

Airplane Flight Manual

The Airplane must be operated in compliance with the LIMITATIONS prescribed herein.

MODEL	A/C EFFECTIVITY
BD-700-1A10	9002 thru 9174 incorporating SB 700-31-025 – BATCH 2+ IAC UPGRADE, and 9175 thru 9312, 9314 thru 9380, 9384 thru 9429
42,411 kg / 93,500 lb MTOW or 43,091 kg / 95,000 lb MTOW or 43,545 kg / 96,000 lb MTOW or 44,452 kg / 98,000 lb MTOW or 45,132 kg / 99,500 lb MTOW	
FIRST ISSUED: Aug 28/1998	REVISION 109: Aug 16/2021

BOMBARDIER
GLOBAL EXPRESS

GLOBAL EXPRESS* (MODEL BD-700-1A10) AIRPLANE FLIGHT MANUAL – CSP 700-1A

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To ease the ordering process, the following Document
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This is revision **109** to the Airplane Flight Manual, CSP 700-1A.

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PERFORMANCE
TAKE-OFF PERFORMANCE

1. INTRODUCTION

A. General

The Take-Off Performance section contains the charts used to obtain the take-off performance data for varying conditions of temperature, airport pressure altitude, and airplane weight for the specified take-off configurations.

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6°

A. Maximum Allowable Take-Off Weight

The maximum allowable take-off weight is limited by the most restrictive of the following:

- Maximum approved take-off weight (Refer to Chapter 2; LIMITATIONS – STRUCTURAL WEIGHT LIMITATION); or
- Climb requirements; or
- Tire limit speed; or
- Brake energy available; or
- Runway length available.

(1) TAKE-OFF WEIGHT LIMITED BY CLIMB REQUIREMENTS

The maximum take-off weight limited by climb requirements for a slat out / flap 6° take-off is determined from Figure 06-03-1, for varying conditions of ambient temperature, airport pressure altitude, engine bleed and pack usage.

The weights presented in Figure 06-03-1 are limited by second segment climb gradient requirements, as per FAR 25.121 (b). The first segment climb and final segment climb gradient requirements, as per FAR 25.121 (a) and FAR 25.121 (c), respectively, are not limiting.

With the APU on, reduce the take-off weight derived from Figure 06-03-1 by 250 kg (551 lb).

Example:

Associated Conditions:

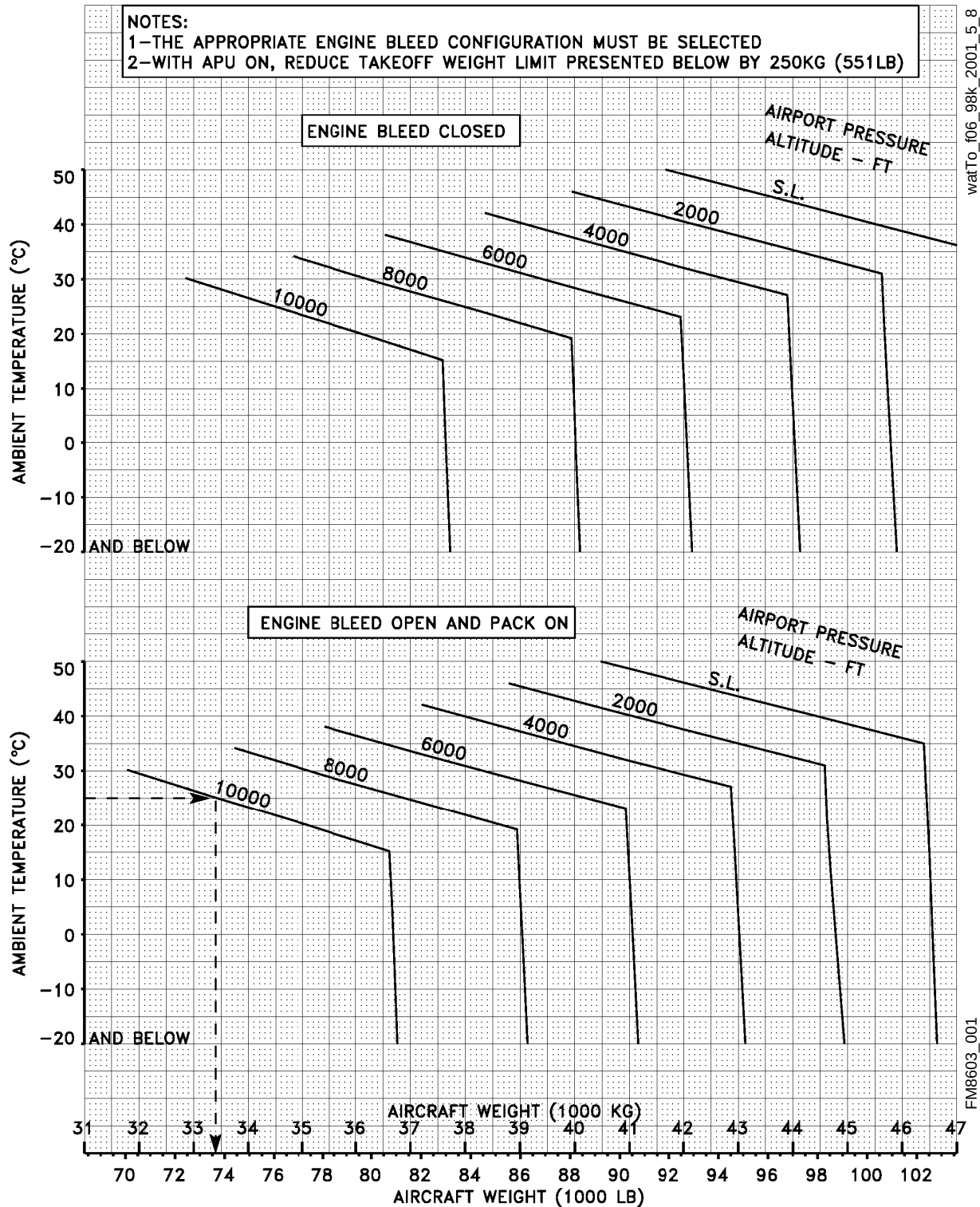
Ambient temperature	= 25 °C
Airport pressure altitude	= 10,000 ft
Engine bleed	= Open
Pack	= On
APU	= Off

As shown in the example on Figure 06-03-1, the maximum take-off weight limited by climb requirements is 33,400 kg (73,600 lb). The take-off weight in this case is less than the maximum approved take-off weight (Refer to Chapter 2; LIMITATIONS – STRUCTURAL WEIGHT LIMITATION) and is considered limiting.

PERFORMANCE TAKE-OFF PERFORMANCE

I 2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

A. Maximum Allowable Take-Off Weight (Cont'd)



Take-Off Weight Limited by Climb Requirements – Slat OUT / Flap 6°
Figure 06-03-1

PERFORMANCE
TAKE-OFF PERFORMANCE**I 2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)****A. Maximum Allowable Take-Off Weight (Cont'd)****(2) TAKE-OFF WEIGHT LIMITED BY MAXIMUM TIRE SPEED**

The tire limit speed of 210 mph (183 knots), does not restrict the maximum take-off weight for the slat OUT / flap 6° configuration.

(3) TAKE-OFF WEIGHT LIMITED BY BRAKE ENERGY AVAILABLE

The maximum take-off weight limited by the brake energy available in the brake system (with the Brake Temperature Monitoring System (BTMS) operative), for a slat OUT / flap 6° take-off, on dry or wet runways, is determined from Figure 06-03-2, for varying conditions of ambient temperature, airport pressure altitude, reported wind and runway slope. The effect of engine bleed and pack usage is negligible.

The brake energy available is based on the brake status provided by the BTMS. The maximum take-off weight limited by brake energy can be determined for the following conditions:

- when maximum brake energy is available (BTMS unit of 6 or less); or
- when partial brake energy is available following a landing or a rejected take-off.

The BTMS temperature reading of the warmest brake is to be used in the derivation of the maximum take-off weight.

Example:

Associated Conditions:

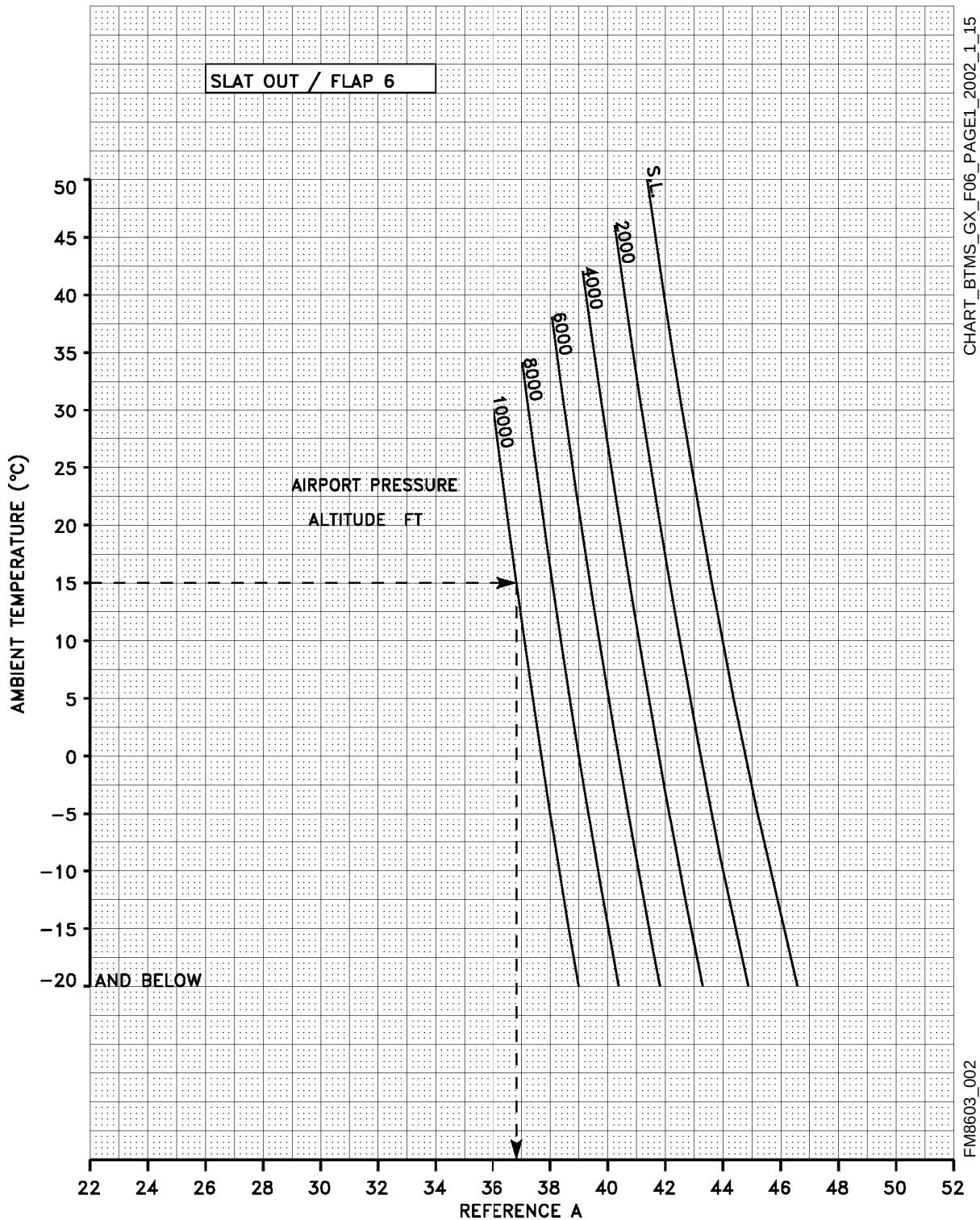
Ambient temperature	= 15 °C
Airport pressure altitude	= 10,000 ft
Reported wind	= 10 knots (headwind)
Runway slope	= +2% (uphill)
Warmest brake readout	= BTMS unit of 13

The example in Figure 06-03-2 shows that the maximum take-off weight limited by brake energy available is 36,550 kg (80,580 lb).

If maximum brake energy is available (warmest brake readout before take-off is BTMS unit of 6 or below), then the maximum take-off weight limited by brake energy would be 42,200 kg (93,030 lb).

PERFORMANCE TAKE-OFF PERFORMANCE

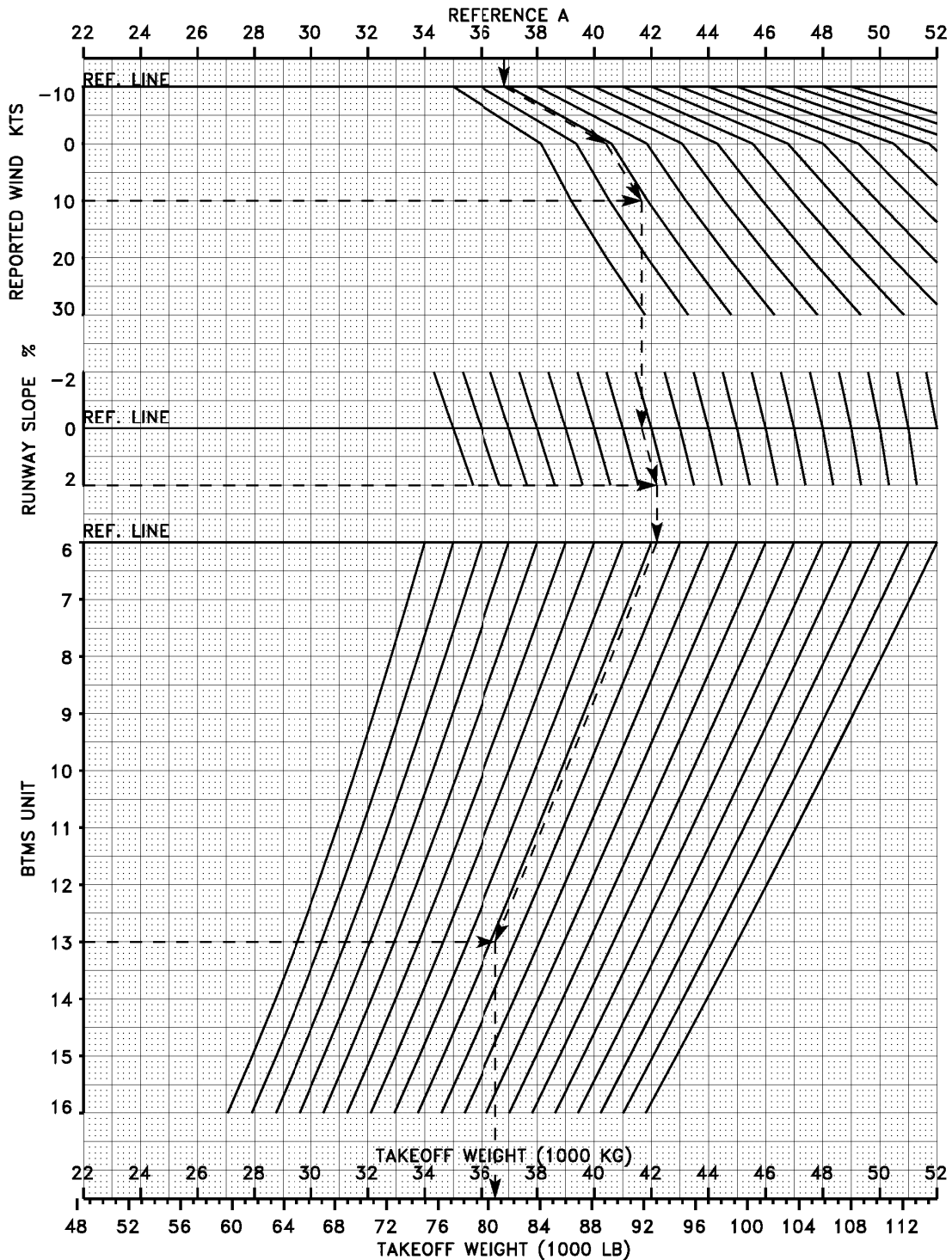
I 2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D) A. Maximum Allowable Take-Off Weight (Cont'd)



Take-Off Weight Limited by Brake Energy – Slat OUT/Flap 6°
Figure 06-03-2 (Sheet 1 of 2)

PERFORMANCE TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D) A. Maximum Allowable Take-Off Weight (Cont'd)



Take-Off Weight Limited by Brake Energy – Slat OUT/Flap 6°
Figure 06-03-2 (Sheet 2 of 2)

PERFORMANCE
TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

B. Dry Runway Take-Off Field Length

The following charts are used to obtain the take-off field length required on a dry runway, for a given value of airplane weight, ambient temperature, airport pressure altitude (from sea level to 10,000 feet in 2,000-foot intervals), reported wind, runway slope and various bleed configurations.

The take-off field length, as presented in these charts, is the most limiting of the following:

- Take-off distance with all engines operating, multiplied by a factor of 1.15;
- Take-off distance with one engine inoperative; and
- Accelerate-stop distance.

NOTE

When the take-off crosswind exceeds 20 knots, the high crosswind take-off procedure must be used (refer to the Flight Crew Operating Manual, Chapter 4: NORMAL PROCEDURES – TAXIING AND TAKE-OFF – HIGH CROSSWIND TAKE-OFF). The corrected take-off field length must be increased by 520 meters (1,700 feet).

The take-off field length for a slat OUT / flap 6° take-off on a dry runway, are given by the following:

- Figure 06-03-3 provides the uncorrected take-off field length;
- Figure 06-03-4 provides the take-off field length corrected for the effects of engine bleed / pack usage, runway slope and reported wind.

Effectivity:

- *Airplanes 9002 thru 9158 not incorporating Service Bulletins:*
 - *SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,*
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- *Airplanes 9159 thru 9304 not incorporating Service Bulletins:*
 - *SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,*
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

Figure 06-03-4 (sheet 2) provides the take-off field length factor for accommodating BCU characteristics at high speeds.

PERFORMANCE
TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

B. Dry Runway Take-Off Field Length (Cont'd)

The uncorrected take-off field length can be interpolated linearly with altitude.

Example:

Associated Conditions:

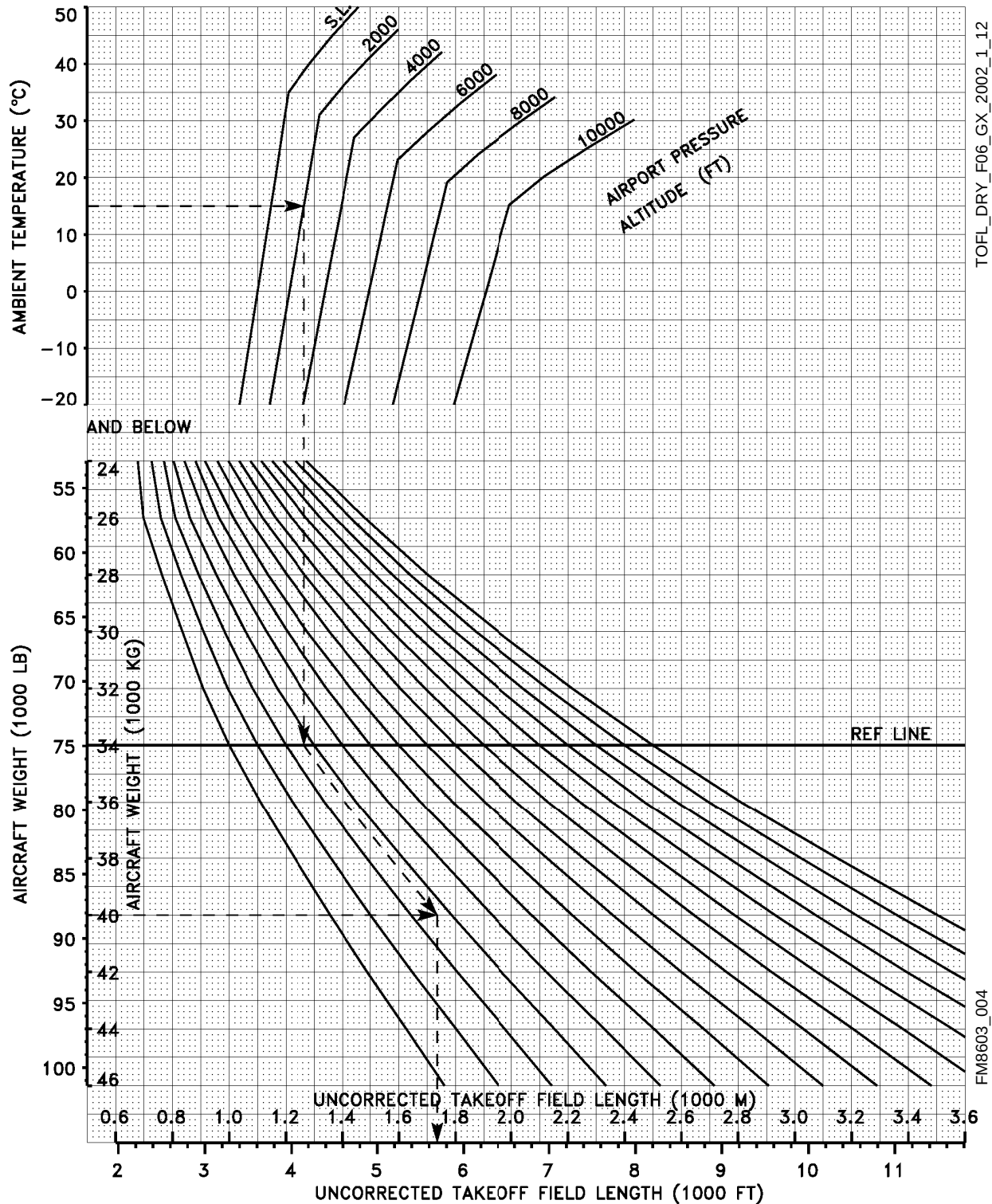
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots headwind
Runway slope	= + 1 % (uphill)

The example in Figure 06-03-3 and Figure 06-03-4 shows that for the above associated conditions, the corrected take-off field length required is 1,715 meters (5,630 feet).

PERFORMANCE TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

B. Dry Runway Take-Off Field Length (Cont'd)

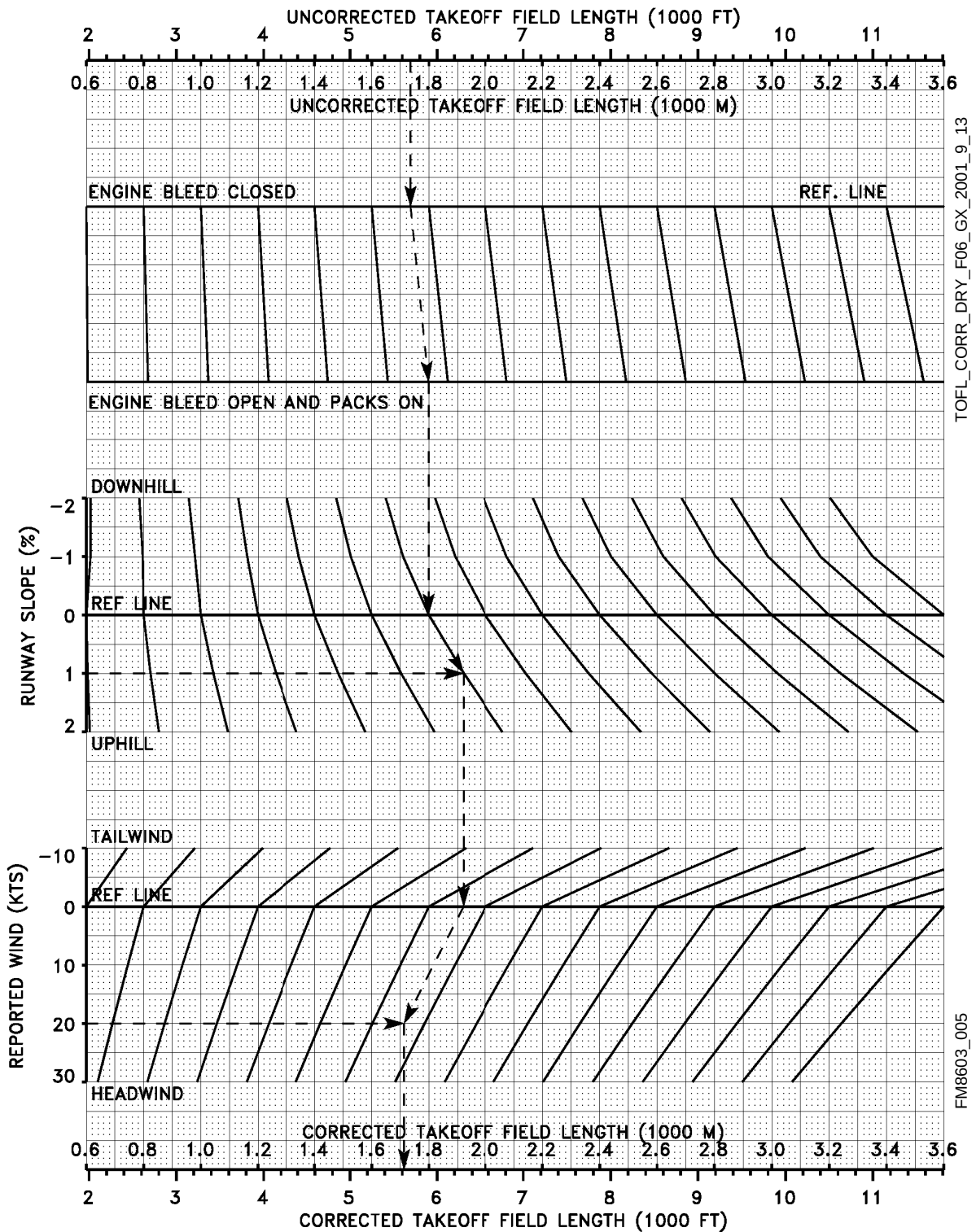


Uncorrected Take-Off Field Length, Dry Runway, Slat OUT / Flap 6°
Figure 06-03-3

PERFORMANCE TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

B. Dry Runway Take-Off Field Length (Cont'd)



Corrected Take-Off Field Length, Dry Runway, Slat OUT / Flap 6°
Figure 06-03-4 (Sheet 1 of 2)

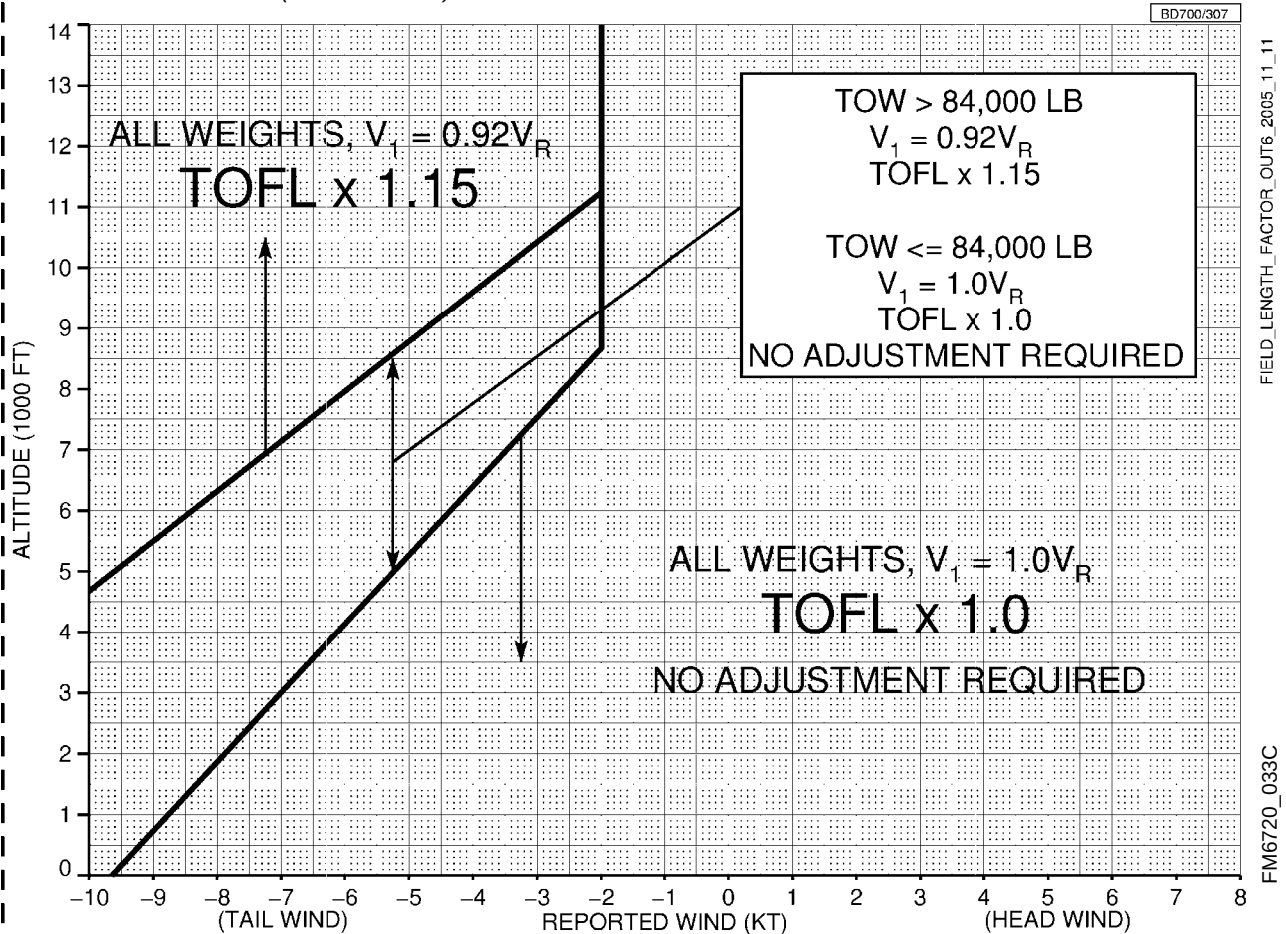
PERFORMANCE
TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

B. Dry Runway Take-Off Field Length (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability, or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance, or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)



Corrected Take-Off Field Length, Dry Runway, Slat OUT / Flap 6°
Figure 06-03-4 (Sheet 2 of 2)

PERFORMANCE
TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

C. Wet Runway Take-Off Field Length

A wet runway condition has a deteriorating effect on the stopping performance of the airplane and appropriate corrections should be made to compensate for this degradation.

The following charts are used to obtain the take-off field length required on a wet runway, for a given value of airplane weight, ambient temperature, airport pressure altitude (from sea level to 10,000 feet in 2,000-foot intervals), reported wind, runway slope, usage of thrust reversers and various bleed configurations.

The take-off field length, as presented in these charts, is the most limiting of the following:

- Take-off field length on a dry runway;
- Take-off distance with all engines operating, multiplied by a factor of 1.15;
- Take-off distance with one engine inoperative; and
- Accelerate--stop distance.

NOTE

When the take-off crosswind exceeds 20 knots, the high crosswind take-off procedure must be used (refer to the Flight Crew Operating Manual, Chapter 4: NORMAL PROCEDURES – TAXIING AND TAKE-OFF – HIGH CROSSWIND TAKE-OFF). The corrected take-off field length must be increased by 520 meters (1,700 feet).

The take-off field length for a slat OUT / flap 6° take-off on a wet runway, are given by the following:

- Figure 06-03-5 provides the uncorrected take-off field length;
- Figure 06-03-6 provides the take-off field length corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage. With one or both thrust reversers inoperative, if the actual takeoff weight is less than 29,000 kg (63,935 lb), a weight of 29,000 kg (63,935 lb) must be used to determine the take-off field length.

PERFORMANCE
TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

C. Wet Runway Take-Off Field Length (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
 - or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

Where V_1 determined from Figure 06-03-7 is greater than $0.92 V_R$, determined from Figure 06-03-8, the take-off field length obtained from Figure 06-03-5 and Figure 06-03-6 must be increased by 15% (TOFL x 1.15).

The uncorrected take-off field length can be interpolated linearly with altitude.

Example:

Associated Conditions:

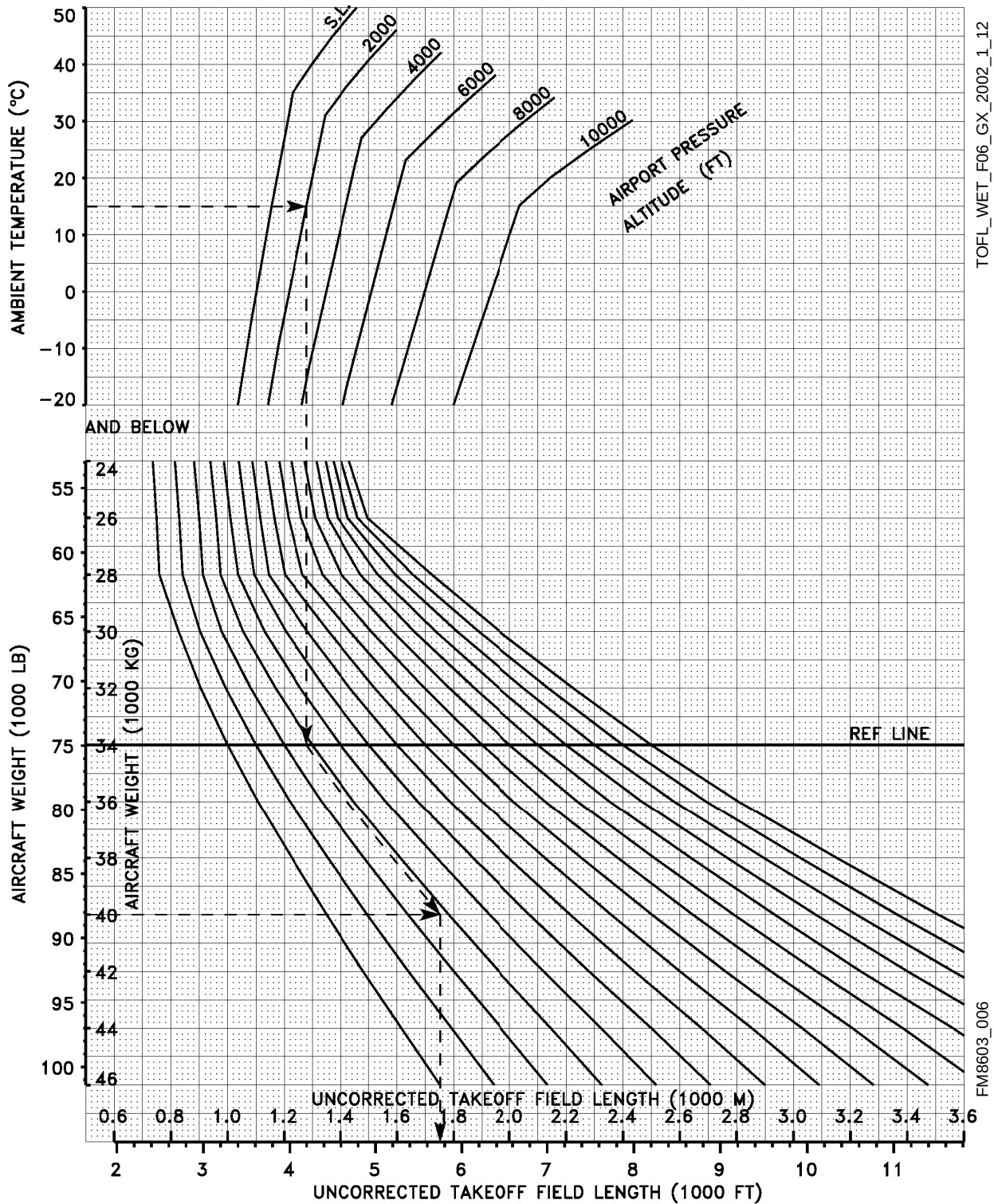
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots headwind
Runway slope	= + 1 % (uphill)
Thrust reversers	= Both operable

The example in Figure 06-03-5 and Figure 06-03-6 shows that for the above associated conditions, the corrected take-off field length is 1,715 meters (5,630 feet).

PERFORMANCE TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

C. Wet Runway Take-Off Field Length (Cont'd)

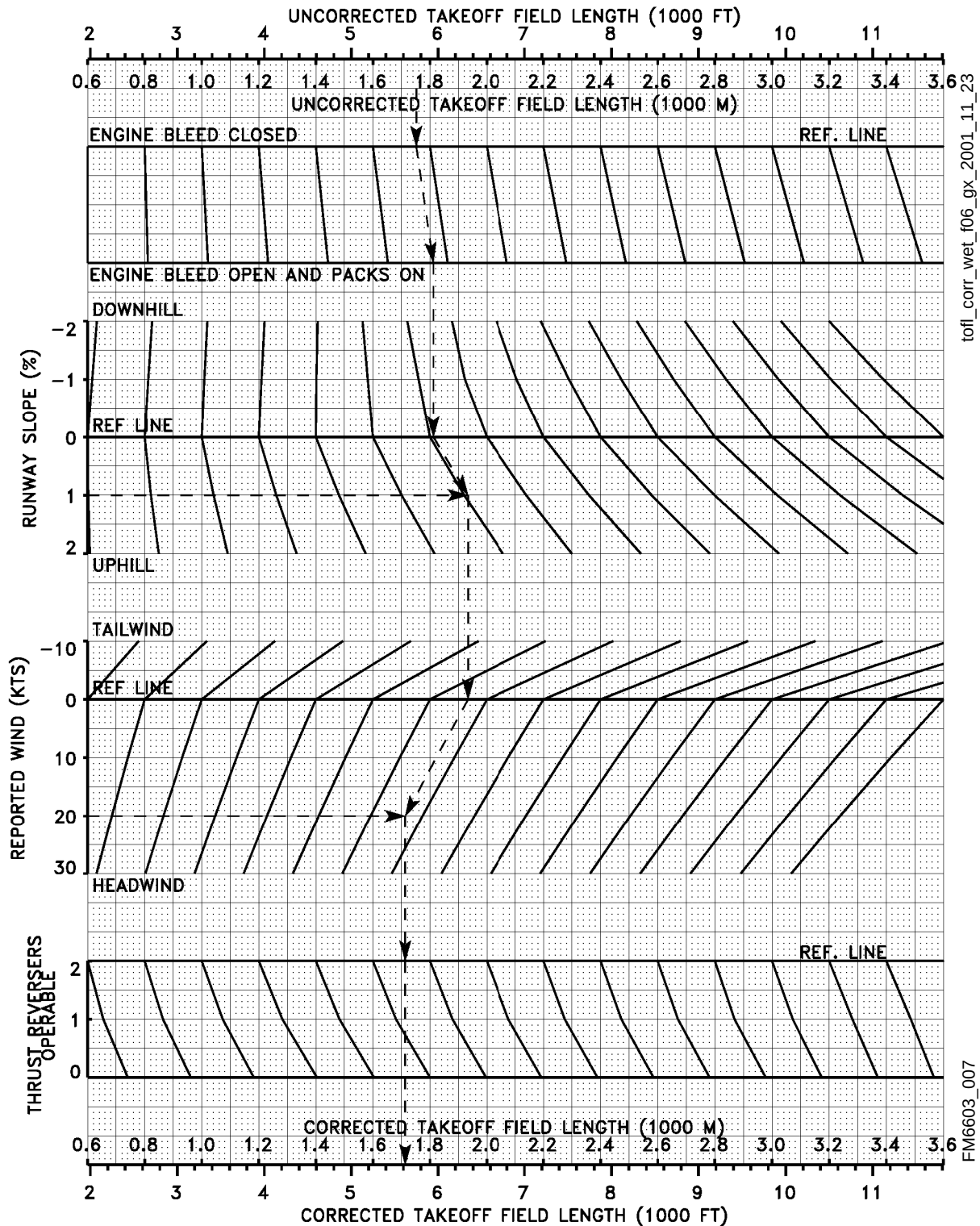


Uncorrected Take-Off Field Length, Wet Runway, Slat OUT / Flap 6°
Figure 06-03-5

PERFORMANCE TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

C. Wet Runway Take-Off Field Length (Cont'd)



Corrected Take-Off Field Length, Wet Runway, Slat OUT / Flap 6°
Figure 06-03-6

PERFORMANCE
TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

D. Take-Off Speeds

(1) TAKE-OFF DECISION SPEED, V_1 - DRY RUNWAY

The take-off decision speed (V_1) for a slat OUT / flap 6° take-off on a dry runway, is equal to the rotation speed (V_R). Use the appropriate V_R chart. Refer to Figure 06-03-8.

V_1 must not be less than V_{1MCG} .

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

The take-off decision speed (V_1) for slat OUT / flap 6° take-off on a dry runway, is established from the rotation speed (V_R), Figure 06-03-8, multiplied by a V_R factor of Figure 06-03-4 (sheet 2).

(2) TAKE-OFF DECISION SPEED, V_1 - WET RUNWAY

The following charts are used to obtain the take-off decision speed (V_1) for a slat OUT / flap 6° take-off on a wet runway, for a given value of airplane weight, ambient temperature, airport pressure altitude (from sea level to 10,000 feet in 2,000-foot intervals), reported wind, runway slope, usage of thrust reversers and various bleed configurations.

V_1 must not be less than V_{1MCG} .

The take-off decision speed (V_1) for a slat OUT / flap 6° take-off on a wet runway is determined from Figure 06-03-7.

PERFORMANCE
TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

D. Take-Off Speeds (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)

or

- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

The take-off decision speed (V_1) for slat OUT / flap 6° take-off on a wet runway, is established as the lower of:

- V_1 determined from Figure 06-03-7;
- V_1 determined from V_R , Figure 06-03-8, and multiplied by a V_R factor of 0.92.

Example:

Associated Conditions:

Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
A/C weight	= 40,000 kg (88,185 lb)
Runway slope	= + 1% (uphill)
Engine Bleed	= Open
Pack	= On
Reported wind	= 20 knots headwind
Thrust reversers	= Both operable

The example in Figure 06-03-7 shows that for the above associated conditions, V_1 is equal to 117.0 KIAS.

(3) MINIMUM V_1 LIMITED BY CONTROL ON THE GROUND, V_{1MCG}

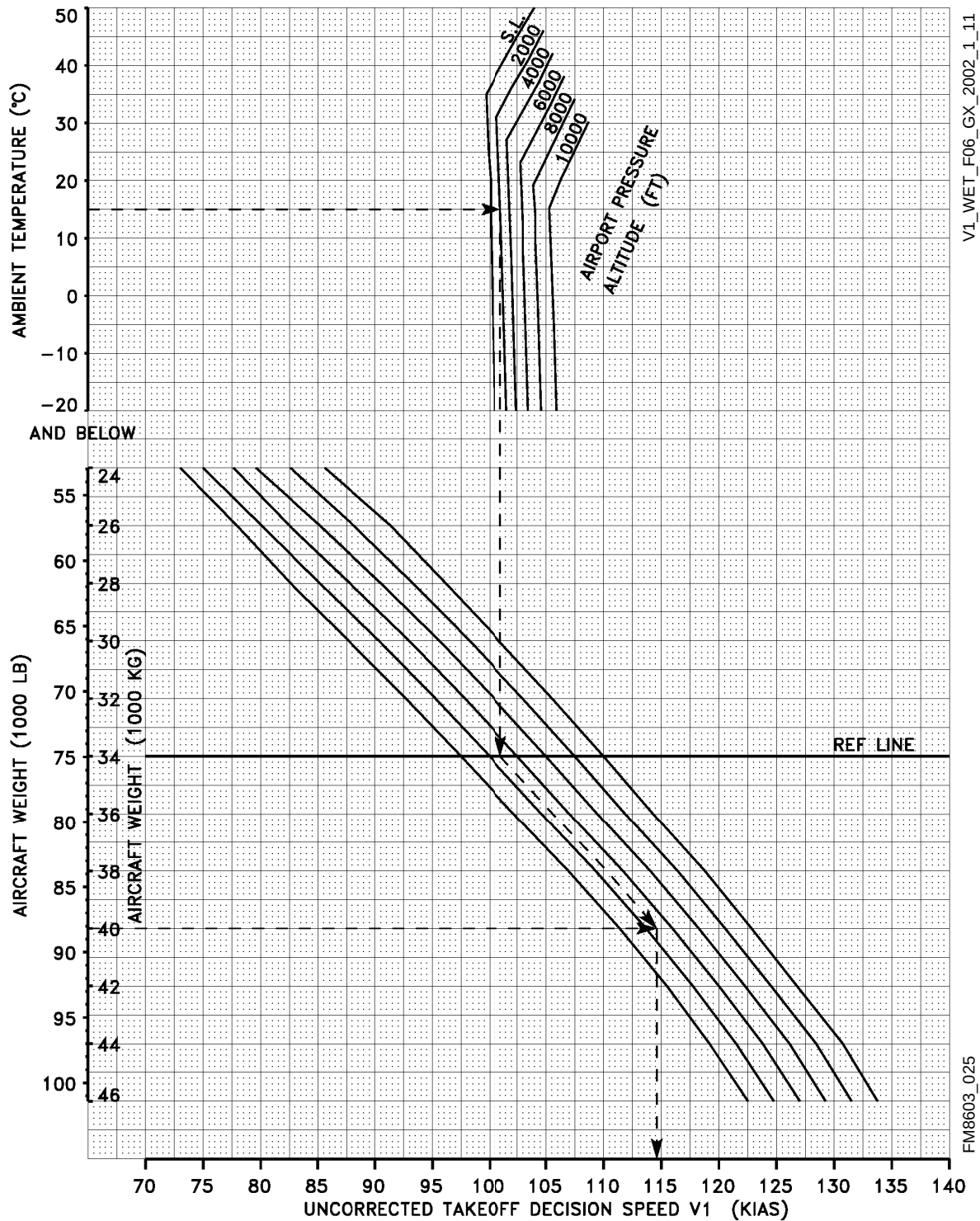
Applicable to both dry and wet runway operations:

- V_{1MCG} (Slat OUT / Flap 6°) = 88 KIAS

PERFORMANCE TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

D. Take-Off Speeds (Cont'd)



V1_WET_F06_GX_2002_1_11

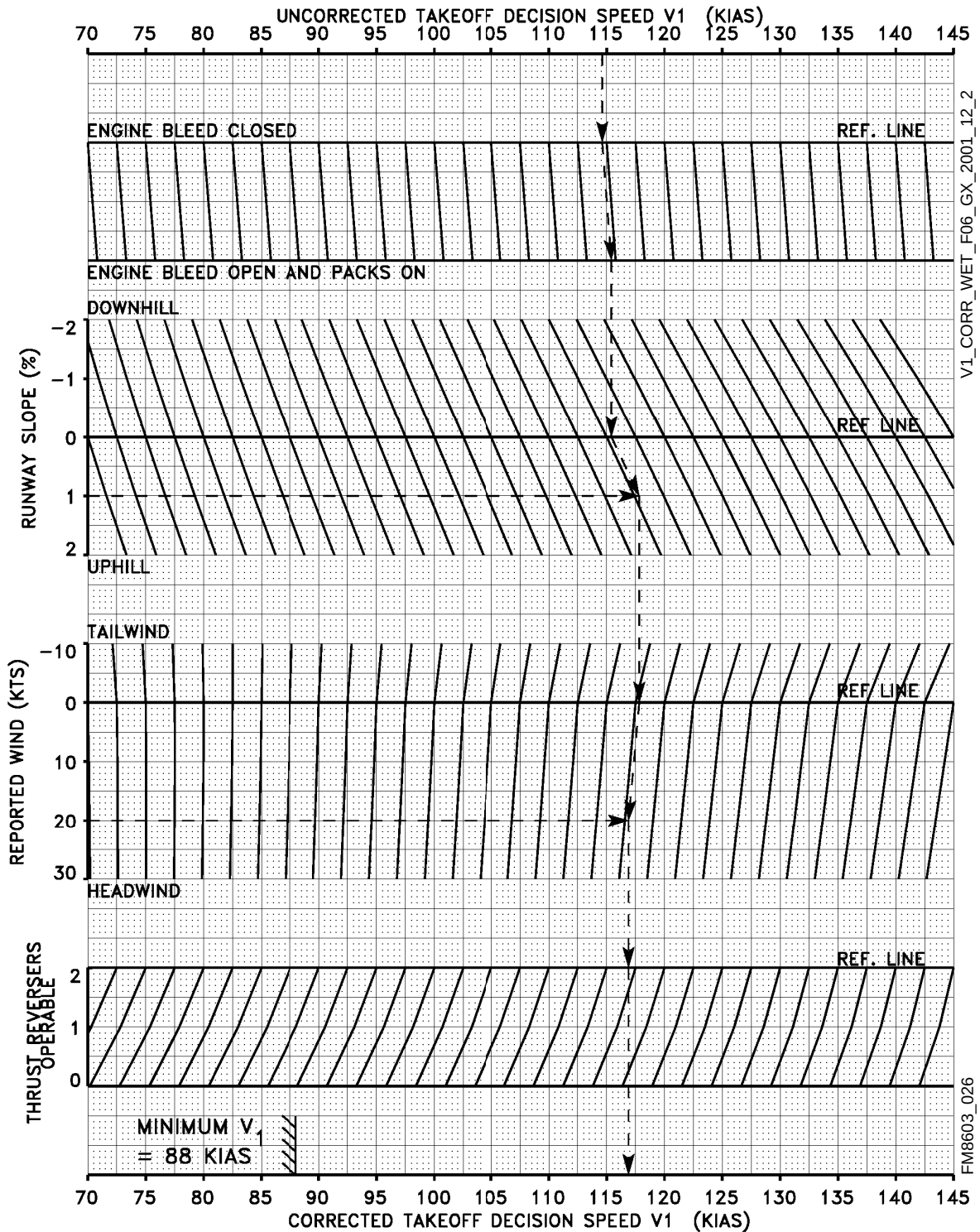
FM8603_025

Take-Off Decision Speed V1 – Slat OUT / Flap 6°– Wet Runway
Figure 06-03-7 (Sheet 1 of 2)

PERFORMANCE TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

D. Take-Off Speeds (Cont'd)



Take-Off Decision Speed V_1 – Slat OUT / Flap 6° – Wet Runway
Figure 06-03-7 (Sheet 2 of 2)

PERFORMANCE
TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

D. Take-Off Speeds (Cont'd)

(4) ROTATION SPEED, V_R

Figure 06-03-8 is used to determine the rotation speed (V_R) for dry and wet runway operations, as well as the take-off decision speed (V_1) for dry runway operations, for a slat OUT / flap 6° take-off, for varying conditions of ambient temperature, airport pressure altitude, take-off weight and runway slope. The effect of engine bleed and pack utilization is negligible.

V_R must not be less than 88 KIAS.

Example:

Associated Conditions:

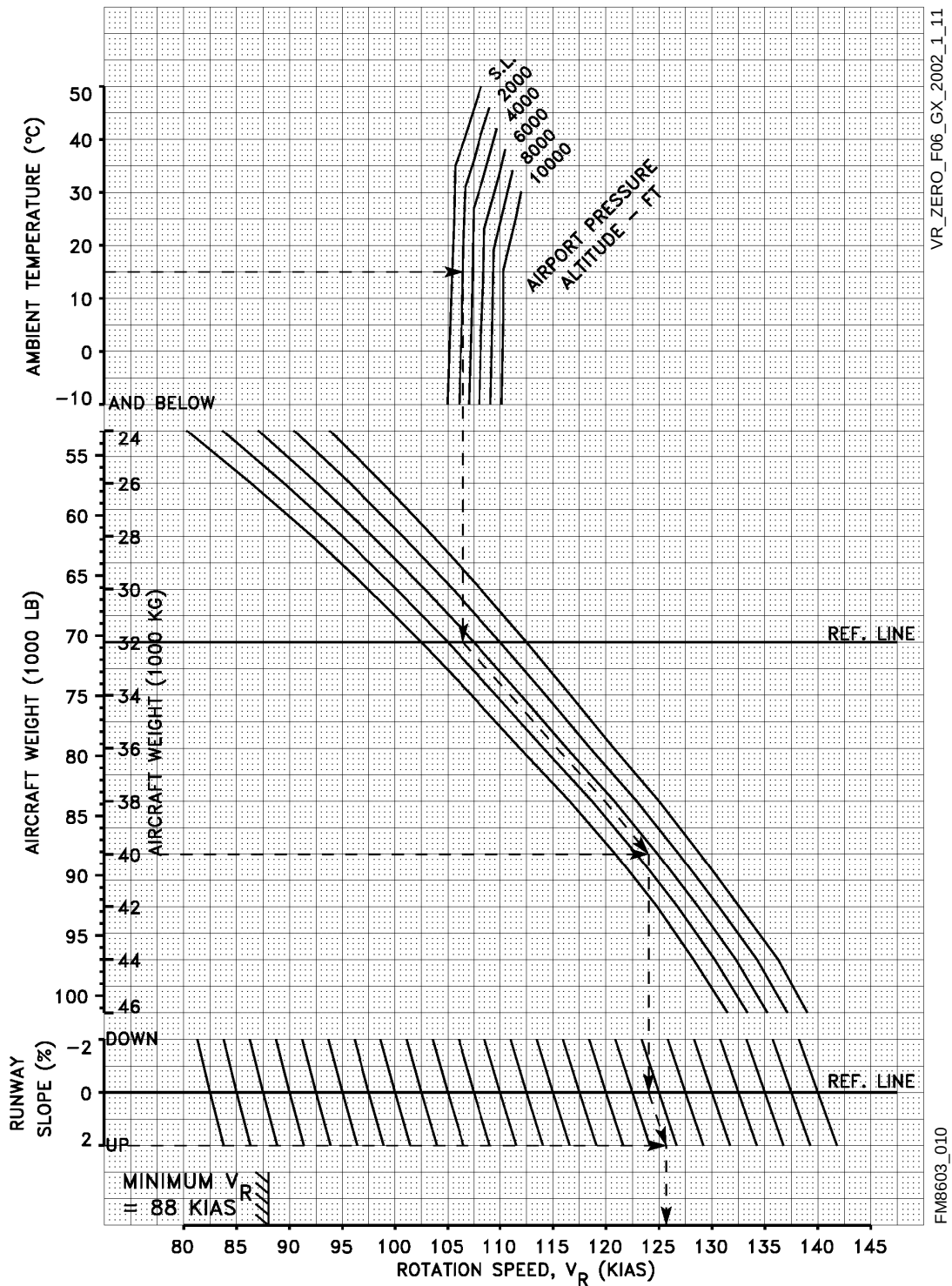
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
A/C weight	= 40,000 kg (88,185 lb)
Runway slope	= + 2% (uphill)

The example in Figure 06-03-8 shows that for the above associated conditions, the rotation speed is 125.6 KIAS.

PERFORMANCE TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

D. Take-Off Speeds (Cont'd)



Rotation Speed, V_R – Slat OUT / Flap 6°
Figure 06-03-8

PERFORMANCE
TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

D. Take-Off Speeds (Cont'd)

(5) TAKE-OFF SAFETY SPEED, V_2

Figure 06-03-9 is used to determine the take-off safety speed (V_2) for a slat out / flap 6° take-off, on dry or wet runways, for varying conditions of ambient temperature, airport pressure altitude and take-off weight. The effect of engine bleed and pack utilization is negligible.

Example:

Associated Conditions:

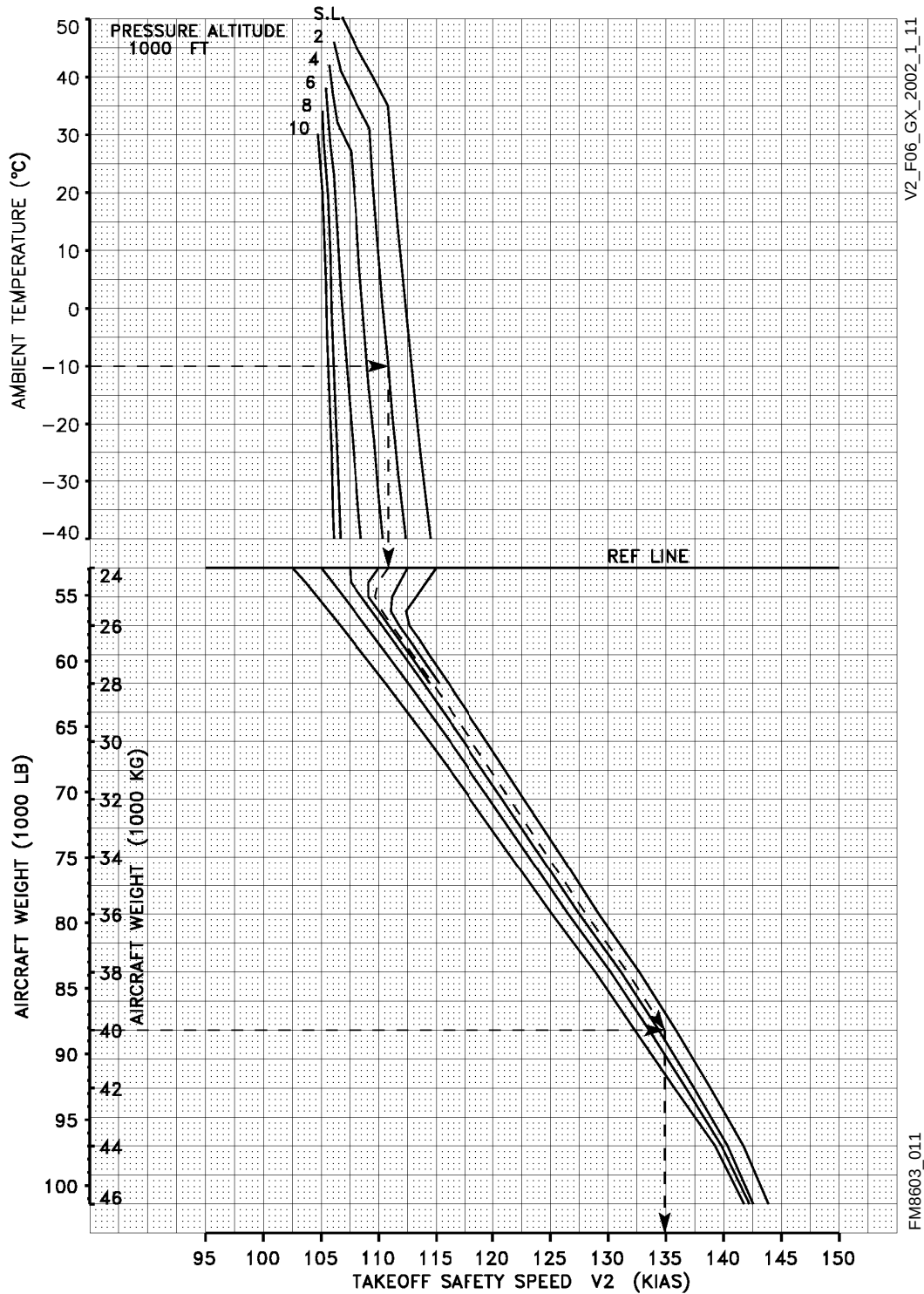
Ambient temperature	= -10 °C
Airport pressure altitude	= 2,000 feet
A/C weight	= 40,000 kg (88,185 lb)

The example in Figure 06-03-9 shows that for the above associated conditions, the take-off safety speed is 135 KIAS.

PERFORMANCE TAKE-OFF PERFORMANCE

2. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 6° (CONT'D)

D. Take-Off Speeds (Cont'd)



Take-Off Safety Speed, V_2 – Slat OUT / Flap 6°
Figure 06-03-9

PERFORMANCE
TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16°

A. Maximum Allowable Take-Off Weight

The maximum allowable take-off weight is limited by the most restrictive of the following:

- Maximum approved take-off weight (Refer to Chapter 2; LIMITATIONS – STRUCTURAL WEIGHT LIMITATION); or
- Climb requirements; or
- Tire limit speed; or
- Brake energy available; or
- Runway length available;

(1) TAKE-OFF WEIGHT LIMITED BY CLIMB REQUIREMENTS

The maximum take-off weight limited by climb requirements for a slat out / flap 16° take-off is determined from Figure 06-03-10, for varying conditions of ambient temperature, airport pressure altitude, engine bleed and pack usage.

The weights presented in Figure 06-03-10 are limited by second segment climb gradient requirements, as per FAR 25.121 (b). The first segment climb and final segment climb gradient requirements, as per FAR 25.121 (a) and FAR 25.121 (c), respectively, are not limiting.

With the APU on, reduce the take-off weight derived from Figure 06-03-10 by 220 kg (485 lb).

Example:

Associated Conditions:

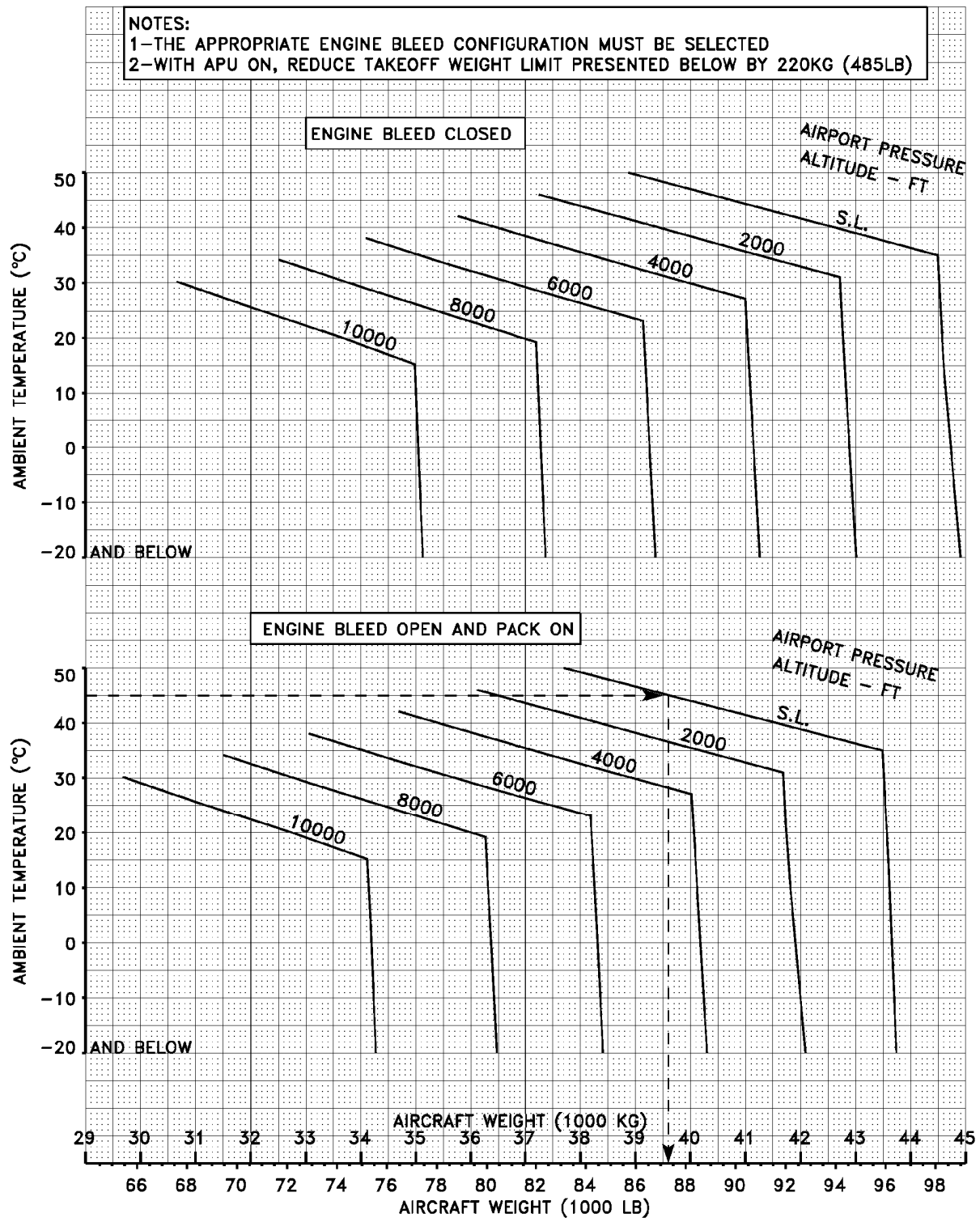
Ambient temperature	= 45 °C
Airport pressure altitude	= Sea level (0 ft)
Engine bleed	= Open
Pack	= On
APU	= Off

As shown in the example on Figure 06-03-10, the maximum take-off weight limited by climb requirements is 39,600 kg (87,300 lb). The take-off weight in this case is less than the maximum approved take-off weight (Refer to Chapter 2; LIMITATIONS – STRUCTURAL WEIGHT LIMITATION) and is considered limiting.

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

A. Maximum Allowable Take-Off Weight (Cont'd)



Take-Off Weight Limited by Climb Requirements – Slat OUT / Flap 16°

Figure 06-03-10

PERFORMANCE
TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

A. Maximum Allowable Take-Off Weight (Cont'd)

(2) TAKE-OFF WEIGHT LIMITED BY MAXIMUM TIRE SPEED

The tire limit speed of 210 mph (183 knots), does not restrict the maximum take-off weight for the slat OUT / flap 16° configuration.

(3) TAKE-OFF WEIGHT LIMITED BY BRAKE ENERGY AVAILABLE

The maximum take-off weight limited by the brake energy available in the brake system (with the Brake Temperature Monitoring System (BTMS) operative), for a slat OUT / flap 16° take-off, on dry or wet runways, is determined from Figure 06-03-11, for varying conditions of ambient temperature, airport pressure altitude, reported wind and runway slope. The effect of engine bleed and pack usage is negligible.

The brake energy available is based on the brake status provided by the BTMS. The maximum take-off weight limited by brake energy can be determined for the following conditions:

- when maximum brake energy is available (BTMS unit of 6 or less);
- when partial brake energy is available following a landing or a rejected take-off.

The BTMS temperature reading of the warmest brake is to be used in the derivation of the maximum take-off weight.

Example:

Associated Conditions:

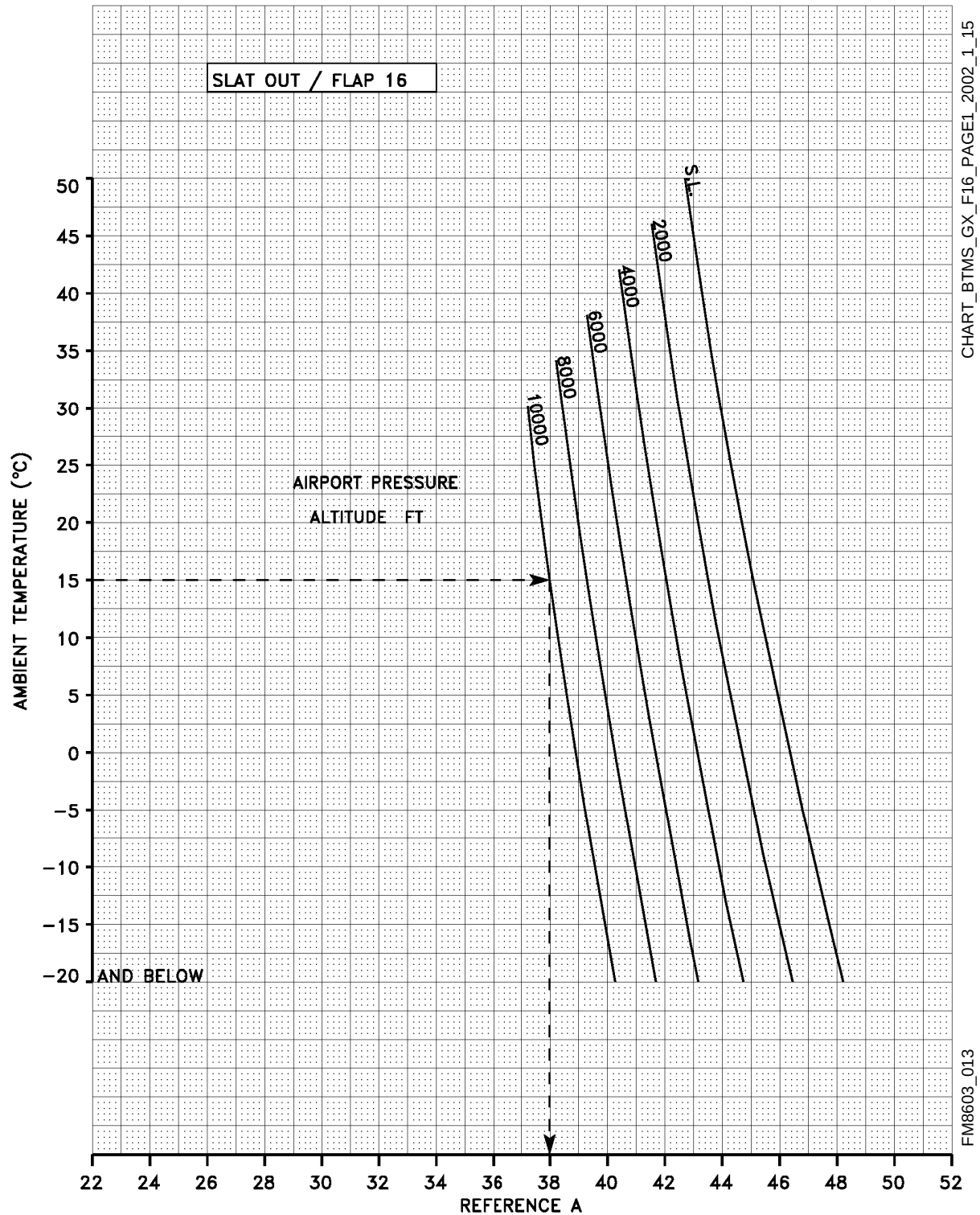
Ambient temperature	= 15 °C
Airport pressure altitude	= 10,000 ft
Reported wind	= 10 knots (headwind)
Runway slope	= + 2% (uphill)
Warmest brake readout	= BTMS unit of 10

The example in Figure 06-03-11 shows that the maximum take-off weight limited by brake energy available is 40,400 kg (89,060 lb).

If maximum brake energy is available (warmest brake readout before take-off is BTMS unit of 6 or below), then the maximum take-off weight limited by brake energy would be 43,700 kg (96,340 lb).

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D) A. Maximum Allowable Take-Off Weight (Cont'd)

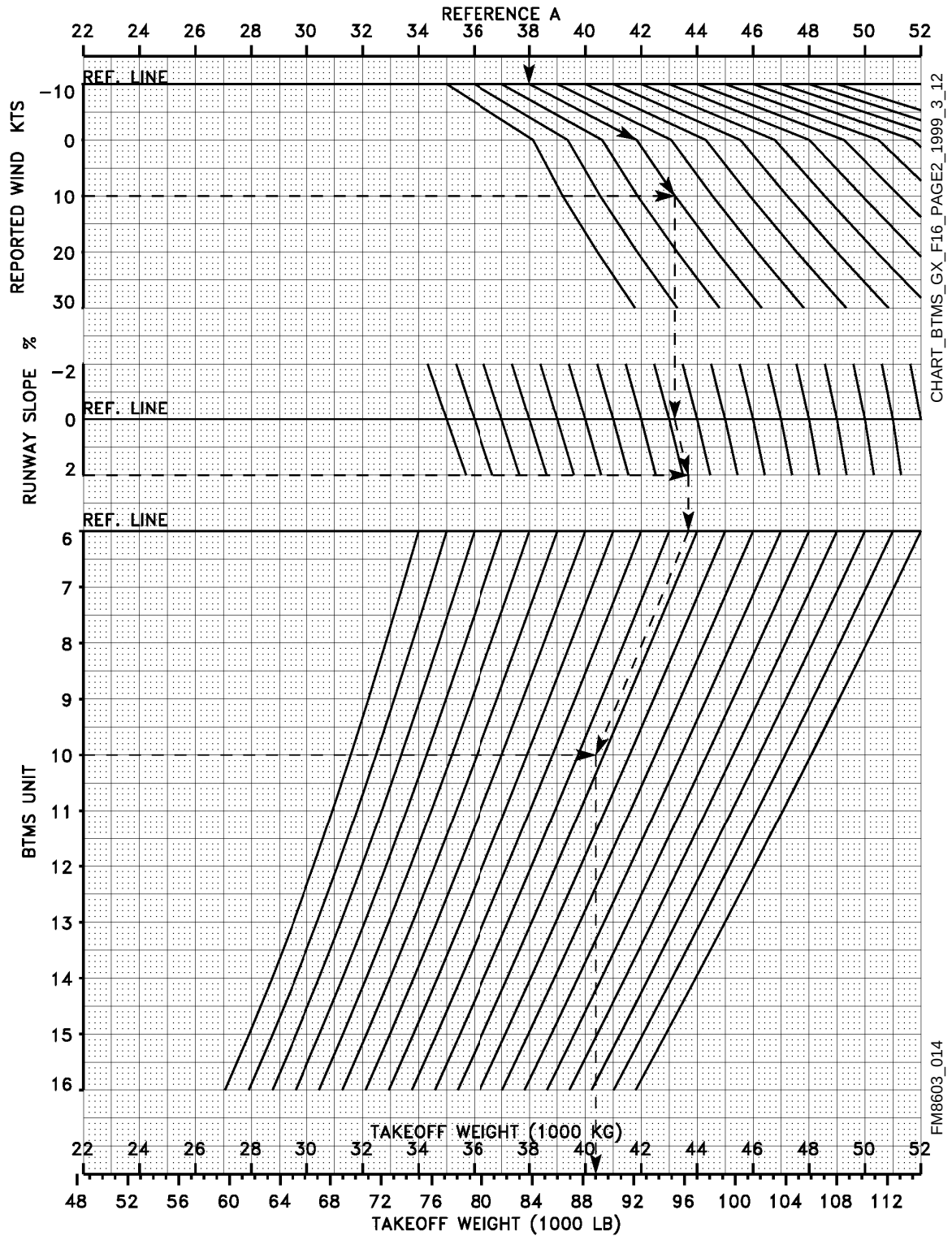


Take-Off Weight Limited by Brake Energy – Slat OUT / Flap 16°
Figure 06-03-11 (Sheet 1 of 2)

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

A. Maximum Allowable Take-Off Weight (Cont'd)



Take-Off Weight Limited by Brake Energy – Slat OUT / Flap 16°
Figure 06-03-11 (Sheet 2 of 2)

PERFORMANCE
TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

B. Dry Runway Take-Off Field Length

The following charts are used to obtain the take-off field length required on a dry runway, for a given value of airplane weight, ambient temperature, airport pressure altitude (from sea level to 10,000 feet in 2,000-foot intervals), reported wind, runway slope and various bleed configurations.

The take-off field length, as presented in these charts, is the most limiting of the following:

- Take-off distance with all engines operating, multiplied by a factor of 1.15;
- Take-off distance with one engine inoperative; and
- Accelerate-stop distance.

NOTE

When the take-off crosswind exceeds 20 knots, the high crosswind take-off procedure must be used (refer to the Flight Crew Operating Manual, Chapter 4: NORMAL PROCEDURES – TAXIING AND TAKE-OFF – HIGH CROSSWIND TAKE-OFF). The corrected take-off field length must be increased by 460 meters (1,500 feet).

The take-off field length for a slat OUT / flap 16° take-off on a dry runway, are given by the following:

- Figure 06-03-12 provides the uncorrected take-off field length;
- Figure 06-03-13 provides the take-off field length corrected for the effects of engine bleed / pack usage, runway slope and reported wind.

The uncorrected take-off field length can be interpolated linearly with altitude.

Example:

Associated Conditions:

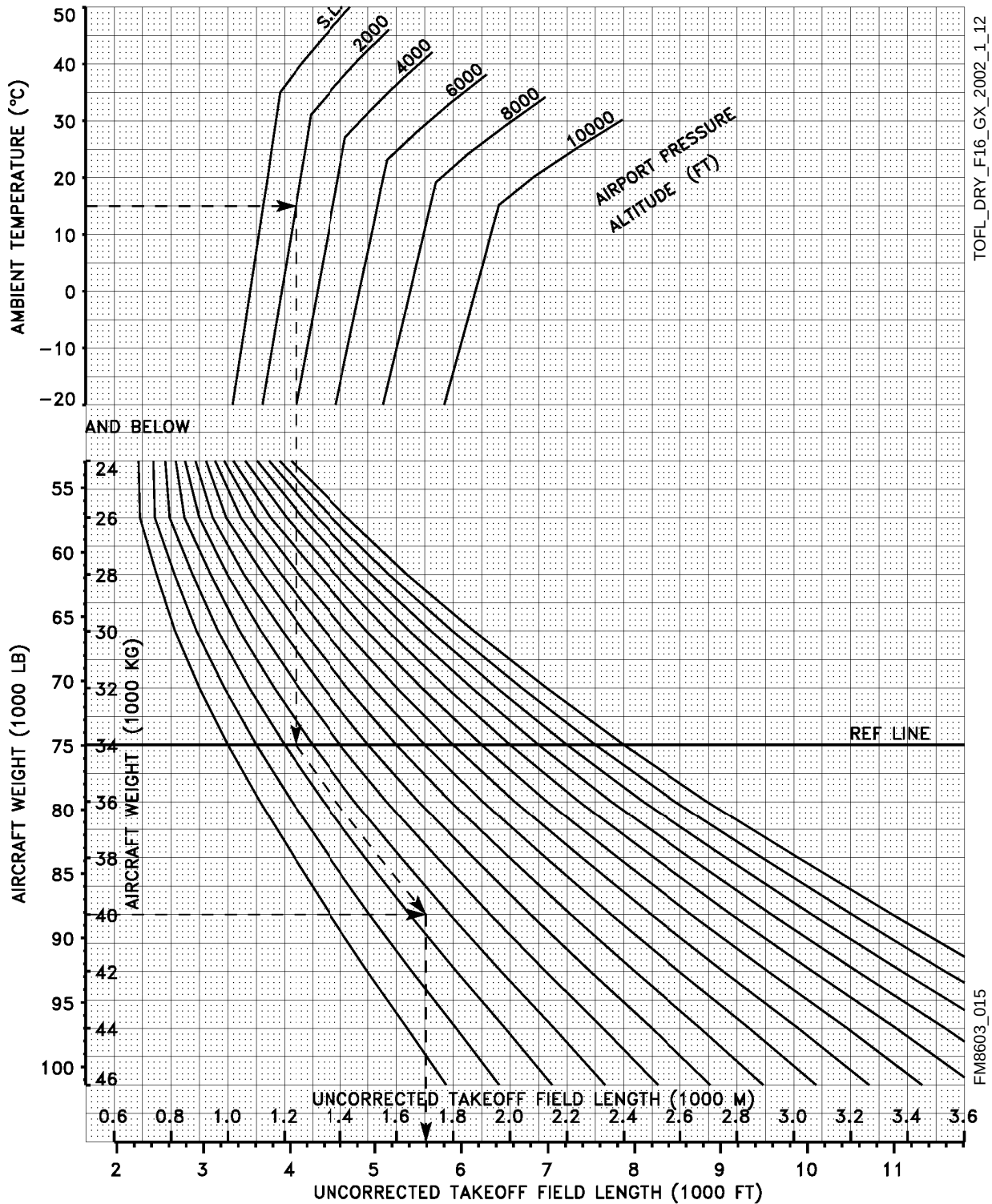
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots headwind
Runway slope	= + 1 %

The example in Figure 06-03-12 and Figure 06-03-13 shows that for the above associated conditions, the corrected take-off field length is 1,685 meters (5,530 feet).

