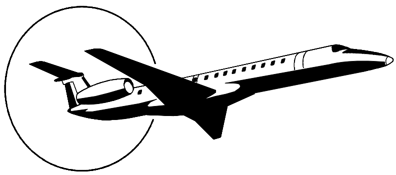
EMB145

EMBRAER



UNITED STATES

AIRPLANE FLIGHT MANUAL

EMBRAER S.A.

THIS MANUAL IS APPROVED IN ACCORDANCE WITH FAR 21.29 FOR U.S. REGISTERED AIRCRAFT, AND IS APPROVED BY THE CTA ON BEHALF OF THE FEDERAL AVIATION ADMINISTRATION.
THIS DOCUMENT IS APPLICABLE TO EMB-145 STANDARD, EMB-145ER, EMB-145EP, EMB-145MP, EMB-145LR, EMB-145XR, EMB-135ER AND EMB-135LR AIRPLANES.

CTA APPROVAL:____________________

CHEFE DA DIVISÃO DE
HOMOLOGAÇÃO AERONÁUTICA

DATE: **DECEMBER 10, 1996**

REGISTRATION NUMBER:____________________

SERIAL NUMBER:____________________

AFM–145/1153
DECEMBER 10, 1996
REVISION 67 – APRIL 17, 2019

REVISION APPROVAL

AFM-145/1153 – EMB-145 STANDARD, EMB-145 ER, EMB-145 EP, EMB-145 MP, EMB-145 LR, EMB-145 XR, EMB-135 ER, EMB-135 LR – FAA

REVISION: 67

DATE: APRIL 17, 2019

Approval n° 373/2019/GCPR/GGCP/SAR-ANAC:

AFFECTED INFORMATION	DESCRIPTION OF REVISION
Section 3	CABIN FIRE OR SMOKE AIR CONDITIONING SMOKE ELECTRICAL SYSTEM FIRE OR SMOKE These procedures are being merged into a single Smoke Fire or Fumes procedure to deal with smoke that comes from different sources.
Section 3	SMOKE EVACUATION Included steps to don oxygen masks and set to 100%, don smoke goggles and establish crew communication. Included statement to land at the nearest suitable airport.
Section 3	LAVATORY SMOKE Included step to contact the cabin crew and, if necessary, perform an inflight diversion and smoke evacuation procedure. Removed the reference to CABIN FIRE OR SMOKE Procedure (now merged into the SMOKE FIRE OR FUMES procedure). The SMOKE FIRE OR FUMES procedure is applicable to smoke, fire or fumes situation with no EICAS warning.
Section 3	EMERGENCY DESCENT Included steps to set transponder code 7700 and to notify the ATC. Updated the step "Minimum Enroute Altitude.... CHECK" to "Altitude......MEA or 10000 FT WHICHEVER IS HIGHER".
Section 3	ONE ENGINE INOPERATIVE GO-AROUND Revised the procedure to advance only the Operative Engine Thrust Lever to MAX if a go-around should be initiated with a failed engine. Also a note is being included to aware pilots to advance both thrust levers to MAX if an engine fails during the approach and a go-around should be initiated before securing the failed engine.

RP435

AFFECTED INFORMATION	DESCRIPTION OF REVISION
Section 2	**NAVIGATION AND COMMUNICATION EQUIPMENT** Included statement of compliance with the applicable regulations for the ADS-B Out system.
Section 4	**AFTER START** Included step to set the transponder according to local requirements.
Section 4	**AFTER LANDING** Updated step to set the transponder to STBY or according to local requirements.

RP536

Guidance Information:

AFFECTED INFORMATION	DESCRIPTION OF REVISION
Section 1	**INDENTATION** Added the explanation on the indentation structure used throughout the AFM.

RP773

RECORD OF TEMPORARY REVISIONS
(AFM–145/1153)

TR N°	APPLICABILITY	DATE ISSUED	DATE REMOVED	INCORPORATED BY
55.1	Supplement 10	Mar 03/03	Oct 21/03	Revision 56
55.2	Sections 2, 3 and 4	Apr 14/03	Oct 21/03	Revision 56
55.3	Sections 1, 2, 3, 4, Supplements 1, 2, 4, 11, 12, 20, 21, 22 and Appendix 1	Jul 02/03	Oct 21/03	Revision 56
55.4	Sections 2 and 5	Aug 19/03	Oct 21/03	Revision 56
56.1	Sections 1, 5 and Supplements 10, 21 and 25	Nov 06/03	Jun 17/04	Revision 57
56.2	Section 3	Feb 13/04	Jun 17/04	Revision 57
56.3	Sections 2, 3, 4, 5, Supplements 9, 11, 12, 15, 18, 19, 20, 22, 23, 24 and Appendix 1	Mar 17/04	Jun 17/04	Revision 57
57.1	Section 3 and Supplement 19	Oct 05/04	Nov 23/04	Revision 58
58.1	Sections 1, 2, 3, 4 and Supplements 9, 11, 12, 18, 21 and 22	Mar 29/05	Jun 30/05	Revision 59
58.2	Sections 1, 2 and Supplements 9 and 11	Apr 26/05	Jun 30/05	Revision 59

RECORD OF TEMPORARY REVISIONS

(AFM–145/1153)

TR N°	APPLICABILITY	DATE ISSUED	DATE REMOVED	INCORPORATED BY
58.3	Section 5 and Supplements 9, 12, 15 and 17	May 20/05	Jun 30/05	Revision 59
59.1	Section 1 and Supplement 10	Oct 20/05	Nov 30/05	Revision 60
60.1	Sections 1, 2 and Supplement 3	Dec 28/05	Nov 17/06	Revision 61
60.2	Section 4	Mar 08/06	Nov 17/06	Revision 61
60.3	Section 1 and Supplement 10	May 16/06	Nov 17/06	Revision 61
60.4	Sections 2, 3, 5 and Supplements 1, 5, 8, 12 and 17	Jul 13/06	Nov 17/06	Revision 61
60.5	Section 1 and Supplements 15 and 26	Sep 12/06	Nov 17/06	Revision 61
60.6	Sections 1, 2, 5 and Supplements 3, 9, 12 and 15	Sep 28/06	Nov 17/06	Revision 61
61.1	Supplements 21 and 22	Mar 15/07	Jun 19/07	Revision 62
62.1	Sections 2, 3, 4 and Supplements 9, 11, 12, 18 and 22	Aug 29/07	Nov 20/07	Revision 63
63.1	Section 3	Jan 10/12	Oct 18/12	Revision 64
63.2	Sections 1, 2, 3 and Supplements 4, 15, 27 and 28	Sep 25/12	Oct 18/12	Revision 64

RECORD OF TEMPORARY REVISIONS

(AFM–145/1153)

TR N°	APPLICABILITY	DATE ISSUED	DATE REMOVED	INCORPORATED BY
64.1	Sections 1, 3, 5 and Supplements 9, 11 and 12	Oct 29/12	Oct 03/13	Revision 65
64.2	Supplements 2 and 29	Jun 10/13	Oct 03/13	Revision 65
65.1	Sections 1, 2 and Supplements 9 and 11	Jun 11/14	Mar 15/17	Revision 66
65.2	Supplement 29	Sep 01/16	Mar 15/17	Revision 66
66.1	Sections 2, 3 and 4	Mar 21/18	Apr 17/19	Revision 67

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LIST OF EFFECTIVE PAGES

ORIGINAL.......... 0 .... DEC 10, 1996
REVISION.......... 1 .... DEC 20, 1996
REVISION.......... 2 .... MAR 10, 1997
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REVISION.......... 5 .... MAY 27, 1997
REVISION.......... 6 .... JUL 24, 1997
REVISION.......... 7 .... OCT 02, 1997
REVISION.......... 8 .... JAN 13, 1998
REVISION.......... 9 .... FEB 20, 1998
REVISION....... 10........ APR 06, 1998
REVISION....... 11........ APR 07, 1998
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REVISION....... 17........ JUL 06, 1998
REVISION....... 18........ AUG 06, 1998
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REVISION....... 23........ JAN 14, 1999
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REVISION....... 26........ APR 05, 1999
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REVISION....... 32........ DEC 17, 1999
REVISION....... 33........ DEC 23, 1999
REVISION....... 34........ DEC 27, 1999
REVISION....... 35........ APR 25, 2000
REVISION....... 36........ JUN 20, 2000
REVISION....... 37........ JUL 03, 2000

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REVISION .... 48 .... JUN 12, 2001
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REVISION .... 55 .... NOV 27, 2002
REVISION .... 56 .... OCT 21, 2003
REVISION .... 57 .... JUN 17, 2004
REVISION .... 58 .... NOV 23, 2004
REVISION .... 59 .... JUN 30, 2005
REVISION .... 60 .... NOV 30, 2005
REVISION .... 61 .... NOV 17, 2006
REVISION .... 62 .... JUN 19, 2007
REVISION .... 63 .... NOV 20, 2007
REVISION .... 64 .... OCT 18, 2012
REVISION .... 65 .... OCT 03, 2013
REVISION .... 66 .... MAR 15, 2017
REVISION .... 67 .... APR 17, 2019

* Asterisk indicates pages revised, added or deleted by the current revision.

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SUPPLEMENTS

Supplements pages as per individual “List of Effective Pages” of each Supplement.

* Asterisk indicates pages revised, added or deleted by the current revision.

APPENDICES

Appendices pages as per individual "List of Effective Pages" of each Appendix.

* Asterisk indicates pages revised, added or deleted by the current revision.

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TABLE OF CONTENTS

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SECTION 1

GENERAL

INTRODUCTION

This Airplane Flight Manual (AFM) meets the certification requirements of FAR 25 and provides the approved information necessary to safely operate the EMB-145.

For additional information, please contact:

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REVISIONS

EMBRAER may revise this manual periodically as required to update information or provide information not available at the time of printing. Revised data may result from EMBRAER approved airplane modifications or from improved techniques gained through operational experience. Changes to the text are indicated by a vertical line in the outside margin of the page.

Relocated or rearranged text or illustrations will be indicated by a vertical line adjacent to the page number.

A Revision Approval, at the beginning of this manual, shows the approval date and authority signature, as well as a brief description of the last revision modifications.

The basic issue date of this Manual is presented on the title page. The revisions to the basic Manual will be numbered sequentially (Rev. 1, 2, 3 etc...). This also applies to pages revised by an earlier revision.

NOTE: In March 21st, 2006 the Brazilian Airworthiness Authority has changed from CTA to ANAC (Agência Nacional de Aviação Civil). Only the pages revised from this date onwards will bear the wording "ANAC Approved", except for the front page, which refers to the original AFM approval, and thus will keep the former wording.

TEMPORARY REVISIONS

Temporary revisions may be issued when the need arises. The temporary revision will be clearly identified and will be replaced as soon as possible. Temporary revisions will not be included in the List of Effective Pages, but a brief description of the temporary revision modifications will be presented in the last Revision Approval pages.

LIST OF EFFECTIVE PAGES

A List of Effective Pages for all the sections is located at the beginning of this Manual. This list presents the issuance date of each page and it is revised with the Manual. Its purpose is to verify that the Manual is current.

ORGANIZATION

This Airplane Flight Manual is divided into seven Sections, as follows:

- Section 1 - General
- Section 2 - Limitations
- Section 3 - Emergency and Abnormal Procedures
- Section 4 - Normal Procedures
- Section 5 - Performance
- Supplements
- Appendices

The Sections and their use are explained below.

SECTION 1 - GENERAL

This Section contains general information pertaining to the Manual, such as the revision rules, its organization and a definition of terms.

SECTION 2 - LIMITATIONS

This Section contains airworthiness certification limitations.
The limitations restrict airplane operation in accordance with the airworthiness certificate.

SECTION 3 - EMERGENCY AND ABNORMAL PROCEDURES

This Section contains the recommended actions in the event of failures.

SECTION 4 - NORMAL PROCEDURES

This Section contains the specific EMB-145 normal procedures to be followed in a normal day-by-day operation.

SECTION 5 - PERFORMANCE

This section contains performance data for takeoff, enroute, landing and go-around phases.

SUPPLEMENTS

Supplements may be incorporated into the AFM. They provide the necessary additional information for the operation of the airplane, when equipped with optional systems and equipment not provided with the standard airplane, or when specific operational information is applicable to the airplane (e.g. ferry flights, special operation etc...). Supplements may modify the limitations, procedures or performance data of the basic AFM.

APPENDICES

Appendices may be incorporated in the AFM to provide additional information for the operation of the airplane, in a format that may not be the same as the basic AFM.

GUIDANCE INFORMATION

Some portions of the AFM are provided as guidance information and were not applied for a certification process, being presented in the AFM for the operator convenience. Such portions are presented in segregated Sections, Supplements or Appendices, and their pages do not bear the notation "ANAC APPROVED".

INDENTATION

Indentation exists when the information is displaced to the right relative to the paragraph that immediately precedes it. The indentation is used to establish a relationship between the indented and the preceding information.

Indented information is normally preceded by a condition (e.g. “during landing”, “if something is true”, “when something happens”). When this is the case, observe the indented information when the preceding condition is satisfied.

DEFINITION OF TERMS

The following definitions apply to the terms below:

WARNING: **OPERATING PROCEDURES, TECHNIQUES AND OTHER RELATED INFORMATION WHICH MAY RESULT IN PERSONAL INJURY OR LOSS OF LIFE, IF NOT FOLLOWED.**

CAUTION: OPERATING PROCEDURES, TECHNIQUES AND OTHER RELATED INFORMATION WHICH MAY RESULT IN DAMAGE OR DESTRUCTION OF EQUIPMENT, IF NOT FOLLOWED.

NOTE: Operating procedures, techniques and other related information which are considered essential to emphasize.

ABBREVIATIONS AND ACRONYMS USED

ABBREVIATIONS OR ACRONYMS	MEANING
°C	Degree Celsius
°F	Degree Fahrenheit
ft	Feet
g	Gravity Acceleration
h	Hour
Hz	Hertz
in.Hg	Inches of Mercury
kg	Kilogram
km	Kilometer
kt	Knot
lb	Pounds
m	Meter
mb	Milibar
min	Minute
mm	Milimeter
nm	Nautical Mile
pph	Pounds per Hour
psi	Pound per Square Inch
sec	Second
∆Gust	Increase in airspeed due to gust.
A	Ampere
AC	Alternating Current
ACOC	Air Cooled Oil Cooler
ADC	Air Data Computer
ADF	Automatic Direction Finder
AFM	Airplane Flight Manual
AGL	Above Ground Level
AHC	Attitude and Heading Computer

ABBREVIATIONS OR ACRONYMS	MEANING
AHRS	Attitude and Heading Reference System
AIL	Aileron
ALC	APU Line Contactor
ALT	Altitude
ALTN	Alternate
AOA	Angle of Attack
AP	Autopilot
APU	Auxiliary Power Unit
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
ATS	Air Turbine Starter
ATT	Attitude
ATTCS	Automatic Takeoff Thrust Control System
AUX	Auxiliary
AWU	Aural Warning Unit
BC	Battery Contactor
BCU	Brake Control Unit
BIT	Built In Test
CDL	Configuration Deviation List
CG	Center of Gravity
CMC	Central Maintenance Computer
COMM	Communication
CON	Continuous
CPAM	Cabin Pressure Acquisition Module
CR	Cruise
CRZ	Cruise
CVR	Cockpit Voice Recorder
DAU	Data Acquisition Unit
DC	Direct Current, Digital Controller

ABBREVIATIONS OR ACRONYMS	MEANING
DFDR	Digital Flight Data Recorder
DH	Decision Height
DME	Distance Measurement Equipment
EADI	Electronic Attitude Director Indicator
EFIS	Electronic Flight Instrument System
EGT	Exhaust Gas Temperature
EHSI	Electronic Horizontal Situation Indicator
EICAS	Engine Indication and Crew Alerting System
ELT	Emergency Locator Transmitter
FADEC	Full Authority Digital Electronic Control
FCOC	Fuel Cooled Oil Cooler
FDRS	Flight Data Recorder System
FMS	Flight Management System
G/S, GS	Glide Slope
GI	Ground Idle
GMT	Greenwich Mean Time
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
HDG	Heading
HF	High Frequency
IAS	Indicated Airspeed
IC	Integrated Computer
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IPS	Inches Per Second
IRS	Inertial Reference System
IRU	Inertial Reference Unit
ISA	International Standard Atmosphere
ITT	Interturbine Temperature

ABBREVIATIONS OR ACRONYMS	MEANING
KCAS	Calibrated Airspeed in Knots
KEAS	Equivalent Airspeed in Knots
Khz	Kilohertz
KIAS	Indicated Airspeed in Knots
LOC	Localizer
M	Mach
MAC	Mean Aerodynamic Chord
MAN	Manual
MAX	Maximum
MB	Marker Beacon
MEA	Minimum Enroute Altitude
MFD	Multifunction Display
Mhz	Megahertz
MIN	Minimum
MMEL	Master Minimum Equipment List
M_{MO}	Maximum Operating Mach
MSU	Mode Select Unit
NAV	Navigation
NEXRAD	Next-Generation Radar
NOTAM	Notice to Airmen
PAX	Passenger
PBE	Protective Breathing Equipment
PFD	Primary Flight Display
PMA	Permanent Magnet Alternator
RA	Radio Altimeter
RAAS	Runway Awareness and Advisory System
RMI	Radio Magnetic Indicator
RMU	Radio Management Unit
RPM	Revolution Per Minute
SAT	Static Air Temperature
SG	Symbol Generator

ABBREVIATIONS OR ACRONYMS	MEANING
SL	Sea Level
SPS	Stall Protection System
STAB	Stabilizer
TAS	True Airspeed
TAT	Total Air Temperature
TCAS	Traffic and Collision Avoidance System
TDR	Transponder
TLA	Thrust Lever Angle
U.S. NAS	U.S. National Airspace System
V	Volt
V_1	Decision Speed
V_2	Takeoff Safety Speed
VA	Volt-Ampere
V_A	Design Maneuvering Speed
V_{EF}	Critical Engine Failure Speed
V_{FE}	Maximum Flaps Extended Speed
VFR	Visual Flight Rules
VHF	Very High Frequency
V_{LE}	Maximum Landing Gear Extended Speed
VLF	Very Low Frequency
V_{LO}	Maximum Landing Gear Operating Speed
V_{LOF}	Lift Off Speed
VLV	Valve
V_{MCA}	Air Minimum Control Speed
V_{MCG}	Ground Minimum Control Speed
V_{MO}	Maximum Operating Speed
VOR	VHF Omnidirectional Range
V_R	Rotation Speed
V_{REF}	Landing Reference Speed
$V_{REF\ XX}$	Landing Reference Speed associated to the flap setting XX

ABBREVIATIONS OR ACRONYMS	MEANING
V_{SR}	Reference Stall Speed
VS	Vertical Speed
WB	Weight and Balance

SERVICE BULLETIN TABLE

SB	SUBJECT
SB 145-00-0025	Increases the MZFW of the EMB-135ER Model
SB 145-00-0028	Increases the MTOW of the EMB-135ER Model
SB 145-00-0031	Configures Airplane for Operations up to 8500 ft
SB 145-00-0032	Increases the maximum gross weights of the EMB-145LR Model
SB 145-22-0001	Configures Airplane for CAT II Operation
SB 145-27-0032	Improves Speed Brake System
SB 145-31-0007	Change to P/N of DAU and IC
SB 145-31-0009	Incorporates EICAS 15A Version
SB 145-31-0010	Incorporates EICAS 12A Version
SB 145-31-0014	Incorporates EICAS 16 Version
SB 145-31-0016	Incorporates EICAS 16.5 Version
SB 145-31-0020	Incorporates EICAS 17 Version
SB 145-31-0021	Incorporates the Oil Pressure “Super Smart Sensor”
SB 145-31-0038	Incorporates Modifications to Extend the Speed Envelope of the EMB-145 XR Model
SB 145-31-0040	Configures the EMB-145 XR Model for CAT II Operation
SB 145-31-0042	Incorporates EICAS 20.5 Version
SB 145-32-0030	Replaces Brakes, Tires and Wheels for LR Version
SB 145-34-0026	Incorporates Modification to the Anemometric Static Ports
SB 145-34-0054	Activates the ISIS Anemometric Correction
SB 145-34-0082	Configures Airplane for RVSM Operation
SB 145-49-0010	Incorporates Modification to Permit APU Start Above 25000 ft
SB 145-53-0064	Increases the MZFW of the EMB-145ER and EP Models
SB 145-73-0006	Incorporates FADEC IV.2 Version
SB 145-73-0010	Incorporates FADEC B5.1.1 Version on AE3007A and A1/1 Engines
SB 145-73-0011	Incorporates FADEC B5.1.1 Version on AE3007A1 Engines
SB 145-73-0012	Incorporates FADEC B5.1.1 Version on AE3007A1P Engines

SB	SUBJECT
SB 145-73-0013	Incorporates FADEC B5.1.1 Version on AE3007A1/3 Engines
SB 145-73-0014	Incorporates FADEC B5.1.1 Version on AE3007A3 Engines
SB 145-73-0021	Incorporates FADEC B7.6 Version on AE3007A and A1/1 Engines
SB 145-73-0022	Incorporates FADEC B7.6 Version on AE3007A1 Engines
SB 145-73-0023	Incorporates FADEC B7.6 Version on AE3007A1P
SB 145-73-0024	Incorporates FADEC B7.6 Version on AE3007A1/3
SB 145-73-0025	Incorporates FADEC B7.6 Version on AE3007A3
SB 145-73-0026	Incorporates FADEC B7.6 Version on AE3007A1E
SB 145-73-0027	Incorporates FADEC B8.0 Version on AE3007A1P
SB 145-73-0028	Incorporates FADEC B8.0 Version on AE3007A1E
SB 145-73-0029	Incorporates FADEC B8.0 Version on AE3007A1
SB 145-73-0030	Incorporates FADEC B8.0 Version on AE3007A and AE3007A1/1
SB 145-73-0031	Incorporates FADEC B8.0 Version on AE3007A1/3
SB 145-77-0002	Includes Placard for 95 psi Oil Pressure Limit
SB 145-77-0003	Includes Placard for 115 psi Oil Pressure Limit
SB 145-77-0004	New EICAS N2 Red Line Margin for A1 and A1/3 Engines

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SECTION 2

LIMITATIONS

INTRODUCTION

This airplane must be operated in accordance with the limitations presented in this Section. These limitations also apply to operations in accordance with an approved Supplement or Appendix to this AFM, except as altered by such Supplement or Appendix.

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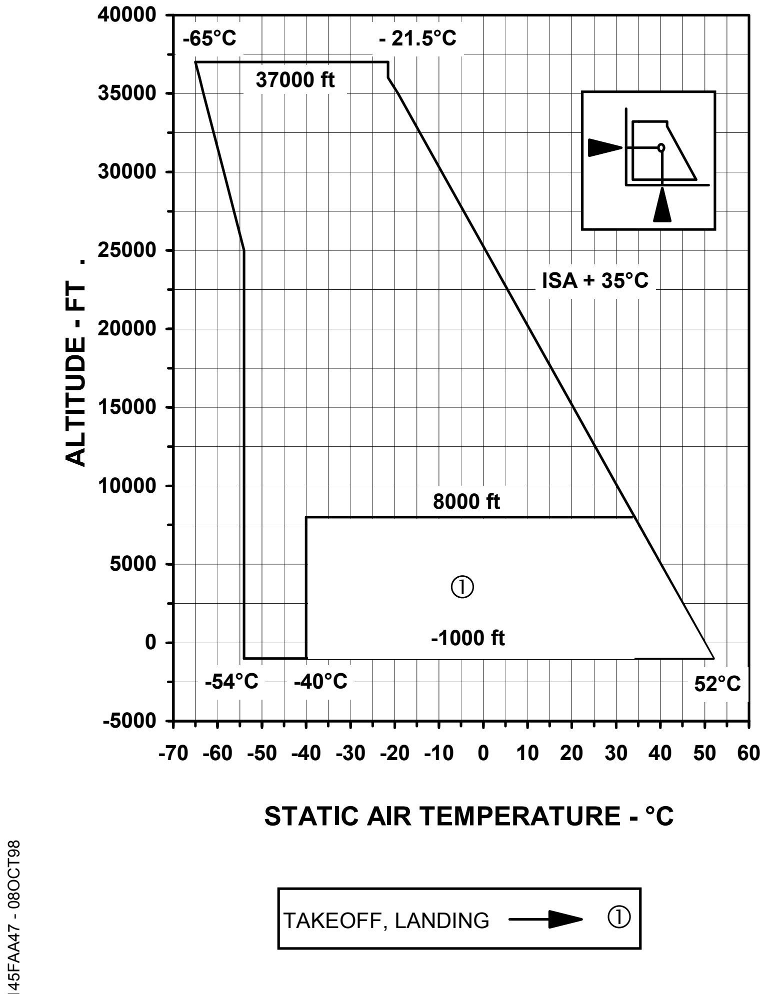
OPERATIONAL LIMITATIONS

OPERATIONAL ENVELOPE



NOTE: - In the event of a landing below –40°C, the airplane may not takeoff without further maintenance inspection.

- Total Air Temperature in cruise flight above 25000 ft is limited to -45°C.

WEIGHT

AIRPLANE MODELS	MAXIMUM WEIGHT (lb) Max. Ramp Weight (MRW)	Max. Takeoff Weight (MTOW)	Max. Landing Weight (MLW)	Max. Zero Fuel Weight (MZFW)
STD	42549	42328	41226	37698
ER	45635	45414	41226	37698 (1)
EP	46495	46275	41226	37698 (1)
MP	46495	46275	42549	39462
LR	48722	48501	42549	39462
LR (2)	50044	49823	43651	40564

NOTE: 1) For airplanes Post-Mod. SB 145-53-0064 or with an equivalent modification factory incorporated, the MZFW is 38250 lb.

2) Only applicable to airplanes Post-Mod. SB 145-00-0032 or with an equivalent modification factory incorporated.

To comply with the performance and operating limitations of the regulations, the maximum allowable takeoff and landing operational weights may be equal to, but not greater than design limits.

The takeoff weight (weight at brake release or at start of takeoff run) is the lowest among MTOW and the following weights:

– Maximum takeoff weight for altitude and temperature determined from Maximum Takeoff Weight - Climb Limited chart (Section 5).
– Maximum takeoff weight, as limited by runway length and determined from Maximum Takeoff Weight - Field Length Limited chart (Section 5).
– Maximum takeoff weight, as limited by brake energy and determined from Maximum Takeoff Weight - Brake Energy Limited chart (Section 5).
– Maximum takeoff weight, as limited by obstacle clearance, enroute, and landing operating requirements (Section 5).

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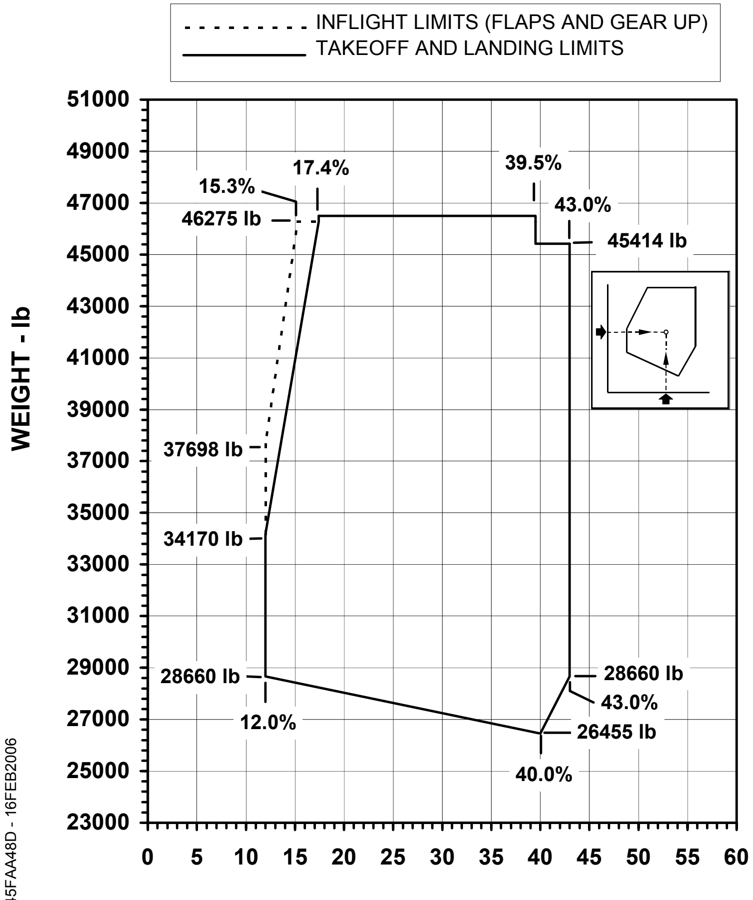
The landing weight is the lowest among MLW and the following weights:

- Maximum approach and landing weight for altitude and temperature determined from Maximum Landing Weight - Climb Limited charts (Section 5).
- Maximum landing weight, as limited by runway length and determined from Maximum Landing Weight - Field Length Limited chart (Section 5).

CENTER OF GRAVITY ENVELOPE

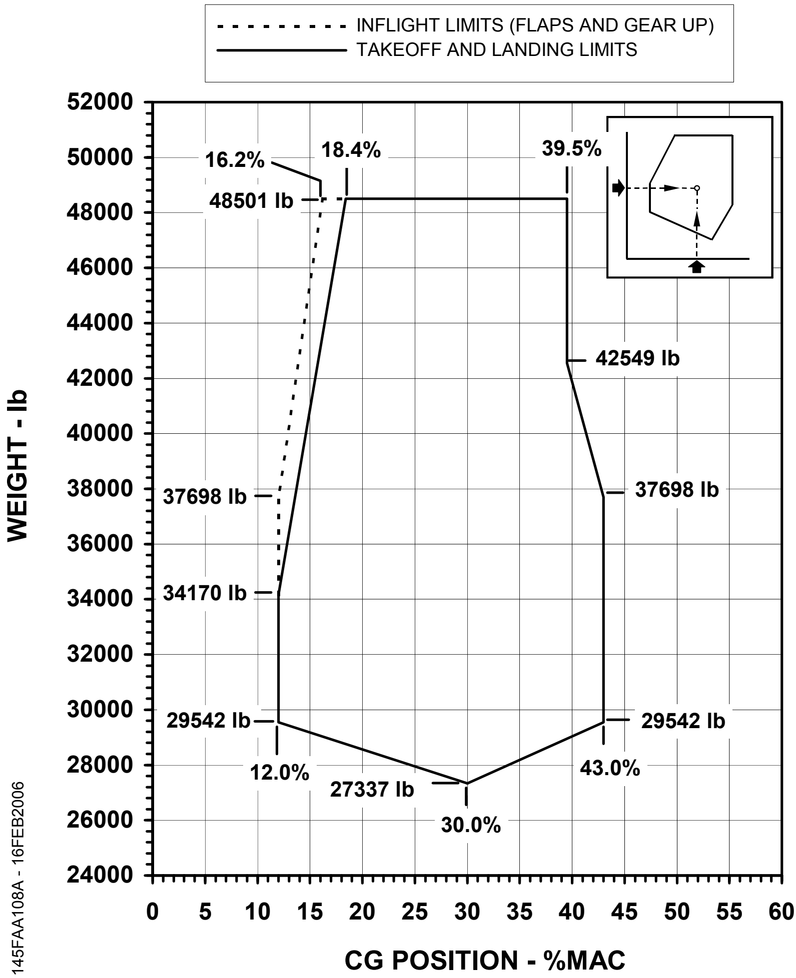
STANDARD, ER AND EP MODELS (TAKEOFF WITH FLAPS 9° OR 18°)

NOTE: The data below must be used in conjunction with the maximum weight values (ramp, takeoff, landing and zero fuel) associated to each model and found in the Operational Limitations Section, Weight table.



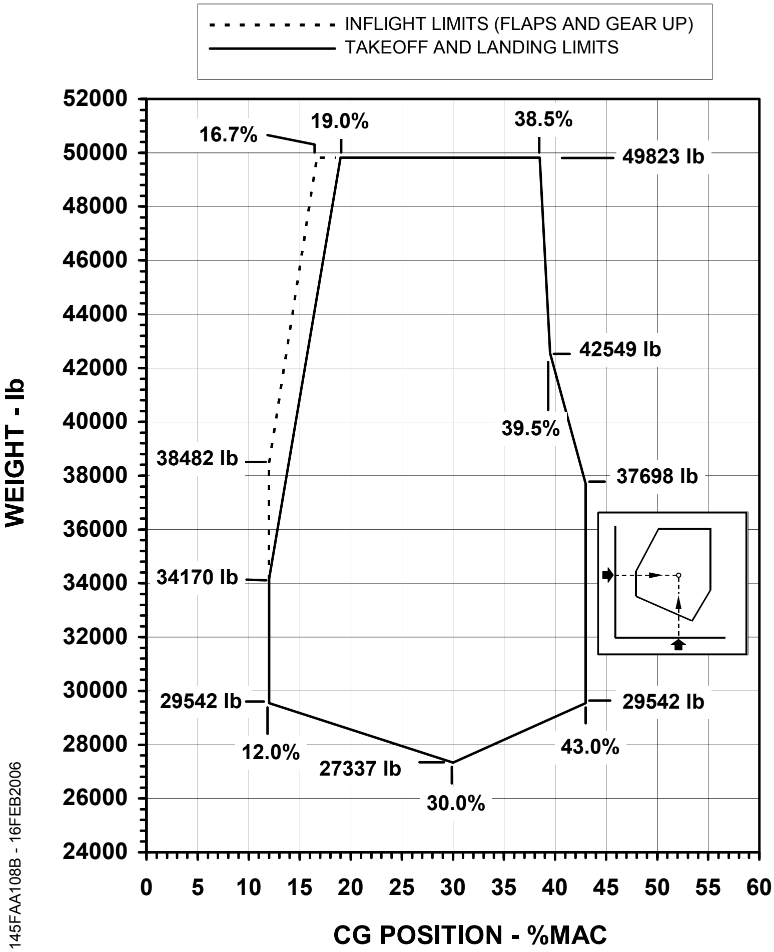
LR MODELS PRE-MOD. SB 145 -00-0032 AND MP MODELS (TAKEOFF WITH FLAPS 9° OR 18°)

NOTE: The data below must be used in conjunction with the maximum weight values (ramp, takeoff, landing and zero fuel) associated to each model and found in the Operational Limitations Section, Weight table.



LR MODELS POST-MOD. SB 1 45-00-0032 OR WIT H AN EQUIVALENT MODIFICATION FACTORY INCORPORATED (TAKEOFF WITH FLAPS 9° OR 18°)

NOTE: The data below must be used in conjunction with the maximum weight values (ramp, takeoff, landing and zero fuel) associated to each model and found in the Operational Limitations Section, Weight table.



LOADING

The airplane must be loaded in accordance with the information contained in the Weight and Balance Manual (WB-145/1161).

AIRSPEEDS

LANDING GEAR OPERATION/EXTENDED SPEED (V_{LO} AND V_{LE})

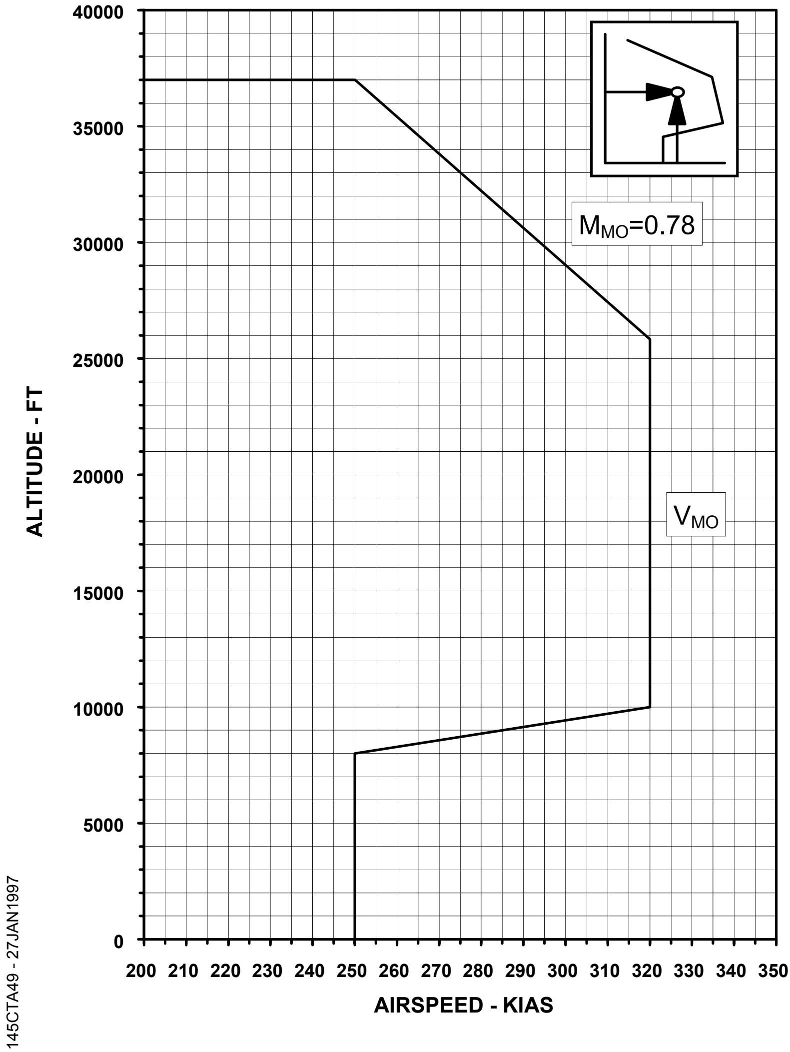
V_{LO} for retraction .... 200 KIAS
V_{LO} for extension .... 250 KIAS
V_{LE} .... 250 KIAS

NOTE: - V_{LO} is the maximum speed at which the landing gear can be safely extended and retracted.
- V_{LE} is the maximum speed at which the airplane can be safely flown with the landing gear extended and locked.

MINIMUM CONTROL SPEED

Refer to Section 5 - Performance for V_{MCA}, V_{MCG} and V_{MCL} values.

MAXIMUM OPERATING SPEED



NOTE: The V_{MO}/M_{MO} may not be deliberately exceeded in any regime of flight (climb, cruise, or descent).

MANEUVERING SPEED (V_A)

V_A .... 200 KIAS

NOTE: Maneuvers that involve angle of attack near the stall or full application of rudder, elevator, and aileron controls should be confined to speeds below V_A. In addition, the maneuvering flight load factor limits, presented in this Section, should not be exceeded.

WARNING: **RAPID AND LARGE ALTERNATING CONTROL INPUTS, ESPECIALLY IN COMBINATION WITH LARGE CHANGES IN PITCH, ROLL, OR YAW (E.G. LARGE SIDE SLIP ANGLES) MAY RESULT IN STRUCTURAL FAILURES AT ANY SPEED, EVEN BELOW VA.**

MAXIMUM FLAP EXTENDED SPEED (V_{FE})

Flaps 9°.. 250 KIAS
Flaps 18°.. 200 KIAS
Flaps 22°.. 200 KIAS
Flaps 45°.. 145 KIAS

TAILWIND

Maximum Takeoff and Landing Tailwind Component .. 10 kt

KINDS OF OPERATION

This airplane may be flown day and night in the following conditions, when the appropriate equipment and instruments required by airworthiness and operating regulations are approved, installed and in an operable condition:

- Visual (VFR);
- Instrument (IFR);
- Icing conditions.

MINIMUM CREW

Minimum Flight Crew .... PILOT AND COPILOT

MANEUVERING FLIGHT LOAD FACTORS

These corresponding accelerations limit the bank angle during turns and limit the pull-up maneuvers.

LOAD FACTOR LIMIT	FLAPS UP	FLAPS DOWN (9°, 18°, 22° and 45°)
Positive	2.50 g	2.00 g
Negative	-1.00 g	0 g

RUNWAY

Runway Slope .... -2% TO +2%
Runway Surface Type.. PAVED

FUEL

AIRPLANE MODEL	STD/ER/ EP/MP	LR
Maximum usable quantity per tank	679.8 US Gal (4600 lb)	844.9 US Gal (5717 lb)
Unusable quantity per tank	7.1 US Gal (48 lb)	5.8 US Gal (39 lb)

Maximum permitted imbalance between tanks............. 800 lb

NOTE: - When the EICAS fuel quantity is zero in level flight, any fuel remaining in the tanks can not be used safely in flight.
- Unusable fuel increases to 266 lb (STD, ER, EP and MP models) or 365 lb (LR model) in each tank if any of the associated electric fuel pumps is inoperative.
- The values above have been determined for an adopted fuel density of 6.767 lb/US Gal.
- When performing pressure refueling, the usable fuel quantity in each tank may be reduced by 7.9 US Gal (STD, ER, EP and MP models) or 13.2 US Gal (LR model) maximum.

FUEL SPECIFICATION

Brazilian Specification.. QAV1
ASTM Specification .... D1655-JET A AND JET A-1
American Specification ....MIL-T-83133A-JP8 AND MIL-DTL-5624-JP5

FUEL TANK TEMPERATURE

Minimum .... -40°C
Maximum .... 52°C

NOTE: If fuel does not contain an icing inhibitor, the temperature of fuel leaving FCOC must be above 4°C (refer to FUEL LOW TEMPERATURE Procedure).

AUXILIARY POWER UNIT

OPERATIONAL LIMITS

APU Model	T-62T-40C11		T-62T-40C14	
PARAMETER	**MIN**	**MAX**	**MIN**	**MAX**
TEMPERATURE	-54°C	-	-	-
ALTITUDE FOR START:	-	25000 ft or	-	-
	-	30000 ft (2)	-	30000 ft
OPERATION ALTITUDE	-	37000 ft	-	37000 ft
ROTOR SPEED	-	108%	-	108%
EGT:	-	-	-	-
START	-	884°C (1)	-	884°C
CONTINUOUS	-	680°C (6)	-	680°C (6)

NOTE: **1)** May be exceeded up to 925°C above 25000 ft during 10 seconds.
2) For airplanes Post-Mod. SB 145-49-0010 or equipped with an equivalent modification factory incorporated. In this case, the minimum temperature for APU start is -54°C up to 30000 ft.
3) Minimum battery temperature for APU start is -20°C.
4) Refer to Fuel Tank Temperature limitations for other APU starting related limits.
5) The APU Model T-62T-40C14 will be automatically shut down at 104% rotor speed.
6) The APU EGT may be exceeded up to 717°C for 5 minutes maximum.

APU STARTER LIMITS

Cooling period between each starting attempt:

Between Three Consecutive Attempts .... 1 MINUTE OFF

Between Two Series of

Three Consecutive Attempts .... 30 MINUTES OFF

POWER PLANT

ENGINES

Two Rolls-Royce Engines AE3007A or two AE3007A1/1.

NOTE: Intermix Operation with AE3007A and AE3007A1/1 engines is allowed provided both engines have the same FADEC version.

WARNING: **ALL FOUR FADECS INSTALLED ON THE AIRP LANE MUST BE THE SAME P ART NUMBER. INCORRECT ENGINE OPERATION CAN RESULT FROM USI NG FADECS WITH TWO DIFFERENT PART NUMBERS.**

OPERATIONAL LIMITS (ROLLS-ROYCE AE300 7A OR AE3007A1/1)

PARAMETER (5)	MIN	MAX
N1	-	100%
N2	-	102.4% (8)
ITT:	-	-
START	-	800°C
TAKEOFF	-	921°C (1)
CONTINUOUS	-	868°C
OIL PRESSURE:	-	-
BELOW 88% N2	34 psi	95 psi (2)(6) 110 psi (2)(7)
AT OR ABOVE 88% N2	50 psi (9)	95 psi (6) 110 psi (7)
OIL TEMPERATURE	21°C (3)	126°C
FUEL TEMPERATURE	-54°C	52°C
VIBRATION:	-	-
LP SPOOL	-	1.8 IPS (4)
HP SPOOL	-	1.1 IPS (4)

NOTE: 1) Takeoff Thrust is time limited to 5 minutes.

2) May be exceeded during starts if oil temperature is below 21°C. The engine must remain at IDLE until the oil pressure is less than 95 psi (110 psi for airplanes Post-Mod. SB 145-73-0021 or equipped with an equivalent modification factory incorporated).

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3) Minimum oil temperature for starting is -40°C for lubrication oil specified by MIL-L-23699D and -54°C for lubrication oil specified by MIL-L-7808K.

4) Vibration in the amber range below 2.5 IPS is time limited to 5 minutes during the takeoff or go-around phases or 10 seconds during the remainder flight phases.

5) Any engine exceedance or peak must be monitored and logged by the crew.

6) Operation in oil pressure amber range is permitted between 96 and 115 psi in all operational modes and time limited to 5 minutes, or between 116 and 155 psi in all operational modes time limited to 2 minutes. Total time above 95 psi may not exceed 5 minutes.

7) For airplanes Post-Mod. SB 145-73-0021 or equipped with an equivalent modification factory incorporated the upper limit of the oil pressure green band is 110 psi. Operation in oil pressure amber range is permitted between 111 and 115 psi in all operational modes time limited to 5 minutes, or between 116 and 155 psi in all operational modes time limited to 2 minutes. Total time above 110 psi may not exceed 5 minutes.

8) For airplanes Pre-Mod. SB 145-73-0030 the N2 limit is 102.5%.

9) While this is an abnormal condition, operation between 50 and 34 psi is permitted during takeoff and go-around phases.

STARTER LIMITS

On Ground:

Starting or Dry Motoring	UP TO 5 MINUTES ON, 5 MINUTES OFF
OR	
First to Fourth Cycles	1 MINUTE ON, 1 MINUTE OFF
Following Cycles	1 MINUTE ON, 5 MINUTES OFF

In Flight:

Maximum Continuous Operation Time	5 MINUTES ON

NOTE: No cool down time is required should an in-flight start be reattempted.

AUTOMATIC TAKEOFF THRUST CONTROL SYSTEM (ATTCS)

ATTCS must be operative to select ALT T/O-1, T/O or E T/O modes.

For airplanes equipped with AE3007A, AE3007A1, AE3007A1/1, AE3007A1/3 or AE3007A1P engines and FADEC versions previous than B8.0 or airplanes equipped with AE3007A3 engines:

At least once a week a Thrust Assurance Check must be performed by selecting maximum takeoff mode during takeoff and checking engine parameters.

The Thrust Assurance Check is not required if the owner/operator actively participate in Engine Condition Monitoring, as described Chapter 5 of the AE3007A Series Engine Maintenance Manual.

For airplanes equipped with AE3007A, AE3007A1, AE3007A1/1, AE3007A1/3 or AE3007A1P engines and FADEC versions B8.0 and on or airplanes equipped with AE3007A1E engines, the Thrust Assurance Check is not required.

THRUST REVERSER

Thrust reversers are intended for use during rejected takeoff or landing only. Do not attempt a go-around procedure after deployment of the thrust reversers following a landing.

ENGINE WARM-UP

Prior to takeoff, the engines must be allowed to run at low thrust to stabilize the engine temperatures before takeoff thrust is selected.

After start, the engines must run at idle or taxi thrust for at least 4 minutes for cold engines or 2 minutes for warm engines.

Before takeoff, to increase N2 above 83% the engine oil temperature must be at 40°C minimum. In lieu of this limit, it is acceptable to either:

- run the engine for at least 8 minutes in idle or taxi thrust and check if the temperature is at least 21°C or,
- for airplanes Pre-Mod. Rolls-Royce SB AE3007A-79-025, complete a static run-up to 88% N2, stabilize, and check to ensure that oil pressure is equal to or less than 83 psi.

NOTE: The engine is considered cold if it has been shutdown for more than 90 minutes.

ENGINE COOL DOWN

The engines must run for at least 1 minute at idle or taxi thrust before shutdown.

PERFORMANCE

APPROACH CLIMB GRADIENT AND APPROACH CLIMB LIMITED WEIGHTS

Airplanes equipped with FADEC software version B5.1.1 must decrease the Approach Climb Gradient by 1.5% and decrease the Approach Climb Limited Weight by 2780 lb.

OPERATION IN ICING CONDITIONS

Maximum Temperature for Anti-icing Operation .... 10°C
Minimum Temperature for
Manual Anti-icing Operation .... -40°C
Holding configuration:
Landing Gear .... UP
Flaps .... UP
Minimum Airspeed .... 200 KIAS

NOTE: - There is no temperature limitation for anti-icing system automatic operation.
- Use Static Air Temperature (SAT) on ground or for takeoff operations and Total Air Temperature (TAT) for operations in flight.
- Icing conditions may exist whenever the Static Air Temperature (SAT) on the ground or for takeoff, or Total Air Temperature (TAT) in flight, is 10°C or below and visible moisture in any form is present (such as clouds, fog with visibility of one mile or less, rain, snow, sleet, and ice crystals).
- Icing conditions may also exist when the SAT on the ground and for takeoff is 10°C or below when operating on ramps, taxi ways, or runways where surface snow, ice, standing water, or slush may be ingested by the engines, or freeze on engines, nacelles, or engine sensor probes.
- Takeoff is prohibited with frost, ice, snow or slush adhering to wings, control surfaces, engine inlets, or other critical surfaces (refer to the applicable requirements).
- There are many methods to ensure the wing is clear of ice. If visual inspection or installed clear ice detectors do not indicate wing contamination, a tactile (hand on surface) check of the wing leading edge and the upper surface must be accomplished prior to takeoff. The tactile check must also be performed when the holdover time is exceeded after airplane de/anti-icing fluids are applied. This check should be performed whenever the outside temperature is less than 6°C or if it cannot be ascertained that the wing fuel temperature is above 0°C, and:
  - there is visible moisture; or
  - water is present on the wing; or

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- the difference between the dew point and the outside air temperature is 3°C or less; or
- the atmospheric conditions have been conducive to frost formation.

CAUTION:
- ON GROUND, DO NOT RELY ON VISUAL ICING EVIDENCE OR ICE DETECTOR ACTUATION TO TURN ON THE ANTI-ICING SYSTEM. USE THE TEMPERATURE AND VISUAL MOISTURE CRITERIA AS SPECIFIED ABOVE. DELAYING THE USE OF THE ANTI-ICING SYSTEM UNTIL ICE BUILD-UP IS VISIBLE FROM THE COCKPIT MAY RESULT IN ICE INGESTION AND POSSIBLE ENGINE DAMAGE OR FLAME-OUT.
- DO NOT USE APU BLEED AS PNEUMATIC SOURCE FOR ANTI-ICING SYSTEM.

ELECTRICAL

Maximum load on main generator .... 400 A
Maximum load on APU generator:

Up to 30000 ft .... 400 A
Above 30000 ft .... 300 A

Maximum battery temperature..................................... 70°C

PNEUMATIC, AIR CONDITI ONING AND PRESSURIZATION

PRESSURIZATION

Maximum differential pressure .... 7.8 psi
Maximum differential overpressure .... 8.1 psi
Maximum differential negative pressure....................... -0.3 psi

FLIGHT CONTROLS

FLAPS

Maximum Altitude for Flap Extension........................... 20000 ft

PITCH TRIM

Maximum Airspeed after Takeoff/During Climb
without Retrimming.. 160 KIAS

ELECTROMECHANICAL GUST LOCK

Each time electromechanical gust lock lever is set to unlocked position elevator movement must be checked. This check must be performed at least 10 seconds after positioning the gust lock lever to the unlocked position by moving the control column from the full up stop to the full down stop and back to the full up stop position.

NAVIGATION AND COMMUNICATION EQUIPMENT

RADAR

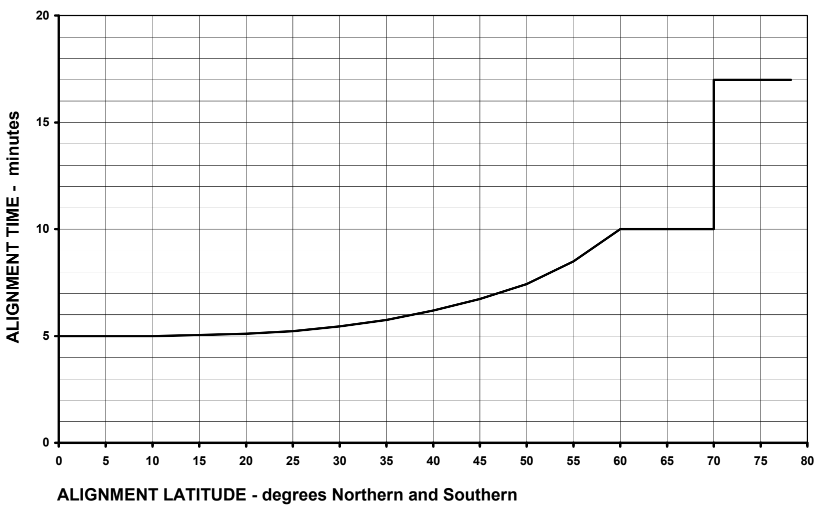
Do not operate weather radar during refueling, near fuel spills or people.

ATTITUDE AND HEADING REFERENCE SYSTEM

Airplane must not be moved until all attitude and heading information presented on PFD is valid.

For the AH-900 AHRS version the following limits are applicable:

- Maximum latitude for alignment........ 78.25° Northern and Southern
- AHRS alignment will complete only after a valid aircraft present position (latitude and longitude) is received.
- Time to Alignment:



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- The airplanes may not be operated within the North and South magnetic polar cut-out regions below:

MAGNETIC CUT-OUT REGIONS	LATITUDE	LONGITUDE
North	Between 70°N and 82°N	Between 80°W and 135°W
	North of 82°N	Between 0° and 180°W/E
South	Between 60°S and 82°S	Between 118.5°E and 160°E
	South of 82°S	Between 0° and 180°W/E

NOTE: Within the magnetic polar cut-out regions AHRS heading data is not available.

INSTRUMENT LANDING SYSTEM (ILS)

This limitation applies to airplanes equipped with Mod. L of the Honeywell Primus II NV-850 Navigation Receiver Module P/N 7510134-831; which is part of the Honeywell Primus II RNZ-851 Integrated Navigation Unit P/N 7510100-831, -832, -833 and -834.

When crossing the Outer Marker on glideslope, the altitude must be verified with the value on the published procedure.

For airplanes with a single operating glideslope receiver, the approach may be flown using normal procedures no lower than Localizer Only Minimum Descent Altitude (MDA).

For airplanes with two operating glideslope receivers, the airplane may be flown to the published minimums for the approach using normal procedures if both glideslope receivers are tuned to the approach and both crew members are monitoring the approach using independent data and displays.

CHARTS AND MAPS FUNCTION (PRIMUS ELITE) (IF APPLICABLE)

The display of maps on the MFD (Charts & Maps function) is for enhanced situational awareness only, and use as a primary navigation source is prohibited.

The use of the Charts and Maps function on MFD to take credit for a paperless cockpit approval/application is prohibited.

ENHANCED GROUND PROXIMITY WARNING SYST EM (EGPWS)

The following limitations are applicable to the Enhanced Ground Proximity Warning System (EGPWS):

- The Allied-Signal Enhanced Ground Proximity Warning System Pilot’s Guide, Document Number 060-4241-000, March 1997 edition (or later revision of the manual) or FAA accepted Operating Manual, must be immediately available to the flight crew.
- Allied-Signal Application Software version 202 and Configuration Software version 202 or later must be installed.
- Navigation is not to be predicated on the use of the Terrain Awareness Display.
- The EGPWS data base, displays, and alerting algorithms currently do not account for man made obstructions.
- Pilot’s should inhibit the Terrain Awareness Alerting and Display function by pressing the TERRAIN SYS OVRD button when within 15 nm of takeoff, approach, or landing at an airport when any of the following conditions apply:
  - The airport has no approved instrument approach procedure.
  - The longest runway is less than 3500 ft in length.
  - The airport is not included in the Allied Signal data base.
- Terrain Display must be inhibited when using QFE altimeter settings (not applicable to the software version 216 and on).
- Pilots are authorized to deviate from their current Air Traffic Control (ATC) clearance to the extent necessary to comply with an EGPWS warning.
- The Terrain Display is intended to be used as a situational tool only and may not provide the accuracy and/or fidelity on which to solely base terrain avoidance maneuvering.
- In the event that accuracy of the airplane position data from the FMS becomes inadequate for navigation (Dead Reckoning Mode), the Terrain Awareness Alerting and Display functions must be inhibited. This will not affect the basic GPWS functions (modes 1 to 7). If the FMS is restored after a period of inadequacy, the Terrain Awareness may be enabled by pressing again the TERRAIN SYS OVRD button.

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- In case of a conflict between the terrain alerts and an auto-popped-up picture, pilot’s must check the sweeping marker movement on the horizontal line below the terrain picture. If the marker is frozen, the MFD terrain indication must be deselected on MFD bezel panel.
- For airplanes Post-Mod. SB 145-31-0009 or equipped with an equivalent modification factory incorporated, in case of a conflict between the terrain alerts and an auto-popped-up picture, pilots must check the MFD 2 terrain information. If the terrain picture bus fail is not annunciated (TERR amber annunciation), the MFD 2 must be used as terrain picture reference.

INTEGRATED STANDBY INSTRUMENT SYSTEM (ISIS)

Maximum duration of ISIS when operating on batteries only is 40 minutes.

NOTE: The maximum duration of battery power can be extended to 45 minutes if the Pitot 3 Sensor Heating Button is turned off when not operating in icing conditions.

Airplane must not be moved during power-up initialization.

Do not cage attitude in turning flight.

SATELLITE WEATHER RADIO SYSTEM (XM WEATHER) (IF APPLICABLE)

XM Weather information must not be used for hazardous weather penetration. XM Weather information is provided only for hazardous weather avoidance.

NEXRAD weather data is intended for long-range planning purposes only. Due to inherent delays and relative age of the data, NEXRAD weather data should not be used for short-range avoidance of hazardous weather.

AUTOMATIC DEPENDENCE SURVEILLANCE — BROADCAST OUT (ADS-B OUT)

For airplanes Post-Mod. SB 145-34-0118 or equipped with an equivalent modification factory incorporated, the installed ADS-B OUT system complies with FAA AC 20-165B. The installed ADS-B OUT system has also been shown to meet the equipment requirements of 14 CFR 91.227.

DOORS

COCKPIT SECURITY DOOR

On airplanes equipped with a cockpit security door, two crewmembers must be in the cockpit during all flight phases.

If one of the pilots leaves the flight deck, he must be replaced in the cockpit by another crewmember.

Positive identification of the person wishing to enter the flight deck must be obtained before opening the door.

The security cockpit door must be kept closed and locked at all times during flight except to permit access and egress according to the operator’s procedures for opening, closing and locking the door.

Any time that cockpit door is opened in flight, a challenge and response closing and locking verification procedure must be used to verify that the door is closed and locked.

AUTOPILOT

The following limitations are applicable to the Autopilot:

For airplanes Pre-Mod. SB 145-31-0016, the use of the Autopilot below 1500 ft AGL is only permitted when coupled to the captain's Flight Director.

Minimum Engagement Height After Takeoff............ 500 ft

Autopilot coupled approaches approved down to 200 ft AGL.
Descent below Minimum Descent Altitude on a non precision approach with autopilot engaged is prohibited.

Single engine go-around with autopilot engaged is prohibited.

Approach mode selection during Localizer capture is allowed only when airplane is inbound.

NOTE: Coupled go-around height loss may be 75 ft.

OZONE CONCENTRATION

The tables below show the airplane altitude limitations due to ozone concentration in atmosphere.

NOTE: - These tables are based on FAA ADVISORY CIRCULAR Nº 120.38.
- The tables show altitude limitations calculated for constant ozone concentration, cabin stabilized at 8000 ft, and both recirculation fans turned on.
- For conditions other than those specified in item 2 above, an optimized flight plan must be approved by regulatory agencies.
- For longitudes, the following apply:
  W = Western
  E = Eastern
  Reference = 100°W longitude

NORTH AMERICA - MAXIMUM OZONE CRITERIA

FLIGHT LEVEL	JAN		FEB		MAR		APR		MAY		JUN	
LATITUDE	**W**	**E W**	**E W**	**E W E**	**W**					**E**	**W E**	
80°N	-	330	-	330	-	320	-	320	-	-	-	340
75°N	-	330	-	330	-	330	-	320	-	320	-	340
70°N	-	350	-	330	-	330	-	330	-	320	-	340
65°N	-	360	340	330	330	340	330	330	330	330	340	350
60°N	-	-	360	350	340	340	330	330	340	330	350	350
55°N	-	-	-	360	350	350	340	340	340	340	350	-
50°N	-	-	-	-	-	360	340	350	340	350	-	-
45°N	-	-	-	-	-	-	360	360	360	-	-	-
40°N	-	-	-	-	-	-	-	-	-	-	-	-
35°N	-	-	-	-	-	-	-	-	-	-	-	-

FLIGHT LEVEL	JUL		AUG		SEP		OCT		NOV		DEC	
LATITUDE	**W**	**E W**	**E**		**W**	**E**	**W**	**E**	**W**	**E**	**W E**	
80°N	-	350	-	-	-	-	-	-	-	-	-	-
75°N	-	360	-	-	-	-	-	-	-	-	-	-
70°N	-	-	-	-	-	-	-	-	-	-	-	-
65°N	360	-	-	-	-	-	-	-	-	-	-	-
60°N	360	-	-	-	-	-	-	-	-	-	-	-
55°N	-	-	-	-	-	-	-	-	-	-	-	-
50°N	-	-	-	-	-	-	-	-	-	-	-	-
45°N	-	-	-	-	-	-	-	-	-	-	-	-
40°N	-	-	-	-	-	-	-	-	-	-	-	-
35°N	-	-	-	-	-	-	-	-	-	-	-	-

NORTH AMERICA - TWA OZONE CRITERIA

NOTE: Values below are the altitude limitations which the airplane is allowed to fly more than 3 continuous hours.

FLIGHT LEVEL	JAN		FEB		MAR		APR		MAY		JUN	
LATITUDE	**W**	**E W**	**E W**	**E W E**	**W**					**E**	**W E**	
80°N	-	290	-	290	-	-	-	-	-	-	-	270
75°N	-	290	-	290	-	270	-	270	-	-	-	270
70°N	-	300	-	290	-	270	-	270	-	-	-	290
65°N	320	310	310	270	310	290	300	270	270	270	310	290
60°N	330	310	310	290	310	300	290	270	270	270	310	290
55°N	340	310	330	300	310	300	290	290	290	290	310	300
50°N	350	320	350	310	320	310	270	290	290	290	310	320
45°N	350	330	320	320	320	320	290	310	310	310	330	330
40°N	340	350	-	320	320	330	310	310	330	330	350	350
35°N	-	-	-	-	350	-	-	350	-	350	-	-
30°N	-	-	-	-	-	-	-	-	-	-	-	-

FLIGHT LEVEL	JUL		AUG		SEP		OCT		NOV		DEC	
LATITUDE	**W**	**E W**	**E**		**W**	**E**	**W**	**E**	**W**	**E**	**W E**	
80°N	-	270	-	310	-	310	-	310	-	300	-	310
75°N	-	290	-	330	-	320	-	310	-	310	-	310
70°N	-	290	-	330	-	330	-	320	-	310	-	310
65°N	310	310	340	340	350	330	330	330	350	310	330	310
60°N	310	320	340	350	350	350	330	330	350	310	330	320
55°N	310	320	340	350	-	350	350	350	350	330	350	330
50°N	320	330	340	350	-	-	-	-	350	350	-	350
45°N	330	350	-	-	-	-	-	-	-	-	-	350
40°N	-	-	-	-	-	-	-	-	-	-	-	350
35°N	-	-	-	-	-	-	-	-	-	-	-	-
30°N	-	-	-	-	-	-	-	-	-	-	-	-

SECTION 3

EMERGENCY AND ABNORMAL PROCEDURES

EMERGENCY PROCEDURES

ABNORMAL PROCEDURES

INTRODUCTION

The emergency and abnormal procedures contained in this manual have been developed by the airplane manufacturer and approved by the certification authority for use in the operation of this airplane.

This Section provides the emergency and abnormal procedures to be performed in case of a system malfunction or failure, in order to protect passengers and/or crew from serious harm and to maintain the airworthiness of the airplane.

Some procedures require a landing at the nearest suitable airport. Such information is provided with the intent of establishing that the flight should be terminated at the pilot's discretion. It is the pilot's responsibility to use good judgement concerning the time and place to land, as well as to evaluate factors such as airplane condition, weather, etc...

However, it is emphasized that for fire or smoke that cannot be positively located and extinguished, an immediate descent, landing and passenger evacuation should be performed.

The decision to reject takeoff should be considered if any undesirable event occurs.

The procedures are presented as follows:

- The actions contained in a box are immediate actions. They must be performed expeditiously and from memory to minimize hazards. The other actions should be performed as soon as the condition permits.
- All the actions must be performed in the order given.

Procedures contained herein assume:

- Airplane systems are operating normally prior to the failure.
- Normal procedures have been properly accomplished.
- System controls are in normal condition prior to initiation of the associated procedure.
- Aural warnings are silenced as applicable. Master Warning/Caution lights are reset as soon as the failure is recognized.
- Oxygen masks and smoke goggles are donned when cabin altitude is excessive or ambient air is contaminated.
- Crew communication is established when required.
- Circuit breakers are checked.

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EMERGENCY PROCEDURES

MAIN OR SERVICE DOOR OPEN

EICAS WARNING: MAIN DOOR OPN or SERVICE DOOR OPN

Fasten Seat Belts .... ON

Check doors pictorial indication on MFD Takeoff Page. If message is confirmed or if MFD is not available:

Door Internal Lock Indicator (red marks)................. CHECK

If the door is confirmed locked:

Monitor cabin pressure.

If the door internal lock indicators are not aligned or it is not possible to maintain the pressurization, proceed:

Altitude.. MEA OR 10000 ft, WHICHEVER IS HIGHER

Cabin .... DEPRESSURIZE

Land at the nearest suitable airport.

STALL PROTECTION INOPERATIVE

EICAS WARNING: SPS 1 (2) INOP

Associated Stall Protection System.............................. OFF

Avoid skidding the airplane.

Add 5 KIAS to go-around speed.

Approach and landing configuration:

Landing Gear .... DOWN

Flaps .... 45°

Airspeed.. $V_{REF\ 45}$ + 5 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.10.

STICK PUSHER FAILURE

EICAS WARNING: SPS 1-2 INOP
EICAS CAUTION: STICK PUSHER FAIL

Control Column .... PUSH FORWARD TO NEUTRAL

Stall Protection is not available.

Airspeed .... 1.2 V_{SR} MINIMUM

TAKEOFF CONFIGURATION WARNING

EICAS WARNING: NO TAKEOFF CONFIG
Aural Warning: Voice Messages TAKEOFF-BRAKES, TAKEOFF-FLAPS, TAKEOFF-SPOILERS or TAKEOFF-TRIM.

Do not take off.
Airplane configuration..CORRECT

BATTERY OVERTEMPERATURE

EICAS WARNING: BATT 1 (2) OVTEMP

Associated Battery...OFF

Check that the associated BATT OFF BUS message is on.

If the associated BATT OFF BUS message is not on, land at the nearest suitable airport.

ESSENTIAL ELECTRIC TRANSFER FAILURE

EICAS WARNING: ELEC ESS XFR FAIL

If no generator is available:
LOSS OF ALL GENERATORS Procedure .... ACCOMPLISH
If the message remains:
Bus Ties .... OFF
If the message still remains:
Shed Buses.. OFF
Turn off equipment not essential for the flight. Begin with the equipment connected to DC Buses 1 and 2 (Circuit Breaker Panel rows D, E, F, G, H).
Land at the nearest suitable airport.

LOSS OF ALL GENERATORS

EICAS CAUTION: GEN 1, 2, 3, 4 OFF BUS and APU GEN OFF BUS

Airspeed .... MAXIMUM 250 KIAS
Altitude .... MEA OR 10000 ft, WHICHEVER IS HIGHER
Essential Power .... ON
Crew Oxygen .... AS REQUIRED
Passenger Oxygen .... AS REQUIRED
Emergency Lights .... OFF
    If required, turn on Emergency Lights before landing.
Land at the nearest suitable airport.
    Landing Gear .... DOWN

FLAPS POSITION	MINIMUM AIRSPEED
0 to 8°	$V_{REF\ 45}$ + 30 KIAS
9° to 21°	$V_{REF\ 45}$ + 10 KIAS
22° to 44°	$V_{REF\ 45}$ + 5 KIAS
45°	$V_{REF\ 45}$

CAUTION:
- MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.95.
- BATTERY DURATION IS 40 MINUTES

NOTE: - The nose landing gear doors will open if DC Bus 2 is off, therefore the pilot should expect noise increase.
- The following warning messages will be presented: SPS 1-2 INOP and ICE COND-A/I INOP.
- The following caution messages will be presented: STICK PUSHER FAIL, SPS ADVANCED, GPWS INOP, WINDSHEAR INOP, CHECK PFD 1, IC BUS FAIL, APU GEN OFF BUS, GEN 1-2-3-4 OFF BUS, DC BUS 1-2 OFF, SHED BUS 1-2 OFF, 115 VAC BUS OFF, EMERG LT NOT ARMD, E1-2 CTL A-B FAIL, ENG 1-2 REV FAIL, LG AIR/GND FAIL, FLAP FAIL, SPOILER FAIL, PITOT 1-2 INOP, W/S 1-2 HEAT FAIL, TAT 1-2 HEAT INOP, STAB A/ICE FAIL, A/ICE SW OFF, WG 1-2 A/ICE FAIL, E1-2 A/ICE FAIL, AOA 1-2 HEAT INOP, ICE DET 1-2 FAIL and ICE DETECTORS FAIL.

SMOKE FIRE OR FUMES

Crew Oxygen Masks	DON, 100%
Smoke Goggles	DON
Crew Communication	ESTABLISH

LAND AT THE NEAREST SUITABLE AIRPORT.

Recirculation Fans .... OFF
Gasper Fan .... OFF

If smoke origin is identified, remove the affected source.

If applicable, perform the SMOKE EVACUATION procedure.

If smoke origin is not identified:

- Emergency Descent procedure .... ACCOMPLISH
- Smoke Evacuation procedure .... ACCOMPLISH
- Packs 1 and 2 .... OFF
- Shed Buses .... OFF
- Bus Ties .... OFF
- Ventral Pump Selector Button (if applicable) .... SET TO A
- Fuel Pump 1 .... 1A OR 1C
- Fuel Pump 2 .... 2B
- Battery 2 .... OFF
- Generators 2 and 4 .... OFF

If able to land soon or if smoke stops or decreases:

- Icing Conditions .... EXIT/AVOID
- Airspeed .... MAX 250 KIAS
- On Reversionary Panel 2:
  - SG .... PRESS
- COM 1 on Digital Audio Panel 1 .... PUSH IN
- When necessary to extend landing gear:
- Abnormal Landing Gear Extension .... ACCOMPLISH

Landing configuration:

- Flaps .... 45°
- Airspeed .... $V_{REF\ 45}$ + 5 KIAS

CAUTION: MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.95.

If smoke persists and unable to land soon:

Generators 2 and 4 .... ON
Battery 2 .... AUTO
Fuel Pump 1 .... 1B
Fuel Pump 2 .... 2A OR 2C
Ventral Pump Selector Button (if applicable) ... SET TO B
Battery 1 .... OFF
Generators 1 and 3 .... OFF
Emergency lights .... OFF

If smoke stops or decreases:

Icing Conditions .... EXIT/AVOID
On Reversionary Panel 1
SG .... PRESS
COM 2 on Digital Audio Panel 2........................PUSH IN

Landing configuration:

Emergency lights .... ON
Flaps .... 45°
Airspeed .... $V_{REF\ 45}$ + 5 KIAS

CAUTION: MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.95.

If smoke persists:

Generators 1 and 3 .... ON
Battery 1 .... AUTO
Backup Battery .... OFF

WARNING: CONSIDER AN IMMEDIATE LANDING

Landing configuration:

Emergency lights .... ON
Flaps .... 45°
Airspeed .... $V_{REF\ 45}$

SMOKE EVACUATION

Crew Oxygen Masks	DON, 100%
Smoke Goggles	DON
Crew Communication	ESTABLISH

LAND AT THE NEAREST SUITABLE AIRPORT.

Cockpit Door .... CLOSE
Reinforced Cockpit Door Louver Vent (if applicable).... CLOSE
Recirculation Fan .... OFF
Gasper Fan .... OFF
Pressurization Manual Controller .... 1 O'CLOCK
Wait 15 seconds.

Pressurization Mode Selector .... MAN
Pressurization Manual Controller .... AS REQUIRED
Passenger Oxygen .... AS REQUIRED

To evacuate the smoke faster:

Pressurization Manual Controller .... UP
Packs 1 and 2 .... OFF
Bleeds (engine or APU) .... OPEN
Emergency Descent .... AS REQUIRED
Altitude .... MEA OR 10000 ft, WHICHEVER IS HIGHER

Recover cabin pressure as soon as smoke has been cleared.

LAVATORY SMOKE

EICAS WARNING: LAV SMOKE

Lavatory Flush/Lavatory Light CB's (E11 and E12) ..... PULL

Establish contact with the cabin crew.

If necessary, consider a diversion and accomplish the Smoke Evacuation Procedure.

BAGGAGE COMPARTMENT SMOKE

EICAS WARNING: BAGG SMOKE

Baggage Fire Extinguishing Button (if installed)........... PRESS

Shed Buses .... OFF
Diversion .... CONSIDER
Altitude .... MAINTAIN
Maintain the current flight level as long as possible.
Alternate Airport .... IDENTIFY
Commence the diversion to land at the nearest suitable airport.

NOTE: - The extinguishing agent duration is approximately 50 minutes.
- Advise ground crew of possible presence of Halon vapors and smoke trapped in the compartment.

INTENTIONALLY BLANK

FUEL LOW LEVEL

EICAS WARNING: FUEL 1 (2) LO LEVEL

Thrust Levers .... REDUCE TO LONG RANGE SET

Level the airplane and check both fuel quantities.
If fuel quantity is sufficient, complete the flight normally.
If fuel quantity is not sufficient, avoid pitch attitudes in excess of 10° nose down or 12° nose up attitude, uncoordinated maneuvers and negative g's.

CROSSFEED OPERATION
Procedure .... AS REQUIRED

Land at the nearest suitable airport.

APU FIRE

EICAS WARNING: APU FIRE
Aural Warning: BELL

APU Fuel Shutoff Valve .... CLOSE

APU Master Knob .... OFF
APU FUEL SOV CLSD message
on EICAS .... CONFIRM

If the valve is not confirmed closed and the fire message remains:
Right Electric Fuel Pumps .... OFF
Crossfeed .... OFF
Initiate a descent to 25000 ft or MEA, whichever is higher.

After 30 seconds, if the APU FIRE message remains displayed or if the APU FIREDET FAIL message is displayed:
APU Fire Extinguishing Button .... PRESS

Land at the nearest suitable airport.

WARNING: DO NOT ATTEMPT TO RESTART APU.

APU OVERTEMPERATURE

APU Bleed .... CLOSE
Wait 10 seconds.
If EGT still in red or yellow range:
APU Fuel Shutoff Valve .... CLOSE
APU Master Knob .... OFF

ENGINE FIRE, SEVERE DAMAGE OR SEPARATION

EICAS WARNING: ENG 1 (2) FIRE (may be presented)
LIGHT: Engine Fire Handle (may be illuminated)
Aural Warning: BELL (in case of fire) (may sound)

Associated Thrust Lever	IDLE
Associated Start/Stop Selector	STOP
Associated Fire Extinguishing Handle	PULL (DO NOT ROTATE)

If E1 (2) FUELSOV CLSD advisory message is displayed on the EICAS:

If the fire message remains displayed after 30 seconds from pulling the Fire Handle:
Fire Extinguishing Handle (1st shot).................... ROTATE
If the fire message remains displayed on EICAS after 30 seconds from 1st shot:
Fire Extinguishing Handle (2nd shot) .... ROTATE

If E1 (2) FUELSOV CLSD advisory message is not displayed on the EICAS:

Crossfeed Selector Knob... OFF
Associated Fuel Pumps .... OFF
If the fire message remains displayed after 30 seconds from selecting fuel pumps to off:
Fire Extinguishing Handle (1st shot).................... ROTATE
If the fire message remains displayed after 30 seconds from 1st shot:
Fire Extinguishing Handle (2nd shot) .... ROTATE

If the E1 (2) FIREDET FAIL message is displayed:
Fire Extinguishing Handle (one shot, if available).... ROTATE

In flight:
Affected Engine Bleed .... CLOSE
Remaining Engine Thrust Rating............................. CON
APU... START
APU Bleed .... AS REQUIRED
Crossbleed... AS REQUIRED

Land at the nearest suitable airport.

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EMERGENCY EVACUATION Procedure .... AS REQUIRED

WARNING:
- **DO NOT ATTEMPT TO RESTART ENGINE.**
- **IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.**

NOTE:
- If in flight below 9700 ft, the air conditioning pack valves may close automatically. The APU may be used as pneumatic source by closing the remaining engine bleed valve.
- Engine will not shutdown with the Start/Stop Selector unless associated Thrust Lever is first moved to IDLE. If STOP is selected before Thrust Lever is retarded to IDLE, momentarily cycle START/STOP Selector to RUN and back to STOP.

ENGINE LOW N1

EICAS WARNING: E1 (2) LOW N1

Do not takeoff.

ATTCS FAILURE

EICAS WARNING: ATTCS FAIL

Thrust Levers... MAX

Another takeoff is not permitted.

ENGINE ATTCS NO MARGIN

EICAS WARNING: E1 (2) ATTCS NO MRGN

Consider not taking off.

For airplanes equipped with A, A1/1, A1 or A3 engines:

Perform a Thrust Assurance Check before the next takeoff, as follows:

Thrust Levers .... MAX

Check engine parameters.

If engine parameters are within normal range, another takeoff may be attempted. Alternate Takeoff modes are prohibited.

CAUTION: BRAKES TEMPERATURE MUST BE CHECKED AFTER REJECTED TAKEOFFS.

For airplanes equipped with A1P, A1/3 or A1E engines:

Another takeoff is not permitted.

DUAL ENGINE FAILURE

EICAS WARNING: ENG 1-2 OUT

Airspeed	MINIMUM 260 KIAS
Oxygen Mask (if required)	DON

Altitude .... MAX 25000 ft

ENGINE AIRSTART Procedure .... ACCOMPLISH

CAUTION: IF APU HAS BEEN USED TO START THE ENGINES, DO NOT ALTERNATE THE FADECS AFTER START.

NOTE: If APU is not available, only equipment supplied by the Essential DC Bus 1 and 2 will be available. Engine windmilling should drive engine driven pumps and supply hydraulic pressure.

If neither engine can be restarted:

FORCED LANDING Procedure .... ACCOMPLISH

ENGINE OIL LOW PRESSURE

EICAS WARNING: E1 (2) OIL LOW PRESS (may be presented)

Oil Pressure Indication.. CHECK
When conditions permit, reduce N2 below 88%, and monitor oil temperature and oil quantity indication.

Monitor oil pressure for the remainder of the flight. If oil pressure is in the red range:

Associated Thrust Lever.. IDLE
If oil pressure is still in the red range:
PRECAUTIONARY ENGINE
SHUTDOWN Procedure................................ ACCOMPLISH

ENGINE REVERSER FAILURE/DISAGREE

EICAS CAUTION: ENG1 (2) REV FAIL or
ENG1 (2) REV DISAGREE

Do not takeoff.
During landing:
Affected Thrust Lever .... IDLE

In flight:
N1 .... CHECK
If N1 is decreasing:
Associated Thrust Lever..................................... IDLE
Airspeed .... MAXIMUM 200 KIAS
PRECAUTIONARY ENGINE
SHUTDOWN Procedure................................ ACCOMPLISH
Land at the nearest suitable airport.

REJECTED TAKEOFF (AT OR BELOW V_1)

Thrust Levers.. IDLE OR MAX REVERSE

Brakes... APPLY MAXIMUM
Directional Control .... MAINTAIN
Immediately after stopping:

PRECAUTIONARY ENGINE SHUTDOWN or
ENGINE FIRE, SEVERE DAMAGE OR
SEPARATION Procedure.................................. AS REQUIRED

TAKEOFF WITH ENGINE FAILURE ABOVE V_1

Maximum Takeoff Thrust .... CHECK At V_R rotate the airplane. With positive rate of climb: Landing Gear .... UP Airspeed .... V_2

Maintain V_2 up to the level off altitude. If maneuvering is required, maintain a maximum bank of 15°.

When reaching the level off height:

Flaps (at V_2 + 15 KIAS) .... UP
Airspeed .... ACCELERATE TO FINAL SEGMENT SPEED

After flaps are retracted:
PRECAUTIONARY ENGINE SHUTDOWN or ENGINE FIRE, SEVERE DAMAGE OR SEPARATION Procedure .... AS REQUIRED

After a maximum of 5 minutes at T/O-1:
Thrust Rating .... AS REQUIRED

LANDING GEAR/LEVER DISAGREE

EICAS WARNING: LG/LEVER DISAGREE

Airspeed .... MAXIMUM 200 KIAS
Landing Gear .... CYCLE

If the message persists:

In a retraction:
Landing Gear .... DOWN
Continue flight with landing gear down.
Airspeed .... MAXIMUM 250 KIAS
Land at the nearest suitable airport. Leave and avoid icing conditions.

In an extension:
ABNORMAL LANDING GEAR EXTENSION Procedure .... ACCOMPLISH

PITCH TRIM RUNAWAY

EICAS WARNING: AUTOPILOT FAIL (may be presented)
EICAS CAUTION: AUTO TRIM FAIL (may be presented)

Quick Disconnect Button .... PRESS AND HOLD

NOTE: Do not change flap setting.

At safe altitude:

- Pitch Trim Main System.. OFF
- Pitch Trim Back Up System.................................... OFF
- Quick Disconnect Button .... RELEASE

<u>WARNING:</u> DO NOT OPEN THE SPEED BRAKE.

If control column forces are excessive, try to recover airplane control by turning one system on and trimming the airplane as necessary. Initiate with the Backup System. Leave the failed system off.

Autopilot.. AS REQUIRED

If neither Main nor Backup Pitch Trim system is operative:

- PITCH TRIM INOPERATIVE Procedure .... ACCOMPLISH

PITCH TRIM INOPERATIVE

EICAS WARNING: PIT TRIM 1(2) INOP or
PTRIM MAIN INOP, PTRIM BACKUP INOP
(may be presented)

EICAS CAUTION: AUTO TRIM FAIL (may be presented)

If at least one message is presented without pressing any Pitch Trim Switch:

Affected Pitch Trim System .... OFF
Use the remaining Pitch Trim System.

If both Pitch Trim Systems become inoperative:
Pitch Trim Main System..................................... OFF
Pitch Trim Back Up System................................ OFF
Consider landing at the nearest suitable airport.

If no message is presented or is only presented when pressing any Pitch Trim Switch:

Airspeed.. REDUCE
Airspeed reduction alleviates control column forces and may permit Pitch Trim command to be recovered.

If Pitch Trim command is reestablished continue using with the remaining Pitch Trim System.

NOTE: - For the EMB-145 XR model, if the PTRIM BACKUP INOP message is displayed the maximum airspeed allowed is Mach 0.78.
- Do not engage the Autopilot if the Main Pitch Trim System is inoperative.
- If only one segment of the Pitch Trim Switch is pressed, the TRIM aural warning message will be generated.

WARNING: IF PITCH TRIM COMMAND IS NOT REESTABLISHED, DO NOT OPEN SPEEDBRAKE.

If pitch trim command is not reestablished and the airplane presents a NOSE UP tendency:

Airspeed.. REDUCE
If it is necessary to reduce airspeed below 180 KIAS (or 200 KIAS in icing conditions), extend flaps to 9° (at 20000 ft maximum).

If it is necessary to reduce airspeed below 160 KIAS, extend flaps to 22°.

NOTE: Turning the airplane and extending the landing gear helps to maintain minimum airspeed with unwanted pitch up tendency.

Pitch Trim Command.. CHECK ALL SWITCHES

If pitch trim is recovered, re-trim the airplane and proceed with flight normally.

If pitch trim is not recovered:

Consider landing at the nearest suitable airport.

Approach and landing configuration:

Landing Gear.. DOWN

Flaps.. 22°

Airspeed .... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

If pitch trim command is not reestablished and the airplane presents a NOSE DOWN tendency:

Airspeed .... REDUCE

Below 250 KIAS:

Flaps (at 20000 ft maximum).............................. 9°

Below 200 KIAS:

Flaps.. 22°

Approach and landing configuration:

Landing Gear... DOWN

NOTE: Gear extension should be delayed as long as possible.

Flaps.. 22°

Airspeed .... $V_{REF\ 45}$ + 25 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.75.

JAMMED ELEVATOR

EICAS WARNING: SPS 1-2 INOP (may be presented)
EICAS CAUTION: STICK PUSHER FAIL

Elevator Disconnect	PULL
Autopilot	OFF
Airspeed	MAXIMUM 200 KIAS
Pitch Trim	AS REQUIRED

Avoid landing at airports with anticipated turbulence or crosswind.

Approach and landing configuration:

Landing Gear	DOWN
Flaps	22°
Airspeed	$V_{REF\ 45}$ + 10 KIAS

If both elevators are jammed, pitch trim may be used to land the airplane.
If left elevator is jammed, Stick Pusher will not be available.
Depending on the jammed elevator position, the remaining elevator power to flare the airplane will be reduced.
Do not reengage autopilot.

