller full INCREASE
Throttle 2000 RPM
Magnetos max. drop 175 RPM
- max. diff. 50 RPM
Vacuum 5.0" Hg. $\pm$.1
Oil temp check
Oil pressure check
Air conditioner check
Annunciator panel press-to-test
Propeller exercise - then
full INCREASE

Alternate air check
Engine is warm for takeoff when throttle can be
opened without engine faltering.

Electric fuel pump OFF
Fuel pressure check
Throttle retard

CLIMB

Master switch	ON
Flight instruments	check
Fuel selector	proper tank
Electric fuel pump	ON
Engine gauges	check
Alternate air	CLOSED
Seat backs	erect
Mixture	set
Prop	set
Belts/harness	fastened
Empty seats	seat belts snugly fastened
Flaps	set
Trim tab	set
Controls	free
Doors	latched
Air conditioner	OFF
Parking brake	release

TAKEOFF

NORMAL

Flaps retracted
Trim slightly aft of neutral
Accelerate to 75 to 85 KIAS
Control wheel back pressure to
rotate to climb attitude

SHORT OR SOFT FIELD, OBSTACLE
CLEARANCE

Flaps second notch
Trim slightly aft of neutral
Throttle full power prior to brake release
Accelerate to 66 to 70 KIAS (depending on weight).
Control wheel back pressure to rotate
to climb attitude
After breaking ground, accelerate to 68 to 74 KIAS
(depending on weight).
Gear (Override Engaged) (aircraft equipped with the
backup gear extender) UP
Accelerate to climb speed.
Flaps retract slowly

Best rate (3600 lb) (gear up)	V_y	
(flaps up)		92 KIAS
Best rate (3600 lb) (gear down)		
(flaps up)		87 KIAS
Best angle (3600 lb) (gear up)	V_y	
(flaps up)		87 KIAS
Best angle (3600 lb) (gear down)		
(flaps up)		68 KIAS
En route		104 KIAS
Electric fuel pump		OFF at
		desired altitude

CRUISING

Reference performance charts, Avco-Lycoming
Operator's Manual and power setting table.

Normal max power	75%
Power	set per power table
Mixture	adjust

APPROACH AND LANDING

Fuel selector	proper tank
Seat backs	erect
Belts/harness	fasten
Electric fuel pump	ON
Mixture	set
Propeller	set
Gear	down - 129 KIAS max. ✓
Flaps	set - 109 KIAS max.
Air conditioner	OFF

NORMAL TECHNIQUE

Flaps..... as required
Trim 95 KIAS
Throttle as required

SHORT FIELD TECHNIQUE

Flaps third notch
Trim 75 KIAS
Throttle as required

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

Throttle	full forward
Control wheel	back pressure to rotate to climb attitude
Gear	UP
Flaps	retract slowly
Trim	as required

Flaps	retract
Electric fuel pump	OFF
Air conditioner	OFF
Radios	OFF
Propeller	full INCREASE
Throttle	full aft
Mixture	idle cut-off
Magnetos	OFF
Master switch	OFF

Parking brake	set
Control wheel	secured with belts
Flaps	full up
Wheel chocks	in place
Tie downs	secure

4.7 AMPLIFIED NORMAL PROCEDURES (GENERAL)

The following paragraphs are provided to supply detailed information and explanations of the normal procedures necessary for the operation of the airplane.

4.9 PREFLIGHT CHECK

The airplane should be given a thorough preflight and walk-around check. The preflight should include a check of the airplane's operational status, computation of weight and C.G. limits, takeoff distance and in-flight performance. A weather briefing should be obtained for the intended flight path, and any other factors relating to a safe flight should be checked before takeoff.

CAUTION

The flap position should be noted before boarding the aircraft. The flaps must be placed in the "UP" position before they will lock and support weight on the step.

Upon entering the cockpit, release the seat belts securing the control wheel and set the parking brake. Turn "ON" the master switch and check the fuel quantity gauges for sufficient fuel. After the fuel quantity check is made turn the master switch "OFF" and check that the ignition is "OFF".

To begin the exterior walk-around, check for external damage and operational interference of the control surfaces or hinges. Insure that the wings and control surfaces are free of snow, ice, frost or any other foreign materials.

An operational check of the stall warning system and navigation lights should now be made. Turn the master switch "ON." Lift the detector while checking to determine if the horn is actuated and check that the navigation lights are illuminated. The master switch should be returned to the "OFF" position after the checks are complete.

A visual check of the fuel tank quantity should be performed. Remove the filler cap from each tank and visually check the supply. Be sure to secure the caps properly after the check is complete. Each inboard tank is furnished with an external fuel quantity indicator to assist the pilot in determining fuel quantities of less than 25 gallons. A visual check of this indicator should also be made.

The fuel system tank sumps and strainer should be drained daily prior to the first flight and after refueling to check for water, sediment and proper fuel. Each fuel tank is equipped with an individual quick drain located at the lower inboard rear corner of the tank. The fuel strainer and a system quick drain valve are located in the fuselage at the lowest point of the fuel system. It is important that the fuel system be drained properly.

Drain each tank through its individual quick drain located at the lower inboard rear corner of the tank, making sure that enough fuel has been drained to insure that all water and sediment is removed.

Next, place a container under the fuel strainer drain outlet located under the fuselage.

Now drain the fuel strainer by pressing down on the lever located on the right hand side of the cabin below the forward edge of the rear seat. The fuel selector should be positioned in the following sequence while draining the strainer: "OFF," "LEFT," "RIGHT." This is done to insure that the fuel lines between each tank outlet and fuel strainer are drained as well as the strainer. When the fuel tanks are full, it will take approximately six seconds to drain all the fuel in one of the lines from a tank to the fuel strainer. When the fuel tanks are less than full, it will take a few seconds longer.

Examine the contents of the container placed under the fuel strainer drain outlet for water, sediment and proper fuel and dispose of the contents.

CAUTION

When draining any amount of fuel, care should be taken to insure that no fire hazard exists before starting engine.

After using the under-seat quick drain, it should be checked from outside to make sure it has closed completely and is not leaking.

Check all of the fuel tank vents to make sure they are open.

Next, complete a check of the landing gear. Check the main gear shock struts for proper inflation. There should be 4.0 inches of strut exposure under a normal static load. The nose gear should be checked for 2.60 inches of strut exposure. Check all tires for cuts and wear and insure proper inflation. Make a visual check of the brake blocks for wear or damage.

Remove the cover from the pitot head on the underside of the left wing. Check the pitot head to make sure the holes are open and clear of obstructions.

Don't forget to clean and check the windshield.

The propeller and spinner should be checked for defects or nicks.

Lift the cowlings and check for any obvious fuel or oil leaks. Check the oil level. Make sure that the dipstick has properly seated after checking. Secure the cowlings and check the inspection covers.

Check the air inlets for foreign matter and the alternator belt for proper tension.

Stow the tow bar and check the baggage for proper storage and security. The baggage compartment doors should be closed and secure.

Upon entering the aircraft, ascertain that all primary flight controls operate properly. Close and secure the fore and aft cabin doors and check that all the required papers are in order and in the airplane.

Fasten the seat belts and shoulder harness and check the function of the inertia reel by pulling sharply on the strap. Fasten seat belts on empty seats.

4.11 BEFORE STARTING ENGINE

Before starting the engine the parking brake should be set "ON" and the propeller lever moved to full "INCREASE" rpm position. The fuel selector should then be moved to the desired tank.

4.13 STARTING ENGINE

(a) Starting Engine When Cold

Open the throttle lever approximately 1/2 inch. Turn "ON" the master switch and the electric fuel pump. Move the mixture control to full "RICH" until an indication is noted on the fuel flow meter. The engine is now primed.

Move the mixture control to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture control to full "RICH" and move the throttle to the desired setting.

If the engine does not fire within five to ten seconds, disengage the starter and reprime.

(b) Starting Engine When Hot

Open the throttle approximately 1/2 inch. Turn "ON" the master switch and the electric fuel pump. Move the mixture control lever to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture and move the throttle to the desired setting.

(c) Starting Engine When Flooded

The throttle lever should be full "OPEN." Turn "ON" the master switch and turn "OFF" the emergency fuel pump. Move the mixture control lever to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture and retard the throttle.

(d) Starting Engine With External Power Source

An optional feature called the Piper External Power (PEP) allows the operator to use an external battery to crank the engine without having to gain access to the airplane's battery.

Turn the master switch OFF and turn all electrical equipment OFF. Connect the RED lead of the PEP kit jumper cable to the POSITIVE (+) terminal of an external 12-volt battery and the BLACK lead to the NEGATIVE (-) terminal. Insert the plug of the jumper cable into the socket located on the fuselage. Note that when the plug is inserted, the electrical system is ON. Proceed with the normal starting technique.

After the engine has started, reduce power to the lowest possible RPM, to reduce sparking, and disconnect the jumper cable from the aircraft. Turn the master switch ON and check the alternator ammeter for an indication of output. DO NOT ATTEMPT FLIGHT IF THERE IS NO INDICATION OF ALTERNATOR OUTPUT.

NOTE

For all normal operations using the PEP jumper cables, the master switch should be OFF, but it is possible to use the ships battery in parallel by turning the master switch ON. This will give longer cranking capabilities, but will not increase the amperage. CAUTION: Care should be exercised because if the ships battery has been depleted, the external power supply can be reduced to the level of the ships battery. This can be tested by turning the master switch ON momentarily while the starter is engaged. If cranking speed increases, the ships battery is at a higher level than the external power supply.

When the engine is firing evenly, advance the throttle to 800 RPM. If oil pressure is not indicated within thirty seconds, stop the engine and determine the trouble. In cold weather it will take a few seconds longer to get an oil pressure indication. If the engine has failed to start, refer to the Lycoming Operating Handbook, Engine Troubles and Their Remedies.

Starter manufacturers recommend that cranking periods be limited to thirty seconds with a two minute rest between cranking periods. Longer cranking periods will shorten the life of the starter.

4.15 WARM-UP

Warm-up the engine at 1000 to 1200 RPM. Avoid prolonged idling at low RPM, as this practice may result in fouled spark plugs.

Takeoff may be made as soon as the ground check is completed, provided that the throttle may be opened fully without backfiring or skipping, and without a reduction in engine oil pressure.

Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones, gravel or any loose material that may cause damage to the propeller blades.

4.17 TAXIING

Before attempting to taxi the airplane, ground personnel should be instructed and approved by a qualified person authorized by the owner. Ascertain that the wheel chocks and propeller back blast and taxi areas are clear. Release the parking brake.

Power should be applied slowly to start the taxi roll. Taxi a few feet forward and apply the brakes to determine their effectiveness. Taxi with the propeller set in low pitch, high RPM setting. While taxiing, make slight turns to ascertain the effectiveness of the steering.

Observe wing clearances when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane.

Avoid holes and ruts when taxiing over uneven ground.

Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones, gravel or any loose material that may cause damage to the propeller blades.

4.19 GROUND CHECK

Set the parking brake. The magnetos should be checked at 2000 RPM with the propeller set at high RPM. Drop off on either magneto should not exceed 175 RPM and the difference between the magnetos should not exceed 50 RPM. Operation on one magneto should not exceed 10 seconds.

Check the vacuum gauge; the indicator should read 5.0" $\pm$.1" Hg at 2000 RPM.

Check the annunciator panel lights with the press-to-test button. Also check the air conditioner and the alternate air.

The propeller control should be moved through its complete range to check for proper operation, and then placed in full "INCREASE" rpm for takeoff. To obtain maximum rpm, push the pedestal mounted control fully forward on the instrument panel. Do not allow a drop of more than 500 RPM during this check. In cold weather the propeller control should be cycled from high to low RPM at least three times before takeoff to make sure that warm engine oil has circulated.

The electric fuel pump should be turned "OFF" after starting or during warm-up to make sure that the engine driven pump is operating. Prior to takeoff the electric pump should be turned ON again to prevent loss of power during takeoff should the engine driven pump fail. Check both oil temperature and oil pressure. The temperature may be low for some time if the engine is being run for the first time of the day. The engine is warm enough for takeoff when the throttle can be opened without the engine faltering.

4.21 BEFORE TAKEOFF

All aspects of each particular takeoff should be considered prior to executing the takeoff procedure.

On aircraft equipped with the backup gear extender, if the gear selector switch is placed in the gear up position after takeoff, before reaching the airspeed at which the system no longer commands gear down*, the gear will not retract. For obstacle clearance on takeoff and for takeoffs from high altitude airports, the landing gear can be retracted after lift-off at the pilot's discretion by placing the gear selector switch in the UP position and the latching the emergency gear lever in the OVERRIDE ENGAGED position. If desired, the OVERRIDE ENGAGED position can be selected and latched before takeoff, and the gear will then retract as soon as the gear selector switch is placed in the UP position. Care should always be taken not to retract the gear prematurely, or the aircraft could settle back onto the runway. If the override lock is used for takeoff, it should be disengaged as soon as sufficient airspeed and terrain clearance are obtained, to return the gear system to normal operation. For normal operation, the pilot should extend and retract the gear with the gear selector switch located on the instrument panel, just as he would if the backup gear extender system were not installed.

If the airplane is to be operated with the rear cabin door removed, it is recommended that all passengers wear parachutes.

After all aspects of the takeoff are considered, a pretakeoff check procedure must be performed.

Turn ON the master switch and check and set all of the flight instruments as required. Check the fuel selector to make sure it is on the proper tank (fullest). Turn ON the electric fuel pump and check the engine gauges. The alternate air should be in the CLOSED position.

All seat backs should be erect.

Open the cowl flaps. The mixture and propeller control levers should be set and the seat belts and shoulder harness fastened. Fasten the seat belts snugly around the empty seats.

Exercise and set the flaps and trim tab. Ensure proper flight control movement and response. All doors should be properly secured and latched. On air conditioned models, the air conditioner must be OFF to ensure normal takeoff performance.

Release the parking brake.

4.23 TAKEOFF

NORMAL TECHNIQUE (No Performance Chart Furnished)

When the available runway length is well in excess of that required and obstacle clearance is no factor, the normal takeoff technique may be used. The flaps should be set in the retracted position and the pitch trim set slightly aft of neutral. Align the airplane with the runway, apply full power, and accelerate to 75 to 85 KIAS. Apply back pressure to the control wheel to lift off, then control pitch attitude as required to attain the desired climb speed. Retract the landing gear when a straight-ahead landing on the runway is no longer possible. Since takeoff distances with this technique will vary, performance charts are not furnished.

*Approximately 81 KIAS at sea level to approximately 100 KIAS at 10,000 ft with a straight line variation between.

MAXIMUM PERFORMANCE WITH FLAPS RETRACTED (See Chart, Section 5)

Align the airplane with the runway, set the brakes, adjust the pitch trim slightly aft of neutral, and advance the throttle to full power. Release the brakes and allow the airplane to accelerate to 66 to 70 KIAS, depending on weight, and apply back pressure to rotate for lift off. After breaking ground, accelerate to 68 to 74 KIAS and retract gear**. When clear of obstacles, increase the climb speed to that desired.

Achievement of the charted performance requires strict adherence to the associated speeds, and familiarity with the airplane's flight characteristics. Note that takeoff distances are increased for center of gravity locations forward of the 85 inch datum (see chart, Section 5).

SHORT FIELD TECHNIQUE (See Chart, Section 5)

For short or soft field takeoff, flaps should be lowered to the second notch, and the pitch trim set slightly aft of neutral. Align the airplane with the runway, set the brakes, and advance the throttle to full power.

Release the brakes, allow the airplane to accelerate to 64 KIAS, and apply back pressure to rotate for lift off. After breaking ground, accelerate to 66 KIAS and retract the gear**. Slowly retract the flaps while continuing to accelerate to the desired climb speed.

Achievement of the charted performance requires strict adherence to the associated speeds, and familiarity with the airplane's flight characteristics. Note that takeoff distances are increased for center of gravity locations forward of the 85 inch datum (see chart, Section 5).

4.25 CLIMB

The best rate of climb at gross weight will be obtained at 92 KIAS. The best angle of climb may be obtained at 87 KIAS. At lighter than gross weight these speeds are reduced somewhat*. For climbing enroute, a speed of 104 KIAS is recommended.

When reaching the desired altitude, the electric fuel pump may be turned off.

NOTE

On aircraft equipped with the backup gear extender, to prevent the landing gear from extending automatically during climbs at best *angle* of climb speed at any altitude, or best *rate* of climb speed above approximately 15,000 feet *density* altitude, it may be necessary to select OVERRIDE ENGAGED. This altitude decreases with reduced climb power and increases with increased climb speed.

*To obtain the performance presented in the Performance Section of this handbook, full power (full throttle and 2700 rpm) must be used

**If desired, on aircraft equipped with backup gear extender, the OVERRIDE ENGAGED position can be selected and latched before takeoff. The gear will now retract as soon as the gear selector switch is placed in the UP position. Care should be taken not to retract the gear prematurely, in event aircraft should settle back onto the runway. If the override lock is used for takeoff, disengage as soon as sufficient terrain and obstacle clearance is obtained, to return the gear system to normal operation.

4.27 CRUISING

The cruising speed of the Lance II is determined by many factors, including power setting, altitude, temperature, loading and equipment installed in the airplane.

The normal maximum cruising power is 75% of the rated horsepower of the engine. When selecting cruising RPM below 2300, limiting manifold pressure for continuous operation, as specified by the appropriate "Avco-Lycoming Operator's Manual," should be observed.

To obtain the desired power, set the manifold pressure and RPM according to the power setting table in this manual.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes. The mixture should be leaned during cruising operation when 75% power or less is being used. If any doubt exists as to the amount of power being used, the mixture should be in the full "RICH" position for all operations under 5000 feet.

To lean the mixture, disengage the lock and pull the mixture control until the engine becomes rough, indicating that the lean mixture limit has been reached in the leaner cylinders. Then enrich the mixture by pushing the control towards the instrument panel until engine operation becomes smooth. The fuel flow meter will give a close approximation of the fuel being consumed. The low side of the power setting, as shown on the fuel flow meter, indicates best economy for that percent of power while the high side indicates best power.

If the airplane is equipped with the optional exhaust gas temperature (EGT) gauge, a more accurate means of leaning is available to the pilot. For this procedure, refer to the "Avco-Lycoming Operator's Manual."

In order to keep the airplane in best lateral trim during cruise flight, the fuel should be used alternately from each tank at one hour intervals.

Always remember that the electric fuel pump should be turned "ON" before switching tanks, and should be left on for a short period thereafter. To preclude making a hasty selection, and to provide continuity of flow, the selector should be changed to another tank before fuel is exhausted from the tank in use. The electric fuel pump should be normally "OFF" so that any malfunction of the engine driven fuel pump is immediately apparent. If signs of fuel starvation should occur at any time during flight, fuel exhaustion should be suspected, at which time the fuel selector should be immediately positioned to a full tank and the electric fuel pump switched to the "ON" position.

4.29 APPROACH AND LANDING

Accomplish the Landing Check List early in the landing approach. Depending on field length and other factors the following procedures are appropriate:

NORMAL TECHNIQUE (No Performance Chart Furnished)

When available runway length is in excess of required runway length, a normal approach and landing technique may be utilized. The aircraft should be flown down the final approach course at 95 KIAS with power required to maintain the desired approach angle. The amount of flap used during approach and landing and the speed of the aircraft at contact with the runway should be varied according to the landing surface, conditions of wind and aircraft loading. It is generally good practice to contact the ground at the minimum possible safe speed consistent with existing conditions. As landing distances with this technique will vary, performance charts are not furnished.

SHORT FIELD LANDING APPROACH POWER OFF (See Chart, Section 5)

When available runway length is minimal or obstacle clearance to landing is of major concern, this approach/landing technique may be employed. The aircraft should be flown on the final approach at 75 KIAS with full flaps, gear down and idle power. The glide path should be stabilized as early as possible. Reduce the speed slightly during landing flareout and contact the ground close to stall speed. After ground contact, retract the flaps and apply full aft travel on the control wheel and maximum braking consistent with existing conditions.

SHORT FIELD LANDING APPROACH POWER ON (No Performance Chart Furnished)

It may sometimes be advantageous to use this approach technique when obstacle clearance during landing is of concern. The aircraft should be flown with full flaps, gear down and power sufficient for an approach path that will clear the obstacle. When obstacle clearance is assured, reduce the power and assume the 75 KIAS approach speed to landing flare. After ground contact, close the throttle, retract the flaps, apply full aft travel on the control wheel and maximum braking consistent with existing conditions. As landing distances with this technique will vary, performance charts are not furnished.

4.31 GO-AROUND

To initiate a go-around from a landing approach, the throttle should be advanced to maximum power while the pitch attitude is increased. Allow the airplane to accelerate to the best angle of climb speed (87 KIAS) for obstacle clearance or to the best rate of climb speed (92 KIAS) if obstacles are not a factor. Retract the landing gear and slowly retract the flaps when a positive climb is established. Reset the longitudinal trim as required.

NOTE

When power is advanced for a go-around from a low power, full flap approach, a nose down pitch will occur which must be countered with an aft control input.

4.33 STOPPING ENGINE

At the pilot's discretion, the flaps should be raised and the electric fuel pump turned "OFF."

NOTE

The flaps must be placed in the "UP" position for the flap step to support weight. Passengers should be cautioned accordingly.

The air conditioner and radios should be turned "OFF," the propeller set in the full "INCREASE" position, and the engine stopped by disengaging the mixture control lock and pulling the mixture control back to idle cut-off. The throttle should be left full aft to avoid engine vibration while stopping. Then the magneto and master switches must be turned "OFF."

4.35 PARKING

If necessary, the airplane should be moved on the ground with the aid of the nose wheel tow bar provided with each airplane and secured behind the rear seats. The aileron and stabilator controls should be secured by looping the safety belt through the control wheel and pulling it snug. The flaps are locked when in the "UP" position and should be left retracted.

Tie downs can be secured to rings provided under each wing and to the tail skid. The rudder is held in position by its connections to the nose wheel steering and normally does not have to be secured.

4.37 STALLS

The stall characteristics of the Lance II are conventional. An approaching stall is indicated by a stall warning horn which is activated between five and ten knots above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall.

The gross weight stalling speed with power off and full flaps is 52 KIAS. With the flaps up this speed is increased 1 KT. Loss of altitude during stalls can be as great as 550 feet, depending on configuration and power.

NOTE

The stall warning system is inoperative with the master switch "OFF."

During preflight, the stall warning system should be checked by turning the master switch "ON," lifting the detector and checking to determine if the horn is actuated. The master switch should be returned to the "OFF" position after the check is complete.

4.39 TURBULENT AIR OPERATION

In keeping with good operating practice used in all aircraft, it is recommended that when turbulent air is encountered or expected, the airspeed be reduced to maneuvering speed to reduce the structural loads caused by gusts and to allow for inadvertent speed build-ups which may occur as a result of the turbulence or of distractions caused by the conditions.

4.41 LANDING GEAR

Some aircraft are equipped with an airspeed - power sensing system (backup gear extender) which extends the landing gear under low airspeed - power conditions* even though the pilot may not have selected gear down. This system will also prevent retraction of the landing gear by normal means when the airspeed - power values are below a predetermined minimum. To override this system or to hold the emergency gear lever in the OVERRIDE ENGAGED position without maintaining manual pressure on the emergency gear lever, pull the lever full up and push the latch down. To release the override, pull lever up to disengage the latch, then release lever. For normal operation, the pilot should extend and retract the gear with the gear selector switch located on the instrument panel, just as he would if the backup gear extender system were not installed.

The pilot should become familiar with the function and significance of the landing gear position indicators and warning lights.

The red gear warning light on the instrument panel and the horn operate simultaneously in flight when the throttle is reduced to where the manifold pressure is approximately 14 inches of mercury or below, and the gear selector is not in the DOWN position. On aircraft equipped with the backup gear extender, this warning will also occur during flight when the system has lowered the landing gear and the gear selector switch is not in the DOWN position and the throttle is not full OPEN.

The red gear warning light on the instrument panel and the horn will also operate simultaneously on the ground when the master switch is ON and the gear selector switch is in the UP position.

WARNING

Radio lights' dimmer switch must be off to obtain gear lights full intensity during daytime flying. When aircraft is operated at night and radio lights' dimmer switch is turned on, gear lights will automatically dim.

The three green lights on the instrument panel operate individually as each associated gear is locked in the extended position.

On aircraft equipped with the backup gear extender, the yellow AUTO EXT OFF light immediately below the gear selector switch flashes whenever the emergency gear lever is in the OVERRIDE ENGAGED position.

When the Emergency Landing Gear Extension Procedure (Paragraph 3.27) is performed for training purposes, the following changes must be made to the procedure in order to prevent the hydraulic pump from activating during the procedure. On aircraft equipped with the backup gear extender, the landing gear selector must be left in the UP position until all gear position indicators are green. On aircraft which do NOT have the backup gear extender, a pull type LANDING GEAR PUMP circuit breaker is installed and must be pulled prior to executing the emergency extension procedure. The circuit breaker must be reset after the completion of the procedure to allow normal gear system operation.

4.43 WEIGHT AND BALANCE

It is the responsibility of the owner and pilot to determine that the airplane remains within the allowable weight vs. center of gravity envelope while in flight.

For weight and balance data, refer to Section 6 (Weight and Balance).

*Approximately 103 KIAS at any altitude, power off.

TABLE OF CONTENTS

SECTION 5

PERFORMANCE

Paragraph No.		Page No.
5.1	General	5-1
5.3	Introduction to Performance and Flight Planning	5-1
5.5	Flight Planning Example	5-3
5.7	Performance Graphs	5-7
	List of Figures	5-7

SECTION 5 PERFORMANCE

5.1 GENERAL

All of the required (FAA regulations) and complementary performance information applicable to the Lance II is provided by this section.

Performance information associated with those optional systems and equipment which require handbook supplements is provided in Section 9 (Supplements).

5.3 INTRODUCTION TO PERFORMANCE AND FLIGHT PLANNING

The performance information presented in this section is based on measured Flight Test Data corrected to I.C.A.O. standard day conditions and analytically expanded for the various parameters of weight, altitude, temperature, etc.

The performance charts are unfactored and do not make any allowance for varying degrees of pilot proficiency or mechanical deterioration of the aircraft. This performance, however, can be duplicated by following the stated procedures in a properly maintained airplane.

Effects of conditions not considered on the charts must be evaluated by the pilot, such as the effect of soft or grass runway surface on takeoff and landing performance, or the effect of winds aloft on cruise and range performance. Endurance can be grossly affected by improper leaning procedures, and inflight fuel flow quantity checks are recommended.

REMEMBER. To get chart performance, follow the chart procedures.

The information provided by paragraph 5.5 (Flight Planning Example) outlines a detailed flight plan using performance charts in this section. Each chart includes its own example to show how it is used.

WARNING

Performance information derived by extrapolation beyond the limits shown on the charts should not be used for flight planning purposes.