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

B. Dry Runway Take-Off Field Length (Cont'd)

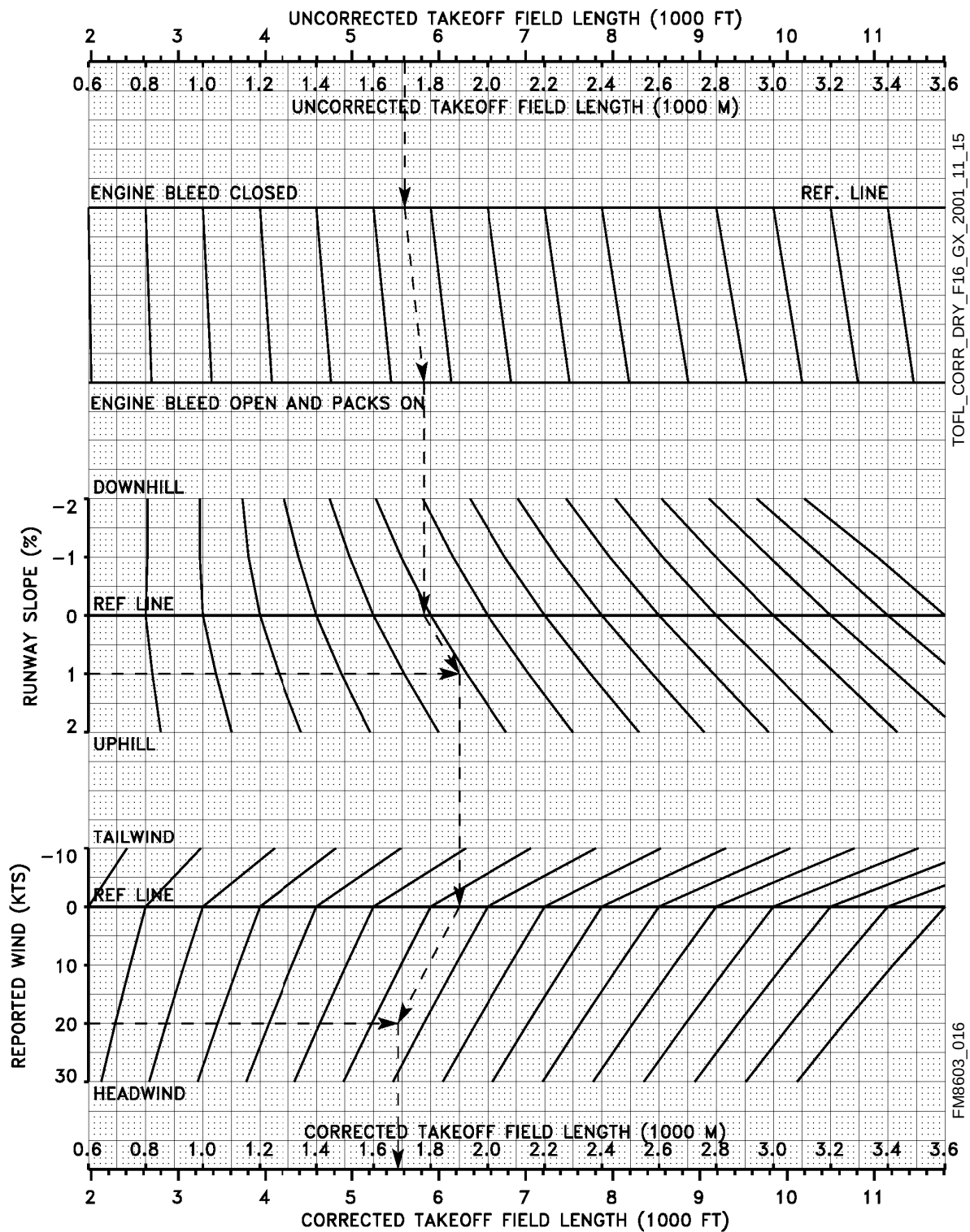


Uncorrected Take-Off Field Length, Dry Runway, Slat OUT/ Flap 16°
Figure 06-03-12

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

B. Dry Runway Take-Off Field Length (Cont'd)



Corrected Take-Off Field Length, Dry Runway, Slat OUT/ Flap 16°
Figure 06-03-13

PERFORMANCE
TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

C. Wet Runway Take-Off Field Length

A wet runway condition has a deteriorating effect on the stopping performance of the airplane and appropriate corrections should be made to compensate for this degradation.

The following charts are used to obtain the take-off field length required on a wet runway, for a given value of airplane weight, ambient temperature, airport pressure altitude (from sea level to 10,000 feet in 2,000-foot intervals), reported wind, runway slope, usage of thrust reversers and various bleed configurations.

The take-off field length, as presented in these charts, is the most limiting of the following:

- Take-off field length on a dry runway;
- Take-off distance with all engines operating, multiplied by a factor of 1.15;
- Take-off distance with one engine inoperative; and
- Accelerate-stop distance.

NOTE

When the take-off crosswind exceeds 20 knots, the high crosswind take-off procedure must be used (refer to the Flight Crew Operating Manual, Chapter 4: NORMAL PROCEDURES – TAXIING AND TAKE-OFF – HIGH CROSSWIND TAKE-OFF). The corrected take-off field length must be increased by 460 meters (1,500 feet).

The take-off field length for a slat OUT / flap 16° take-off on a wet runway, are given by the following:

- Figure 06-03-14 provides the uncorrected take-off field length;
- Figure 06-03-15 provides the take-off field length corrected for engine bleed / pack usage, runway slope, the effect of reported wind and thrust reverser(s) usage. With one or both thrust reversers inoperative, if the actual takeoff weight is less than 29,000 kg (63,935 lb), a weight of 29,000 kg (63,935 lb) must be used to determine the take-off field length.

The uncorrected take-off field length can be interpolated linearly with altitude.

Example:

Associated Conditions:

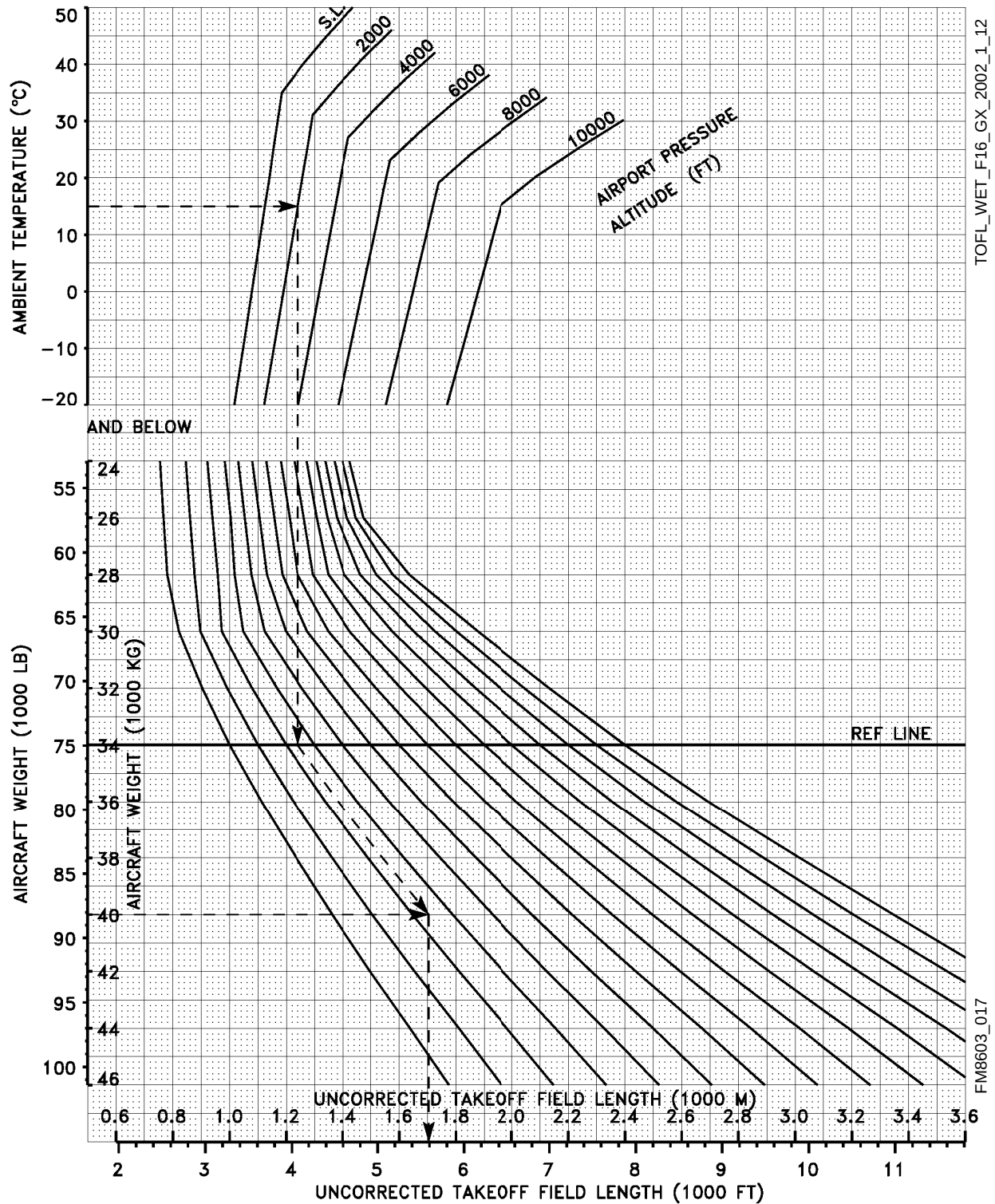
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots headwind
Runway slope	= + 1 % (uphill)
Thrust reversers	= Both operable

The example in Figure 06-03-14 and Figure 06-03-15 shows that for the above associated conditions, the corrected take-off field length is 1,685 meters (5,530 feet).

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

C. Wet Runway Take-Off Field Length (Cont'd)

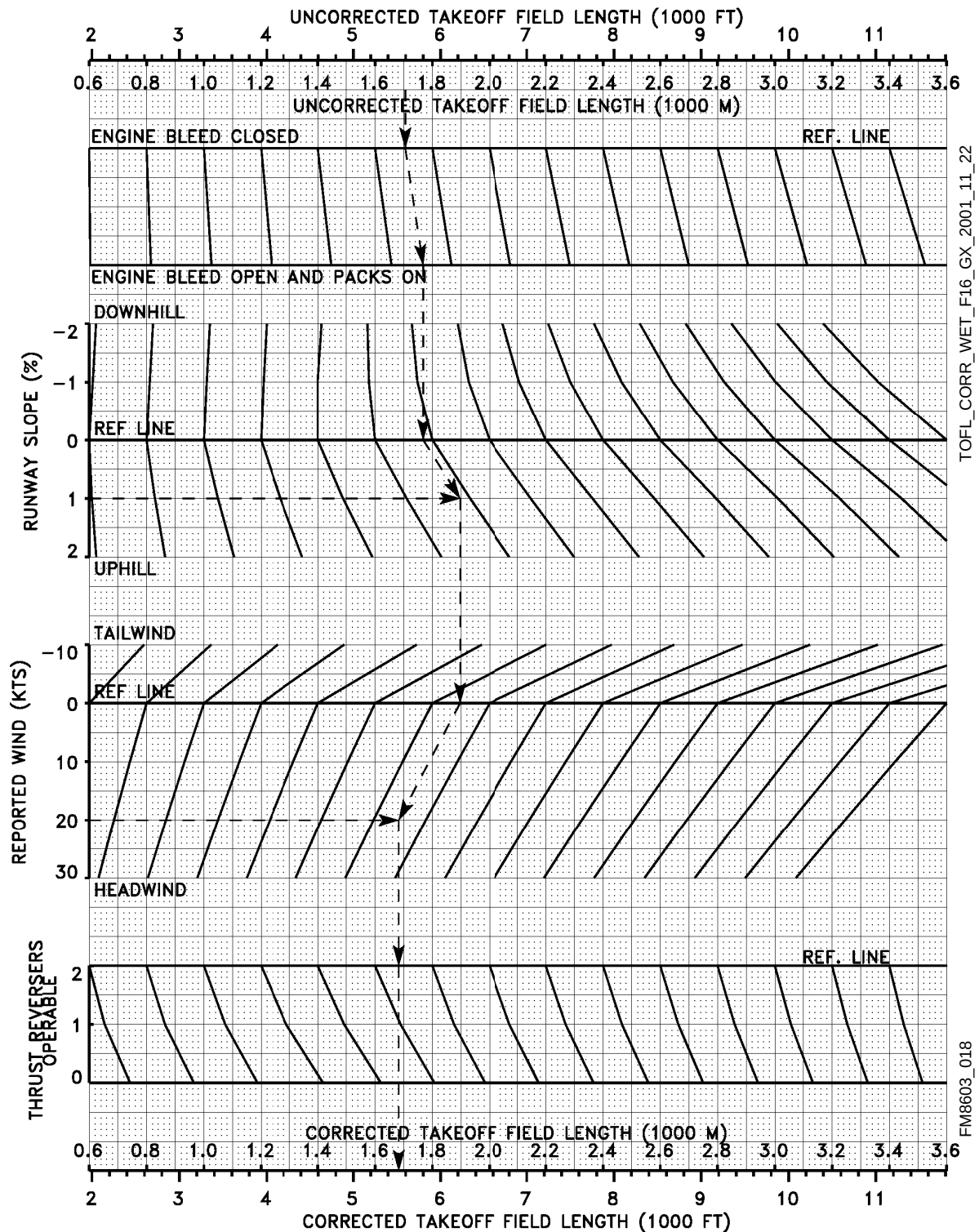


Uncorrected Take-Off Field Length, Wet Runway, Slat OUT / Flap 16°
Figure 06-03-14

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

C. Wet Runway Take-Off Field Length (Cont'd)



Corrected Take-Off Field Length, Wet Runway, Slat OUT / Flap 16°
Figure 06-03-15

PERFORMANCE
TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

D. Take-Off Speeds

(1) TAKE-OFF DECISION SPEED, V_1 - DRY RUNWAY

The take-off decision speed (V_1) for a slat OUT / flap 16° take-off on a dry runway, is equal to the rotation speed (V_R). Use the appropriate V_R chart. Refer to Figure 06-03-17.

V_1 must not be less than V_{1MCG} .

(2) TAKE-OFF DECISION SPEED, V_1 - WET RUNWAY

The following charts are used to obtain the take-off decision speed (V_1) for a slat OUT / flap 16° take-off on a wet runway, for a given value of airplane weight, ambient temperature, airport pressure altitude (from sea level to 10,000 feet in 2,000-foot intervals), reported wind, runway slope, usage of thrust reversers and various bleed configurations.

V_1 must not be less than V_{1MCG} .

The take-off decision speed (V_1) for a slat OUT / flap 16° take-off on a wet runway, is determined from Figure 06-03-16.

Example:

Associated Conditions:

Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
A/C weight	= 40,000 kg (88,185 lb)
Runway slope	= + 1% (uphill)
Engine Bleed	= Open
Pack	= On
Reported wind	= 20 knots headwind
Thrust reversers	= Both operable

The example in Figure 06-03-16 shows that for the above associated conditions, V_1 is equal to 114.0 KIAS.

(3) MINIMUM V_1 LIMITED BY CONTROL ON THE GROUND, V_{1MCG}

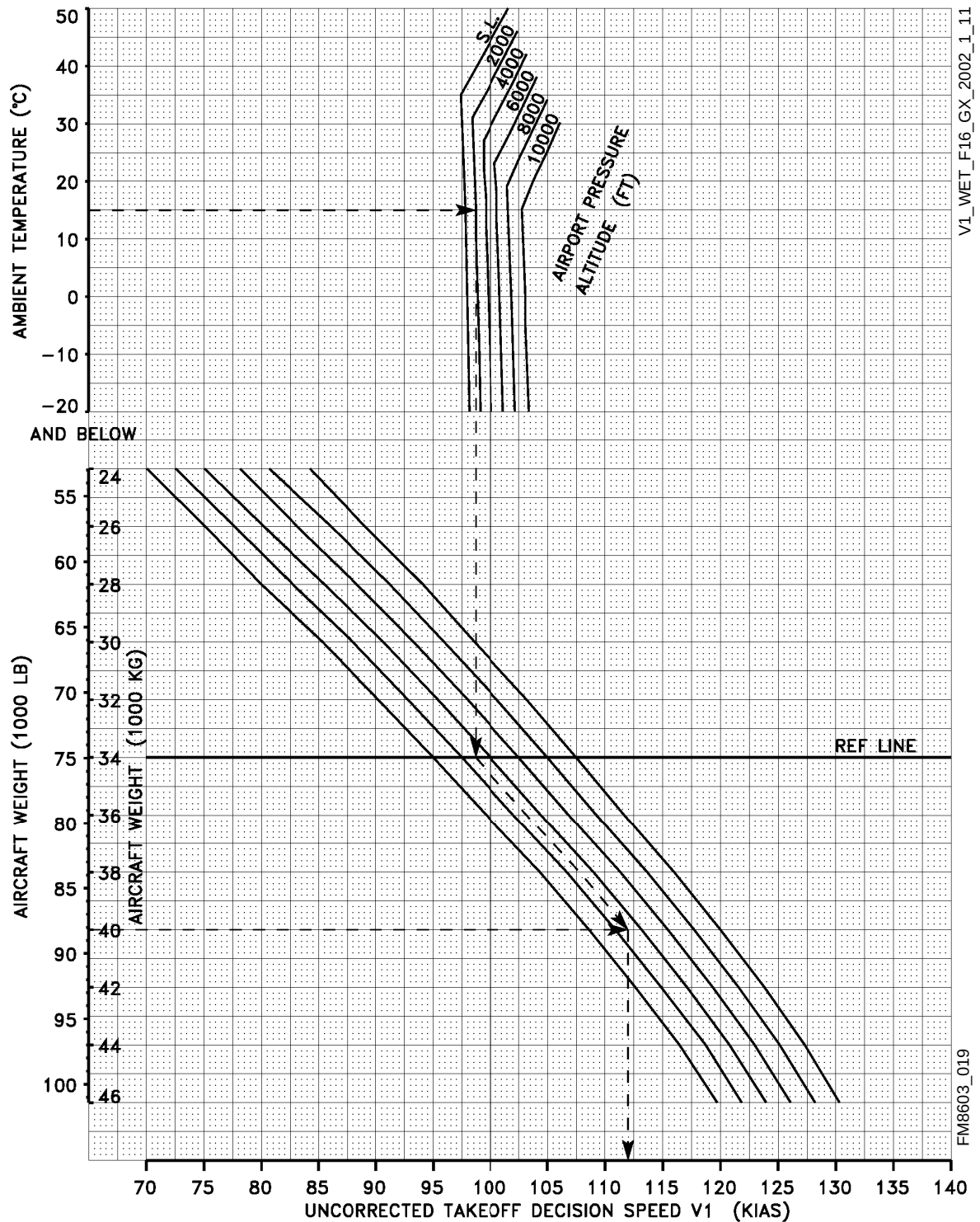
Applicable to both dry and wet runway operations:

- V_{1MCG} (Slat OUT / Flap 16°) = 88 KIAS

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

D. Take-Off Speeds (Cont'd)



V1_WET_F16_GX_2002_1_11

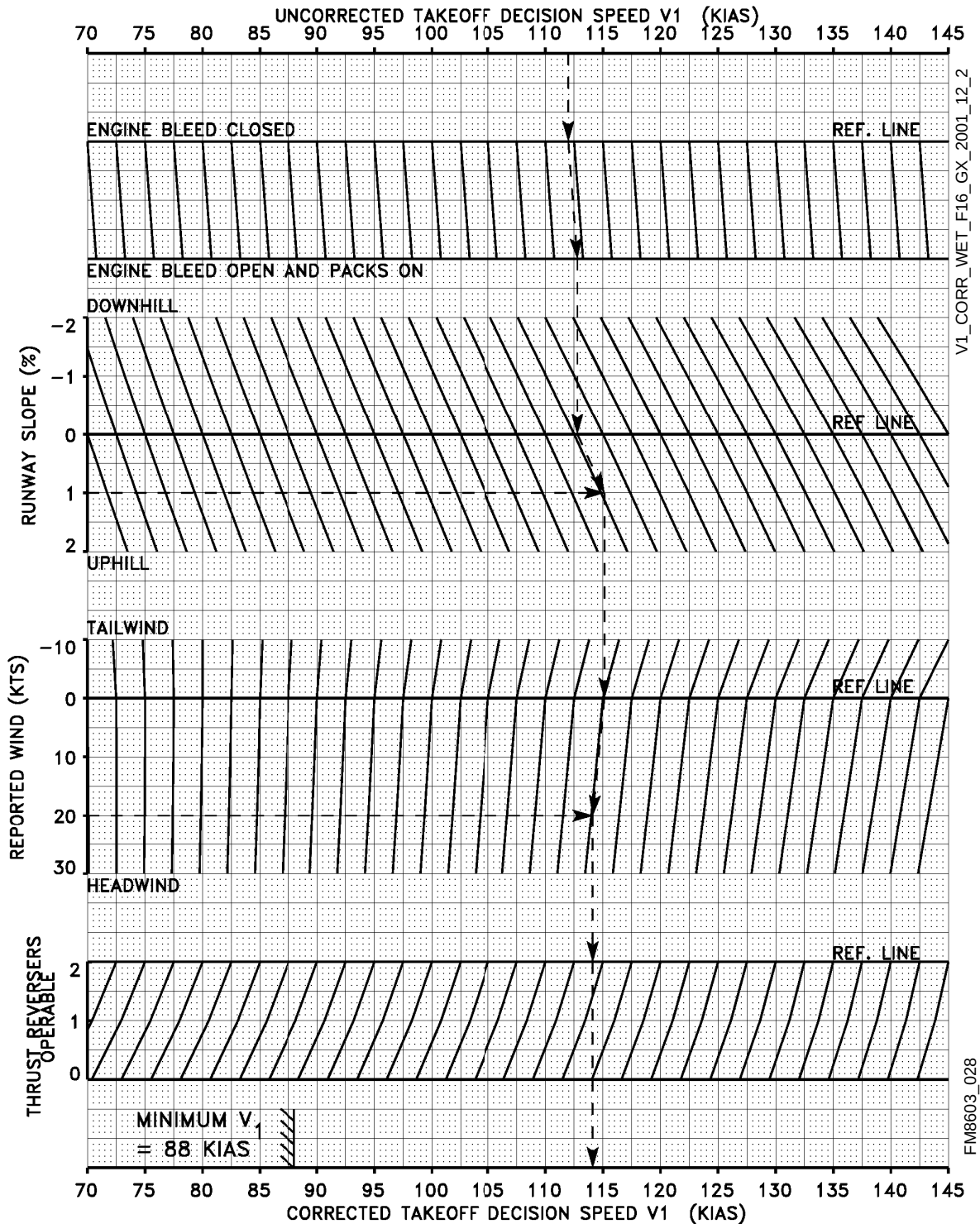
FM8603_019

Take-Off Decision Speed V1 – Slat OUT / Flap 16° – Wet Runway
Figure 06-03-16 (Sheet 1 of 2)

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

D. Take-Off Speeds (Cont'd)



Take-Off Decision Speed V_1 – Slat OUT / Flap 16° – Wet Runway
Figure 06-03-16 (Sheet 2 of 2)

PERFORMANCE
TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

D. Take-Off Speeds (Cont'd)

(4) ROTATION SPEED, V_R

Figure 06-03-17 is used to determine the rotation speed (V_R) for dry and wet runway operations, as well as the take-off decision speed (V_1) for dry runway operations, for a slat OUT / flap 16° take-off, for varying conditions of ambient temperature, airport pressure altitude, take-off weight and runway slope. The effect of engine bleed and pack utilization is negligible.

V_R must not be less than 88 KIAS.

Example:

Associated Conditions:

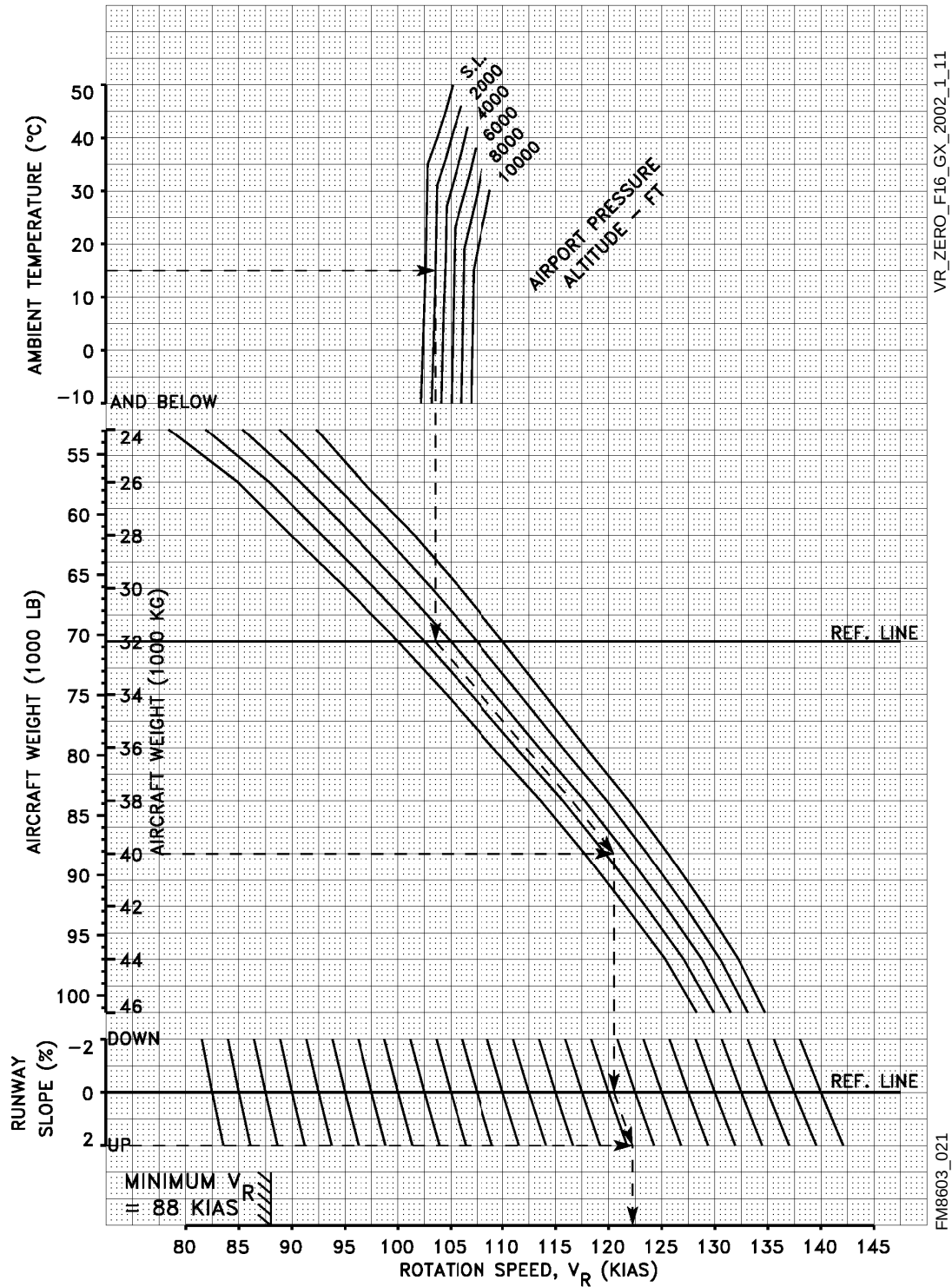
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
A/C weight	= 40,000 kg (88,185 lb)
Runway slope	= + 2% (uphill)

The example in Figure 06-03-17 shows that for the above associated conditions, the rotation speed is 122.3 KIAS.

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

D. Take-Off Speeds (Cont'd)



Rotation Speed V_R – Slat OUT / Flap 16°
Figure 06-03-17

PERFORMANCE
TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

D. Take-Off Speeds (Cont'd)

(5) TAKE-OFF SAFETY SPEED, V_2

Figure 06-03-18 is used to determine the take-off safety speed (V_2) for a slat out / flap 16° take-off, on dry or wet runways, for varying conditions of ambient temperature, airport pressure altitude and take-off weight. The effect of engine bleed and pack utilization is negligible.

Example:

Associated Conditions:

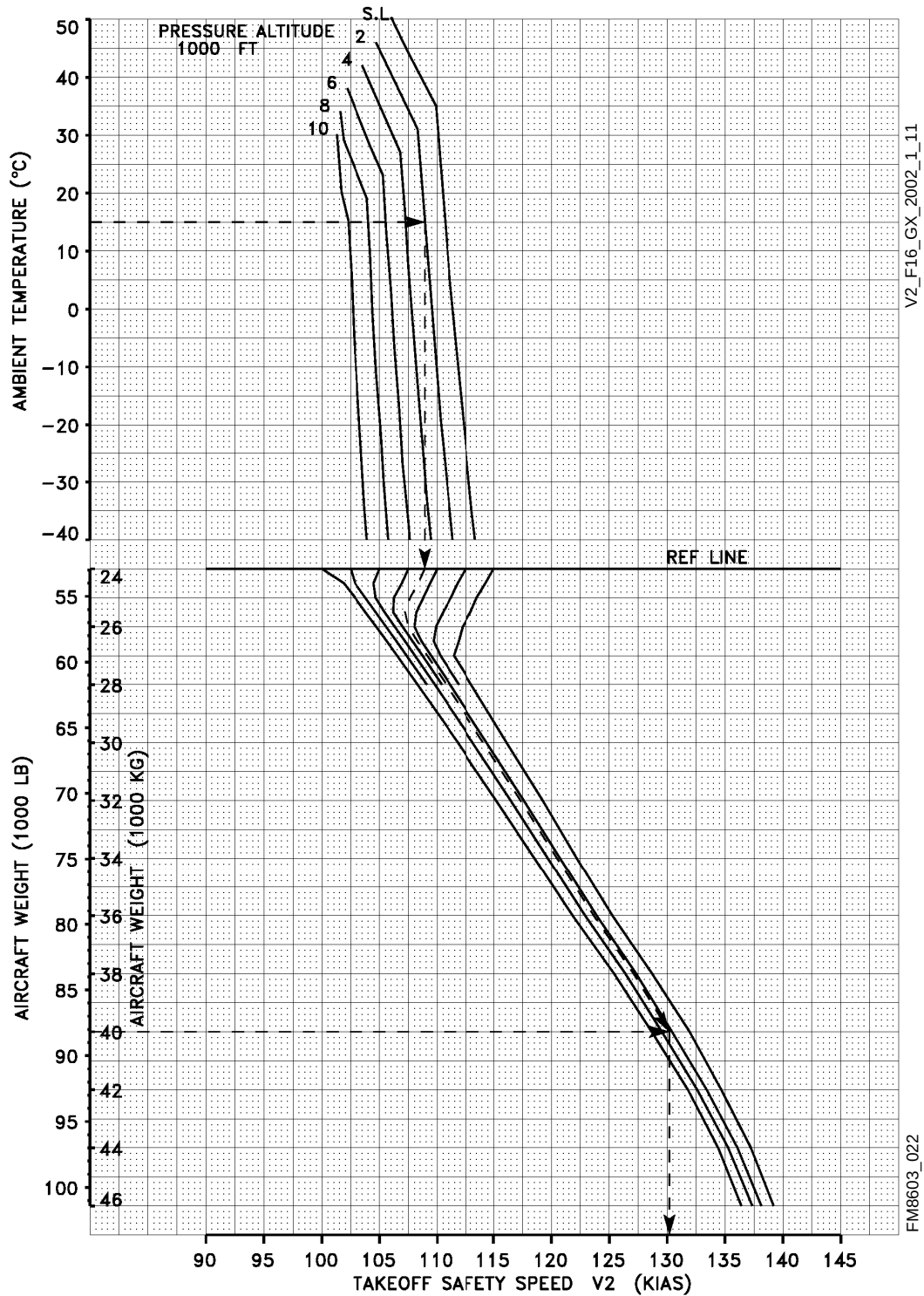
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 feet
A/C weight	= 40,000 kg (88,185 lb)

Figure 06-03-18 shows that for the above associated conditions, the take-off safety speed is 130.2 KIAS.

PERFORMANCE TAKE-OFF PERFORMANCE

3. TAKE-OFF PERFORMANCE - SLAT OUT / FLAP 16° (CONT'D)

D. Take-Off Speeds (Cont'd)



Take-Off Safety Speed V_2 – Slat OUT / Flap 16°
Figure 06-03-18

PERFORMANCE
TAKE-OFF PERFORMANCE

4. MAXIMUM ALLOWABLE BRAKE TEMPERATURE

A. Maximum Allowable Brake Temperature for Take-Off

The minimum brake cooling time after a landing or a rejected take-off and the maximum allowable brake temperature for take-off specified herein must be observed to ensure sufficient brake energy capability in the event of a rejected take-off.

A minimum brake cooling time of fifteen (15) minutes must be observed between a landing stop or a rejected take-off and the subsequent take-off.

Brake cooling is required if the maximum take-off weight limited by the brake energy available (as derived from Figure 06-03-2 (Slat OUT / flap 6°) or Figure 06-03-11 (Slat OUT / flap 16°)), is less than the actual take-off weight.

The BTMS temperature of the warmest brake must be at or below the BTMS level derived from Figure 06-03-2 or Figure 06-03-11 (see below) to ensure that there will be sufficient brake energy to perform a safe rejected take-off for the associated conditions of airport pressure altitude, temperature, reported wind, runway gradient and actual take-off weight.

The maximum BTMS of the warmest brake is derived as follows:

- From sheet 2 of either Figure 06-03-2 or Figure 06-03-11, follow the BTMS correction guideline until it intersects the actual take-off weight. From this intersection, derive the BTMS unit. Take-off will be permissible when all the BTMS readouts are at or below the resulting value.

5. STABILIZER TRIM SETTING

A. Stabilizer Trim Setting for Take-Off

Stabilizer trim setting data for take-off are presented in Figure 06-03-19 (Slat OUT / Flap 6°) and Figure 06-03-20 (Slat OUT / Flap 16°).

Example:

Associated Conditions:

A/C weight	= 40,000 kg (88,185 lb)
Center of gravity	= 29% MAC

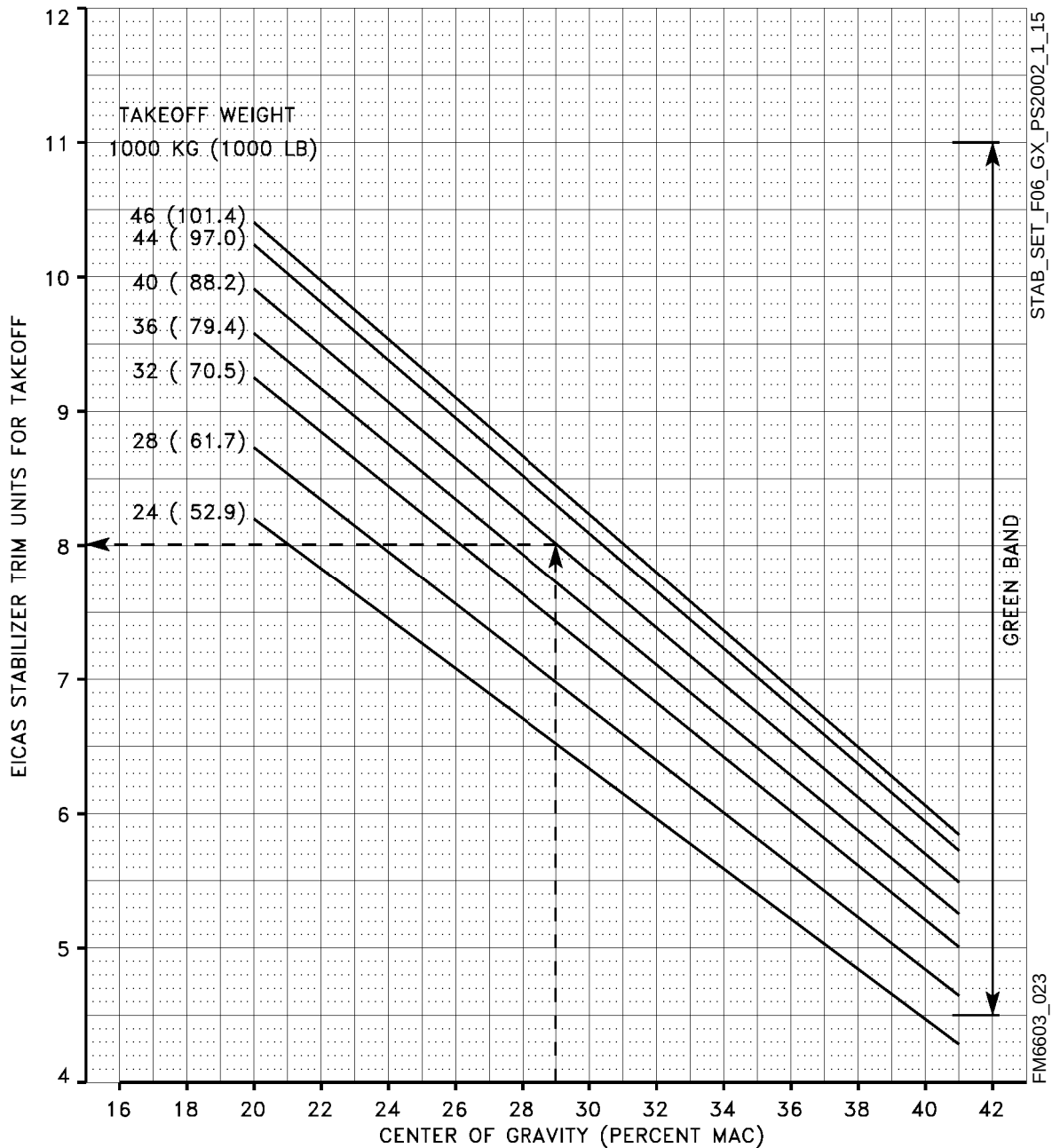
Figure 06-03-19 shows that for the above associated conditions for a slat OUT / flap 6° take-off, the stabilizer trim setting is 8.0.

Figure 06-03-20 shows that for the above associated conditions for a slat OUT / flap 16° take-off, the stabilizer trim setting is 8.4.

PERFORMANCE TAKE-OFF PERFORMANCE

5. STABILIZER TRIM SETTING (CONT'D)

A. Stabilizer Trim Setting for Take-Off (Cont'd)

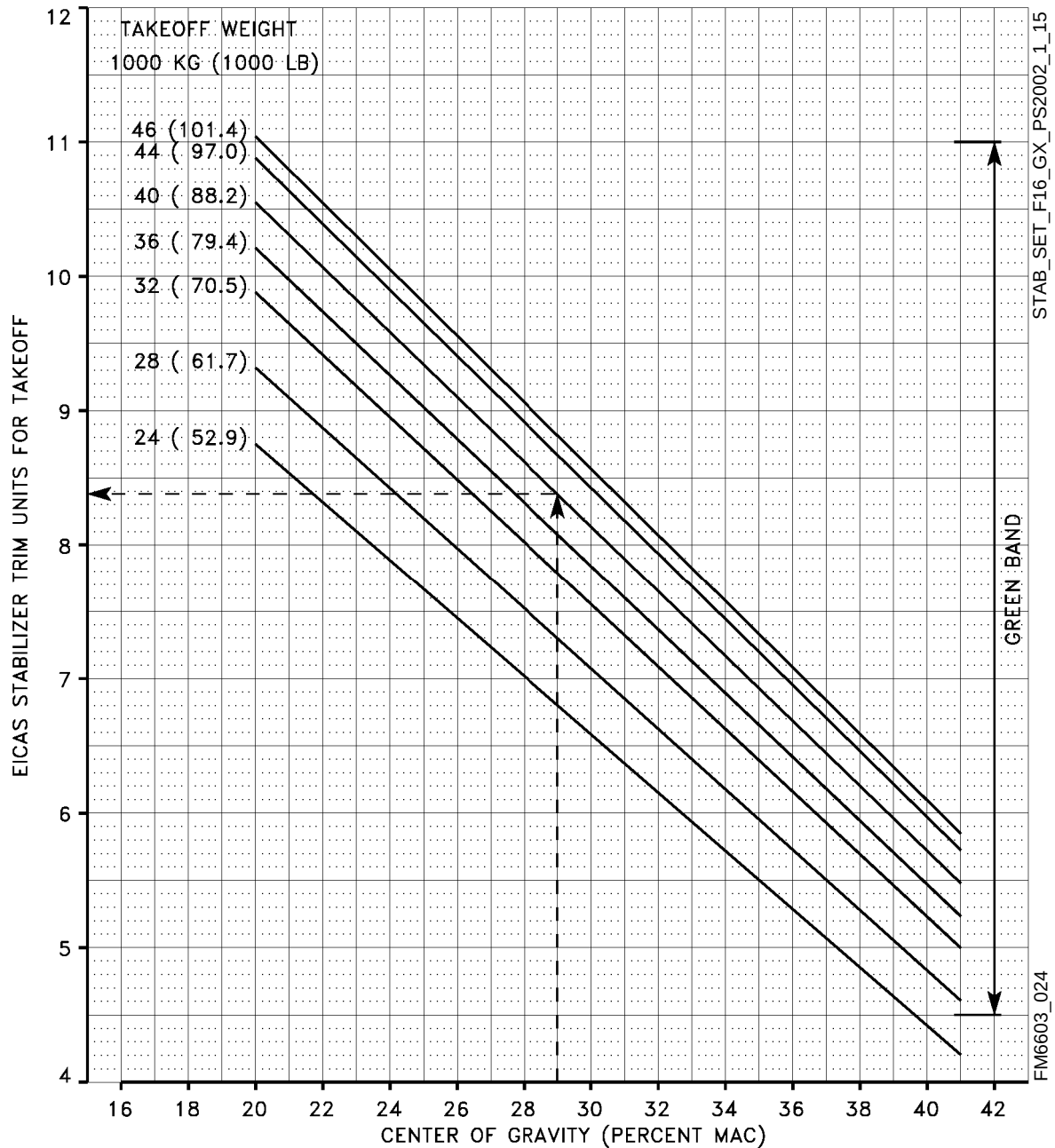


Stabilizer Trim Setting For Take-Off – Slat OUT / Flap 6°
Figure 06-03-19

PERFORMANCE TAKE-OFF PERFORMANCE

5. STABILIZER TRIM SETTING (CONT'D)

A. Stabilizer Trim Setting for Take-Off (Cont'd)



Stabilizer Trim Setting For Take-Off – Slat OUT / Flap 16°
Figure 06-03-20

PERFORMANCE
TAKE-OFF PERFORMANCE

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**PERFORMANCE
PERFORMANCE DATA FOR OPERATION IN
ICING CONDITIONS****1. INTRODUCTION****A. General**

The following section presents performance correction data for operation in icing conditions. The information contained in this section supersedes the performance data in Sections 1 to 6 of the basic Airplane Flight Manual when operating in icing conditions and must be used in conjunction with Sections 1 to 6 of the basic Airplane Flight Manual.

The effect of this section on the basic Airplane Flight Manual is given in paragraph 2. below.

NOTE

With either the cowl anti-ice (CAI) on, or the wing and cowl anti-ice (WCAI) on, the reference data is the 'Engine Bleed Open and Pack On' data.

2. PERFORMANCE CORRECTIONS**A. General**

The effects of using the cowl anti-ice system on the take-off performance, obstacle clearance, enroute performance, approach and landing climb and landing performance sections of the basic Airplane Flight Manual, are presented in tabular form in paragraph 2.B. No ice accumulation on unprotected surfaces is assumed.

The effects of using the wing and cowl anti-ice system on the take-off performance, obstacle clearance, enroute performance, approach and landing climb and landing performance sections of the basic Airplane Flight Manual, are presented in tabular form in paragraph 2.C. Appropriate corrections for ice accumulation on unprotected surfaces are also included where they apply. These corrections are cumulative.

Corrections for ice accumulation on unprotected surfaces remain applicable even though the airplane has flown out of icing conditions and the anti-ice system is no longer in use.

The maximum take-off weight limited by climb requirements, for a slat OUT / flap 6° take-off, with either the cowl or wing and cowl anti-ice system in use, is presented in paragraph 2.D.

The maximum take-off weight limited by climb requirements, for a slat OUT / flap 16° take-off, with either the cowl or wing and cowl anti-ice system in use, is presented in paragraph 2.E.

The final segment and enroute climb gradient with one engine inoperative and the other engine operating at maximum continuous thrust (MCT), with the engine bleed open / one (1) pack on and the cowl anti-icing on, is presented in paragraph 2.F.

The final segment and enroute climb gradient with one engine inoperative and the other engine operating at maximum continuous thrust (MCT), with the engine bleed open / one (1) pack on and the wing and cowl anti-icing on, is presented in paragraph 2.G.

The maximum landing weight limited by climb requirements, for a slat OUT / approach flap 6° / landing flap 30° landing, with either the cowl or wing and cowl anti-ice system in use, is presented in paragraph 2.H.

B. Effects of Cowl Anti-Ice On

FIGURE	DESCRIPTION	CAI ON CORRECTIONS
TAKE-OFF PERFORMANCE		
06-03-1	Take-off Weight Limited by Climb Requirements – Slat OUT / Flap 6°	Use data from Figure 06-08-1.

PERFORMANCE **PERFORMANCE DATA FOR OPERATION IN** **ICING CONDITIONS**

2. PERFORMANCE CORRECTIONS (CONT'D)

B. Effects of Cowl Anti-Ice On (Cont'd)

FIGURE	DESCRIPTION	CAI ON CORRECTIONS
TAKE-OFF PERFORMANCE		
06-03-2	Take-off Weight Limited by Brake Energy – Slat OUT / Flap 6°	Reduce take-off weight limited by brake energy by 550 kg (1,210 lb).
06-03-3	Uncorrected Take-off Field Length, Dry Runway – Slat OUT / Flap 6°	Use "ENGINE BLEED OPEN AND PACK ON" data.
06-03-4	Corrected Take-off Field Length, Dry Runway – Slat OUT / Flap 6°	
06-03-5	Uncorrected Take-off Field Length, Wet Runway – Slat OUT / Flap 6°	Use "ENGINE BLEED OPEN AND PACK ON" data. Increase take-off field length based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 3% • 0 thrust reversers: 8%
06-03-6	Corrected Take-off Field Length, Wet Runway – Slat OUT / Flap 6°	
06-03-7	Take-off Decision Speed, V_1 – Slat OUT / Flap 6° – Wet Runway	Use "ENGINE BLEED OPEN AND PACK ON" data.
06-03-8	Rotation Speed, V_R – Slat OUT / Flap 6°	
06-03-9	Take-Off Safety Speed, V_2 – Slat OUT / Flap 6°	
06-03-10	Take-Off Weight Limited by Climb Requirements – Slat OUT / Flap 16°	Use data from Figure 06-08-2.
06-03-11	Take-off Weight Limited by Brake Energy – Slat OUT / Flap 16°	Reduce take-off weight limited by brake energy by 550 kg (1,210 lb).
06-03-12	Uncorrected Take-off Field Length, Dry Runway – Slat OUT / Flap 16°	Use "ENGINE BLEED OPEN AND PACK ON" data.
06-03-13	Corrected Take-off Field Length, Dry Runway – Slat OUT / Flap 16°	
06-03-14	Uncorrected Take-off Field Length, Wet Runway – Slat OUT / Flap 16°	Use "ENGINE BLEED OPEN AND PACK ON" data. Increase take-off field length based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 3% • 0 thrust reversers: 8%
06-03-15	Corrected Take-off Field Length, Wet Runway – Slat OUT / Flap 16°	
06-03-16	Take-off Decision Speed, V_1 – Slat OUT / Flap 16° – Wet Runway	Use "ENGINE BLEED OPEN AND PACK ON" data.
06-03-17	Rotation Speed, V_R – Slat OUT / Flap 16°	
06-03-18	Take-Off Safety Speed, V_2 – Slat OUT / Flap 16°	

PERFORMANCE PERFORMANCE DATA FOR OPERATION IN ICING CONDITIONS

2. PERFORMANCE CORRECTIONS (CONT'D)

B. Effects of Cowl Anti-Ice On (Cont'd)

FIGURE	DESCRIPTION	CAI ON CORRECTIONS
TAKE-OFF PERFORMANCE		
06-03-19	Stabilizer Trim Setting for Take-Off – Slat OUT / Flap 6°	NO CORRECTIONS
06-03-20	Stabilizer Trim Setting for Take-Off – Slat OUT / Flap 16°	

FIGURE	DESCRIPTION	CAI ON CORRECTIONS
OBSTACLE CLEARANCE		
06-04-1	Take-Off Flight Path – Gross Level-off Height Less than 1500 Feet	NO CORRECTIONS
06-04-2	Take-Off Flight Path – Gross Level-off Height Greater than 1500 Feet	
06-04-3	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6°– Engine Bleed Closed	For a level-off height pressure altitude 10,000 ft and below, reduce “ENGINE BLEED OPEN AND PACK ON” data by 0.2%. For a level-off height pressure altitude above 10,000 ft, reduce “ENGINE BLEED OPEN AND PACK ON” data by 0.4%.
06-04-4	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6°– Engine Bleed Open / Packs On	
06-04-5	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 16°– Engine Bleed Closed	
06-04-6	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 16°– Engine Bleed Open / Packs On	
06-04-7	Net Take-Off Flight Path – Close-In Obstacles	NO CORRECTIONS
06-04-8	Net Take-Off Flight Path – Far Obstacles	
06-04-9	Geometric Height Above Airport to Pressure Height Above Airport Conversion	
06-04-10	Net Acceleration Distance	Use CAI ON obstacle clearance reference climb gradient.

FIGURE	DESCRIPTION	CAI ON CORRECTIONS
ENROUTE PERFORMANCE		
06-05-1	Final Segment and Enroute Climb Speed – Slat IN / Flap 0°	NO CORRECTIONS
06-05-2	Final Segment and Enroute Climb Gradient, Slat IN / Flap 0°	Use data from Figure 06-08-3.

PERFORMANCE

PERFORMANCE DATA FOR OPERATION IN ICING CONDITIONS

2. PERFORMANCE CORRECTIONS (CONT'D)

B. Effects of Cowl Anti-Ice On (Cont'd)

FIGURE	DESCRIPTION	CAI ON CORRECTIONS
APPROACH AND LANDING CLIMB		
06-06-1	Approach Climb Speed, Slat OUT / Flap 6°	NO CORRECTIONS
06-06-2	Approach Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Closed	Reduce “ENGINE BLEED OPEN AND PACK ON” data by 0.1%.
06-06-3	Approach Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Open / Pack On	
06-06-4	Landing Climb Speed, Slat OUT / Flap 30°	NO CORRECTIONS
06-06-5	Landing Climb Gradient, Slat OUT / Flap 30° – Engine Bleed Closed	Reduce “ENGINE BLEED OPEN AND PACK ON” data by 0.2%.
06-06-6	Landing Climb Gradient, Slat OUT / Flap 30° – Engine Bleeds Open / Packs On	

FIGURE	DESCRIPTION	CAI ON CORRECTIONS
LANDING PERFORMANCE		
06-07-1	Landing Weight Limited by Climb Requirements – Slat OUT / Approach Flap 6° / Landing Flap 30°	Use data from Figure 06-08-5.
06-07-2	Actual Landing Distance and Landing Speed – Slat OUT / Flap 30°	Increase actual landing distance and landing field length by 2%.
06-07-3	Landing Field Length Required – Slat OUT / Flap 30°	
06-07-4	Actual Distance From Touchdown to Full Stop Using Autobrake – Slat OUT / Flap 30°	NO CORRECTIONS

C. Effects of Wing and Cowl Anti-Ice On / Ice Accumulation

FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
TAKE-OFF PERFORMANCE		
06-03-1	Take-off Weight Limited by Climb Requirements – Slat OUT / Flap 6°	Use data from Figure 06-08-1.
06-03-2	Take-off Weight Limited by Brake Energy – Slat OUT / Flap 6°	Reduce take-off weight limited by brake energy by 1,250 kg (2,760 lb).

PERFORMANCE **PERFORMANCE DATA FOR OPERATION IN** **ICING CONDITIONS**

2. PERFORMANCE CORRECTIONS (CONT'D)

C. Effects of Wing and Cowl Anti-Ice On / Ice Accumulation (Cont'd)

FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
TAKE-OFF PERFORMANCE		
06-03-3	Uncorrected Take-off Field Length, Dry Runway – Slat OUT / Flap 6°	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperature 5 °C and below, adjust "ENGINE BLEED OPEN AND PACK ON" data as follows: increase take-off field length by 4%.
06-03-4	Corrected Take-off Field Length, Dry Runway – Slat OUT / Flap 6°	For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperature above 5 °C, adjust "ENGINE BLEED OPEN AND PACK ON" data as follows: increase take-off field length by 11%.
06-03-5	Uncorrected Take-off Field Length, Wet Runway – Slat OUT / Flap 6°	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperature 5 °C and below, use "ENGINE BLEED OPEN AND PACK ON" data and increase take-off field length based on the number of thrust reversers operative: 2 thrust reversers: 0% 1 thrust reverser: 6% 0 thrust reversers: 17%
06-03-6	Corrected Take-off Field Length, Wet Runway – Slat OUT / Flap 6°	For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperature above 5 °C, use "ENGINE BLEED OPEN AND PACK ON" data and increase take-off field length based on the number of thrust reversers operative: 1 or 2 thrust reversers: 12% 0 thrust reversers: 18%

PERFORMANCE **PERFORMANCE DATA FOR OPERATION IN** **ICING CONDITIONS**

2. PERFORMANCE CORRECTIONS (CONT'D)

C. Effects of Wing and Cowl Anti-Ice On / Ice Accumulation (Cont'd)

FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
TAKE-OFF PERFORMANCE		
06-03-7	Take-off Decision Speed, V_1 – Slat OUT / Flap 6° – Wet Runway	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperature 5 °C and below, use “ENGINE BLEED OPEN AND PACK ON” data. For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperature above 5 °C, adjust “ENGINE BLEED OPEN AND PACK ON” data as follows:
06-03-8	Rotation Speed, V_R – Slat OUT / Flap 6°	
06-03-9	Take-Off Safety Speed, V_2 – Slat OUT / Flap 6°	increase V_1 and V_R by 1 knot.
06-03-10	Take-Off Weight Limited by Climb Requirements – Slat OUT / Flap 16°	Use data from Figure 06-08-2.
06-03-11	Take-off Weight Limited by Brake Energy – Slat OUT / Flap 16°	Reduce take-off weight limited by brake energy by 1,250 kg (2,760 lb).
06-03-12	Uncorrected Take-off Field Length, Dry Runway – Slat OUT / Flap 16°	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperature 5 °C and below, adjust “ENGINE BLEED OPEN AND PACK ON” data as follows:
06-03-13	Corrected Take-off Field Length, Dry Runway – Slat OUT / Flap 16°	- increase take-off field length by 4%. For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperature above 5 °C, adjust “ENGINE BLEED OPEN AND PACK ON” data as follows: - increase take-off field length by 13%;

PERFORMANCE **PERFORMANCE DATA FOR OPERATION IN** **ICING CONDITIONS**

2. PERFORMANCE CORRECTIONS (CONT'D)

C. Effects of Wing and Cowl Anti-Ice On / Ice Accumulation (Cont'd)

FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
TAKE-OFF PERFORMANCE		
06-03-14	Uncorrected Take-off Field Length, Wet Runway – Slat OUT / Flap 16°	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperature 5 °C and below, use "ENGINE BLEED OPEN AND PACK ON" data and increase take-off field length based on the number of thrust reversers operative:
06-03-15	Corrected Take-off Field Length, Wet Runway – Slat OUT / Flap 16°	• 2 thrust reversers: 0% • 1 thrust reverser: 6% • 0 thrust reversers: 18% For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperature above 5 °C, use "ENGINE BLEED OPEN AND PACK ON" data and increase take-off field length based on the number of thrust reversers operative: • 1 or 2 thrust reversers: 11% • 0 thrust reversers: 19%
06-03-16	Take-off Decision Speed, V_1 – Slat OUT / Flap 16° – Wet Runway	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperature 5 °C and below, use "ENGINE BLEED OPEN AND PACK ON" data. For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperature above 5 °C, adjust "ENGINE BLEED OPEN AND PACK ON" data as follows:
06-03-17	Rotation Speed, V_R – Slat OUT / Flap 16°	
06-03-18	Take-Off Safety Speed, V_2 – Slat OUT / Flap 16°	
06-03-19	Stabilizer Trim Setting for Take-Off – Slat OUT / Flap 6°	NO CORRECTIONS
06-03-20	Stabilizer Trim Setting for Take-Off – Slat OUT / Flap 16°	

PERFORMANCE **PERFORMANCE DATA FOR OPERATION IN** **ICING CONDITIONS**

2. PERFORMANCE CORRECTIONS (CONT'D)

C. Effects of Wing and Cowl Anti-Ice On / Ice Accumulation (Cont'd)

FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
OBSTACLE CLEARANCE		
06-04-1	Take-Off Flight Path – Gross Level-off Height Less than 1500 Feet	NO CORRECTIONS
06-04-2	Take-Off Flight Path – Gross Level-off Height Greater than 1500 Feet	
06-04-3	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6°– Engine Bleed Closed	For a level-off height pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, reduce “ENGINE BLEED OPEN AND PACK ON” data by 0.8%. For level-off height pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, reduce “ENGINE BLEED OPEN AND PACK ON” data by 2.5%.
06-04-4	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6°– Engine Bleed Open / Packs On	
06-04-5	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 16°– Engine Bleed Closed	
06-04-6	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 16°– Engine Bleed Open / Packs On	
06-04-7	Net Take-Off Flight Path – Close-In Obstacles	NO CORRECTIONS
06-04-8	Net Take-Off Flight Path – Far Obstacles	NO CORRECTIONS
06-04-9	Geometric Height Above Airport to Pressure Height Above Airport Conversion	
06-04-10	Net Acceleration Distance	Use WCAI ON obstacle clearance reference climb gradient.
FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
ENROUTE PERFORMANCE		
06-05-1	Final Segment and Enroute Climb Speed – Slat IN / Flap 0°	NO CORRECTIONS
06-05-2	Final Segment and Enroute Climb Gradient, Slat IN / Flap 0°	Use data from Figure 06-08-4 . If ice accumulation is suspected on the unprotected surfaces, increase airplane weight by 100 kg (220 lb) and reduce by 0.7% the gradient derived from Figure 06-08-4 using the corrected airplane weight.

PERFORMANCE PERFORMANCE DATA FOR OPERATION IN ICING CONDITIONS

2. PERFORMANCE CORRECTIONS (CONT'D)

C. Effects of Wing and Cowl Anti-Ice On / Ice Accumulation (Cont'd)

FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
APPROACH AND LANDING CLIMB		
06-06-1	Approach Climb Speed, Slat OUT / Flap 6°	NO CORRECTIONS
06-06-2	Approach Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Closed	For pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, use “ENGINE BLEED OPEN AND PACK ON” data. For pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, reduce “ENGINE BLEED OPEN AND PACK ON” data by 2.0%.
06-06-3	Approach Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Open / Pack On	If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (220 lb) and reduce the derived gradient by 0.7%.
06-06-4	Landing Climb Speed, Slat OUT / Flap 30°	NO CORRECTIONS
06-06-5	Landing Climb Gradient, Slat OUT / Flap 30° – Engine Bleed Closed	For pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, use “ENGINE BLEED OPEN AND PACK ON” data. For pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, reduce “ENGINE BLEED OPEN AND PACK ON” data by 4.0%.
06-06-6	Landing Climb Gradient, Slat OUT / Flap 30° – Engine Bleeds Open / Packs On	If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (220 lb) and reduce the derived gradient by 0.7%.
FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
LANDING PERFORMANCE		
06-07-1	Landing Weight Limited by Climb Requirements – Slat OUT / Approach Flap 6° / Landing Flap 30°	Use data from Figure 06-08-5. If ice accumulation is suspected on unprotected surfaces, reduce the maximum landing weight values by 2650 kg (5842 lb).

PERFORMANCE PERFORMANCE DATA FOR OPERATION IN ICING CONDITIONS

2. PERFORMANCE CORRECTIONS (CONT'D)

C. Effects of Wing and Cowl Anti-Ice On / Ice Accumulation (Cont'd)

FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
LANDING PERFORMANCE		
06-07-2	Actual Landing Distance and Landing Speed – Slat OUT / Flap 30°	Increase the actual landing distance and landing field length by 5%.
06-07-3	Landing Field Length Required – Slat OUT / Flap 30°	If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (220 lb).
06-07-4	Actual Distance From Touchdown to Full Stop Using Autobrake – Slat OUT / Flap 30°	Increase air distance allocation from 460 meters (1,500 feet) to 560 meters (1,830 feet). If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (220 lb).

D. Take-Off Weight Limited by Climb Requirements, Slat OUT / Flap 6° – Anti-Ice On

The maximum take-off weight limited by climb requirements for a slat OUT / flap 6° take-off with one engine inoperative and the other engine operating at maximum take-off thrust (MTO), is provided by Figure 06-08-1, with the engine bleed open / one (1) pack on and either the cowl anti-icing on or the wing and cowl anti-icing on.

NOTE

With the APU on, subtract 250 kg (551 lb) from the take-off weight derived from Figure 06-08-1.

Example:

Associated Conditions:

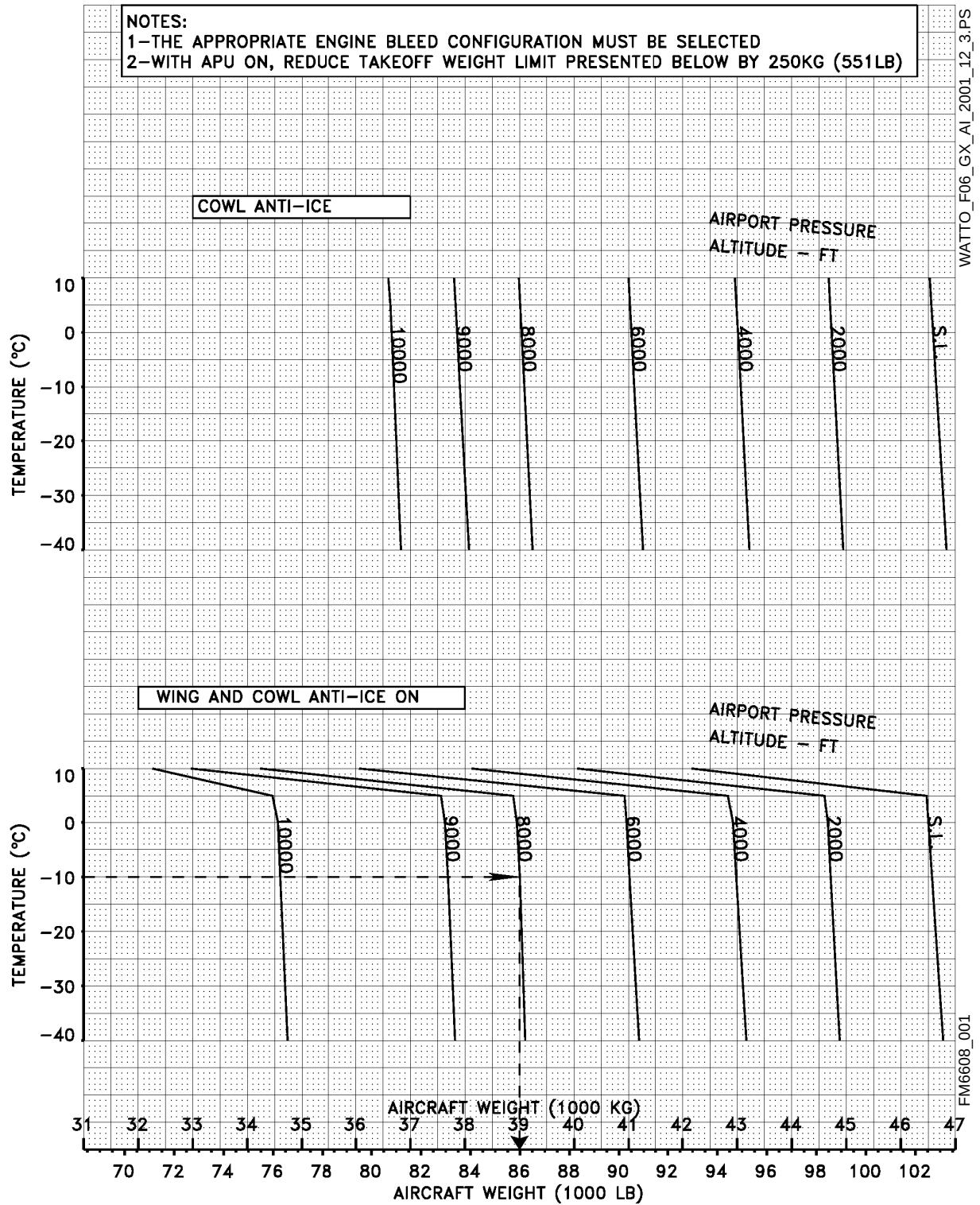
Ambient temperature	= -10 °C
Pressure altitude	= 8,000 ft
Cowl anti-ice	= On
On Wing anti-ice	= On
APU	= Off

The example on Figure 06-08-1 shows that for the above associated conditions, the maximum take-off weight limited by climb requirements is 39,000 kg (86,000 lb).

PERFORMANCE PERFORMANCE DATA FOR OPERATION IN ICING CONDITIONS

2. PERFORMANCE CORRECTIONS (CONT'D)

D. Take-Off Weight Limited by Climb Requirements, Slat OUT / Flap 6° – Anti-Ice On (Cont'd)



Take-Off Weight Limited by Climb Requirements, Slat OUT / Flap 6° – Anti-Ice On
Figure 06-08-1

**PERFORMANCE
PERFORMANCE DATA FOR OPERATION IN
ICING CONDITIONS****2. PERFORMANCE CORRECTIONS (CONT'D)****E. Take-Off Weight Limited by Climb Requirements, Slat OUT / Flap 16° – Anti-Ice On**

The maximum take-off weight limited by climb requirements for a slat OUT / flap 16° take-off with one engine inoperative and the other engine operating at maximum take-off thrust (MTO), is provided by Figure 06-08-2, with the engine bleed open / one (1) pack on and either the cowl anti-icing on or the wing and cowl anti-icing on.

NOTE

With the APU on, subtract 220 kg (485 lb) from the take-off weight derived from Figure 06-08-2.

Example:

Associated Conditions:

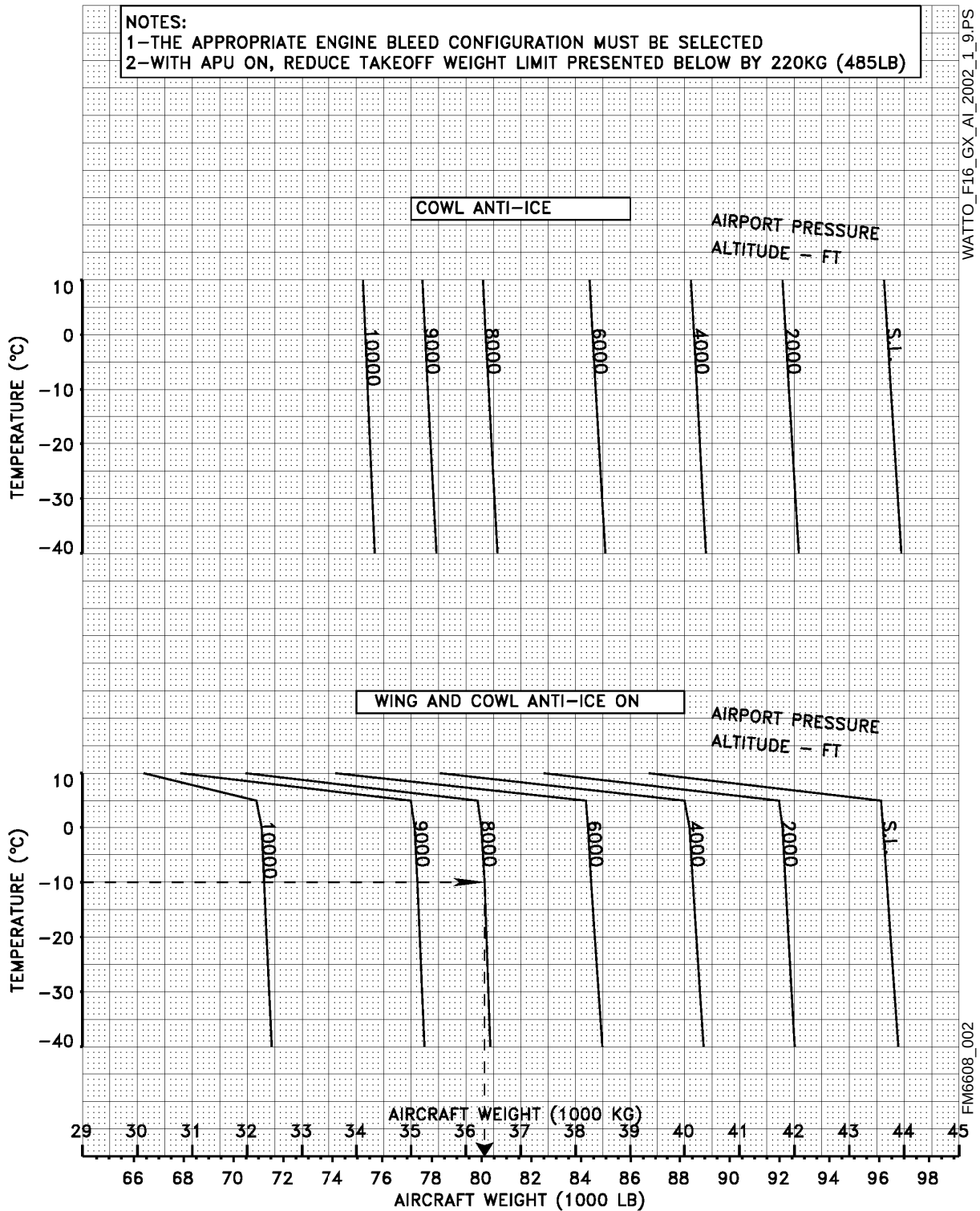
Ambient temperature	= -10 °C
Pressure altitude	= 8,000 ft
Cowl anti-ice	= On
Wing anti-ice	= On
APU	= Off

The example on Figure 06-08-2 shows that for the above associated conditions, the maximum take-off weight limited by climb requirements is 36,350 kg (80,140 lb).

PERFORMANCE PERFORMANCE DATA FOR OPERATION IN ICING CONDITIONS

2. PERFORMANCE CORRECTIONS (CONT'D)

E. Take-Off Weight Limited by Climb Requirements, Slat OUT / Flap 16° – Anti-Ice On (Cont'd)



Take-Off Weight Limited by Climb Requirements, Slat OUT / Flap 16° – Anti-Ice On
Figure 06-08-2

**PERFORMANCE
PERFORMANCE DATA FOR OPERATION IN
ICING CONDITIONS****2. PERFORMANCE CORRECTIONS (CONT'D)****F. Final Segment and Enroute Climb Gradient, Slat IN / Flap 0° – Cowl Anti-Ice On**

The final segment and enroute climb gradient with one engine inoperative and the other engine operating at maximum continuous thrust (MCT), is provided by Figure 06-08-3, with the engine bleed open / one (1) pack on and the cowl anti-icing on.

NOTE

With the APU on, subtract 0.15 percent from the gradient derived from Figure 06-08-3.

Example:

Associated Conditions:

Ambient temperature	= -12 °C
Pressure altitude	= 20,000 ft
A/C weight	= 33,500 kg (73,850 lb)
APU	= Off

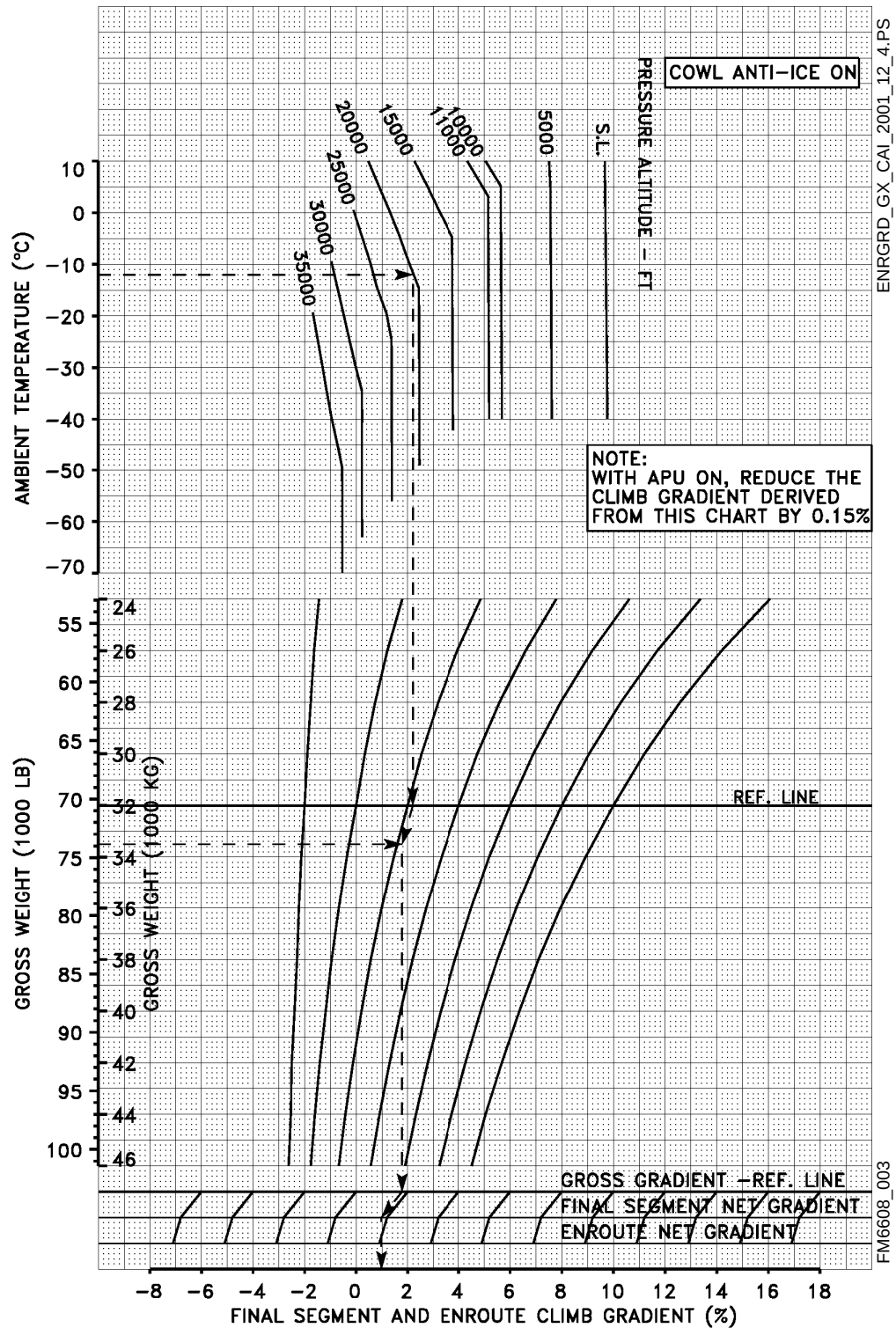
The example on Figure 06-08-3 shows that for the above associated conditions, the following climb gradients are obtained:

- Gross final segment and gross enroute climb gradients = 1.8%
- Net final segment climb gradient = 1.0%
- Net enroute climb gradient = 0.7%

PERFORMANCE PERFORMANCE DATA FOR OPERATION IN ICING CONDITIONS

2. PERFORMANCE CORRECTIONS (CONT'D)

F. Final Segment and Enroute Climb Gradient, Slat IN / Flap 0° – Cowl Anti-Ice On (Cont'd)



Final Segment and Enroute Climb Gradient, Slat IN / Flap 0° – Cowl Anti-Ice On
Figure 06-08-3

**PERFORMANCE
PERFORMANCE DATA FOR OPERATION IN
ICING CONDITIONS****2. PERFORMANCE CORRECTIONS (CONT'D)****G. Final Segment and Enroute Climb Gradient, Slat IN / Flap 0° – Wing and Cowl Anti-Ice On**

The final segment and enroute climb gradient with one engine inoperative and the other engine operating at maximum continuous thrust (MCT), is provided by Figure 06-08-4, with the engine bleed open / one (1) pack on and the wing and cowl anti-icing on.