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

AILERON/ROLL TRIM RUNAWAY

Quick Disconnect Button	PRESS AND HOLD
Aileron Systems 1 and 2	OFF

Roll Trim Circuit Breaker (F23) .... PULL
Quick Disconnect Button .... RELEASE
Airspeed .... MAXIMUM 250 KIAS

If necessary, turn on one aileron hydraulic system at a time to identify the failed system. Prepare to overcome the roll generated by the failed aileron system. If the failure is confirmed in one aileron system, the roll trim system may be used as required.

If the message AIL SYS 1-2 INOP is displayed on EICAS:

Aileron is operating under mechanical reversion mode. Expect greater aileron control force. If required, both pilots should act together to control airplane. Avoid landing at airports with anticipated turbulence or crosswind. Perform a long final approach.

Approach and landing configuration:

Landing Gear .... DOWN
Flaps .... 22°
Airspeed .... $V_{REF\ 45}$ + 30 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.85.

JAMMED AILERON

Aileron Disconnect	PULL

Autopilot .... OFF
Airspeed .... MAXIMUM 200 KIAS

NOTE: Roll rate with aileron disconnected is lower than with full system.

After control is regained:

If the copilot's aileron is operative, roll trim and artificial feel are available.

If the pilot's aileron is operative, roll trim and artificial feel are not available. Do not make sudden and large aileron inputs. Do not increase bank angle above 20°.

In either case, autopilot must not be reengaged.

If both ailerons are jammed, use rudder to control the airplane.

Avoid landing at airports with anticipated turbulence or crosswind.

Approach and landing configuration:

Landing Gear .... DOWN
Flaps .... 45°
Airspeed .... $V_{REF\ 45}$ + 5 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.10.

JAMMED RUDDER

Command rudder through yaw trim. If not possible:

Rudder System 2 .... OFF

If still jammed:

Rudder System 2 .... ON
Rudder System 1 .... OFF

If rudder control through pedals is not restored:

Airspeed .... MAXIMUM 200 KIAS

Avoid landing at airports with anticipated turbulence or crosswind.

Approach and landing configuration:

Landing Gear .... DOWN
Flaps .... 22°
Airspeed .... $V_{REF\ 45}$ + 5 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.62.

If required use asymmetric thrust to trim the airplane directionally, and maintain the engine thrust until nose gear contact in order to avoid lateral and directional miscontrol.

During final approach, the pilot not flying must keep the Steering Disengage Button pressed to avoid inadvertent nose wheel deflection once on ground.

When the airplane is firmly on ground, use the Steering Handle to control the airplane still keeping the Steering Disengage Button pressed and then reduce the engine thrust to IDLE.

If necessary, use differential braking to steer the airplane.

NOTE: The Steering handle is effective even with the Steering Disengage Button pressed.

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INADVERTENT SPOILER OPENING IN FLIGHT

EICAS CAUTION: SPOILER FAIL (may be presented)

Speed Brake	CLOSE

Speed Brake Circuit Breaker (F13) .... PULL
Ground Spoiler Outboard
Circuit Breaker (F14) .... PULL
Ground Spoiler Inboard
Circuit Breaker (F21) .... PULL

If any panel is jammed closed, open or is floating:

Approach and landing configuration:
Landing Gear .... DOWN
Flaps .... 22°
Airspeed .... $V_{REF\ 45}$ + 10 KIAS

Do not reduce engine thrust during flare to avoid abrupt lateral and directional corrections before touchdown.

CAUTION:
- IN CASE OF PANEL JAMMED CLOSED OR FLOATING, TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.50.
- IN CASE OF PANEL JAMMED OPEN, TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

BLEED LEAK

EICAS WARNING: BLD 1 (2) LEAK or BLD APU LEAK

Crossbleed .... CLOSE
Associated Bleed and APU Bleed .... CLOSE
Altitude .... MAX 25000 ft
MINIMUM MEA
Icing Conditions .... EXIT/AVOID
Wait 3 minutes.

If the message remains on, but the associated advisory message on EICAS (BLD 1 or 2 VLV CLSD) indicates the valve is closed:

Opposite Bleed .... CLOSE
Associated Bleed .... OPEN
Wait 3 minutes.
If the message still remains:
Associated Bleed .... CLOSE
Altitude .... MEA OR 10000 ft WHICHEVER IS HIGHER

If the message remains on and is associated with a failed engine bleed valve (BLD 1 or 2 VLV FAIL caution message):

Associated Thrust Lever .... IDLE
Wait 3 minutes.
If the message still remains:
Associated Engine (or APU) .... SHUTDOWN

BLEED OVERTEMPERATURE

EICAS WARNING: BLD 1 (2) OVTEMP

Crossbleed .... OPEN
Cross-side Bleed .... OPEN
Associated Bleed .... CLOSE
Altitude .... MAX 25000 ft
MINIMUM MEA

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

RAPID CABIN DEPRESSURIZATION

Aural Warning: CABIN

Crew Oxygen Masks	DON
Crew Communication	ESTABLISH
Emergency Descent	AS REQUIRED

Passenger Oxygen	AS REQUIRED
Altitude	MEA OR 10000 ft, WHICHEVER IS HIGHER

ANTI-ICING INOPERATIVE IN ICING CONDITIONS

EICAS WARNING: ICE COND-A/I INOP with any or all Anti-icing System EICAS CAUTION

On the ground, whenever the message is displayed, do not takeoff and perform the test below:

Thrust Levers .... IDLE
Ice Detection Override Knob................................... AUTO
Ice Detection Test Knob .... 1, THEN 2

Test knob must be held for 5 seconds in each test position.

For each side separately, check that OPEN inscriptions in the anti-icing buttons flash alternately and that ICE DET 1 (or 2) FAIL caution message and ICE CONDITION advisory message are displayed on the EICAS.

If any OPEN inscription does not flash do not takeoff.

If the message ICE COND-A/I INOP persists do not takeoff.

If the message ICE COND-A/I INOP disappears within 60 seconds:
TAKEOFF .... ACCOMPLISH

In flight:

Ice Detection Override Knob................................... ALL
If necessary, refer to the specific anti-icing system failure.
If the message persists, exit and avoid icing conditions.

AUTOPILOT FAILURE

EICAS WARNING: AUTOPILOT FAIL

Aural Warning: AUTOPILOT (only below 2500 ft radio altitude, when autopilot is disconnected)

Autopilot .... DISENGAGE

Trim airplane as required.

NOTE: If associated with autopilot hardover a sudden deviation from the expected flight path may occur.

EMERGENCY DESCENT

Cabin Crew	NOTIFY
Fasten Belts	ON
Thrust Levers	IDLE
Speed Brakes	OPEN
Airspeed	250 KIAS
Landing Gear	DOWN
Altitude	MEA or 10000 ft WHICHEVER IS HIGHER

Transponder 7700
ATC .... NOTIFY

CAUTION: THIS PROCEDURE ASSUMES THAT THE INTEGRITY OF THE STRUCTURE IS NOT AFFECTED. IF STRUCTURAL DAMAGE IS SUSPECTED, USE THE FLIGHT CONTROLS WITH CAUTION AVOIDING HIGH MANEUVERING LOADS AND REDUCING AIRSPEED AS APPROPRIATE.

NOTE: It is recommended that descent be initiated by a turn with a bank angle of 30°.

FORCED LANDING

This procedure is recommended for landings, with engines operative or not, including places other than a runway.

Landing on unprepared surfaces is not recommended. However, if specific circumstances render such landing inevitable, accomplish the procedures below.

ATC and Cabin Crew ....NOTIFY
Transponder...7700
ELT...ON
Emergency Lights ....ON
Passenger..PREPARE FOR FORCED LANDING
Cabin (below 10000 ft)..DEPRESSURIZE

When committed to land:

Landing Gear ....AS REQUIRED
Flaps ....45°
If it is not possible to achieve the selected flap position, maintain airspeed according to the following:

FLAPS POSITION	MINIMUM AIRSPEED
0 to 8°	$V_{REF\ 45}$ + 30 KIAS
9° to 21°	$V_{REF\ 45}$ + 10 KIAS
22° to 44°	$V_{REF\ 45}$ + 5 KIAS
45°	$V_{REF\ 45}$

If necessary, inhibit EGPWS/GPWS (CB J7 or CB J8) and Aural Warning System (CBs B4 and E30) by pulling their circuit breakers:

If crash is unavoidable, just before touchdown:

Fire Extinguishing Handles ....PULL
APU Fuel Shutoff Valve ....CLOSE
Ventral Tank Transfer Knob (if applicable) .....OFF

When the airplane comes to a complete stop:

EMERGENCY EVACUATION
Procedure ....ACCOMPLISH

DITCHING

WARNING: THE EMB-145 WAS NOT TESTED FOR DITCHING. BELOW ARE THE RECOMMENDED PROCEDURES, WHICH HAVE BEEN DEVELOPED BASED ON PREVIOUS EXPERIENCE.

ATC/Cabin Crew .... NOTIFY
Transponder 7700
ELT .... ON
Emergency Lights .... ON
Passengers .... PREPARE FOR DITCHING
Cabin (below 10000 ft) .... DEPRESSURIZE

If necessary, inhibit EGPWS/GPWS (CB J7 or CB J8) and Aural Warning System (CB's B4 and E30) by pulling their circuit breakers.

When reaching 1000 ft:

Ventral Tank Transfer Knob (if applicable) .... OFF
Air Conditioning 1 and 2 .... OFF
Engine Bleeds .... CLOSE

Approach configuration:

Landing Gear .... UP
Flaps .... 45°
If it is not possible to achieve the selected flap position, maintain airspeed according to the following:

FLAPS POSITION	MINIMUM AIRSPEED
0 to 8°	$V_{REF\ 45}$ + 30 KIAS
9° to 21°	$V_{REF\ 45}$ + 10 KIAS
22° to 44°	$V_{REF\ 45}$ + 5 KIAS
45°	$V_{REF\ 45}$

The final path should be made with airplane straight and level. Yaw angles should be limited to one ball of sideslip. If possible, ditching should be made parallel to the line of the wave crests.

Before touchdown:

Rate of Descent .... LESS THAN 180 ft/MIN
Attitude .... 4° NOSE UP

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Upon water contact:

Start/Stop Selectors .... STOP
EMERGENCY EVACUATION Procedure .... ACCOMPLISH

WARNING: AIRPLANE EVACUATION MUST BE DONE THROUGH THE OVERWING EMERGENCY EXITS ONLY. DO NOT OPEN REMAINING DOORS.

EMERGENCY EVACUATION

Parking Brake (if necessary)... APPLY
Cabin .... DEPRESSURIZE
Fire Extinguishing Handles .... PULL
APU Fuel Shutoff Valve .... CLOSE
APU and Engine Fire Extinguishing
Bottles (if necessary) .... DISCHARGE
Ventral Tank Transfer Knob (if applicable) .... OFF
Electric Fuel Pumps.. OFF
Electric Hydraulic Pumps.. OFF
Cabin Crew .... NOTIFY
Emergency Lighting .... ON
Evacuation .... INITIATE

NOTE: Cockpit door blow-out panels may be broken to be used as an alternative way to leave cockpit.

ATC .... NOTIFY
Before leaving the airplane:
Batteries.. OFF

ABNORMAL PROCEDURES

EQUIPMENT AND FURNISHINGS

EMERGENCY EXIT OPEN

EICAS CAUTION: EMERG EXIT OPN

Fasten Belts... ON
Verify door handle pushed in and remove passengers from the seats near the associated emergency exit.

If emergency exit is not confirmed locked or it is not possible to maintain the pressurization:

Altitude... MEA OR 10000 ft, WHICHEVER IS HIGHER
Cabin Pressure.. MONITOR

BAGGAGE/ACCESS DOOR OPEN

EICAS CAUTION: BAGGAGE DOOR OPN or ACCESS DOORS OPN

Avoid rapid maneuvers.
If it is not possible to maintain the pressurization, proceed:

Altitude... MEA OR 10000 ft, WHICHEVER IS HIGHER
Pressurization.. MONITOR

CREW AWARENESS

ERRONEOUS STALL PROTECTION ACTUATION

Immediately and simultaneously:

Quick Disconnect Button .... PRESS
Both Stall Protection Systems .... CUTOUT

Avoid skidding the airplane.

Add 5 KIAS to approach, landing and go-around speeds.

Landing configuration:

Flaps .... 45°
Airspeed.. $V_{REF\ 45}$ + 5 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE BY 1.10.

ADVANCED STALL PROTECTION

EICAS CAUTION: SPS ADVANCED

If altitude is above 25000 ft:

Airspeed.. ABOVE 150 KIAS

Add 5 KIAS to go-around speed to prevent stall protection from being actuated.

Approach and Landing configuration:

Landing Gear .... DOWN
Flaps .... 45°
Airspeed.. $V_{REF\ 45}$ + 5 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE BY 1.10.

STICK PUSHER JAMMING

EICAS CAUTION: STICK PUSHER FAIL

Elevator Disconnection Handle .... PULL
Copilot must fly the airplane.

Avoid landings at airports with anticipated turbulence or crosswinds.

GPWS INOPERATIVE

EICAS CAUTION: GPWS INOP or TERRAIN INOP (for EGPWS)

Monitor any trend toward terrain contact, excessive sink rate, marginal flight path and airplane configuration.

AURAL WARNING FAILURE

EICAS CAUTION: AURAL WARN FAIL

Monitor airplane instruments.
Do not perform CAT II or CAT III approaches.

WINDSHEAR DETECTION INOPERATIVE

EICAS CAUTION: WINDSHEAR INOP

Avoid windshear.

ELECTRICAL

DC BUS OFF

EICAS CAUTION: DC BUS 1 (2) OFF

Bus Ties .... OVERRIDE
If associated bus is still off:
    Bus Ties .... AUTO
Remaining Buses.. CHECK
If DC Bus 2 is off:
    Airspeed... MAXIMUM 250 KIAS

NOTE: The nose landing gear doors will open if DC Bus 2 is off, therefore the pilot should expect noise increase.

Icing Conditions .... EXIT/AVOID

ESSENTIAL BUS 1 OFF

EICAS CAUTION: ESS BUS 1 OFF

On Reversionary Panel 1:

    SG .... PRESS
Fuel Pump 1... 1B OR 1C
Fuel Pump 2... 2A OR 2C
Altitude .... MAX 25000 FT, MIN MEA

WARNING: **IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.**

COM 2 on Digital Audio Panel 2 .... PRESS

Monitor fuel quantity indication 1 through FMS.

If the EICAS is not energized:

    DAU 1 on EICAS Rev .... PRESS

    At pilot’s discretion, on Reversionary Panel 1:

        MFD Knob.. EICAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

ESSENTIAL BUS 2 OFF

EICAS CAUTION: ESS BUS 2 OFF

Fuel Pump 1 .... 1A OR 1C
Fuel Pump 2 .... 2B OR 2C
Icing Conditions .... EXIT/AVOID
Altitude .... MAX 25000 FT, MINIMUM MEA

Monitor fuel quantity indication 2 through FMS.

When necessary to extend landing gear:
ABNORMAL LANDING GEAR EXTENSION .... ACCOMPLISH

CAUTION:
- DO NOT USE CROSSFEED.
- TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

ESSENTIAL BUS 1-2 OFF

EICAS CAUTION: ESS BUS 1-2 OFF

Bus Ties .... OFF
MFD Electrical Page .... CHECK
If both DC buses are energized:
Batteries 1 and 2 .... OFF
Check if the essential buses remain off.
Associated ESS BUS OFF Procedure .... ACCOMPLISH
If only DC BUS 1 is energized:
Battery 1 .... OFF
Check which essential bus is off.
Associated ESS BUS OFF Procedure .... ACCOMPLISH
If only DC BUS 2 is energized:
Battery 2 .... OFF
Check which essential bus remain off.
Associated ESS BUS OFF Procedure .... ACCOMPLISH

SHED BUS OFF

EICAS CAUTION: SHED BUS 1 (2) OFF

If message is confirmed and shed buses are off, monitor the system for the remainder of the flight.

GENERATOR OFF BUS

EICAS CAUTION: GEN 1 (2, 3, 4) OFF BUS or APU GEN OFF BUS

Affected Generator .... OFF, THEN ON
If the generator does not reset:
    APU Generator .... AS REQUIRED

CAUTION: • IF ALL GENERATORS ARE OFF BUS, CABIN WILL DEPRESSURIZE. REFER TO LOSS OF ALL GENERATORS PROCEDURE.
• BATTERY DURATION IS 40 MINUTES.

GENERATOR OVERLOAD

EICAS CAUTION: GEN 1 (2, 3, 4) OVLD or APU GEN OVLD

Shed Buses .... OFF
If the message remains:
    Electrical Load (on affected generator) .... REDUCE
If APU generator is not affected and any generator is overloaded:
    APU Generator .... ON

BATTERY OFF BUS

EICAS CAUTION: BATT 1 (2) OFF BUS

Affected Battery .... AUTO

BACK-UP BATTERY OFF BUS

EICAS CAUTION: BKUP BATT OFF BUS

Backup Battery .... VERIFY ON

ELECTRICAL EMERGENCY ABNORMAL TRANSFER

EICAS CAUTION: ELEC EMERG ABNORM

Essential Power .... OFF
APU Generator .... ON

CAUTION: IF APU GENERATOR IS NOT AVAILABLE OR IF THE MESSAGE REMAINS, BATTERY DURATION WILL BE 40 MINUTES.

Land at the nearest suitable airport.

APU CONTACTOR CLOSED

EICAS CAUTION: APU CNTOR CLOSED

Bus Ties .... OFF
Battery 2 .... OFF

115 V AC BUS OFF

EICAS CAUTION: 115 VAC BUS OFF

AC Power .... OFF, THEN ON
If unsuccessful:
AC Power .... OFF

GENERATOR BEARING FAILURE

EICAS ADVISORY: GEN 1 (2, 3, 4) BRG FAIL

Crew awareness.

LIGHTING

EMERGENCY LIGHTS NOT ARMED

EICAS CAUTION: EMG LT NOT ARMD

Emergency Lighting Selector .... ARM
If unsuccessful, check that Attendant Emergency Light Control Button is set to NORM.

FIRE PROTECTION

FIRE DETECTION FAILURE

EICAS CAUTION: E1 (2) FIREDET FAIL or APU FIREDET FAIL

Engine or APU .... MONITOR

If engine fire or overheat is suspected or if E1 (2) FIREDET FAIL message appears simultaneously with engine failure:

ENGINE FIRE, SEVERE
DAMAGE OR SEPARATION Procedure............ ACCOMPLISH

If APU fire or overheat is suspected or if APU FIREDET FAIL message appears simultaneously with APU failure:

APU FIRE Procedure... ACCOMPLISH

FIRE EXTINGUISHING INOPERATIVE

EICAS CAUTION: E1 (2) EXTBTLA INOP, E1 (2) EXTBTLB INOP, APU EXTBTL INOP or BAGG EXTBTL INOP (if installed)

On Engines:

Only one discharge will be available from the remaining bottle, to protect both engines against fire.

On APU:

Consider shutting APU down (or not starting it) if bleed extraction or electrical generation is not essential.

On Baggage Compartment:

In flight:

If associated with the BAGG SMOKE message, land at the nearest suitable airport.

FUEL

FUEL LOW PRESSURE

EICAS CAUTION: E1 (2) FUEL LO PRESS

Select another electric fuel pump on the associated tank.
If all pumps in one tank are inoperative:
Altitude.. MAX 25000 ft
MINIMUM MEA

NOTE: If required, Crossfeed may be open above 25000 ft.

Avoid rapid thrust lever movements and set minimum required thrust.

FUEL LOW TEMPERATURE

EICAS CAUTION: FUEL TANK LO TEMP or E1 (2) FUEL LO TEMP

WARNING: IF FUEL TANK LO TEMP MESSAGE IS PRESENTED, IN ANY CASE, OR E1 (2) FUEL LO TEMP IS PRESENTED WITHOUT ICING INHIBITOR, ENGINE FLAMEOUT MAY OCCUR.

On ground:
Low temperature in the engine (E1 or E2 FUEL LO TEMP):
Before takeoff, check that fuel icing inhibitor has been added to the fuel.
Low temperature in the tank (FUEL TANK LO TEMP):
Check tank temperature. If message is confirmed or if MFD is not available, do not takeoff.

In flight:
Descend to lower altitude and monitor engine indications as long as the message remains.
If the low temperature is in the tank (FUEL TANK LO TEMP) and MFD is available, tank temperature may be checked on the MFD Fuel Page, before descending.

FUEL CROSSFEED FAILURE

EICAS CAUTION: FUEL XFEED FAIL

Fuel Imbalance..MONITOR
Asymmetric Thrust..AS REQUIRED

FUEL IMBALANCE

EICAS CAUTION: FUEL IMBALANCE

If fuel imbalance is confirmed:
CROSSFEED OPERATION
Procedure..ACCOMPLISH

REFUELING COMPARTMENT DOOR OPEN

EICAS CAUTION: FUELING DOOR OPN

On ground:
Check the door for positive locking before takeoff. If the message remains, repair is required before takeoff.

ENGINE FUEL SHUTOFF VALVE FAILURE

EICAS CAUTION: E1 (2) FUEL SOV INOP

Engine Fuel Indications..MONITOR
If the message has been presented during a fire procedure:
Crossfeed..OFF
Associated Fuel Pumps..OFF
If valve is confirmed closed during normal operation (fuel flow decreasing to zero):
Fire Extinguishing Handle.......................................CHECK IN
If valve remains closed and it is not possible to restart the affected engine, land at the nearest suitable airport.
PRECAUTIONARY ENGINE
SHUTDOWN Procedure....................................ACCOMPLISH
If engine is running normally, disregard the message.

ENGINE FUEL SHUTOFF VALVE CLOSED

EICAS ADVISORY: E1 (2) FUEL SOV CLSD

Fire Extinguishing Handle... CHECK IN
If valve is open and engine is running normally, disregard the message.
If valve remains closed and it is not possible to restart the affected engine:
PRECAUTIONARY ENGINE
SHUTDOWN Procedure.................................... ACCOMPLISH
Land at the nearest suitable airport.

APU FUEL SHUTOFF VALVE FAILED

EICAS CAUTION: APU FUEL SOV INOP

Check that APU Fuel Shutoff Button is not pressed.
If valve remains closed and it is not possible to restart the APU:
APU Master Knob.. OFF
If APU is running normally, disregard the message.

APU FUEL SHUTOFF VALVE CLOSED

EICAS ADVISORY: APU FUEL SOV CLSD

If valve is open and APU is running normally, disregard the message.

APU FUEL LOW PRESSURE

EICAS CAUTION: APU FUEL LO PRESS

Select another right electric fuel pump (2A, 2B or 2C) on the associated tank.

If message remains, repeat the procedure.

FUEL CROSSFEED MISCOMMAND

EICAS CAUTION: FUEL EQ XFEED OPN

Crossfeed Selector Knob .... OFF
Fuel Imbalance... CHECK
Crossfeed Selector Knob .... AS REQUIRED
Check Crossfeed Selector Knob properly positioned to correct wing fuel imbalance.

FUEL CROSSFEED OPEN

EICAS ADVISORY: FUEL XFEED OPEN

If not required, close crossfeed.

AUXILIARY POWER UNIT

APU OIL LOW PRESSURE/OIL HIGH TEMPERATURE

EICAS CAUTION: APU OIL LO PRESS or APU OIL HI TEMP

If the APU is not essential for the flight:
APU .... SHUTDOWN

If APU is essential, monitor APU EGT and RPM.
If the APU EGT enters the red or amber range, apply the APU OVERTEMPERATURE Procedure.
If RPM enters red range:
APU .... SHUTDOWN

APU AUTOMATIC SHUTDOWN

EICAS CAUTION: APU FAIL

If shutdown occurs with APU running:
Do not try to restart the APU.

If shutdown occurs during APU start cycle and provided there is no obvious safety hazard:
APU start procedure .... AS REQUIRED
If APU fails to restart, two more APU start attempts may be accomplished.

NOTE: Refer to APU STARTER LIMITS in AFM Limitations section between start attempts.

POWERPLANT

ENGINE FAILURE

Remaining Engine Thrust Rating .... CON
Altitude .... MAX 25000 ft
MINIMUM MEA
ENGINE AIRSTART Procedure .... AS REQUIRED

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

NOTE: If in flight below 9700 ft (or 15000 ft for AE3007A and AE3007A1/1 engines Pre-Mod. SB 145-73-0010) and the remaining engine is at the maximum takeoff thrust (or also CON mode for AE3007A and AE3007A1/1 engines Pre-Mod. SB 145-73-0010), the air conditioning pack valves will close automatically. The APU may be used as pneumatic source by closing the remaining engine bleed valve.

ONE ENGINE INOPERATIVE APPROACH AND LANDING

Inoperative Engine Thrust Lever................................... IDLE
Landing Gear .... DOWN
Thrust Rating... TAKEOFF MODE
Flaps .... 22°
Airspeed .... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.48.

ONE ENGINE INOPERATIVE GO-AROUND

Quick Disconnect Button .... PRESS
Go Around Button .... PRESS
Operative Engine Thrust Lever.................................... MAX

NOTE: If during approach an engine fails and a go around is initiated, advance both thrust levers to MAX.

Rotate to go-around attitude (10° nose up).
Flaps .... 9°
With positive rate of climb:
Landing Gear .... UP
Minimum Airspeed .... APPROACH CLIMB SPEED

At level off height, proceed as for TAKEOFF WITH ENGINE FAILURE Procedure.

NOTE: - Limiting bank angle to 5° towards operative engine improves climb performance.
- During GO-AROUND procedure, the DON'T SINK aural warning may sound. In this case monitor the sink rate and follow the GO-AROUND guidance.

ABNORMAL ENGINE START

Abort engine start immediately when:

- Only on ground, no light-up in 10 seconds after the first fuel flow indication.

  NOTE: The start should not be aborted if fuel flow drops to zero pph immediately after light-up.

- ITT approaches start limit.
- N2 remains steady or decreases for more than 30 seconds.
- N2 indicates no rotation up to 10 seconds after the start command.
- Any unusual noise or vibration occurs.
- Engine instruments indicate abnormal conditions.
- Visible burning on the exhaust pipe.
- Oil pressure does not reach at least 34 psi after the engine reaches stabilized idle.

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To abort start:
Associated Thrust Lever .... IDLE
Start/Stop Selector... STOP

If fire occurs or engine does not shutdown:
Fire Extinguishing Handle....................................... PULL
ENGINE DRY MOTORING Procedure .... ACCOMPLISH

ENGINE DRY MOTORING

Dry motor the engine for a minimum of 30 seconds to clear it of unburned fuel prior to attempting another start.

FADEC Control Knob.. ALTN
Check alternation of FADEC-in-control indication on the EICAS.

CAUTION: IF FADEC DOES NOT ALTERNATE, DO NOT PROCEED WITH THE ENGINE DRY MOTORING.

Ignition.. OFF
Check IGN OFF indication on EICAS display.
Start/Stop Selector.. START, THEN RUN

NOTE: If N2 indicates no rotation after 10 seconds, abort dry motoring attempt immediately.

After 30 seconds:
Start/Stop Selector... STOP
Ignition Selector .... AUTO

PRECAUTIONARY ENGINE SHUTDOWN

Associated Thrust Lever .... IDLE
Associated Start/Stop Selector .... STOP

NOTE: Engine will not shutdown with the START/STOP Selector unless associated Thrust Lever is first moved to IDLE. If STOP is selected before Thrust Lever is retarded to IDLE, momentarily cycle START/STOP Selector to RUN and back to STOP.

If engine shutdown does not occur:
Fire Extinguishing Handle.. PULL (DO NOT ROTATE)
Remaining Engine Thrust Rating.................................. CON
Verify N2 and ITT decreasing below IDLE values.
APU... START
APU Bleed .... AS REQUIRED
Crossbleed... AS REQUIRED

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

NOTE: If in flight below 9700 ft (or 15000 ft for AE3007A and AE3007A1/1 engines Pre-Mod. SB 145-73-0010) and the remaining engine is at the maximum takeoff thrust (or also CON mode for AE3007A and AE3007A1/1 engines Pre-Mod. SB 145-73-0010), the air conditioning pack valves will close automatically. The APU may be used as pneumatic source by closing the remaining engine bleed valve.

ENGINE AIRSTART

Affected engine:

One Electric Fuel Pump (A or B) .... ON
Ignition .... AUTO
Start/Stop Selector.. STOP
Engine Bleed.. CLOSE
Thrust Lever... IDLE
Airspeed and Altitude.. REFER TO AIRSTART ENVELOPE

Perform an assisted start or windmilling, as required:

CAUTION: IN ICING CONDITIONS DO NOT USE APU BLEED START, TO AVOID LOSS OF ANTI-ICE SYSTEM PERFORMANCE.

Assisted start:

Crossbleed start:
N2 (operating engine).. ABOVE 80%
Crossbleed.. AUTO OR OPEN
Engine Bleed (operating engine)........................ OPEN
Start/Stop Selector.. START, THEN RUN
Engine Indication .... MONITOR
Check ignition. Check N2 rising. Observe limits. Abort start immediately if an Abnormal Engine Start is detected.

APU bleed start:
APU.. START
APU Bleed .... OPEN
Crossbleed.. AUTO OR OPEN
Engine Bleed (operating engine)........................ CLOSE
If only the APU Generator is operative:
Windshield Heating.. OFF
Electric Hydraulic Pump
(inoperative engine)...................................... OFF
Start/Stop Selector.. START, THEN RUN

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Engine Indication .... MONITOR
Check ignition. Check N2 rising. Observe limits. Abort start immediately if an Abnormal Engine Start is detected.
If Windshield Heating and Electric Hydraulic Pump were turned off before engine start:
Windshield Heating .... ON
Electric Hydraulic Pump .... AUTO

Windmilling start:
Airspeed.. ABOVE 260 KIAS
Minimum N2 .... 10%
Start/Stop Selector .... START, THEN RUN
ITT and N2.. MONITOR
Observe limits. Abort start immediately if an Abnormal Engine Start is detected.

NOTE: - Windmilling start will be slower than an assisted start.
- Windmilling start with N2 above 30% and increasing, the loss of altitude may be minimized, by reducing airspeed.
- Initiate windmilling start with N2 as high as possible. Windmilling starts are not possible with N2 below 10%. Once N2 is below 10%, it may not be recovered.

After start:

Affected Engine Bleed .... AS REQUIRED
Crossbleed .... AUTO
APU Bleed .... AS REQUIRED

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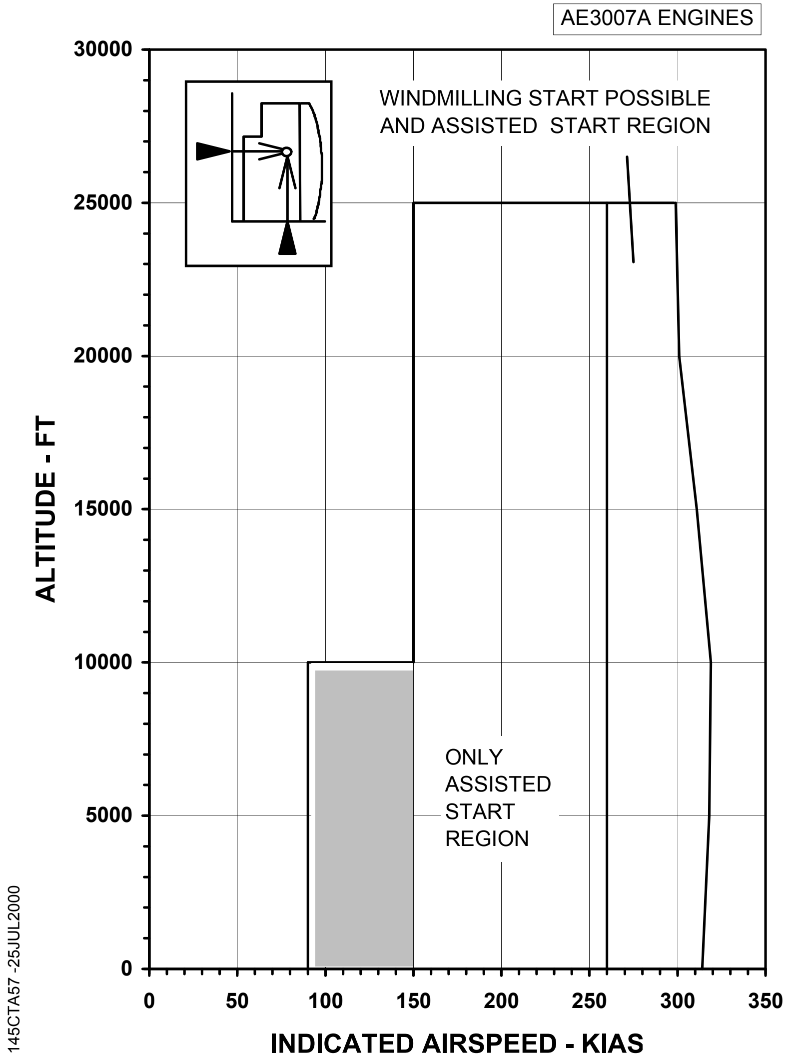
ENGINE AIRSTART ENVELOPE



NOTE: Shaded area may be below 1.23 V_{SR}.

ENGINE HIGH OIL PRESSURE

Oil Pressure, Oil Temperature,

Oil Level, Engine Vibration .... MONITOR

If oil temperature, and/or oil level, and/or engine vibration, exceeds normal operation range:

Associated Procedure .... ACCOMPLISH

ENGINE HIGH OIL TEMPERATURE

Associated Thrust Lever .... REDUCE

Reduce thrust lever and maintain the temperature within limits.

If oil temperature remains high, above 25000 ft:

Altitude.. MAX 25000 ft
MINIMUM MEA

Monitor oil temperature for the remainder of the flight.

If limits cannot be maintained, perform a precautionary engine shutdown to prevent engine damage.

ENGINE OIL LOW PRESSURE

When conditions permit, reduce N2 below 88%, and monitor oil temperature.

ENGINE LOW OIL LEVEL

Monitor oil pressure for the remainder of the flight.

Consider performing a precautionary engine shutdown in order to preserve oil quantity so that engine may be restarted prior to landing.

ENGINE ATS SHUTOFF VALVE OPEN

EICAS CAUTION: E1 (2) ATS SOV OPN

Associated Bleed (including APU bleed)....................... CLOSE

Crossbleed.. CLOSE

On ground:

Associated Thrust Lever.. IDLE

Associated Start/Stop Selector................................ STOP

If engine shutdown does not occur:

Fire Extinguishing Handle .... PULL (DO NOT ROTATE)

In flight:

Altitude.. MAX 25000 ft

Exit and avoid icing conditions.

ENGINE REFERENCE ANTI-ICE DISAGREE

EICAS CAUTION: ENG REF A/I DISAG

Check ice protection system selection against takeoff data entered.

ENGINE OVERTEMPERATURE

Associated Thrust Lever .... REDUCE
If the condition remains:
Associated Bleed .... CLOSE
Altitude .... MAX 25000 ft
MINIMUM MEA
If the conditions remains:
PRECAUTIONARY ENGINE SHUTDOWN or
ENGINE FIRE, SEVERE DAMAGE OR
SEPARATION Procedure .... ACCOMPLISH

ENGINE CONTROL FAILURE

EICAS CAUTION: E1 (2) CTL FAIL (may be presented)

CAUTION: DO NOT MANUALLY ALTERNATE ASSOCIATED FADECS.

Verify the associated FADEC in control.

Associated FADEC .... RESET
If FADEC alternates automatically:
Avoid quick movements of the associated Thrust Lever.

NOTE: Thrust Lever movements may cause surge or an uncommanded engine shutdown.

If the associated engine thrust is no longer controllable:
PRECAUTIONARY ENGINE
SHUTDOWN Procedure .... AS REQUIRED
If FADEC does not alternate automatically:
Engine control is recovered.

ENGINE NO TAKEOFF DATA

EICAS CAUTION: ENG NO TO DATA

Enter takeoff data before takeoff.

THRUST LEVER FAILURE

EICAS CAUTION: ENG1 (2) TLA FAIL

Associated FADEC .... RESET
If Thrust Lever command is not available:
    Associated FADEC .... ALTN
If thrust lever still does not respond thrust can be partially controlled through the Thrust Rating Buttons.
    PRECAUTIONARY ENGINE
        SHUTDOWN Procedure .... AS REQUIRED

THRUST LEVER STOP FAILURE

EICAS ADVISORY: E1 (2) IDL STP FAIL

Be careful when reducing engines near IDLE.

CAUTION: NEVER SET THRUST LEVERS BELOW IDLE INFLIGHT.

ADC DATA FAIL

EICAS ADVISORY: E1 (2) ADC DATA FAIL

Associated FADEC ....RESET
If the message remains on:
  Associated FADEC ....ALTN
If the message remains on:
  Avoid unnecessary rapid thrust levers movement.

ENGINE ABNORMAL VIBRATION

Associated Thrust Lever ....REDUCE TO KEEP VIBRATION WITHIN LIMITS

CAUTION: CONTINUOUS VIBRATION ABOVE LIMITS MAY DAMAGE THE ENGINE.

If vibration indication remains out of limits:

  PRECAUTIONARY ENGINE
    SHUTDOWN Procedure ....ACCOMPLISH

ENGINE FUEL FILTER IMPENDING BYPASS

EICAS ADVISORY: E1 (2) FUEL IMP BYP

If both engine fuel filters are affected:
  Land at the nearest suitable airport.

ENGINE OIL FILTER IMPENDING BYPASS

EICAS ADVISORY: E1 (2) OIL IMP BYP

Crew awareness.

ENGINE FADEC FAULT

EICAS ADVISORY: E1 (2) FADEC FAULT

Crew awareness.

ENGINE NOT DISPATCHABLE

EICAS CAUTION: E1 (2) NO DISP

Crew awareness.

ENGINE OUT

EICAS CAUTION: ENG1 (2) OUT

If during takeoff, above V_1 and associated with an engine flameout:
- TAKEOFF WITH ENGINE FAILURE Procedure.. ACCOMPLISH

If in flight:
- PRECAUTIONARY ENGINE SHUTDOWN Procedure.................................... ACCOMPLISH
- ENGINE AIRSTART Procedure .... AS REQUIRED

FADEC NOT DISPATCHABLE

EICAS CAUTION: FADEC ID NO DISP

Crew awareness.

ENGINE LIMITS EXCEEDANCE

EICAS CAUTION: E1 (2) EXCEEDANCE

Do not takeoff.

ENGINE SHORT DISPATCHABLE

EICAS ADVISORY: E1 (2) SHORT DISP

Crew awareness.

CHECK ENGINE PERFORMANCE

EICAS ADVISORY: CHECK A (A1, A1P, A1E, A3, A1/3) PERF

Associated Engine Performance.................................. CHECK

LOSS OF ENGINE INDICATIONS

CONDITION: Loss of Thrust Mode, ITT, N1 and N2 indications.

If engine is operative but the indications are lost, proceed:

- Associated FADEC .... RESET
- If engine indications are still not available:
  - Associated FADEC .... ALTN
  - If engine indications are still not available:
  - Monitor the remaining engine indications.
    - PRECAUTIONARY ENGINE SHUTDOWN Procedure.......................... AS REQUIRED

HYDRAULIC POWER

BOTH HYDRAULIC SYSTEMS FAILURE

EICAS CAUTION: HYD SYS 1-2 FAIL, RUDDER SYS 1-2 INOP or AIL SYS 1-2 INOP
EICAS ADVISORY: E1-2 HYD PUMP FAIL

Airspeed.. MAXIMUM 250 KIAS

Check hydraulic systems fluid quantity:
If any hydraulic system fluid quantity is in green range:
Associated Electric Hydraulic Pump .... ON
If any hydraulic system fluid quantity is in amber range:
Associated Electric Hydraulic Pump .... OFF

CAUTION: DO NOT OPEN THE SPEED BRAKE.

If one system can be recovered, complete the appropriate procedure for one hydraulic system failure.

If both systems remain inoperative:
Quick Disconnect Button .... PRESS
Both Electric Hydraulic Pumps .... OFF

NOTE: The nose landing gear doors will open, therefore the pilot should expect noise increase.

ABNORMAL LANDING GEAR
EXTENSION Procedure .... ACCOMPLISH

Use rudder for directional control on the ground.
Rudder and aileron are operating under mechanical reversion mode. Expect greater rudder pedals and control wheels control forces. Both pilots should act together to control the airplane, if required. Consider the use of aileron and asymmetric thrust to help in yaw control.
Land at the nearest suitable airport. Avoid landings at airports with anticipated crosswind or turbulence. Perform a long final approach.
Approach and landing configuration:
Landing Gear .... DOWN
Flaps .... 22°
Airspeed .... $V_{REF\ 45}$ + 30 KIAS

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EMERGENCY BRAKE
TECHNIQUE Procedure .... ACCOMPLISH
Do not attempt to taxi.

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 3.45.

HYDRAULIC SYSTEM 1 FAILURE

EICAS CAUTION: HYD SYS 1 FAIL, RUDDER SYS 1 INOP or AIL SYS 1 INOP
EICAS ADVISORY: E1 HYD PUMP FAIL

Check hydraulic system fluid quantity:
If hydraulic system fluid quantity is in green range:
Electric Hydraulic Pump 1.................................. ON
If hydraulic system fluid quantity is in amber range:
Electric Hydraulic Pump 1.................................. OFF

If hydraulic power is not recovered:
Airspeed.. MAXIMUM 250 KIAS
Electric Hydraulic Pump 1....................................... OFF

NOTE: As the nose landing gear doors will open, the pilot should expect a noise increasing during flight.

For landing gear extension:
ABNORMAL LANDING GEAR
EXTENSION Procedure .... ACCOMPLISH
Do not actuate left Thrust Reverser.
Use rudder and differential braking for directional control on ground.
Approach and Landing configuration:
Landing Gear .... DOWN
Flaps .... 45°
Airspeed.. $V_{REF\ 45}$

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.60.

HYDRAULIC SYSTEM 2 FAILURE

EICAS CAUTION: HYD SYS 2 FAIL, RUDDER SYS 2 INOP or
AIL SYS 2 INOP
EICAS ADVISORY: E2 HYD PUMP FAIL

Check hydraulic system fluid quantity:
- If hydraulic system fluid quantity is in green range:
  - Electric Hydraulic Pump 2 ....ON
- If hydraulic system fluid quantity is in amber range:
  - Electric Hydraulic Pump 2 ....OFF

If hydraulic power is not recovered:
- Airspeed..MAXIMUM 250 KIAS
- Electric Hydraulic Pump 2 ....OFF
- Do not actuate right Thrust Reverser.
- Approach and Landing configuration:
  - Landing Gear..DOWN
  - Flaps...45°
  - Airspeed ....$V_{REF\ 45}$

CAUTION:
- DO NOT OPEN THE SPEED BRAKE.
- TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.53.

NOTE: The Emergency/Parking Brake will be available only with the accumulator charge.

HYDRAULIC SYSTEM OVERHEAT

EICAS CAUTION: HYD SYS 1 (2) OVHT

Associated Engine Hydraulic Pump ....SHUTOFF
Associated Electric Hydraulic Pump.........................OFF
Airspeed..MAXIMUM 250 KIAS

For remainder of flight, if required:
- Affected Hydraulic System ....15 MINUTES OFF, 1 MINUTE ON

During approach and landing:
- Affected Hydraulic System ....ON

After reaching taxi speed:
- Affected Hydraulic System ....OFF

HYDRAULIC SYSTEM LOW QUANTITY

EICAS ADVISORY: HYD1 (2) LO QTY

Monitor associated hydraulic system.

NOTE: Do not open the Speed Brake if the Hydraulic System 2 is affected.

HYDRAULIC SYSTEM 1 (2) FAILURE Procedure .... AS REQUIRED

HYDRAULIC ENGINE PUMP FAILURE

EICAS ADVISORY: E1 (2) HYD PUMP FAIL

Monitor associated hydraulic system.
Refer to HYDRAULIC SYSTEM 1 (2) FAILURE Procedure, if necessary.

HYDRAULIC PUMP SELECTED OFF

EICAS ADVISORY: HYD PUMP SELEC OF

Electric Hydraulic Pumps .... AUTO

HYDRAULIC SHUTOFF VALVE CLOSED

EICAS ADVISORY: E1 (2) HYDSOV CLSD

If valve is not intentionally closed:
Engine Pump Shutoff Button .... CHECK NOT PRESSED

LANDING GEAR AND BRAKES

GEAR LEVER CANNOT BE MOVED TO UP AFTER TAKEOFF

Wait 10 seconds to verify if the LG AIR/GND FAIL message is displayed.
If the message is presented, do not move Landing Gear Lever.
If the message is not presented:
  Downlock Release Button .... PRESS
  Landing Gear Lever.. UP
Landing Gear Lever will be released, permitting gear retraction.

ABNORMAL LANDING GEAR EXTENSION

Landing Gear Lever... DOWN
Gear Electrical Override .... DOORS
Wait 3 seconds:

  Gear Electrical Override .... GEAR
  Landing Gear Indication .... CHECK
If any of the gear is not locked down:
  Landing Gear Lever.. UP
  Gear Electrical Override .... NORMAL
  Wait 10 seconds.
  Free Fall Lever .... ACTUATE
    Actuate the free fall lever up to full uplock position.
  Landing Gear Lever.. DOWN
  Landing Gear Indication .... CHECK

  If the failure persists:

    Free Fall Lever .... CYCLE
      Cycle the free fall lever as long as necessary, but limited to 10 times, to lower the landing gear. Wait 20 seconds, with the lever in the uplock position, between each cycle. Verify lever at full uplock position after cycling.

    If the failure still persists:
      PARTIAL OR GEAR UP
        LANDING Procedure................................ ACCOMPLISH

PARTIAL OR GEAR UP LANDING

EICAS WARNING: LG/LEVER DISAGREE

Burn fuel to reduce touchdown speed.

Passengers/crew .... PREPARE FOR EMERGENCY LANDING AND EVACUATION PROCEDURE

Prior to approach:

Inhibit EGPWS/GPWS (J7 or J8) and Aural Warning System (B4 and E30) by pulling their circuit breakers.

Emergency Lights .... ON
Electric Hydraulic Pumps .... OFF
Engine Bleed .... OFF
Pressurization Dump Button .... PRESS
Flaps .... 45°
Landing Gear .... AS REQUIRED

NOTE: The decision to land with all gear up or with any gear extended is left to pilots. The choice of configuration is based on the number of gear available, airplane load distribution, controllability and conditions of the landing field.

Landing Briefing .... PERFORM

Apply thrust reverser (if available) at touchdown. Ground spoilers, thrust reverser, steering and normal brakes will not operate if any main gear is up.

Rudder is available to maintain runway centerline during initial landing phase.

Maintain wings level as long as possible and use brakes and steering (if available) for directional control.

After the airplane comes to a complete stop:

Start/Stop Selector .... STOP
Electric Fuel Pumps .... OFF
Fire Extinguishing Handles .... PULL AND ROTATE
EMERGENCY EVACUATION
Procedure .... ACCOMPLISH

LANDING GEAR AIR/GROUND SYSTEM FAILURE

EICAS CAUTION: LG AIR/GND FAIL

If not in icing conditions:

Icing Conditions .... AVOID

Landing Configuration:

Flaps .... 45°

Airspeed .... $V_{REF\ 45}$

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.70.

If in icing conditions:

Anti-icing system .... MONITOR

If any anti-ice valve does not open or anti-ice failure messages appear, leave and avoid icing conditions.

After exiting icing conditions, proceed as follows:

Maximum Bank Angle .... 30°

Minimum Airspeed for Flaps up or 9° .... 190 KIAS

Landing Configuration:

Flaps .... 22°

Airspeed .... $V_{REF\ 45}$ + 30 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 2.40.

NOTE: - Thrust Reversers, and Ground Spoiler, may not be available. Depending on the failed condition, Ground Idle may not be selectable. Refer to the associated abnormal procedures.

- If message is presented on ground, one pair of brakes (below 10 kt ground speed) and Steering may not be available. Refer to the associated abnormal procedures.

BRAKE DEGRADED

EICAS CAUTION: BRAKE DEGRADED
Apply brakes normally.

Brake effectiveness may be reduced and braking asymmetry may be felt.
During landing run:
Thrust Levers (if available) .... REVERSE

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.24.

BRAKES INOPERATIVE

EICAS CAUTION: BRK OUTBD (INBD) INOP
If one pair of brakes is inoperative, apply brakes normally through the pedals.
If both pair of brakes are inoperative:
EMERGENCY BRAKING
TECHNIQUE Procedure .... ACCOMPLISH
In any case:
Landing configuration:
Flaps .... 45°
Airspeed .... $V_{REF\ 45}$
During landing run:
Thrust Levers .... REVERSE

CAUTION: IN BOTH CASES, TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

EMERGENCY BRAKING TECHNIQUE

Pull the emergency brake handle carefully and continuously until the first airplane reaction. Use the parking brake light as a reference for brake application. Modulate brake application until the airplane achieve the desired deceleration.
In case of airplane skidding, release the handle and pull it again as required.

NOTE: Anti-skid protection is not available for emergency/parking brake.

EMERGENCY/PARKING BRAKE HANDLE DISAGREE

INDICATION: BRAKE ON light illuminated with Emergency/Parking Brake handle not actuated.

Park the airplane as soon as possible.

Do not takeoff.

BRAKES OVERHEAT

EICAS CAUTION: BRAKE OVERHEAT

If during landing and runway length is enough:
- Brake Pressure .... REDUCE
- Use of full reverse thrust is recommended.

If after takeoff:
- Lower landing gear for cooling as soon as possible.
- Airspeed .... BELOW 200 KIAS
- Retract gear when brakes temperature is at green range.
- If MFD is not available, retract gear after message is removed.
  - Airspeed .... AS REQUIRED

When on ground, park the airplane as soon as possible.

Before next takeoff:
- Brakes Temperature .... CHECK AT GREEN RANGE
- If Brakes Temperature Monitoring System is not available:
  - Quick Turn Around Chart .... CHECK
  - Wheel Thermal Plugs .... CHECK

  NOTE: A positive way to check Wheel Thermal Plugs is to verify that none of tires is flat.

EMERGENCY/PARKING BRAKE LOW PRESSURE

EICAS CAUTION: EMRG BRK LO PRES

If necessary to use the emergency/parking brake, apply it in advance.
When parking the airplane, use wheel blocks.

STEERING SYSTEM INOPERATIVE OR UNCOMMANDED SWERVING ON GROUND

EICAS CAUTION: STEER INOP (may be presented)

Steering Handwheel..	DO NOT USE
Steering Disengagement Button....................................	PRESS

Control the airplane using rudder command and differential brakes and rudder.
Consider the use of differential thrust reverser if serviceable.

FLIGHT CONTROLS

RUDDER/YAW TRIM RUNAWAY

Quick Disconnect Button	PRESS AND HOLD
Rudder Systems 1 and 2	OFF

Yaw Trim Circuit Breaker (F12) .... PULL
Quick Disconnect Button .... RELEASE

Strongly push pedal opposite to the side of the uncommanded yaw, while applying ailerons to control roll.

If necessary, turn on one rudder system at a time to identify the failed system. Prepare to overcome the yaw generated by the failed system.

If both systems remains inoperative:

Expect greater rudder pedals force. Both pilots should act together to control the airplane, if required. Consider the use of aileron to help in yaw control, and asymmetric thrust to trim the airplane.
Do not use yaw trim system for the remainder of the flight.
Avoid landing at airports with anticipated turbulence or crosswind.
Land at the nearest suitable airport.

CAUTION: DO NOT TRY TO RESET THE RUDDER SYSTEMS.

RUDDER SYSTEM INOPERATIVE

EICAS CAUTION: RUDDER SYS 1 (2) INOP or RUDDER SYS 1-2 INOP

If only one rudder system is affected:

Affected Rudder System .... OFF

If RUDDER SYS 1-2 INOP message is displayed:

Rudder System 2 .... OFF

If RUDDER SYS 1-2 INOP message is still displayed:

Rudder System 1 .... OFF

CAUTION: IF THE MESSAGE IS PRESENTED FOLLOWING A RUDDER RUNAWAY, DO NOT TURN ON THE SYSTEMS.

Both Rudder Systems .... ON

If RUDDER SYS 1-2 INOP message is still displayed:

Expect greater rudder pedal force. If required, both pilots should act together to control the airplane. Consider the use of aileron to help in yaw control, and asymmetric thrust to control the airplane.

Avoid landing at airports with anticipated turbulence, gusts or crosswind.

RUDDER OVERBOOST

EICAS CAUTION: RUDDER OVERBOOST

Rudder System 2 .... OFF

If the message disappears:

Continue flight with rudder system 2 off.

Below 135 KIAS:

Rudder System 2 .... ON

If message remains:

Rudder System 2 .... ON

Rudder System 1 .... OFF

Continue flight with the rudder system 1 off.

Below 135 KIAS:

Rudder System 1 .... ON

RUDDER HARDOVER PROTECTION FAILURE

EICAS CAUTION: RUD HDOV PROTFAIL

On ground:
Do not takeoff.
In flight:
Hardover protection is not available.

AILERON SYSTEM INOPERATIVE

EICAS CAUTION: AIL SYS 1 (2) INOP

Associated Aileron System .... OFF
Airspeed .... MAXIMUM 250 KIAS

If the remaining system fails:

Remaining Aileron System .... OFF
Quick Disconnect Button .... PRESS

Aileron is operating under mechanical reversion mode. Expect greater aileron control force. If required, both pilot should act together to control airplane. Avoid landing at airports with anticipated turbulence or crosswind. Perform a long final approach.

Approach and landing configuration:

Landing Gear .... DOWN
Flaps .... 22°
Airspeed .... $V_{REF\ 45}$ + 30 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.85.

FLAP SYSTEM FAILURE

EICAS CAUTION: FLAP FAIL

Flaps may be at intermediate positions. Maintain airspeed according to the following:

FLAPS POSITION	MAXIMUM AIRSPEED
1° to 9°	250 KIAS
10° to 22°	200 KIAS
23° to 45°	145 KIAS

When landing maintain airspeed according to the following:

FLAPS POSITION	MINIMUM AIRSPEED
0 to 8°	$V_{REF\ 45}$ + 30 KIAS
9° to 21°	$V_{REF\ 45}$ + 10 KIAS
22° to 44°	$V_{REF\ 45}$ + 5 KIAS
45°	$V_{REF\ 45}$

CAUTION:
- TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.65 WHEN LANDING WITH FLAPS BETWEEN ZERO AND 8°.
- TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.40 WHEN LANDING WITH FLAPS BETWEEN 9° AND 21°.
- TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.40 WHEN LANDING WITH FLAPS BETWEEN 22° AND 44°.

NOTE:
- Depending on the flap position, EGPWS/GPWS warnings may sound. If necessary, inhibit EGPWS/GPWS by pulling its circuit breaker (J7 or J8).
- If flap indication on EICAS is not available, use flap position marks on the wing.

SPEED BRAKE LEVER DISAGREE

EICAS CAUTION: SPBK LVR DISAGREE

Speed Brake Lever .... CLOSE

FLAP LOW ACTUATION SPEED

EICAS ADVISORY: FLAP LOW SPEED

Anticipate flap actuation.

GUST LOCK FAILURE

Light: GUST LOCK (amber)

On ground:

Do not takeoff.

In flight:

Do not push control column full Nose Down.
Avoid flying in turbulence conditions.
Consider diversion.
Avoid landing at airports with anticipated turbulence or crosswind.

PITCH TRIM SWITCH INOPERATIVE

EICAS CAUTION: PTRIM CPT SW FAIL, PTRIM F/O SW FAIL, PTRIM BKP SW FAIL

On ground:

Deenergize the airplane and energize it again.

In flight:

Use another serviceable switch.

AIR CONDITIONING, PNEUMATICS AND PRESSURIZATION

BLEED LOW TEMPERATURE

EICAS CAUTION: BLD 1 (2) LOW TEMP

If temperature indication on MFD (ECS and Pneumatic Page) is in the green range or the pointer is out of view, disregard the message. Monitor the bleed temperature.
If the pointer on MFD indicates low temperature (white range):
Associated Thrust Lever .... ADVANCE
Adjust associated Thrust Lever until the message disappears or until the pointer of the failed side reaches the green range or the remaining pointer.
If the message persists or if the MFD is not available:
Associated Bleed .... CLOSE
Altitude .... MAX 25000 ft
MINIMUM MEA

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

If the message persists, avoid or exit icing conditions.

NOTE: Ice Detection Override Knob must be set to ALL at least 2 minutes after exiting icing conditions or after ICE CONDITION advisory message has disappeared.

HIGH STAGE VALVE FAILURE

EICAS CAUTION: HS VLV 1 (2) FAIL

Monitor bleed temperature.
If the bleed temperature is too high:
BLEED OVERTEMPERATURE
Procedure .... AS REQUIRED
If the bleed temperature is too low:

BLEED LOW TEMPERATURE
Procedure .... AS REQUIRED

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

BLEED VALVE FAILURE

EICAS CAUTION: BLD VLV 1 (2) FAIL

If BLD 2 VLV CLSD message is also displayed on the EICAS:
- Crossbleed .... OPEN
- Altitude .... MAX 25000 ft MINIMUM MEA

If BLD 1 VLV CLSD message is also displayed on the EICAS:
- If APU is not serviceable:
  - Crossbleed .... OPEN
  - Altitude .... MAX 25000 ft MINIMUM MEA
- If APU is serviceable:
  - Crossbleed .... CLOSE
  - APU .... START
  - APU Bleed .... OPEN

<u>WARNING:</u> IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

If BLD 1(2) VLV CLSD message is not displayed on the EICAS:
- Monitor the system for the remainder of the flight.

BLEED VALVE CLOSED

EICAS ADVISORY: BLD 1 (2) VLV CLSD

If required and situation permits:
- Associated Pack .... OFF THEN ON
- Associated Bleed .... OPEN

If it is not possible to open bleed valve:
- BLEED VALVE FAILURE Procedure .... ACCOMPLISH

APU BLEED VALVE FAIL

EICAS CAUTION: APU BLD VLV FAIL

If valve failed closed:
- Engine Bleed .... AS REQUIRED

If valve failed open and a duct leak exists (OPEN annunciation in the APU Bleed Button and BLD APU LEAK message displayed):
- APU .... SHUTDOWN

CROSSBLEED FAILURE

EICAS CAUTION: CROSS BLD FAIL

If the valve has failed open, associated to a duct leakage or engine overtemperature:

Both Engine Bleeds .... CLOSE
APU Bleed .... CLOSE
Altitude .... MEA OR 10000 ft, WHICHEVER IS HIGHER
Icing Conditions .... EXIT/AVOID

CROSSBLEED SELECTED OFF

EICAS CAUTION: CROSS BLD SW OFF

Crossbleed Knob .... AUTO

RAM AIR VALVE FAILURE

EICAS CAUTION: RAM AIR VLV FAIL

Air Conditioning System .... MONITOR

If the PACK 1 (2) OVLD or PACK 1 (2) OVHT caution message appears:

Associated Pack .... OFF
Altitude.. MAX 25000 ft
MINIMUM MEA

If both packs have been shutoff:

Altitude.. MEA OR
10000 ft,
WHICHEVER
IS HIGHER
Pressurization Mode Selector.................................. MAN
Pressurization Manual Controller .... AS REQUIRED
If necessary:
Pressurization Manual Controller .... FULL UP
At least one bleed source, engines or APU, must be kept open.

PACK OVERLOAD

EICAS CAUTION: PACK 1 (2) OVLD

Associated Temperature & Mode Selector................... AUTO/
12 O'CLOCK
Associated Pack .... OFF
Wait 3 minutes.
Associated Pack .... ON
If message remains on:
Associated Temperature & Mode Selector.............. MANUAL/
12 O'CLOCK
Associated Pack .... OFF
Wait 3 minutes.
Associated Pack .... ON
If the message still remains on:
Associated Pack .... OFF
Altitude.. MAX 25000 ft
MINIMUM MEA
Associated Engine Bleed.. OPEN

CONTINUES ON NEXT PAGE

CONTINUED FROM PREVIOUS PAGE

If both packs have been shutoff:

Altitude .... MEA OR 10000 ft, WHICHEVER IS HIGHER
Pressurization Mode Selector .... MAN
Pressurization Manual Controller .... AS REQUIRED
If required:
Pressurization Manual Controller .... FULL UP

NOTE: At least one bleed source, engines or APU, must be kept open.

PACK OVERHEAT

EICAS CAUTION: PACK 1 (2) OVHT

Associated Temperature & Mode Selector .... AUTO/FULL COLD
Associated Pack .... OFF
Wait 3 minutes.
Associated Pack .... ON
If message remains:
Associated Temperature & Mode Selector .... MANUAL/ FULL COLD
Associated Pack .... OFF
Wait 3 minutes.
Associated Pack .... ON
If the message still remains:
Associated Pack .... OFF
Altitude .... MAX 25000 ft MINIMUM MEA

If both packs have been shutoff:

Altitude .... MEA OR 10000 ft, WHICHEVER IS HIGHER
Pressurization Mode Selector .... MAN
Pressurization Manual Controller .... AS REQUIRED
If required:
Pressurization Manual Controller .... FULL UP

NOTE: At least one bleed source, engines or APU, must be kept open.

PACK VALVE FAILURE

EICAS CAUTION: PACK 1 (2) VLV FAIL

If valve failed closed (pack valve closed advisory message is on):

Altitude .... MAX 25000 ft MINIMUM MEA

If valve failed open and it is necessary to turn off associated air conditioning system:

Crossbleed .... CLOSE
Associated Bleed .... CLOSE
APU Bleed (if left pack failed) .... CLOSE
Altitude .... MAX 25000 ft MINIMUM MEA

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

If both packs have been shutoff:

Altitude .... MEA OR 10000 ft, WHICHEVER IS HIGHER
Pressurization Mode Selector .... MAN
Pressurization Manual Controller .... AS REQUIRED
If required:
Pressurization Manual Controller .... FULL UP

NOTE: At least one bleed source, engines or APU, must be kept open.

PACK VALVE CLOSED

EICAS ADVISORY: PACK 1 (2) VLV CLSD

If required and situation permitting:

Associated Pack .... OFF, THEN ON

If it is not possible to open pack valve:

Altitude .... MAX 25000 ft MINIMUM MEA

If both packs are closed:

Altitude .... MEA OR 10000 ft WICHEVER IS HIGHER

PRESSURIZATION AUTOMATIC SYSTEM FAILURE/ CABIN DEPRESSURIZATION

EICAS CAUTION: PRESN AUTO FAIL (may be presented)

Pressurization Manual Controller .... 11 O'CLOCK POSITION
Pressurization Mode Selector .... MAN
Pressurization Manual Controller .... AS REQUIRED
If unsuccessful:
  Altitude .... MEA OR 10000 ft, WHICHEVER IS HIGHER
  Pressurization Manual Controller .... FULL DOWN
  Pressurization Mode Selector .... AUTO
  Pressurization Dump Button .... PRESS

ELECTRONIC BAY OVERTEMPERATURE

EICAS CAUTION: ELEKBAY OVTEMP

Turn off the redundant system and equipment unessential for the present phase of flight.
The following equipment is installed in the forward electronic compartment:

- ADC
- Transponder Mode S
- Integrated Communication Unit
- Aural Warning Computer
- FMS
- AHRS
- Passenger Address
- Integrated Navigation Unit
- Inverters
- Dimmers
- Backup Battery

If the message remains, maintain a cross-check between main and standby instruments. In case a disagreement arises, assume the main instruments indication is unreliable and land at the nearest suitable airport.

LOSS OF PRESSURIZATION INDICATION

Use the remaining indications to maintain cabin altitude below 10000 ft, according to the table below:

AIRPLANE ALTITUDE (ft)	CABIN ALTITUDE (ft)	DIFFERENTIAL PRESSURE (psi)
10000	300	4.4
11000	500	4.7
12000	700	5.0
13000	900	5.2
14000	1100	5.5
15000	1300	5.7
16000	1500	5.9
17000	1700	6.1
18000	1900	6.3
19000	2200	6.5
20000	2400	6.7
21000	2700	6.8
22000	2900	7.0
23000	3200	7.1
24000	3400	7.2
25000	3800	7.3
26000	4100	7.4
27000	4400	7.5
28000	4700	7.6
29000	5000	7.6
30000	5400	7.7
31000	5700	7.7
32000	6100	7.7
33000	6500	7.7
34000	6800	7.8
35000	7200	7.8
36000	7600	7.8
37000	8000	7.8

ICE PROTECTION SYSTEM

WING ANTI-ICING FAILURE

EICAS WARNING: ICE COND-A/I INOP
EICAS CAUTION: WG 1 (2) A/ICE FAIL or WG A/ICE FAIL

Ice Detection Override Knob.. ALL
Thrust Levers .... ADVANCE
If failure persists:
    Wing Anti-Icing Button .... CYCLE
If failure persists:
    Wing Anti-Icing Button .... OFF
    Avoid or exit icing conditions.
    After exiting icing conditions:
        Ice Detection Override Knob .... AUTO

Maximum Bank Angle .... 30°
Minimum Airspeed for
    Flaps up or 9°.. 190 KIAS

If in icing conditions or if there is any uncertainty as to whether the wing surfaces are clear of ice prior to approach and landing, proceed:
    Landing configuration:
        Flaps .... 22°
        Airspeed... $V_{REF\ 45}$ + 30 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.85.

STABILIZER ANTI-ICING FAILURE

EICAS WARNING: ICE COND-A/I INOP
EICAS CAUTION: STAB A/ICE FAIL

Ice Detection Override Knob .... ALL
Thrust Levers... ADVANCE
If failure persists:

Stabilizer Anti-Icing Button .... CYCLE
If failure persists:

Stabilizer Anti-Icing Button .... OFF
Avoid or exit icing conditions.

After exiting icing conditions:

Ice Detection Override Knob .... AUTO

Maximum Bank Angle... 30°
Minimum Airspeed for
Flaps up or 9° .... 190 KIAS

Landing configuration:

Flaps.. 22°
Airspeed... $V_{REF\ 45}$ + 15 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.55.

If associated with Wing Anti-Icing System failure and if in icing conditions or if there is any uncertainty as to whether the wing surfaces are clear of ice prior to approach and landing, proceed:

Landing configuration:
Flaps.. 22°
Airspeed .... $V_{REF\ 45}$ + 30 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.85.

ENGINE ANTI-ICING FAILURE

EICAS WARNING: ICE COND-A/I INOP
EICAS CAUTION: E1 (2) A/ICE FAIL

Thrust Levers .... ADVANCE
If the message persists:
    Ice Detection Override Knob.................................... ALL
    If the message still persists:
        Engine Air Inlet Anti-Icing Button......................... CYCLE
        If the message still persists:
            Icing Conditions .... AVOID/EXIT
            Two minutes after exiting icing conditions:
                Ice Detection Override Knob .... AUTO

NOTE: Ice Detection Override Knob must be set to ALL for at least 2 minutes either after exiting icing conditions or after ICE CONDITION advisory message has disappeared. In such condition caution message NO ICE-A/I ON may be presented and must be disregarded.

Engine Vibration... MONITOR
    If vibration increases, advance thrust levers, one at a time, to obtain 60% N1 minimum for 5 seconds, and then return to the former setting.
    If vibration increases to unacceptable values or engine parameters indicate abnormal values, exit icing conditions.

ANTI-ICING LOW CAPACITY

EICAS WARNING: ICE COND-A/I INOP
EICAS CAUTION: A/ICE LOW CAPACIT

Thrust Lever .... ADVANCE
    Advance Thrust Lever at least 55% N1 and wait for 5 seconds.
If the message still persists and the Wing and/or Stabilizer Anti-Icing System message is presented, then:
    Associated Wing and/or Stabilizer
        Anti-Icing Procedure .... ACCOMPLISH

ENGINE ANTI-ICING OVERPRESSURE

EICAS ADVISORY: ENG A/ICEOVERPRES

Crew awareness.

SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS

Crossbleed.. OPEN
Altitude.. MEA OR BELOW 15000 ft, WHICHEVER IS HIGHER

Above 15000 ft:

Anti-icing system performance decreases.
If it is not possible to descend below 15000 ft, failure messages may be presented. In this case, exit icing conditions and refer to the appropriate approach and landing procedure.

Below 15000 ft:

If an anti-icing system failure message is presented, refer to the associated anti-icing system failure procedure.

ANTI-ICING ON WITHOUT ICING CONDITIONS

EICAS CAUTION: NO ICE-A/ICE ON

Ice Detection Override Knob..AUTO
If the message persists, check the overhead panel and turn off all unnecessary anti-icing system.
If the message persists and is associated with Wing or Stabilizer Anti-Icing System:
- Altitude..MAX 25000 ft MINIMUM MEA
- APU...START
- APU Bleed...OPEN
- Crossbleed...OPEN
- Engine Bleeds..CLOSE

ANTI-ICING SWITCH OFF

EICAS CAUTION: A/ICE SW OFF

Turn on all anti-icing system buttons.

ICE DETECTOR FAIL

EICAS CAUTION: ICE DET 1 (2) FAIL or ICE DETECTORS FAIL

Use visual cues (ice accretion on windshield and windshield wipers) and temperature criteria to determine whether icing conditions exist.

When flying in icing conditions:
- Ice Detection Override Knob...................................ALL

After positively exiting icing conditions:
- Ice Detection Override Knob...................................AUTO

NOTE: - Icing conditions may exist in-flight when Total Air Temperature (TAT) is 10°C or below and visible moisture in any form is present (such as clouds, fog with visibility of one mile or less, rain, snow, sleet, and ice crystals).
- Ice Detection Override Knob must be kept at ALL for at least 2 minutes after exiting icing conditions or after ICE CONDITION advisory message has disappeared. In such condition, caution message NO ICE-A/ICE ON may be presented, and must be disregarded.

WINDSHIELD HEATING FAILURE

EICAS CAUTION: W/S 1 (2) HEAT FAIL

Associated Windshield Heating .... OFF

PITOT SENSORS HEATING FAILURE

EICAS CAUTION: PITOT 1 (2, 3) INOP

Information on the instruments supplied by the affected system may be unreliable. Cross-check and do not use the affected system if a disagreement is found.
If the Pitot 3 is the affected one, standby instruments and pressurization system may be affected.
If necessary:
ADC Button (Reversionary Panel)........................... PRESS

AOA SENSOR HEATING FAILURE

EICAS CAUTION: AOA 1 (2) HEAT INOP

Maintain airspeed according to the following:

FLAPS POSITION	MINIMUM AIRSPEED
UP	$V_{REF\ 45}$ + 25 KIAS
9°	$V_{REF\ 45}$ + 5 KIAS
18°	$V_{REF\ 45}$ + 5 KIAS
22°	$V_{REF\ 22}$
45°	$V_{REF\ 45}$

TAT SENSORS HEATING FAILURE

EICAS CAUTION: TAT HEAT INOP

TAS and SAT indication may be unreliable.

OXYGEN

CREW/PASSENGER OXYGEN LOW PRESSURE

EICAS CAUTION: OXYGEN LO PRESS or
CREW (PAX) OXY LOW PRESS

Altitude .... MEA OR 10000 ft, WHICHEVER IS HIGHER

NAVIGATION

FLIGHT DATA RECORDER FAILURE

EICAS CAUTION: DFDR FAIL

Crew awareness.

FDAU FAIL

EICAS ADVISORY: FDAU FAIL

Crew awareness.

AHRS OVERHEAT

EICAS CAUTION: AHRS 1 (2) OVERHEAT

AHRS data is valid for 30 minutes after failure. Use standby indicators for reference.

AHRS ALIGNMENT FAULT

EICAS CAUTION: AHRS 1 (2) ALN FAULT

Check and reenter present position. If necessary, reenter present position once again.

AHRS FAIL

EICAS CAUTION: AHRS 1 (2) FAIL

Associated AHRS Reversionary Button .... PRESS

NOTE: The Autopilot is not available.

AHRS ALIGNMENT

EICAS ADVISORY: AHRS 1 (2) ALN

This message is normally presented during alignment phase. No action is required.

AHRS EXCESSIVE MOTION

EICAS ADVISORY: AHRS 1 (2) EXC MOTION

Make sure the airplane is completely stationary.

The AHRS will restart a full alignment 30 seconds after the motion is stopped.

AHRS BASIC MODE

EICAS ADVISORY: AHRS 1 (2) BASIC MODE

Affected AHRS is reverted to the basic mode due to the TAS signal lost.

AHRS ATTITUDE MODE

EICAS ADVISORY: AHRS 1 (2) ATT MODE

Associated AHRS Reversionary Button........................ PRESS
If cross-side AHRS is not available:

Maintain wings level and constant airspeed until AHRS 1 (2) ALN message is no longer displayed and attitude is recovered (approximately 20 seconds).

CAUTION:
- ATTITUDE OUTPUTS ARE NOT AS ACCURATE AS IN THE NORMAL OPERATIONAL MODE.
- AHRS MAGNETIC HEADING IS NOT AVAILABLE.

NOTE: The Autopilot is not available while AHRS 1 (2) ALN is being displayed.

AHRS ON BATTERY

EICAS ADVISORY: AHRS 1 (2) ON BATT

Associated AHRS will operate for 40 minutes.

AHRS NO MAGNETIC HEADING

EICAS ADVISORY: AHRS 1 (2) NO MAG HDG

Enter Magnetic Heading.

AHRS NO PRESENT POSITION

EICAS ADVISORY: AHRS 1 (2) NO PPOS

Enter Present Position.

IC OVERHEAT

EICAS CAUTION: IC 1(2) OVERHEAT

If there is smoke associated to IC 1 OVERHEAT message:

IC 1 Circuit Breaker (C3) .... PULL
Backup Battery .... OFF
SG 1 Button .... PRESS

If there is smoke associated to IC 2 OVERHEAT message:

IC 2 Circuit Breaker (D31 or D32) .... PULL
SG 2 Button .... PRESS

IC FAILURE/IC BUS FAILURE

CONDITION: Associated Display Units blank and with a red X drawn over them.

EICAS CAUTION: IC BUS FAIL (may be presented)

If IC 1 failed (loss of PFD 1, MFD 1 and EICAS):

SG 1 Button .... PRESS

If IC 2 failed (loss of MFD 2 and PFD 2):

SG 2 Button .... PRESS

NOTE: In case of IC 1 failure, the PIT TRIM 1 (2) INOP message may not be available.

IC AIR/GROUND CONDITION SIGNAL INOPERATIVE

EICAS CAUTION: IC1 (2) WOW INOP

Do not take off.

IC'S CONFIGURATION MISMATCH

EICAS CAUTION: CHK IC CONFIG or
EICAS ADVISORY: CONFIG MISMATCH

Do not take off.

IC CONFIGURATION FAILURE

EICAS ADVISORY: IC1 (2) CONFIG FAIL

Crew awareness.

CHECK IC SOFTWARE

EICAS CAUTION: CHECK IC1 (2) SW

Do not takeoff.

DISPLAY FAILURE

EICAS CAUTION: CHECK PFD 1 (2) message is presented if PFD is the failed display.

If PFD failed:
  Associated MFD Selector Knob .... PFD
If EICAS failed:
  MFD Selector Knob (as required) .... EICAS
If all main panel displays failed:
  Exit or avoid icing conditions.
  RMU .... AS REQUIRED
    Use RMU to access power plant or navigation data.
  Land at the nearest suitable airport.

DAU FAILURE

EICAS CAUTION: DAU 1 (2) A FAIL or
EICAS ADVISORY: DAU 1 (2) (B) FAIL

For DAU 1 A FAIL caution message, proceed:

DAU 1 Reversion.. ON

NOTE: The following indications and messages will not be available:

- Indications: Engine 1 oil (temperature, pressure and level), Battery 1 temperature, fuel tank temperature, roll trim position, cabin temperature, Bleed 1 temperature.
- Messages: BLEED 1 OVTEMP, E1 FUEL LO TEMP, FUEL TANK LO TEMP.

For DAU 2 A FAIL caution message, proceed:

DAU 2 Reversion.. ON

NOTE: The following indications and messages will not be available:

- Indications: Engine 2 oil (temperature, pressure and level), Battery 2 temperature, Hydraulic quantity 1 and 2, yaw trim position, cockpit temperature, Bleed 2 temperature.
- Messages: BLEED 2 OVTEMP, E2 FUEL LO TEMP, HYD 1 LO QTY, HYD 2 LO QTY.

If both channels of DAU 1 have failed, the messages and indications associated with the following systems will not be available:

- All messages and indications: Oxygen, Steering, Pressurization, Landing Gear, Roll Trim, and the message EMERG LIGHT NOT ARMED.
- Some messages and indications: Doors, Stall Protection, Electrical, Fire Protection, Fuel, APU, Power Plant, Thrust Reverser, Flap, Spoiler, Brakes, Air Conditioning, Ice And Rain Protection, Hydraulic.

If both channels of DAU 2 have failed, the messages and indications associated with the following systems will not be available:

- All messages and indications: Smoke, Hydraulic, Rudder, Yaw Trim.
- Some messages and indications: Doors, Stall Protection, Electrical, Fire Protection, Fuel, APU, Power Plant, Thrust Reverser, Flap, Spoiler, Brakes, Air Conditioning, Ice And Rain Protection.

DAU MISCOMPARE

EICAS CAUTION: DAU 1-2 ENG MISCOMP or DAU 1-2 SYS MISCOMP or DAU 1-2 WRN MISCOMP

Associated DAU Reversion.. ON

NOTE: For each miscompare message and each side, check the following parameters before and after the reversion:
- Engine: N1, N2, ITT.
- System: Battery voltage and temperature, takeoff temperature, hydraulic pressure, oxygen pressure.
- Warning: all warning messages, if any.

DAU AIRPLANE ID MISCOMPARE

EICAS CAUTION: DAU AC ID MISCMP

Do not takeoff.

MESSAGE MISCOMPARISON

Pilot’s MFD Selector Knob .... EICAS
Copilot's MFD Selector Knob.. EICAS

Compare the messages displayed on the copilot's MFD with the messages presented on the pilot's MFD to check which is the discrepant message. Analyze the situation to check whether the discrepant message is spurious or not, and take appropriate corrective action.

CHECKLIST MISMATCH

EICAS ADVISORY: CHECKLIST MISMATCH

Do not use Checklist Display.

IC FAN FAILURE

EICAS ADVISORY: IC 1 (2) FAN FAIL

An overheat condition may arise in the associated IC. In this case, turn the IC off by pulling its respective circuit breaker (C3 or D31).

DISPLAY FAN FAILURE

EICAS ADVISORY: DU 1 (2, 3, 4, 5) FAN FAIL

An overheat condition may arise in the associated display. In this case, it will be shut down automatically. Use reversionary capabilities.

DAU REVERSION

EICAS ADVISORY: DAU 1 (2) REVERSION

If the reversionary condition is not required, press the associated DAU Reversionary Button to remove it.

CENTRAL MAINTENANCE COMPUTER FAILURE

EICAS ADVISORY: CMC FAIL

Crew awareness.

RADIO ALTIMETER FAIL

EICAS ADVISORY: RAD ALT 1 (2) FAIL or
RAD ALT FAIL

If one Radio altimeter is lost (RAD ALT 1 (2) FAIL is presented):

Automatic reversion... CONFIRM
Automatic reversion may be confirmed through the RA1 (2) amber annunciator presented on both PFDs. In this case the CAT II logic is assured.

If both Radio Altimeters are lost (RAD ALT FAIL is presented):

Do not perform CAT II approaches.
If already performing a CAT II approach procedure:
MISSED APPROACH Procedure....................... PERFORM
Perform a normal MISSED APPROACH Procedure, unless the approach is continued under visual conditions and the airplane position and attitude assure a safe landing.

NAV/FLIGHT INSTRUMENTS FAILURE

ANNUNCIATOR/ FAILURE	LOCATION	ACTION
ATT FAIL (red)	PFD	Use cross-side attitude by pressing the AHRS (IRS) button on associated reversionary panel or use standby attitude indicator.
"X" (red) over IAS tape	PFD	Use cross-side airspeed by pressing the ADC button on associated reversionary panel or use standby airspeed indicator.
"X" (red) over altitude tape	PFD	Use cross-side altitude by pressing the ADC button on associated reversionary panel or use standby altimeter.
"X" (red) over course scale	PFD	Select another sensor.
VS (red)	PFD	Use cross-side vertical speed by pressing the ADC button on associated reversionary panel.
ROL, PIT, ATT, IAS, or ALT (amber)	PFD	Compare data with Standby Indicator. For altitude compare the PFD altimeters setting also. If required, use cross-side data by pressing the appropriate button on associated reversionary panel.
RA (amber)	PFD	Compare both radio altimeter indications. If required, consider only the lower indication. Otherwise, disregard Radio Altitude.
RA1 (2) (amber)	PFD	Radio altimeter automatic reversion has occurred. No action is required.
PFD or EICAS Blank or "X"(red)	PFD	Use the MFD Knob to present the required information on MFD.
HDG FAIL (red)	PFD MFD	Use cross-side heading by pressing the AHRS (IRS) button on associated reversionary panel or use RMU or standby attitude indicator.
HDG (amber)	PFD MFD	Compare data with the Magnetic Compass. After identifying the failed side, use cross-side data by pressing the AHRS (IRS) button on associated reversionary panel.

NAV/FLIGHT INSTRUMENTS FAILURE (CONTINUED)

ANNUNCIATOR/ FAILURE	LOCATION	ACTION
MENU INOP (amber)	MFD	Crew awareness.
ATT: CAGE (amber)	ISIS	Press the CAGE push button in order to recover attitude indication. Caging the ISIS in flight will result in loss of attitude indication for up to 10 seconds and the amber message ATT 10s will be presented during this time. Until attitude indication is available again use the primary indication source.
ATT, ALT, SPD, M, HDG (red)		Use the primary indication source.

AUTOPILOT

AUTOPILOT TRIM FAILED

EICAS CAUTION: AUTO TRIM FAIL

Control Column .... HOLD FIRMLY
Quick Disconnect Button.. PRESS
Pitch Trim .... AS REQUIRED
Trim the airplane.
Autopilot .... AS REQUIRED

STABILIZER OUT OF TRIM

EICAS CAUTION: AP ELEV MISTRIM

Control Column .... HOLD FIRMLY
Quick Disconnect Button.. PRESS
Pitch Trim .... AS REQUIRED
Trim the airplane.
Autopilot .... AS REQUIRED

FD LATERAL MODE FAILURE

EICAS CAUTION: LATERAL MODE OFF

At crew discretion, re-select the affected Flight Director or select the other.

NOTE: For some EICAS versions this message will be presented if the crew turns the Flight Director off. In this case, the message must be disregarded.

FD VERTICAL MODE FAILURE

EICAS CAUTION: VERTICAL MODE OFF

At crew discretion, re-select the affected Flight Director or select the other.

NOTE: For some EICAS versions this message will be presented if the crew turns the Flight Director off. In this case, the message must be disregarded.

AILERON OUT OF TRIM

EICAS CAUTION: AP AIL MISTRIM

If the message is displayed more than 10 seconds, proceed:

Control Wheel .... HOLD FIRMLY
Quick Disconnect Button .... PRESS
Roll Trim .... AS REQUIRED
Return the airplane to an in-trim condition, by trimming in the direction as requested by the EICAS indication.
Autopilot... AS REQUIRED

YAW DAMPER FAILURE

EICAS CAUTION: YAW DAMPER FAIL

Yaw Damper .... DISENGAGE
Autopilot may be reengaged at pilot’s discretion. If after reengagement the failure persists, continue the flight with autopilot disengaged.

MISCELLANEOUS

IMPAIRED OR CRACKED WINDSHIELD

Associated Windshield Heating .... OFF
If only the outer layer (glass) is cracked, no action is required.
If not, proceed as follows:

Cockpit Door .... CLOSE
Altitude .... MEA OR BELOW 10000 ft, WHICHEVER IS HIGHER
Cabin ΔP = 1 psi .... SET

NOTE: Pressurization Manual Controller must be used to reach and maintain cabin altitude steady while descending.

Airspeed.. MAXIMUM 250 KIAS
Smoke Goggle .... DON

In case both windshields are impaired:

Cabin (below 10000 ft).. DEPRESSURIZE
Airspeed.. MAX 140 KIAS MINIMUM V_{REF}

Check no loose objects in the cockpit.
If necessary:

Direct Vision Window... REMOVE

Landing must be made by looking through Direct Vision Window.

NOTE: Intercommunication will be impossible with window removed.

OVERWEIGHT LANDING

Before touchdown:

Rate of Descent .... MAXIMUM 300 ft/min

Touch smoothly the runway surface. Reduce the engine thrust only after the touchdown.

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.10.

SECTION 4
NORMAL PROCEDURES

INTRODUCTION

The normal procedures contained in this manual have been developed and recommended by the manufacturer and approved by the certification authorities for use during the operation of the EMB-145.

Indented explanations (lines beginning further from the margin than the others) may follow a main item regarded as not being self-explanatory or lacking further details.

* Items marked with an asterisk are to be performed at least once a day, by flight crew or maintenance personnel, at operators discretion.

EXTERNAL SAFETY INSPECTION

Wheel Chocks .... IN PLACE

NOSE SECTION

Access Doors and Panels... SECURED
Static Ports Cover .... REMOVED
Sensors, Pitot Tubes and Static Ports .... CONDITION, NO OBSTRUCTION
Windshield Wiper... CONDITION
Air Inlets .... NO OBSTRUCTION
Radome .... SECURED
Nose Gear .... CHECK
  Wheels and Tires.. CONDITION
  Gear Struts/Wheelwell/Doors .... CONDITION, NO LEAKS
  Ground Locking Pin .... REMOVED
  Gear Lockup Hook... UNLOCKED
  Static Discharger .... CONDITION
  Landing and Taxi Lights.. CONDITION
Hydraulic Compartment (right side) .... NO LEAKS
Oxygen Disc and Recharging
  Panel (right side).. CHECK
    Check oxygen overpressure green disc in place.