THIS PAGE INTENTIONALLY LEFT BLANK

5.5 FLIGHT PLANNING EXAMPLE

(a) Aircraft Loading

The first step in planning our flight is to calculate the airplane weight and center of gravity by utilizing the information provided by Section 6 (Weight and Balance) of this handbook.

The basic empty weight for the airplane as licensed at the factory has been entered in Figure 6-5. If any alterations to the airplane have been made effecting weight and balance, reference to the aircraft logbook and Weight and Balance Record (Figure 6-7) should be made to determine the current basic empty weight of the airplane.

Make use of the Weight and Balance Loading Form (Figure 6-11) and the C.G. Range and Weight graph (Figure 6-15) to determine the total weight of the airplane and the center of gravity position.

After proper utilization of the information provided the following weights have been determined for consideration in the flight planning example.

The landing weight cannot be determined until the weight of the fuel to be used has been established [refer to item (g)(1)].

(1) Basic Empty Weight	2100 lbs.
(2) Occupants (6 x 170 lbs)	1020 lbs.
(3) Baggage and Cargo	60 lbs.
(4) Fuel (6 lb/gal x 50)	300 lbs.
(5) Takeoff Weight	3480 lbs.
(6) Landing Weight	
(a)(5) minus (g)(1), (3480 lbs. minus 90 lbs.)	3390 lbs.

The takeoff weight is below the maximum 3600 lbs. and the weight and balance calculations have determined the C.G. position within the approved limits.

(b) Takeoff and Landing

After determining the aircraft loading, all aspects of takeoff and landing must be considered.

All of the existing conditions at the departure and destination airport must be acquired, evaluated and maintained throughout the flight.

Apply the departure airport conditions and takeoff weight to the appropriate Takeoff Performance and Takeoff Ground Roll graph (Figures 5-5, 5-7, 5-9, and 5-11) to determine the length of runway necessary for the takeoff and/or the barrier distance.

The landing distance calculations are performed in the same manner using the existing conditions at the destination airport and, when established, the landing weight.

The conditions and calculations for the example flight are listed below. The takeoff and landing distances required for the example flight have fallen well below the available runway lengths.

	Departure Airport	Destination Airport
(1) Pressure Altitude	1200 ft.	400 ft.
(2) Temperature	15.6°C	23.9°C
(3) Wind Component	10 KTS	0 KTS
(4) Runway Length Available	3000 ft.	4600 ft.
(5) Runway Required	2240 ft.*	1740 ft.**

NOTE

The remainder of the performance charts used in this flight plan example assume a no wind condition. The effect of winds aloft must be considered by the pilot when computing climb, cruise and descent performance.

(c) Climb

The next step in the flight plan example is to determine the necessary climb segment components.

The desired cruise pressure altitude and corresponding cruise outside air temperature values are the first variables to be considered in determining the climb components from the Fuel, Distance, and Time to Climb graph (Figure 5-17). After the fuel, distance and time for the cruise pressure altitude and outside air temperature values have been established, apply the existing conditions at the departure field to graph (Figure 5-17). Now, subtract the values obtained from the graph for the field of departure conditions from those for the cruise pressure altitude.

The remaining values are the true fuel, distance and time components for the climb segment of the flight plan corrected for field pressure altitude and temperature.

The following values were determined from the above instructions in the flight planning example.

(1) Cruise Pressure Altitude	6000 ft.
(2) Cruise OAT	5.6°C
(3) Time to Climb (8 min. minus 1.5 min.)	6.5 min.***
(4) Distance to Climb (14 nautical miles minus 3 nautical miles)	11 nautical miles ***
(5) Fuel to Climb (3.2 gal. minus 0.4 gal.)	2.8 gal.***

*reference Figure 5-5

**reference Figure 5-33

***reference Figure 5-17

(d) Descent

The descent data will be determined prior to the cruise data to provide the descent distance for establishing the total cruise distance.

Utilizing the cruise pressure altitude and OAT, determine the basic fuel, distance and time for descent (Figure 5-29). These figures must be adjusted for the field pressure altitude and temperature at the destination airport. To find the necessary adjustment values, use the existing pressure altitude and temperature conditions at the destination airport as variables to find the fuel, distance and time values from the graph (Figure 5-29). Now subtract the values obtained from the field conditions from the values obtained from the cruise conditions to find the true fuel, distance and time values needed for the flight plan.

The values obtained by proper utilization of the graphs for the descent segment of the example are shown below.

- | | |
|--|--------------------|
| (1) Time to Descend (12.5 min. minus 2.5 min.) | 10 min.* |
| (2) Distance to Descend (33 nautical miles minus 7 nautical miles) | 26 nautical miles* |
| (3) Fuel to Descend (4 gal. minus 1 gal.) | 3 gal.* |

(e) Cruise

Using the total distance to be traveled during the flight, subtract the previously calculated distance to climb and distance to descend to establish the total cruise distance. Refer to the appropriate Avco Lycoming Operator's Manual and the Power Setting Table (Figure 5-19) when selecting the cruise power setting. The established pressure altitude and temperature values and the selected cruise power should now be utilized to determine the true airspeed from the appropriate Speed Power graph (Figure 5-21 or 5-23).

Calculate the cruise fuel flow for the cruise power setting from the information provided by the Avco Lycoming Operator's Manual.

The cruise time is found by dividing the cruise distance by the cruise speed and the cruise fuel is found by multiplying the cruise fuel flow by the cruise time.

The cruise calculations established for the cruise segment of the flight planning example are as follows:

- | | |
|--|--------------------|
| (1) Total Distance | 130 nautical miles |
| (2) Cruise Distance | |
| (e)(1) minus (c)(4) minus (d)(2), (130 nautical miles | |
| minus 11 nautical miles minus 26 nautical miles) | 93 nautical miles |
| (3) Cruise Power | 65% rated power |
| (4) Cruise Speed | 142 KTS TAS** |
| (5) Cruise Fuel | 13.8 GPH |
| (6) Cruise Time | |
| (e)(2) divided by (e)(4), (93 nautical miles divided | |
| by 142 KTS) | .66 hrs. (40 min.) |
| (7) Cruise Fuel | |
| (e)(5) multiplied by (e)(6), (13.8 GPH multiplied by .66 hrs.) | 9.11 gal. |

*reference Figure 5-29

**reference Figure 5-23

(f) Total Flight Time

The total flight time is determined by adding the time to climb, the time to descend and the cruise time. Remember! The time values taken from the climb and descent graphs are in minutes and must be converted to hours before adding them to the cruise time.

The following flight time is required for the flight planning example.

(1) Total Flight Time

(c)(3) plus (d)(1) plus (e)(6), (.11 hrs. plus .17 hrs. plus .66 hrs.)
(6.5 min. plus 10 min. plus 40 min.) 56.5 min.

(g) Total Fuel Required

Determine the total fuel required by adding the fuel to climb, the fuel to descend and the cruise fuel. When the total fuel (in gallons) is determined, multiply this value by 6 lb/gal to determine the total fuel weight used for the flight.

The total fuel calculations for the example flight plan are shown below.

(1) Total Fuel Required

(c)(5) plus (d)(3) plus (e)(7), (2.8 gal. plus 3.0 gal. plus 9.11 gal.) 14.91 gal.
14.91 gal. multiplied by 6 lb/gal. 90 lbs.

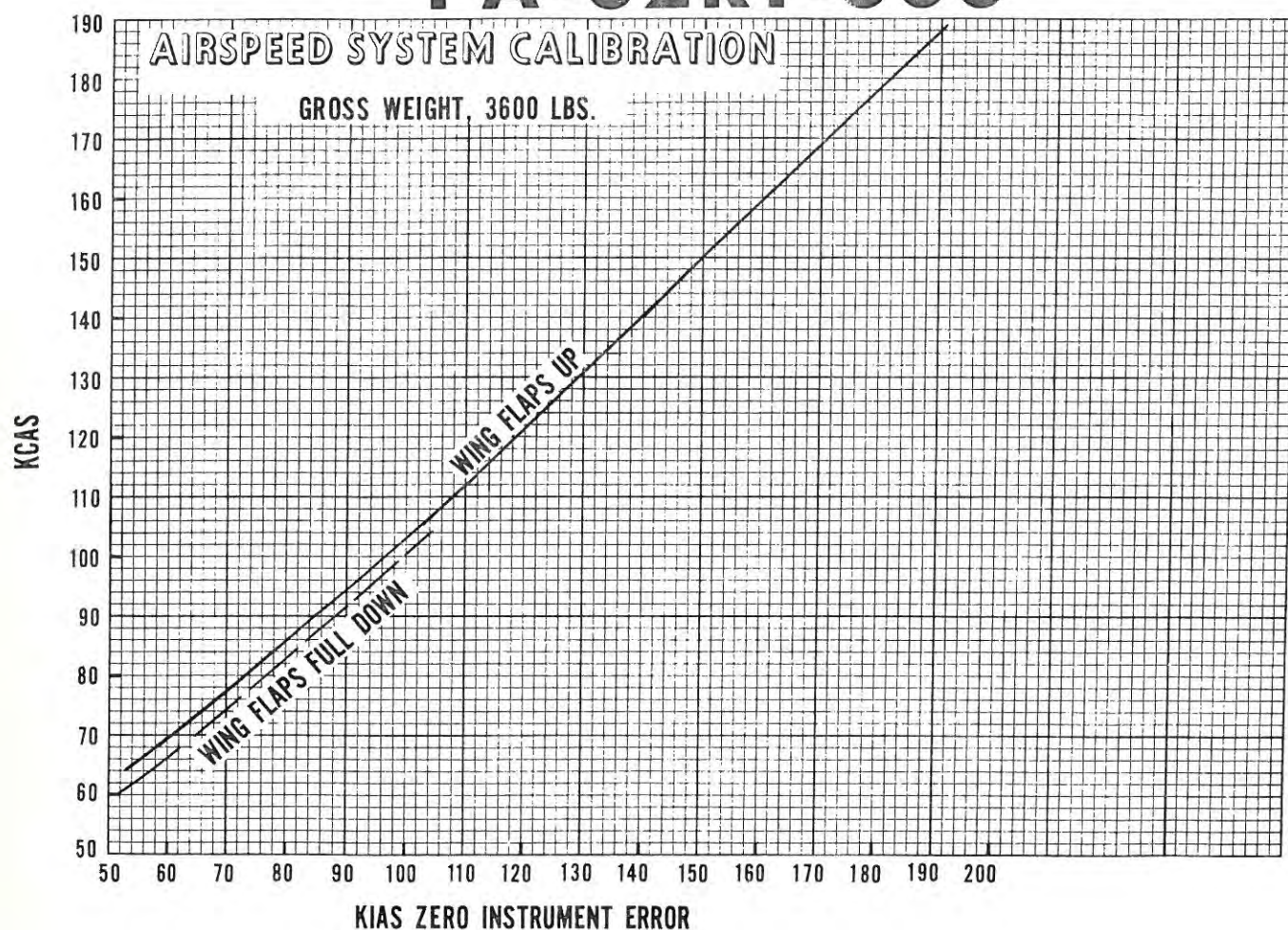
5.7 PERFORMANCE GRAPHS

LIST OF FIGURES

Figure No.		Page No.
5-1	Airspeed System Calibration	5-9
5-3	Stall Speed vs Angle of Bank	5-10
5-5	Flaps Second Notch Takeoff Performance	5-11
5-7	Flaps Second Notch Takeoff Ground Roll	5-12
5-9	Flaps Up Takeoff Performance	5-13
5-11	Flaps Up Takeoff Ground Roll	5-14
5-13	Gear Up Rate of Climb	5-15
5-15	Gear Down Rate of Climb	5-16
5-17	Fuel, Distance and Time to Climb	5-17
5-19	Power Setting Table	5-19
5-21	Speed Power - Performance Cruise	5-21
5-23	Speed Power - Economy Cruise	5-22
5-25	Range	5-23
5-27	Endurance	5-24
5-29	Fuel, Distance and Time to Descend	5-25
5-31	Glide Range	5-26
5-33	Landing Performance	5-27
5-35	Landing Ground Roll	5-28
5-37	Landing Performance (Heavy Duty Group)	5-29
5-39	Landing Ground Roll (Heavy Duty Group)	5-30

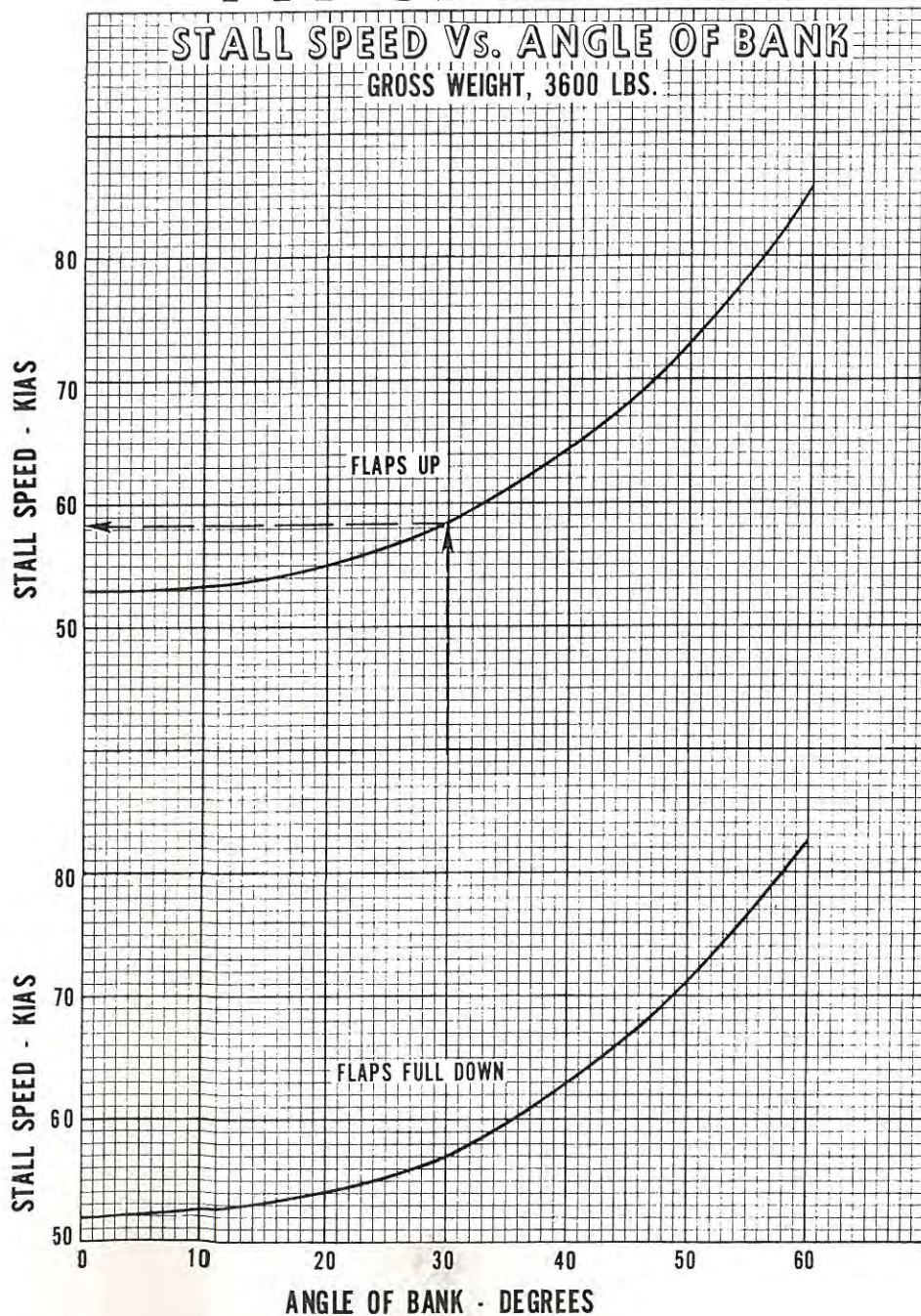
THIS PAGE INTENTIONALLY LEFT BLANK

PA-32RT-300



AIRSPPEED SYSTEM CALIBRATIONS
Figure 5-1

PA-32RT-300



Example:
Flaps: Up
Angle of bank: 30°
Stall speed: 58.5 KIAS

STALL SPEED VS. ANGLE OF BANK
Figure 5-3

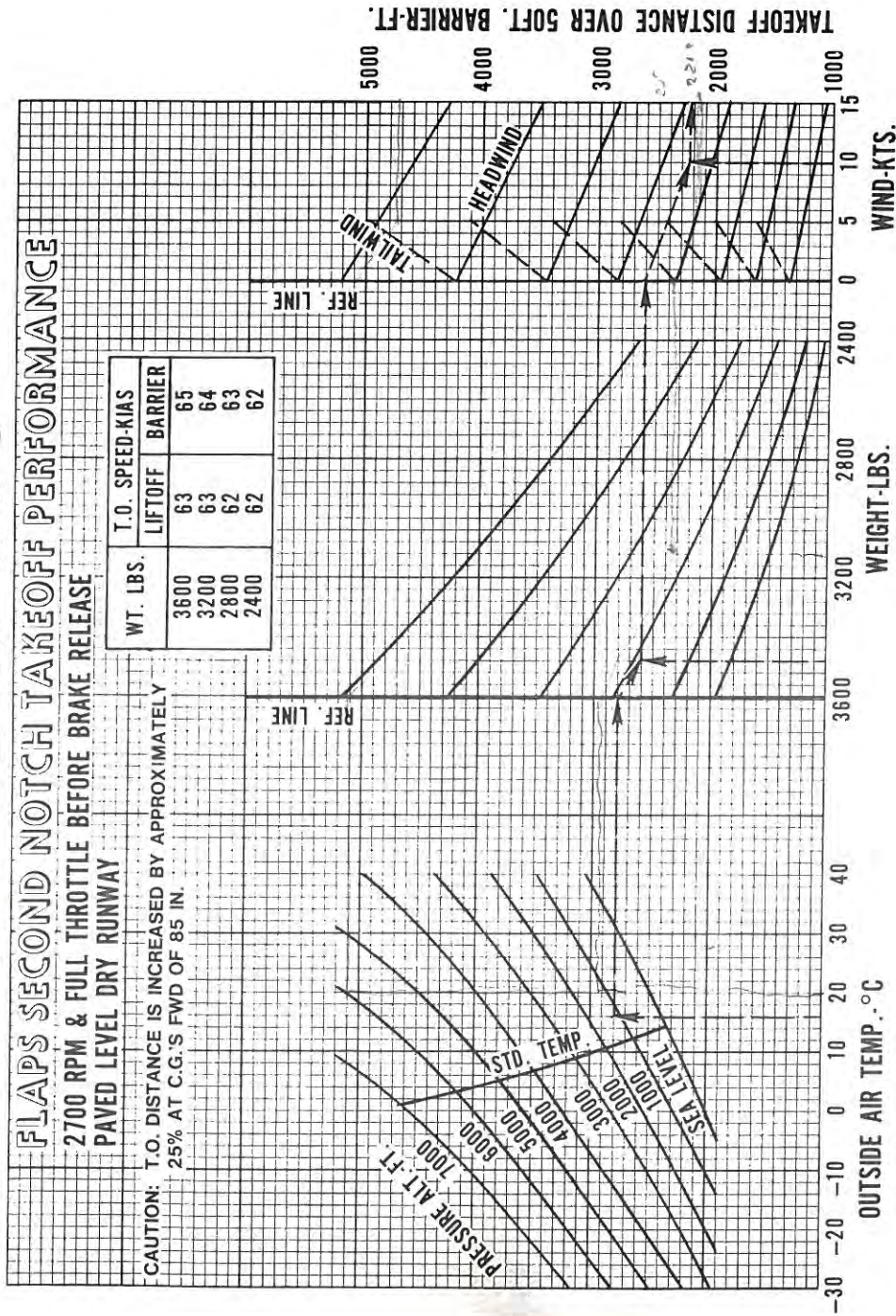
PA-32RT-300

FLAPS SECOND NOTCH TAKEOFF PERFORMANCE

2700 RPM & FULL THROTTLE BEFORE BRAKE RELEASE
PAVED LEVEL DRY RUNWAY

WT. LBS.	T.O. SPEED-KIAS	
	LIFTOFF	BARRIER
3600	63	65
3200	63	64
2800	62	63
2400	62	62

CAUTION: T.O. DISTANCE IS INCREASED BY APPROXIMATELY
25% AT C.G.'S FWD OF 85 IN.



Example:
Outside air temp.: +16° C
Airport pressure altitude: 1200 ft.
Gross weight: 3480 lbs.
Headwind: 10 kts.
Takeoff distance: 2240 ft.

FLAPS SECOND NOTCH TAKEOFF PERFORMANCE

Figure 5-5

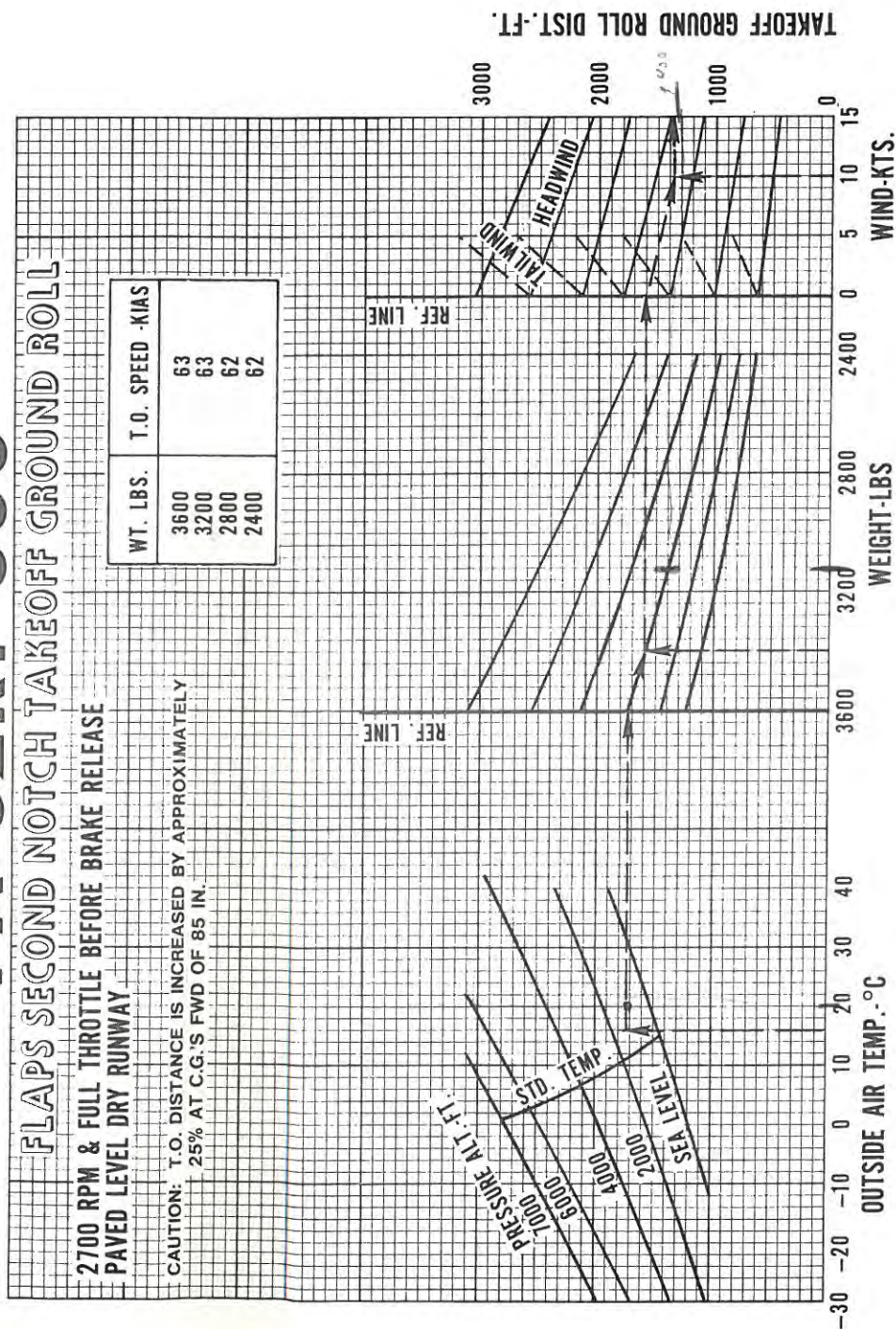
PA-32RT-300

FLAPS SECOND NOTCH TAKEOFF GROUND ROLL

2700 RPM & FULL THROTTLE BEFORE BRAKE RELEASE
PAVED LEVEL DRY RUNWAY

CAUTION: T.O. DISTANCE IS INCREASED BY APPROXIMATELY
25% AT C.G.'S FWD OF 85 IN.

WT. LBS.	T.O. SPEED - KIAS
3600	63
3200	63
2800	62
2400	62



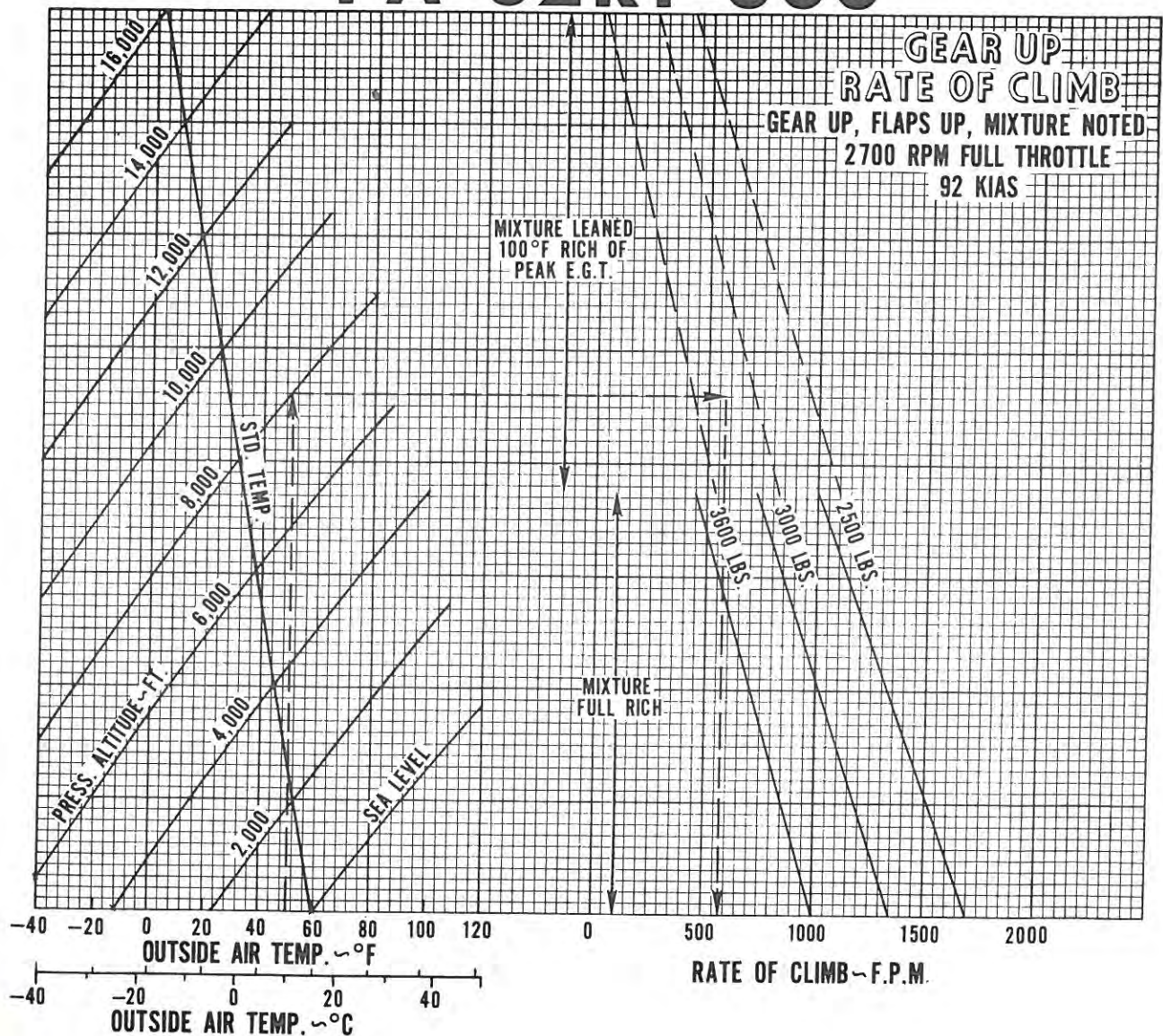
Example:

Outside air temp.: +16 °C
Airport pressure altitude: 1200 ft.
Gross weight: 3480 lbs.
Headwind: 10 kts.
Takeoff ground roll: 1360 ft.

