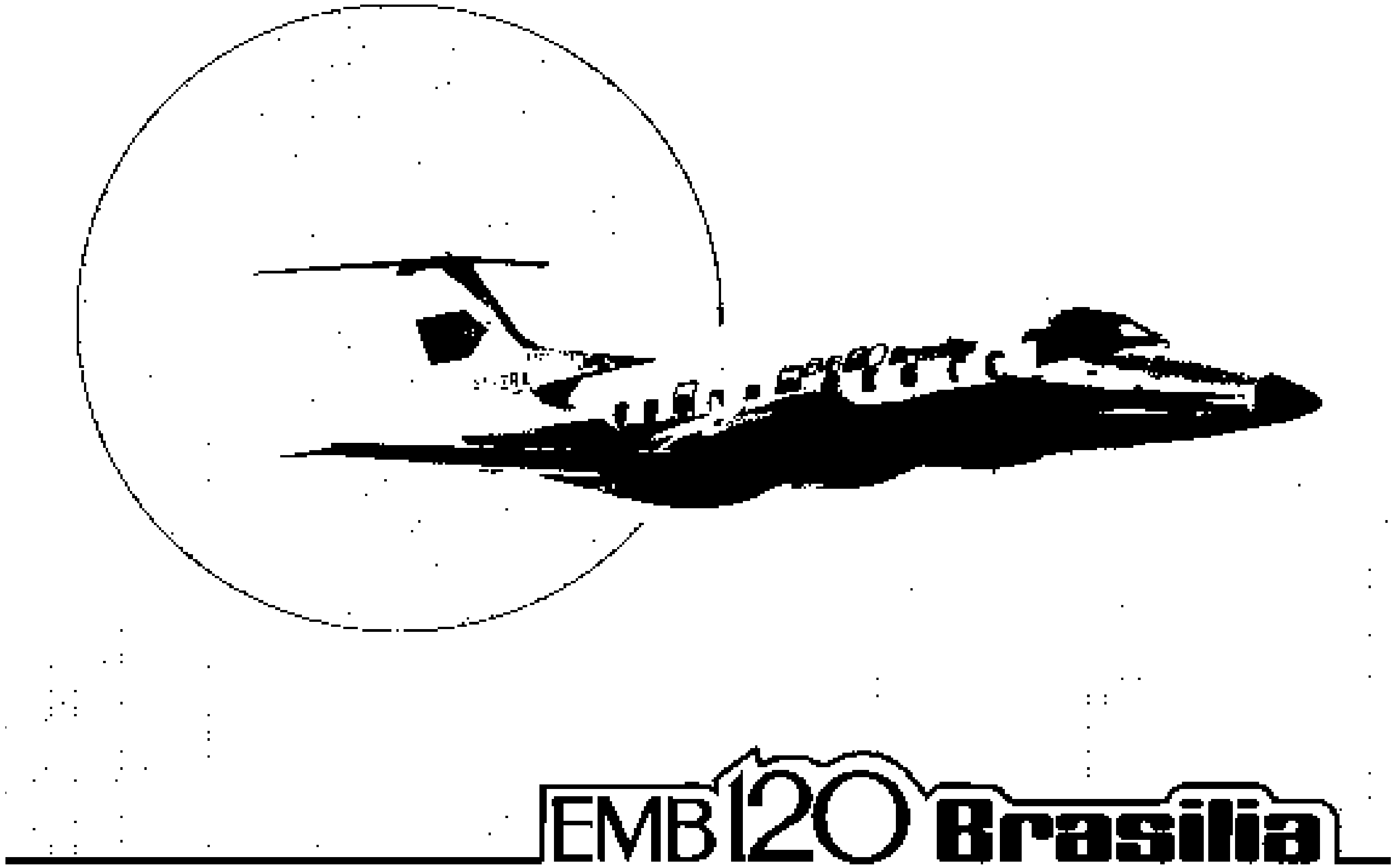

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AIRPORT PLANNING MANUAL

THIS PUBLICATION SUPERSEDES A.P. 120/731

DATED 19 NOVEMBER 1985, REVISION 2 - 22 MAY 1987

A.P. – 120/731

30 OCTOBER 2000

REVISION 1 - 27 SEPTEMBER 2019

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TO: HOLDERS OF PUBLICATION No. A.P. 120/731 - “AIRPORT PLANNING MANUAL”, APPLICABLE TO EMB-120 “BRASILIA” AIRCRAFT.

REVISION No. 1 DATED SEPTEMBER 27/19

HIGHLIGHTS

Pages which have been added, revised or deleted by the current revision are indicated by an asterisk, on the List of Effective Pages.
This issue incorporates all preceding Temporary Revisions (if any).

LIST OF EFFECTIVE PAGES

Original ...... 0 ...... 30 OCTOBER 2000
Revision ...... 1 ...... 27 SEPTEMBER 2019

* Title	Revision 1	3-4	Original
* A	Revision 1	3-5	Original
* B	Revision 1	3-6	Original
i	Original	3-7	Original
ii blank	Original	3-8	Original
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2-17	Original	5-3	Original
2-18	Original	5-4	Original
3-1	Original	5-5	Original
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* Asterisk indicates pages changed, added/deleted (del) by the current revision.

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TECHNICAL PUBLICATIONS

STATUS REPORT - TEMPORARY REVISIONS

CURRENT STATUS OF EFFECTIVE TEMPORARY REVISIONS

AP-120/731
Revision 1 - September 27/2019

Currently there is no effective Temporary Revision intended for this manual. The latest revision to it has incorporated any and all preceding Temporary Revisions issued (if any).

Latest update: Sep 27/19

SECTION I

INTRODUCTION

1.1 PURPOSE

This document provides airplane characteristics data for general airport planning. Since operational practices vary among airlines, specific data should be coordinated with the using airlines prior to facility design. EMBRAER should be contacted for any additional information required.

1.2 SCOPE

This document provides characteristics of the EMB-120 airplane for airport planners and operators, airlines, architectural and engineering consultant organizations, and other interested industry agencies. Airplane changes and available options may alter model characteristics. The data presented herein reflect typical airplanes.

For additional information on and revisions to this document, contact:

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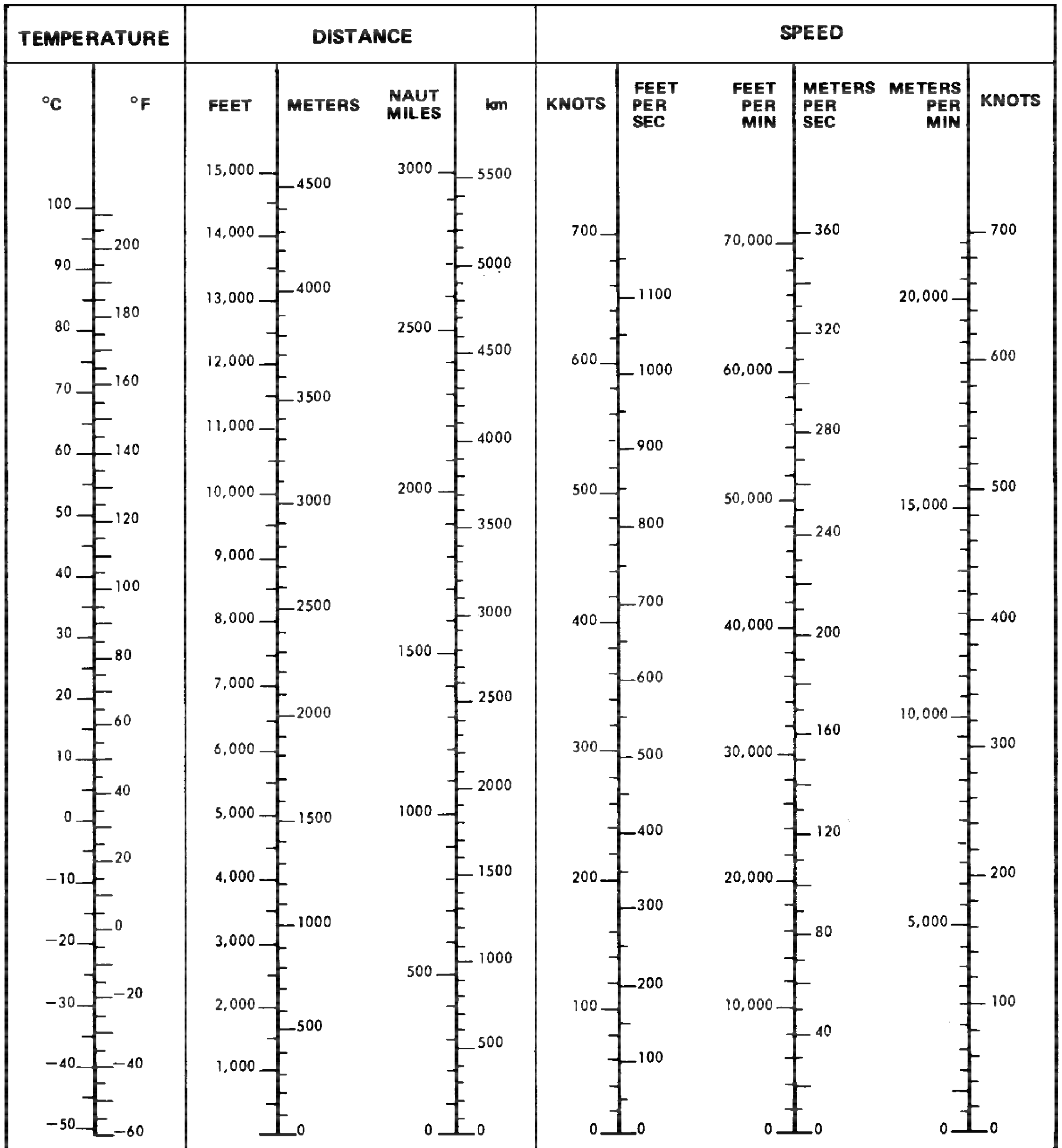


NOTE: TO CONVERT LITERS TO U.S. GAL: MULTIPLY BY 0.264
TO CONVERT LITERS TO IMP. GAL: MULTIPLY BY 0.220
TO CONVERT MILLIBARS TO INCHES OF MERCURY: MULTIPLY BY 0.0295
TO CONVERT KILOGRAMS TO POUNDS: MULTIPLY BY 2.205
TO CONVERT POUNDS TO KIGRAMS: MULTIPLY BY 0.454
TO CONVERT KILOMETERS TO STATUTE MILES MULTIPLY BY 0.620
TO CONVERT KILOMETERS TO NAUTICAL MILES MULTIPLY BY 0.540
TO CONVERT MEGA NEWTON PER CUBIC METERS TO POUNDS PER CUBIC INCHES: MULTIPLY BY 3.684
TO CONVERT MEGA PASCAL TO POUNDS PER SQUARE INCH: MULTIPLY BY 145.058

120APM010001.TIF

Units Conversion Table

Figure 1-1

SECTION II

GENERAL AIRPLANE CHARACTERISTICS

2.1. GENERAL DESCRIPTION

The EMB-120 Brasilia has been basically conceived for passenger and/or cargo transportation in typical commercial aviation operations.
It is an all-metal, pressurized, low-wing, T-tail, monoplane airplane.
Fully retractable, tricycle-type landing gear with dual wheels, anti-skid braking system, and steerable nose gear are utilized. Power is provided by two turboprop, axial-flow, PW118-series engines. Fuel is stored in two integral wing tanks. As an option, the airplane may be provided with an auxiliary power unit (APU).

2.2. DEFINITIONS

2.2.1. Maximum Zero Fuel Weight (MZFW)

Is the maximum approved weight for the airplane with only unusable fuel in tanks.

2.2.2. Equipped Empty Weight (EEW TOLERANCE = ± 1%)

Is the total weight of the airplane structure plus power plant, instruments, control, hydraulic, electronic, electrical, air conditioning, anemometric, oxygen, de-icing and anti-icing, pressurization systems, plus interior furnishings, etc.

2.2.3. Basic Empty Weight (BEW)

Is the equipped empty weight plus unusable fuel, total engine oil, total hydraulic fluid and, when existing, removable ballast weights.

2.2.4. Maximum Payload

Is the difference between maximum zero fuel weight and operating weight.

2.2.5. Operating Weight (OW)

Is the basic empty weight plus weights of movable items which do not alter significantly along a mission. Such items include toilet water, crew, attendant material, extra and emergency equipment possibly needed.

2.2.6. Useful Load

Is the difference between takeoff weight and equipped empty weight.

2.2.7. Maximum Taxi Weight (MTW)

Is the maximum weight for ground maneuver as limited by aircraft strength and airworthiness requirements. (It includes weight for taxiing and runup fuel).

2.2.8. Maximum Landing Weight (MLW)

Is the maximum weight for landing as limited by aircraft strength and airworthiness requirements.

2.2.9. Maximum Takeoff Weight (MTOW)

Is the maximum weight for takeoff as limited by aircraft strength and airworthiness requirements. (This is the maximum weight at start of the takeoff run).

DESIGN WEIGHT	MODEL			
	RT		ER	
	kg	lb	kg	lb
Maximum Taxi Weight	11580	25529	12070	26610
Maximum Landing Weight	11250	24802	11700	25794
Maximum Takeoff Weight	11500	25353	11990	26433
Maximum Zero Fuel Weight	10500	23148	10900	24030
Equipped Empty Weight (PAX) (Average Weight)	7072	15591	7177	15824
Operating Weight (PAX) (Average Weight)	7230	15939	7628	16817
Operating Weight (Quick-change - PAX)	-	-	7680	16931
Operating Weight (Quick-change - Cargo)	-	-	7400	16931
Operating Weight (Combi)	-	-	7700	16975
Operating Weight (Full Cargo)	-	-	7160	15785
Maximum Payload (PAX) (Average)	3270	7209	3272	7213
Maximum Payload (Quick-change - PAX)	-	-	3220	7099
Maximum Payload (Quick-change - Cargo)	-	-	3500	7716
Maximum Payload (Combi)	-	-	3200	7054
Maximum Payload (Full Cargo)			3740	8245

Design Weights for Standard Configuration

Figure 2-1

FUEL	MEASUREMENT UNITS	MODELS
		RT/ER
Usable Fuel	US Gallons	875
	Liters	3312
	Pounds	5731
	Kilograms	2600
Unusable Fuel	US Gallons	7
	Liters	28
	Pounds	48
	Kilograms	22

NOTE: Assumed fuel density is 0.785 kg/l (6500 lb/U.S.GAL).