FUSELAGE

Access Doors and Panels... SECURED
Fueling Compartment Door (right side) .... SECURED
Inspection Lights .... CONDITION
Air Inlets and Outlets... NO OBSTRUCTION
Red Beacon .... CONDITION
Antennas.. CONDITION
Ram Air Inlet .... NO OBSTRUCTION
Fluid Drain Holes .... NO LEAKS

WINGS

Landing Lights	CONDITION
Emergency Lights	CONDITION
Wing Leading Edge	CONDITION
Access Doors and Panels	SECURED
Direct Measuring Sticks	PUSHED IN
Air Inlets, Outlets and Vents	NO OBSTRUCTION
Vortilons and Vortex Generators	NUMBER AND CONDITION
Marking, Navigation and Strobe Lights	CONDITION
Static Dischargers	NUMBER AND CONDITION
Flight Control Surfaces and Fairings	CONDITION
Main Gear	CHECK
Wheels and Tires	CONDITION
Gear Struts/Wheelwell	CONDITION, NO LEAKS
Ground Locking Pin	REMOVED
Brake Wear Indicator	CHECK
Gear Lockup Hook	UNLOCKED

TAIL CONE SECTION

Air Inlets and Outlets.. NO OBSTRUCTION
Antennas.. CONDITION
Access Doors and Panels.. SECURED
Pylons .... CONDITION
Engines.. CHECK

Check engines for leaks and obstructions in the air inlets.

Thrust Reverser Doors .... FLUSH WITH NACELLE
Horizontal Stabilizer .... CONDITION
Flight Control Surfaces .... CONDITION
Static Dischargers... NUMBER AND CONDITION
APU... CONDITION
Pressurization Static Ports... NO OBSTRUCTION

INTERNAL SAFETY INSPECTION

COCKPIT

Airplane Manuals and Documents .... ON BOARD
Cockpit Emergency Equipment.................................... CHECK
Protective Breathing Equipment................................... CHECK
Gear Pins, Covers and Chocks.................................... ON BOARD
Reinforced Cockpit Door Vent Louver (if applicable) .... OPEN
GPU or APU .... AS REQUIRED
Batteries .... CHECK/AS REQUIRED
* Batteries Voltage .... CHECK

If battery voltage is below 24.0 V, report to the maintenance personnel or try to recharge the affected battery by using the APU Generator for at least 30 minutes.

Internal and External Lights .... AS REQUIRED

For daylight operation, Overhead Panel Lighting Control Knob must be off.

Overhead, Main and Control Pedestal
Panels .... CHECK

Check all controls in their normal position. All buttons (except GPU, if applicable) must not be illuminated. Button guards must be stowed.

Fuel Quantity and Fuel Used.. CHECK AND SET
Fire Extinguishing Handles .... PUSHED IN
APU Fire Extinguishing Button...................................... GUARDED, NOT ILLUMINATED
Baggage Fire Extinguishing Button (if installed) .... GUARDED, NOT ILLUMINATED
Crew/Pax Oxygen Pressure.. CHECK

Check MFD ECS page for flight crew minimum pressure, 1500 psi for three occupants or 1100 psi for two occupants. If applicable, check passenger system minimum pressure, 1150 psi.

Crew Oxygen Masks and Goggles................................ CHECK
Passenger Oxygen Selector Knob .... AUTO

Landing Gear Lever .... DOWN
Aileron and Elevator Disconnect
Handles.. PUSHED IN
Gust Lock.. AS REQUIRED
Speed Brake Lever .... CLOSE
Thrust Levers.. IDLE
Emergency/Parking Brake Handle................................ PULL
Radar .... OFF
Flap Selector Lever.. ZERO
Landing Gear Electrical Override
Switch .... NORMAL AND LOCKED
Free Fall Lever.. FULL DOWN
Free Fall Compartment.. CLOSED

PASSENGER CABIN

Cabin Emergency Equipment .... CHECK
Protective Breathing Equipment
Indicator .... GREEN
Service Door Locking Pin (if applicable) .... REMOVED
Emergency Exits... CLOSED AND LATCHED
Emergency Exit Locking Pin (if applicable)................... REMOVED
Photoluminescent Emergency Lights (if applicable) .... CHARGED
Make sure the system was properly charged according to the table below:

Charge	Bin door position	Charge duration (minutes)	Operational duration (when lights are extinguished)
Initial	Closed	15	4.75 hours
		30	6.5 hours
Subsequent	Closed	15	6.75 hours
		30	9 hours
	Open	30	5 hours

Overwing Fueling Caps... SECURED
Passenger Seats and Belts .... CONDITION
Galley and Toilet .... CONDITION
Curtains.. STOWED

APU START

Internal Safety Inspection... PERFORM
Batteries .... AUTO
Backup Battery.. ON
Avionics Masters .... OFF
One Fuel Pump .... ON
Crossfeed... ON, IF USING A LEFT FUEL PUMP
* Fire Detection System .... TEST
APU Master.. ON, WAIT 3 SECONDS, START, THEN ON
Monitor APU EGT and RPM increasing within limits.
APU Generator.. AS REQUIRED
APU Bleed.. AS REQUIRED

APU SHUTDOWN

APU Stop Button .... PRESS
Monitor APU EGT decreasing and RPM reaching zero.
Fuel Pumps .... AS REQUIRED
APU Master Knob .... OFF

BEFORE START

Internal and External
    Safety Inspections .... COMPLETE
Batteries... AUTO
Seat, Pedals and Seat Belts .... ADJUST
Cockpit Voice Recorder .... TEST
Bus Ties .... AUTO
Shed Buses... AS REQUIRED
AC Power .... ON
Backup Battery... ON
Avionics Masters.. ON
Emergency Lights .... ARM
Ventral Tank Transfer Knob (if applicable) .... AUTO
∗ Fire Detection System.. TEST
Ignition .... AUTO
Takeoff Data .... SET
Start/Stop Selector.. STOP
Aileron.. ON
Rudder .... ON
Engine Hydraulic Pumps Shutoff .... BUTTONS GUARDED AND NOT PRESSED
∗ Electric Hydraulic Pumps .... TEST
    One Electric Hydraulic Pump.................................. ON/THEN AUTO
    Hydraulic Pressure Indication on MFD .... CHECK
    Check hydraulic pressure within 2900 ± 200 psi.
    Repeat procedure for the remaining pump.
Electric Hydraulic Pumps .... OFF
No Smoking and Fasten Belts .... ON
Sensors Heating .... ON
Recirculation Fans .... AS REQUIRED
Gasper Fan... AS REQUIRED
Crossbleed... OPEN
If APU is running and APU Bleed is open:
    Air Conditioning Packs... OPEN
    Temperature and Mode Control .... AS REQUIRED
Flight Guidance Controller .... AS REQUIRED
Autopilot Disconnection .... CHECK
    Autopilot Engage Button .... PRESS
    Quick Disconnect Button .... PRESS
    Check that autopilot has disengaged.

Display Control Panel..AS REQUIRED
AHRS Mode..SLVD
Clocks..SET
Reversionary Panel..CHECK NORMAL
Digital Audio Panel..SET
Primary Flight Display..SET
V_1, V_R and V_2 on Multi-Function Display..SET
Standby Instruments..SET
ELT..ARM
EICAS..CHECK
Radio Management Units..SET
EICAS Reversionary Panel..NORMAL
Tuning Backup Control Head..SET
Weather Radar..SET
Pitch Trim Cutout Buttons..GUARDED AND NOT ILLUMINATED
HF (if installed)..SET
Trims..CKD/SET

Actuate the pilot and copilot's Pitch Trim Switches and the backup pitch trim switch nose up and then nose down, and check correct indication on the EICAS. Hold trim input to verify that the trim motion stops after approximately 3 seconds. Set the pitch trim to the units required for takeoff. Set the roll and yaw trims to zero.

PITCH TRIM UNITS	8	7	6	5	4
CG POSITION (%)	LESS THAN 25	30	35	40	43

Pressurization..SET
Manual Controller..FULL DOWN
Stall Protection System..TEST

NOTE: - Before testing the SPS, wait 40 seconds for power-up BIT to finish.
- TEST button must be released at the first stick shaker actuation signal.

SPS Cutout Buttons..GUARDED AND NOT ILLUMINATED

CLEARED TO START

Doors and Windows .... CLOSE
Red Beacon .... ON
External Lights .... AS REQUIRED
Air Conditioning and
Pneumatic System .... AS REQUIRED

ENGINE START

One Fuel Pump .... ON
Crossfeed .... AS REQUIRED

NOTE: Alternate fuel pumps on each engine starting.

Associated Start/Stop Selector .... START, THEN RUN
Engine Parameters .... MONITOR
Observe limits. Abort start immediately if an Abnormal Engine Start is detected.

NOTE: Light-ups at 28% N2 will be achieved with systems meeting minimum performance requirements. If light-ups are occurring below 28%, the airplane should be scheduled for maintenance to avoid disruptions to passenger service.

Repeat the procedure for the other engine.
If any starting limit is exceeded prior to aborting a start, do not attempt further starts and report to the maintenance personnel.

AFTER START

FADEC Control Knobs .... RESET, THEN ALTN
GPU Button .... OFF
GPU .... DISCONNECT

Disconnect the GPU only after releasing the GPU Button. If not, spurious EICAS messages may be presented.

APU .... IF REQUIRED
Takeoff Data .... CHECK

Check both takeoff data on MFD and takeoff mode on EICAS being presented in cyan.

Electric Hydraulic Pumps .... AUTO
Windshield Heating .... IF REQUIRED
Ice Protection .... IF REQUIRED

CAUTION: ICE DETECTION OVERRIDE KNOB MUST NOT BE SET TO ALL POSITION ON GROUND, EXCEPT DURING TEST.

WARNING: IF ICING CONDITIONS EXIST OR ARE FORECAST, REFER TO OPERATION IN ICING CONDITIONS PROCEDURE.

Air Conditioning and Pneumatic System .... SET
Transponder .... AS REQUIRED

Select the transponder mode in accordance with local requirements.

Flaps .... TAKEOFF SETTING
Flight Controls .... CHECK

NOTE: Rudder must be checked through full travel in both directions. For each direction, check that the EICAS message RUD SYS 1-2 INOP is not presented when pedal is at the stop.

TAXI

Ground Equipment .... CLEARED
Wheel Chocks .... REMOVED
Taxi Lights .... ON
Steering .... CHECK
Takeoff Configuration .... CHECK

BEFORE TAKEOFF

Takeoff Briefing.. PERFORM
PC Power System (if installed) .... OFF
Crossfeed .... OFF
Go Around Button .... PRESS
Thrust Rating .... CHECK
Brakes Temperature... CHECK AT GREEN RANGE

CAUTION: TAKEOFF MUST NOT BE PERFORMED IF BRAKES TEMPERATURE ARE NOT IN THE GREEN RANGE.

CLEARED INTO POSITION

Gust Lock... UNLOCK
Landing Lights.. AS REQUIRED
Strobe Lights.. ON
Transponder .... ON

TAKEOFF

Thrust Levers .... THRUST SET

If an Alternate Takeoff Mode has been selected, check green ATTCS indication presented on EICAS.

NOTE: - If the runway is considered to be limiting, a static takeoff must be accomplished. In this case, release brakes after engine has reached the target N1.

- For rolling takeoffs, performance data is valid from the point where takeoff thrust is achieved.
- During takeoff run, pedals should be used to steer the airplane.

Engine Parameters .... MONITOR

At V_R, rotate the airplane to 14°.

With positive rate of climb:

Landing Gear .... UP

Minimum Airspeed .... V_2

If maneuvering is required, maintain a minimum airspeed of V_2 + 10 KIAS with a maximum bank of 25°.

At level off height:

Airspeed .... V_2 + 15 KIAS

Flaps .... UP

AFTER TAKEOFF

Pitch Trim .... AS REQUIRED

Keep the airplane trimmed to avoid excessive loads on the Horizontal Stabilizer Actuator (HSA). The airplane should be trimmed before 160 KIAS.

Air Conditioning and
Pneumatic System .... AS REQUIRED
APU .... AS REQUIRED
Internal and External Lights .... AS REQUIRED
Windshield Heating .... AS REQUIRED
Autopilot/Flight Director .... AS REQUIRED
Altimeter and Standby Altimeter .... SET AND X CHECK
Thrust Rating .... CLB

CLIMB

Fasten Belts .... AS REQUIRED
At or above 10000 ft:
PC Power System (if installed) .... ON

CRUISE

Thrust Rating .... CRZ
Radar .... AS REQUIRED

DESCENT

Fasten Belts .... ON
Windshield Heating .... ON
Flight Instruments, Navigation
and Radios .... SET AND X CHECK
Speed Brake .... AS REQUIRED
Pressurization .... CHECK
Below 10000 ft:
PC Power System (if installed) .... OFF
Curtains .... STOWED

APPROACH

For airplanes Post-Mod. SB 145-27-0032 or S/N 145.001 through 145.003, 145.034 and on, if necessary to increase rate of descent:
Flaps .... 9°
Speed Brake .... OPEN
Crossfeed .... OFF
APU .... AS REQUIRED
Air Conditioning and
Pneumatic System .... SET
Internal and External Lights .... AS REQUIRED
No Smoking .... ON
Altimeter .... SET AND X CHECK
AP Speed on Multi Function Display .... SET V_{REF}
Thrust Rating .... T/O

NOTE: The VAPP mode should be selected only on final approach segment, below 2500 ft AGL. Therefore, the outbound segment should be flown using any other mode.

BEFORE LANDING

Speed Brake .... CLOSE
Landing Lights .... AS REQUIRED
Autopilot .... AS REQUIRED
SPD Button (Flight Guidance Controller) .... SET APPROACH CLIMB SPEED
Yaw Damper .... OFF
Landing Gear .... DOWN AND CHECK
Flaps .... LANDING SETTING

GO-AROUND

Go Around Button .... PRESS
Thrust Levers .... MAX
Rotate or verify that autopilot rotates the airplane to 10° nose up.
Flaps .... 9°
With positive rate of climb:
    Landing Gear .... UP
    Minimum Airspeed .... APPROACH CLIMB SPEED

At the level off height, proceed as in a normal takeoff.

NOTE: - For coupled Go-Around the altitude loss may be 75 ft.
- During the GO-AROUND procedure, the DON'T SINK aural warning may sound. In this case monitor the sink rate and follow the GO-AROUND guidance.

LANDING

Airspeed .... $V_{REF\ XX}$
Thrust Levers .... IDLE OR REVERSE
If reverse has been used, select IDLE at 50 KIAS.
Brakes .... AS REQUIRED

NOTE: During landing run, pedals should be used to steer the airplane.

AFTER LANDING

Internal and External Lights .... AS REQUIRED
APU .... AS REQUIRED
Windshield Heating .... AS REQUIRED
    Turn windshield heating OFF if not required to defog or deice the windshield.
Air Conditioning and
    Pneumatic System .... AS REQUIRED
Transponder .... AS REQUIRED
    Select the transponder to STBY or in accordance with local requirements.
Flaps .... UP
Radar .... STBY
Pressurization .... CHECK

ENGINE SHUTDOWN

Emergency/Parking Brake .... APPLY
Thrust Levers .... IDLE
Overhead, Main and Control
Pedestal Panels .... AS REQUIRED
Electrical Power .... SET
Internal and External Lights .... AS REQUIRED
Fuel Pumps .... AS REQUIRED
APU .... AS REQUIRED
Electric Hydraulic Pumps .... OFF
Ice Protection System .... OFF
Air Conditioning and
Pneumatic System .... SET
Start/Stop Selector .... STOP

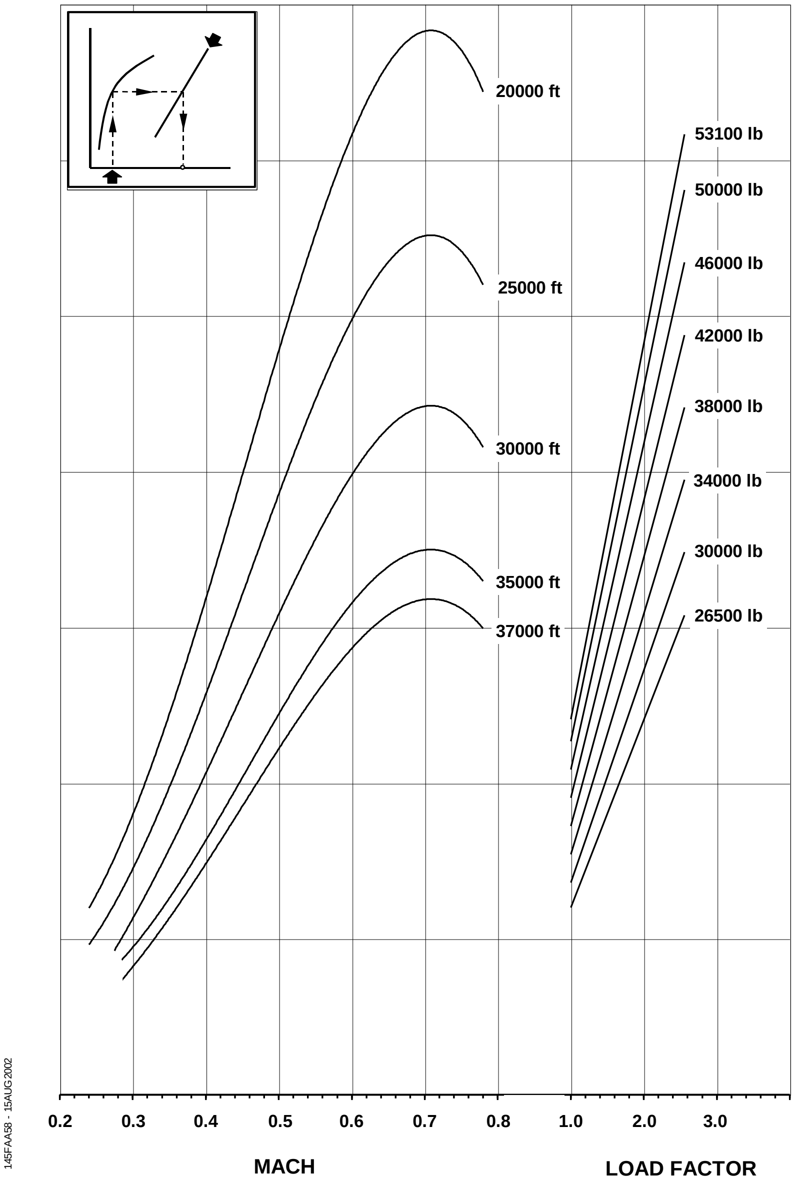
NOTE: Engine will not shutdown with the START/STOP Selector unless associated Thrust Lever is first moved to IDLE. If STOP is selected before Thrust Lever is retarded to IDLE, momentarily cycle START/STOP Selector to RUN and back to STOP.

If engine shutdown does not occur:
Fire Extinguishing Handle .... PULL (DO NOT ROTATE)

LEAVING THE AIRPLANE

Standby Horizon .... CAGED
Gust Lock .... LOCKED
Radar .... OFF
Internal and External Lights .... OFF
GPU and APU .... OFF
Main and Backup Batteries .... OFF

BUFFET ONSET ENVELOPE



TURBULENT AIR PENETRATION

Flight through severe turbulence must be avoided, if possible.
If not possible, reduce altitude to increase buffet margin.
The recommended procedures for turbulent air penetration are:

1. MAXIMUM AIRSPEED

At or below 10000 ft .... 200 KIAS
Above 10000 ft .... 250 KIAS/ 0.63 M, WHICHEVER IS LOWER

Severe turbulence will cause large and often rapid variations in indicated airspeed. Do not chase the airspeed.

2. ATTITUDE

Maintain wings level and proper pitch attitude. Use attitude indicator as the primary instrument. In extreme drafts, large attitude changes may occur. Do not use sudden large control inputs.

3. PITCH TRIM

Maintain control of the airplane with the elevators. After establishing the trim setting for penetration speed, do not change pitch trim.

4. ALTITUDE

Large altitude variations are possible in severe turbulence. Sacrifice altitude in order to maintain the desired attitude. Do not chase altitude.

5. THRUST SETTING

Make an initial thrust setting for the target airspeed. Change thrust setting only in case of extreme airspeed variation.
In case of inadvertent negative-g condition, reduce thrust levers.

NOTE: Do not extend flaps except for approach and landing.

CROSSFEED OPERATION

NOTE: Crossfeed must be OFF during takeoff and landing.

If fuel imbalance is verified:

Attitude.. WINGS LEVELED

If left wing presents lower level:

Crossfeed Selector LOW1

If right wing presents lower level:

Crossfeed Selector LOW2

Avoid rapid thrust levers movement.

Monitor fuel imbalance. When the desired balance is achieved:

Crossfeed Selector .... OFF

ENHANCED/GROUND PROXIMITY WARNING

Voice messages: WHOOP-WHOOP PULL UP or PULL UP (for EGPWS), SINK RATE, TERRAIN TERRAIN or TERRAIN TERRAIN PULL UP (for EGPWS), CAUTION TERRAIN (for EGPWS), OBSTACLE OBSTACLE PULL UP (for EGPWS), CAUTION OBSTACLE (for EGPWS), DON'T SINK DON'T SINK, TOO LOW TERRAIN, TOO LOW GEAR, TOO LOW FLAPS, GLIDE SLOPE and BANK ANGLE voice messages may be generated, but are not associated with GPWS/EGPWS EICAS message.

When an EGPWS/GPWS alert occurs, use the flight controls and thrust as necessary to correct the airplane attitude, flight path and configuration according to the voice message presented to provide terrain clearance.

CAUTION: FOR EGPWS, THE TERRAIN DISPLAY IS INTENDED TO BE USED AS A SITUATIONAL TOOL ONLY AND MAY NOT PROVIDE THE ACCURACY AND/OR FIDELITY ON WHICH TO SOLELY BASE TERRAIN AVOIDANCE MANEUVERING DECISIONS.

WINDSHEAR PREVENTION/RECOVERY

Aural Warning: WINDSHEAR voice message is generated if WDSHEAR red indication is presented (GPWS warning may also be activated).

Thrust Levers	MAX
Go-around Buttons	PRESS

Rotate the airplane smoothly to minimize altitude loss. Flight guidance on EADI must be followed.

NOTE: Pitch attitude may be well above normal angles.

Maintain airplane configuration.

CAUTION: DO NOT CHANGE GEAR AND FLAP POSITION UNTIL TERRAIN CLEARANCE IS ASSURED.

TRAFFIC AND COLLISION AVOIDANCE

Aural Warning: According to the Traffic Advisory (TA) and Resolution Advisory (RA) associated.

The pilot must not initiate evasive maneuvers using information from the traffic display or the voice message only, without visually sighting the traffic. The traffic display and advisories are intended for assistance in visually locating the traffic.
Compliance with TCAS resolution advisory is required unless the pilot considers it unsafe to do so. Maneuvers which are in the opposite direction of the RA are extremely hazardous, especially RAs involving altitude crossing, and are prohibited unless it is visually determined to be the only means to assure safe separation.

TRANSPONDER

In compliance with Airworthiness Directive 2006-19-04, during all flight phases, after completion of any 4096 ATC Code change (also referred to as Mode A Code), check the status of the transponder. If the transponder indicates that it is in standby mode, re-select the desired mode (i.e., the transponder should be in the active mode).

OPERATION IN ICING CONDITIONS

The procedures below supplement or change the remaining procedures presented in this Section. For emergency and abnormal procedures related to operation in icing conditions, refer to Section 3.

NOTE:
- Icing conditions may exist whenever the Static Air Temperature (SAT) on the ground or for takeoff, or Total Air Temperature (TAT) inflight, is 10°C or below and visible moisture in any form is present (such as clouds, fog with visibility of one mile or less, rain, snow, sleet, and ice crystals).
- Icing conditions may also exist when the SAT on the ground and for takeoff is 10°C or below when operating on ramps, taxyways, or runways where surface snow, ice, standing water, or slush may be ingested by the engines, or freeze on engines, nacelles, or engine sensor probes.
- Notwithstanding ice detector monitoring, the crew remains responsible for monitoring icing conditions and for manual activation of the ice protection system if icing conditions are present and the ice detection system is not activating the ice protection system.

BEFORE START

NOTE: The SPS/ICE SPEEDS message will remain displayed after icing encounter. Before next takeoff the message must be removed by testing the Stall Protection System.

AFTER START

Ice Detection Override Knob .... ENG
Crossbleed .... AUTO

CAUTION: BOTH ENGINE BLEEDS MUST BE OPEN, IN ORDER TO ASSURE BLEED AIR FLOW THROUGH THE LEADING EDGES. APU BLEED MUST NOT BE USED.

BEFORE TAKEOFF

∗ Ice Protection Test:

NOTE: The ice protection test may be carried out completely on the ground, or in 2 separate phases (first phase on the ground and second phase in flight), depending on weather conditions and crew discretion. For takeoffs when icing conditions exist or are anticipated for takeoff or climb, the tests in paragraph A must be performed.

On ground, if engine vibration increases, advance thrust levers, one at a time, to obtain at least 60% N1 for 5 seconds and then return to the former setting.

A - When actual icing conditions exist or are anticipated for takeoff and climb, proceed:

Ice Detection Override Knob.................................... ALL
Thrust Levers... 83% N2
Ice Detection Test Knob .... 1, THEN 2

Test knob must be held at least 10 seconds in each test position but no more than 15 seconds.

For each side separately, check that OPEN inscriptions in the buttons are illuminated and that, ICE DET 1 (or 2) FAIL and BLD 1 (or 2) LOW TEMP caution messages and ICE CONDITION advisory message are displayed on EICAS. The CROSS BLD OPEN advisory message may also be displayed.

NOTE: For the EMB-145 XR model, when the Ice Detection Test Knob is selected to 1, the CLR ICE 1, CLR ICE 2, CLR/I INOP 1 and CLR/I INOP 2 caution messages are displayed on the EICAS and the lights CLR ICE 1 and CLR ICE 2 illuminate; when the Ice Detection test Knob is selected to 2, none of those caution messages are displayed on the EICAS.

Thrust Levers... IDLE
Ice Detection Override Knob.................................... ENG

<u>CAUTION:</u> ICE DETECTION OVERRIDE KNOB MUST NOT BE SET TO "ALL" ON GROUND, EXCEPT DURING TEST.

B - For flight when no actual icing conditions exist or are anticipated for takeoff and climb, proceed:

Before engines start, perform the on ground test:

APU Bleed .... CLOSE
Engine Bleed... CLOSE
Anti-Icing Buttons (Engine,
Wing and Stabilizer)............................... PRESSED
Ice Detection Override Knob.......................... AUTO
Ice Detection Test Knob .... 1, THEN 2

Test knob must be held at least 10 seconds in each test position.

For each side separately, check that ICE DET 1 (or 2) FAIL and BLD 1 (or 2) LOW TEMP caution messages and ICE CONDITION advisory message are displayed on EICAS.

NOTE: For the EMB-145 XR model, when the Ice Detection Test Knob is selected to 1, the CLR ICE 1, CLR ICE 2, CLR/I INOP 1 and CLR/I INOP 2 caution messages are displayed on the EICAS and the lights CLR ICE 1 and CLR ICE 2 illuminate; when the Ice Detection Test Knob is selected to 2, none of those caution messages are displayed on the EICAS.

During climb, perform the in-flight test:

Engine Bleeds... OPEN
Thrust Lever... THRUST SET
Altitude .... FROM 2000 TO 23000 ft
TAT .... LESS THAN 10°C
Ice Detection Override Knob............................... ALL FOR 20 SECONDS

Check that OPEN inscriptions in the buttons are illuminated and NO ICE-A/ICE ON caution message is displayed on EICAS. The CROSS BLD OPEN advisory message may also be displayed.

Ice Detection Override Knob............................... AUTO (AFTER 20 SECONDS)

NOTE: The ice protection test must be fully accomplished before entering icing conditions and before reaching 23000 ft.

AFTER TAKEOFF

Ice Protection Test (if applicable) .... COMPLETE

CLIMB

Ice Detection Override Knob.. AUTO

CRUISE

Engine Parameters... MONITOR

If engine vibration increases, advance thrust levers, one at a time, to obtain 60% N1 minimum for 5 seconds, and then return to the former setting.

If ITT increases beyond limits, reduce thrust levers as required to maintain ITT within limits.

If airframe vibration and/or buffeting occurs, reduce the airspeed as required down to 200 KIAS to eliminate the vibration and/or buffeting.

HOLDING

Landing Gear .... UP
Flaps .... UP
Minimum Airspeed.. 200 KIAS

DESCENT

When flying in icing conditions at high speeds or after flying icing conditions, if vibration and/or buffeting occurs, reduce the airspeed as required down to 200 KIAS to eliminate the vibration and/or buffeting.

CAUTION: EVEN SMALL ACCUMULATIONS OF ICE ON THE WING LEADING EDGE MAY CHANGE THE STALL CHARACTERISTICS OR THE STALL PROTECTION SYSTEM WARNING MARGIN.

APPROACH

For airplanes Post-Mod. SB 145-27-0032 or S/N 145.001 through 145.003, 145.034 and on, if necessary to increase rate of descent:

Flaps .... 9°
Speed Brake .... OPEN

INTENTIONALLY BLANK

SECTION 5

PERFORMANCE

INTRODUCTION

The performance information given in this Section is applicable to the AE3007A engines. For performance information related to other engine model, refer to its respective Supplement.

NOTE: Charts labeled as applicable to AE3007A engines are also applicable to AE3007A1/1 engines and intermix operation between AE3007A and AE3007A1/1 engines.

The performance data are on the following conditions:

– Pertinent power less installation, air bleed, and accessory losses.
– Full temperature accountability within the operational limits for which the airplane is certified.
– Wing flap position as follows:

	WING FLAP POSITION
TAKEOFF/APPROACH	9°
ENROUTE	UP
LANDING	22° or 45°

– The wind correction grids are factored in compliance with the regulations, and represent the headwind/tailwind components measured at 10 m (32.8 ft) height.
– Humidity has no appreciable effect on the power of the engines; therefore, it has not been considered in the performance data.
– All takeoff and landing based on paved runways.
– Anti-skid and ground spoilers are considered to be operative.
– Two brake versions are considered: ER version (P/N 2-1582 or 2-1699-1) and LR version (P/N 2-1624 or 2-1707).

CAUTION: ALTHOUGH SOME PREFORMANCE CHARTS ARE PRESENTED UP TO 52910 LB, THE MAXIMUM TAKEOFF WEIGHT ASSOCIATED TO EACH MODEL MUST BE OBSERVED.

NOTE: For ALT T/O-1 Thrust Mode the takeoff calculations consider both bleeds open when operating. If an engine failure occurs the remaining engine thrust increases to T/O-1 and packs are automatically closed.

The performance information is not valid if:

- The airplane gross weight exceeds the appropriate maximum allowable limits.
- Any of the limitations in Section 2 is not observed.
- A reading from any graph is obtained by extrapolation (i.e. using values of parameters outside the range given on the graph).

NOTE: In the case of headwind components, the airplane may be operated in reported components greater than 30 kt, but the effect of only 30 kt may be taken.

Tire speed limits are only applicable to the EMB-145 XR model. For more information, refer to the Supplement Operation with EMB-145XR.

DEFINITIONS

AIRSPEED

INDICATED AIRSPEED - KIAS

It is the reading on the airspeed indicator (knots), as installed in the airplane, uncorrected for static source position error. Zero instrument error is assumed.

CALIBRATED AIRSPEED - KCAS

It is the indicated airspeed (knots), corrected for static source position error.

TRUE AIRSPEED - TAS

It is the equivalent airspeed corrected for atmospheric density effects.

CRITICAL ENGINE FAILURE SPEED - V_{EF}

It is the speed at which, if one engine fails, the failure is recognized at V_1.

1-G STALL SPEED - V_{S1G}

Is the minimum speed at which the lift provided by the wing is capable of supporting the weight of the airplane.

REFERENCE STALL SPEED - V_{SR}

It is stall speed used as the reference in determining the various airplane speeds. V_{SR} may not be less than V_{S1G}.

TAKEOFF DECISION SPEED - V_1

It is the speed at which, following a failure of one engine at V_{EF}, the decision to continue the takeoff results in:

- a takeoff distance to a height of 35 ft at V_2 speed, that will not exceed the available takeoff distance;
- or the distance to bring the airplane to a full stop that will not exceed the accelerate-stop distance available.

V_1 must not be greater than the rotation speed (V_R).

ROTATION SPEED - V_R

It is the speed at which rotation is initiated during the takeoff, to attain the takeoff safety speed at or before a height of 35 ft above runway surface.

TAKEOFF SAFETY SPEED - V_2

The target speed to be attained at a 35 ft height, during a takeoff with an engine failure. Two schedules for Takeoff Speed - V_2 are presented as follows:

- Normal V_2 - This speed is equal to 1.2 V_{SR} (for flaps 9°) or 1.15 V_{SR} (for flaps 22°).
- Increased V_2 - This speed is equal to 1.25 V_{SR} (only for flaps 9°).

AIR MINIMUM CONTROL SPEED - V_{MCA}

The minimum flight speed at which the airplane is controllable with a maximum 5° bank, when one engine suddenly becomes inoperative with the remaining engine operating at takeoff power. The value presented represents the most critical combination of power, weight, and center of gravity.

GROUND MINIMUM CONTROL SPEED - V_{MCG}

The minimum speed on the ground at which the takeoff can be continued, utilizing aerodynamic controls alone, when one engine suddenly becomes inoperative and the remaining engine is operating at takeoff power. The value presented represents the most critical combination of power, weight, and center of gravity.

LANDING REFERENCE SPEED - $V_{REF\ XX}$

The speed at a 50 ft height in a normal landing. This speed is equal to 1.23 V_{SR} + 5 KIAS (for flaps 22°) or 1.23 V_{SR} (for flaps 45°) in the landing configuration (gear down and specific landing flaps XX).

MANEUVERING SPEED - V_A

The maximum speed at which application of full available aileron or rudder will not overstress the airplane.

Maneuver involving pitching control must not exceed the limit load factor defined in Section 2 - Limitations.

MINIMUM CONTROL SPEEDS DURING LANDING AND APPROACH - V_{MCL}

V_{MCL} is the minimum control speed during landing and approach with all engines operating, when the critical engine is suddenly made inoperative.

FINAL TAKEOFF SEGMENT SPEED - V_{FS}

It is the speed to be achieved during final segment, with landing gear up and flaps retracted.

METEOROLOGICAL

INTERNATIONAL STANDARD ATMOSPHERE - ISA

As accepted by the International Civil Aviation Organization.

STATIC AIR TEMPERATURE - SAT

Outside air temperature as indicated on the MFD.

TRUE OUTSIDE AIR TEMPERATURE

The free air static (ambient) temperature.

WIND VELOCITY

The actual wind velocity at a 10 m (32.8 ft) height, reported from the tower and corrected by the wind component chart to a headwind or tailwind component parallel to the flight path.

TAKEOFF

The takeoff path assumes failure of one engine at V_{EF} and extends from a standing start to a point in the takeoff at which the airplane is at least 1500 ft above the takeoff surface and has achieved the enroute configuration and final segment speed. The takeoff path is divided into segments related to the distinct changes in the configuration, power, and speed.

Some of the terms used in the takeoff path are defined below.

TAKEOFF DISTANCE

The greater of the distance from the start of the takeoff to the point at which the airplane is 35 ft above the takeoff surface, with a failure of one engine at V_{EF} ; or 115 percent of the distance with all engines operating, from the start of the takeoff to a point 35 ft above the takeoff surface.

TAKEOFF RUN

The greater of the distance from the start of the takeoff to a point equidistant between liftoff and the point at which the airplane is 35 ft above the takeoff surface, with a failure of one engine at V_{EF} ; or 115 percent of the distance from the start of the takeoff to a point equidistant between liftoff and the point at which the airplane is 35 ft above the takeoff surface, with all engines operating.

ACCELERATE-STOP DISTANCE

The horizontal distance traversed from brake release to the point at which the airplane comes to a complete stop on a takeoff during which the pilot elects to stop at V_1. The accelerate-stop distance must not exceed the length of the runway plus the length of the stopway.

CLEARWAY

An obstacle free area beyond the end of the runway which can be taken into account for takeoff distance calculation.

STOPWAY

An area extending beyond the end of the runway which may be used in decelerating the airplane in case of a refused takeoff.

PAVED RUNWAY

A surface such as concrete or tarmac.

NET TAKEOFF FLIGHT PATH

The net flight path is the gross (actual) path diminished by the gradient required by regulation.

TAKEOFF FLIGHT PATH

The takeoff flight path begins 35 ft above the takeoff surface at the end of the takeoff distance and extends to a point at which the airplane is at least 1500 ft above the takeoff surface and has achieved the enroute configuration and final segment speed, whichever occurs last.

REFERENCE ZERO

This is the reference to which the coordinates of the various points in the takeoff are referred to. It is defined as the end of the takeoff distance and 35 ft below the flight path at this point.

LEVEL OFF HEIGHT

The height at which the third segment is performed (400 ft minimum).

FIRST SEGMENT

Extends from the end of the takeoff distance to the point at which the landing gear is fully retracted, using takeoff power and takeoff flaps, at a constant V_2 speed.

SECOND SEGMENT

Extends from the gear-up point to the level off height (400 ft minimum), using takeoff power and takeoff flaps at a constant V_2.

THIRD SEGMENT

The horizontal distance required to accelerate, at constant altitude, using takeoff power to the final segment speed while retracting flaps.

FINAL SEGMENT

Extends from the end of the third segment to a gross height of at least 1500 ft, with flaps up, maximum continuous power, and at final segment speed.

NOTE: The flight path data given in the charts contained in this manual is such that all heights have been reduced by 35 ft for convenience in use; the obstacle height should, therefore, be compared directly with the flight path.

GROSS CLIMB GRADIENT

The ratio, expressed as a percentage of the change in geometric height divided by the horizontal distance (both in the same unit) travelled in a given time. The gradients shown on the charts are true gradients, i.e., they are derived from geometric (not pressure) rates of climb.

NET CLIMB GRADIENT

The demonstrated gross gradient reduced by 0.8% during takeoff phase and 1.1% enroute.

GROSS HEIGHT

The geometric height attained using gross climb gradient in a given time.

NET HEIGHT

The geometric height attained using net climb gradient in a given time. Net height is used to determine a net flight which will clear any obstacle by at least 35 ft to comply with the regulations.

ENROUTE AND LANDING

ENROUTE CLIMB

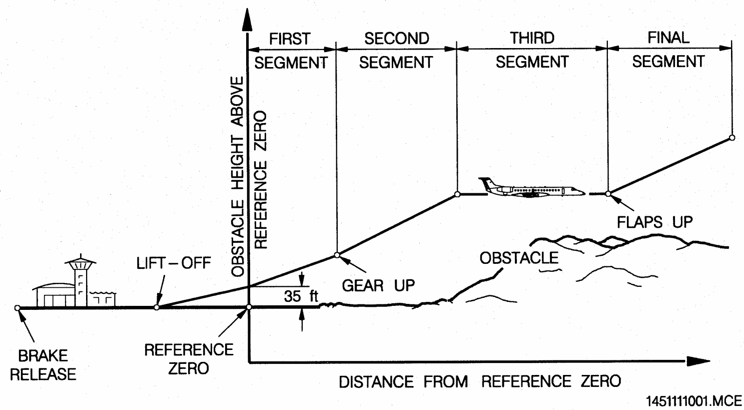
Climb with flaps up, landing gear retracted, maximum continuous power on one engine, and at the adopted enroute climb speed.

APPROACH CLIMB

Climb from a missed or aborted approach, with approach flaps, gear up, and takeoff power on one engine, at the maximum landing weight, and at the adopted approach climb speed.

LANDING CLIMB

Climb from an aborted landing with landing flaps, landing gear extended, and takeoff power on both engines.



TAKEOFF PROFILE

DEMONSTRATED CROSSWIND

The maximum demonstrated crosswind component for takeoff and landing is 30 kts measured at tower height of 10 m (32.8 ft). The demonstration was made with both engines operating on a dry runway and using V_{REF} plus half the maximum gust intensity. This value is not considered to be limiting.

NOISE LEVELS

The following Effective Perceived Noise Levels (EPNL´s) comply with FAR Part 36, Appendix C, Stage 3 noise limits. The tests and analysis procedures used to obtain these noise levels are essentially equivalent to those required by the ICAO Annex 16, Volume 1, Chapter 3.

NOISE LEVEL IN EPNdb				
Airplane Model	Noise Level	CONDITION		
		Sideline	Takeoff	Approach
	Maximum Allowable	**94.0**	**89.0**	**98.0**
ER	Actual	85.1	79.8	92.6
EP	Actual	85.0	80.1	92.6
MP	Actual	85.0	80.1	92.5
LR	Actual	84.9	81.0 (1)	92.5

NOTE: 1) For airplanes with MTOW of 49823 lb the actual noise level for takeoff condition is 81.6 EPNdb.

These values are stated for reference conditions of standard atmosphere pressure at sea level, 25°C ambient temperature, 70% relative humidity, and zero wind. Takeoff and sideline noise levels were established for the EMB-145 equipped with two Rolls-Royce AE3007A, AE3007A1, AE3007A1/1 and AE3007A1P engines at the Maximum Takeoff Weight of each model, V_2 climb speed, flaps 9°, and all engines with maximum takeoff power setting. Approach noise levels were established from a 3º glide slope at the Maximum Landing Weight of each model, $V_{REF\ 45}$, and flaps 45°.

The takeoff power cutback procedure was used.

No determination has been made by the Airworthiness Authority that the noise levels in this manual are or should be acceptable or unacceptable for operation at, into, or out of any airport.

WIND COMPONENTS

The wind correction grids are factored according to the regulations, and represent the headwind/tailwind components measured at 10 m (32.8 ft) height.

Correction to wind velocity and direction into headwind/tailwind and crosswind is given in the Wind Component chart.

USE

Enter the chart with the reported wind velocity and the relative angle to the runway, to read the wind component parallel to the runway and the crosswind.

EXAMPLE

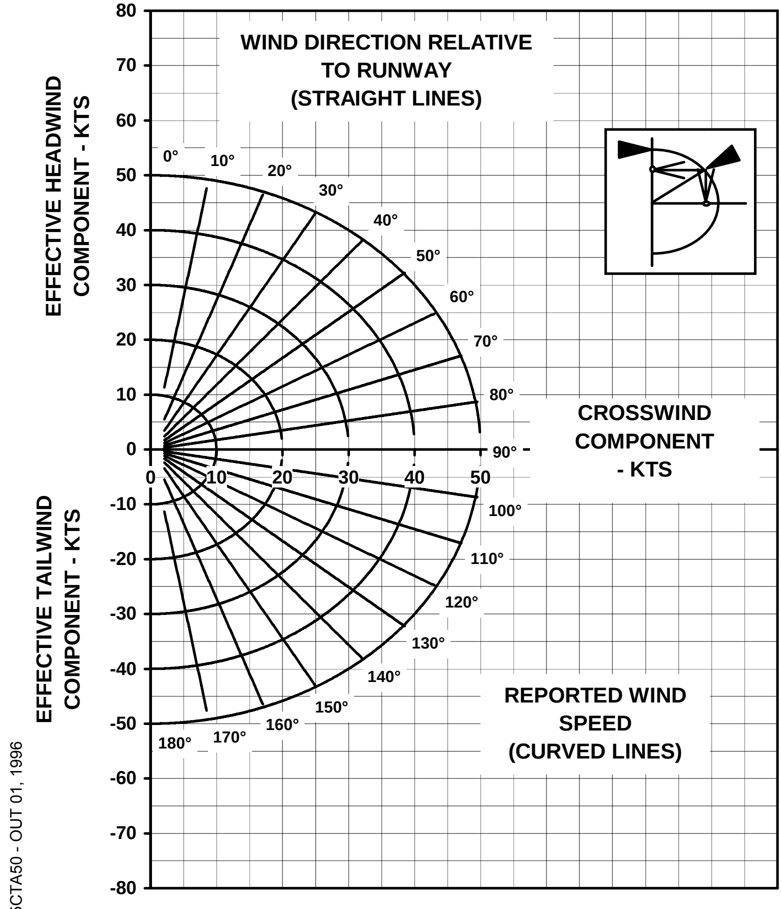
Given:

Wind velocity .... 20 kt
Wind direction .... 60°

Determine:

Wind component parallel to the runway .... 10 kt
Crosswind .... 17.5 kt

WIND COMPONENT



POSITION ERROR CORRECTIONS

The corrections to be applied to indicated airspeed or altitude, to eliminate the effect of the location of the static port on instrument reading, are shown in a set of Airspeed and Altitude Position Error Correction charts.

For Standby Pitots, two sets of charts are presented:

- One for airplanes Pre-Mod. SB 145-34-0054, and
- One for airplanes Post-Mod. SB 145-34-0054 or with an equivalent modification factory incorporated.

For Pilot's and Copilot's Pitot, two sets of charts are presented:

- One for airplanes Post-Mod. SB 145-34-0082 or with an equivalent modification factory incorporated (equipped for RVSM operations), and
- One for airplanes Pre-Mod. SB 145-34-0082 (not equipped for RVSM operations).

NOTE: - The Airspeed Position Error Correction and the Altitude Position Error Correction charts for flaps 22° are also applicable to flaps 18°.

- For Pilot's and Copilot's Pitots, the Airspeed and Altitude Position Error Correction charts listed below are applicable to all airplanes configurations (Pre-Mod. and Post-Mod. SB 145-34-0082):
  - Gear Down - Flaps 45°;
  - Ground Effect - Flaps 9° and 22.

Since all airspeeds and altitudes in this section are presented as indicated values, no correction need to be made when reading from the charts.

AIRSPEED POSITION ERROR CORRECTION CHARTS

USE

Enter the appropriate chart with indicated airspeed, considering the appropriate configuration, to read the airspeed correction. The calibrated airspeed will be the sum of the indicated airspeed and airspeed correction.

EXAMPLE

Given, for Standby Pitot, in airplane Pre-Mod. SB 145-34-0054:

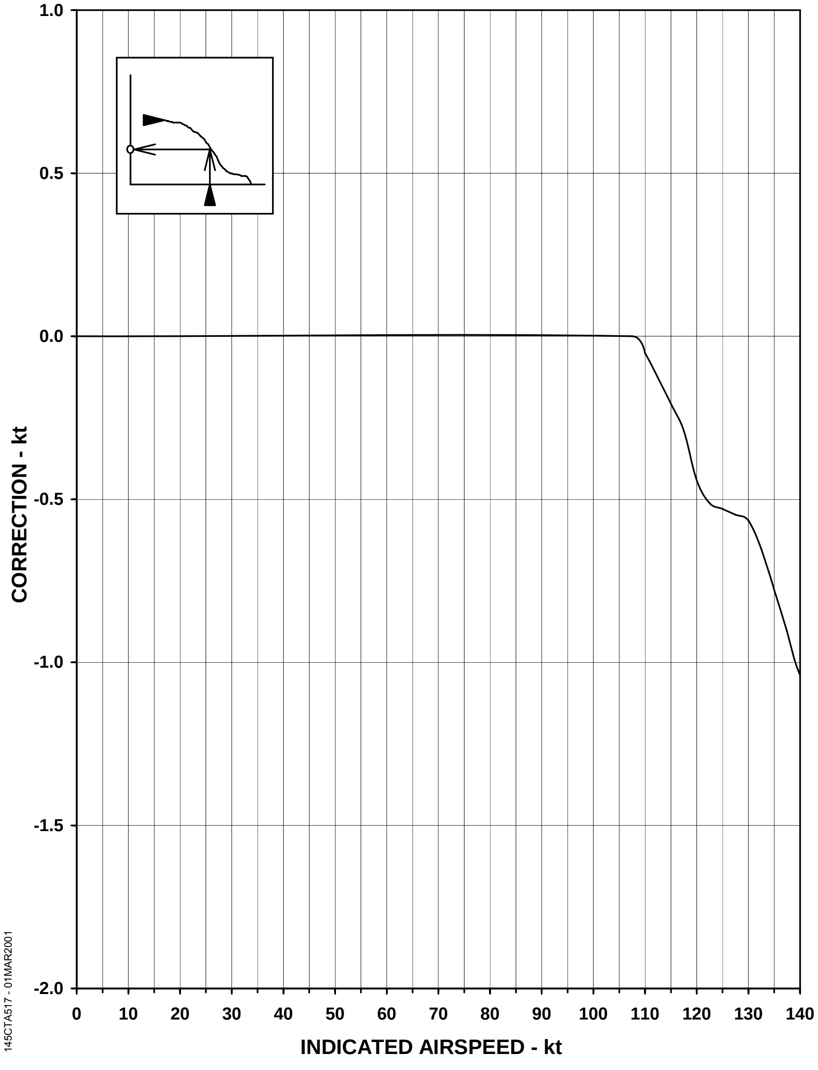
Indicated Airspeed .... 135 KIAS
Gear .... DOWN
Flaps .... 22°
Weight.. 40000 lb

Determine:

Airspeed correction.. 0.9 kt
Calibrated Airspeed .... 135.9 KCAS

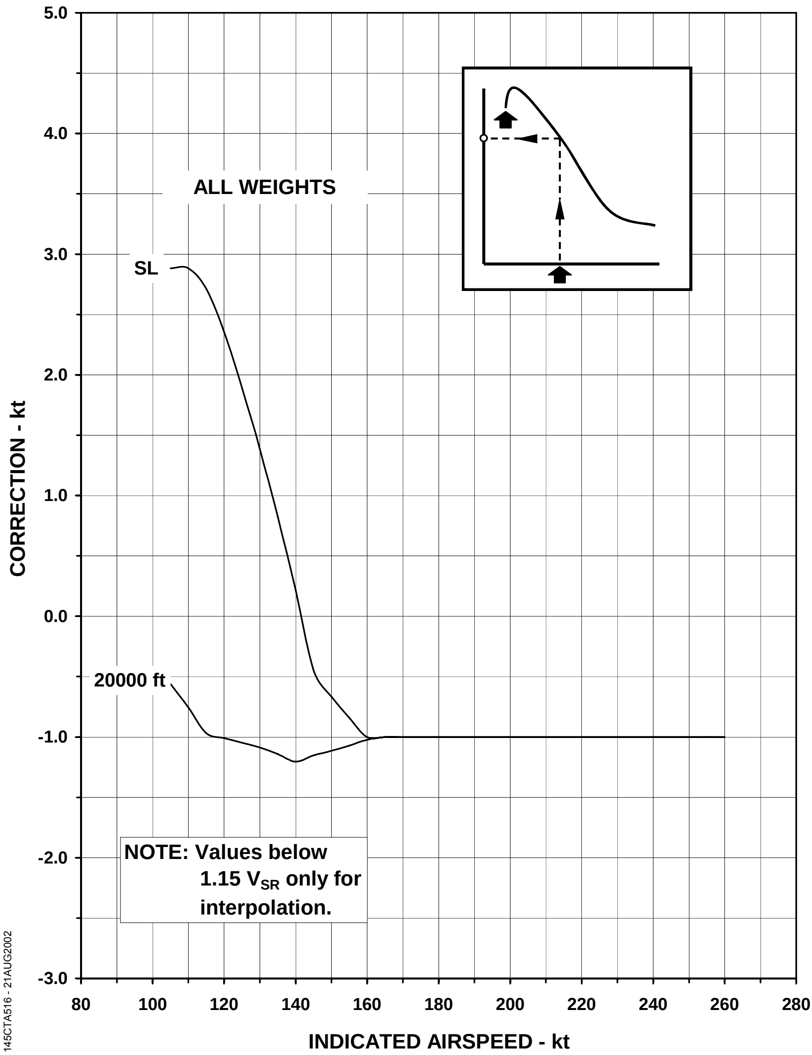
AIRSPEED POSITION ERROR CORRECTION
STANDBY PITOT
GROUND EFFECT - FLAPS 9° and 22°

AIRPLANES POST-MOD. SB 145-34-0054 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED



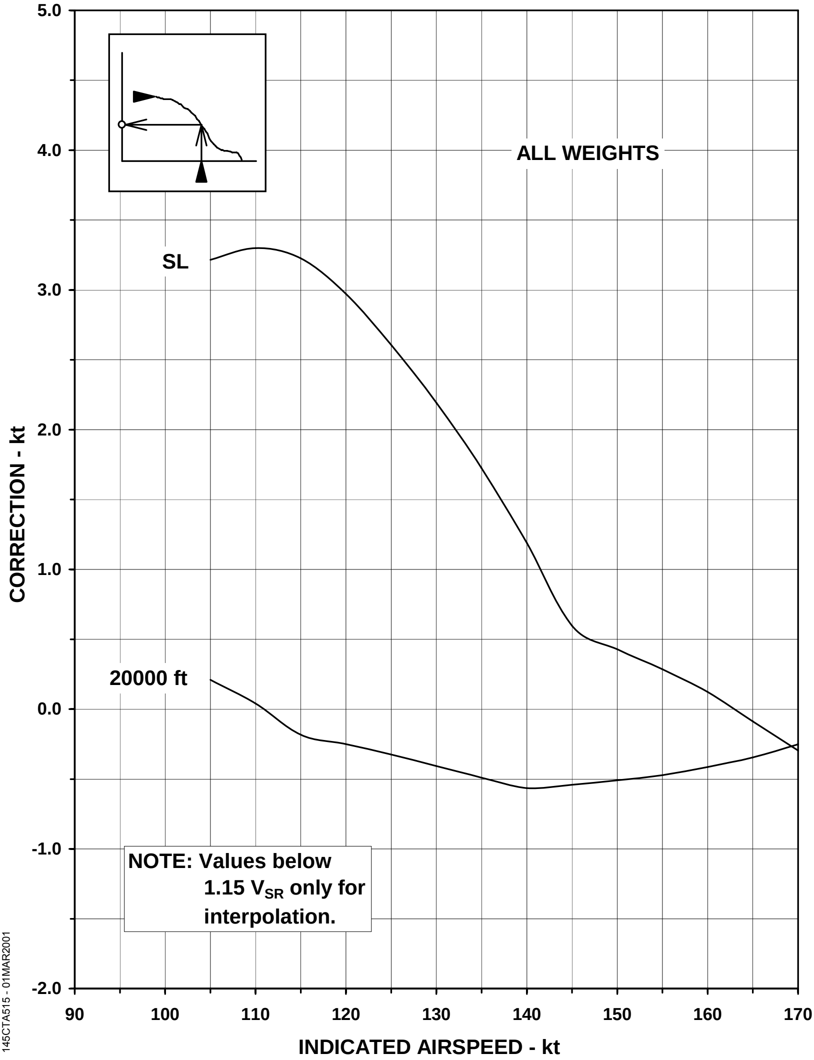
AIRSPEED POSITION ERROR CORRECTION STANDBY PITOT
GEAR DOWN - FLAPS 9° and 22°

AIRPLANES POST-MOD. SB 145-34-0054 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED



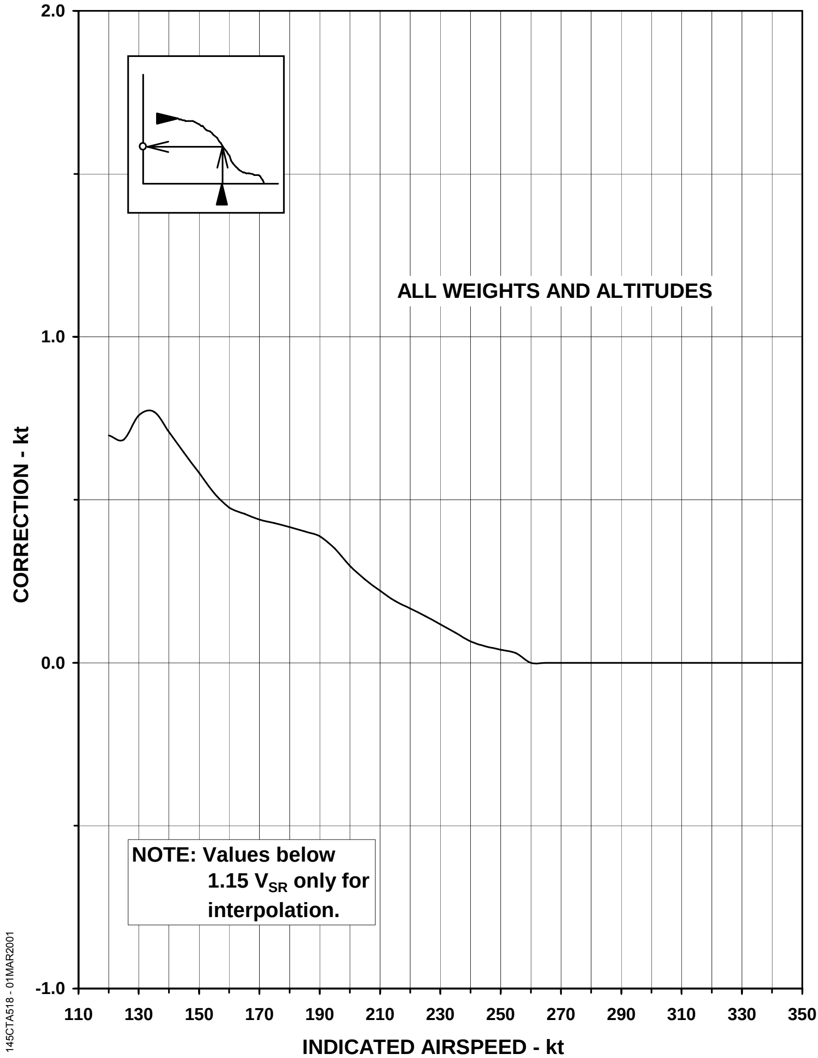
AIRSPEED POSITION ERROR CORRECTION STANDBY PITOT
GEAR DOWN - FLAPS 45°

AIRPLANES POST-MOD. SB 145-34-0054 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED



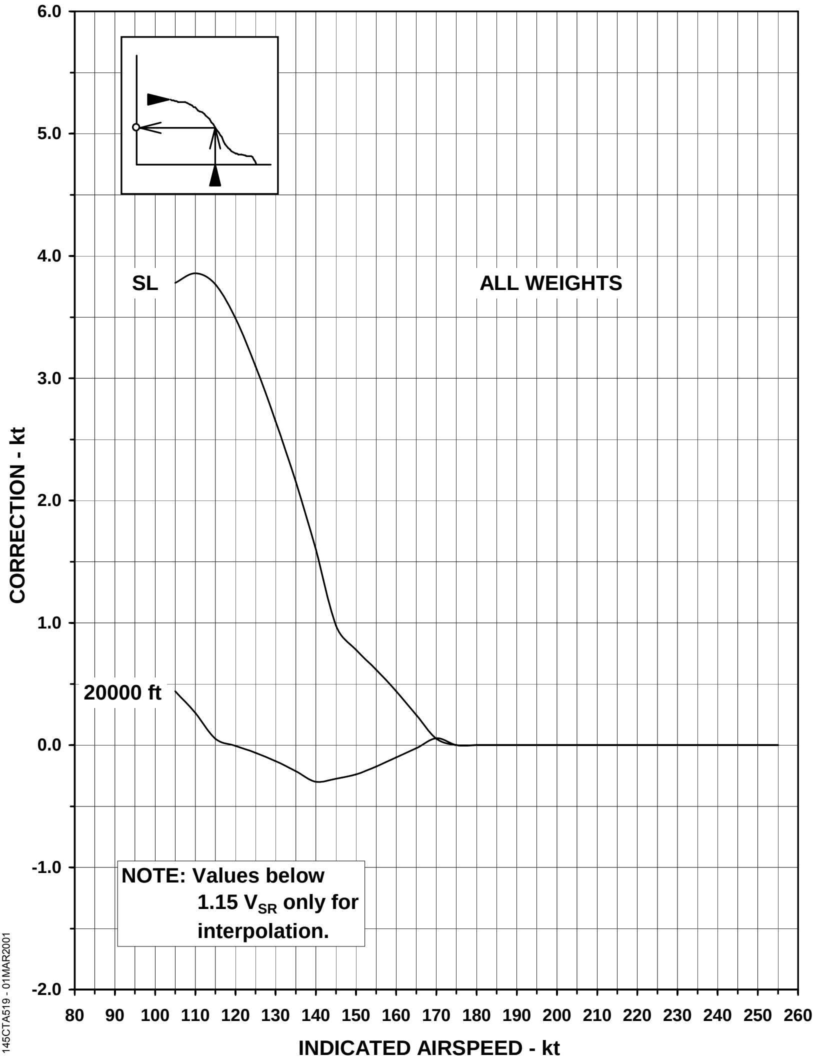
AIRSPEED POSITION ERROR CORRECTION
STANDBY PITOT
GEAR UP - FLAPS UP

AIRPLANES POST-MOD. SB 145-34-0054 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED

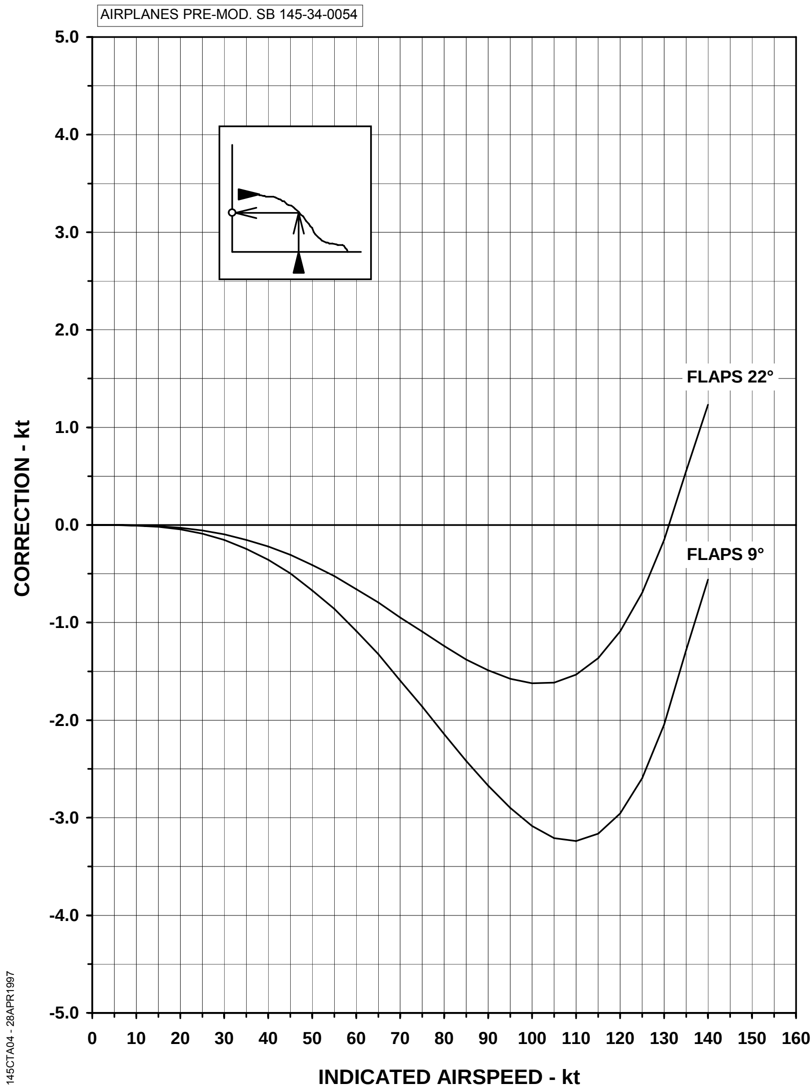


AIRSPEED POSITION ERROR CORRECTION
STANDBY PITOT
GEAR UP - FLAPS 9° and 22°

AIRPLANES POST-MOD. SB 145-34-0054 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED

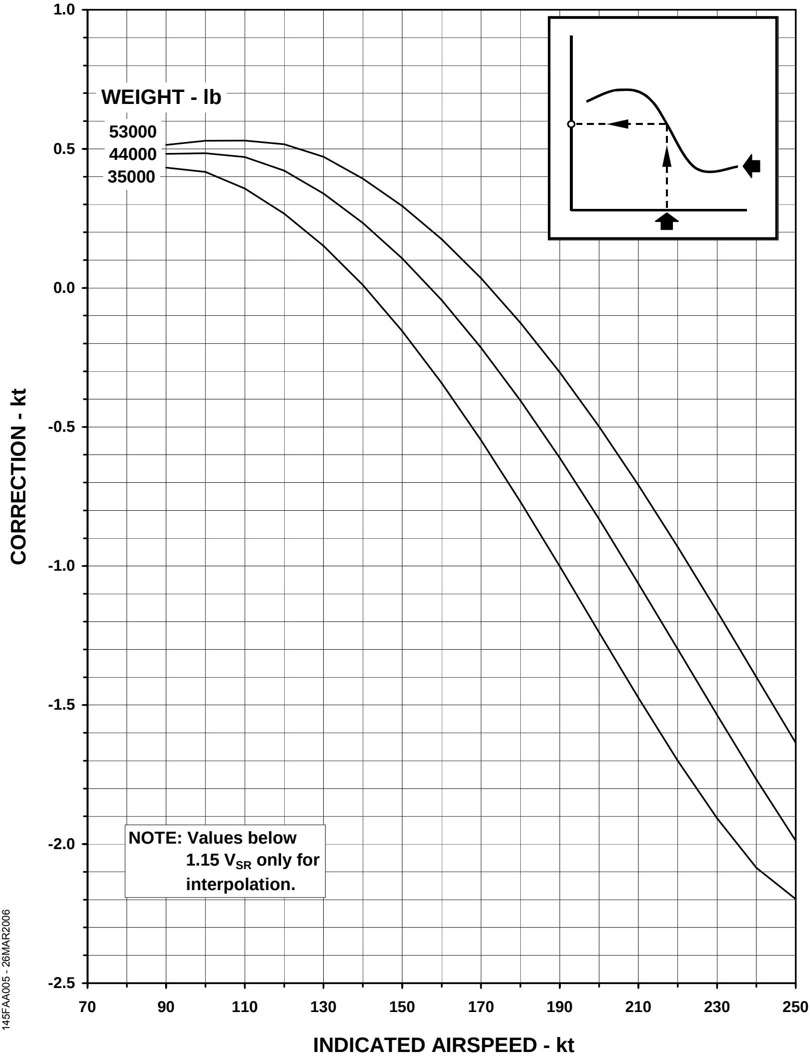


AIRSPEED POSITION ERROR CORRECTION
STANDBY PITOT
GROUND EFFECT - FLAPS 9° AND 22°



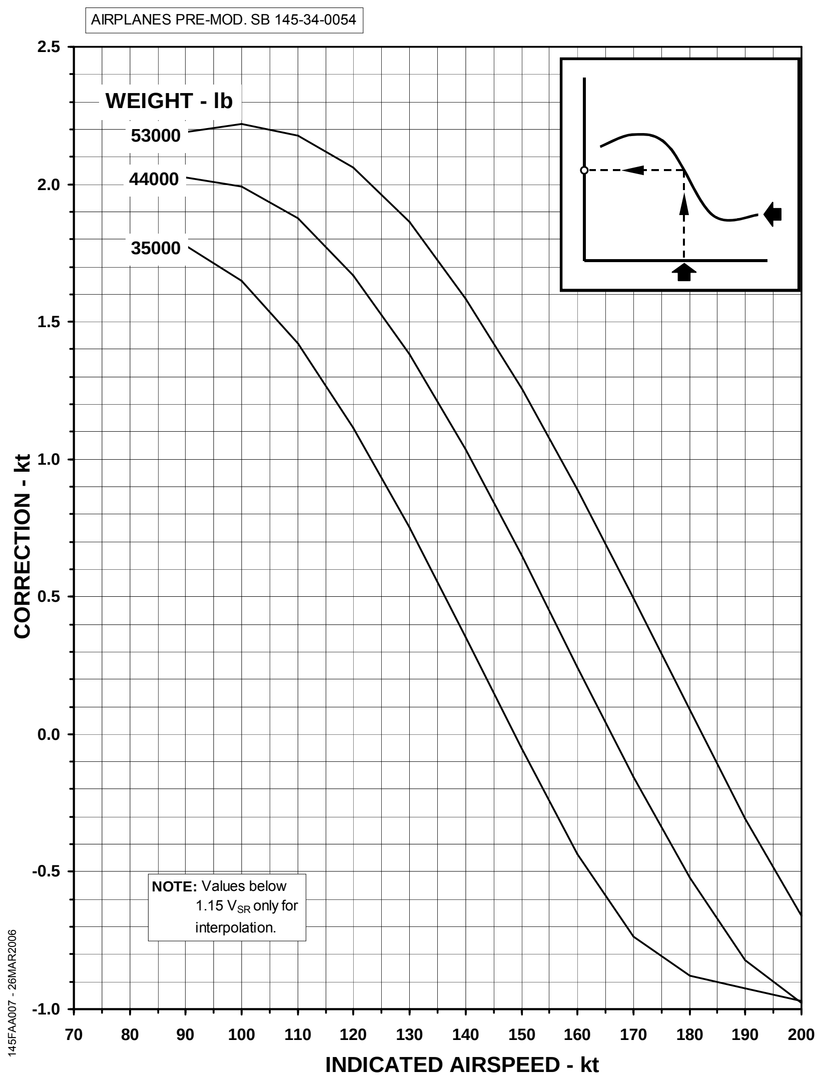
AIRSPEED POSITION ERROR CORRECTION
STANDBY PITOT
GEAR DOWN - FLAPS 9°

AIRPLANES PRE-MOD. SB 145-34-0054



AFM-145/1153 - FAA

AIRSPEED POSITION ERROR CORRECTION
STANDBY PITOT
GEAR DOWN - FLAPS 18° OR 22°

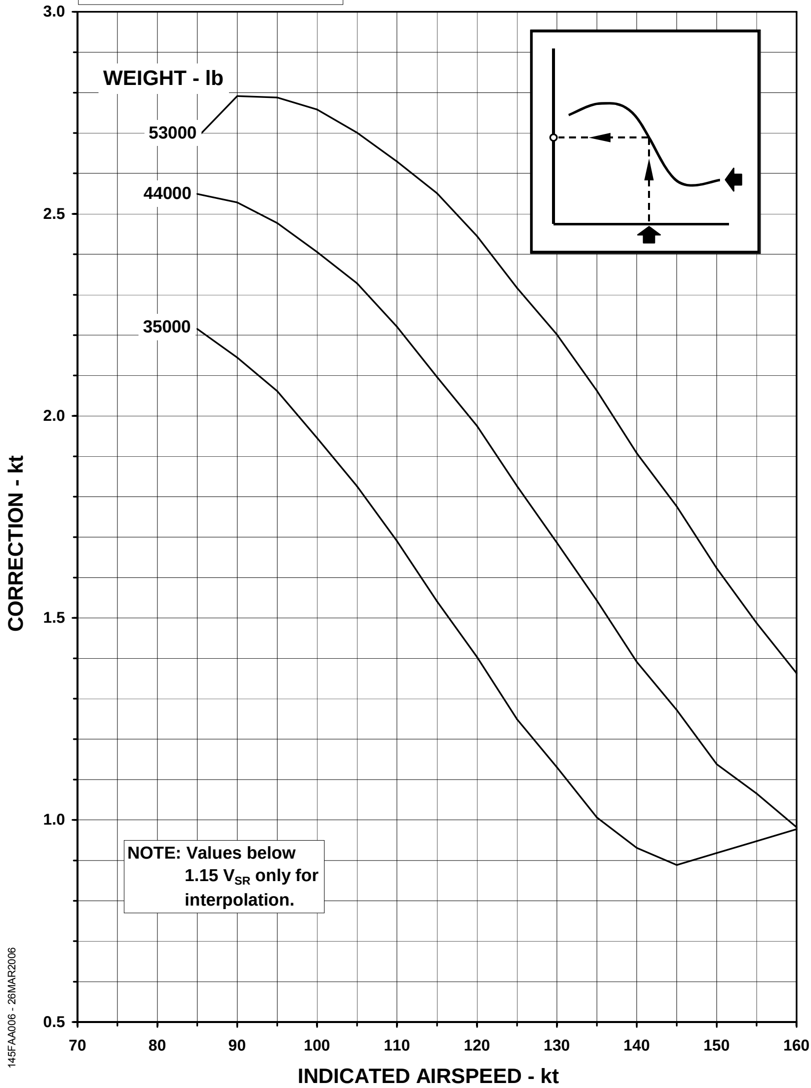


AIRSPEED POSITION ERROR CORRECTION

STANDBY PITOT

GEAR DOWN - FLAPS 45°

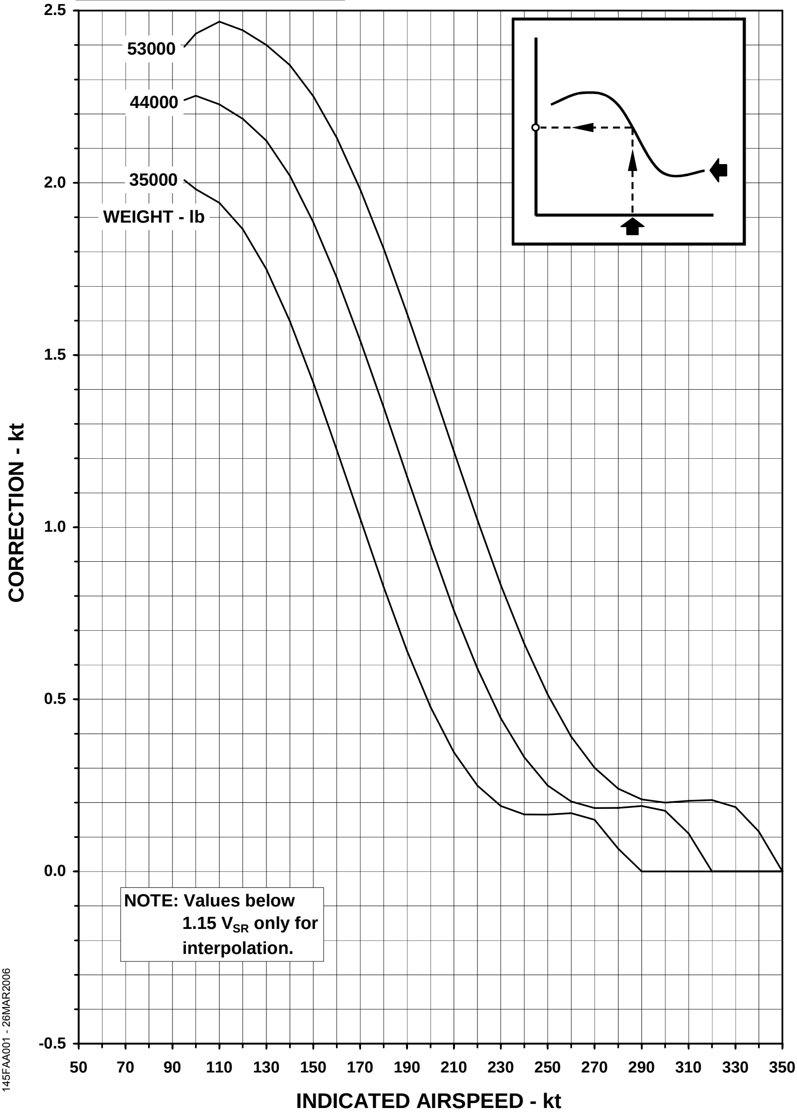
AIRPLANES PRE-MOD. SB 145-34-0054



AFM-145/1153 - FAA

AIRSPEED POSITION ERROR CORRECTION
STANDBY PITOT
GEAR UP - FLAPS UP

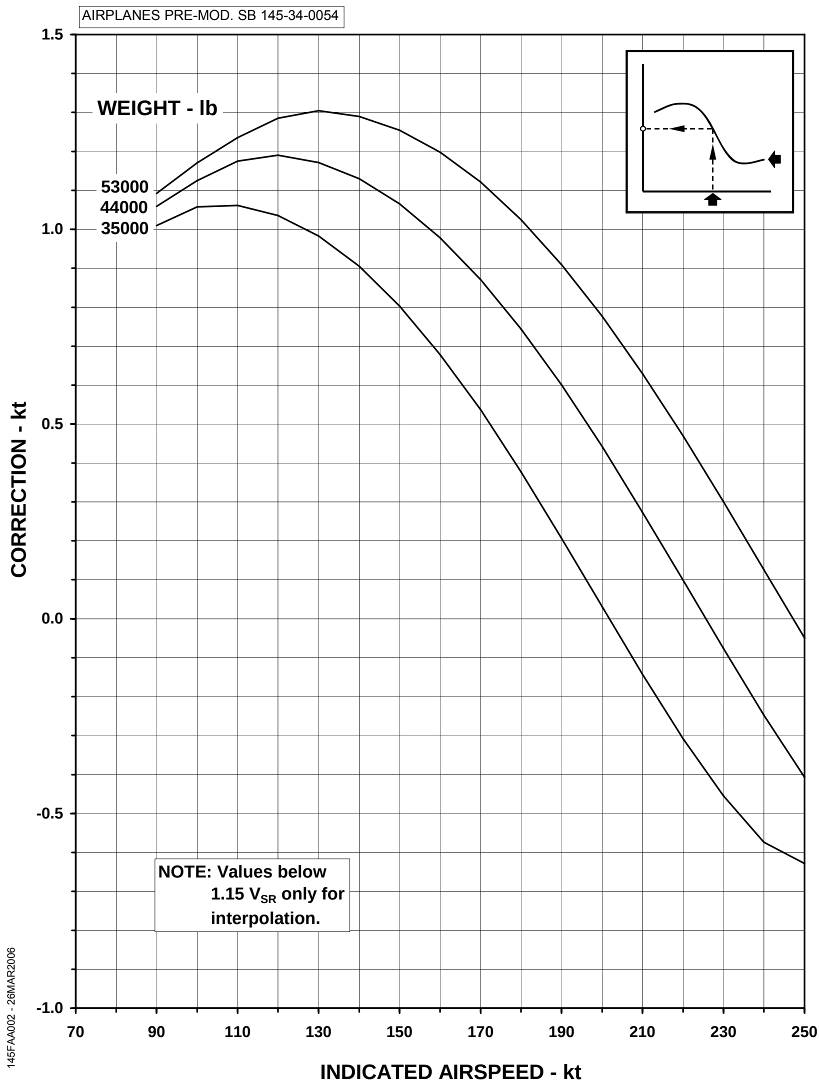
AIRPLANES PRE-MOD. SB 145-34-0054



AIRSPEED POSITION ERROR CORRECTION

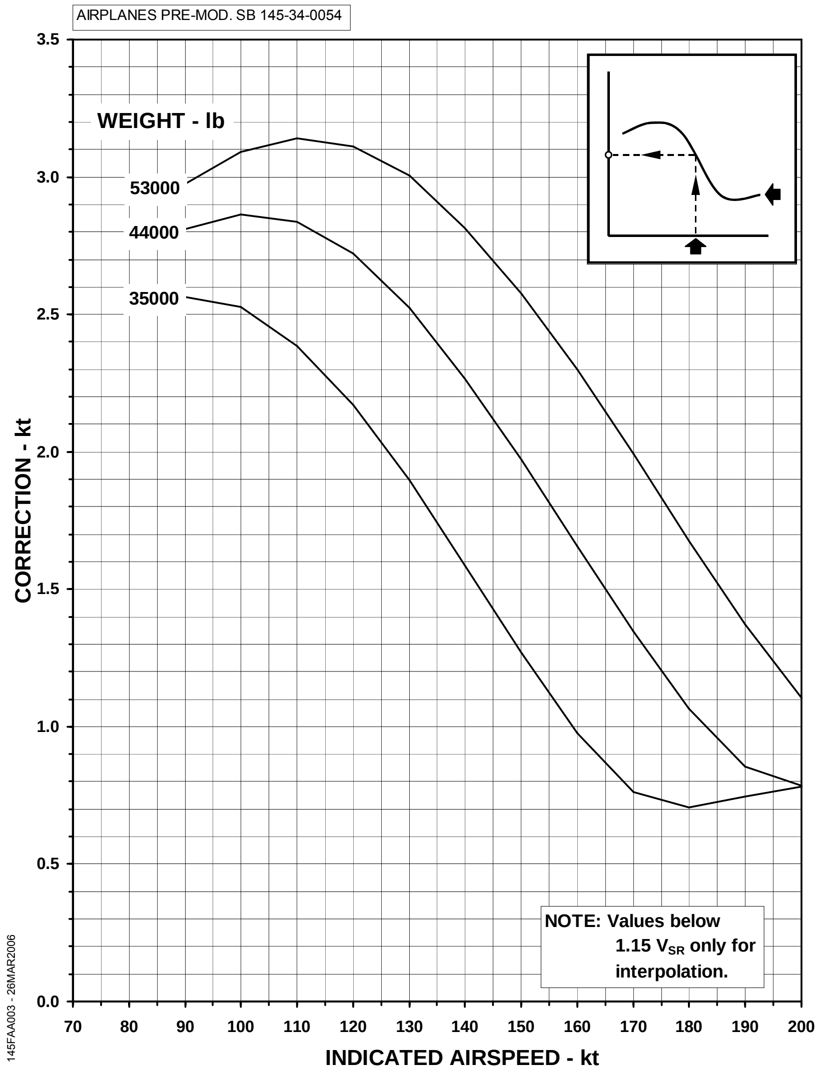
STANDBY PITOT

GEAR UP - FLAPS 9°

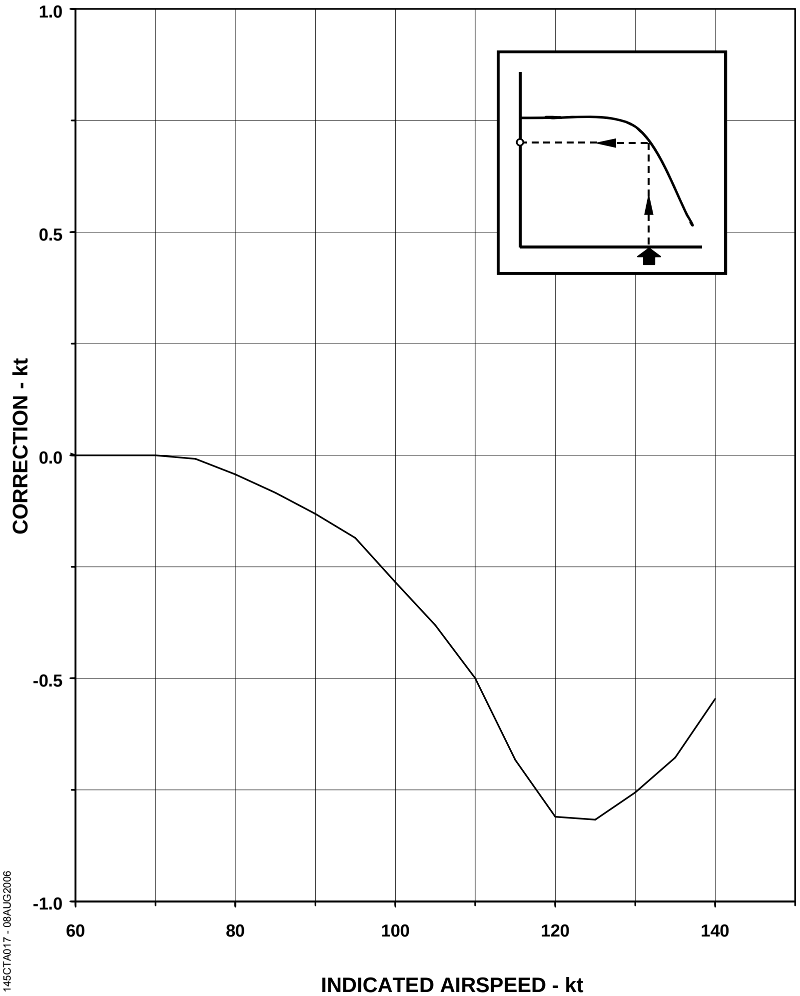


AFM-145/1153 - FAA

AIRSPEED POSITION ERROR CORRECTION
STANDBY PITOT
GEAR UP - FLAPS 18° OR 22°

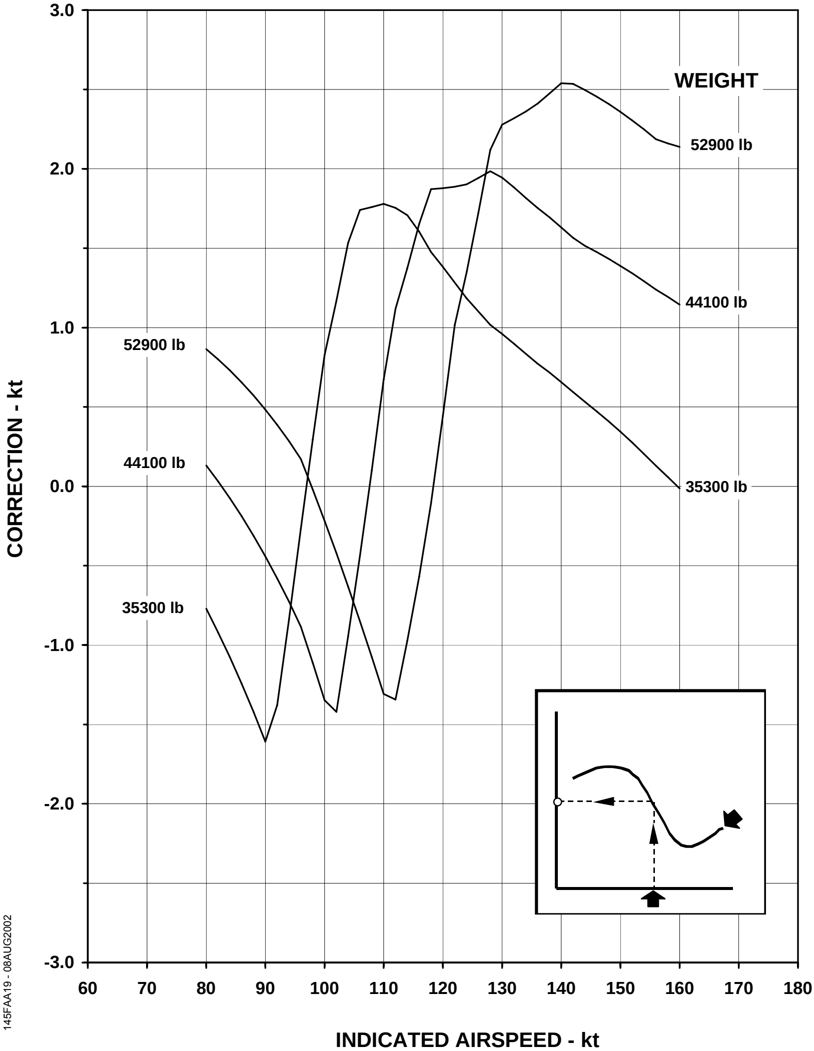


AIRSPEED POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GROUND EFFECT - FLAPS 9° AND 22°