FLAPS SECOND NOTCH TAKEOFF GROUND ROLL

Figure 5-7

PA-32RT-300



Example:

Climb pressure altitude: 8000 ft.

Outside air temp.: +10° C

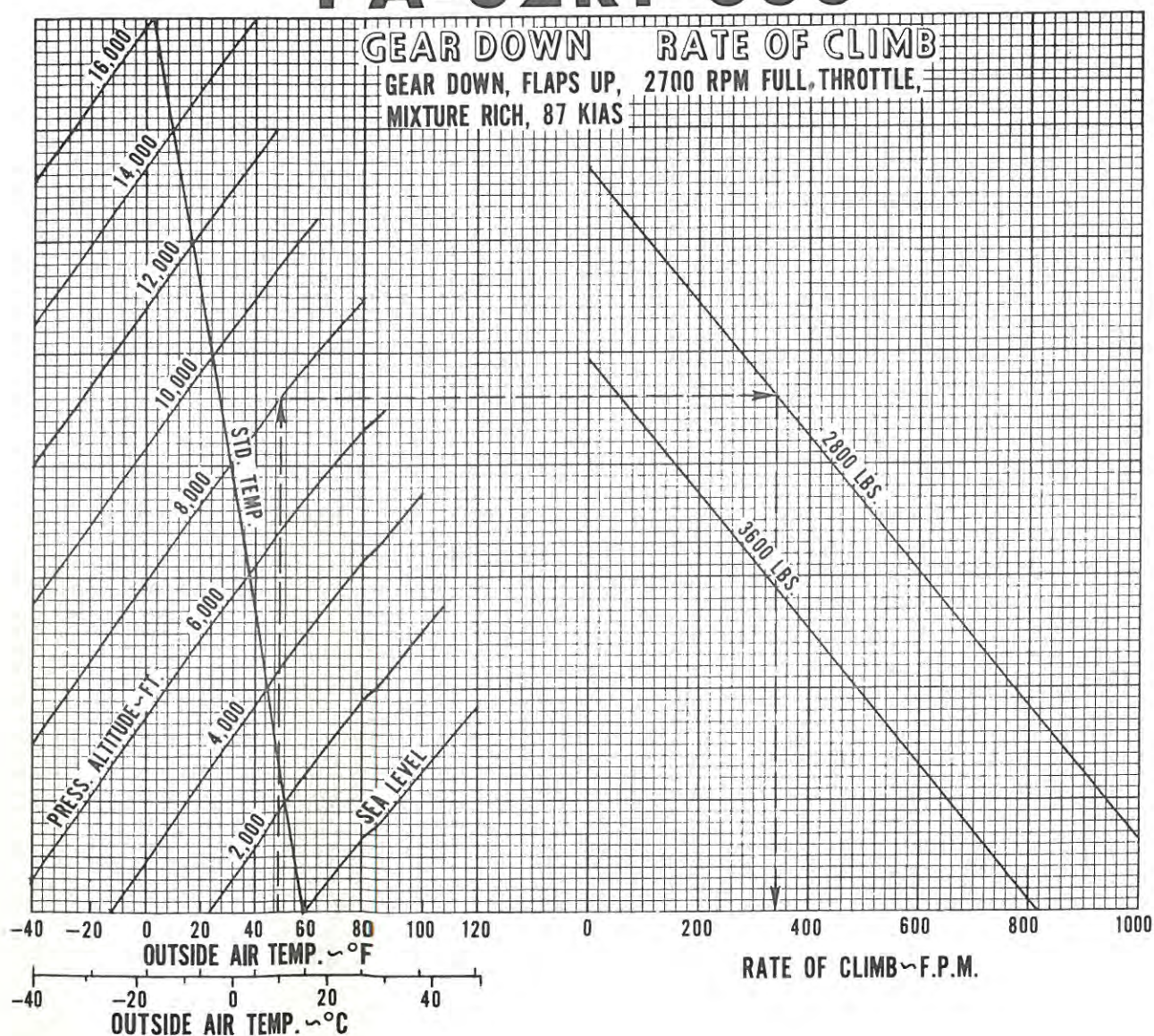
Gross weight: 3400 lbs.

Rate of climb: 570 fpm

GEAR UP RATE OF CLIMB

Figure 5-13

PA-32RT-300



Example:

Climb pressure altitude: 8000 ft.

Outside air temp.: +10° C

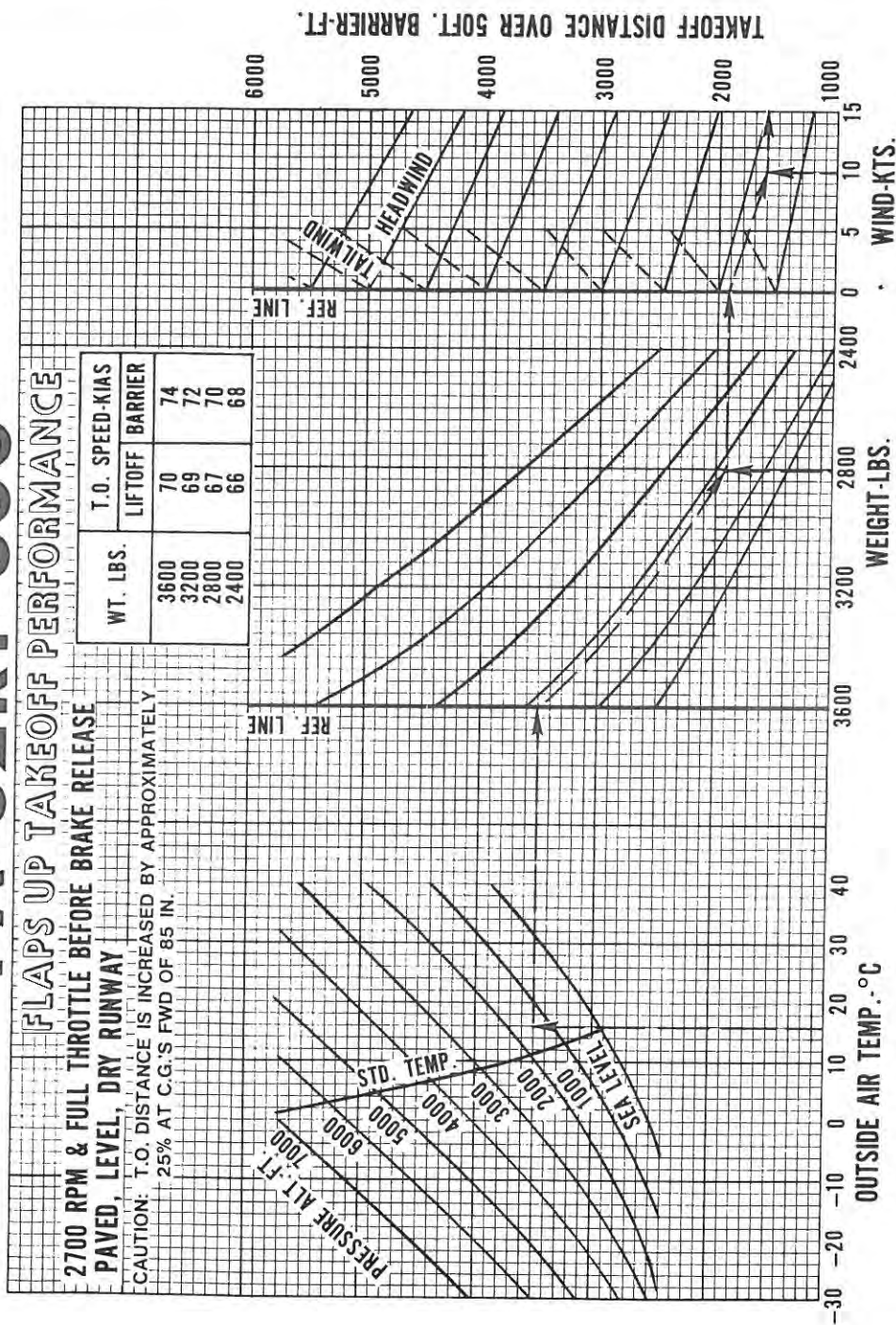
Gross weight: 2800 lbs.

Rate of climb: 340 fpm

GEAR DOWN RATE OF CLIMB

Figure 5-15

PA-32RT-300



Example:

Outside air temp.: +16 °C
Airport pressure altitude: 1200 ft.
Gross weight: 2800 lbs.
Headwind: 10 kts.
Takeoff distance: 1610 ft.

FLAPS UP TAKEOFF PERFORMANCE

Figure 5-9

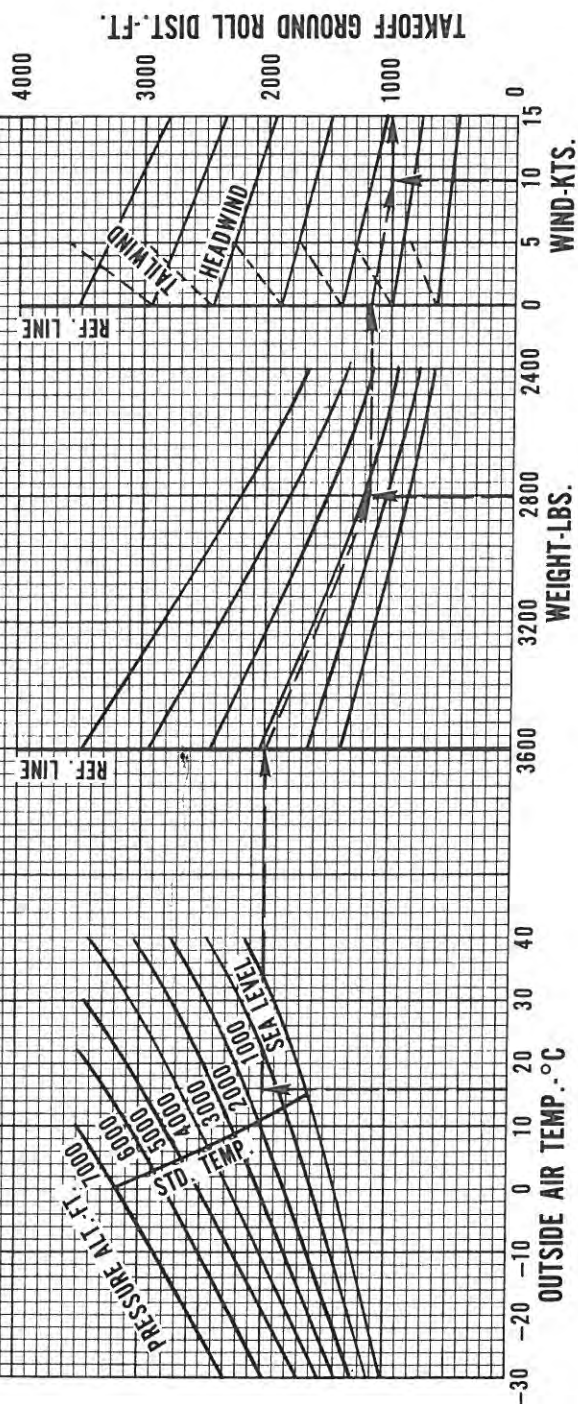
PA-32RT-300

FLAPS UP TAKEOFF GROUND ROLL

2700 RPM & FULL THROTTLE BEFORE BRAKE RELEASE
PAVED LEVEL DRY RUNWAY

CAUTION: T.O. DISTANCE IS INCREASED BY APPROXIMATELY
25% AT C.G.'S FWD OF 85 IN.

WT. LBS.	T.O. SPEED-KIAS LIFTOFF
3600	70
3200	69
2800	67
2400	66



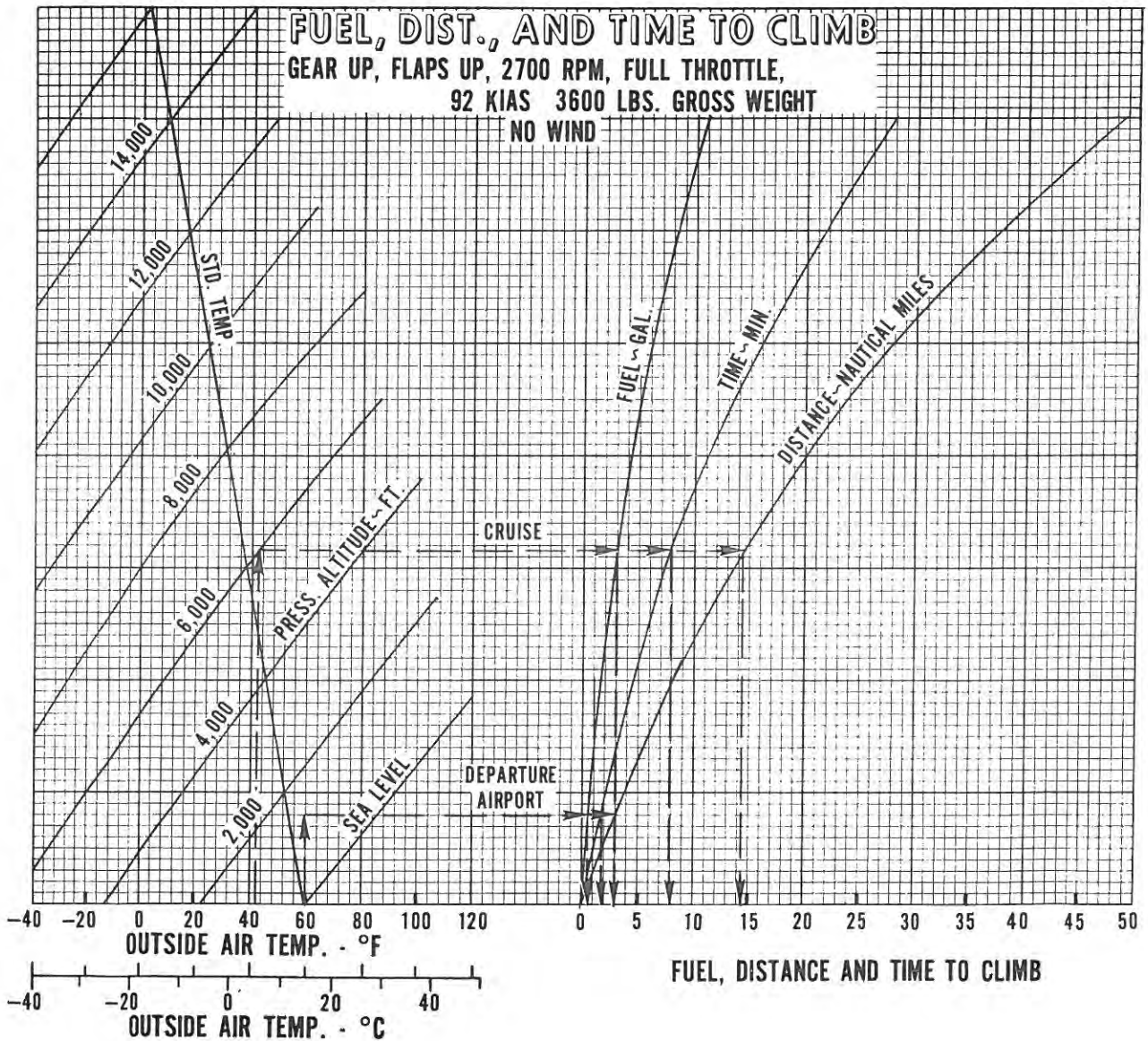
Example:

Outside air temp.: +16 °C
Airport pressure altitude: 1200 ft.
Gross weight: 2800 lbs.
Headwind: 10 kts.
Takeoff ground roll: 1000 ft.

FLAPS UP TAKEOFF GROUND ROLL

Figure 5-11

PA-32RT-300



FUEL, DISTANCE AND TIME TO CLIMB

Figure 5-17

THIS PAGE INTENTIONALLY LEFT BLANK

POWER SETTING TABLE - LYCOMING MODEL IO-540-K, -L, -M SERIES, 300 HP ENGINE

Press. Alt Feet	Std Alt Temp °F	135 HP - 45% RATED RPM AND MAN. PRESS.				165 HP - 55% RATED RPM AND MAN. PRESS.				195 HP - 65% RATED RPM AND MAN. PRESS.				225 HP - 75% RATED RPM AND MAN. PRESS.			
		2100	2200	2300	2400	2100	2200	2300	2400	2100	2200	2300	2400	2200	2300	2400	
SL	59-15	19.0	18.5	18.0	17.6	22.5	21.8	21.2	20.7	25.6	24.7	23.8	23.2	27.6	26.6	25.8	
1,000	55-12	18.8	18.3	17.8	17.4	22.3	21.6	21.0	20.5	25.3	24.4	23.5	22.9	27.3	26.3	25.5	
2,000	52-11	18.6	18.1	17.6	17.2	22.1	21.4	20.7	20.2	25.1	24.2	23.3	22.7	27.1	26.1	25.2	
3,000	48-8	18.4	17.9	17.4	17.0	21.9	21.2	20.5	20.0	24.8	23.9	23.0	22.5	26.8	25.8	24.9	
4,000	45-7	18.25	17.75	17.2	16.8	21.7	21.0	20.3	19.8	24.6	23.7	22.8	22.2	26.5	25.6	24.6	
5,000	41-5	18.1	17.6	17.0	16.6	21.5	20.8	20.1	19.6	24.3	23.5	22.5	22.0	-	25.3	24.4	
6,000	38-3	17.9	17.4	16.8	16.4	21.3	20.6	19.8	19.3	24.0	23.2	22.3	21.7	-	25.0	24.1	
7,000	34-1	17.7	17.2	16.6	16.25	21.0	20.4	19.6	19.1	23.7	22.9	22.0	21.5	-	-	23.8	
8,000	31-0	17.5	17.0	16.5	16.1	20.8	20.2	19.4	18.9	-	22.5	21.8	21.2	-	-	-	
9,000	27-2	17.3	16.8	16.3	15.9	20.6	20.0	19.2	18.6	-	-	21.5	21.0	-	-	-	
10,000	23-5	17.1	16.6	16.1	15.75	20.4	19.8	19.0	18.4	-	-	21.2	20.7	-	-	-	
11,000	19-7	16.9	16.4	15.9	15.6	20.2	19.6	18.7	18.2	-	-	-	20.4	-	-	-	
12,000	16-8	16.75	16.25	15.75	15.4	20.0	19.4	18.5	18.0	-	-	-	-	-	-	-	
13,000	12-11	16.6	16.0	15.6	15.2	-	19.2	18.3	17.7	-	-	-	-	-	-	-	
14,000	9-13	16.4	15.8	15.4	15.0	-	-	18.0	17.3	-	-	-	-	-	-	-	
15,000	5-15	16.2	15.7	15.2	14.8	-	-	-	16.9	-	-	-	-	-	-	-	

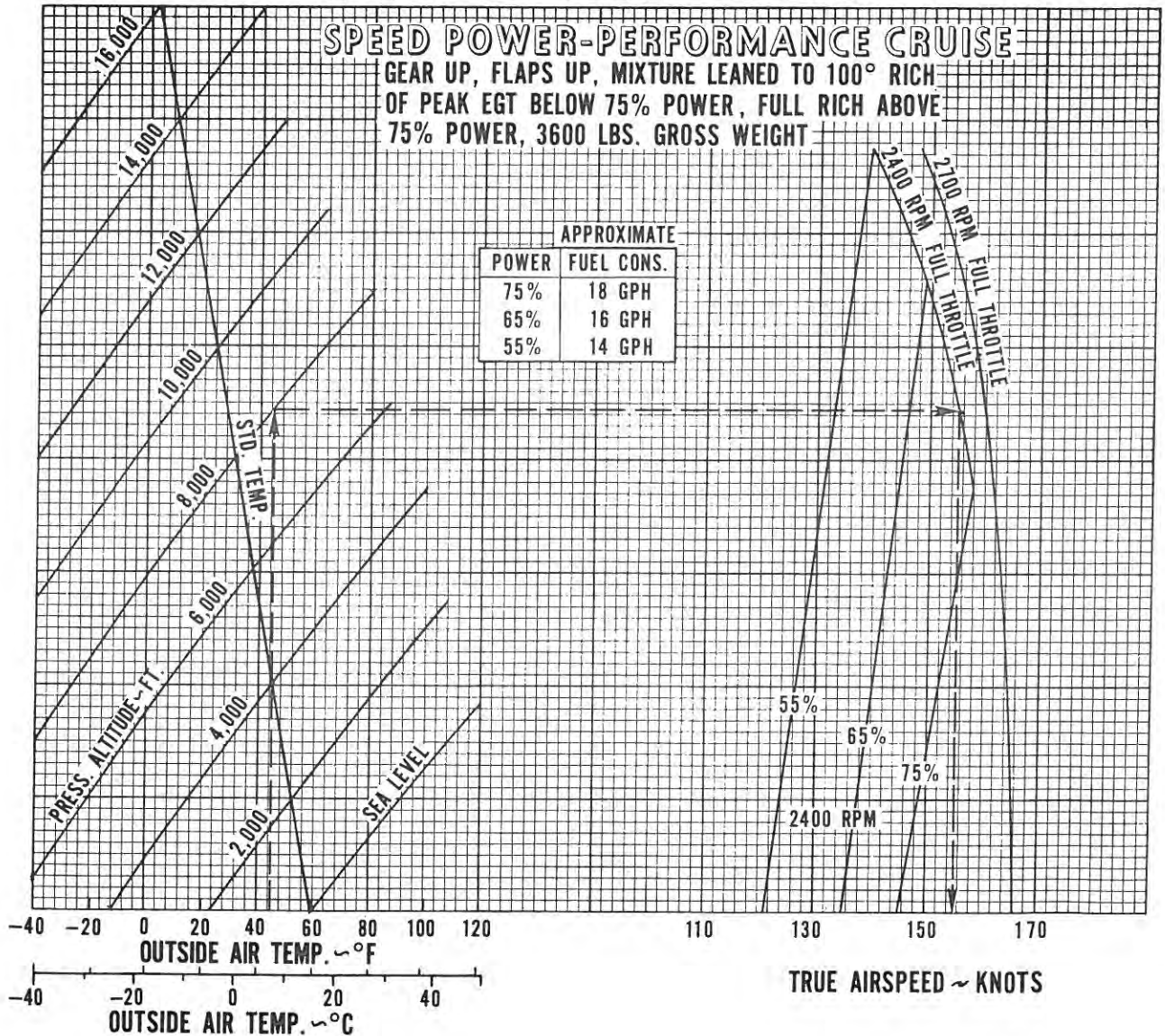
To maintain constant power, correct manifold pressure approximately 0.18" Hg for each 10°F variation in induction air temperature from standard altitude temperature. Add manifold pressure for air temperature above standard; subtract for temperature below standard.

POWER SETTING TABLE

Figure 5-19

THIS PAGE INTENTIONALLY LEFT BLANK

PA-32RT-300



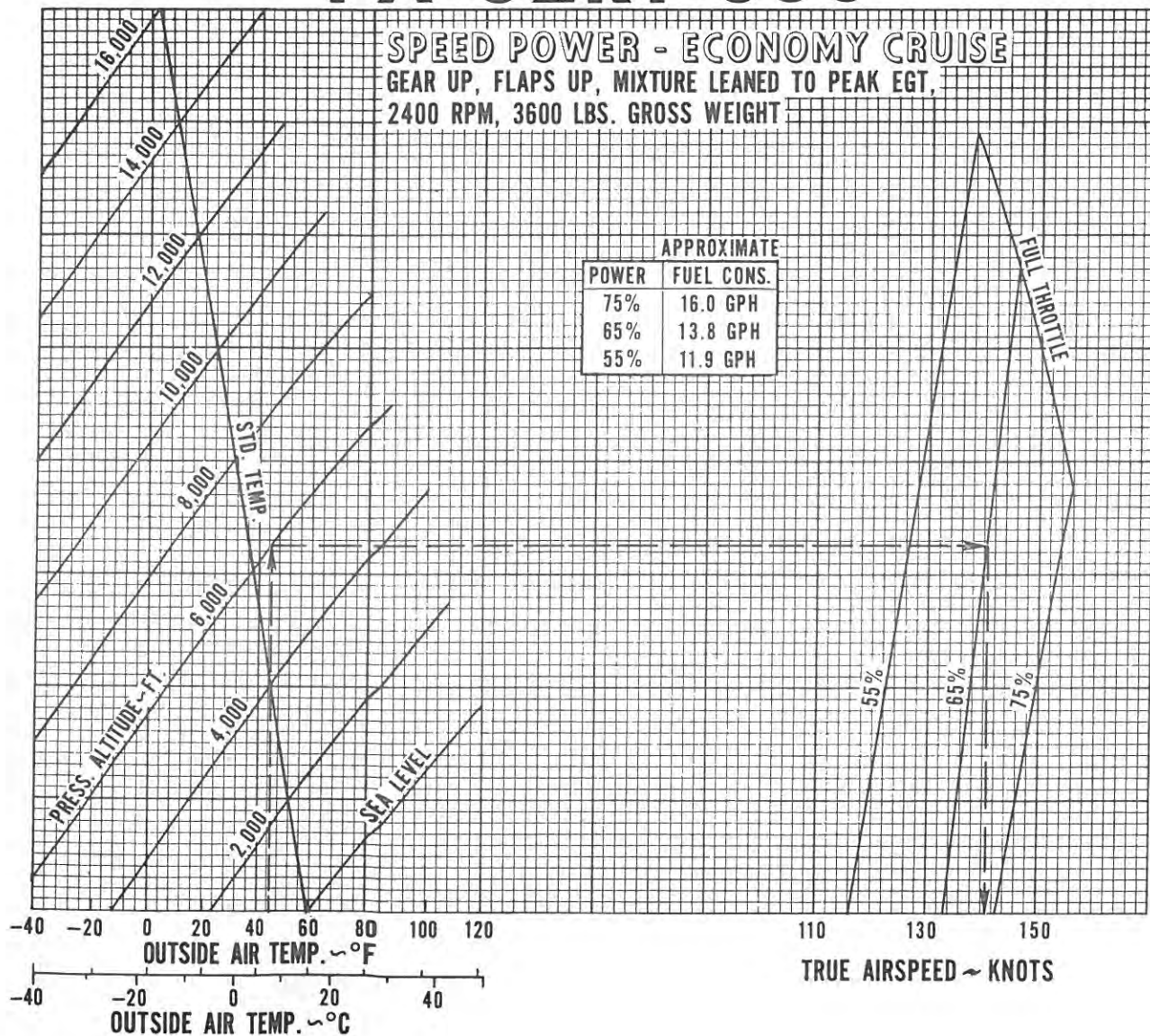
Example:

Cruise pressure altitude: 8000 ft.
Cruise outside air temp.: +5.6° C
Power: full throttle, 2400 rpm
True airspeed: 155 kts.