Usable and Unusable Fuel

Figure 2-2

Overhead Bins: Max allowable weight is 40 lb (18 kg) in each module.

Rear BAGGAGE COMPARTMENT:

- For passenger luggage:

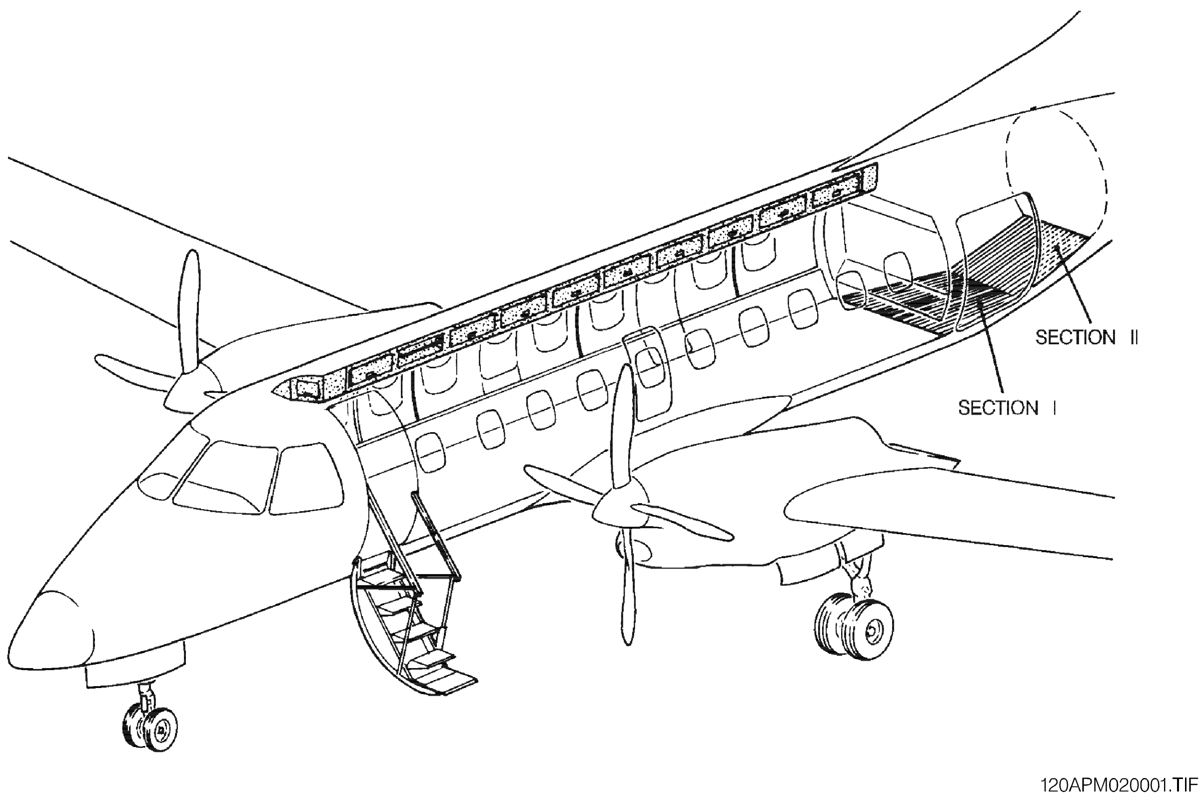
Sections I + II (Max. allowable weight: 1213 lb (550 kg)).

- For cargo Transportation:

Section I (Max. allowable weight: 1213 lb (550 kg)).

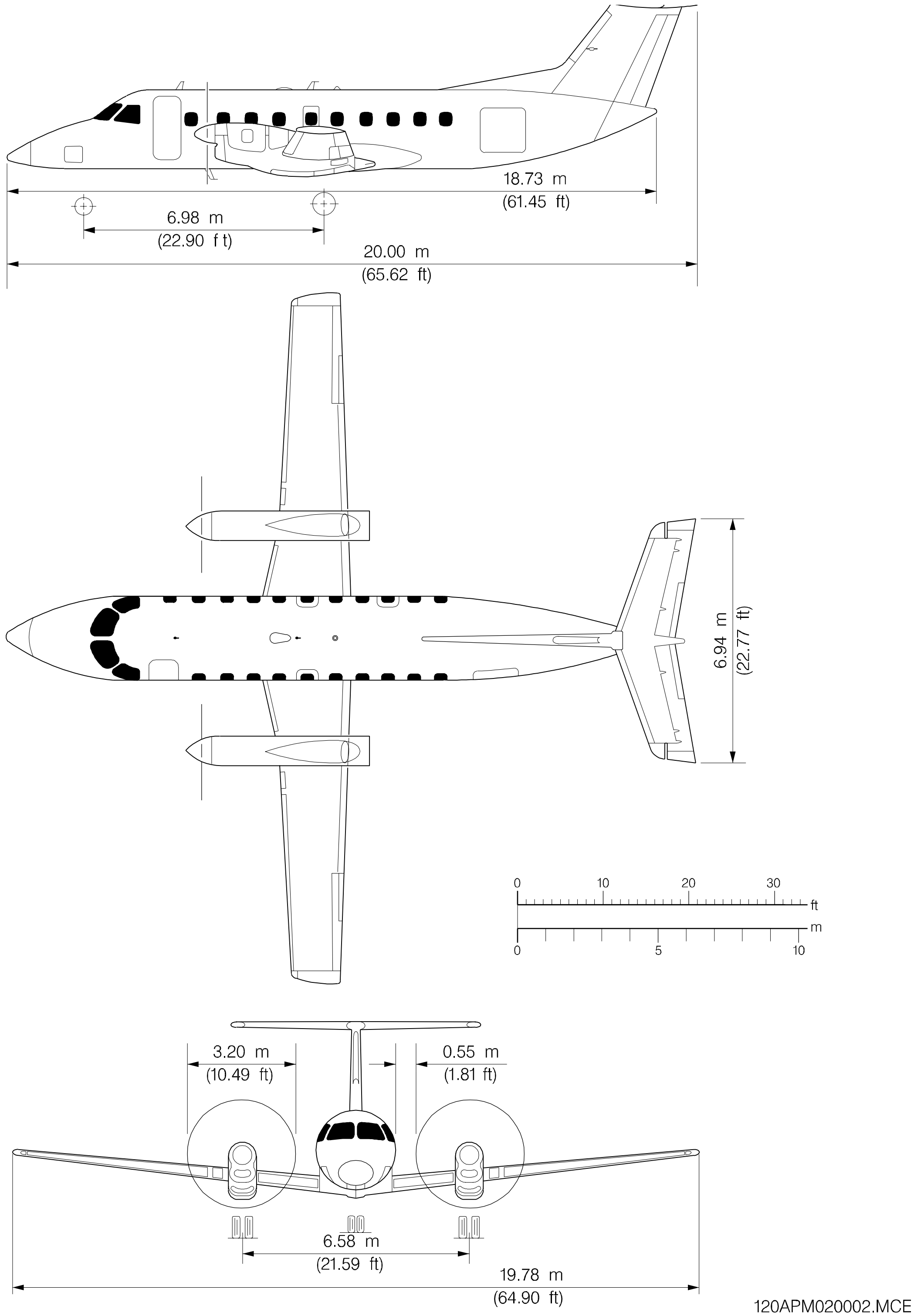
Section II (Max. allowable weight: 570 lb (258 kg)).

The amount of sections I and II should not exceed the maximum allowable weight of 1213 lb (550 kg).