AIRSPEED POSITION ERROR CORRECTION PILOT'S AND COPILOT'S PITOTS

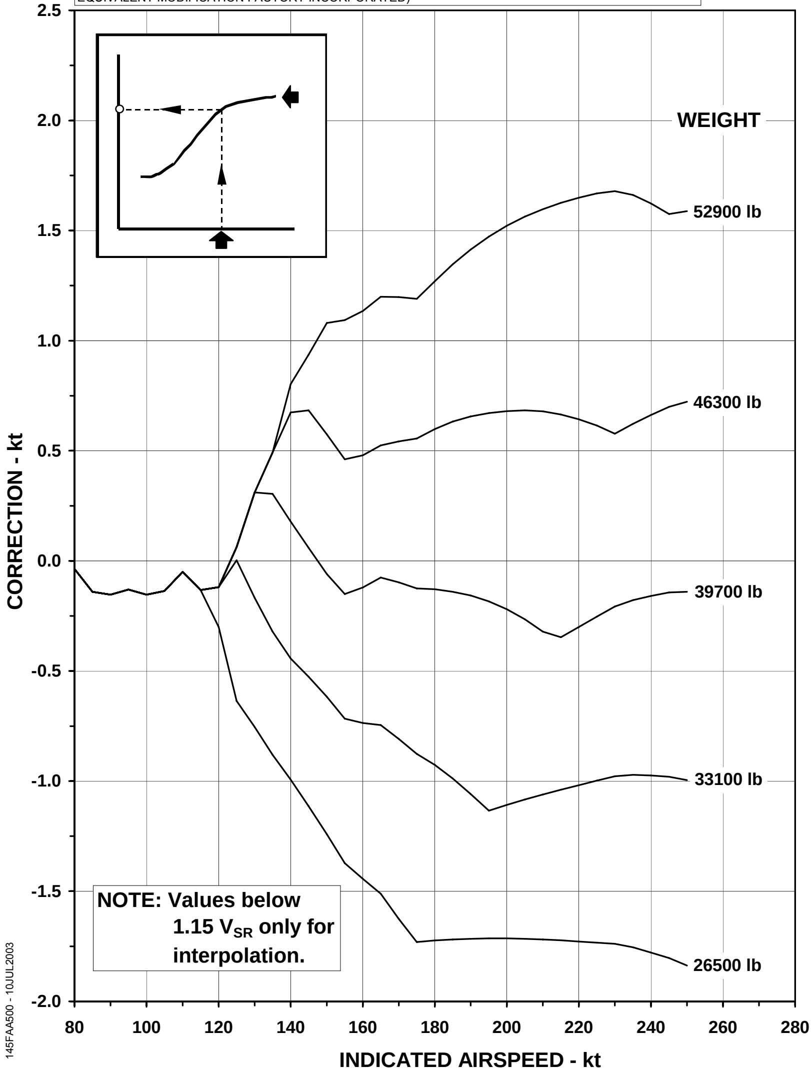
GEAR DOWN - FLAPS 45°



AIRSPEED POSITION ERROR CORRECTION PILOT'S AND COPILOT'S PITOTS

GEAR DOWN - FLAPS 9°

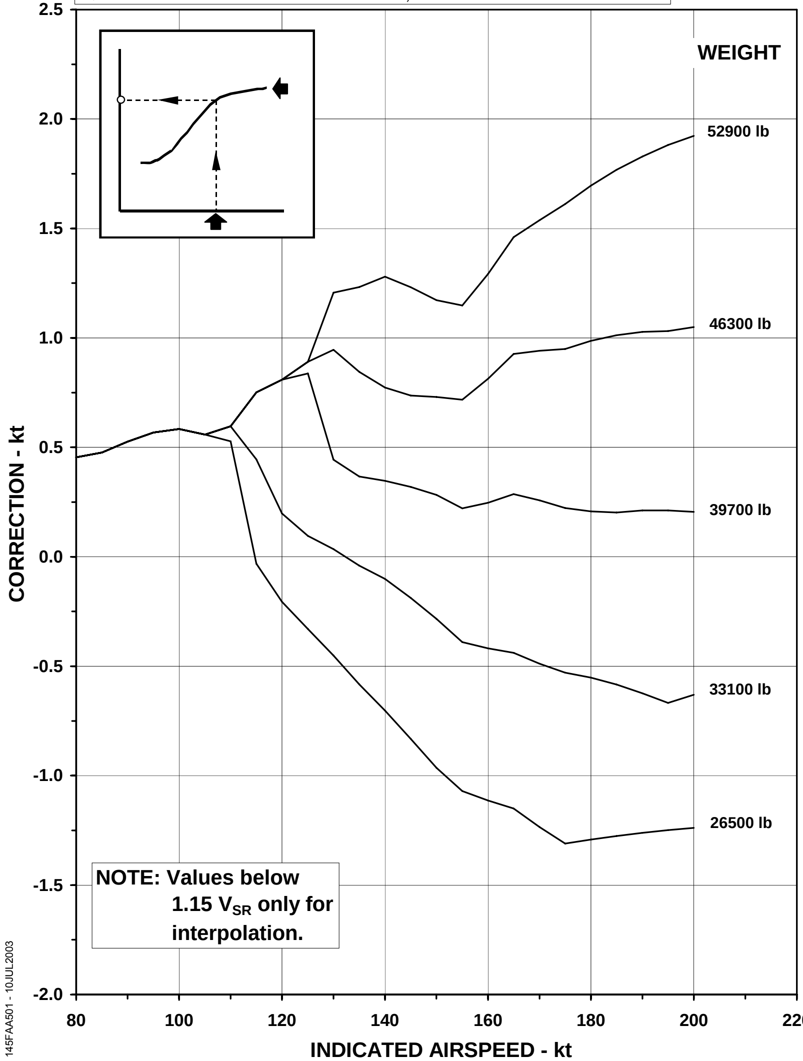
ALL EMB-145 MODELS EQUIPPED FOR RVSM OPERATIONS (POST-MOD. SB 145-34-0082 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED)



AFM-145/1153 - FAA

AIRSPEED POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GEAR DOWN - FLAPS 18° OR 22°

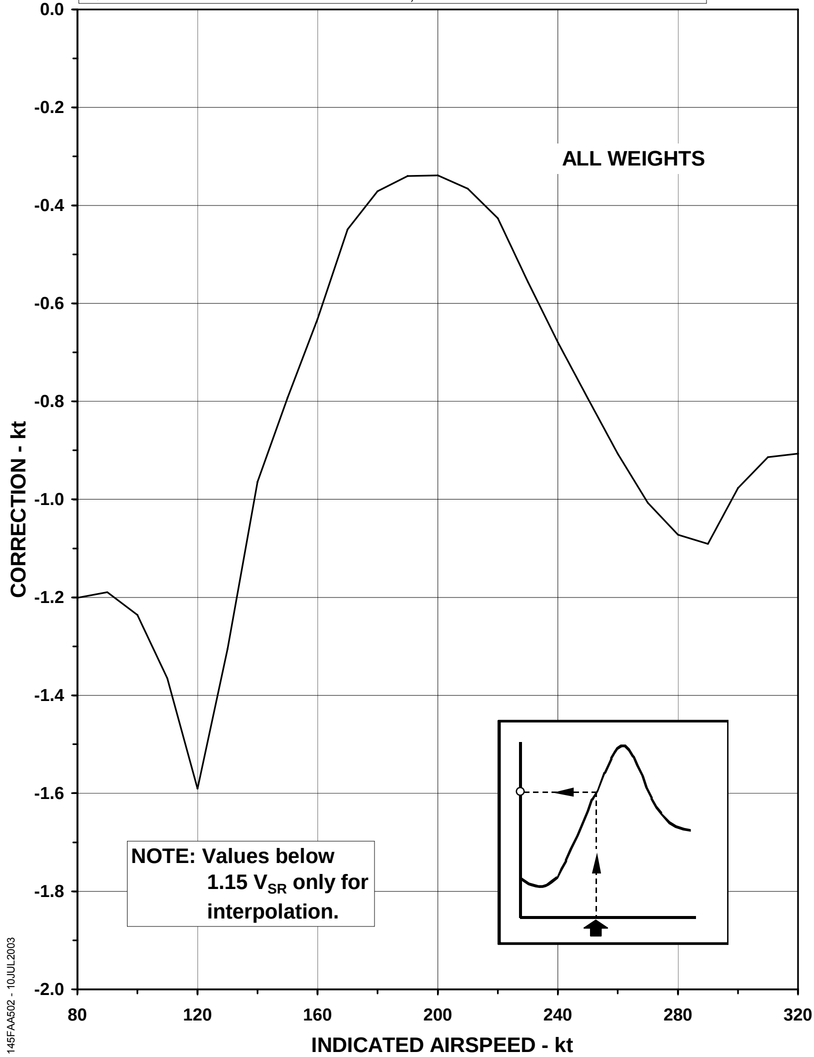
ALL EMB-145 MODELS EQUIPPED FOR RVSM OPERATIONS (POST-MOD. SB 145-34-0082 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED)



AIRSPEED POSITION ERROR CORRECTION PILOT'S AND COPILOT'S PITOTS

GEAR UP - FLAPS UP

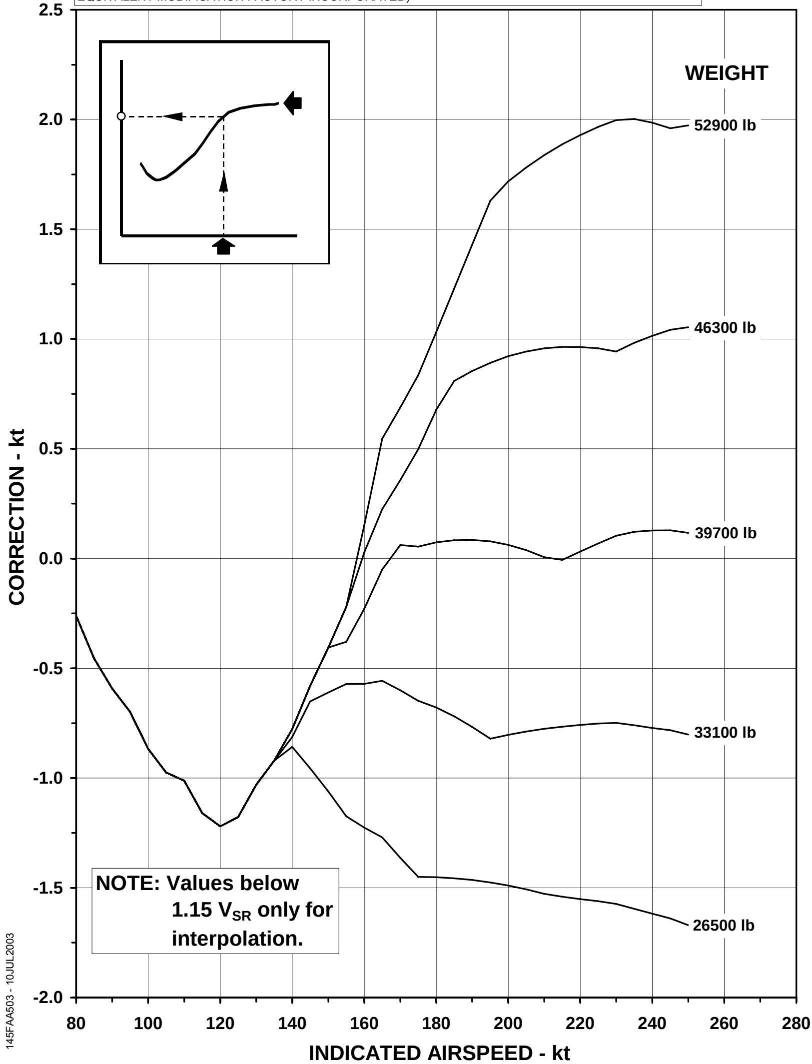
ALL EMB-145 MODELS EQUIPPED FOR RVSM OPERATIONS (POST-MOD. SB 145-34-0082 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED)



AIRSPEED POSITION ERROR CORRECTION PILOT'S AND COPILOT'S PITOTS

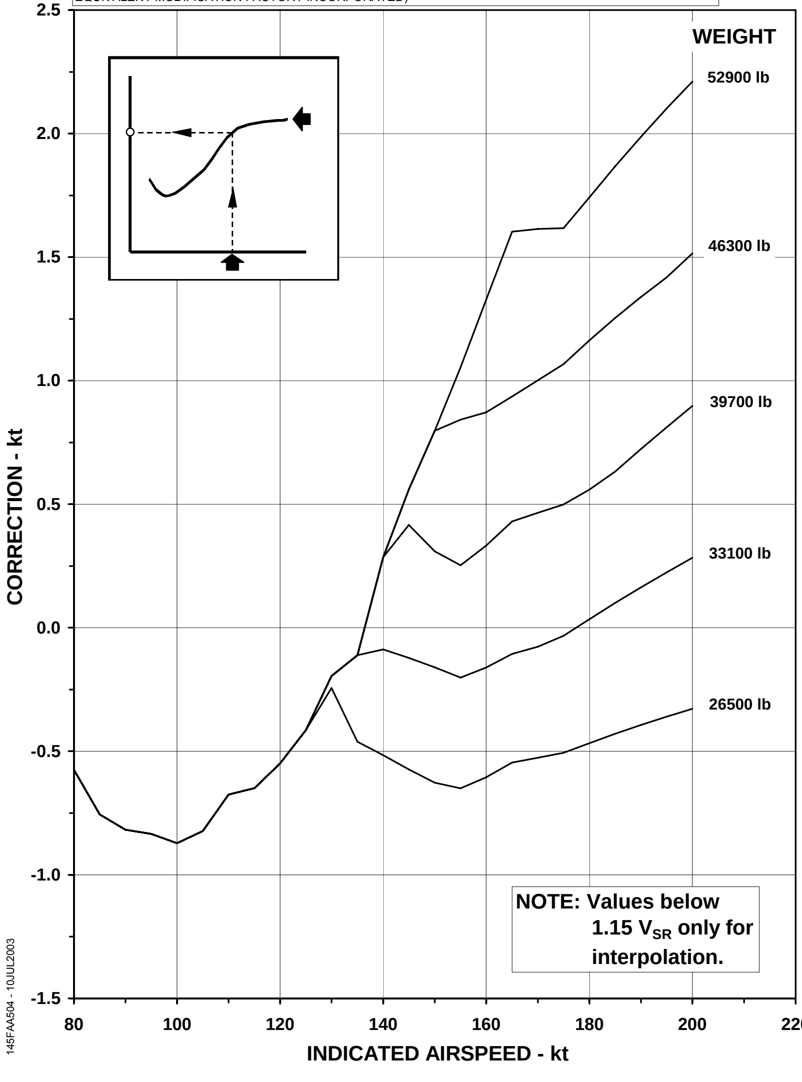
GEAR UP - FLAPS 9°

ALL EMB-145 MODELS EQUIPPED FOR RVSM OPERATIONS (POST-MOD. SB 145-34-0082 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED)



AIRSPEED POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GEAR UP - FLAPS 18° OR 22°

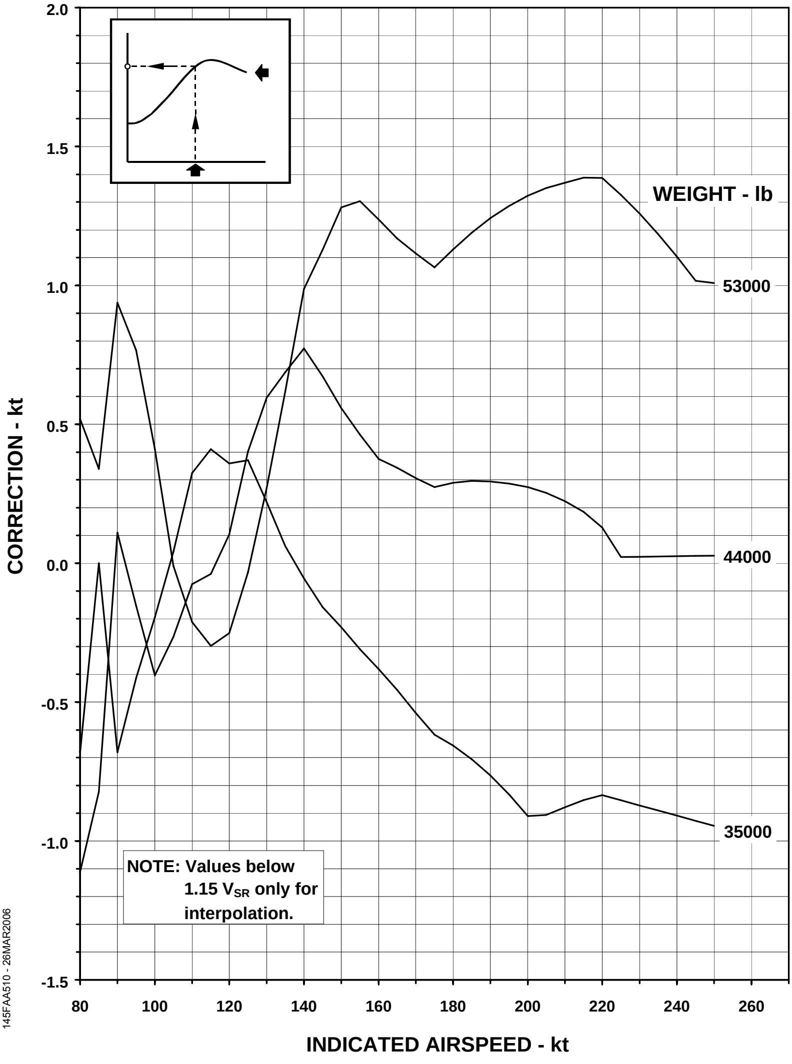
ALL EMB-145 MODELS EQUIPPED FOR RVSM OPERATIONS (POST-MOD. SB 145-34-0082 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED)



AFM-145/1153 - FAA

AIRSPEED POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GEAR DOWN - FLAPS 9°

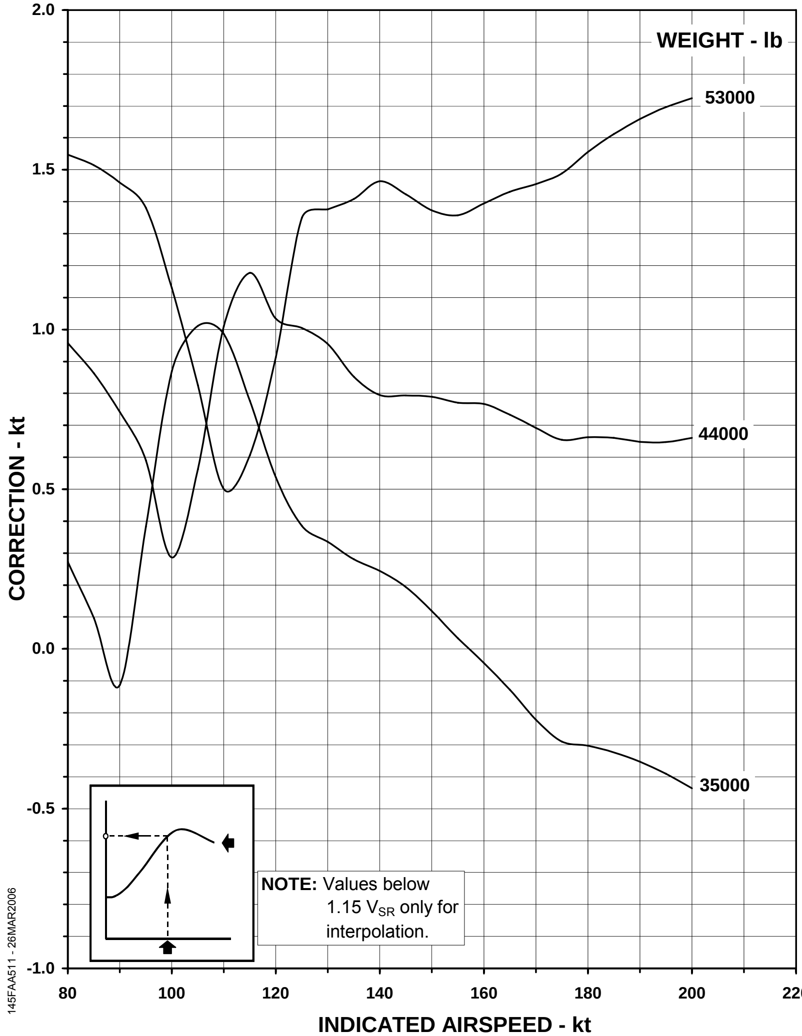
AIRPLANES NOT EQUIPPED FOR RVSM OPERATIONS (PRE-MOD. SB 145-34-0082)



AIRSPEED POSITION ERROR CORRECTION

PILOT'S AND COPILOT'S PITOTS
GEAR DOWN - FLAPS 18° OR 22°

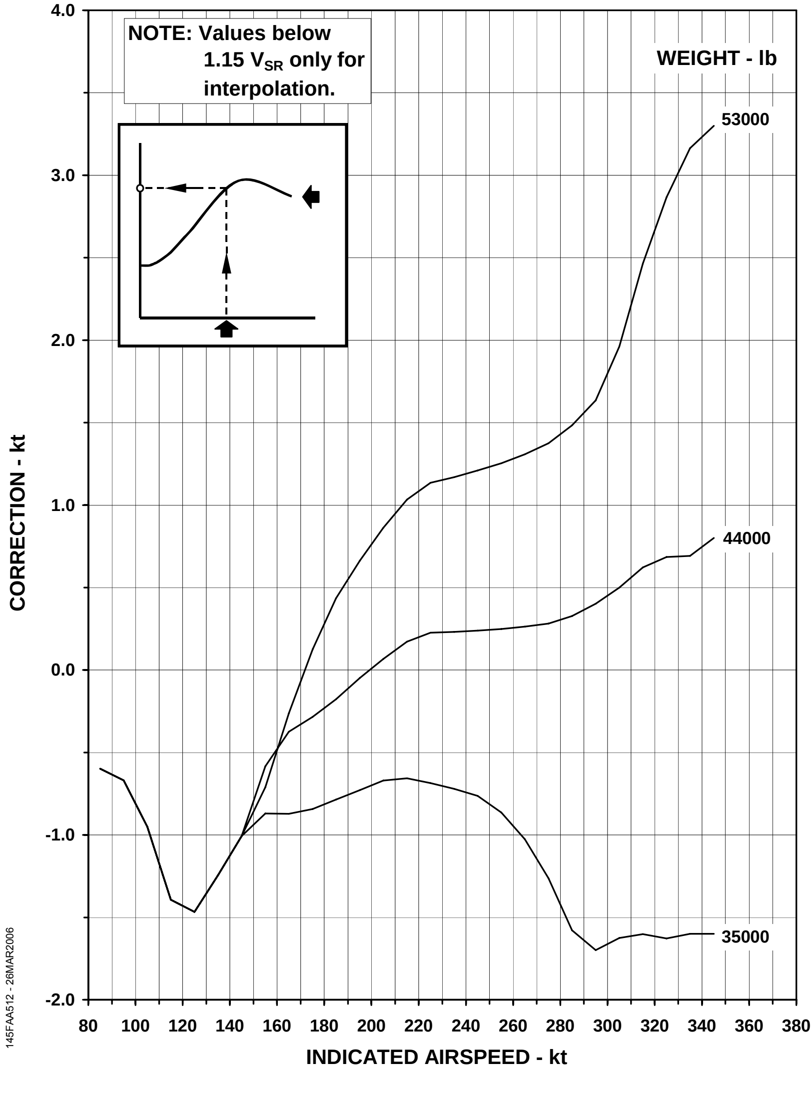
AIRPLANES NOT EQUIPPED FOR RVSM OPERATIONS (PRE-MOD. SB 145-34-0082)



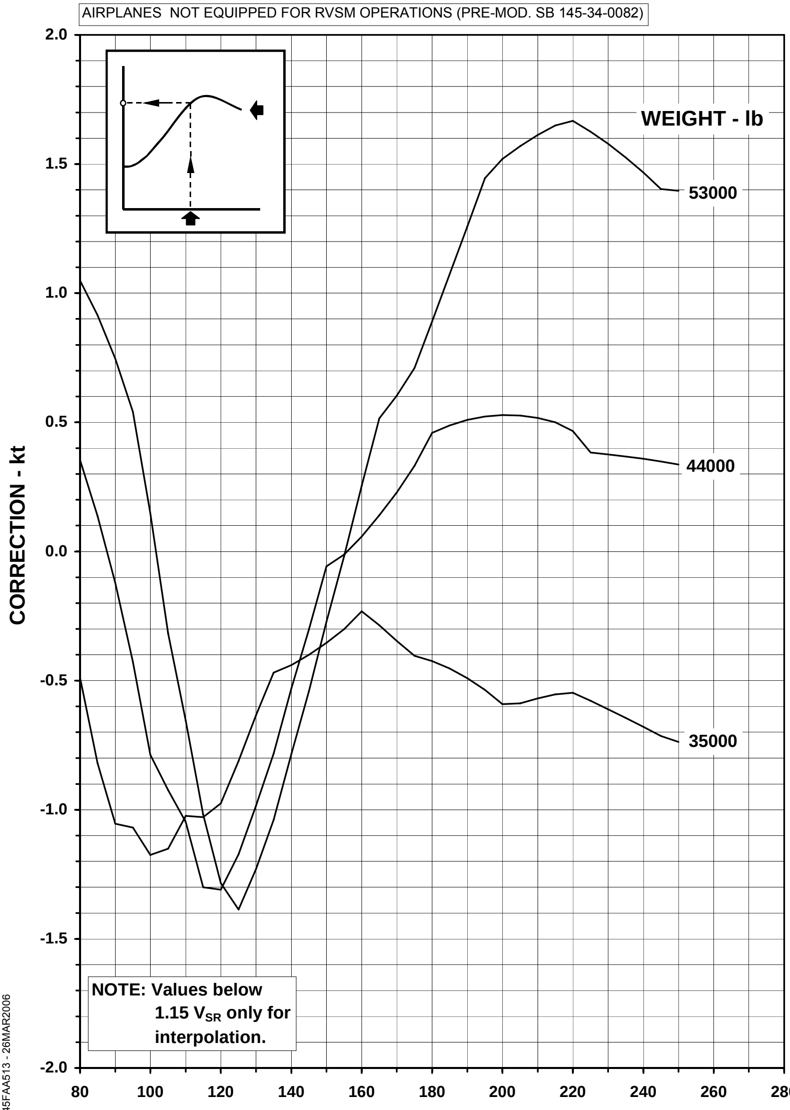
AFM-145/1153 - FAA

AIRSPEED POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GEAR UP - FLAPS UP

AIRPLANES NOT EQUIPPED FOR RVSM OPERATIONS (PRE-MOD. SB 145-34-0082)



AIRSPEED POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GEAR UP - FLAPS 9°



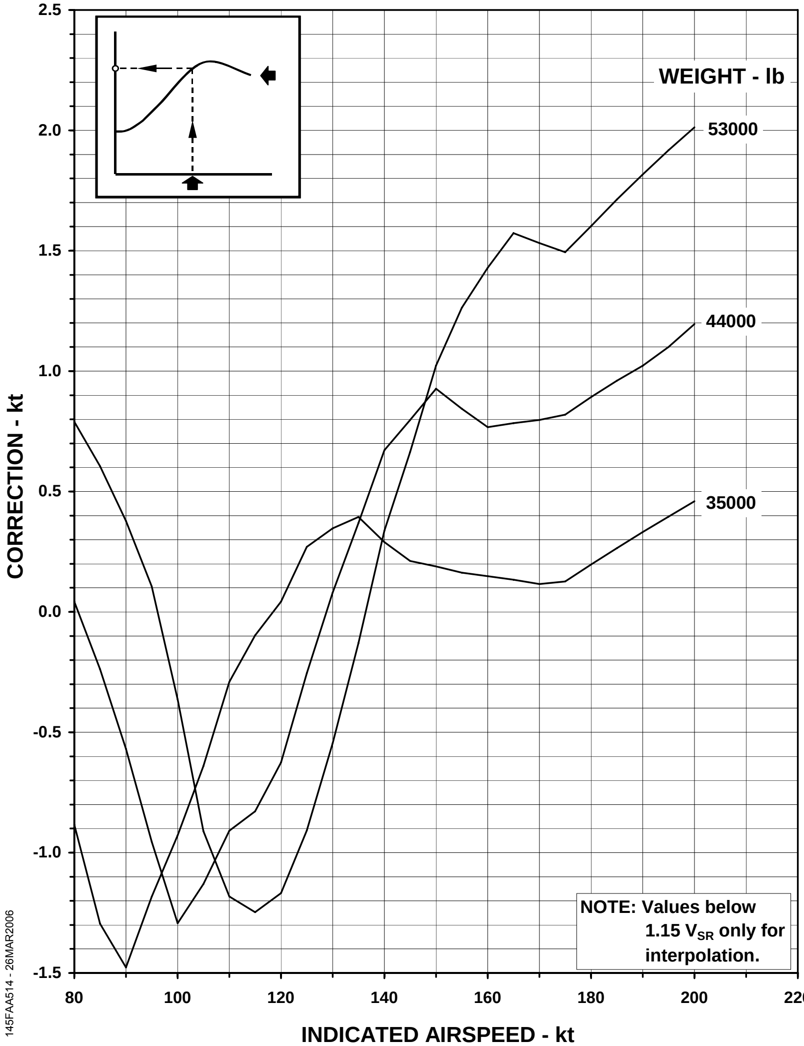
AFM-145/1153 - FAA

AIRSPEED POSITION ERROR CORRECTION

PILOT'S AND COPILOT'S PITOTS

GEAR UP - FLAPS 18° OR 22°

AIRPLANES NOT EQUIPPED FOR RVSM OPERATIONS (PRE-MOD. SB 145-34-0082)



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ALTITUDE POSITION ERROR CORRECTION CHARTS

USE

Enter the appropriate chart with indicated airspeed, the indicated pressure altitude, and weight (when applicable) considering the appropriate airplane configuration and pitot (standby, or pilot and copilot), to read the altimetric correction. The true pressure altitude will be the indicated pressure altitude minus the altimetric correction.

EXAMPLE

Given:

Standby Pitot
Indicated Airspeed .... 235 KIAS
Gear .... DOWN
Flaps .... 9°
Altitude .... 20000 ft
Airplane .... Pre-Mod. SB 145-34-0054

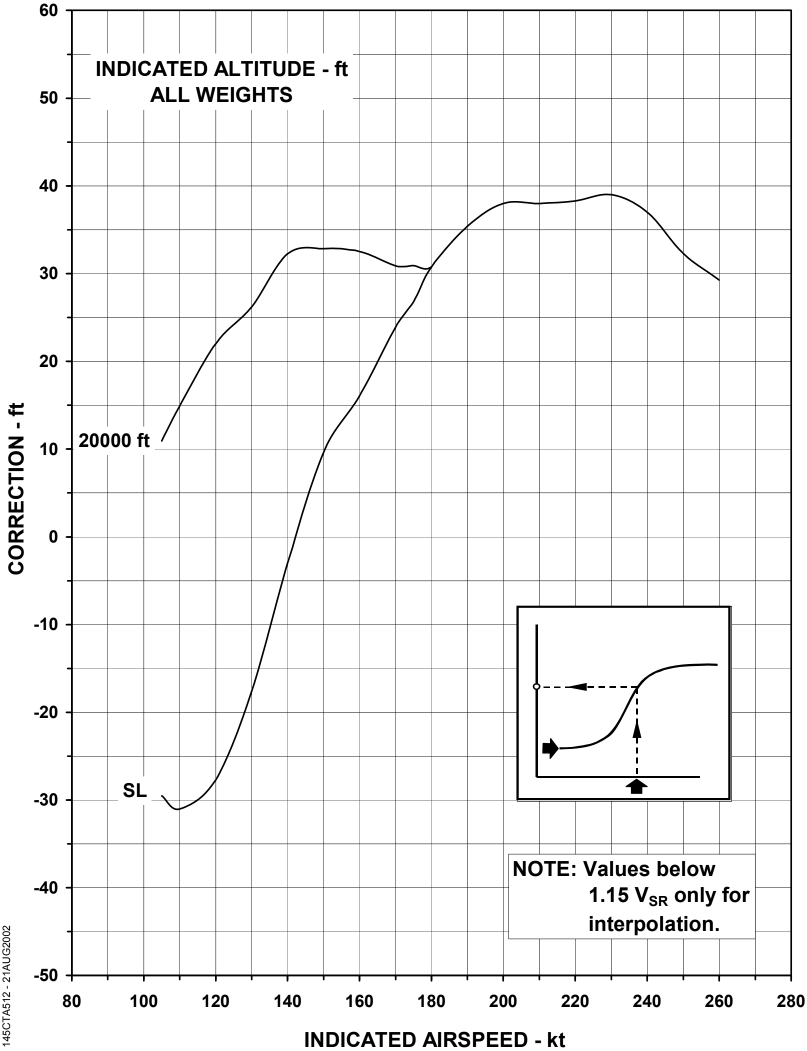
Determine:

Altimetric correction .... 95 ft
True Pressure Altitude .... 19905 ft

ALTITUDE POSITION ERROR CORRECTION STANDBY PITOT

GEAR DOWN - FLAPS 9° and 22°

AIRPLANES POST-MOD. SB 145-34-0054 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED



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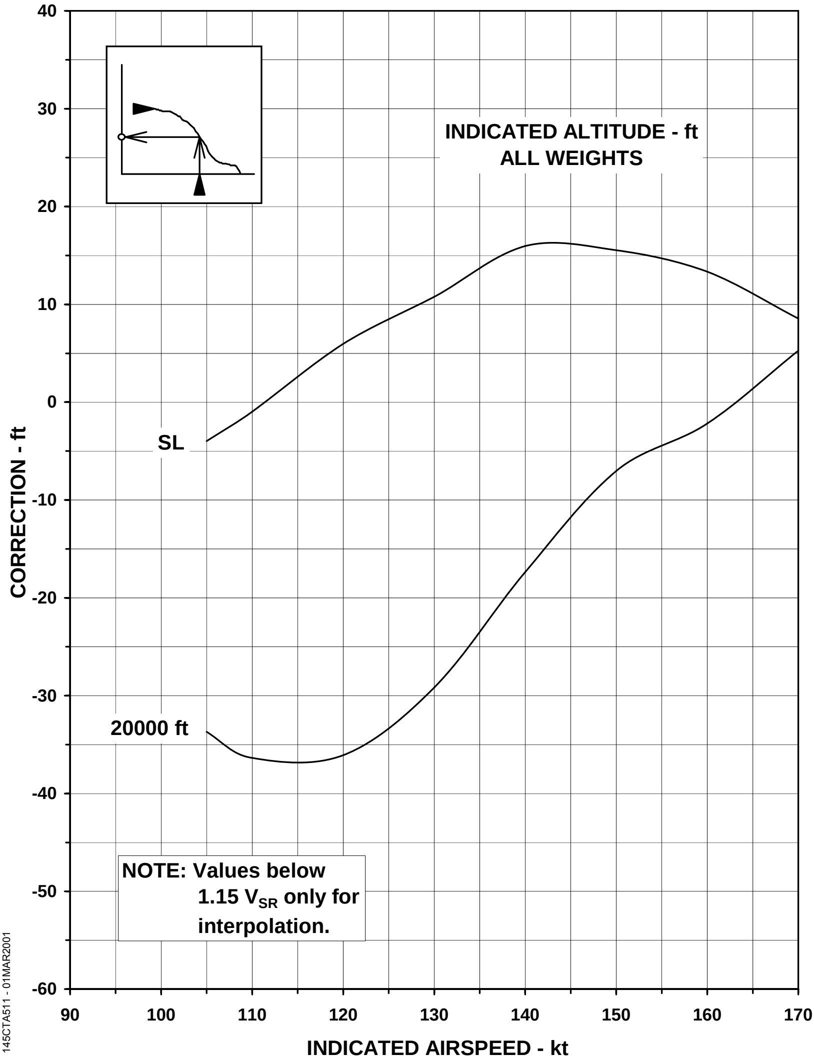
AFM-145/1153 - FAA

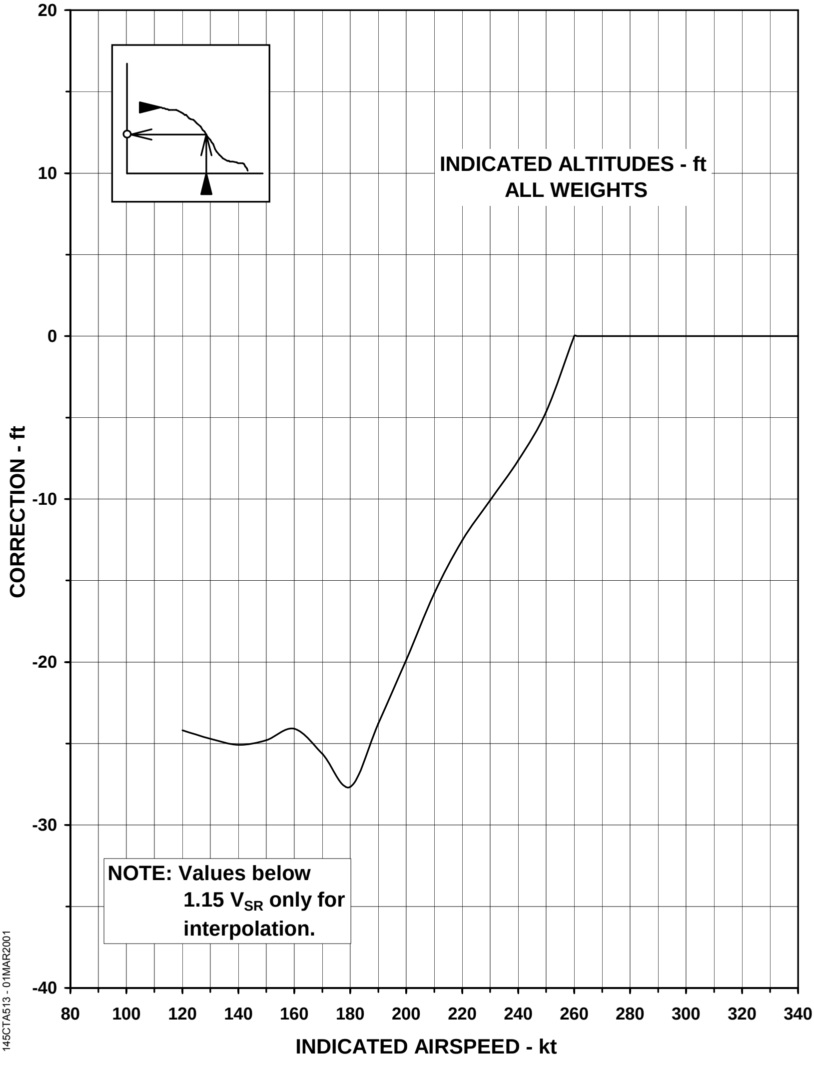
ALTITUDE POSITION ERROR CORRECTION
STANDBY PITOT
GEAR DOWN - FLAPS 45°

AIRPLANES POST-MOD. SB 145-34-0054 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED



ALTITUDE POSITION ERROR CORRECTION
STANDBY PITOT
GEAR UP - FLAPS UP

AIRPLANES POST-MOD. SB 145-34-0054 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED

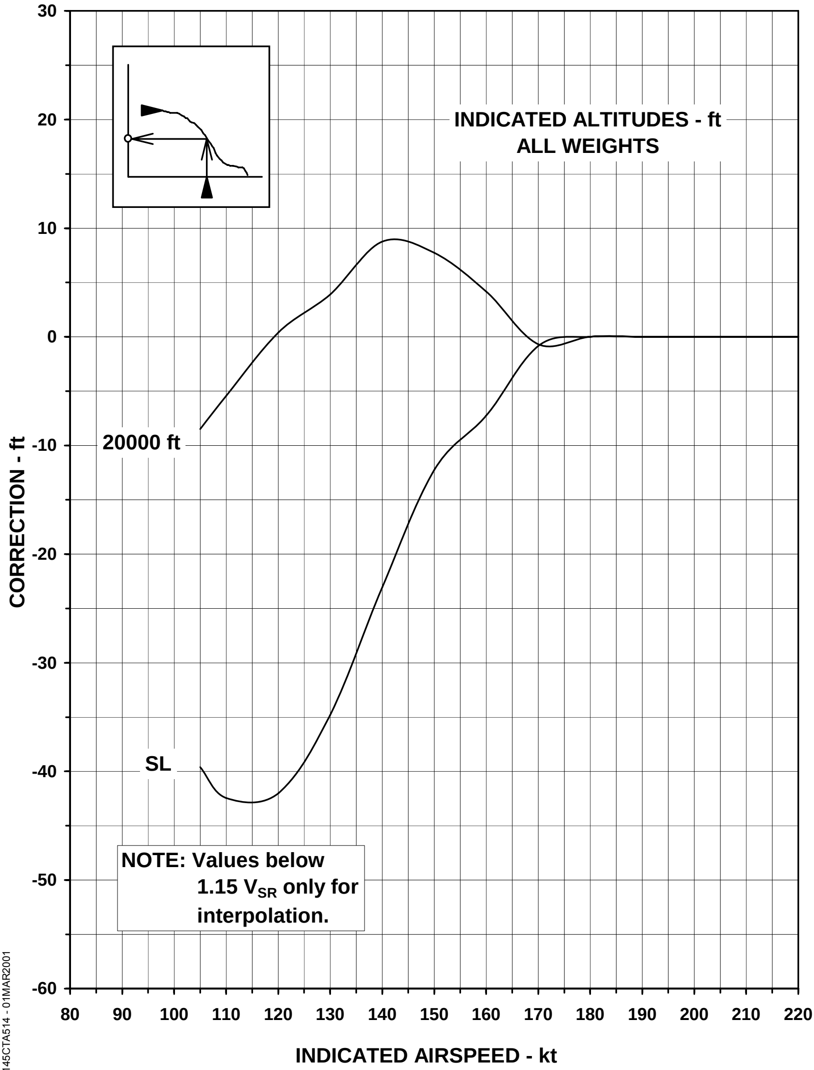


AFM-145/1153 - FAA

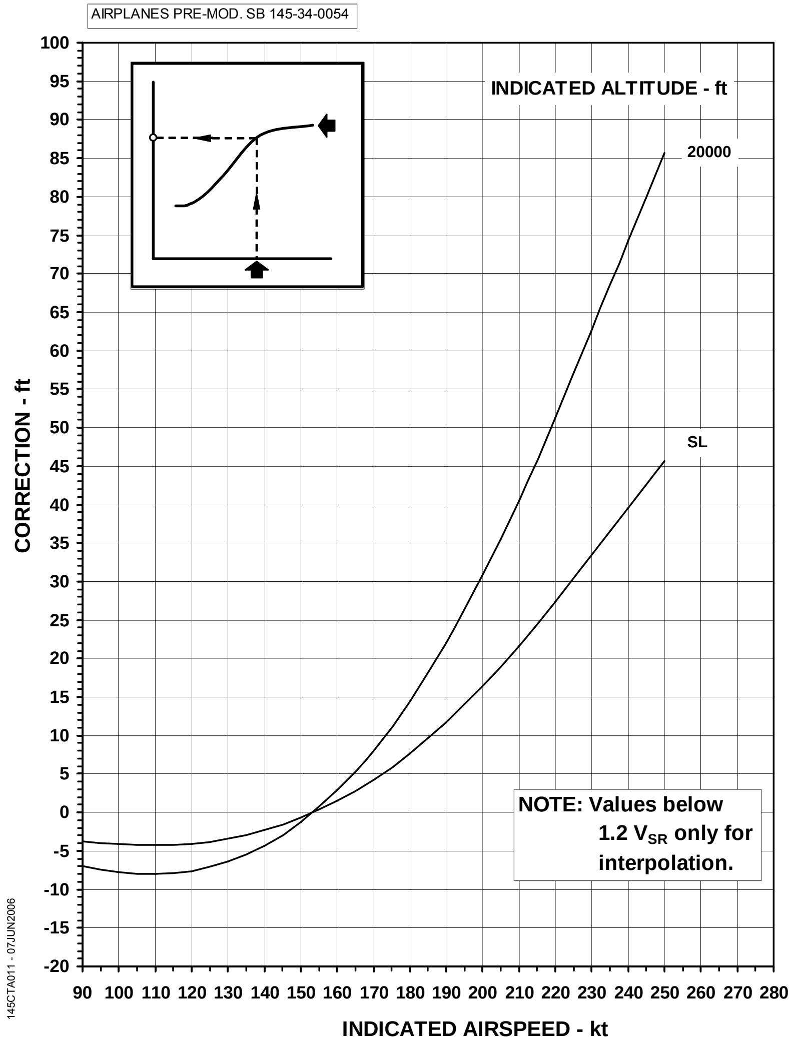
ALTITUDE POSITION ERROR CORRECTION STANDBY PITOT

GEAR UP - FLAPS 9° and 22°

AIRPLANES POST-MOD. SB 145-34-0054 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED

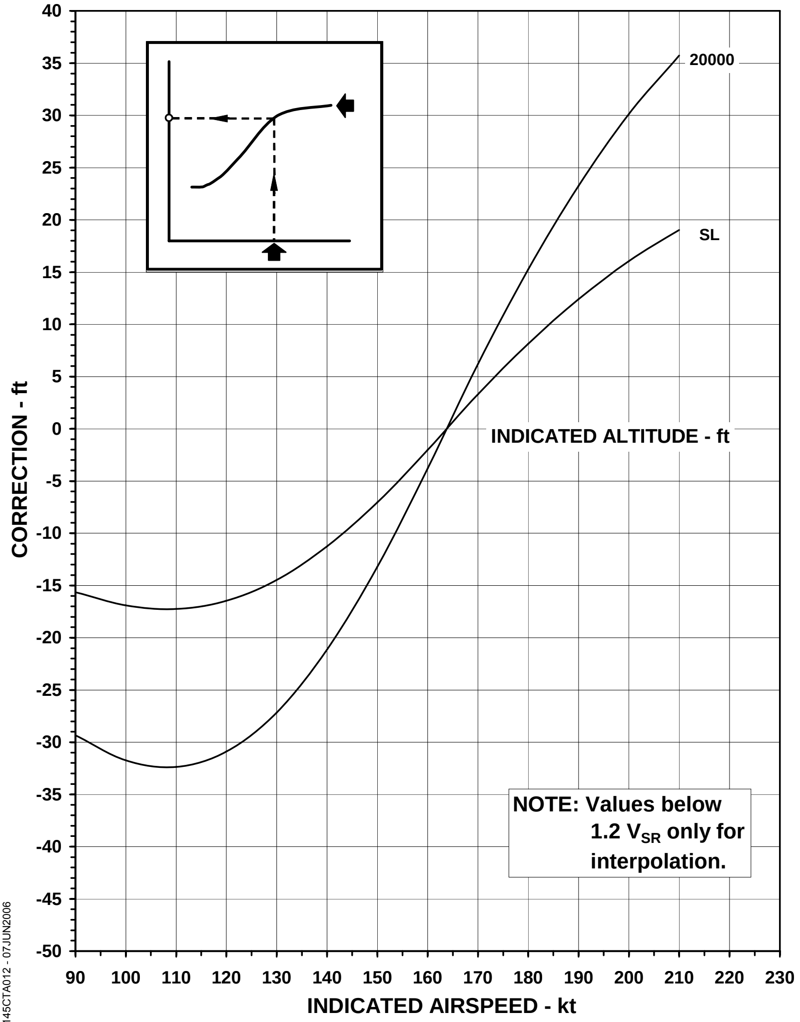


ALTITUDE POSITION ERROR CORRECTION
STANDBY PITOT
GEAR DOWN - FLAPS 9°



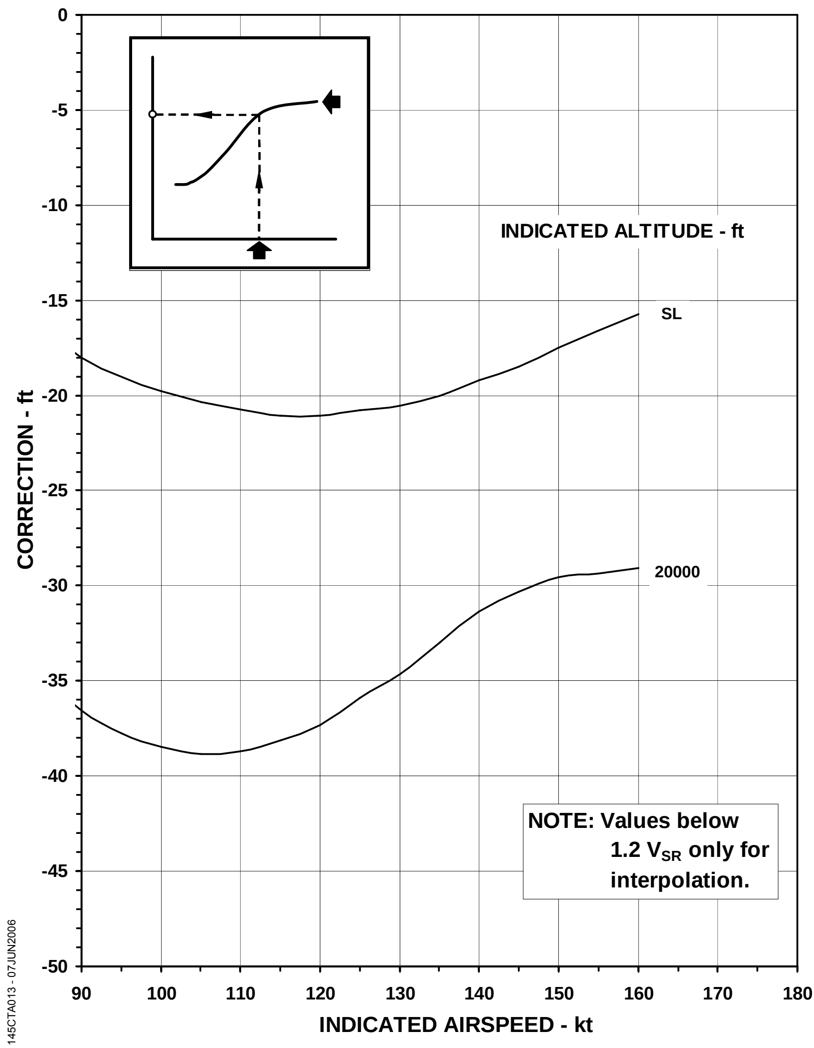
ALTITUDE POSITION ERROR CORRECTION
STANDBY PITOT
GEAR DOWN - FLAPS 18° OR 22°

AIRPLANES PRE-MOD. SB 145-34-0054



ALTITUDE POSITION ERROR CORRECTION
STANDBY PITOT
GEAR DOWN - FLAPS 45°

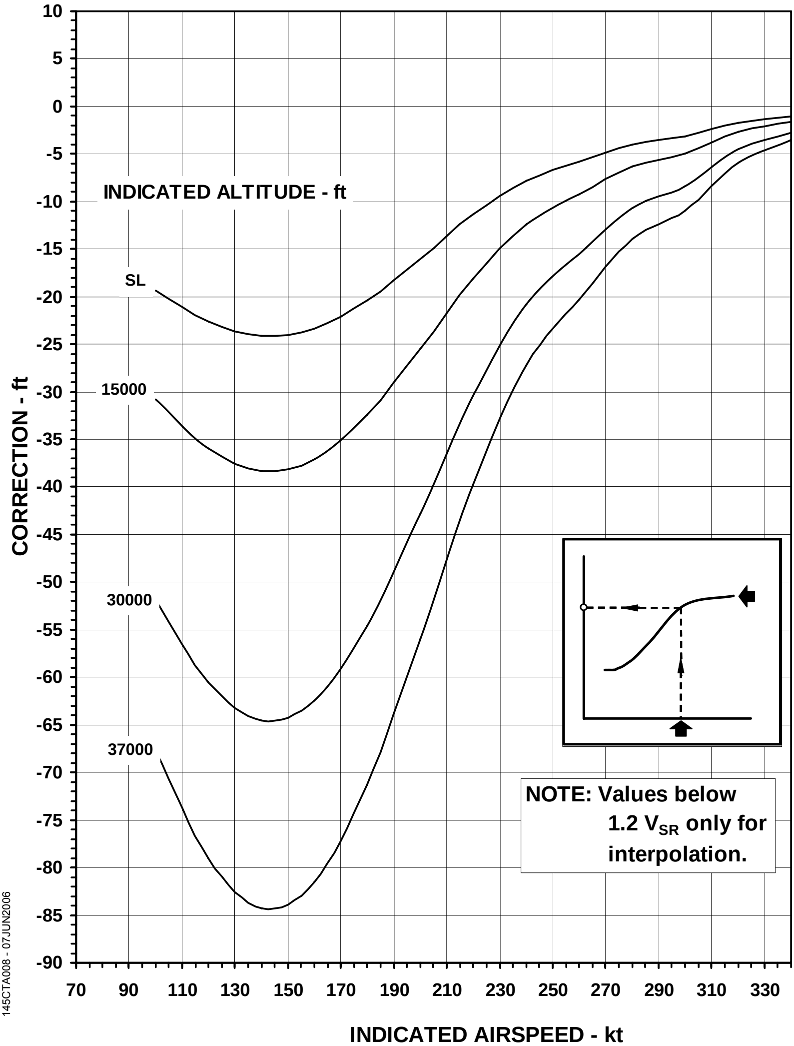
AIRPLANES PRE-MOD. SB 145-34-0054



AFM-145/1153 - FAA

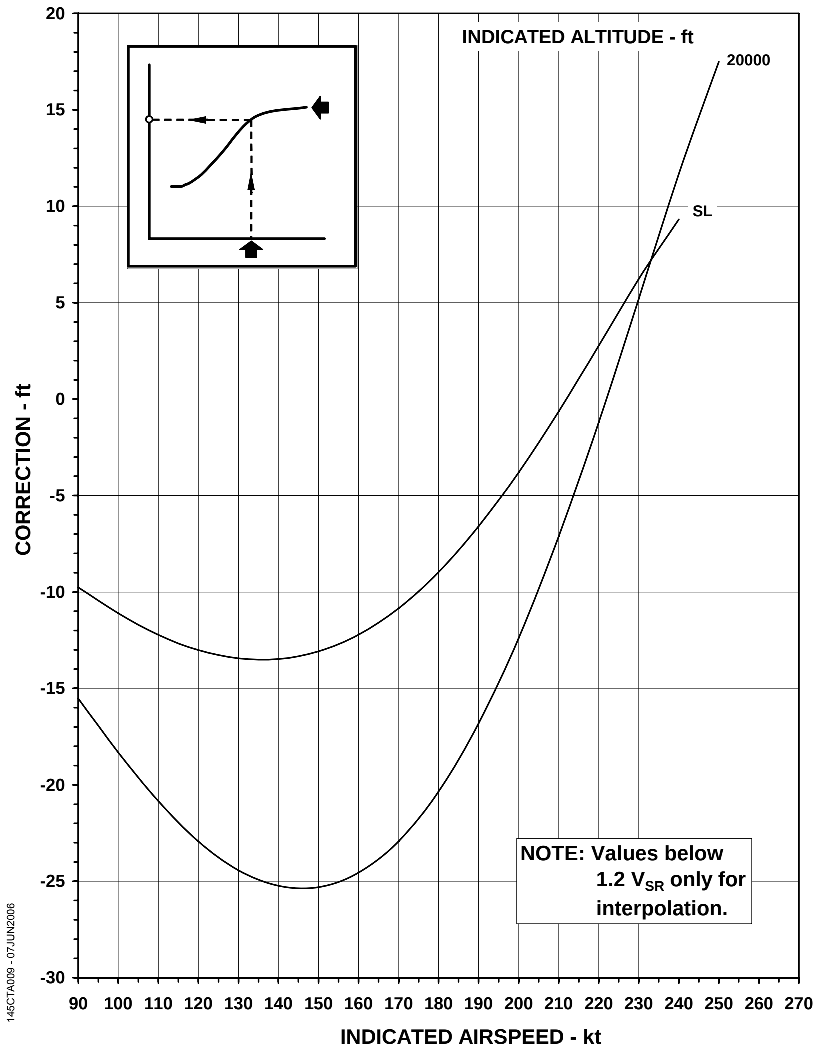
ALTITUDE POSITION ERROR CORRECTION
STANDBY PITOT
GEAR UP - FLAPS UP

AIRPLANES PRE-MOD. SB 145-34-0054



ALTITUDE POSITION ERROR CORRECTION
STANDBY PITOT
GEAR UP - FLAPS 9°

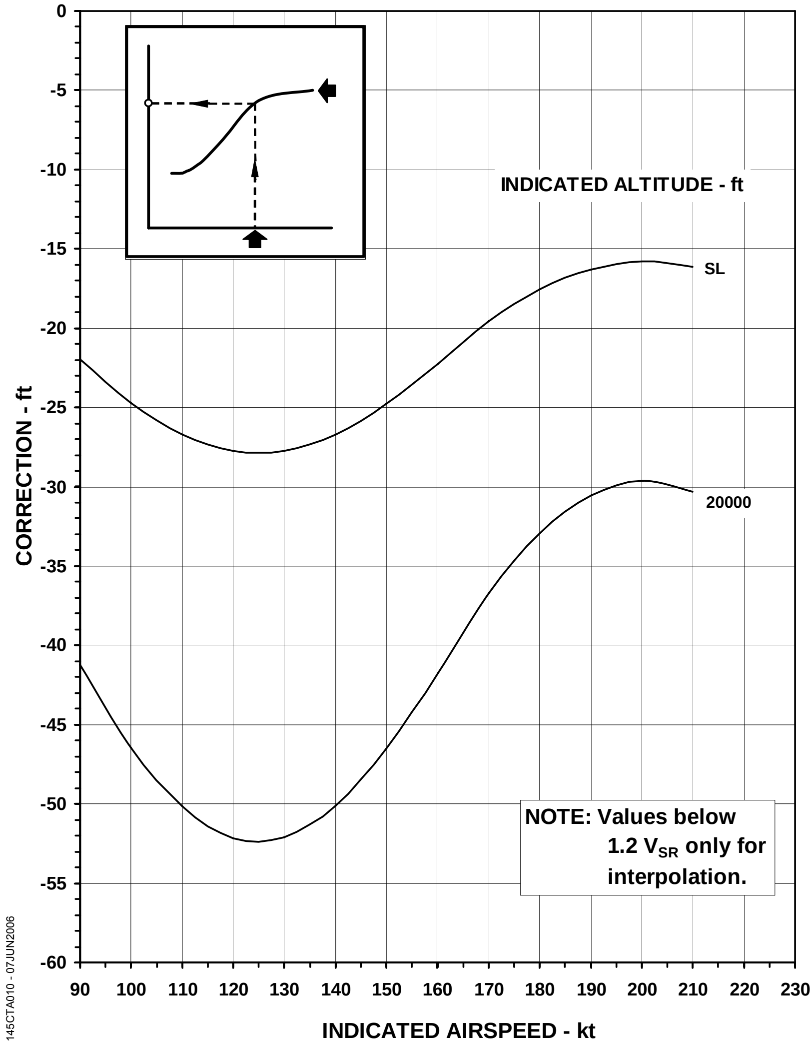
AIRPLANES PRE-MOD. SB 145-34-0054



AFM-145/1153 - FAA

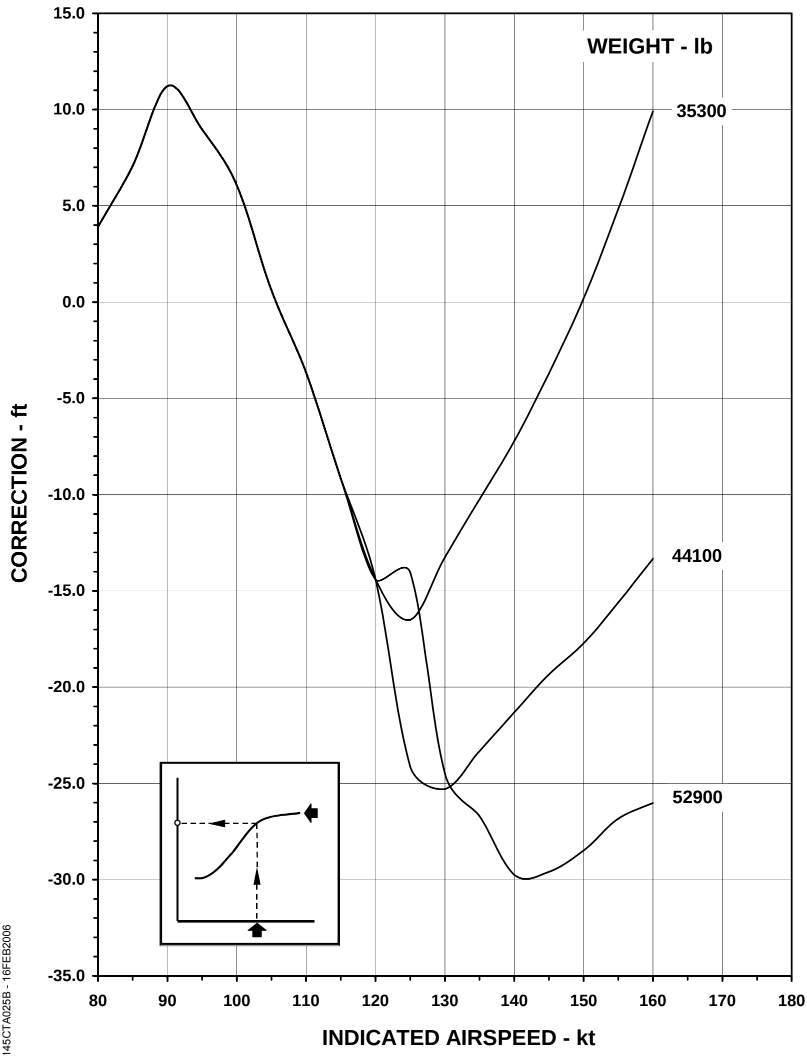
ALTITUDE POSITION ERROR CORRECTION STANDBY PITOT
GEAR UP - FLAPS 18° OR 22°

AIRPLANES PRE-MOD. SB 145-34-0054



ALTITUDE POSITION ERROR CORRECTION

PILOT'S AND COPILOT'S PITOTS
GEAR DOWN - FLAPS 45°

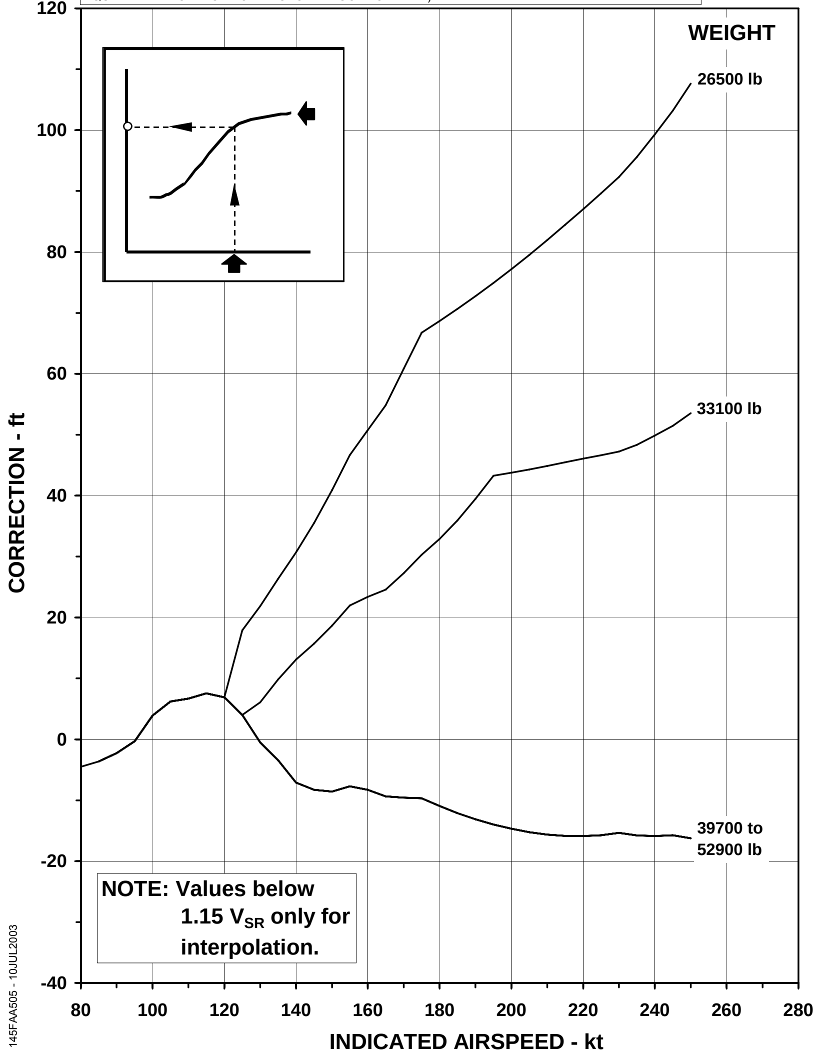


AFM-145/1153 - FAA

ALTITUDE POSITION ERROR CORRECTION PILOT'S AND COPILOT'S PITOTS

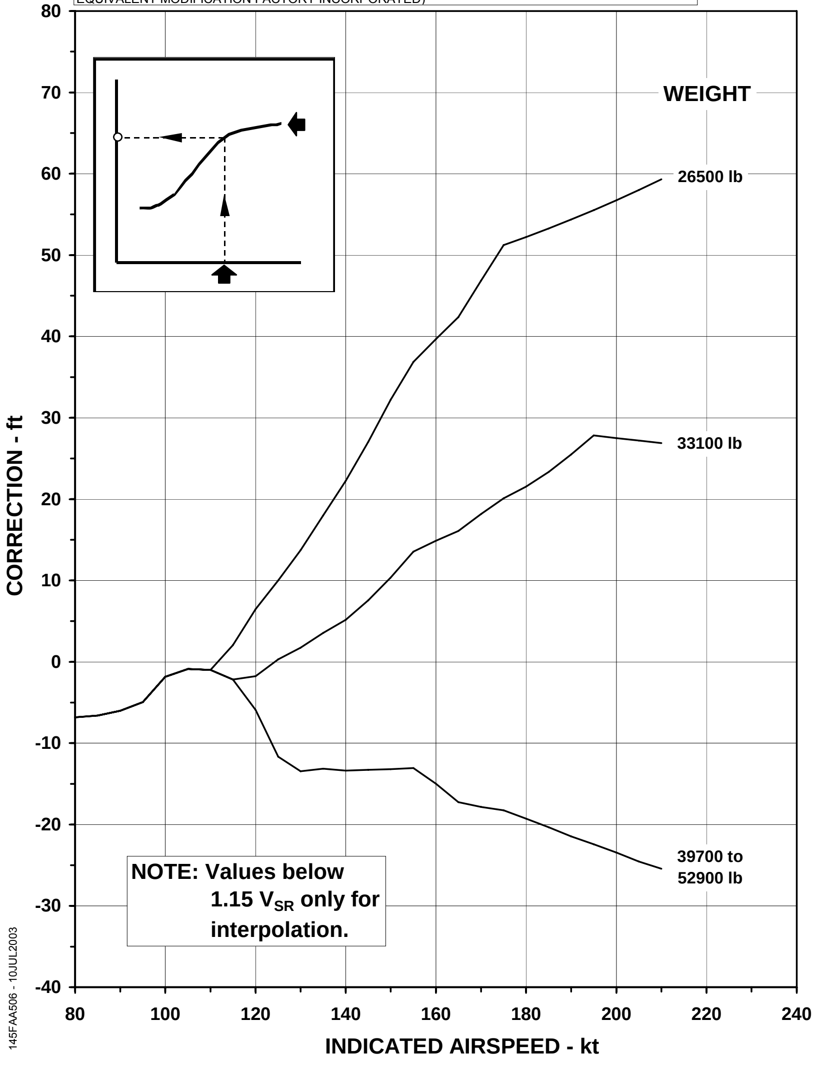
GEAR DOWN - FLAPS 9°

ALL EMB-145 MODELS EQUIPPED FOR RVSM OPERATIONS (POST-MOD. SB 145-34-0082 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED)



ALTITUDE POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GEAR DOWN - FLAPS 18° OR 22°

ALL EMB-145 MODELS EQUIPPED FOR RVSM OPERATIONS (POST-MOD. SB 145-34-0082 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED)

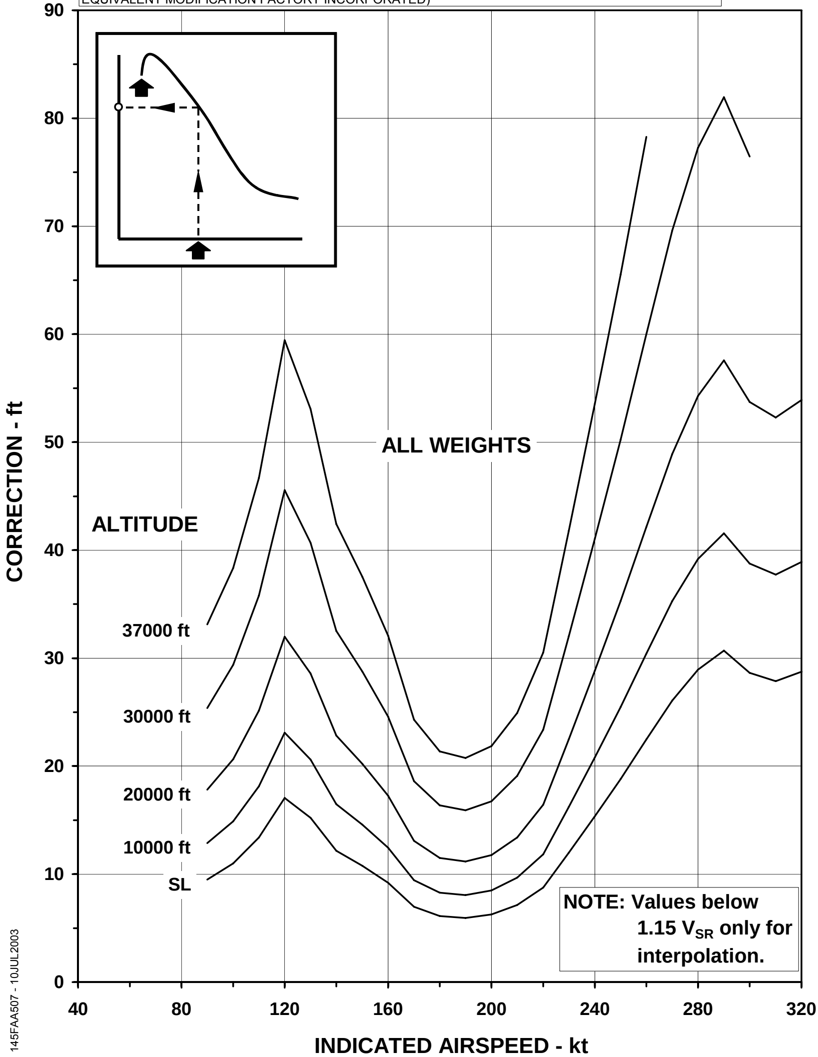


AFM-145/1153 - FAA

ALTITUDE POSITION ERROR CORRECTION PILOT'S AND COPILOT'S PITOTS

GEAR UP - FLAPS UP

ALL EMB-145 MODELS EQUIPPED FOR RVSM OPERATIONS (POST-MOD. SB 145-34-0082 OR WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED)



ALTITUDE POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GEAR UP - FLAPS 9°

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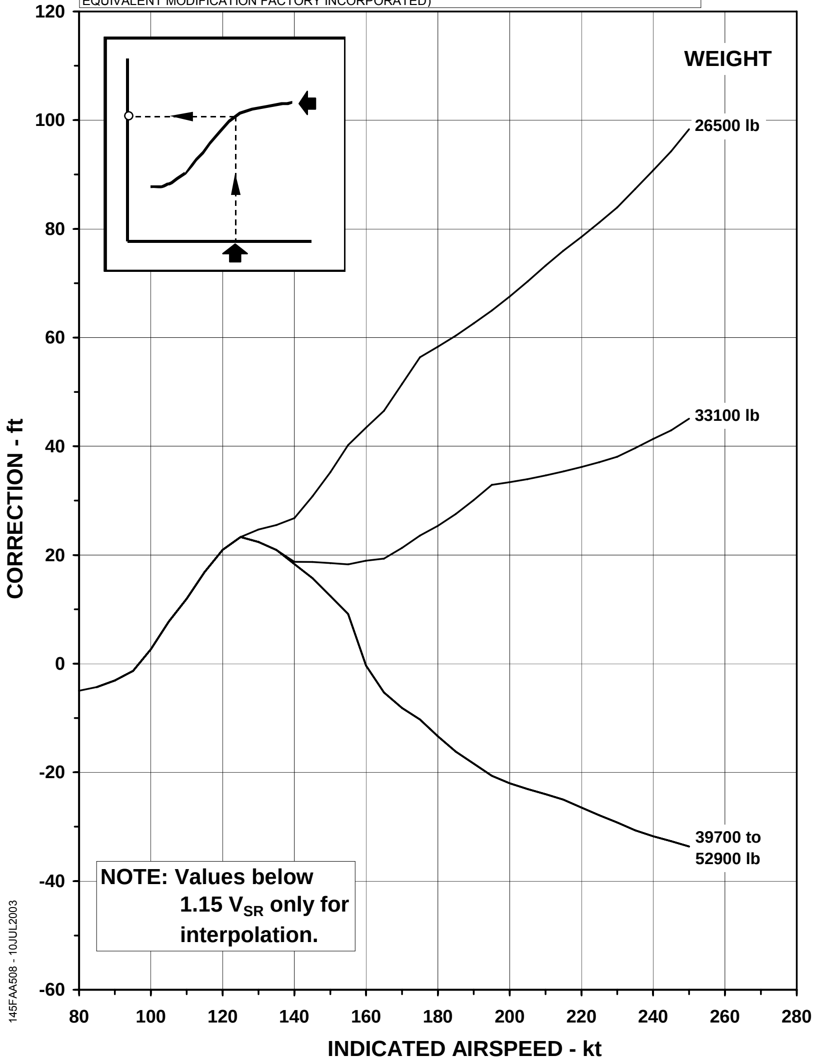

ALTITUDE POSITION ERROR CORRECTION PILOT'S AND COPILOT'S PITOTS

GEAR UP - FLAPS 18° OR 22°

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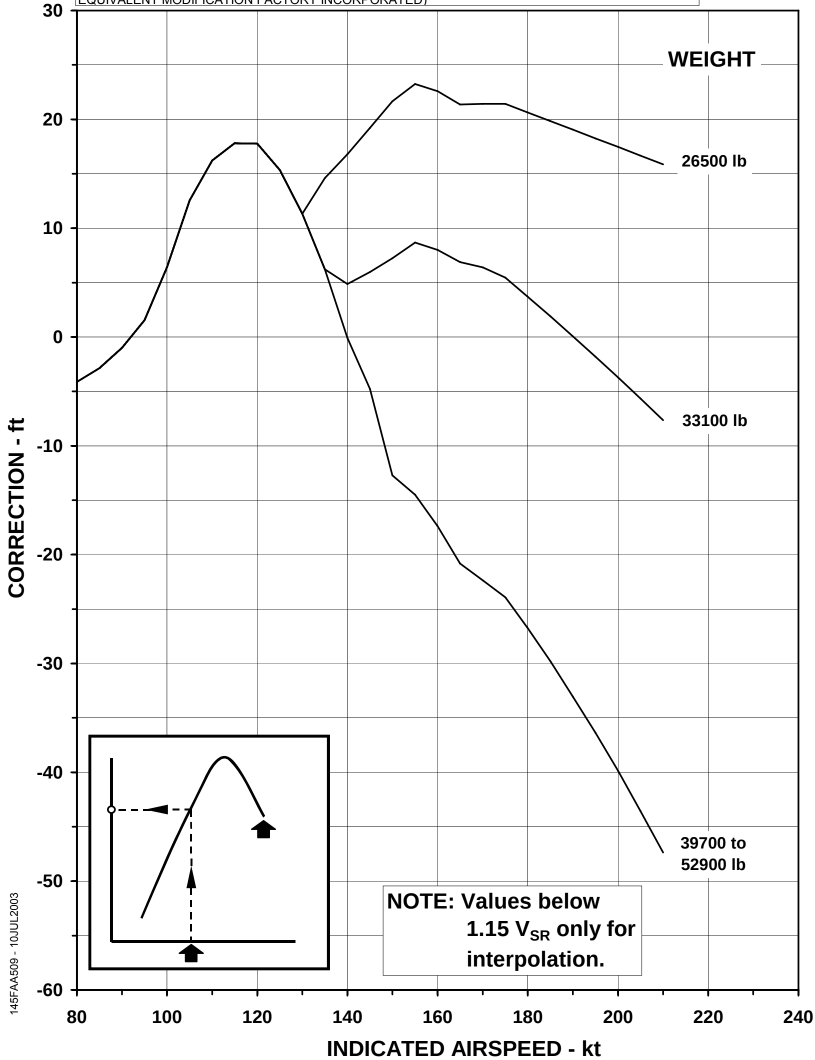
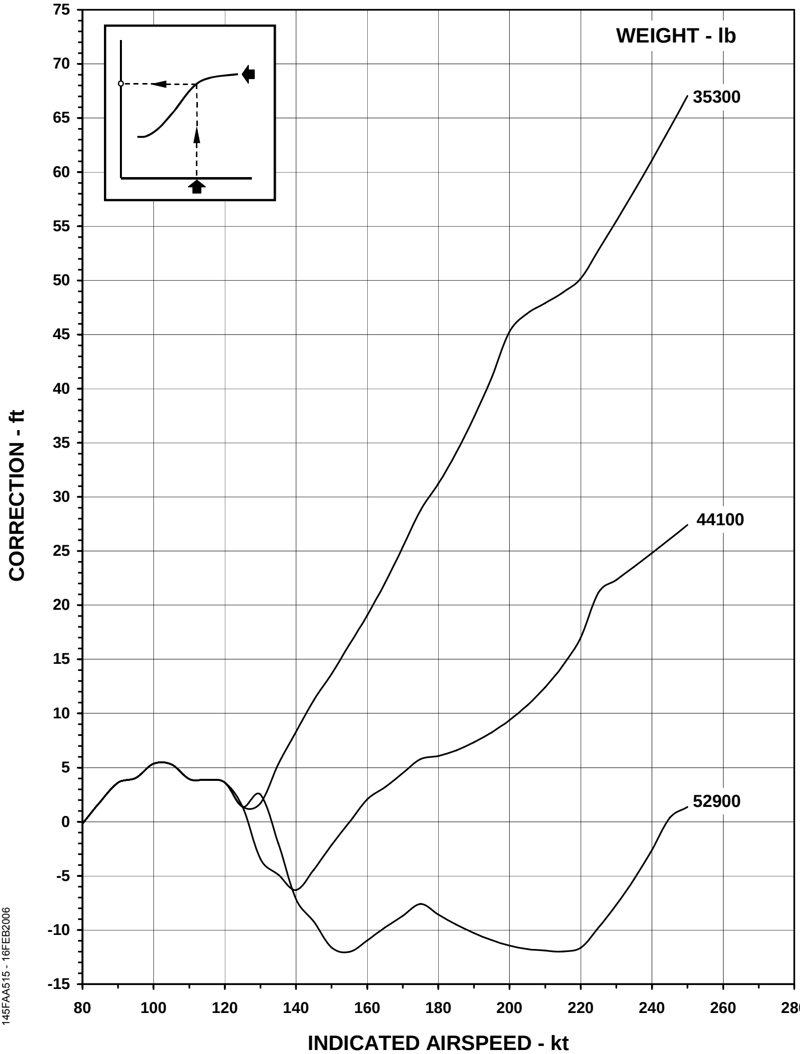


ALTITUDE POSITION ERROR CORRECTION

PILOT'S AND COPILOT'S PITOTS

GEAR DOWN - FLAPS 9°

AIRPLANES NOT EQUIPPED FOR RVSM OPERATIONS (PRE-MOD. SB 145-34-0082)



AFM-145/1153 - FAA

ALTITUDE POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GEAR DOWN - FLAPS 18° OR 22°

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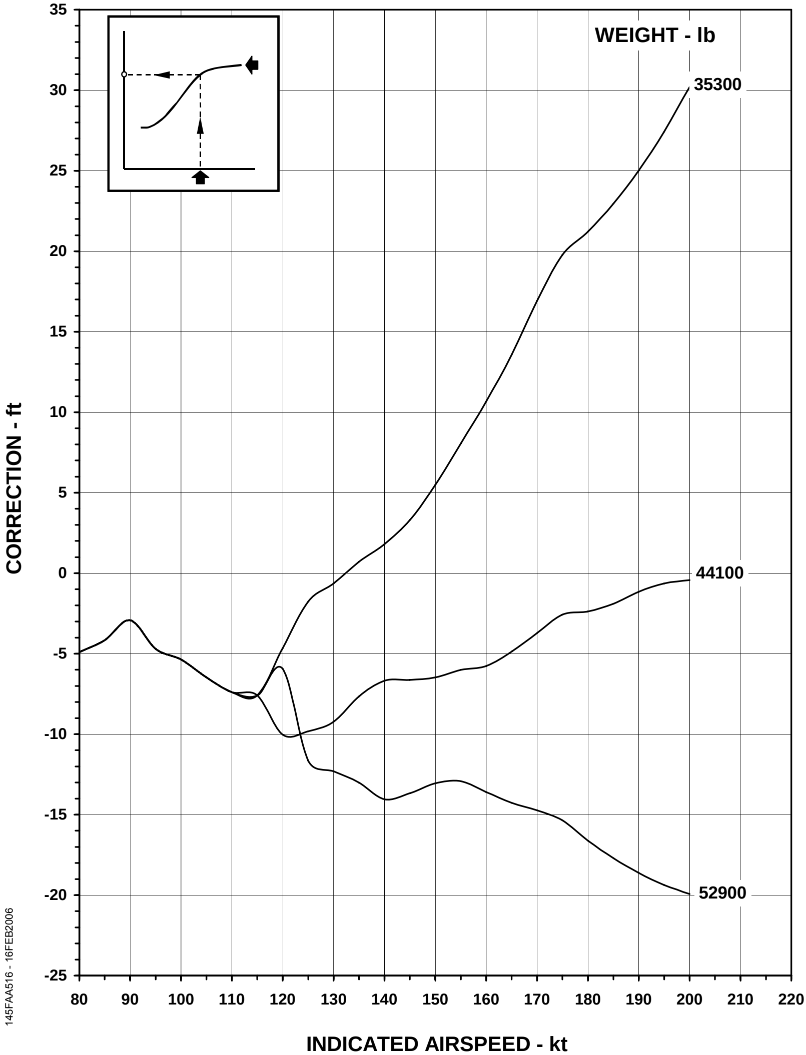
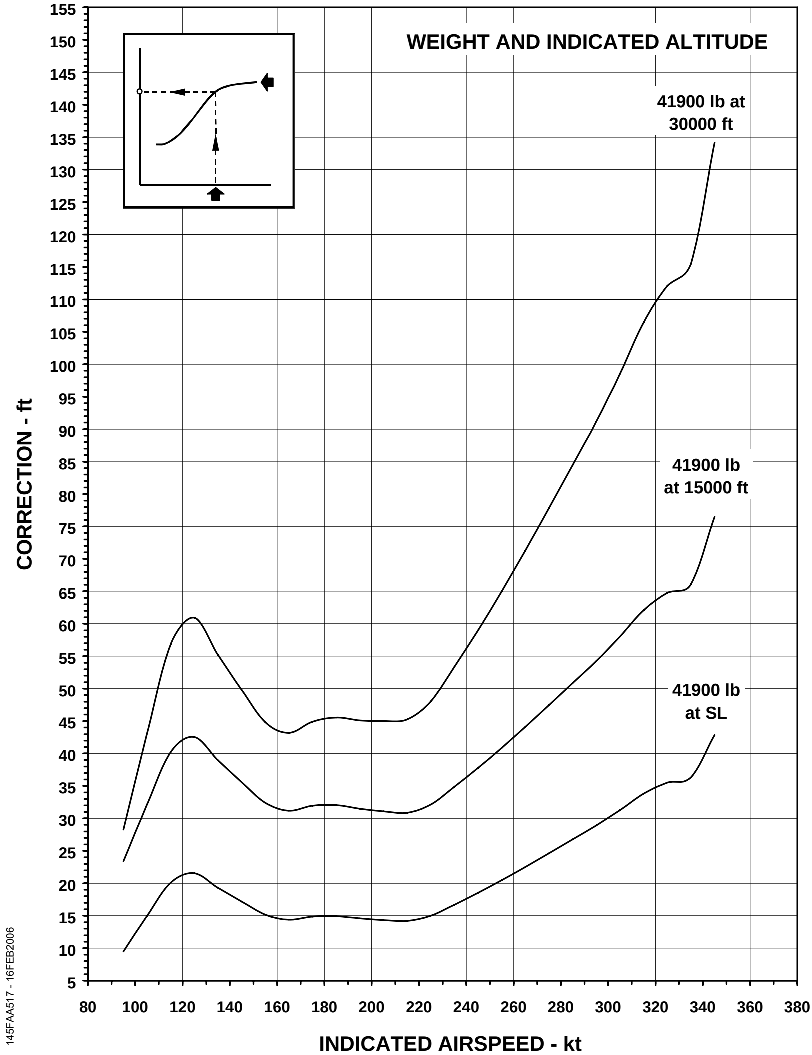


ALTITUDE POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GEAR UP - FLAPS UP

AIRPLANES NOT EQUIPPED FOR RVSM OPERATIONS (PRE-MOD. SB 145-34-0082)



AFM-145/1153 - FAA

ALTITUDE POSITION ERROR CORRECTION
PILOT'S AND COPILOT'S PITOTS
GEAR UP - FLAPS 9°

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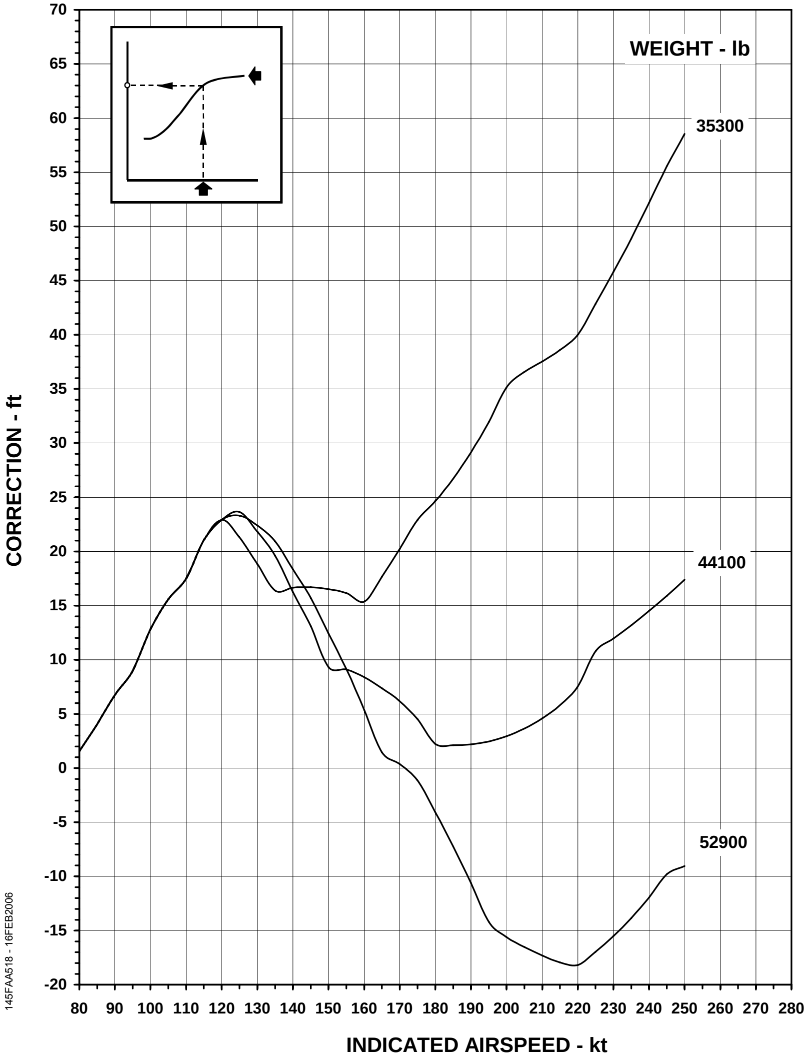
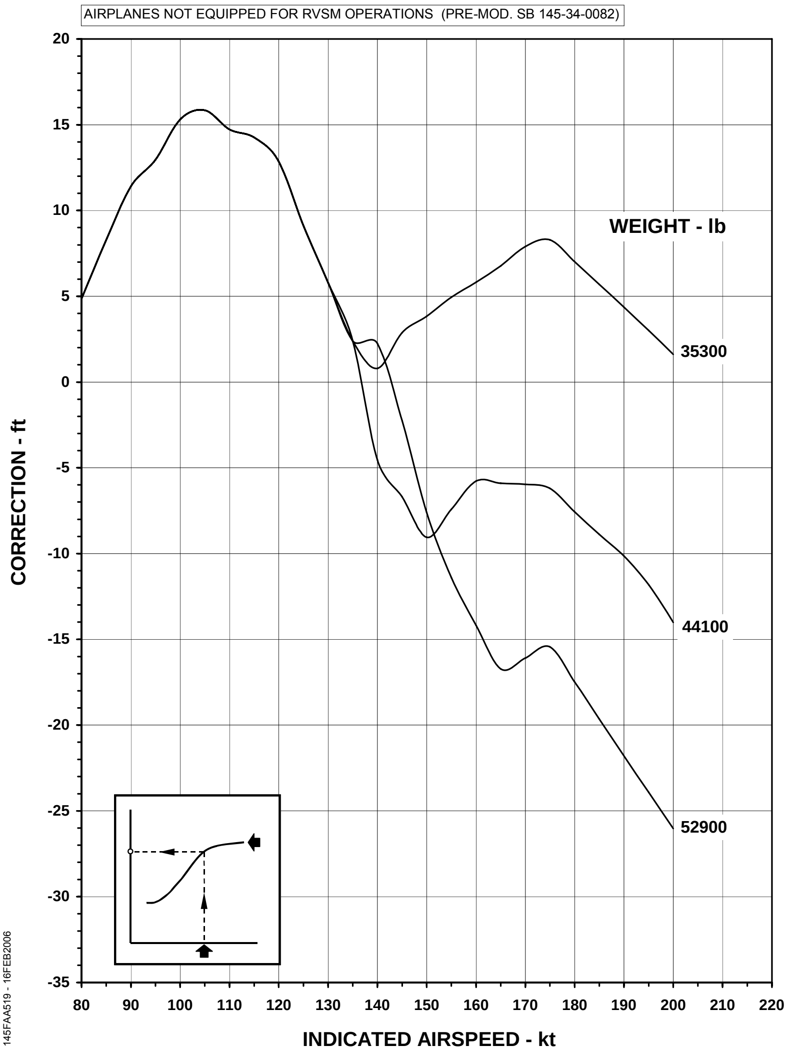


ALTITUDE POSITION ERROR CORRECTION

PILOT'S AND COPILOT'S PITOTS

GEAR UP - FLAPS 18° OR 22°



STALL SPEEDS

The stall speed is shown in the Stall Speed Chart. Stall speeds, with zero thrust in accordance with Airworthiness Requirements, are the reference for the various handling speeds herein presented. This chart is provided in terms of knots of calibrated airspeed for various weights and airplane configurations.