NOTE

1. With the APU on, subtract 0.15 percent from the gradient derived from Figure 06-08-4 .
2. If ice accumulation is suspected on unprotected surfaces, increase the airplane weight by 100 kg (220 lb) and reduce the gradient derived from Figure 06-08-4 by 0.7%.

Example:

Associated Conditions:

Ambient temperature	= -12 °C
Pressure altitude	= 20,000 ft
A/C weight	= 33,500 kg (73,850 lb)
APU	= Off

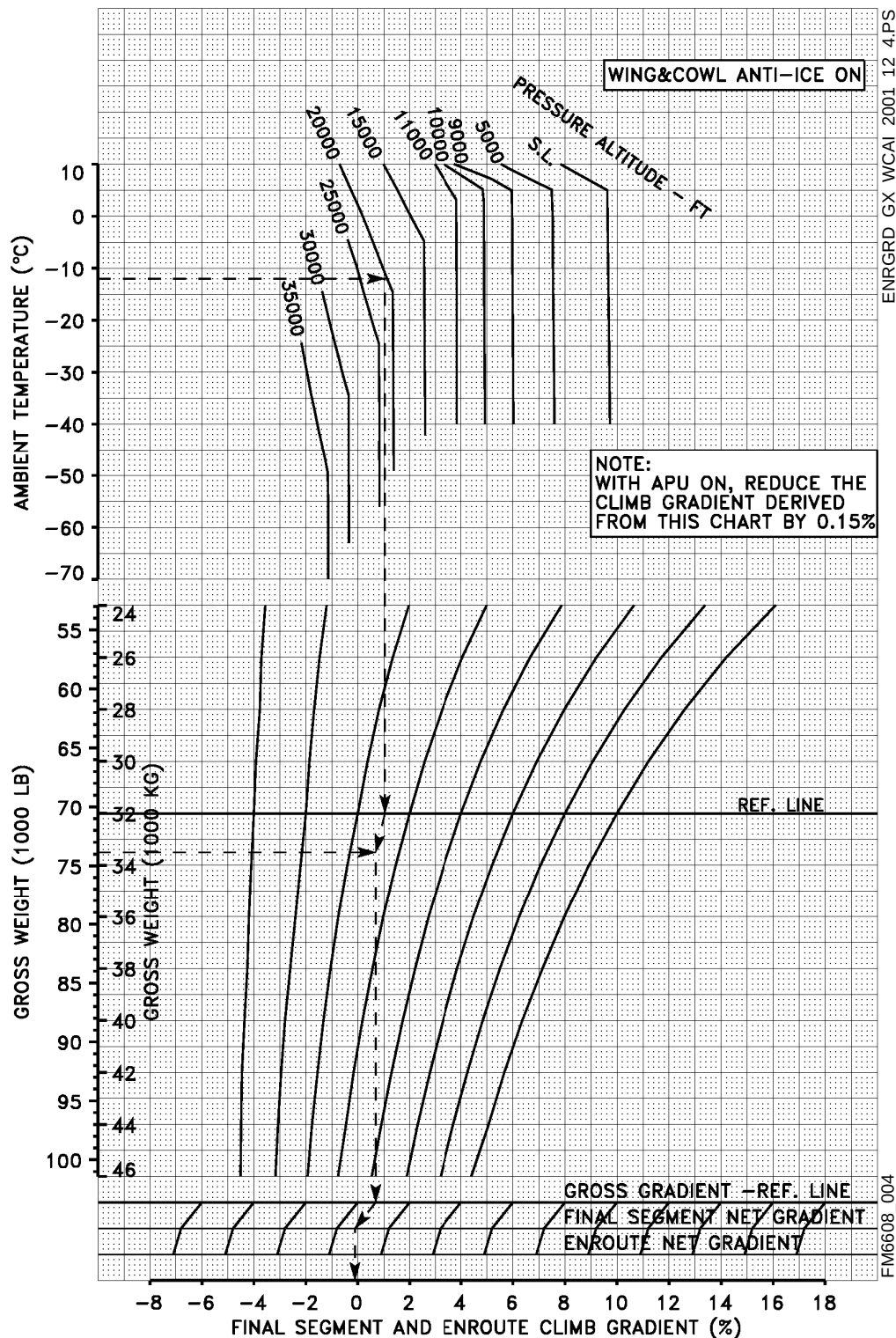
The example on Figure 06-08-4 shows that for the above associated conditions, the following climb gradients are obtained:

Gross final segment and gross enroute climb gradients	= 0.7%
Net final segment climb gradient	= -0.1%
Net enroute climb gradient	= -0.4%

PERFORMANCE PERFORMANCE DATA FOR OPERATION IN ICING CONDITIONS

2. PERFORMANCE CORRECTIONS (CONT'D)

G. Final Segment and Enroute Climb Gradient, Slat IN / Flap 0° – Wing and Cowl Anti-Ice On (Cont'd)



Final Segment and Enroute Climb Gradient, Slat IN / Flap 0° – Wing and Cowl Anti-Ice On
Figure 06-08-4

**PERFORMANCE
PERFORMANCE DATA FOR OPERATION IN
ICING CONDITIONS****2. PERFORMANCE CORRECTIONS (CONT'D)****H. Maximum Landing Weight Limited by Climb Requirements –
Slat OUT / Approach Flap 6° / Landing Flap 30° – Anti-Ice On**

The Maximum Landing Weight Limited by Climb Requirements with one engine inoperative and the other engine operating at maximum take-off thrust (MTO), is provided by Figure 06-08-5, with the engine bleed open / one (1) pack on and either the cowl anti-icing on or the wing and cowl anti-icing on.

NOTE

1. With the APU on, subtract 335 kg (740 lb) from the landing weight derived from Figure 06-08-5 .
2. If ice accumulation is suspected on unprotected surfaces, reduce the landing weight derived from Figure 06-08-5 by 2,650 kg (5,842 lb).

Example:

Associated Conditions:

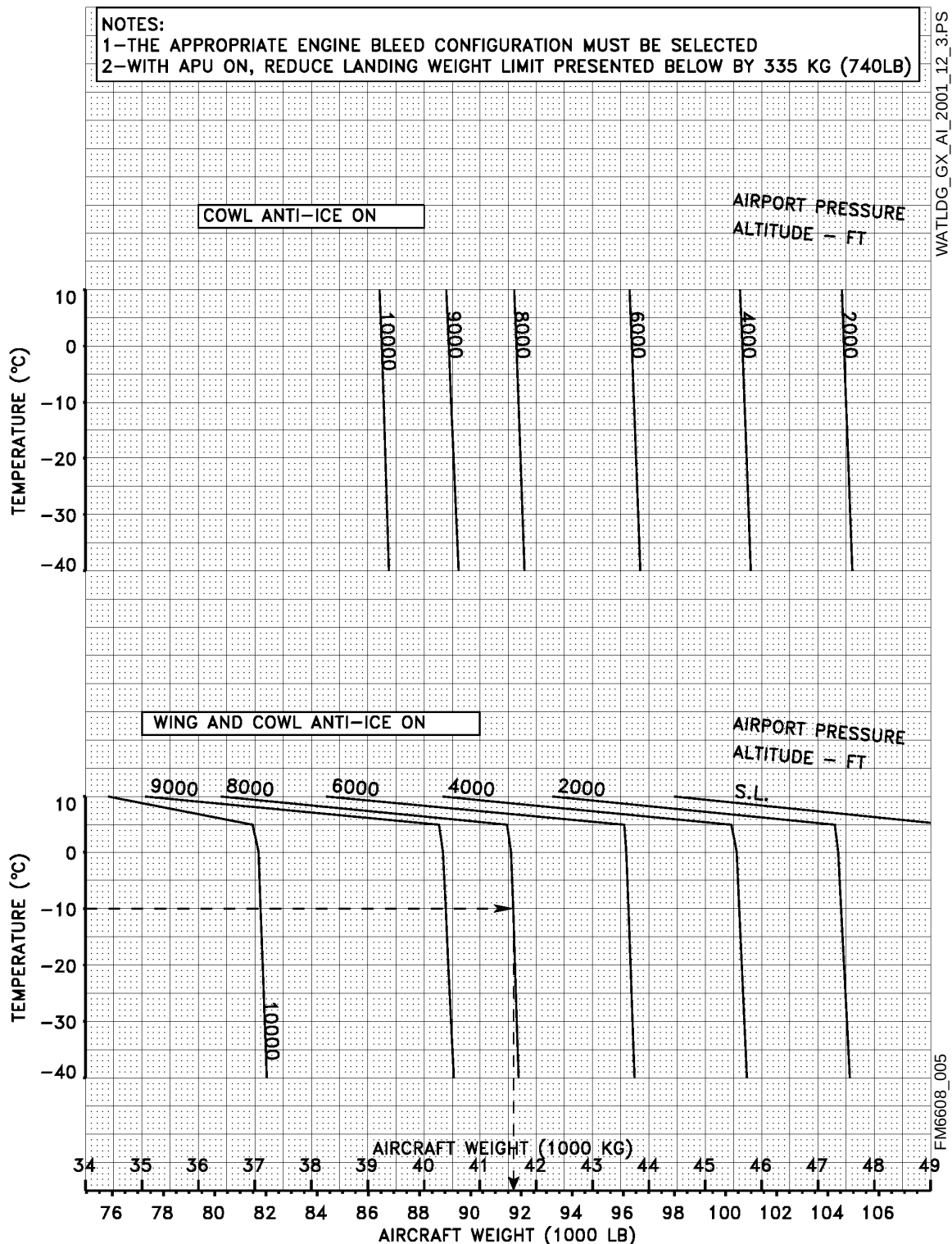
Ambient temperature	= -10 °C
Airport pressure altitude	= 8,000 ft
Cowl anti-ice	= On
Wing anti-ice	= On
APU	= Off

The example on Figure 06-08-5 shows that for the above associated conditions, the maximum landing weight limited by climb requirements is 41,600 kg (91,710 lb).

PERFORMANCE PERFORMANCE DATA FOR OPERATION IN ICING CONDITIONS

2. PERFORMANCE CORRECTIONS (CONT'D)

H. Maximum Landing Weight Limited by Climb Requirements – Slat OUT / Approach Flap 6° / Landing Flap 30° – Anti-Ice On (Cont'd)



Maximum Landing Weight Limited by Climb Requirements – Slat OUT / Approach Flap 6° /
Landing Flap 30° – Anti-Ice On
Figure 06-08-5

PERFORMANCE
PERFORMANCE DATA FOR OPERATION IN
ICING CONDITIONS

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SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

1. INTRODUCTION

A. General

This Supplement contains information and procedures for operation of the GLOBAL EXPRESS® model BD 700-1A10 airplane, fitted with two BR700-710A2-20 engines, on runways contaminated by standing water, slush, loose snow, compacted snow or ice.

This information has been prepared by the manufacturer and approved as guidance material, to assist operators in developing suitable guidance, recommendations or instructions for use by their flight crews when operating on contaminated runway surface conditions.

The data have been prepared using reasonable estimates of the effects of contaminated runway surface conditions on the accelerating ground roll and the braking ground roll. The effects of actual conditions may differ from those used to establish the data.

Contaminated runway performance data were estimated assuming that the runway is completely contaminated, with the contaminant (standing water, slush or snow) to be of uniform depth and density.

The provision of performance information for contaminated runways should not be taken as implying that ground handling characteristics on these surfaces will be as good as can be achieved on dry or wet runways, in particular, in crosswinds and when using reverse thrust.

The effect of this Supplement on the basic Airplane Flight Manual is given below:

B. Runway Conditions

(1) RUNWAY CONTAMINATED BY STANDING WATER, SLUSH OR LOOSE SNOW

- A runway is considered to be contaminated, when more than 25% of the runway surface area (whether in isolated areas or not), within the required length and width being used, is covered by more than 3 millimeters (1/8 inch) of standing water or its equivalent in slush or loose snow (see table below):

	STANDING WATER	SLUSH	LOOSE WET SNOW	LOOSE DRY SNOW
Contaminated Rwy	3.2 mm (0.125 in)	3.8 mm (0.15 in)	7.6 mm (0.30 in)	15.2 mm (0.60 in)

(2) RUNWAY CONTAMINATED BY COMPACTED SNOW

- A runway is considered to be contaminated by compacted snow when covered by snow which has been compacted into a solid mass which resists further compression and will hold together or break into lumps if picked up.

(3) RUNWAY CONTAMINATED BY ICE

- A runway surface condition where braking action is expected to be very low, due to the presence of ice.

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

2. LIMITATIONS

The limitations in Chapter 2 and the Supplement Compatibility table (Page 07-00-01-1) are applicable, except as modified by the following:

- The maximum depths of runway contaminants covering an appreciable part of the runway are:

	STANDING WATER	SLUSH	LOOSE WET SNOW	LOOSE DRY SNOW
TAKE-OFF	6.4 mm (0.25 in)	7.6 mm (0.30 in)	15.2 mm (0.60 in)	30.5 mm (1.2 in)
LANDING	12.7 mm (0.50 in)	15.2 mm (0.60 in)	30.5 mm (1.20 in)	61.0 mm (2.40 in)

- Take-off with slat OUT / flap 0° is prohibited on a runway contaminated with ice.

Effectivity:

- *Airplanes 9002 thru 9304 not incorporating Service Bulletin:*
 - *SB 700-27-054 or SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability.*
- Take-off with slat OUT / flap 0° is prohibited on a runway contaminated with compacted snow.
- Take-off with one or both thrust reversers inoperative is prohibited on a runway contaminated with ice.

3. EMERGENCY PROCEDURES

The emergency procedures in Chapter 3 are applicable.

4. NORMAL PROCEDURES

The normal procedures in Chapter 4 are applicable.

5. NON-NORMAL PROCEDURES

The non-normal procedures in Chapter 5 are applicable.

6. PERFORMANCE

The performance data in Chapter 6 and the compatible supplements are applicable, except as modified by the following:

NOTE

Compatible supplement performance penalties are cumulative.

Where applicable, the performance factor of the compatible supplement must be applied to the calculated performance data of this supplement.

6. PERFORMANCE (CONT'D)

For slat OUT / flap 0°, weights below 26,000 kg (57,320 lb) assume a weight of 26,000 kg (57,320 lb).

A. Operation on Contaminated Runways

Contaminated runway distances have been estimated assuming that the runway is completely contaminated. However, selection of the type and amount of contaminant should be based on the runway conditions where the high speed portion of the take-off will occur and, in the case of an ice covered runway, where braking would be used during a rejected take-off.

The determination of the rotation speed (V_R) and the take-off safety speed (V_2) as presented in Chapter 6 of the Airplane Flight Manual, remains applicable.

Various charts are presented herein, to obtain the take-off field length and the take-off decision speed (V_1), required on a runway contaminated with ice, compacted snow, standing water, slush or loose snow.

The take-off field length, as presented in these charts, is the most limiting of the following:

- Take-off distance with all engines operating, multiplied by a factor of 1.15;
- Take-off distance with one engine inoperative; and
- Accelerate-stop distance.

(1) TAKE-OFF FIELD LENGTH ON A RUNWAY CONTAMINATED WITH ICE

The following charts are used to obtain the take-off field length required on a runway contaminated with ice, for a given value of airplane weight, ambient temperature, airport pressure altitude (from sea level to 10,000 feet in 2,000-foot intervals), reported wind, runway slope, and various bleed configurations. The charts are applicable to either wet or dry ice.

NOTE

When the take-off crosswind exceeds 20 knots, the high crosswind take-off procedure must be used (refer to the Flight Crew Operating Manual, Chapter 4: NORMAL PROCEDURES – TAXIING AND TAKE-OFF – HIGH CROSSWIND TAKE-OFF). The corrected take-off field length must be increased by 520 meters (1,700 feet) slat OUT / flap 6° and slat OUT / flap 16°.

The take-off field length required on a runway contaminated with ice, are given by the following:

- Figure 07-03-1 provides the uncorrected take-off field length for a slat OUT / flap 6° take-off;
- Figure 07-03-2 provides the take-off field length for a slat OUT / flap 6° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-3 provides the uncorrected take-off field length for a slat OUT / flap 16° take-off;
- Figure 07-03-4 provides the take-off field length for a slat OUT / flap 16° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

The effects of using the cowl anti-ice (CAI) or the wing and cowl anti-ice (WCAI) on the take-off field length required on a runway contaminated with ice, are presented in the following table:

FIGURE	CAI ON CORRECTIONS	WCAI ON CORRECTIONS
07-03-1 07-03-2	With 2 thrust reversers operative, use "ENGINE BLEED OPEN AND PACK ON" data. Operation is prohibited with one or both thrust reversers inoperative.	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, use "ENGINE BLEED OPEN AND PACKS ON" data as follows: with 2 thrust reversers operative, use "ENGINE BLEED OPEN AND PACKS ON" data.
07-03-3 07-03-4		For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, adjust the "ENGINE BLEED OPEN AND PACKS ON" data as follows: with 2 thrust reversers operative, increase take-off field length by 15%. Operation is prohibited with one or both thrust reversers inoperative.

The uncorrected take-off field length can be interpolated linearly with altitude.

Example:

Associated Conditions:

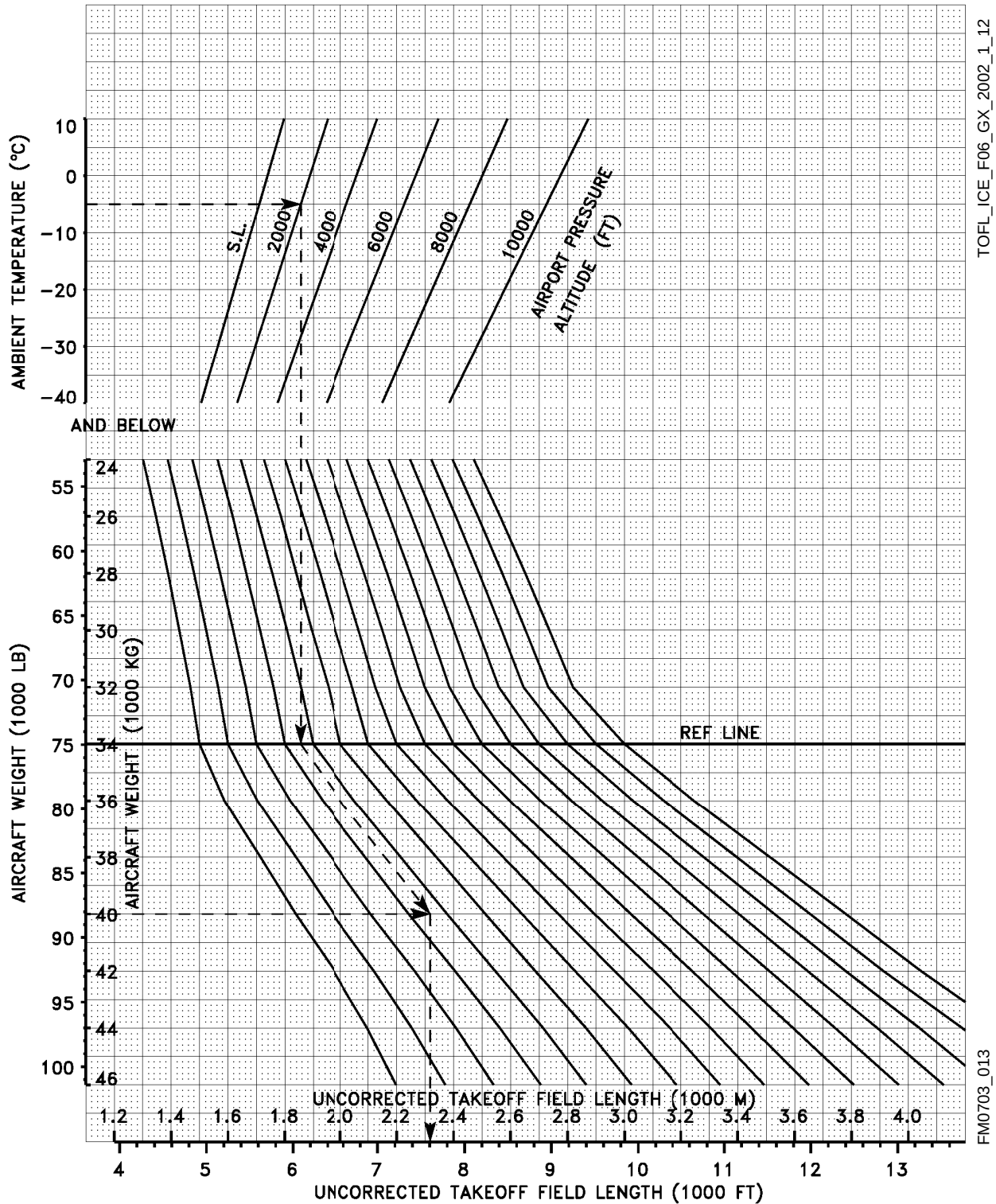
Ambient temperature	= -5 °C
Airport pressure altitude	= 2,000 ft
Wing anti-ice	= On
Cowl anti-ice	= On
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots (headwind)
Runway slope	= + 1% (uphill)
Slat/Flap	= OUT/6°

The example in Figure 07-03-1 and Figure 07-03-2 shows that for the above associated conditions, the corrected take-off field length is 2,128 meters (6,982 feet).

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

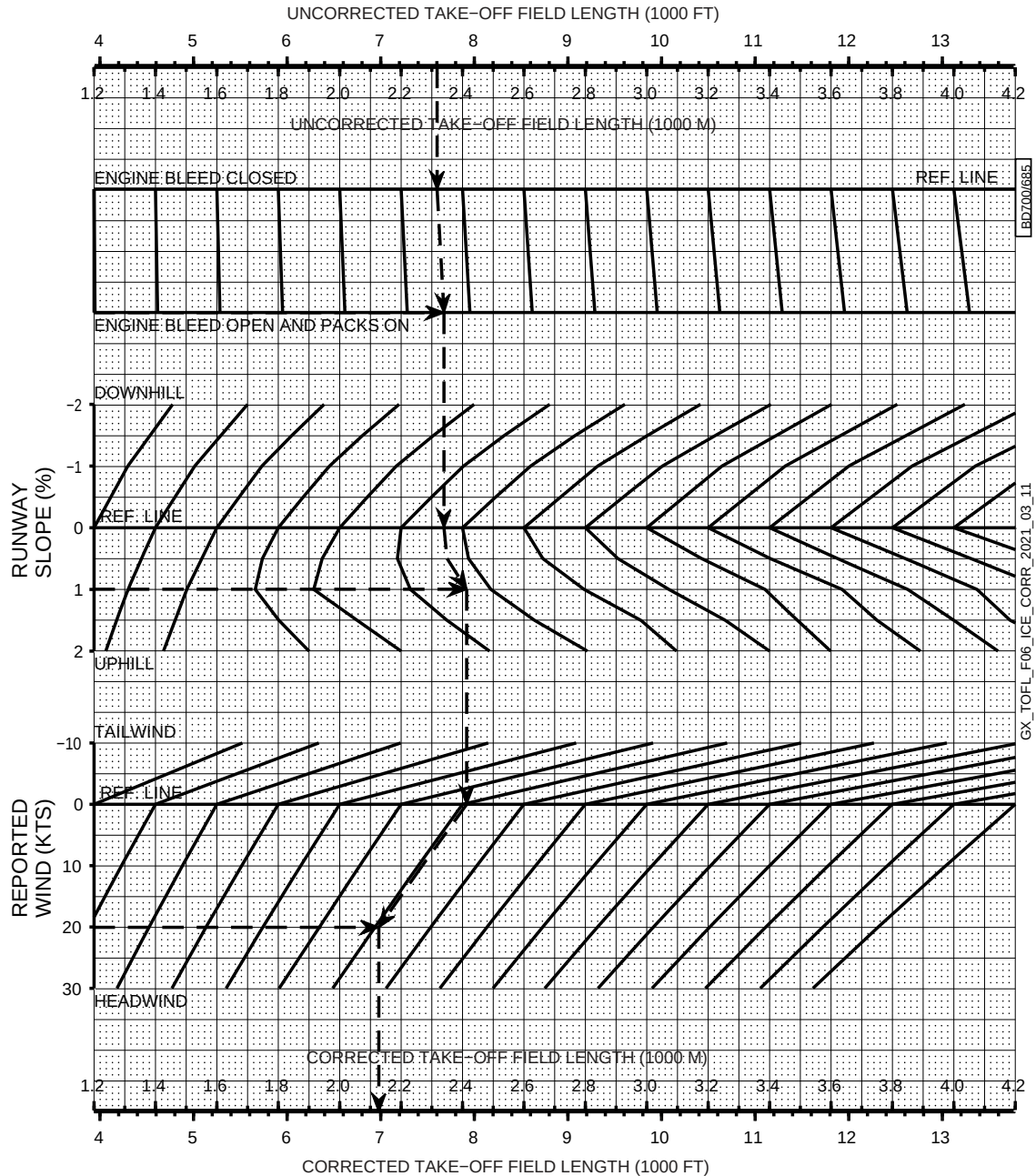


Uncorrected Take-Off Field Length on a Runway Contaminated with Ice – Slat OUT / Flap 6°
Figure 07-03-1

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

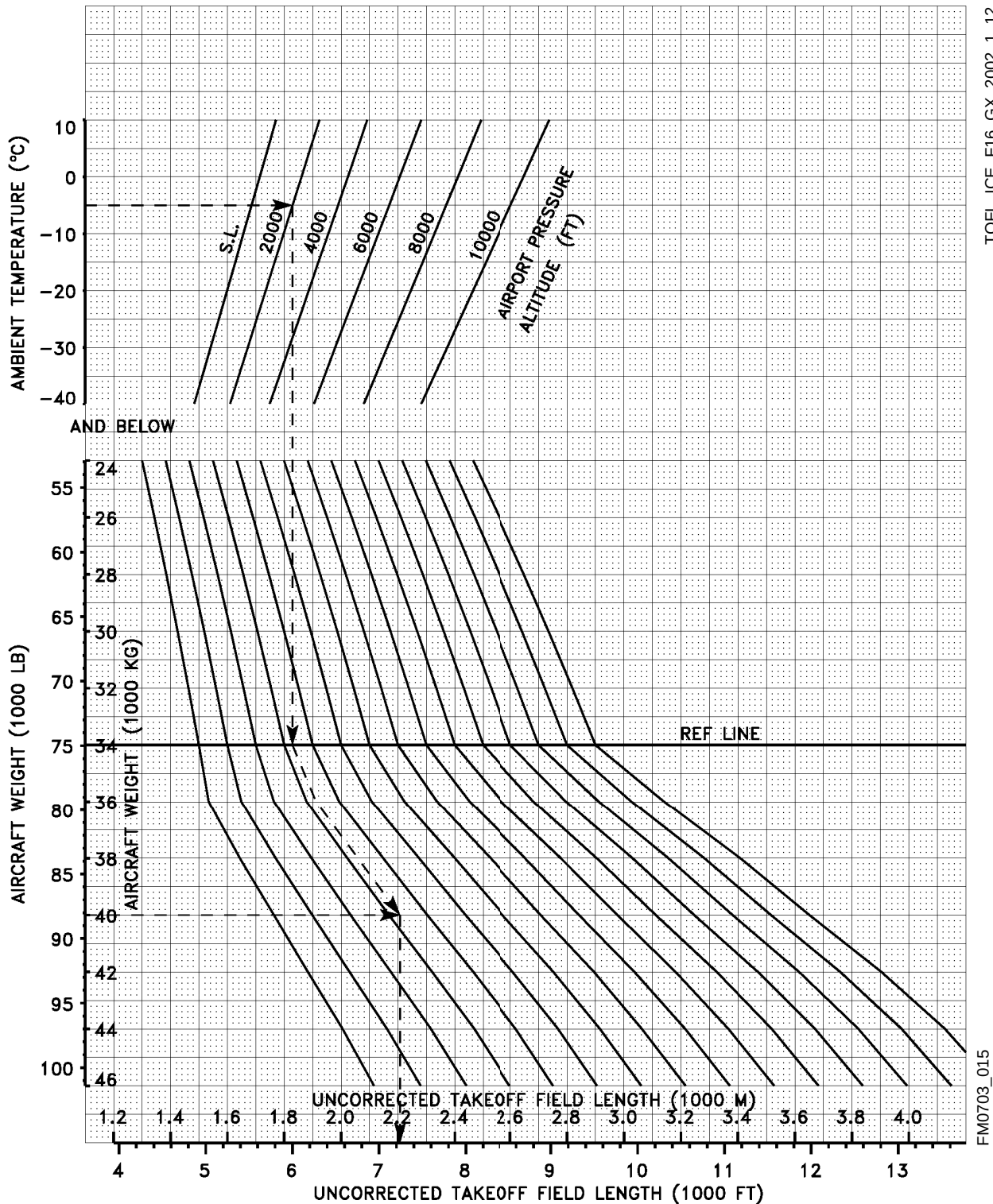


Corrected Take-Off Field Length on a Runway Contaminated with Ice – Slat OUT / Flap 6°
Figure 07-03-2

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

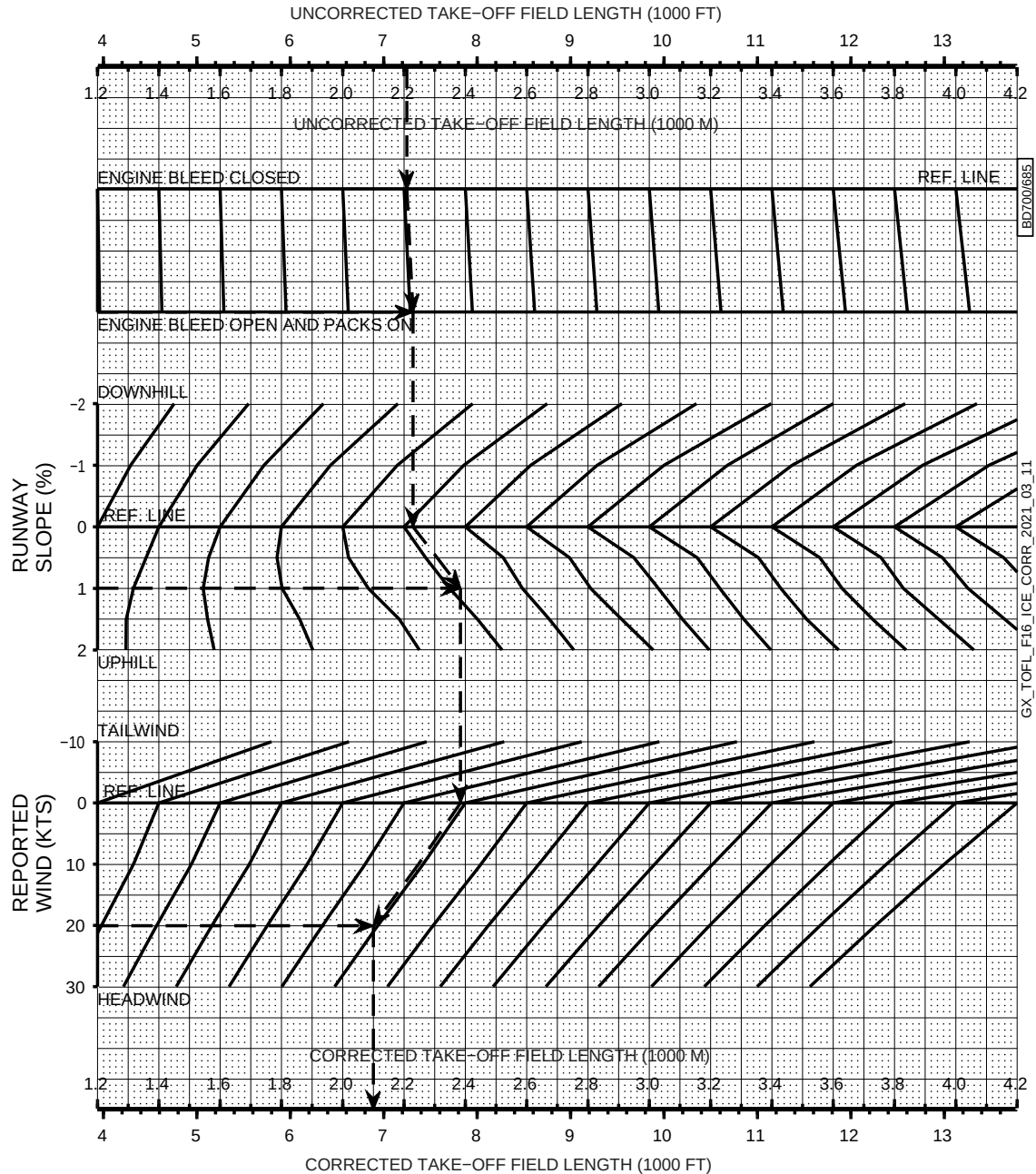


Uncorrected Take-Off Field Length on a Runway Contaminated with Ice – Slat OUT / Flap 16°
Figure 07-03-3

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Corrected Take-Off Field Length on a Runway Contaminated with Ice – Slat OUT / Flap 16°
Figure 07-03-4

SUPPLEMENT 3

OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

(2) TAKE-OFF DECISION SPEED (V_1) ON A RUNWAY CONTAMINATED WITH ICE

The following charts are used to obtain the take-off decision speed (V_1) required on a runway contaminated with ice, for a given value of airplane weight, ambient temperature, airport pressure altitude, reported wind, runway slope, various bleed configurations and number of operable thrust reversers.

V_1 must not be less than V_{1MCG} .

The V_1 required on a runway contaminated with ice, are given by the following:

- Figure 07-03-5 provides the V_1 for a slat OUT/ flap 6° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-6 provides the V_1 for a slat OUT/ flap 16° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.

The effects of using the cowl anti-ice (CAI) or the wing and cowl anti-ice (WCAI) on the take-off decision speed (V_1) on a runway contaminated with ice, are presented in the following table:

FIGURE	CAI ON CORRECTIONS	WCAI ON CORRECTIONS
07-03-5	Use "ENGINE BLEED OPEN AND PACKS ON" data.	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, use "ENGINE BLEED OPEN AND PACKS ON" data. For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, adjust the "ENGINE BLEED OPEN AND PACKS ON" data as follows: increase V_1 and V_R by 1 knot.
07-03-6	Use "ENGINE BLEED OPEN AND PACKS ON" data.	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, use "ENGINE BLEED OPEN AND PACKS ON" data. For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, adjust the "ENGINE BLEED OPEN AND PACKS ON" data as follows: increase V_1 and V_R by 1 knot.

6. PERFORMANCE (CONT'D)**A. Operation on Contaminated Runways (Cont'd)**Example:

Associated Conditions:

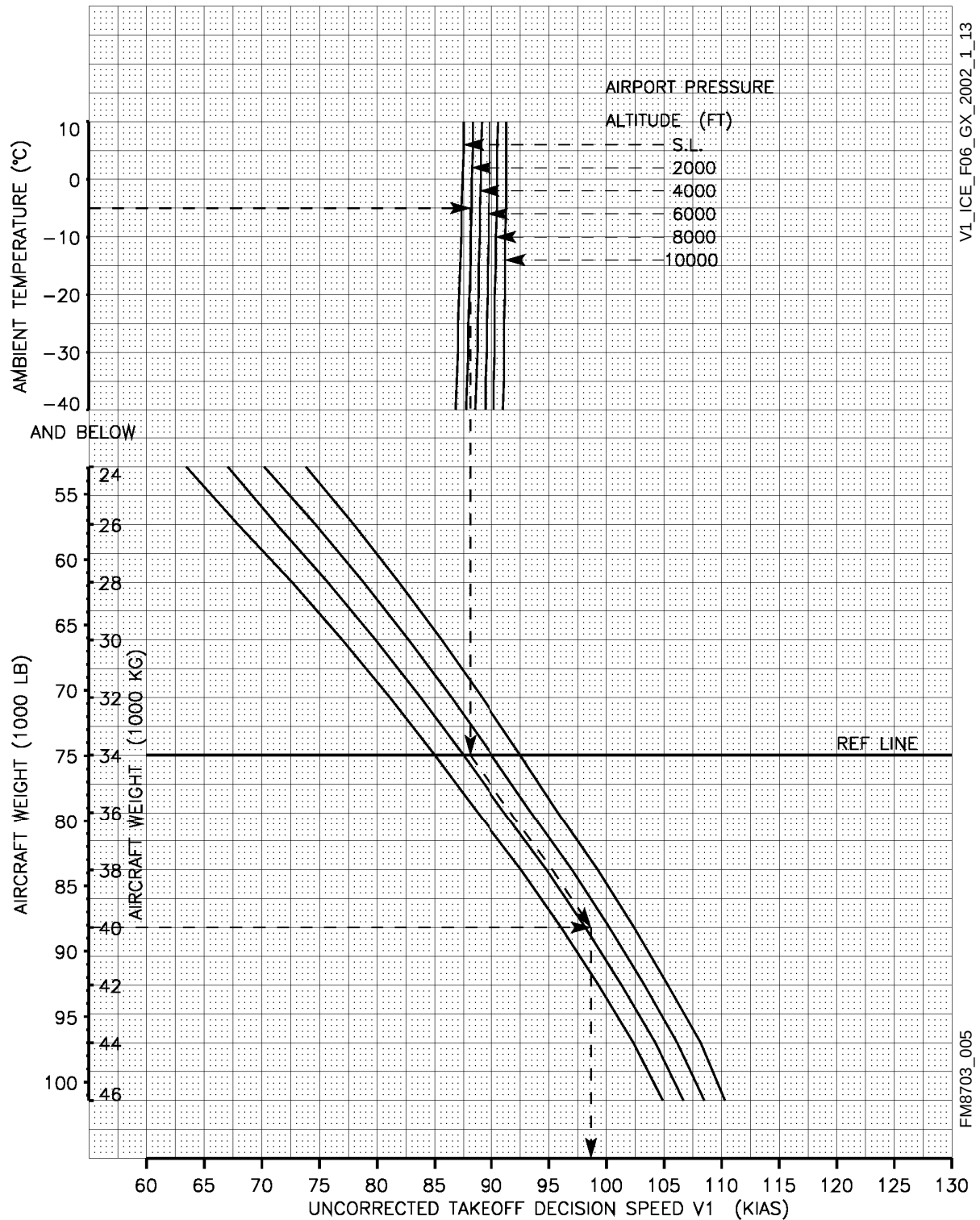
Ambient temperature	= -5 °C
Airport pressure altitude	= 2,000 ft
Wing anti-ice	= On
Cowl anti-ice	= On
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots (headwind)
Runway slope	= + 1% (uphill)
Thrust reversers	= Both operable
Slat/Flap	= OUT/6°

The example in Figure 07-03-5 shows that for the above associated conditions, V_1 is equal to 97.5 KIAS.

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

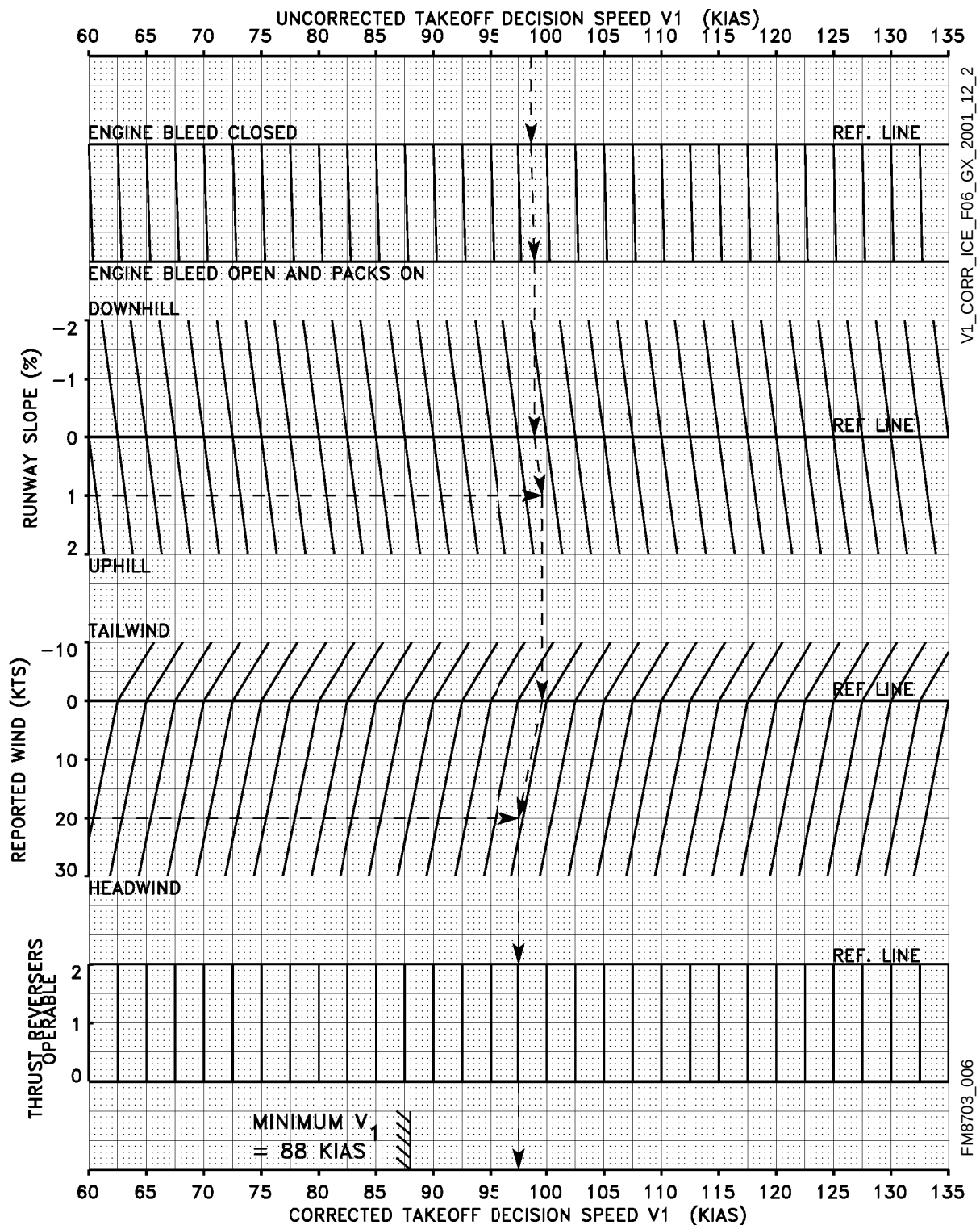


Take-Off Decision Speed on a Runway Contaminated With Ice – Slat OUT / Flap 6°
Figure 07-03-5 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

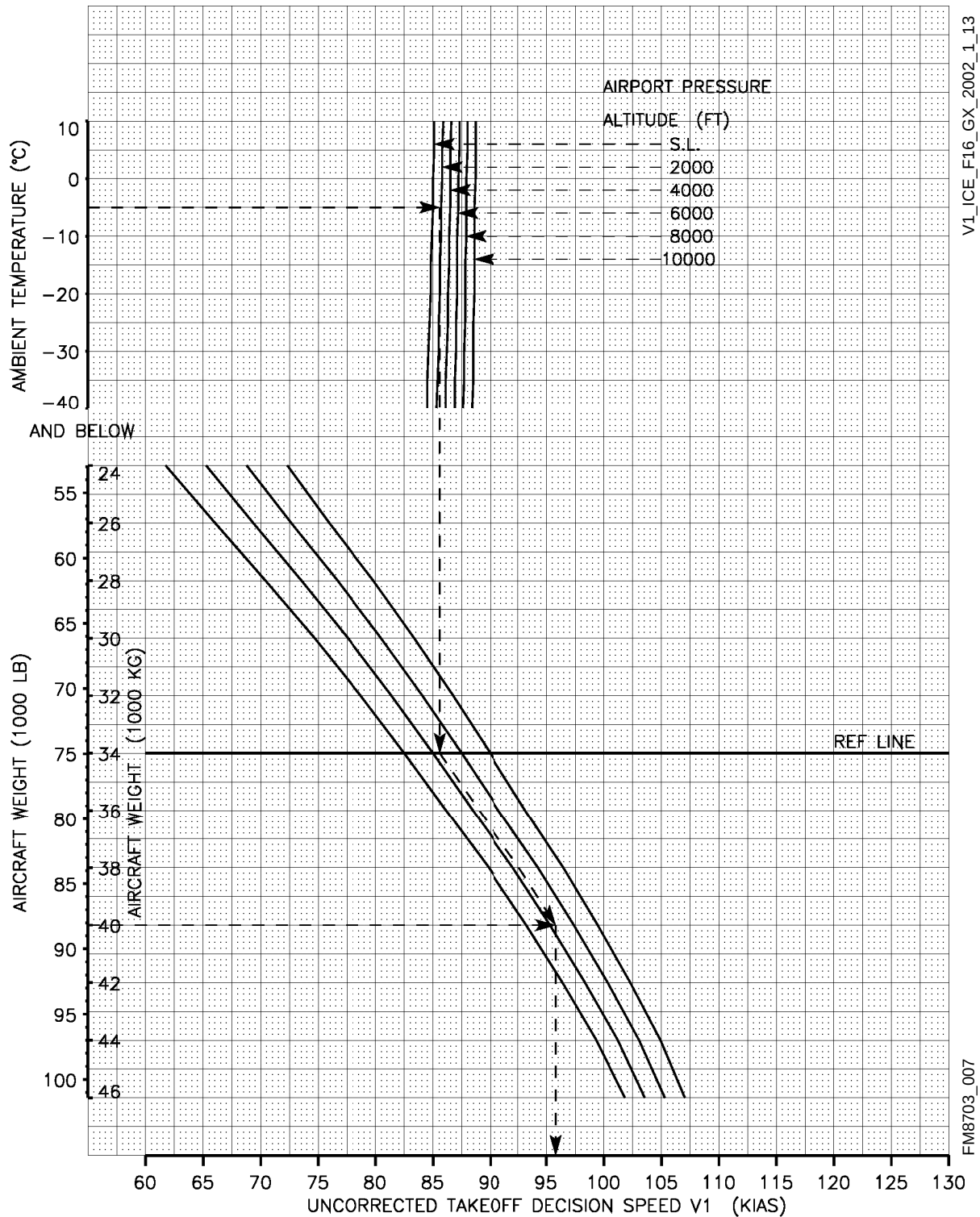


Take-Off Decision Speed on a Runway Contaminated With Ice – Slat OUT / Flap 6°
Figure 07-03-5 (Sheet 2 of 2)

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

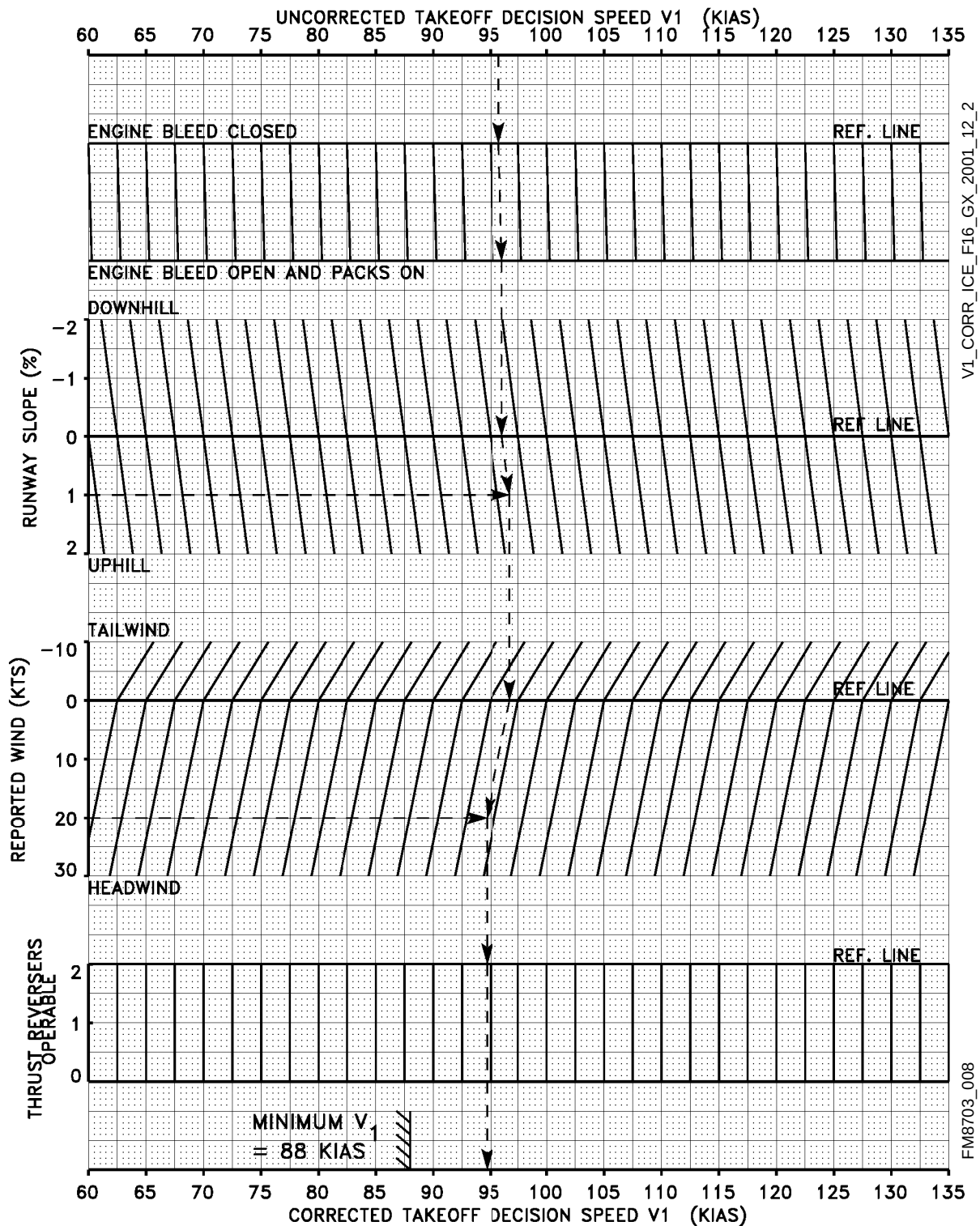


Take-Off Decision Speed on a Runway Contaminated With Ice – Slat OUT / Flap 16°
Figure 07-03-6 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Take-Off Decision Speed on a Runway Contaminated With Ice – Slat OUT / Flap 16°
Figure 07-03-6 (Sheet 2 of 2)

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

(3) TAKE-OFF FIELD LENGTH ON A RUNWAY CONTAMINATED WITH COMPACTED SNOW

The following charts are used to obtain the take-off field length required on a runway contaminated with compacted snow, for a given value of airplane weight, ambient temperature, airport pressure altitude (from sea level to 10,000 feet in 2,000-foot intervals), reported wind, runway slope, usage of thrust reversers and various bleed configurations.

NOTE

When the take-off crosswind exceeds 20 knots, the high crosswind take-off procedure must be used (refer to the Flight Crew Operating Manual, Chapter 4: NORMAL PROCEDURES – TAXIING AND TAKE-OFF – HIGH CROSSWIND TAKE-OFF). The corrected take-off field length must be increased by 580 meters (1,900 feet) slat OUT/ flap 0° and 520 meters (1,700 feet) slat OUT/ flap 6° and slat OUT/ flap 16°.

The take-off field length required on a runway contaminated with compacted snow, are given by the following:

Effectivity:

- *Airplanes 9002 thru 9304 not incorporating Service Bulletin:*
 - *SB 700-27-054 or SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability.*
 - Take-off with slat OUT / flap 0° is prohibited on a runway contaminated with compacted snow. Figure 07-03-7 and Figure 07-03-8 are not applicable.
- Figure 07-03-7 provides the uncorrected take-off field length for a slat OUT/ flap 0° take-off;
 - Figure 07-03-8 provides the take-off field length for a slat OUT/ flap 0° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
 - Figure 07-03-9 provides the uncorrected take-off field length for a slat OUT/ flap 6° take-off;
 - Figure 07-03-10 provides the take-off field length for a slat OUT/ flap 6° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
 - Figure 07-03-11 provides the uncorrected take-off field length for a slat OUT/ flap 16° take-off;
 - Figure 07-03-12 provides the take-off field length for a slat OUT/ flap 16° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.

SUPPLEMENT 3

OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

The effects of using the cowl anti-ice (CAI) or the wing and cowl anti-ice (WCAI) on the take-off field length required on a runway contaminated with compacted snow, are presented in the following table:

FIGURE	CAI ON CORRECTIONS	WCAI ON CORRECTIONS
07-03-7	Use "ENGINE BLEED OPEN AND PACK ON" data. Increase take-off field length based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 4% • 0 thrust reversers: 9%	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperature 5 °C and below, use "ENGINE BLEED OPEN AND PACK ON" data and increase take-off field length based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 8% • 0 thrust reversers: 24%
07-03-8		
07-03-9		
07-03-10		For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperature above 5 °C, use "ENGINE BLEED OPEN AND PACK ON" data and increase take-off field length based on the number of thrust reversers operative: • 1 or 2 thrust reversers: 13% • 0 thrust reversers: 24%
07-03-11		
07-03-12		

The uncorrected take-off field length can be interpolated linearly with altitude.

Example:

Associated Conditions:

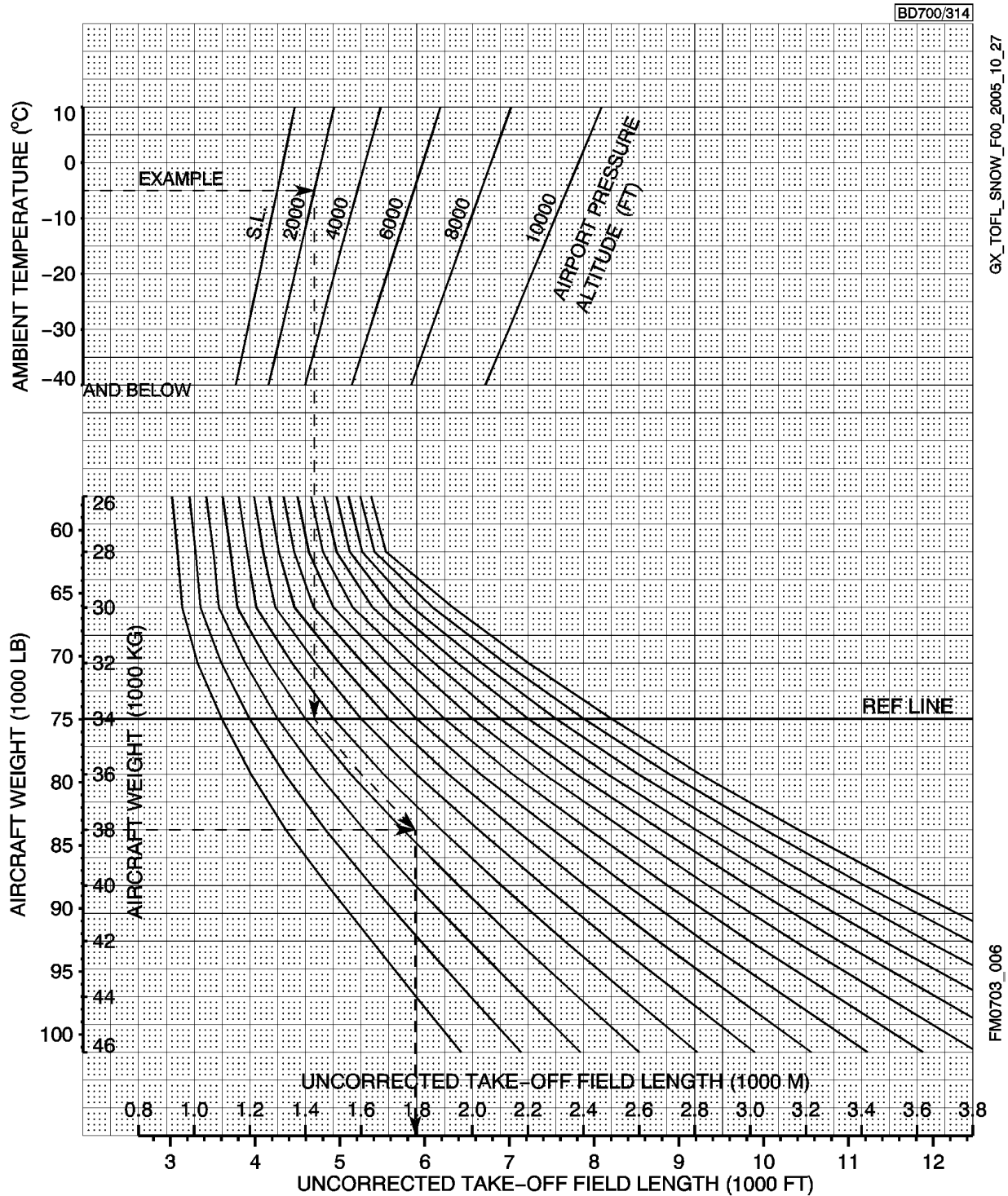
Ambient temperature	= -5 °C
Airport pressure altitude	= 2,000 ft
Wing anti-ice	= On
Cowl anti-ice	= On
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots (headwind)
Runway slope	= + 1% (uphill)
Slat/Flap	= OUT/6°

The example in Figure 07-03-9 and Figure 07-03-10 shows that for the above associated conditions, the corrected take-off field length is 1,611 meters (5,286 feet).

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

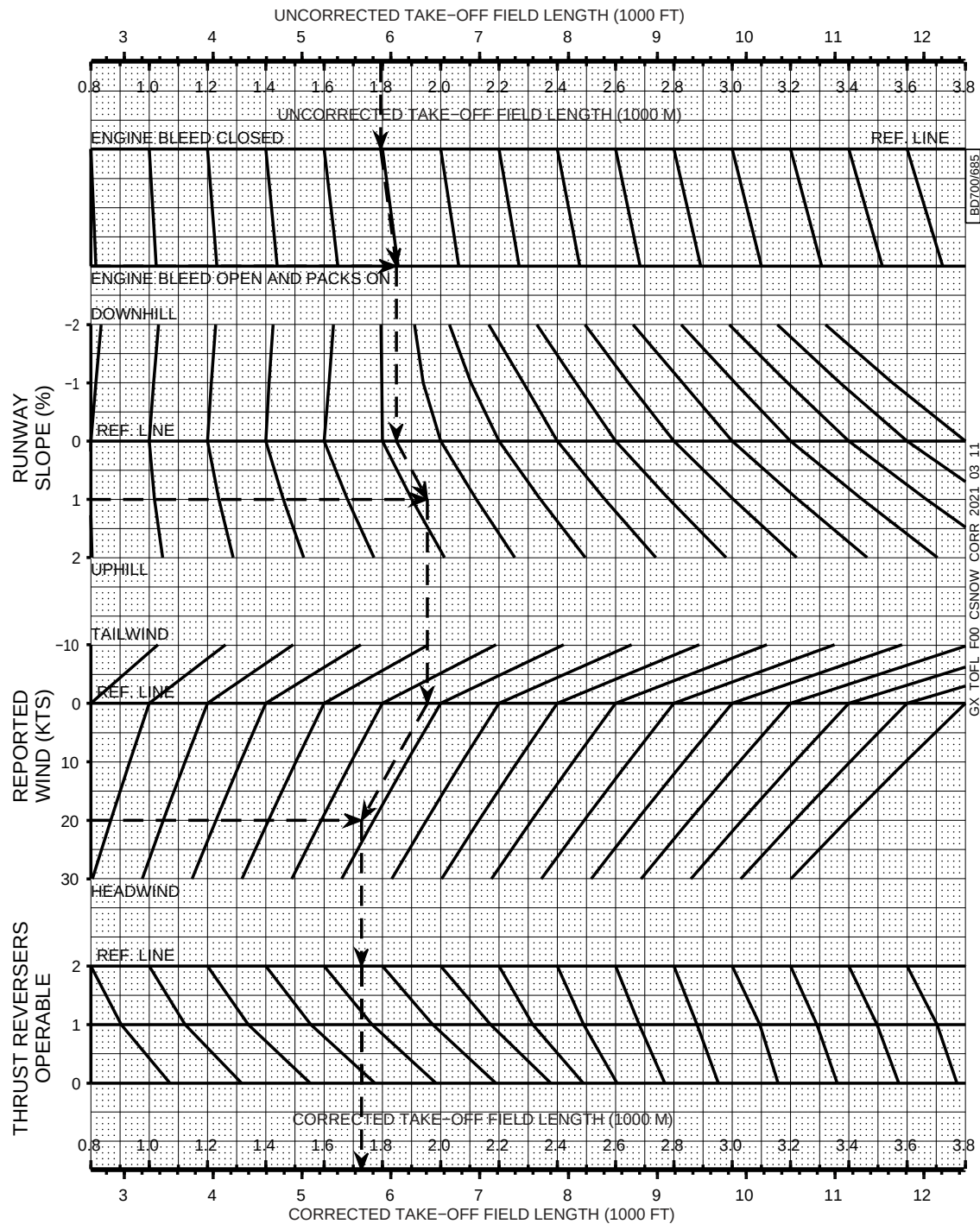
6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Uncorrected Take-Off Field Length on a Runway Contaminated with Compacted Snow –
Slat OUT / Flap 0°
Figure 07-03-7

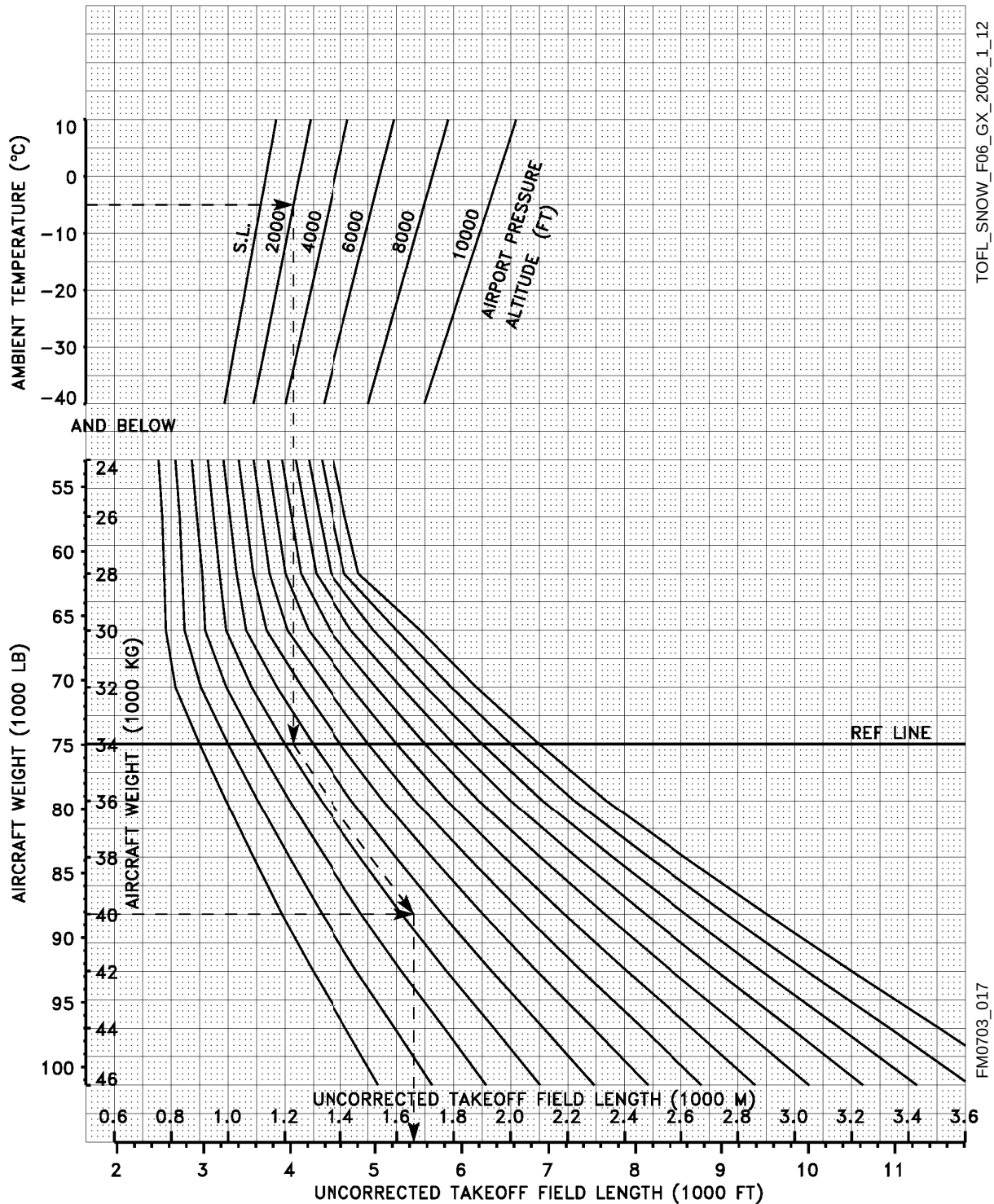
A. Operation on Contaminated Runways (Cont'd)



Corrected Take-Off Field Length on a Runway Contaminated with Compacted Snow –
Slat OUT / Flap 0°
Figure 07-03-8

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

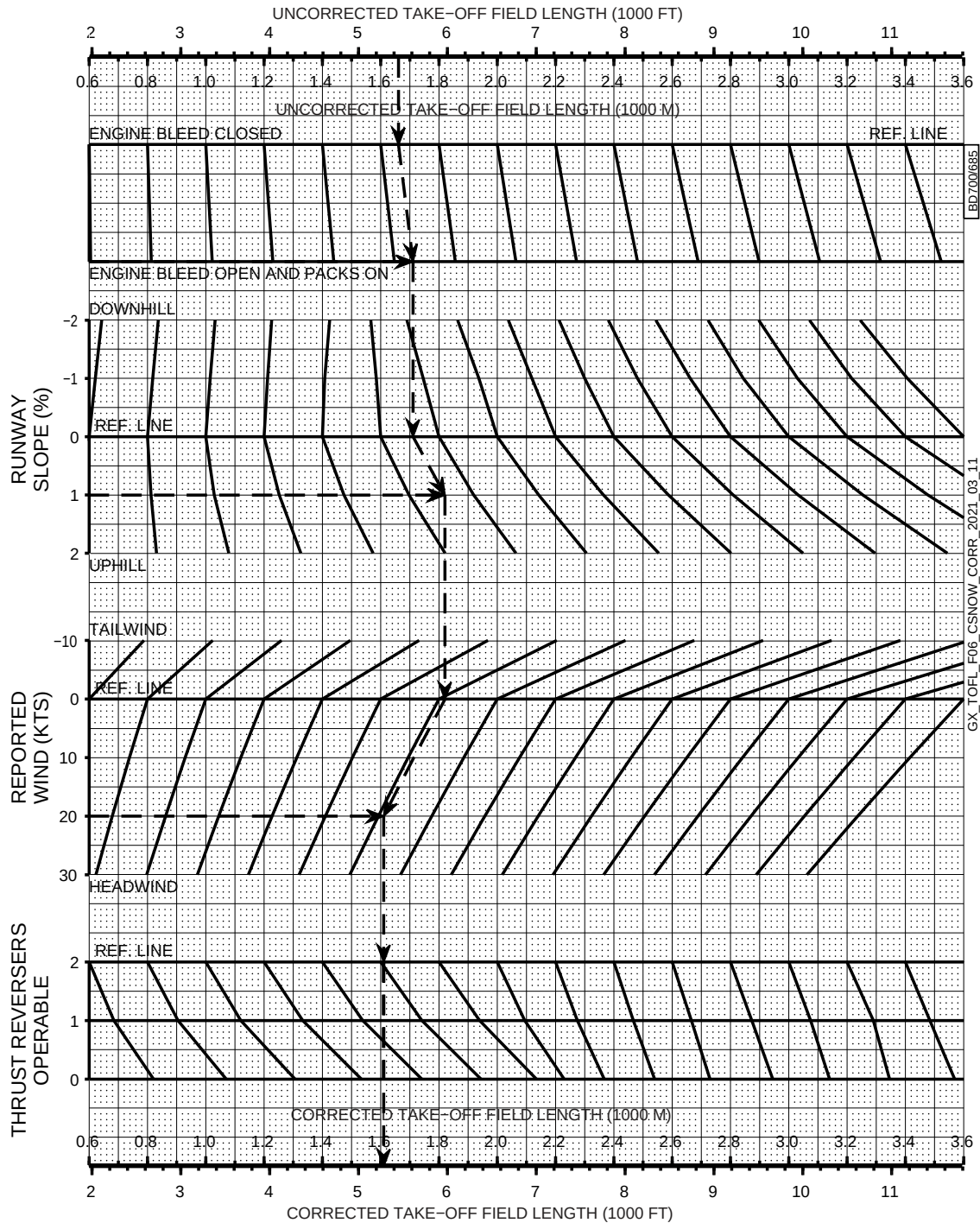


Uncorrected Take-Off Field Length on a Runway Contaminated with Compacted Snow –
Slat OUT / Flap 6°
Figure 07-03-9

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

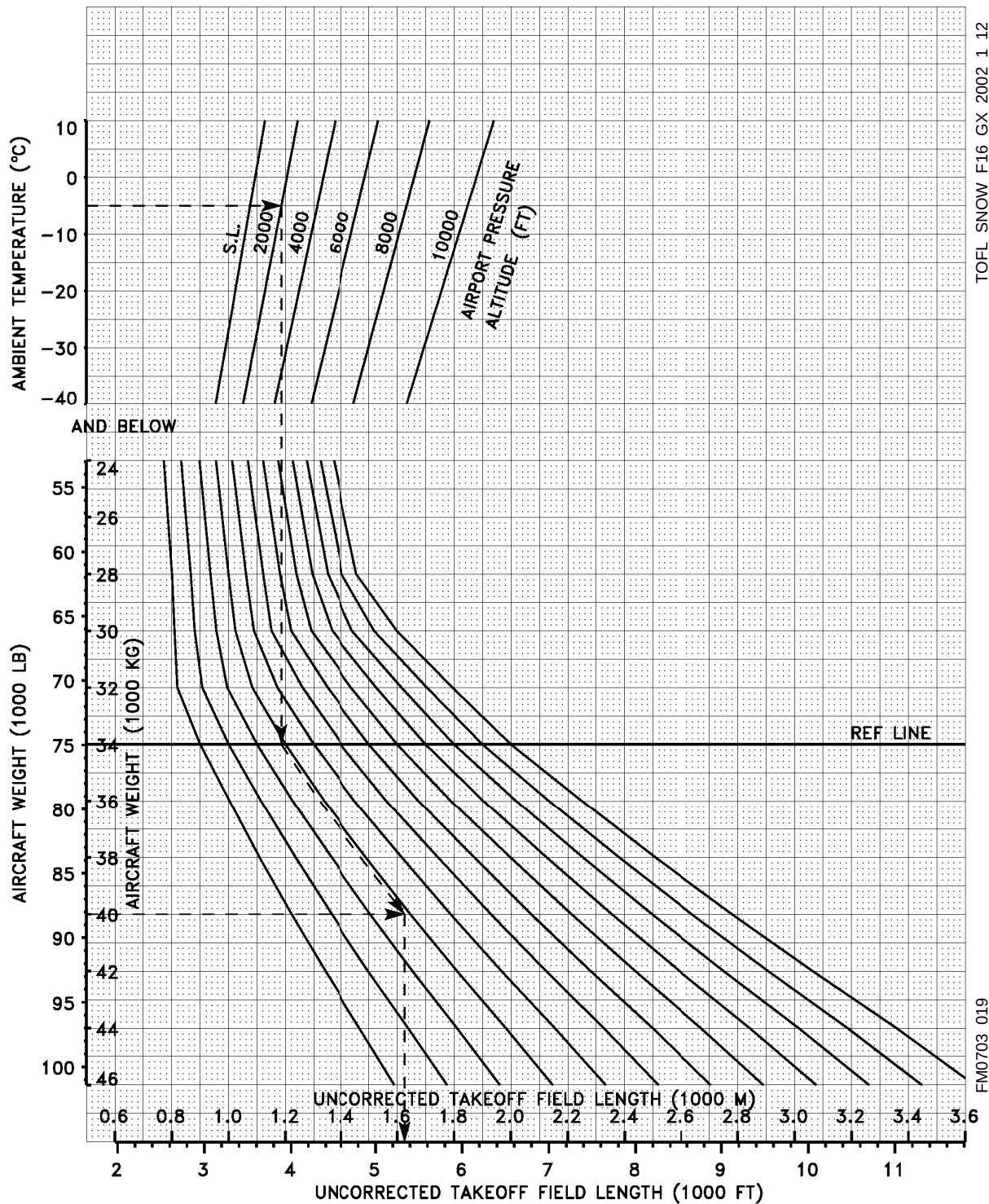
A. Operation on Contaminated Runways (Cont'd)



Corrected Take-Off Field Length on a Runway Contaminated with Compacted Snow –
Slat OUT / Flap 6°
Figure 07-03-10

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

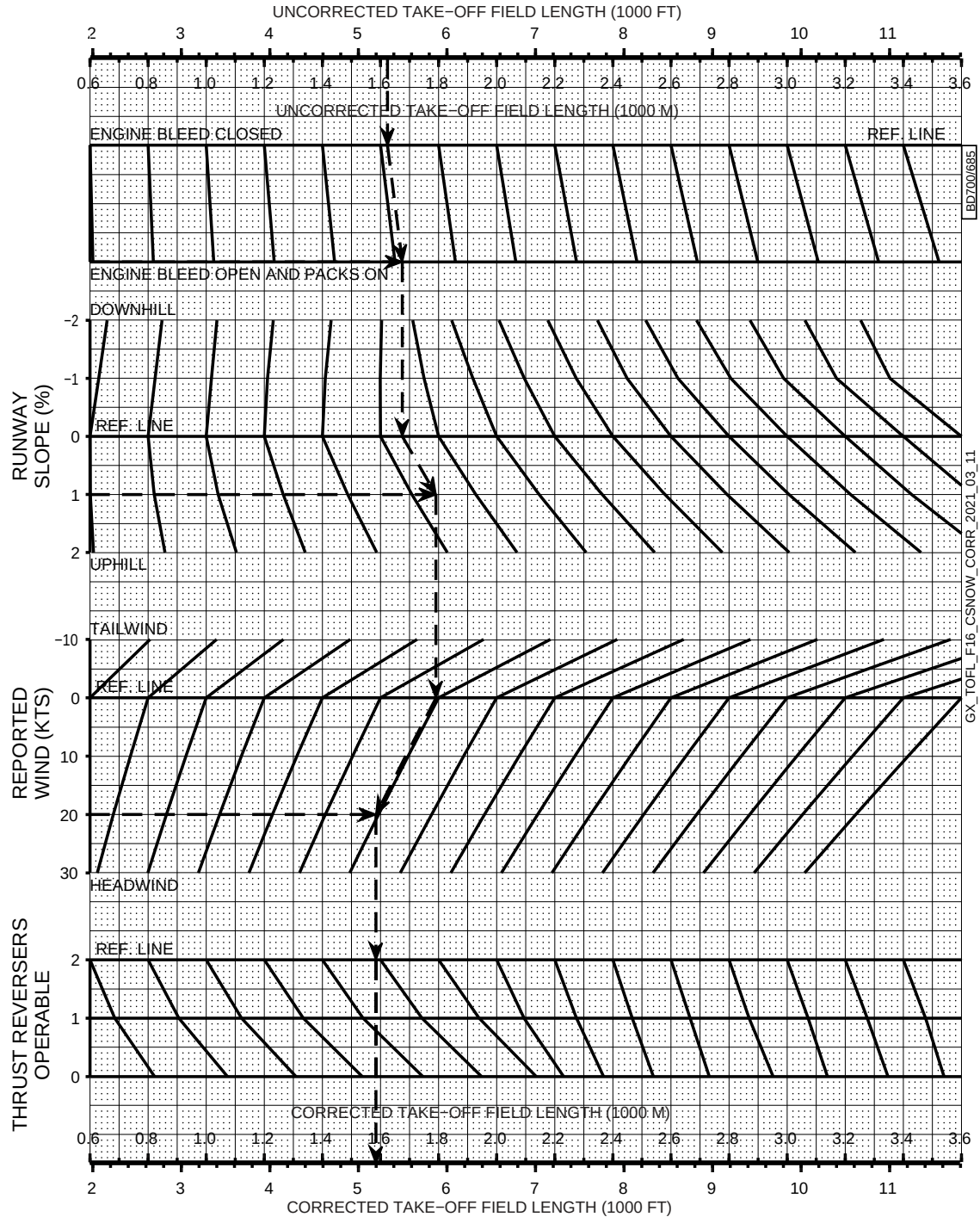


Uncorrected Take-Off Field Length on a Runway Contaminated with Compacted Snow –
Slat OUT / Flap 16°
Figure 07-03-11

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Corrected Take-Off Field Length on a Runway Contaminated with Compacted Snow –
Slat OUT / Flap 16°
Figure 07-03-12

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

- (4) TAKE-OFF DECISION SPEED (V_1) ON A RUNWAY CONTAMINATED WITH COMPACTED SNOW

The following charts are used to obtain the take-off decision speed (V_1) required on a runway contaminated with compacted snow, for a given value of airplane weight, ambient temperature, airport pressure altitude, reported wind, runway slope, various bleed configurations and number of operable thrust reversers.