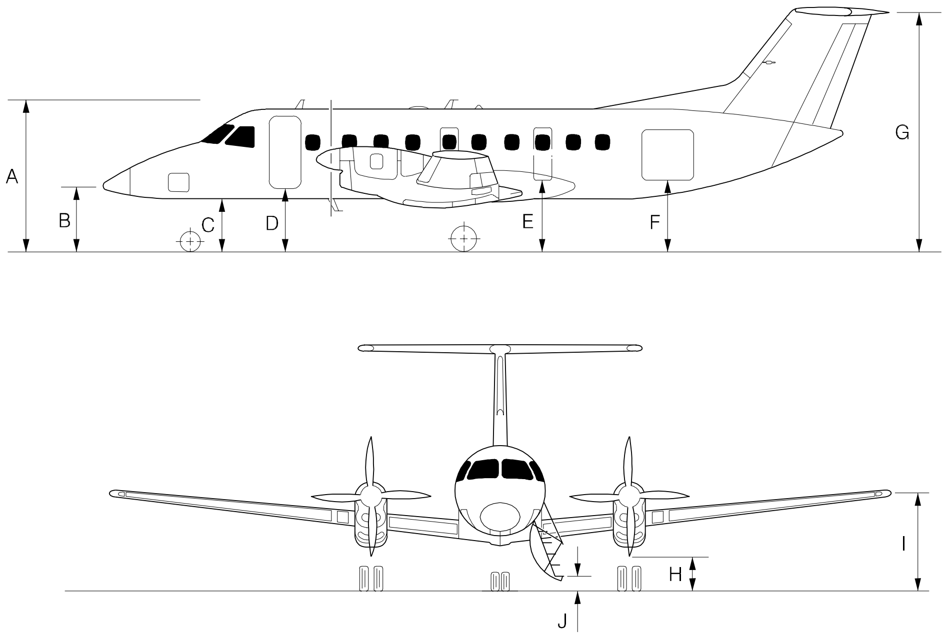
Load Baggage Compartment

Figure 2-3



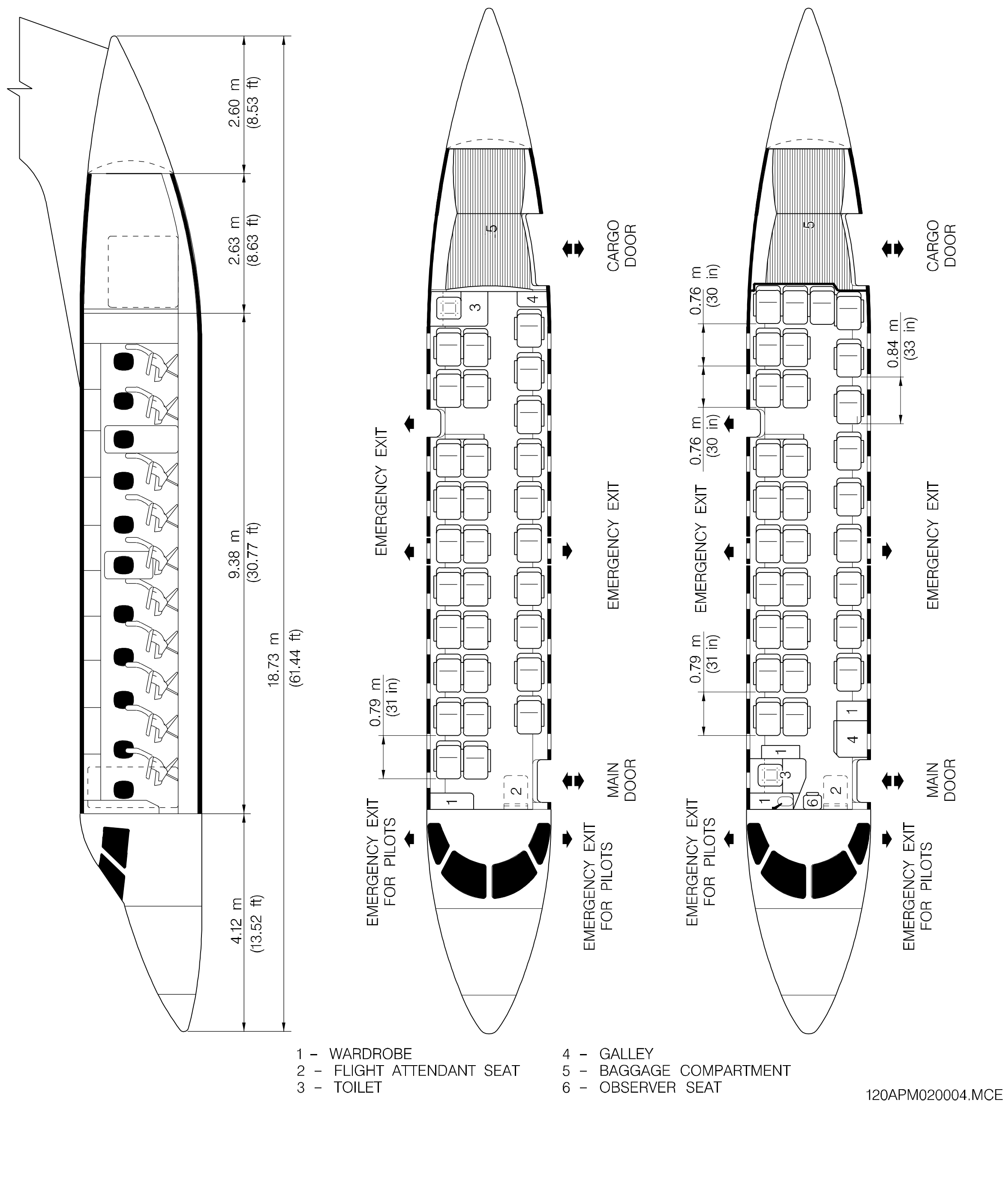
Airplane General Dimensions

Figure 2-4



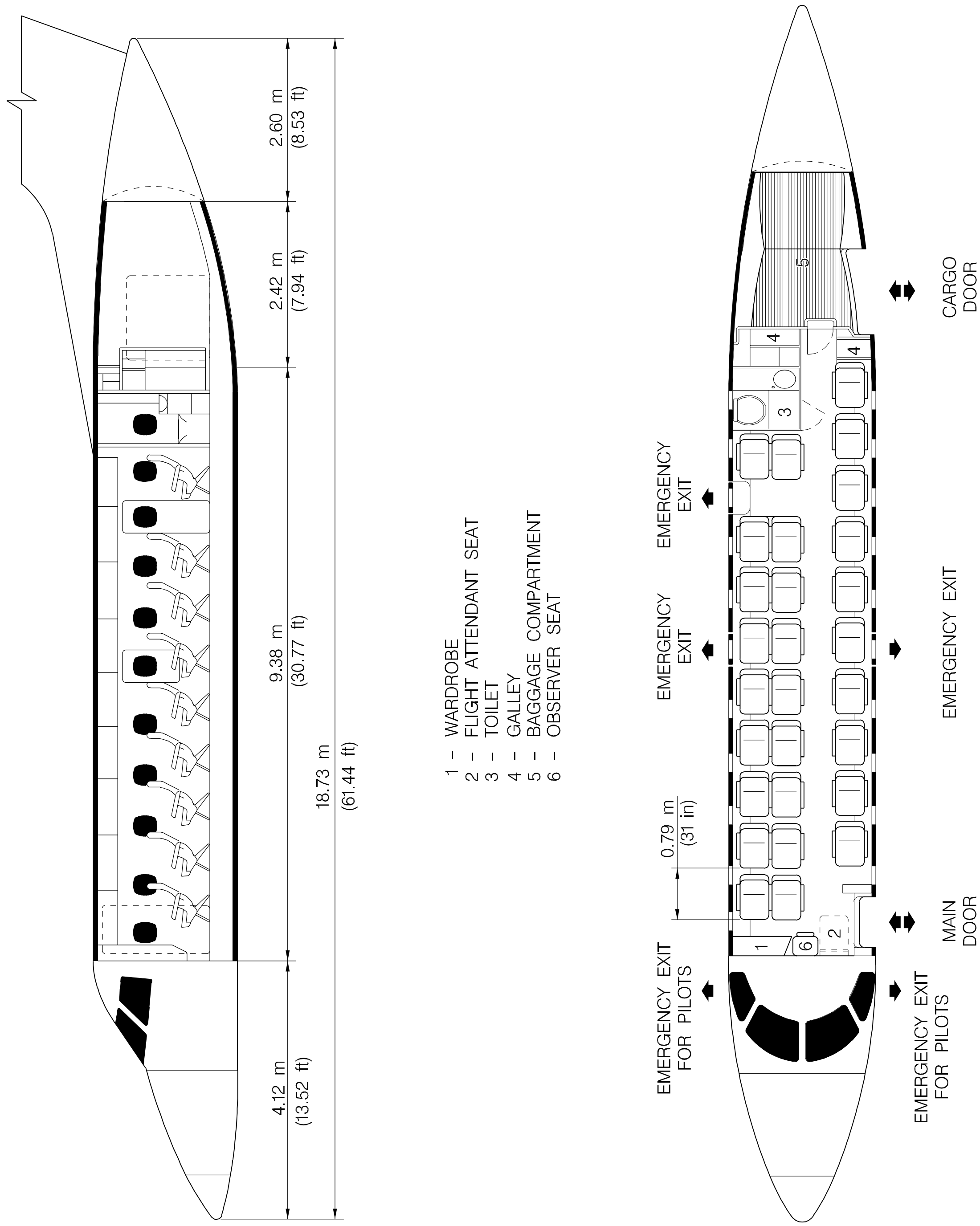
	VERTICAL CLEARANCES			
	MAXIMUM		MINIMUM	
	METERS	IN	METERS	IN
A	3.43	135.0	3.30	129.9
B	1.46	57.5	1.30	50.8
C	1.13	44.5	0.98	38.6
D	1.58	62.2	1.46	57.5
E	1.76	69.3	1.57	61.8
F	1.88	74.0	1.61	63.4
G	6.53	257.1	6.16	242.5
H	0.58	22.8	0.46	18.1
I	2.36	92.9	2.20	86.6
J	0.43	16.9	0.31	12.2

Ground Clearances
Figure 2-5



Interior Arrangements (30 PAX)

Figure 2-6 (Sheet 1)



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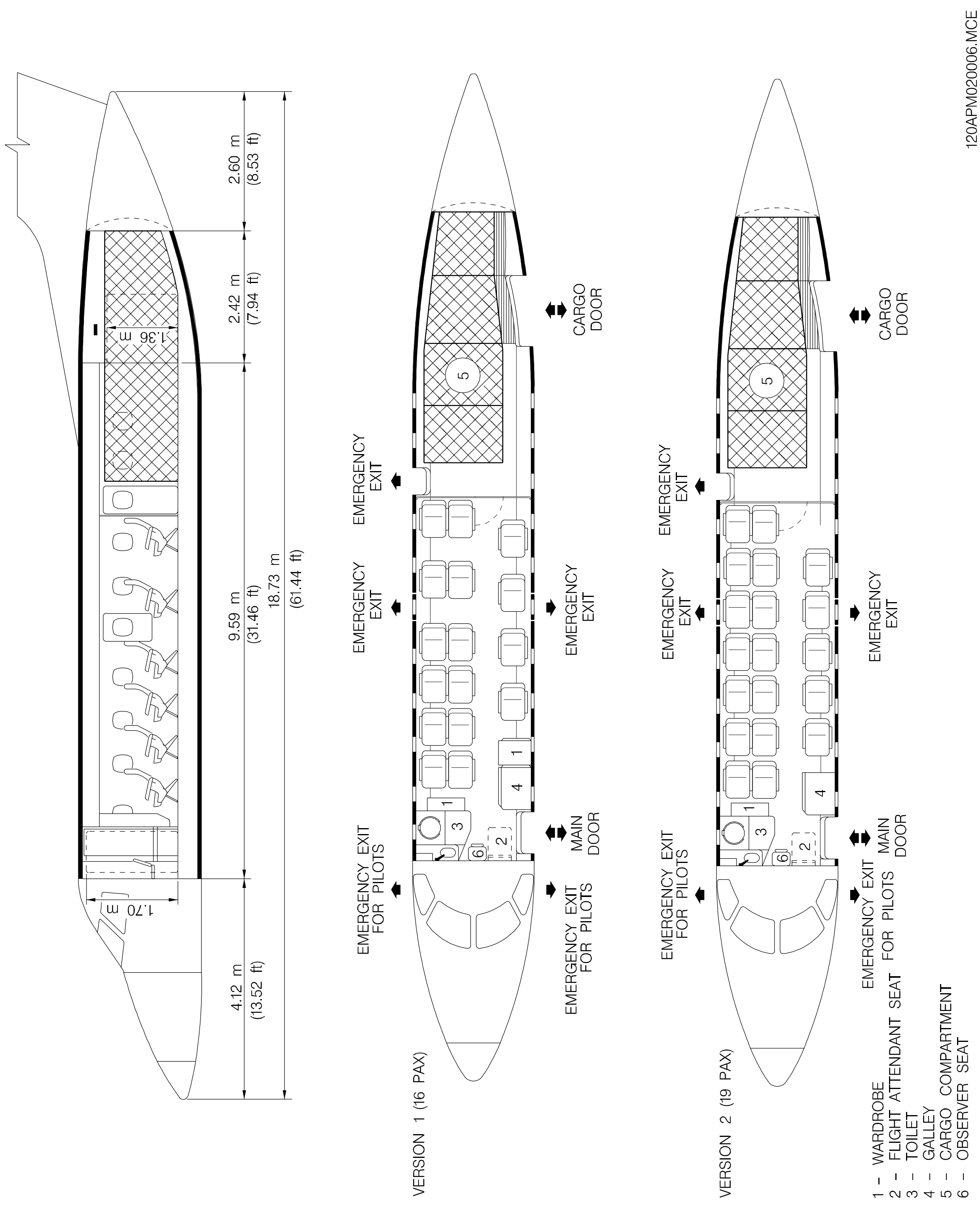
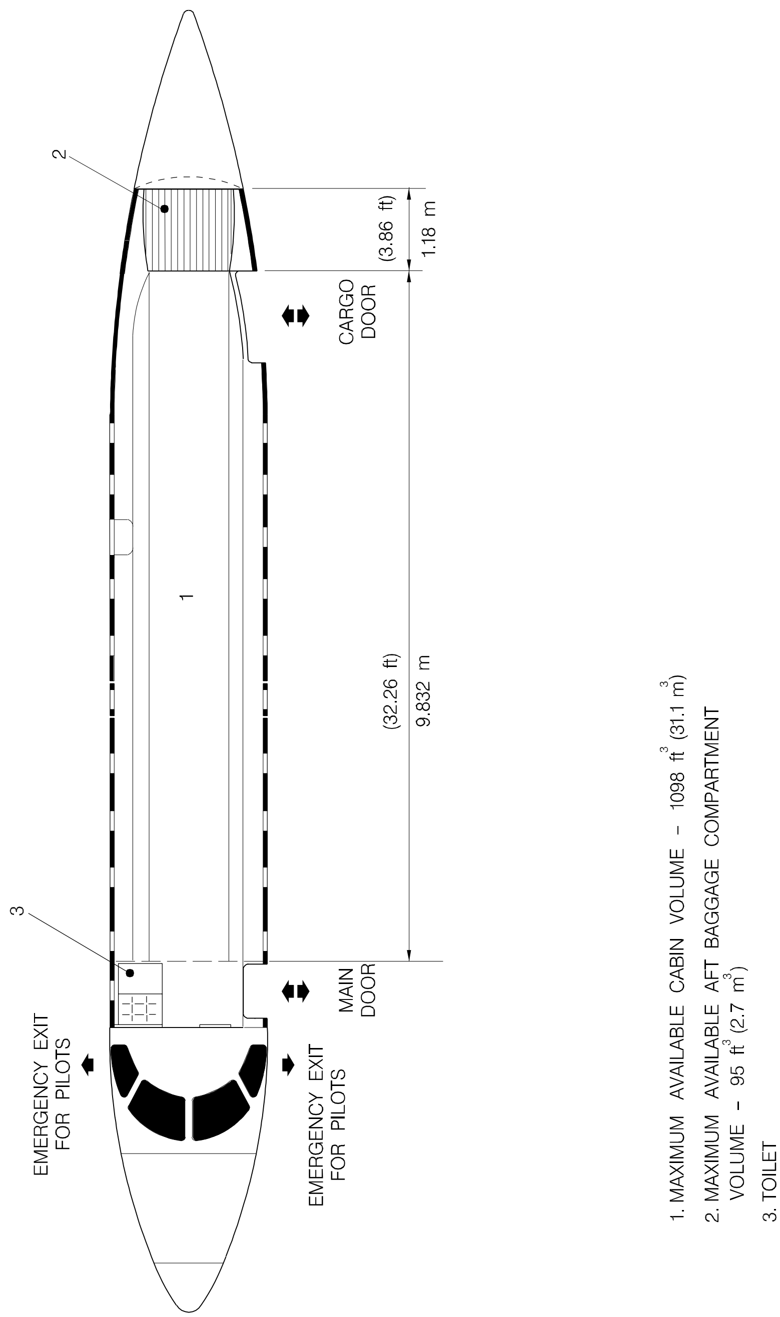
Interior Arrangements (28 PAX)

Figure 2-6 (Sheet 2)



Interior Arrangements (Combi)

Figure 2-6 (Sheet 3)