SPEED POWER-PERFORMANCE CRUISE

Figure 5-21

PA-32RT-300



Example:

Cruise pressure altitude: 6000 ft.

Cruise outside air temp.: +5.6° C

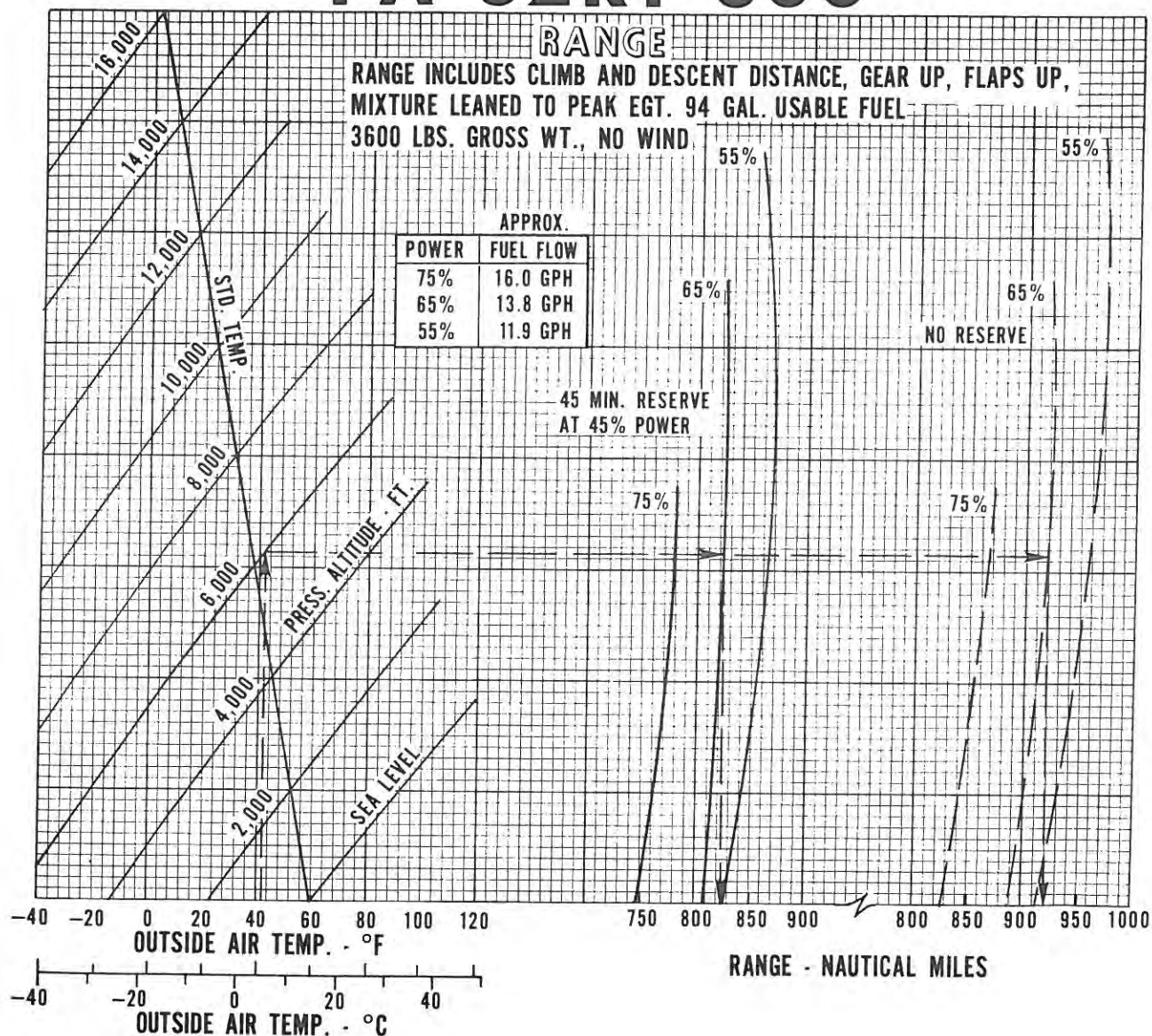
Power: 65%

True airspeed: 142 kts.

SPEED POWER-ECONOMY CRUISE

Figure 5-23

PA-32RT-300

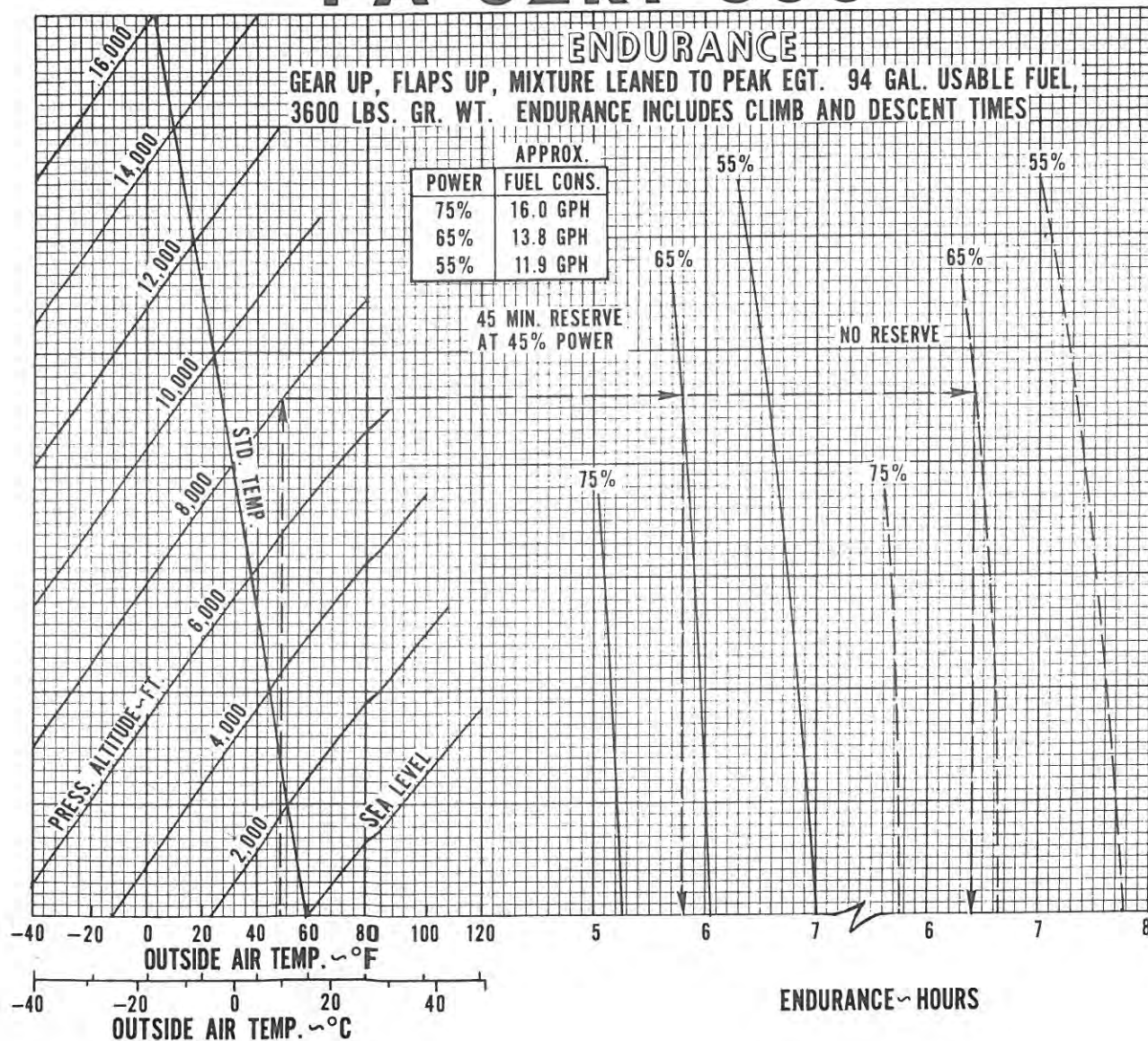


Example:

Cruise pressure altitude: 6000 ft.
Cruise outside air temp.: +5.6° C
Power: 65 %
Range with reserve: 825 NM
Range no reserve: 915 NM

RANGE
Figure 5-25

PA-32RT-300



Example:

Cruise pressure altitude: 8000 ft.

Cruise outside air temp.: +10°C

Power: 65%

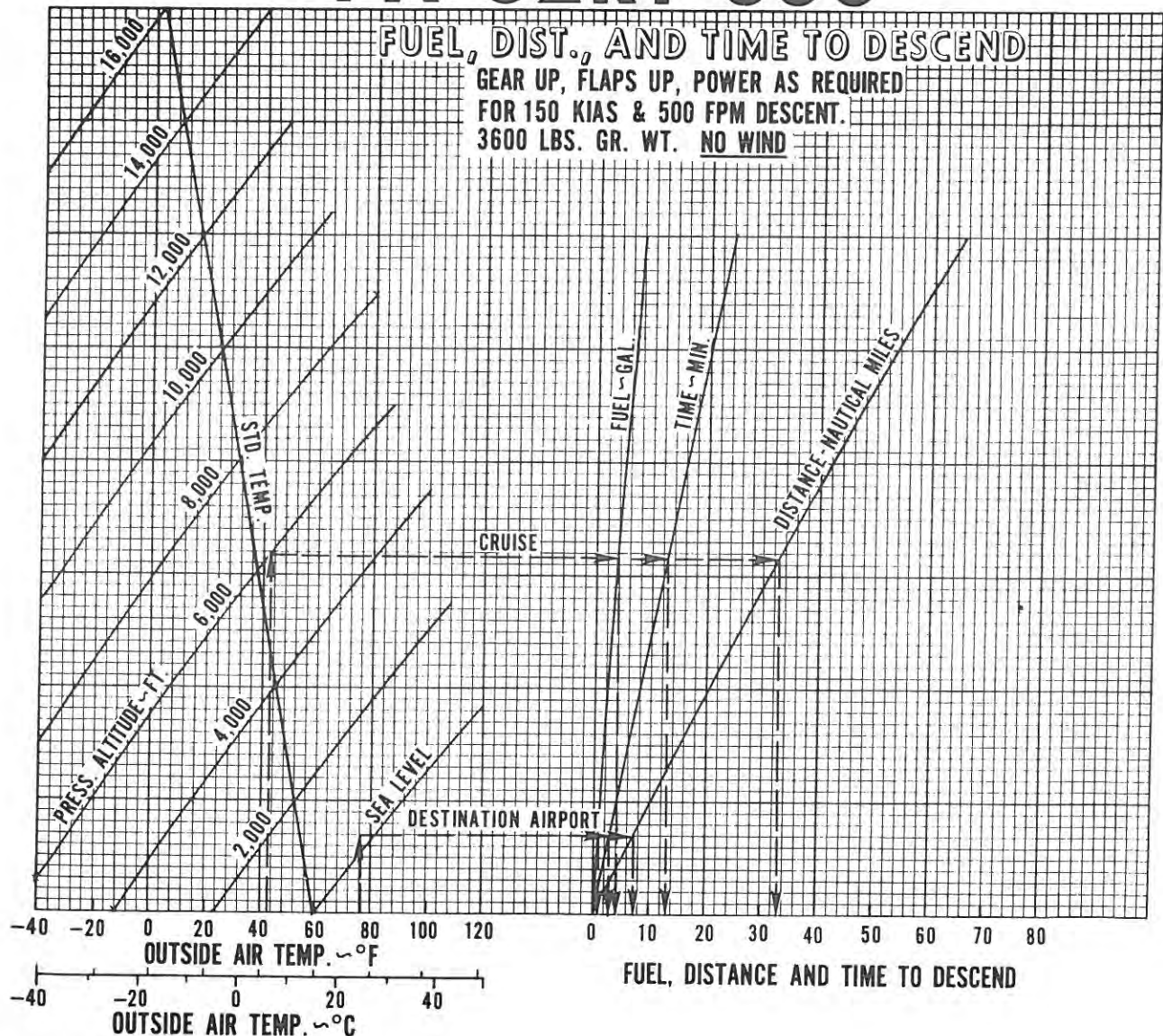
Endurance with reserve: 5.8 hrs.

Endurance no reserve: 6.4 hrs.

ENDURANCE

Figure 5-27

PA-32RT-300



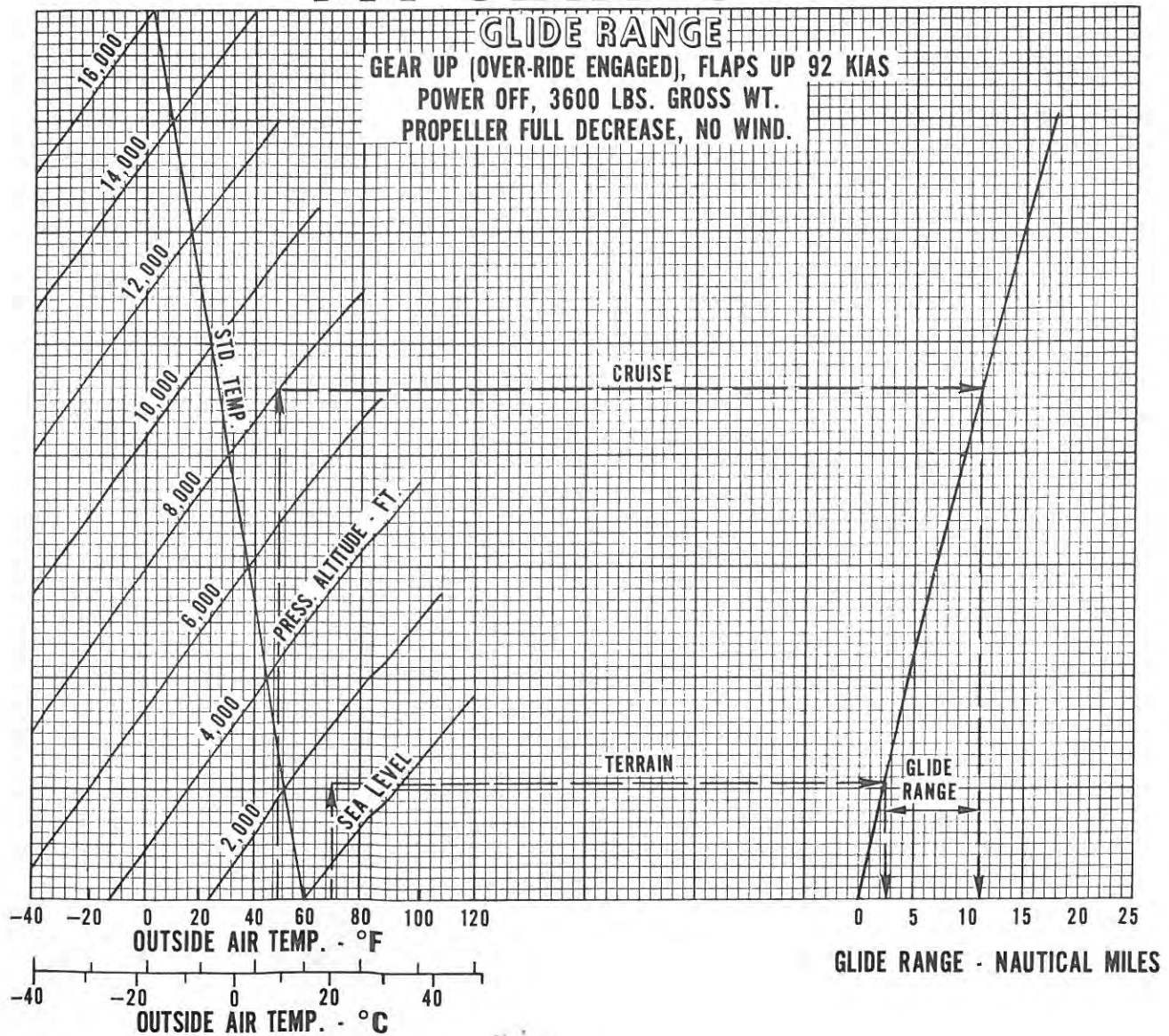
Example:

Cruise pressure altitude: 6000 ft.
Cruise outside air temp.: +5.6° C
Destination airport pressure altitude: 400 ft.
Destination airport outside air temp.: +23.9° C
Fuel to descend: 4 less 1 = 3 gal.
Time to descend: 12.5 less 2.5 = 10 min.
Distance to descend: 33 less 7 = 26 NM

FUEL, DISTANCE AND TIME TO DESCEND

Figure 5-29

PA-32RT-300



Example:

Cruise pressure altitude: 8000 ft.
Cruise outside air temp.: +10° C
Terrain pressure altitude: 1200 ft.
Terrain outside air temp.: +20.6° C
Glide range: 11 less 2.5 = 8.5 NM

GLIDE RANGE
Figure 5-31

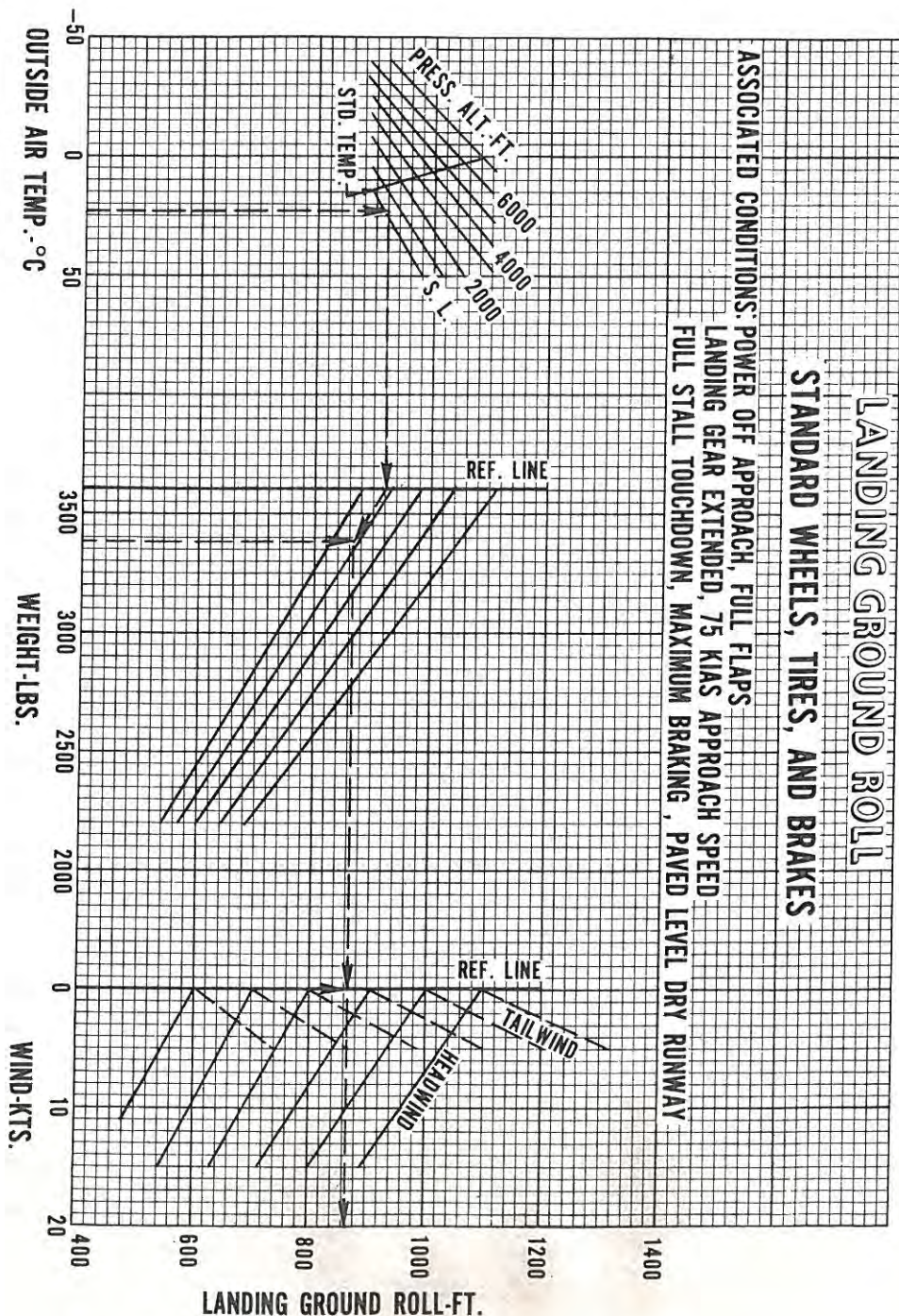
LANDING GROUND ROLL
Figure 5-35

PA-32RT-300

LANDING GROUND ROLL

STANDARD WHEELS, TIRES, AND BRAKES

ASSOCIATED CONDITIONS: POWER OFF APPROACH, FULL FLAPS
LANDING GEAR EXTENDED, 75 KIAS APPROACH SPEED
FULL STALL TOUCHDOWN, MAXIMUM BRAKING, PAVED LEVEL DRY RUNWAY

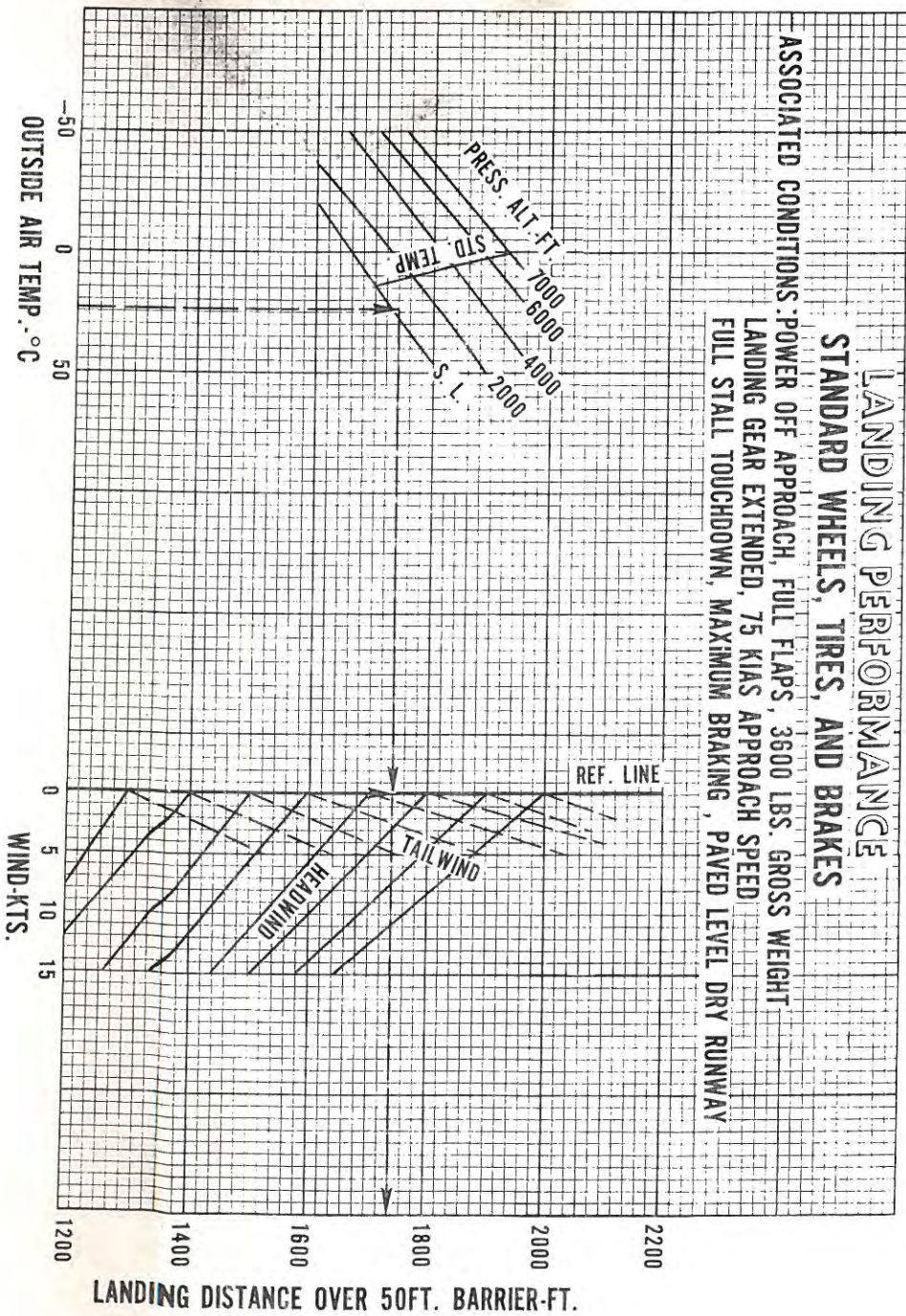


Example:
Airport pressure altitude: 400 ft.
Outside air temp.: +23.9° C
Gross weight: 3390 lbs.
Wind: 0 kts.
Ground roll: 870 ft.

PA-32RT-300

LANDING PERFORMANCE STANDARD WHEELS, TIRES, AND BRAKES

— ASSOCIATED CONDITIONS: POWER OFF APPROACH, FULL FLAPS, 3600 LBS. GROSS WEIGHT
— LANDING GEAR EXTENDED, 75 KIAS APPROACH SPEED
— FULL STALL TOUCHDOWN, MAXIMUM BRAKING, PAVED LEVEL DRY RUNWAY



Example:
 Airport pressure altitude: 400 ft.
 Airport outside air temp.: +23.9 °C
 Wind: 0 kts.
 Landing distance over 50 ft barrier: 1740 ft.