V_1 must not be less than V_{1MCG} .

The V_1 required on a runway contaminated with compacted snow, are given by the following:

Effectivity:

- Airplanes 9002 thru 9304 **not incorporating** Service Bulletin:
 - SB 700-27-054 or SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability.
- Take-off with slat OUT / flap 0° is prohibited on a runway contaminated with compacted snow. Figure 07-03-13 is not applicable.
- Figure 07-03-13 provides the V_1 for a slat OUT/ flap 0° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-14 provides the V_1 for a slat OUT/ flap 6° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-15 provides the V_1 for a slat OUT/ flap 16° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

The effects of using the cowl anti-ice (CAI) or the wing and cowl anti-ice (WCAI) on the take-off decision speed (V_1) on a runway contaminated with compacted snow, are presented in the following table:

FIGURE	CAI ON CORRECTIONS	WCAI ON CORRECTIONS
07-03-13	Use "ENGINE BLEED OPEN AND PACKS ON" data.	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, use "ENGINE BLEED OPEN AND PACKS ON" data. For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, adjust the "ENGINE BLEED OPEN AND PACKS ON" data as follows: increase V_1 and V_R by 2 knots.
07-03-14 07-03-15	Use "ENGINE BLEED OPEN AND PACKS ON" data.	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, use "ENGINE BLEED OPEN AND PACKS ON" data. For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, adjust the "ENGINE BLEED OPEN AND PACKS ON" data as follows: increase V_1 and V_R by 1 knot.

Example:

Associated Conditions:

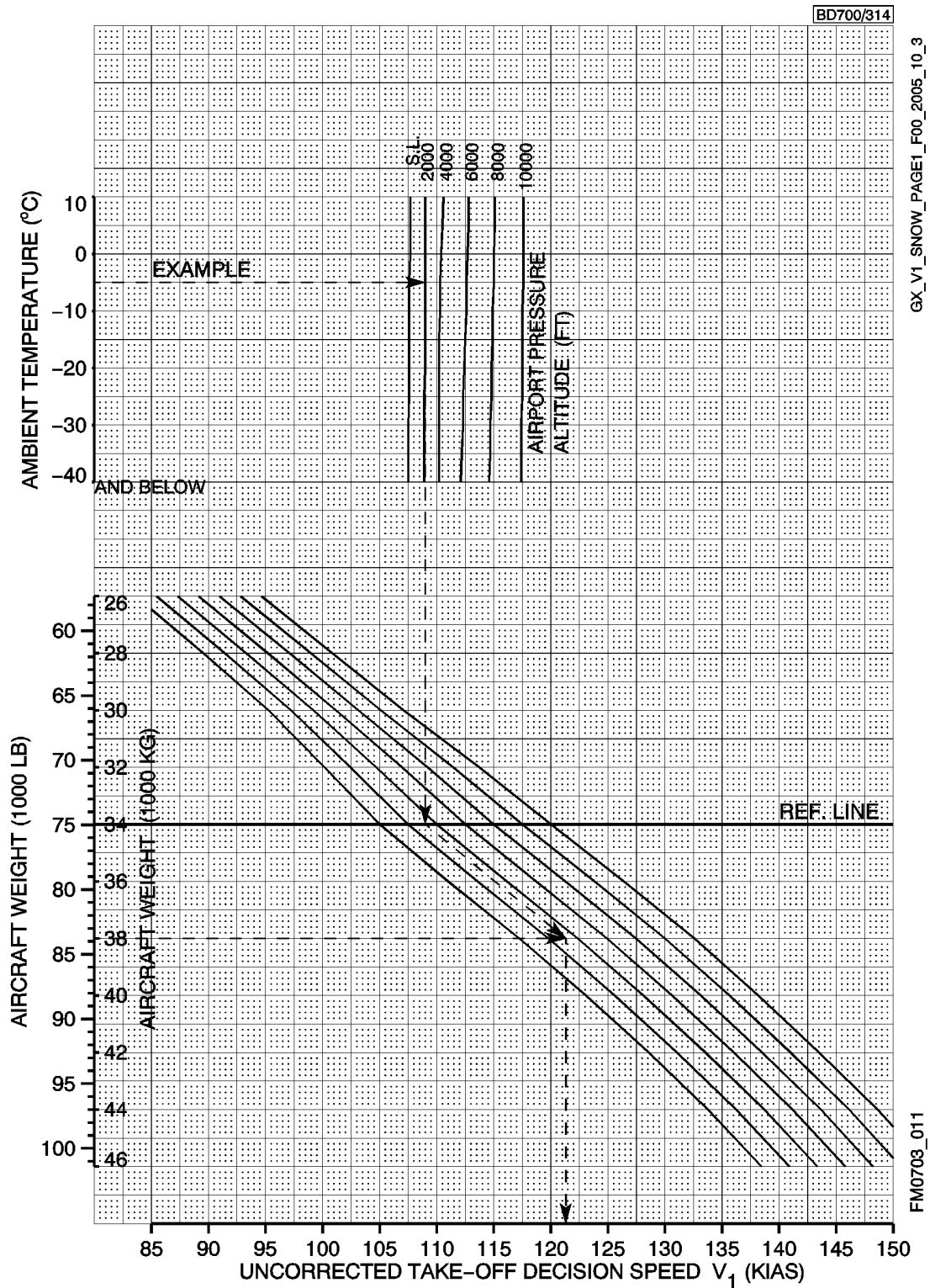
Ambient temperature	= -5 °C
Airport pressure altitude	= 2,000 ft
Wing anti-ice	= On
Cowl anti-ice	= On
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots (headwind)
Runway slope	= + 1% (uphill)
Thrust reversers	= Both operable
Slat/Flap	= OUT/6°

The example in Figure 07-03-14 shows that for the above associated conditions, V_1 is equal to 115.8 KIAS.

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

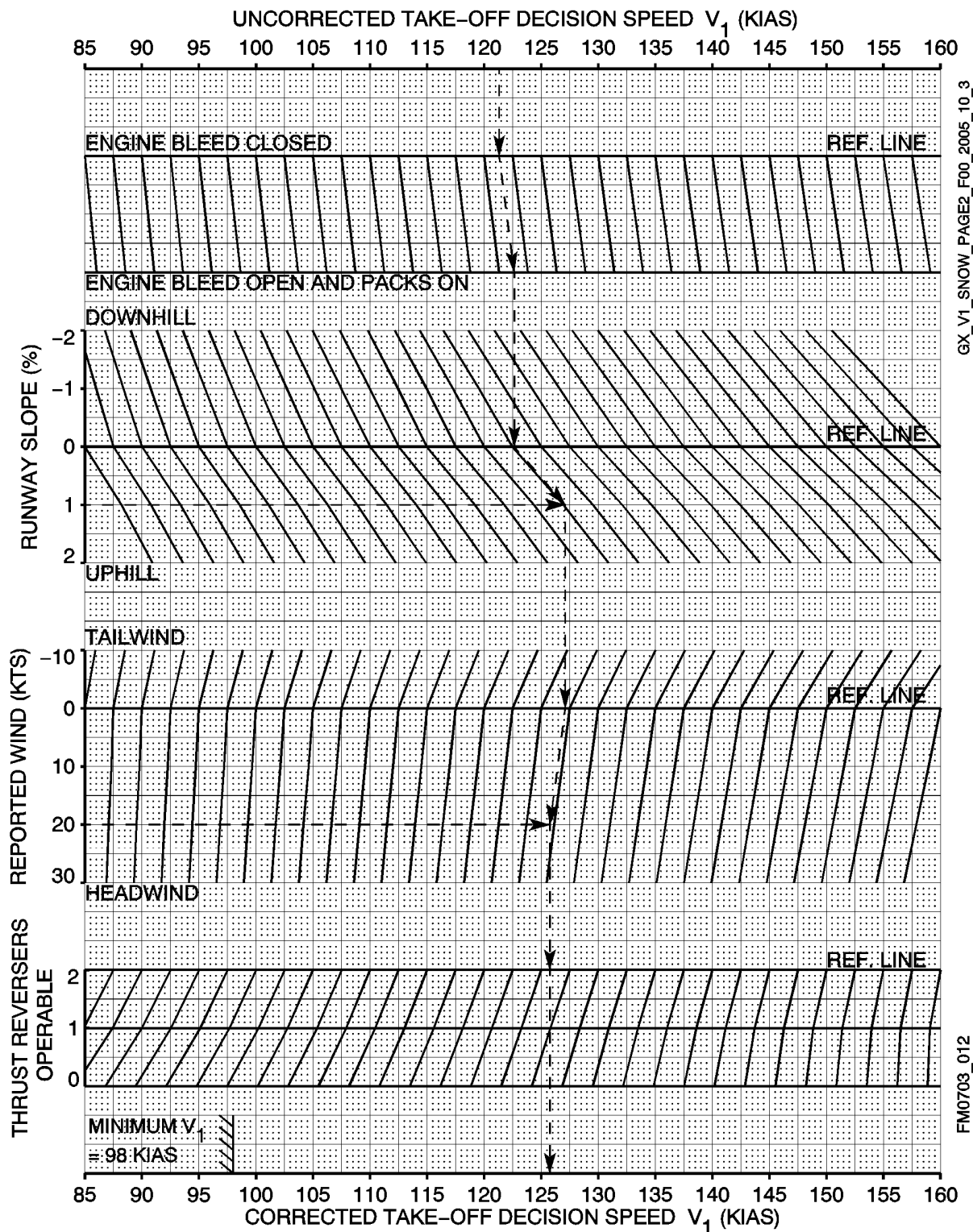


Take-Off Decision Speed on a Runway Contaminated with Compacted Snow – Slat OUT/Flap 0°
Figure 07-03-13 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

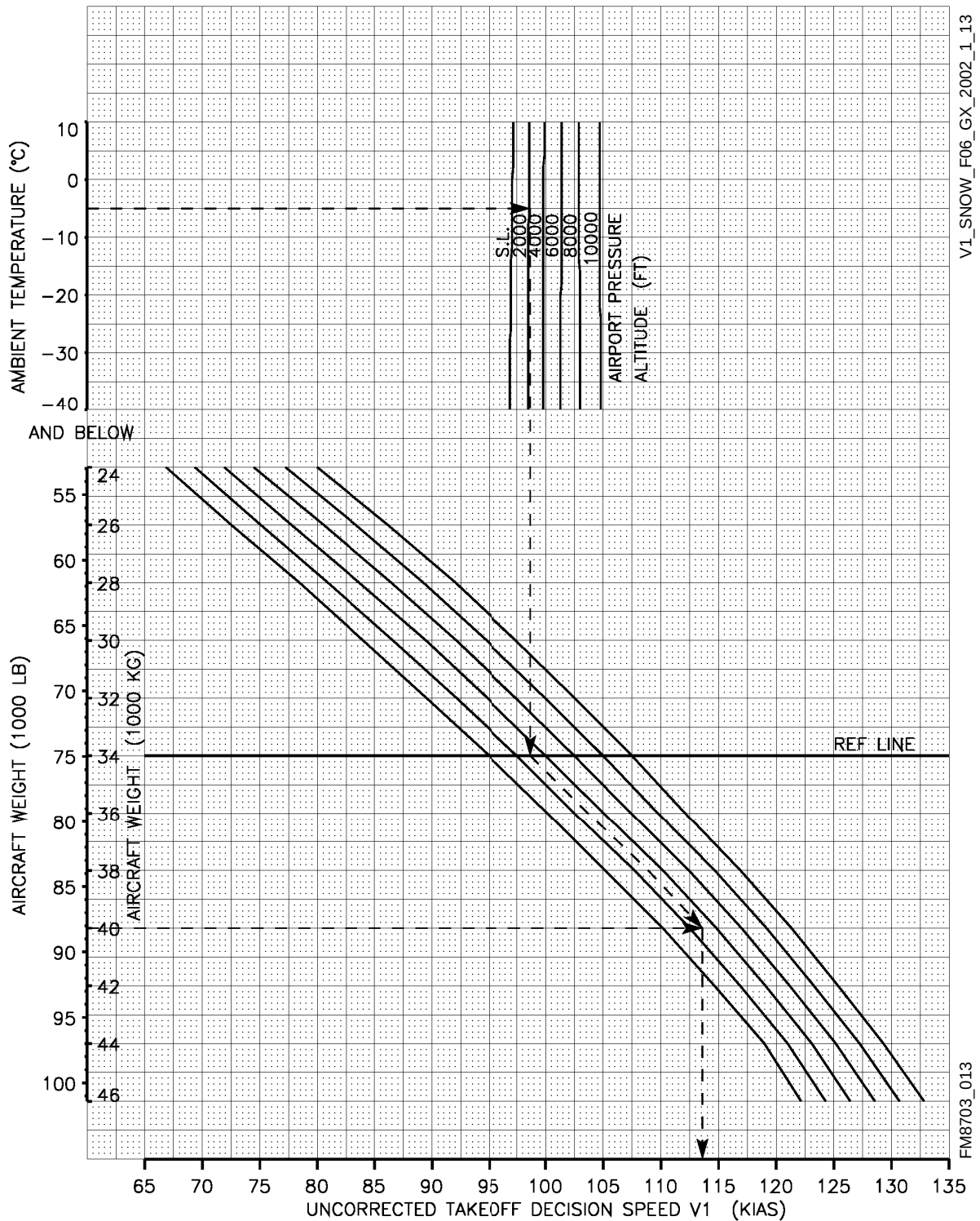


Take-Off Decision Speed on a Runway Contaminated with Compacted Snow – Slat OUT/Flap 0°
Figure 07-03-13 (Sheet 2 of 2)

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

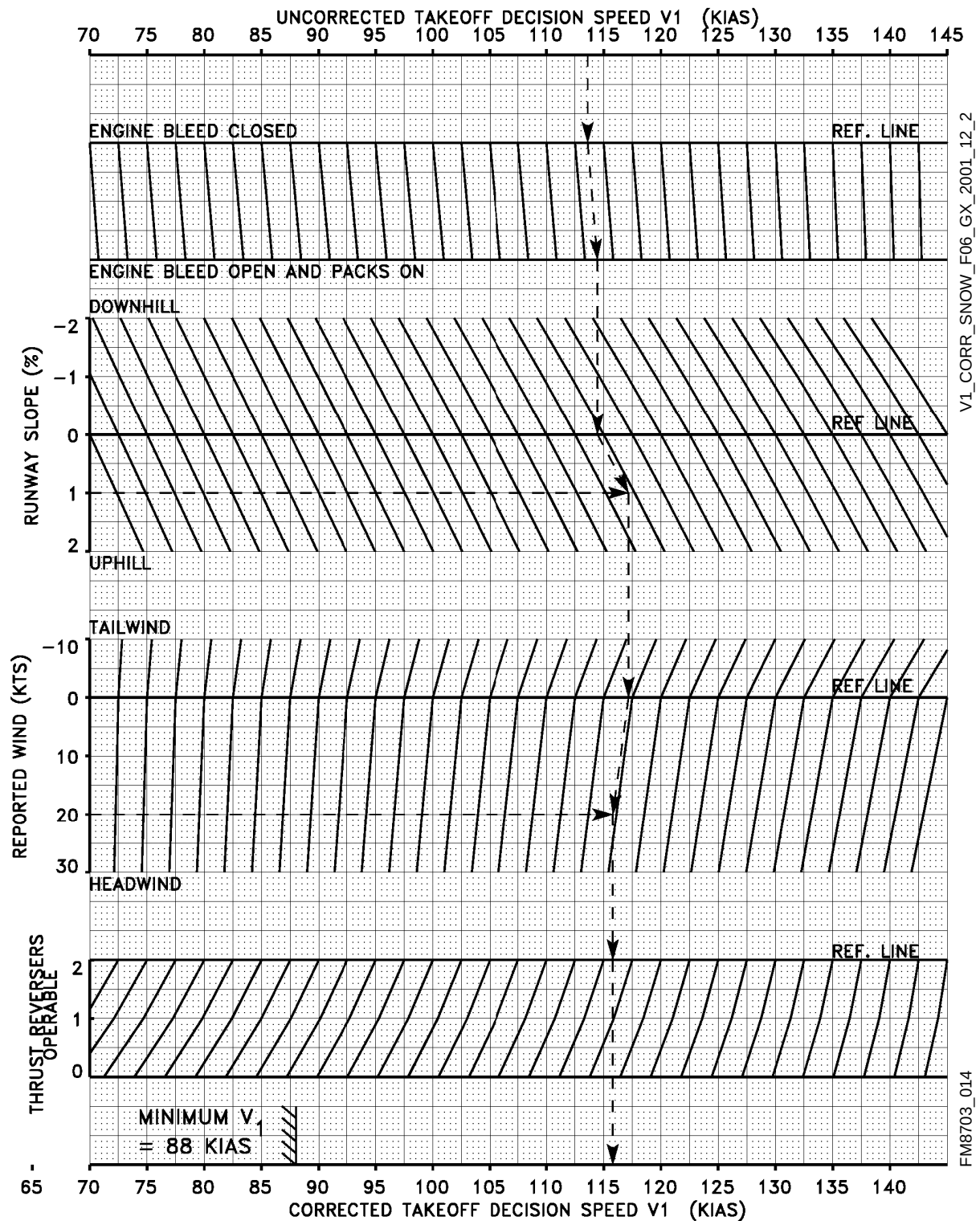


Take-Off Decision Speed on a Runway Contaminated With Compacted Snow – Slat OUT / Flap 6°
Figure 07-03-14 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

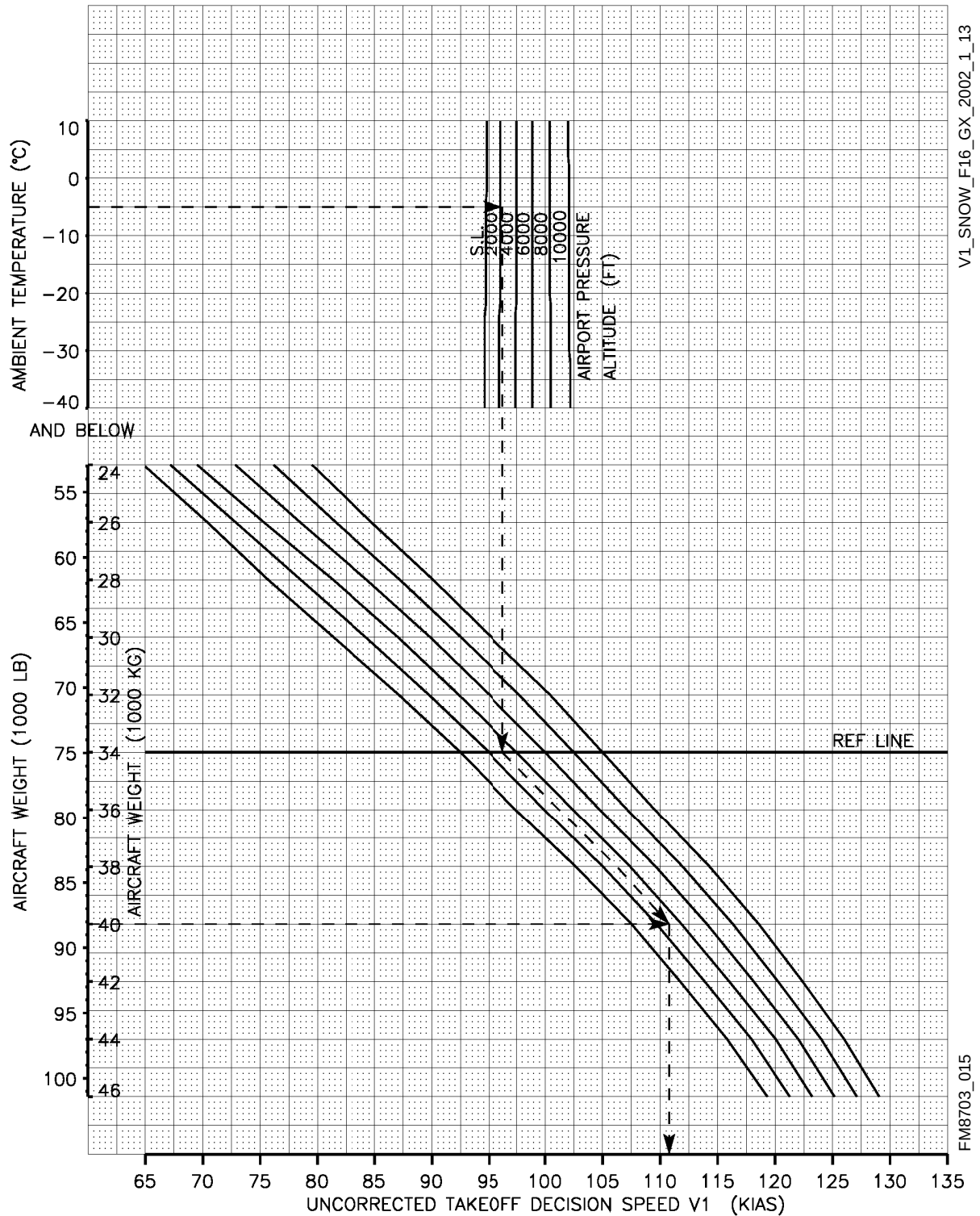


Take-Off Decision Speed on a Runway Contaminated With Compacted Snow – Slat OUT / Flap 6°
Figure 07-03-14 (Sheet 2 of 2)

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

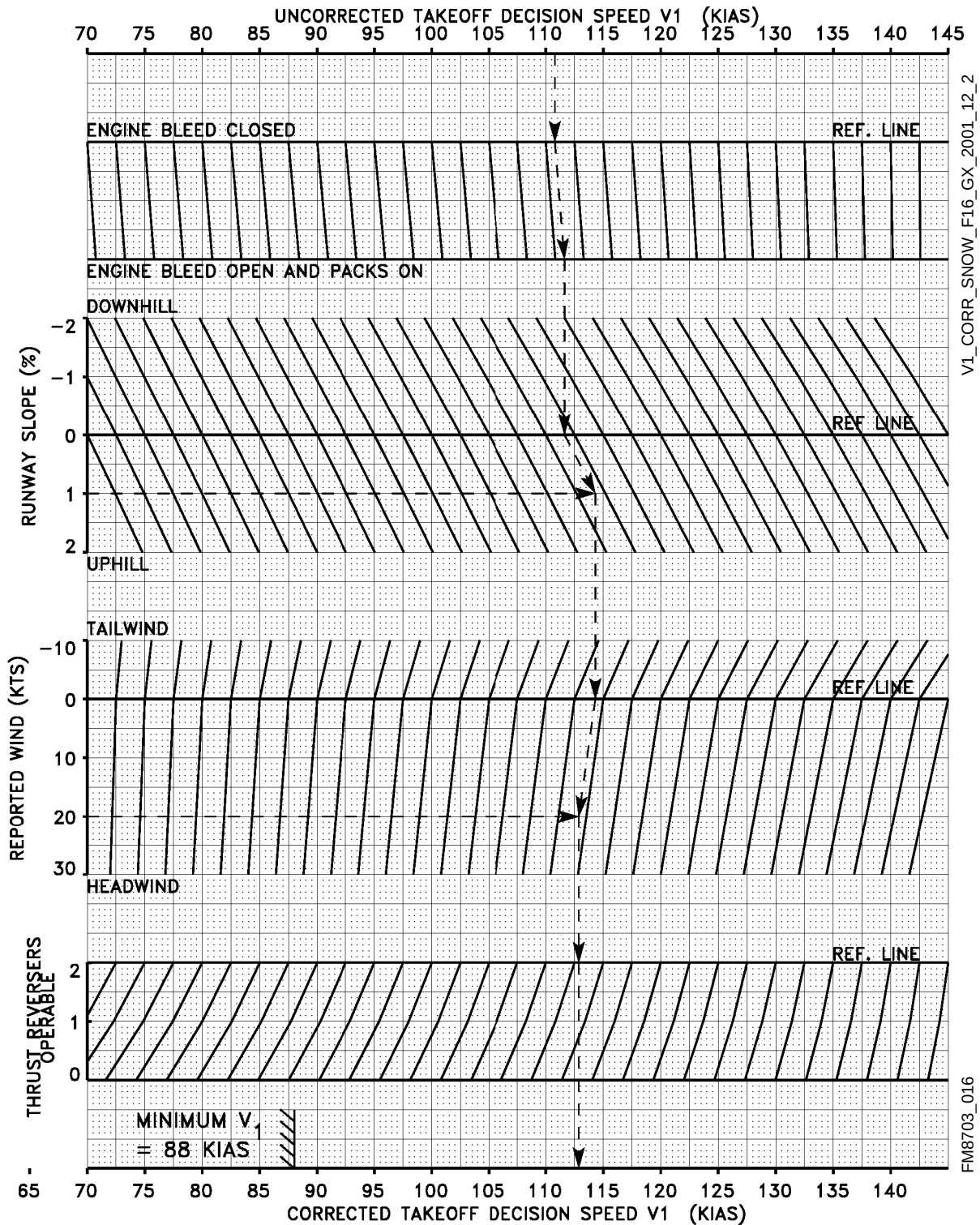


Take-Off Decision Speed on a Runway Contaminated With Compacted Snow – Slat OUT / Flap 16°
Figure 07-03-15 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Take-Off Decision Speed on a Runway Contaminated With Compacted Snow – Slat OUT / Flap 16°
Figure 07-03-15 (Sheet 2 of 2)

6. PERFORMANCE (CONT'D)**A. Operation on Contaminated Runways (Cont'd)****(5) TAKE-OFF FIELD LENGTH ON A RUNWAY CONTAMINATED WITH STANDING WATER (0.125")**

The following charts are used to obtain the take-off field length required on a runway contaminated with 3.2 mm (0.125 in) of standing water or equivalent [3.8 mm (0.15 in) of slush; or 7.6 mm (0.30 in) of wet snow; or 15.2 mm (0.60 in) of dry snow], for a given value of airplane weight, ambient temperature, airport pressure altitude (from sea level to 10,000 feet in 2,000-foot intervals), reported wind, runway slope, usage of thrust reversers and various bleed configurations.

NOTE

When the take-off crosswind exceeds 20 knots, the high crosswind take-off procedure must be used (refer to the Flight Crew Operating Manual, Chapter 4: NORMAL PROCEDURES – TAXIING AND TAKE-OFF – HIGH CROSSWIND TAKE-OFF). The corrected take-off field length must be increased by 630 meters (2,070 feet) slat OUT/ flap 0° and 560 meters (1,840 feet) slat OUT/ flap 6° and slat OUT/ flap 16°.

The take-off field length required on a runway contaminated with 3.2 mm (0.125 in) of standing water or equivalent, are given by the following:

- Figure 07-03-16 provides the uncorrected take-off field length for a slat OUT/ flap 0° take-off;
- Figure 07-03-17 provides the take-off field length for a slat OUT/ flap 0° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-18 provides the uncorrected take-off field length for a slat OUT/ flap 6° take-off;
- Figure 07-03-19 provides the take-off field length for a slat OUT/ flap 6° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-20 provides the uncorrected take-off field length for a slat OUT/ flap 16° take-off;
- Figure 07-03-21 provides the take-off field length for a slat OUT / flap 16° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.

SUPPLEMENT 3

OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

The effects of using the cowl anti-ice (CAI) or the wing and cowl anti-ice (WCAI) on the take-off field length required on a runway contaminated with 3.2 mm (0.125 in) of standing water or equivalent, are presented in the following table:

FIGURE	CAI ON CORRECTIONS	WCAI ON CORRECTIONS
07-03-16	Use "ENGINE BLEED OPEN AND PACK ON" data. Increase take-off field length based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 8% • 0 thrust reversers: 18%	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperature 5 °C and below, use "ENGINE BLEED OPEN AND PACK ON" data and increase take-off field length based on the number of thrust reversers operative:
07-03-17		• 2 thrust reversers: 0% • 1 thrust reverser: 19% • 0 thrust reversers: 49%
07-03-18		
07-03-19		For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperature above 5 °C, use "ENGINE BLEED OPEN AND PACK ON" data and increase take-off field length based on the number of thrust reversers operative:
07-03-20		• 2 thrust reversers: 17% • 1 thrust reverser: 23% • 0 thrust reversers: 54%
07-03-21		

The uncorrected take-off field length can be interpolated linearly with altitude.

Example:

Associated Conditions:

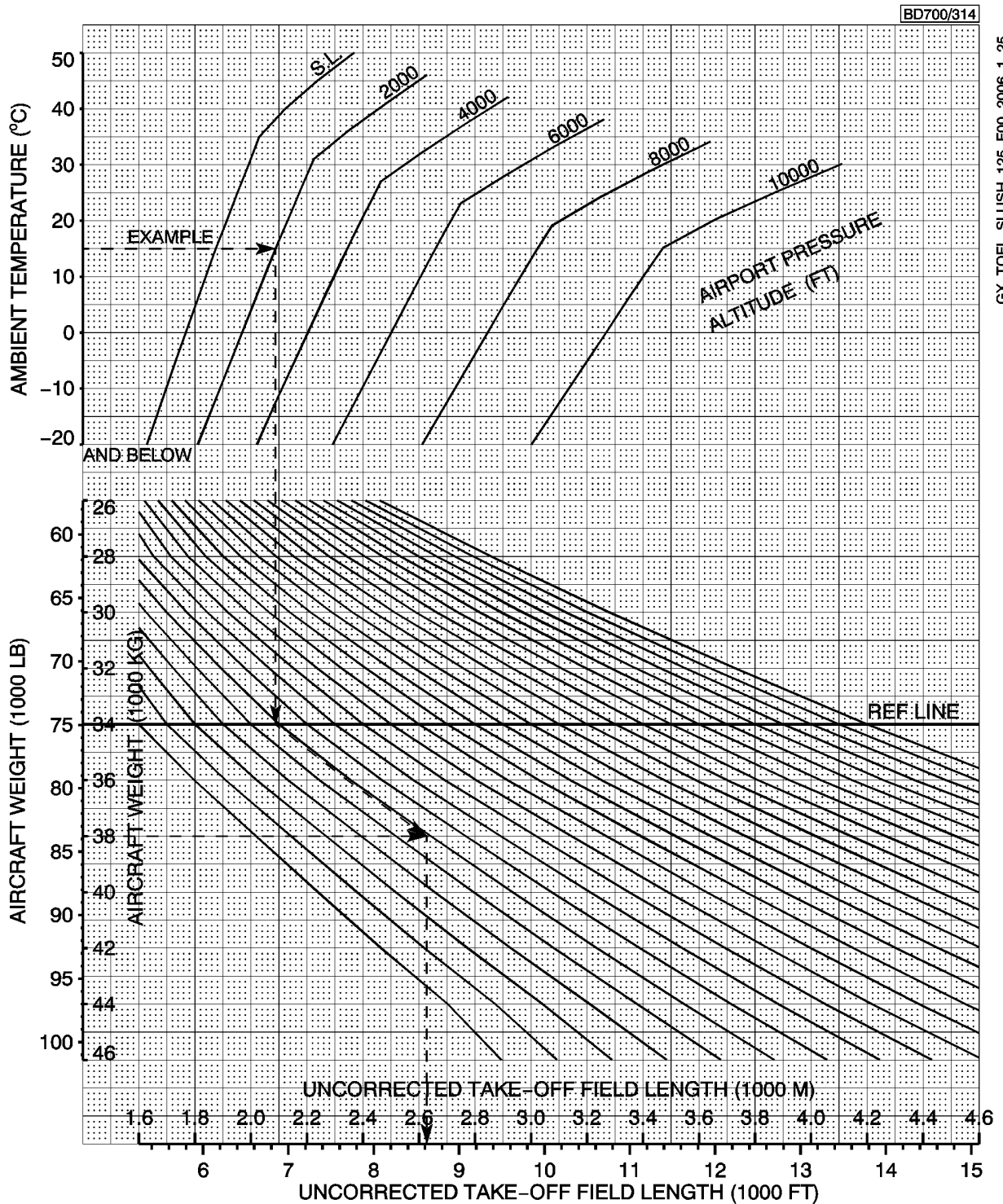
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots (headwind)
Runway slope	= + 1% (uphill)
Thrust reversers	= Both operable
Slat/Flap	= OUT/6°

The example in Figure 07-03-18 and Figure 07-03-19 shows that for the above associated conditions, the corrected take-off field length is 2,145 meters (7,038 feet).

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

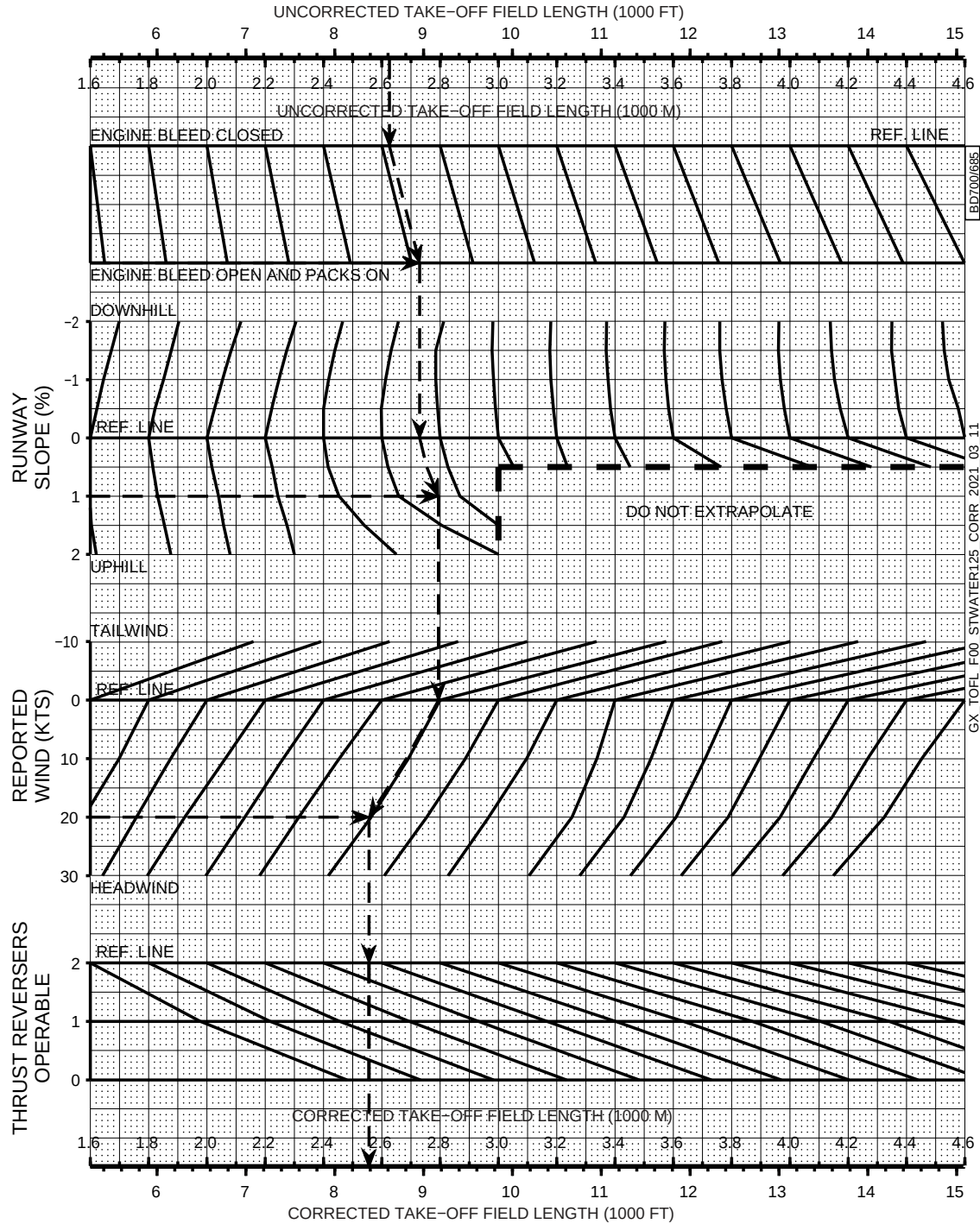


Uncorrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.125") or Equivalent – Slat OUT / Flap 0°
Figure 07-03-16

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



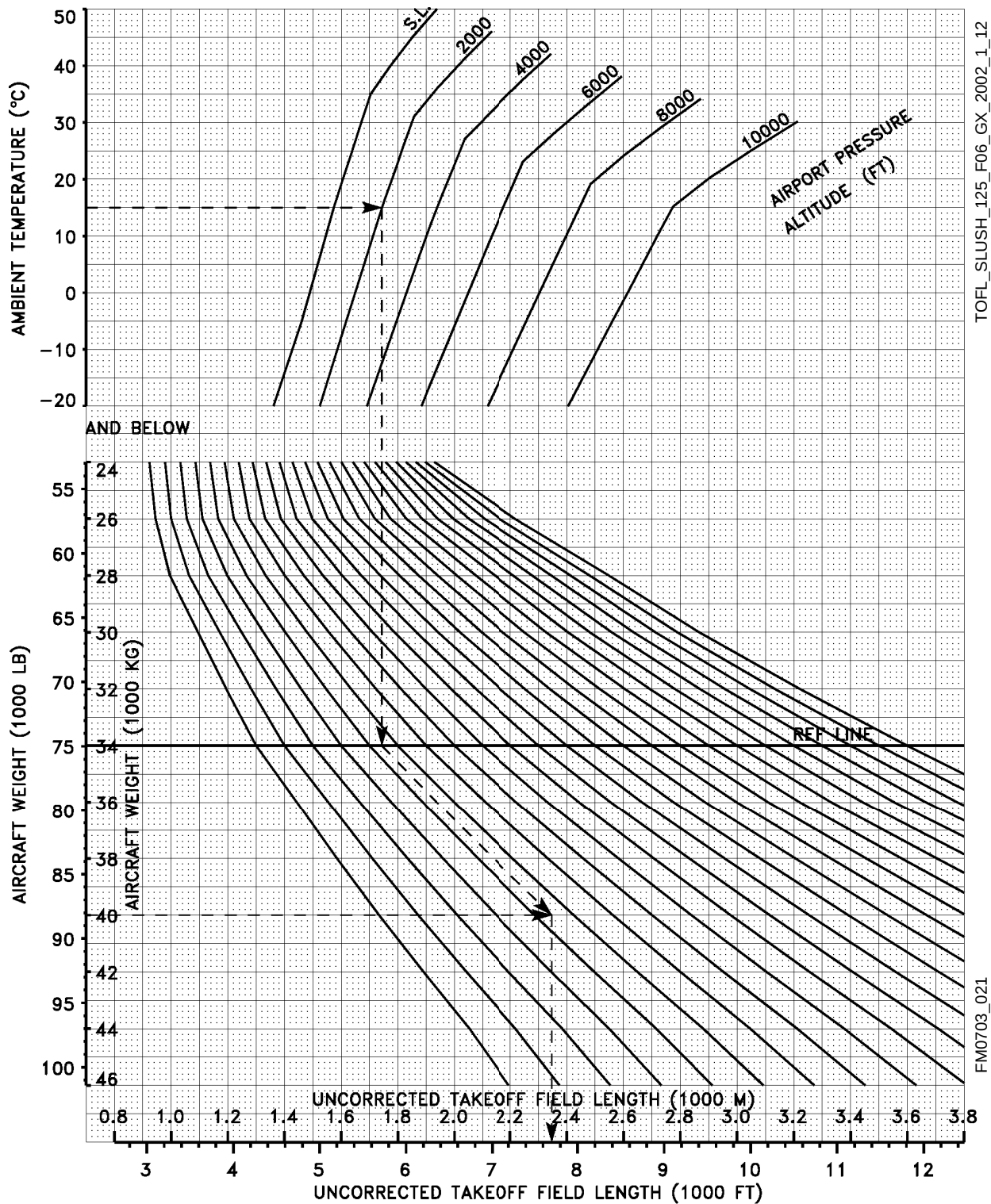
Corrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.125 in.) or Equivalent – Slat OUT / Flap 0°

Figure 07-03-17

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Uncorrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.125") or Equivalent – Slat OUT / Flap 6°
Figure 07-03-18

A. Operation on Contaminated Runways (Cont'd)

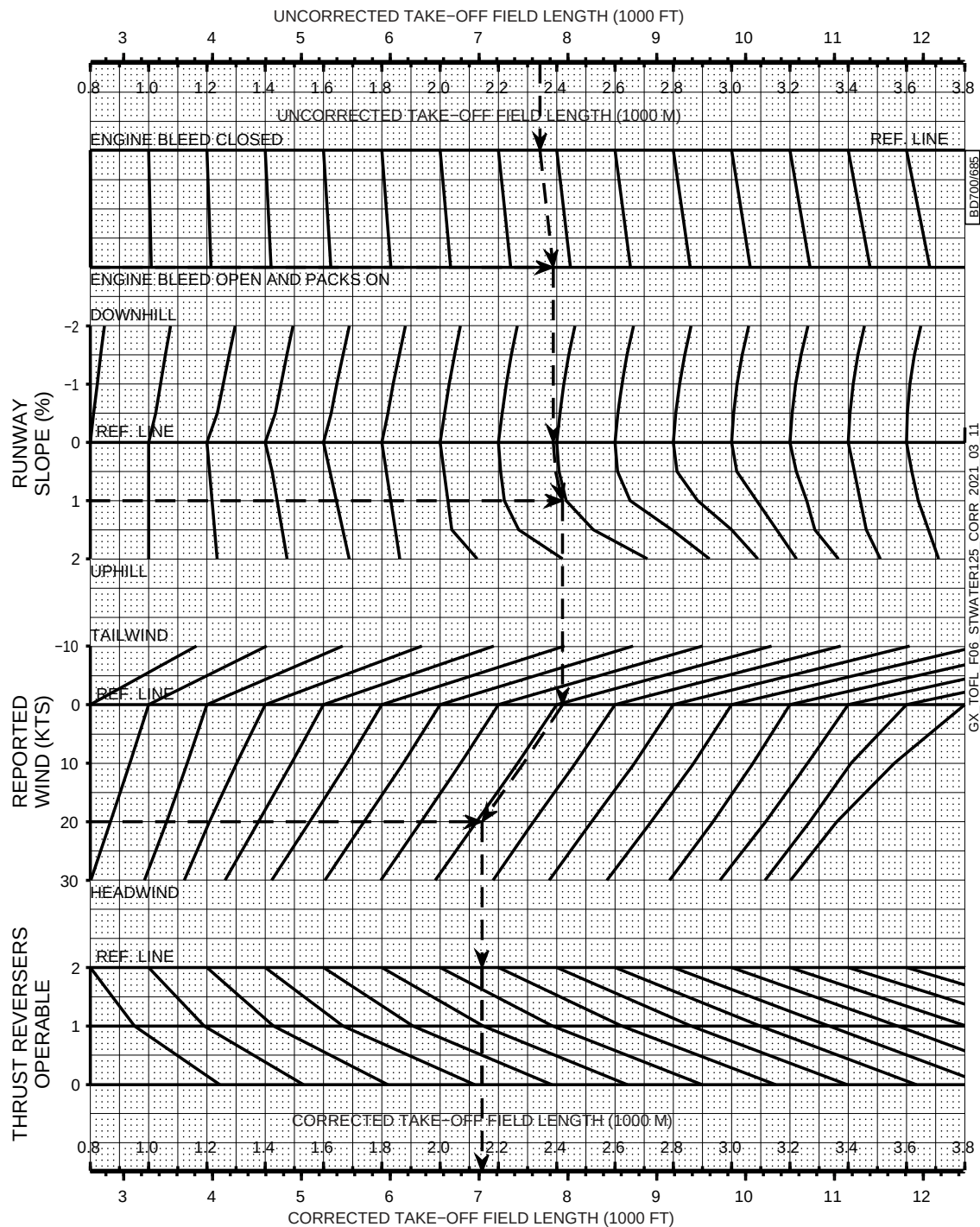
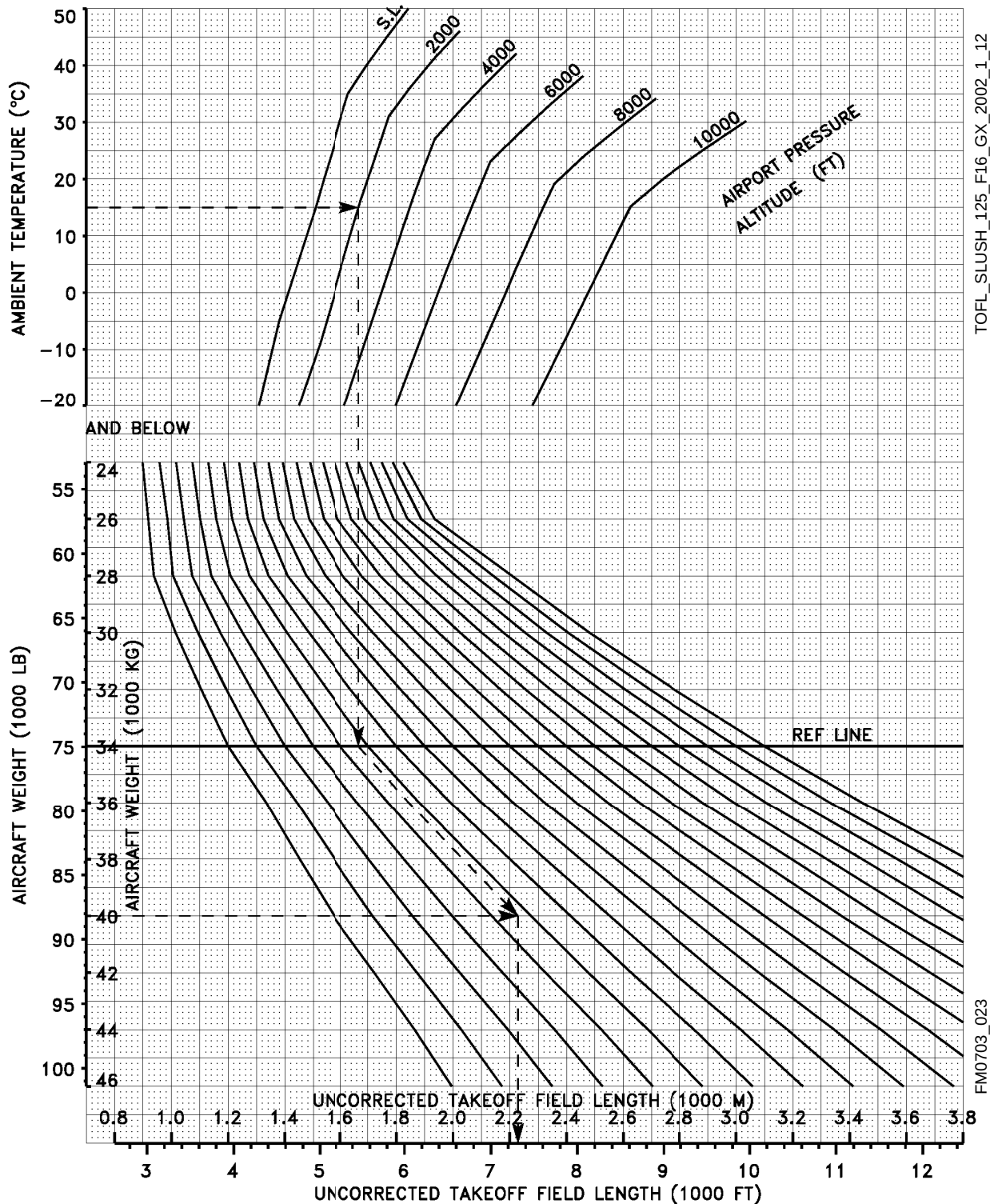


Figure 07-03-19

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



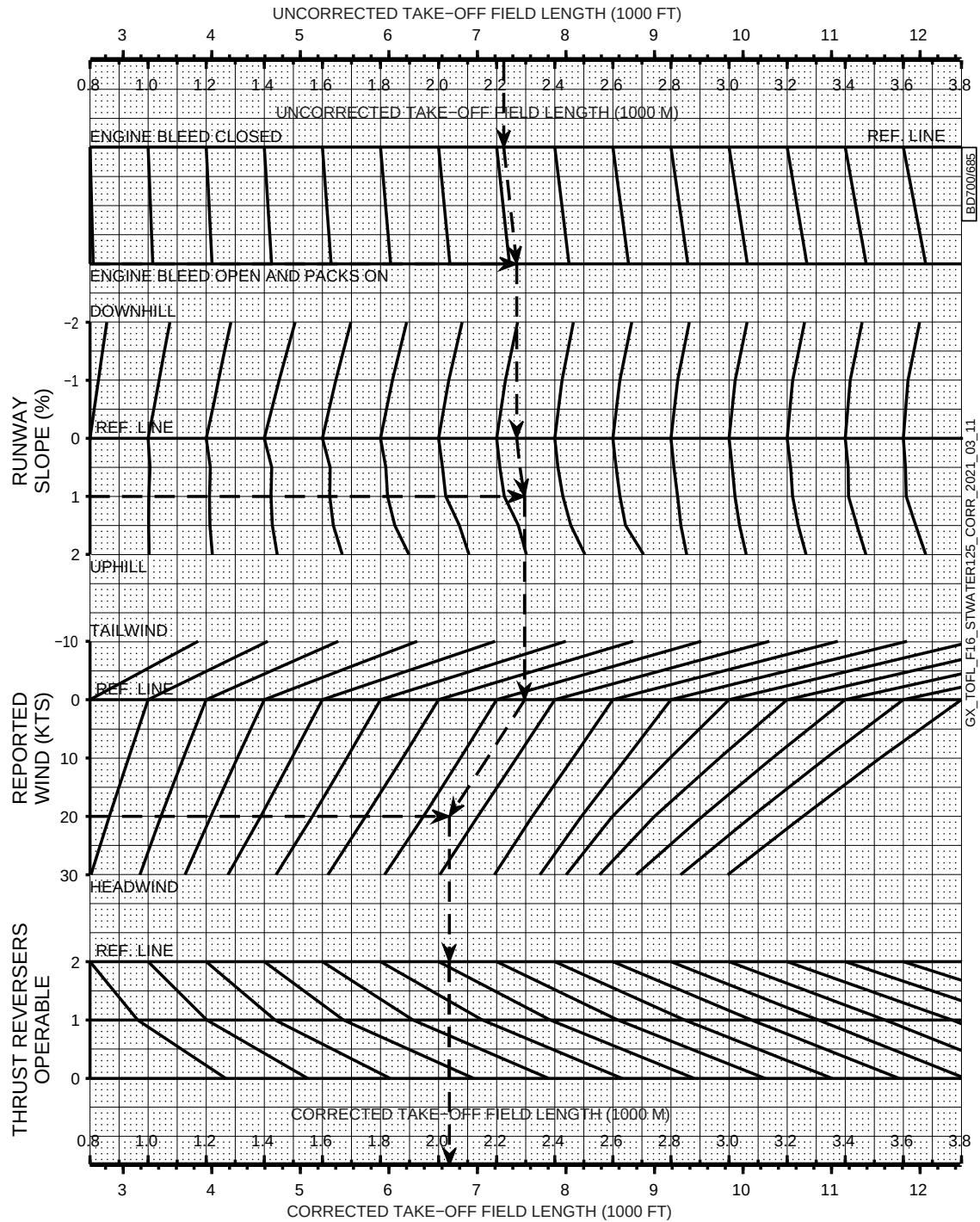
Uncorrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.125") or Equivalent – Slat OUT / Flap 16°

Figure 07-03-20

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Corrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.125 in.) or Equivalent – Slat OUT / Flap 16°

Figure 07-03-21

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

- (6) TAKE-OFF DECISION SPEED (V_1) ON A RUNWAY CONTAMINATED WITH STANDING WATER (0.125")

The following charts are used to obtain the take-off decision speed (V_1) required on a runway contaminated with 3.2 mm (0.125 in) of standing water or equivalent [3.8 mm (0.15 in) of slush; or 7.6 mm (0.30 in) of wet snow; or 15.2 mm (0.60 in) of dry snow], for a given value of airplane weight, ambient temperature, airport pressure altitude, reported wind, runway slope, various bleed configurations and number of operable thrust reversers.

V_1 must not be less than V_{1MCG} .

The V_1 required on a runway contaminated with 3.2 mm (0.125 in) of standing water or equivalent, are given by the following:

- Figure 07-03-22 provides the V_1 for a slat OUT/ flap 0° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-23 provides the V_1 for a slat OUT/ flap 6° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-24 provides the V_1 for a slat OUT/ flap 16° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.

The effects of using the cowl anti-ice (CAI) or the wing and cowl anti-ice (WCAI) on the take-off decision speed (V_1) on a runway contaminated with 3.2 mm (0.125 in) of standing water or equivalent, are presented in the following table:

FIGURE	CAI ON CORRECTIONS	WCAI ON CORRECTIONS
07-03-22	Use "ENGINE BLEED OPEN AND PACKS ON" data.	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, use "ENGINE BLEED OPEN AND PACKS ON" data.
07-03-23		For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, adjust the "ENGINE BLEED OPEN AND PACKS ON" data as follows:
07-03-24		increase V_1 and V_R by 1 knot.

6. PERFORMANCE (CONT'D)**A. Operation on Contaminated Runways (Cont'd)**Example:

Associated Conditions:

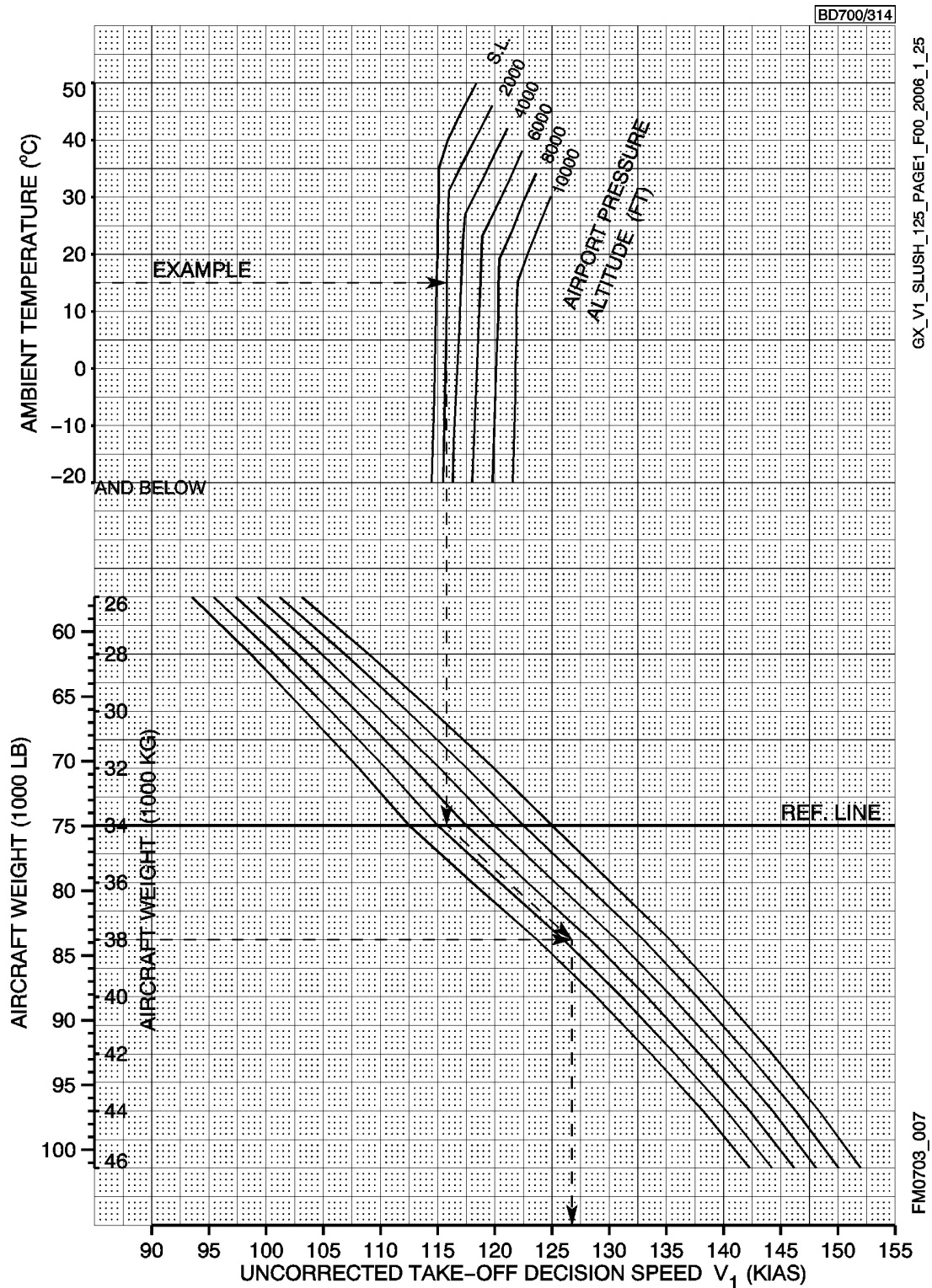
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots (headwind)
Runway slope	= + 1% (uphill)
Thrust reversers	= Both operable
Slat/Flap	= OUT/6°

The example in Figure 07-03-23 shows that for the above associated conditions, V_1 is equal to 116.6 KIAS.

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



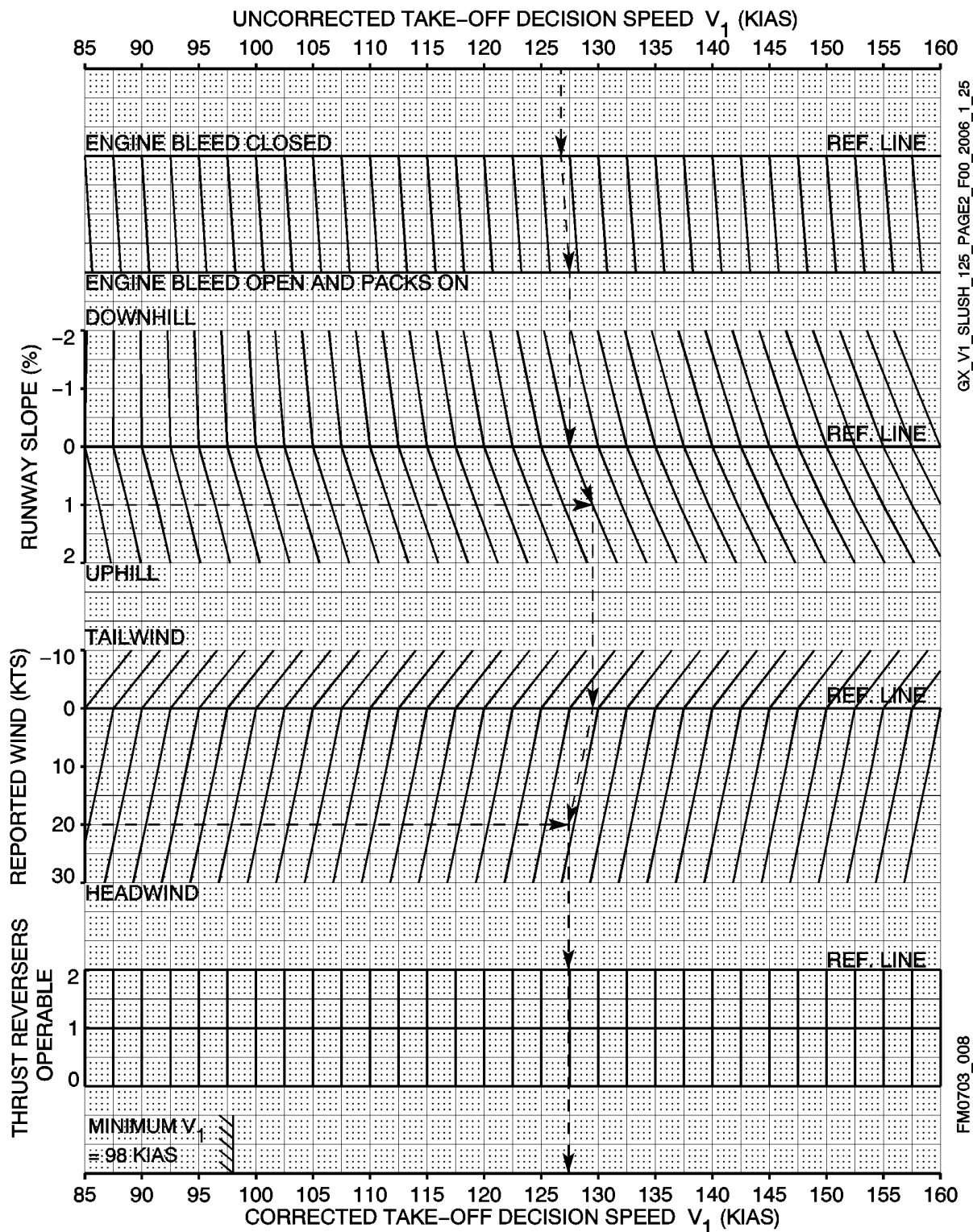
Take-Off Decision Speed on a Runway Contaminated with Standing Water (0.125") or Equivalent –
Slat OUT/Flap 0°

Figure 07-03-22 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



GX_V1_SLUSH_125_PAGE2_F00_2006_1_25

FM0703_008

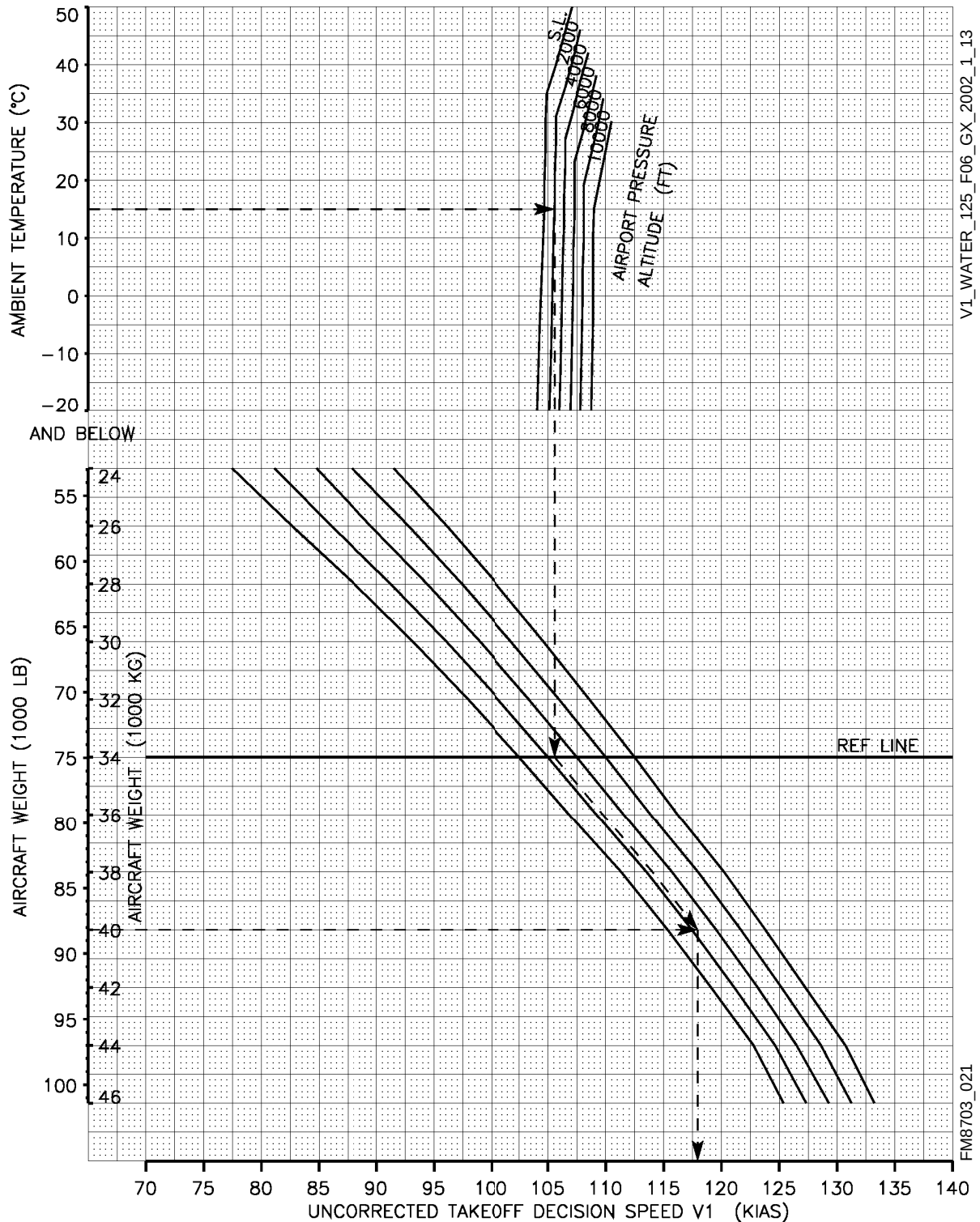
Take-Off Decision Speed on a Runway Contaminated with Standing Water (0.125") or Equivalent –
Slat OUT/Flap 0°

Figure 07-03-22 (Sheet 2 of 2)

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



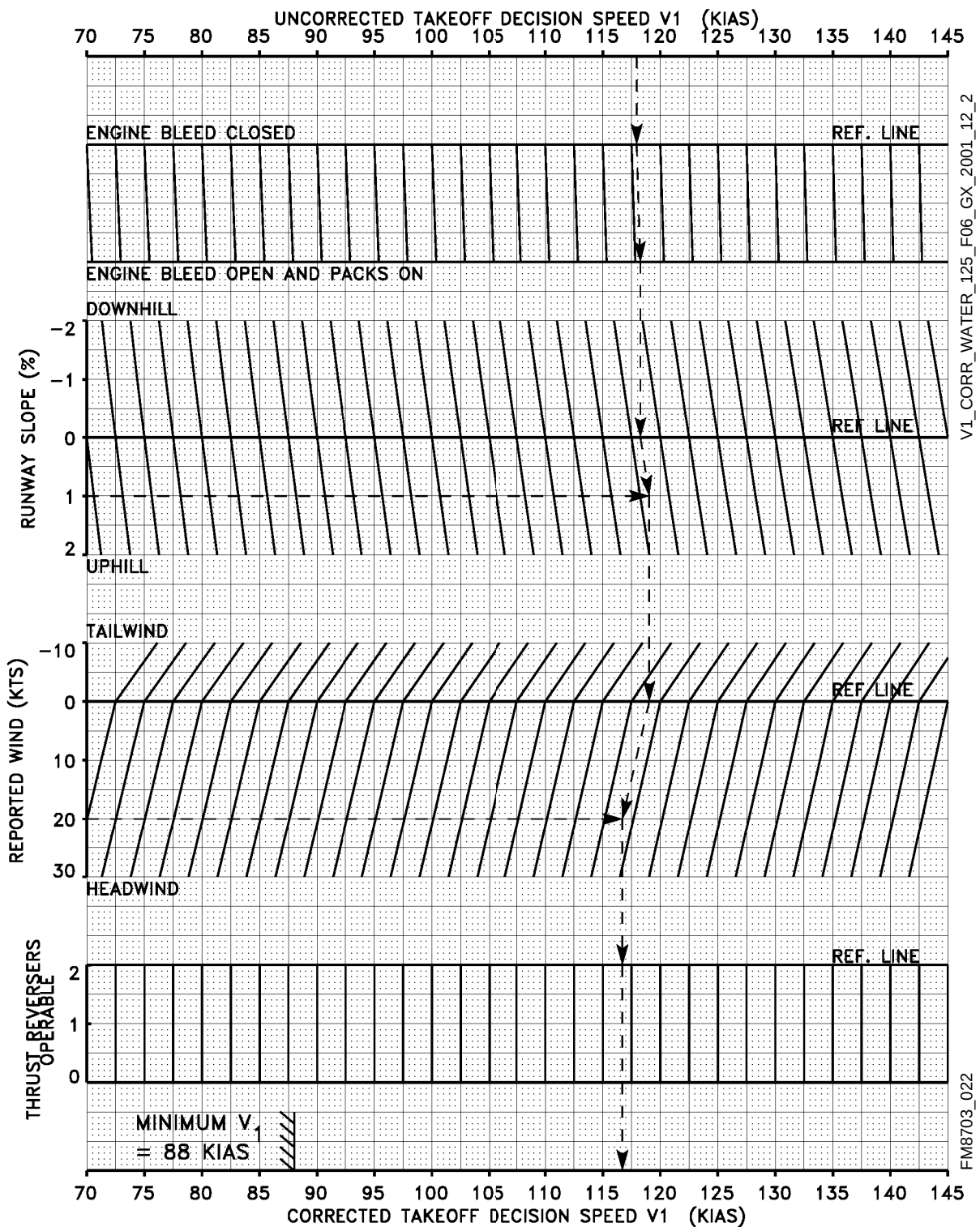
Take-Off Decision Speed on a Runway Contaminated With Standing Water (0.125") or Equivalent –
Slat OUT / Flap 6°

Figure 07-03-23 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Take-Off Decision Speed on a Runway Contaminated With Standing Water (0.125") or Equivalent –
Slat OUT / Flap 6°

Figure 07-03-23 (Sheet 2 of 2)

07-03-01-44

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A. Operation on Contaminated Runways (Cont'd)

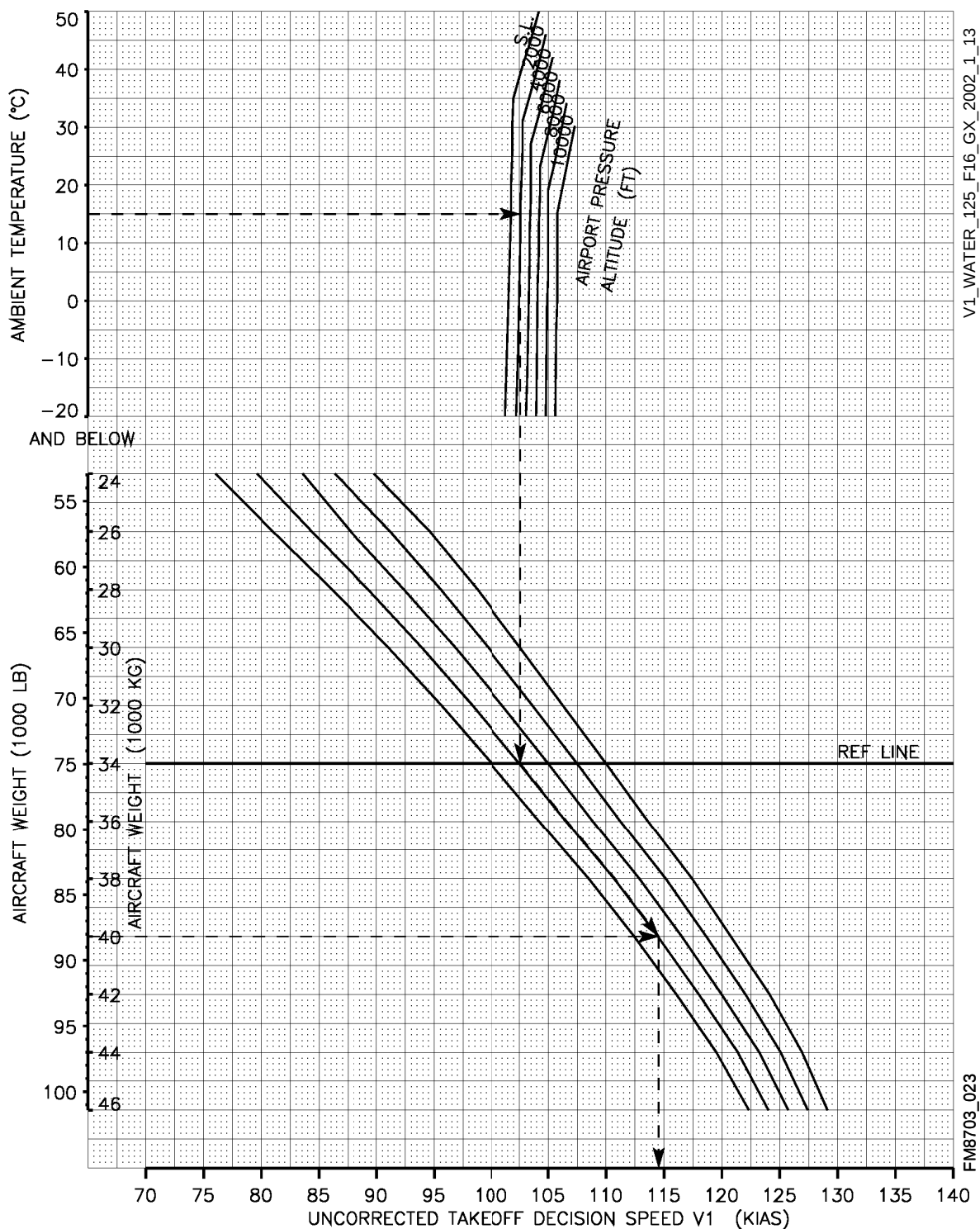
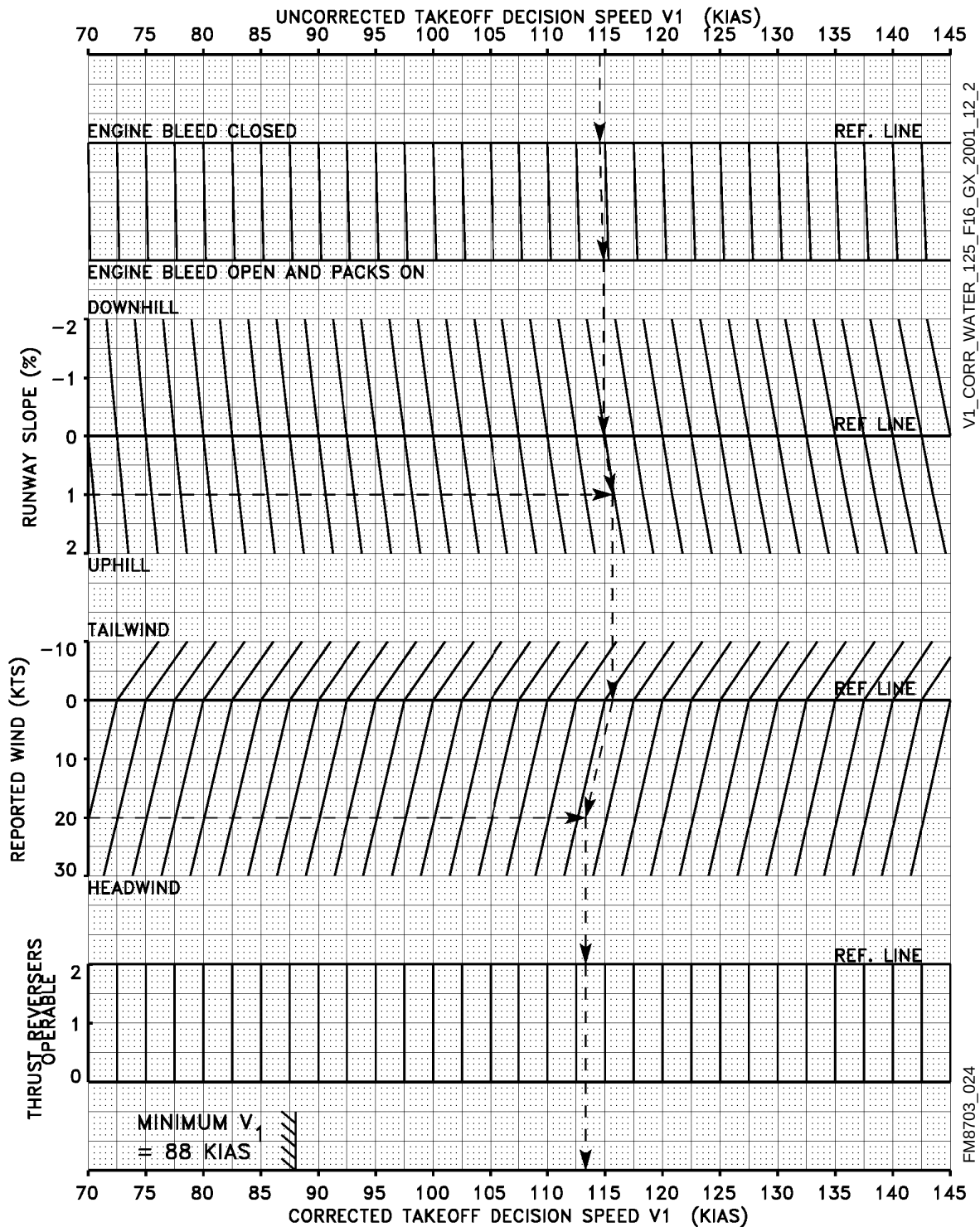


Figure 07-03-24 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Take-Off Decision Speed on a Runway Contaminated With Standing Water (0.125") or Equivalent –
Slat OUT / Flap 16°

Figure 07-03-24 (Sheet 2 of 2)

6. PERFORMANCE (CONT'D)**A. Operation on Contaminated Runways (Cont'd)****(7) TAKE-OFF FIELD LENGTH ON A RUNWAY CONTAMINATED WITH STANDING WATER (0.25")**

The following charts are used to obtain the take-off field length required on a runway contaminated with 6.4 mm (0.25 in) of standing water or equivalent [7.6 mm (0.30 in) of slush; or 15.2 mm (0.60 in) of wet snow; or 30.4 mm (1.2 in) of dry snow], for a given value of airplane weight, ambient temperature, airport pressure altitude (from sea level to 10,000 feet in 2,000-foot intervals), reported wind, runway slope, usage of thrust reversers and various bleed configurations.