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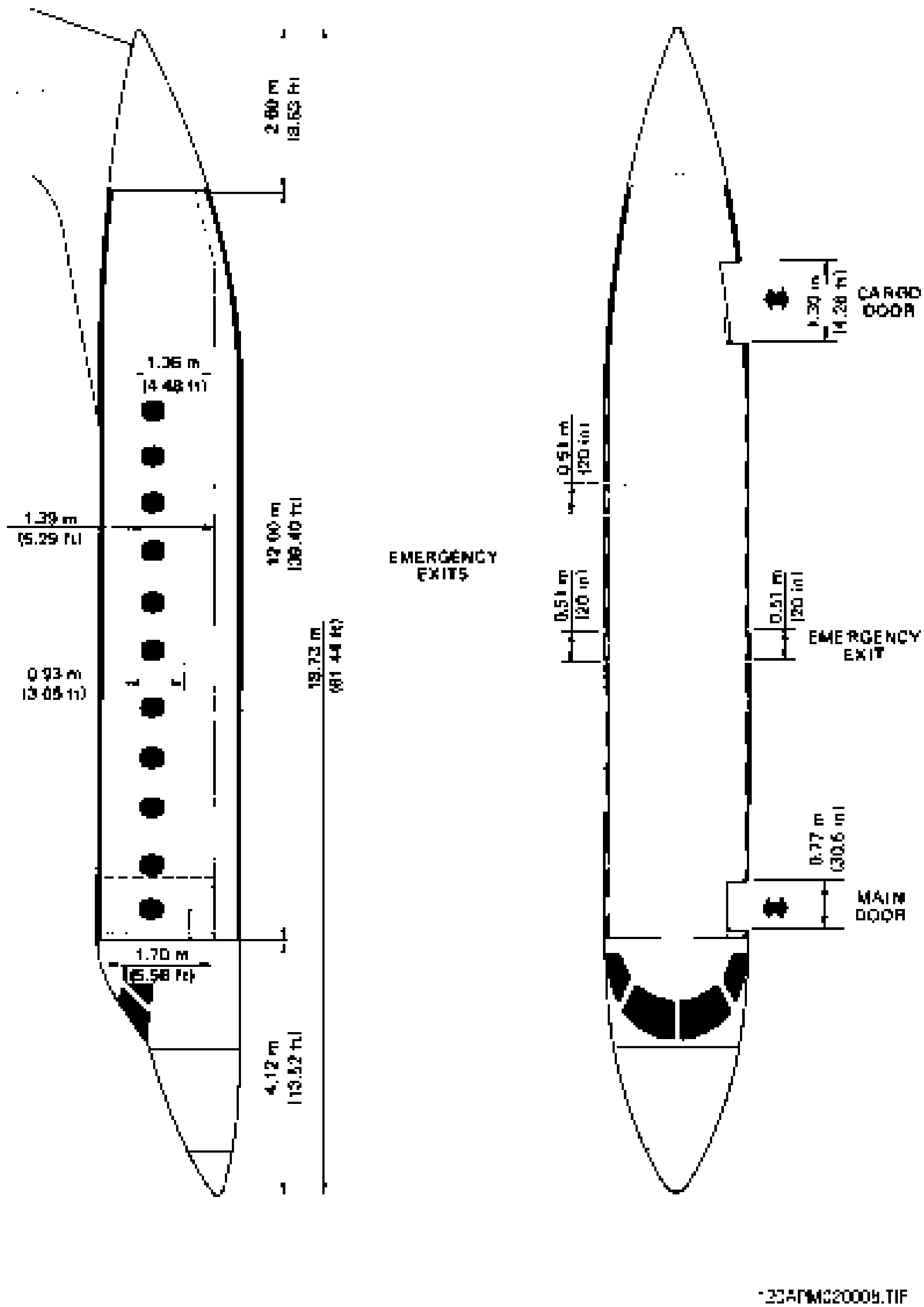
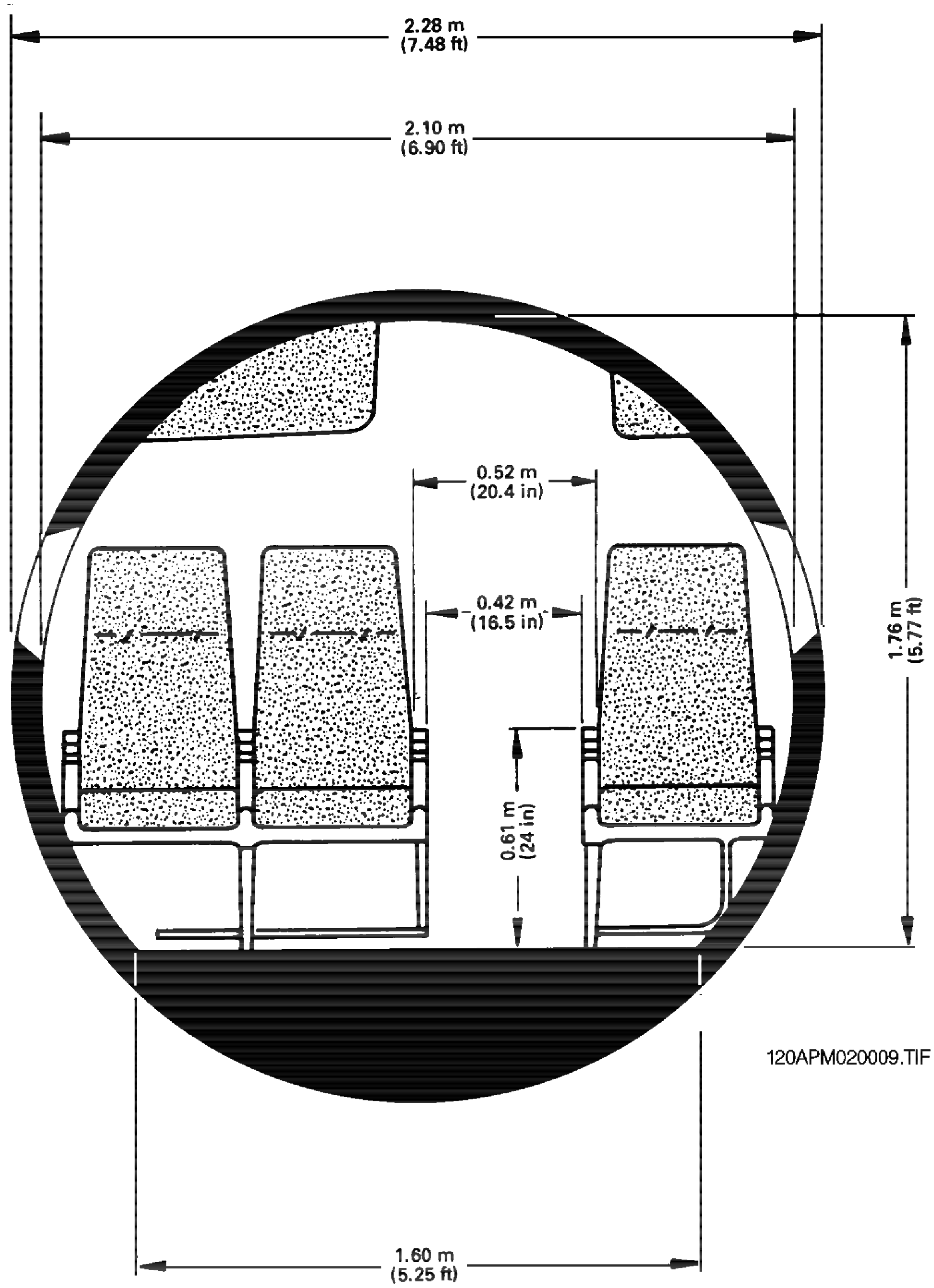
Interior Arrangements (Cargo)

Figure 2-6 (Sheet 4)