LANDING PERFORMANCE

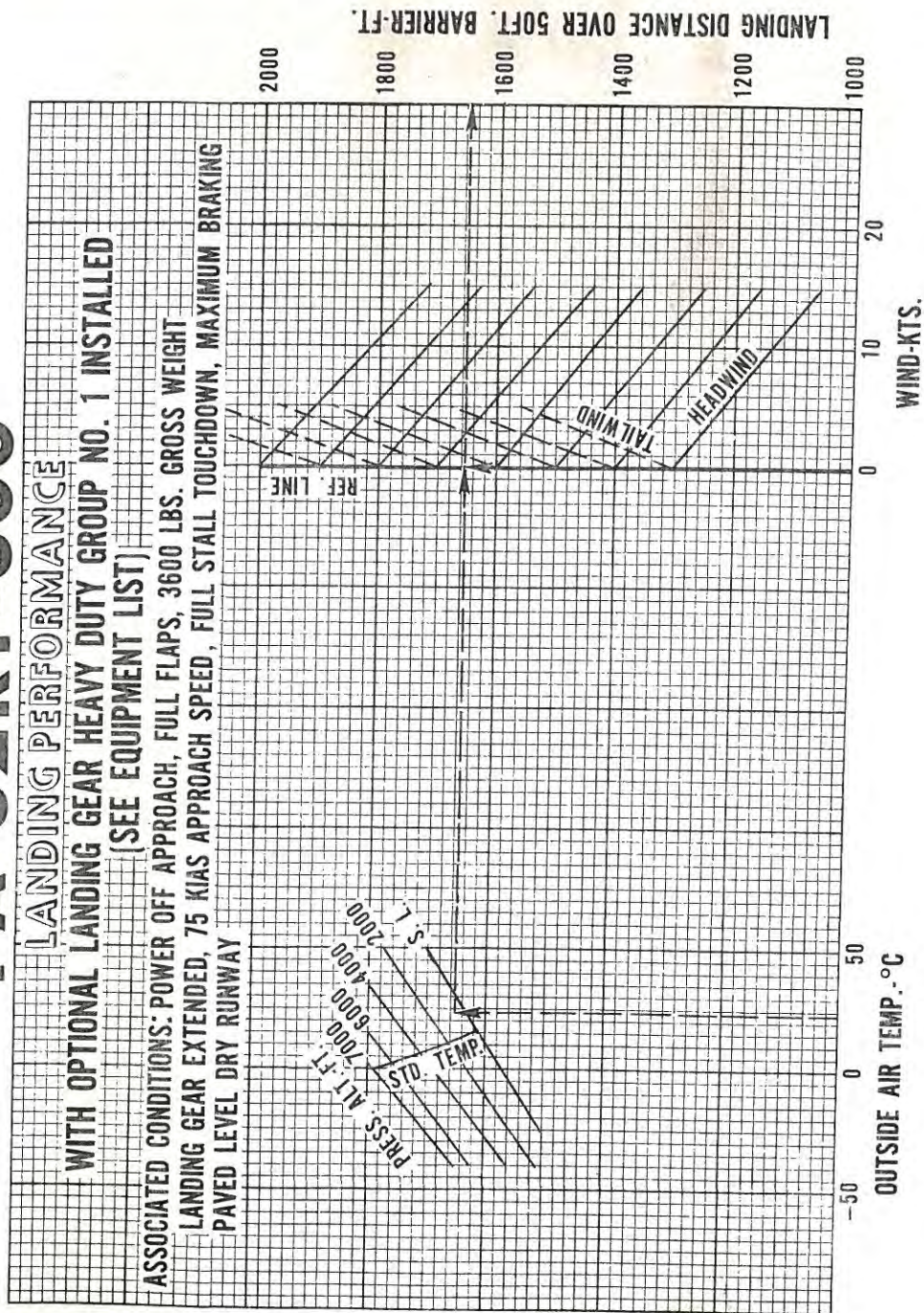
Figure 5-33

PA-32RT-300

LANDING PERFORMANCE

WITH OPTIONAL LANDING GEAR HEAVY DUTY GROUP NO. 1 INSTALLED
(SEE EQUIPMENT LIST)

ASSOCIATED CONDITIONS: POWER OFF APPROACH, FULL FLAPS, 3600 LBS. GROSS WEIGHT
LANDING GEAR EXTENDED, 75 KIAS APPROACH SPEED, FULL STALL TOUCHDOWN, MAXIMUM BRAKING
PAVED LEVEL DRY RUNWAY



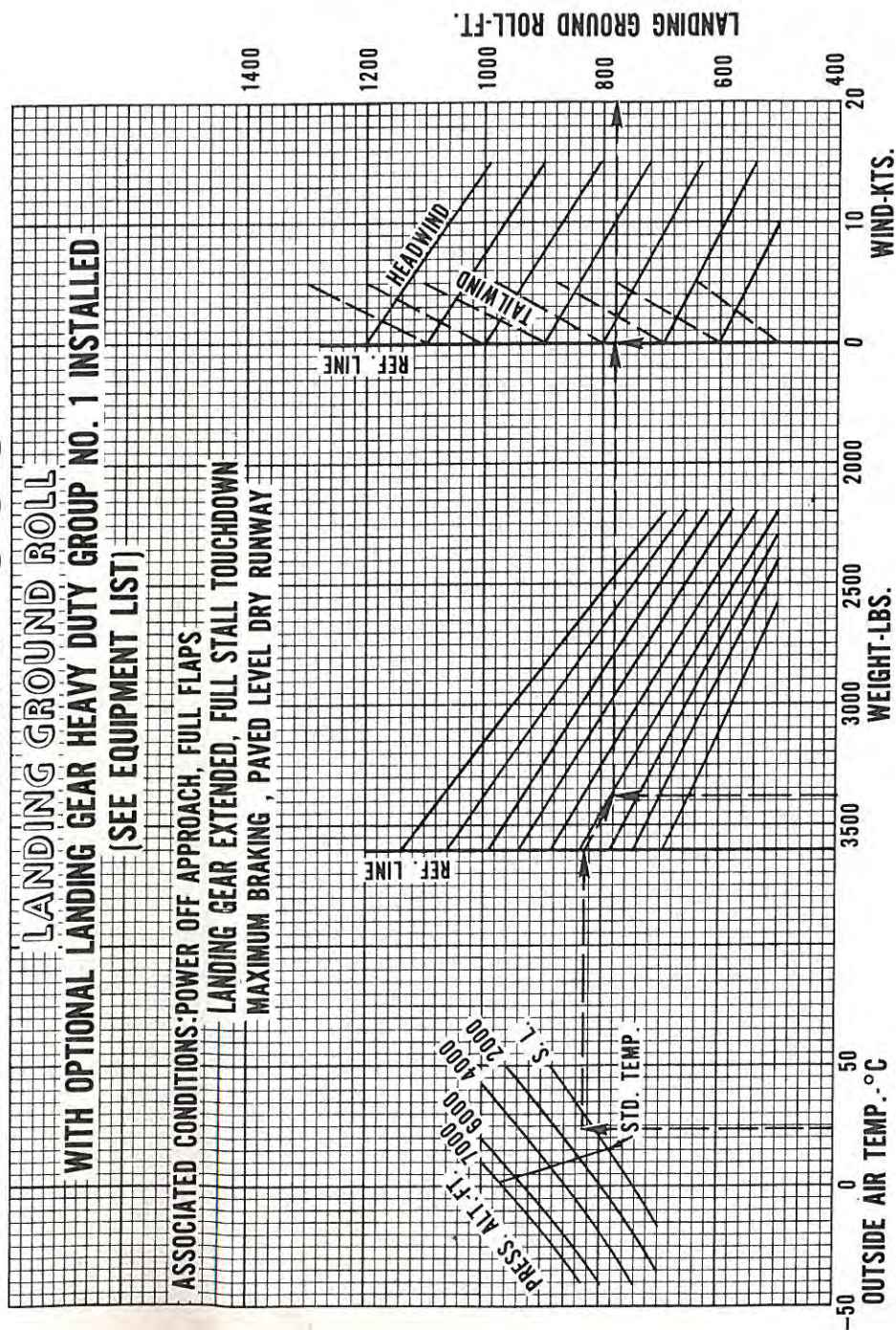
Example:

Airport pressure altitude: 400 ft.
Airport outside air temp.: +23.9 °C
Wind: 0 kts.
Landing distance over 50 ft. barrier: 1650 ft.

LANDING PERFORMANCE (HEAVY DUTY GROUP)

Figure 5-37

PA-32RT-300



Example:

Airport pressure altitude: 400 ft.
Outside air temp.: +23.9 °C
Gross weight: 3390 lbs.
Wind: 0 kts.
Ground roll: 780 ft.

LANDING GROUND ROLL (HEAVY DUTY GROUP)

Figure 5-39

TABLE OF CONTENTS

SECTION 6

WEIGHT AND BALANCE

Paragraph No.		Page No.
6.1	General	
6.3	Airplane Weighing Procedure	6-1
6.5	Weight and Balance Data and Record	6-2
6.7	Weight and Balance Determination for Flight	6-4
6.9	Instructions for Using the Weight and Balance Plotter	6-9
6.11	Equipment List	6-13
(a)	Propeller and Propeller Accessories	6-15
(b)	Engine and Engine Accessories, Fuel and oil Systems	6-15
(c)	Landing Gear and Brakes	6-16
(d)	Electrical Equipment	6-17
(e)	Instruments	6-17
(f)	Hydraulic Equipment	6-18
(g)	Cabin Interior	6-19
(h)	Engine and Engine Accessories, Fuel and Oil Systems (Optional Equipment)	6-20
(i)	Propeller and Propeller Accessories (Optional Equipment)	6-21
(j)	Landing Gear and Brakes (Optional Equipment)	6-22
(k)	Electrical Equipment (Optional Equipment)	6-22
(l)	Instruments (Optional Equipment)	6-23
(m)	Autopilots (Optional Equipment)	6-25
(n)	Radio Equipment (Optional Equipment)	6-29
(o)	Miscellaneous (Optional Equipment)	6-30
		6-38

SECTION 6

WEIGHT AND BALANCE

6.1 GENERAL

In order to achieve the performance and flight characteristics which are designed into the airplane, it must be flown with the weight and center of gravity (C.G.) position within the approved operating range (envelope). Although the airplane offers flexibility of loading, it cannot be flown with the maximum number of adult passengers, full fuel tanks and maximum baggage. With the flexibility comes responsibility. The pilot must ensure that the airplane is loaded within the loading envelope before he makes a takeoff.

Misloading carries consequences for any aircraft. An overloaded airplane will not take off, climb or cruise as well as a properly loaded one. The heavier the airplane is loaded, the less climb performance it will have.

Center of gravity is a determining factor in flight characteristics. If the C.G. is too far forward in any airplane, it may be difficult to rotate for takeoff or landing. If the C.G. is too far aft, the airplane may rotate prematurely on takeoff or tend to pitch up during climb. Longitudinal stability will be reduced. This can lead to inadvertent stalls and even spins; and spin recovery becomes more difficult as the center of gravity moves aft of the approved limit.

A properly loaded airplane, however, will perform as intended. Before the airplane is licensed, a basic empty weight and C.G. location is computed (basic empty weight consists of the standard empty weight of the airplane plus the optional equipment). Using the basic empty weight and C.G. location, the pilot can easily determine the weight and C.G. position for the loaded airplane by computing the total weight and moment and then determining whether they are within the approved envelope.

The basic empty weight and C.G. location are recorded in the Weight and Balance Data Form (Figure 6-5) and the Weight and Balance Record (Figure 6-7). The current values should always be used. Whenever new equipment is added or any modification work is done, the mechanic responsible for the work is required to compute a new basic empty weight and C.G. position and to write these in the Aircraft Log Book and the Weight and Balance Record. The owner should make sure that it is done.

A weight and balance calculation is necessary in determining how much fuel or baggage can be boarded so as to keep within allowable limits. Check calculations prior to adding fuel to insure against improper loading.

The following pages are forms used in weighing an airplane in production and in computing basic empty weight, C.G. position, and useful load. Note that the useful load includes usable fuel, baggage, cargo and passengers. Following this is the method for computing takeoff weight and C.G.

6.3 AIRPLANE WEIGHING PROCEDURE

At the time of licensing, Piper Aircraft Corporation provides each airplane with the basic empty weight and center of gravity location. This data is supplied by Figure 6-5.

The removal or addition of equipment or airplane modifications can affect the basic empty weight and center of gravity. The following is a weighing procedure to determine this basic empty weight and center of gravity location:

(a) Preparation

- (1) Be certain that all items checked in the airplane equipment list are installed in the proper location in the airplane.
- (2) Remove excessive dirt, grease, moisture, foreign items such as rags and tools from the airplane before weighing.
- (3) Defuel airplane. Then open all fuel drains until all remaining fuel is drained. Operate engine on each tank until all undrainable fuel is used and engine stops. Then add the unusable fuel (4.0 gallons total, 2.0 gallons each wing).

CAUTION

Whenever the fuel system is completely drained and fuel is replenished it will be necessary to run the engine for a minimum of three minutes at 1000 RPM on each tank to insure that no air exists in the fuel supply lines.

- (4) Fill with oil to full capacity.
- (5) Place pilot and copilot seats in fourth (4th) notch, aft of forward position. Put flaps in the fully retracted position and all control surfaces in the neutral position. Tow bar should be in the proper location and all entrance and baggage doors closed.
- (6) Weigh the airplane inside a closed building to prevent errors in scale readings due to wind.

(b) Leveling

- (1) With airplane on scales, block main gear oleo pistons in the fully extended position.
- (2) Level airplane (refer to Figure 6-3) deflating nose wheel tire, to center bubble on level.

(c) Weighing - Airplane Basic Empty Weight

- (1) With the airplane level and brakes released, record the weight shown on each scale. Deduct the tare, if any, from each reading.

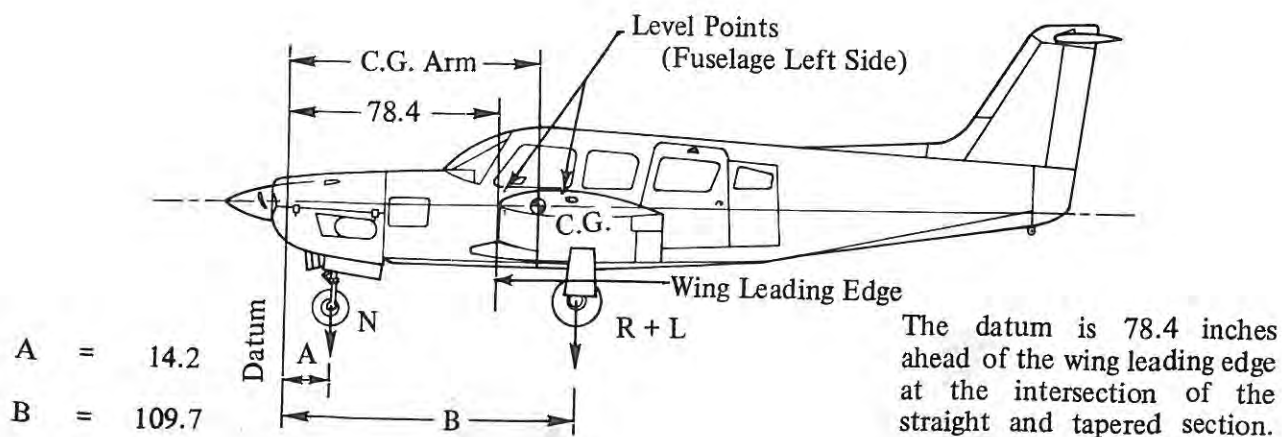
Scale Position and Symbol	Scale Reading	Tare	Net Weight
Nose Wheel (N)			
Right Main Wheel (R)			
Left Main Wheel (L)			
Basic Empty Weight, as Weighed (T)			

WEIGHING FORM

Figure 6-1

(d) Basic Empty Weight Center of Gravity

- (1) The following geometry applies to the PA-32RT-300 airplane when it is level. Refer to Leveling paragraph 6.3 (b).



LEVELING DIAGRAM

Figure 6-3

- (2) The basic empty weight center of gravity (as weighed including optional equipment, full oil and unusable fuel) can be determined by the following formula:

$$\text{C.G. Arm} = \frac{N(A) + (R + L)(B)}{T} \text{ inches}$$

Where: $T = N + R + L$

6-5. WEIGHT AND BALANCE DATA AND RECORD

The Basic Empty Weight, Center of Gravity Location and Useful Load listed in Figure 6-5 are for the airplane as licensed at the factory. These figures apply only to the specific airplane serial number and registration number shown.

The basic empty weight of the airplane as licensed at the factory has been entered in the Weight and Balance Record (Figure 6-7). This form is provided to present the current status of the airplane basic empty weight and a complete history of previous modifications. Any change to the permanently installed equipment or modification which affects weight or moment must be entered in the Weight and Balance Record.

MODEL PA-32RT-300 LANCE II

Airplane Serial Number 32R-1885090

Registration Number N30927

Date ~~8-27-84~~ 9-20-99

AIRPLANE BASIC EMPTY WEIGHT

Item	Weight (Lbs)	x	C. G. Arm (Inches Aft of Datum)	=	Moment (In-Lbs)
Standard Empty Weight* Actual- Computed	1986.0		82.5		163763
Optional Equipment	207.3		113.3		23477
Basic Empty Weight	2193.3		85.4		187240

2189.98 87.21 192008.63

*The standard empty weight includes full oil capacity and 4.0 gallons of unusable fuel.

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

(Gross Weight) - (Basic Empty Weight) = Useful Load

(3600 lbs) - (2193.3 lbs) = 1406.7 lbs.
2189.98 = 1410

See Fig 6-7

THIS BASIC EMPTY WEIGHT, C.G. AND USEFUL LOAD ARE FOR THE AIRPLANE AS LICENSED AT THE FACTORY. REFER TO APPROPRIATE AIRCRAFT RECORD WHEN ALTERATIONS HAVE BEEN MADE.

WEIGHT AND BALANCE DATA FORM

Figure 6-5

THIS PAGE INTENTIONALLY LEFT BLANK

DODSON AVIATION**WEIGHT AND BALANCE REVISION SHEET**REG #: N30927MAKE: PiperMODEL: PA-32RT-300S/N: 32R-7885090

ITEM NAME	WEIGHT	ARM	MOMENT
Aircraft as of 01/25/2007	2208.38	87.09	192316.8
Removed the following:			
McCAULEY PROP & SPINNER 10/14/10	-74.20	-12.70	942.30
NORTH STAR GPS-600	-4.50	61.00	-274.50
GPS-600 ANTENNA	-.30	61.00	-18.30
BENDIX/KING KX-165 NAV/COM	-5.70	61.60	-351.12
APPOLLO 360 GPS	-1.70	61.60	-104.72
Installed the following:			
GNS-430 W GPS/NAV/COM	6.20	61.60	381.92
GA-35 GPS ANTENNA	.47	90.20	42.39
HARTZELL PROP & STC# SA1791GL	68.20	-12.10	-825.22
HARTZELL SPINNER	3.40	-13.20	-44.88
WX 900 STORM SCOPE	1.56	61.60	96.10
WX 900 STORM SCOPE ANTENNA	.92	219.00	201.48
WX 900 STORM SCOPE CABLE ASSY	2.1	155.00	341.00
TOTAL	2204.83	87.40	192703.25

LOAD AIRCRAFT IN ACCORDANCE WITH AIRPLANE FLIGHT MANUAL.

MAXIMUM GROSS T.O. WEIGHT - 3600.00 LBS

NEW A/C EMPTY WEIGHT - 2204.83 LBS

NEW USEFUL LOAD - 1395.17

NEW EMPTY WEIGHT CENTER OF GRAVITY 87.40 IN AFT OF DATUM


 Robert D. Bowers
 A&P 2672460



U.S. Department
of Transportation
**Federal Aviation
Administration**

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020
2/28/2011

Electronic Tracking Number

For FAA Use Only

INSTRUCTIONS: Print or type all entries. See Title CFR §43.9, Part 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. §44701). Failure to report can result in a civil penalty for each such violation (49 U.S.C. §46301(a)).

1. Aircraft	Nationality and Registration Mark N30927	Serial No. 32R-7885090	
	Make PIPER	Model PA-32RT-300	Series
2. Owner	Name (As shown on registration certificate) William H. Johnson	Address (As shown on registration certificate) Address 1551 Labarre St. City Mandeville State La. Zip 70448-4041 Country USA	

3. For FAA Use Only

4. Type		5. Unit Identification			
Repair	Alteration	Unit	Make	Model	Serial No.
☐	☒	AIRFRAME		(As described in item 1 above)	
☐	☐	POWERPLANT			
☐	☐	PROPELLER			
☐	☐	APPLIANCE	Type Manufacturer		

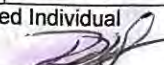
6. Conformity Statement

A. Agency's Name and Address		B. Kind of Agency	
Name	ROBERT BOWERS	☒ U.S. Certificated Mechanic	Manufacturer
Address	4392 LOUISIANA RD	☐ Foreign Certificated Mechanic	C. Certificate No.
City	OTTAWA State KS	☐ Certificated Repair Station	A&P 2672460
Zip	66067 Country USA	☐ Certificated Maintenance Organization	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 5 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Extended range fuel per 14 CFR Part 43 App. B ☐	Signature/Date of Authorized Individual  02/01/2012
---	---

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in item 5 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED					
BY	FAA Flt. Standards Inspector	Manufacturer	Maintenance Organization	Person Approved by Canadian Department of Transport	
	FAA Designee	Repair Station	☒ Inspection Authorization	Other (Specify)	
Certificate or Designation No. A&P 2672460 IA		Signature/Date of Authorized Individual  02/01/2012			

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

N30927 PIPER PA-32RT-300 Ser# 32R-7885090

02/01/2012

Nationality and Registration Mark

Date

GARMIN GNS430W INSTALLATION

Removed the following equipment:

- 1 each Northstar M3 GPS (#1GPS) from left radio stack.
- 1 each GPS Antenna from top center fuselage (Sta. 90.20).
- 1 each Bendix/King KX-165 Nav/Com from left radio stack.
- 1 each Apollo 360 GPS (#2GPS) from Pilot's instrument panel left of radio stack.
- 2 each N.A.T. RS-08 relays and 2 each PB-08 switch/annunciators and associated wiring.

Installed a GNS430W GPS/NAV/COM system in accordance with STC SA01993LA and a GA35 GPS Antenna in accordance with STC SA02018SE. Verified aircraft and equipment interfaces are covered under the STC AML.

The GA35 was mounted on the top center of the fuselage (Sta.90.20) and connected to the GNS430W using RG-142 cable. The GNS430W was mounted in the left radio stack (2nd position down) of the instrument panel. Power is provided by a 10 amp circuit breaker (COM-1) and a 5 amp circuit breaker (GPS-1) on the avionics bus. Panel lights are wired to the Radio dimmer. Main navigation outputs are wired to the existing Pilot's NSD-360A HSI. Steering outputs (Left/Right) are wired to the existing Century III Autopilot. **No Glideslope coupling to the Autopilot in this installation.** Altitude data input interfaced to existing Narco AR-500 Encoder. Com/Nav audio interfaced to the existing KMA-24 Audio panel. Com/Nav/Glideslope RF cables connected to existing antennas.

Performed post-installation configuration and ground checks.

Aircraft weight & balance / equipment list revised.

FAA Approved Airplane Flight Manual Supplement, Document # 190-00356-03, Rev A, dated Nov 20, 2007 was placed in the Pilot Operating Handbook.

Instructions for Continued Airworthiness, Document # 190-00356-65, Rev A, dated Nov 03, 2006 was placed in the aircraft logbook.

////////////////////////////////////// END //

☐ Additional Sheets Are Attached



U.S. Department
of Transportation
Federal Aviation
Administration

MAJOR REPAIR AND ALTERATION (Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020
2/28/2011

Electronic Tracking Number

For FAA Use Only

INSTRUCTIONS: Print or type all entries. See Title CFR §43.9, Part 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. §44701). Failure to report can result in a civil penalty for each such violation (49 U.S.C. §46301(a)).

1. Aircraft	Nationality and Registration Mark N30927	Serial No. 32R-7885090	
	Make PIPER	Model PA-32RT-300	Series
2. Owner	Name (As shown on registration certificate) William H. Johnson	Address (As shown on registration certificate)	
		Address 1551 Labarre St.	
		City Mandeville	State La.
		Zip 70448-4041	Country USA

3. For FAA Use Only

4. Type		5. Unit Identification			
Repair	Alteration	Unit	Make	Model	Serial No.
☐	☒	AIRFRAME		(As described in item 1 above)	
☐	☐	POWERPLANT			
☐	☐	PROPELLER			
☐	☐	APPLIANCE	Type		
			Manufacturer		

6. Conformity Statement

A. Agency's Name and Address		B. Kind of Agency	
Name	ROBERT BOWERS	☒ U.S. Certificated Mechanic	Manufacturer
Address	4392 LOUISIANA RD.	☐ Foreign Certificated Mechanic	C. Certificate No.
City	OTTAWA State Ks.	☐ Certificated Repair Station	A&P 2672460
Zip	66067 Country USA	☐ Certificated Maintenance Organization	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 5 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Extended range fuel per 14 CFR Part 43 App. B	☐	Signature/Date of Authorized Individual	02/01/2012
--	--------------------------	---	------------

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in item 5 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED					
BY	FAA Flt. Standards Inspector	Manufacturer	Maintenance Organization	Person Approved by Canadian Department of Transport	
	FAA Designee	Repair Station	☒ Inspection Authorization	Other (Specify)	
Certificate or Designation No. A&P 2672460 IA		Signature/Date of Authorized Individual 02/01/2012			

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

N30927 PIPER PA-32RT-300 Ser# 32R-7885090

02/01/2012

Nationality and Registration Mark

Date

During Annual Inspection found the following equipment installed without proper documentation by 337 form:

HARTZELL PROPELLER M/N HC-C3YR-1RF S/N DY7986B Installed 10/14/2010 (see log book entry)
Inspected installation and found it to be in accordance with STCSA1791GL.

STORMSCOPE WX-900 Found installed by persons unknown.
Inspected installation and found it to be in accordance with the manufactures installation manual P/N 78-8060-6104-6 Rev. C.

Aircraft weight & balance / equipment list revised.

//////////////////// END //////////////////////

☐ Additional Sheets Are Attached

Aircraft Services Ltd.