STALL SPEED CHART

USE

Enter the chart with airplane gross weight and airplane configuration and read the airspeed.

EXAMPLE

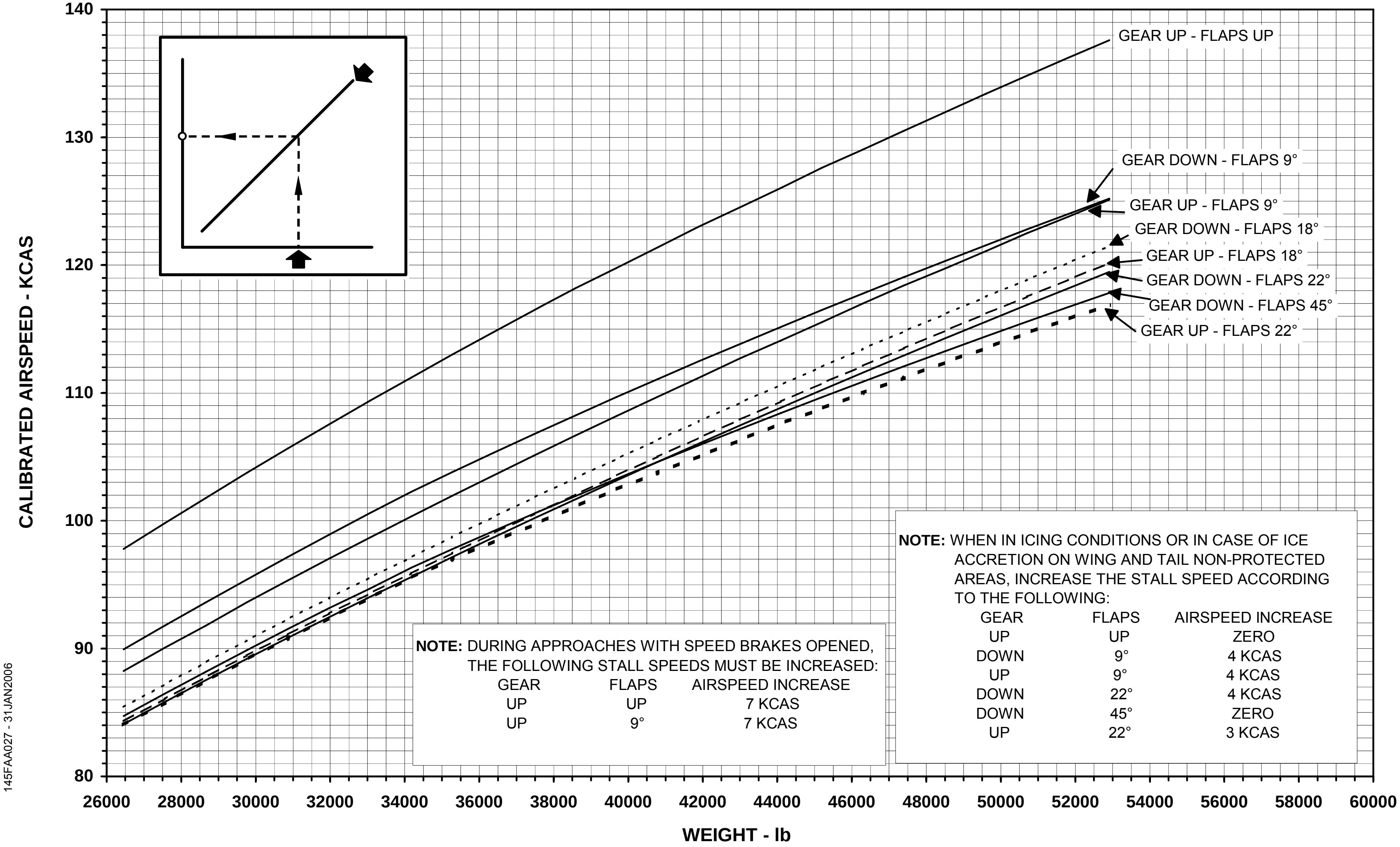
Given:

Configuration.. FLAPS 9° AND GEAR DOWN
Airplane gross weight .... 35000 lb

Determine:

Stall Speed.. 103 KCAS

STALL SPEED (STICK PUSHER SPEED)
ZERO THRUST - FORWARD CG



NOTE: DURING APPROACHES WITH SPEED BRAKES OPENED, THE FOLLOWING STALL SPEEDS MUST BE INCREASED:

GEAR	FLAPS	AIRSPEED INCREASE
UP	UP	7 KCAS
UP	9°	7 KCAS

NOTE: WHEN IN ICING CONDITIONS OR IN CASE OF ICE ACCRETION ON WING AND TAIL NON-PROTECTED AREAS, INCREASE THE STALL SPEED ACCORDING TO THE FOLLOWING:

GEAR	FLAPS	AIRSPEED INCREASE
UP	UP	ZERO
DOWN	9°	4 KCAS
UP	9°	4 KCAS
DOWN	22°	4 KCAS
DOWN	45°	ZERO
UP	22°	3 KCAS

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ENGINE DATA

The engine power readings used to obtain the installed engine power on which the airplane certified performance in this manual is based, are shown in the Takeoff, Go-Around, Maximum Continuous and Flight Idle Thrust tables.

THRUST SETTING TABLES

Settings are shown for various pressure altitudes and Static Air Temperatures, with engine bleed closed or open, and anti-ice on or off. Takeoff, Go-Around, and Maximum Continuous tables are presented in two sets: one for anti-ice off and other for anti-ice on. Flight Idle table is presented only for anti-ice on.

USE

Enter the chart with the Static Air Temperature and pressure altitude to read the N1 setting.

EXAMPLE

Given:

Static air temperature .... 30°C
Pressure altitude.. 8000 ft
Airspeed.. 100 KCAS
Bleed.. CLOSED
Anti-ice.. OFF

Determine:

N1 For Go-Around .... 88.0 %

N1 FOR T/O-1 MODE

BLEED CLOSED - ANTI-ICE OFF (FADEC REF A/ICE OFF)

AIRSPEED: 0 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	75.2	75.9	76.7	77.6	78.4	79.2	80.0	80.8	81.6	82.4	83.2
0	75.7	76.4	77.3	78.1	79.0	79.8	80.6	81.4	82.2	83.0	83.8
1000	76.2	76.9	77.8	78.6	79.4	80.3	81.1	81.9	82.7	83.5	84.3
2000	76.7	77.4	78.2	79.1	79.9	80.8	81.6	82.4	83.2	84.0	84.8
3000	77.1	77.8	78.7	79.6	80.4	81.2	82.1	82.9	83.7	84.5	85.3
4000	77.6	78.3	79.2	80.0	80.9	81.7	82.6	83.4	84.2	85.0	85.8
5000	78.0	78.8	79.6	80.5	81.4	82.2	83.1	83.9	84.7	85.5	86.3
6000	78.5	79.2	80.1	81.0	81.8	82.7	83.5	84.4	85.2	86.0	86.8
7000	79.0	79.7	80.6	81.4	82.3	83.2	84.0	84.9	85.7	86.5	87.3
8000	79.4	80.1	81.0	81.9	82.8	83.6	84.5	85.3	86.2	87.0	87.8

N1 FOR T/O-1 MODE

BLEED CLOSED - ANTI-ICE OFF (FADEC REF A/ICE OFF)

AIRSPEED: 0 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	0	5	10	15	20	25	30	35	40	45	50
-1000	84.0	84.7	85.5	86.3	87.0	87.7	88.5	88.5	86.6	85.1	83.7
0	84.6	85.3	86.1	86.9	87.6	88.3	89.1	88.8	86.5	85.1	83.8
1000	85.1	85.8	86.6	87.4	88.1	88.9	89.1	87.6	86.3	85.0	83.7
2000	85.6	86.4	87.1	87.9	88.7	89.4	89.3	87.5	86.2	85.0	83.7
3000	86.1	86.9	87.7	88.4	89.2	89.6	88.5	87.4	86.3	85.1	84.1
4000	86.6	87.4	88.2	89.0	89.7	89.9	88.5	87.5	86.5	85.5	85.0
5000	87.1	87.9	88.7	89.5	90.3	90.2	88.9	88.1	87.4	86.5	-
6000	87.6	88.4	89.2	90.0	90.3	89.3	88.5	87.5	86.6	86.0	-
7000	88.1	88.9	89.7	90.5	90.6	89.1	88.2	87.2	86.2	85.9	-
8000	88.7	89.5	90.3	90.8	90.6	88.9	87.9	86.9	86.0	-	-

N1 FOR GO-AROUND

BLEED CLOSED - ANTI-ICE OFF

AIRSPEED: 100 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	75.1	75.8	76.7	77.5	78.3	79.1	79.9	80.7	81.5	82.3	83.1
0	75.8	76.5	77.3	78.2	79.0	79.8	80.6	81.4	82.2	83.0	83.8
1000	76.2	76.9	77.8	78.6	79.4	80.3	81.1	81.9	82.7	83.5	84.3
2000	76.6	77.3	78.2	79.1	79.9	80.7	81.6	82.4	83.2	84.0	84.8
3000	77.1	77.8	78.7	79.5	80.4	81.2	82.0	82.9	83.7	84.5	85.3
4000	77.5	78.2	79.1	80.0	80.8	81.7	82.5	83.3	84.1	85.0	85.8
5000	78.0	78.7	79.6	80.4	81.3	82.1	83.0	83.8	84.6	85.4	86.3
6000	78.4	79.1	80.0	80.9	81.8	82.6	83.4	84.3	85.1	85.9	86.7
7000	78.9	79.6	80.5	81.3	82.2	83.1	83.9	84.8	85.6	86.4	87.2
8000	79.3	80.0	80.9	81.8	82.7	83.5	84.4	85.2	86.1	86.9	87.7

N1 FOR GO-AROUND

BLEED CLOSED - ANTI-ICE OFF

AIRSPEED: 100 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	0	5	10	15	20	25	30	35	40	45	50
-1000	83.9	84.6	85.4	86.1	86.9	87.6	88.4	88.4	86.4	85.0	83.5
0	84.6	85.4	86.1	86.9	87.6	88.4	89.1	88.9	86.5	85.1	83.7
1000	85.1	85.9	86.6	87.4	88.1	88.9	89.1	87.6	86.3	85.0	83.6
2000	85.6	86.4	87.1	87.9	88.7	89.4	89.4	87.4	86.2	84.9	83.6
3000	86.1	86.8	87.6	88.4	89.2	89.6	88.5	87.4	86.2	85.0	84.0
4000	86.6	87.3	88.1	88.9	89.7	89.8	88.5	87.5	86.5	85.5	85.0
5000	87.1	87.8	88.6	89.4	90.2	90.1	88.9	88.2	87.5	86.5	-
6000	87.6	88.3	89.1	89.9	90.3	89.3	88.5	87.6	86.7	86.1	-
7000	88.0	88.9	89.6	90.4	90.5	89.1	88.2	87.3	86.3	86.0	-
8000	88.6	89.4	90.2	90.7	90.6	88.9	88.0	87.0	86.1	-	-

N1 FOR GO-AROUND

BLEED CLOSED - ANTI-ICE OFF

AIRSPEED: 150 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	74.8	75.4	76.3	77.1	77.9	78.8	79.6	80.4	81.1	81.9	82.7
0	75.4	76.1	77.0	77.8	78.6	79.5	80.3	81.1	81.9	82.7	83.4
1000	75.9	76.6	77.4	78.3	79.1	79.9	80.8	81.6	82.4	83.2	84.0
2000	76.4	77.1	77.9	78.8	79.6	80.4	81.3	82.1	82.9	83.7	84.5
3000	76.8	77.5	78.4	79.3	80.1	80.9	81.8	82.6	83.4	84.2	85.0
4000	77.3	78.0	78.9	79.8	80.6	81.4	82.3	83.1	83.9	84.7	85.5
5000	77.8	78.5	79.4	80.3	81.1	82.0	82.8	83.6	84.4	85.3	86.1
6000	78.3	79.0	79.9	80.7	81.6	82.5	83.3	84.1	85.0	85.8	86.6
7000	78.8	79.5	80.4	81.3	82.1	83.0	83.8	84.7	85.5	86.3	87.1
8000	79.3	80.0	80.9	81.8	82.6	83.5	84.3	85.2	86.0	86.9	87.7

N1 FOR GO-AROUND

BLEED CLOSED - ANTI-ICE OFF

AIRSPEED: 150 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	0	5	10	15	20	25	30	35	40	45	50
-1000	83.5	84.2	85.0	85.7	86.5	87.2	87.9	88.1	86.1	84.6	83.1
0	84.2	85.0	85.7	86.5	87.2	88.0	88.7	88.6	86.2	84.7	83.3
1000	84.7	85.5	86.3	87.0	87.8	88.5	88.9	87.3	86.0	84.6	83.3
2000	85.3	86.0	86.8	87.6	88.3	89.1	89.1	87.2	85.9	84.7	83.3
3000	85.8	86.6	87.3	88.1	88.9	89.4	89.2	87.2	86.1	84.9	83.9
4000	86.3	87.1	87.9	88.7	89.4	89.7	88.4	87.5	86.5	85.4	85.0
5000	86.9	87.7	88.4	89.2	90.0	90.0	88.8	88.2	87.5	86.3	-
6000	87.4	88.2	89.0	89.8	90.2	89.2	88.3	87.5	86.5	85.9	-
7000	87.9	88.7	89.5	90.3	90.4	89.0	88.1	87.1	86.1	85.8	-
8000	88.5	89.3	90.1	90.7	90.5	88.8	87.8	86.8	85.9	-	-

N1 FOR GO-AROUND

BLEED CLOSED - ANTI-ICE OFF

AIRSPEED: 200 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	74.5	75.2	76.0	76.8	77.6	78.4	79.3	80.0	80.8	81.6	82.4
0	75.1	75.8	76.7	77.5	78.3	79.2	80.0	80.8	81.6	82.3	83.1
1000	75.6	76.3	77.2	78.0	78.8	79.7	80.5	81.3	82.1	82.9	83.6
2000	76.1	76.8	77.7	78.5	79.3	80.2	81.0	81.8	82.6	83.4	84.2
3000	76.6	77.3	78.2	79.0	79.9	80.7	81.5	82.3	83.1	83.9	84.7
4000	77.1	77.8	78.7	79.6	80.4	81.2	82.1	82.9	83.7	84.5	85.3
5000	77.7	78.4	79.2	80.1	81.0	81.8	82.6	83.5	84.3	85.1	85.9
6000	78.2	78.9	79.7	80.6	81.5	82.3	83.2	84.0	84.8	85.6	86.4
7000	78.6	79.4	80.2	81.1	82.0	82.8	83.7	84.5	85.4	86.2	87.0
8000	79.1	79.9	80.7	81.6	82.5	83.4	84.2	85.1	85.9	86.7	87.5

N1 FOR GO-AROUND

BLEED CLOSED - ANTI-ICE OFF

AIRSPEED: 200 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	0	5	10	15	20	25	30	35	40	45	50
-1000	83.1	83.9	84.7	85.4	86.1	86.9	87.6	87.6	85.5	84.0	82.4
0	83.9	84.7	85.4	86.2	86.9	87.7	88.4	88.1	85.6	84.1	82.6
1000	84.4	85.2	86.0	86.7	87.5	88.2	88.4	86.8	85.5	84.1	82.7
2000	85.0	85.7	86.5	87.3	88.0	88.8	88.7	86.8	85.5	84.2	82.8
3000	85.5	86.3	87.1	87.8	88.6	89.1	87.9	86.8	85.6	84.4	83.3
4000	86.1	86.9	87.7	88.4	89.2	89.4	87.9	86.9	85.7	84.6	84.1
5000	86.7	87.5	88.3	89.0	89.8	89.7	88.0	87.0	86.0	84.9	-
6000	87.2	88.0	88.8	89.6	90.0	88.8	87.7	86.7	85.5	84.8	-
7000	87.8	88.6	89.4	90.2	90.3	88.6	87.5	86.4	85.3	85.0	-
8000	88.4	89.2	90.0	90.5	90.3	88.4	87.3	86.2	85.2	-	-

N1 FOR MAXIMUM CONTINUOUS MODE - ANTI-ICE OFF

BLEED OPEN - PACK ON - ANTI-ICE OFF

AIRSPEED: 100 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
0	73.0	73.7	74.5	75.3	76.1	76.9	77.7	78.5	79.3	80.0	80.8
2000	73.7	74.3	75.2	76.0	76.8	77.6	78.4	79.2	79.9	80.7	81.5
4000	74.3	75.0	75.8	76.6	77.4	78.3	79.1	79.8	80.6	81.4	82.2
6000	75.1	75.8	76.6	77.5	78.3	79.1	79.9	80.7	81.5	82.3	83.1
8000	76.1	76.8	77.6	78.5	79.3	80.1	81.0	81.8	82.6	83.4	84.2
10000	77.1	77.8	78.7	79.5	80.4	81.2	82.0	82.9	83.7	84.5	85.3
12000	78.0	78.7	79.6	80.5	81.3	82.2	83.0	83.9	84.7	85.5	86.3
14000	78.9	79.7	80.5	81.4	82.3	83.1	84.0	84.8	85.7	86.5	87.3
16000	80.5	81.2	82.2	83.0	83.9	84.8	85.7	86.5	87.4	88.2	89.1
18000	82.9	83.7	84.6	85.5	86.5	87.4	88.2	89.1	90.0	90.1	88.6
20000	85.6	86.3	87.3	88.2	89.2	90.1	91.0	91.1	89.9	89.2	88.5
22000	85.9	86.7	87.7	88.6	89.6	90.5	90.8	89.8	89.2	88.5	87.8
24000	86.4	87.1	88.1	89.1	90.0	90.5	89.8	89.3	88.8	88.2	87.6
26000	86.4	87.2	88.2	89.1	89.8	89.5	89.1	88.7	88.3	87.9	87.4
28000	86.5	87.3	88.3	89.2	89.1	88.8	88.6	88.4	88.1	87.8	87.2
30000	86.6	87.4	88.3	88.5	88.5	88.4	88.4	88.3	88.2	87.6	87.0
32000	86.6	87.4	87.9	87.9	88.1	88.2	88.3	88.4	88.0	87.4	87.2
34000	86.7	87.2	87.5	87.6	88.1	88.3	88.5	88.4	87.9	87.6	-
36000	86.6	86.9	87.4	87.5	88.2	88.6	88.8	88.3	88.0	-	-
37000	86.5	86.8	87.2	87.3	88.0	88.3	88.4	88.0	87.7	-	-

N1 FOR MAXIMUM CONTINUOUS MODE

BLEED OPEN - PACK ON - ANTI-ICE OFF

AIRSPEED: 100 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	0	5	10	15	20	25	30	35	40	45	50
0	81.5	82.3	83.0	83.7	84.5	85.2	85.9	85.6	83.4	82.0	80.7
2000	82.2	83.0	83.7	84.5	85.2	85.9	85.9	84.0	82.8	81.6	80.3
4000	82.9	83.7	84.4	85.2	85.9	86.1	84.8	83.9	82.9	81.9	81.5
6000	83.8	84.6	85.4	86.1	86.5	85.5	84.7	83.9	83.0	82.5	-
8000	84.9	85.7	86.5	87.0	86.9	85.3	84.4	83.4	82.6	-	-
10000	86.1	86.8	87.6	87.6	86.0	85.1	84.1	83.1	-	-	-
12000	87.1	87.9	88.1	86.6	85.6	84.6	83.6	83.3	-	-	-
14000	88.1	88.4	87.1	86.1	85.1	84.1	83.6	-	-	-	-
16000	89.1	87.4	86.5	85.5	84.4	83.7	-	-	-	-	-
18000	87.7	86.8	85.9	84.9	84.1	-	-	-	-	-	-
20000	87.7	86.9	86.0	85.1	-	-	-	-	-	-	-
22000	87.0	86.2	85.4	85.1	-	-	-	-	-	-	-
24000	86.9	86.1	85.8	-	-	-	-	-	-	-	-
26000	86.7	86.2	-	-	-	-	-	-	-	-	-
28000	86.5	-	-	-	-	-	-	-	-	-	-
30000	-	-	-	-	-	-	-	-	-	-	-
32000	-	-	-	-	-	-	-	-	-	-	-
34000	-	-	-	-	-	-	-	-	-	-	-
36000	-	-	-	-	-	-	-	-	-	-	-
37000	-	-	-	-	-	-	-	-	-	-	-

N1 FOR MAXIMUM CONTINUOUS MODE

BLEED OPEN - PACK ON - ANTI-ICE OFF

AIRSPEED: 150 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
0	72.8	73.5	74.3	75.1	75.9	76.7	77.5	78.3	79.0	79.8	80.6
2000	73.5	74.2	75.0	75.8	76.7	77.5	78.3	79.0	79.8	80.6	81.3
4000	74.3	74.9	75.8	76.6	77.4	78.2	79.0	79.8	80.6	81.4	82.1
6000	75.2	75.8	76.7	77.5	78.4	79.2	80.0	80.8	81.6	82.4	83.1
8000	76.2	76.9	77.8	78.6	79.5	80.3	81.1	81.9	82.7	83.5	84.3
10000	77.3	78.0	78.9	79.7	80.6	81.4	82.3	83.1	83.9	84.7	85.5
12000	78.0	78.7	79.6	80.4	81.3	82.2	83.0	83.8	84.6	85.5	86.3
14000	78.6	79.3	80.2	81.1	81.9	82.8	83.6	84.5	85.3	86.1	87.0
16000	80.3	81.0	81.9	82.8	83.7	84.6	85.4	86.3	87.2	88.0	88.8
18000	83.0	83.8	84.7	85.6	86.5	87.4	88.3	89.2	90.1	90.1	88.6
20000	85.5	86.3	87.2	88.2	89.1	90.1	91.0	91.0	89.8	89.1	88.3
22000	86.1	86.9	87.9	88.8	89.8	90.7	91.0	89.9	89.2	88.5	87.7
24000	86.8	87.6	88.6	89.5	90.5	90.9	90.1	89.5	88.9	88.2	87.4
26000	87.3	88.1	89.1	90.1	90.7	90.2	89.7	89.1	88.5	87.9	87.2
28000	88.1	88.9	89.9	90.8	90.7	89.9	89.4	88.9	88.3	87.7	87.1
30000	88.5	89.3	90.3	90.4	89.8	89.4	89.0	88.5	88.0	87.5	86.9
32000	89.1	89.9	90.0	90.0	89.5	89.1	88.7	88.3	87.9	87.3	87.2
34000	88.8	89.1	89.0	89.0	88.8	88.7	88.5	88.2	87.7	87.5	-
36000	87.9	88.0	88.2	88.2	88.4	88.5	88.4	88.1	87.8	-	-
37000	87.8	87.9	88.0	88.0	88.1	88.2	88.1	87.8	87.6	-	-

N1 FOR MAXIMUM CONTINUOUS MODE

BLEED OPEN - PACK ON - ANTI-ICE OFF

AIRSPEED: 150 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	0	5	10	15	20	25	30	35	40	45	50
0	81.3	82.1	82.8	83.5	84.2	84.9	85.7	85.5	83.2	81.8	80.4
2000	82.1	82.9	83.6	84.3	85.1	85.8	85.8	84.0	82.8	81.5	80.2
4000	82.9	83.7	84.4	85.2	85.9	86.1	84.9	84.0	83.0	82.1	81.7
6000	83.9	84.7	85.4	86.2	86.6	85.6	84.8	84.0	83.1	82.5	-
8000	85.1	85.9	86.6	87.2	87.0	85.4	84.5	83.5	82.7	-	-
10000	86.3	87.1	87.9	87.8	86.2	85.2	84.2	83.2	-	-	-
12000	87.1	87.9	88.0	86.4	85.5	84.4	83.4	83.1	-	-	-
14000	87.8	88.0	86.6	85.6	84.6	83.5	83.0	-	-	-	-
16000	88.8	87.1	86.1	85.1	84.0	83.3	-	-	-	-	-
18000	87.8	86.9	85.9	85.0	84.1	-	-	-	-	-	-
20000	87.5	86.6	85.8	84.8	-	-	-	-	-	-	-
22000	86.9	86.1	85.2	84.9	-	-	-	-	-	-	-
24000	86.7	86.0	85.7	-	-	-	-	-	-	-	-
26000	86.6	86.1	-	-	-	-	-	-	-	-	-
28000	86.5	-	-	-	-	-	-	-	-	-	-
30000	-	-	-	-	-	-	-	-	-	-	-
32000	-	-	-	-	-	-	-	-	-	-	-
34000	-	-	-	-	-	-	-	-	-	-	-
36000	-	-	-	-	-	-	-	-	-	-	-
37000	-	-	-	-	-	-	-	-	-	-	-

N1 FOR MAXIMUM CONTINUOUS MODE

BLEED OPEN - PACK ON - ANTI-ICE OFF

AIRSPEED: 200 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
0	72.7	73.4	74.2	75.0	75.8	76.6	77.4	78.1	78.9	79.7	80.4
2000	73.4	74.1	74.9	75.8	76.6	77.4	78.2	78.9	79.7	80.5	81.2
4000	74.3	74.9	75.8	76.6	77.4	78.2	79.0	79.8	80.6	81.4	82.1
6000	75.2	75.9	76.7	77.6	78.4	79.2	80.0	80.8	81.6	82.4	83.2
8000	76.3	77.0	77.8	78.7	79.5	80.4	81.2	82.0	82.8	83.6	84.4
10000	77.4	78.1	79.0	79.8	80.7	81.5	82.3	83.2	84.0	84.8	85.6
12000	78.1	78.8	79.6	80.5	81.4	82.2	83.1	83.9	84.7	85.5	86.3
14000	78.8	79.5	80.4	81.3	82.1	83.0	83.8	84.7	85.5	86.3	87.2
16000	80.4	81.2	82.1	83.0	83.9	84.7	85.6	86.5	87.3	88.2	89.0
18000	82.9	83.7	84.6	85.5	86.5	87.4	88.3	89.1	90.0	90.0	88.6
20000	85.3	86.1	87.0	88.0	88.9	89.8	90.8	90.8	89.3	88.4	87.5
22000	86.2	87.0	87.9	88.9	89.8	90.8	91.0	89.8	89.0	88.2	87.3
24000	87.1	87.9	88.9	89.9	90.8	91.3	90.3	89.6	88.8	88.0	87.2
26000	87.9	88.7	89.7	90.7	91.4	90.6	89.9	89.2	88.4	87.6	86.9
28000	88.6	89.4	90.4	91.3	91.2	90.1	89.4	88.7	88.0	87.2	86.7
30000	89.1	90.0	91.0	91.0	90.1	89.6	88.9	88.3	87.5	87.1	86.7
32000	90.0	90.8	90.9	90.7	89.8	89.2	88.6	87.9	87.4	87.0	86.9
34000	89.7	89.9	89.6	89.5	88.9	88.5	88.0	87.7	87.4	87.3	-
36000	88.9	88.8	88.7	88.7	88.3	88.1	87.8	87.7	87.6	-	-
37000	88.9	88.8	88.6	88.5	88.1	87.7	87.4	87.4	87.3	-	-

N1 FOR MAXIMUM CONTINUOUS MODE

BLEED OPEN - PACK ON - ANTI-ICE OFF

AIRSPEED: 200 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C										
	0	5	10	15	20	25	30	35	40	45	50
0	81.2	81.9	82.6	83.4	84.1	84.8	85.5	85.2	82.8	81.3	79.9
2000	82.0	82.7	83.5	84.2	84.9	85.7	85.6	83.7	82.5	81.2	79.9
4000	82.9	83.7	84.4	85.1	85.9	86.1	84.7	83.6	82.5	81.5	81.0
6000	84.0	84.7	85.5	86.2	86.6	85.4	84.4	83.4	82.3	81.6	-
8000	85.2	85.9	86.7	87.3	87.1	85.2	84.2	83.1	82.1	-	-
10000	86.4	87.2	87.9	87.9	86.1	85.0	83.9	82.8	-	-	-
12000	87.1	87.9	88.1	86.4	85.4	84.3	83.1	82.8	-	-	-
14000	88.0	88.3	86.8	85.8	84.7	83.5	83.0	-	-	-	-
16000	89.0	87.3	86.3	85.3	84.2	83.5	-	-	-	-	-
18000	87.7	86.9	85.9	85.0	84.1	-	-	-	-	-	-
20000	86.6	85.6	84.6	83.5	-	-	-	-	-	-	-
22000	86.4	85.5	84.6	84.4	-	-	-	-	-	-	-
24000	86.5	85.9	85.6	-	-	-	-	-	-	-	-
26000	86.4	86.0	-	-	-	-	-	-	-	-	-
28000	86.3	-	-	-	-	-	-	-	-	-	-
30000	-	-	-	-	-	-	-	-	-	-	-
32000	-	-	-	-	-	-	-	-	-	-	-
34000	-	-	-	-	-	-	-	-	-	-	-
36000	-	-	-	-	-	-	-	-	-	-	-
37000	-	-	-	-	-	-	-	-	-	-	-

N1 FOR T/O-1 MODE

BLEED OPEN - PACK OFF - ANTI-ICE ON (FADEC REF A/ICE ON)

AIRSPEED: 0 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	77.0	77.9	78.7	79.6	80.4	81.2	82.0	82.8	83.6	84.4	84.0	84.7	85.5
0	77.5	78.4	79.3	80.1	80.9	81.8	82.6	83.4	84.2	85.0	84.6	85.3	86.1
1000	78.0	78.9	79.7	80.6	81.4	82.3	83.1	83.9	84.7	85.5	85.1	85.8	86.6
2000	78.5	79.3	80.2	81.1	81.9	82.8	83.6	84.4	85.2	86.0	85.6	86.4	87.1
3000	78.9	79.8	80.7	81.5	82.4	83.2	84.1	84.9	85.7	86.5	86.1	86.9	87.7
4000	79.4	80.3	81.2	82.0	82.9	83.7	84.6	85.4	86.2	87.0	86.6	87.4	88.2
5000	79.9	80.8	81.6	82.5	83.4	84.2	85.1	85.9	86.7	87.6	87.1	87.9	88.7
6000	80.3	81.2	82.1	83.0	83.8	84.7	85.6	86.4	87.2	88.1	87.6	88.4	89.2
7000	80.8	81.7	82.6	83.5	84.3	85.2	86.0	86.9	87.7	88.6	88.1	88.9	89.7
8000	81.2	82.1	83.0	83.9	84.8	85.7	86.5	87.4	88.2	89.1	88.7	89.5	90.3

N1 FOR GO-AROUND

BLEEDS OPEN - PACK OFF - ANTI-ICE ON

AIRSPEED: 100 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	76.9	77.8	78.6	79.5	80.3	81.1	81.9	82.7	83.5	84.3	83.9	84.6	85.4
0	77.6	78.4	79.3	80.1	81.0	81.8	82.6	83.4	84.2	85.0	84.6	85.4	86.1
1000	78.0	78.9	79.7	80.6	81.4	82.3	83.1	83.9	84.7	85.5	85.1	85.9	86.6
2000	78.5	79.3	80.2	81.1	81.9	82.7	83.6	84.4	85.2	86.0	85.6	86.4	87.1
3000	78.9	79.8	80.7	81.5	82.4	83.2	84.0	84.9	85.7	86.5	86.1	86.8	86.7
4000	79.4	80.2	81.1	82.0	82.8	83.7	84.5	85.3	86.2	87.0	86.6	87.0	86.1
5000	79.8	80.7	81.6	82.4	83.3	84.2	85.0	85.8	86.7	87.5	87.1	86.7	86.1
6000	80.2	81.1	82.0	82.9	83.8	84.6	85.5	86.3	87.1	88.0	87.2	86.5	85.7
7000	80.7	81.6	82.5	83.4	84.2	85.1	86.0	86.8	87.6	88.5	87.1	86.3	85.5
8000	81.2	82.1	83.0	83.8	84.7	85.6	86.4	87.3	88.1	89.0	87.0	86.2	85.3

N1 FOR GO-AROUND

BLEEDS OPEN - PACK OFF - ANTI-ICE ON

AIRSPEED: 150 KCAS

ALLISON AE3007A ENGINES

BLEEDS OPEN - PACK OFF - ANTI-ICE ON

Pressure Altitude (ft)	Static Air Temperature - °C												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	76.6	77.4	78.3	79.1	79.9	80.7	81.5	82.3	83.1	83.9	83.5	84.2	85.0
0	77.2	78.1	78.9	79.8	80.6	81.4	82.3	83.1	83.9	84.7	84.2	85.0	85.7
1000	77.7	78.6	79.4	80.3	81.1	81.9	82.8	83.6	84.4	85.2	84.7	85.5	86.3
2000	78.2	79.1	79.9	80.8	81.6	82.4	83.3	84.1	84.9	85.7	85.3	86.0	86.8
3000	78.7	79.5	80.4	81.3	82.1	82.9	83.8	84.6	85.4	86.2	85.8	86.6	86.5
4000	79.1	80.0	80.9	81.8	82.6	83.5	84.3	85.1	85.9	86.8	86.3	86.9	86.1
5000	79.6	80.5	81.4	82.3	83.1	84.0	84.8	85.6	86.5	87.3	86.9	86.6	86.0
6000	80.1	81.0	81.9	82.8	83.6	84.5	85.3	86.2	87.0	87.8	87.1	86.4	85.6
7000	80.6	81.5	82.4	83.3	84.1	85.0	85.9	86.7	87.5	88.4	87.1	86.2	85.4
8000	81.1	82.0	82.9	83.8	84.7	85.5	86.4	87.2	88.1	88.9	87.0	86.1	85.2

N1 FOR GO-AROUND

BLEEDS OPEN - PACK OFF - ANTI-ICE ON

AIRSPEED: 200 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	76.3	77.1	78.0	78.8	79.6	80.4	81.2	82.0	82.8	83.6	83.1	83.9	84.7
0	77.0	77.8	78.7	79.5	80.3	81.1	82.0	82.8	83.6	84.4	83.9	84.7	85.4
1000	77.4	78.3	79.1	80.0	80.8	81.7	82.5	83.3	84.1	84.9	84.4	85.2	86.0
2000	77.9	78.8	79.7	80.5	81.3	82.2	83.0	83.8	84.6	85.4	85.0	85.7	86.5
3000	78.4	79.3	80.2	81.0	81.9	82.7	83.5	84.4	85.2	86.0	85.5	86.3	86.2
4000	79.0	79.8	80.7	81.6	82.4	83.3	84.1	84.9	85.7	86.5	86.1	86.7	85.7
5000	79.5	80.4	81.2	82.1	83.0	83.8	84.7	85.5	86.3	87.1	86.7	86.2	85.3
6000	80.0	80.9	81.8	82.6	83.5	84.3	85.2	86.0	86.9	87.7	87.0	86.1	85.1
7000	80.5	81.4	82.3	83.1	84.0	84.9	85.7	86.6	87.4	88.2	86.9	85.9	84.9
8000	81.0	81.9	82.8	83.7	84.5	85.4	86.3	87.1	87.9	88.8	86.8	85.8	84.8

N1 FOR MAXIMUM CONTINUOUS MODE

BLEEDS OPEN - PACK ON - ANTI-ICE ON

AIRSPEED: 100 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
0	74.8	75.6	76.5	77.3	78.1	78.9	79.7	80.5	81.2	82.0	81.5	82.3	83.0
2000	75.4	76.3	77.1	77.9	78.7	79.6	80.4	81.1	81.9	82.7	82.2	83.0	83.1
4000	76.1	76.9	77.8	78.6	79.4	80.2	81.0	81.8	82.6	83.4	82.9	82.6	81.8
6000	76.9	77.8	78.6	79.4	80.3	81.1	81.9	82.7	83.5	84.3	82.8	82.0	81.3
8000	77.9	78.8	79.6	80.5	81.3	82.1	83.0	83.8	84.6	84.6	82.6	81.8	81.0
10000	78.9	79.8	80.6	81.5	82.4	83.2	84.0	84.9	85.3	84.6	82.5	81.7	80.8
12000	79.9	80.7	81.6	82.5	83.4	84.2	85.1	85.0	84.2	83.4	81.3	80.4	79.4
14000	80.8	81.7	82.6	83.4	84.3	85.2	84.6	83.8	82.9	82.0	79.8	78.8	77.8
16000	82.4	83.3	84.2	85.1	84.7	84.0	83.1	82.3	81.4	80.5	78.2	77.2	76.2
18000	84.8	85.3	84.7	84.0	83.3	82.6	81.8	80.9	80.1	79.1	77.0	76.0	74.9
20000	84.8	84.3	83.7	83.1	82.5	81.8	81.1	80.3	79.5	78.7	76.6	75.6	74.7
22000	83.4	82.9	82.3	81.7	81.1	80.4	79.7	79.0	78.2	77.3	75.2	74.3	73.4
24000	82.4	82.0	81.5	80.9	80.3	79.7	79.0	78.3	77.6	76.8	74.8	73.9	73.5
26000	81.5	81.1	80.6	80.0	79.4	78.8	78.1	77.4	76.7	75.9	73.9	73.3	-
28000	80.7	80.2	79.7	79.1	78.6	77.9	77.3	76.6	75.8	75.1	73.2	-	-
30000	79.8	79.3	78.8	78.3	77.7	77.0	76.4	75.7	74.9	74.2	-	-	-
32000	79.0	78.5	78.0	77.4	76.8	76.2	75.5	74.8	74.1	73.8	-	-	-
34000	78.3	77.9	77.4	76.9	76.3	75.7	75.1	74.4	74.0	-	-	-	-
36000	77.8	77.4	76.9	76.5	75.9	75.4	74.8	74.3	-	-	-	-	-
37000	77.4	77.0	76.6	76.1	75.6	75.1	74.6	74.2	-	-	-	-	-

N1 FOR MAXIMUM CONTINUOUS MODE

BLEEDS OPEN - PACK ON - ANTI-ICE ON

AIRSPEED: 150 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
0	74.6	75.4	76.3	77.1	77.9	78.7	79.5	80.2	81.0	81.8	81.3	82.0	82.8
2000	75.3	76.2	77.0	77.8	78.6	79.4	80.2	81.0	81.8	82.6	82.1	82.8	83.1
4000	76.1	76.9	77.7	78.6	79.4	80.2	81.0	81.8	82.6	83.4	82.9	82.7	81.9
6000	77.0	77.8	78.7	79.5	80.3	81.2	82.0	82.8	83.6	84.4	82.9	82.2	81.4
8000	78.0	78.9	79.8	80.6	81.5	82.3	83.1	83.9	84.7	84.9	82.8	82.0	81.1
10000	79.1	80.0	80.9	81.8	82.6	83.5	84.3	85.1	85.6	84.8	82.8	81.9	81.0
12000	79.8	80.7	81.6	82.5	83.3	84.2	85.0	85.0	84.2	83.3	81.2	80.2	79.2
14000	80.4	81.3	82.2	83.1	84.0	84.8	84.3	83.4	82.5	81.6	79.4	78.4	77.3
16000	82.2	83.1	84.0	84.9	84.5	83.7	82.9	82.0	81.1	80.2	78.0	76.9	75.8
18000	84.9	85.5	84.8	84.2	83.5	82.7	81.9	81.1	80.2	79.3	77.1	76.1	75.0
20000	84.8	84.3	83.7	83.1	82.4	81.7	81.0	80.2	79.3	78.5	76.3	75.4	74.4
22000	83.6	83.0	82.4	81.8	81.1	80.4	79.7	78.9	78.0	77.2	75.0	74.2	73.3
24000	82.6	82.0	81.5	81.0	80.5	79.9	79.3	78.6	78.0	77.3	75.3	74.5	74.1
26000	81.6	81.1	80.7	80.2	79.7	79.1	78.5	77.9	77.2	76.5	74.5	74.0	-
28000	80.8	80.4	79.9	79.5	78.9	78.4	77.8	77.2	76.5	75.8	74.0	-	-
30000	80.0	79.6	79.2	78.7	78.2	77.7	77.1	76.5	75.8	75.1	-	-	-
32000	79.3	78.9	78.5	78.0	77.5	77.0	76.4	75.8	75.2	75.0	-	-	-
34000	78.8	78.4	78.1	77.6	77.2	76.7	76.2	75.6	75.3	-	-	-	-
36000	78.4	78.1	77.8	77.4	77.1	76.6	76.2	75.8	-	-	-	-	-
37000	78.1	77.9	77.6	77.3	76.9	76.6	76.2	75.9	-	-	-	-	-

N1 FOR MAXIMUM CONTINUOUS MODE

BLEEDS OPEN - PACK ON - ANTI-ICE ON

AIRSPEED: 200 KCAS

ALLISON AE3007A ENGINES

Pressure Altitude (ft) / Static Air Temperature - °C

Pressure Altitude (ft)	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
0	74.5	75.3	76.1	76.9	77.7	78.5	79.3	80.1	80.9	81.6	81.2	81.9	82.6
2000	75.2	76.1	76.9	77.7	78.5	79.3	80.1	80.9	81.7	82.5	82.0	82.7	83.0
4000	76.0	76.9	77.7	78.6	79.4	80.2	81.0	81.8	82.6	83.4	82.9	82.6	81.7
6000	77.0	77.9	78.7	79.6	80.4	81.2	82.0	82.8	83.6	84.4	82.9	82.0	81.1
8000	78.1	79.0	79.8	80.7	81.5	82.4	83.2	84.0	84.8	85.0	82.8	81.9	80.9
10000	79.2	80.1	81.0	81.8	82.7	83.5	84.4	85.2	85.8	84.9	82.7	81.7	80.7
12000	79.9	80.8	81.7	82.5	83.4	84.3	85.1	85.2	84.3	83.3	81.1	80.1	79.0
14000	80.6	81.5	82.4	83.3	84.2	85.0	84.6	83.7	82.8	81.8	79.5	78.4	77.3
16000	82.3	83.2	84.1	85.0	84.9	84.1	83.2	82.4	81.5	80.5	78.3	77.2	76.1
18000	84.8	85.5	84.9	84.3	83.6	82.8	82.1	81.3	80.4	79.5	77.3	76.3	75.3
20000	84.6	83.9	83.2	82.4	81.6	80.8	79.9	79.0	78.3	77.5	75.5	74.7	73.8
22000	83.6	82.9	82.2	81.5	80.7	80.1	79.5	78.9	78.3	77.6	75.6	74.9	74.1
24000	82.7	82.1	81.5	81.1	80.6	80.1	79.6	79.1	78.5	77.9	76.0	75.4	75.0
26000	81.6	81.1	80.8	80.4	80.0	79.5	79.0	78.5	78.0	77.4	75.5	75.1	-
28000	80.7	80.4	80.1	79.7	79.3	78.9	78.5	78.0	77.4	76.9	75.2	-	-
30000	80.1	79.8	79.5	79.2	78.8	78.4	78.0	77.5	77.0	76.5	-	-	-
32000	79.6	79.3	79.0	78.7	78.4	78.0	77.6	77.1	76.7	76.5	-	-	-
34000	79.3	79.2	79.0	78.7	78.5	78.2	77.9	77.5	77.3	-	-	-	-
36000	79.2	79.2	79.0	78.9	78.7	78.5	78.2	78.1	-	-	-	-	-
37000	79.0	78.9	78.9	78.8	78.6	78.5	78.3	78.1	-	-	-	-	-

N1 FOR FLIGHT IDLE

BLEEDS OPEN - PACK ON - ANTI-ICE ON

ALLISON AE3007A ENGINES

Pressure Altitude (ft)	Static Air Temperature - °C													
	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
0	39.4	39.8	40.3	40.9	41.4	41.9	42.4	43.0	43.5	44.0	44.5	45.1	45.6	46.1
2000	41.2	41.7	42.2	42.8	43.3	43.9	44.5	45.0	45.6	46.1	46.7	47.2	47.8	48.4
4000	43.1	43.6	44.1	44.7	45.3	45.9	46.5	47.1	47.7	48.2	48.8	49.4	50.0	50.6
6000	44.9	45.4	46.1	46.7	47.3	47.9	48.5	49.1	49.7	50.4	51.0	51.6	52.2	52.8
8000	46.8	47.3	48.0	48.6	49.2	49.9	50.5	51.2	51.8	52.5	53.1	53.8	54.4	55.0
10000	48.7	49.2	49.9	50.5	51.2	51.9	52.6	53.2	53.9	54.6	55.2	55.9	56.6	57.3
12000	50.5	51.1	51.8	52.5	53.2	53.9	54.6	55.3	56.0	56.7	57.4	58.1	58.8	59.5
14000	52.4	53.0	53.7	54.4	55.1	55.9	56.6	57.3	58.1	58.8	59.5	60.3	61.0	61.7
16000	54.2	54.8	55.6	56.4	57.1	57.9	58.6	59.4	60.2	60.9	61.7	62.4	63.2	64.0
18000	56.1	56.7	57.5	58.3	59.1	59.9	60.7	61.4	62.2	63.0	63.8	64.6	65.4	66.2
20000	57.9	58.6	59.4	60.2	61.0	61.9	62.7	63.5	64.3	65.1	66.0	66.8	67.6	68.4
22000	59.8	60.5	61.3	62.2	63.0	63.9	64.7	65.6	66.4	67.2	68.1	68.9	69.8	70.6
24000	61.6	62.4	63.2	64.1	65.0	65.9	66.7	67.6	68.5	69.4	70.2	71.1	72.0	72.4
26000	63.5	64.2	65.1	66.0	66.9	67.9	68.8	69.7	70.6	71.5	72.4	73.3	73.9	-
28000	65.4	66.1	67.0	68.0	68.9	69.8	70.8	71.7	72.6	73.6	74.5	75.4	-	-
30000	67.2	68.0	69.0	69.9	70.9	71.8	72.8	73.8	74.7	75.7	76.7	-	-	-
32000	69.1	69.9	70.9	71.9	72.8	73.8	74.8	75.8	76.8	77.8	78.1	-	-	-
34000	70.9	71.7	72.8	73.8	74.8	75.8	76.9	77.9	78.9	79.4	-	-	-	-
36000	72.8	73.6	74.7	75.7	76.8	77.8	78.9	79.9	80.7	-	-	-	-	-
37000	73.7	74.6	75.6	76.7	77.8	78.8	79.9	81.0	81.7	-	-	-	-	-

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TAKEOFF

INTRODUCTION

The information and procedures in this subsection are provided so that the scheduled takeoff performance can be achieved under all conditions.

TAKEOFF PROCEDURES

Refer to Section 4 - Normal Procedures for more detailed information on takeoff technique.

In the event of an engine failure during takeoff, V_2 will be achieved by 35 ft. Refer to Section 3 - Emergency and Abnormal Procedures for more detailed information.

PROCEDURE FOR DETERMINATION OF TAKEOFF WEIGHT - ILLUSTRATIVE EXAMPLE

Takeoff data:

Airplane Model	EMB-145ER
Runway Length Available	5700 ft
Runway Slope	1% (DOWNHILL)
Obstacle (from brake release)	1000 ft HIGH AT 30000 ft
Airport Pressure Altitude	2000 ft
Airport Temperature	20°C
Reported Wind	10 kt (HEAD WIND)
Flaps	9°
Takeoff Technique	STATIC
Anti-Ice	OFF

1 - Determine the maximum takeoff weight climb limited:

Normal V_2	Increased V_2
45414 lb	45414 lb

2 - Determine the maximum takeoff weight field length limited:

Normal V_2	Increased V_2
42500 lb	41000 lb

3 - Determine the maximum takeoff weight brake energy limited:

Normal V_2	Increased V_2
45414 lb	45414 lb

4 - Determine the Obstacle Clearance – Reference Gradient using the lowest among weights determined in steps 1, 2 and 3 and the Maximum Takeoff Weight (structural):

Normal V_2	Increased V_2
3.0%	3.75%

5 - Determine obstacle height and distance from reference zero:

- Height: 1057 ft

  Calculation: $\text{height} = 1000 + \dfrac{(5700)}{100} = 1057\text{ ft}$

- Distance: 24300 ft

  Calculation: distance = 30000 - 5700 = 24300 ft

6 - Determine height above reference zero from the obstacle clearance chart:

Normal V_2	Increased V_2
750 ft	925 ft

The airplane will not clear the obstacle.

7 - Determine a lower weight to verify if the obstacle will be cleared. Assume 39000 lb.

8 - The next step is to determine the required runway length for the new weight, by entering the Maximum Takeoff Weight Field Length Limited chart in the reverse way.

Normal V_2	Increased V_2
4800 ft	5250 ft

9 - Determine new reference gradient:

Normal V_2	Increased V_2
4.25%	4.5%

10 - Determine the new obstacle height and distance from reference zero:

	Normal V_2	Increased V_2
Height	1048 ft	1053 ft
Distance	25200 ft	24750 ft

11 - Determine the new airplane height above reference zero:

	Normal V_2	Increased V_2
Height	1100 ft	1125 ft
Clearance	52 ft	72 ft

Failure to clear the obstacle requires that the procedure be repeated for a lower weight.

12 - The level off height for this condition is:

– 1600 ft

13 - Interpolate between higher weight and lower weight to determine the weight for zero feet clearance:

– For normal V_2 :

Calculation : weight $= 39000 + 52 \times \dfrac{(42500 - 39000)}{(307 + 52)} = 39507$ lb

– For increased V_2 :

Calculation : weight $= 39000 + 72 \times \dfrac{(41000 - 39000)}{(132 + 72)} = 39706$ lb

14 - Determine V_1, V_R, V_2 and final segment speed:

	Normal V_2	Increased V_2
V_1	119 KIAS	125 KIAS
V_R	119 KIAS	125 KIAS
V_2	131 KIAS	136 KIAS
V_{FS}	160 KIAS	160 KIAS

TAKEOFF CLIMB

The maximum takeoff weight for altitude and temperature in compliance with the airworthiness climb requirements is shown in the Maximum Takeoff Weight Climb Limited chart.

MAXIMUM TAKEOFF WEIGHT - CLIMB LIMITED CHART

USE

Enter the chart with Static Air Temperature and airport pressure altitude to read the climb limited weight.

Six charts for takeoffs with flaps 9° are provided, according to the following options:

- T/O-1 or ALT T/O-1 thrust rating modes,
- FADEC REF A/ICE on or off,
- Normal V_2 or increased V_2.

NOTE: Increased V_2 data may only be used when taking off using T/O-1 Thrust Rating Mode.

Increased V_2 chart provides better performance when the airplane is climb limited, although decreasing field length performance. An adequate compromise between both characteristics must be ensured by the operator.

WARNING: PERFORMANCE DATA FOR NORMAL V_2 AND INCREASED V_2 MUST NOT BE MIXED.

EXAMPLE

Given:

Thrust Mode T/O-1
Flaps .... 9°
FADEC REF A/ICE .... OFF
Static Air Temperature .... 20°C
Airport pressure altitude .... 5000 ft
V_2 .... NORMAL

Determine:

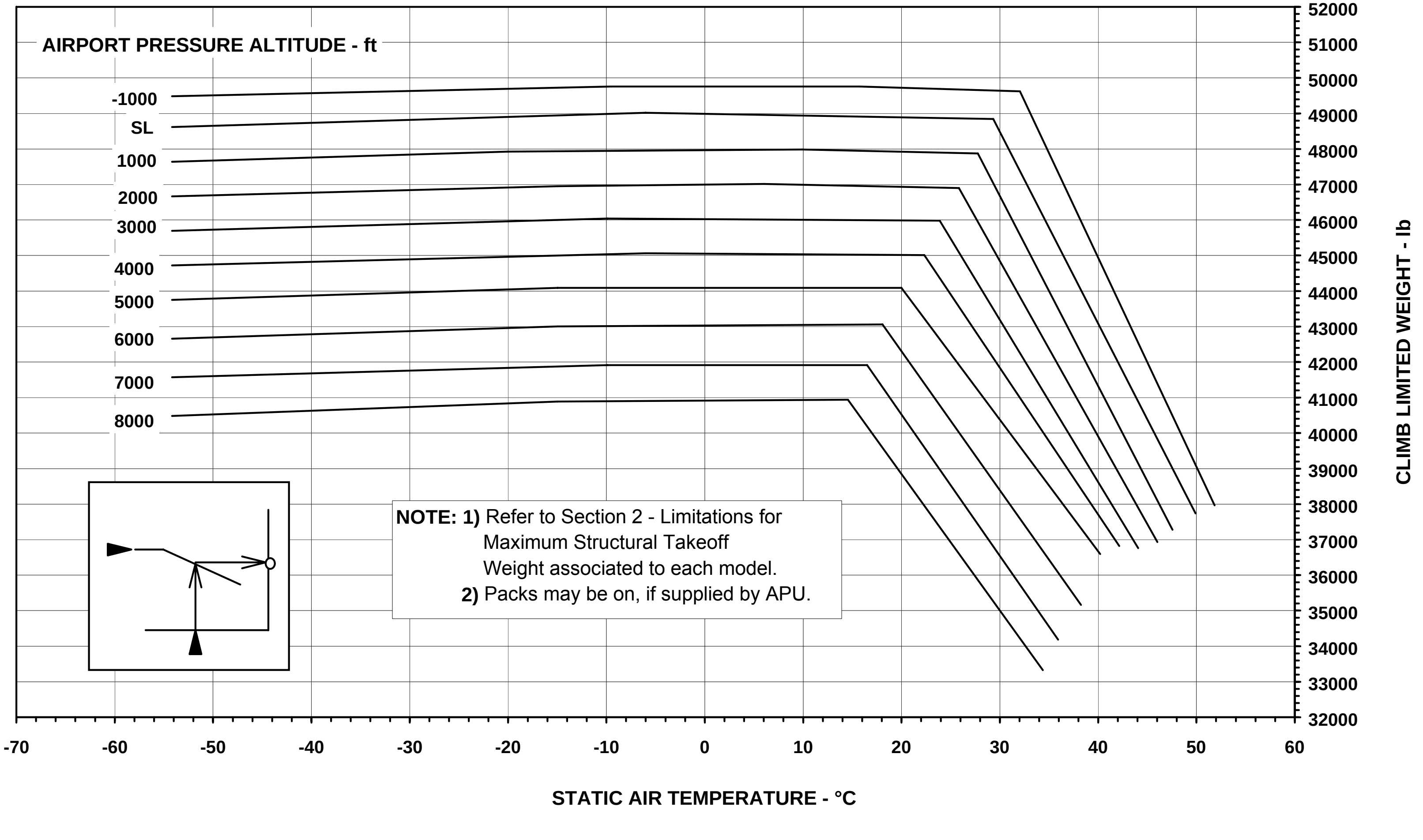
Climb limited weight .... 44100 lb

MAXIMUM TAKEOFF WEIGHT - CLIMB LIMITED

FLAPS 9°

NORMAL V_2 - T/O-1 MODE - BLEED CLOSED (PACKS OFF - FADEC REF A/ICE OFF)

AE3007A ENGINES WITH T/R



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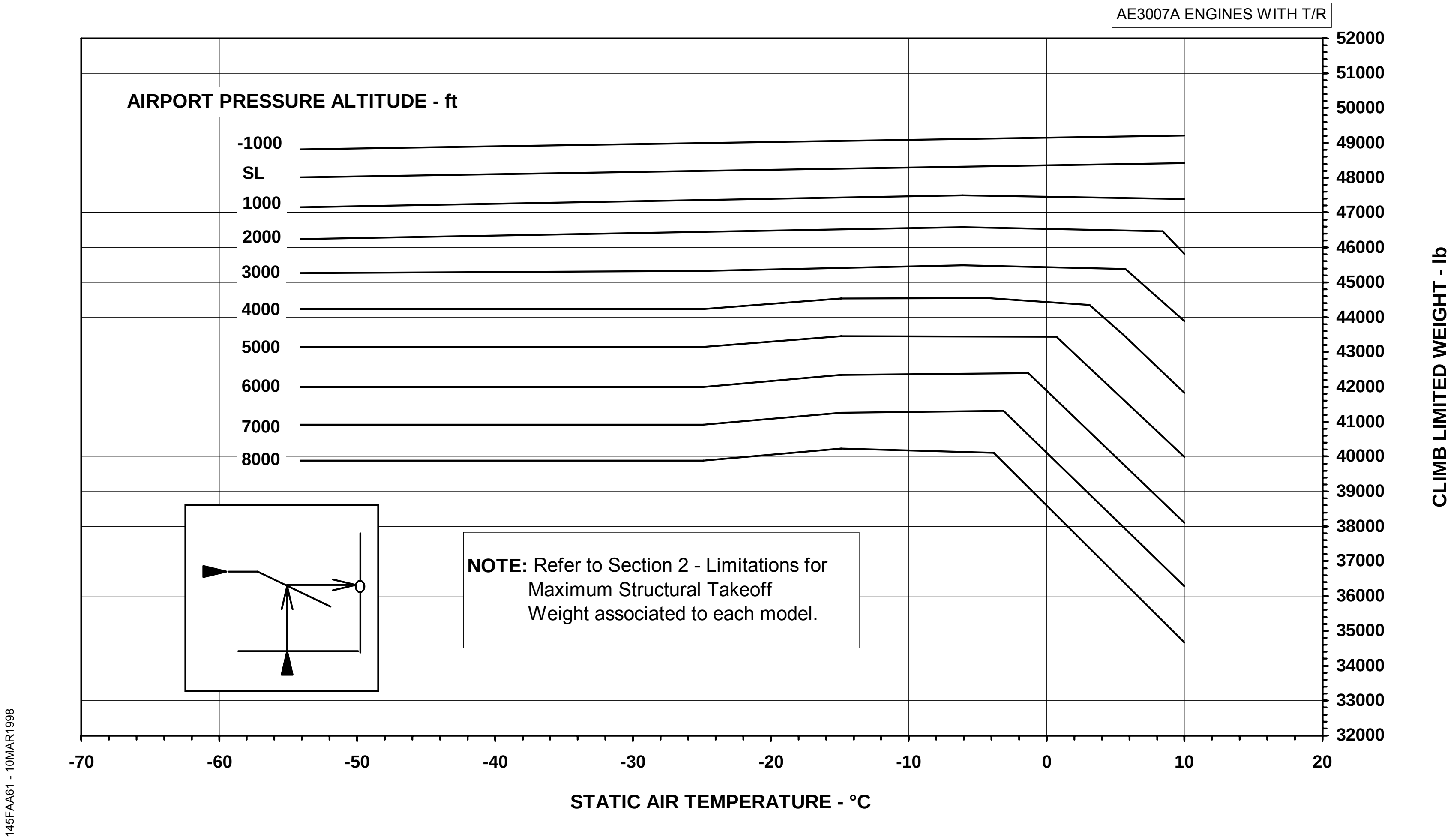
MAXIMUM TAKEOFF WEIGHT - CLIMB LIMITED
FLAPS 9°
NORMAL V_2 - T/O-1 MODE - BLEED OPEN (PACKS OFF - FADEC REF A/ICE ON)



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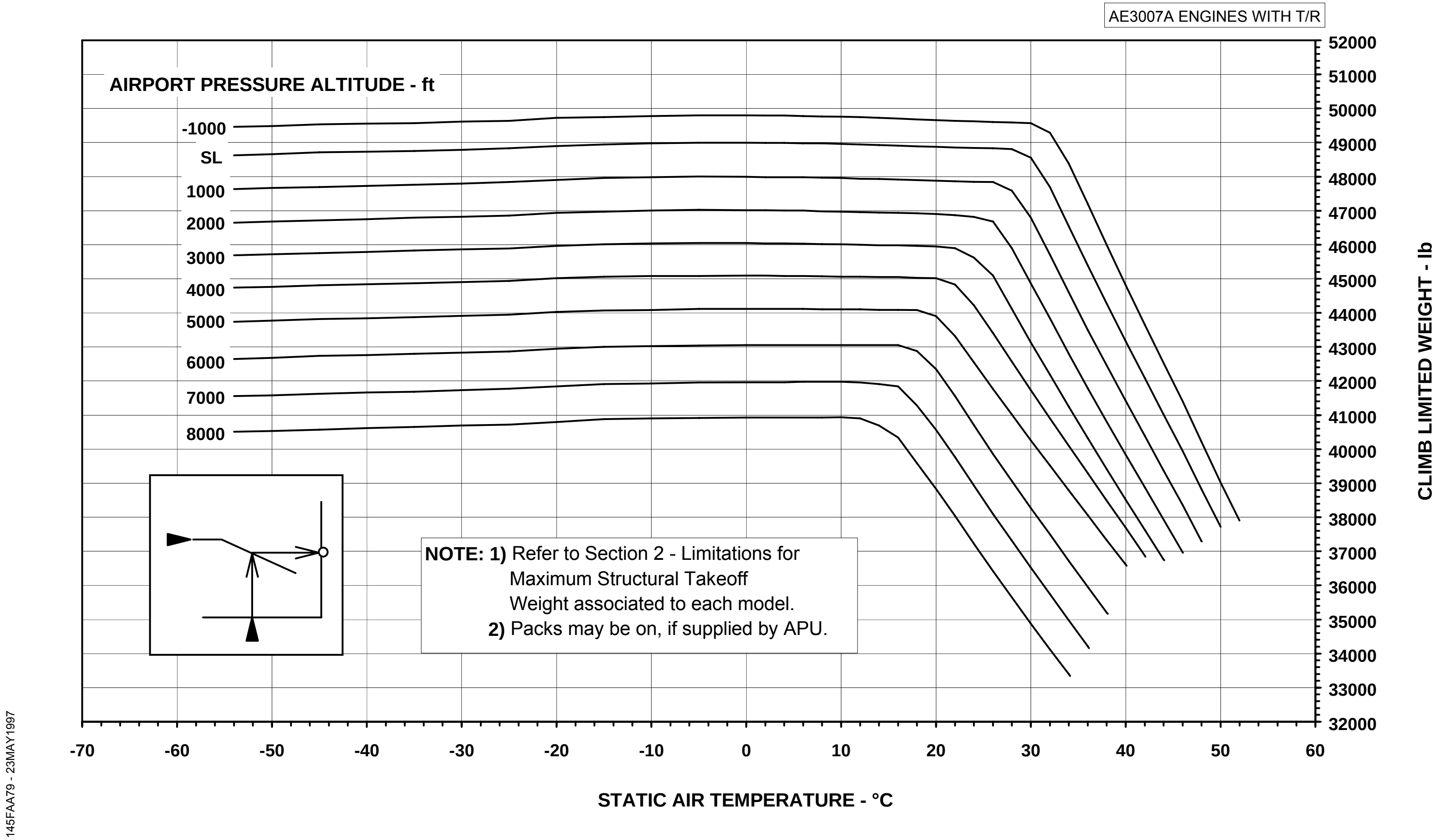
MAXIMUM TAKEOFF WEIGHT - CLIMB LIMITED
FLAPS 9°
NORMAL V_2 - ALT T/O-1 MODE - BLEED CLOSED (PACKS OFF - FADEC REF A/ICE OFF)



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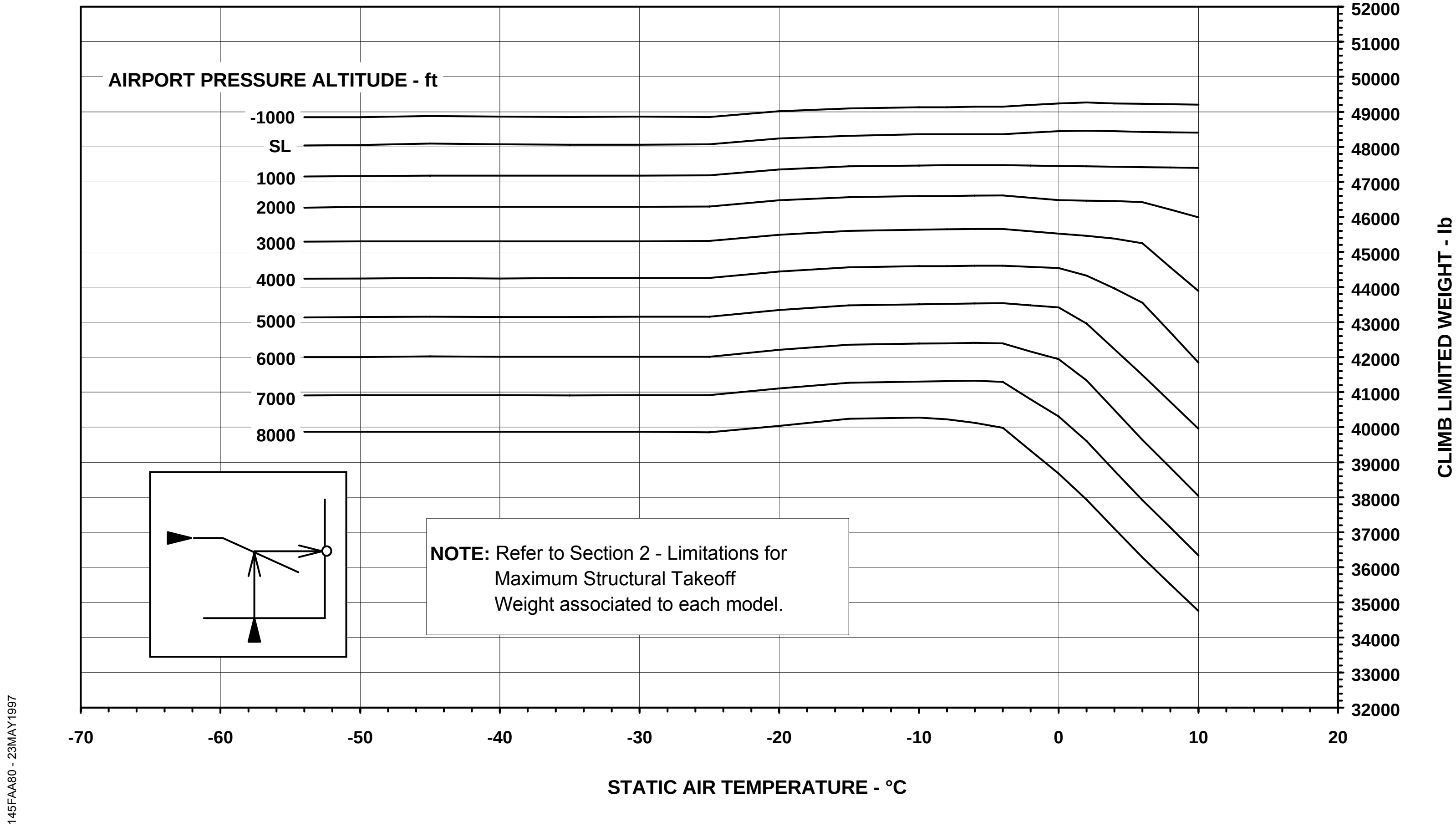
MAXIMUM TAKEOFF WEIGHT - CLIMB LIMITED
FLAPS 9°
NORMAL V_2 - ALT T/O-1 MODE - BLEED OPEN (PACKS OFF - FADEC REF A/ICE ON)

AE3007A ENGINES WITH T/R



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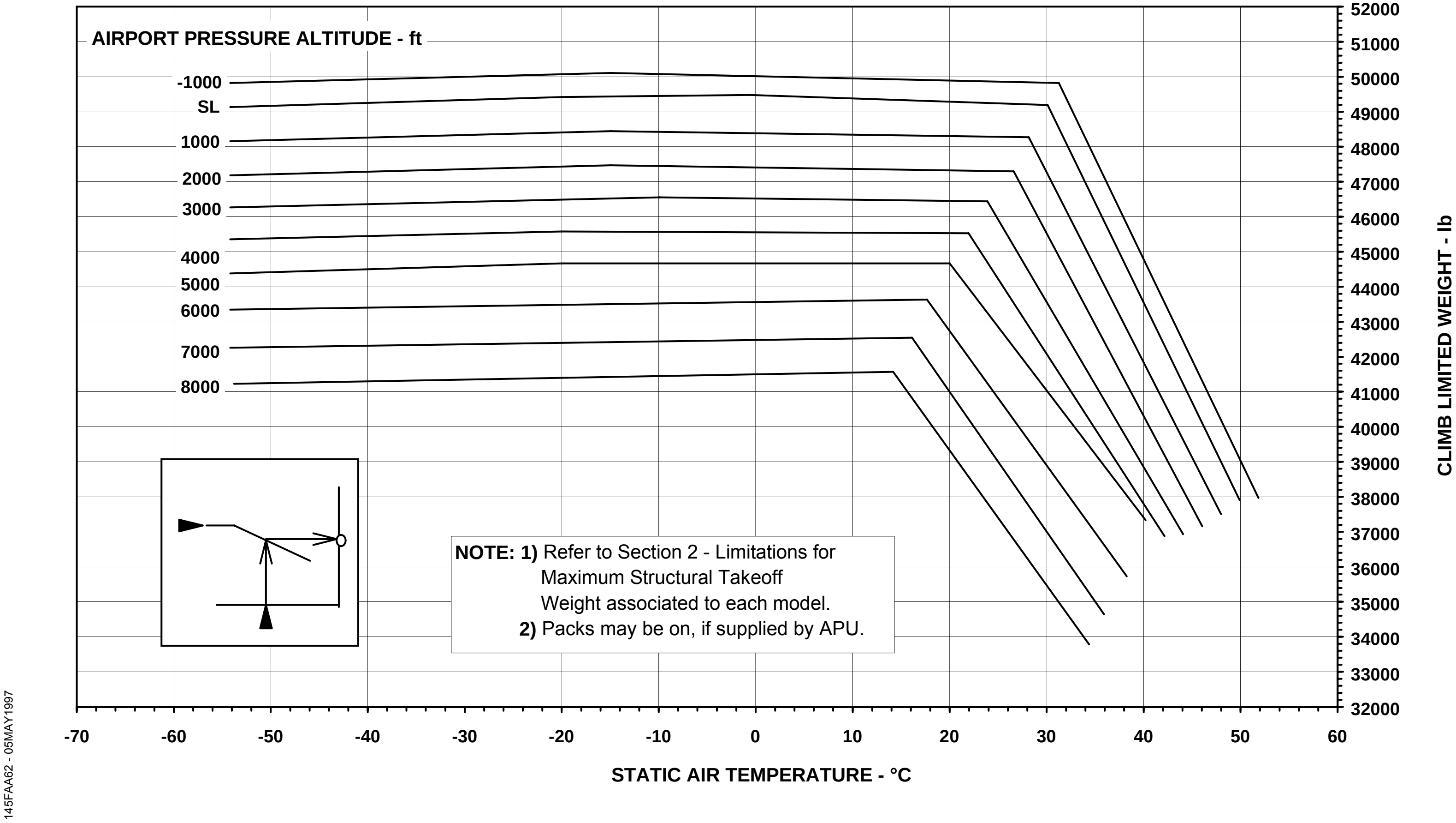
MAXIMUM TAKEOFF WEIGHT - CLIMB LIMITED
FLAPS 9°
INCREASED V_2 - T/O-1 MODE - BLEED CLOSED (PACKS OFF - FADEC REF A/ICE OFF)

AE3007A ENGINES WITH T/R



NOTE: 1) Refer to Section 2 - Limitations for Maximum Structural Takeoff Weight associated to each model.
2) Packs may be on, if supplied by APU.

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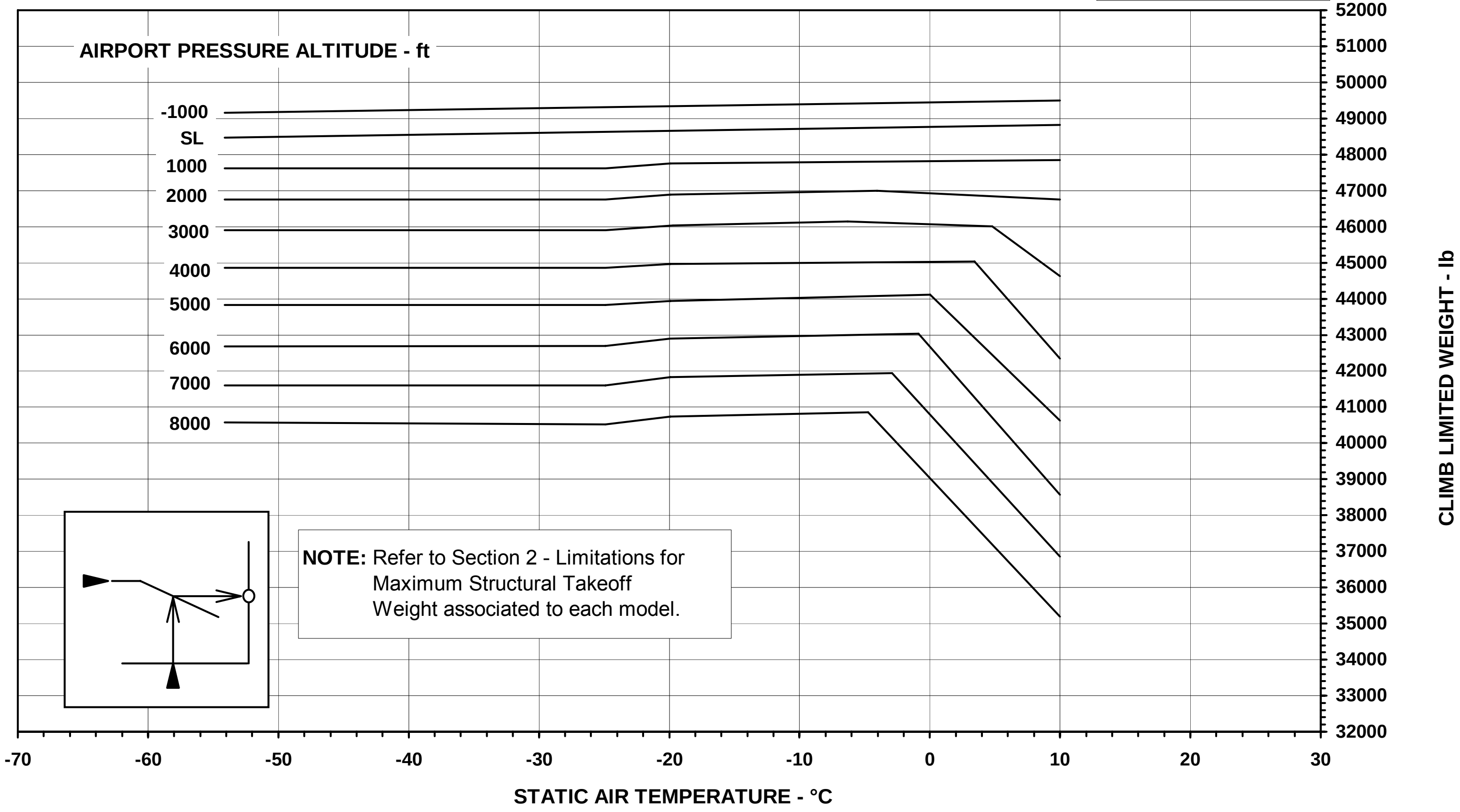
MAXIMUM TAKEOFF WEIGHT - CLIMB LIMITED
FLAPS 9°
INCREASED V_2 - T/O-1 MODE - BLEED OPEN (PACKS OFF - FADEC REF A/ICE ON)

AE3007A ENGINES WITH T/R



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TAKEOFF FIELD LENGTHS

The maximum takeoff weight to enable compliance with operating regulations relating to takeoff field lengths is shown in the Maximum Takeoff Weight - Field Length Limited charts.

MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED CHART

USE

Choose the appropriate chart according to FADEC REF A/ICE setting and V_2 option.

Enter chart 1 of 2 with the Static Air Temperature and go to the Airport Pressure Altitude to read the transfer scale. Enter chart 2 of 2 with runway length available, go through runway slope and wind component corrections. Enter with the transfer scale value and go to the weight reference line. Follow the guide lines until intercepting the horizontal line from the runway length and read the field length limited weight.

Six charts for takeoffs with flaps 9° are provided, according to the following options:

- T/O-1 or ALT T/O-1 thrust rating modes,
- FADEC REF A/ICE on or off,
- Normal V_2 or increased V_2.

NOTE: Increased V_2 data is available only when taking off using T/O-1 Thrust Rating Modes.

Increased V_2 chart provides better performance when the airplane is climb limited, although decreasing field length performance. An adequate compromise between both characteristics must be ensured by the operator.

WARNING: PERFORMANCE DATA FOR NORMAL V_2 AND INCREASED V_2 MUST NOT BE MIXED.