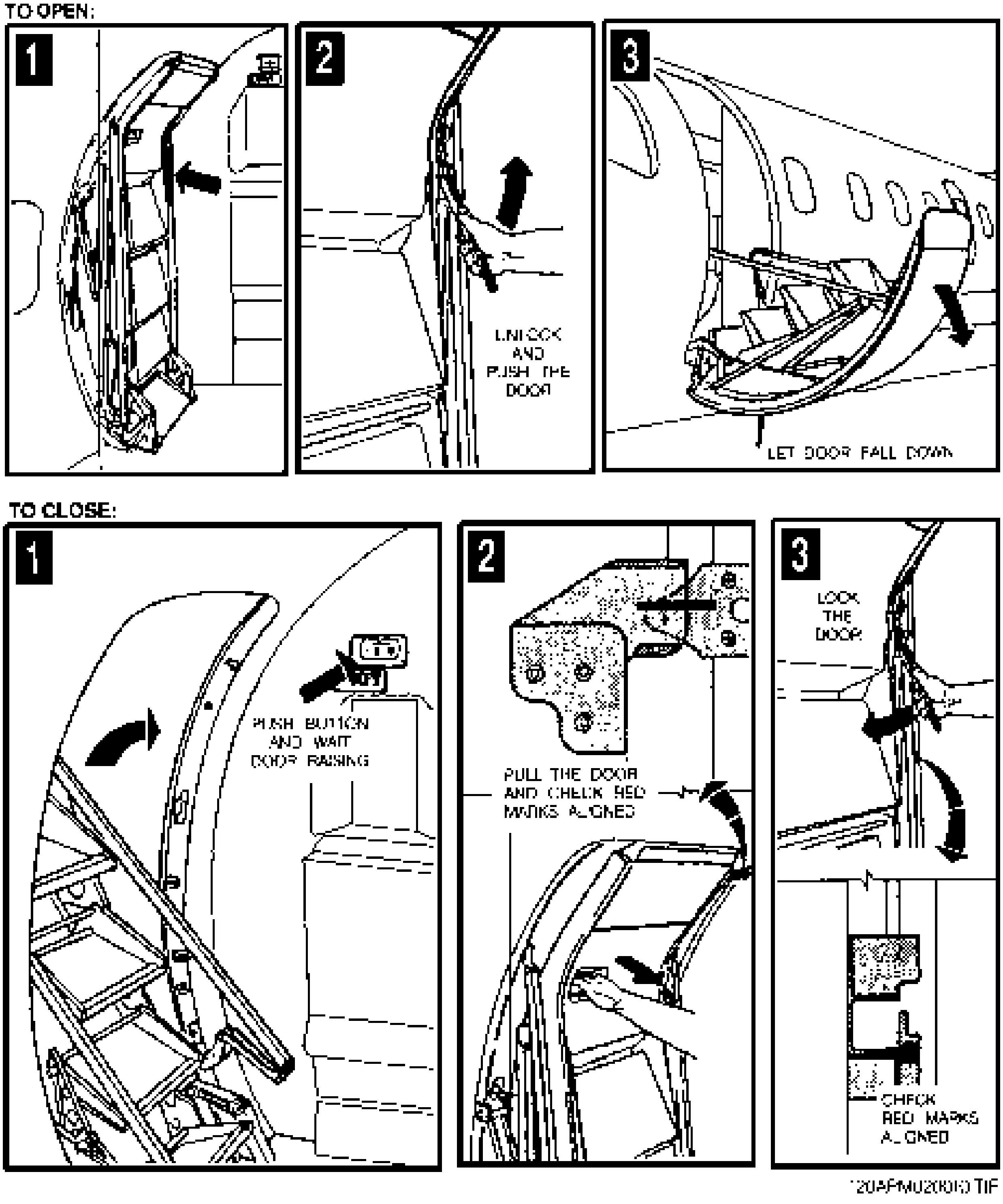
Door Clearances

Figure 2-7



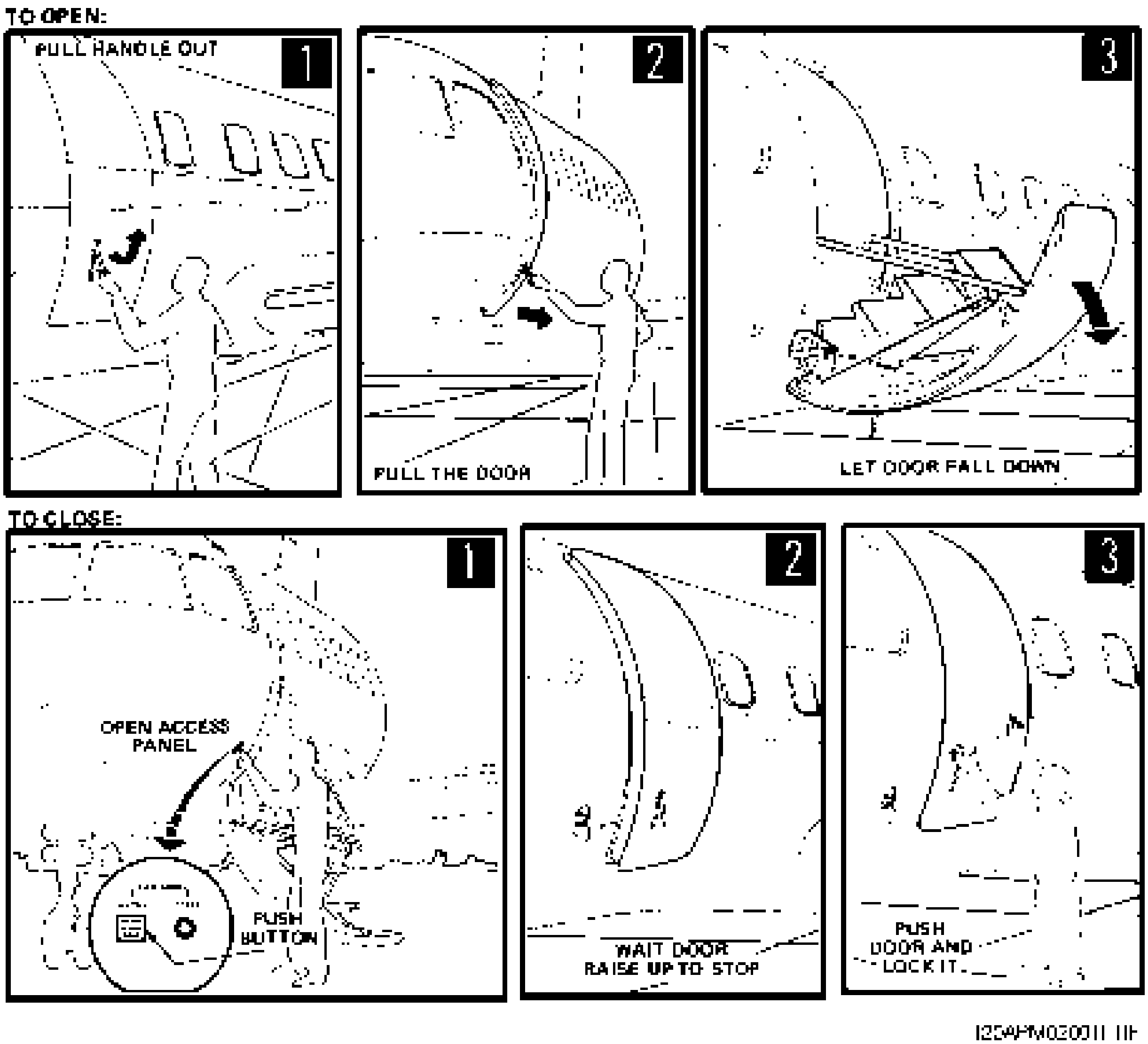
Passenger Cabin Cross Section - Typical

Figure 2-8



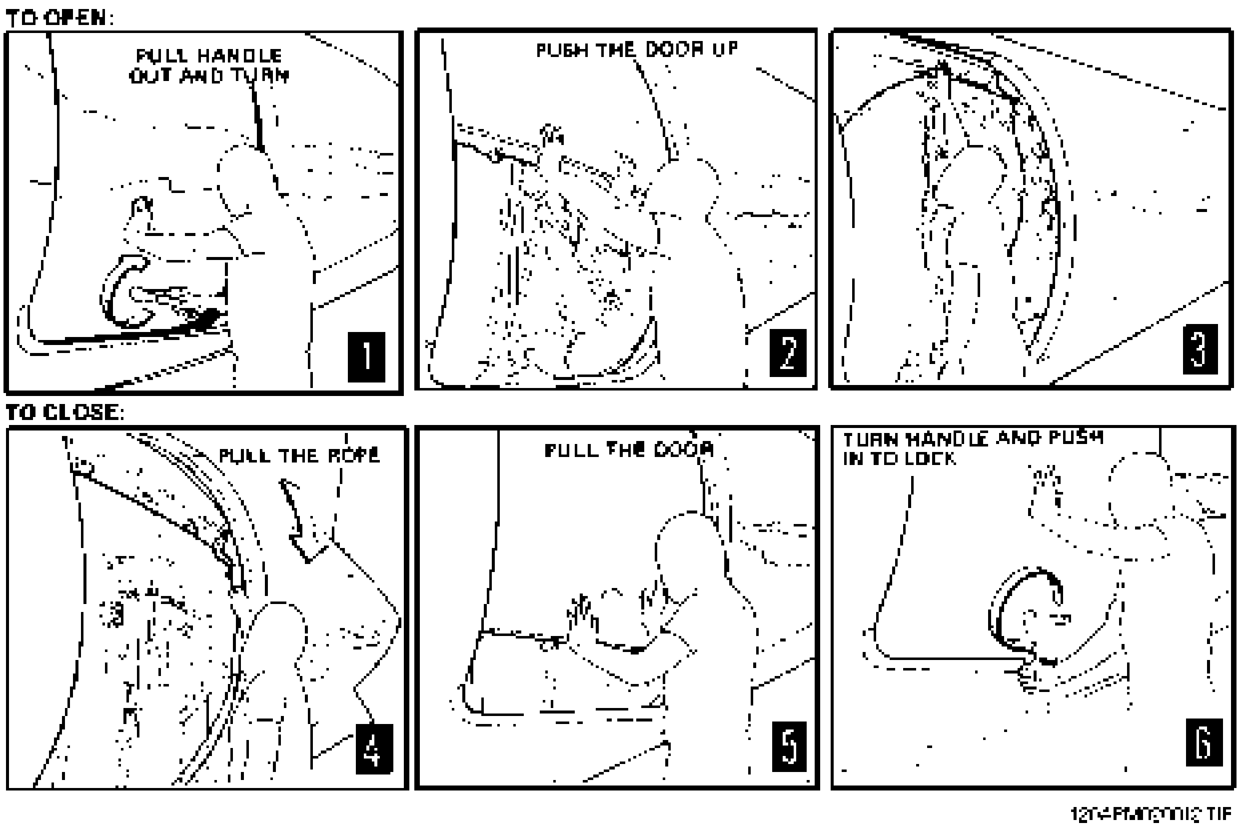
Main Door Operation (Inside Cabin)

Figure 2-9



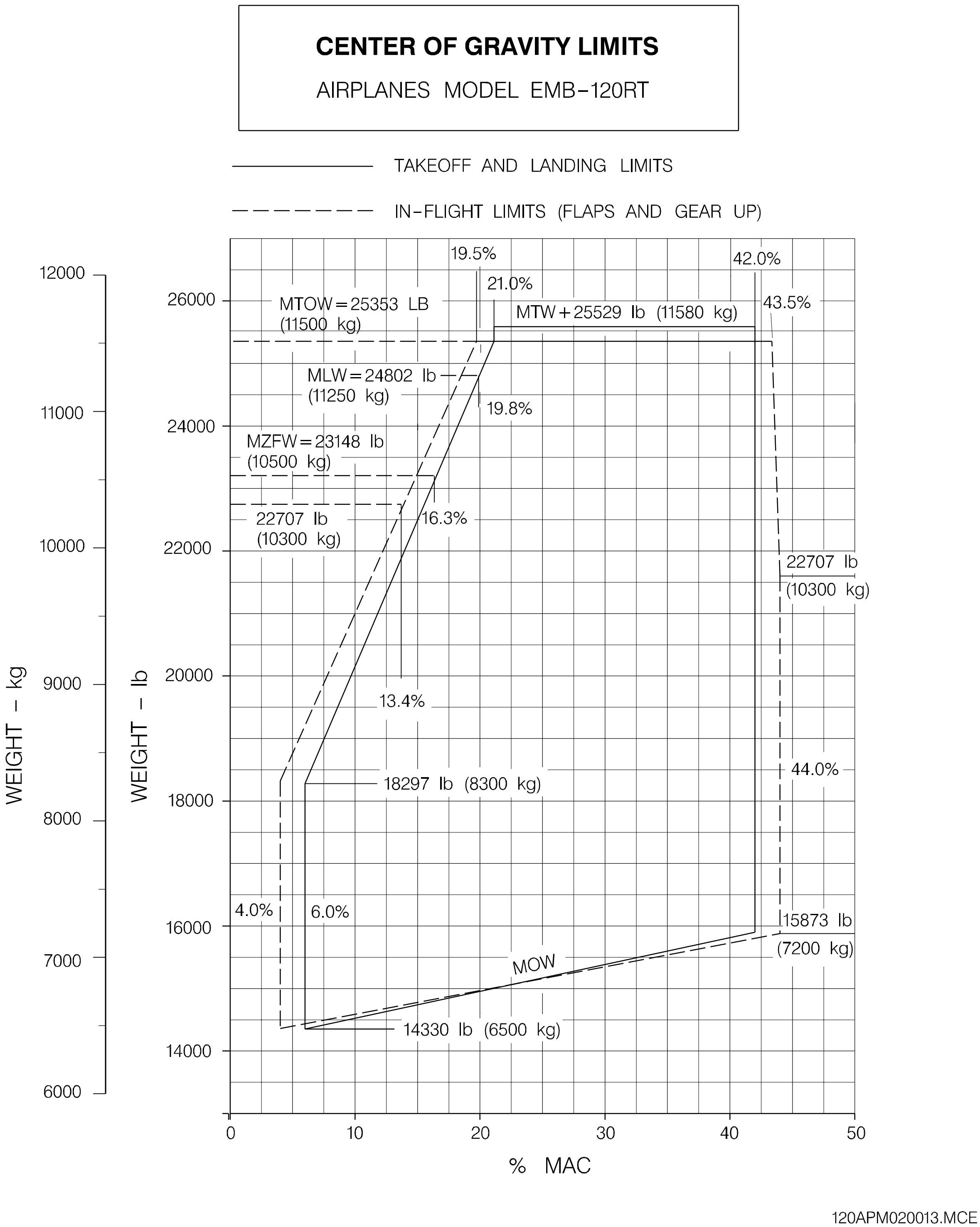
Main Door Operation (Outside Cabin)

Figure 2-10



Cargo Door Operation

Figure 2-11

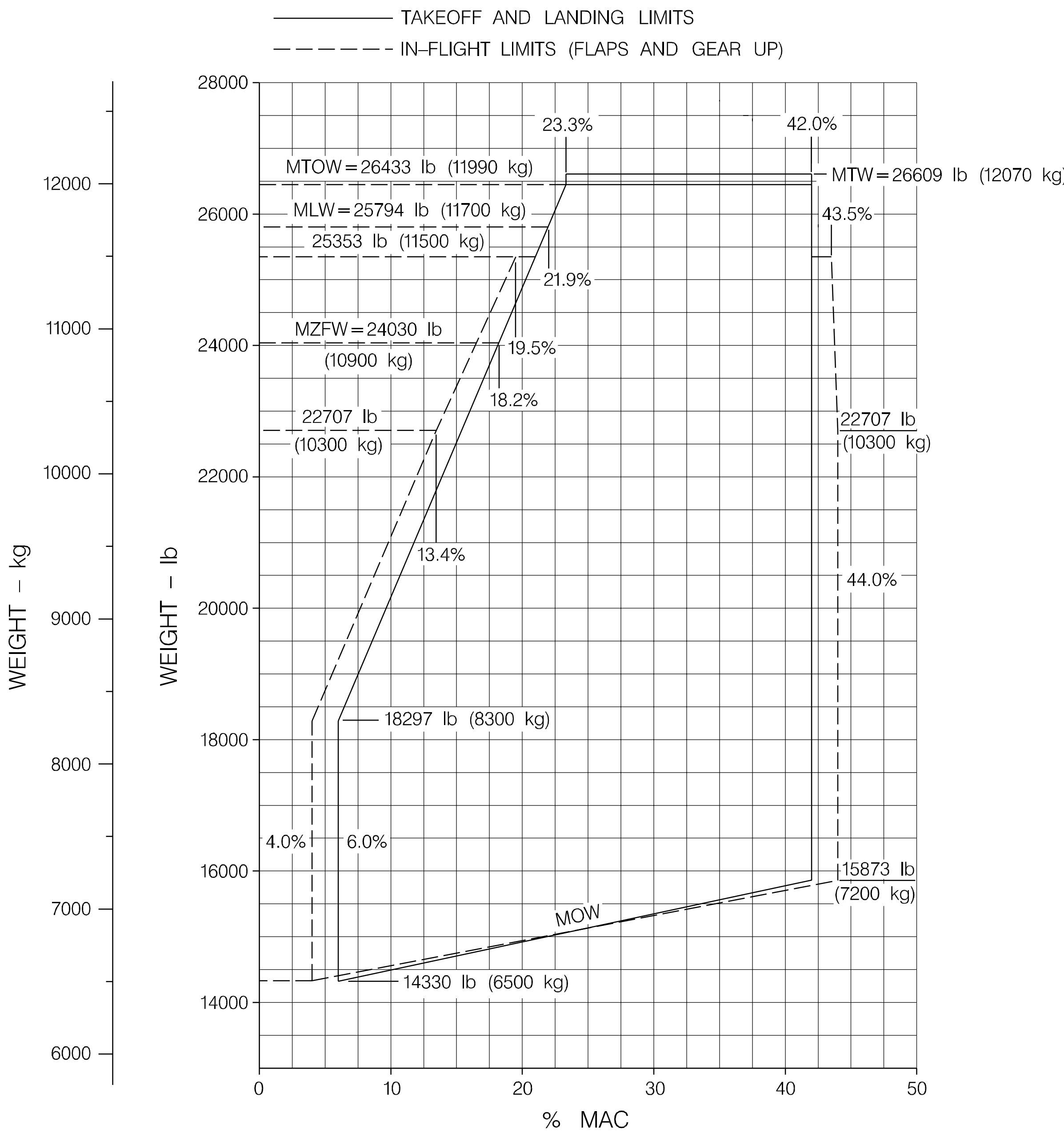


Weight x C.G. Envelope

Figure 2-12 (Sheet 1)

CENTER OF GRAVITY LIMITS

AIRPLANES MODEL EMB–120ER



Weight x C.G. Envelope

Figure 2-12 (Sheet 2)

SECTION III

AIRPLANE PERFORMANCE

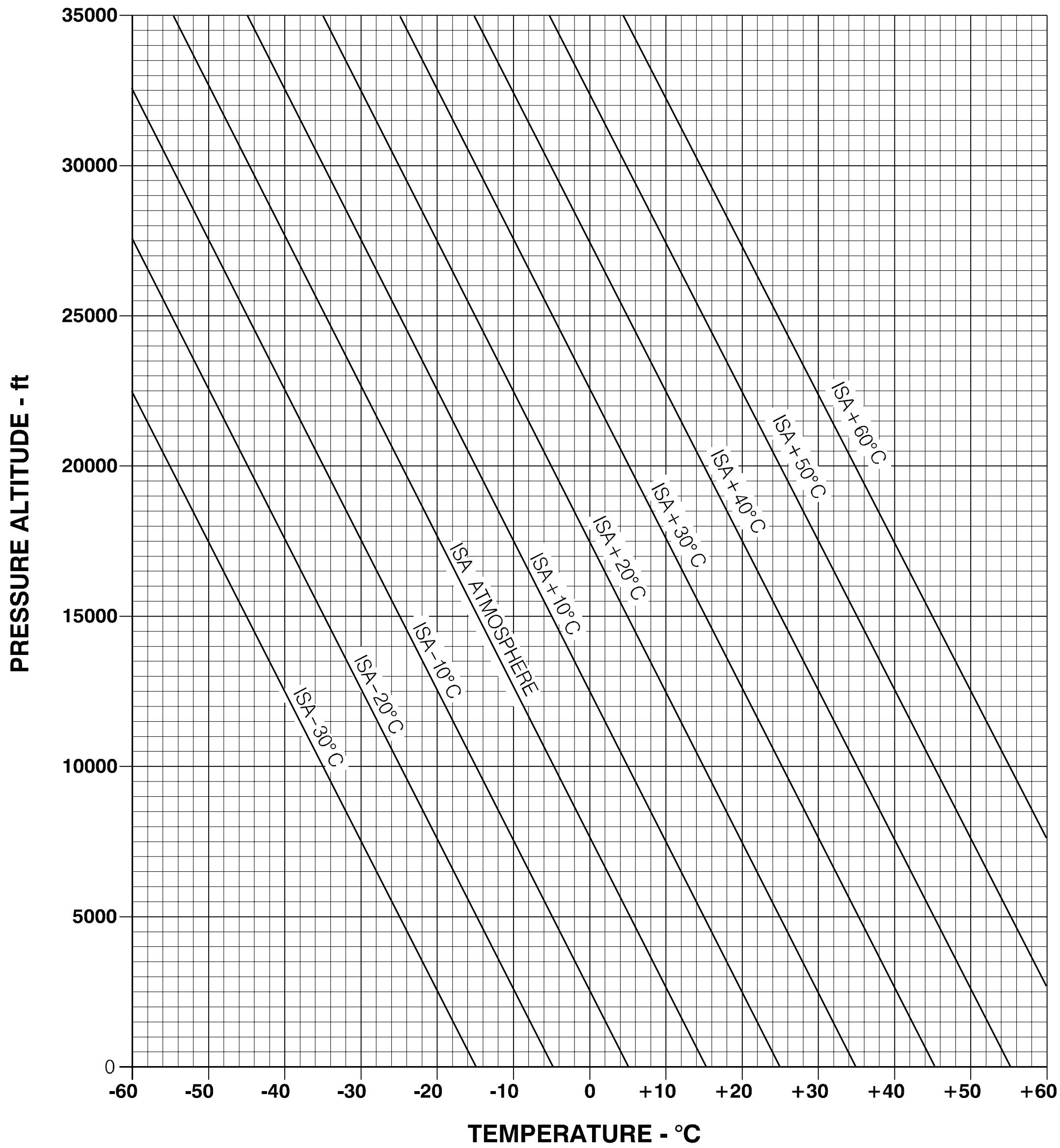
3.1. GENERAL INFORMATION

This section contains conversion tables and charts with information on payload, range, fuel limits, and take-off and landing runway length requirements for different weights and pressure altitudes for the standard configuration of EMB-120 BRASILIA equipped with PW 118, PW 118A, or PW 118B engines.