200 Lake Sabine Ct.
Slidell, La. 70461
985-640-6671

Weight And Balance

Reg. Number: N30927
Make/Model: PIPER PA-32RT-300
Year: 1978
Serial Number: 32R7885090

Date: 01-25-2007
Tach: 2748.50
Max Weight: 3600.00
Work Order:

New A/C Empty Weight: 2208.38
New A/C Empty C.G.: 87.09
New A/C Useful Load: 1391.62

Description	Serial Number	Weight	Arm	Moment	Installed	Removed
Previous Aircraft Empty	32R7885090	2189.98	87.71	192083.1	n/a	n/a
Removed Harzell prop & spinner	HC-C2YK-1BF	55.80	12.70	708.7		X
Installed McCauley prop & spinner	B3B36C433	74.20	12.70	942.3	X	
<i>Superseded 02/01/2012</i>						
New Aircraft Values		2208.38	87.09	192316.8		

Chas W. Huete
Chas W. Huete, A&P2586899

RECEIVED

NOV 19 1960

1960

1960

1960

1960

1960

1960

1960

1960

1960

X

1960

1960

20/10/60
10/10/60

1960

1960

1960

1960



US Department
of Transportation
Federal Aviation
Administration

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020

For FAA Use Only

Office Identification

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in civil penalty not to exceed \$1,000 for each such violation (Section 901 Federal Aviation Act of 1958).

1. Aircraft	Make PIPER	Model PA-32RT-300
	Serial No. 32R-7885090	Nationality and Registration Mark N30927
2. Owner	Name (As shown on registration certificate) JOHNSON WILLIAM H	Address (As shown on registration certificate) 1551 LABARRE ST MANDEVILLE, LOUISIANA 70448-4041

3. For FAA Use Only

4. Unit Identification				5. Type	
Unit	Make	Model	Serial No.	Repair	Alteration
AIRFRAME	(As described in Item 1 above)				X
POWERPLANT	LYCOMING	IO-540-K1G5D	L-17991-48A		
PROPELLER					
APPLIANCE	Type				
	Manufacturer				

6. Conformity Statement

A. Agency's Name and Address Charles W. Huete 200 Lake Sabine Ct. Slidell, La. 70461	B. Kind of Agency ☒ U.S. Certificated Mechanic ☐ Foreign Certificated Mechanic ☐ Certificated Repair Station ☐ Manufacturer	C. Certificate No. A&P2586899
---	--	----------------------------------

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Date JAN-25-2007	Signature of Authorized Individual Charles W. Huete <i>Charles W. Huete</i>
---------------------	--

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY	FAA Fit. Standards Inspector	Manufacturer	☒ Inspection Authorization Person Approved by Transport Canada Airworthiness Group	Other (Specify)
	FAA Designee	Repair Station		
Date of Approval or Rejection JAN-25-2007		Certificate or Designation No. IA2586899	Signature of Authorized Individual Charles W. Huete <i>Charles W. Huete</i>	

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

Removed Hartzell Propeller Model No. HC-C2YK-1BF/ F8475D-4, S/ N CH15699, and spinner assembly.
Installed new McCauley Propeller Model B3B36C433/ 80V SA-1, and spinner assembly, in accordance with McCauley STC # SA433CH, and McCauley Technical Report (TR) 863, no revision, dated February 24, 1997, and McCauley Drawing No. D-60178, no revision, dated February 26, 1997, or later FAA Approved revisions.
Inserted FAA Approved Airplane Flight Manual Supplement into Pilots Operating Handbook and FAA Approved Airplane Flight Manual as required.
Aircraft weight and balance revised, equipment list updated.

----- END -----

☐ Additional Sheets Are Attached

AVIATION ENTERPRISES, INC.

5030 W. KEARNEY, SUITE A
SPRINGFIELD, MO 65803
(417) 831-2772 (800) 715-2772



AIR CHARTER SERVICE

YOUR TIME IS MONEY - WE GUARANTEE IT WILL BE TIME WELL SPENT

9/20/99

This Weight and Balance and supplemental equipment list supersedes information dated 3-31-95.

Piper PA32RT-300 S/N 32R-7885090

	Wt.	Arm	Moment
Old Aircraft wt. and balance	2198.2	87.38	192068.9
Removed Prestolite MZ-4222 Starter	-18	.7	-13
Install Sky-Tec Starter	+7.8	.7	5.4
Install Reiff Hot Bandd and Hot Padd Engine Heater	+1.98	11.25	22.275
	2189.98	87.71	1920083.63
			192083
New Empty WT.	2189.98		
New Emptyt Wt.			
C.G.	87.71		
New Useful Load	1410.02		

David Will

David Will
487645318

C

100-10000-10000-10000

100-10000-10000-10000

O

O

Dyersburg Avionics, Inc.

TAA CERTIFIED REPAIR STATION 76117

MUNICIPAL AIRPORT
DYERSBURG, TENNESSEE 38024
(901) 206-2233

REVISED WEIGHT AND BALANCE DATA

MAKE: PIPER LANCE

SN#: 32R-7885090

RN#: N 30927

DATE: 2-12-93

PREVIOUS EMPTY WEIGHT

WEIGHT	ARM	MOMENT
<u>2203.9</u>	<u>87.6</u>	<u>192943.0</u>

ADDED:		
<u>GPS-600</u>	<u>4.5</u>	<u>274.5</u>

<u>GPS ANT</u>	<u>0.3</u>	<u>25.8</u>
----------------	------------	-------------

REMOVED:		
<u>RNAV SI</u>	<u>2.5</u>	<u>152.5</u>

NEW AIRCRAFT EMPTY WEIGHT: 2206.2

NEW AIRCRAFT C.G.: 87.5

NEW AIRCRAFT USEFUL LOAD 7393.8

MOMENT: 193090.8

[Handwritten notes and signatures are present on this page, which appears to be a continuation or related document.]

2.5 12 vanu

2022

052

9. EPEY

9.040391

WEIGHT & BALANCE SHEET

ACFT PA-32-RT-300

DATE II- DEC- 85

N 30927

Supersedes W & B of

S/N 32R 7885090

7-OCT- 80

<u>ITEM</u>	<u>WEIGHT</u>	<u>ARM</u>	<u>MOMENT</u>
Aircraft Empty WT.	2202.4	85.48	19273
Standby Vac. Sys.	1.5	14.02	21.3
	2203.9	87.5	19294.3

Superseded 2/12/93

Gross Weight 3600 Lbs C G Limit Fwd _____

Empty Weight 2203.9 Lbs C G Limit Aft _____

USEFUL LOAD 1395.5 Lbs EWCG = 87.5 = _____

EWCG = _____ ins

HUNTSVILLE AVIATION CORP.
P.O. BOX 1324. JETPORT
HUNTSVILLE, ALABAMA 35807

300-300

25

33

225

255

000000

3.

CS

0-9

3.

2000

333

300

3

WEIGHT & BALANCE
SHEET

ACFT PA-32RT-30

DATE 7 OCT 80

N 30927

Supersedes W & B of

S/N 32R.2885090

1 MAY 78

<u>ITEM</u>	<u>WEIGHT</u>	<u>ARM</u>	<u>MOMENT</u>
AIRCRAFT EMPTY WT	2200.6	85.4	18793
ELT MOD	1.8	267.2	480
	2202.4	85.48	19273

REVISED
and/or
SUPERSEDED

11 DEC-85

Gross Weight 3600 Lbs

C G Limit Fwd

Empty Weight 2202.4 Lbs

C G Limit Aft

USEFUL LOAD 1397 Lbs

EWCG = =

EWCG = 85.48 ins

HUNTSVILLE AVIATION CORP.
P. O. BOX 1324, JETPORT
HUNTSVILLE, ALABAMA 35807
FAA REPAIR STATION 702-11

25

ALL INFORMATION CONTAINED
HEREIN IS UNCLASSIFIED
DATE 10-11-2001 BY 60322
JAN 11 2002

PA-32RT-300		Serial Number	Registration Number	Page Number						
Date	Item No.	Description of Article or Modification	Weight Change						Running Basic Empty Weight	
	In		Out	Added (+)			Removed (-)			Wt. (Lb.)
			Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Moment /100
		As Licensed								
5/6/78	X	KN62 System: RNAU 511 System							2193.3	187240
10/9/80	X	ELT Mod	11.8	267.2					2200.6	187781
2-12-93		RNAV 511	27.5	66.0					2202.4	19273
2-12-93	X	GPS-600	4.5	61.0	274.5					
"	X	GPS-600 Antenna	0.3	61.0	25.8				2206.2	193090.8
3-31-95		KING KMA-20 Audio Panel				5.7	74.9	277.0		
"	X	KX170 (DUAL) NAV/COM				15.0	61.6	924.0		
"	X	KX201 VOR/LOC/CONV Indicator				2.4	64.9	156.0		
"	X	KN72 VOR/LOC/CONV				1.3	214.8	279.0		
"	X	KK73 Glide Slope Receiver				2.0	214.8	430.0	2181.8	191024.8
3-31-95	X	KING KMA 24 Audio Panel	1.7	74.9	127.3					
"	X	KING KX165 NAV/COM	5.7	61.6	351.1					
"	X	KING KX155 NAV/COM	5.3	61.6	326.5					
"	X	KING KX204 VOR/LOC/CONV Indicator	1.3	64.9	84.4					
"	X	Apollo 360 GPS	1.7	61.6	104.7					
"	X	Apollo 360 GPS Antenna	6.3	85.0	25.5					
3-31-95	X	NAT AA80-62 INDI/COM	0.4	61.6	24.6				2198.2	192068.9
	X	GPS 600	4.5	61.0	274.5					
	X	GPS 600 ANTENNA	1.3	61.0	18.3					
	X	KING KX165 NAV/COM	5.7	61.6	351.1					
	X	Apollo 360 GPS	1.7	61.6	104.7					

WEIGHT AND BALANCE RECORD

Figure 6-7

SECTION 6

WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

[illegible]**WEIGHT AND BALANCE RECORD (cont)**

Figure 6-7 (cont)

6.7 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

- Add the weight of all items to be loaded to the basic empty weight.
- Use the Loading Graph (Figure 6-13) to determine the moment of all items to be carried in the airplane.
- Add the moment of all items to be loaded to the basic empty weight moment.
- Divide the total moment by the total weight to determine the C.G. location.
- By using the figures of item (a) and item (d) (above), locate a point on the C.G. range and weight graph (Figure 6-15). If the point falls within the C.G. envelope, the loading meets the weight and balance requirements.

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight	2193.3	85.4	187240
Pilot and Front Passenger	340.0	85.5	29070
Passengers (Center Seats) (Forward Facing)		118.1	
Passengers (Center Seats) (Aft Facing) (Optional)	340.0	119.1	40494
Passengers (Rear Seats)	340.0	157.6	53584
Passenger (Jump Seat) (Optional)		118.1	
Fuel (94 Gallon Maximum)	286.7	93.6	26835
Baggage (Forward) (100 Lb. Limit)	100.0	42.0	4200
Baggage (Aft) (100 Lb. Limit)		78.7	
Moment due to Retraction of Landing Gear			819
Total Loaded Airplane	3600	95.1	342242

The center of gravity (C.G.) of this sample loading problem is at 95.1 inches aft of the datum line. Locate this point (95.1) on the C.G. range and weight graph. Since this point falls within the weight - C.G. envelope, this loading meets the weight and balance requirements.

IT IS THE RESPONSIBILITY OF THE PILOT AND AIRCRAFT OWNER TO INSURE THAT THE AIRPLANE IS LOADED PROPERLY.

SAMPLE LOADING PROBLEM (NORMAL CATEGORY)

Figure 6-9

SECTION 6
WEIGHT AND BALANCE

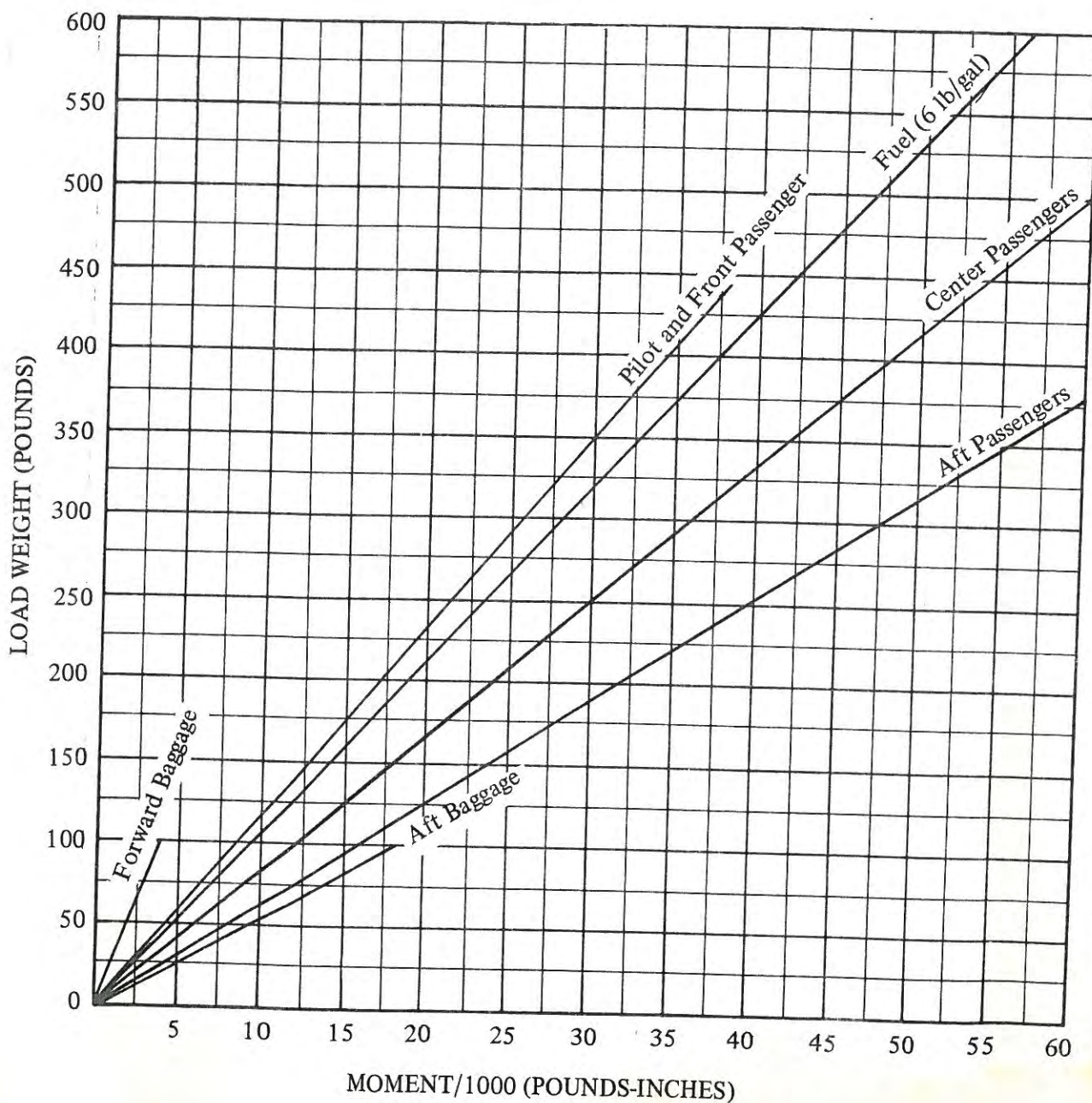
PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight	2190	87.7	192083
Pilot and Front Passenger	350	85.5	30000
Passengers (Center Seats) (Forward Facing)		118.1	
Passengers (Center Seats) (Aft Facing) (Optional)	250	119.1	30000
Passengers (Rear Seats)		157.6	
Passenger (Jump Seat) (Optional)		118.1	
Fuel (94 Gallon Maximum)	560	93.6	55000
Baggage (Forward) (100 Lb. Limit)	50	42.0	2500
Baggage (Aft) (100 Lb. Limit)	100	178.7	17000
Moment due to Retraction of Landing Gear			819
Total Loaded Airplane	3500	93.5	327402

Totals must be within approved weight and C.G. limits. It is the responsibility of the airplane owner and the pilot to insure that the airplane is loaded properly. The Basic Empty Weight C.G. is noted on the Weight and Balance Data Form (Figure 6-5). If the airplane has been altered, refer to the Weight and Balance Record for this information.

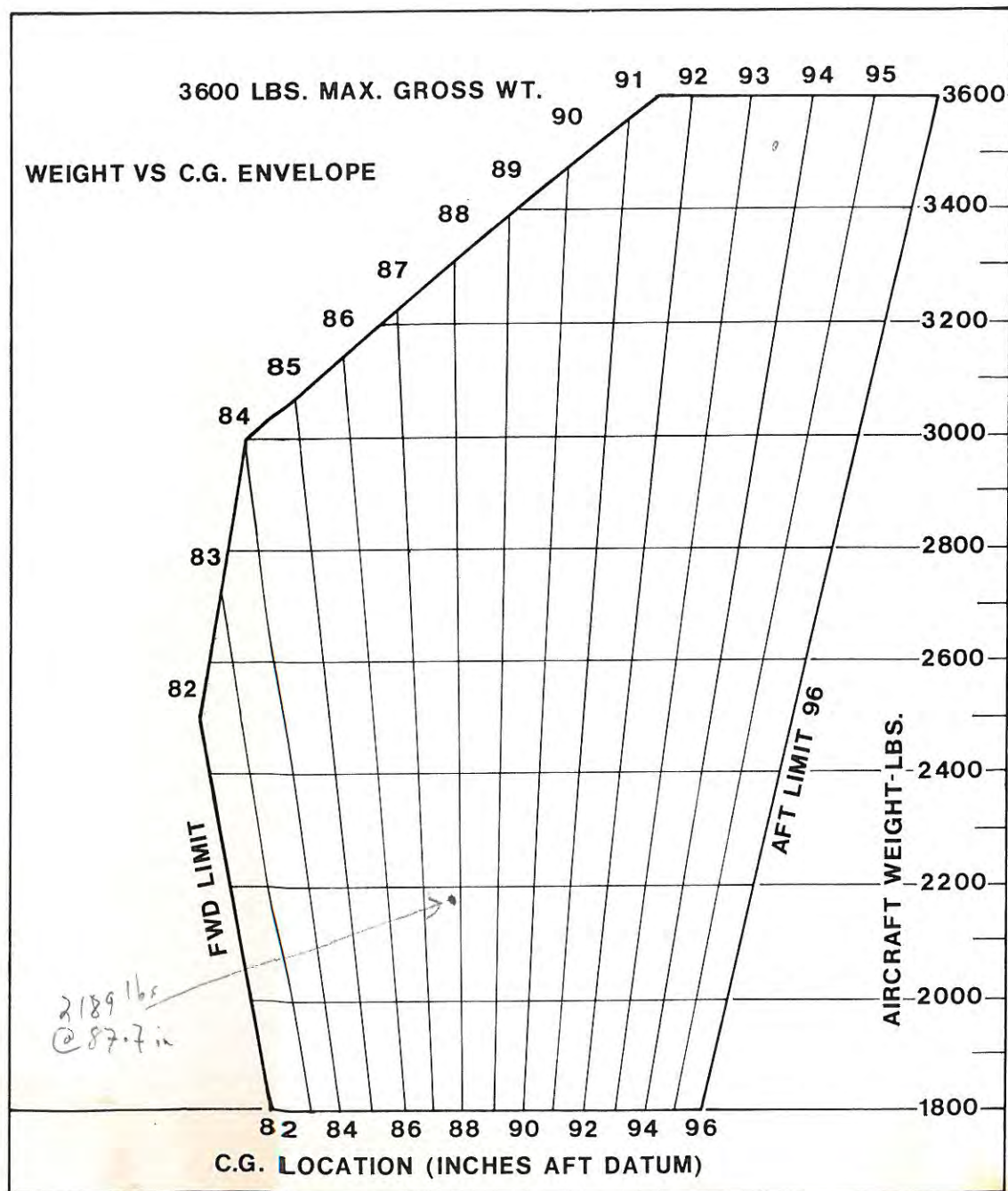
WEIGHT AND BALANCE LOADING FORM

Figure 6-11



LOADING GRAPH

Figure 6-13



Moment change due to retracting landing gear = +819 IN.-LBS.

C.G. RANGE AND WEIGHT

Figure 6-15

6.9 INSTRUCTIONS FOR USING THE WEIGHT AND BALANCE PLOTTER

This plotter is provided to enable the pilot quickly and conveniently to:

- (a) Determine the total weight and C.G. position.
- (b) Decide how to change his load if his first loading is not within the allowable envelope.

Heat can warp or ruin the plotter if it is left in the sunlight. Replacement plotters may be purchased from Piper dealers and distributors.

When the airplane is licensed, the basic weight and basic C.G. will be recorded on the computer. These should be changed any time the basic weight or C.G. location is changed.

The plotter enables the user to add weights and corresponding moments graphically. The effect of adding or disposing of useful load can easily be seen. The plotter does not cover the situation where cargo is loaded in locations other than on the seats or in the baggage compartments.

Brief instructions are given on the plotter itself. To use it, first plot a point on the grid to locate the basic weight and C.G. location. This can be put on more or less permanently because it will not change until the airplane is modified. Next, position the zero weight end of any one of the loading slots over this point. Using a pencil, draw a line along the slot to the weight which will be carried in that location. Then position the zero weight end of the next slot over the end of this line and draw another line representing the weight which will be located in this second position. When all the loads have been drawn in this manner, the final end of the segmented line locates the total load and the C.G. position of the airplane for takeoff. If this point is not within the allowable envelope it will be necessary to remove fuel, baggage, or passengers and/or to rearrange baggage and passengers to get the final point to fall within the envelope.

Fuel burn-off and gear movement do not significantly affect the center of gravity.

SAMPLE PROBLEM

A sample problem will demonstrate the use of the weight and balance plotter.

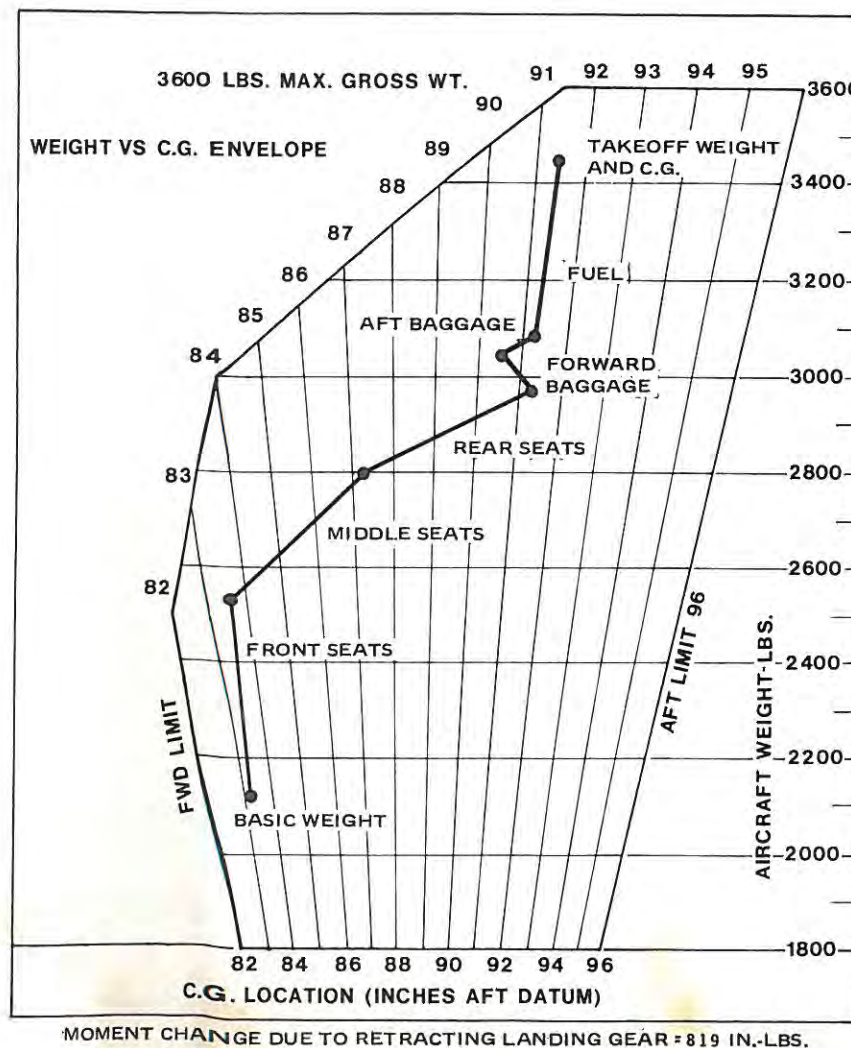
Assume a basic weight and C.G. location of 2150 pounds at 83.5 inches respectively. We wish to carry a pilot and 5 passengers. Two men weighing 180 and 200 pounds will occupy the front seats, two women weighing 115 and 135 pounds will occupy the middle seats and two children weighing 80 and 100 pounds will ride in the rear. Two 25 pound suitcases will be tied down in the front baggage compartment and two suitcases weighing 25 pounds and 20 pounds respectively, will be carried in the rear compartment. We wish to carry 60 gallons of fuel. Will we be within the safe envelope?

- (1) Place a dot on the plotter grid at 2150 pounds and 83.5 inches to represent the basic airplane. (See illustration.)
- (2) Slide the slotted plastic into position so that the dot is under the slot for the forward seats, at zero weight.
- (3) Draw a line up the slot to the 380 pound position ($180 + 200$) and put a dot.
- (4) Move the slotted plastic again to get the zero end of the middle seat slot over this dot.
- (5) Draw a line up this slot to the 250 pound position ($115 + 135$) and place the 3rd dot.

- (6) Continue moving the plastic and plotting points to account for weight in the rear seats (80 + 100), forward baggage compartment (50), rear baggage compartment (45), and fuel tanks (360).
- (7) As can be seen from the illustration, the final dot shows the total weight to be 3440 pounds with the C.G. at 91.6. This is well within the envelope.
- (8) There will be room for more fuel.

As fuel is burned off, the weight and C.G. will follow down the fuel line and stay within the envelope for landing.

SAMPLE PROBLEM



6.11 EQUIPMENT LIST

The following is a list of equipment which may be installed in the PA-32RT-300. It consists of those items used for defining the configuration of an airplane when the basic empty weight is established at the time of licensing. Only those standard items which are alternate standard items and those required to be listed by the certificating authority (FAA) are presented. Items marked with an "X" are those items which were installed on the airplane described below when licensed by the manufacturer.

Where the letter "A," "B", or "C" precedes an item, "A" denotes an item which is required equipment that must be installed in the aircraft, "B" denotes an item which is required equipment that must be installed in the aircraft unless replaced by an optional equivalent item; "C" denotes an optional item which replaces a required item of standard equipment. Where no letter precedes an item, that item is not required equipment.

Unless otherwise indicated, the installation certification basis for the equipment included in this list is the aircraft's approved type design.