EXAMPLE

Given:

Flaps .... 9°
Takeoff Mode.. T/O-1
V_2 .... NORMAL
Static air temperature .... 20°C
Airport pressure altitude .... 0 ft (SEA LEVEL)
Runway length available.. 6000 ft
FADEC REF A/ICE... OFF
Runway slope .... 2% (UPHILL)
Wind .... 10 kt (HEADWIND)

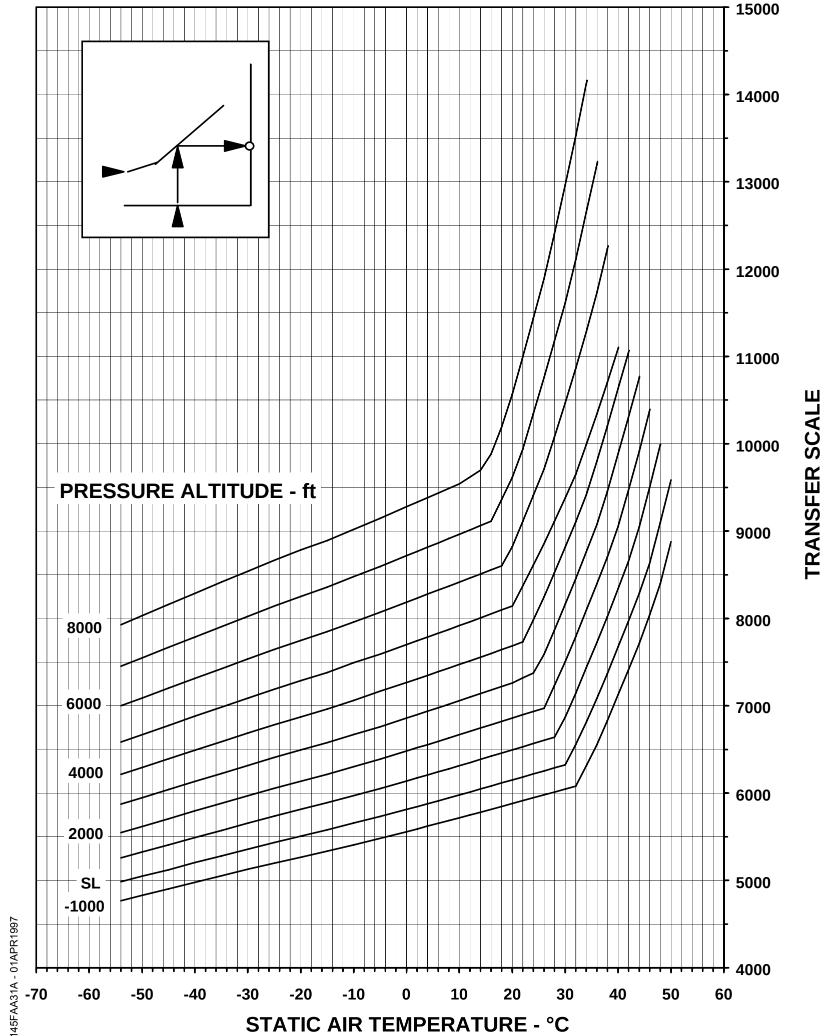
Determine:

Transfer Scale 6250
Field length limited weight .... 42000 lb

MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED

T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH -
NORMAL V_2 - BLEEDS CLOSED - PACKS OFF - FADEC REF A/ICE OFF
CHART 1 OF 2

AE3007A ENGINES WITH T/R



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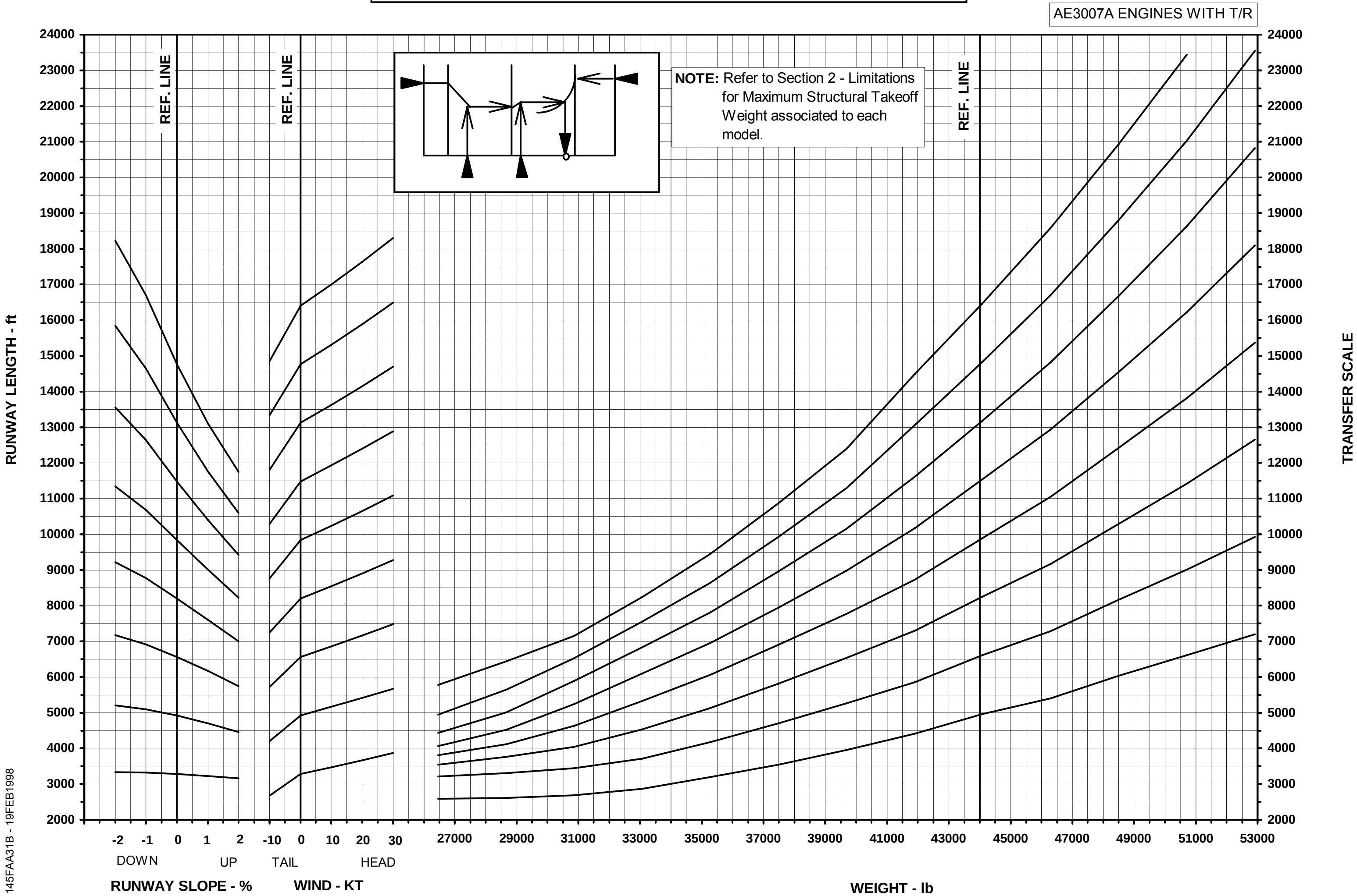
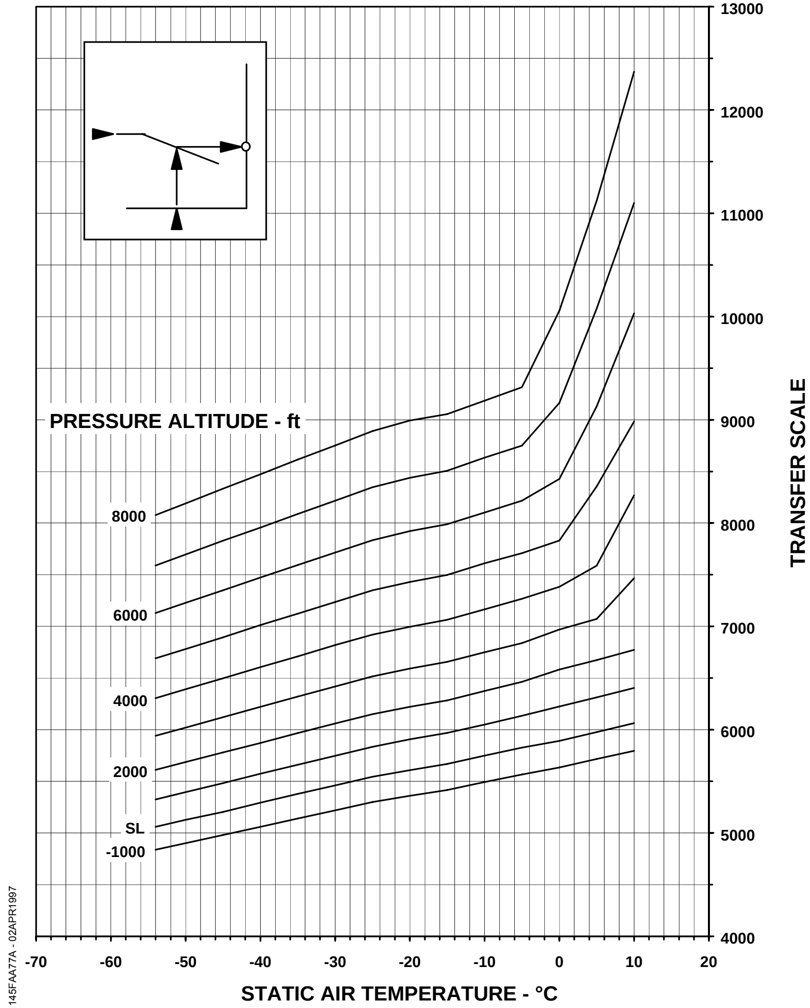
MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED
T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH - NORMAL V_2
BLEEDS CLOSED - PACKS OFF - FADEC REF A/ICE OFF
CHART 2 OF 2



MAXIMUM TAKEOFF WEIGHT -
FIELD LENGTH LIMITED
T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH
NORMAL V_2 - BLEEDS OPEN - PACKS OFF - FADEC REF A/ICE ON
CHART 1 OF 2

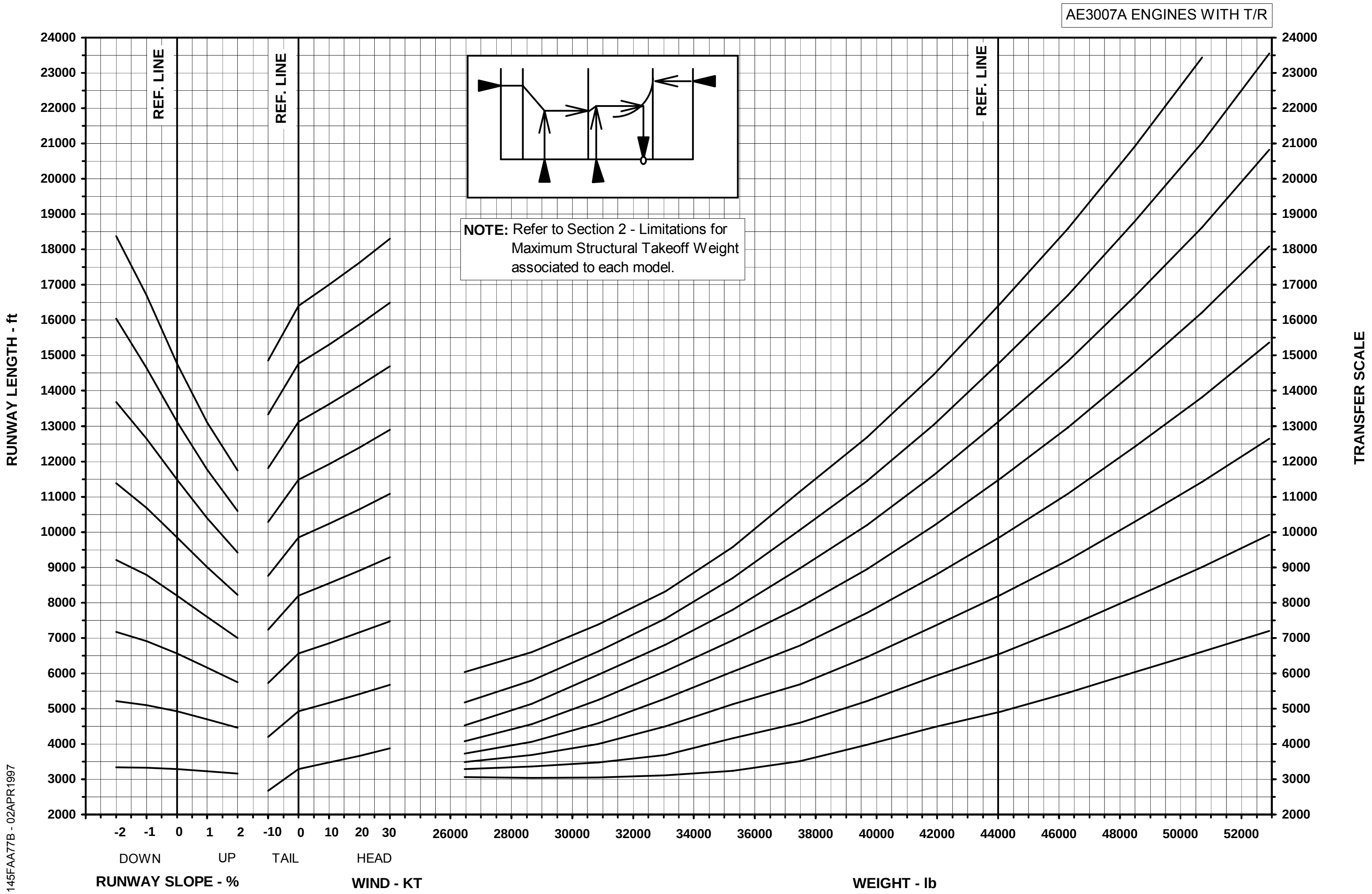
AE3007A ENGINES WITH T/R



MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED

T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH - NORMAL V_2 - BLEEDS OPEN - PACKS OFF - FADEC REF A/ICE ON

CHART 2 OF 2

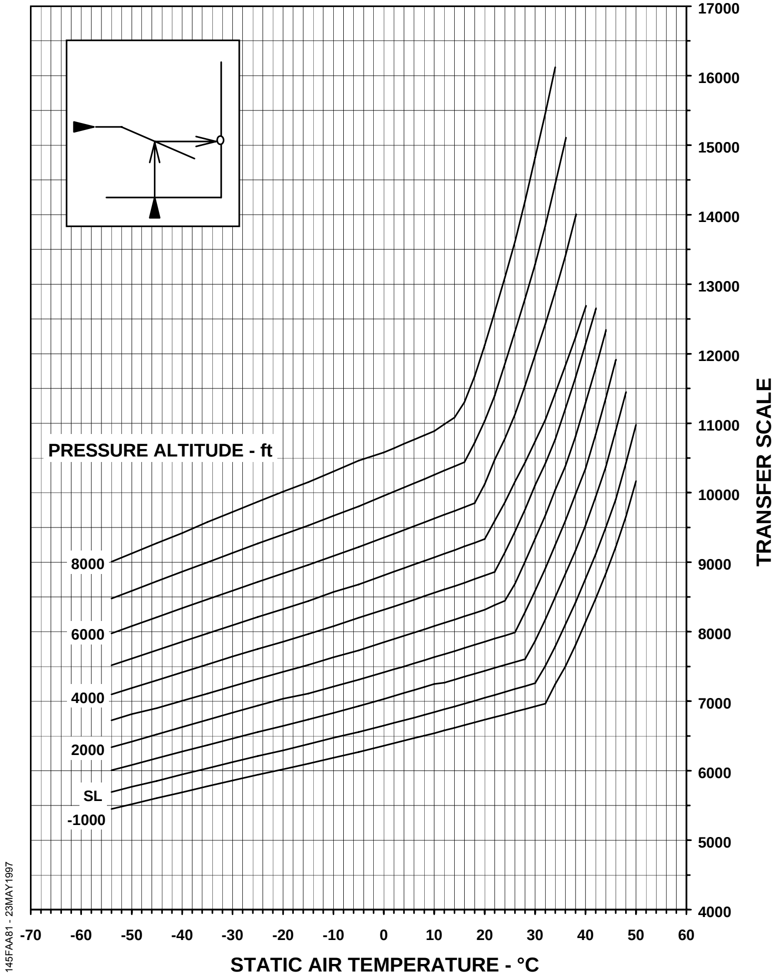


MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED

ALT T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH - NORMAL V_2 - BLEEDS CLOSED - PACKS OFF - FADEC REF A/ICE OFF

CHART 1 OF 2

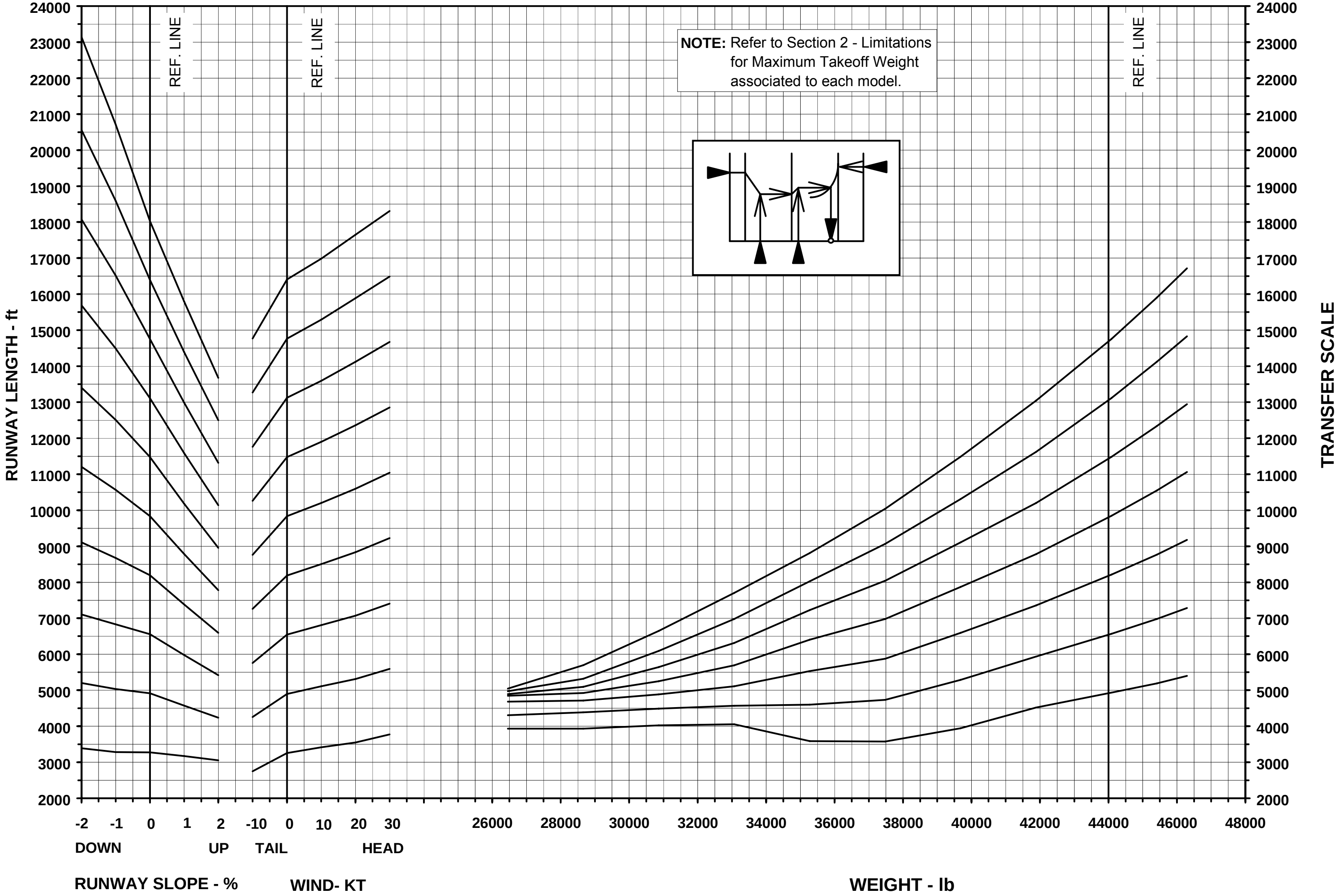
AE3007A ENGINES WITH T/R



MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED

ALT T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH - NORMAL V_2
BLEEDS CLOSED - PACKS OFF - FADEC REF A/ICE OFF
CHART 2 OF 2

AE3007A ENGINES WITH T/R

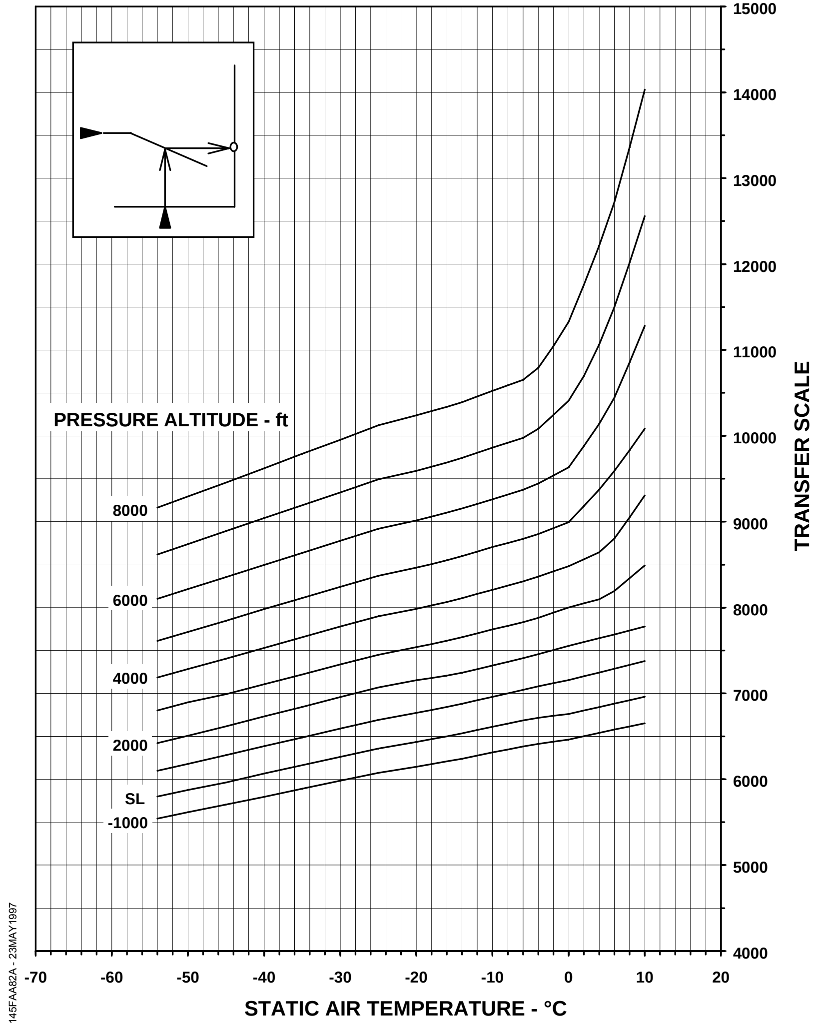


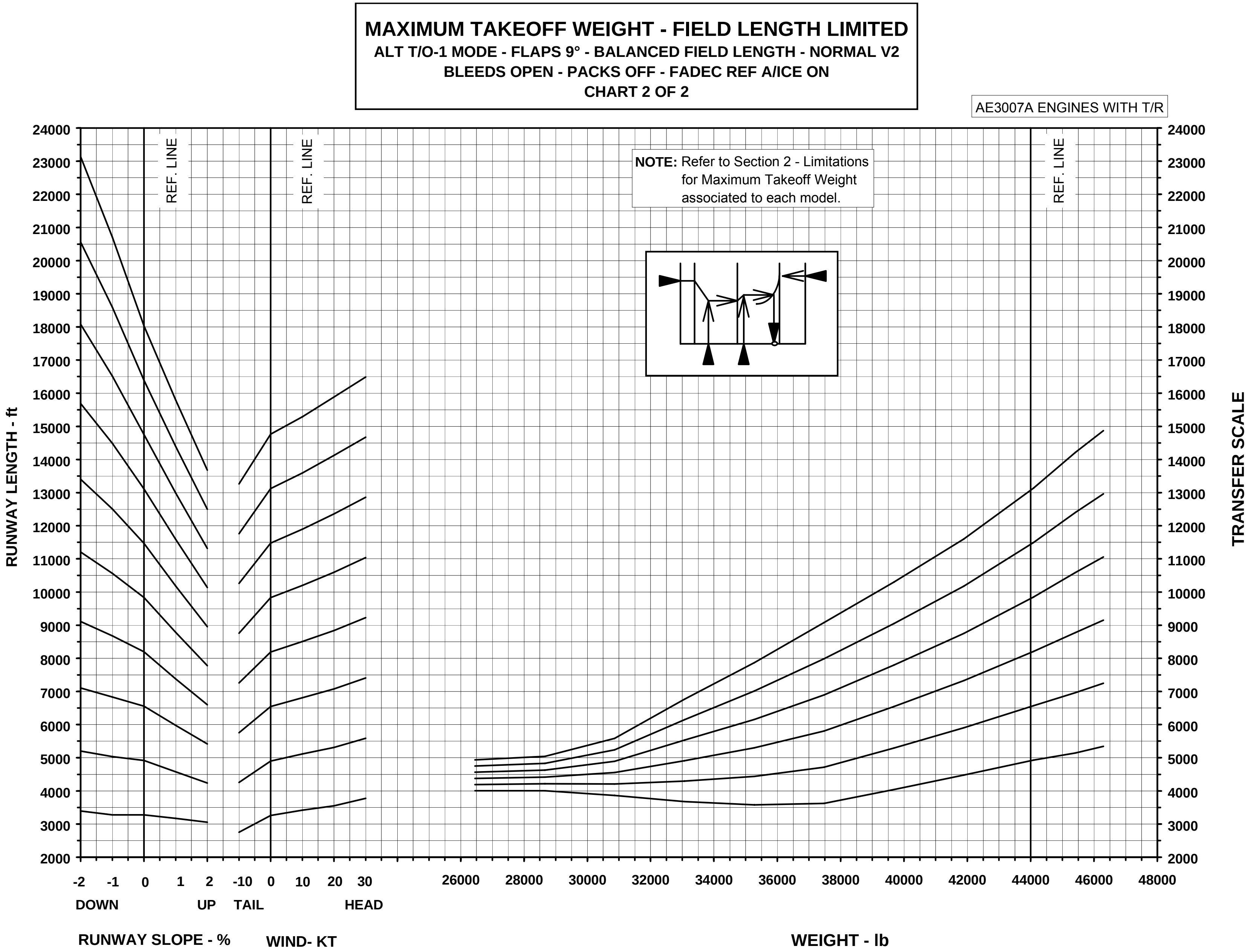
MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED

ALT T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH - NORMAL V2 - BLEEDS OPEN - PACKS OFF - FADEC REF A/ICE ON

CHART 1 OF 2

AE3007A ENGINES WITH T/R



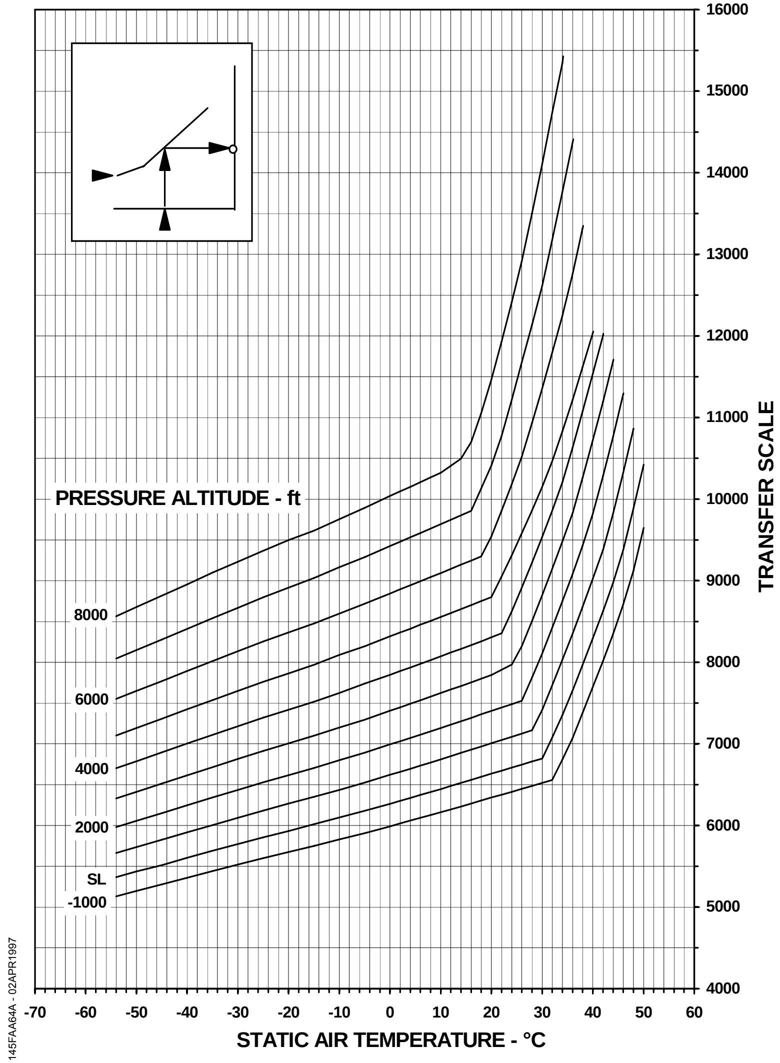

MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED
ALT T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH - NORMAL V2
BLEEDS OPEN - PACKS OFF - FADEC REF A/ICE ON
CHART 2 OF 2
AE3007A ENGINES WITH T/R
NOTE: Refer to Section 2 - Limitations for Maximum Takeoff Weight associated to each model.
REF. LINE
REF. LINE
REF. LINE
RUNWAY LENGTH - ft
TRANSFER SCALE
24000
23000
22000
21000
20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
-2
-1
0
1
2
DOWN
UP
-10
0
10
20
30
TAIL
HEAD
26000
28000
30000
32000
34000
36000
38000
40000
42000
44000
46000
48000
RUNWAY SLOPE - %
WIND- KT
WEIGHT - lb

MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED

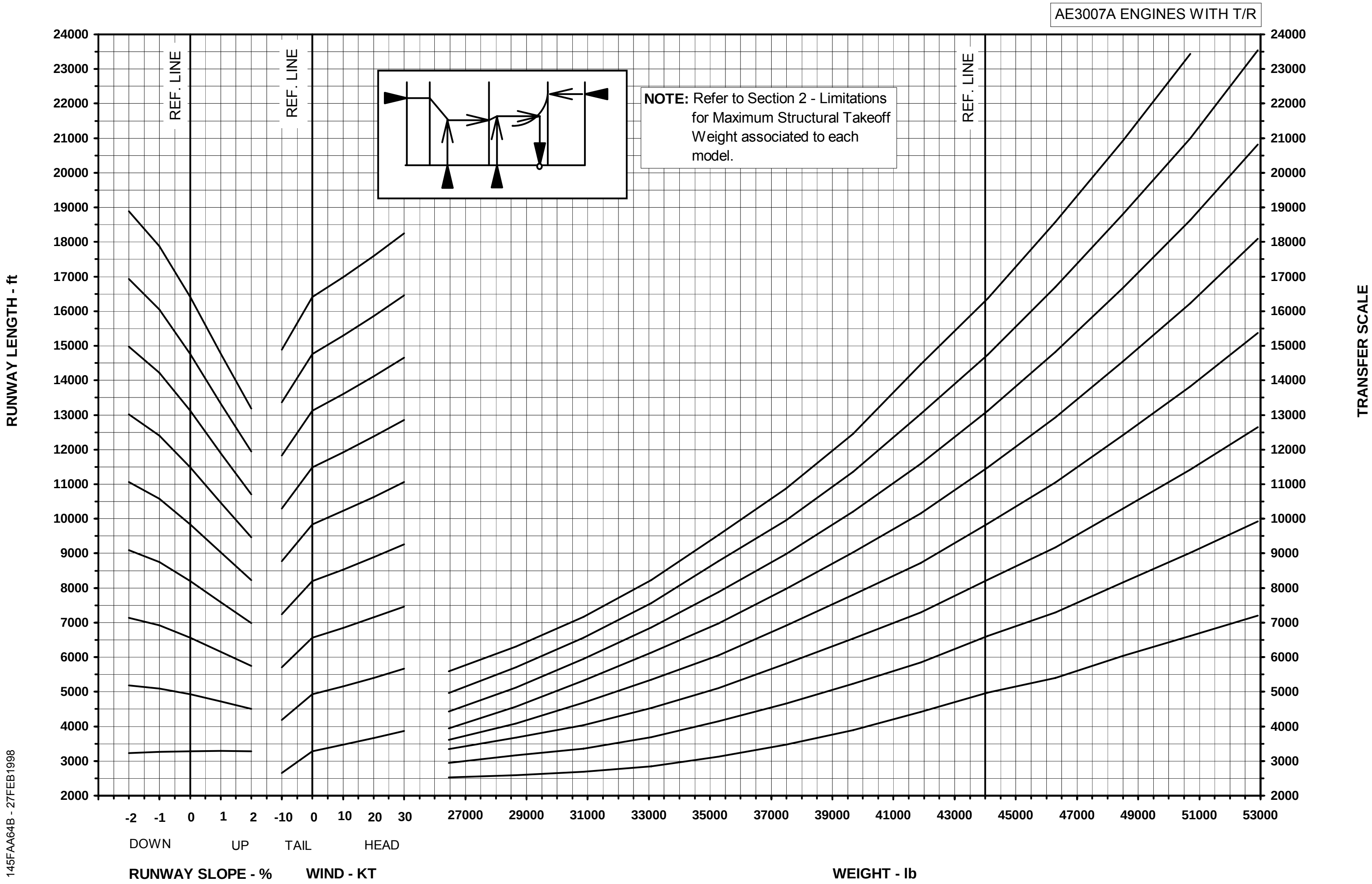
T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH - INCREASED V_2 - BLEEDS CLOSED - PACKS OFF - FADEC REF A/ICE OFF

CHART 1 OF 2

AE3007A ENGINES WITH T/R



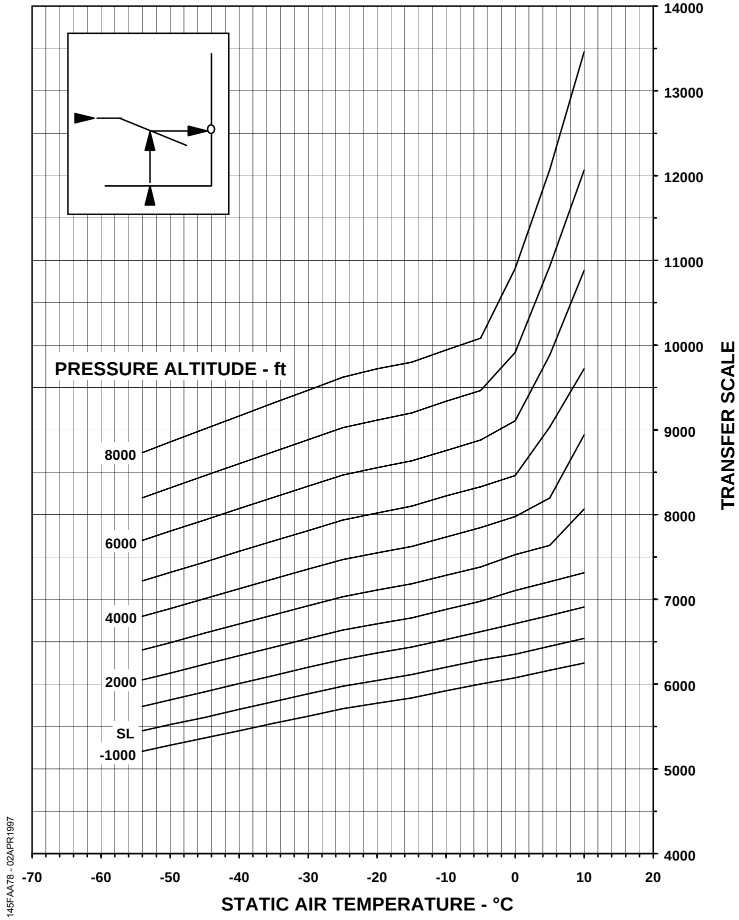
MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED
T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH
INCREASED V_2 - BLEEDS CLOSED - PACKS OFF - FADEC REF A/ICE OFF
CHART 2 OF 2



MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED

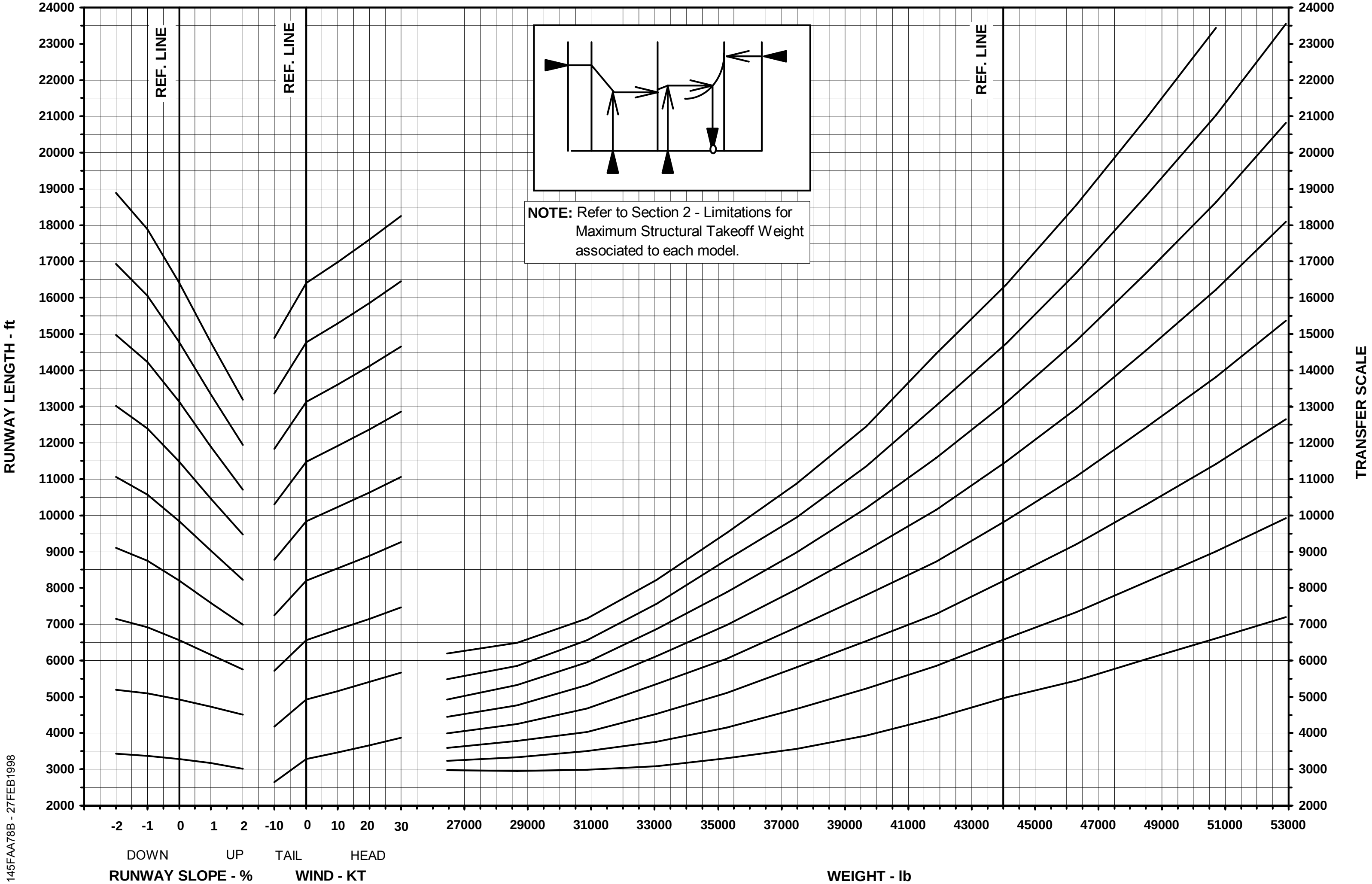
T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH
INCREASED V_2 - BLEEDS OPEN - PACKS OFF - FADEC REF A/ICE ON
CHART 1 OF 2

AE3007A ENGINES WITH T/R



MAXIMUM TAKEOFF WEIGHT - FIELD LENGTH LIMITED
T/O-1 MODE - FLAPS 9° - BALANCED FIELD LENGTH - INCREASED V_2
BLEEDS OPEN - PACKS OFF - FADEC REF A/ICE ON
CHART 2 OF 2

AE3007A ENGINES WITH T/R



NOTE: Refer to Section 2 - Limitations for Maximum Structural Takeoff Weight associated to each model.

BRAKE ENERGY

The maximum takeoff weight to enable compliance with brake energy requirements is shown in the Maximum Takeoff Weight - Brake Energy Limited charts.

MAXIMUM TAKEOFF WEIGHT - BRAKE ENERGY LIMITED CHART

Two charts for takeoffs with flaps 9° are provided. One chart allows obtaining the Maximum Takeoff Weight Brake Energy Limited for takeoffs with normal V_2 and the remaining chart allow obtaining the same data for increased V_2.

Increased V_2 chart provides better performance when the airplane is climb limited, although decreasing field length performance. An adequate compromise between both characteristics must be ensured by the operator.

WARNING: **PERFORMANCE DATA FOR NORMAL V_2 AND INCREASED V_2 MUST NOT BE MIXED.**

USE

Enter the chart with the Static Air Temperature and go to the Airport Pressure Altitude. Go to the right to the wind reference line and follow the guide lines until intercepting the current wind. From this point, go to the right to the slope reference line and follow the guide lines until intercepting the current slope. Go to the right to read the maximum takeoff weight as limited by brake energy.

EXAMPLE

Given:

V_2 .... NORMAL
Static Air Temperature... 20°C
Airport Pressure Altitude.. 6000 ft
Wind.. 0 kt
Runway Slope 0%

Determine:

Brake Energy Limited Weight................................... 45414 lb

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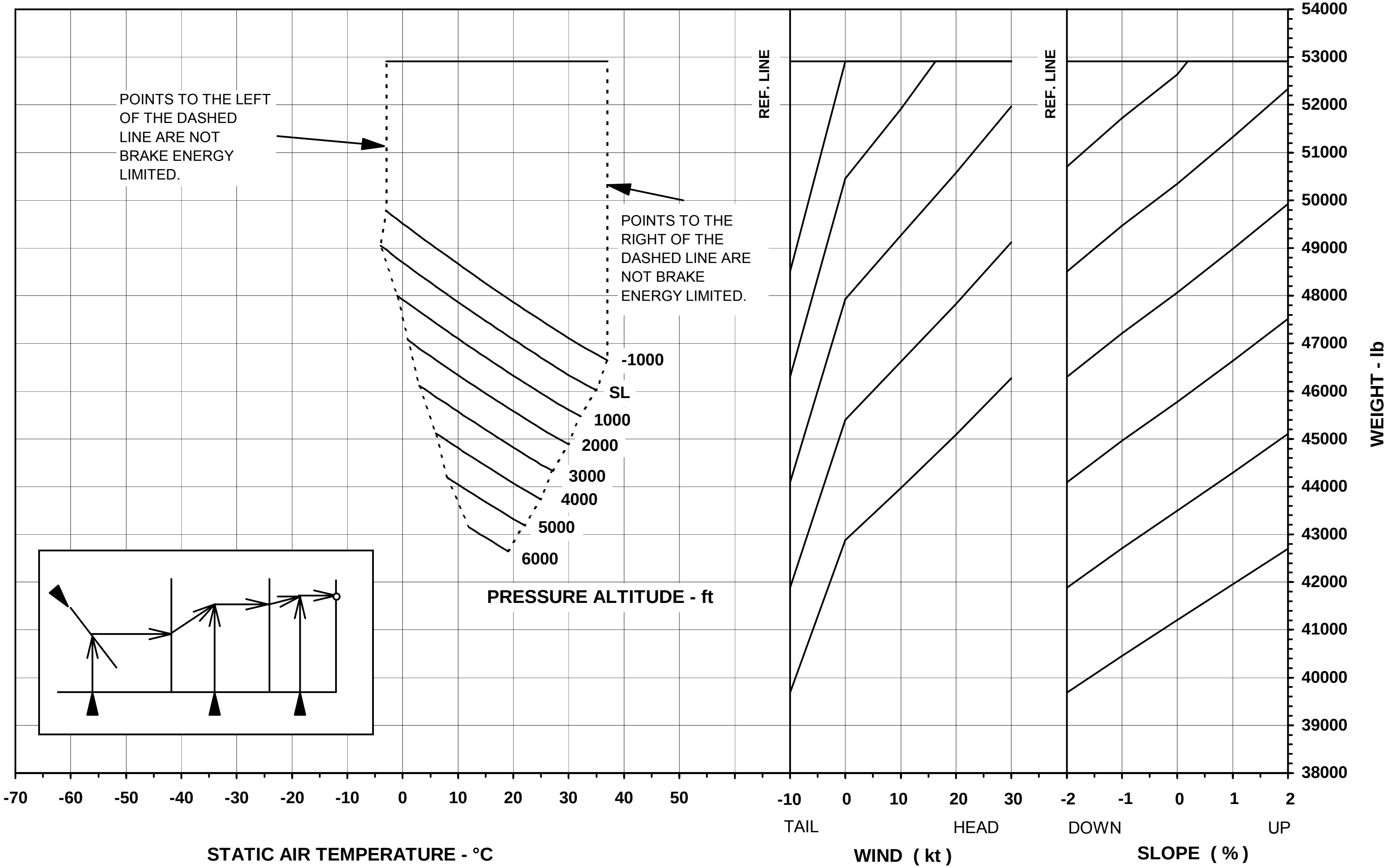
MAXIMUM TAKEOFF WEIGHT - BRAKE ENERGY LIMITED
NORMAL V_2

AE3007A ENGINES WITH TR



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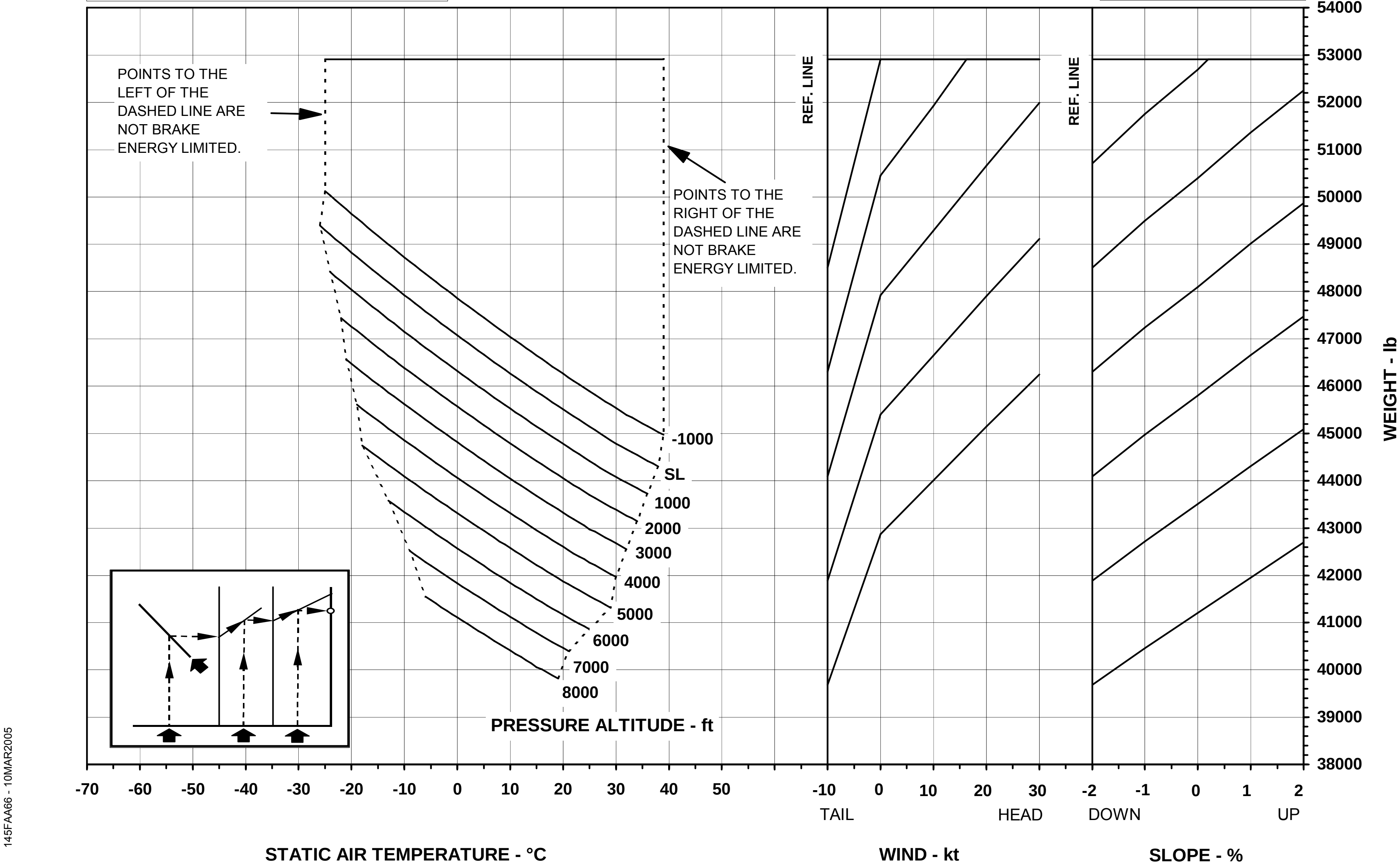
MAXIMUM TAKEOFF WEIGHT - BRAKE ENERGY LIMITED

INCREASED V_2

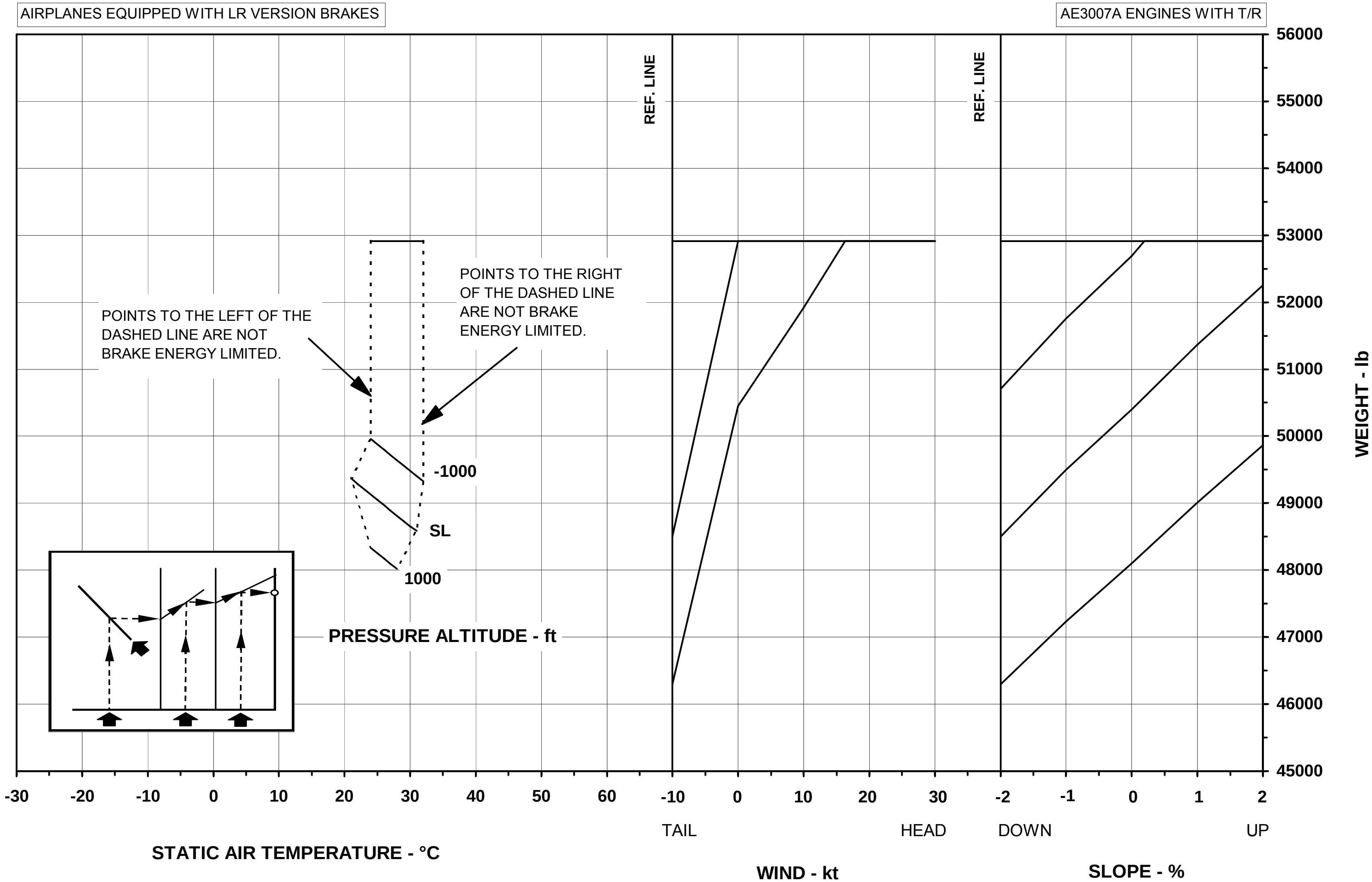
AIRPLANES EQUIPPED WITH ER VERSION BRAKES

AE3007A ENGINES WITH T/R



MAXIMUM TAKEOFF WEIGHT - BRAKE ENERGY LIMITED

INCREASED V_2



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NET TAKEOFF FLIGHT PATH

The net flight path graphs are provided to allow calculation of obstacle clearance after takeoff. It is necessary to establish that all obstacles in the takeoff path will be cleared, once this is done there is no need for proceeding further with the calculations.

The construction of the flight path assumes that the airplane is flown in the following manner:

- Engine failure has been recognized at V_1.
- Landing gear is selected up after liftoff, with positive rate of climb. At the end of the takeoff distance, where the net flight path begins, the landing gear is still retracting. The speed is V_2.
- The climb is continued to the acceleration height where the airplane accelerates in level flight to the final segment speed, and flaps are retracted.
- When final segment speed is reached, and flaps are retracted, climb is resumed.
- If the flight path has to be extended beyond the limits of the net flight path data, the enroute climb chart must be used.

TAKEOFF NET FLIGHT PATH – REFERENCE GRADIENT

The reference gradient to be used on the obstacle analysis is shown in the Obstacle Clearance - Reference Gradient chart.

OBSTACLE CLEARANCE – REFERENCE GRADIENT CHART

USE

Choose the appropriate chart considering FADEC REF A/ICE and Thrust Rating Mode options.

Enter the chart with Static Air Temperature and go to the Airport Pressure Altitude. From this point, go to the right until the weight reference line and follow the guide lines until intercepting the current weight. From the interception, go to the airspeed reference line. If necessary, apply the airspeed correction to read reference gradient.

NOTE: Increased V_2 takeoffs are not available when taking off using ALT T/O-1 Mode.

WARNING: **PERFORMANCE DATA FOR NORMAL V_2 AND INCREASED V_2 MUST NOT BE MIXED.**

EXAMPLE

Given:

Static air temperature .... 20°C
Airport pressure altitude .... 5000 ft
Weight.. 42000 lb
FADEC REF A/ICE .... OFF
V_2 .... NORMAL

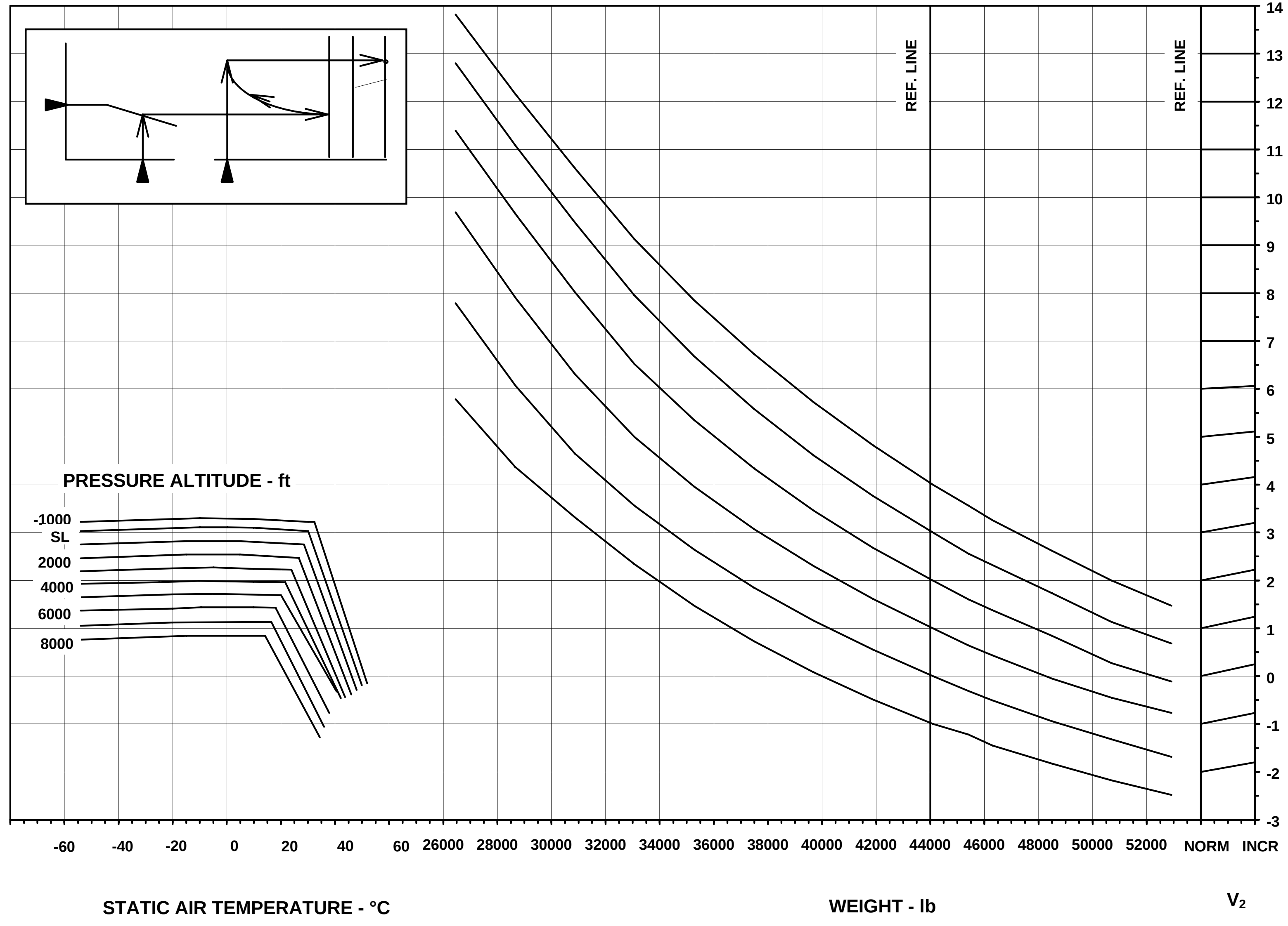
Determine:

Reference gradient .... 2.2 %

OBSTACLE CLEARANCE - REFERENCE GRADIENT

FLAPS 9° - T/O-1 MODE - BLEED CLOSED - PACKS OFF - FADEC REF A/ICE OFF

AE3007A ENGINES WITH T/R



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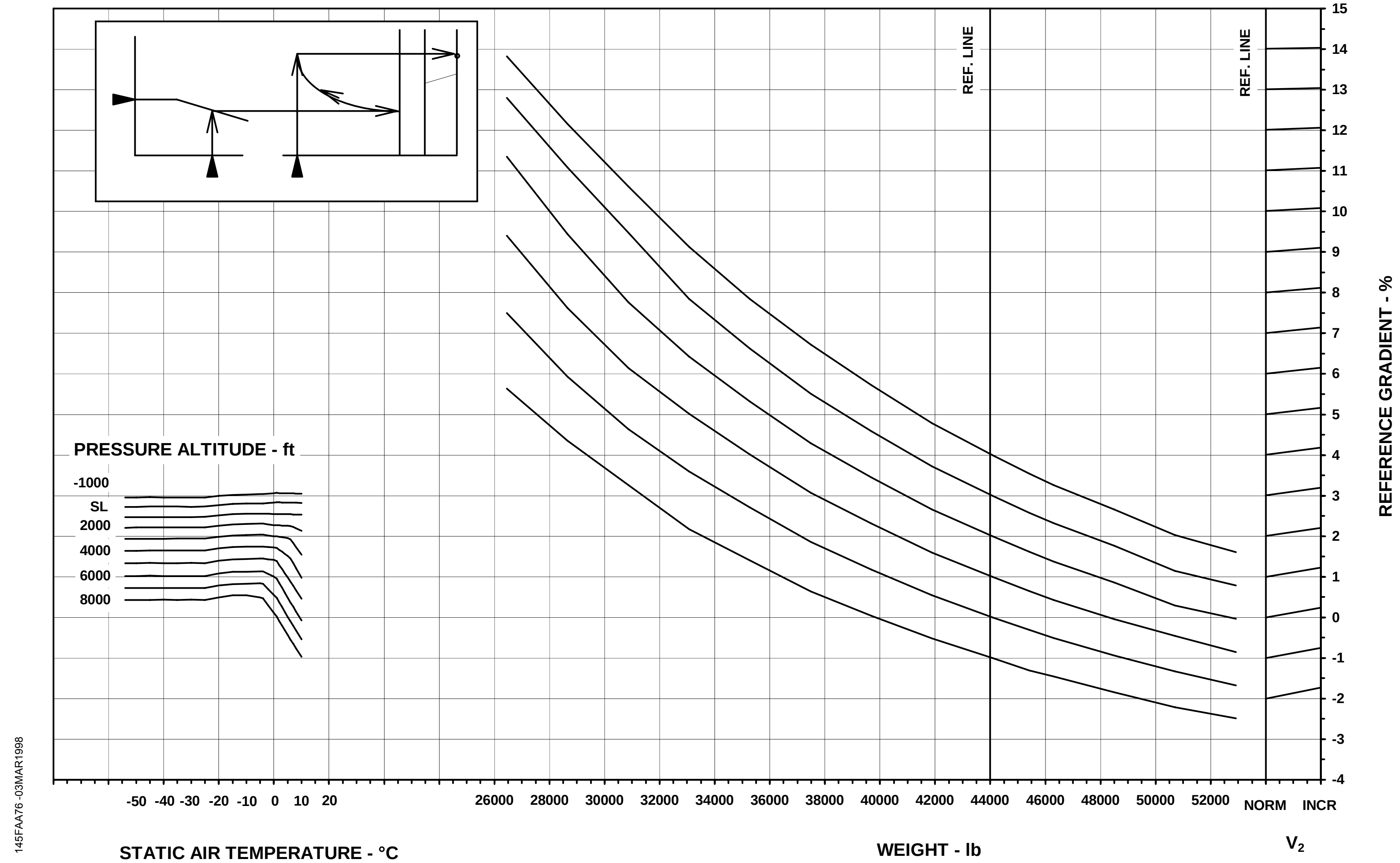
OBSTACLE CLEARANCE - REFERENCE GRADIENT

FLAPS 9° - T/O-1 MODE - BLEEDS OPEN - PACKS OFF - FADEC REF A/ICE ON

AE3007A ENGINES WITH T/R



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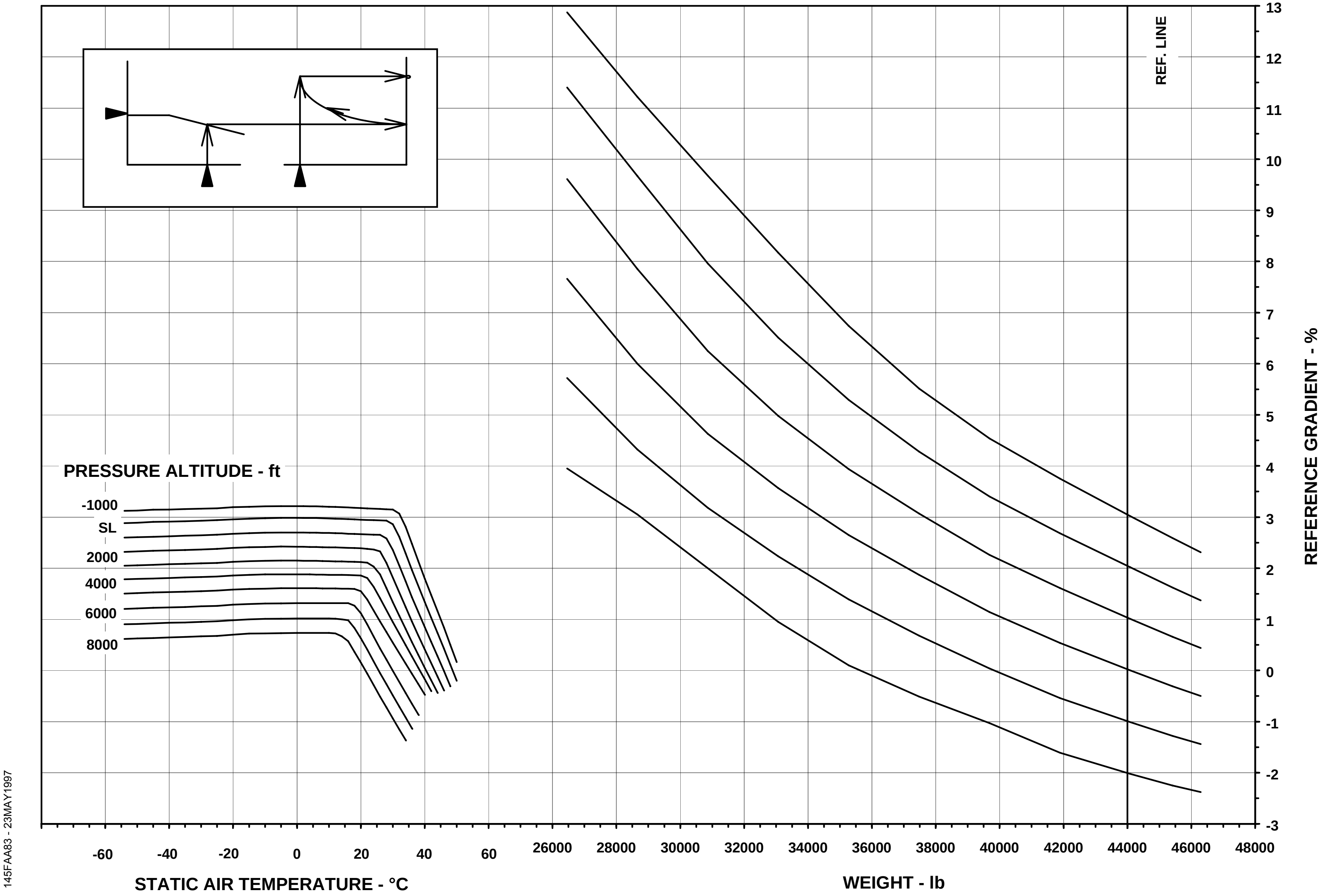
OBSTACLE CLEARANCE - REFERENCE GRADIENT

FLAPS 9° - ALT T/O-1 MODE - BLEEDS CLOSED - PACKS OFF - FADEC REF A/ICE OFF

AE3007A ENGINES WITH T/R



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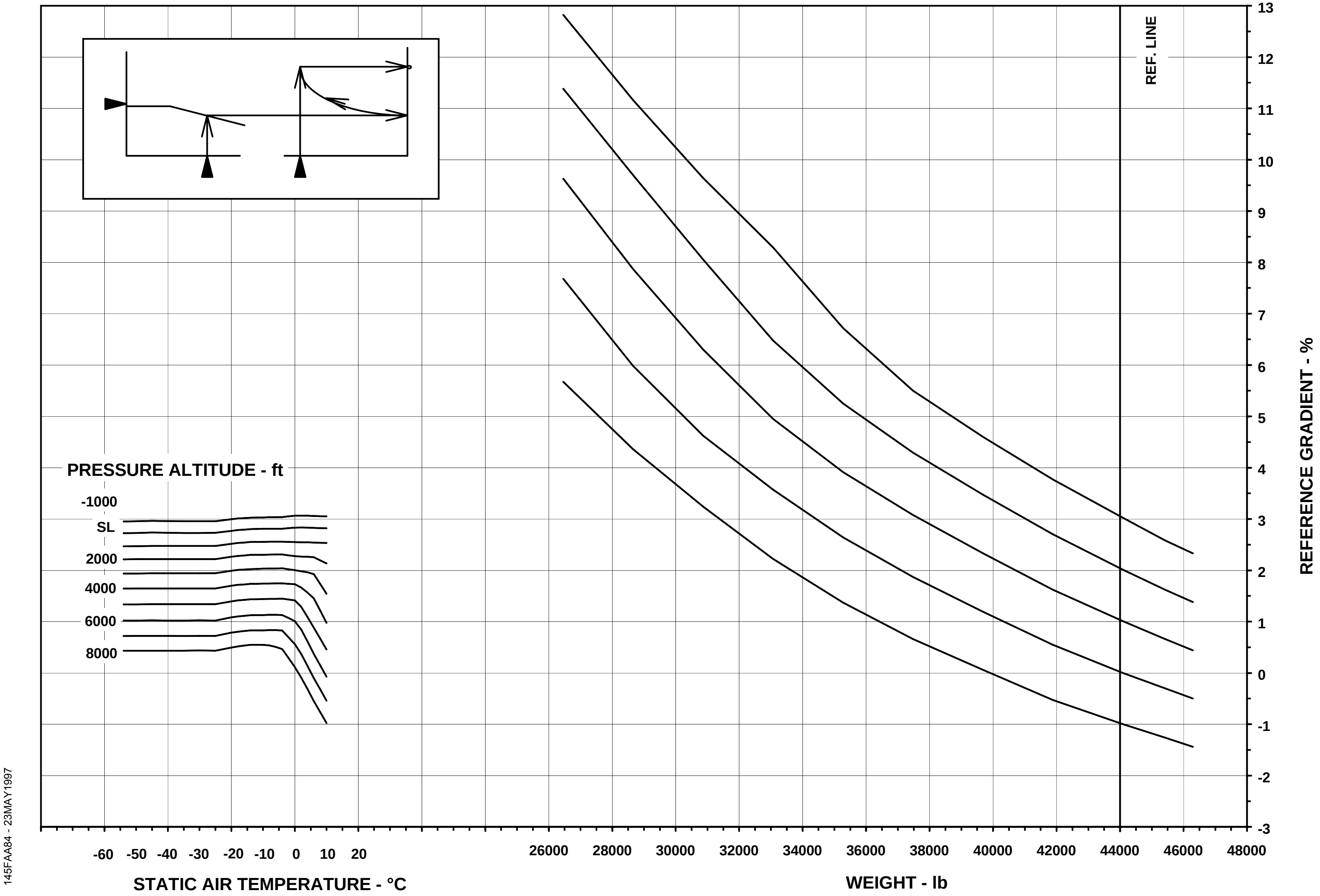
OBSTACLE CLEARANCE - REFERENCE GRADIENT

FLAPS 9° - ALT T/O-1 MODE - BLEEDS OPEN - PACKS OFF - FADEC REF A/ICE ON

AE3007A ENGINES WITH T/R



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TAKEOFF NET FLIGHT PATH - OBSTACLE CLEARANCE

The takeoff net flight path for the first and second segment is shown in Obstacle Clearance chart.

Associated conditions:

Airspeed	V_{LOF} TO V_2 (FIRST SEGMENT) V_2 (SECOND SEGMENT)
Flaps	9°
Landing gear	RETRACTING (FIRST SEGMENT) UP (SECOND SEGMENT)
Operating engine	TAKEOFF POWER

OBSTACLE CLEARANCE CHART

USE

Enter chart with the obstacle horizontal distance from reference zero, wind component, and the Reference Gradient. Read the obstacle height above reference zero and the Level Off Height.

EXAMPLE

Given:

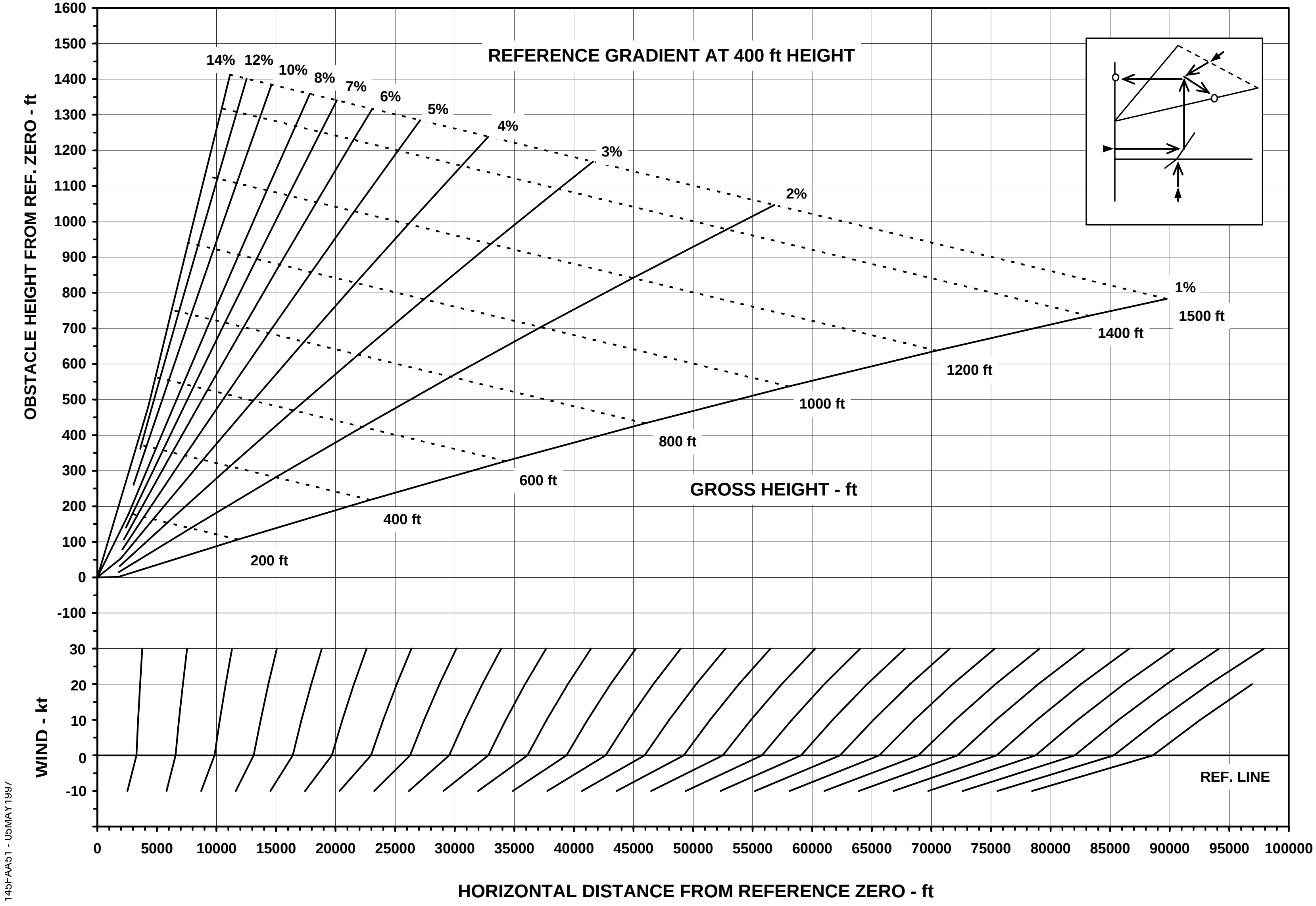
Horizontal distance from reference zero.................. 30000 ft
Wind component.. 10 kt (HEADWIND)
Reference gradient 3%

Determine:

Level Off Height .... 900 ft
Height above reference zero .... 1150 ft

OBSTACLE CLEARANCE
FLAPS 9°

AE3007A ENGINES



MAXIMUM LEVEL OFF HEIGHT CHART

USE

Enter chart with the Reference Gradient. Read the Maximum Level Off Height.

EXAMPLE

Given:

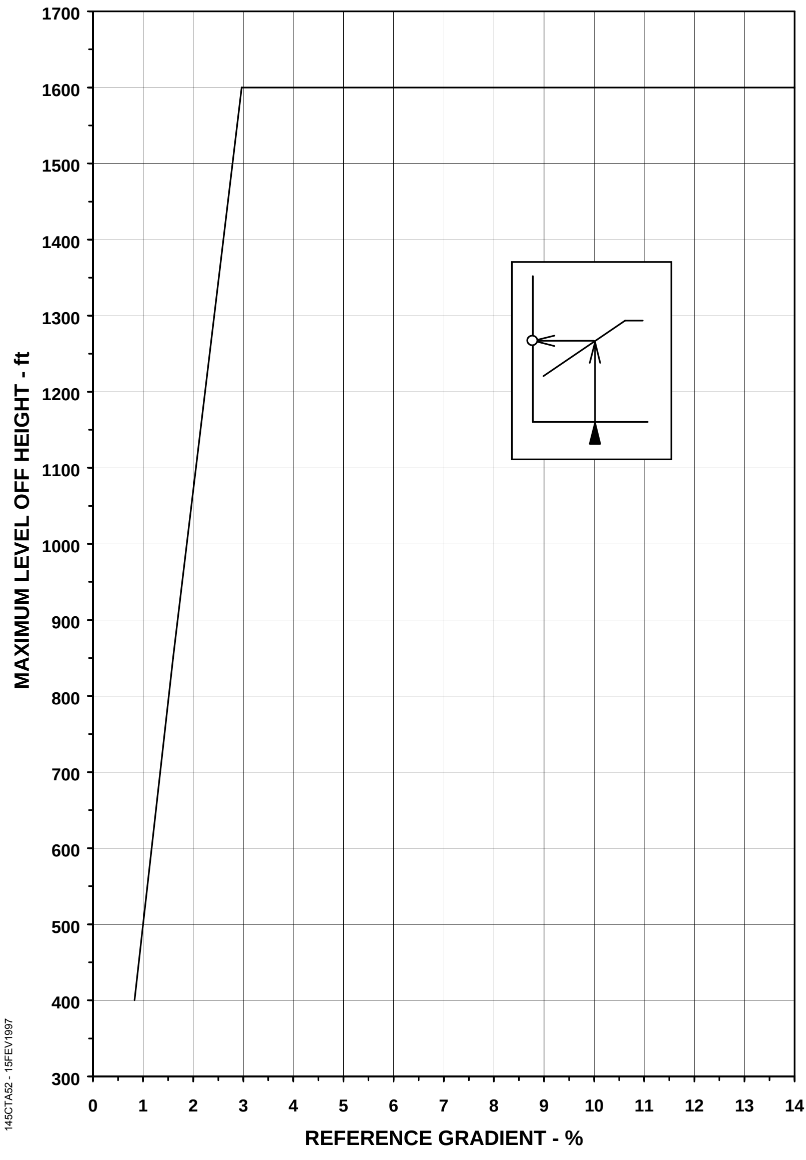
Reference gradient 6%

Determine:

Maximum Level Off Height .... 1600 ft

MAXIMUM LEVEL OFF HEIGHT

AE3007A ENGINES



TAKEOFF NET FLIGHT PATH - THIRD SEGMENT

The horizontal distance required for acceleration to the final segment speed and flap retraction to 0 is given in the Third Segment Horizontal Distance chart.

The height of the third segment acceleration may be varied to suit the current conditions. The lower limit is 400 ft above the runway surface, the upper limit is 1500 ft above the runway surface. In general, since most obstacles are close in, it will be advantageous to use the greatest acceleration height, but if the critical obstacle is a long way out it may be better to accelerate at the minimum height in order to improve the later stages of the flight path.

If obstacles exists both close in and far out, there may be an advantage in accelerating at an intermediate height.

If there are no obstacles, any convenient height between the two limits may be selected for the acceleration.

Associated conditions:

Airspeed .... V_2 TO V_{FS}
Flaps .... RETRACTING FROM 9° TO ZERO
Landing gear .... UP
Operating engine .... TAKEOFF POWER

THIRD SEGMENT HORIZONTAL DISTANCE CHART

USE

Enter the chart with reference gradient, level off height, and wind component. Read the third segment horizontal distance.

EXAMPLE

Given:

Reference Gradient 6%
Level Off Height... 1000 ft
Wind Component.. 10 kt (HEADWIND)

Determine:

Third Segment Horizontal Distance......................... 11500 ft

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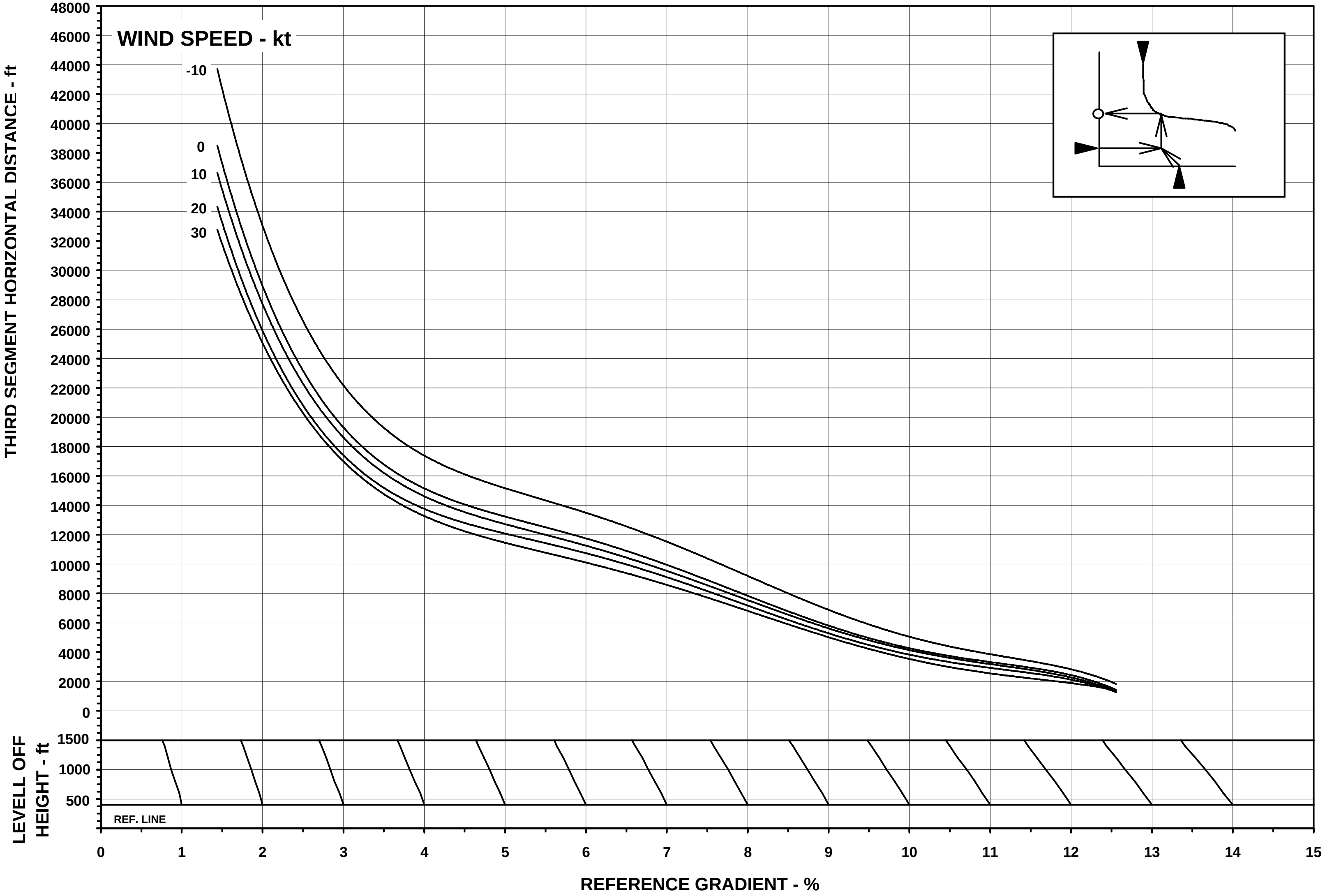
THIRD SEGMENT HORIZONTAL DISTANCE
TAKEOFF FLAPS 9°

AE3007A ENGINES WITH T/R



TAKEOFF NET FLIGHT PATH - FINAL SEGMENT

The net gradient of climb between the end of the third segment and 1500 ft height point is shown in the Final Segment Net Gradient of Climb chart.

Associated conditions:

Airspeed.. V_{FS}
Flaps .... UP
Landing gear .... UP
Operating engine .... TAKEOFF POWER (MAX CONTINUOUS AFTER 5 MINUTES)

FINAL SEGMENT NET GRADIENT OF CLIMB CHART

USE

Enter the chart with reference gradient and wind component. Read the final segment net gradient of climb.