PRESSURE ALTITUDE		STANDARD DAY TEMP	
FEET	METERS	°F	°C
0	0	59	15
2000	610	51.9	11.6
4000	1220	44.7	7.1
6000	1830	37.6	3.1
8000	2440	30.5	-0.85

Standard Day Temperatures for Pressure Altitudes
Figure 3-1

ISA CONVERSION



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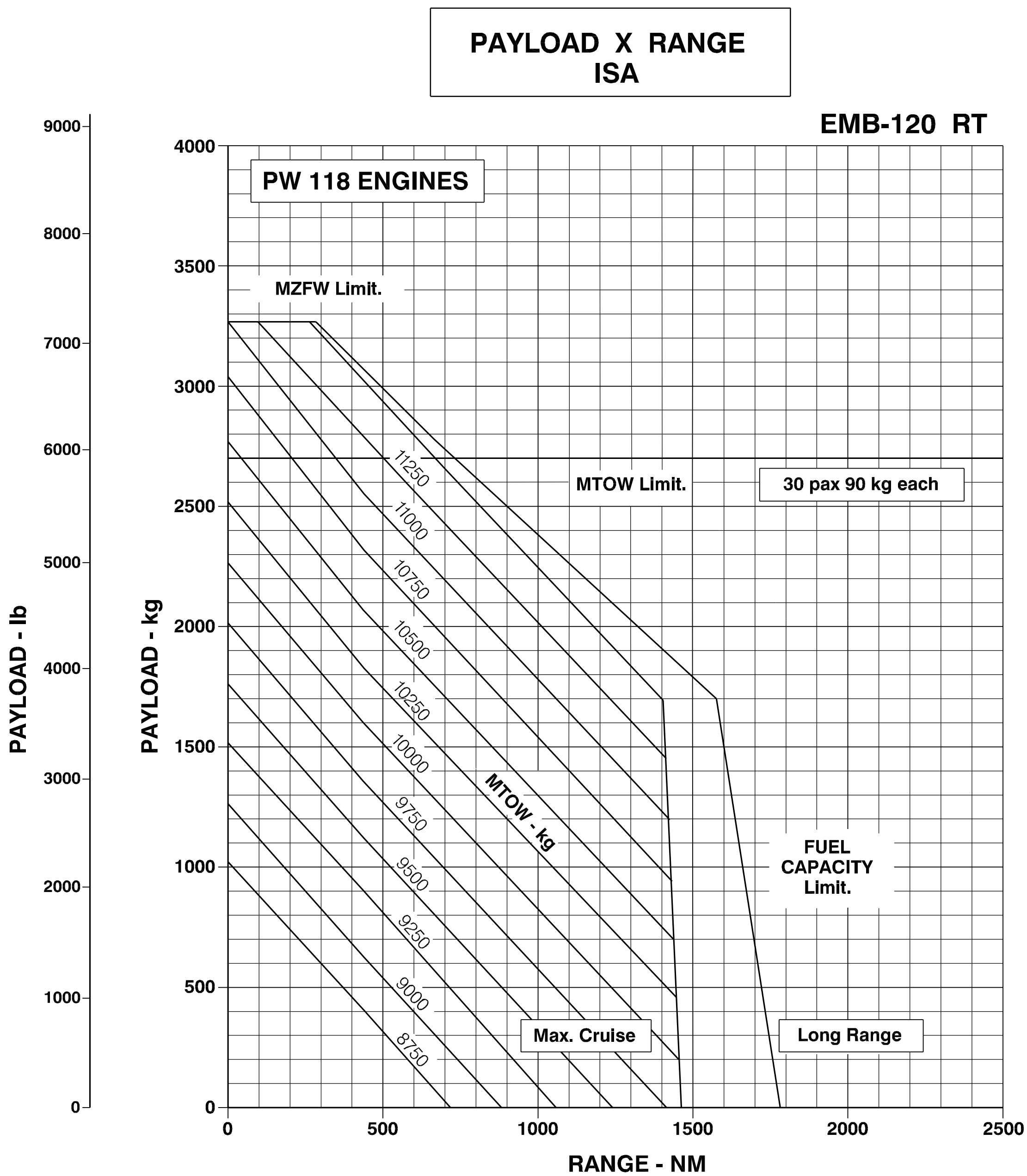
Isa Conversion Chart

Figure 3-2

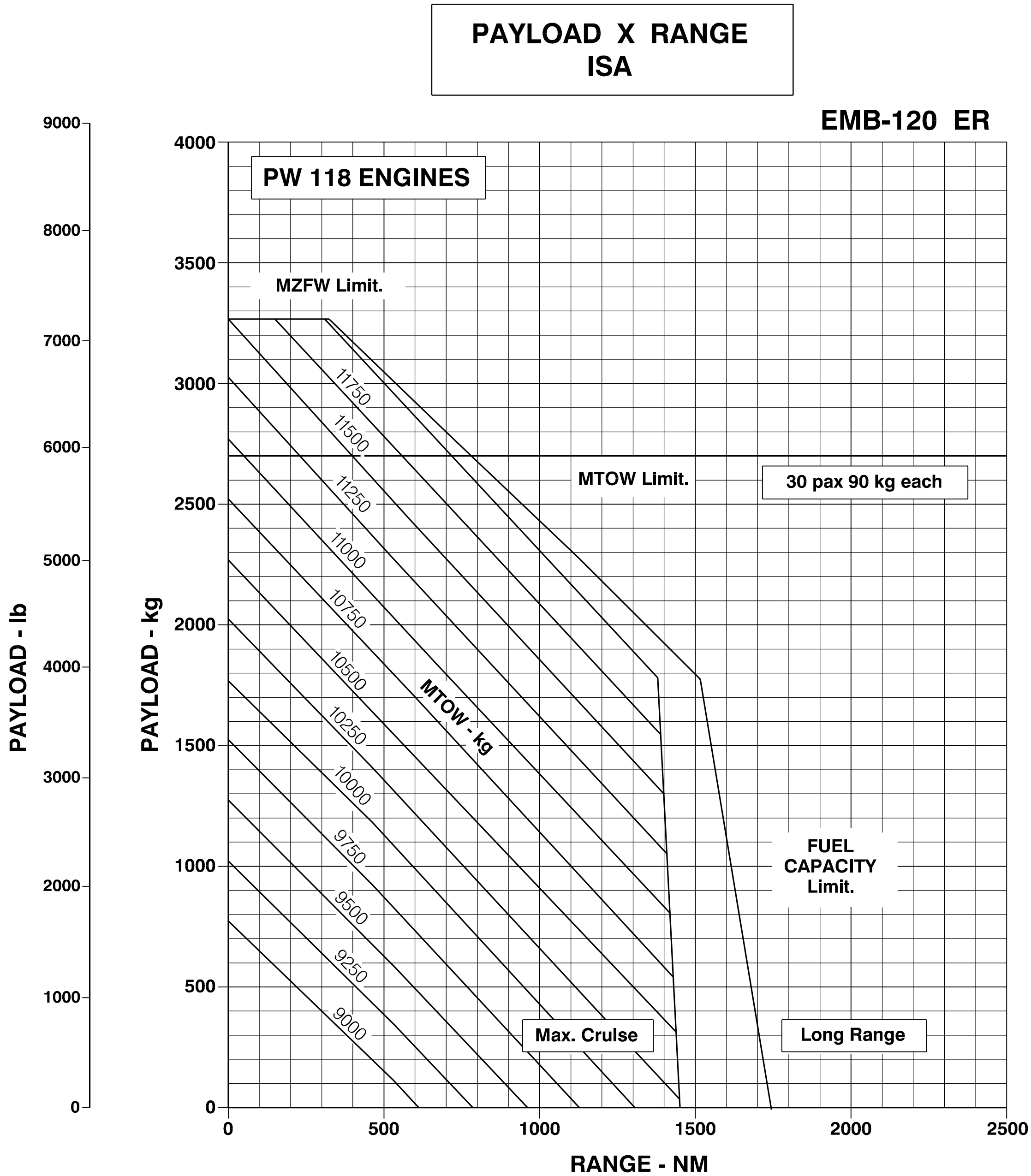


NOTES: FLIGHT LEVEL.................................. 250
RESERVE.. 100 NM ALTERNATE + 45 min HOLDING
MAX. TAKEOFF WEIGHT.................. 11500 kg
MAX. ZERO FUEL WEIGHT............ 10500 kg
BASIC OPERATING WEIGHT.......... 7230 kg (standard configuration)
MAX USABLE FUEL......................... 2600 kg

120APM030002.MCE

Payload x Range - (PW 118 Engines)

Figure 3-3 (Sheet 1)



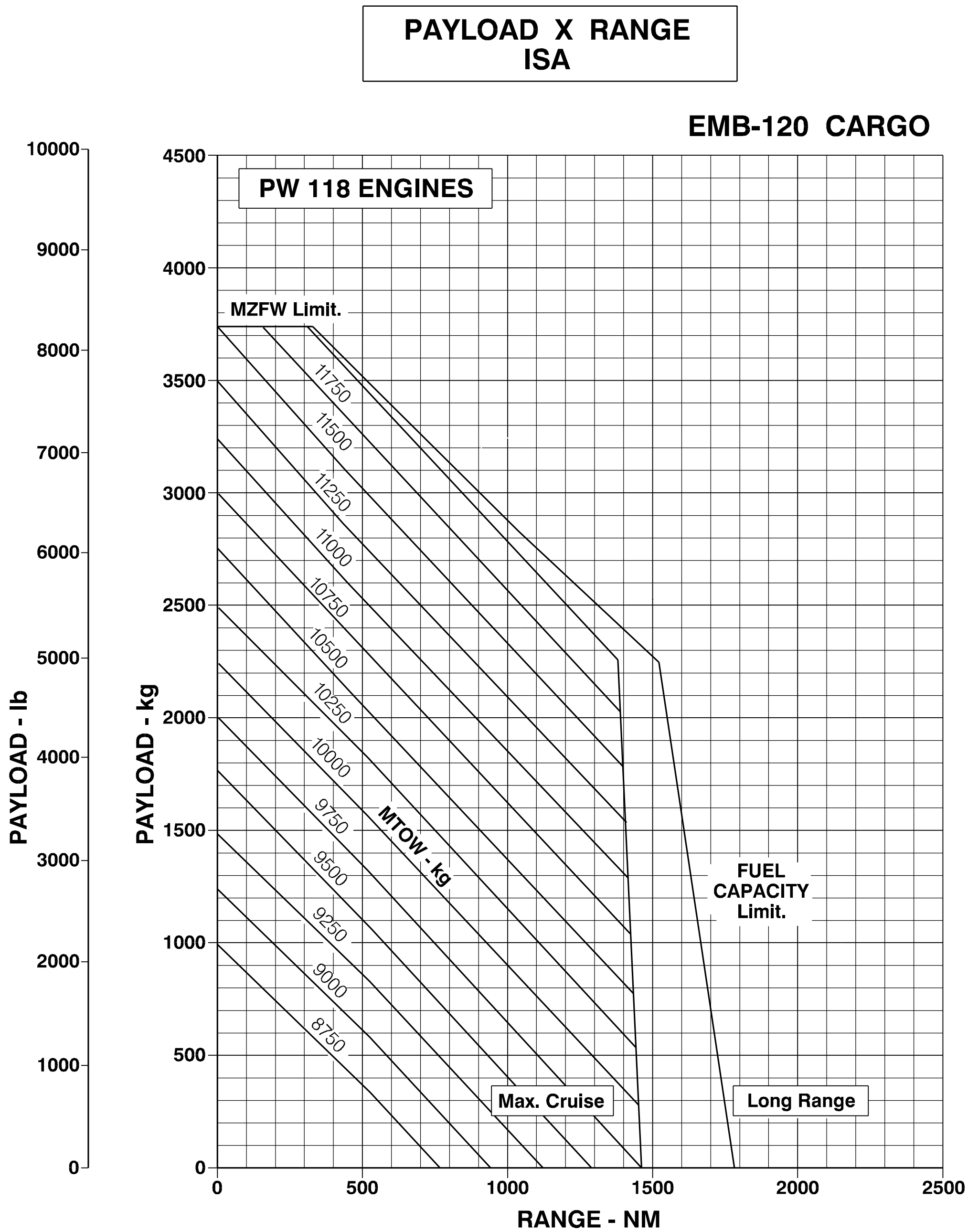
NOTES:

FLIGHT LEVEL	250	
RESERVE	100	NM ALTERNATE + 45 min HOLDING
MAX. TAKEOFF WEIGHT	11990	kg
MAX. ZERO FUEL WEIGHT	10900	kg
BASIC OPERATING WEIGHT	7628	kg (standard configuration)
MAX. USABLE FUEL	2600	kg

120APM030003.MCE

Payload x Range - (PW 118 Engines)

Figure 3-3 (Sheet 2)