PIPER AIRCRAFT CORPORATION

PA-32RT-300 LANCE II

SERIAL NO. 32R-7885090 REGISTRATION NO. N30927 DATE: APR 12, 1978

(a) Propeller and Propeller Accessories

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
1	A Propeller, Hartzell HC-C2YK-1 () F/F8475D-4 Cert. Basis - TC P920 <i>McCawley B3B36C433 + SPINNER</i>		51.0 74.2	-12.1 12.7	-618 942.3
3	Spinner <i>JAN-15-2007</i> Piper Dwg. 99374-0 <i>CLW Dwg. A-93586899</i> <i>SEE FAA FORM 337 DATED 1-25-2007</i>		4.8	-13.2	-63
5	A Propeller Governor Piper Dwg. 66634-8 (Hartzell F-4-11 ()) Cert. Basis - TC P920		4.5	-3.1	-14

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(b) Engine and Engine Accessories, Fuel and Oil Systems

Item No.		Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
7	A	Engine Lycoming Model IO-540-K1G5D Cert. Basis - TC 1E4	_____	468.8	11.25	5274
9	A	Engine Driven Fuel Pump Lycoming P/N 75247 Cert Basis - TC 1E4	_____	*1.7	27.6	47
11	A	Electric Fuel Pump Airborne P/N 1B5-6	_____	3.0	112.6	338
13	A	Fuel Valve Piper Dwg. 69735-5 (Airborne P/N 1-H65-5)	_____	2.4	110.8	266
15	A	Oil Coolers (2), (Harrison P/N 8543897) or (Niagara P/N N.D.M. 20014A)	_____	4.2	22.5	94
17	A	Air Filter Fram P/N CA-161PL	_____	1.0	16.0	16
19	B	Alternator Piper Dwg. 99945-0	_____			
		a. Chrysler P/N 3656624	_____	*12.7	-2.5	-32
		b. Chrysler P/N 4111810	_____	13.5	-2.5	-34
21	A	Starter Lycoming P/N 76211 (Prestolite P/N MZ 4206) Cert. Basis - TC 1E4	_____	*18.0	0.7	13
23	A	Oil Filter Lycoming P/N 63459 Cert. Basis - TC 1E4	_____	*1.6	43.5	70

*Included in basic engine dry weight.



U.S. Department
of Transportation
Federal Aviation
Administration

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020

For FAA Use Only

Office Identification

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in a civil penalty not to exceed \$1,000 for each such violation (Section 901 Federal Aviation Act of 1958).

1. Aircraft	Make Piper	Model PA-32RT-300
	Serial No. 32R-7885090	Nationality and Registration Mark N30927
2. Owner	Name (As shown on registration certificate) Kenyon, Dennis D. Kenyon, Donna M.	Address (As shown on registration certificate) 7790 E FR182 Rogersville, Mo. 65742

3. For FAA Use Only

4. Unit Identification				5. Type	
Unit	Make	Model	Serial No.	Repair	Alteration
AIRFRAME	~~~~~ (As described in Item 1 above) ~~~~~				
POWERPLANT	Lycoming	IO-540-K1G5D	L-17991-48A		X
PROPELLER					
APPLIANCE	Type				
	Manufacturer				

6. Conformity Statement

A. Agency's Name and Address David Will Aviation Enterprises 5030 W. Kearney Springfield, Mo. 65803	B. Kind of Agency ☒ U.S. Certified Mechanic ☐ Foreign Certified Mechanic ☐ Certified Repair Station ☐ Manufacturer	C. Certificate No. 487645318
--	--	--

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Date 9/20/99	Signature of Authorized Individual David Will
-----------------	--

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY	FAA Fit Standards Inspector	Manufacturer	☒	Inspection Authorization	Other (Specify)
	FAA Designee	Repair Station		Person Approved by Transport Canada Airworthiness Group	
Date of Approval or Rejection 9/20/99		Certificate or Designation No. 487645318 IA		Signature of Authorized Individual David Will	

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

Description of Work Accomplished
(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

Install Sky-Tec starter as per instructions contained in STC SE00218NY. See attached Sky-Tec Drawing # 20101 for continued airworthiness information.

-END-

[illegible]

United States of America
Department of Transportation—Federal Aviation Administration
Supplemental Type Certificate

Number SE00218NY

This certificate, issued to Staples Holdings, Ltd.
433 Plainview
Hurst, Texas 76054

*certifies that the change in the type design for the following product with the limitations and conditions
therefor as specified hereon meets the airworthiness requirements of Part 33 of the Federal Aviation
Regulations.*

Original Product—Type Certificate Number See Page 2, Lycoming Engine Models
Make Textron Lycoming
Model See Page 2, Lycoming Engine Models

Description of Type Design Change:

Configuration I
Replacement of Lycoming starter with SKY-TEC 12-volt Starter Model 149-12PM,
installed in accordance with SKY-TEC DWG. 20101 Rev B.

Configuration II
Replacement of Lycoming starter with SKY-TEC 12-volt Starter Model 122-12PM,
installed in accordance with SKY-TEC DWG 20101 Rev. B.

Limitations and Conditions

- 1) This approval is limited to aircraft with a 12-volt DC Source available to the starter.
- 2) Configuration I is limited to SKY-TEC Starter Model 149-12PM used with a 149-Tooth engine ring gear and starter drive ratio of 13.55:1 and Configuration II is limited to SKY-TEC starter model 122-12PM used with a 122-Tooth engine ring gear and starter drive ratio of 14.9:1.

(See Continuation Sheet Page 2)

*This certificate and the supporting data which is the basis for approval shall remain in effect until sur-
rendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the
Federal Aviation Administration.*

Date of application June 11, 1994
Date of issuance September 12, 1994

Date issued January 14, 1997
Date amended February 6, 1995, May 23, 1996
September 20, 1996

By direction of the Administrator



(Signature)
Anthony Socias
Mgr. Airframe and
Propulsion Branch

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both.

United States of America
Department of Transportation—Federal Aviation Administration
Supplemental Type Certificate
(Continuation Sheet)

Number SE00218NY

Date Reissued: January 14, 1997

Models (Continued)

Lycoming Engine Models

TC E-286: O-360 Series

TC E-26EA: TO-360 Series

TC 1E10: IO-360 Series; All Models except LI0, LHI0

TC 1E12: IO-320 Series; All Models except LI0-320 Series

TC E-274: O-320 Series

TC E-233: O-235 Series

TC E-229: O-290 Series

TC E-295: O-540 Series

TC 1E4: IO-540 Series; All Models except LI0, LHI0

TC E11EA: T10-541 Series

Description of Type Design Change:

Configuration III

Replacement of Lycoming starter with SKY-TEC 12-volt Starter Model 149-12LS, in accordance with SKY-TEC DWG 20130 Rev. B.

Configuration IV

Replacement of Lycoming starter with SKY-TEC 12-volt Starter Model 122-12LS in accordance with SKY-TEC DWG 20130 Rev. B

Limitations and Conditions (Cont.):

3. This approval should not be incorporated in any engine on these specific models on which other approved modifications are incorporated, unless it is determined that the interrelationship between this change and any of those previously incorporated approved modifications will not introduce any adverse effect upon the airworthiness of the engine.

Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both.

FAA FORM 8110-2-1 (10-69)

This certificate may be transferred in accordance with FAR 21.47.

REVISIONS

LETTER	DESCRIPTION	DATE	APPROVED
A	ADDED 24 VOLT MODELS	2/20/95	TCW
B	ADDED PLATFORM HEIGHT	5/15/95	TW
C	ADDED NOTES & CUTOFF	8/27/95	TW
D	ADDED PMA MARKINGS	12/4/97	LES
E	DELETED MODULE, EXTEND CASE	3/2/98	

GENERAL DESCRIPTION

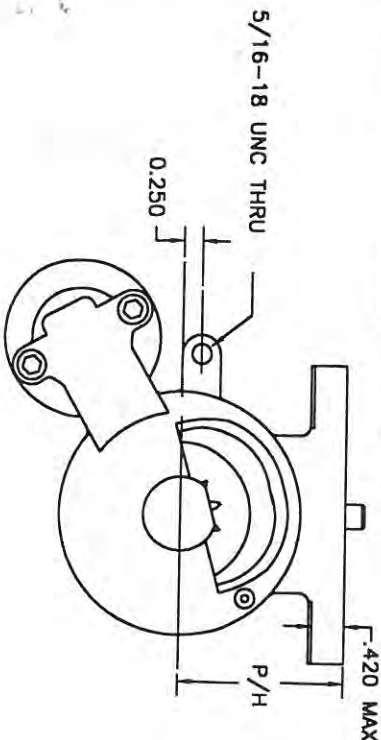
THE SKY-TEC PERMANENT MAGNET, GEAR REDUCTION STARTERS HAVE A PERMANENT MAGNET MOTOR FIELD WITH A WOUND ARMATURE. 12 VOLTS APPLIED THRU BRUSHES TO THE COMMUTATOR WILL PRODUCE 2 hp. THE MOTOR DRIVES AN IN-LINE PLANETARY GEAR BOX WITH A 4.27:1 REDUCTION. THE PLANET GEARS AND THE OUTBOARD DRIVE SHAFT USE NEEDLE TYPE ANTI-FRICTION BEARINGS.

THE OUTBOARD NEEDLE BEARING SHOULD BE CLEANED AND RE-LUBRICATED WITH LITHIUM BASE GREASE ON A 2000 hr BASIS. NO OTHER MAINTENANCE IS REQUIRED.

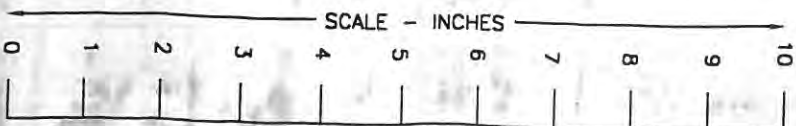
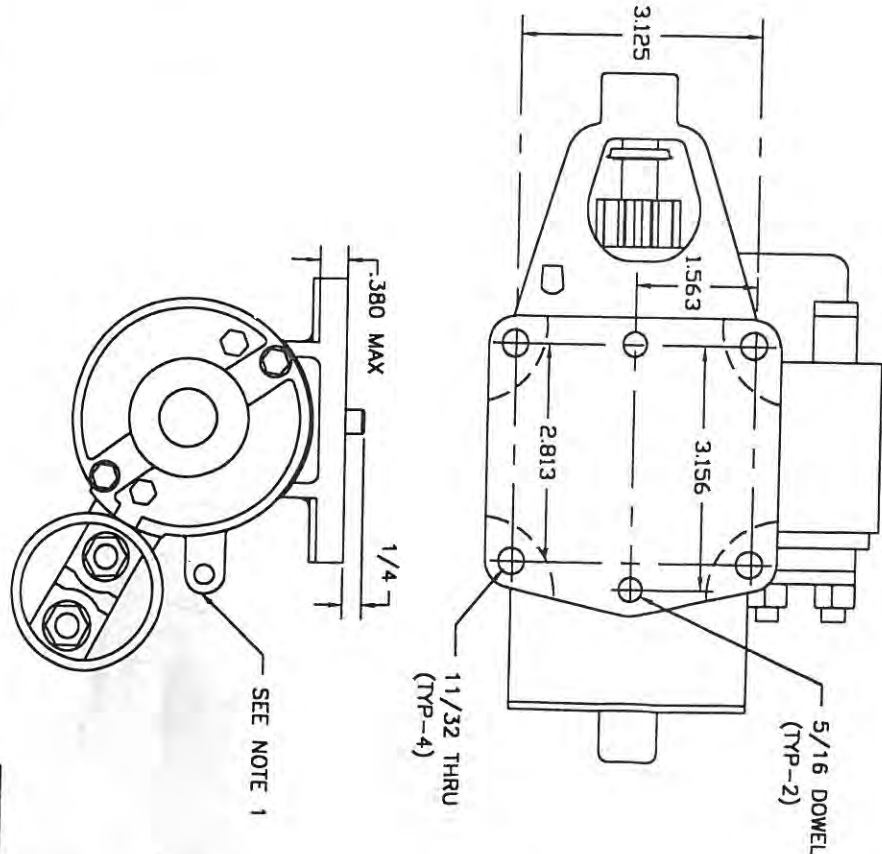
PMA MARKINGS

Sky-Tec FAA-PMA
For eligibility see STC

Model No. _____
Serial No. _____
Pitch _____ Volts _____



- ## NOTES
1. THE STARTERS ARE MANUFACTURED IN ACCORDANCE WITH DRAWING 20102 AND SUBS
 2. AN OPTIONAL 6" EXTENSION CABLE KIT IS AVAILABLE - P/N 20139.



SPECIFICATIONS

MODEL NUMBER	RING GEAR	INPUT POWER	GEAR RATIO	ROTATION	P/H ± .005	PITCH TEETH	PINION
122-12PM	122	200AMP-12VDC	13.55	CW	2.093	10	9
149-12PM	149	200AMP-12VDC	14.9	CW	2.153	12	10
122-24PM	122	100AMP-24VDC	13.55	CW	2.093	10	9
149-24PM	149	100AMP-24VDC	14.9	CW	2.153	12	10

Sky-Tec Mfg Inc holds
a US Patent on this design.

Sky-Tec Mfg Inc
Winter Haven, Florida

PMGR STARTER INSTALLATION

DRAWN BY Tom Williams DATE 6/7/93

MATERIALS REV

20101

E

IMPORTANT DOCUMENTATION

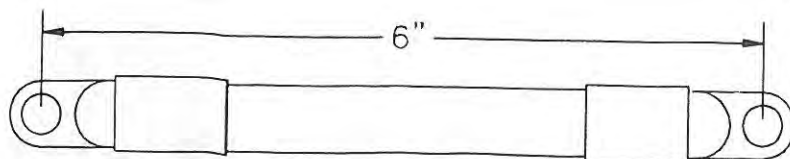
**THIS PACKET CONTAINS THE
INSTALLATION DATA AND STC
FOR THE FOLLOWING
STARTER MODELS**

122-12PM --- 149-12PM

122-24PM --- 149-24PM

NOTES

1. CABLE IS AWG #4 TINNED COPPER WIRE WITH 5/16" EYE CONNECTORS ON ENDS. SHRINK TUBES SUPPORT THE EYE ENDS.
2. THE KIT INCLUDES SCREW, NUT, 4" SHRINK TUBE AND LOCKWASHER.



*Available from Sky-Tec
Call 1-800-476-7896*

LETTER	DESCRIPTION	DATE	APPROVED

REVISIONS

Sky-Tec Mfg Inc	
Winter Haven, Florida	
EXTENSION CABLE	
DRAWN BY: Tom Williams	DATE: 8/29/96
MATERIAL: SEE NOTES	DRAWING NUMBER: 20139
	REV.



US Department
of Transportation
**Federal Aviation
Administration**

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020

For FAA Use Only

Office Identification

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in a civil penalty not to exceed \$1,000 for each such violation (Section 901 Federal Aviation Act of 1958).

1. Aircraft	Make Piper	Model PA32R-300
	Serial No. 32R-7885090	Nationality and Registration Mark N30927
2. Owner	Name (As shown on registration certificate) Coker Aircraft Sales, Inc.	Address (As shown on registration certificate) 6418 Old Orchard Cove Memphis, TN 38119

3. For FAA Use Only

4. Unit Identification				5. Type	
Unit	Make	Model	Serial No.	Repair	Alteration
AIRFRAME	~~~~~ (As described in Item 1 above) ~~~~~				X
POWERPLANT					
PROPELLER					
APPLIANCE	Type				
	Manufacturer				

6. Conformity Statement

A. Agency's Name and Address	B. Kind of Agency	C. Certificate No.
Dyerburg Avionics, Inc. Municipal Airport Dyersburg TN 38024	☐ U.S. Certificated Mechanic	Limited Airframe SF4R516M
	☐ Foreign Certificated Mechanic	
	☒ Certificated Repair Station	
	☐ Manufacturer	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Date 12 FEB 1993	Signature of Authorized Individual Jerrie W. Davis <i>Jerrie W Davis</i>
---------------------	---

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY	FAA Flt. Standards Inspector	Manufacturer	Inspection Authorization	Other (Specify)
	FAA Designee ☒	Repair Station	Person Approved by Transport Canada Airworthiness Group	
Date of Approval or Rejection 12 FEB 1993		Certificate or Designation No. SF4R516M	Signature of Authorized Individual Jerrie W. Davis <i>Jerrie W Davis</i>	

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

Removed Foster 511 RNAV.

Installed Northstar GPS -600 in right avionics stack. Installed AN-130 GPS antenna on top of fuselage over cockpit area . GPS interfaced to existing HSI and A/P by utilizing NAT PB08-001 and RS08-001.

Placarded "GPS NOT APPROVED FOR IFR".

System installed IAW FAR 43.13-1A chapter 11 section 2 paragraph 424,429(b); and AC 43.13-2A chapter 2 paragraph 21(a), 22, 23(a)(b)(c);AC20-130 paragraph 6a , and manufacturers installation instructions. The GPS installation conforms with the following airworthiness considerations as per and AC20-130.

- (a) The GPS does not interfere with the normal operation of other equipment installed in the aircraft as confirmed by ground and flight test.
- (b) The installation is for VFR operation and has been appropriately placarded.
- (c) The GPS is protected by appropriately placarded and sized circuit breakers.

Total electrical load does not exceed 80% of total alternator output.

Utilized TEFZEL MIL 22759/16 wire in installation.

Weight and balance data revised and entered into appropriate records.

Reference work order 8716 this repair station.

-----THE END-----

☐ Additional Sheets Are Attached

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
Budget Bureau No. 04-R060.1

FOR FAA USE ONLY

OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE Piper Lance II	MODEL PA-32RT- 300
	SERIAL NO. 32R- 78850 90	NATIONALITY AND REGISTRATION MARK N30927
2. OWNER	NAME (As shown on registration certificate) Horton A Smith	ADDRESS (As shown on registration certificate) 401 Lowell Drive Suite 2 Huntsville, AL 35801

3. FOR FAA USE ONLY

4. UNIT IDENTIFICATION

UNIT	MAKE	MODEL	SERIAL NO.	5. TYPE	
				REPAIR	ALTERATION
AIRFRAME	***** (As described in item 1 above) *****				
POWERPLANT					XX
PROPELLER					
APPLIANCE	TYPE				
	MANUFACTURER				

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS Buddy Washington 850 Browns Ferry Rd Madison, AL 35758	B. KIND OF AGENCY	C. CERTIFICATE NO. 42I 70 9I05
	☒ U.S. CERTIFICATED MECHANIC	
	FOREIGN CERTIFICATED MECHANIC	
	CERTIFICATED REPAIR STATION	
	MANUFACTURER	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE II-Dec- 85	SIGNATURE OF AUTHORIZED INDIVIDUAL <i>Buddy Washington</i>
---------------------------	---

7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

FAA FLT. STANDARDS INSPECTOR	MANUFACTURER	XX	INSPECTION AUTHORIZATION	OTHER (Specify)
FAA DESIGNEE	REPAIR STATION		CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT	
DATE OF APPROVAL OR REJECTION II-DEC-85	CERTIFICATE OR DESIGNATION NO. 42I-70-9I05	SIGNATURE OF AUTHORIZED INDIVIDUAL <i>Buddy Washington</i>		

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

NOTICE

8. DESCRIPTION OF WORK ACCOMPLISHED (If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

Installed Precise Flight, Inc. Standby Vacuum System In accordance With Airframe STC#SA2167NM And Lycoming STC#SEI779NM.

Weight And Balance Revised •

New Aircraft Empty Weight = 2203.9lbs
New Empty Weight CG = 87.5ins

END

AIRCRAFT TEST FLOWN, CHECKED & RECORDED.

16 DEC '85
McGraw-Hill 420499

☐ ADDITIONAL SHEETS ARE ATTACHED

MAY 10 1978

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION**MAJOR REPAIR AND ALTERATION**
(Airframe, Powerplant, Propeller, or Appliance)Form Approved
Budget Bureau No. 04-R060.1

FOR FAA USE ONLY

OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE Piper	MODEL PA-32RT-300
	SERIAL NO. 32R-7885090	NATIONALITY AND REGISTRATION MARK N30927
2. OWNER	NAME (As shown on registration certificate) Huntsville Aviation	ADDRESS (As shown on registration certificate) P. O. Box 1324 Huntsville, Al. 35807

3. FOR FAA USE ONLY

"The data identified herein complies with the applicable airworthiness requirements and is approved for the above described aircraft, subject to conformity inspection by a person authorized in FAR 43, section 43.7."

5/11/78 Cecil L. Vaughn
Date Signature of FAA inspector

4. UNIT IDENTIFICATION

UNIT	MAKE	MODEL	SERIAL NO.	5. TYPE	
				REPAIR	ALTERATION
AIRFRAME	***** (As described in item 1 above) *****				
POWERPLANT					X
PROPELLER					
APPLIANCE	TYPE				
	MANUFACTURER				

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS Montgomery Aviation Corp P. O. Box 92 Montgomery, Al. 36101	B. KIND OF AGENCY		C. CERTIFICATE NO. 5370
	U.S. CERTIFICATED MECHANIC		
	FOREIGN CERTIFICATED MECHANIC		
	X CERTIFICATED REPAIR STATION		
	MANUFACTURER		

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE 27 April 78	SIGNATURE OF AUTHORIZED INDIVIDUAL James W. Adams 1601485
---------------------	--

7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY	FAA FLT. STANDARDS INSPECTOR	MANUFACTURER	INSPECTION AUTHORIZATION	OTHER (Specify)
	FAA DESIGNEE	X REPAIR STATION	CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT	
DATE OF APPROVAL OR REJECTION 27 April 78		CERTIFICATE OR DESIGNATION NO. 5370	SIGNATURE OF AUTHORIZED INDIVIDUAL James W. Adams 1601485	

NOTICE
Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

DESCRIPTION OF WORK ACCOMPLISHED (If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

INSTALLED THE FOLLOWING:

1. King KN62 DME
2. King KA-60 DME Antenna
3. Narco VNA-10 Nav. Antenna
4. Foster Air Data R-Nav-511
5. Foster Airdata 51DSA Steering Adapter
6. Foster Airdata DME Adapter

EQUIPMENT INSTALLED AS PER AC43.13-1, SECTION 7 AND AC43.13-2, CHAPTER 2 & 3. ELECTRICAL LOAD IS WITHIN ALTERNATOR CAPACITY. COMPASS CHECKED AND OPERATION OF EQUIPMENT IS SATISFACTORY.

END

☐ ADDITIONAL SHEETS ARE ATTACHED

MAY 10 1978

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATIONForm Approved
Budget Bureau No. 04-R060.1**MAJOR REPAIR AND ALTERATION**
(Airframe, Powerplant, Propeller, or Appliance)

FOR FAA USE ONLY

OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE Piper	MODEL PA-32RT-300
	SERIAL NO. 32R-7885090	NATIONALITY AND REGISTRATION MARK N30927
2. OWNER	NAME (As shown on registration certificate) Huntsville Aviation	ADDRESS (As shown on registration certificate) P. O. Box 1324 Huntsville, Al. 35807

3. FOR FAA USE ONLY

The data identified herein complies with the applicable airworthiness requirements and is approved for the above described aircraft, subject to conformity inspection by a person authorized in FAR 43, section 43.7.

5/11/78
DateCeil L. Vaughan
Signature of FAA inspector

4. UNIT IDENTIFICATION

UNIT	MAKE	MODEL	SERIAL NO.	REPAIR	ALTERATION
AIRFRAME	***** (As described in item 1 above) *****				X
POWERPLANT					
PROPELLER					
APPLIANCE	TYPE				
	MANUFACTURER				

5. TYPE
SO-CAD-2

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS Montgomery Aviation Corp. P. O. Box 92 Montgomery, Al. 36101	B. KIND OF AGENCY		C. CERTIFICATE NO. 5370
	U.S. CERTIFICATED MECHANIC		
	FOREIGN CERTIFICATED MECHANIC		
	X CERTIFICATED REPAIR STATION		
	MANUFACTURER		

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE 27 April 78	SIGNATURE OF AUTHORIZED INDIVIDUAL James W. Adams 1601485
---------------------	--

7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY	FAA FLT. STANDARDS INSPECTOR	MANUFACTURER	INSPECTION AUTHORIZATION	OTHER (Specify)
	FAA DESIGNEE	REPAIR STATION	CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT	
DATE OF APPROVAL OR REJECTION 27 April 78		CERTIFICATE OR DESIGNATION NO. 5370	SIGNATURE OF AUTHORIZED INDIVIDUAL James W. Adams 1601485	

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

NOTICE

8. DESCRIPTION OF WORK ACCOMPLISHED (If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

KN62 DME INSTALLATION:
WE CERTIFY THAT THE DME WAS INSTALLED AS PER AC43.13-1, SECTION 7 AND AC 43.13-2 CHAPTER 2 & 3.

R NAV IFR CERTIFICATION:
THE FOLLOWING INFORMATION WILL CERTIFY COMPLIANCE OF AREA NAVIGATION SYSTEM WITH

REQUIREMENTS SET FORTH IN FAA AC90-45, APPENDIX B PARAGRAPH 2.

1. Installation was accomplished by Montgomery Aviation Corp on a form 337.

2. Equipment list:

King KX170B Nav/Com
King KN62 DME
Foster Alrdara R Nav. 511

Foster Alrdara Steering adapter Model 51DSA
Foster Alrdara DME adapter P/N 804B0116

Edo-Aire Mitchell NSD 360
King KN7 Vor/Loc Converter.

3. OPERATION INSTRUCTIONS:

FOSTER AIRDATA PROVIDES AN R NAV 511 PILOTS GUIDE AND THE OPERATION OF THIS EQUIPMENT IS LIMITED TO THE INFORMATION CONTAINED THEREIN, A COPY OF THIS MANUAL IS MADE A PERMANENT PART OF THE A/C FLIGHT MANUAL.

4. PRE FLIGHT TESTS:

PRE FLIGHT TESTS WERE PERFORMED WITH SYSTEM INSTALLED IN THE A/C AND THE EQUIPMENT MET THE REQUIRED ERROR TOLERANCES: REF. AC90-45, APPENDIX A PARAGRAPH 3B.

5. GROUND CHECKS:

WERE MADE ALL MEASUREMENTS FALL WITHIN STATED TOLERANCE OF REF. AC90-45 APPENDIX

A PARAGRAPH 3C.

6. FLIGHT TEST

A FLIGHT TEST AS PRESCRIBED BY THE GADO HAS BEEN PERFORMED IN FULFILLMENT OF REQUIREMENTS OF AC90-45, APPENDIX A PARAGRAPH 3C AND THIS INSTALLATION HAS BEEN FOUND TO MEET ALL ACCURACY REQUIREMENTS STATED THEREIN. REF. AC90-45

7. STATEMENT OF COMPLIANCE:

I CERTIFY THAT THIS INSTALLATION MEETS REQUIREMENTS FOR IFR OPERATION IN ACCORDANCE WITH PROVISIONS OF FAA AC90-45 AND IN ACCORDANCE WITH INSTALLATION PROCEDURES, GROUND AND FLIGHT CHECKS PERFORMED BY ME OR UNDER MY SUPERVISION AND APPROVAL.

MONTGOMERY AVIATION CORP.

P. O. BOX 92

MONTGOMERY, AL. 36101

WORKED PERFORMED BY JAMES W. ADAMS

DATE 27 April 78

INSTALLING TECHNICIAN William A. Griffin

I CERTIFY that the ABOVE AIRCRAFT WAS FLIGHT TESTED AND MET THE REQUIREMENTS OF AC 90-45.