EXAMPLE

Given:

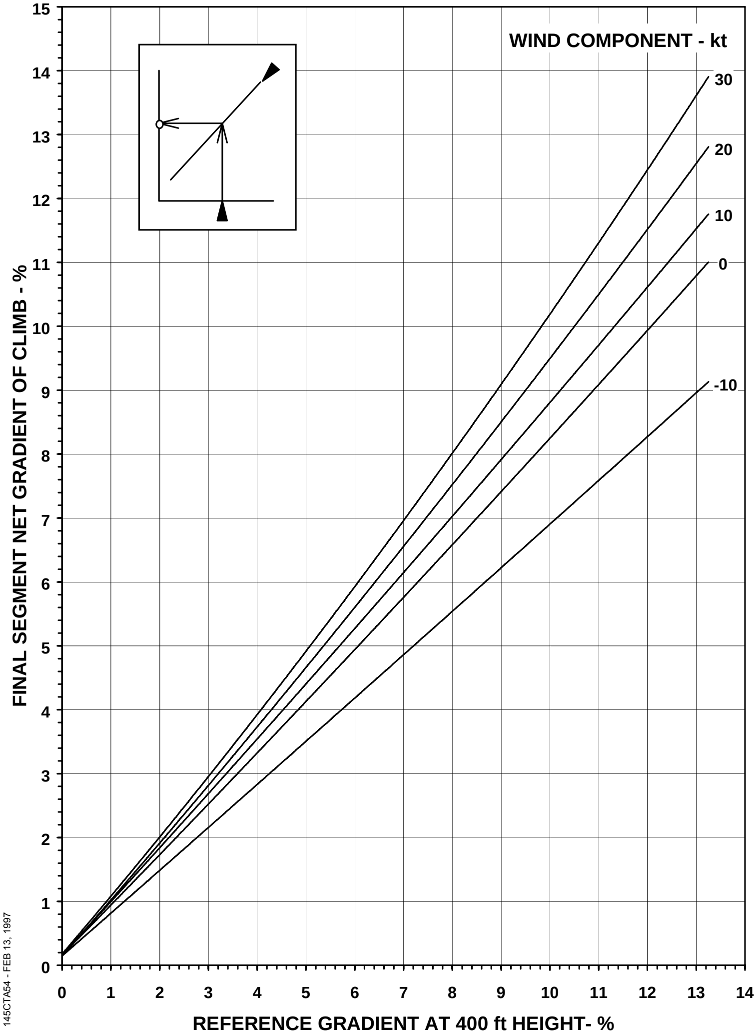
Reference Gradient 6%
Wind component.. 10 kt (HEADWIND)

Determine:

Final segment net gradient of climb............... 5.3%

FINAL SEGMENT NET GRADIENT OF CLIMB
TAKEOFF FLAPS 9°

AE3007A ENGINES



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TAKEOFF SPEEDS

The speeds to be used during takeoff are shown in the Takeoff Speeds -V_1, V_R and V_2 charts, Ground Minimum Control Speed - V_{MCG} chart, Air Minimum Control Speed - V_{MCA} chart, and Final Segment Speed - V_{FS} chart.

Charts for flaps 9° are provided.

TAKEOFF SPEEDS - V_1, V_R AND V_2 CHARTS

Three sets of charts for takeoffs with flaps 9° are provided, according to the following options:

- T/O-1 Thrust Rating Mode and Normal V_2,
- ALT T/O-1 Thrust Rating Mode and Normal V_2,
- T/O-1 Thrust Rating Mode and Increased V_2.

WARNING: PERFORMANCE DATA FOR NORMAL V_2 AND INCREASED V_2 MUST NOT BE MIXED.

NOTE: If the maximum takeoff weight is higher than the actual takeoff weight, and if V_1 for this maximum permitted takeoff weight is higher than the V_1 for actual weight, any V_1 between the V_1 for the maximum takeoff weight and the V_1 for the actual weight may be used provided it is not higher than the V_R for the actual weight.

USE

Enter the appropriate chart with Static Air Temperature and go to the Airport Pressure Altitude. Go to the right until intercepting the appropriate weight line and read the desired speed.

EXAMPLE

Given:

Flaps .... 9°
Takeoff Mode T/O-1
V_2 .... NORMAL
Static Air Temperature .... 20°C
Airport pressure altitude .... 2000 ft
Airplane gross weight .... 38000 lb

Determine:

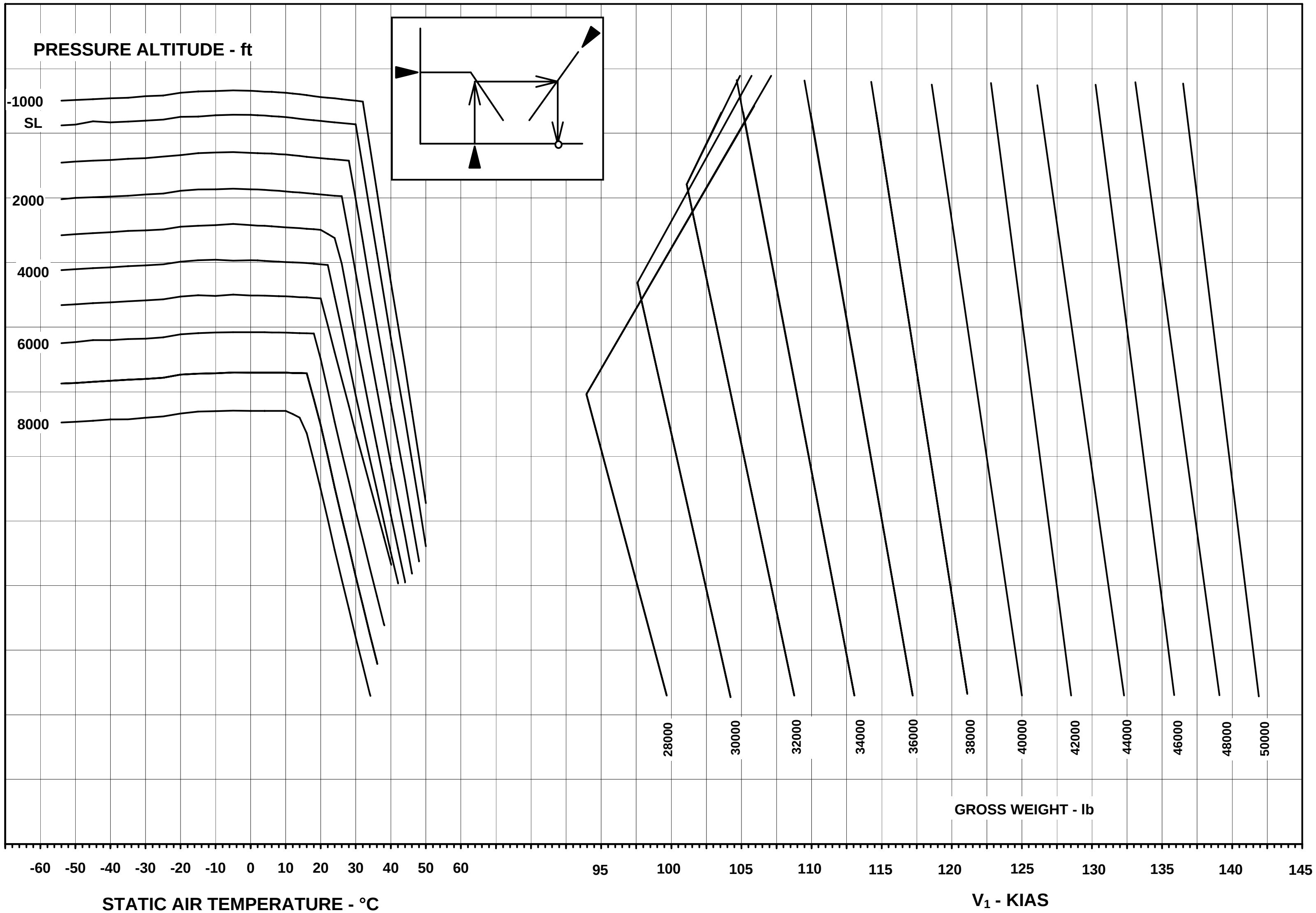
V_1 .... 116 KIAS
V_R .... 116 KIAS
V_2 .... 123 KIAS

AFM-145/1153 - FAA

TAKEOFF SPEEDS - V_1 (FOR NORMAL V_2)

FLAPS 9° - T/O-1 MODE - BALANCED FIELD LENGTH

AE3007A ENGINES WITH T/R



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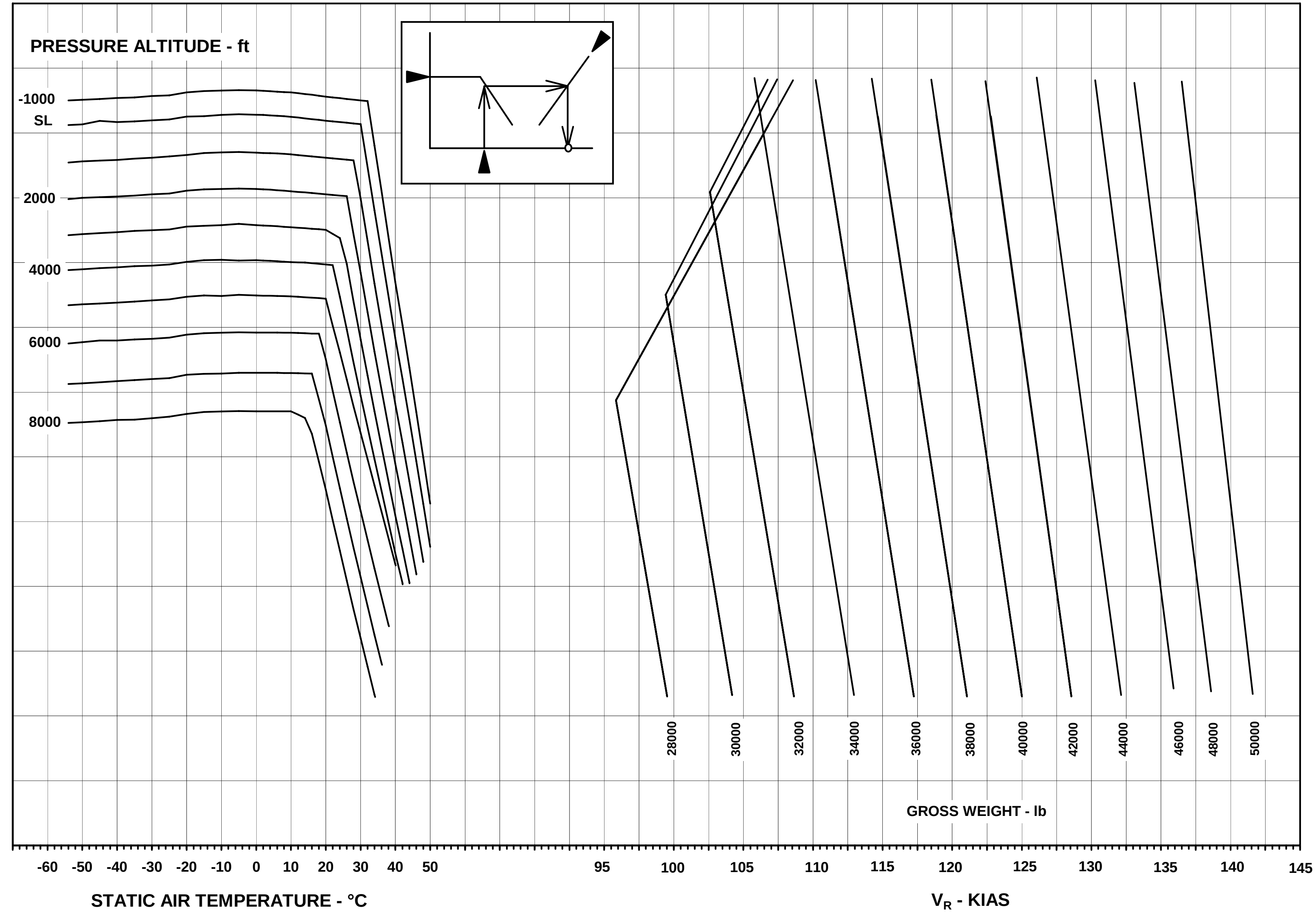
TAKEOFF SPEEDS - V_R (FOR NORMAL V_2)

FLAPS 9° - T/O-1 MODE - BALANCED FIELD LENGTH

AE3007A ENGINES WITH T/R



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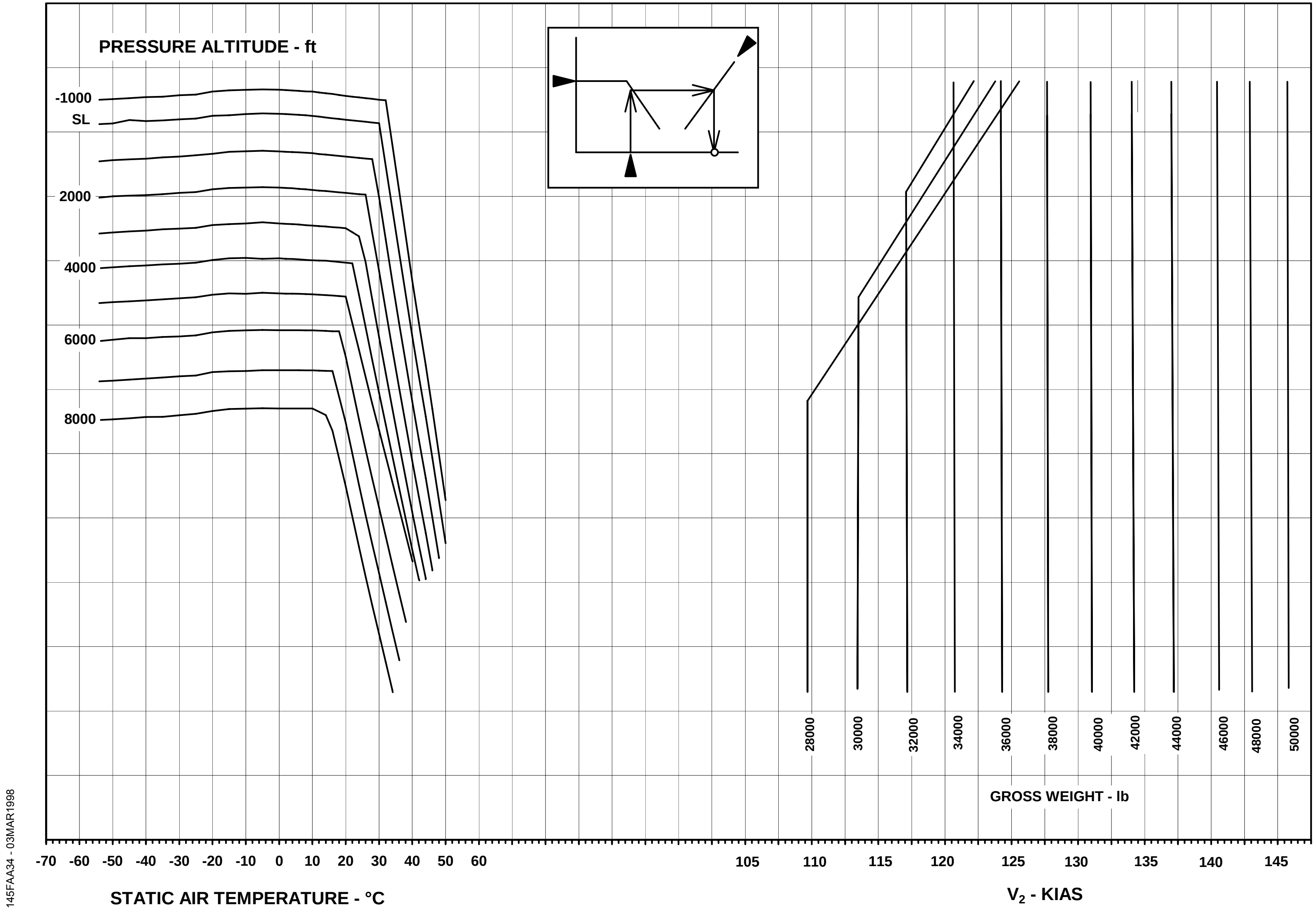
TAKEOFF SPEEDS - V_2 (NORMAL)

FLAPS 9° - T/O-1 MODE - BALANCED FIELD LENGTH

AE3007A ENGINES WITH T/R



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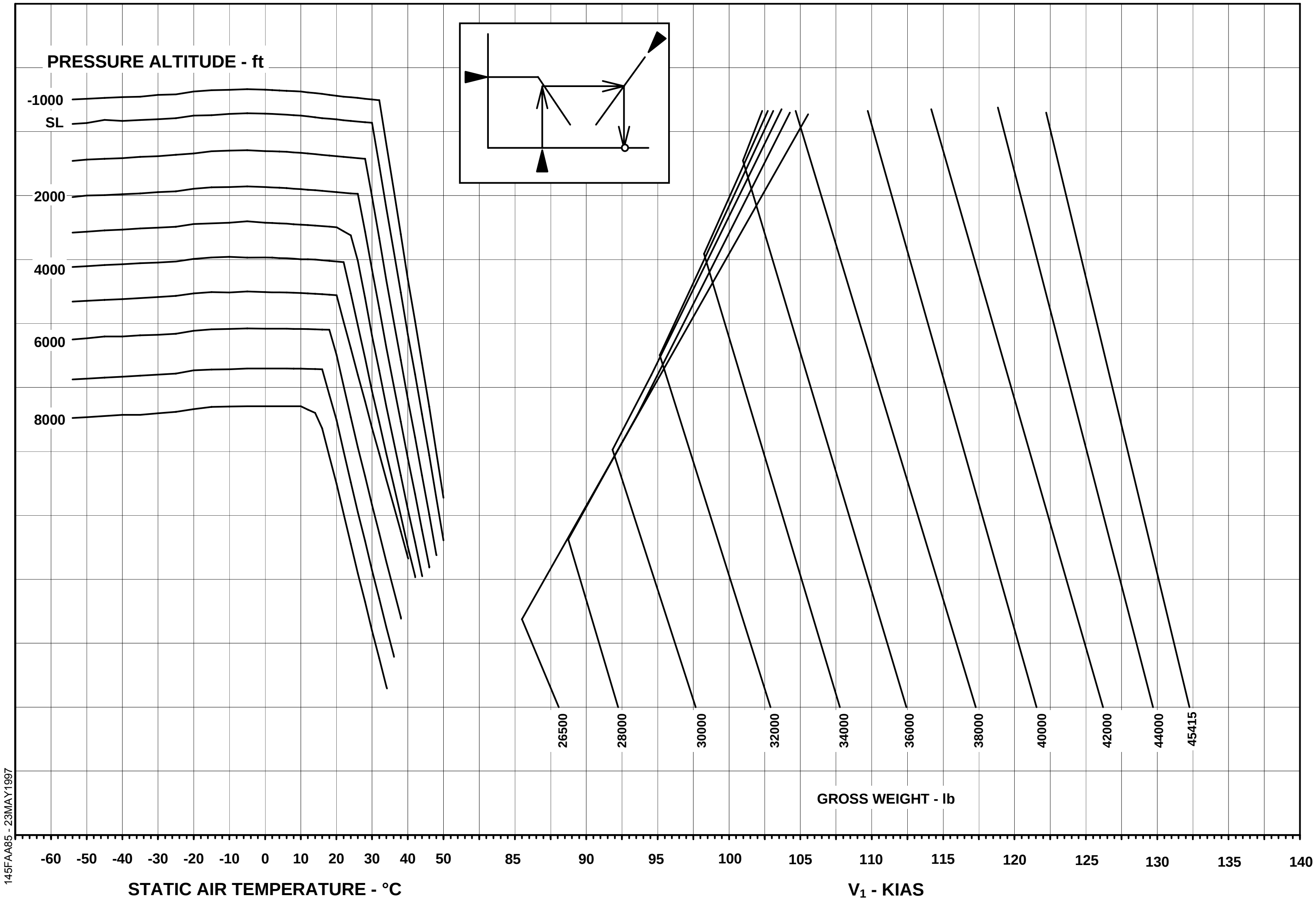
TAKEOFF SPEEDS - V_1

FLAPS 9° - ALT T/O-1 MODE - BALANCED FIELD LENGTH

AE3007A ENGINES WITH T/R



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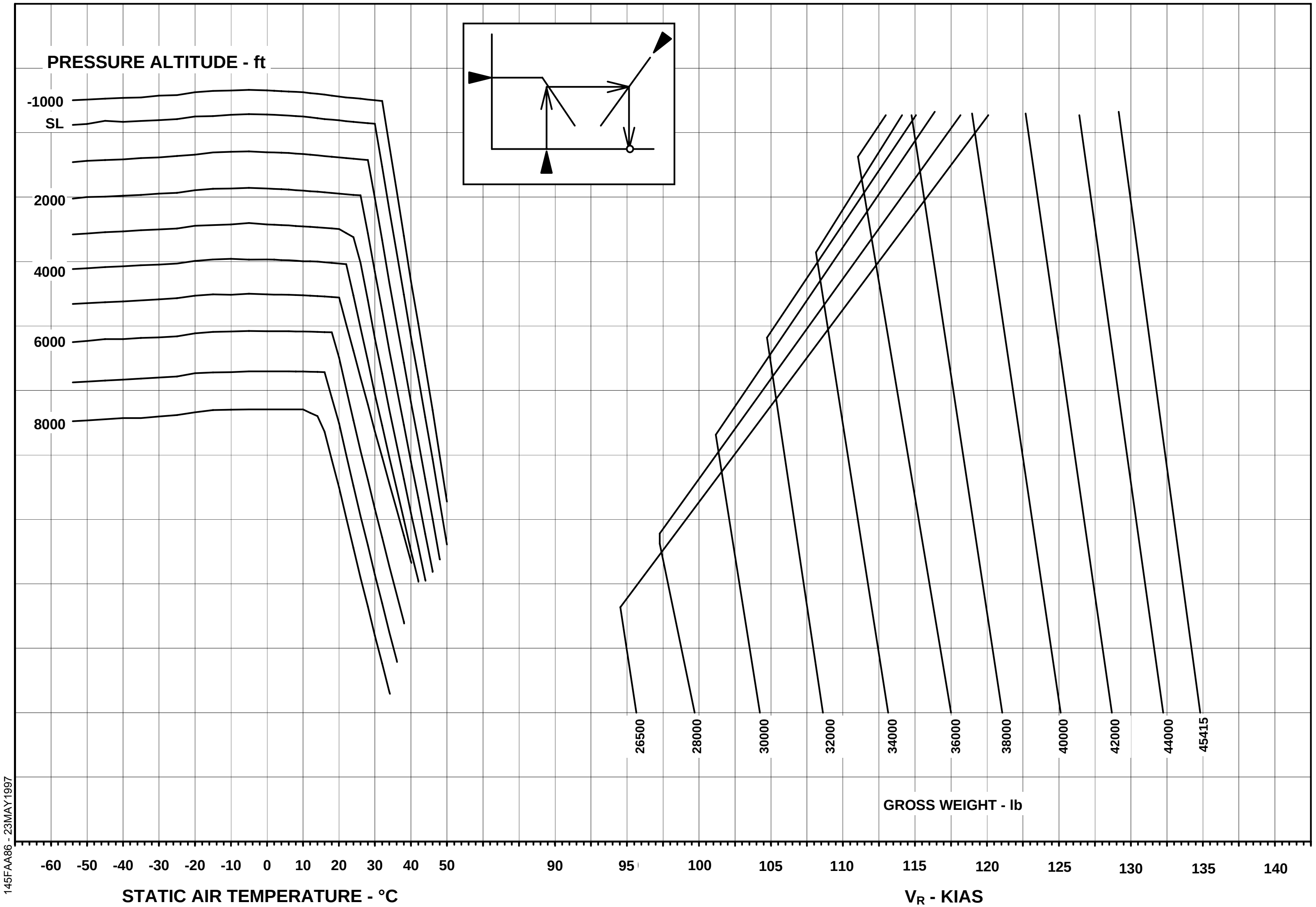
TAKEOFF SPEEDS - V_R

FLAPS 9° - ALT T/O-1 MODE - BALANCED FIELD LENGTH

AE3007A ENGINES WITH T/R



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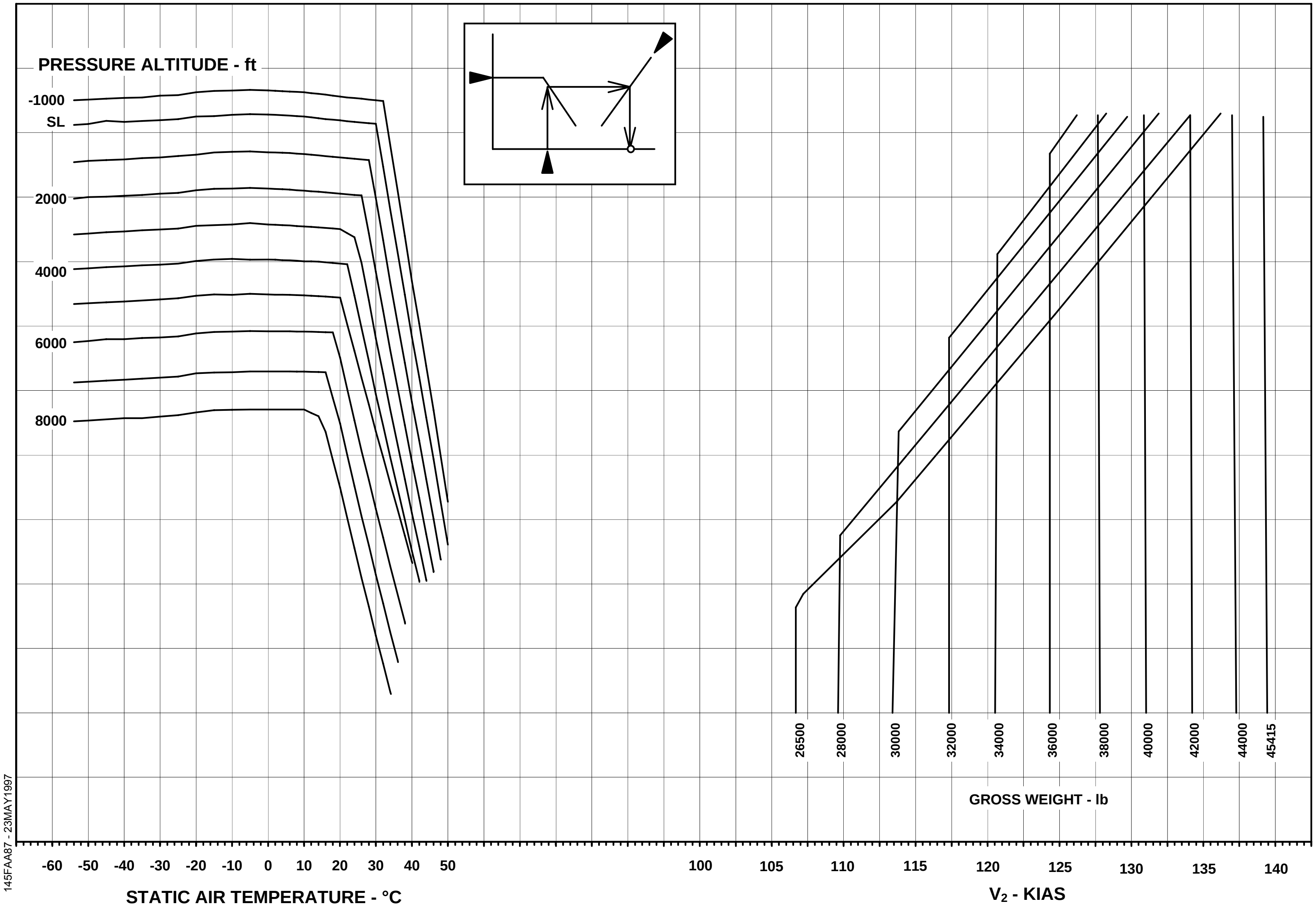
TAKEOFF SPEEDS - V_2

FLAPS 9° - ALT T/O-1 MODE - BALANCED FIELD LENGTH

AE3007A ENGINES WITH T/R



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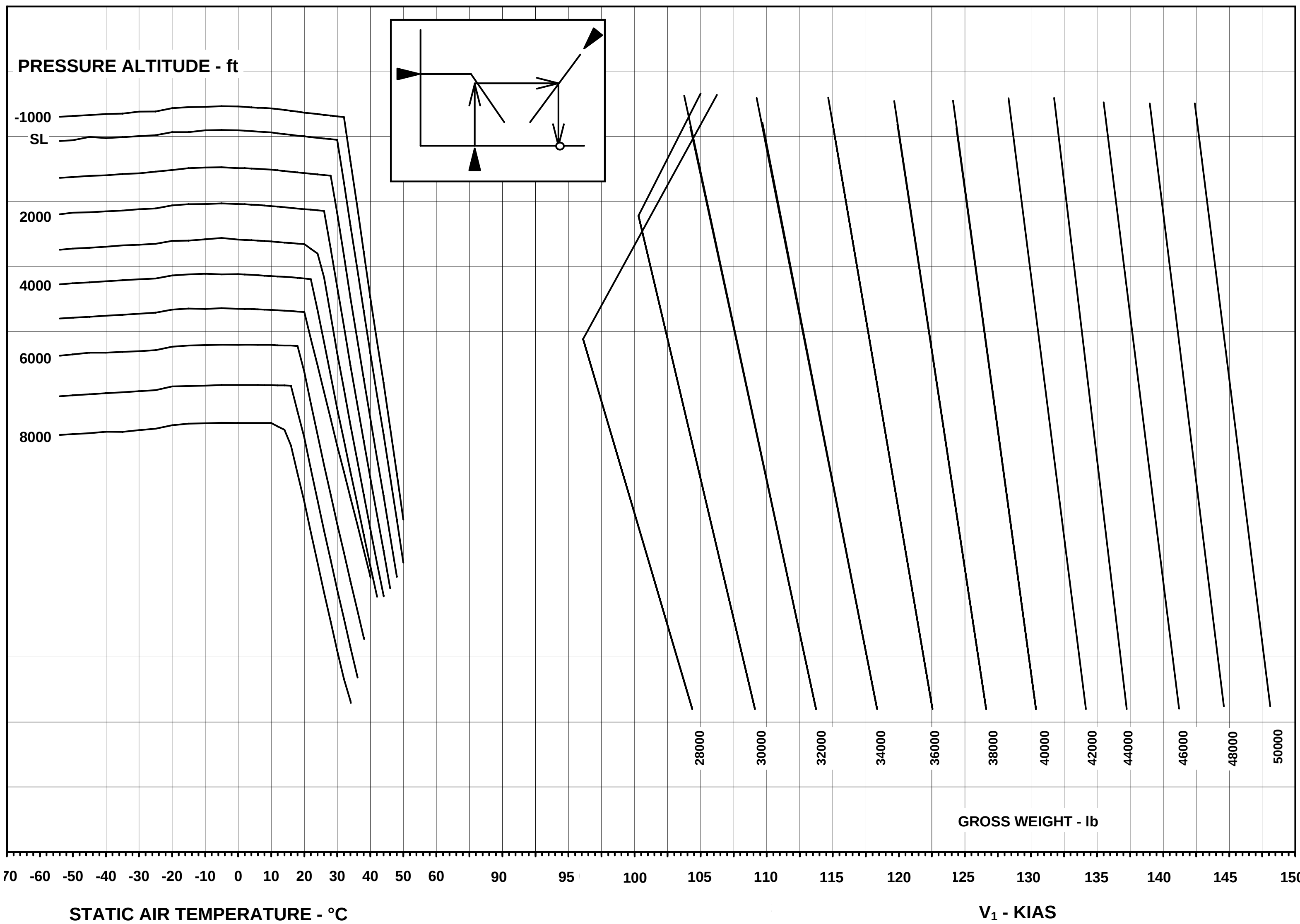
TAKEOFF SPEEDS - V_1 (FOR INCREASED V_2)

FLAPS 9° - T/O-1 MODE - BALANCED FIELD LENGTH

AE3007A ENGINES WITH T/R



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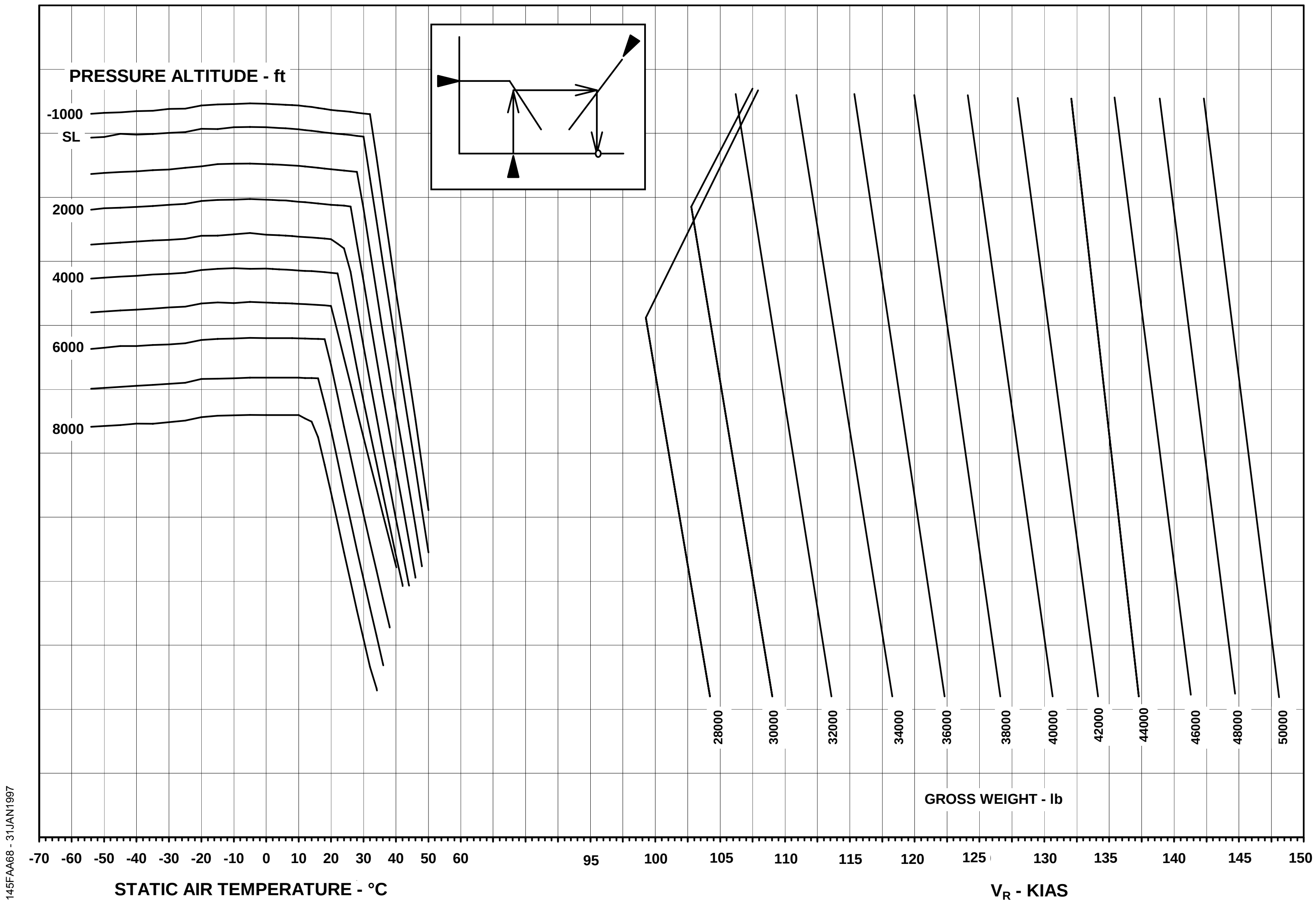
TAKEOFF SPEEDS - V_R (FOR INCREASED V_2)

FLAPS 9° - T/O-1 MODE - BALANCED FIELD LENGTH

AE3007A ENGINES WITH T/R



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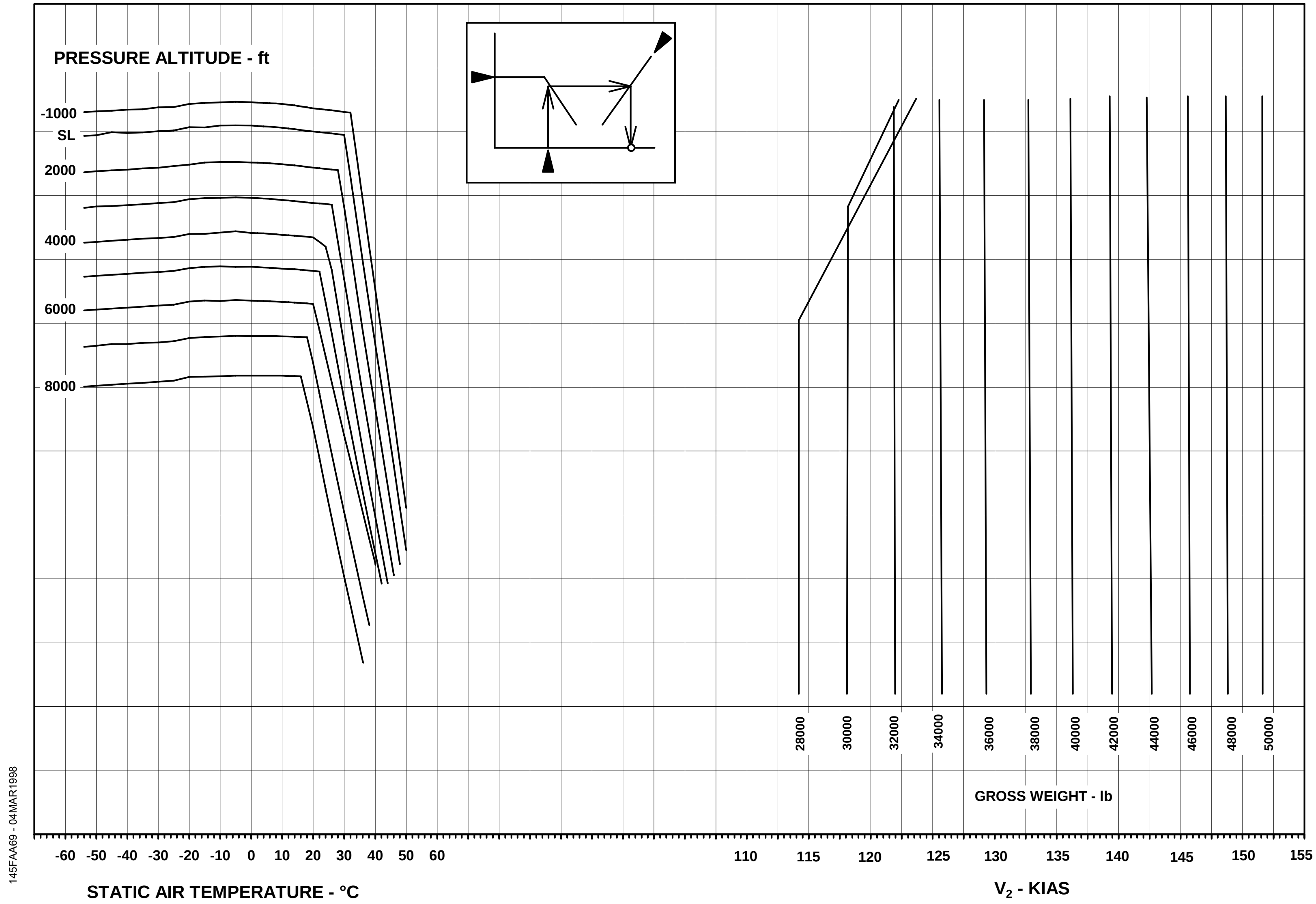
TAKEOFF SPEEDS - V_2 (INCREASED)

FLAPS 9° - T/O-1 MODE - BALANCED FIELD LENGTH

AE3007A ENGINES WITH T/R



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GROUND MINIMUM CONTROL SPEED - V_{MCG} CHART, AIR MINIMUM CONTROL SPEED - V_{MCA} CHART AND MINIMUM CONTROL SPEED DURING LANDING AND APPROACH – V_{MCL}

Minimum Control Speed During Landing and Approach (V_{MCL}) is equal to 98 KIAS.

USE

Enter the chart with the Static Air Temperature go to the Airport Pressure Altitude and read V_{MCG} or V_{MCA}.

EXAMPLE

Given:

Static Air Temperature... 20°C
Airport Pressure Altitude.. 5000 ft

Determine:

V_{MCG} .... 90 KIAS
V_{MCA} .... 93 KIAS

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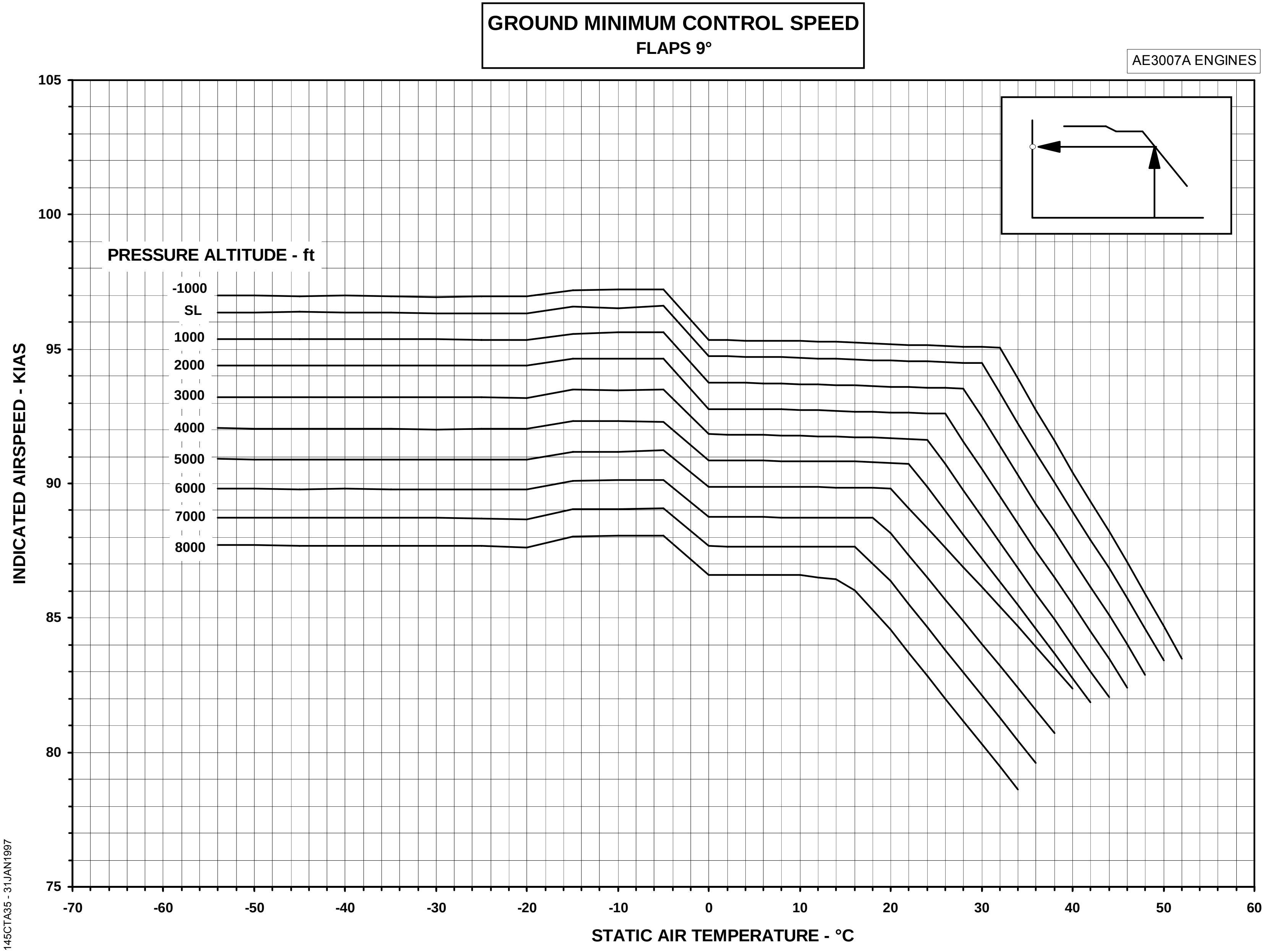
GROUND MINIMUM CONTROL SPEED
FLAPS 9°
AE3007A ENGINES
PRESSURE ALTITUDE - ft
-1000
SL
1000
2000
3000
4000
5000
6000
7000
8000
INDICATED AIRSPEED - KIAS
STATIC AIR TEMPERATURE - °C
105
100
95
90
85
80
75
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
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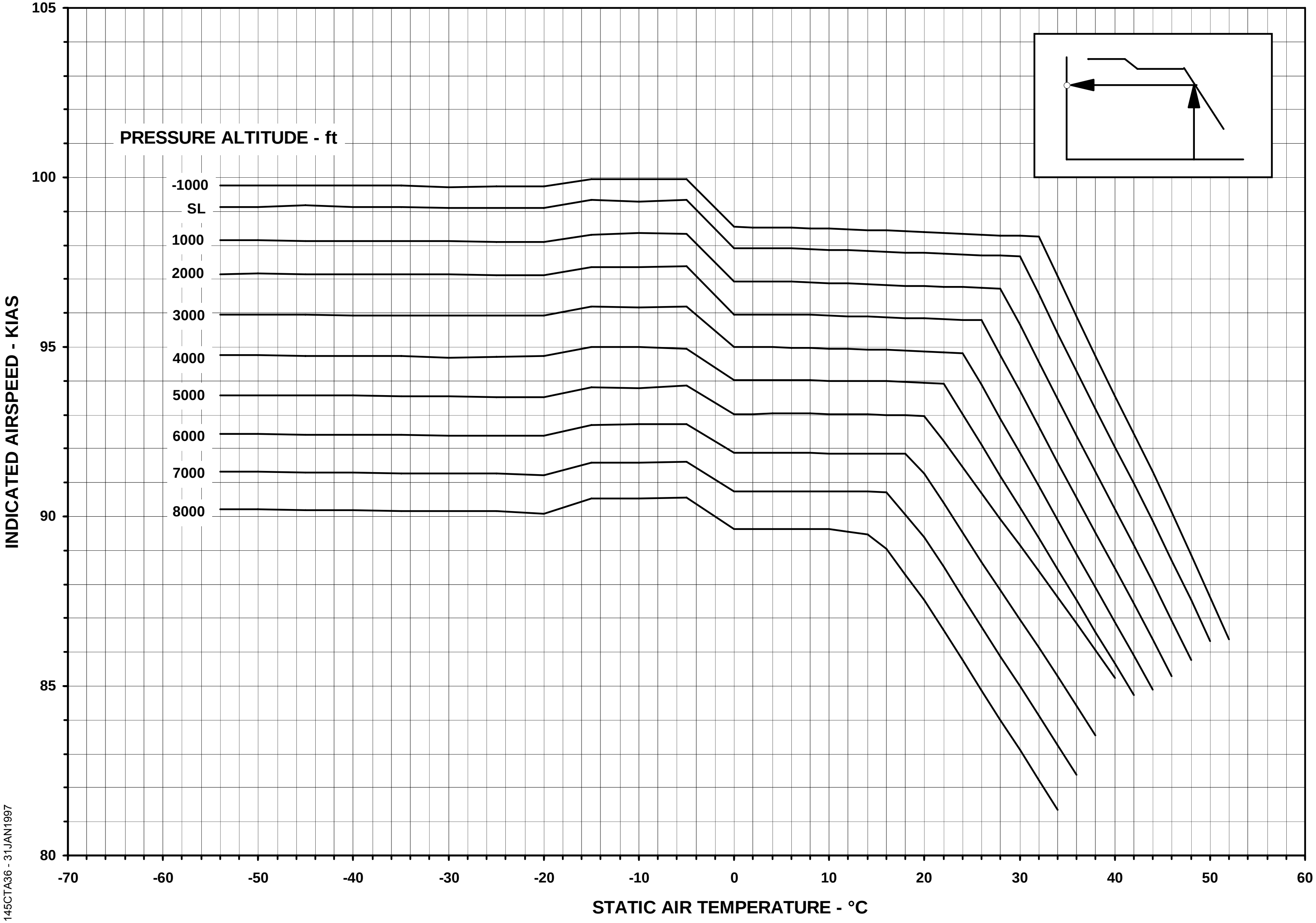
AIR MINIMUM CONTROL SPEED
FLAPS 9°

AE3007A ENGINES



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FINAL SEGMENT SPEED - V_{FS} CHART

USE

Enter the chart with airplane weight to read the V_{FS}.

EXAMPLE

Given:

Airplane weight .... 38000 lb

Determine:

V_{FS} .... 156 KIAS

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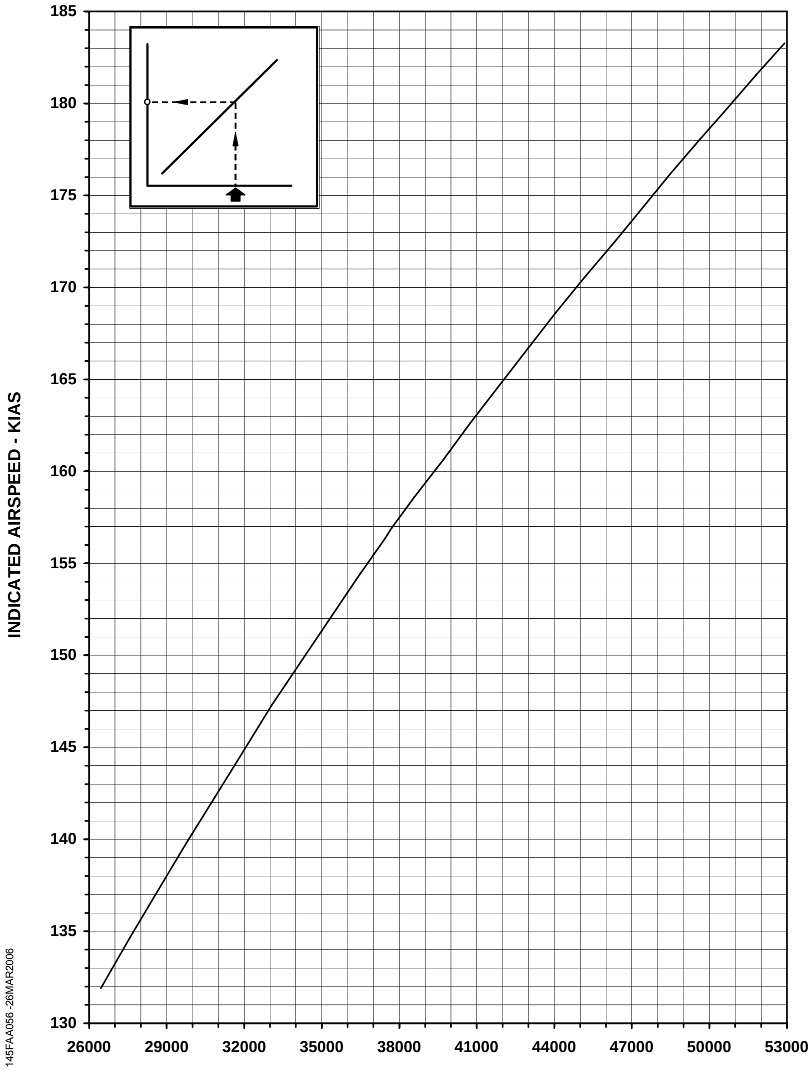
FINAL SEGMENT SPEED
GEAR UP - FLAPS UP



ENROUTE

INTRODUCTION

Enroute climb data is provided for assessing compliance with the operating regulations relating to enroute flight.

ENROUTE NET CLIMB GRADIENT - ONE ENGINE INOPERATIVE

The one engine inoperative enroute net climb gradient is shown for various pressure altitudes, static air temperatures, and weights.

Associated conditions:

Flaps .... UP
Landing gear .... UP
Operating engine .... MAXIMUM CONTINUOUS POWER

USE

Choose the appropriate chart considering anti-ice option.

Enter the chart with the Static Air Temperature and go to the pressure altitude. Go to the right to the weight reference line. Follow the guide lines until intercepting the airplane weight. From the interception, go to the right until the bleed reference line and apply the correction if necessary. Read the enroute net climb gradient.

EXAMPLE

Given:

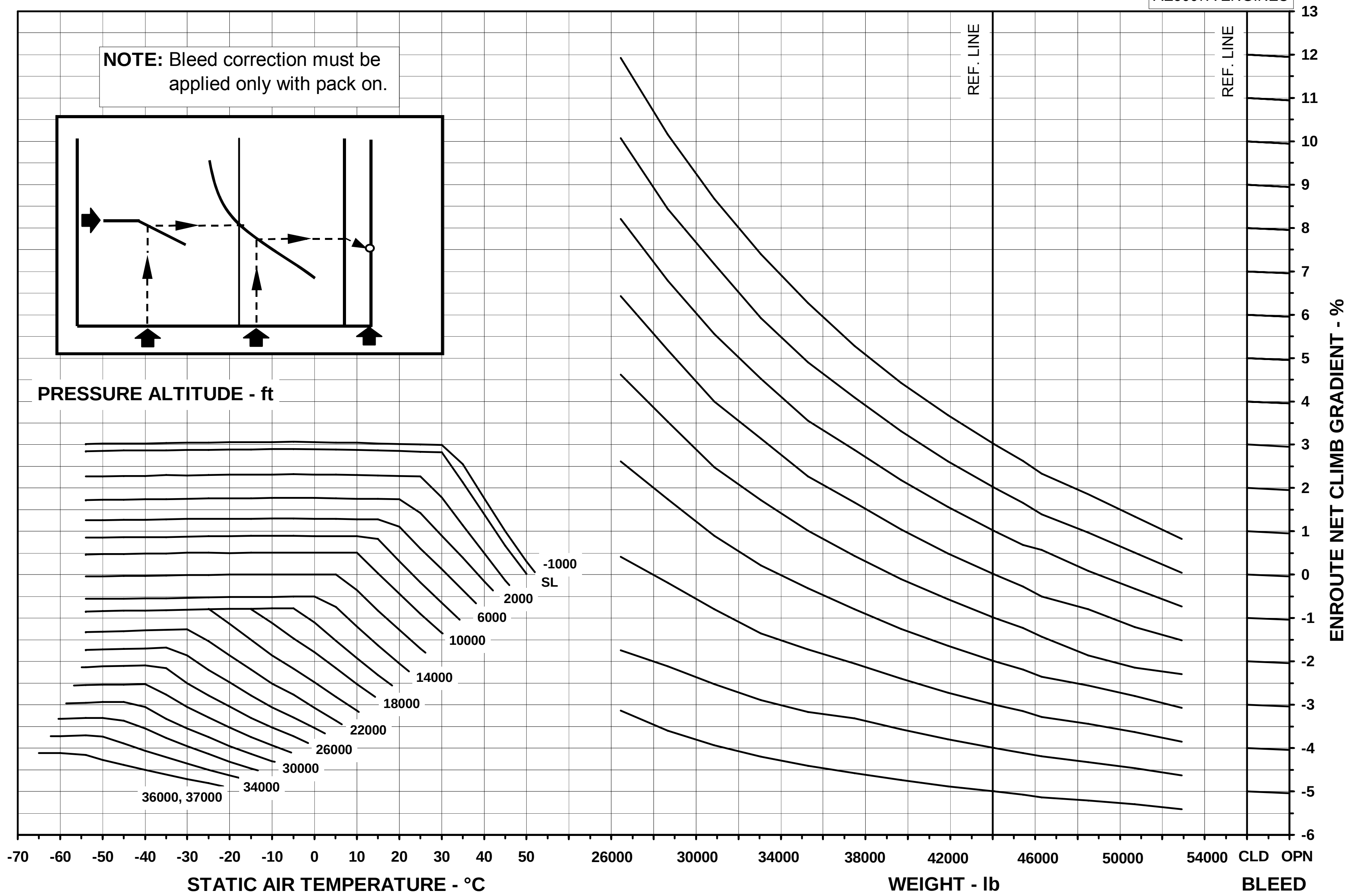
Static Air Temperature .... 10°C
Pressure altitude .... 12000 ft
Airplane weight .... 38000 lb
Bleed .... CLOSED
Anti-ice .... OFF

Determine:

Enroute climb net gradient .... 1.0 %

ENROUTE NET CLIMB GRADIENT - ONE ENGINE INOPERATIVE

FLAPS UP - ANTI-ICE OFF



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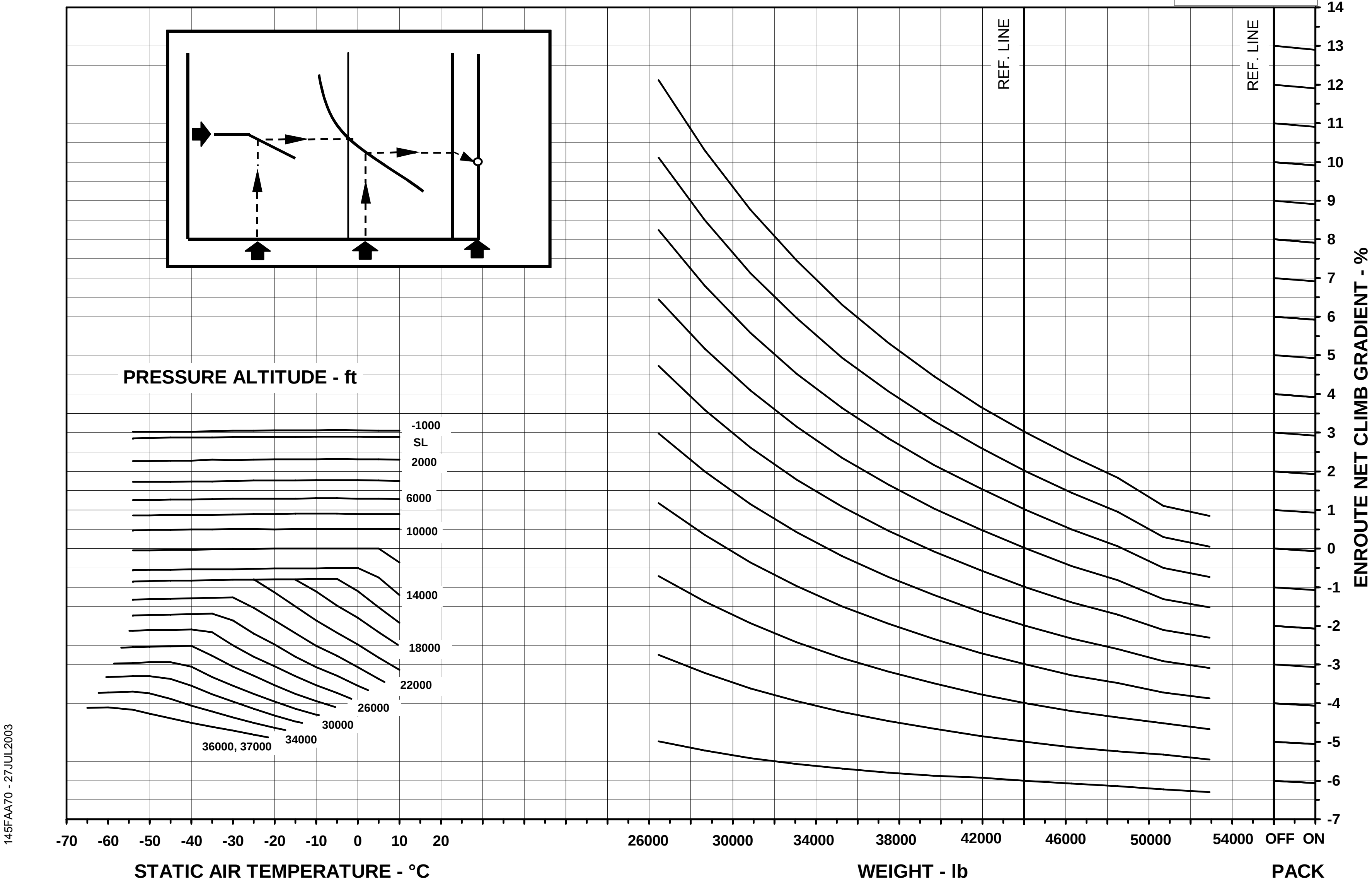
ENROUTE NET CLIMB GRADIENT - ONE ENGINE INOPERATIVE

FLAPS UP - ANTI-ICE ON

AE3007A ENGINES



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ENROUTE CLIMB SPEED

The one engine inoperative Enroute Climb Speed is shown for various weights.

Associated conditions:

Flaps .... UP
Landing gear.. UP
Operating engine .... MAXIMUM CONTINUOUS POWER

USE

Enter the chart with the airplane gross weight to read the Enroute Climb Speed.

EXAMPLE

Given:

Airplane weight .... 38000 lb

Determine:

Airspeed.. 156 KIAS

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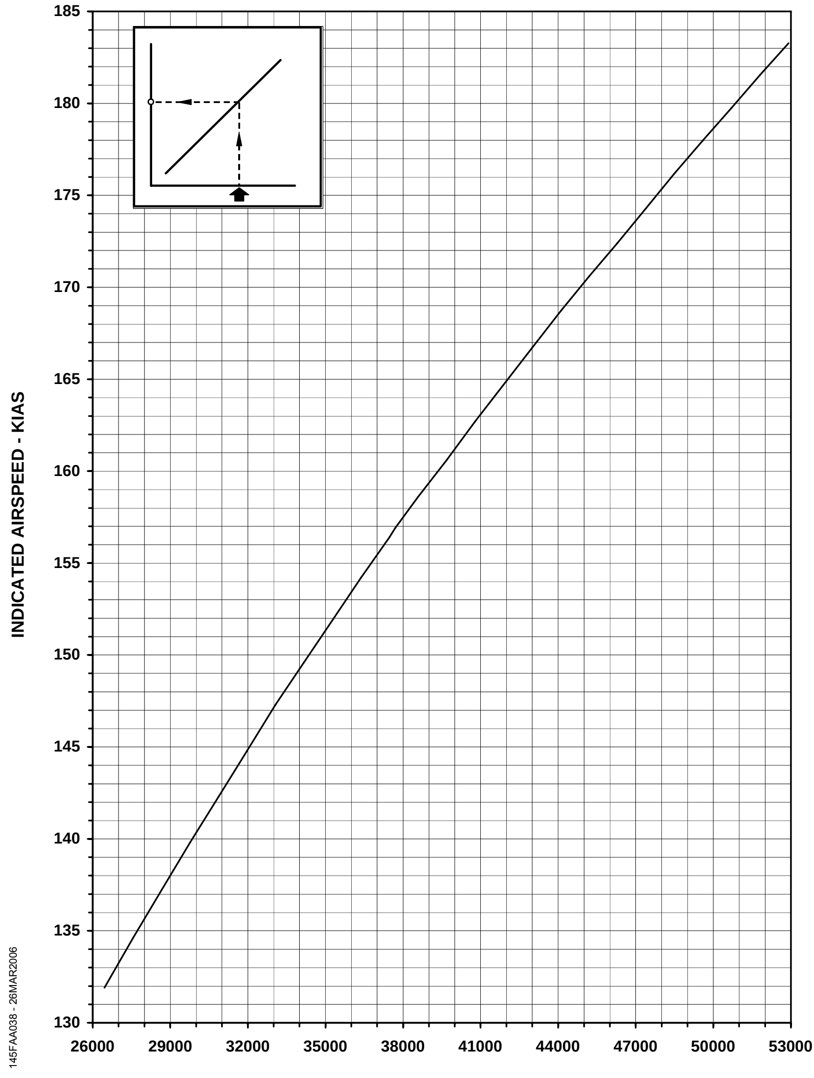
ENROUTE CLIMB SPEED
GEAR UP - FLAPS UP



ENROUTE CLIMB WEIGHTS FOR POSITIVE NET GRADIENT

The one-engine climb weights for positive net gradient are shown for various pressure altitude and temperature relation to ISA.

USE

Choose the appropriate chart considering the anti-ice option.

Enter the chart with airplane weight and go to the temperature relation to ISA line. From the interception, go to the right to the bleed correction reference line and apply the correction if necessary. Read the maximum operating altitude for that condition.

EXAMPLE

Given:

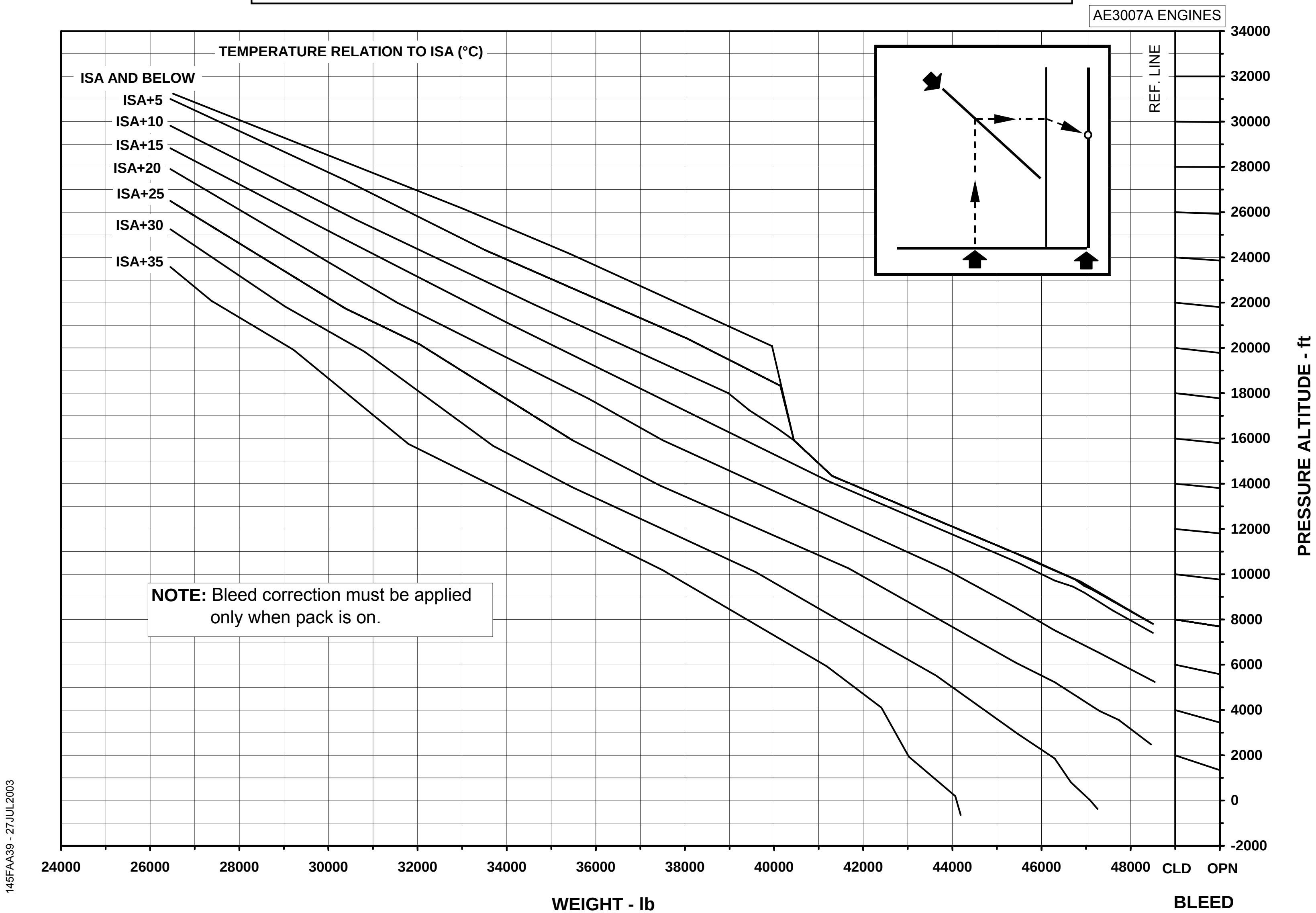
Airplane weight .... 33000 lb
Temperature in relation to ISA.................................. ISA + 20°C
Bleed... CLOSED
Anti-Ice... OFF

Determine:

Maximum Operating Pressure Altitude.................... 20500 ft

ENROUTE CLIMB WEIGHTS FOR POSITIVE NET GRADIENT

FLAPS UP - ONE ENGINE INOPERATIVE - ANTI-ICE OFF



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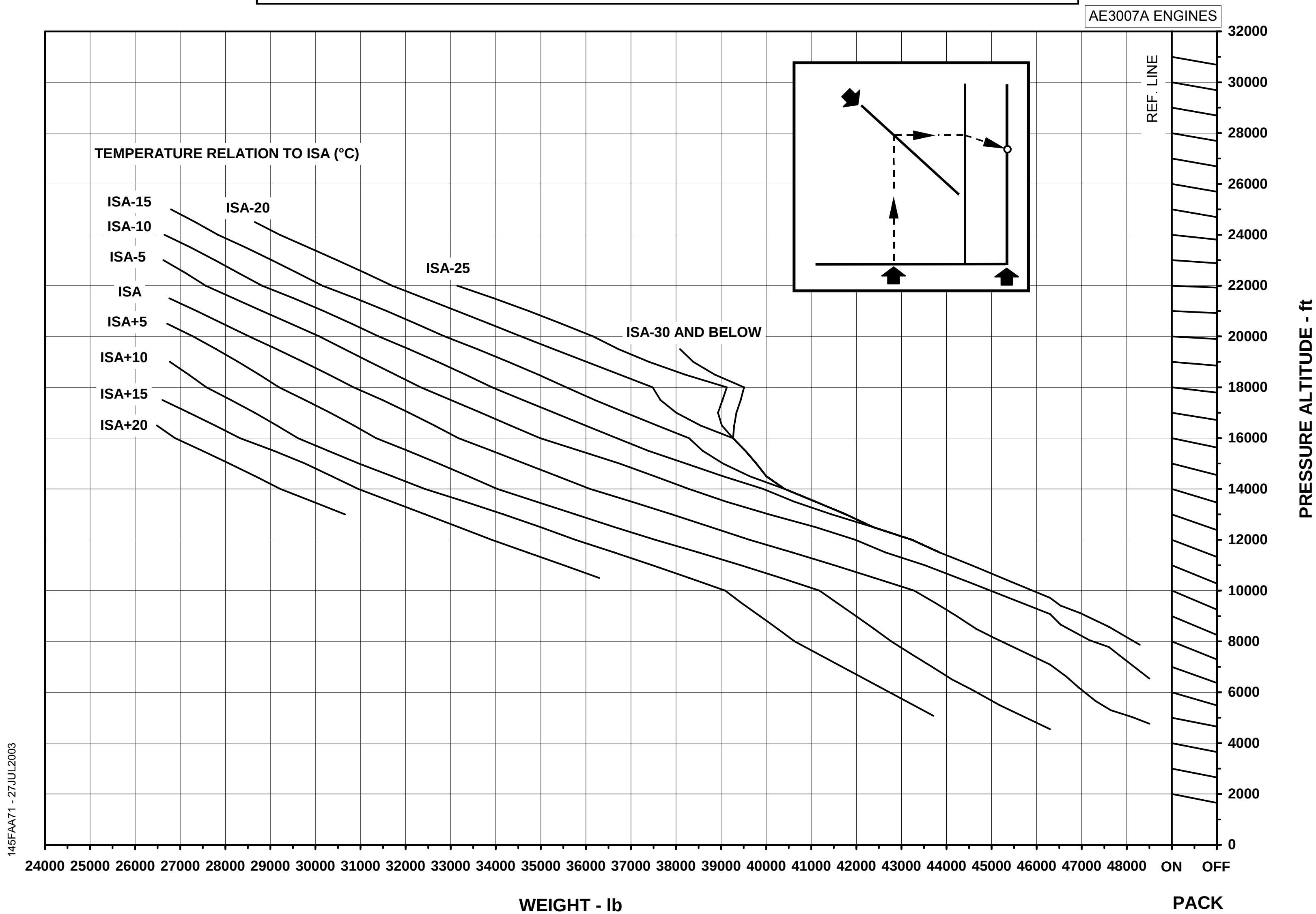
ENROUTE CLIMB WEIGHTS FOR POSITIVE NET GRADIENT

FLAPS UP - ONE ENGINE INOPERATIVE - ANTI-ICE ON



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APPROACH AND LANDING

INTRODUCTION

Information given herein is provided so that the scheduled landing performance can regularly be achieved.

PROCEDURES

For final approach, wing flaps should be in landing position and the speed set according to the flap configuration given here. At 50 ft, the thrust levers are reduced smoothly. When the airplane is firmly on the ground with the nosewheel in contact, brakes are applied.

Refer to Section 4 - Normal Procedures for further information on landing technique, and Section 3 - Emergency and Abnormal Procedures when landing with one engine inoperative.

APPROACH AND LANDING CLIMB GRADIENTS

The approach and landing climb gradients attained during a go-around are shown for various Static Air Temperatures, airport pressure altitudes, and airplane gross weights.

APPROACH CLIMB GRADIENT

Two charts for Approach Climb Gradients are provided, according to the following conditions:

Airspeed .... APPROACH CLIMB SPEED
Anti-Ice .... ON OR OFF
Flaps .... 9°
Landing gear .... UP
Operating engine .... MAXIMUM TAKEOFF POWER

LANDING CLIMB GRADIENT

Four charts for Landing Climb Gradients are provided, according to the following conditions:

Airspeed .... $V_{REF\ XX}$
Anti-Ice .... ON OR OFF
Flaps .... 22° or 45°
Landing gear .... DOWN
Engines .... MAXIMUM TAKEOFF POWER

APPROACH CLIMB GRADIENT CHARTS AND LANDING CLIMB GRADIENT CHARTS

USE

Choose the appropriate chart considering the anti-ice and flaps options.

For each gradient, enter the first chart with the Static Air Temperature and Airport Pressure Altitude to read the transfer scale. Enter the second chart with the value obtained from the first one, go to the reference line and follow the guide lines to the airplane weight, to read the desired gradient.

NOTE: Airplanes equipped with FADEC software version B5.1.1 must decrease the Approach Climb Gradient by 1.5%.

EXAMPLE

Given:

Static Air Temperature.. 35°C
Airport Pressure Altitude... 1000 ft
Airplane Weight .... 38000 lb
Approach Flaps .... 9°
Landing Flaps .... 45°
Anti-Ice... OFF

Determine:

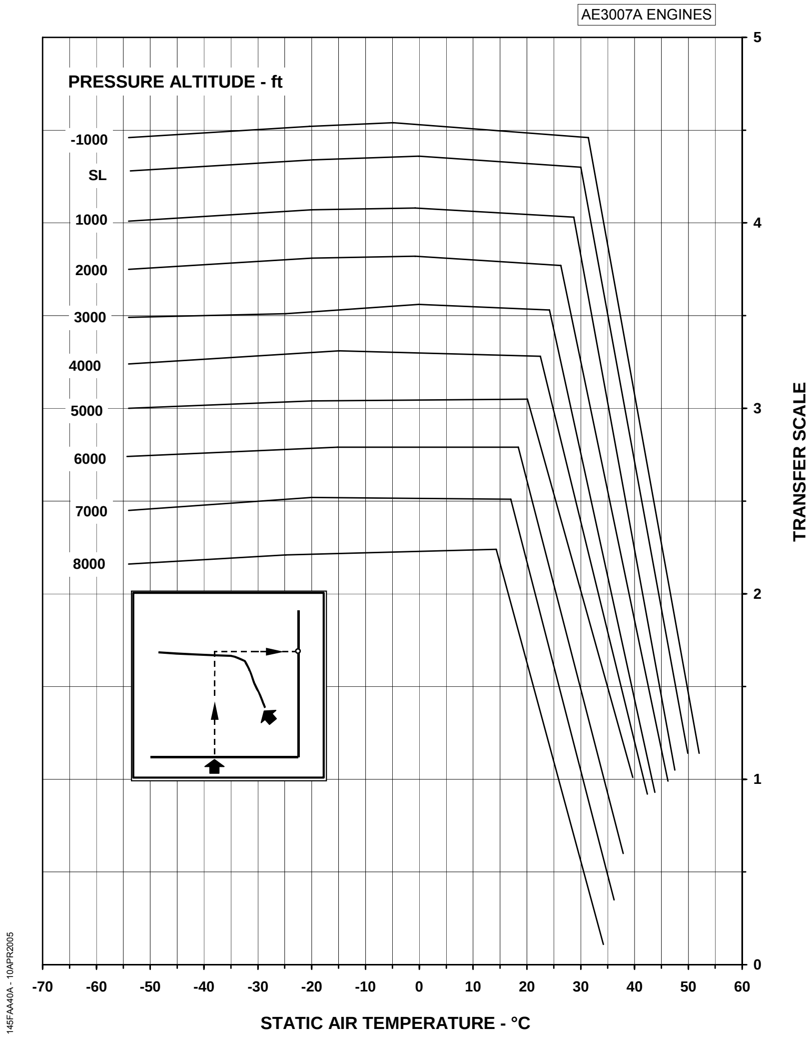
For Approach Climb:
Transfer Scale 3.0
Gradient.. 5.0%

For Landing Climb:
Transfer Scale 6.0
Gradient.. 8.5%

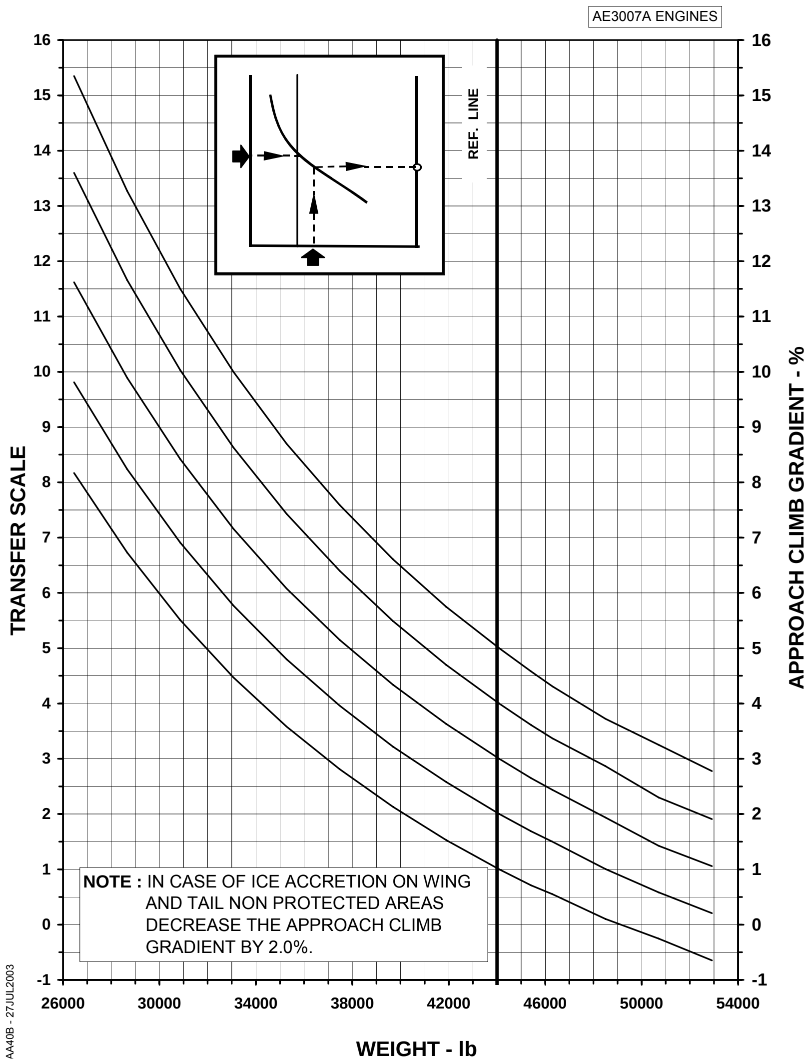
APPROACH CLIMB GRADIENT

ONE ENGINE INOPERATIVE - FLAPS 9° - ANTI-ICE OFF

CHART 1 OF 2

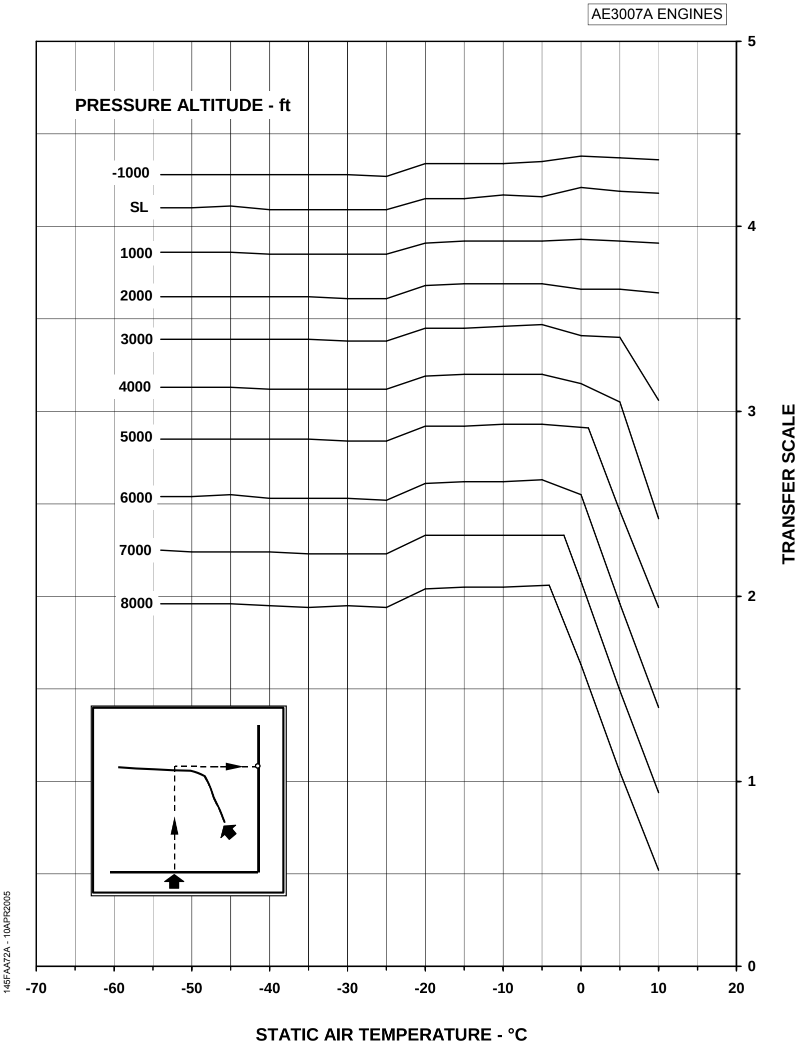


APPROACH CLIMB GRADIENT
ONE ENGINE INOPERATIVE - FLAPS 9° - ANTI-ICE OFF
CHART 2 OF 2



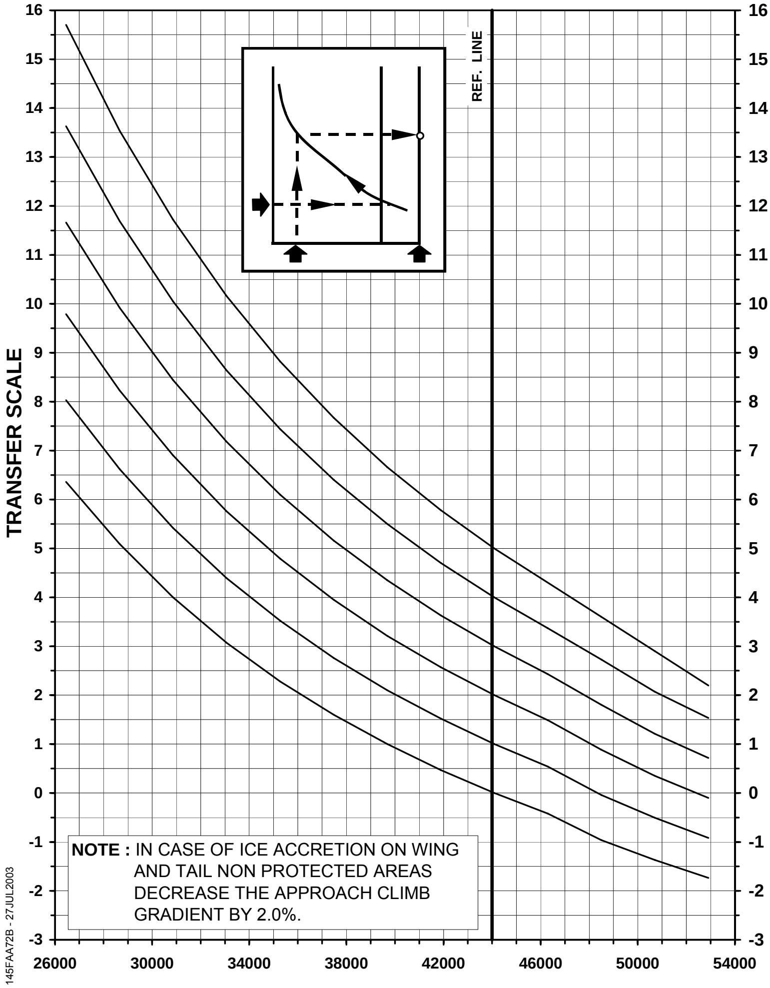
NOTE : IN CASE OF ICE ACCRETION ON WING AND TAIL NON PROTECTED AREAS DECREASE THE APPROACH CLIMB GRADIENT BY 2.0%.