NOTE

When the take-off crosswind exceeds 20 knots, the high crosswind take-off procedure must be used (refer to the Flight Crew Operating Manual, Chapter 4: NORMAL PROCEDURES – TAXIING AND TAKE-OFF – HIGH CROSSWIND TAKE-OFF). The corrected take-off field length must be increased by 730 meters (2,400 feet) slat OUT/ flap 0° and 650 meters (2,130 feet) slat OUT/ flap 6° and slat OUT/ flap 16°.

The take-off field length required on a runway contaminated with 6.4 mm (0.25 in) of standing water or equivalent, are given by the following:

- Figure 07-03-25 provides the uncorrected take-off field length for a slat OUT / flap 0° take-off;
- Figure 07-03-26 provides the take-off field length for a slat OUT/ flap 0° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-27 provides the uncorrected take-off field length for a slat OUT / flap 6° take-off;
- Figure 07-03-28 provides the take-off field length for a slat OUT/ flap 6° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-29 provides the uncorrected take-off field length for a slat OUT/ flap 16° take-off;
- Figure 07-03-30 provides the take-off field length for a slat OUT/ flap 16° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.

SUPPLEMENT 3

OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

The effects of using the cowl anti-ice (CAI) or the wing and cowl anti-ice (WCAI) on the take-off field length required on a runway contaminated with 6.4 mm (0.25 in) of standing water or equivalent, are presented in the following table:

FIGURE	CAI ON CORRECTIONS	WCAI ON CORRECTIONS
07-03-25	Use "ENGINE BLEED OPEN AND PACK ON" data. Increase take-off field length based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 6% • 0 thrust reversers: 16%	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperature 5 °C and below, use "ENGINE BLEED OPEN AND PACK ON" data and increase take-off field length based on the number of thrust reversers operative:
07-03-26		• 2 thrust reversers: 0% • 1 thrust reverser: 16% • 0 thrust reversers: 42%
07-03-27		
07-03-28		For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperature above 5 °C, use "ENGINE BLEED OPEN AND PACK ON" data and increase take-off field length based on the number of thrust reversers operative:
07-03-29		• 2 thrust reversers: 9% • 1 thrust reverser: 20% • 0 thrust reversers: 47%
07-03-30		

The uncorrected take-off field length can be interpolated linearly with altitude.

Example:

Associated Conditions:

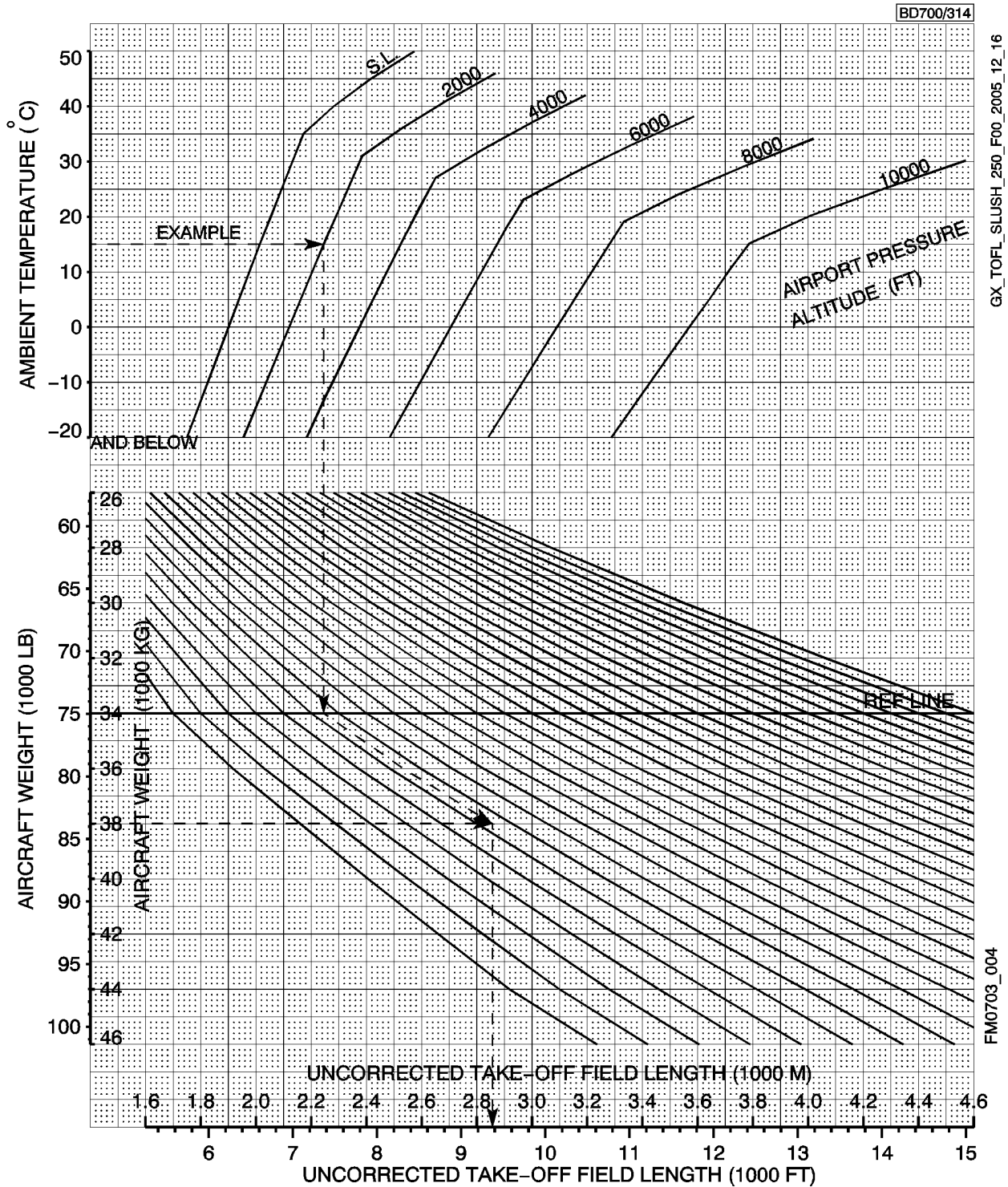
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots (headwind)
Runway slope	= + 1% (uphill)
Thrust reversers	= Both operable
Slat/Flap	= OUT/6°

The example in Figure 07-03-27 and Figure 07-03-28 shows that for the above associated conditions, the corrected take-off field length is 2,264 meters (7,428 feet).

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

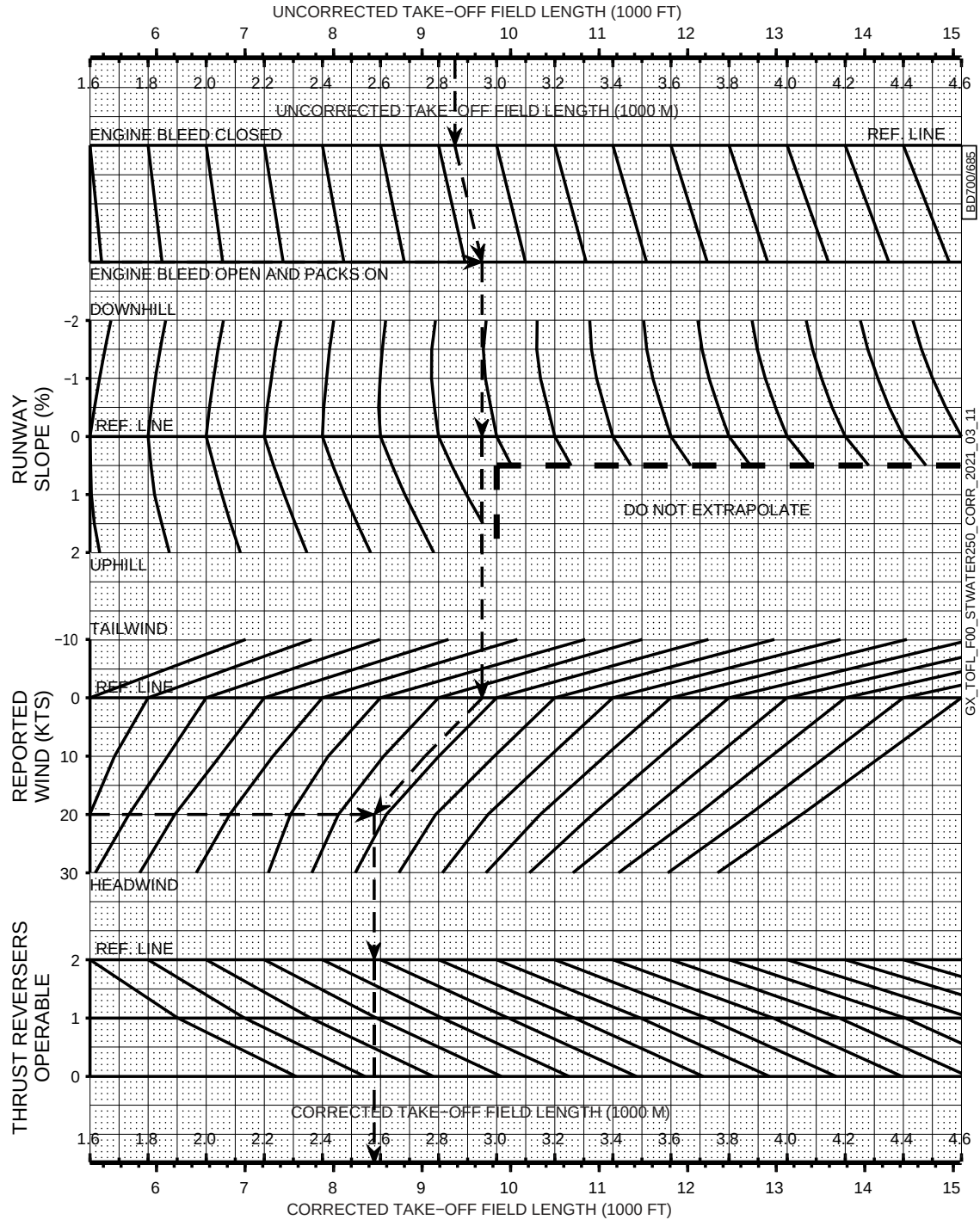


Uncorrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.25") or Equivalent – Slat OUT / Flap 0°
Figure 07-03-25

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



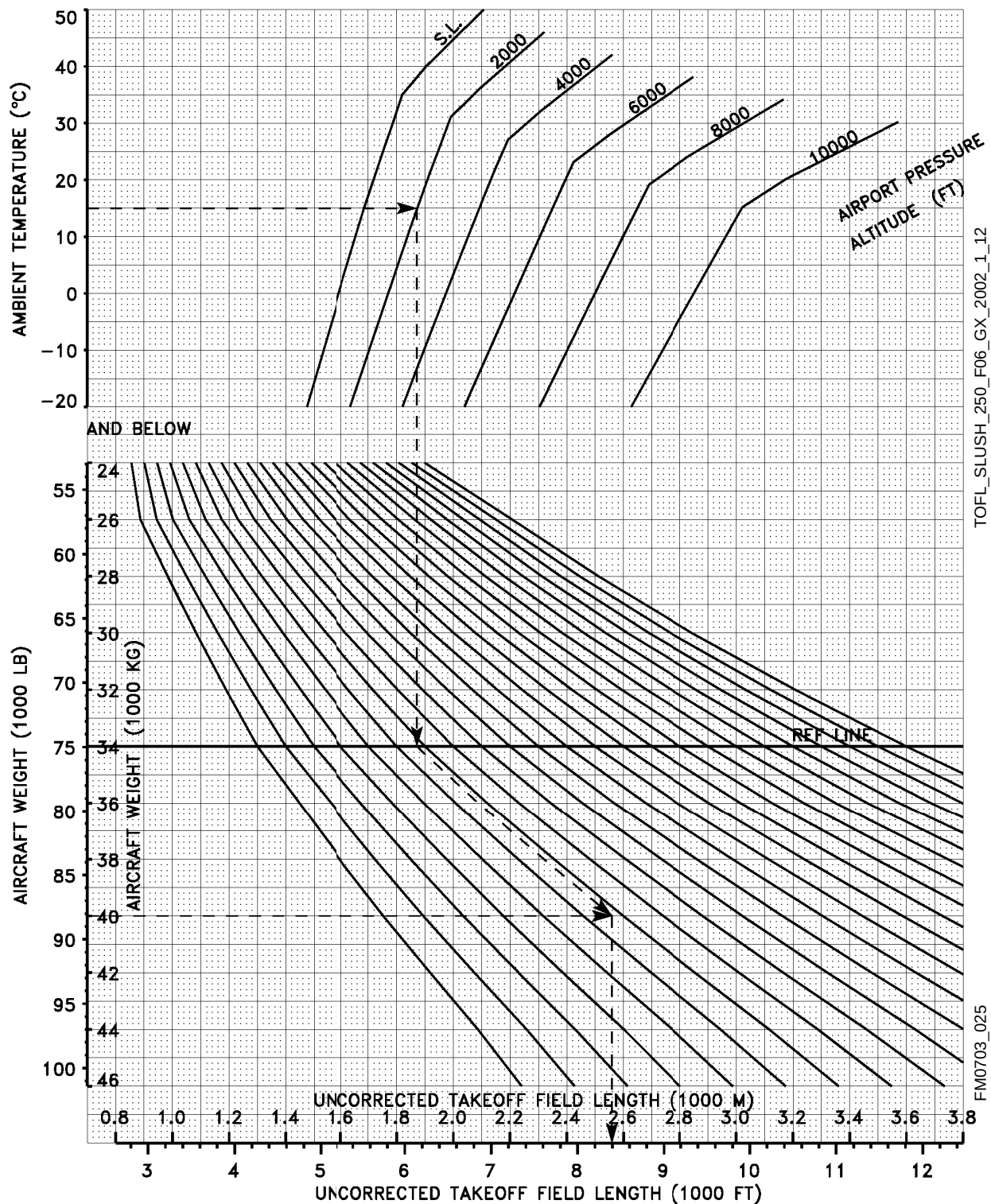
Corrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.250 in.) or Equivalent – Slat OUT / Flap 0°

Figure 07-03-26

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

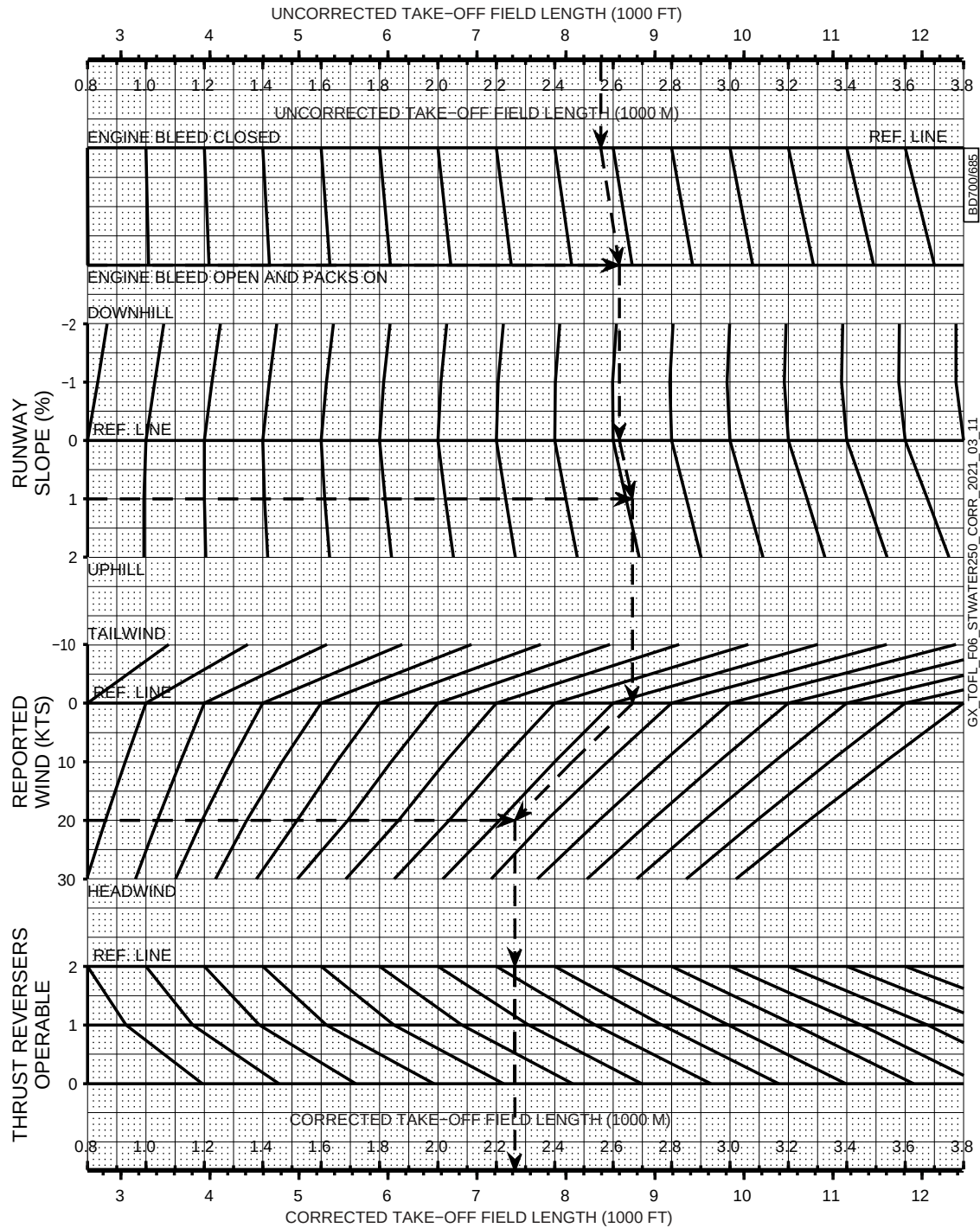


Uncorrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.25") or Equivalent – Slat OUT / Flap 6°
Figure 07-03-27

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

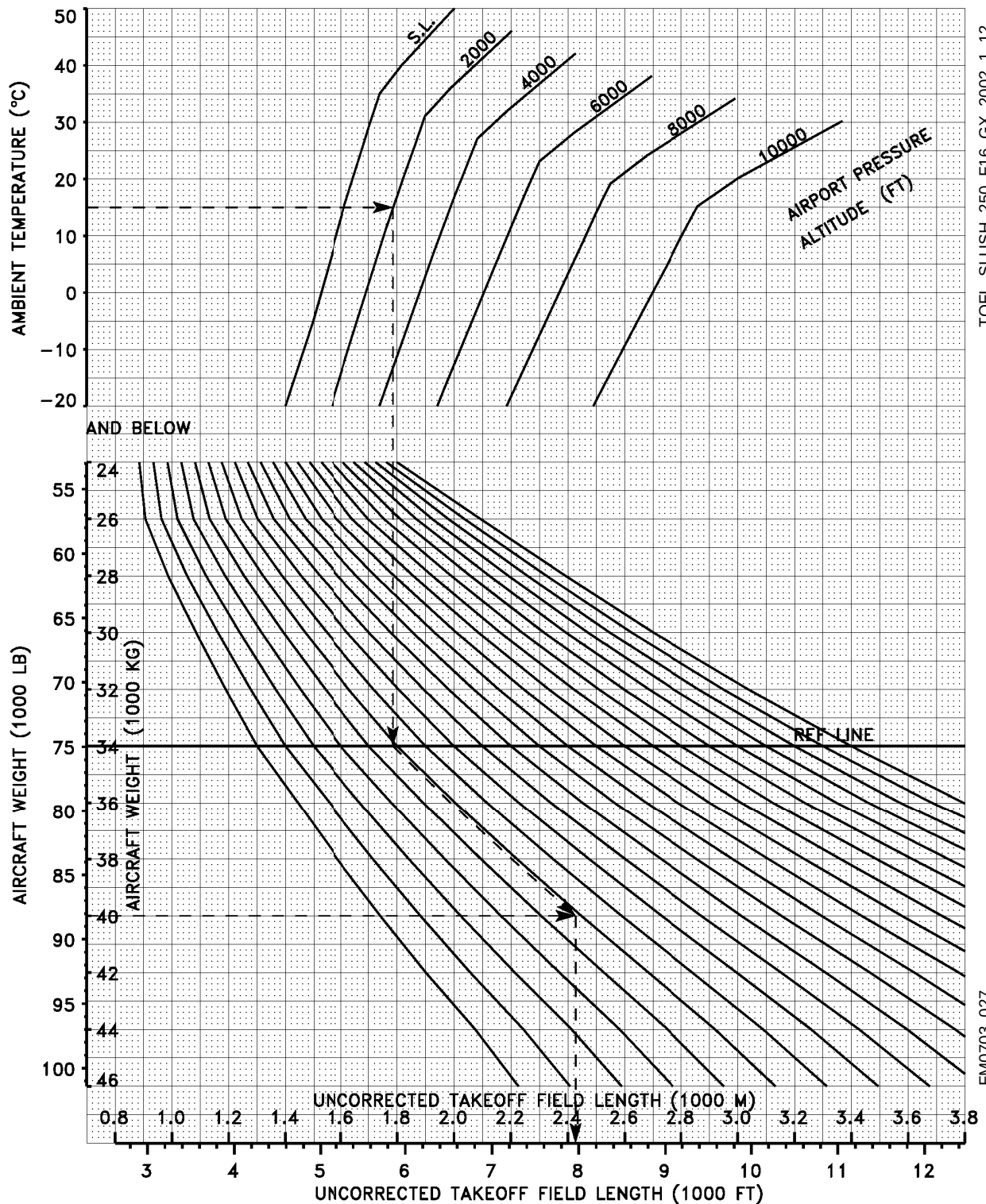


Corrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.250 in.) or Equivalent – Slat OUT / Flap 6°
Figure 07-03-28

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



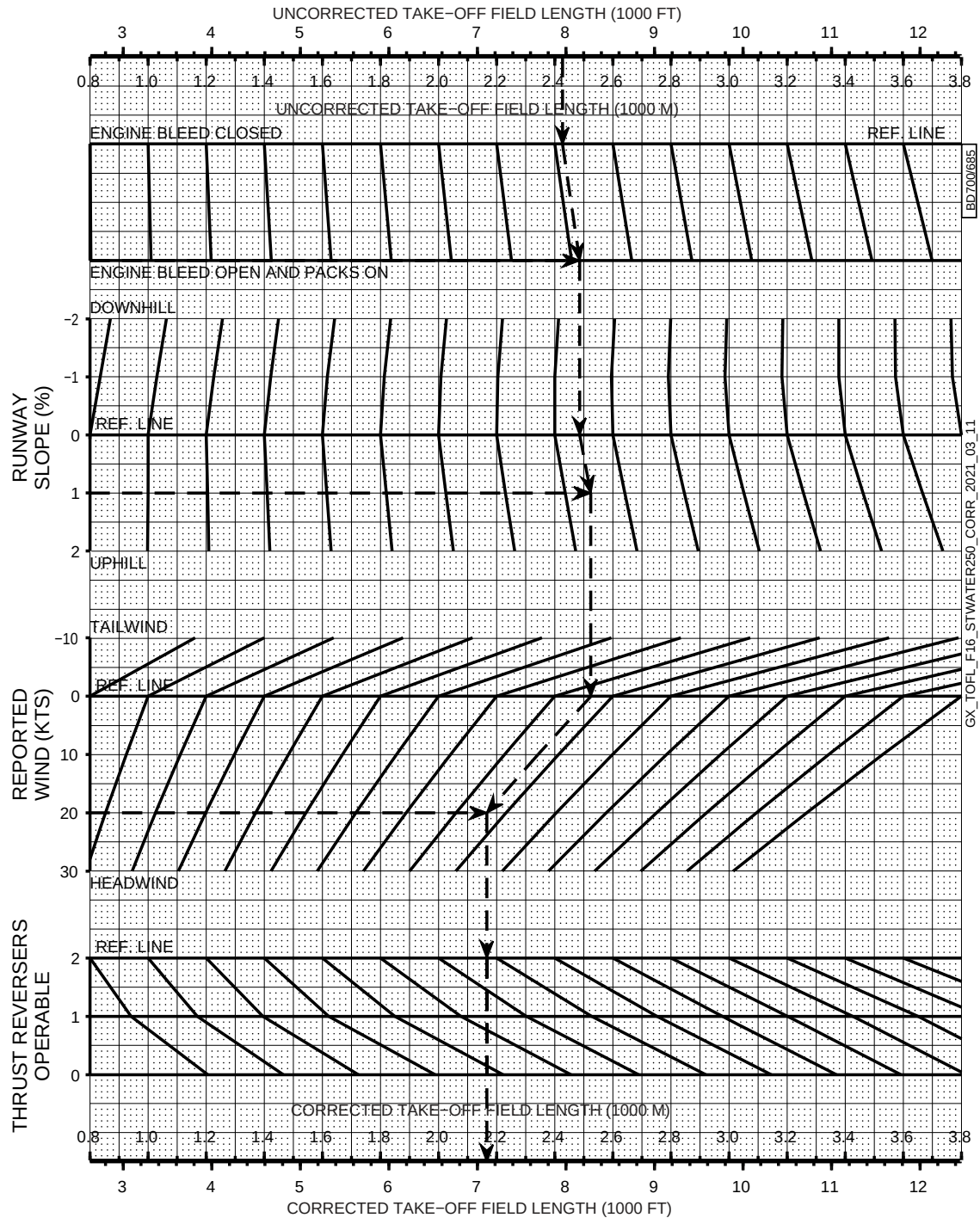
Uncorrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.25") or Equivalent – Slat OUT / Flap 16°

Figure 07-03-29

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Corrected Take-Off Field Length on a Runway Contaminated with Standing Water (0.250 in) or Equivalent – Slat OUT / Flap 16°

Figure 07-03-30

6. PERFORMANCE (CONT'D)**A. Operation on Contaminated Runways (Cont'd)**

- (8) TAKE-OFF DECISION SPEED (V_1) ON A RUNWAY CONTAMINATED WITH STANDING WATER (0.25")

The following charts are used to obtain the take-off decision speed (V_1) required on a runway contaminated with 6.4 mm (0.25 in) of standing water or equivalent [7.6 mm (0.30 in) of slush; or 15.2 mm (0.60 in) of wet snow; or 30.4 mm (1.2 in) of dry snow], for a given value of airplane weight, ambient temperature, airport pressure altitude, reported wind, runway slope, various bleed configurations and number of operable thrust reversers.

V_1 must not be less than V_{1MCG} .

The V_1 required on a runway contaminated with 6.4 mm (0.25 in) of standing water or equivalent, are given by the following:

- Figure 07-03-31 provides the V_1 for a slat OUT/ flap 0° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-32 provides the V_1 for a slat OUT/ flap 6° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.
- Figure 07-03-33 provides the V_1 for a slat OUT/ flap 16° take-off, corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage.

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

The effects of using the cowl anti-ice (CAI) or the wing and cowl anti-ice (WCAI) on the take-off decision speed (V_1) on a runway contaminated with 6.4 mm (0.25 in) of standing water or equivalent, are presented in the following table:

FIGURE	CAI ON CORRECTIONS	WCAI ON CORRECTIONS
07-03-31	Use "ENGINE BLEED OPEN AND PACKS ON" data.	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, use "ENGINE BLEED OPEN AND PACKS ON" data. For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, adjust the "ENGINE BLEED OPEN AND PACKS ON" data as follows: increase V_1 and V_R by 2 knots.
07-03-32 07-03-33	Use "ENGINE BLEED OPEN AND PACKS ON" data.	For take-off pressure altitudes 9,000 ft and below and outside (ambient) air temperatures 5 °C and below, use "ENGINE BLEED OPEN AND PACKS ON" data. For take-off pressure altitudes above 9,000 ft or outside (ambient) air temperatures above 5 °C, adjust the "ENGINE BLEED OPEN AND PACKS ON" data as follows: increase V_1 and V_R by 1 knot.

Example:

Associated Conditions:

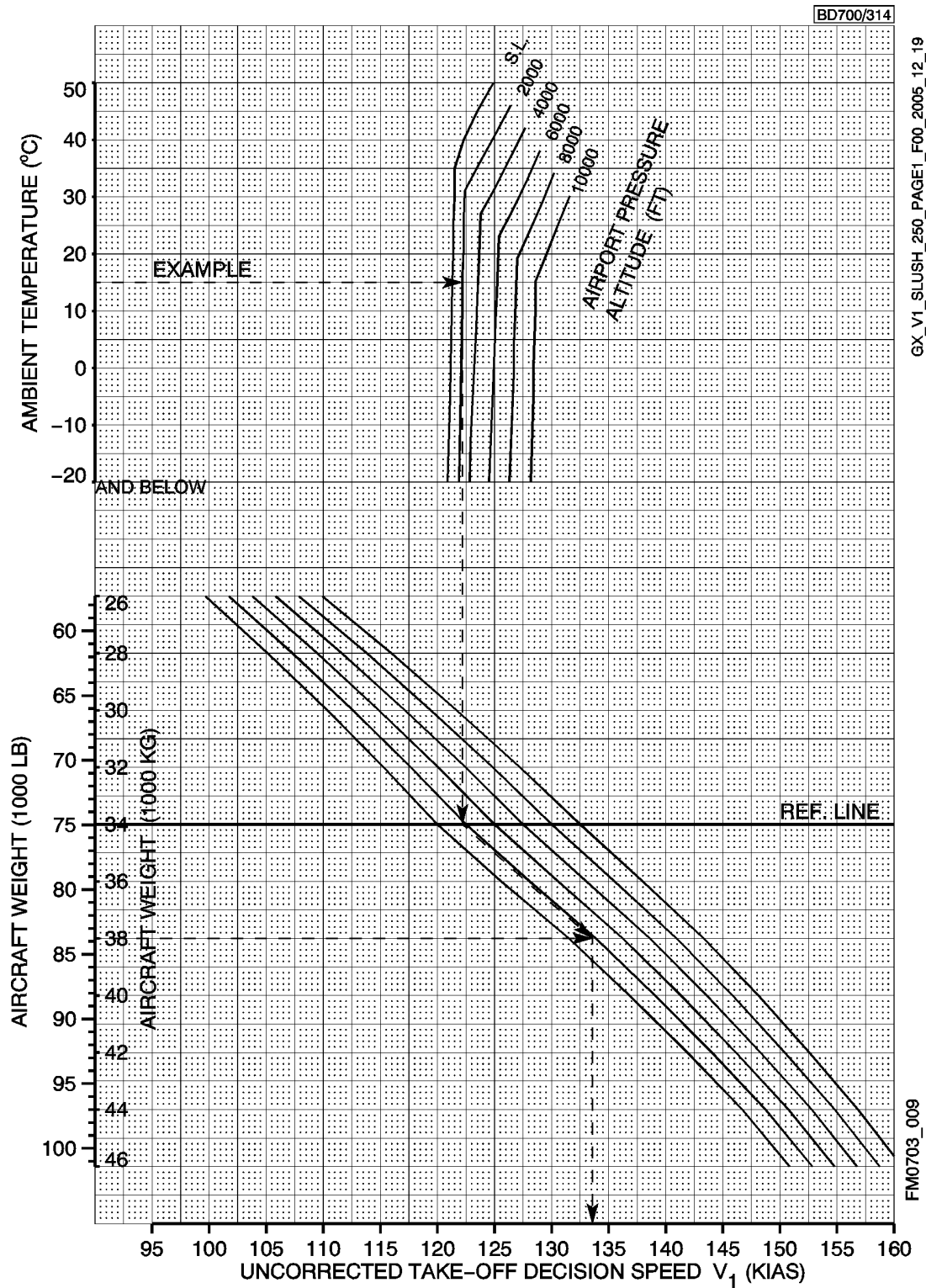
Ambient temperature	= 15 °C
Airport pressure altitude	= 2,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 40,000 kg (88,185 lb)
Reported wind	= 20 knots (headwind)
Runway slope	= + 1% (uphill)
Thrust reversers	= Both operable
Slat/Flap	= OUT/6°

The example in Figure 07-03-32 shows that for the above associated conditions, V_1 is equal to 123.1 KIAS.

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



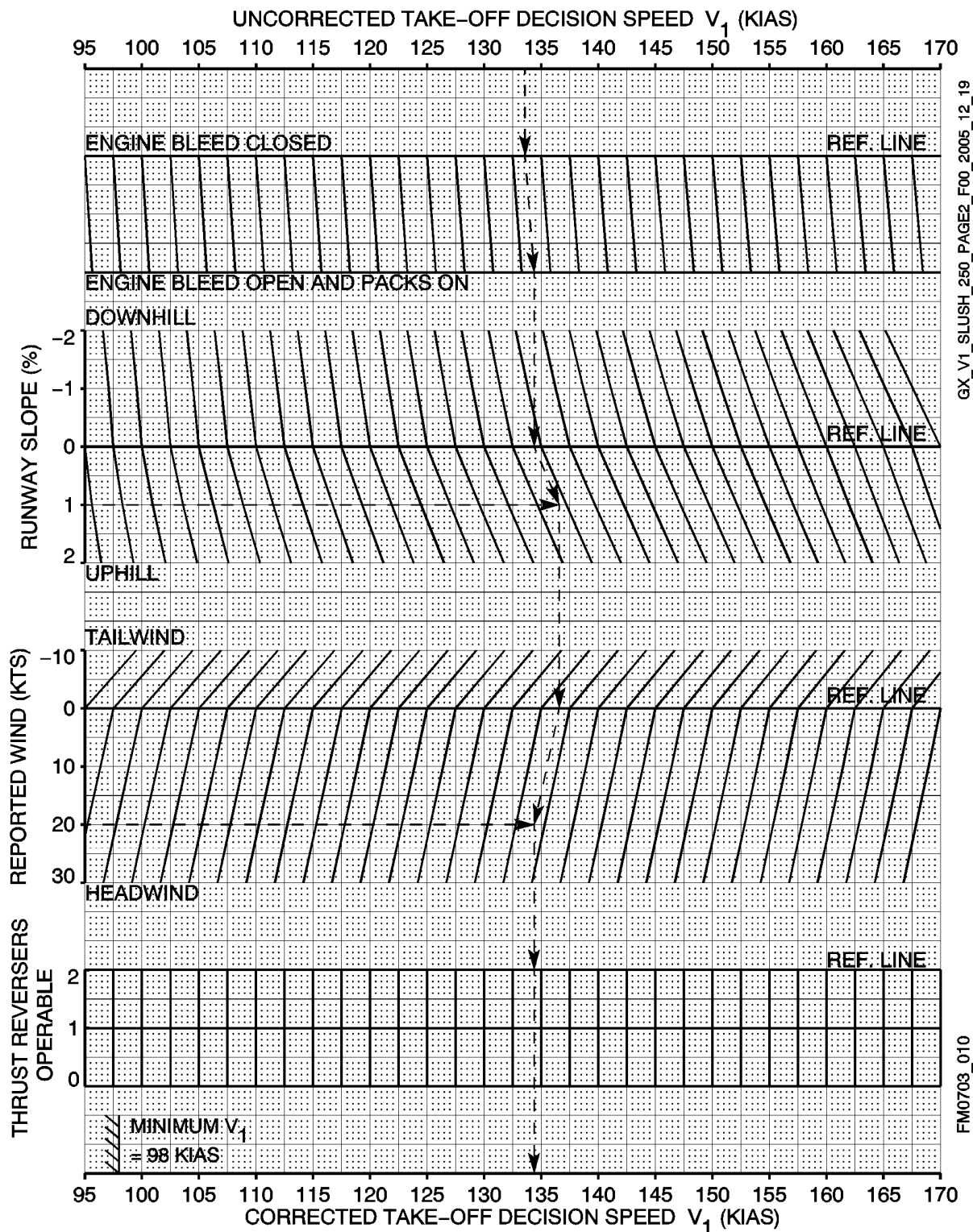
Take-Off Decision Speed on a Runway Contaminated with Standing Water (0.25") or Equivalent – Slat OUT/Flap 0°

Figure 07-03-31 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

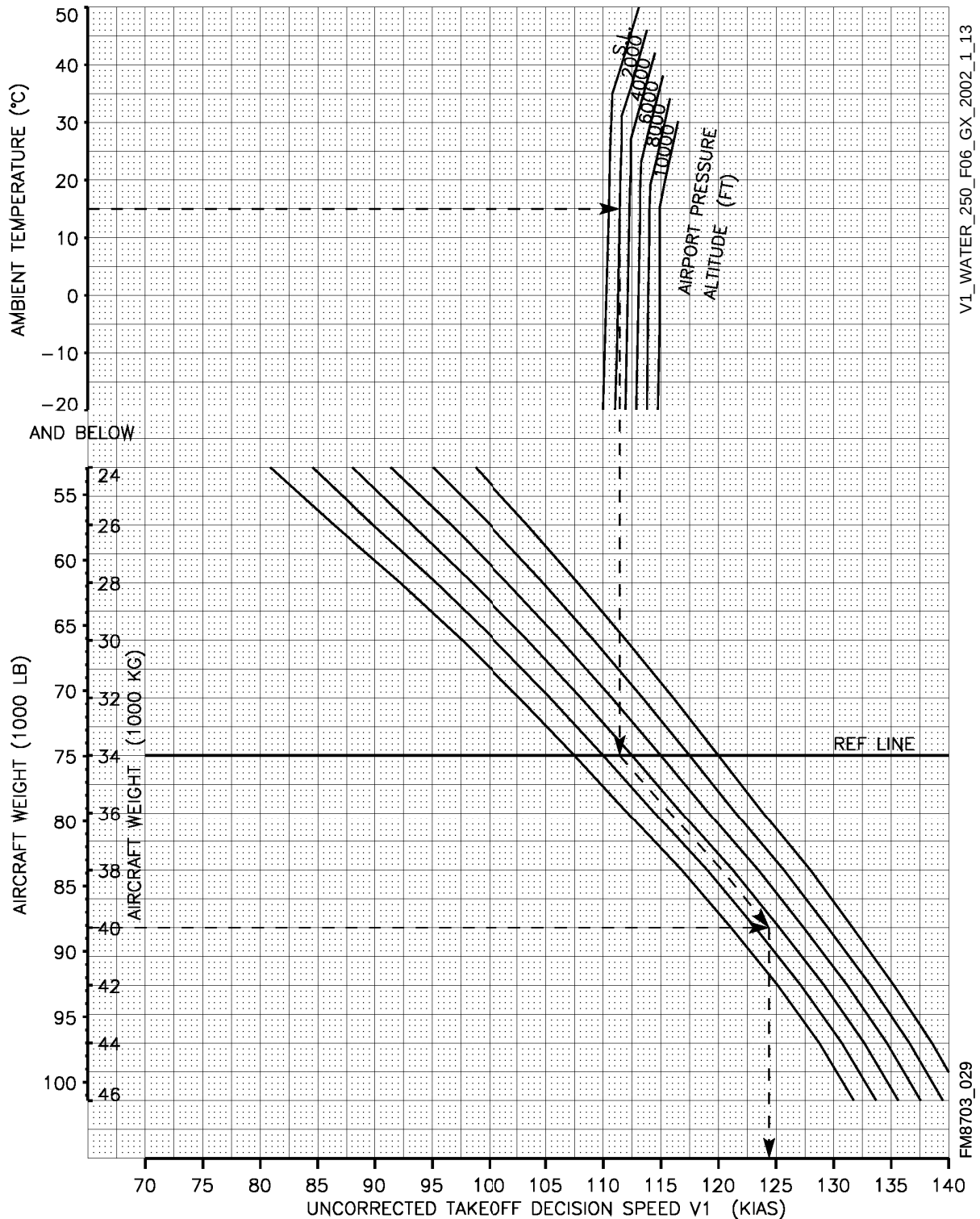


Take-Off Decision Speed on a Runway Contaminated with Standing Water (0.25") or Equivalent –
Slat OUT/Flap 0°

Figure 07-03-31 (Sheet 2 of 2)

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



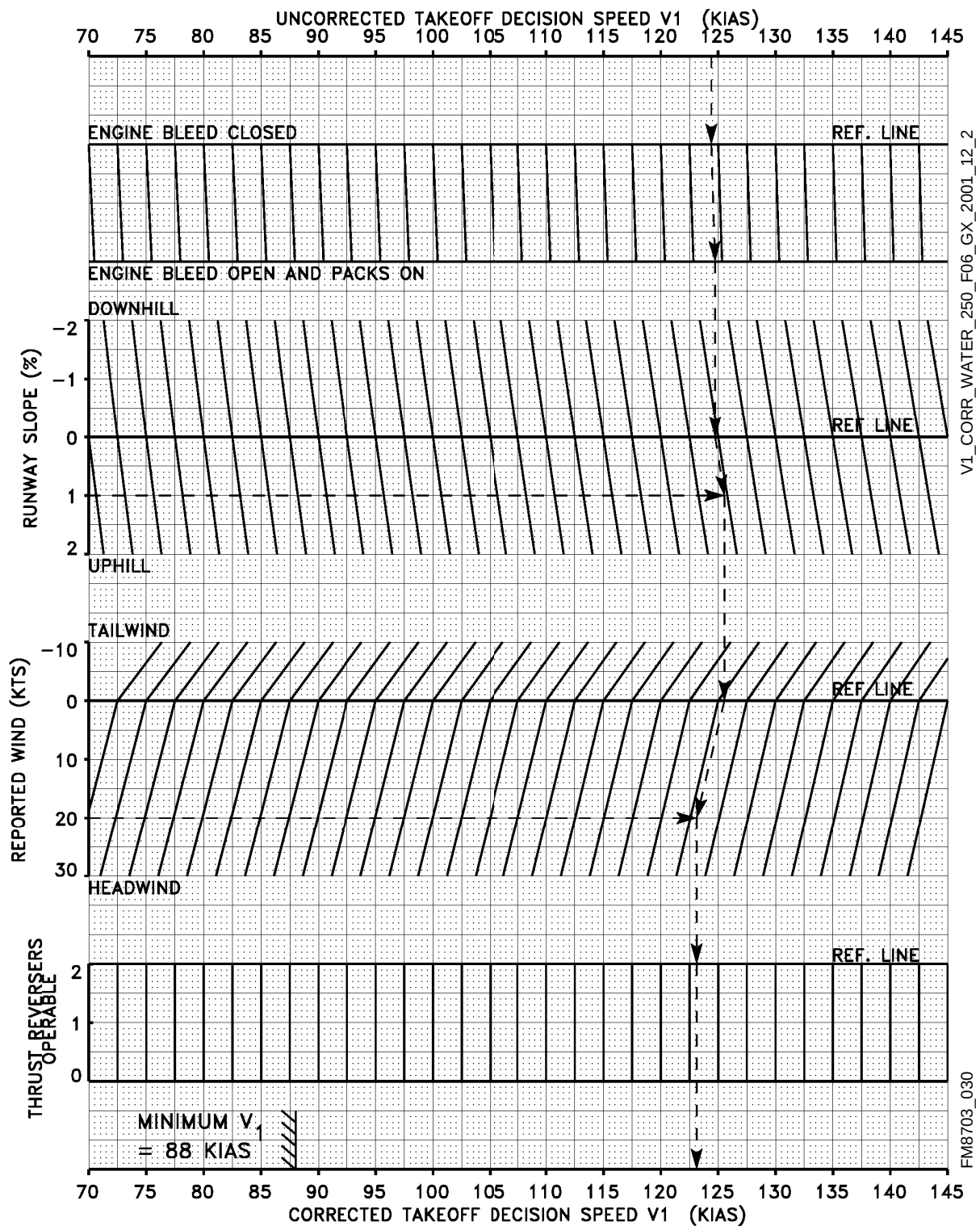
Take-Off Decision Speed on a Runway Contaminated With Standing Water (0.25") or Equivalent –
Slat OUT / Flap 6°

Figure 07-03-32 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Take-Off Decision Speed on a Runway Contaminated With Standing Water (0.25") or Equivalent –
Slat OUT / Flap 6°

Figure 07-03-32 (Sheet 2 of 2)

07-03-01-60

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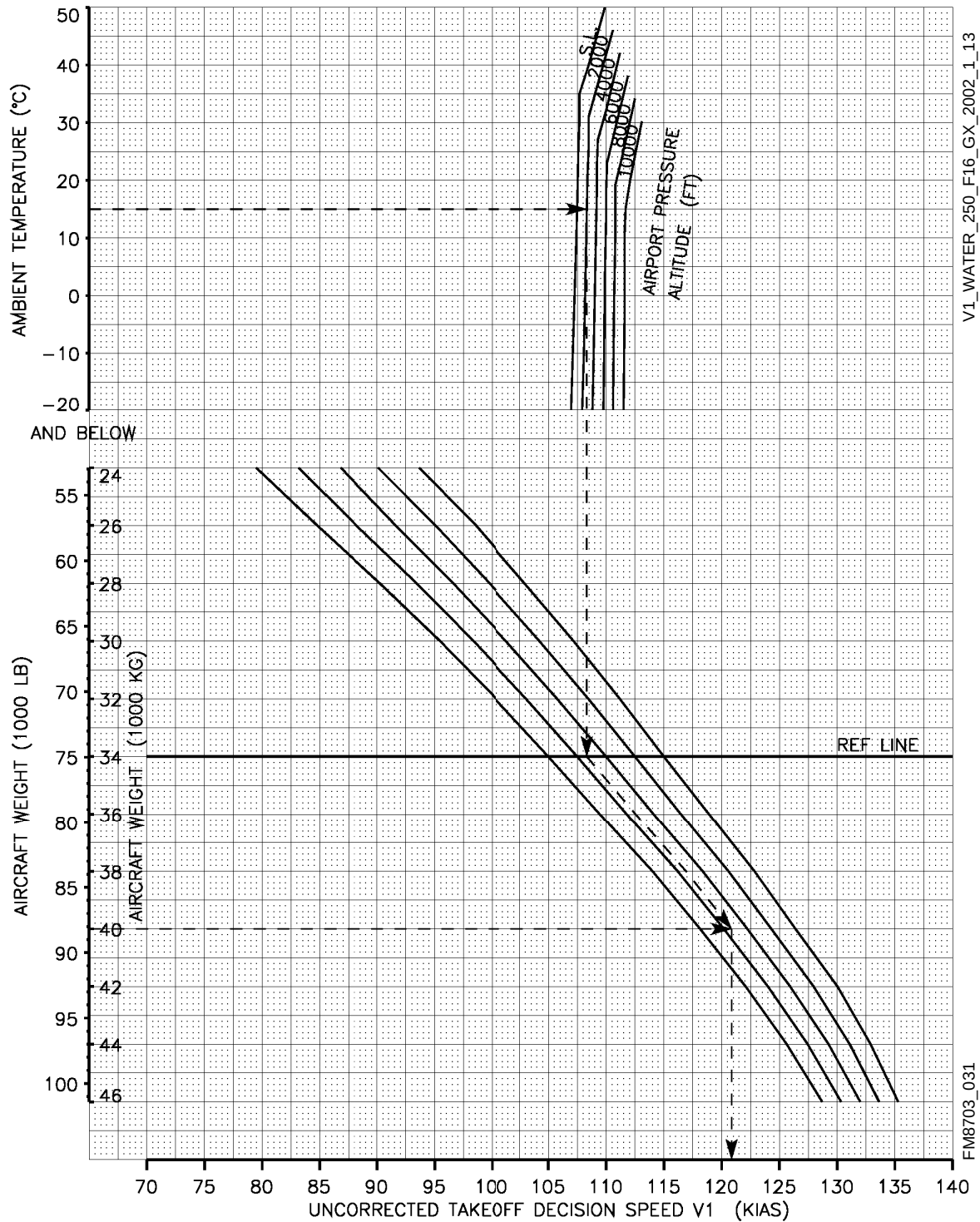
DOT Approved

CSP 700-1A

REV 58, Sep 29, 2008

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



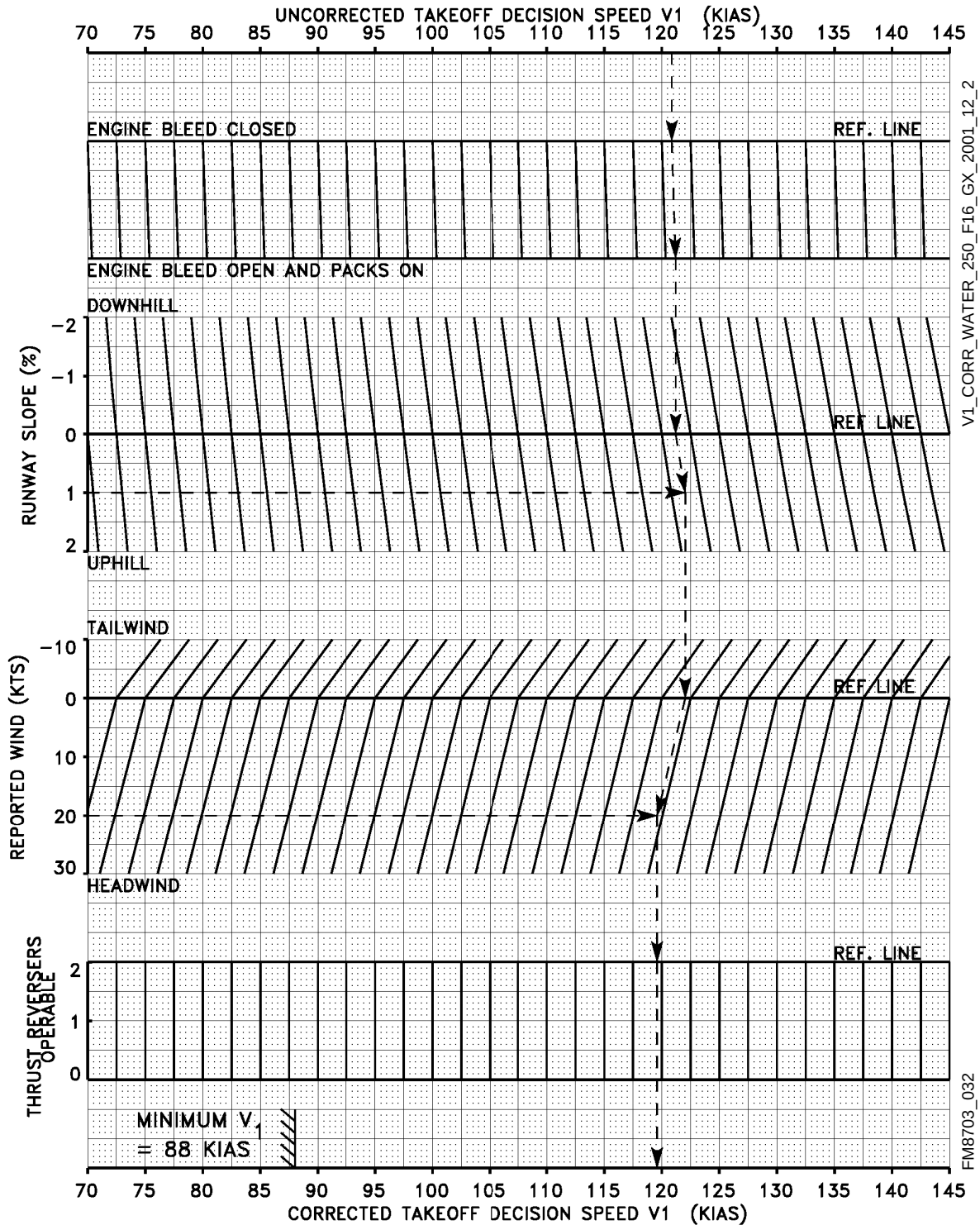
Take-Off Decision Speed on a Runway Contaminated With Standing Water (0.25") or Equivalent –
Slat OUT / Flap 16°

Figure 07-03-33 (Sheet 1 of 2)

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Take-Off Decision Speed on a Runway Contaminated With Standing Water (0.25") or Equivalent –
Slat OUT / Flap 16°

Figure 07-03-33 (Sheet 2 of 2)

SUPPLEMENT 3

OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

(9) ACTUAL LANDING DISTANCE ON CONTAMINATED RUNWAYS

The following charts are used to obtain the actual landing distance on contaminated runways, for a slat OUT / flap 30° landing, for a given value of airplane weight, airport pressure altitude, reported wind, landing approach speed (V_{REF}) increment and number of operable thrust reversers.

The actual landing distance on contaminated runways, for a slat OUT/ flap 30° landing, are given by the following:

- Figure 07-03-34 provides the actual landing distance on a runway contaminated with ice;
- Figure 07-03-35 provides the actual landing distance on a runway contaminated with compacted snow;
- Figure 07-03-36 provides the actual landing distance on a runway contaminated with loose snow (applicable to both loose dry snow or loose wet snow);
- Figure 07-03-37 provides the actual landing distance on a runway contaminated with standing water or its equivalent.

The effects of using the cowl anti-ice (CAI), the wing and cowl anti-ice (WCAI) or ice accumulation on unprotected surfaces, on the actual landing distance on contaminated runways, for a slat OUT / flap 30° landing, are presented in the following table:

FIGURE	CAI ON CORRECTIONS	WCAI ON CORRECTIONS
07-03-34	Increase actual landing distance based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 17% • 0 thrust reversers: 68%	Increase actual landing distance based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 68% • 0 thrust reversers: 100% NOTE Operation with 1 or 0 thrust reverser operative on icy runway is not recommended. If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (220 lb).

SUPPLEMENT 3
OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

FIGURE	CAI ON CORRECTIONS	WCAI ON CORRECTIONS
07-03-35	Increase actual landing distance based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 3% • 0 thrust reversers: 6%	Increase actual landing distance based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 6% • 0 thrust reversers: 15% If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (220 lb).
07-03-36	Increase actual landing distance based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 5% • 0 thrust reversers: 13%	Increase actual landing distance based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 11% • 0 thrust reversers: 37% If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (220 lb).
07-03-37		Increase actual landing distance based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 11% • 0 thrust reversers: 39% If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (220 lb).

Example:

Associated Conditions:

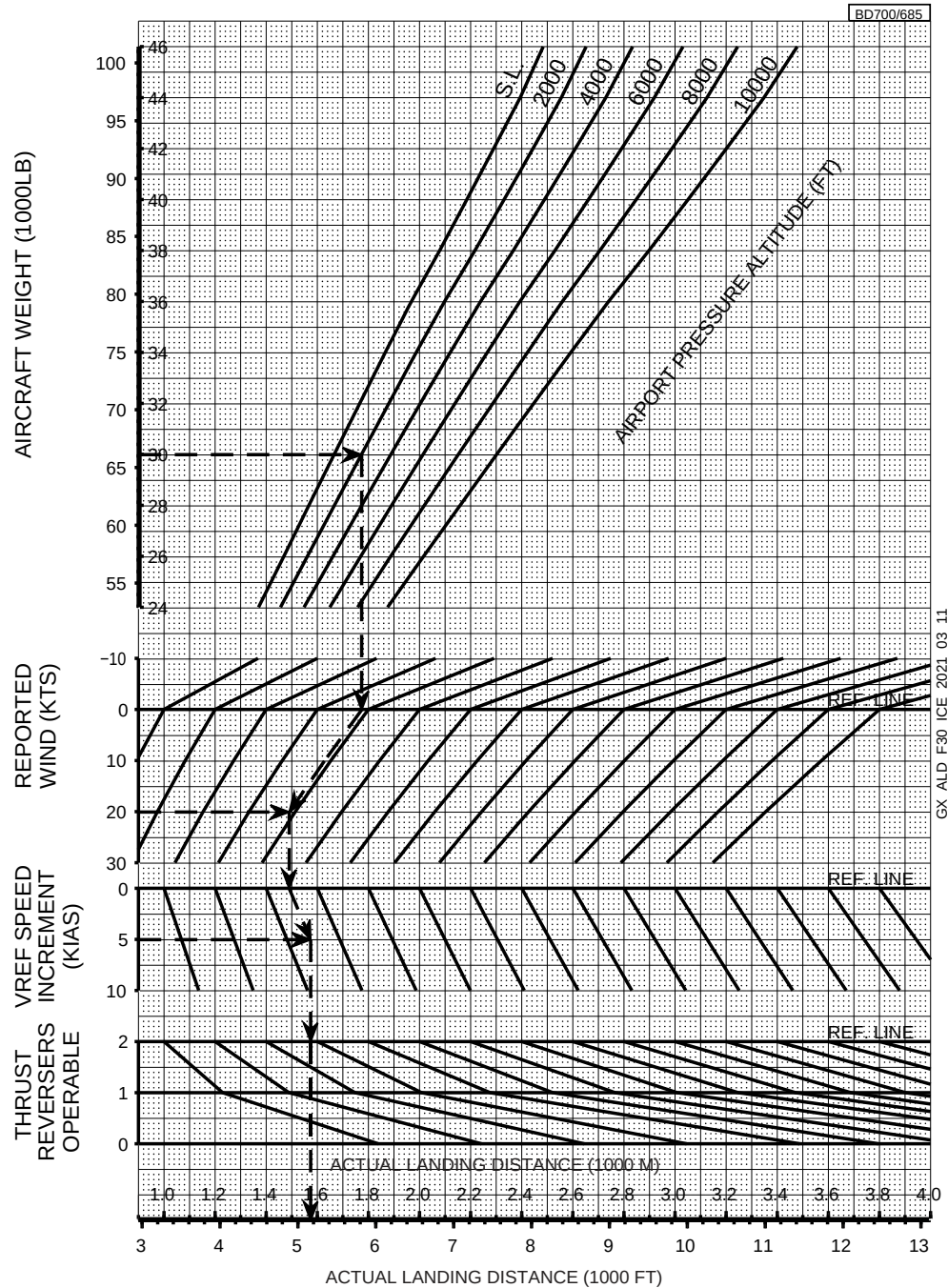
Contaminant	= Ice
A/C weight	= 30,000 kg (66,140 lb)
Airport pressure altitude	= 2,000 ft
Reported wind	= 20 knots (headwind)
V _{REF} speed increment	= + 5 KIAS
Thrust reversers	= Both operable
Cowl anti-ice	= On

The example in Figure 07-03-34 shows that for the above associated conditions, the actual landing distance is 1,573 meters (5,161 feet).

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

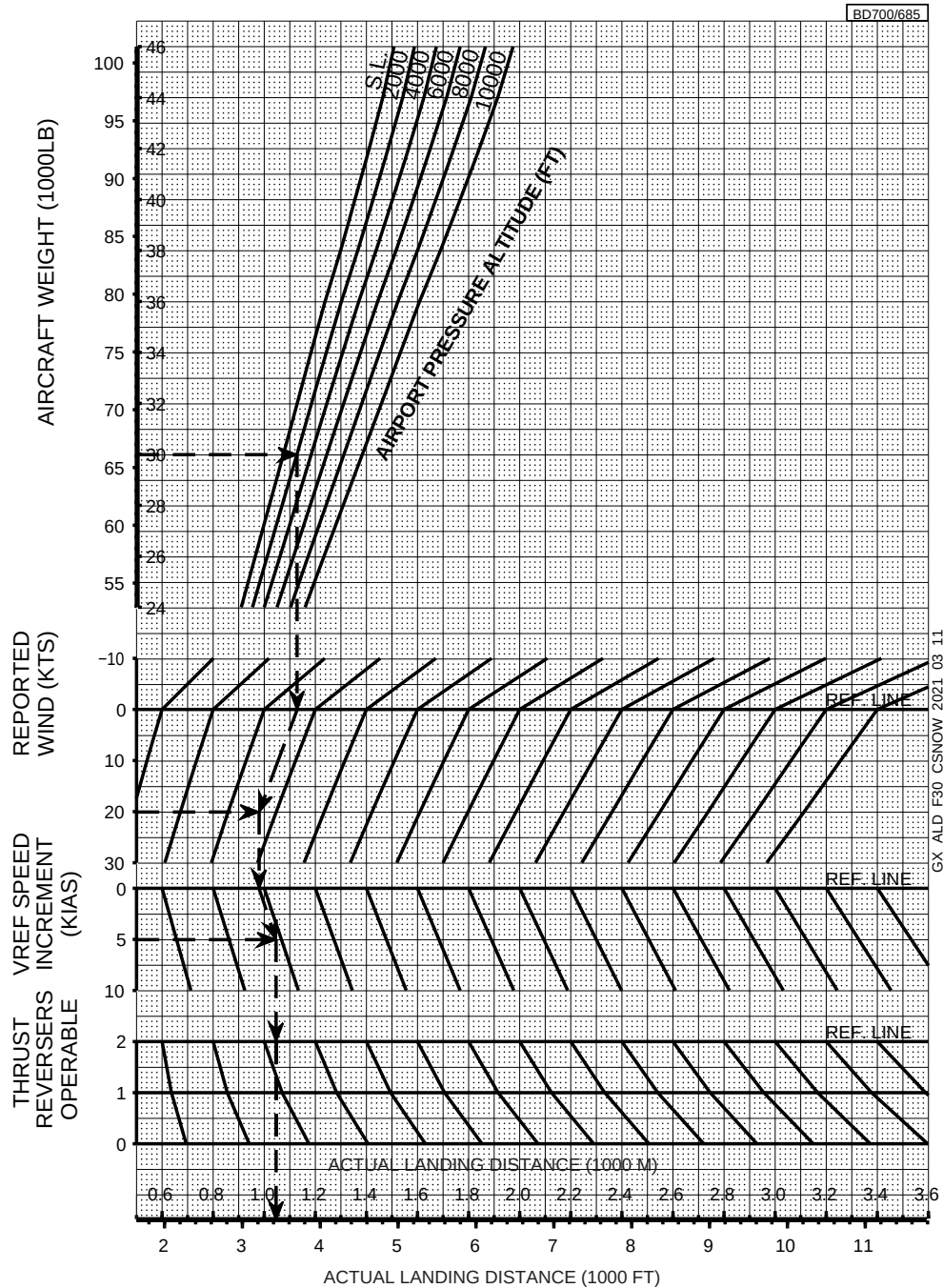


Actual Landing Distance on a Runway Contaminated With Ice – Slat OUT / Flap 30°
Figure 07-03-34

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

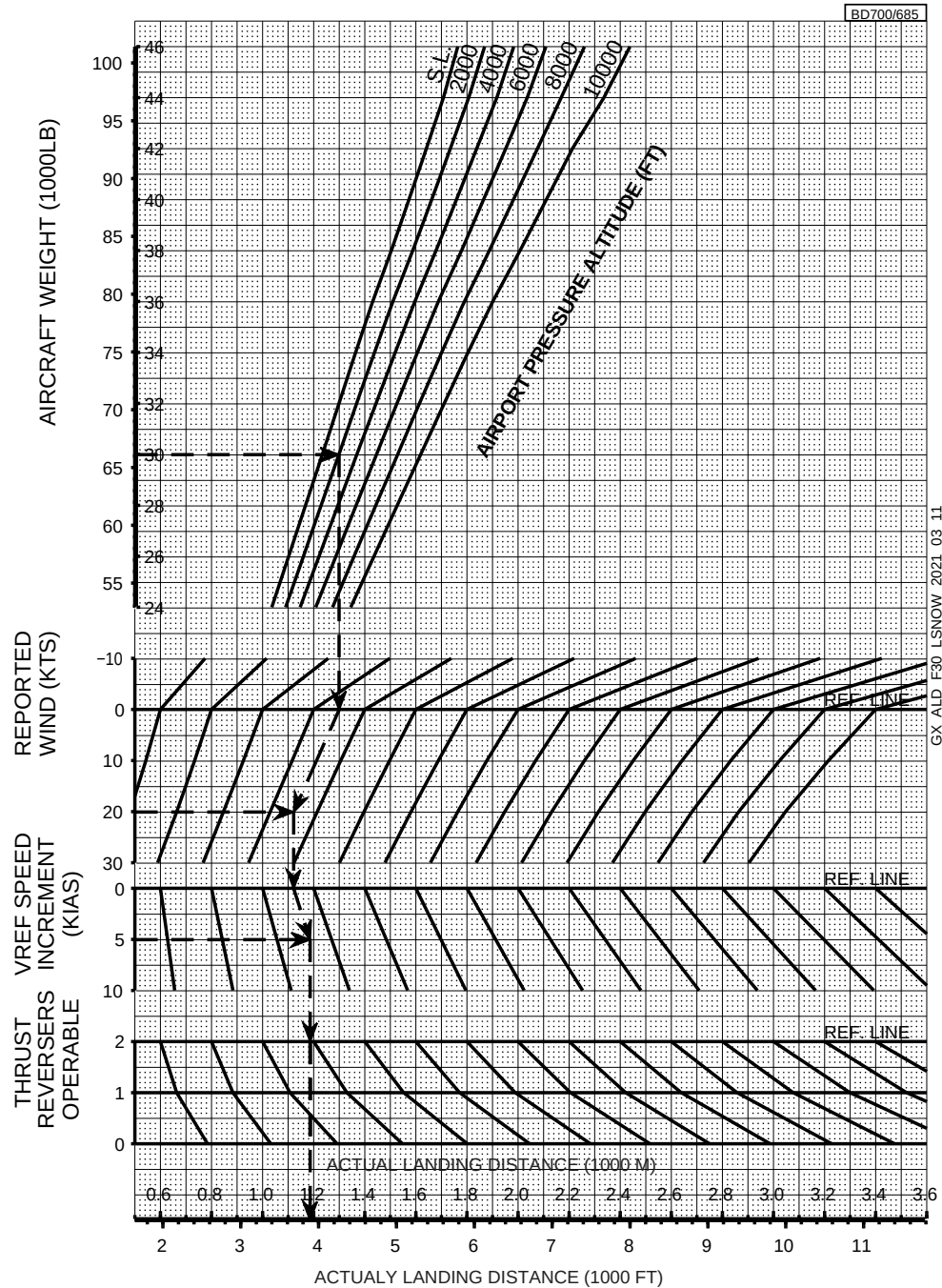


Actual Landing Distance on a Runway Contaminated With Compacted Snow – Slat OUT / Flap 30°
Figure 07-03-35

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)

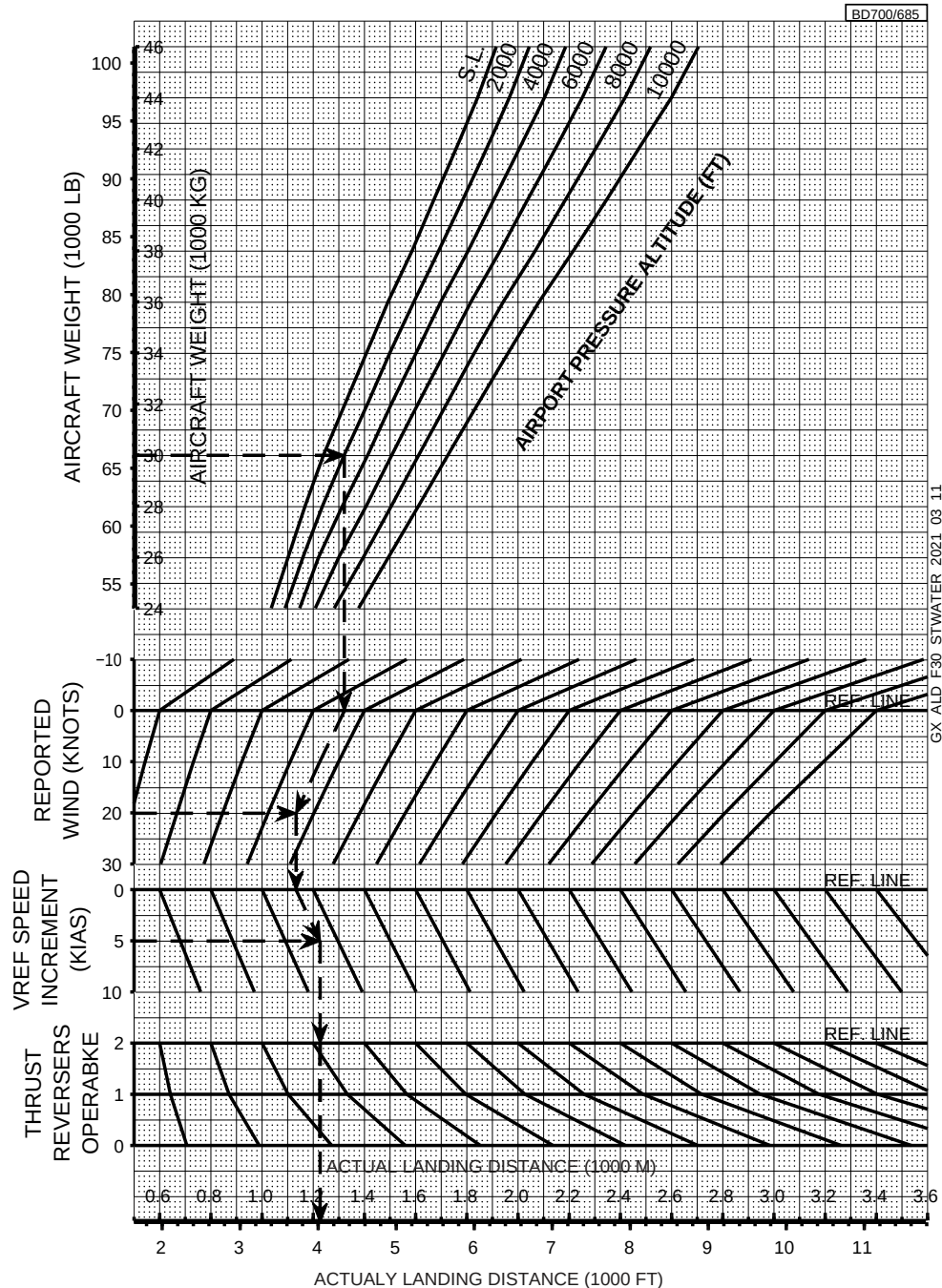


Actual Landing Distance on a Runway Contaminated With Loose Snow – Slat OUT / Flap 30°
Figure 07-03-36

SUPPLEMENT 3 OPERATION ON CONTAMINATED RUNWAYS

6. PERFORMANCE (CONT'D)

A. Operation on Contaminated Runways (Cont'd)



Actual Landing Distance on a Runway Contaminated With Standing Water– Slat OUT / Flap 30°
Figure 07-03-37

SUPPLEMENT 5
IMPROVED CLIMB PERFORMANCE**1. INTRODUCTION****A. General**

This Supplement contains the improved climb performance data for a slat out / flap 6° take-off, for the GLOBAL EXPRESS® model BD 700-1A10 airplane, fitted with two BR700-710A2-20 engines, and may be used whenever the airplane is climb performance take-off weight limited and that both the take-off distance and the brake energy available are greater than that required.

A climb performance limited take-off weight results when the available climb gradient, with one engine inoperative, is equal to any of the minimum gradients required by regulations for the various segments of the take-off flight path. When excess take-off distance and brake energy are available, the take-off weight may be increased by correspondingly increasing the take-off safety speed (V_2). The take-off decision speed (V_1) and rotation speed (V_R) must also be increased accordingly. This method is applicable to both dry and wet runway operations.

In some cases, when it has been determined that when the brake energy limit is reached and excess field length is still available, an increase in the take-off weight may be achieved by reducing the V_1/V_R ratio. This alternate method is applicable to dry runway operations only.

The effects of this Supplement on the basic Airplane Flight Manual (AFM) are given in paragraphs 2. to 6. in the following pages.

B. Qualifying Take-Off Conditions

The improved climb performance data given herein may be used to maximize the take-off weight, provided all of the following take-off conditions apply:

- (1) The take-off weight is limited by take-off climb requirements;
- (2) The take-off distance available is greater than that required for the climb limited weight;
- (3) The take-off weight limited by brake energy available is greater than the take-off weight limited by climb requirements;
- (4) The take-off weight limited by tire speed is greater than the take-off weight limited by climb requirements; and
- (5) The take-off weight is NOT limited by obstacle clearance requirements. The end of the available runway must be used as the reference zero point during obstacle clearance calculations.

SUPPLEMENT 5
IMPROVED CLIMB PERFORMANCE

2. LIMITATIONS

The limitations in Chapter 2 and the Supplement Compatibility table (Page 07-00-01-1) are applicable, except as modified by the following:

- Use of this data for a slat OUT / flap 16° take-off is prohibited.
- The maximum number of overspeed units to be used is 7.

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

Increase take-off field length required by a factor of 1.5 when scheduled V_1 speed is higher than the maximum V_1 speed shown below:

MAXIMUM V_1 SPEED (KIAS)			
Pressure Alt (ft)	Tailwind/Headwind (kt)		
	Tailwind ≤ 10 kt	Headwind ≤ 10 kt	Headwind > 10 kt
Sea Level	133	144	152
1,000	132	142	150
2,000	131	140	148
3,000	129	138	146
4,000	128	136	143
5,000	127	135	141
6,000	125	133	139
7,000	124	131	137
8,000	122	129	135
9,000	121	127	132
10,000	120	126	130
11,000	118	124	128
12,000	117	122	126
13,000	116	120	123

SUPPLEMENT 5
IMPROVED CLIMB PERFORMANCE**3. LIMITATIONS**

MAXIMUM V_1 SPEED (KIAS)			
14,000	114	119	121

3. EMERGENCY PROCEDURES (CONT'D)

The emergency procedures in Chapter 3 are applicable.

4. NORMAL PROCEDURES

The normal procedures in Chapter 4 are applicable.

5. NON-NORMAL PROCEDURES

The non-normal procedures in Chapter 5 are applicable.

6. PERFORMANCE

The performance data in Chapter 6 and the compatible supplements are applicable, in addition to the data given below:

NOTE

Compatible supplement performance penalties are cumulative.

Where applicable, the performance factor of the compatible supplement must be applied to the calculated performance data of this supplement.

A. Improved Climb Performance

The following data may be used to maximize the take-off weight, subject to the conditions of paragraphs 1. B. and 2., for given conditions of airport altitude, ambient temperature and field length available, for a slat OUT / flap 6° take-off. The maximum allowable take-off weight is first determined, which is then used to derive the new allowable take-off weight.

Obtaining a new take-off weight by increasing the take-off speeds is the procedure that is normally used for improved climb performance calculations. This procedure may be applied to either dry or wet runway operations.

Under certain circumstances, an additional increase in the take-off weight may be obtained by reducing the V_1 / V_R ratio. This alternate procedure however, may only be applied to dry runway operations.

(1) MAXIMUM ALLOWABLE TAKE-OFF WEIGHT

The first step in obtaining an improved climb performance is to derive the maximum allowable take-off weight.

The maximum allowable take-off weight is the most restrictive of the following:

- Take-off weight limited by climb requirements; or
- Take-off weight limited by brake energy available; or
- Take-off weight limited by available field length; or
- Take-off weight limited by tire speed.

SUPPLEMENT 5
IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

The maximum take-off weight limited by climb requirements, for a slat out / flap 6° take-off, is obtained from the main body of the AFM, using Figure 06-03-1 under paragraph 2. A. (1) within Chapter 6 – PERFORMANCE – TAKE-OFF PERFORMANCE.

The maximum take-off weight limited by brake energy available in the brake system (BTMS operative), for a slat out / flap 6° take-off, is obtained from the main body of the AFM, using Figure 06-03-2, under paragraph 2. A. (3) within Chapter 6 – PERFORMANCE – TAKE-OFF PERFORMANCE.

NOTE

For wet runway operations, increase the maximum take-off weight limited by brake energy derived from Figure 06-03-2 by 4,000 kg (8,818 lb).

The maximum take-off weight limited by the available field length, for a slat out / flap 6° take-off, on dry or wet runways, is determined from Figure 07-05-1, for varying conditions of ambient temperature, airport pressure altitude, runway condition and available field length. The uncorrected take-off weight is first obtained and then corrected for the effects of runway condition, engine bleed configuration, reported wind and runway slope.

NOTE

The take-off field length data on wet runways are based on both thrust reversers operable and assumes that maximum available reverse thrust is used down to a complete stop.

The maximum take-off weight limited by tire speed, for a slat out / flap 6° take-off, on dry or wet runways, is determined from Figure 07-05-2, for varying conditions of ambient temperature, airport pressure altitude, reported wind and runway slope. The tire limit speed of 210 mph (183 knots), does not restrict the maximum take-off weight for a slat OUT / flap 6° configuration.

(2) REDUCED V_1 / V_R RATIO

When the maximum allowable take-off weight limited by brake energy is less than the maximum allowable take-off weight limited by available field length, as obtained from paragraph (1) above, the excess field length may be traded for the brake energy limit and the take-off weight increased by using a reduced V_1 / V_R ratio, in combination afterwards with an increase in the take-off speeds. The take-off weight adjustment for the effects of using a reduced V_1 / V_R ratio, is given in Figure 07-05-3. This procedure is only applicable to dry runway operations and is described in more detail in Example B.

(3) TAKE-OFF SPEED INCREASE

When the maximum allowable take-off weight limited by available field length is less than the maximum allowable take-off weight limited by brake energy, as obtained from paragraph (1) above, increasing the take-off speeds will yield an increase in the allowable take-off weight. This procedure is described as follows and in Example A.

SUPPLEMENT 5
IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

(a) Weight Limit Trade-Offs

The following trade-off charts present the effects of increased take-off speeds on the maximum allowable take-off weights obtained previously and are used to determine the optimum speed increase and corresponding increased take-off weight for improved climb performance. The climb limited weight is traded-off against the brake energy limited weight, the available field length limited weight and the tire speed limited weight.