SIGNATURE & PILOT LICENSE #

ADDITIONAL SHEETS ARE ATTACHED

SECTION 6

WEIGHT AND BALANCE

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
31 B	Two Main Wheel-Assemblies, a. Cleveland Aircraft Products Wheel Assy. No. 40-90 Brake Assy. No. 30-65, Cert. Basis - TSO C26a b. 6.00-6 Type III 8 Ply Rating Tires with Reg. Tubes Cert. Basis - TSO C62		32.9	109.8	3612
33 B	Nose Wheel Assembly a. Cleveland Aircraft Products Wheel Assy. No. 40-77 Cert. Basis - TSO C26a b. McCauley Industrial Corp. Wheel Assy. No. D-30500 Cert. Basis - TSO C26b c. 5.00-5 Type III 6 Ply Rating Tire with Reg. Tube Cert. Basis - TSO C62	_____ <u>X</u>	2.6 3.6 6.1	14.3 14.3 14.3	37 51 88

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft. Datum	Moment (Lb-In.)
41 A	Voltage Regulator Piper Dwg. 68804-3		0.5	19.4	10
43 B	Battery Rebat S-25		21.9	42.4	929
45 A	Starter Relay Piper Dwg. 99130-2 (Rebat P/N 111-111)		1.0	32.4	33
47 A	Over Voltage Relay Piper PS50034-1 (Prestolite (Wico Div.) P/N X16799)		0.5	23.0	12

REPORT: VB-890
6-17

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(e) Instruments

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
51 B	Altimeter Piper PS50008-2-2 (United Instruments UI5934-P or UI5934P-1) Cert. Basis - TSO C10b		1.1	65.9	73
53 B	Airspeed Indicator Piper PS50049-39S-2 (United Instruments 8025-B.280) Cert. Basis - TSO C2b		0.6	66.8	40
55 A	Manifold & Fuel Flow Indicator Piper PS50031-7-4 (United Instruments 6082-H.56 or 6331-H.56) Cert. Basis - TSO C45 & C47		1.2	66.2	80
57 A	Compass Piper Dwg. 67462-6 (Airpath P/N C-2200-L4-B) Cert. Basis - TSO C7c		0.9	64.9	59
59 A	Tachometer Piper Dwg. 62177-2 (AC 6411622) or Piper Dwg. 62177-3 (Stewart Warner 551-WE(N))		0.7	66.2	47
61 A	Left Engine Cluster Piper Dwg. 95241-20		0.8	67.4	54
63 A	Right Engine Cluster Piper Dwg. 95211-19, plus 38224-0 and 38224-2		0.8	67.4	54

(f) Hydraulic Equipment

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
71 A	Handbrake Master Cylinder Cleveland Aircraft Products No. 10-22		0.6	60.9	37
73 A	Toe Brake Cylinders				
	a. Cleveland Aircraft Products No. 10-27		0.7	55.1	39
	b. Gar-Kenyon Instruments 17000	<u>X</u>	0.4	55.1	22
75 A	Landing Gear Hydraulic Pump Piper Dwg. 96671-2 (Prestolite HYC-5005)		9.0	46.6	420
77 A	Main Gear Hydraulic Cylinders (2), Piper Dwg. 96860-0 Synco Devices SFA 232-3)		2.2	108.0	238
79 A	Nose Gear Hydraulic Cylinder Piper Dwg. 35797-2 (Gar Kenyon 94951)		2.0	41.8	84

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(g) Cabin Interior

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
85 A	Left Front Seat Piper Dwg. 79337-19		15.5	93.0	1442
87	Right Front Seat Piper Dwg. 79337-20		15.5	93.0	1442
89	Left Middle Seat Piper Dwg. 96827-24		13.5	124.1	1676
91	Right Middle Seat Piper Dwg. 96827-25		13.5	124.1	1676
93	Left Rear Seat Piper Dwg. 79479-2		14.5	155.7	2258
95	Right Rear Seat Piper Dwg. 79479-3		14.5	155.7	2258
97 A	Front Seat Belts (2) Piper PS50039-4-2A (American Safety Eqpt. Corp. 449965 Black) Cert. Basis - TSO C22f		1.8	86.9	156
99 A	Center Seat Belts (2) Piper PS50039-4-3A (American Safety Eqpt. Corp. 500577 Black) Cert. Basis - TSO C22f		1.6	123.0	197
101 A	Aft Seat Belts (2) Piper PS50039-4-4A (American Safety Equip. Corp. 500576 Black) Cert. Basis - TSO C22f		1.6	163.0	261

(g) Cabin Interior (Cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
103 A	Shoulder Harness (2) (Front Seats Only) Piper PS50039-4-21 (Pacific Scientific 1107447-05 Black)		1.4	120.1	169
105 A	Baggage Straps Piper Dwg. 66804-0 and 66805-0		1.3	177.0	230
107	Tow Bar Piper Dwg. 69975-2		2.3	193.9	446

(h) Engine and Engine Accessories, Fuel and Oil Systems
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
111	Vacuum Pump				
	a. Piper Dwg. 26749-3 (Airborne P/N 200CC)	_____	3.6	27.4	99
	b. Piper Dwg. 79399-0 (Airborne P/N 211cc)	_____	1.8	27.4	50
	c. Piper Dwg. 36535-2 (Edo-Aire P/N 1U128A)	<u>X</u>	2.2	27.4	60
113	Exhaust Gas Temperature Gage Installation Piper Dwg. 69185-3, Alcor Indicator P/N 202A-7A or P/N 202B-7A Probe Model "A" Lead Assembly 90.00	<u>X</u>	0.7	69.4	49

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(i) Propeller and Propeller Accessories
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
----------	------	----------------	-----------------	---------------------	-----------------

(j) Landing Gear and Brakes
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
----------	------	----------------	-----------------	---------------------	-----------------

121 C Heavy Duty Group No. 1

- a. Cleveland Aircraft Products
40-120 Wheel Assy. (2),
30-83 Brake Assy. (2),
Cert. Basis - TSO C26a
Goodrich 6.00 x 6 Ribbed
Type III 8 Ply Rating Tire
with Tube (2)

Cert. Basis - TSO C62

- b. Goodrich 5.00 x 5 Ribbed
Type III 6 Ply Rating Tire
with Tube

Cert. Basis - TSO C62

X

*1.5

109.8

165

X

(Same as Standard Equipment)

*Weight and moment difference between standard and optional equipment.

(k) Electrical Equipment
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
131	Instrument Panel Lights Instl. Piper Dwg. 38004-4	<u> </u> X	0.3	67.8	20
133	Instrument Light (2), Grimes 15-0083-7	<u> </u> X	0.2	99.0	20
135	Reading Lights (4) Grimes P/N 10-0644-1	<u> </u> X	0.6	133.3	80
137	Courtesy Light Installation Piper Dwg. 37874-2	<u> </u> X	0.4	125.2	50
139	Forward Baggage Light Piper Dwg. 68697-3	<u> </u> X	0.2	43.5	9
141	Landing Light Piper PS10008-4509 G.E. Model 4509	<u> </u> X	0.5	-2.6	-1
143	Navigation Lights (Wing) (2) Grimes Model A1285 (Red and Green)	<u> </u> X	0.4	106.6	43
145	Navigation Light (Rear) (2) Grimes Model A2064 (White)	<u> </u> X	0.4	304.5	122
147	Anti-Collision Lights (Wing Tip) (Whelen) Piper Dwg. 38221-10 Cert. Basis - STC SA615EA	<u> </u> X	6.3	186.5	1175
149	Heated Pitot Installation Piper Dwg. 67477-0	<u> </u> X	0.4	100.0	40
151	Piper Pitch Trim Piper Dwg. 69378-2	<u> </u> X	4.7	183.2	861
153 C	Battery 12v 35 A.H. Rebat R35	<u> </u> X	*6.5	42.4	276

*Weight and moment difference between standard and optional equipment.

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(k) Electrical Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
155	Auxiliary Power Receptacle, Piper Dwg. 38014-2	<u> X </u>	2.6	48.4	126
157	External Power Cable, Piper Dwg. 62355-2	<u> </u>	4.3	42.0	181
159	Lighter Casco P/N 200462	<u> X </u>	0.2	67.9	14

(I) Instruments
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
167	Attitude Gyro				
	a. Piper Dwg. 99002-3 (Edo-Aire P/N 5000B-9)	_____	1.9	64.4	122
	b. Piper Dwg. 99002-8 (Aeritalia S.P.A. P/N 36101P)	_____	2.2	64.4	142
	Cert. Basis - TSO C4c				
169	Directional Gyro				
	a. Piper Dwg. 99003-3 (Edo-Aire P/N 4000B-9)	_____	2.4	64.7	156
	b. Piper Dwg. 99003-4 (Aviation Inst. Mfg. Corp. P/N 200-5)	_____	2.8	64.7	181
	c. Piper Dwg. 99003-7 (Aeritalia S.P.A. P/N 31101P)	_____	1.9	64.7	123
	Cert. Basis - TSO C5c				
171	Horizontal Situation Indicator (HSI) Mitchell P/N NSD-360A	X			
	Cert. Basis - TSO C6c, C9c, C52c	_____	4.6	64.9	299
173 C	Tru-Speed Indicator Piper PS50049-39T-2	X			
	United Instruments P/N 81 25-B.281				
	Cert. Basis - TSO C2b	_____	(Same as standard equipment)		

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(I) Instruments
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
175 C	Altimeter Piper PS50008-3-2 (United Instruments P/N UI5934-PM or P/N UI5934PM-1) or Piper PS50008-4-2 (United Instruments P/N UI5934-PA or P/N UI5934PA-1) or Piper PS50008-5-2 (United Instruments P/N 5934-PAM-1) Cert. Basis - TSO C10b	<u>X</u>	(Same as standard equipment)		
177 C	Encoding Altimeter Piper PS50008-6-2 (United Instruments P/N UI5035P-P23) or Piper PS50008-7-2 (United Instruments P/N UI5035PM-P24 Cert. Basis - TSO C10b and C88	<u> </u>	*0.7	65.3	46
179	Altitude Reporter (Narco AR-500) Piper Dwg. 69875-3 Cert. Basis - TSO C88	<u>X</u>	1.0	56.2	57
181	Rate of Climb a. Piper Dwg. 99010-3 (Standard Precision Co. P/N SP-1403 (1) -PIP)	<u> </u>	0.5	67.2	34
	b. Piper Dwg. 99010-5 (United Instruments P/N UI-7000) Cert. Basis - TSO C8b	<u>X</u>	0.7	65.9	47

*Weight and moment difference between standard and optional equipment.

(I) Instruments
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
183	Alternate Static Source Installation Piper Dwg. 67479-2	X	0.4	66.0	26
185	Turn and Slip Indicator				
	a. Piper PS50030-2-2 (R. C. Allen P/N A2475-2)	_____	2.9	64.7	188
	b. Piper PS50030-2-3 (Electric Gyro Corp. P/N1234T100-5(P)	_____	1.1	64.7	72
	c. Piper PS50030-2-4 (Electric Gyro Corp. P/N 1234T100-(TY) Cert. Basis - TSO C3b	_____	1.1	64.7	72
187	Turn Coordinator				
	a. Piper PS50030-3-2 (R. C. Allen P/N RCA 80A-9)	_____	2.9	64.7	188
	b. Piper PS50030-3-3 (Electric Gyro Corp. 1394T100-3(5Y)	_____	1.1	64.7	72
	c. Piper PS50030-3-4 (Brittain (AIM) P/N600-009-900)	_____	2.1	64.7	136
	d. Piper PS50030-3-5 (Electric Gyro Corp. 1394T100-3(5PE) Cert. Basis - TSO C3b	X	1.1	64.7	72
189	MK 10 Radar Altimeter Piper Dwg. 37693-8	_____	5.4	181.3	979
191	Engine Hour Meter Piper Dwg. 69889-2	_____	0.3	66.2	20

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(1) Instruments
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
193	Clock Piper Dwg. 69920-3 or Piper Dwg. 99478-0 (Wakman P/N AN5743-L2 or (Aircraft Instruments and Dev. Inc. 16-100)	<u>X</u>	0.4	67.4	27
195	Outside Air Temperature Gauge Piper Dwg. 79316-0 (Dresser Industries P/N NHM-70)	<u>X</u>	0.2	77.6	16
197	Gyro Suction Gauge Piper Dwg. 99480-0 (Airborne P/N 1G10-1) or (AN Std. P/N AN577-11)	<u>X</u>	0.5	67.2	34
199	Vacuum Regulator Airborne P/N 2H3-19	<u>X</u>	0.6	53.2	32
201	Vacuum Filter Piper Dwg. 66673-0 (Airborne P/N 1J7-1)	<u>X</u>	0.3	53.5	16

(m) Autopilots
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
211	Auto Flite II Cert. Basis - STC SA-3054 SW-D	_____	6.6	92.8	613
213	Auto Control IIIB	_____	7.4	88.5	655
	a. Directional Gyro 52D54	_____	3.1	64.0	199
	b. Omni Coupler IC-388	_____	0.9	64.3	58
	Cert. Basis - STC SA-3053 SW-D				
215	AltiMatic IIIC	<u> X </u>	23.0	126.6	2912
	a. Directional Gyro 52D54	_____	3.1	64.9	202
	b. Omni Coupler IC-388	<u> X </u>	0.9	64.3	58
	c. G/S Coupler IC-493	_____	1.5	56.7	85
	Cert. Basis - STC SA-3253 SW-D				
217	King KFC 200 Flight Control System with KI-256 Flight Director and 3 In. Gyros Cert. Basis - STC SA1430CE	_____	50.4	149.9	7555
219	King KFC 200 Flight Control System with KG-258 Attitude Horizon Indicator and 3 In. Gyros Cert. Basis - STC SA1430CE	_____	50.4	149.9	7555

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(n) Radio Equipment
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
221	Collins VHF-250 or VHF-251 Comm Transceiver				
	a. Single	_____	4.0	61.9	248
	b. Dual	_____	8.1	61.9	502
	Cert. Basis - TSO C37b, C38b				
223	Collins VIR-350 or VIR-351 Nav Receiver				
	a. Single	_____	3.9	62.4	243
	b. Dual	_____	7.9	62.4	493
	Cert. Basis - TSO C40a, C36c				
225	Collins IND-350 VOR/LOC Indicator				
	a. Single	_____	1.0	65.2	65
	b. Dual	_____	2.0	65.2	130
	Cert. Basis - TSO C40a, C36c				
227	Collins IND-351 VOR/LOC/ GS Indicator				
	Cert. Basis - TSO C40a, C36c	_____	1.3	65.2	85
229	Collins GLS-350 Glide Slope Receiver				
	Cert. Basis - TSO C34c	_____	2.0	199.7	399
230	Collins DCE 400 Distance Computing Equipment				
	Cert. Basis - TSO C40a	_____	2.1	63.9	134
231	Collins RCR-650 ADF Receiver and Antenna and IND-650 Indicator				
	Cert. Basis - TSO C41c	_____	7.7	122.1	941
233	Collins AMR-350 Audio/Marker Panel				
	Cert. Basis - TSO C35d, C50b	_____	*3.3	123.9	409

*Weight includes marker antenna and cable.

(m) Autopilots
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
211	Auto Flite II Cert. Basis - STC SA-3054 SW-D	_____	6.6	92.8	613
213	Auto Control IIIB	_____	7.4	88.5	655
	a. Directional Gyro 52D54	_____	3.1	64.0	199
	b. Omni Coupler IC-388	_____	0.9	64.3	58
	Cert. Basis - STC SA-3053 SW-D				
215	AltiMatic IIIC	_____X	23.0	126.6	2912
	a. Directional Gyro 52D54	_____	3.1	64.9	202
	b. Omni Coupler IC-388	_____X	0.9	64.3	58
	c. G/S Coupler IC-493	_____	1.5	56.7	85
	Cert. Basis - STC SA-3253 SW-D				
217	King KFC 200 Flight Control System with KI-256 Flight Director and 3 In. Gyros Cert. Basis - STC SA1430CE	_____	50.4	149.9	7555
219	King KFC 200 Flight Control System with KG-258 Attitude Horizon Indicator and 3 In. Gyros Cert. Basis - STC SA1430CE	_____	50.4	149.9	7555

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(n) Radio Equipment
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
221	Collins VHF-250 or VHF-251 Comm Transceiver				
	a. Single	_____	4.0	61.9	248
	b. Dual	_____	8.1	61.9	502
	Cert. Basis - TSO C37b, C38b				
223	Collins VIR-350 or VIR-351 Nav Receiver				
	a. Single	_____	3.9	62.4	243
	b. Dual	_____	7.9	62.4	493
	Cert. Basis - TSO C40a, C36c				
225	Collins IND-350 VOR/LOC Indicator				
	a. Single	_____	1.0	65.2	65
	b. Dual	_____	2.0	65.2	130
	Cert. Basis - TSO C40a, C36c				
227	Collins IND-351 VOR/LOC/GS Indicator				
	Cert. Basis - TSO C40a, C36c	_____	1.3	65.2	85
229	Collins GLS-350 Glide Slope Receiver				
	Cert. Basis - TSO C34c	_____	2.0	199.7	399
231	Collins RCR-650 ADF Receiver and Antenna and IND-650 Indicator				
	Cert. Basis - TSO C41c	_____	7.7	122.1	941
233	Collins AMR-350 Audio/Marker Panel				
	Cert. Basis - TSO C35d, C50b	_____	*3.3	123.9	409

*Weight includes marker antenna and cable.

(n) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
235	Collins TDR-950 Transponder Cert. Basis - TSO C74c	_____	*2.8	62.4	175

*Weight includes antenna and cable.

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(n) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
241	King KX 170 () (VHF Comm/Nav)				
	Transceiver, Single	☒	7.3	61.6	450
	Transceiver, Dual	☒	15.0	61.6	924
243	King KX 175 () VHF				
	a. Transceiver,	☐	11.4	61.6	703
	b. King KN 72 VOR/LOC Converter,	☒	1.3	214.8	279
	c. King KN 73 Glide Slope Receiver,	☒	2.0	214.8	430
	d. King KN 75 Glide Slope Receiver,	☐	1.6	214.8	344
	e. King KN 77 VOR/LOC Converter,	☐	2.8	214.8	601
	f. King KI-204 VOR/ILS Indicator,	☐	1.7	65.5	111
	g. King KNI-520 VOR/ILS Indicator	☐	1.7	65.5	111
	Cert. Basis - TSO C3bc, C37b, C38b, C40a				
245	King KX 175 () VHF				
	a. Transceiver (2nd),	☐	10.0	61.6	616
	b. King KN 72 VOR/LOC Converter,	☐	1.3	214.8	279
	c. King KN 77 VOR/LOC Converter,	☐	2.8	214.8	601
	d. King KI-203 VOR/LOC Indicator,	☐	1.6	65.5	105
	e. King KNI-520 VOR/ILS Indicator	☐	1.7	65.5	111
	Cert. Basis - TSO C36c, C37b, C38b, C40a				
247	King KI-201 () VOR/LOC Indicator				
	a. Single	☒	2.4	64.9	156
	b. Dual	☐	5.0	64.9	325

(n) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
248	King KI-208 VOR/LOC Indicator				
	a. Single	_____	1.0	64.9	65
	b. Dual	_____	2.0	64.9	130
	Cert. Basis - TSO C34c, C36c, C40a				
249	King KI-209 VOR/LOC/GS Indicator	_____	1.2	64.9	78
	Cert. Basis - TSO C34c, C36c, C40a				
250	King KI-213 VOR/LOC/GS Indicator	_____	2.5	64.9	162
251	King KI-214 () VOR/LOC/GS Indicator	_____	2.9	64.9	189
253	King KN 74 R-Nav	_____	4.7	61.3	288
254	King KI-206 R-Nav Indicator	_____	1.3	61.6	80
	Cert. Basis - TSO C34c, C36c, C40a				
255	King KN 61 DME	_____	13.3	189.5	2520
257	King KN 65 () DME	_____	13.8	185.4	2559
	Cert. Basis - TSO C66a				
259	King KR 85 Digital ADF	_____	8.6	96.6	831
	a. Audio Amplifier	_____	0.8	54.1	43
	Cert. Basis - TSO C41b				
261	King KR 86 ADF				
	a. First	<u> X </u>	6.7	104.8	702
	b. Second	_____	9.7	108.9	1057
	c. Audio Amplifier	_____	0.8	54.1	43
263	King KMA 20 () Audio Panel				
	Cert. Basis - TSO C35c, C50b	<u> X </u>	*3.7	74.9	277

*Weight includes antenna and cable.

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(n) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
265	King KT 76 ()/78() Transponder Cert. Basis - TSO C74b	<u>X</u>	*3.1	63.1	196
277	Narco Comm 111 VHF Transceiver a. Single b. Dual Cert. Basis - TSO C37b, C38b	<u> </u> <u> </u>	4.0 8.0	62.4 62.4	250 500
279	Narco Comm 120 VHF Transceiver a. Single b. Dual Cert. Basis - TSO C37b, C38b	<u> </u> <u> </u>	4.8 8.6	61.9 62.4	297 537
281	Narco Nav 121 VHF Receiver a. Single b. Dual Cert. Basis - TSO C36c, C40c, C66a	<u> </u> <u> </u>	3.1 6.2	63.5 63.4	197 393
283	Narco Nav 122 VHF Receiver a. Single b. Dual Cert. Basis - TSO C35d, C36c, C40c, C66a	<u> </u> <u> </u>	**5.3 **8.8	105.7 87.5	560 770
285	Narco Nav 122A VHF Receiver a. Single b. Dual Cert. Basis - TSO C34c, C35d, C36c, C40c, C66a	<u> </u> <u> </u>	**5.4 **9.0	104.6 86.8	565 781
287	Narco Nav 124A VHF Receiver a. Single b. Dual Cert. Basis - TSO C35d, C36c, C40a, C66a	<u> </u> <u> </u>	**6.4 **11.1	100.3 84.2	642 935

*Weight includes antenna and cable.

**Weight includes marker antenna and cable.

(n) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
289	Narco Nav 124R VHF Receiver Cert. Basis - TSO C36c, C40a, C66a	_____	4.4	62.4	275
291	Narco ID 124 VOR/LOC/GS Indicator	_____	1.2	65.5	79
	a. Single	_____	2.4	65.5	157
	b. Dual	_____			
	Cert. Basis - TSO C34c, C35d, C36c, C40c				
293	Narco UGR-2A Glide Slope	_____	3.8	185.5	705
	a. Single	_____	8.2	185.2	1519
	b. Dual	_____			
	Cert. Basis - TSO C34b				
295	Narco CP-135 Audio Selector Panel	_____	2.2	76.2	168
	Cert. Basis - TSO C50b				
297	Narco CP-135M Audio Selector Panel	_____	*3.9	132.6	517
	Cert. Basis - TSO C50b, C35d				
299	Narco CLC-60A R-Nav	_____	11.5	133.9	1540
	a. Narco SA-11 Adapter	_____	0.8	213.4	171
301	Narco DME-190 TSO	_____	**5.9	65.9	389
	Cert. Basis - TSO C66a				
303	Narco DME-195 Receiver and Indicator	_____	**10.4	170.5	1774
	Cert. Basis - TSO C66a				
305	Narco ADF-141	_____	6.4	94.3	604
	a. Single	_____	***17.9	109.9	1967
	b. Dual	_____			
	Cert. Basis - TSO C41c				

*Weight includes marker antenna and cable.

**Weight includes antenna and cable.

***Weight includes dual antenna and cable.

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(n) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (lb-In.)
307	Narco AT 150 Transponder Cert. Basis - TSO C74c	_____	*3.0	62.3	187
309	Antenna and Cable				
	a. Nav Receiving	<u> X </u>	1.3	209.4	273
	b. * 1 VHF Comm	_____	0.6	146.3	88
	c. * 2 VHF Comm	_____	0.9	181.1	163
	d. Glide Slope (Single)	<u> X </u>	0.9	96.7	87
	e. Glide Slope (Dual)	_____	2.8	180.0	504
	f. Single ADF Sense	_____	0.4	160.0	64
311	Anti Static Antenna and Cable				
	a. * 1 VHF Comm	<u> X </u>	1.5	162.7	244
	b. * 2 VHF Comm	<u> X </u>	1.6	192.5	308
	c. Single ADF Sense	<u> X </u>	0.6	160.0	96
313	Emergency Locator Transmitter	<u> X </u>	3.5 1.6	267.2	480 428
	a. Antenna and Coax	<u> X </u>	0.2	255.4	51
	b. Shelf and Access Hole	<u> X </u>	0.5	266.4	134
314	RCA Radar Piper Dwg. 36885-2	_____	23.0	81.0	1863

*Weight includes antenna and cable.

(n) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
315	Headphone Wm. J. Murdock P/N P-23 300 Ohms with MC162A Cushions or Telex Comm. P/N 61650-03	<u>X</u>	0.5	69.9	35
317	Microphone a. Telex Acoustics P/N 60837-17 (Model 66C)	<u> </u>	0.3	69.9	21
	b. Narco P/N M700B	<u> </u>	0.6	74.9	45
	c. Telex Acoustics P/N 62800-04 (Model 100T/NH)	<u> </u>	0.3	69.9	21
319	Boom Microphone - Headset Piper Dwg. 37921-3 Telex 5 x 5 Mark II (P/N 62629-00)	<u>X</u>	0.3	85.5	26
321	Cabin Speaker, Installation Piper Dwg. 69390-7	<u>X</u>	0.8	97.5	78
323	Radio Shelf, Piper Dwg. 67367-0	<u>X</u>	2.3	201.8	464

SECTION 6
WEIGHT AND BALANCE

PIPER AIRCRAFT CORPORATION
PA-32RT-300, LANCE II

(o) Miscellaneous
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft. Datum	Moment (Lb-In.)
337	Zinc Chromate Finish Piper Dwg. 79700-2	_____	7.5	113.2	849
339	Stainless Steel Control Cables Piper Dwg. 79700-12	_____	(Same as standard equipment)		
341	Air Conditioner, Piper Dwg. 99750-4	_____	70.4	114.5	8061
343	Ground Ventilating Blower, Piper Dwg. 79273-13	_____ X	8.6	204.0	1754
345	Assist Step, Piper Dwg. 37846-3	_____ Y	1.5	147.5	221
347	Super Cabin Sound Proofing, Piper Dwg. 79601-7	_____ Y	24.4	107.2	2616
349 C	Adjustable Front Seat (Left), Piper Dwg. 79592-2	_____ X	*4.6	84.7	390
351	Adjustable Front Seat (Right), Piper Dwg. 79592-3	_____ X	*4.6	84.1	387
353	Jump Seat (with seat belts), Piper Dwg. 69595-9	_____ X	9.2	122.3	1125
355	Club Seating (includes oversize headrest center seats) Piper Dwg. 37825-2	_____ X	*14.2	90.4	1284
357	Inboard Armrest - Aft Piper Dwg. 79479-7	_____ X	2.6	152.0	395
359	Headrests (2) Front, Piper Dwg. 79337-18	_____ +	2.0	99.5	199

*Weight and moment difference between standard and optional equipment.