APPROACH CLIMB GRADIENT
ONE ENGINE INOPERATIVE - FLAPS 9° - ANTI-ICE ON
CHART 1 OF 2



APPROACH CLIMB GRADIENT
ONE ENGINE INOPERATIVE - FLAPS 9° - ANTI-ICE ON
CHART 2 OF 2

AE3007A ENGINES

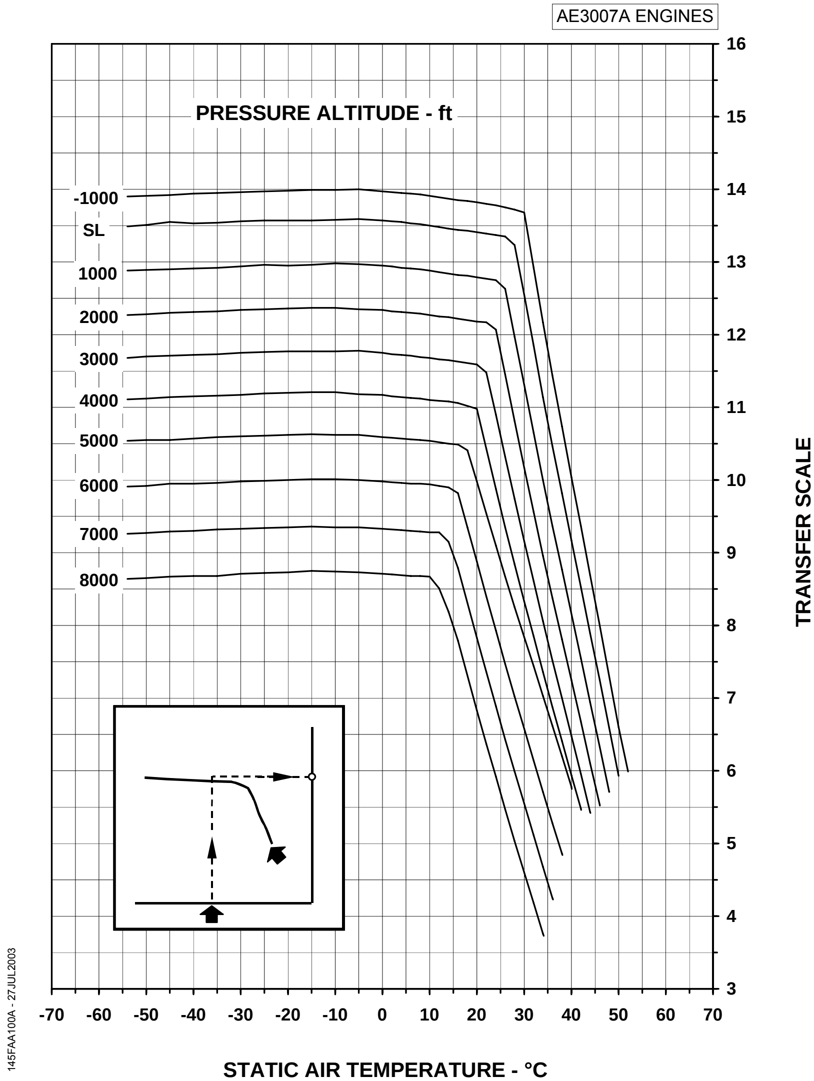


NOTE : IN CASE OF ICE ACCRETION ON WING AND TAIL NON PROTECTED AREAS DECREASE THE APPROACH CLIMB GRADIENT BY 2.0%.

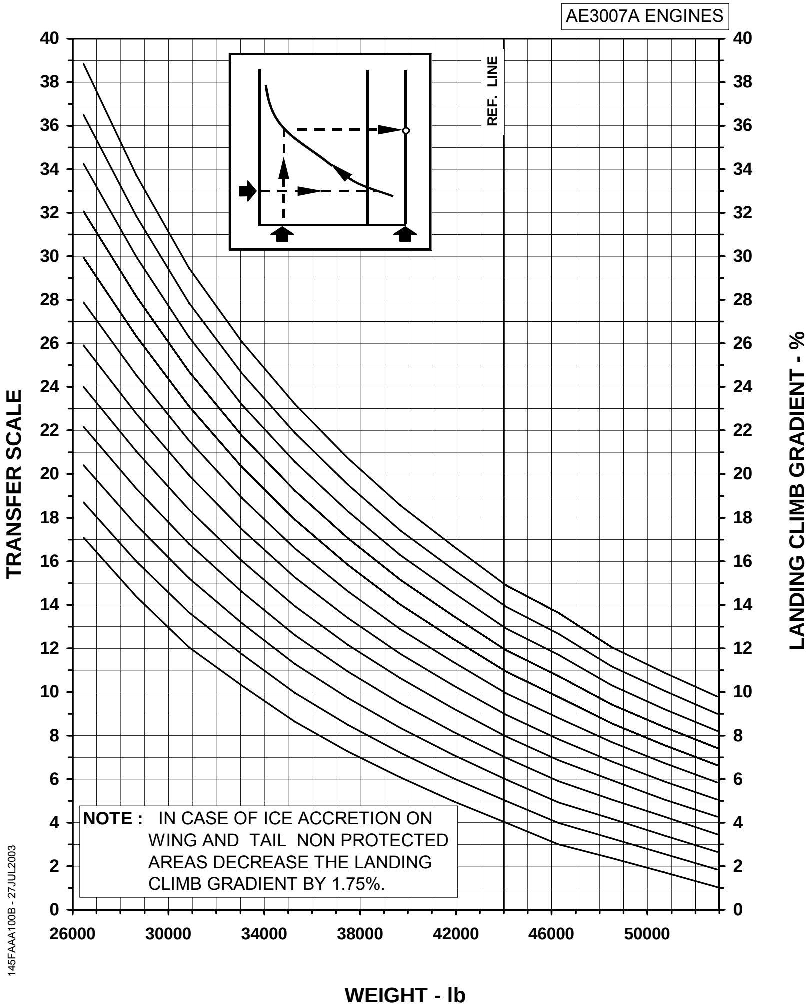
LANDING CLIMB GRADIENT

ALL ENGINES - FLAPS 22° - ANTI-ICE OFF

CHART 1 OF 2

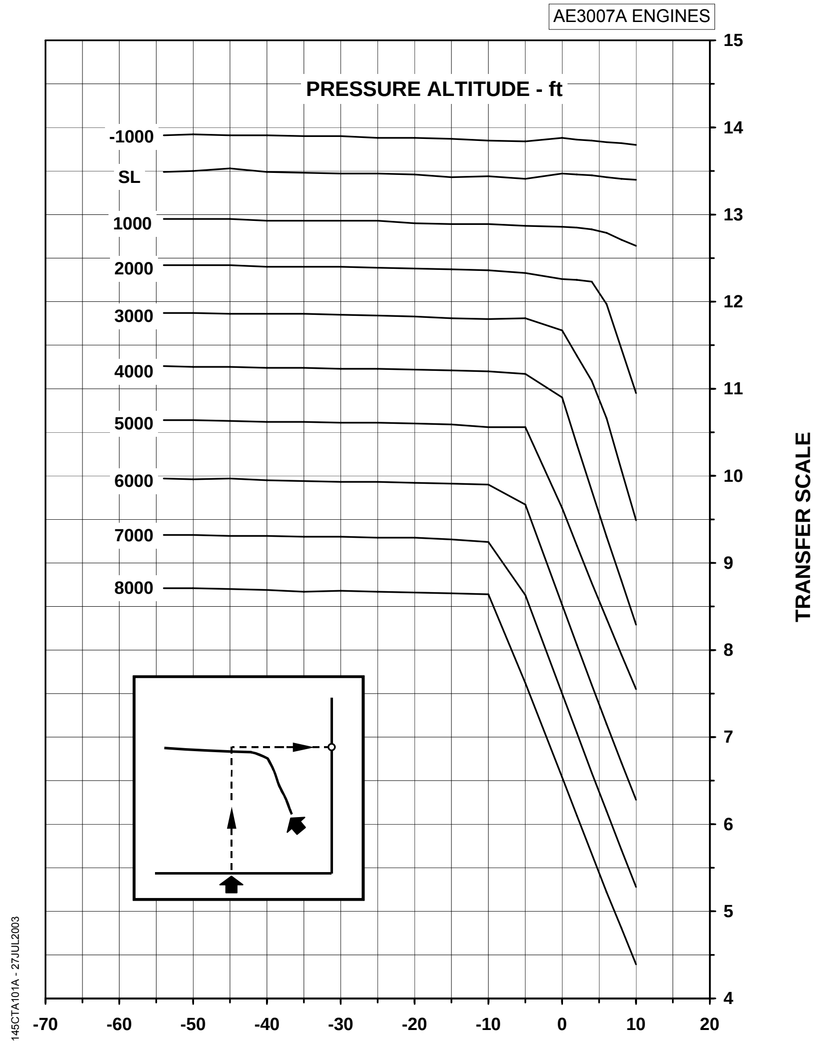


LANDING CLIMB GRADIENT
ALL ENGINES - FLAPS 22° - ANTI-ICE OFF
CHART 2 OF 2



NOTE : IN CASE OF ICE ACCRETION ON WING AND TAIL NON PROTECTED AREAS DECREASE THE LANDING CLIMB GRADIENT BY 1.75%.

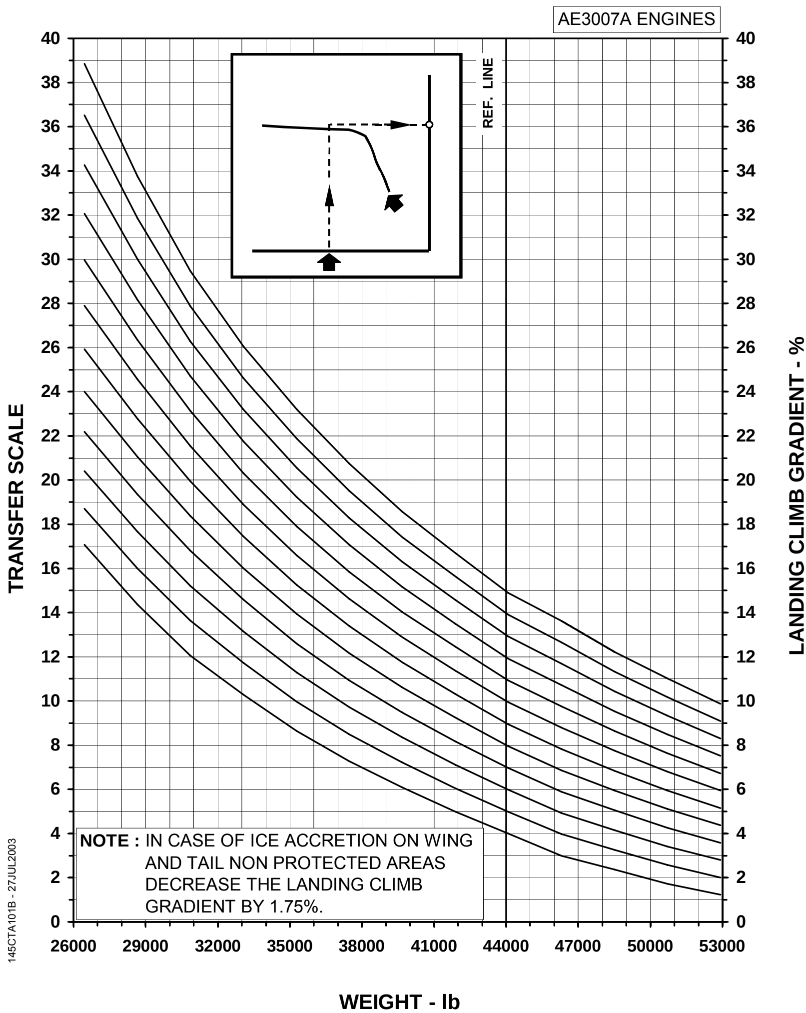
LANDING CLIMB GRADIENT
ALL ENGINES - FLAPS 22° - ANTI-ICE ON
CHART 1 OF 2



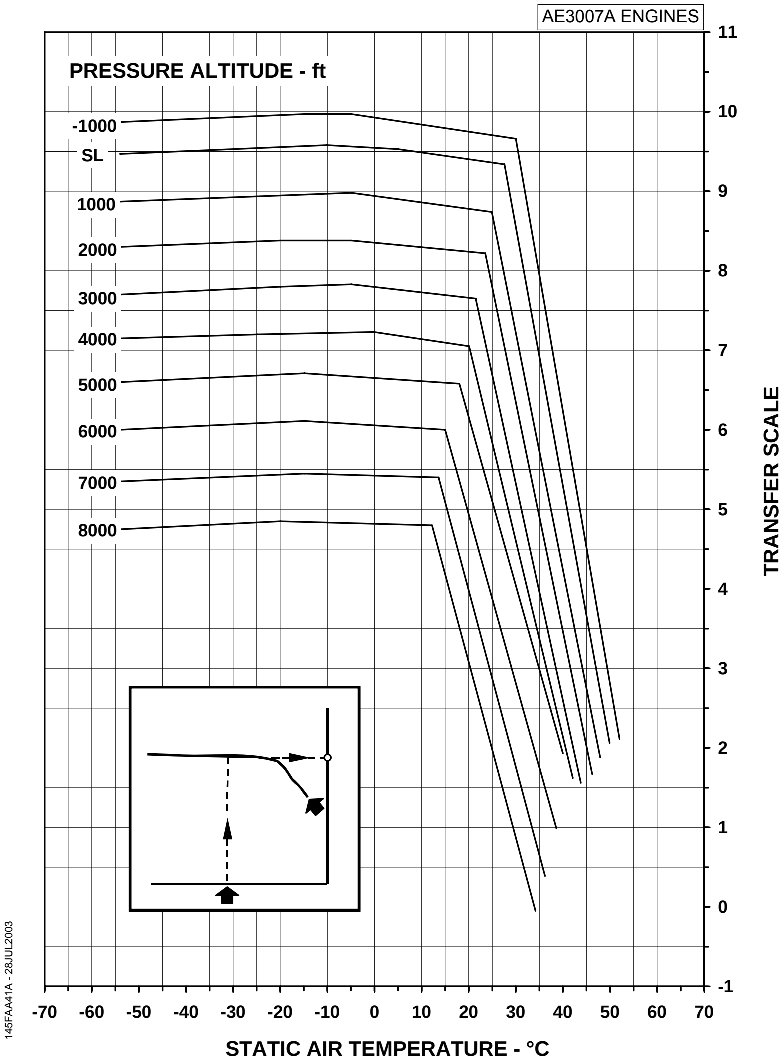
LANDING CLIMB GRADIENT

ALL ENGINES - FLAPS 22° - ANTI-ICE ON

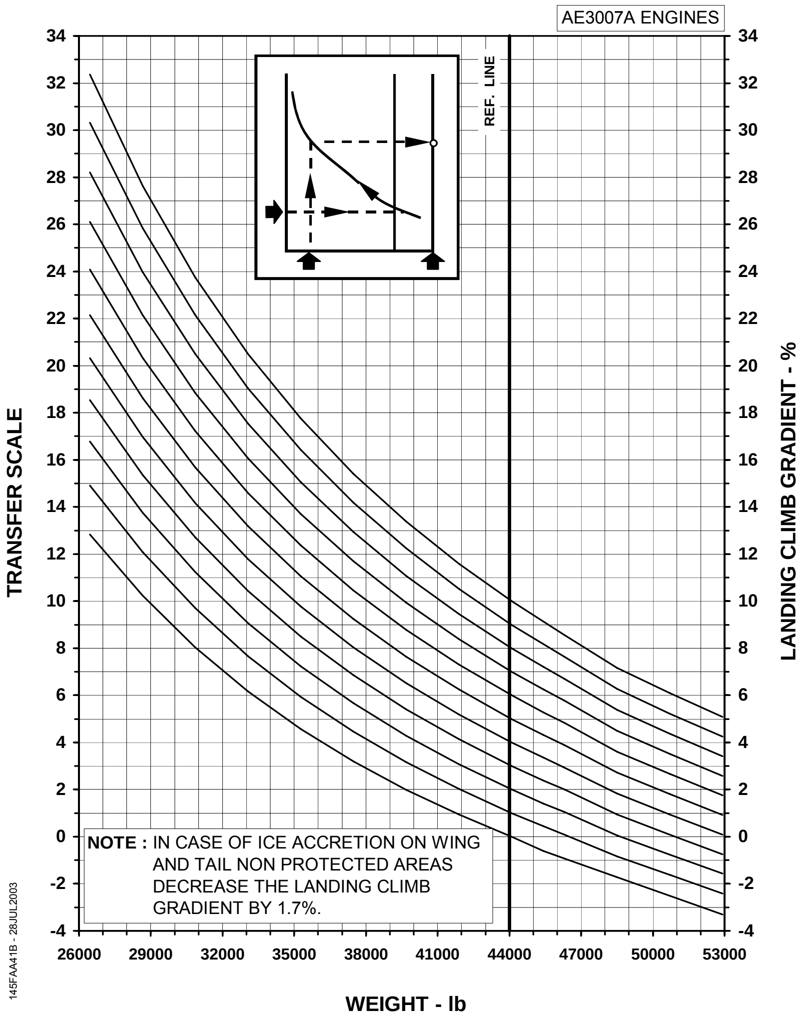
CHART 2 OF 2



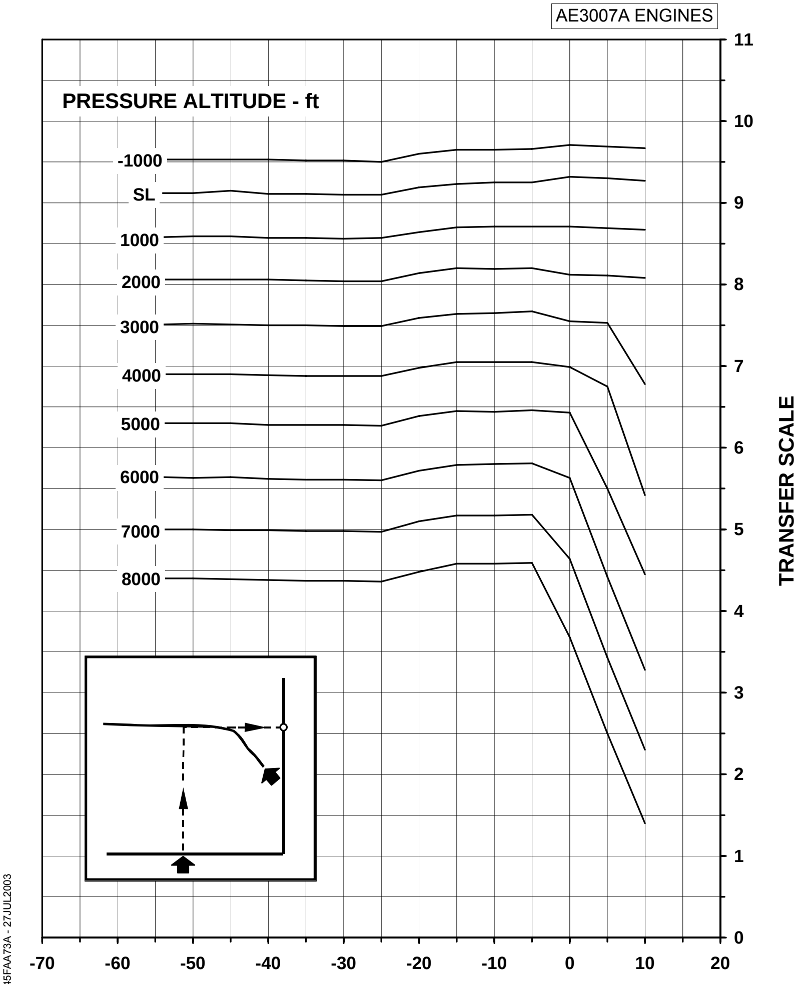
LANDING CLIMB GRADIENT
ALL ENGINES - FLAPS 45° - ANTI-ICE OFF
CHART 1 OF 2



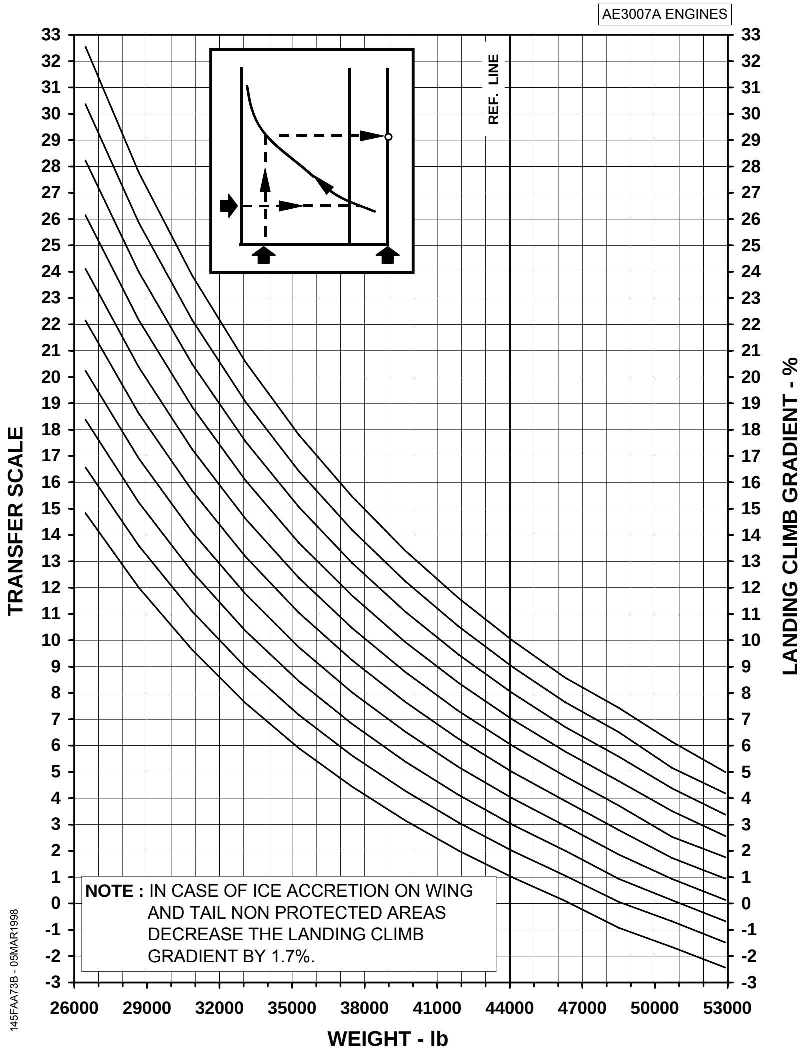
LANDING CLIMB GRADIENT
ALL ENGINES - FLAPS 45° - ANTI-ICE OFF
CHART 2 OF 2



LANDING CLIMB GRADIENT
ALL ENGINES - FLAPS 45° - ANTI-ICE ON
CHART 1 OF 2



LANDING CLIMB GRADIENT
ALL ENGINES - FLAPS 45° - ANTI-ICE ON
CHART 2 OF 2



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APPROACH AND LANDING CLIMB

The maximum landing weight for altitude and temperature, in compliance with the airworthiness climb requirements, is shown in the Maximum Landing Weight - Approach Climb Limited charts and Maximum Landing Weight - Landing Climb Limited charts.

Two Approach Climb Limited charts are presented for approach flaps 9° according to the anti-ice system condition (on or off).

Two Landing Climb Limited charts are presented for landing flaps 45° according to the anti-ice system condition (on or off).

The Maximum Landing Weight - Landing Climb Limited for landing flaps 22° (anti-ice on or off) are always above the maximum structural landing weight and will not be presented herein.

The airspeeds related to the landing flaps are also presented.

MAXIMUM LANDING WEIGHT - APPROACH CLIMB LIMITED CHARTS AND LANDING CLIMB LIMITED CHART

USE

Choose the appropriate chart considering the landing flaps and anti-ice options.

Enter the chart with the Static Air Temperature and go to the Airport Pressure Altitude. Read the desired climb limited weight.

NOTE: Airplanes equipped with FADEC software version B5.1.1 must decrease the Approach Climb Limited Weight by 2780 lb.

EXAMPLE

Given:

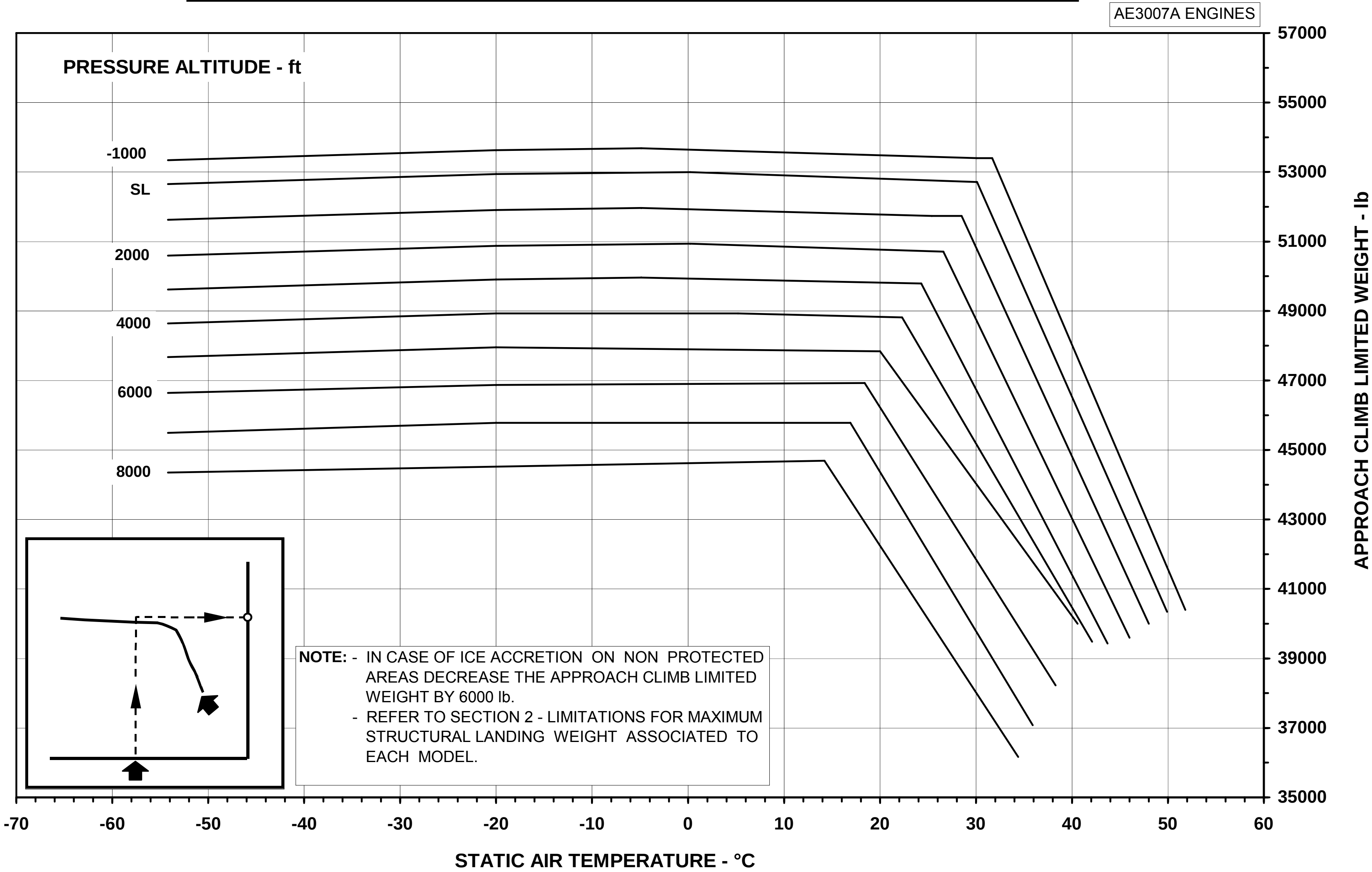
Static Air Temperature .... 20°C
Airport Pressure Altitude .... 7000 ft
Landing Flaps .... 45°
Anti-Ice .... OFF

Determine:

Approach Climb Limited Weight .... 44250 lb
Landing Climb Limited Weight .... 45000 lb

MAXIMUM LANDING WEIGHT - APPROACH CLIMB LIMITED

APPROACH FLAPS 9° - LANDING FLAPS 45° - ANTI-ICE OFF



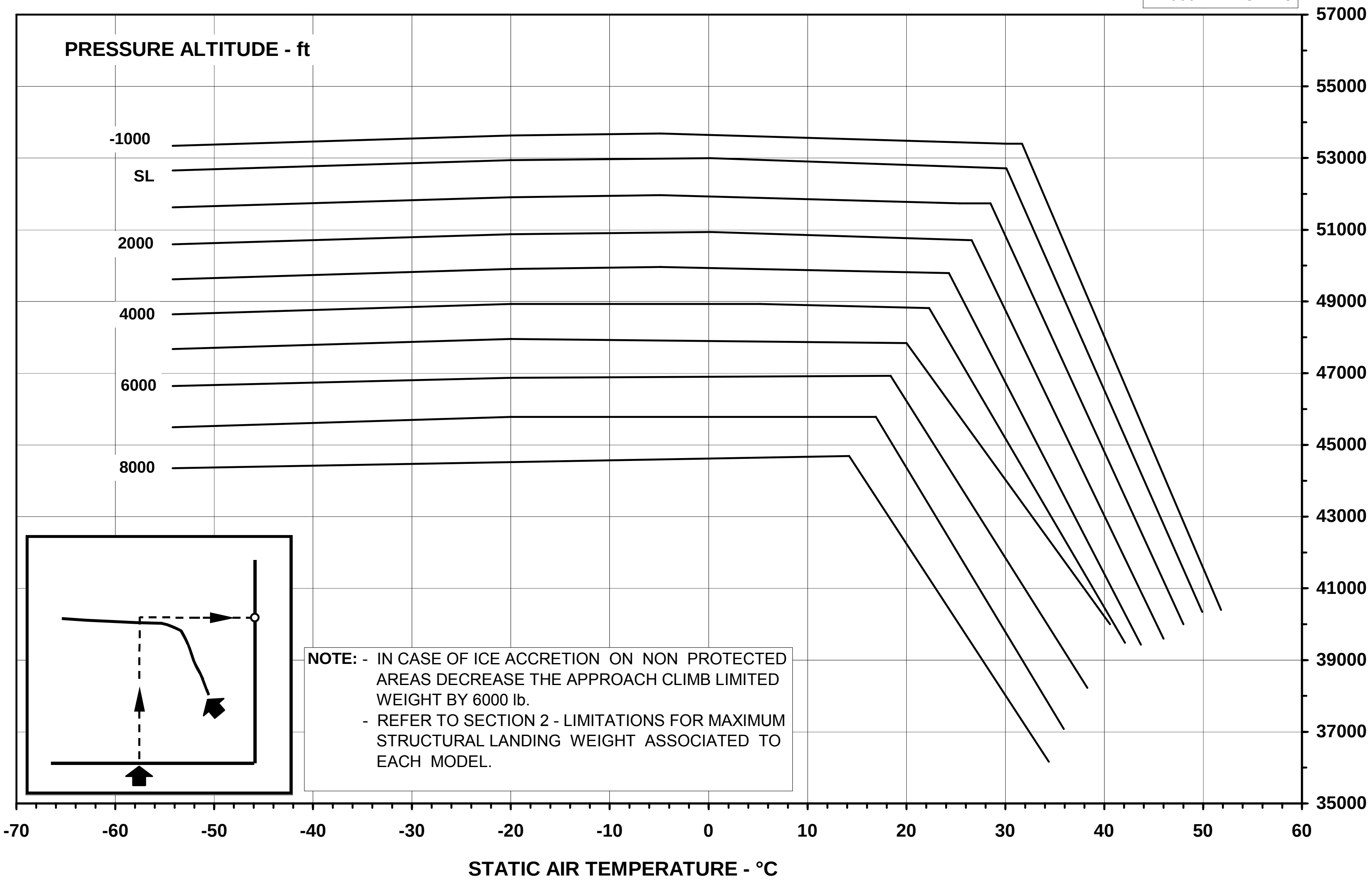
NOTE: - IN CASE OF ICE ACCRETION ON NON PROTECTED AREAS DECREASE THE APPROACH CLIMB LIMITED WEIGHT BY 6000 lb.
- REFER TO SECTION 2 - LIMITATIONS FOR MAXIMUM STRUCTURAL LANDING WEIGHT ASSOCIATED TO EACH MODEL.

145FAA42 - 10APR2005

MAXIMUM LANDING WEIGHT - APPROACH CLIMB LIMITED

APPROACH FLAPS 9° - LANDING FLAPS 45° - ANTI-ICE OFF

AE3007A ENGINES



NOTE: - IN CASE OF ICE ACCRETION ON NON PROTECTED AREAS DECREASE THE APPROACH CLIMB LIMITED WEIGHT BY 6000 lb.
- REFER TO SECTION 2 - LIMITATIONS FOR MAXIMUM STRUCTURAL LANDING WEIGHT ASSOCIATED TO EACH MODEL.

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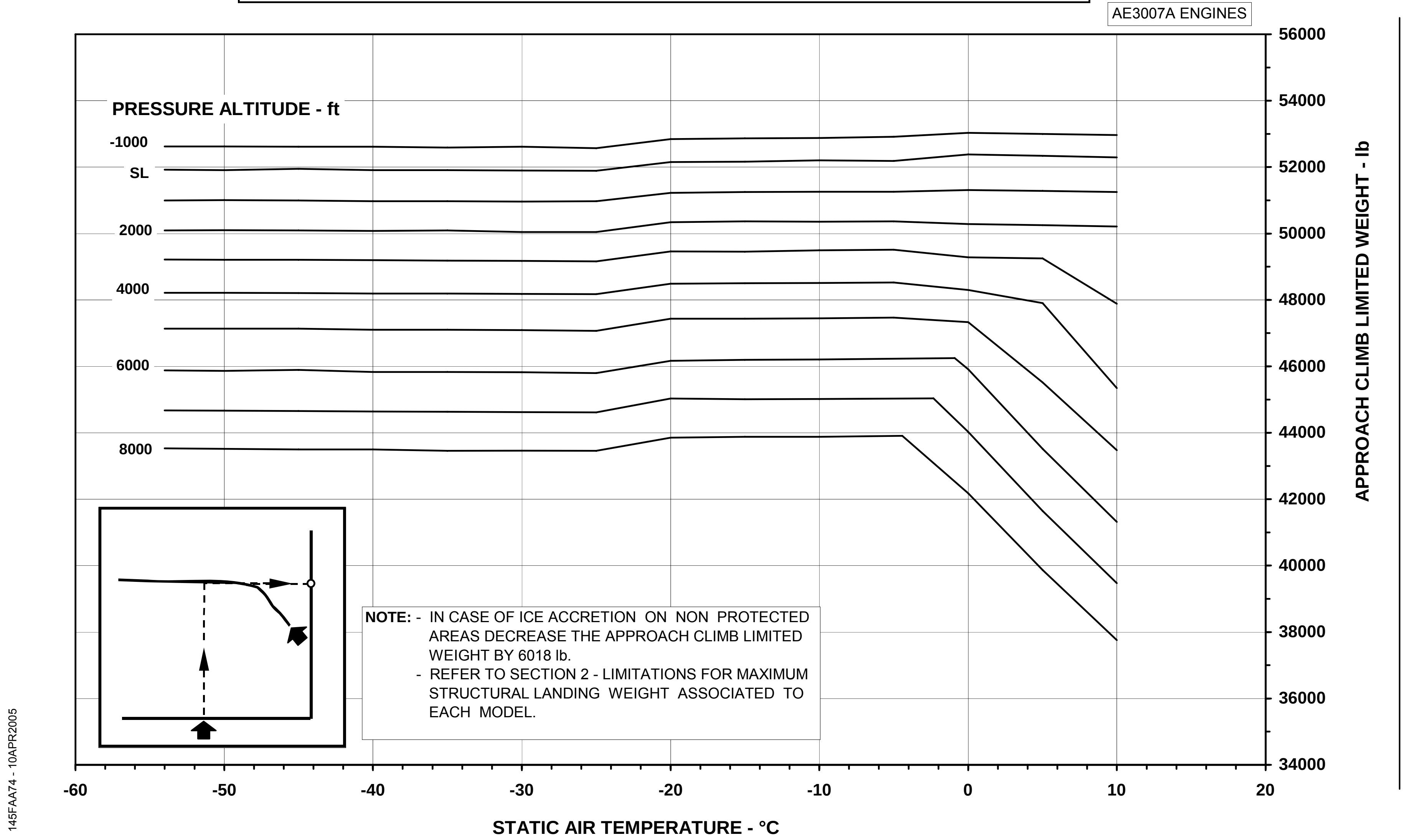
MAXIMUM LANDING WEIGHT - APPROACH CLIMB LIMITED

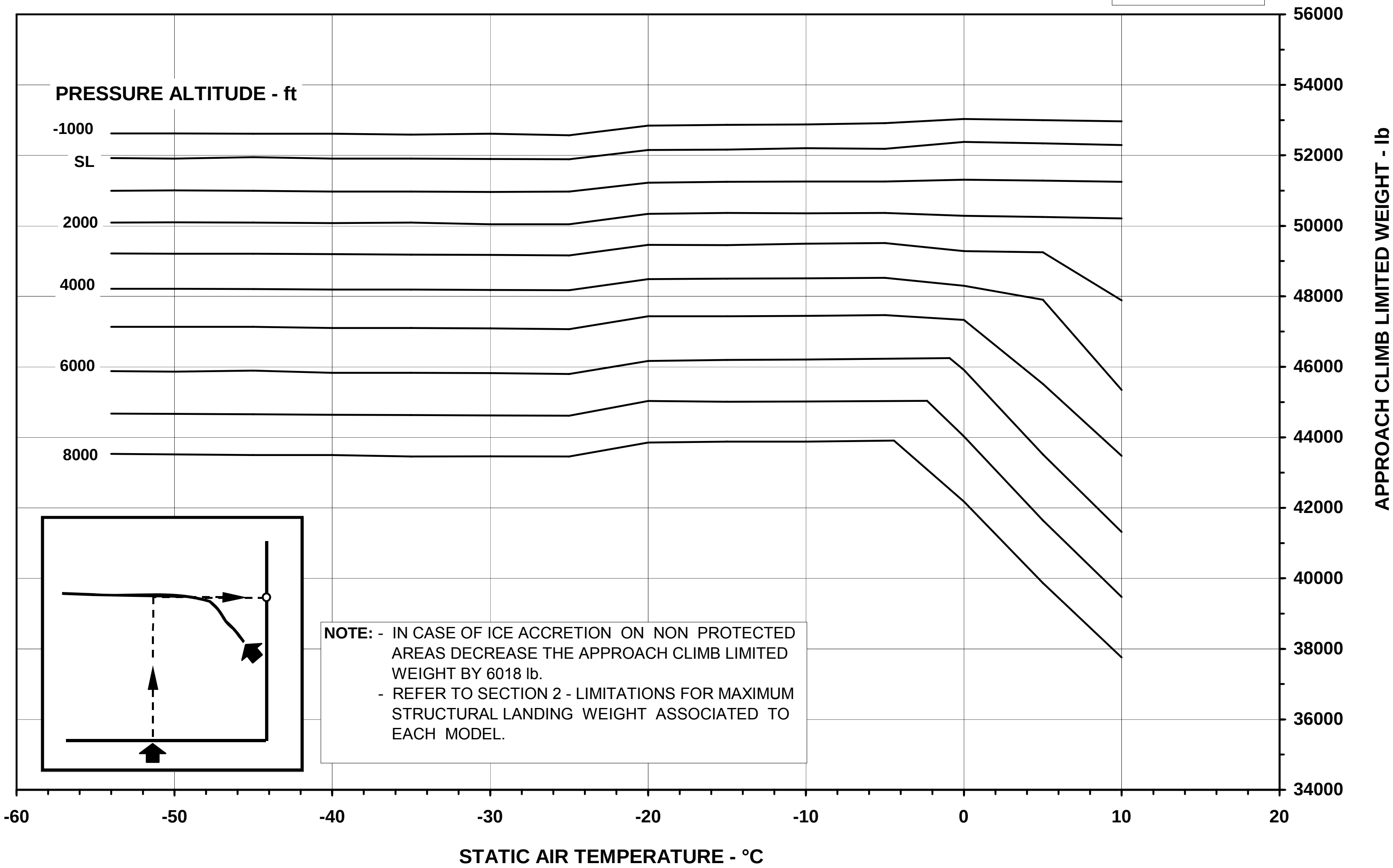
APPROACH FLAPS 9° - LANDING FLAPS 45° - ANTI-ICE ON



MAXIMUM LANDING WEIGHT - APPROACH CLIMB LIMITED

APPROACH FLAPS 9° - LANDING FLAPS 45° - ANTI-ICE ON

AE3007A ENGINES



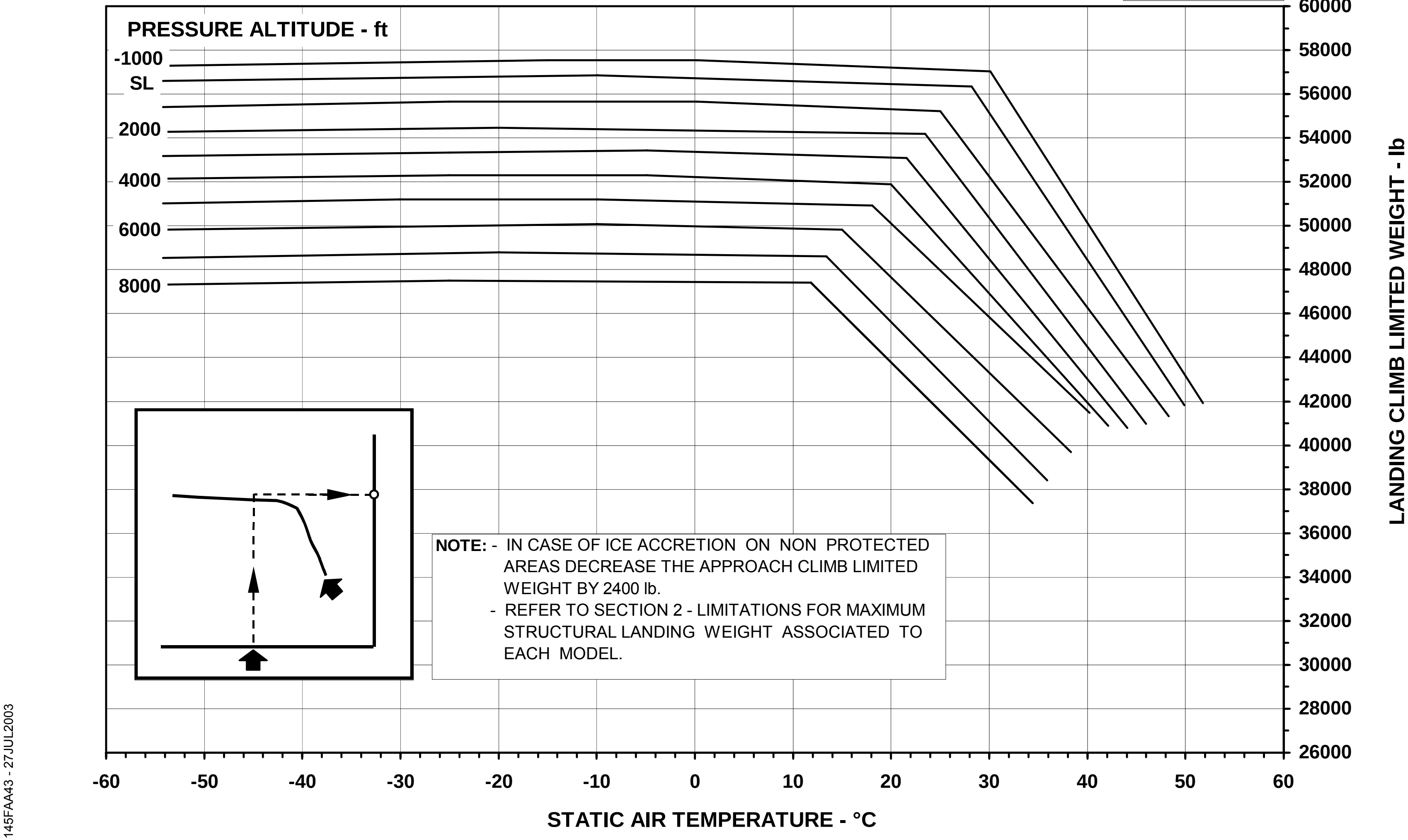
NOTE: - IN CASE OF ICE ACCRETION ON NON PROTECTED AREAS DECREASE THE APPROACH CLIMB LIMITED WEIGHT BY 6018 lb.
- REFER TO SECTION 2 - LIMITATIONS FOR MAXIMUM STRUCTURAL LANDING WEIGHT ASSOCIATED TO EACH MODEL.

145FAA74 - 10APR2005

MAXIMUM LANDING WEIGHT - LANDING CLIMB LIMITED

APPROACH FLAPS 9° - LANDING FLAPS 45° - ANTI-ICE OFF

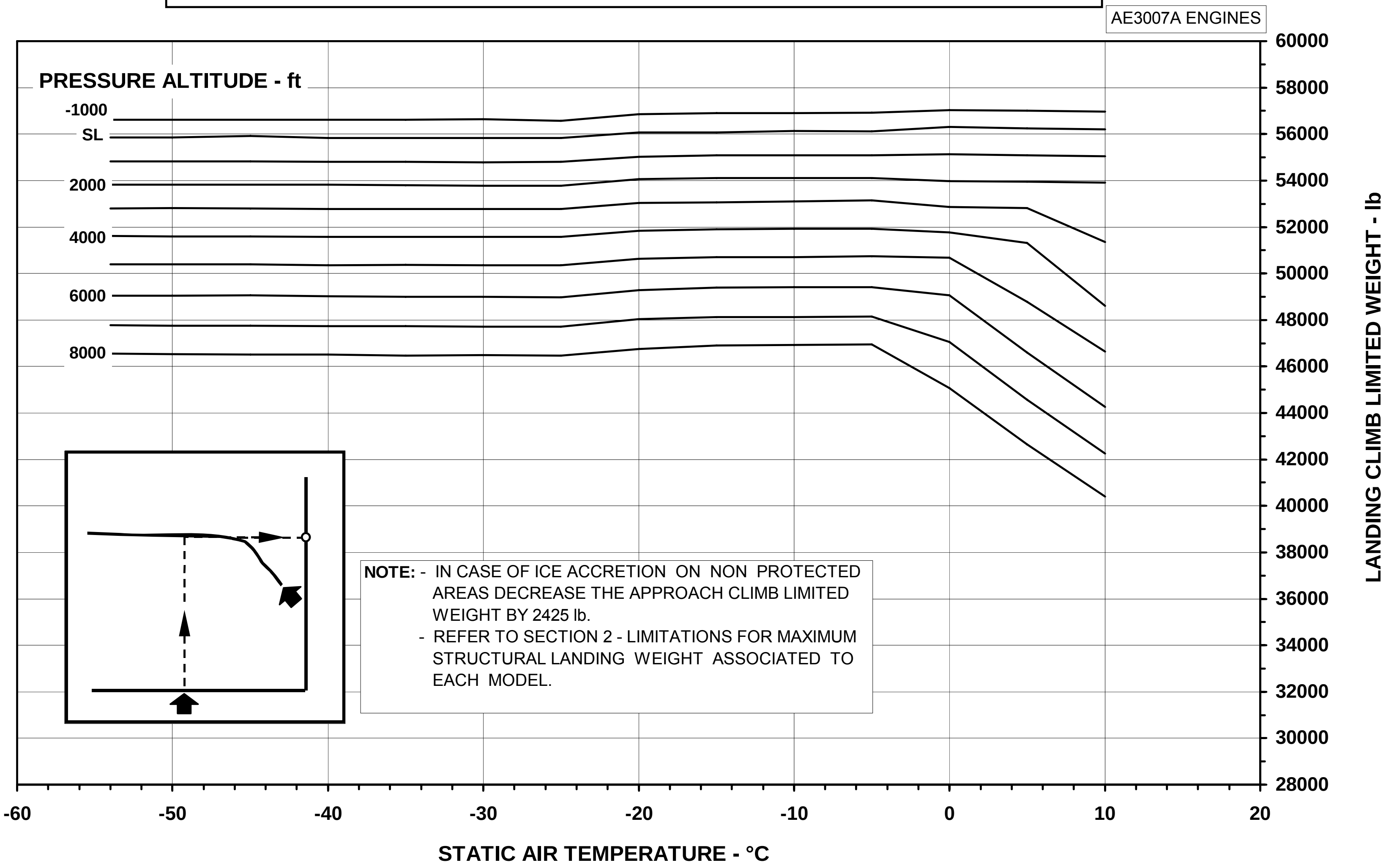
AE3007A ENGINES



NOTE: - IN CASE OF ICE ACCRETION ON NON PROTECTED AREAS DECREASE THE APPROACH CLIMB LIMITED WEIGHT BY 2400 lb.
- REFER TO SECTION 2 - LIMITATIONS FOR MAXIMUM STRUCTURAL LANDING WEIGHT ASSOCIATED TO EACH MODEL.

MAXIMUM LANDING WEIGHT - LANDING CLIMB LIMITED

APPROACH FLAPS 9° - LANDING FLAPS 45° - ANTI-ICE ON



145FAA75 - 27JUL2003

APPROACH CLIMB SPEED CHARTS AND LANDING CLIMB AND REFERENCE SPEED CHARTS

USE

Enter the appropriate chart with the gross weight and read the associated airspeed.

EXAMPLE

Given:

Gross weight.. 40000 lb
Approach Flaps .... 9°
Landing Flaps .... 45°

Determine:

Approach Climb Speed... 151 KIAS
Landing Climb and Reference Speed .... 125 KIAS

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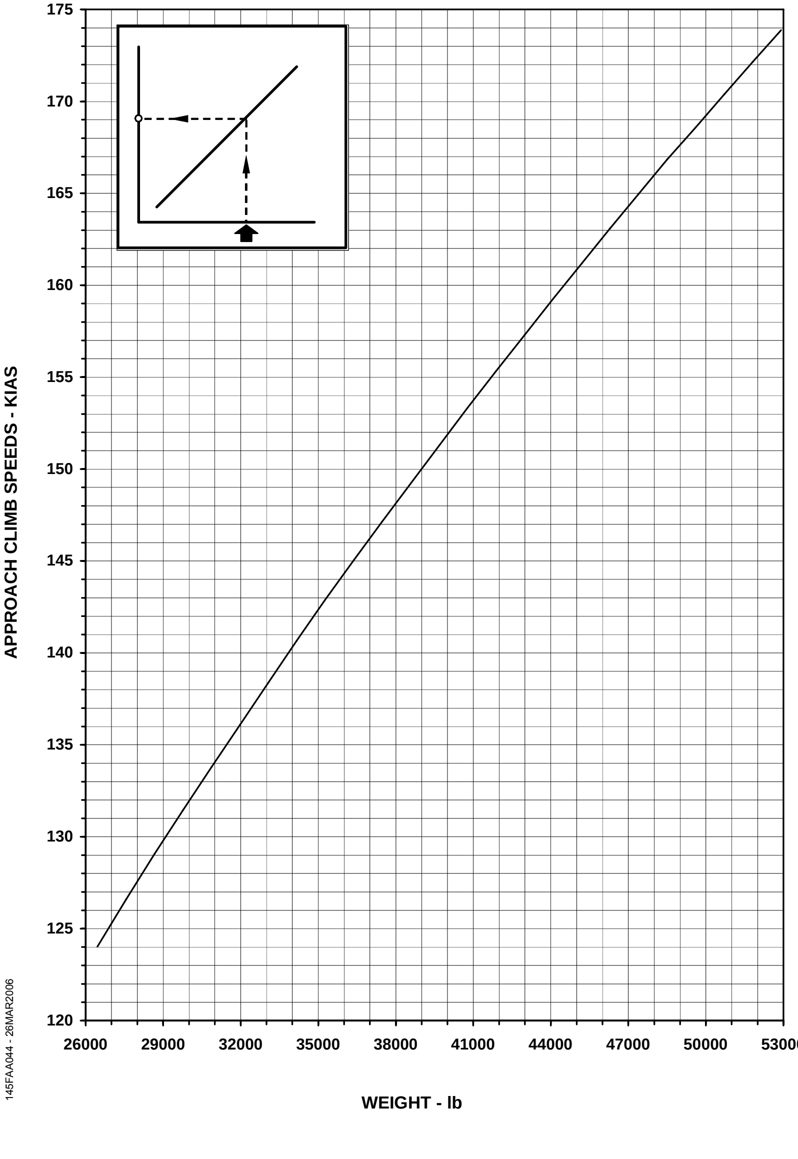
APPROACH CLIMB SPEED
FLAPS 9°

AE3007A ENGINES



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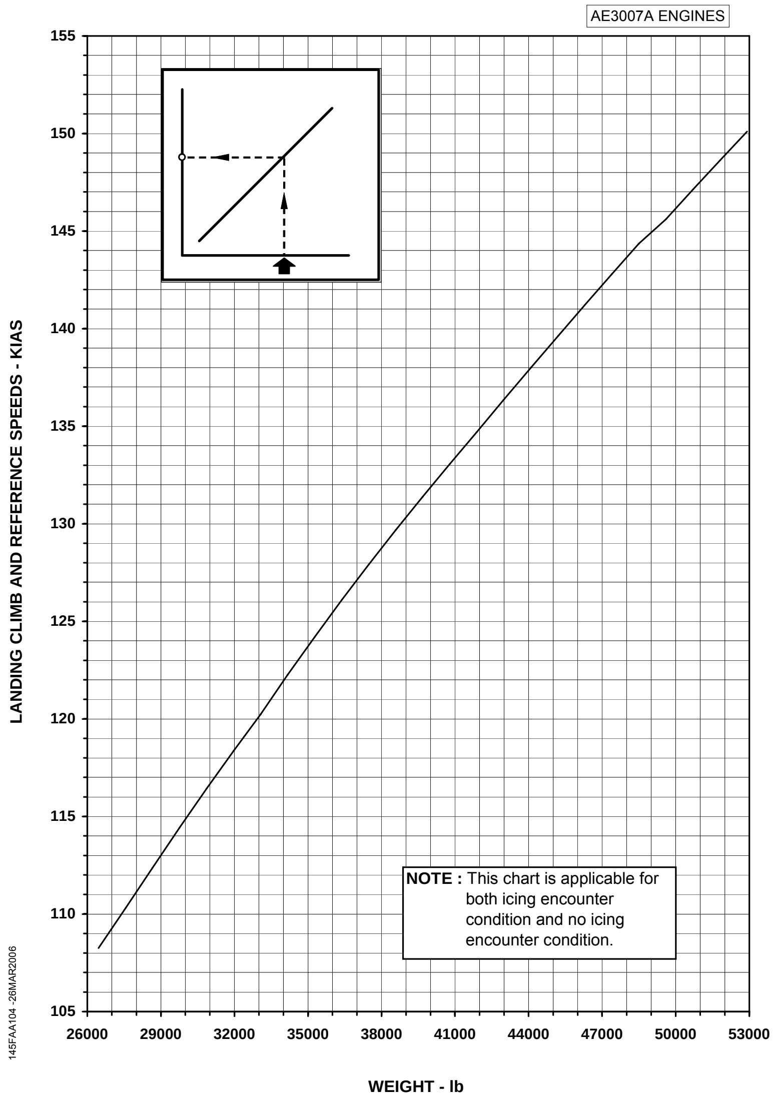
LANDING CLIMB AND REFERENCE SPEEDS

GEAR DOWN - FLAPS 22°



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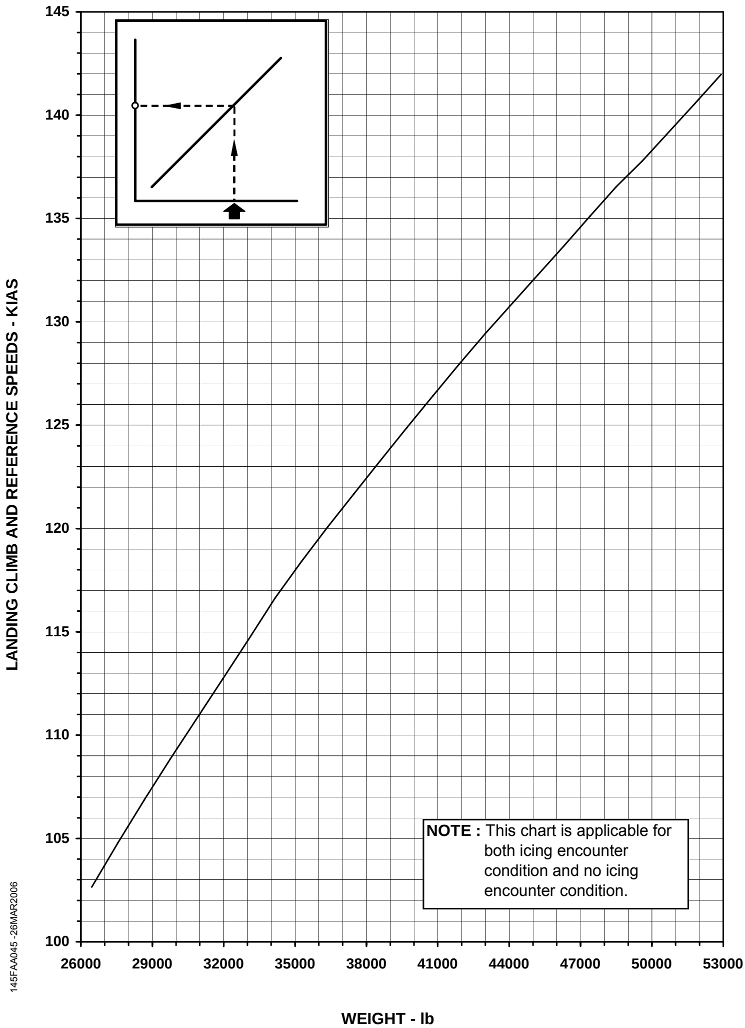
LANDING CLIMB AND REFERENCE SPEEDS
GEAR DOWN - FLAPS 45°

AE3007A ENGINES



LANDING FIELD LENGTHS

The maximum landing weights for compliance with the operating regulations relating landing field lengths are provided in the Maximum Landing Weight - Field Length Limited chart. Landing reference speed (V_{REF}) are provided in the Landing Climb and Reference Speed charts.

Two charts are presented according to the following associated conditions:

Airspeed .... REFERENCE SPEED
Flaps .... 22° OR 45°
Landing gear .... DOWN

The charts present a correction scale to allow obtaining dry runway landing distance without the 60% factor prescribed in the operating regulations.

NOTE: The unfactored landing distance is to be used for emergency purposes only and must not be used for normal operation.

MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED CHART

USE

Enter the first chart with the predicted landing weight and airport pressure altitude and read the transfer scale. Enter the second chart with the transfer scale value, go through the wind component, runway condition and factor reference lines and make the corrections as required. Read the required landing distance. Read the Landing Reference Speed (V_{REF}) from the associated Landing Climb and Reference Speed chart.

EXAMPLE

Given:

Landing weight .... 38000 lb
Runway Condition .... DRY
Wind component.. 10 kt (HEADWIND)
Airport pressure altitude .... SL
Flaps .... 45°

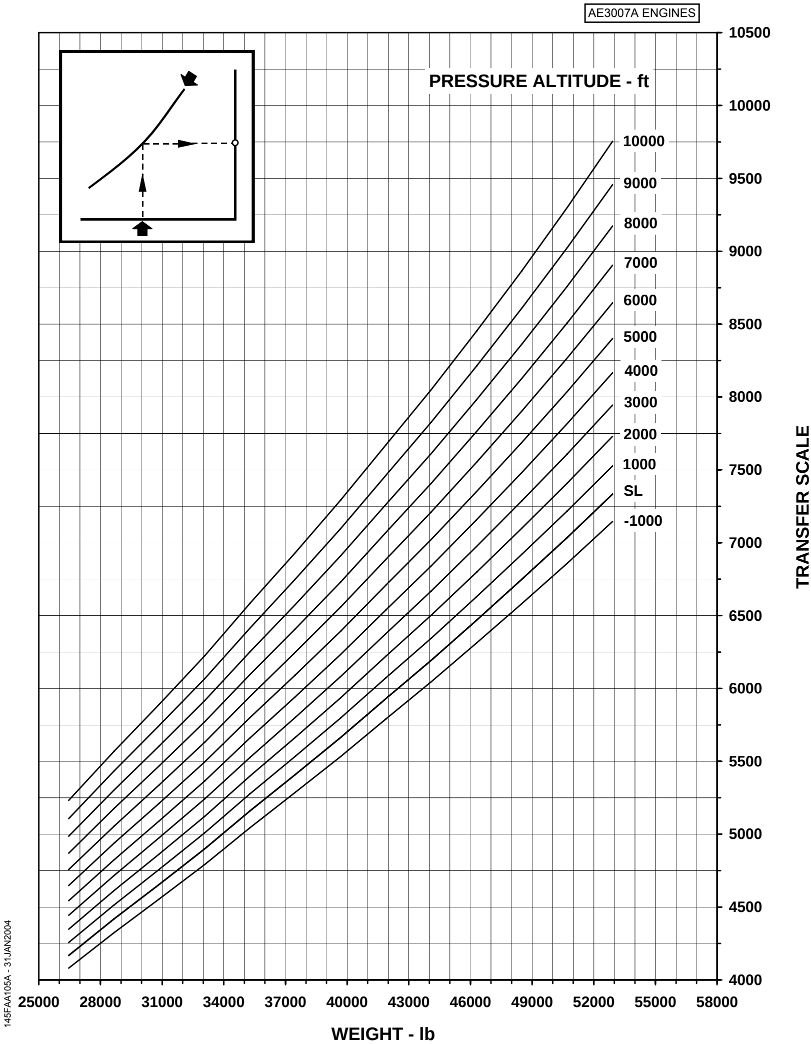
Determine:

Transfer Scale 4250
Landing distance (factored)..................................... 4050 ft
V_{REF45} .... 123 KIAS

MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED

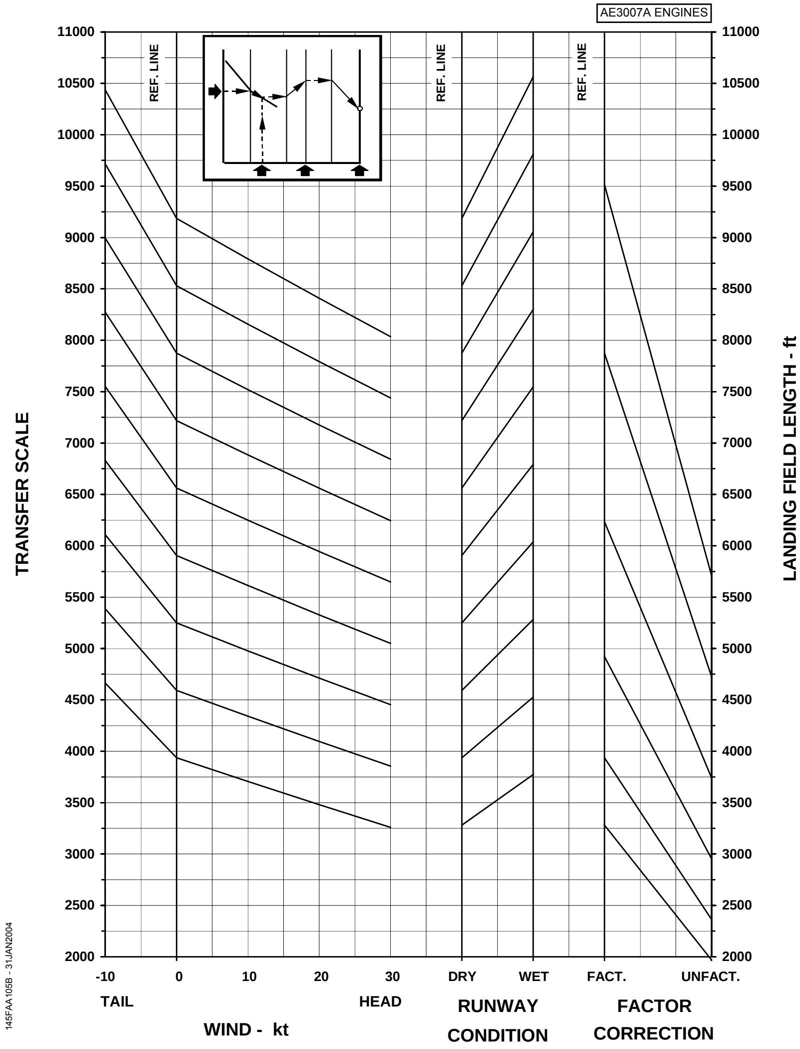
FLAPS 22°

CHART 1 OF 2



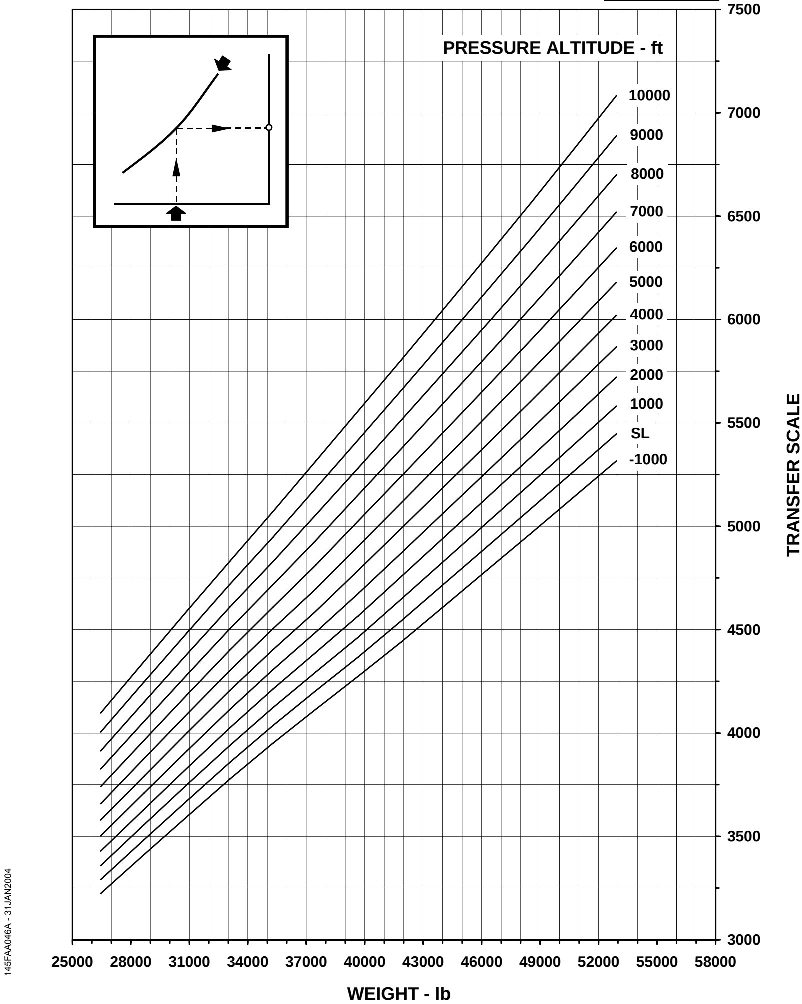
AFM-145/1153 - FAA

MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED
FLAPS 22°
CHART 2 OF 2

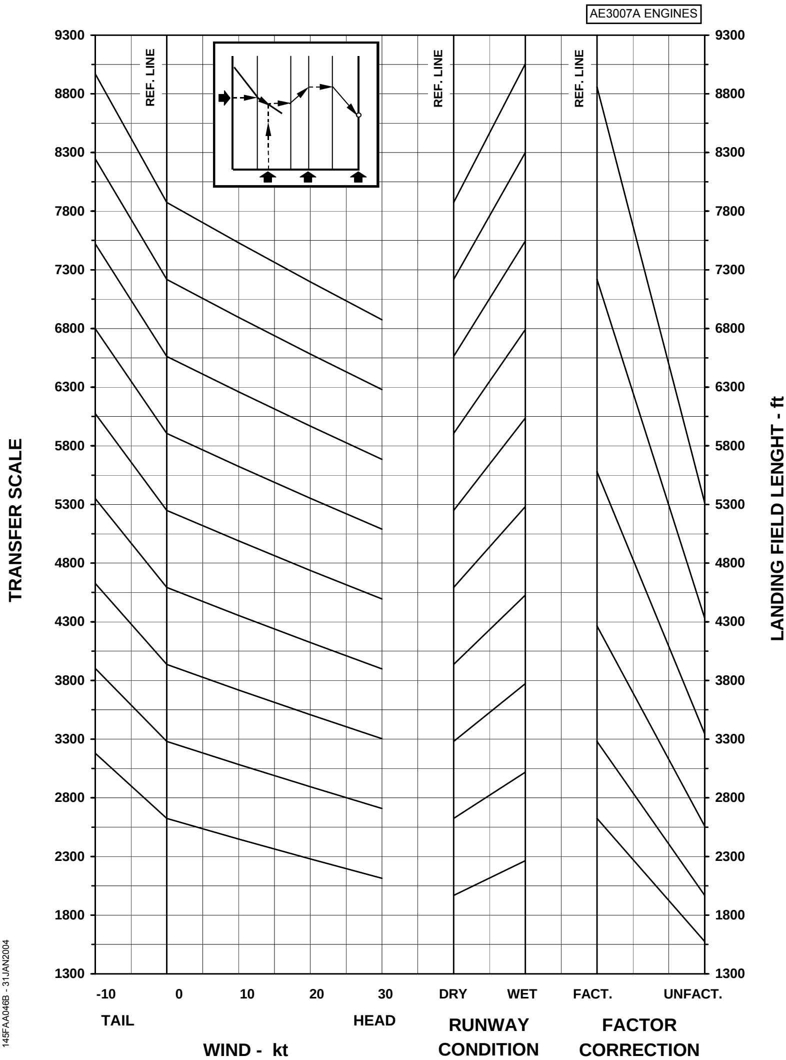


MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED
FLAPS 45°
CHART 1 OF 2

AE3007A ENGINES



MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED
FLAPS 45°
CHART 2 OF 2



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QUICK TURN AROUND WEIGHT

The landing weights for quick turn around, in compliance with the operating regulations relating brake energy, are provided in the Quick Turn Around Weight chart. This chart must be used when the brake temperature indication is not working properly, otherwise the brake temperature can be monitored through the brake temperature indication.

NOTE: If the weights provided in such chart are exceeded, a subsequent takeoff must not be performed before 33 minutes for airplanes equipped with ER version brakes or 36 minutes for airplanes equipped with LR version brakes, without previous check of the wheel thermal plugs.

Four charts are presented according to the following associated conditions:

Airspeed.. REFERENCE SPEED
Brakes Version .... ER or LR
Flaps .... 22° OR 45°
Landing gear.. DOWN

QUICK TURN AROUND WEIGHT CHART

USE

Enter the chart with the static air temperature, airport pressure altitude, wind component, runway slope and read the quick turn around weight.

EXAMPLE

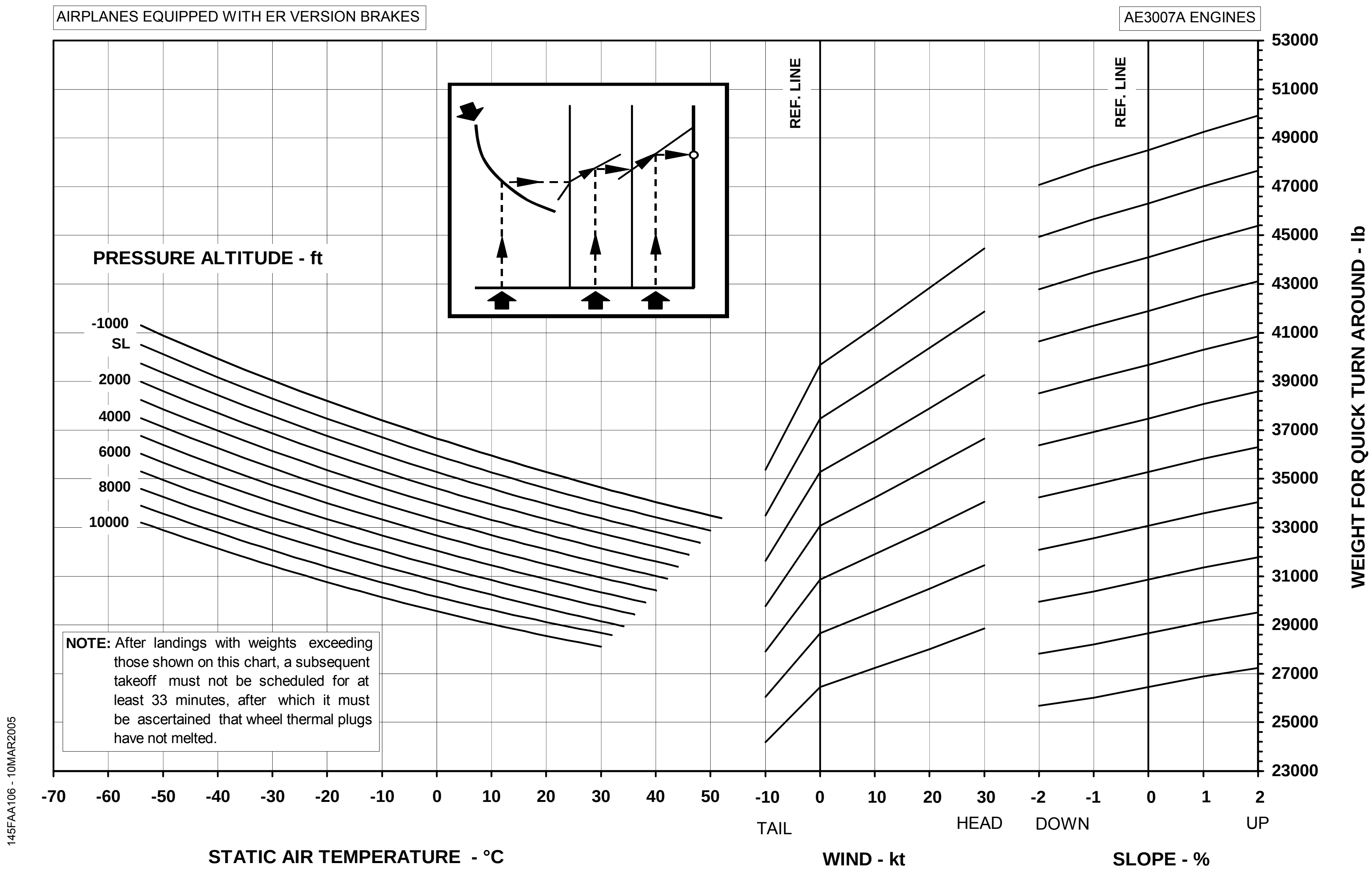
Given:

Static Air Temperature .... 20°C
Airport pressure altitude.. 2000 ft
Wind component.. 10 kt (HEADWIND)
Runway Slope... 1% (UPHILL)
Flaps .... 45°

Determine:

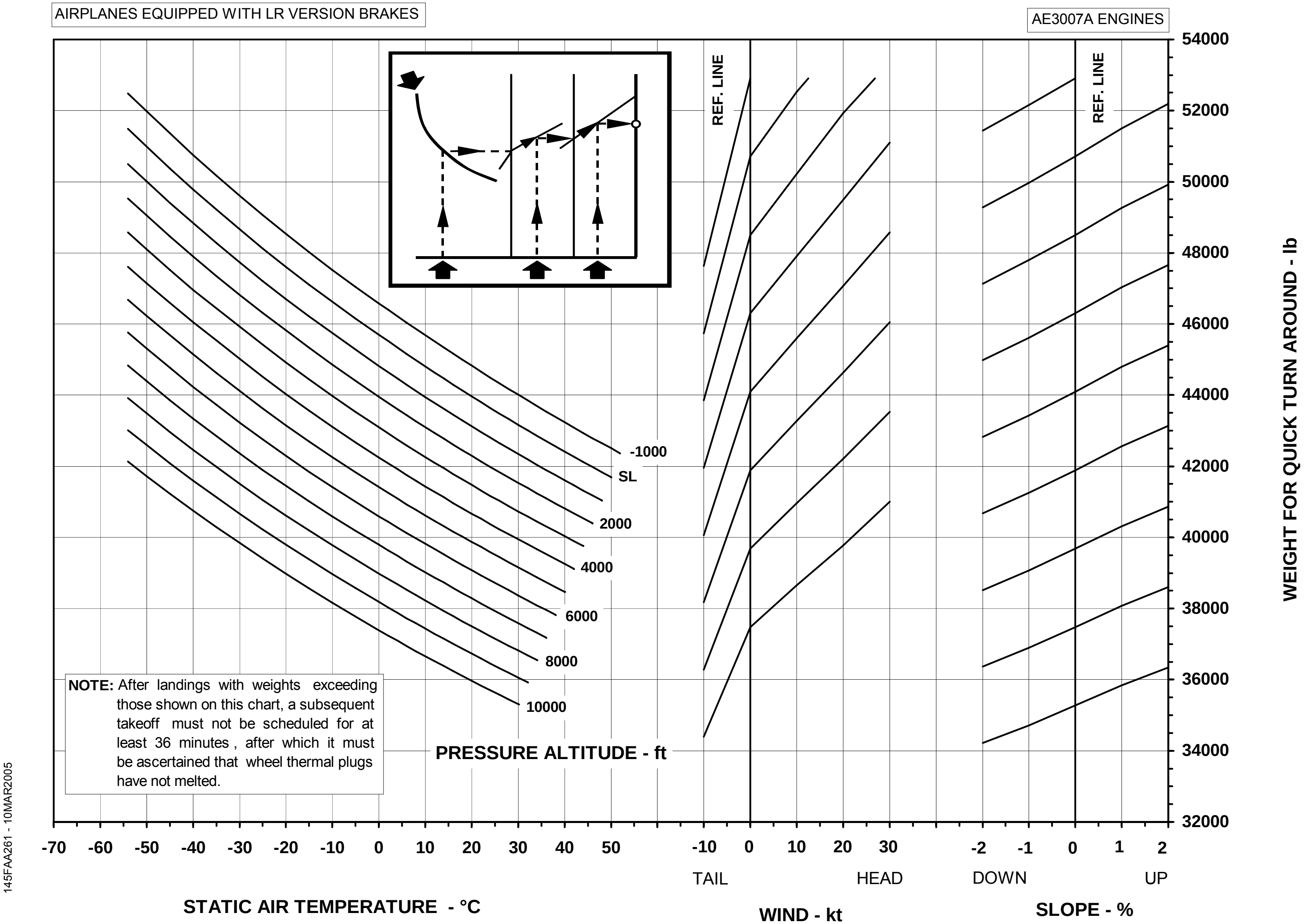
Quick turn around weight... 37500 lb

QUICK TURN AROUND WEIGHT
FLAPS 22°

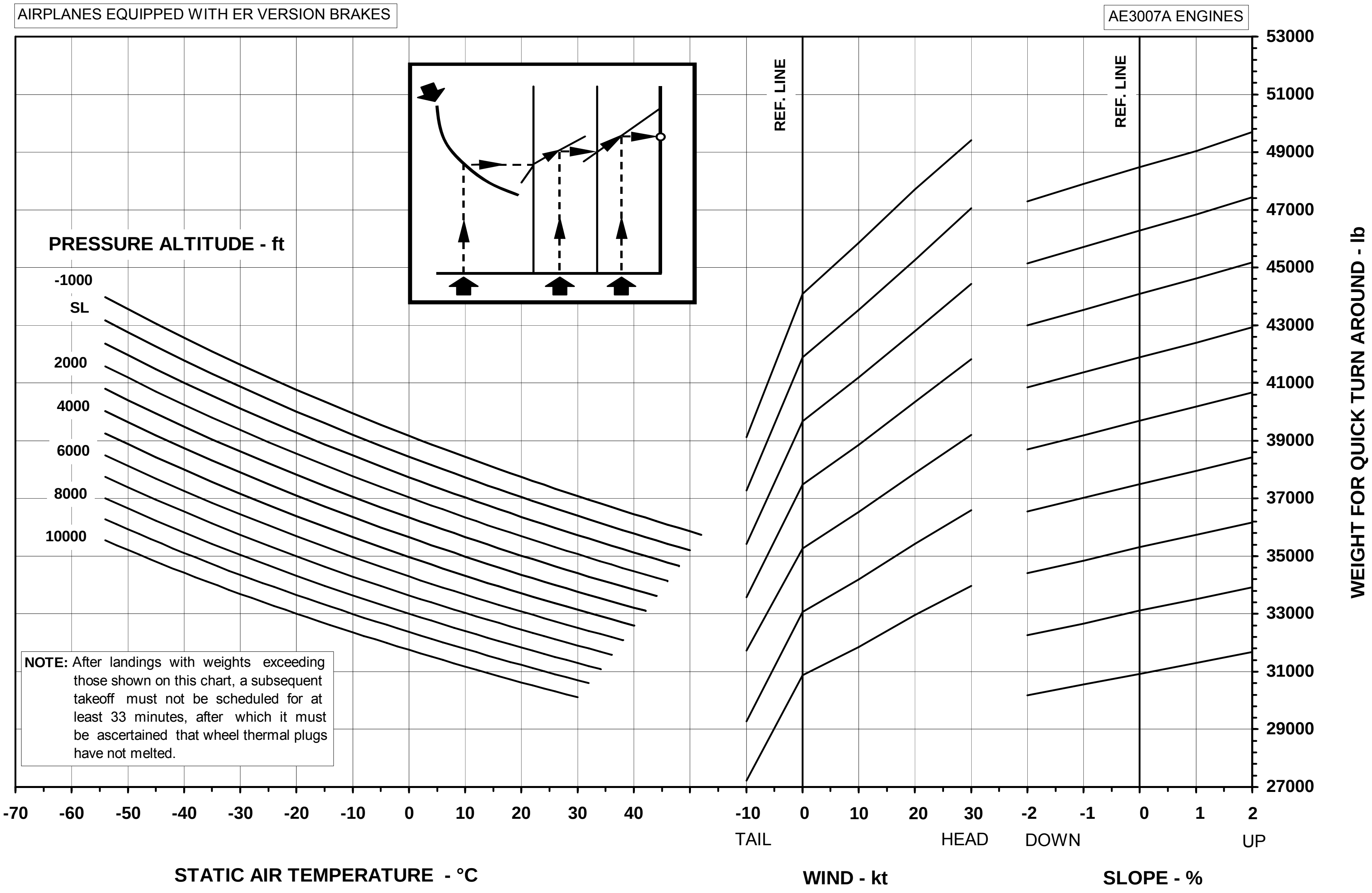


NOTE: After landings with weights exceeding those shown on this chart, a subsequent takeoff must not be scheduled for at least 33 minutes, after which it must be ascertained that wheel thermal plugs have not melted.

QUICK TURN AROUND WEIGHT
FLAPS 22°

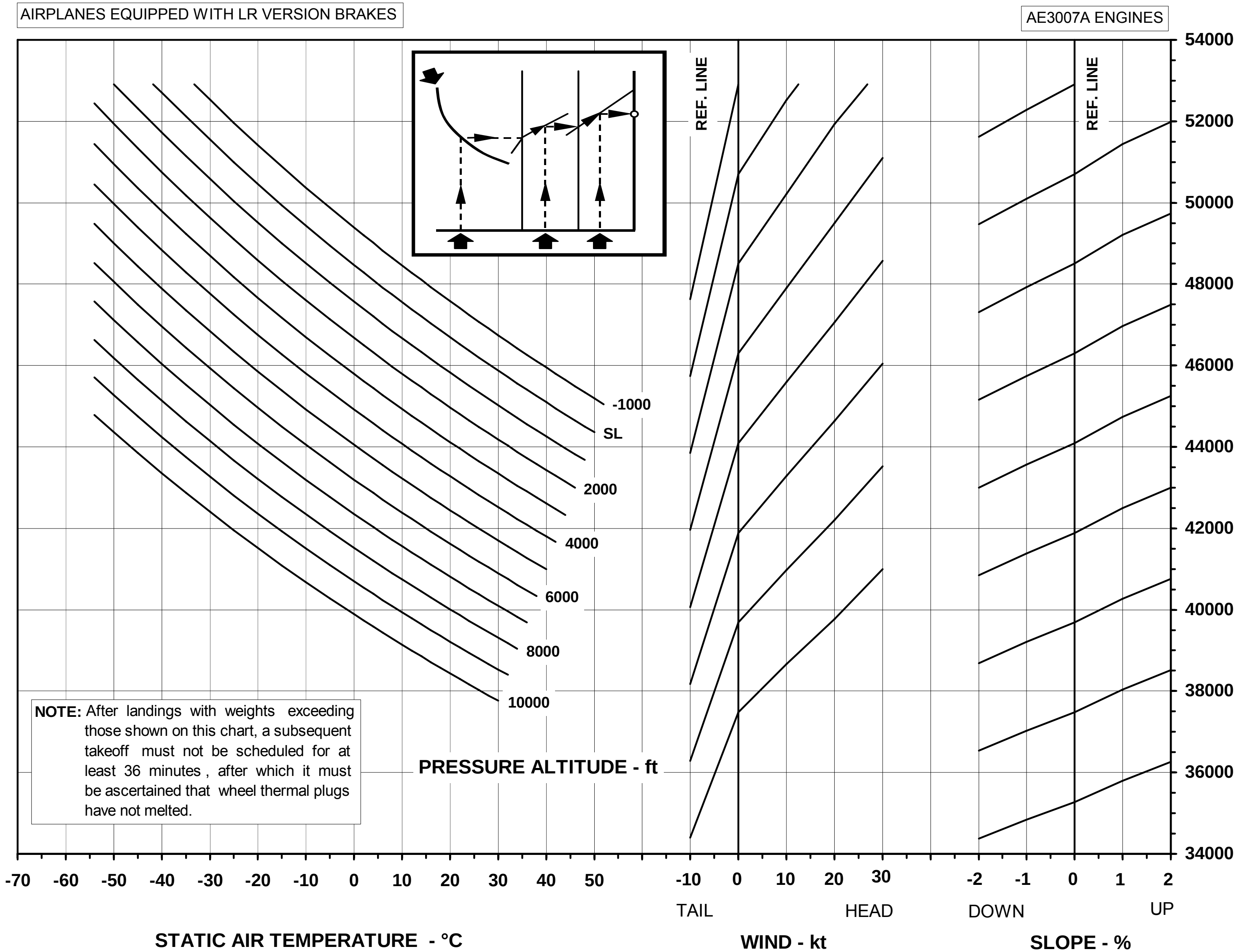


QUICK TURN AROUND WEIGHT
FLAPS 45°



QUICK TURN AROUND WEIGHT

FLAPS 45°



NOTE: After landings with weights exceeding those shown on this chart, a subsequent takeoff must not be scheduled for at least 36 minutes, after which it must be ascertained that wheel thermal plugs have not melted.

145FAA262 - 10MAR2005