Figure 07-05-4 presents the trade-off chart between the available field length limited weight and the climb limited weight. Both weights are entered and their corresponding guidelines followed until the lines intersect or until the maximum overspeed reference of 20 units is reached on the climb limit guidelines.

Figure 07-05-5 presents the trade-off chart between the brake energy limited weight and the climb limited weight. Both weights are entered and their corresponding guidelines followed until the lines intersect or until the maximum overspeed reference of 20 units is reached on the climb limit guidelines.

Figure 07-05-6 presents the trade-off chart between the tire speed limited weight and the climb limited weight. Both weights are entered and their corresponding guidelines followed until the lines intersect or until the maximum overspeed reference of 20 units is reached on the climb limit guidelines.

The new maximum allowable take-off weight and speed increase are the lesser of the three values derived from Figure 07-05-4 to Figure 07-05-6.

(b) Take-Off Speeds

Using the new maximum allowable take-off weight, the take-off speeds for a slat OUT / flap 6° take-off, are determined from the main body of the AFM.

The take-off decision speed (V_1) for dry runways and the rotation speed (V_R) for dry or wet runways, are obtained from Figure 06-03-8 under paragraph 2. D. (4) within Chapter 6 – PERFORMANCE – TAKE-OFF PERFORMANCE.

The take-off decision speed (V_1) for wet runways is obtained from Figure 06-03-7, under paragraph 2. D. (2) within Chapter 6 – PERFORMANCE – TAKE-OFF PERFORMANCE.

The take-off safety speed (V_2) for dry or wet runways is obtained from Figure 06-03-9, under paragraph 2. D. (5) within Chapter 6 – PERFORMANCE – TAKE-OFF PERFORMANCE.

These new take-off speeds are then corrected using Figure 07-05-7 and Figure 07-05-8 for V_1 (and V_R) and V_2 , respectively.

(c) Target Pitch Attitude for Take-Off

During a slat OUT / flap 6° take-off on improved climb performance operations, the airplane must be rotated to a modified target pitch attitude and the flight director guidance cue disregarded. The adjusted target pitch attitude is presented in Figure 07-05-9, as a function of the actual increase in V_2 (the delta V_2 , as a result of the corrected V_2 speed derived from Figure 07-05-8), for both the one-engine-inoperative and all-engines-operating cases.

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

(d) Horizontal Stabilizer Trim Setting Correction

Figure 07-05-10 presents the correction to the take-off stabilizer trim setting. The horizontal stabilizer trim setting obtained from Figure 06-03-19 under paragraph 5.A., within Chapter 6 – PERFORMANCE – TAKE-OFF PERFORMANCE, is adjusted for the actual increase in V_2 (the delta V_2 , as a result of the corrected V_2 speed obtained from Figure 07-05-8), and is presented for various centres of gravity. Values between the two given centres of gravity may be derived by linear interpolation.

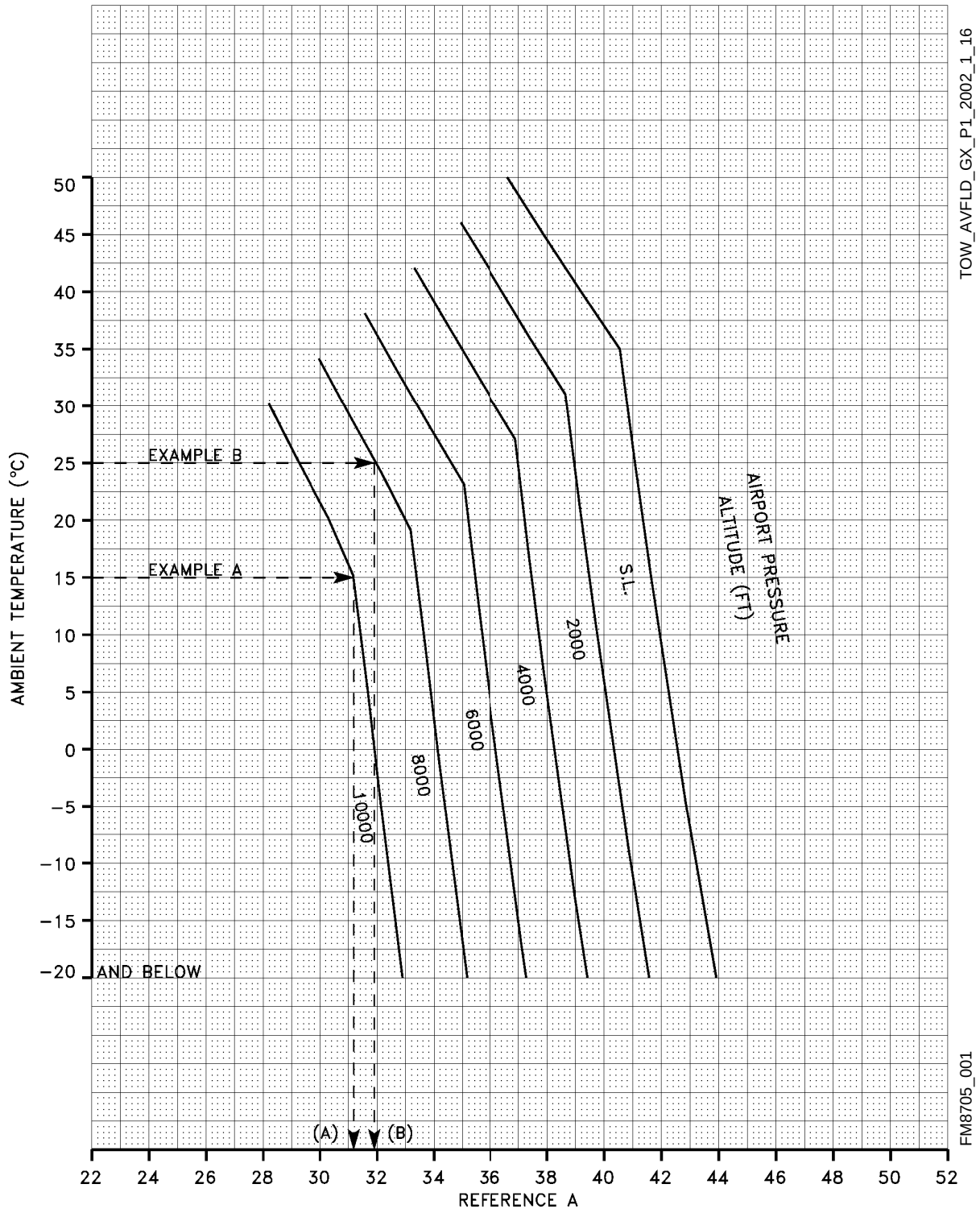
(e) Obstacle Clearance Reference Climb Gradient

Figure 07-05-11 presents the uncorrected obstacle clearance reference climb gradient for various amounts of speed increase which adjusts the obstacle clearance reference climb gradient obtained from the main body of the AFM (see Figure 06-04-3 and Figure 06-04-4) under paragraph 3. A. within Chapter 6 – PERFORMANCE – OBSTACLE CLEARANCE.

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

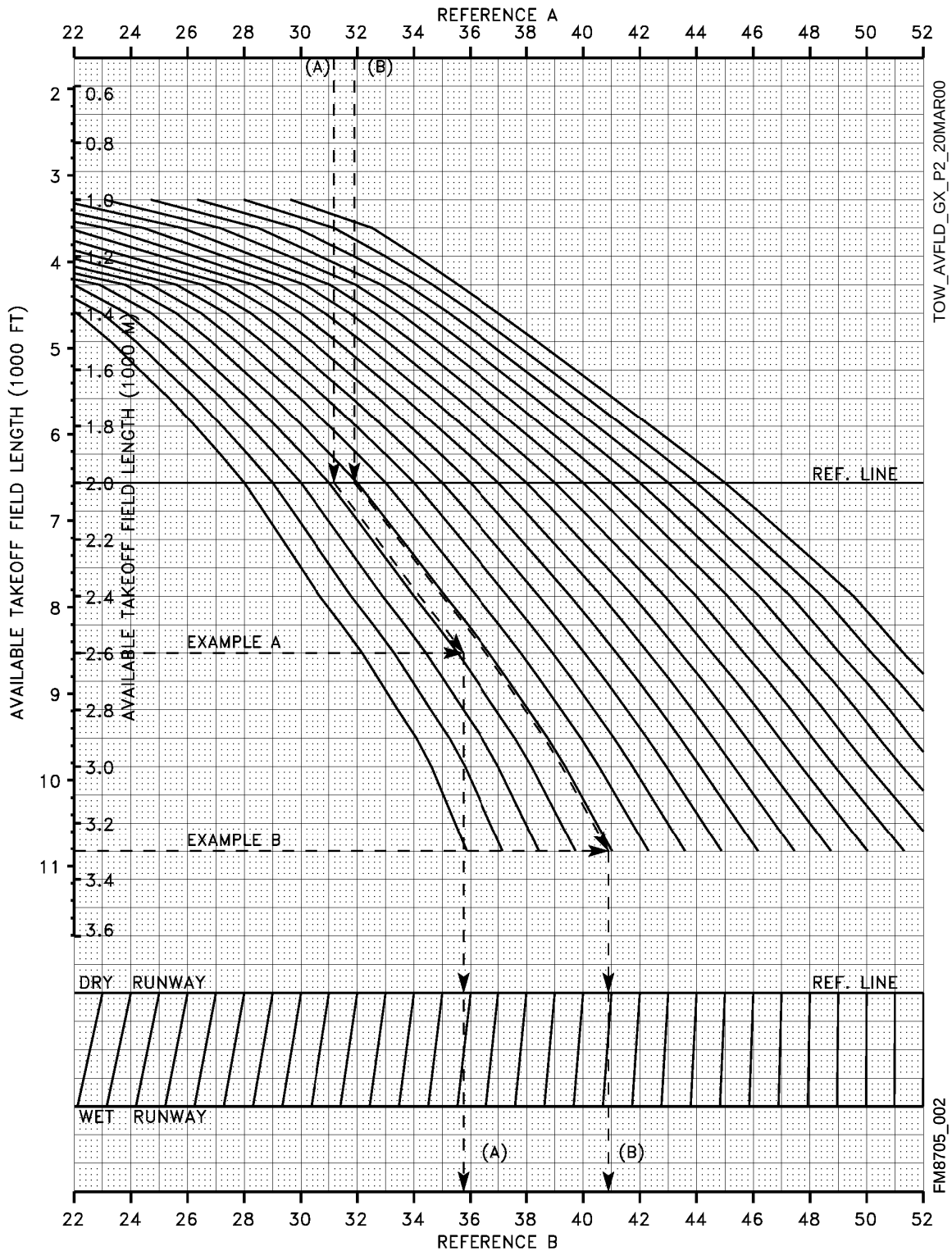


Take-Off Weight Limited by Available Field Length — Slat OUT / Flap 6°
Figure 07-05-1 (Sheet 1 of 3)

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

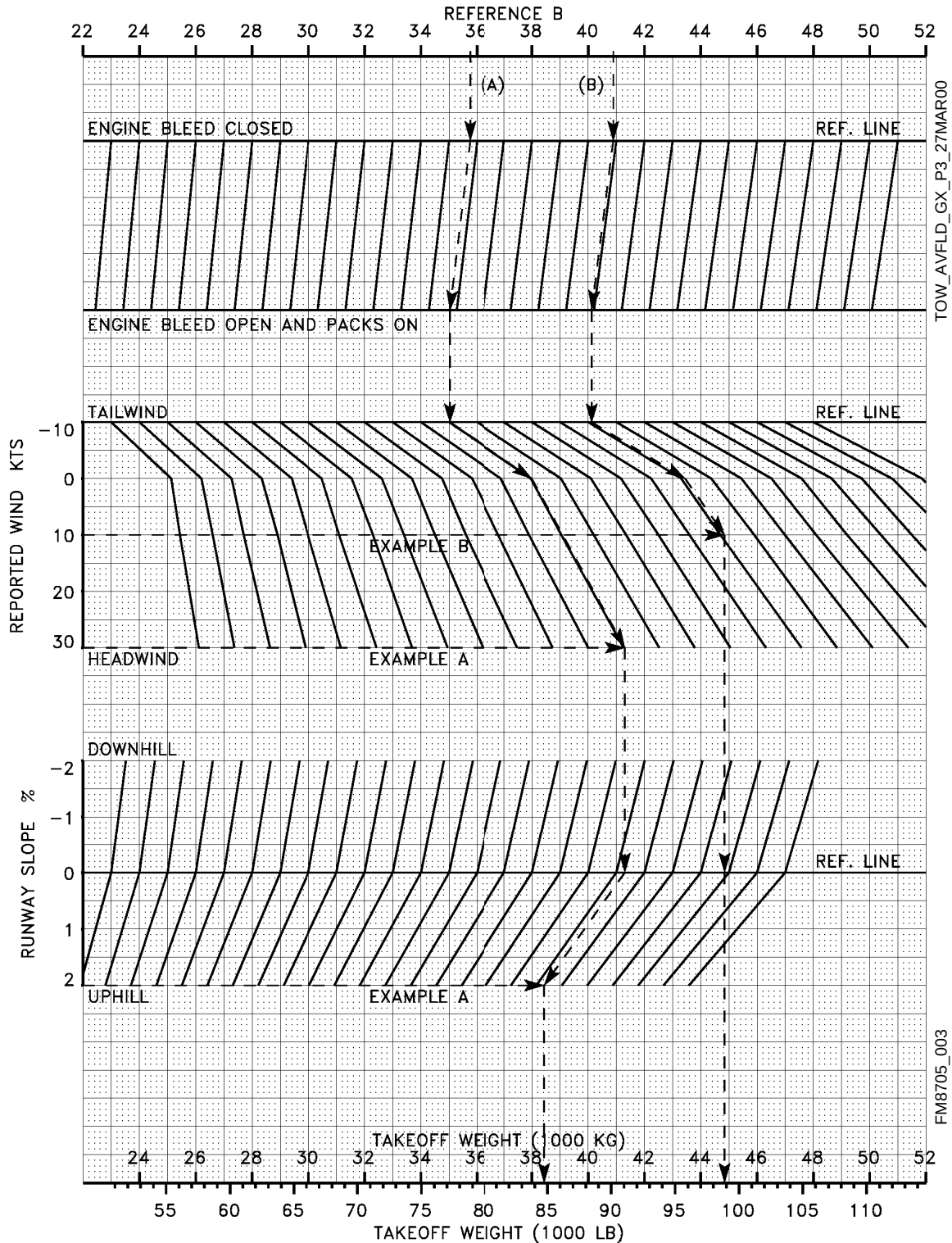


Take-Off Weight Limited by Available Field Length — Slat OUT / Flap 6°
Figure 07-05-1 (Sheet 2 of 3)

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

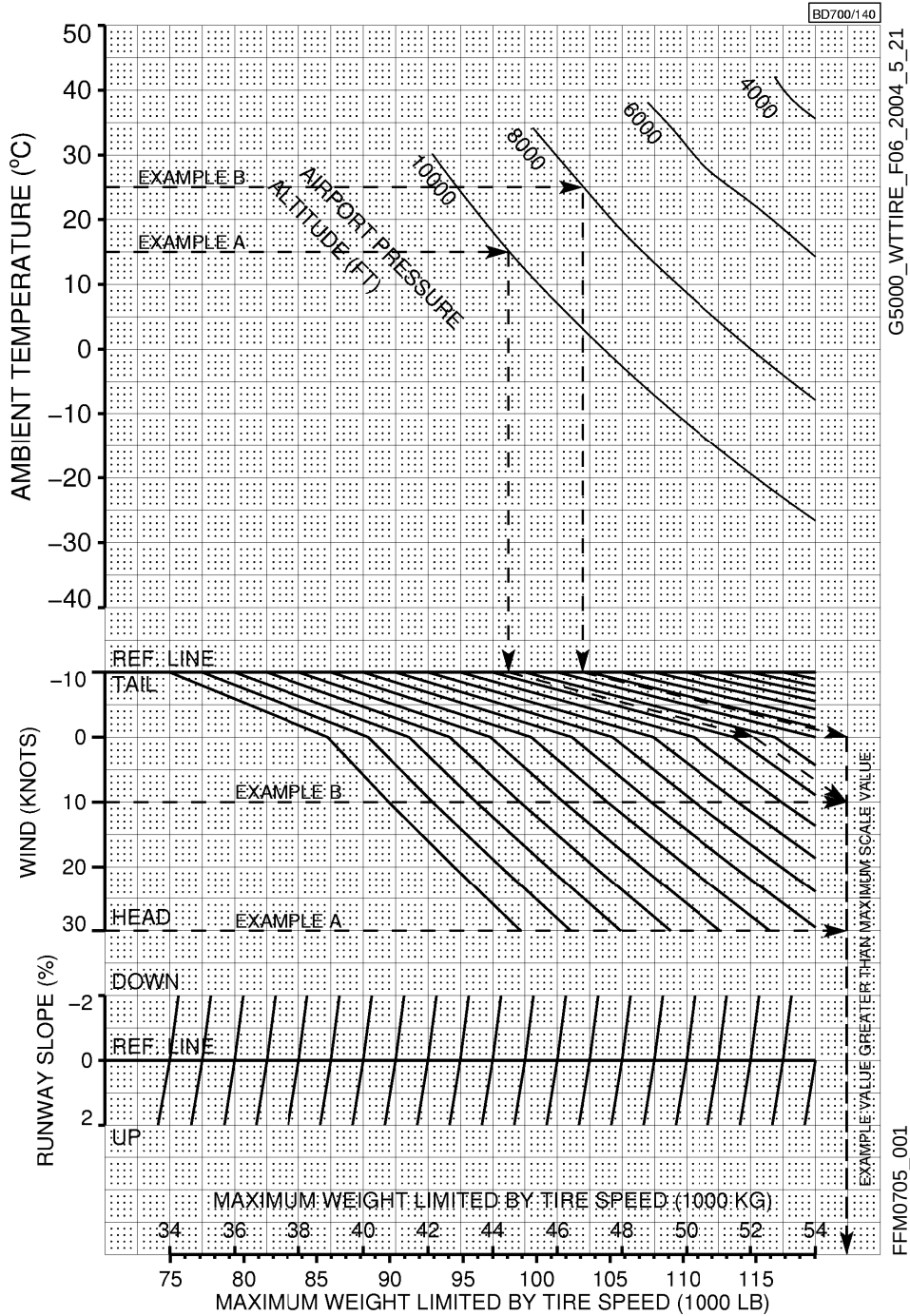


Take-Off Weight Limited by Available Field Length — Slat OUT / Flap 6°
Figure 07-05-1 (Sheet 3 of 3)

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

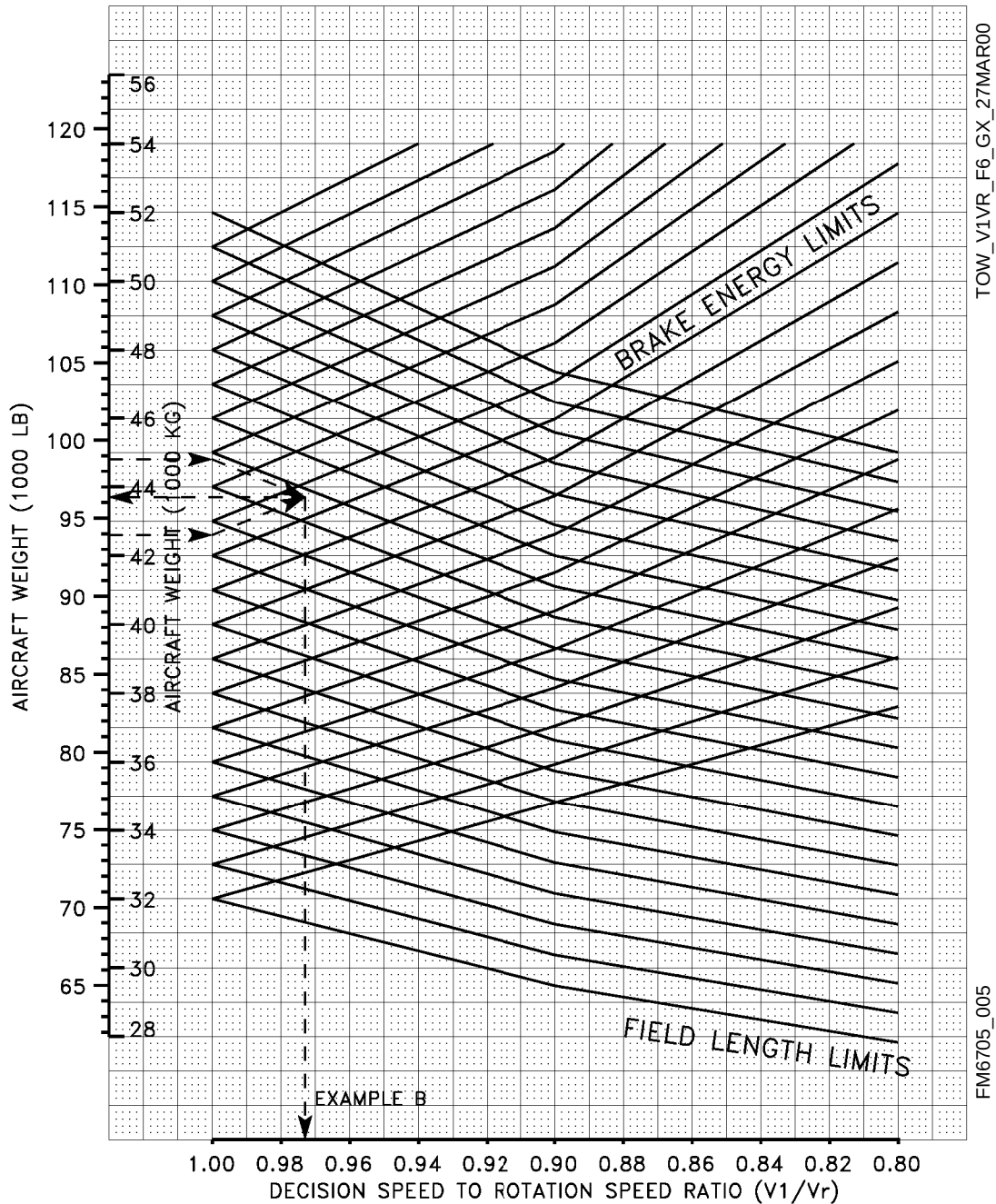


Take-Off Weight Limited by Tire Speed – Slat OUT / Flap 6°
Figure 07-05-2

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

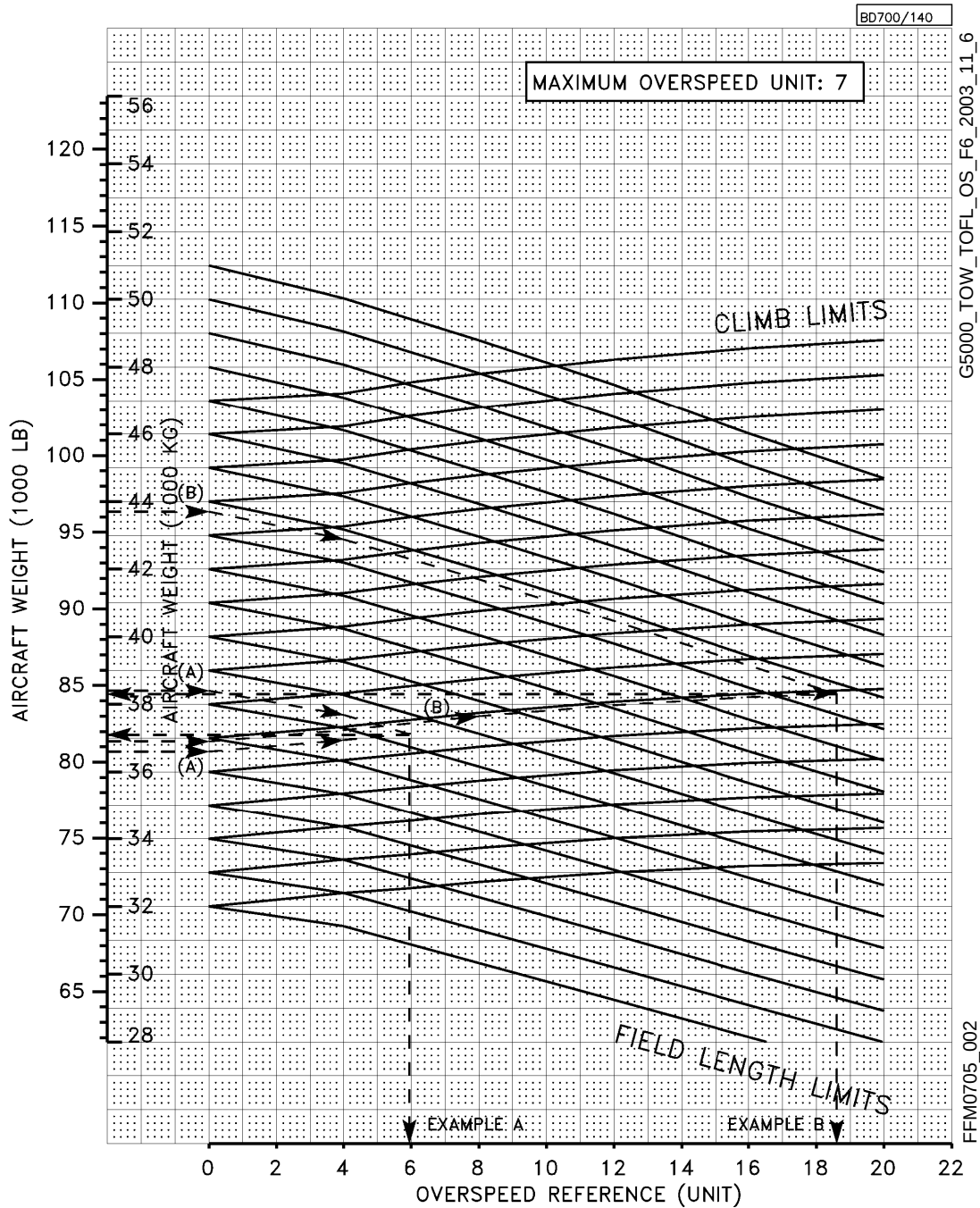


Brake Energy / Field Length Limits Trade-Off for Reduced V_1/V_r – Slat OUT / Flap 6°
Figure 07-05-3

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

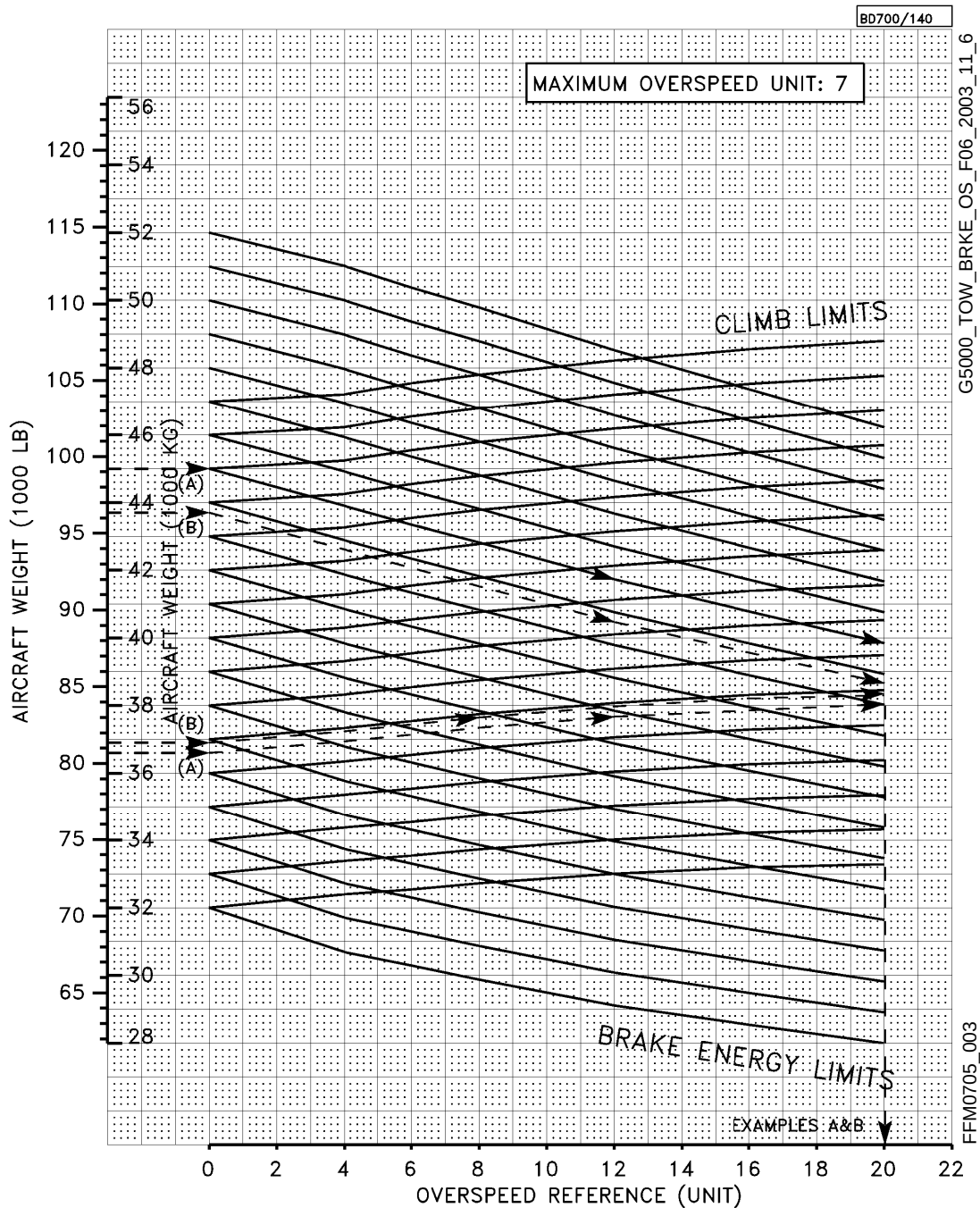


Field Length / Climb Limits Trade-Off – Slat OUT / Flap 6°
Figure 07-05-4

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

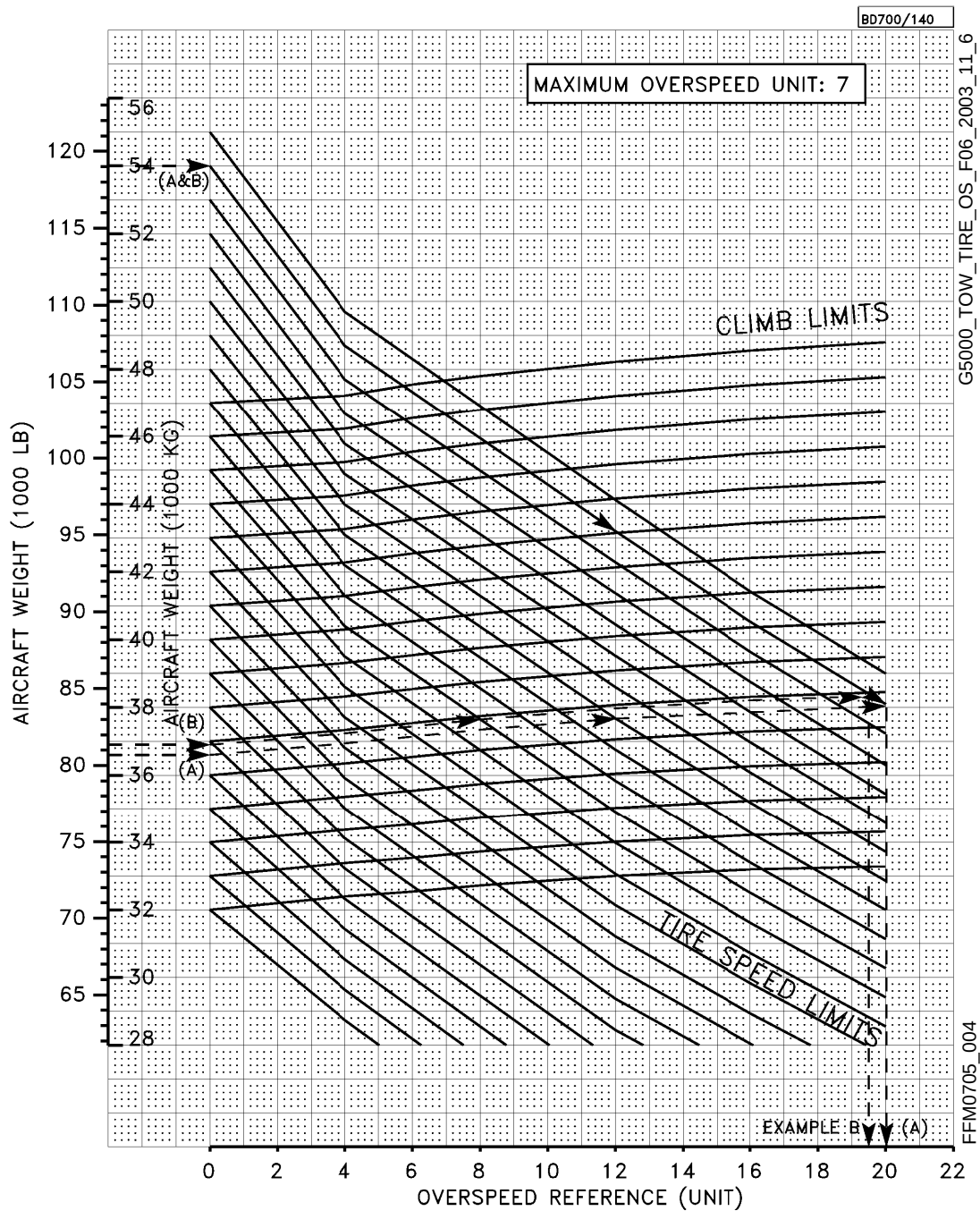


Brake Energy / Climb Limits Trade-Off – Slat OUT / Flap 6°
Figure 07-05-5

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

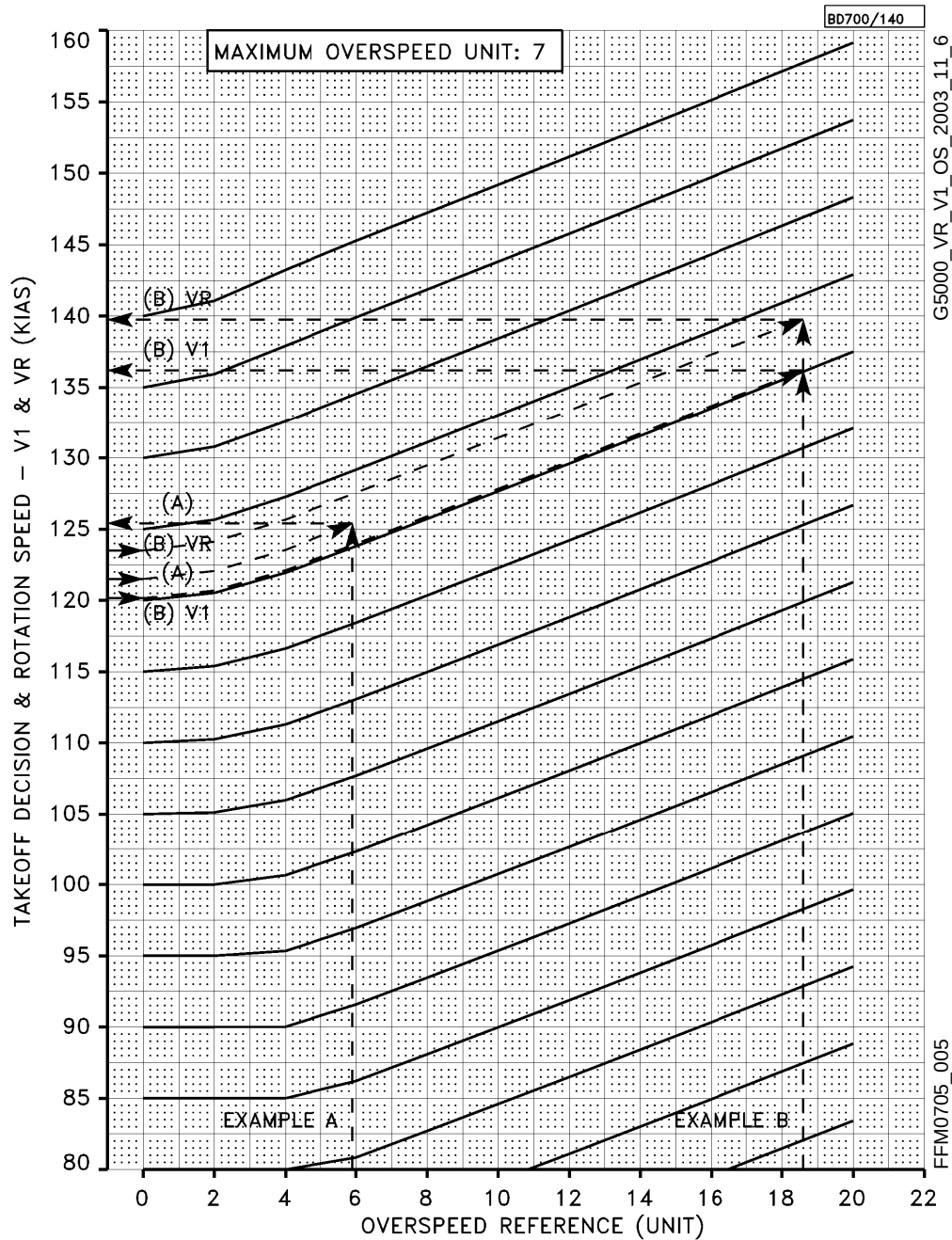


Tire Speed / Climb Limits Trade-Off – Slat OUT / Flap 6°
Figure 07-05-6

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

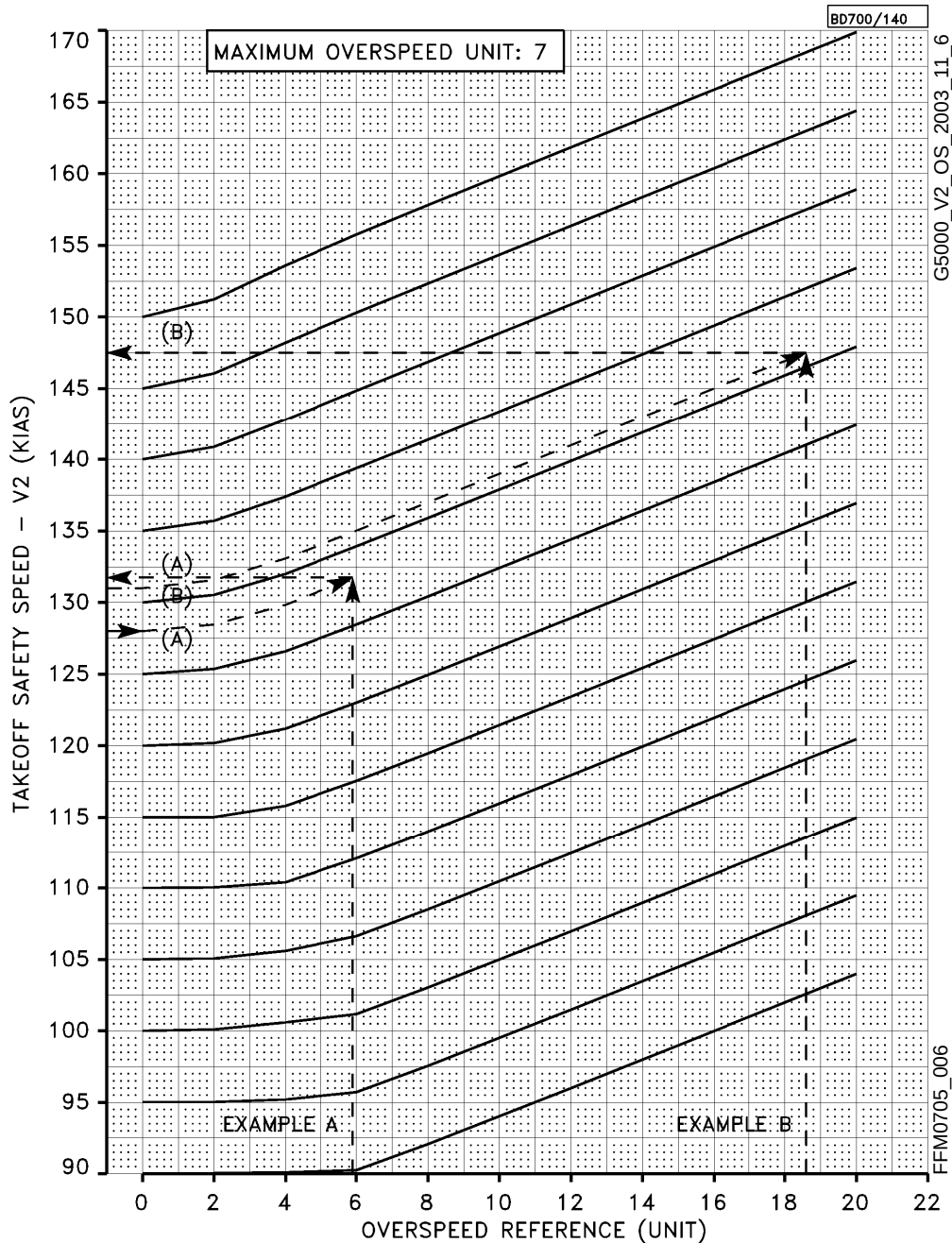


Take-Off Decision and Rotation Speeds (V_1 and V_R) Correction - Slat OUT / Flap 6°
Figure 07-05-7

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

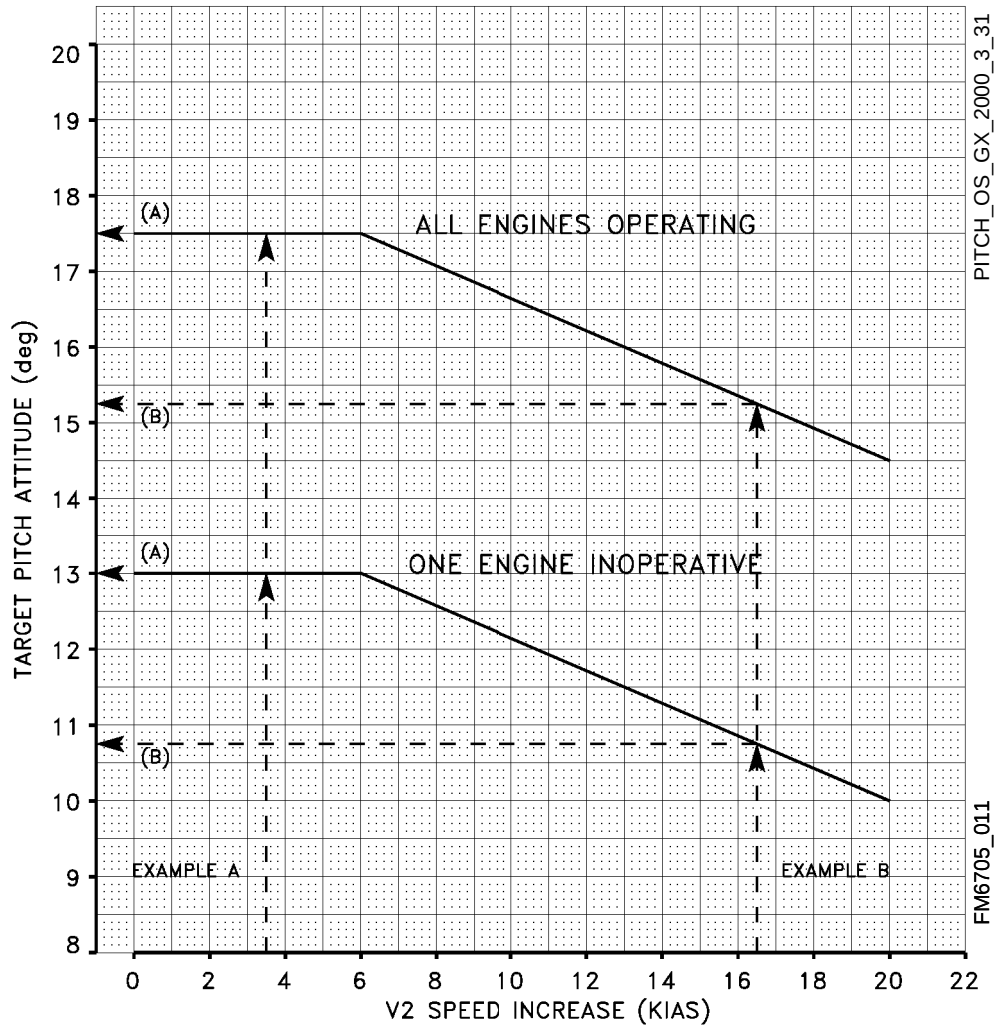


Take-Off Safety Speed (V₂) Correction – Slat OUT / Flap 6°
Figure 07-05-8

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

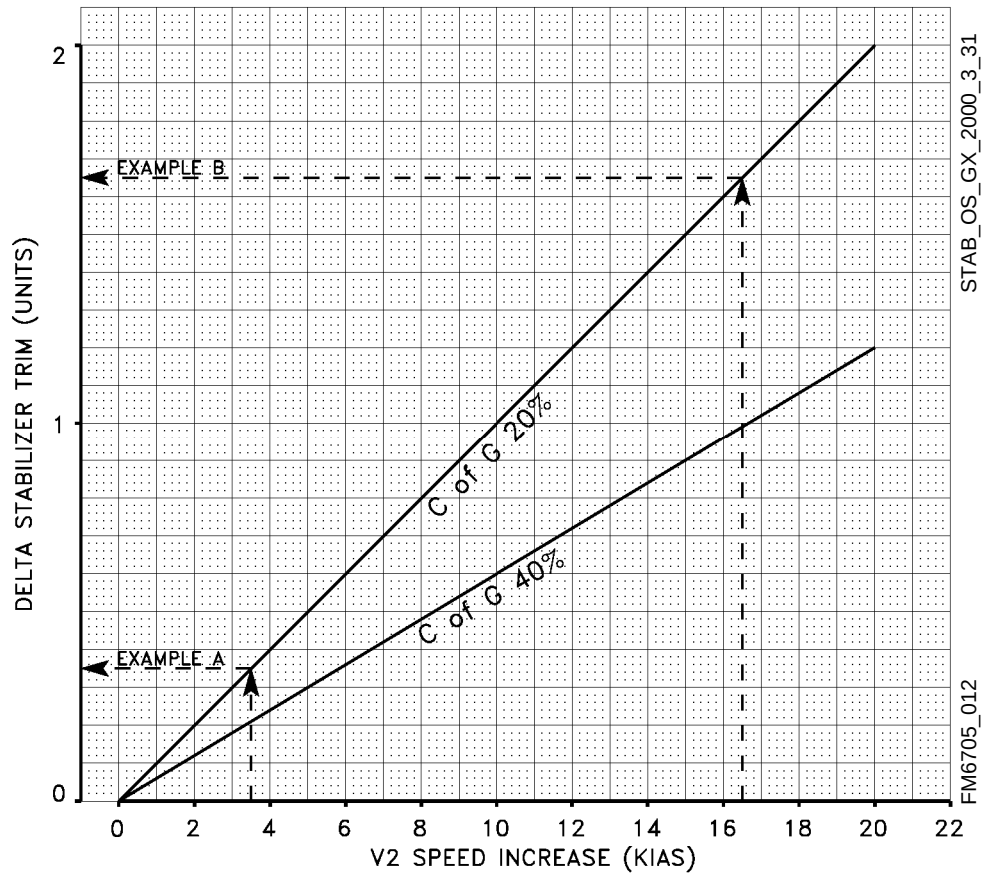


Target Pitch Attitude for Take-Off – Slat OUT / Flap 6°
Figure 07-05-9

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

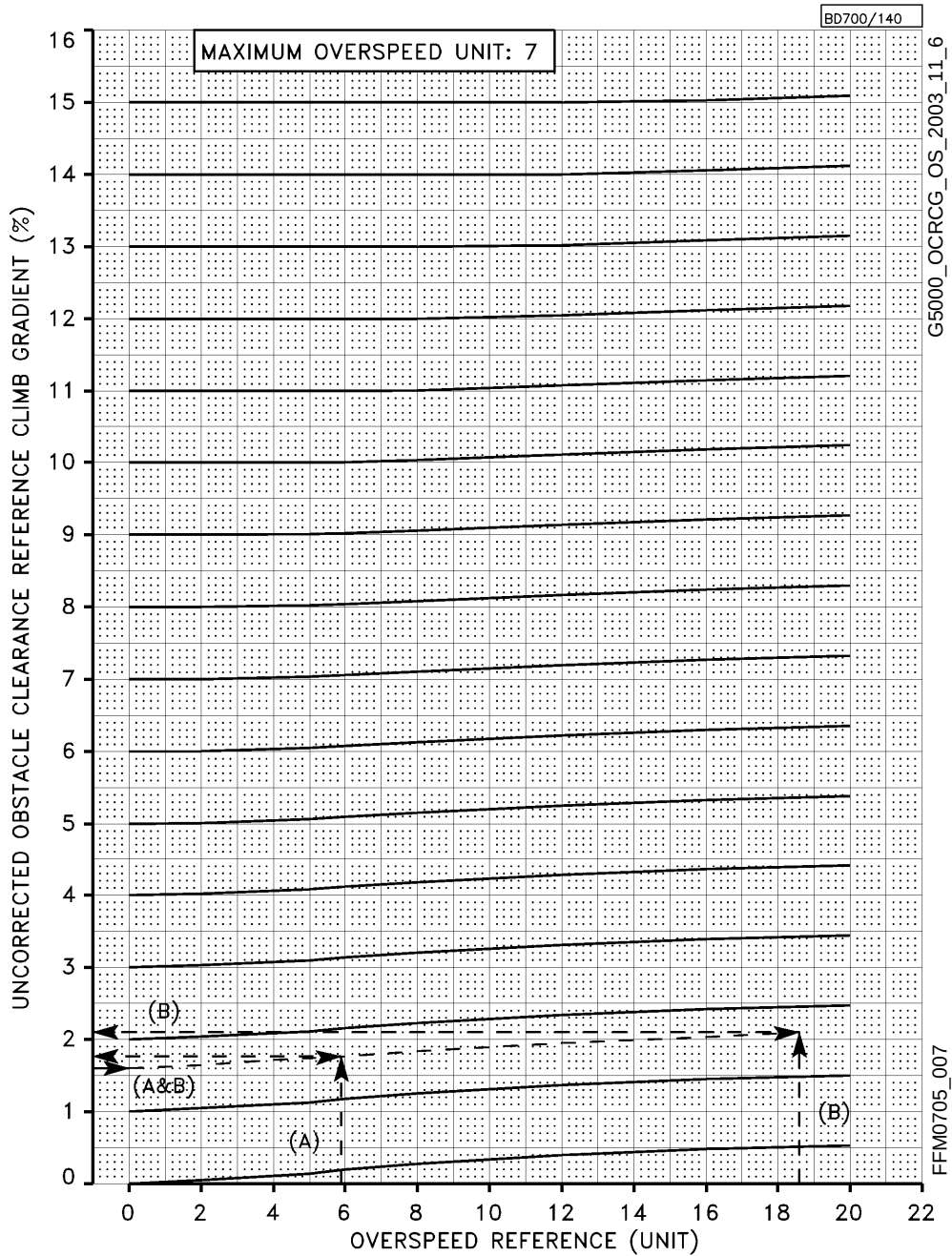


Take-Off Horizontal Stabilizer Trim Setting Correction – Slat OUT / Flap 6°
Figure 07-05-10

SUPPLEMENT 5 IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)



Uncorrected Obstacle Clearance Reference Climb Gradient Adjustment – Slat OUT / Flap 6°
Figure 07-05-11

SUPPLEMENT 5
IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

(4) EXAMPLES

The two examples given below describe how an improved climb performance is obtained by using the preceding charts. Example A shows the calculation of the increased maximum take-off weight by increasing the take-off speeds. Example B shows the calculation of the increased maximum take-off weight by reducing the V_1 / V_R ratio in combination with increasing the take-off speeds.

Example A – SPEED INCREASE:

Associated Conditions:

Ambient temperature	= 15 °C (ISA+20)
Airport pressure altitude	= 10,000 feet
Engine bleed	= Open
Packs	= On
Reported wind	= 30 knots (headwind)
Runway slope	= + 2% (uphill)
BTMS unit	= 6
Available field length	= 2,600 meters (8,531 feet)
Obstacle	= None
Runway condition	= Dry
Slat / flap	= OUT / 6°

Determine the maximum take-off weight limited by climb requirements from the main body of the AFM. Figure 06-03-1 shows that the climb limited weight for the above associated conditions is 36,600 kg (80,690 lb).

Determine the maximum take-off weight limited by brake energy available from the main body of the AFM. Figure 06-03-2 shows that the brake energy limited weight for the above associated conditions is 45,000 kg (99,210 lb).

Determine the maximum take-off weight limited by available field length using Figure 07-05-1. Example A of Figure 07-05-1 shows that the field length limited weight for the above associated conditions is 38,400 kg (84,660 lb).

Determine the maximum take-off weight limited by tire speed using Figure 07-05-2. Example A of Figure 07-05-2 shows that the tire speed limited weight for the above associated conditions is greater than the chart's maximum scale value, hence, the maximum value of 54,000 kg (119,050 lb), will be used.

Using the take-off weights obtained above, perform a trade-off between the maximum take-off weight limited by climb requirements and the other take-off weights to determine the new allowable take-off weight and overspeed reference. Enter the charts with both take-off weights and follow the guidelines until they intersect or until the maximum overspeed reference of 20 units is reached on the climb limit guidelines.

Trade-off the maximum take-off weight limited by climb requirements against the maximum take-off weight limited by available field length using Figure 07-05-4. Example A of Figure 07-05-4 shows that the new maximum allowable take-off weight is 37,100 kg (81,790 lb) with an overspeed reference of 5.9 units.

SUPPLEMENT 5
IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

Trade-off the maximum take-off weight limited by climb requirements against the maximum take-off weight limited by brake energy available using Figure 07-05-5. Example A of Figure 07-05-5 shows that the intersection of the two take-off weights is outside of the chart, therefore, the new allowable take-off weight is not applicable. The maximum overspeed reference of 20 units is used in this case.

Trade-off the maximum take-off weight limited by climb requirements against the maximum take-off weight limited by tire speed using Figure 07-05-6. Example A of Figure 07-05-6 shows that the intersection of the two take-off weights is slightly outside of the chart, hence, the new allowable take-off weight is still not applicable. The maximum overspeed reference of 20 units is also used in this case.

The lesser of the three sets of values obtained from the trade-off procedure above, is selected as the new allowable take-off weight and associated overspeed reference. Therefore the new maximum take-off weight is 37,100 kg (81,790 lb) with an overspeed reference of 5.9 units.

Using the new allowable take-off weight, determine the take-off speeds from the main body of the AFM. Figure 06-03-8 shows that for a take-off weight of 37,100 kg (81,790 lb), V_1 (which is equal to V_R) is 121.5 KIAS. Figure 06-03-9 shows that V_2 is equal to 128 KIAS, for the same take-off weight.

The take-off speeds must now be corrected for the speed increase defined above. Example A of Figure 07-05-7 shows that for an overspeed reference of 5.9 units, V_1 (and V_R) increases to 125.5 KIAS. Example A of Figure 07-05-8 shows that for an overspeed reference of 5.9 units, V_2 increases to 131.5 KIAS.

The actual V_2 increase (corrected V_2 – uncorrected $V_2 = \Delta V_2$) is then used to determine the target pitch attitude for take-off and the stabilizer trim setting adjustment. The ΔV_2 in this case is $131.5 - 128 = 3.5$ KIAS.

Example A of Figure 07-05-9 shows that for a ΔV_2 of 3.5 KIAS, the target pitch attitudes are 17.5° and 13.0° , for all-engines-operating and one-engine-inoperative, respectively.

Assuming a centre of gravity of 20% MAC and the new take-off weight, determine the stabilizer trim setting for take-off from the main body of the AFM. Figure 06-03-19 shows that for the said conditions, the stabilizer trim setting for take-off is 9.65 units. This value must now be corrected for the actual V_2 increase. Example A of Figure 07-05-10 shows that for a ΔV_2 of 3.5 KIAS, a trim setting correction of 0.35 is obtained. The corrected stabilizer trim setting then is $9.65 - 0.35 = 9.3$ units.

SUPPLEMENT 5
IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

Determine the obstacle clearance reference climb gradient from the main body of the AFM. Figure 06-04-4 shows that from the new take-off weight and the associated conditions, an obstacle clearance reference climb gradient of 1.6% is obtained. Using the previously derived overspeed reference of 5.9 units, Example A of Figure 07-05-11 shows that the uncorrected obstacle clearance reference climb gradient is adjusted to 1.75%.

Example B – REDUCED V_1 / V_R WITH SPEED INCREASE:

Associated Conditions:

Ambient temperature	= 25 °C (ISA+26)
Airport pressure altitude	= 8,000 feet
Engine bleed	= Open
Packs	= On
Reported wind	= 10 knots (headwind)
Runway slope	= 0%
BTMS unit	= 6
Available field length	= 3,300 meters (10,827 feet)
Obstacle	= None
Runway condition	= Dry
Slat / flap	= OUT / 6°

Determine the maximum take-off weight limited by climb requirements, brake energy available, available field length and tire speed using the same methods described in Example A.

Figure 06-03-1 in the main body of the AFM, shows that the climb limited weight for the above associated conditions is 36,900 kg (81,350 lb).

Figure 06-03-2 in the main body of the AFM, shows that the brake energy limited weight for the above associated conditions is 42,600 kg (93,920 lb).

Example B of Figure 07-05-1 shows that the field length limited weight for the above associated conditions is 44,800 kg (98,770 lb).

Example B of Figure 07-05-2 shows that the tire speed limited weight for the above associated conditions is 54,000 kg (119,050 lb).

The brake energy limited weight, as obtained above, is more limiting than the field length limited weight, hence, for dry runway operations, the reduced V_1 / V_R ratio may be used. Trade-off the maximum take-off weight limited by brake energy available against the maximum take-off weight limited by available field length using Figure 07-05-3. Example B of Figure 07-05-3 shows that the reduced V_1 / V_R ratio is 0.973, with a corresponding weight of 43,700 kg (96,340 lb). This weight is essentially the new take-off weight limited by brake energy and available field length.

Trade-off the climb limited weight obtained above, against the new field length limited weight using Figure 07-05-4. Example B of Figure 07-05-4 shows that the new maximum allowable take-off weight is 38,300 kg (84,440 lb) with an overspeed reference of 18.6 units.

SUPPLEMENT 5
IMPROVED CLIMB PERFORMANCE

6. PERFORMANCE (CONT'D)

A. Improved Climb Performance (Cont'd)

Trade-off the climb limited weight obtained above, against the new brake energy limited weight using Figure 07-05-5. The intersection of the two take-off weights would be outside of the chart, therefore, the new allowable take-off weight is not applicable. The maximum overspeed reference of 20 units is used in this case.

Trade-off the climb limited weight obtained above, against the tire speed limited weight using Figure 07-05-6. The intersection of the two take-off weights would be slightly outside of the chart, therefore, the new allowable take-off weight is still not applicable. The maximum overspeed reference of 20 units is also used in this case.

The lesser of the three sets of values obtained from the trade-off procedure above, is selected as the new allowable take-off weight and associated overspeed reference. Therefore the new maximum take-off weight is 38,300 kg (84,440 lb) with an overspeed reference of 18.6 units.

Using this new allowable take-off weight, determine the take-off speeds from the main body of the AFM. For a take-off weight of 38,300 kg (84,440 lb), Figure 06-03-8 shows that V_R is equal to 124 KIAS. Since a reduced V_1/V_R ratio is being used, V_1 is then equal to $0.973 V_R = 120.7$ KIAS.

Figure 06-03-9 shows that V_2 is equal to 131 KIAS, for the same take-off weight.

V_1 , V_R and V_2 must now be corrected for the speed increase defined above. Example B of Figure 07-05-7 shows that for an overspeed reference of 18.6 units, V_R increases to 140.5 KIAS. Consequently, $V_1 = 0.973 V_R = 137$ KIAS.

Example B of Figure 07-05-8 shows that for an overspeed reference of 18.6 units, V_2 increases to 147.5 KIAS.

The actual V_2 increase (corrected V_2 – uncorrected $V_2 = \Delta V_2$) is then used to determine the target pitch attitude for take-off and the stabilizer trim setting adjustment. The ΔV_2 in this case is $147.5 - 131 = 16.5$ KIAS.

Example B of Figure 07-05-9 shows that for a ΔV_2 of 16.5 KIAS, the target pitch attitudes are 15.3° and 10.7° , for all-engines-operating and one-engine-inoperative, respectively.

Assuming a centre of gravity of 20% MAC and the new take-off weight, determine the stabilizer trim setting for take-off from the main body of the AFM. Figure 06-03-19 shows that for the said conditions, the stabilizer trim setting for take-off is 9.75 units. Correcting this value for the actual V_2 increase, Example B of Figure 07-05-10 shows that for a ΔV_2 of 16.5 KIAS, a trim setting correction of 1.65 is obtained. The corrected stabilizer trim setting then is $9.75 - 1.65 = 8.1$ units.

Determine the obstacle clearance reference climb gradient from the main body of the AFM. Figure 06-04-4 shows that from the new take-off weight and the associated conditions, an obstacle clearance reference climb gradient of 1.6% is obtained. Using the previously derived overspeed reference of 18.6 units, Example B of Figure 07-05-11 shows that the uncorrected obstacle clearance reference climb gradient is adjusted to 2.1%.

SUPPLEMENT 5
IMPROVED CLIMB PERFORMANCE

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SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET**1. INTRODUCTION**

This Supplement contains information and procedures for the GLOBAL EXPRESS® model BD 700-1A10 airplane, that must be used when operating from airport pressure altitudes above 10,000 feet up to 13,700 feet.

This data complements and/or supersedes the data contained within the basic Airplane Flight Manual. This supplement must therefore, be read in conjunction with the basic Airplane Flight Manual.

The effect of this Supplement on the basic Airplane Flight Manual is given below.

2. LIMITATIONS

The limitations in Chapter 2 and the Supplement Compatibility table (Page 07-00-01-1) are applicable, except as modified by the following:

- Maximum airport pressure altitude for take-off and landing is 13,700 feet.
- The use of manual pressurization is not permitted except when required due to failure of auto pressurization.
- Take-off with slat OUT / flaps 16° is prohibited.
- Take-off and landing with Bleeds CLOSED and APU OFF is prohibited.

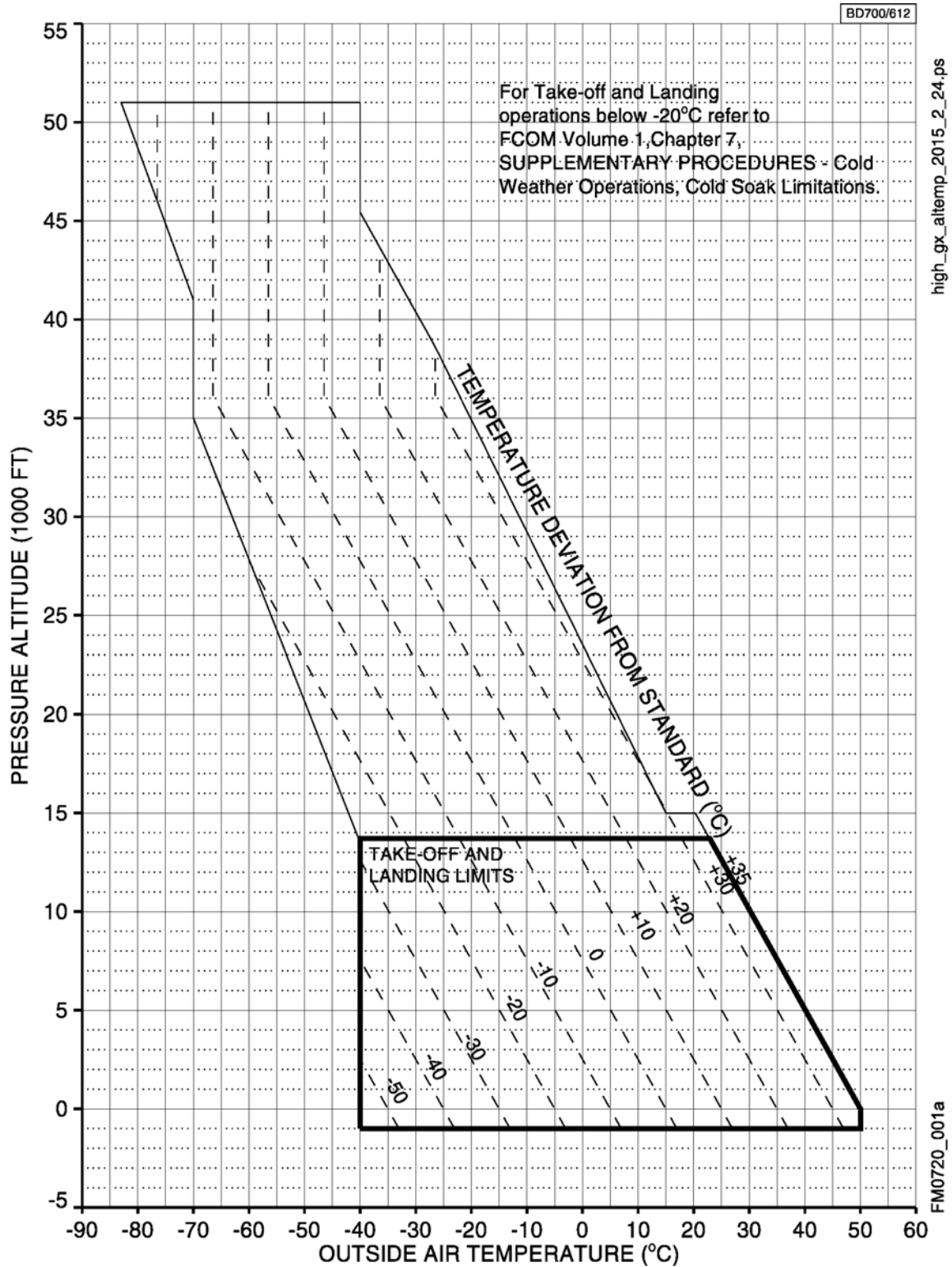
Effectivity:

- *Airplanes 9002 thru 9431 incorporating Service Bulletin:*
 - *SB 700-31-030 Modification – Integrated Avionics Computer (IAC) Software Upgraded, Batch 3.*
- The FMS functionality permits the inclusion of temperature compensated altitudes displayed in inverse video. The functionality is applicable to a maximum altitude of 15,000 feet. For procedures with waypoint altitude constraints above 15,000 feet that require temperature compensation, the pilot must manually insert those values.
- The maximum altitude and temperature operating limits are shown in Figure 07-20-1.

REQUIRED EQUIPMENT LIST	
EQUIPMENT	PRIOR TO APPROACH
CPC automatic channels	Both must be operational.

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

2. LIMITATIONS (CONT'D)



Altitude and Temperature Operating Limit
Figure 07-20-1

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

3. EMERGENCY PROCEDURES

The emergency procedures in Chapter 3 are applicable, except as modified by the following:

A. Landing Distance Factors

(1) POWER PLANT

(a) Dual Engine Out

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.38 (38%)	34,000 kg (74,955 lb)	1.35 (35%)	36,000 kg (79,365 lb)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	36,000 kg (79,365 lb)
Above 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	36,000 kg (79,365 lb)

(2) ELECTRICAL

(a) EMER PWR RAT Deployment – AUTO & MANUAL RELEASE

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.38 (38%)	34,000 kg (74,955 lb)	1.35 (35%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

3. EMERGENCY PROCEDURES (CONT'D)

A. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	38,000 kg (83,775 lb)

(b) EMER PWR RAT Deployment + Spoilers INOP

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.58 (58%)	34,000 kg (74,955 lb)	1.50 (50%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

3. EMERGENCY PROCEDURES (CONT'D)

A. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.28 (128%)	34,000 kg (74,955 lb)	1.73 (73%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
2.28 (128%)	34,000 kg (74,955 lb)	1.73 (73%)	38,000 kg (83,775 lb)

(c) Loss of All DCPC Power (All Display Units Blank)

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.57 (57%)	36,000 kg (79,365 lb)	1.53 (53%)	36,000 kg (79,365 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

3. EMERGENCY PROCEDURES (CONT'D)

A. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.75 (75%)	36,000 kg (79,365 lb)	1.59 (59%)	36,000 kg (79,365 lb)
Above 35,652 kg (78,600 lb) MLW			
1.75 (75%)	36,000 kg (79,365 lb)	1.59 (59%)	36,000 kg (79,365 lb)

(3) FLIGHT CONTROLS

(a) Elevator System Jammed

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.38 (38%)	34,000 kg (74,955 lb)	1.35 (35%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

3. EMERGENCY PROCEDURES (CONT'D)

A. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	38,000 kg (83,775 lb)

(b) Rudder System Jammed

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.38 (38%)	34,000 kg (74,955 lb)	1.35 (35%)	36,000 kg (79,365 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

3. EMERGENCY PROCEDURES (CONT'D)

A. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	36,000 kg (79,365 lb)
Above 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	36,000 kg (79,365 lb)

(4) INSTRUMENTS

(a) Unreliable Airspeed

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.38 (38%)	34,000 kg (74,955 lb)	1.35 (35%)	36,000 kg (79,365 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

3. EMERGENCY PROCEDURES (CONT'D)

A. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	36,000 kg (79,365 lb)
Above 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	36,000 kg (79,365 lb)

(5) LANDING GEAR, WHEEL AND BRAKES SYSTEM

(a) NORM BRAKE FAIL warning message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.96 (96%)	38,000 kg (83,775 lb)	1.81 (81%)	38,000 kg (83,775 lb)

4. NORMAL PROCEDURES

The normal procedures in Chapter 4 are applicable, except as modified by the following:

A. Flight Compartment Safety Check

NOTE

On battery power only, **CABIN ALT** warning is displayed and the CAB ALT display on the STAT page is red. **CAB ALT LEVEL HI** advisory is not displayed. When AC power comes on-line, the **CAB ALT LEVEL HI** message will display. The **CABIN ALT** warning will disappear only momentarily. When a valid LAND ELEV is selected, the **CABIN ALT** warning disappears and the CAB ALT display on the STAT page turns green.

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

4. NORMAL PROCEDURES (CONT'D)

B. Flight Compartment Originating Check

- (1) FMS..... Programmed
- (2) Cabin altitude indicationsChecked
 - Ensure **CAB ALT LEVEL HI** advisory message is displayed.
 - Ensure **CAB ALT** warning message is not displayed.

C. Climb Check

Transition level:

- (1) Cabin altitude indicationsCheck
 - Verify **CAB ALT LEVEL HI** advisory message disappears when cabin altitude descends below 7,330 feet.

NOTE

Following takeoff from an airport above approximately 10,000 feet elevation with the LDG ELEV set to an airport below 7,230 feet, with a low rate of climb to a low cruise altitude, the **CABIN ALT** caution and **CABIN ALT** warning messages may display ten (10) minutes after takeoff. If this occurs monitor EICAS until CAB ALT is below 8,200 feet.

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

4. NORMAL PROCEDURES (CONT'D)

D. Descent Check

- (1) FMS..... Programmed
- (2) Tire limit speedCheck
 - For increased V_{REF} speed landing, verify tire limit speed. CAS values of tire limit speed for a range of altitudes and temperature is presented in the table below.

TIRE SPEED LIMIT OF 183 KTGS EXPRESSED IN KCAS (ZERO WIND ASSUMED)						
AMBIENT TEMPERATURE (° C)	PRESSURE ALTITUDE (FT)					
	10,000	11,000	12,000	13,000	14,000	15,000
-45	171	168	164	161	158	155
-40	169	166	163	159	156	153
-35	167	164	161	158	155	152
-30	165	162	159	156	153	150
-25	164	161	158	154	151	148
-20	162	159	156	153	150	147
-15	161	157	154	151	148	146
-10	159	156	153	150	147	144
-5	157	154	151	149	146	143
0	156	153	150	147	144	141
5	155	152	149	146	143	140
10	153	150	147	145	142	139
15	152	149	146	143	140	138
20	151	148	145	142	139	136
25	149	146	144	141	138	135
30	148	145	142	140	137	134
35	147	144	141	138	136	133
40	146	143	140	137	135	132
45	144	142	139	136	134	131
50	143	141	138	135	133	130

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

4. NORMAL PROCEDURES (CONT'D)

D. Descent Check (Cont'd)

(3) Cabin altitude indicationsCheck

- Verify **CAB ALT LEVEL HI** advisory message displays below 41,000 feet when the cabin altitude climbs above 7,330 feet.

NOTE

The cabin altitude will climb to 300 feet below the LDG ELEV. The **CABIN ALT** (caution) and **CABIN ALT** (warning) messages levels are reset to higher than normal values. These CAS messages will not display unless there is a pressurization malfunction.

A level-off exceeding 3 minutes above FL250 will cause the cabin altitude to return to 5,670 feet.

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletin:
 - SB 700-21-034, Modification – Pressurization Control – Cabin Altitude Reduction During Flight for Improved Passenger Comfort.
 - or
- Airplanes 9159 thru 9174 **not incorporating** Service Bulletin:
 - SB 700-21-036, Modification – Pressurization Control – Cabin Altitude Reduction During Flight for Improved Passenger Comfort.

A level-off exceeding 3 minutes above FL250 will cause the cabin altitude to return to 7,230 feet.

Landing with high aircraft descent rate following long cruise at altitude below 30,000 feet may result in cabin delta P higher than 1.0 psid for landing limitation. Monitor cabin altitude during aircraft descent to comply with cabin delta P requirement.

E. Terminating Check

NOTE

When the aircraft transitions from AC power to battery power only, the **CABIN ALT** warning will activate, and the CAB ALT display on the STAT page will change from green to red.

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES

The non-normal procedures in Chapter 5 are applicable, except as modified by the following:

A. Manual Cabin Pressurization Control Procedure

During descent:

- (1) PRESSURIZATION, MAN ALT
selector Adjust to obtain
landing elevation

NOTE

CAB ALT LEVEL HI advisory message will not be displayed.
CABIN ALT caution and **CABIN ALT** warning messages will
display at their standard settings of 8,200 feet, and 9,000 feet
respectively.

B. Landing Distance Factors

(1) SINGLE ENGINE PROCEDURES

(a) Descent and Landing with One Engine Inoperative

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.30 (30%)	36,000 kg (79,365 lb)	1.28 (28%)	36,000 kg (79,365 lb)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
 - or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.68 (68%)	36,000 kg (79,365 lb)	1.54 (54%)	36,000 kg (79,365 lb)
Above 35,652 kg (78,600 lb) MLW			
1.68 (68%)	36,000 kg (79,365 lb)	1.54 (54%)	36,000 kg (79,365 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

(2) OIL SYSTEM

(a) Low Oil Pressure

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.30 (30%)	36,000 kg (79,365 lb)	1.28 (28%)	36,000 kg (79,365 lb)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.68 (68%)	36,000 kg (79,365 lb)	1.54 (54%)	36,000 kg (79,365 lb)
Above 35,652 kg (78,600 lb) MLW			
1.68 (68%)	36,000 kg (79,365 lb)	1.54 (54%)	36,000 kg (79,365 lb)

(3) ELECTRICAL

(a) DC BUS 1 FAIL caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	WITH THRUST REVERSER
1.27 (27%)	1.24 (24%)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	WITH THRUST REVERSERS
At and Below 35,652 kg (78,600 lb) MLW	
1.59 (59%)	1.38 (38%)
Above 35,652 kg (78,600 lb) MLW	
1.59 (59%)	1.38 (38%)

(b) DC BUS 2 FAIL caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	WITH THRUST REVERSER
1.27 (27%)	1.24 (24%)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	WITH THRUST REVERSERS
At and Below 35,652 kg (78,600 lb) MLW	
1.59 (59%)	1.38 (38%)
Above 35,652 kg (78,600 lb) MLW	
1.59 (59%)	1.38 (38%)

(c) **BATT BUS FAIL** caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	WITH THRUST REVERSERS
1.38 (38%)	--

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	WITH THRUST REVERSERS
At and Below 35,652 kg (78,600 lb) MLW	
1.87 (87%)	--
Above 35,652 kg (78,600 lb) MLW	
1.87 (87%)	--

(d) DC ESS BUS FAIL caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	WITH THRUST REVERSER
1.58 (58%)	1.50 (50%)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	WITH THRUST REVERSERS
At and Below 35,652 kg (78,600 lb) MLW	
2.28 (128%)	1.73 (73%)
Above 35,652 kg (78,600 lb) MLW	
2.28 (128%)	1.73 (73%)

(4) FLIGHT CONTROLS

(a) FLAP FAIL caution message

Increase the Actual Landing Distance as applicable by the factors given below:

SLAT / FLAP INDICATION	FINAL APPROACH SPEED	WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
OUT / 0 to 5	V _{REF} +20	1.70 (70%)	34,000 kg (74,955 lb)	1.60 (60%)	38,000 kg (83,775 lb)
OUT / 6 to 15	V _{REF} +13	1.47 (47%)	32,000 kg (70,545 lb)	1.42 (42%)	38,000 kg (83,775 lb)
OUT / 16 to 29	V _{REF} +6	1.42 (42%)	34,000 kg (74,955 lb)	1.38 (38%)	38,000 kg (83,775 lb)
OUT / 30	V _{REF}	1.00 (0%)	36,000 kg (79,365 lb)	1.00 (0%)	36,000 kg (79,365 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

SLAT / FLAP INDICATION	FINAL APPROACH SPEED	WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
OUT / 0 to 5	V _{REF} +20	2.75 (175%)	34,000 kg (74,955 lb)	1.97 (97%)	38,000 kg (83,775 lb)
OUT / 6 to 15	V _{REF} +13	2.52 (152%)	32,000 kg (70,545 lb)	1.78 (78%)	38,000 kg (83,775 lb)
OUT / 16 to 29	V _{REF} +6	2.12 (112%)	34,000 kg (74,955 lb)	1.65 (65%)	38,000 kg (83,775 lb)
OUT / 30	V _{REF}	1.00 (0%)	36,000 kg (79,365 lb)	1.00 (0%)	36,000 kg (79,365 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

(b) Jammed or Inoperative Slat/Flap Control Lever or **SLAT-FLAP FAIL**

Increase the Actual Landing Distance as applicable by the factors given below:

SLAT / FLAP INDICATION	FINAL APPROACH SPEED	WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
IN / 0 to 5	V _{REF} +45	2.46 (146%)	26,000 kg (57,320 lb)	2.18 (118%)	28,000 kg (61,730 lb)
IN / 6 to 15	V _{REF} +33	1.95 (95%)	32,000 kg (70,545 lb)	1.87 (87%)	38,000 kg (83,775 lb)
IN / 16 to 29	V _{REF} +26	1.83 (83%)	34,000 kg (74,955 lb)	1.76 (76%)	38,000 kg (83,775 lb)
IN / 30	V _{REF} +20	1.66 (66%)	36,000 kg (79,365 lb)	1.61 (61%)	40,000 kg (88,185 lb)
OUT / 0 to 5	V _{REF} +26	1.88 (88%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)
OUT / 6 to 15	V _{REF} +15	1.58 (58%)	32,000 kg (70,545 lb)	1.52 (52%)	36,000 kg (79,365 lb)
OUT / 16 to 29	V _{REF} +12	1.53 (53%)	34,000 kg (74,955 lb)	1.48 (48%)	38,000 kg (83,775 lb)
OUT / 30	V _{REF} +10	1.46 (46%)	34,000 kg (74,955 lb)	1.42 (42%)	36,000 kg (79,365 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

SLAT / FLAP INDICATION	FINAL APPROACH SPEED	WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
IN / 0 to 5	V _{REF} +45	4.17 (317%)	26,000 kg (57,320 lb)	2.67 (167%)	28,000 kg (61,730 lb)
IN / 6 to 15	V _{REF} +33	3.00 (200%)	32,000 kg (70,545 lb)	2.28 (128%)	38,000 kg (83,775 lb)
IN / 16 to 29	V _{REF} +26	2.67 (167%)	34,000 kg (74,955 lb)	2.12 (112%)	38,000 kg (83,775 lb)
IN / 30	V _{REF} +20	2.25 (125%)	28,000 kg (61,730 lb)	1.89 (89%)	28,000 kg (61,730 lb)
OUT / 0 to 5	V _{REF} +26	2.95 (195%)	34,000 kg (74,955 lb)	2.18 (118%)	38,000 kg (83,775 lb)
OUT / 6 to 15	V _{REF} +15	2.56 (156%)	32,000 kg (70,545 lb)	1.86 (86%)	36,000 kg (79,365 lb)
OUT / 16 to 29	V _{REF} +12	2.35 (135%)	34,000 kg (74,955 lb)	1.79 (79%)	38,000 kg (83,775 lb)
OUT / 30	V _{REF} +10	2.05 (105%)	32,000 kg (70,545 lb)	1.66 (66%)	32,000 kg (70,545 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

(c) SLAT FAIL caution message

Increase the Actual Landing Distance as applicable by the factors given below:

SLAT / FLAP INDICATION	FINAL APPROACH SPEED	WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
IN / 30	V _{REF} +20	1.60 (60%)	34,000 kg (74,955 lb)	1.52 (52%)	38,000 kg (83,775 lb)
OUT / 30	V _{REF} +10	1.38 (38%)	34,000 kg (74,955 lb)	1.35 (35%)	36,000 kg (79,365 lb)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

SLAT / FLAP INDICATION	FINAL APPROACH SPEED	WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
IN / 30	V _{REF} +20	2.10 (110%)	34,000 kg (74,955 lb)	1.80 (80%)	38,000 kg (83,775 lb)
OUT / 30	V _{REF} +10	1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	36,000 kg (79,365 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

(d) Slat Damage (Bird Strike)

Increase the Actual Landing Distance as applicable by the factors given below:

SLAT / FLAP INDICATION	FINAL APPROACH SPEED	WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
IN / 0	V _{REF} +45	2.46 (146%)	26,000 kg (57,320 lb)	2.18 (118%)	28,000 kg (61,730 lb)
IN / 0	V _{REF} +50	2.57 (157%)	26,000 kg (57,320 lb)	2.35 (135%)	26,000 kg (57,320 lb)
IN / 0	V _{REF} +55	2.77 (177%)	24,000 kg (52,910 lb)	2.50 (150%)	26,000 kg (57,320 lb)
IN / 0	V _{REF} +60	2.80 (180%)	24,000 kg (52,910 lb)	2.56 (156%)	26,000 kg (57,320 lb)
OUT / 30	V _{REF} +10	1.46 (46%)	34,000 kg (74,955 lb)	1.42 (42%)	36,000 kg (79,365 lb)
OUT / 30	V _{REF} +15	1.56 (56%)	32,000 kg (70,545 lb)	1.51 (51%)	34,000 kg (74,955 lb)
OUT / 30	V _{REF} +20	1.66 (66%)	32,000 kg (70,545 lb)	1.61 (61%)	34,000 kg (74,955 lb)
OUT / 30	V _{REF} +25	1.77 (77%)	30,000 kg (66,140 lb)	1.70 (70%)	32,000 kg (70,545 lb)
OUT / 30	V _{REF} +30	1.88 (88%)	30,000 kg (66,140 lb)	1.80 (80%)	32,000 kg (70,545 lb)
OUT / 30	V _{REF} +45	2.20 (120%)	28,000 kg (61,730 lb)	2.10 (110%)	28,000 kg (61,730 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

SLAT / FLAP INDICATION	FINAL APPROACH SPEED	WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
IN / 0	V _{REF} +45	4.17 (317%)	26,000 kg (57,320 lb)	2.67 (167%)	28,000 kg (61,730 lb)
IN / 0	V _{REF} +50	4.21 (321%)	26,000 kg (57,320 lb)	2.85 (185%)	26,000 kg (57,320 lb)
IN / 0	V _{REF} +55	4.33 (333%)	24,000 kg (52,910 lb)	2.95 (195%)	26,000 kg (57,320 lb)
IN / 0	V _{REF} +60	4.38 (338%)	24,000 kg (52,910 lb)	3.00 (200 %)	26,000 kg (57,320 lb)
OUT / 30	V _{REF} +10	2.05 (105%)	32,000 kg (70,545 lb)	1.66 (66%)	32,000 kg (70,545 lb)
OUT / 30	V _{REF} +15	2.14 (114%)	32,000 kg (70,545 lb)	1.76 (76%)	34,000 kg (74,955 lb)
OUT / 30	V _{REF} +20	2.25 (125%)	32,000 kg (70,545 lb)	1.89 (89%)	34,000 kg (74,955 lb)
OUT / 30	V _{REF} +25	2.39 (139%)	30,000 kg (66,140 lb)	2.01 (101%)	32,000 kg (70,545 lb)
OUT / 30	V _{REF} +30	2.50 (150%)	30,000 kg (66,140 lb)	2.13 (113%)	32,000 kg (70,545 lb)
OUT / 30	V _{REF} +45	2.77 (177%)	28,000 kg (61,730 lb)	2.40 (140%)	28,000 kg (61,730 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

(e) Flight Spoilers Jammed in the Retracted Position

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.38 (38%)	36,000 kg (79,365 lb)	1.33 (33%)	38,000 kg (83,775 lb)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
 - or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.90 (90%)	36,000 kg (79,365 lb)	1.49 (49%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.90 (90%)	36,000 kg (79,365 lb)	1.49 (49%)	38,000 kg (83,775 lb)

(f) Flight Spoilers Jammed in the Extended Position

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.47 (47%)	34,000 kg (74,955 lb)	1.43 (43%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.96 (96%)	34,000 kg (74,955 lb)	1.65 (65%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.96 (96%)	34,000 kg (74,955 lb)	1.65 (65%)	38,000 kg (83,775 lb)

- (g) **FLT SPOILERS FAIL** caution message, if any Flight Spoiler in the Extended position
Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.47 (47%)	34,000 kg (74,955 lb)	1.43 (43%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.96 (96%)	34,000 kg (74,955 lb)	1.65 (65%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.96 (96%)	34,000 kg (74,955 lb)	1.65 (65%)	38,000 kg (83,775 lb)

(h) **FLT SPOILERS FAIL** caution message, if Flight Spoilers in the Retracted position

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.38 (38%)	36,000 kg (79,365 lb)	1.33 (33%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.90 (90%)	36,000 kg (79,365 lb)	1.49 (49%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.90 (90%)	36,000 kg (79,365 lb)	1.49 (49%)	38,000 kg (83,775 lb)

(i) **FLT SPOILERS FAULT** advisory message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.38 (38%)	36,000 kg (79,365 lb)	1.33 (33%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.90 (90%)	36,000 kg (79,365 lb)	1.49 (49%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.90 (90%)	36,000 kg (79,365 lb)	1.49 (49%)	38,000 kg (83,775 lb)

(j) ROLL SPOILERS FAIL caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.61 (61%)	34,000 kg (74,955 lb)	1.52 (52%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.55 (155%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
2.55 (155%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)

(k) GND LIFT DUMP caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.35 (35%)	36,000 kg (79,365 lb)	1.30 (30%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.64 (64%)	36,000 kg (79,365 lb)	1.42 (42%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.64 (64%)	36,000 kg (79,365 lb)	1.42 (42%)	38,000 kg (83,775 lb)

(I) GND LIFT DUMP advisory message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.35 (35%)	36,000 kg (79,365 lb)	1.30 (30%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.64 (64%)	36,000 kg (79,365 lb)	1.42 (42%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.64 (64%)	36,000 kg (79,365 lb)	1.42 (42%)	38,000 kg (83,775 lb)

(m) STALL PROTECT FAIL caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.38 (38%)	34,000 kg (74,955 lb)	1.35 (35%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.87 (87%)	34,000 kg (74,955 lb)	1.56 (56%)	38,000 kg (83,775 lb)

(5) HYDRAULIC POWER

(a) HYD 1 LO PRESS caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.35 (35%)	36,000 kg (79,365 lb)	1.31 (31%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.69 (69%)	36,000 kg (79,365 lb)	1.51 (51%)	38,000 kg (83,775 lb)

(b) HYD 2 LO PRESS caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.97 (97%)	24,000 kg (52,910 lb)	1.83 (83%)	26,000 kg (57,320 lb)
Above 35,652 kg (78,600 lb) MLW			
2.20 (120%)	24,000 kg (52,910 lb)	1.93 (93%)	26,000 kg (57,320 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.13 (113%)	24,000 kg (52,910 lb)	1.87 (87%)	26,000 kg (57,320 lb)
Above 35,652 kg (78,600 lb) MLW			
2.52 (152%)	24,000 kg (52,910 lb)	2.05 (105%)	26,000 kg (57,320 lb)

(c) HYD 3 LO PRESS caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.97 (97%)	26,000 kg (57,320 lb)	1.84 (84%)	28,000 kg (61,730 lb)
Above 35,652 kg (78,600 lb) MLW			
2.08 (108%)	26,000 kg (57,320 lb)	1.87 (87%)	28,000 kg (61,730 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.04 (104%)	26,000 kg (57,320 lb)	1.84 (84%)	28,000 kg (61,730 lb)
Above 35,652 kg (78,600 lb) MLW			
2.32 (132%)	26,000 kg (57,320 lb)	1.95 (95%)	28,000 kg (61,730 lb)

(d) HYD 1 HI TEMP caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.35 (35%)	36,000 kg (79,365 lb)	1.31 (31%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.69 (69%)	36,000 kg (79,365 lb)	1.51 (51%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.69 (69%)	36,000 kg (79,365 lb)	1.51 (51%)	38,000 kg (83,775 lb)

(e) HYD 2 HI TEMP caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.97 (97%)	24,000 kg (52,910 lb)	1.83 (83%)	26,000 kg (57,320 lb)
Above 35,652 kg (78,600 lb) MLW			
2.20 (120%)	24,000 kg (52,910 lb)	1.93 (93%)	26,000 kg (57,320 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.13 (113%)	24,000 kg (52,910 lb)	1.87 (87%)	26,000 kg (57,320 lb)
Above 35,652 kg (78,600 lb) MLW			
2.52 (152%)	24,000 kg (52,910 lb)	2.05 (105%)	26,000 kg (57,320 lb)

(f) HYD 3 HI TEMP caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.97 (97%)	26,000 kg (57,320 lb)	1.84 (84%)	28,000 kg (61,730 lb)
Above 35,652 kg (78,600 lb) MLW			
2.08 (108%)	26,000 kg (57,320 lb)	1.87 (87%)	28,000 kg (61,730 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.04 (104%)	26,000 kg (57,320 lb)	1.84 (84%)	28,000 kg (61,730 lb)
Above 35,652 kg (78,600 lb) MLW			
2.32 (132%)	26,000 kg (57,320 lb)	1.95 (95%)	28,000 kg (61,730 lb)

(g) HYD 1 LO PRESS and HYD 2 LO PRESS caution messages

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
3.03 (203%)	24,000 kg (52,910 lb)	N/A	N/A

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
3.70 (270%)	24,000 kg (52,910 lb)	N/A	N/A

(h) **HYD 2 LO PRESS** and **HYD 3 LO PRESS** caution messages

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
2.56 (156%)	24,000 kg (52,910 lb)	2.38 (138%)	26,000 kg (57,320 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
3.05 (205%)	24,000 kg (52,910 lb)	2.60 (160%)	26,000 kg (57,320 lb)

(i) **HYD 1 LO PRESS** and **HYD 3 LO PRESS** caution messages

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.84 (184%)	24,000 kg (52,910 lb)	2.39 (139%)	26,000 kg (57,320 lb)
Above 35,652 kg (78,600 lb) MLW			
2.98 (198%)	24,000 kg (52,910 lb)	2.43 (143%)	26,000 kg (57,320 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH ONE THRUST REVERSER	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
3.35 (235%)	24,000 kg (52,910 lb)	2.60 (160%)	26,000 kg (57,320 lb)

(6) ICE AND RAIN PROTECTION

(a) Ice Dispersal Procedure

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.60 (60%)	34,000 kg (74,955 lb)	1.52 (52%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.08 (108%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
2.08 (108%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)

(b) L (R) WING A/ICE FAIL caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.60 (60%)	34,000 kg (74,955 lb)	1.52 (52%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.08 (108%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
2.08 (108%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)

(c) WING A/ICE LO HEAT caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.60 (60%)	34,000 kg (74,955 lb)	1.52 (52%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.08 (108%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
2.08 (108%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)

(d) WING A/ICE SENSOR advisory message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.60 (60%)	34,000 kg (74,955 lb)	1.52 (52%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.08 (108%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
2.08 (108%)	34,000 kg (74,955 lb)	1.78 (78%)	38,000 kg (83,775 lb)

(7) INSTRUMENT SYSTEM

(a) Dual Radio Altimeter Failure (red RAD on both ADI)

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.44 (44%)	38,000 kg (83,775 lb)	1.41 (41%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.44 (44%)	38,000 kg (83,775 lb)	1.41 (41%)	38,000 kg (83,775 lb)

(8) LANDING GEAR, WHEEL AND BRAKES SYSTEM

(a) BRAKE 50% DEGRADED caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.80 (80%)	26,000 kg (57,320 lb)	1.60 (60%)	28,000 kg (61,730 lb)
Above 35,652 kg (78,600 lb) MLW			
2.00 (100%)	26,000 kg (57,320 lb)	1.70 (70%)	28,000 kg (61,730 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.10 (110%)	26,000 kg (57,320 lb)	1.72 (72%)	28,000 kg (61,730 lb)
Above 35,652 kg (78,600 lb) MLW			
2.27 (127%)	26,000 kg (57,320 lb)	1.75 (75%)	28,000 kg (61,730 lb)

(b) L (R) INBD BRAKE FAIL or L (R) OUTBD BRAKE FAIL caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.41 (41%)	32,000 kg (70,545 lb)	1.34 (34%)	34,000 kg (74,955 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.66 (66%)	32,000 kg (70,545 lb)	1.45 (45%)	34,000 kg (74,955 lb)
Above 35,652 kg (78,600 lb) MLW			
1.66 (66%)	32,000 kg (70,545 lb)	1.45 (45%)	34,000 kg (74,955 lb)

(c) INBD BRK LO PRESS or OUTBD BRK LO PRESS caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.76 (76%)	26,000 kg (57,320 lb)	1.58 (58%)	28,000 kg (61,730 lb)
Above 35,652 kg (78,600 lb) MLW			
2.00 (100%)	26,000 kg (57,320 lb)	1.68 (68%)	28,000 kg (61,730 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.03 (103%)	26,000 kg (57,320 lb)	1.68 (68%)	28,000 kg (61,730 lb)
Above 35,652 kg (78,600 lb) MLW			
2.21 (121%)	26,000 kg (57,320 lb)	1.72 (72%)	28,000 kg (61,730 lb)

(d) PARK / EMER BRAKE ON caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
1.82 (82%)	38,000 kg (83,775 lb)	1.63 (63%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
1.82 (82%)	38,000 kg (83,775 lb)	1.63 (63%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.00 (100%)	38,000 kg (83,775 lb)	1.72 (72%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
2.20 (120%)	38,000 kg (83,775 lb)	1.72 (72%)	38,000 kg (83,775 lb)

(e) WOW FAIL caution message

Increase the Actual Landing Distance as applicable by the factors given below:

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
1.59 (59%)	36,000 kg (79,365 lb)	1.46 (46%)	38,000 kg (83,775 lb)

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

5. NON-NORMAL PROCEDURES (CONT'D)

B. Landing Distance Factors (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

WITHOUT THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:	WITH THRUST REVERSERS	MAY EXCEED BKE LIMITS AT LANDING WEIGHTS GREATER THAN:
At and Below 35,652 kg (78,600 lb) MLW			
2.17 (117%)	36,000 kg (79,365 lb)	1.62 (62%)	38,000 kg (83,775 lb)
Above 35,652 kg (78,600 lb) MLW			
2.20 (120%)	36,000 kg (79,365 lb)	1.72 (72%)	38,000 kg (83,775 lb)

6. PERFORMANCE

The performance data in Chapter 6 and compatible supplements are applicable, except as modified by the following:

NOTE

Compatible supplement performance penalties are cumulative. Where applicable, the performance factor of the compatible supplement must be applied to the calculated performance data of this supplement.

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

A. Take-Off Weight

The maximum allowable take-off weight is limited by the most restrictive of the following:

- Maximum approved take-off weight (Refer to Chapter 2; LIMITATIONS – STRUCTURAL WEIGHT LIMITATION); or
- Climb requirements; or
- Tire limit speed; or
- Brake energy available; or
- Runway length available.

(1) TAKE-OFF WEIGHT LIMITED BY CLIMB REQUIREMENTS

The maximum take-off weight limited by climb requirements for a slat OUT / flap 6° take-off is determined from Figure 07-20-2, for varying conditions of ambient temperature, airport pressure altitude, engine bleed and pack usage.

The weights presented in Figure 07-20-2 are limited by second segment climb gradient requirements, as per FAR 25.121 (b). The first segment climb and final segment climb gradient requirements, as per FAR 25.121 (a) and FAR 25.121 (c), respectively, are not limiting.

With the APU on, reduce the take-off weight derived from Figure 07-20-2 by 250 kg (551 lb).

Example:

Associated Conditions:

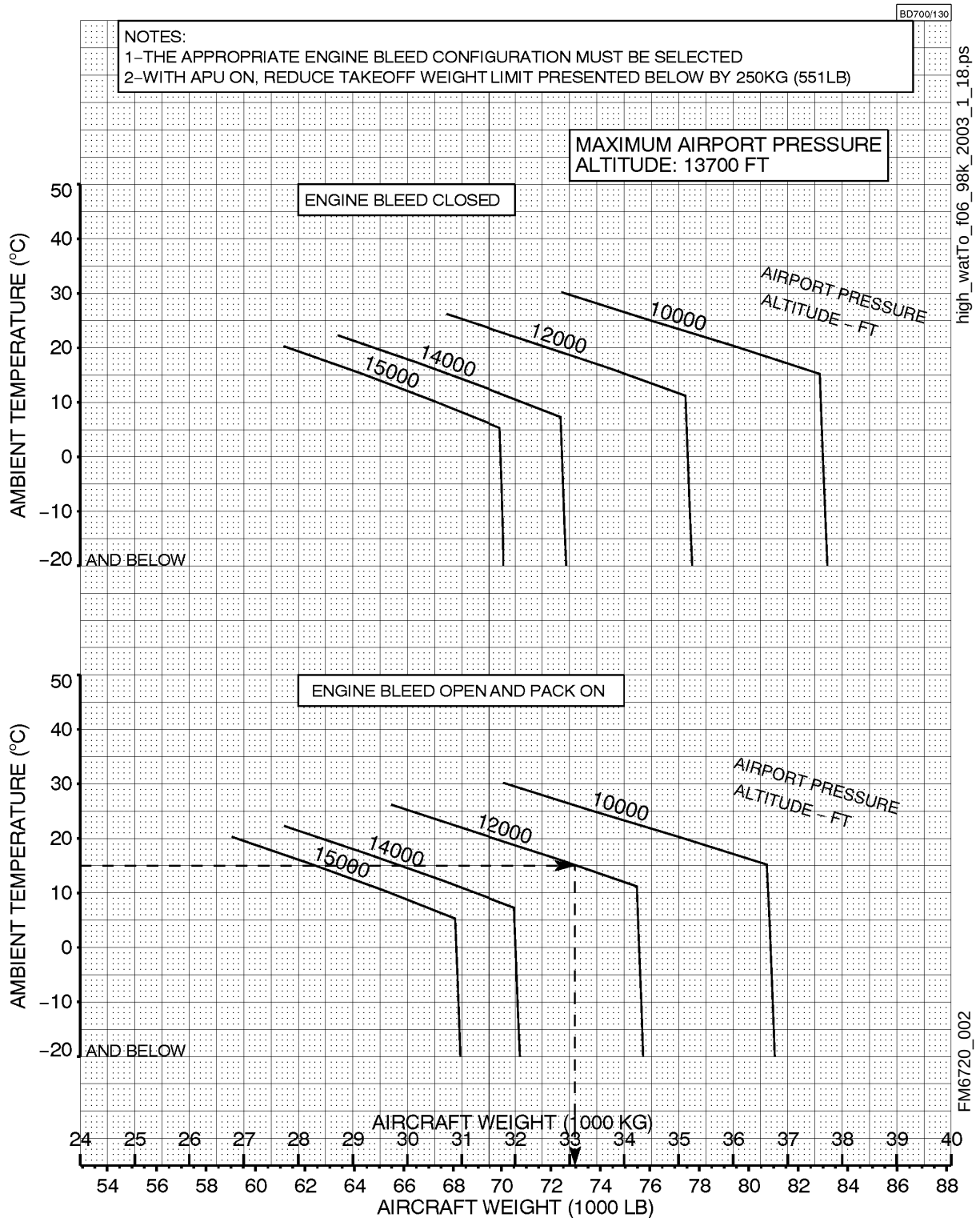
Ambient temperature	= 15 °C
Airport pressure altitude	= 12,000 ft
Engine bleed	= Open
Pack	= On
APU	= Off

As shown in the example on Figure 07-20-2, the maximum take-off weight limited by climb requirements is 33,100 kg (73,000 lb). The take-off weight in this case is less than the maximum approved take-off weight (Refer to Chapter 2; LIMITATIONS – STRUCTURAL WEIGHT LIMITATION) and is considered limiting.

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

A. Take-Off Weight (Cont'd)



Take-Off Weight Limited by Climb Requirements – Slat OUT / Flap 6°
Figure 07-20-2

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

A. Take-Off Weight (Cont'd)

(2) TAKE-OFF WEIGHT LIMITED BY MAXIMUM TIRE SPEED

The tire limit speed of 210 mph (183 knots), does not restrict the maximum take-off weight for the slat OUT / flap 6° configuration.

(3) TAKE-OFF WEIGHT LIMITED BY BRAKE ENERGY AVAILABLE

The maximum take-off weight limited by the brake energy available in the brake system (with the Brake Temperature Monitoring System (BTMS) operative), for a slat OUT / flap 6° take-off, on dry or wet runways, is determined from Figure 07-20-3, for varying conditions of ambient temperature, airport pressure altitude, reported wind and runway slope. The effect of engine bleed and pack usage is negligible.

The brake energy available is based on the brake status provided by the BTMS. The maximum take-off weight limited by brake energy can be determined for the following conditions:

- when maximum brake energy is available (BTMS unit of 6 or less); or
- when partial brake energy is available following a landing or a rejected take-off.

The BTMS temperature reading of the warmest brake is to be used in the derivation of the maximum take-off weight.

Example:

Associated Conditions:

Ambient temperature	= 15 °C
Airport pressure altitude	= 12,000 ft
Reported wind	= 10 knots (headwind)
Runway slope	= + 2% (uphill)
Warmest brake readout	= BTMS unit of 13

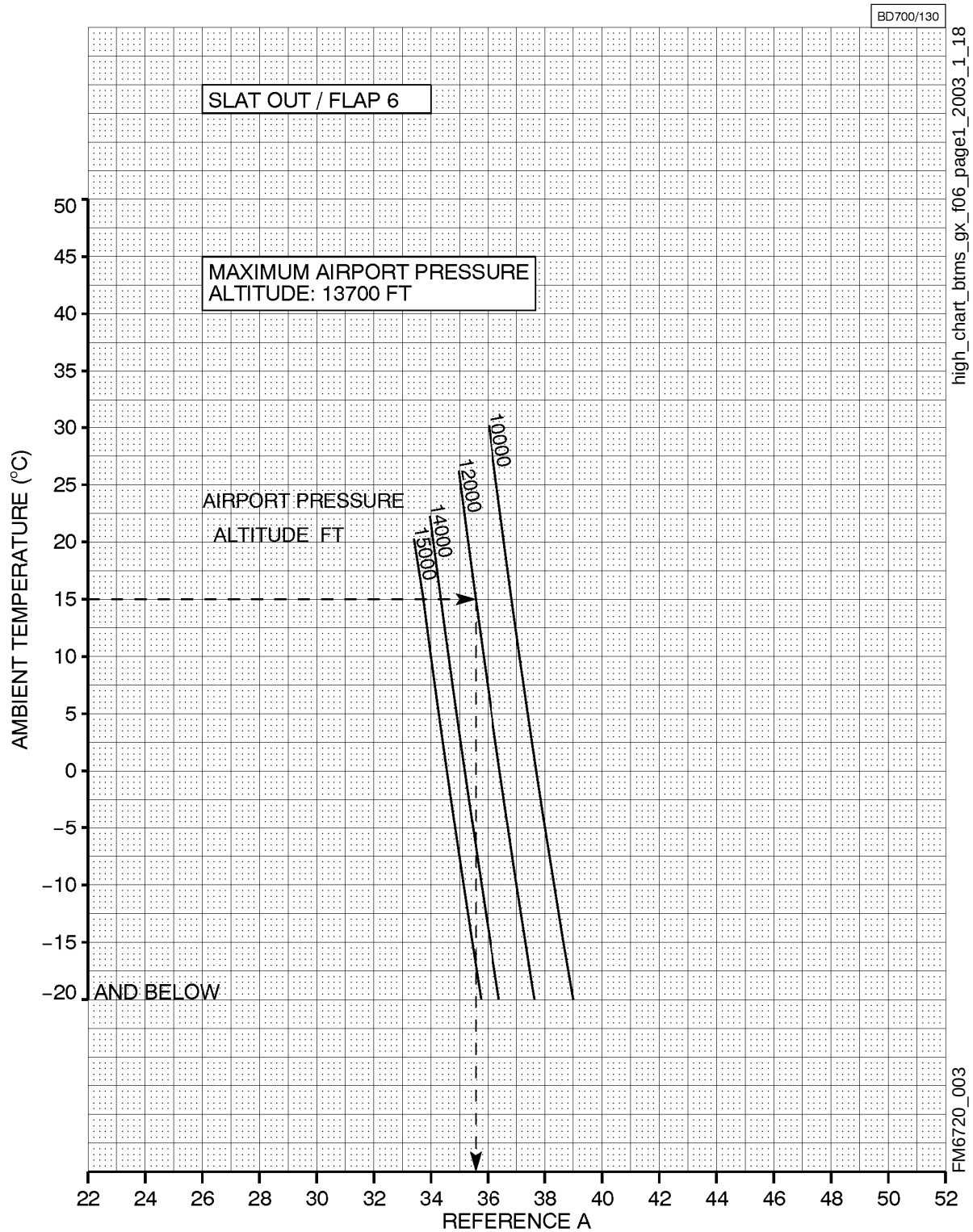
The example in Figure 07-20-3 shows that the maximum take-off weight limited by brake energy available is 35,100 kg (77,390 lb).

If maximum brake energy is available (warmest brake readout before take-off is BTMS unit of 6 or below), then the maximum take-off weight limited by brake energy would be 40,500 kg (89,300 lb).

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

A. Take-Off Weight (Cont'd)

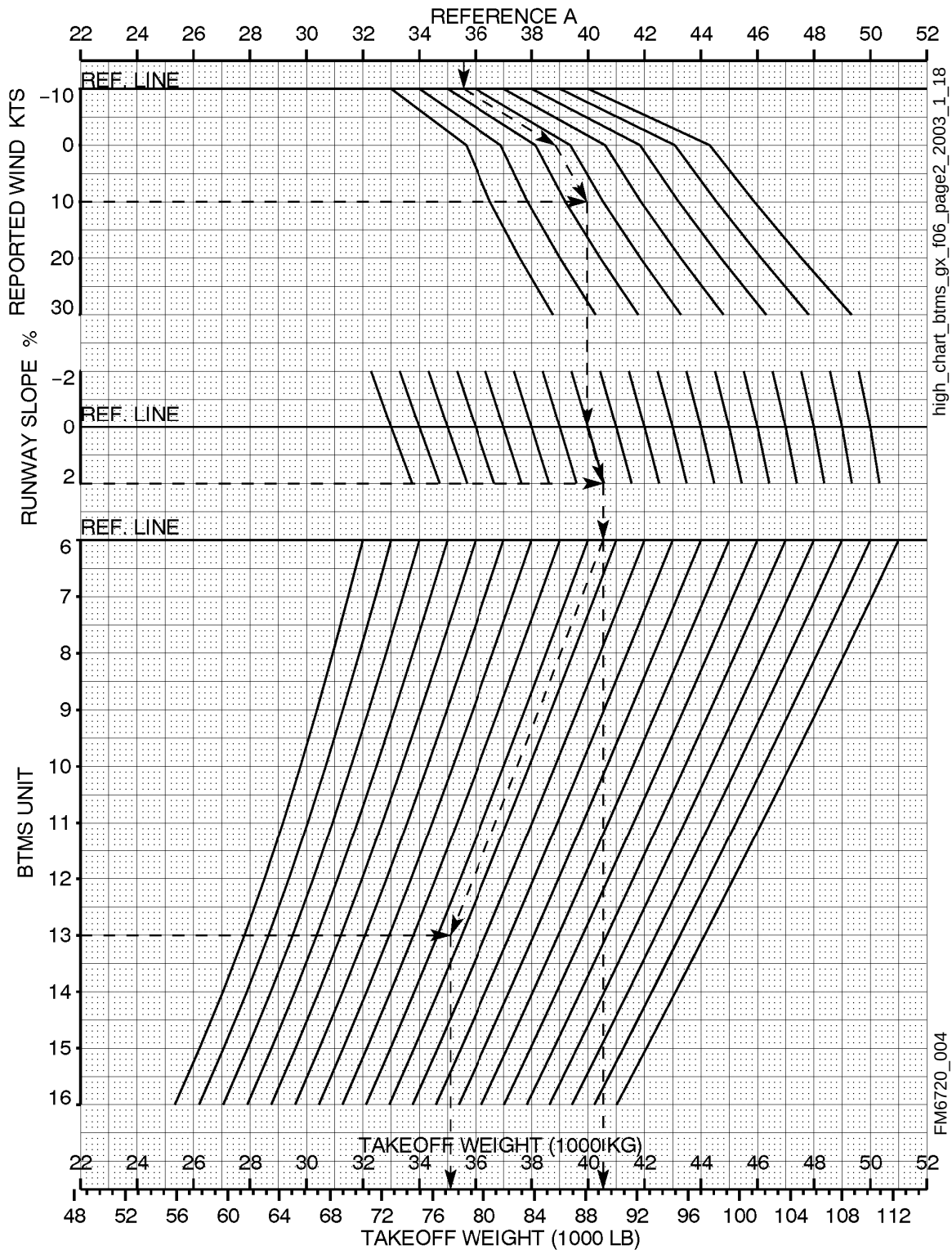


Take-Off Weight Limited by Brake Energy – Slat OUT / Flap 6°
Figure 07-20-3 (Sheet 1 of 2)

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

A. Take-Off Weight (Cont'd)



Take-Off Weight Limited by Brake Energy – Slat OUT / Flap 6°
Figure 07-20-3 (Sheet 2 of 2)

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

B. Take-Off Field Length

(1) DRY RUNWAY TAKE-OFF FIELD LENGTH

The following charts are used to obtain the take-off field length required on a dry runway, for a given value of airplane weight, ambient temperature, airport pressure altitude (from 10,000 to 15,000 feet), reported wind, runway slope and various bleed configurations.

The take-off field length, as presented in these charts, is the most limiting of the following:

- Take-off distance with all engines operating , multiplied by a factor of 1.15;
- Take-off distance with one engine inoperative; and
- Accelerate-stop distance.

NOTE

When the take-off crosswind exceeds 20 knots, the high crosswind take-off procedure must be used (refer to the Flight Crew Operating Manual, Chapter 4: NORMAL PROCEDURES – TAXIING AND TAKE-OFF – HIGH CROSSWIND TAKE-OFF). The corrected take-off field length must be increased by 520 meters (1700 feet).

The take-off field length for a slat OUT / flap 6° take-off on a dry runway, are given by the following:

- Figure 07–20–4 provides the uncorrected take-off field length;
- Figure 07–20–5 provides the take-off field length corrected for the effects of engine bleed / pack usage, runway slope and reported wind.

Effectivity:

- *Airplanes 9002 thru 9158 not incorporating Service Bulletins:*
 - *SB 700–27–054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,*
or SB 700–32–034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140–209–4 (GW415–1050–9)
- or
- *Airplanes 9159 thru 9304 not incorporating Service Bulletins:*
 - *SB 700–27–059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,*
or SB 700–32–034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140–209–4 (GW415–1050–9).

Figure 07–20–5 (sheet 2) provides the take-off field length factor for accommodating BCU characteristics at high speeds.

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

B. Take-Off Field Length (Cont'd)

The uncorrected take-off field length can be interpolated linearly with altitude.

Example:

Associated Conditions:

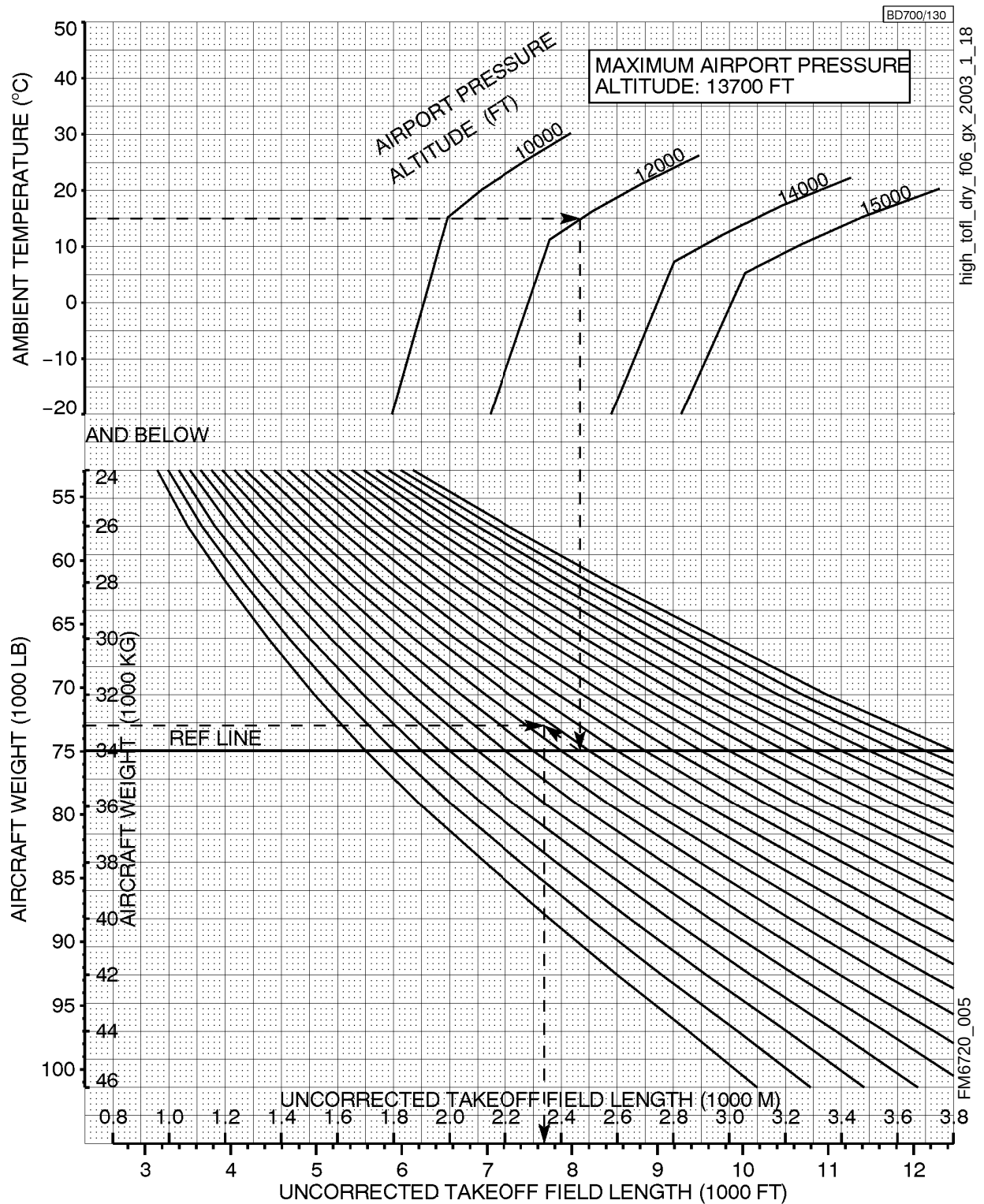
Ambient temperature	= 15 °C
Airport pressure altitude	= 12,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 33,100 kg (73,000 lb)
Reported wind	= 10 knots headwind
Runway slope	= +2% (uphill)

The example in Figure 07-20-4 and Figure 07-20-5 shows that for the above associated conditions, the corrected take-off field length required is 2,675 meters (8,780 feet).

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

B. Take-Off Field Length (Cont'd)



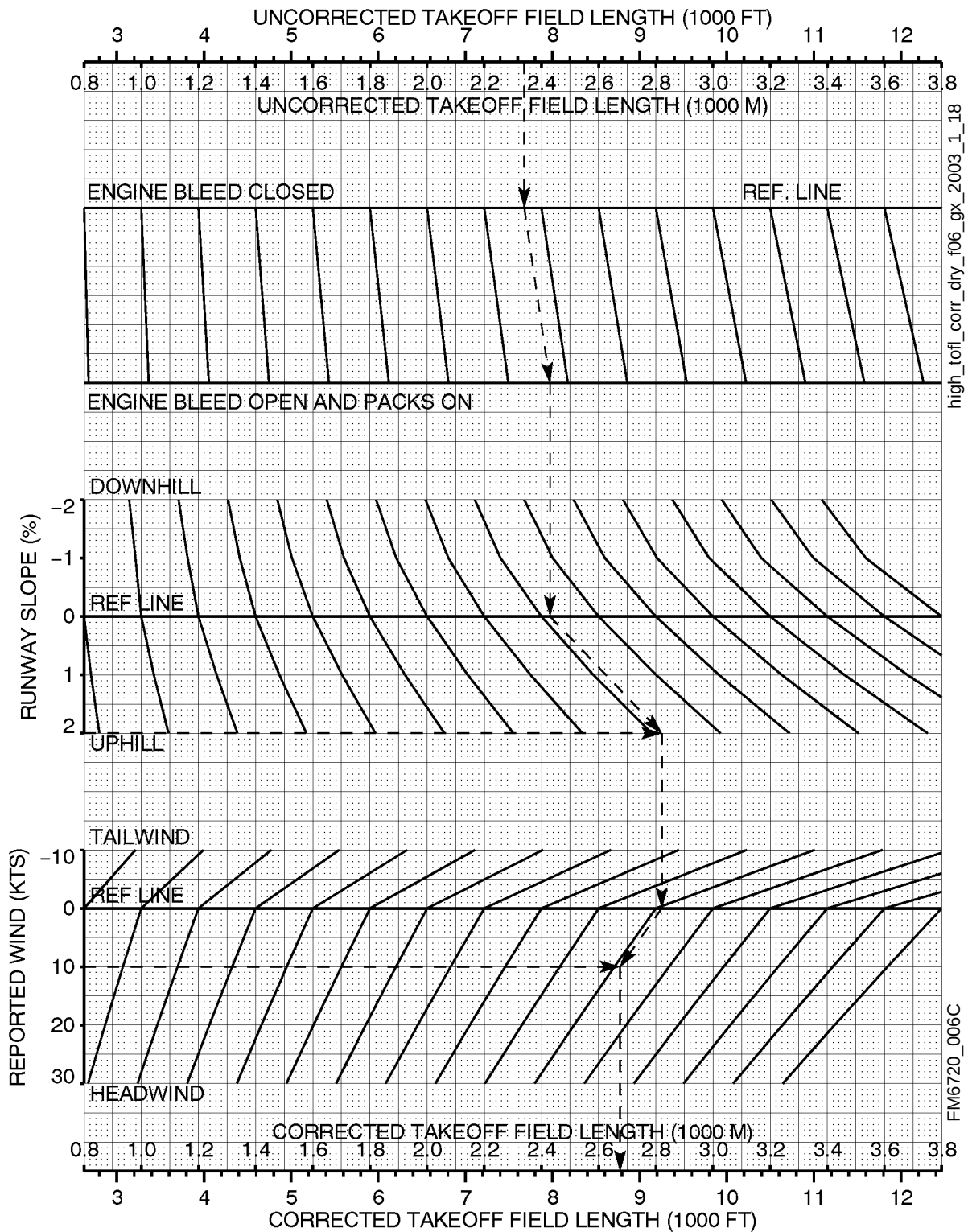
Uncorrected Take-Off Field Length, Dry Runway, Slat OUT / Flap 6°

Figure 07-20-4

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

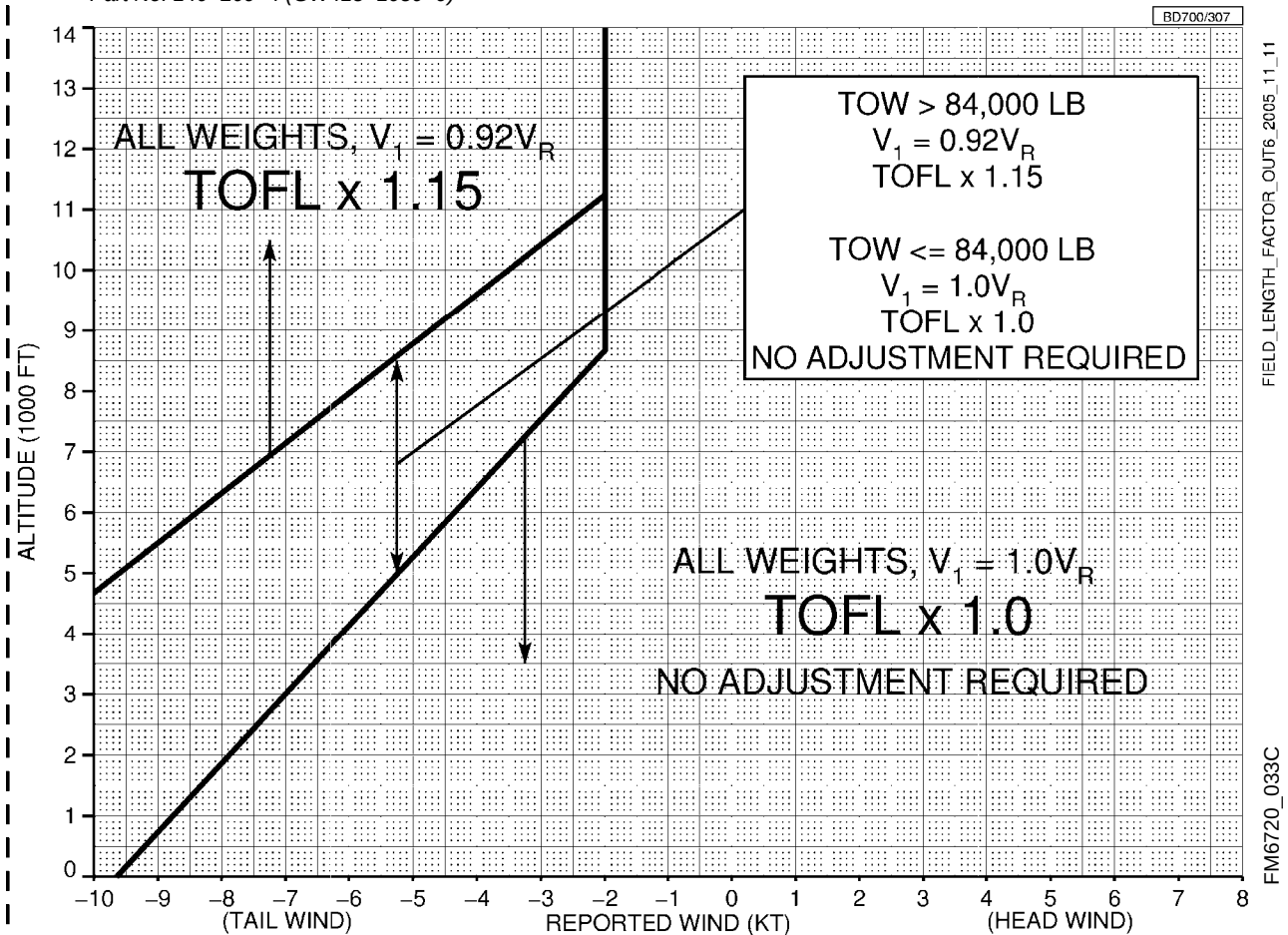
B. Take-Off Field Length (Cont'd)



Corrected Take-Off Field Length, Dry Runway, Slat OUT / Flap 6°
Figure 07-20-5 (Sheet 1 of 2)

B. Take-Off Field Length (Cont'd)

- *Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:*
 - *SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability, **or** SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)*
or
- *Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:*
 - *SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance, **or** SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)*



SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

B. Take-Off Field Length (Cont'd)

(2) WET RUNWAY TAKE-OFF FIELD LENGTH

A wet runway condition has a deteriorating effect on the stopping performance of the airplane and appropriate corrections should be made to compensate for this degradation.

The following charts are used to obtain the take-off field length required on a wet runway, for a given value of airplane weight, ambient temperature, airport pressure altitude (from 10,000 to 15,000 feet), reported wind, runway slope, usage of thrust reversers and various bleed configurations.

The take-off field length, as presented in these charts, is the most limiting of the following:

- Take-off field length on a dry runway;
- Take-off distance with all engines operating, multiplied by a factor of 1.15;
- Take-off distance with one engine inoperative; and
- Accelerate-stop distance.

NOTE

When the take-off crosswind exceeds 20 knots, the high crosswind take off procedure must be used (refer to the Flight Crew Operating Manual, Chapter 4: NORMAL PROCEDURES – TAXIING AND TAKE-OFF – HIGH CROSSWIND TAKE-OFF). The corrected take-off field length must be increased by 520 meters (1700 feet).

The take-off field length for a slat OUT / flap 6° take-off on a wet runway, are given by the following:

- Figure 07-20-6 provides the uncorrected take-off field length;
- Figure 07-20-7 provides the take-off field length corrected for the effects of engine bleed / pack usage, runway slope, reported wind and thrust reverser(s) usage. With one or both thrust reversers inoperative, if the actual takeoff weight is less than 29,000 kg (63,935 lb), a weight of 29,000 kg (63,935 lb) must be used to determine the take-off field length.

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

B. Take-Off Field Length (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

Where V_1 determined from Figure 07-20-8 is greater than $0.92 V_R$, determined from Figure 07-20-9, the take-off field length obtained from Figure 07-20-6 and Figure 07-20-7 must be increased by 15% (TOFL x 1.15).

The uncorrected take-off field length can be interpolated linearly with altitude.

Example:

Associated Conditions:

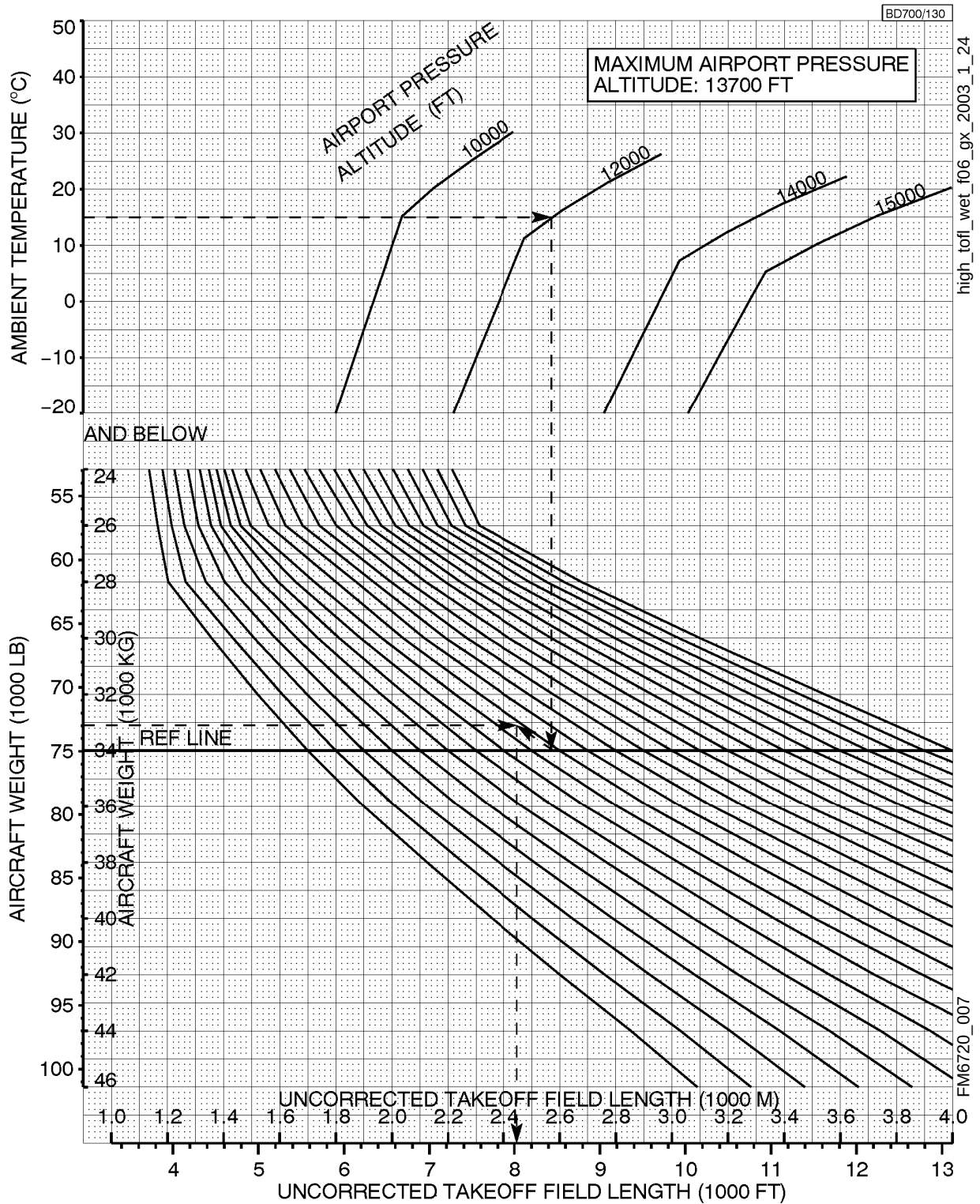
Ambient temperature	= 15 °C
Airport pressure altitude	= 12,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 33,100 kg (73,000 lb)
Reported wind	= 10 knots headwind
Runway slope	= +2% (uphill)
Thrust reversers	= Both operable

The example in Figure 07-20-6 and Figure 07-20-7 shows that for the above associated conditions, the corrected take-off field length is 2,790 meters (9,160 feet).

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

B. Take-Off Field Length (Cont'd)



Uncorrected Take-Off Field Length, Wet Runway, Slat OUT / Flap 6°
Figure 07-20-6

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

C. Take-Off Speeds

(1) TAKE-OFF DECISION SPEED V_1 - DRY RUNWAY

The take-off decision speed (V_1) for a slat OUT / flap 6° take-off on a dry runway, is equal to the rotation speed (V_R). Use the appropriate V_R chart. Refer to Figure 07-20-9.

V_1 must not be less than V_{1MCG} .

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

The take-off decision speed (V_1) for a slat OUT / flap 6° take-off on a dry runway, is established from the rotation speed (V_R), Figure 07-20-9, multiplied by a V_R factor of Figure 07-20-5 (sheet 2).

(2) TAKE-OFF DECISION SPEED, V_1 - WET RUNWAY

The following charts are used to obtain the take-off decision speed (V_1) for a slat OUT / flap 6° take-off on a wet runway, for a given value of airplane weight, ambient temperature, airport pressure altitude (from 10,000 to 15,000 feet), reported wind, runway slope, usage of thrust reversers and various bleed configurations.

V_1 must not be less than V_{1MCG} .

The take-off decision speed (V_1) for a slat OUT / flap 6° take-off on a wet runway, is determined from Figure 07-20-8.

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

C. Take-Off Speeds (Cont'd)

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
 - or
 - Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).
- The take-off decision speed (V_1) for slat OUT / flap 6° take-off on a wet runway is established as the lower of:
- V_1 determined from Figure 07-20-8;
 - V_1 determined from V_R , Figure 07-20-9, and multiplied by a V_R factor of 0.92.

Example:

Associated Conditions:

Ambient temperature	= 15 °C
Airport pressure altitude	= 12,000 ft
Engine bleed	= Open
Packs	= On
A/C weight	= 33,100 kg (73,000 lb)
Runway slope	= +2% (uphill)
Reported wind	= 10 knots headwind
Thrust reversers	= Both operable

The example in Figure 07-20-8 shows that for the above associated conditions, V_1 is equal to 111 KIAS.

(3) MINIMUM V_1 LIMITED BY CONTROL ON THE GROUND, V_{1MCG}

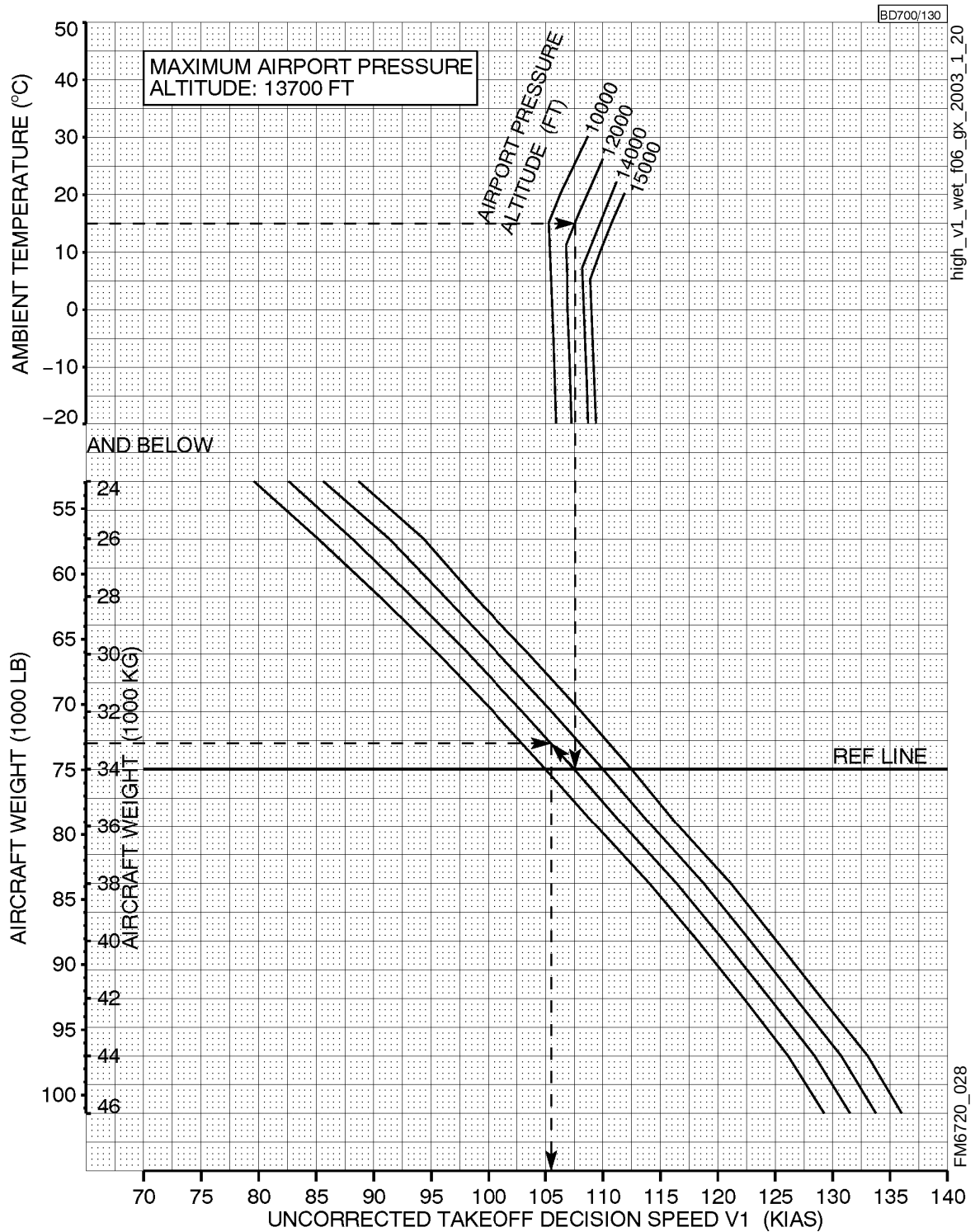
Applicable to both dry and wet runway operations:

- V_{1MCG} (Slat OUT / Flap 6°) = 88 KIAS

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

C. Take-Off Speeds (Cont'd)

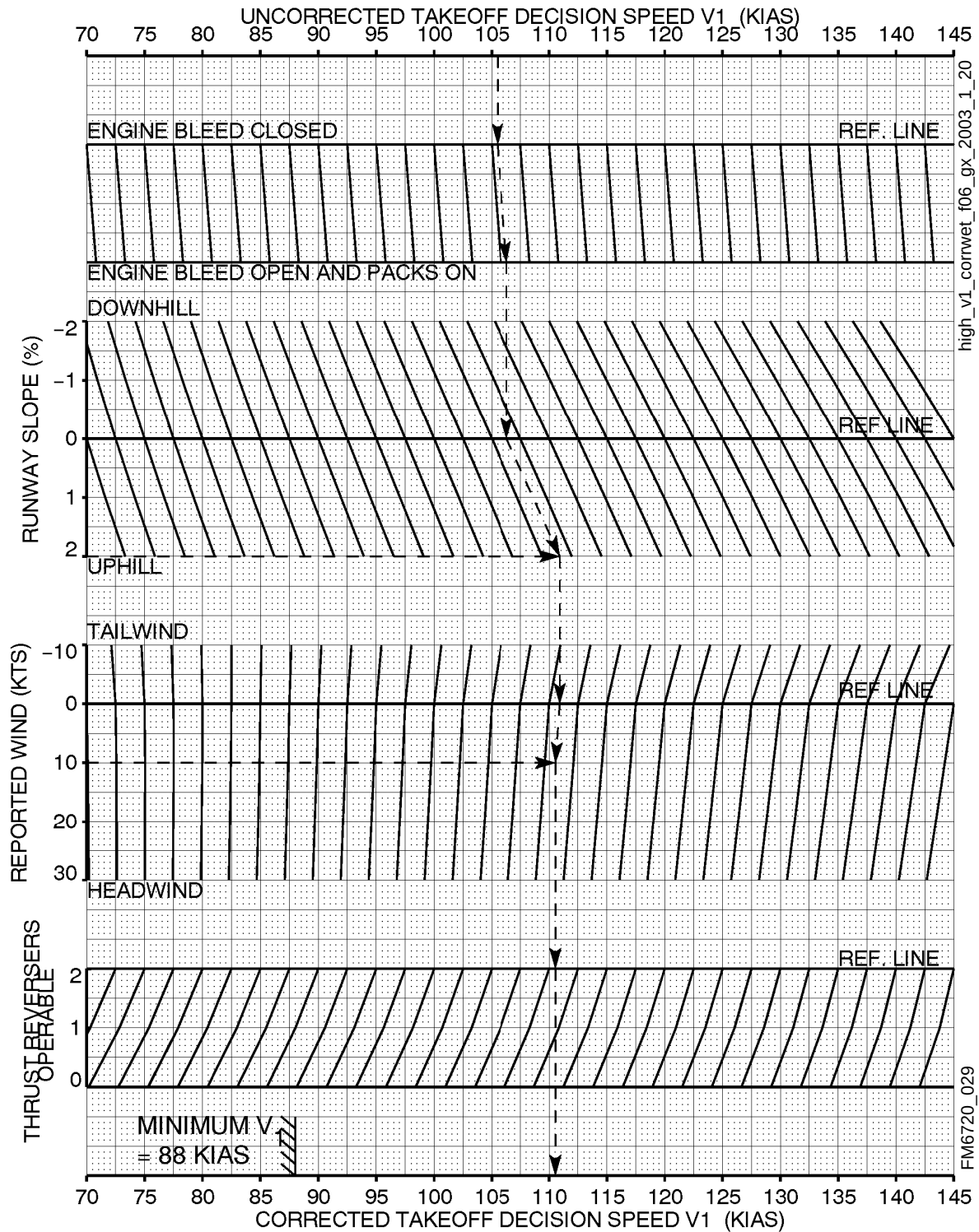


Take-Off Decision Speed, V1 – Slat OUT / Flap 6° – Wet Runway
Figure 07-20-8 (Sheet 1 of 2)

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

C. Take-Off Speeds (Cont'd)



Take-Off Decision Speed, V_1 – Slat OUT / Flap 6° – Wet Runway
Figure 07-20-8 (Sheet 2 of 2)

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

C. Take-Off Speeds (Cont'd)

(4) ROTATION SPEED, V_R

Figure 07-20-9 is used to determine the rotation speed (V_R) for dry and wet runway operations, as well as the take-off decision speed (V_1) for dry runway operations, for a slat OUT / flap 6° take-off, for varying conditions of ambient temperature, airport pressure altitude, take-off weight and runway slope. The effect of engine bleed and pack utilization is negligible.

V_R must not be less than 88 KIAS.

Example:

Associated Conditions:

Ambient temperature	= 15 °C
Airport pressure altitude	= 12,000 ft
A/C weight	= 33,100 kg (73,000 lb)
Runway slope	= +2% (uphill)

The example in Figure 07-20-9 shows that for the above associated conditions, the rotation speed is 116 KIAS.

(5) TAKE-OFF SAFETY SPEED, V_2

Figure 07-20-10 is used to determine the take-off safety speed (V_2) for a slat OUT / flap 6° take-off, on dry or wet runways, for varying conditions of ambient temperature, airport pressure altitude and take-off weight. The effect of engine bleed and pack utilization is negligible.

Example:

Associated Conditions:

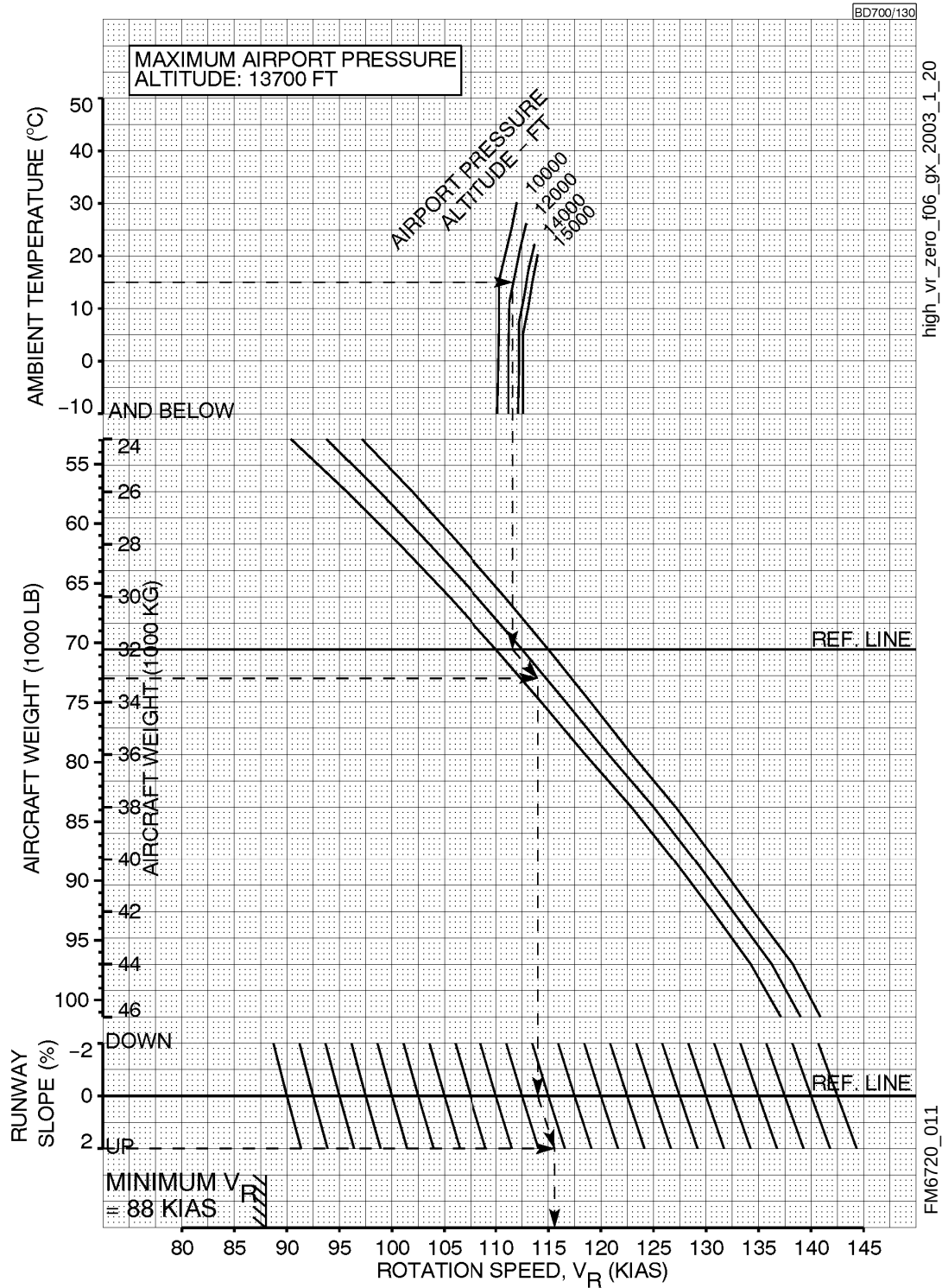
Ambient temperature	= 15 °C
Airport pressure altitude	= 12,000 ft
A/C weight	= 33,100 kg (73,000 lb)

The example in Figure 07-20-10 shows that for the above associated conditions, the take-off safety speed is 122 KIAS.

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

C. Take-Off Speeds (Cont'd)

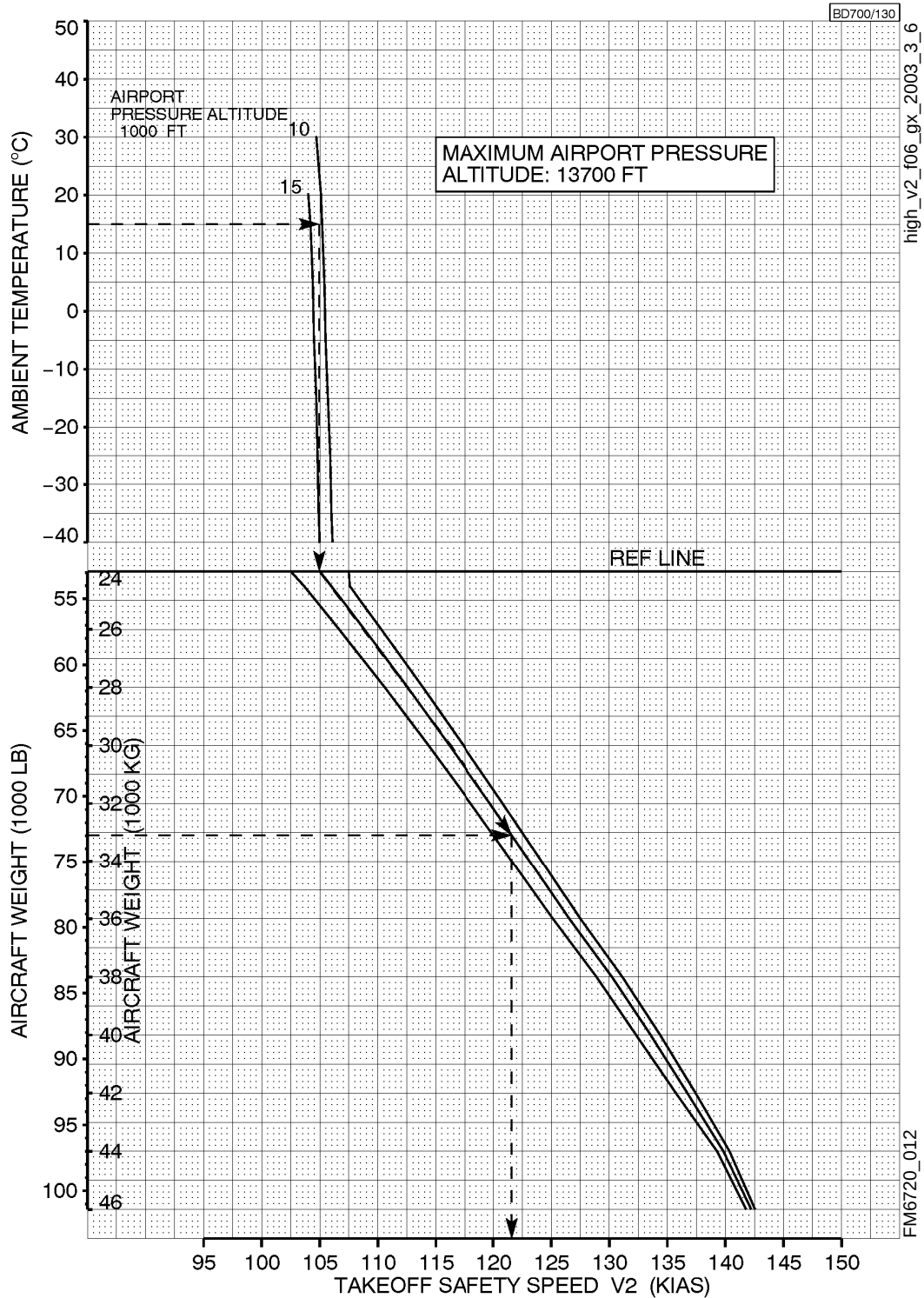


Rotation Speed, V_R - Slat OUT / Flap 6°
Figure 07-20-9

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

C. Take-Off Speeds (Cont'd)



Take-Off Safety Speed, V_2 – Slat OUT / Flap 6°
Figure 07-20-10

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

D. Obstacle Clearance Reference Climb Gradient

Figure 07-20-11 and Figure 07-20-12 are used to determine the obstacle clearance reference climb gradient for varying conditions of ambient temperature, airport pressure altitude, airplane weight, gross level-off height, wind condition and engine bleed configurations. These charts can also be used to determine the weight at which a specific value of obstacle clearance reference climb gradient is achieved.

The obstacle clearance reference climb gradient derived from Figure 07-20-11 and Figure 07-20-12 is equal to the average net gradient between the gear up point and the point where the airplane reaches the level-off height. The corresponding gross gradient can be obtained by adding 0.8% to the net gradient.

As the obstacle clearance reference climb gradient is a function of the gross level-off height, it is necessary to assume a value for the gross level-off height when using the following reference climb gradient charts. For most obstacle clearance cases, best performance is obtained by selecting a gross level-off height which ensures that all obstacles will be cleared during the first or second segments.

Figure 07-20-11 provides the obstacle clearance reference climb gradient for a slat OUT / flap 6° take-off with engine bleeds closed.

Figure 07-20-12 provides the obstacle clearance reference climb gradient for a slat OUT / flap 6° take-off with engine bleeds open and packs on.

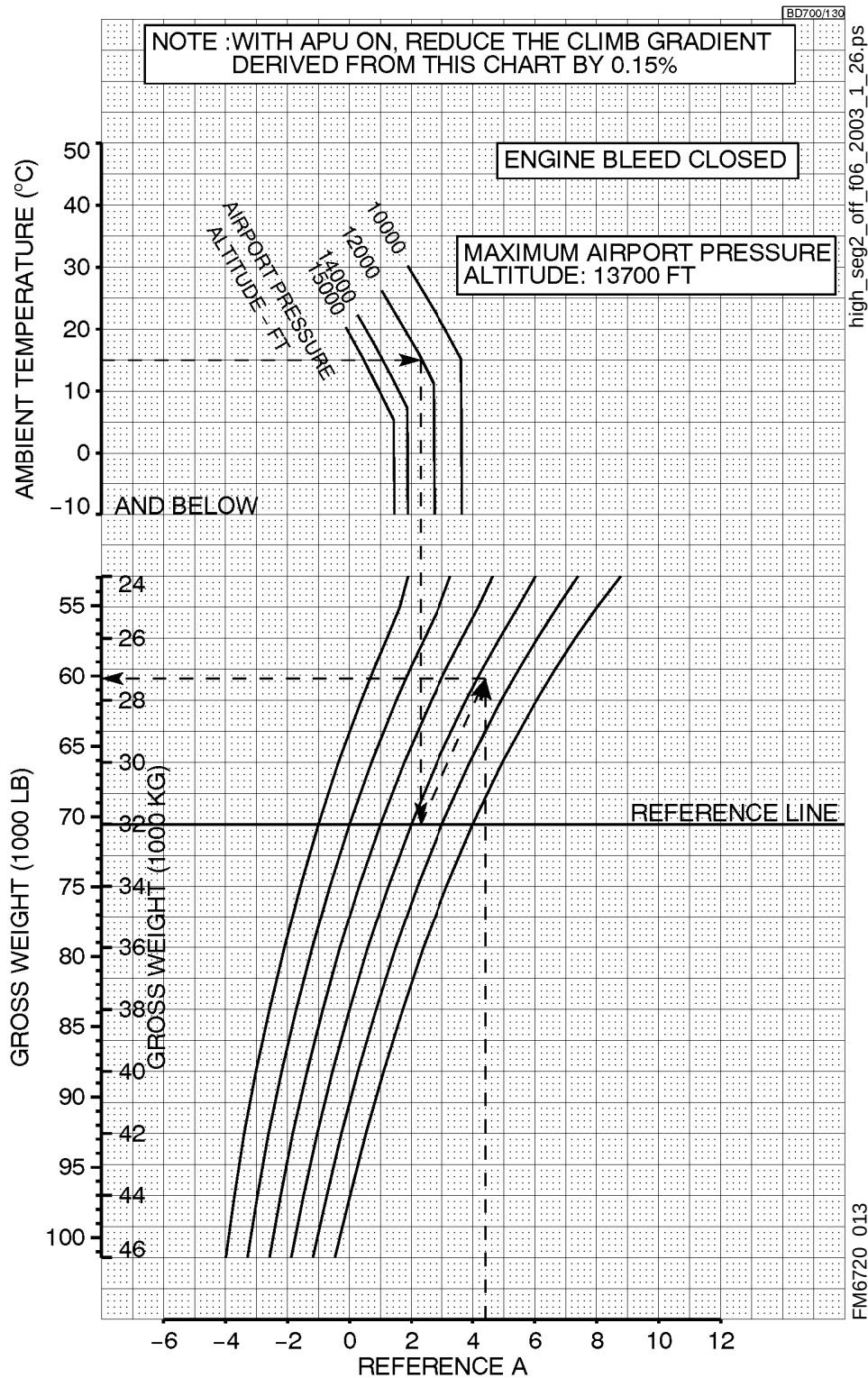
NOTE

With the APU on, reduce the climb gradient derived from the above-mentioned charts by 0.15%

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

D. Obstacle Clearance Reference Climb Gradient (Cont'd)

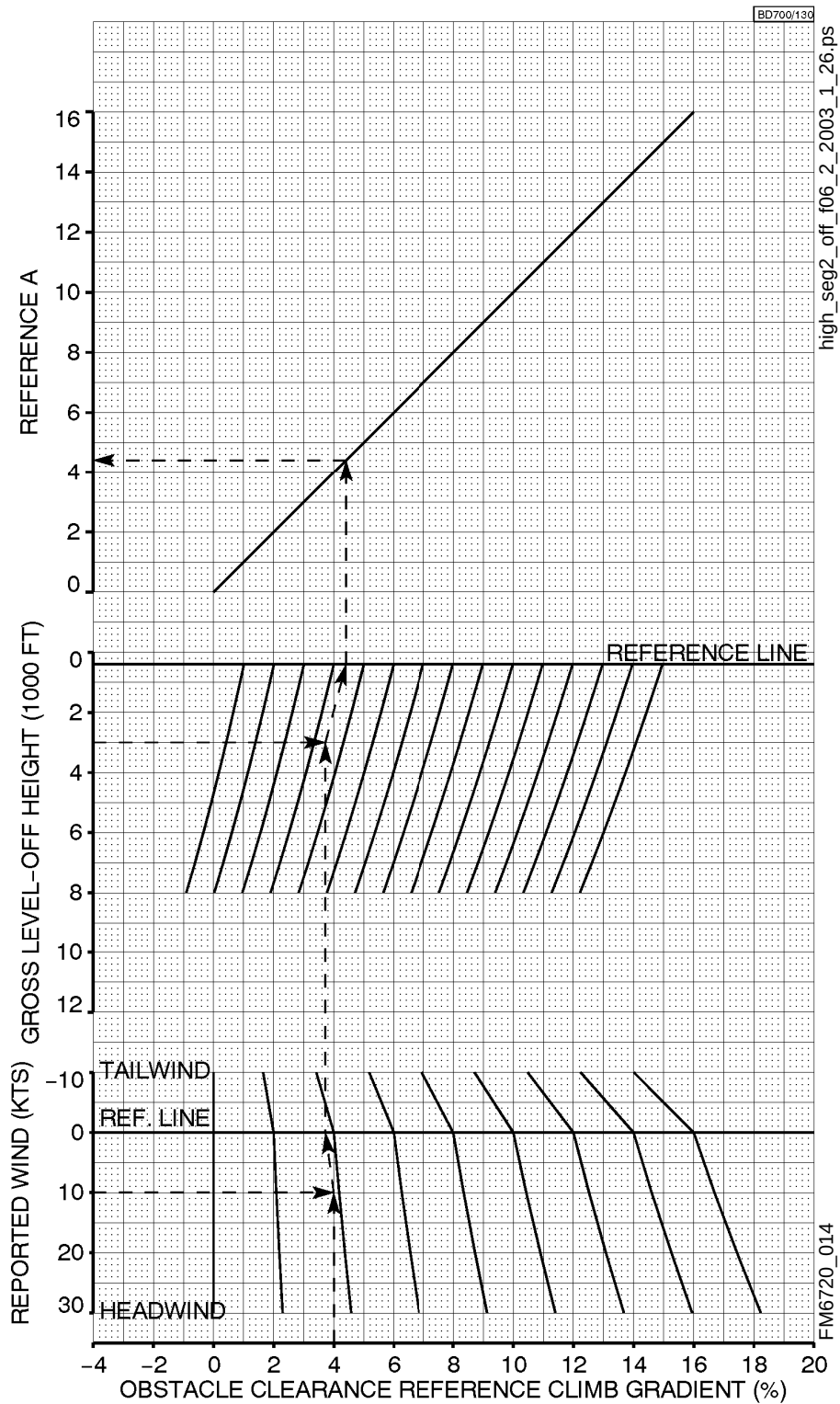


Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Closed
Figure 07-20-11 (Sheet 1 of 2)

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

D. Obstacle Clearance Reference Climb Gradient (Cont'd)

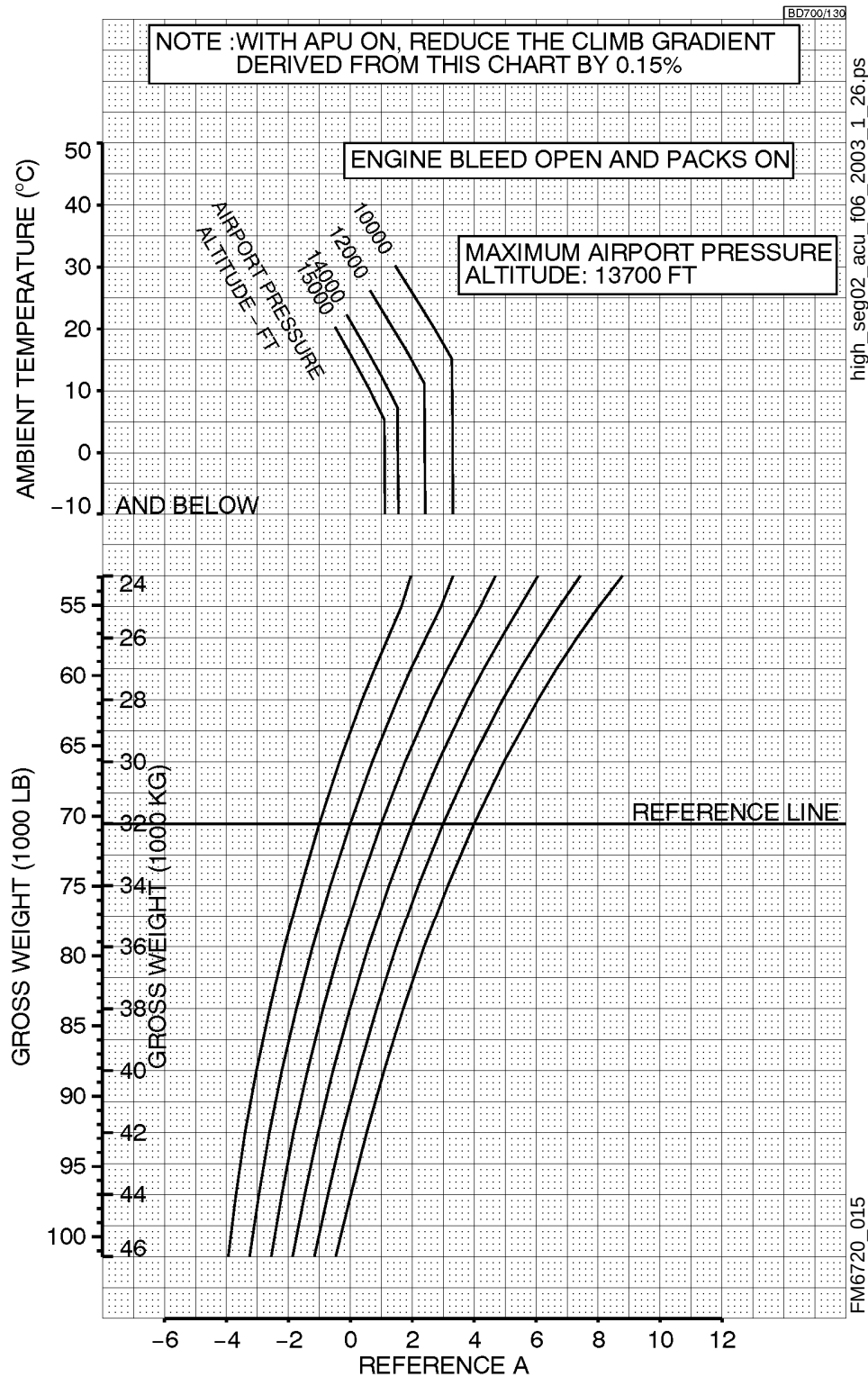


Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Closed
Figure 07-20-11 (Sheet 2 of 2)

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

D. Obstacle Clearance Reference Climb Gradient (Cont'd)

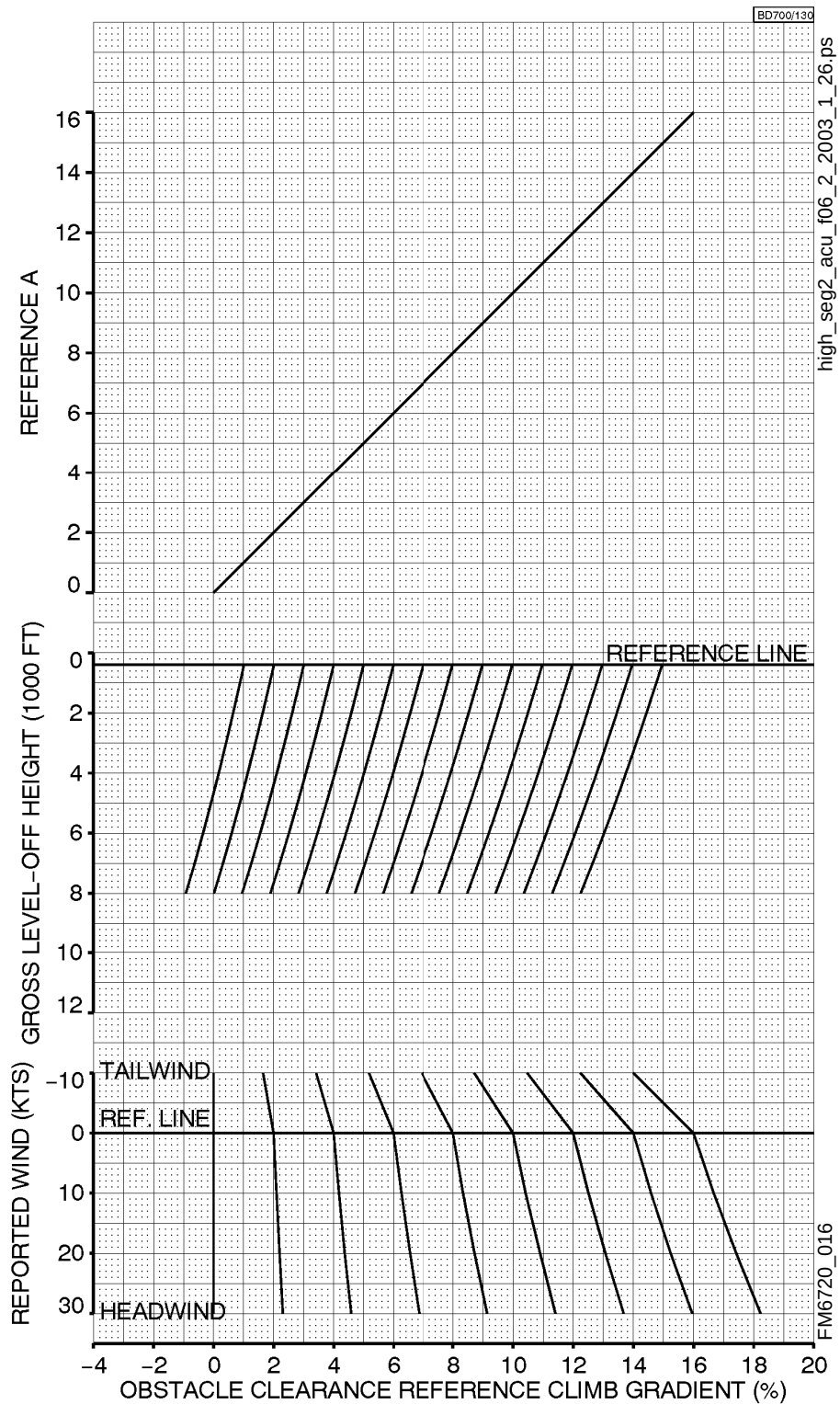


Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Open / Packs On
Figure 07-20-12 (Sheet 1 of 2)

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

D. Obstacle Clearance Reference Climb Gradient (Cont'd)



Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Open / Packs On
Figure 07-20-12 (Sheet 2 of 2)

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb

- (1) APPROACH CLIMB SPEED, V_{AC} - SLAT OUT / FLAP 6°

The approach climb speed (V_{AC}), which is equal to $V_{REF} + 10$ KIAS, for varying conditions of airplane weight and airport pressure altitude, for a slat OUT / flap 6° approach, is provided by Figure 07-20-13.

Example:

Associated Conditions:

Airplane weight = 35,500 kg (78,280 lb)

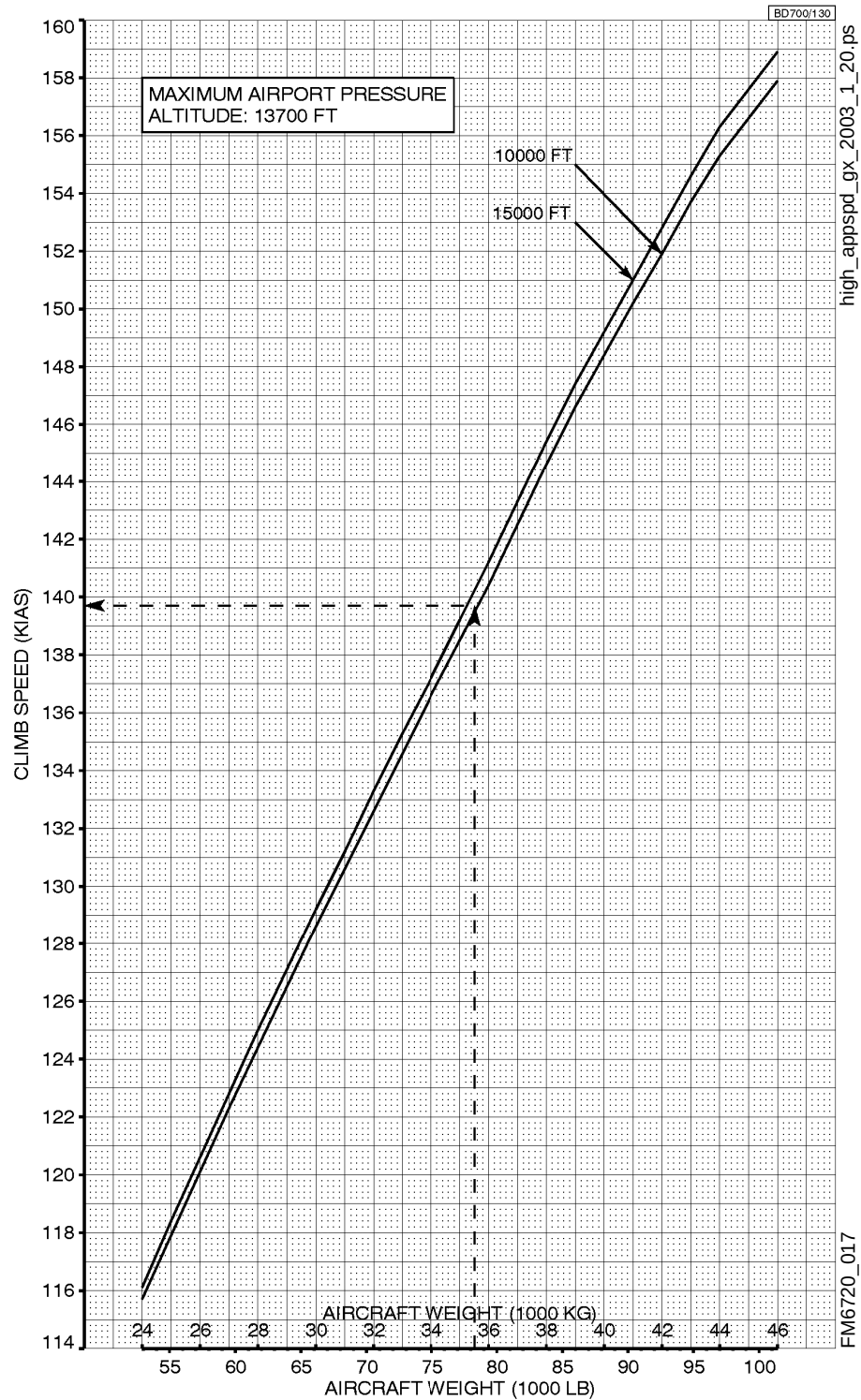
Airport pressure altitude = 12,000 ft

The example in Figure 07-20-13 shows that for the above associated conditions, the approach climb speed for a slat OUT / flap 6° approach is 140 KIAS.

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)



Approach Climb Speed, V_{AC} – Slat OUT / Flap 6°
Figure 07-20-13

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)

(2) APPROACH CLIMB GRADIENT, SLAT OUT / FLAP 6° - ENGINE BLEED CLOSED

The approach climb gradient for varying conditions, for a slat OUT / flap 6° approach with the engine bleed closed, is provided by Figure 07-20-14.

NOTE

With the APU on, reduce the approach climb gradient values derived from Figure 07-20-14 by 0.1%.

Example:

Associated Conditions:

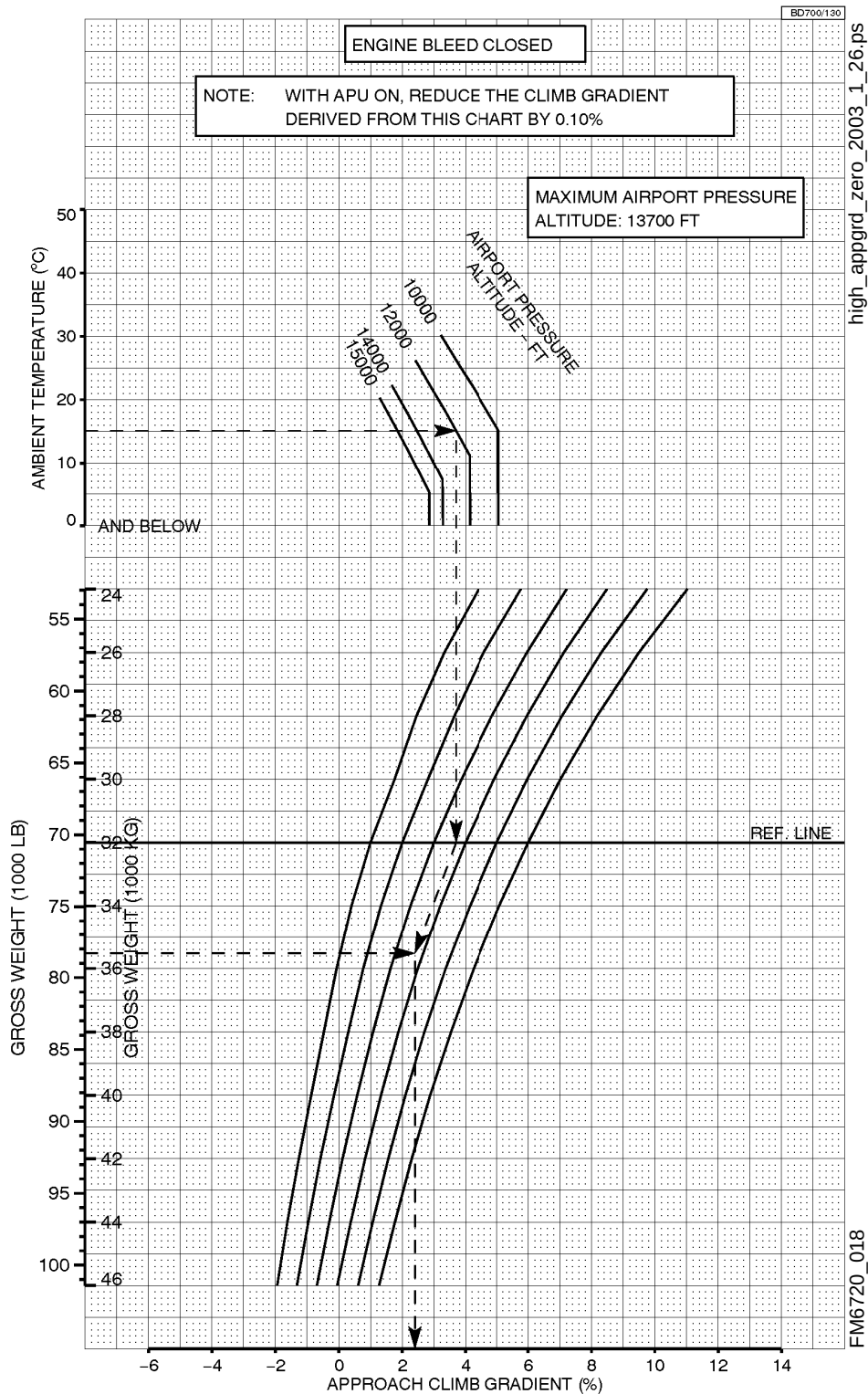
Airport pressure altitude	= 12,000 feet
Temperature	= 15 °C
Engine Bleed	= Closed
Airplane weight	= 35,500 kg (78,280 lb)
APU	= Off

The example in Figure 07-20-14 shows that for the above associated conditions, the approach climb gradient for a slat OUT / flap 6° approach is 2.4%.

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)



Approach Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Closed
Figure 07-20-14

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)

(3) APPROACH CLIMB GRADIENT, SLAT OUT / FLAP 6° - ENGINE BLEED OPEN / PACK ON

The approach climb gradient for varying conditions, for a slat OUT / flap 6° approach with the engine bleeds open and packs on, is provided by Figure 07-20-15.

NOTE

With the APU on, reduce the approach climb gradient values derived from Figure 07-20-15 by 0.1%.

Example:

Associated Conditions:

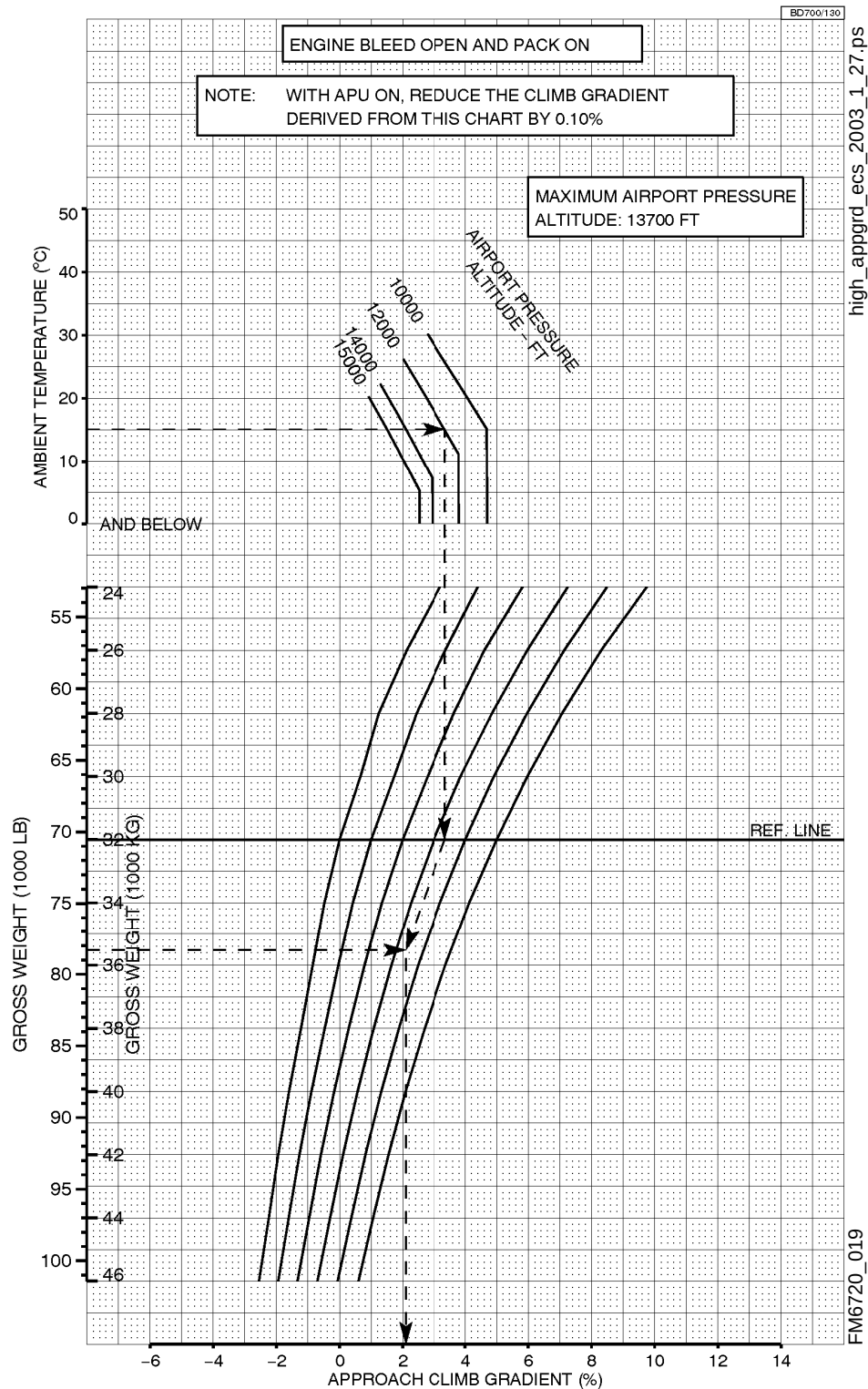
Airport pressure altitude	= 12,000 feet
Temperature	= 15 °C
Pack	= On
Engine Bleed	= Open
Airplane weight	= 35,500 kg (78,280 lb)
APU	= Off

The example in Figure 07-20-15 shows that for the above associated conditions, the approach climb gradient for a slat OUT / flap 6° approach is 2.1%.

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)



Approach Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Open / Packs On
Figure 07-20-15

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)

(4) LANDING CLIMB SPEED, V_{LC} - SLAT OUT / FLAP 30°

The landing climb speed (V_{LC}), which is equal to V_{REF} , for varying conditions of airplane weight and airport pressure altitude, for a slat OUT / flap 30° landing, is provided by Figure 07-20-16.

Example:

Associated Conditions:

Airplane weight = 35,500 kg (78,280 lb)

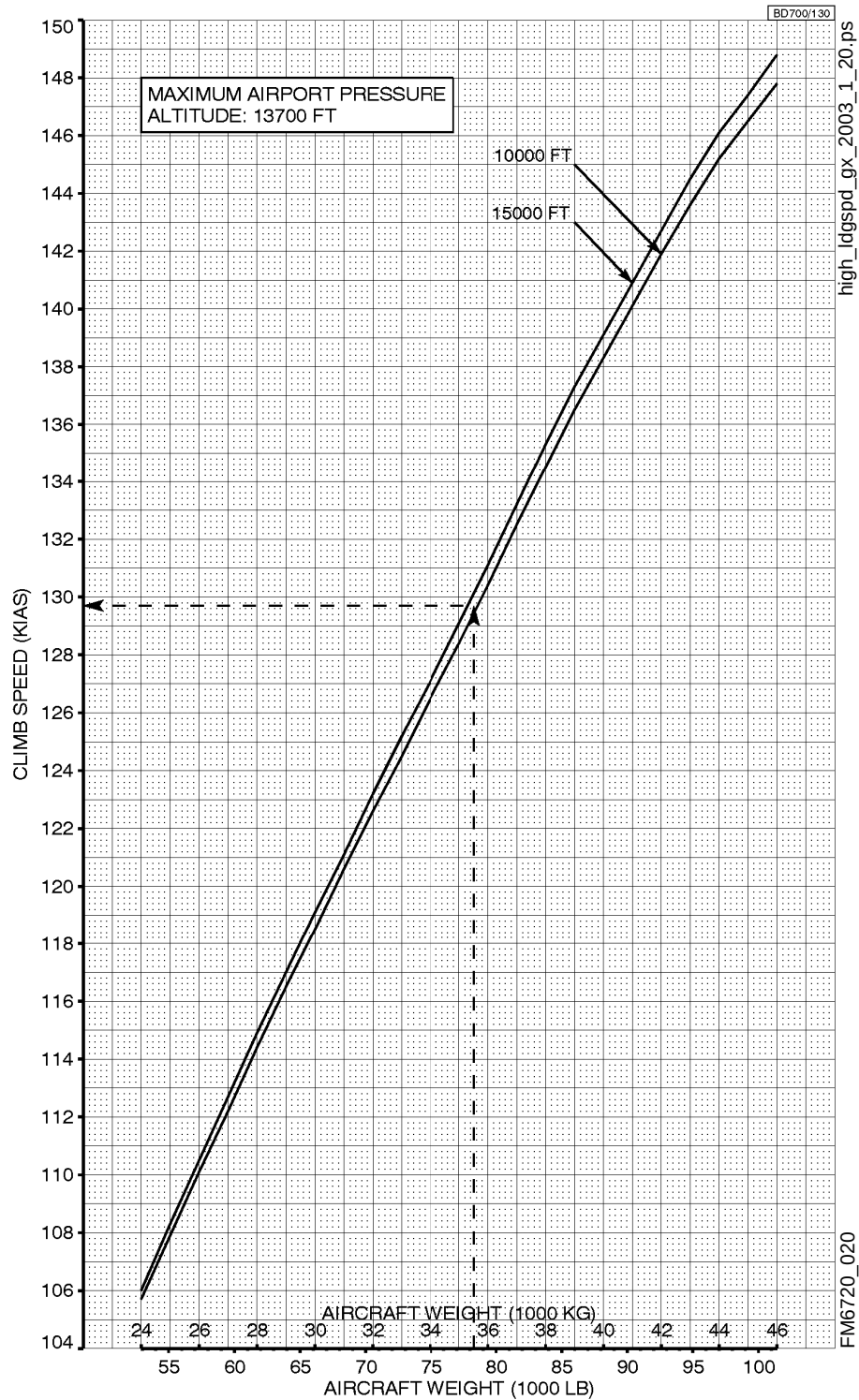
Airport pressure altitude = 12,000 feet

The example in Figure 07-20-16 shows that for the above associated conditions, the landing climb speed for a slat OUT / flap 30° landing is 130 KIAS.

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)



Landing Climb Speed, V_{LC} – Slat OUT / Flap 30°
Figure 07-20-16

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)

(5) LANDING CLIMB GRADIENT, SLAT OUT / FLAP 30° - ENGINE BLEED CLOSED

The landing climb gradient for varying conditions, for a slat OUT / flap 30° landing with the engine bleed closed, is provided by Figure 07-20-17.

NOTE

With the APU on, reduce the landing climb gradient values derived from Figure 07-20-17 by 0.1%.

Example:

Associated Conditions:

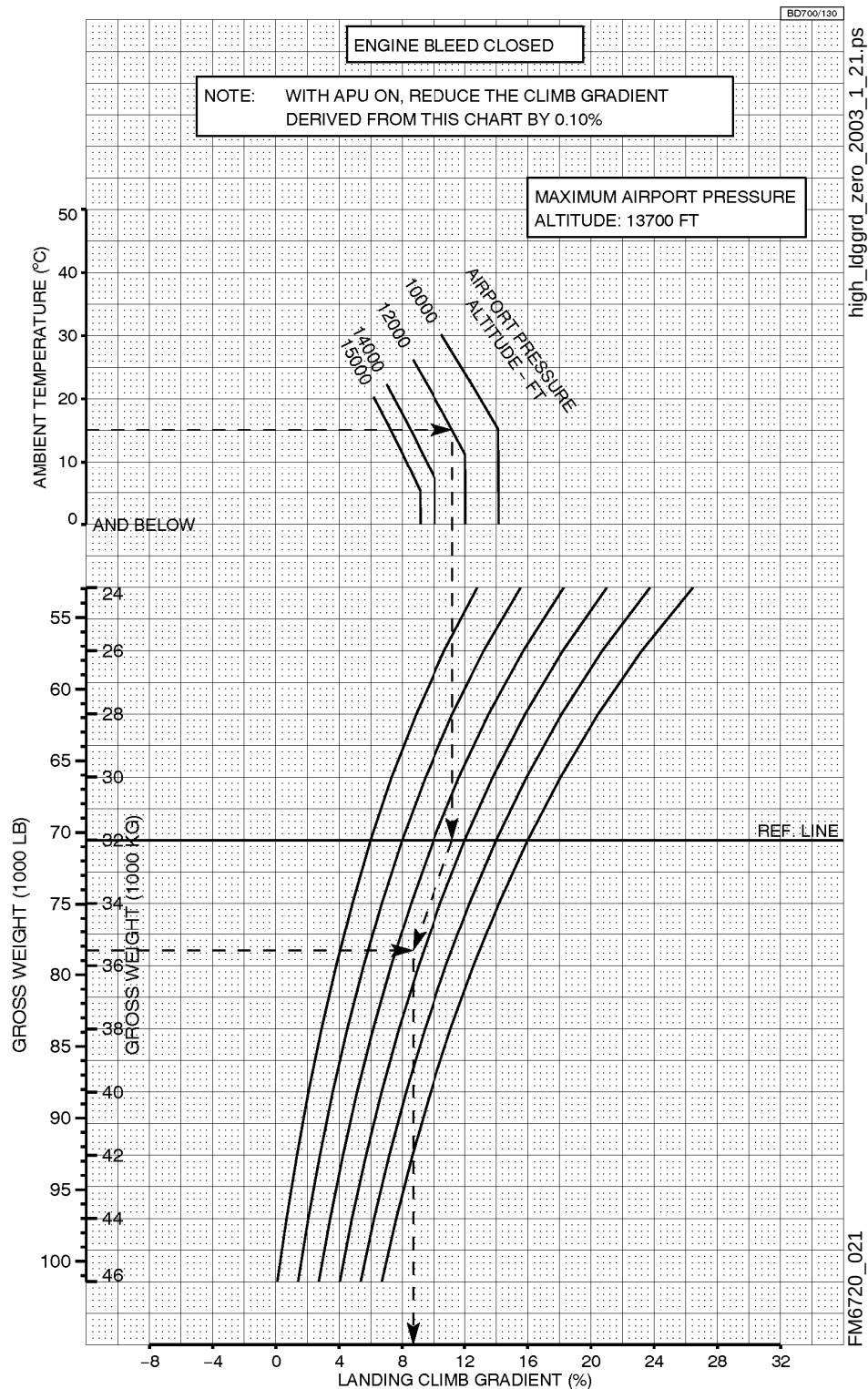
Airport pressure altitude	= 12,000 feet
Temperature	= 15 °C
Engine Bleed	= Closed
Airplane weight	= 35,500 kg (78,280 lb)
APU	= Off

The example in Figure 07-20-17 shows that for the above associated conditions, the landing climb gradient for a slat OUT / flap 30° landing is 8.7%.

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)



Landing Climb Gradient, Slat OUT / Flap 30° – Engine Bleed Closed
Figure 07-20-17

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)

(6) LANDING CLIMB GRADIENT, SLAT OUT / FLAP 30° - ENGINE BLEEDS OPEN / PACKS ON

The landing climb gradient for varying conditions, for a slat OUT / flap 30° landing with engine bleeds open and packs on, is provided by Figure 07-20-18.

NOTE

With the APU on, reduce the landing climb gradient values derived from Figure 07-20-18 by 0.1%.

Example:

Associated Conditions:

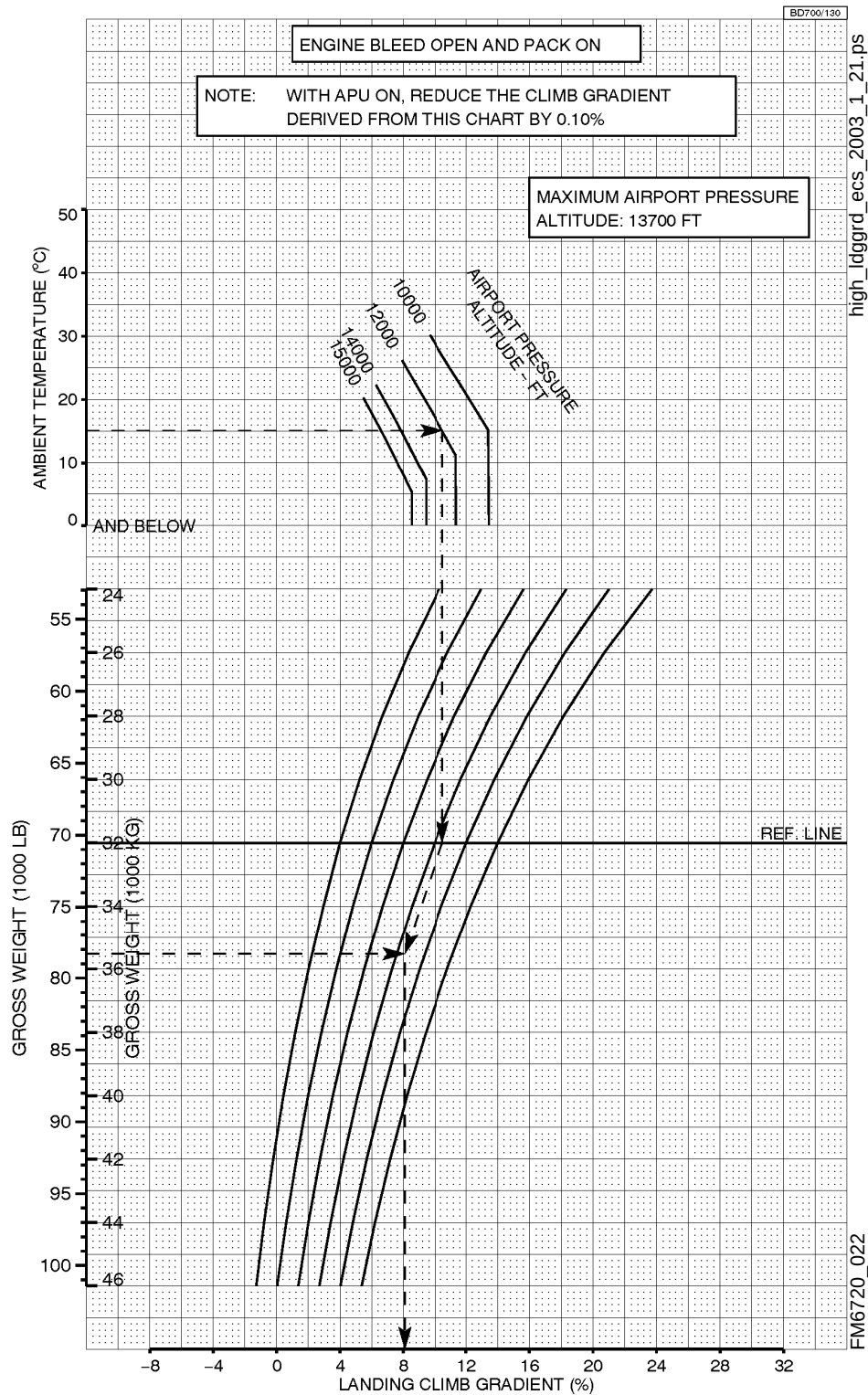
Airport pressure altitude	= 12,000 feet
Temperature	= 15 °C
Pack	= On
Engine Bleed	= Open
Airplane weight	= 35,500 kg (78,280 lb)
APU	= Off

The example in Figure 07-20-18 shows that for the above associated conditions, the landing climb gradient for a slat OUT / flap 30° landing is 8%.

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

E. Approach and Landing Climb (Cont'd)



Landing Climb Gradient, Slat OUT / Flap 30° - Engine Bleed Open / Packs ON
Figure 07-20-18

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

F. Landing Performance

- (1) LANDING WEIGHT LIMITED BY CLIMB REQUIREMENTS - SLAT OUT / APPROACH FLAP 6° / LANDING FLAP 30°

The maximum landing weight limited by climb requirements for varying conditions of airport pressure altitude and temperature for a slat OUT / flap 6° approach climb configuration and a subsequent landing slat OUT / flap 30° configuration, are given in Figure 07-20-19. The chart incorporates both engine bleed closed and engine bleed open / pack on combinations.

NOTE

With the APU on, reduce the maximum landing weight values derived from Figure 07-20-19 by 335 kg (740 lb).

Example:

Associated Conditions:

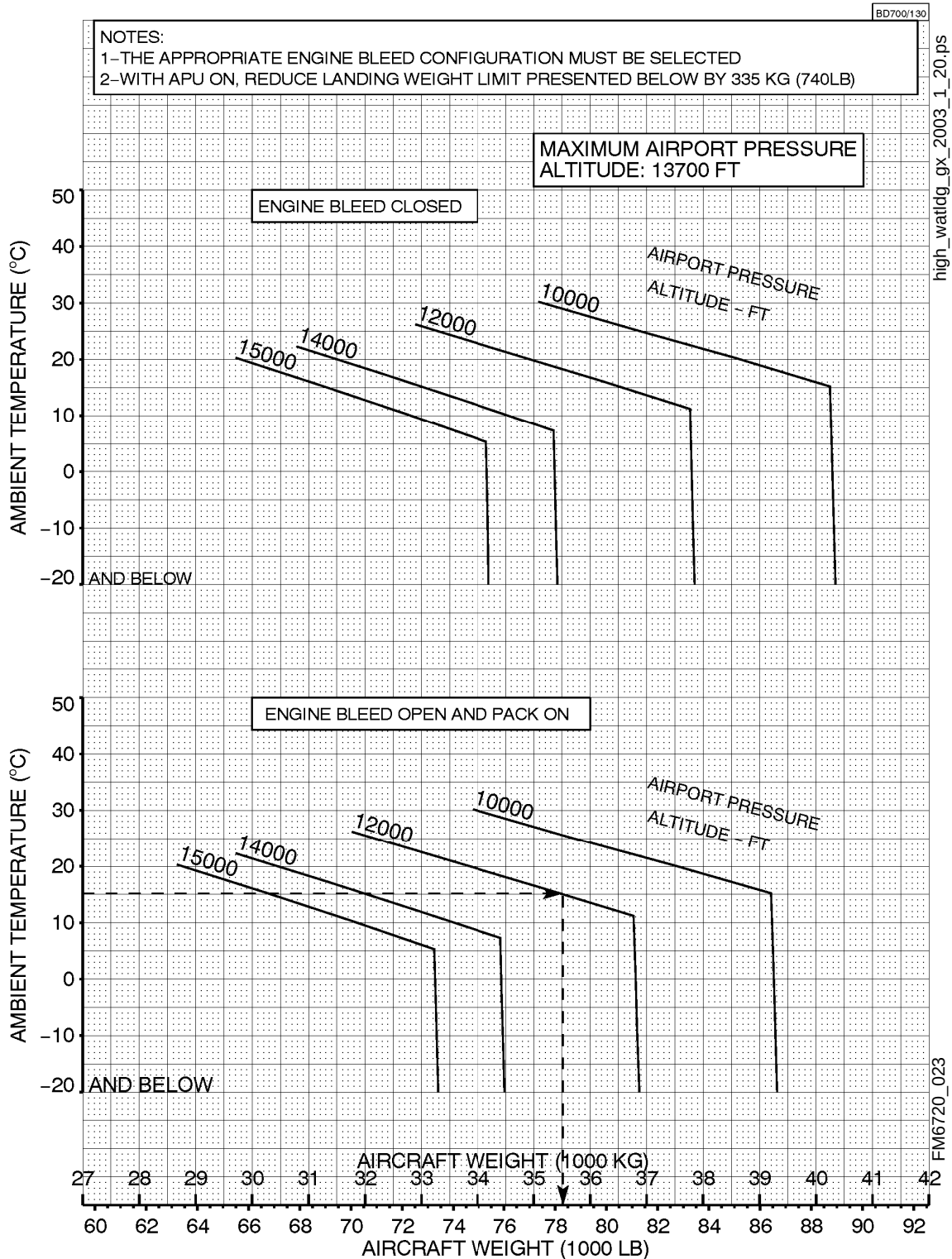
Temperature	= 15 °C
Airport pressure altitude	= 12,000 ft
Pack	= On
Engine Bleed	= Open

As shown in the example, the maximum landing weight limited by climb requirements is 35,500 kg (78,280 lb). The landing weight in this case is less than the maximum approved landing weight (Refer to Chapter 2; LIMITATIONS – STRUCTURAL WEIGHT) and is considered limiting.

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

F. Landing Performance (Cont'd)



Landing Weight Limited by Climb Requirements – Slat OUT / Approach Flap 6° / Landing Flap 30°
Figure 07-20-19

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

F. Landing Performance (Cont'd)

(2) LANDING FIELD LENGTH AND LANDING SPEED, SLAT OUT / FLAP 30°

Effectivity:

- Airplanes 9002 thru 9158 **not incorporating** Service Bulletins:
 - SB 700-27-054, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9)
- or
- Airplanes 9159 thru 9304 **not incorporating** Service Bulletins:
 - SB 700-27-059, Modification – Control and Indication Systems – Modifications to Permit Zero Flap Take-Off Capability with Full Performance,
 - or SB 700-32-034, Modification – Brake Control System – Introduction of Wheel Speed Transducer Part No. 140-209-4 (GW415-1050-9).

NOTE

For landings in a tailwind, add 1,500 feet to the actual landing distance (Figure 07-20-20).

The landing field length required for varying conditions of airplane landing weight, airport pressure altitude and wind is provided by Figure 07-20-20 and Figure 07-20-21.

The landing approach speed (V_{REF}) for varying airplane landing weights and airport pressure altitude is also given by Figure 07-20-20.

The actual landing distance given on Figure 07-20-20 is the distance from a 50 foot height at V_{REF} with slats out and flaps at 30°, to a full stop on a smooth, dry, level, hard-surfaced runway and ISA temperature.

The landing field length required given on Figure 07-20-21 is the actual landing distance (Figure 07-20-20) multiplied by an operational landing field length factor of 1/0.6.

NOTE

Operational rules may require that for wet or slippery runway surfaces, the runway length available be at least 115% of the landing field length derived from Figure 07-20-20.

Example:

Associated Conditions:

Landing gross weight	= 35,500 kg (78,280 lb)
Airport pressure altitude	= 12,000 feet
Wind	= 10 knots (headwind)

The example in Figure 07-20-20 and Figure 07-20-21, shows that for the above conditions, the actual landing distance is 990 meters (3,250 feet) and the landing field length is 1,650 meters (5,420 feet).

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

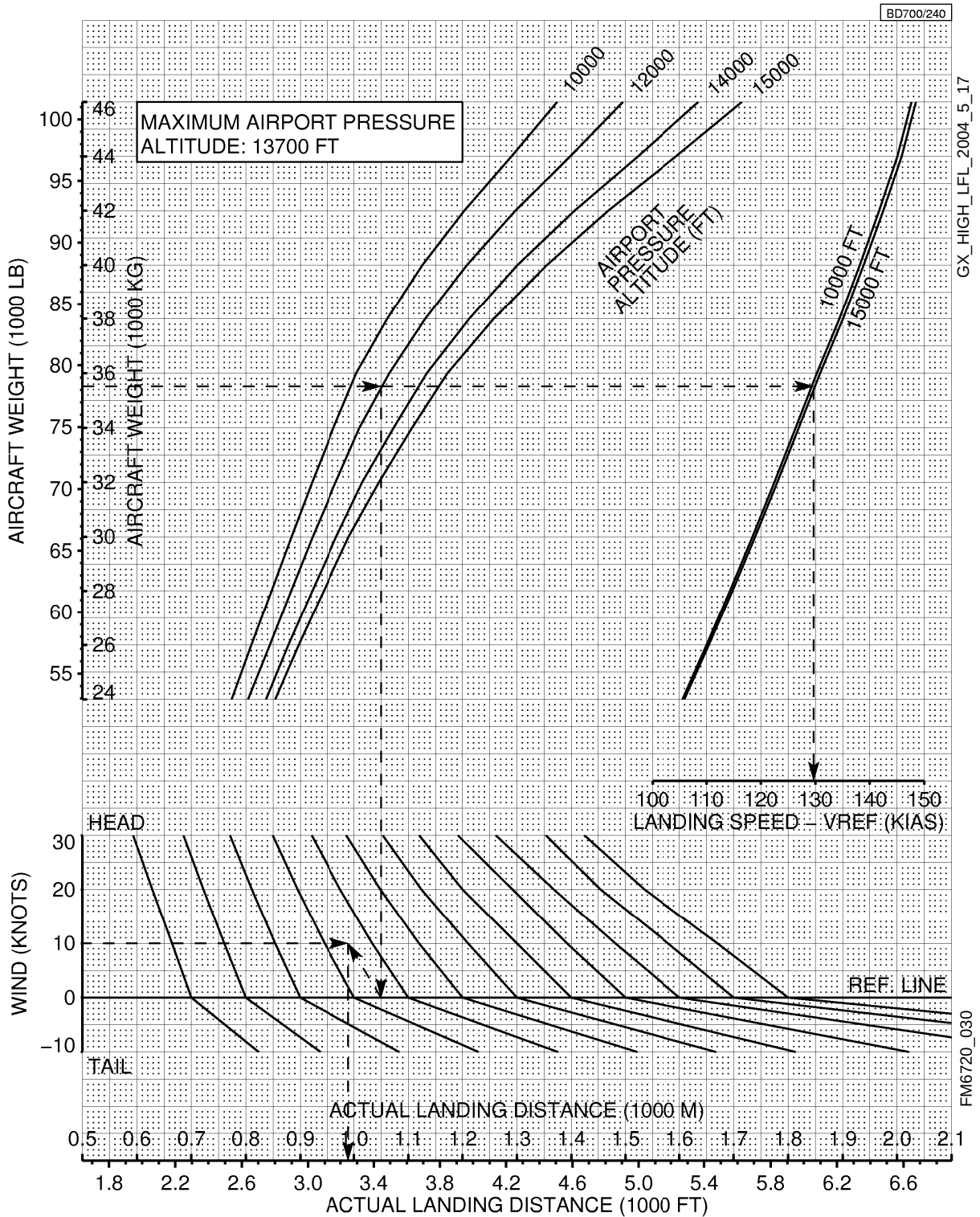
F. Landing Performance (Cont'd)

V_{REF} for the same conditions as above is 130 KIAS.

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

F. Landing Performance (Cont'd)



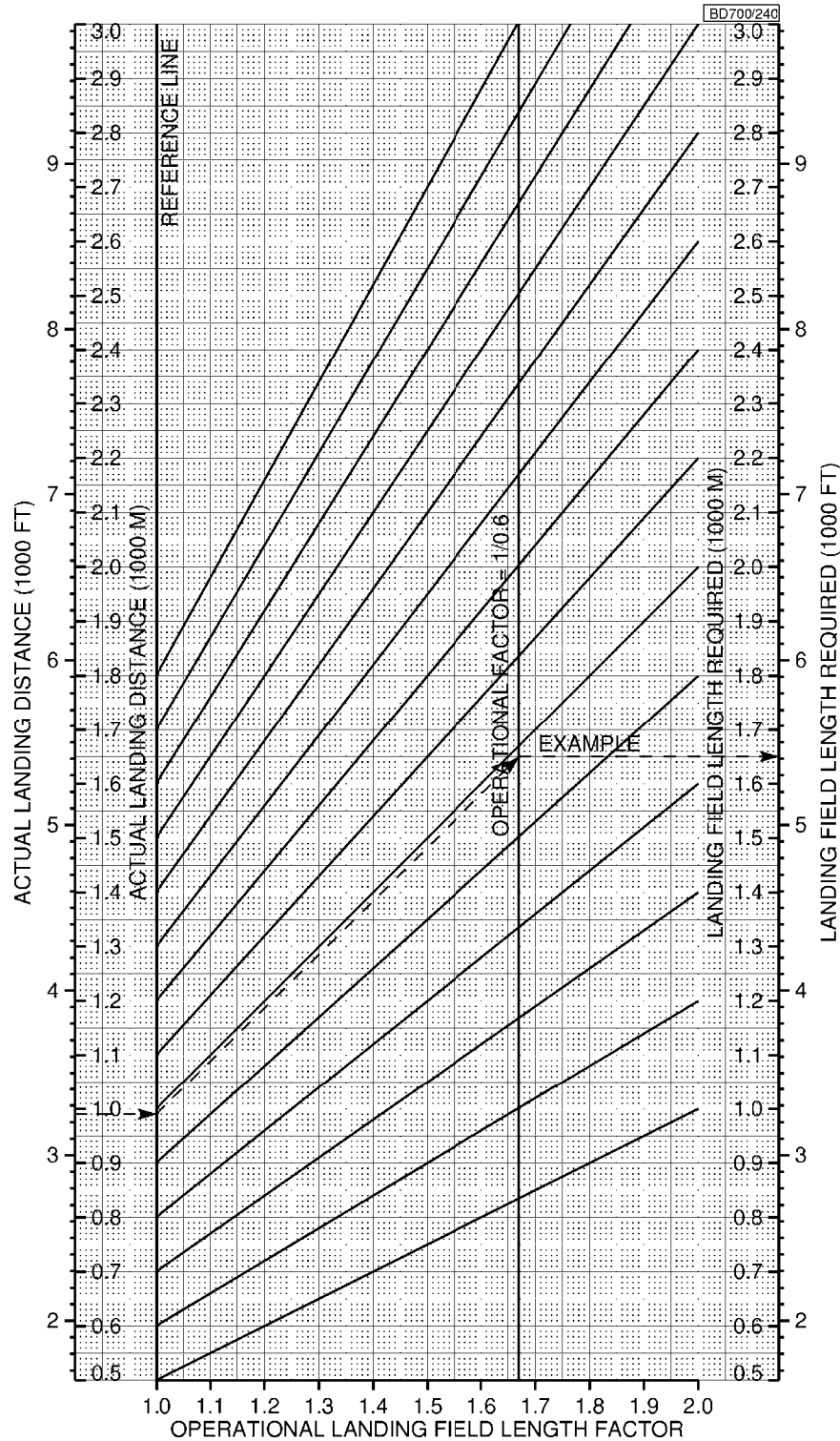
Actual Landing Distance and Landing Speed – Slat OUT / Flap 30°

Figure 07-20-20

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

F. Landing Performance (Cont'd)



Landing Field Length Required – Slat OUT / Flap 30°

Figure 07-20-21

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

F. Landing Performance (Cont'd)

(3) LANDING DISTANCE USING AUTOBRAKE

The following data presents the actual distance from touchdown to full stop, with the autobrake system in use during normal landing and is provided as guidance information. This performance information is based on an approach speed of V_{REF} .

The autobrake system provides selection of three levels of deceleration, i.e., LOW, MED and HI. Use of the autobrake system is optional. The pilot is to select an autobrake setting which ensures that the airplane will stop safely within the available runway length. The use of reverse thrust will allow the autobrake system to reduce the brake pressure to the minimum level associated with the selected deceleration level, thus, minimizing brake and tire wear and keeping the brake temperature to a minimum level. Normal pilot braking can be resumed at any time during the landing roll, by brake pedal application. For more information on the description and operation of the autobrake system, refer to the Flight Crew Operating Manual, Volume 2, Chapter 15 – LANDING GEAR.

Figure 07-20-22 provides the unfactored landing distance (from touchdown to full stop), for varying conditions of landing weight, airport pressure altitude, temperature deviation from ISA and wind, for a slat OUT / flap 30° landing, with the autobrake in use. The actual landing distance is obtained by adding 460 meters (1,500 feet) to the distance derived from Figure 07-20-22.

NOTE

1. HI autobrake setting does not correspond to maximum braking.
2. Any of the autobrake settings can be used on wet runways, however, the LOW setting distance information in Figure 07-20-22 must be used when determining the landing distance using autobrake.
3. If the temperature variation from ISA is less than 0 °C, use a temperature variation from ISA of 0 °C.
4. If the reported wind is positive (headwind), use a wind value of 0.

Example:

Associated Conditions:

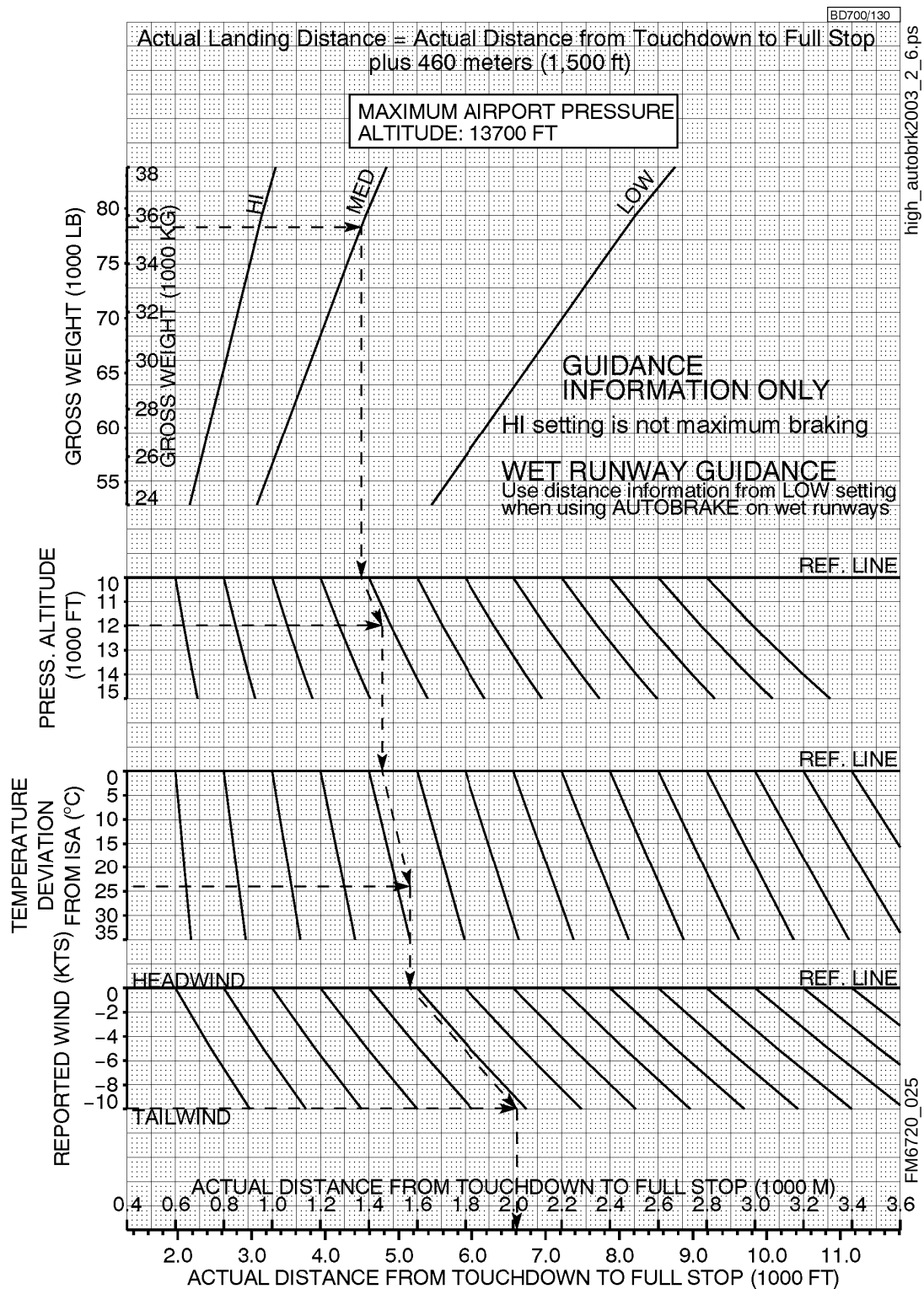
Landing weight	= 35,500 kg (78,280 lb)
Airport pressure altitude	= 12,000 feet
Deviation from ISA	= 24 °C
Wind	= -10 knots (tailwind)
AUTOBRAKE	= MED

The example in Figure 07-20-22 shows that for the above associated conditions, the landing distance from touchdown to full stop is 2,020 meters (6,630 feet). The actual landing distance (from 50 feet screen height to full stop) is therefore 2,480 meters (8,140 feet).

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

F. Landing Performance (Cont'd)



Actual Distance From Touchdown to Full Stop Using Autobrake – Slat OUT / Flap 30°
Figure 07-20-22

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

G. Operation in Icing Conditions

(1) EFFECTS OF COWL ANTI-ICE ON

FIGURE	DESCRIPTION	CAI ON CORRECTIONS
TAKE-OFF PERFORMANCE		
Figure 07-20-2	Take-Off Weight Limited by Climb Requirements – Slat OUT / Flap 6°	Use data from Figure 07-20-23.
Figure 07-20-3	Take-Off Weight Limited by Brake Energy – Slat OUT / Flap 6°	Reduce take-off weight limited by brake energy by 550 kg (1,210 lb).
Figure 07-20-4	Uncorrected Take-Off Field Length, Dry Runway – Slat OUT / Flap 6°	Use “ENGINE BLEED OPEN AND PACK ON” data.
Figure 07-20-5	Corrected Take-Off Field Length, Dry Runway – Slat OUT / Flap 6°	
Figure 07-20-6	Uncorrected Take-Off Field Length, Wet Runway – Slat OUT / Flap 6°	Use "ENGINE BLEED OPEN AND PACK ON" data. Increase take-off field length based on the number of thrust reversers operative: • 2 thrust reversers: 0% • 1 thrust reverser: 3% • 0 thrust reversers: 9%
Figure 07-20-7	Corrected Take-Off Field Length, Wet Runway – Slat OUT / Flap 6°	
Figure 07-20-8	Take-Off Decision Speed, V_1 – Slat OUT / Flap 6° – Wet Runway	Use “ENGINE BLEED OPEN AND PACK ON” data.
Figure 07-20-9	Rotation Speed, V_R – Slat OUT / Flap 6°	
Figure 07-20-10	Take-Off Safety Speed, V_2 – Slat OUT / Flap 6°	
OBSTACLE CLEARANCE		
Figure 07-20-11	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Closed	Reduce “ENGINE BLEED OPEN AND PACK ON” data by 0.4%.
Figure 07-20-12	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Open / Packs On	
APPROACH AND LANDING CLIMB		
Figure 07-20-13	Approach Climb Speed, V_{AC} – Slat OUT / Flap 6°	NO CORRECTIONS

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

G. Operation in Icing Conditions (Cont'd)

FIGURE	DESCRIPTION	CAI ON CORRECTIONS
APPROACH AND LANDING CLIMB		
Figure 07-20-14	Approach Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Closed	Reduce “ENGINE BLEED OPEN AND PACK ON” data by 0.1%.
Figure 07-20-15	Approach Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Open / Pack On	
Figure 07-20-16	Landing Climb Speed, V_{LC} – Slat OUT / Flap 30°	NO CORRECTIONS
Figure 07-20-17	Landing Climb Gradient, Slat OUT / Flap 30° – Engine Bleed Closed	Reduce “ENGINE BLEED OPEN AND PACK ON” data by 0.2%.
Figure 07-20-18	Landing Climb Gradient, Slat OUT / Flap 30° – Engine Bleeds Open / Packs On	
FIGURE	DESCRIPTION	CAI ON CORRECTIONS
LANDING PERFORMANCE		
Figure 07-20-19	Landing Weight Limited by Climb Requirements – Slat OUT / Approach Flap 6° / Landing Flap 30°	Use data from 07-20-24.
Figure 07-20-20	Actual Landing Distance and Landing Speed – Slat OUT / Flap 30°	Increase landing field length by 2%.
Figure 07-20-21	Landing Field Length Required – Slat OUT / Flap 30°	
Figure 07-20-22	Actual Distance from Touchdown to Full Stop Using Autobrake – Slat OUT / Flap 30°	NO CORRECTIONS

(2) EFFECTS OF WING AND COWL ANTI-ICE ON / ICE ACCUMULATION

FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
TAKE-OFF PERFORMANCE		
Figure 07-20-2	Take-Off Weight Limited by Climb Requirements – Slat OUT / Flap 6°	Use data from 07-20-23.
Figure 07-20-3	Take-Off Weight Limited by Brake Energy – Slat OUT / Flap 6°	Reduce take-off weight limited by brake energy by 1,250 kg (2,760 lb).
Figure 07-20-4	Uncorrected Take-Off Field Length, Dry Runway – Slat OUT / Flap 6°	Increase “ENGINE BLEED OPEN AND PACK ON” take-off field length by 11%.
Figure 07-20-5	Corrected Take-Off Field Length, Dry Runway – Slat OUT / Flap 6°	

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

G. Operation in Icing Conditions (Cont'd)

FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
TAKE-OFF PERFORMANCE		
Figure 07-20-6	Uncorrected Take-Off Field Length, Wet Runway – Slat OUT / Flap 6°	Use "ENGINE BLEED OPEN AND PACK ON" data. Increase take-off field length based on the number of thrust reversers operative: 1 or 2 thrust reversers: 12% 0 thrust reversers: 22%
Figure 07-20-7	Corrected Take-Off Field Length, Wet Runway – Slat OUT / Flap 6°	
Figure 07-20-8	Take-Off Decision Speed, V_1 – Slat OUT / Flap 6° – Wet Runway	Increase "ENGINE BLEED OPEN AND PACK ON" V_1 and V_R by 1 knot.
Figure 07-20-9	Rotation Speed, V_R – Slat OUT / Flap 6°	
Figure 07-20-10	Take-Off Safety Speed, V_2 – Slat OUT / Flap 6°	
FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
OBSTACLE CLEARANCE		
Figure 07-20-11	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Closed	Reduce "ENGINE BLEED OPEN AND PACK ON" data by 2.5%.
Figure 07-20-12	Obstacle Clearance Reference Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Open / Packs On	
FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
APPROACH AND LANDING CLIMB		
Figure 07-20-13	Approach Climb Speed, V_{AC} – Slat OUT / Flap 6°	NO CORRECTIONS
Figure 07-20-14	Approach Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Closed	Reduce "ENGINE BLEED OPEN AND PACK ON" data by 2.0%.
Figure 07-20-15	Approach Climb Gradient, Slat OUT / Flap 6° – Engine Bleed Open / Pack On	If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (220 lb) and reduce the derived gradient by 0.7%.
Figure 07-20-16	Landing Climb Speed, V_{LC} – Slat OUT / Flap 30°	NO CORRECTIONS

SUPPLEMENT 20

OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

G. Operation in Icing Conditions (Cont'd)

FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
APPROACH AND LANDING CLIMB		
Figure 07-20-17	Landing Climb Gradient, Slat OUT / Flap 30° – Engine Bleed Closed	Reduce “ENGINE BLEED OPEN AND PACK ON” data by 4.0%.
Figure 07-20-18	Landing Climb Gradient, Slat OUT / Flap 30° – Engine Bleeds Open / Packs On	If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (220 lb) and reduce the derived gradient by 0.7%.
FIGURE	DESCRIPTION	WCAI ON / ICE ACCUMULATION CORRECTIONS
LANDING PERFORMANCE		
Figure 07-20-19	Landing Weight Limited by Climb Requirements – Slat OUT / Approach Flap 6° / Landing Flap 30°	Use data from Figure 07-20-24. If ice accumulation is suspected on unprotected surfaces, reduce the maximum landing weight values by 2650 kg (5842 lb).
Figure 07-20-20	Actual Landing Distance and Landing Speed – Slat OUT / Flap 30°	Increase the actual landing distance and landing field length by 5%.
Figure 07-20-21	Landing Field Length Required – Slat OUT / Flap 30°	If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (200 lb).
Figure 07-20-22	Actual Distance from Touchdown to Full Stop Using Autobrake – Slat OUT / Flap 30°	Increase air distance allocation from 460 meters (1,500 feet) to 560 meters (1,830 feet). If ice accumulation is suspected on unprotected surfaces, increase airplane weight by 100 kg (200 lb).

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

G. Operation in Icing Conditions (Cont'd)

(3) TAKE-OFF WEIGHT LIMITED BY CLIMB REQUIREMENTS, SLAT OUT / FLAP 6° - ANTI-ICE ON

The maximum take-off weight limited by climb requirements for a slat OUT / flap 6° take-off with one engine inoperative and the other engine operating at maximum take-off thrust (MTO), is provided by Figure 07-20-23, with the engine bleed open / one (1) pack on and either the cowl anti-ice on or the wing and cowl anti-ice on.

NOTE

With the APU on, subtract 250 kg (551 lb) from the take-off weight derived from Figure 07-20-23.

Example:

Associated Conditions:

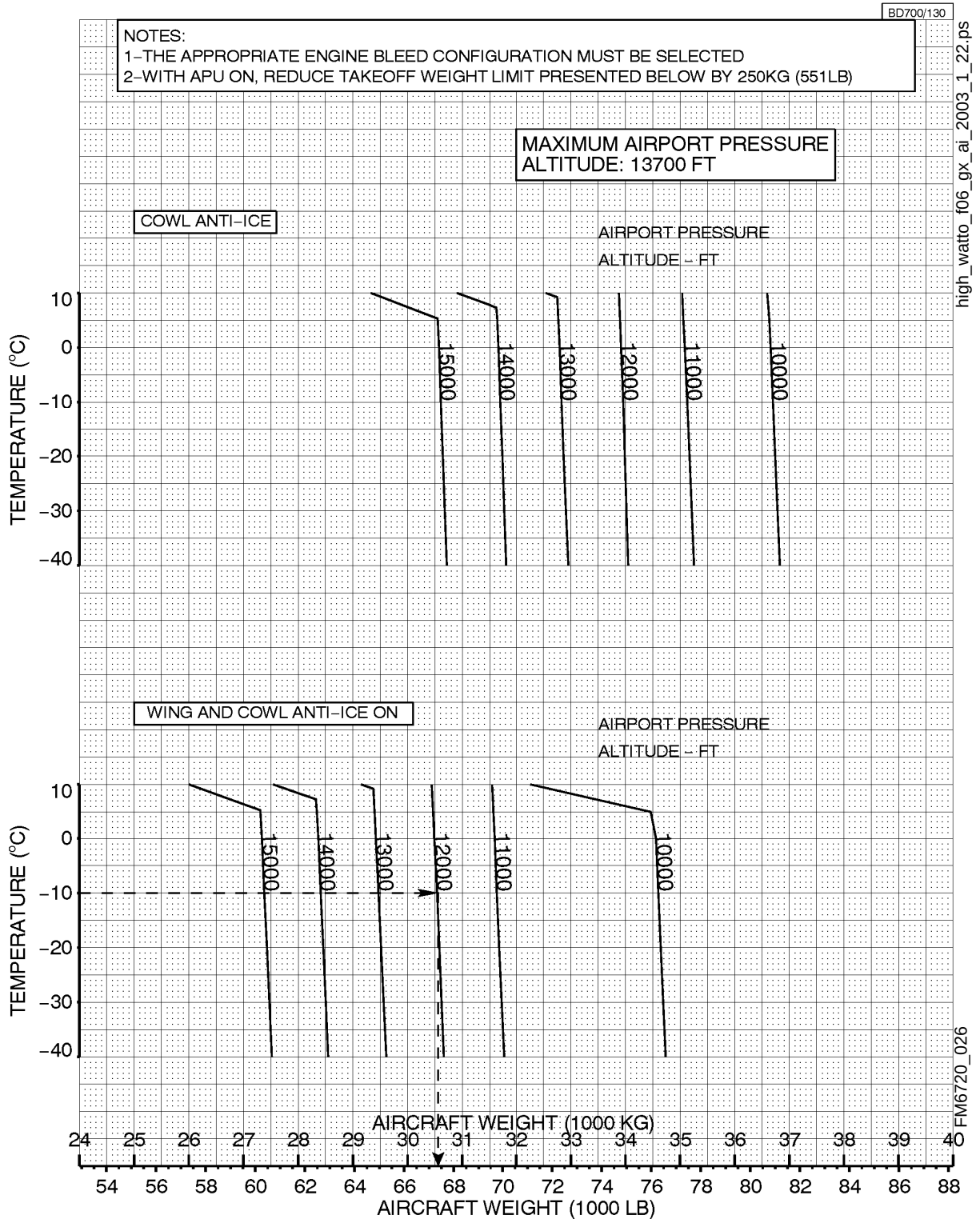
Ambient temperature	= -10 °C
Pressure altitude	= 12,000 ft
Cowl anti-ice	= On
Wing anti-ice	= On
APU	= Off

The example in Figure 07-20-23 shows that for the above associated conditions, the maximum take-off weight limited by climb requirements is 30,550 kg (67,360 lb).

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

G. Operation in Icing Conditions (Cont'd)



Take-Off Weight Limited by Climb Requirements, Slat OUT / Flap 6° – Anti-Ice On
Figure 07-20-23

SUPPLEMENT 20 OPERATIONS AT AIRPORT ELEVATIONS ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

G. Operation in Icing Conditions (Cont'd)

- (4) LANDING WEIGHT LIMITED BY CLIMB REQUIREMENTS - SLAT OUT / APPROACH FLAP 6° / LANDING FLAP 30° - ANTI-ICE ON

The landing weight limited by climb requirements with one engine inoperative and the other engine operating at maximum take-off thrust (MTO), is provided by Figure 07-20-24, with the engine bleed open / one (1) pack on and either the cowl anti-ice on or the wing and cowl anti-ice on.

NOTE

With the APU on, subtract 335 kg (740 lb) from the landing weight derived from Figure 07-20-24.

If ice accumulation is suspected on unprotected surfaces, reduce the landing weight derived from Figure 07-20-24 by 2,650 kg (5,842 lb).

Example:

Associated Conditions:

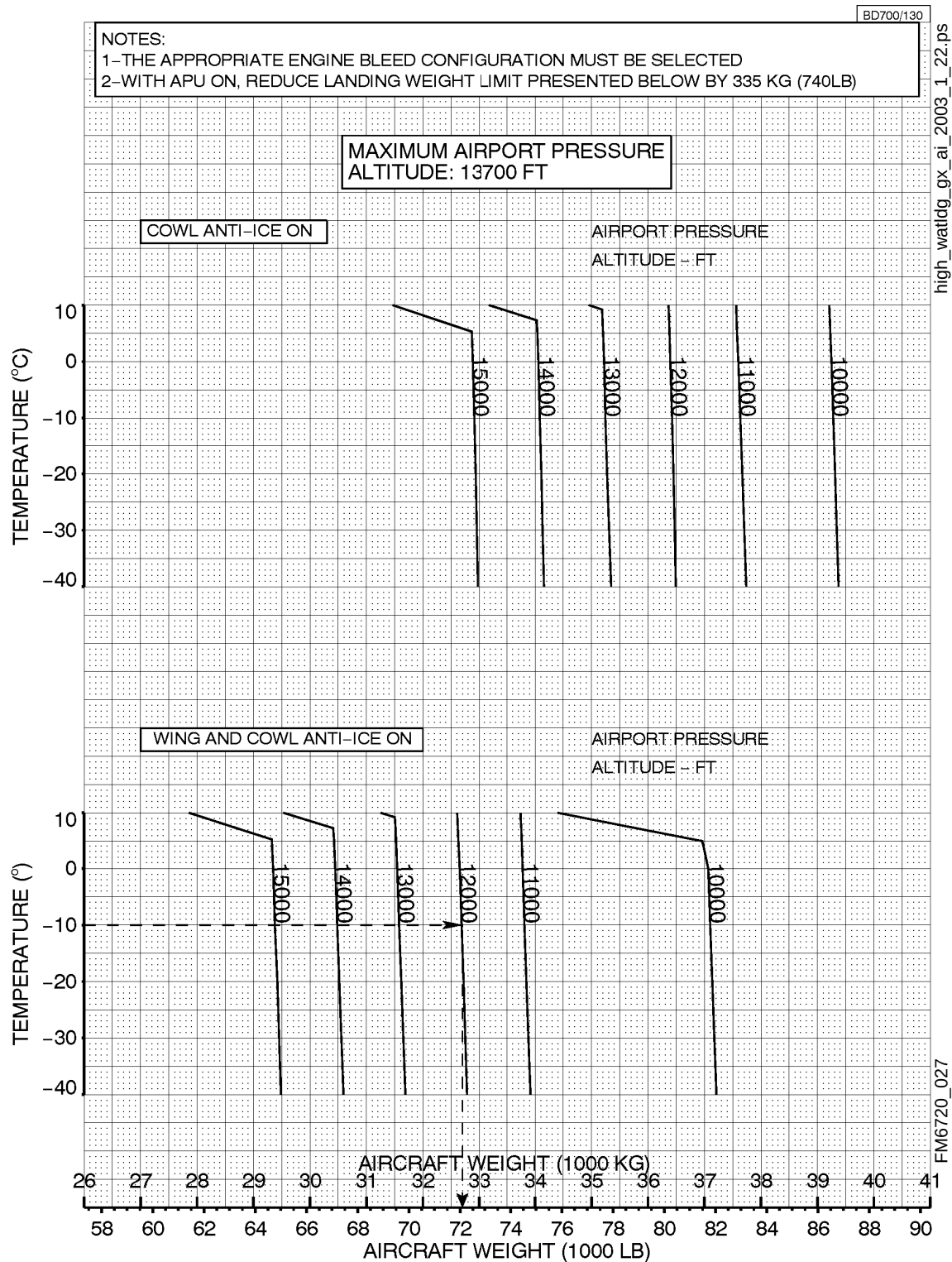
Ambient temperature	= -10 °C
Airport pressure altitude	= 12,000 ft
Cowl anti-ice	= On
Wing anti-ice	= On
APU	= Off

The example in Figure 07-20-24 shows that for the above associated conditions, the maximum landing weight limited by climb requirements is 32,700 kg (72,100 lb)

SUPPLEMENT 20
OPERATIONS AT AIRPORT ELEVATIONS
ABOVE 10,000 FEET

6. PERFORMANCE (CONT'D)

G. Operation in Icing Conditions (Cont'd)



Landing Weight Limited by Climb Requirements – Slat OUT / Approach Flap 6° / Landing Flap 30° –
Anti-Ice On
Figure 07-20-24