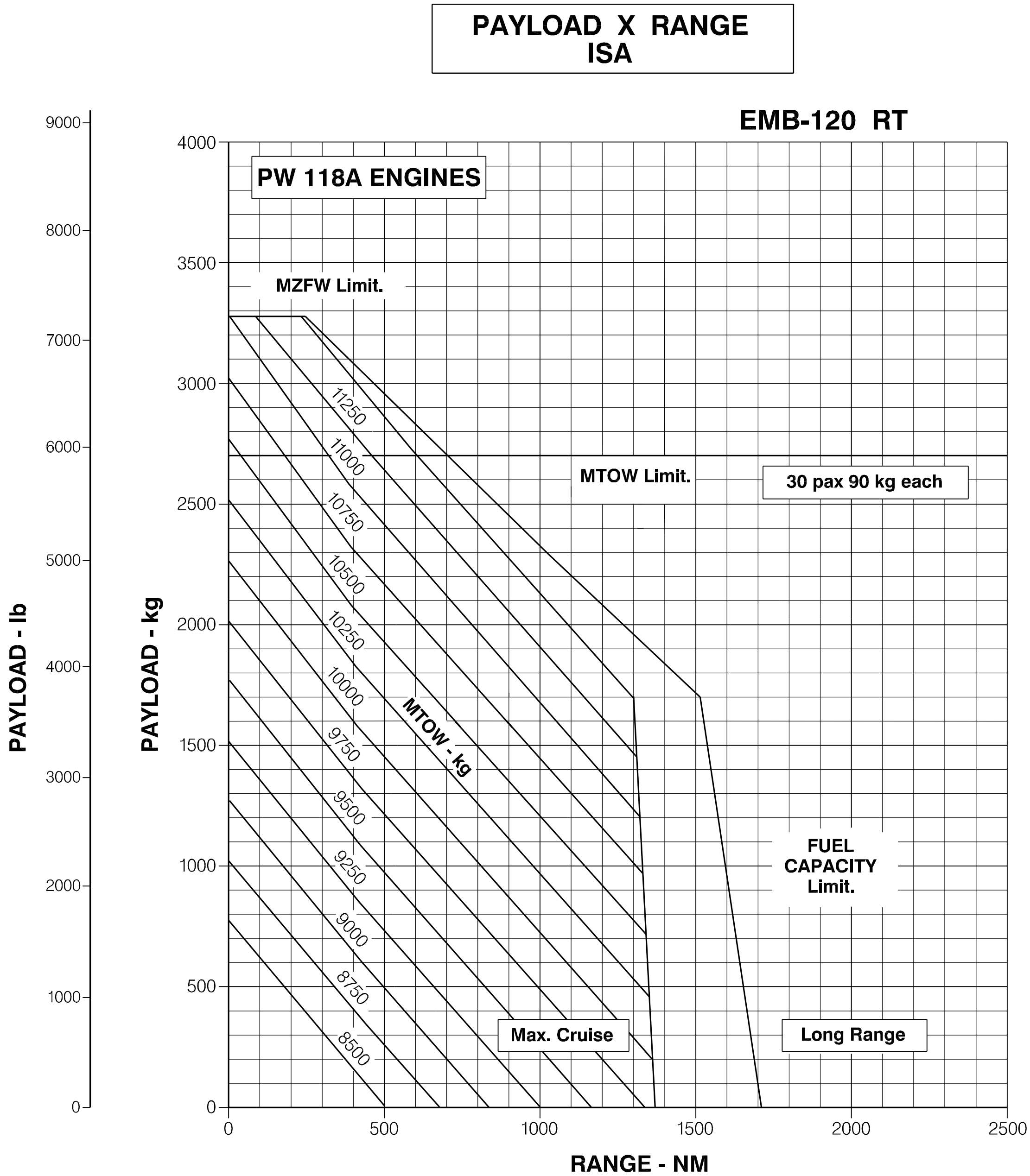
NOTES:

FLIGHT LEVEL..................................	250
RESERVE..	100 NM ALTERNATE + 45 min HOLDING
MAX. TAKEOFF WEIGHT..................	11990 kg
MAX. ZERO FUEL WEIGHT.............	10900 kg
BASIC OPERATING WEIGHT..........	7160 kg (standard configuration)
MAX. USABLE FUEL.........................	2600 kg

120APM030004.MCE

Payload x Range - (PW 118 Engines)

Figure 3-3 (Sheet 3)

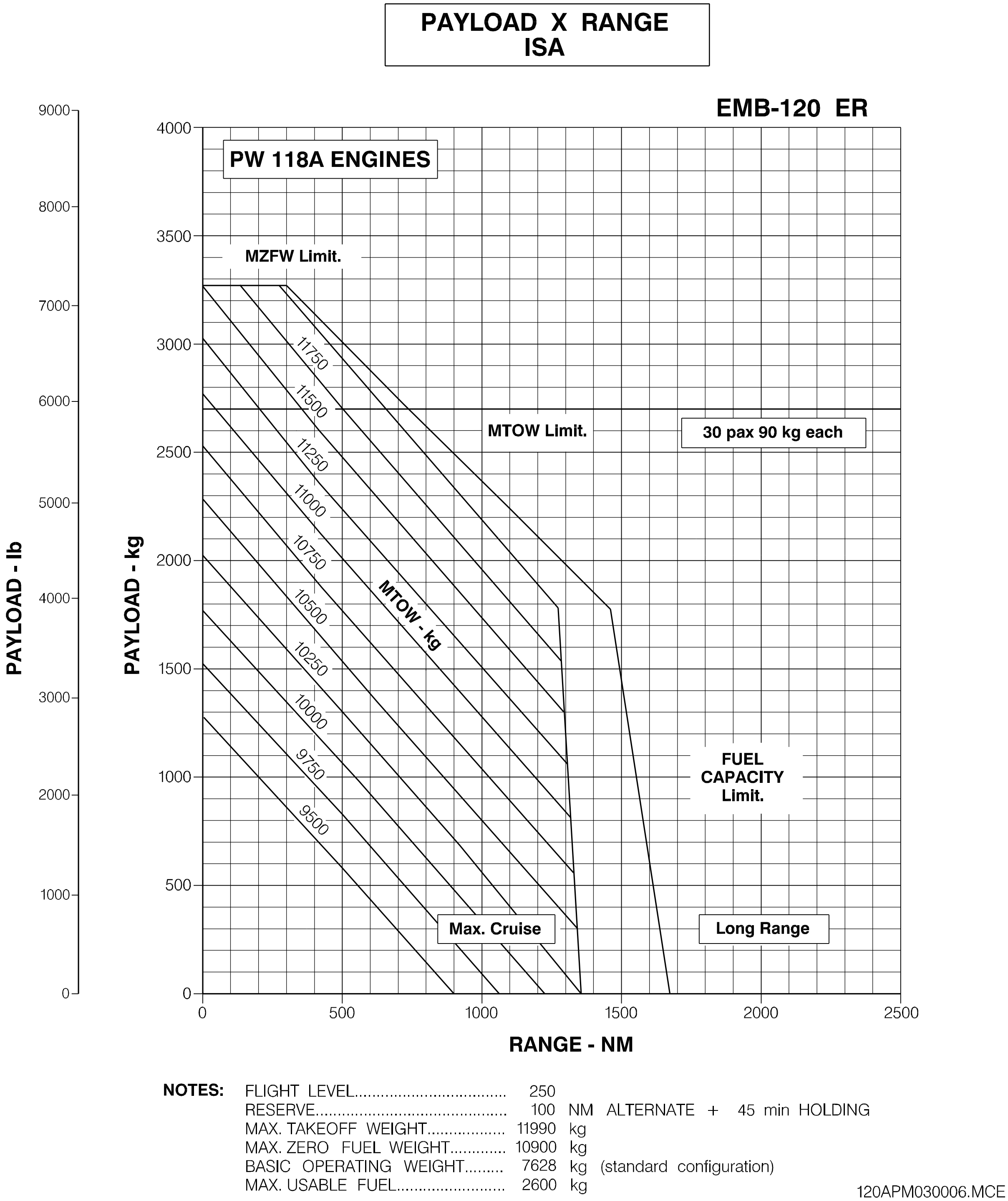


NOTES:
FLIGHT LEVEL.................................. 250
RESERVE... 100 NM ALTERNATE + 45 min HOLDING
MAX. TAKEOFF WEIGHT.................. 11500 kg
MAX. ZERO FUEL WEIGHT............. 10500 kg
BASIC OPERATING WEIGHT.......... 7230 kg (standard configuration)
MAX. USABLE FUEL......................... 2600 kg

120APM030005.MCE

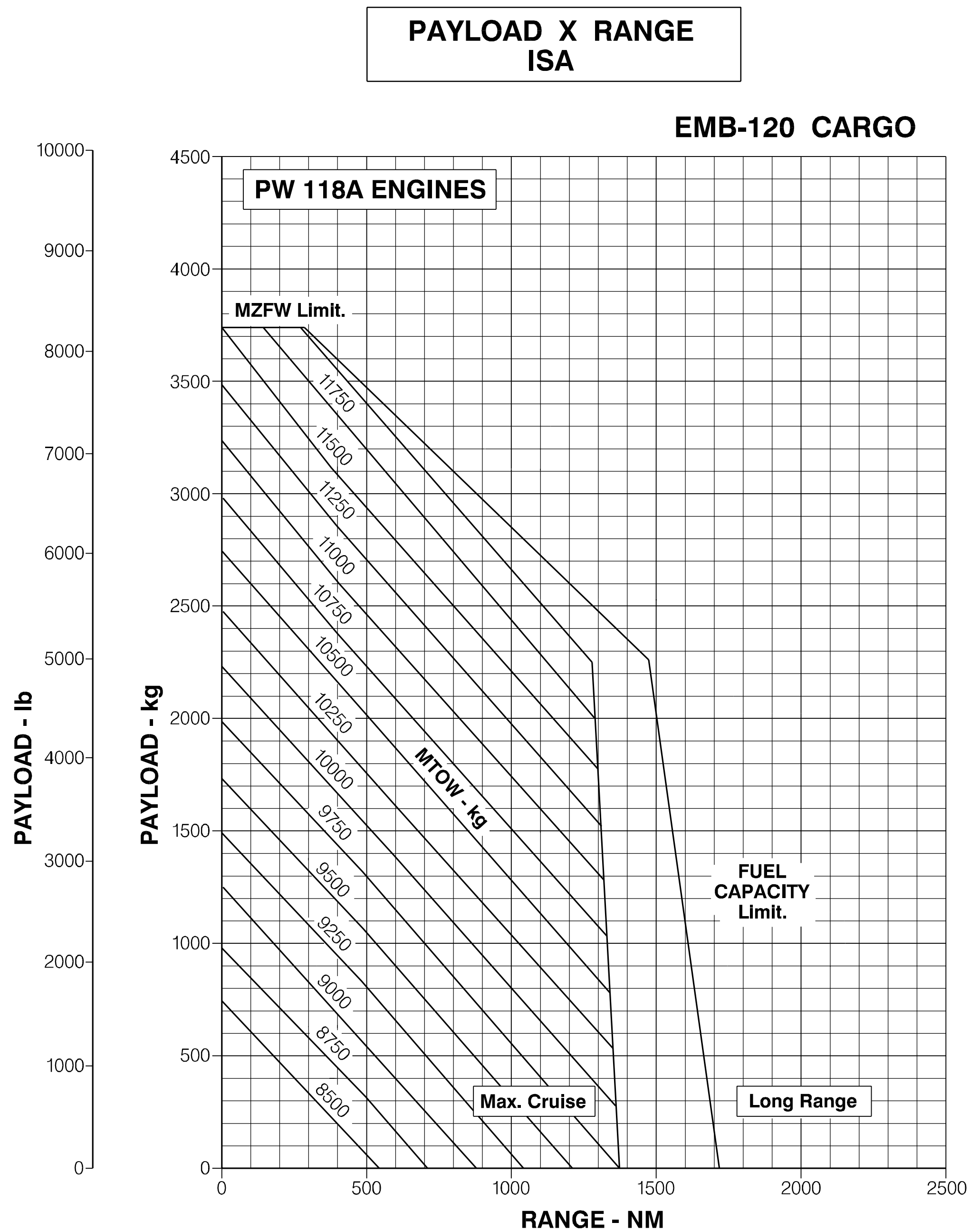
Payload x Range - (PW 118A Engines)

Figure 3-3 (Sheet 4)



Payload x Range - (PW 118A Engines)

Figure 3-3 (Sheet 5)



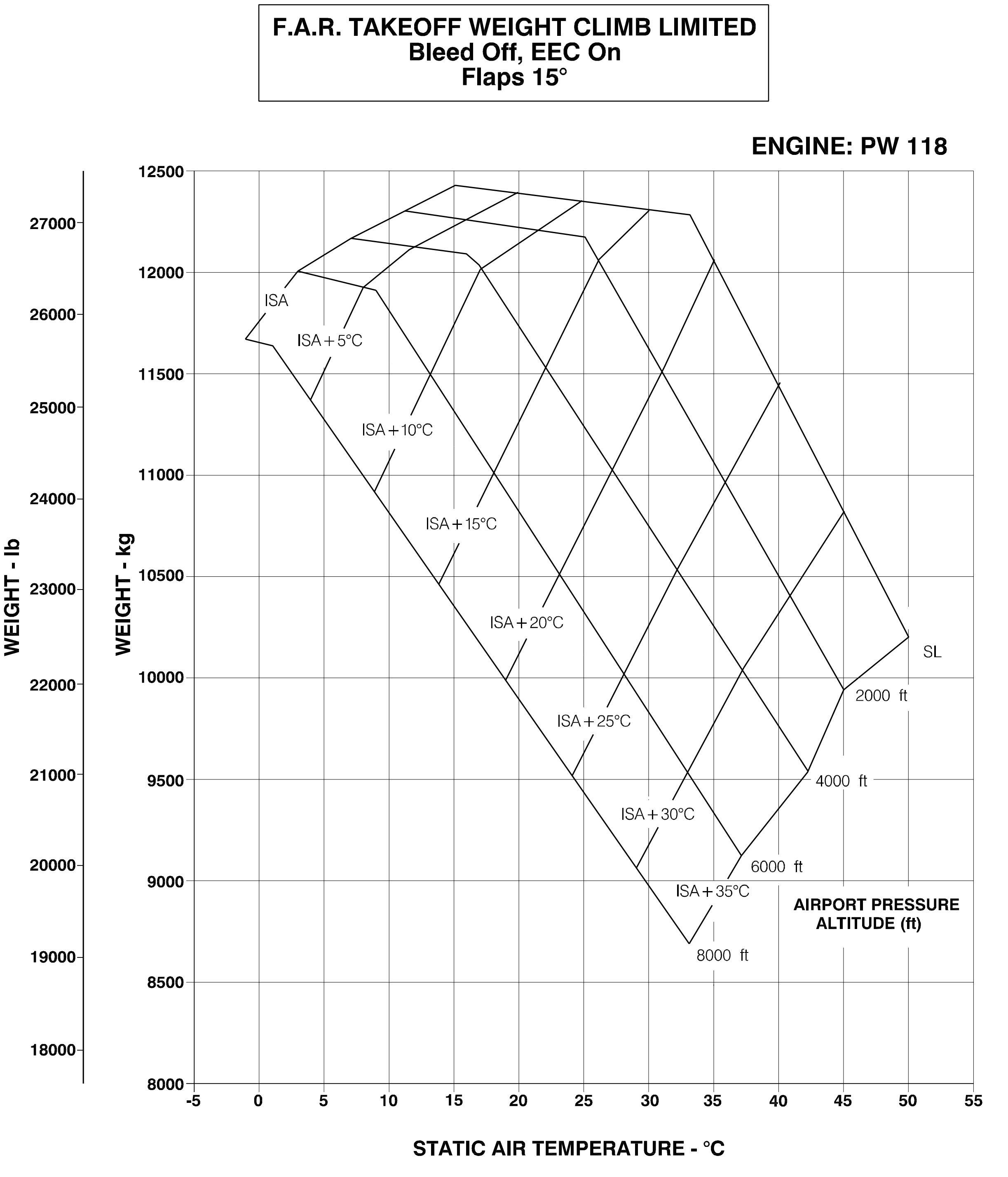
NOTES:

FLIGHT LEVEL..................................	250	
RESERVE...	100	NM ALTERNATE + 45 min HOLDING
MAX. TAKEOFF WEIGHT..................	11990	kg
MAX. ZERO FUEL WEIGHT.............	10900	kg
BASIC OPERATING WEIGHT..........	7160	kg (standard configuration)
MAX. USABLE FUEL..........................	2600	kg

120APM030007.MCE

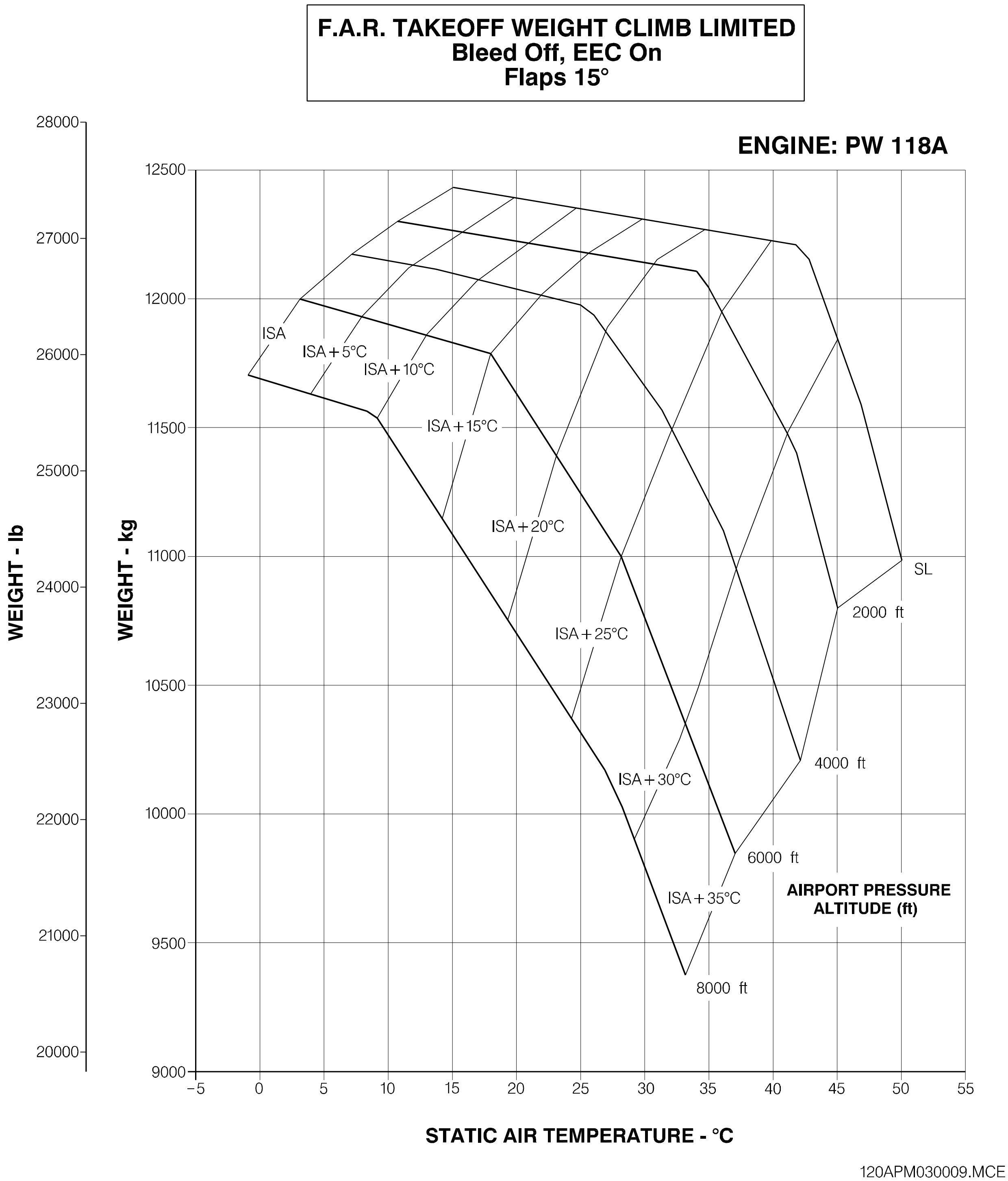
Payload x Range - (PW 118A Engines)

Figure 3-3 (Sheet 6)



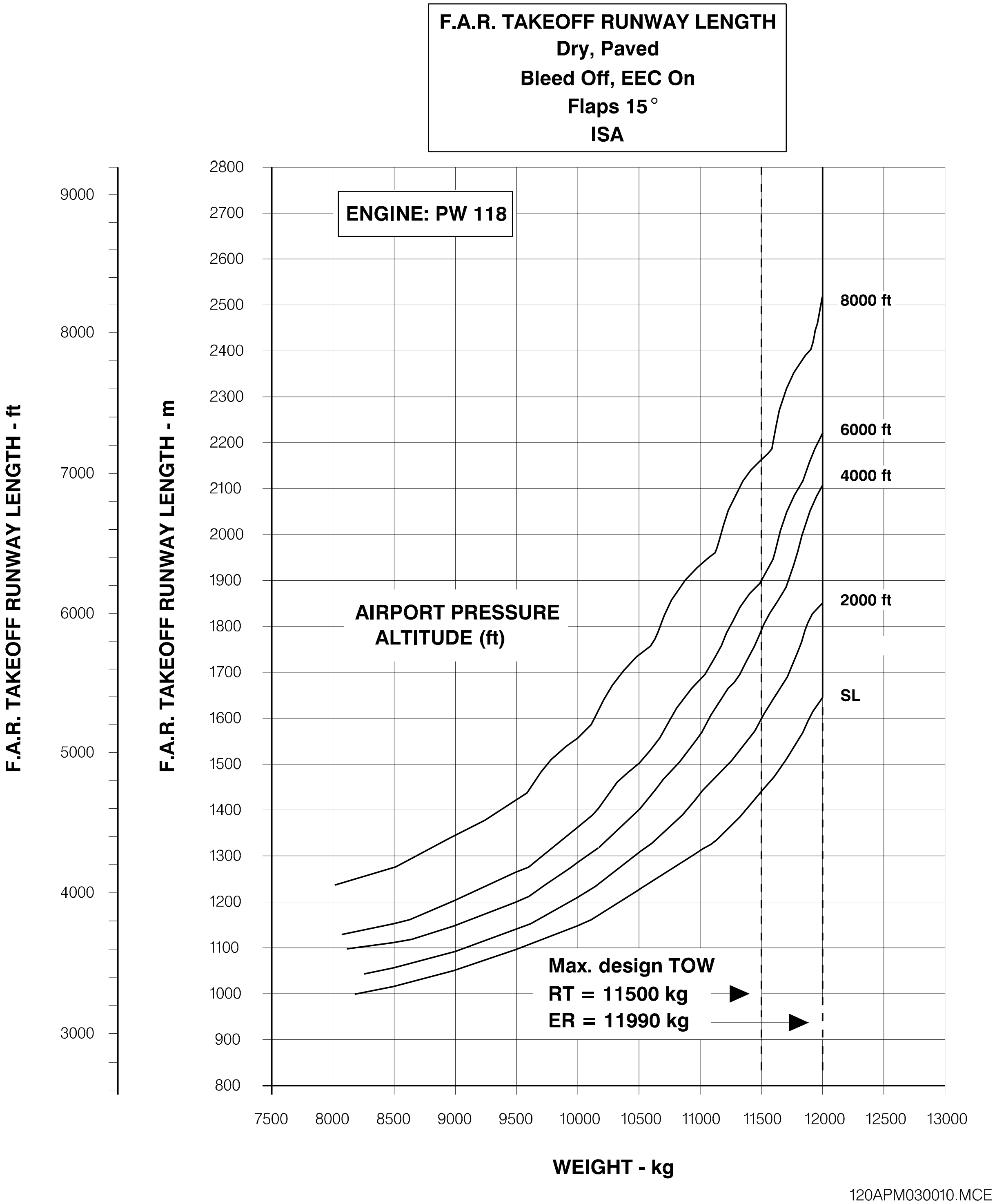
FAR Takeoff Weight Requirements - (PW 118 Engines)

Figure 3-4 (Sheet 1)

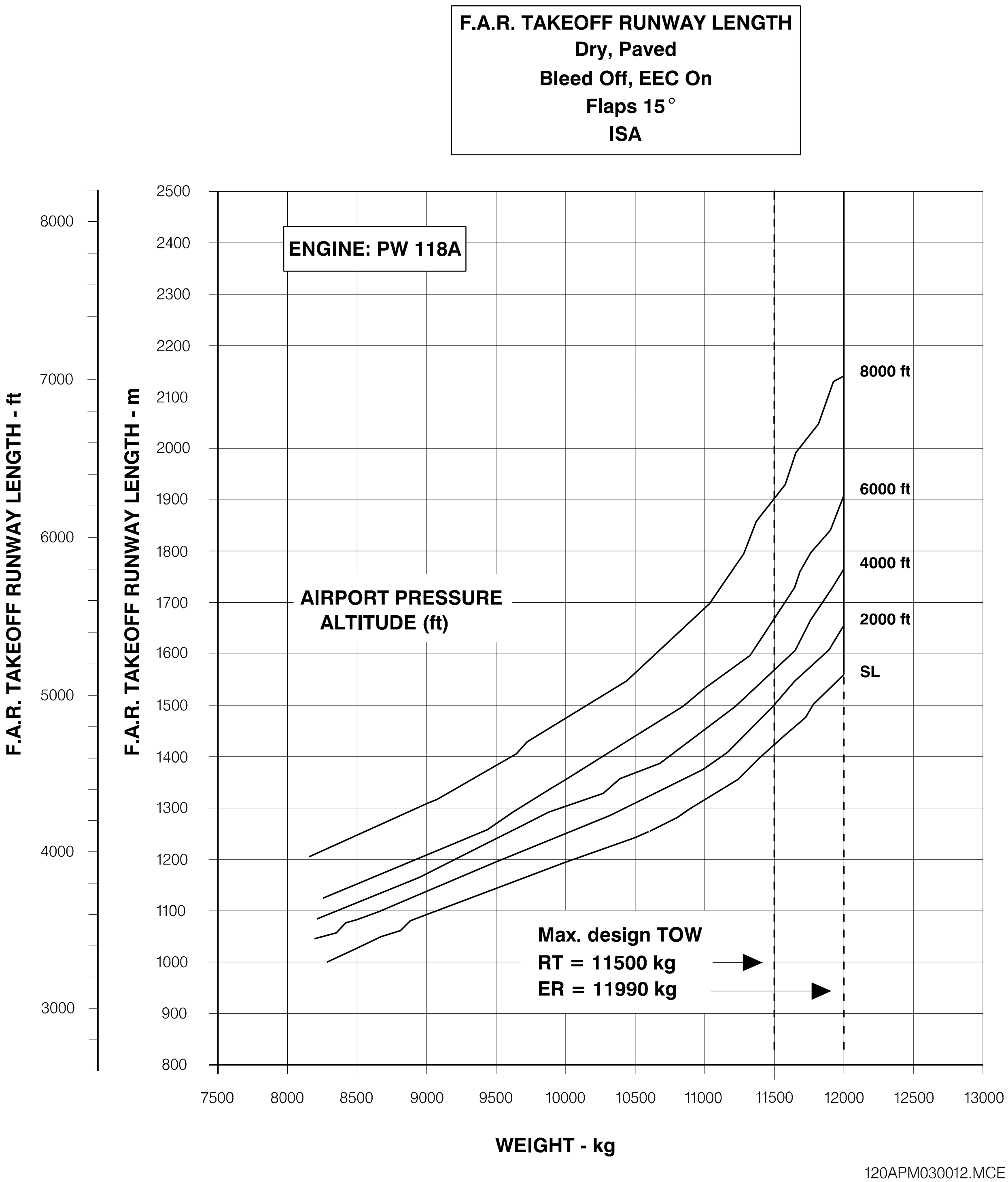


FAR Takeoff Weight Requirements - (PW 118A Engines)

Figure 3-4 (Sheet 2)

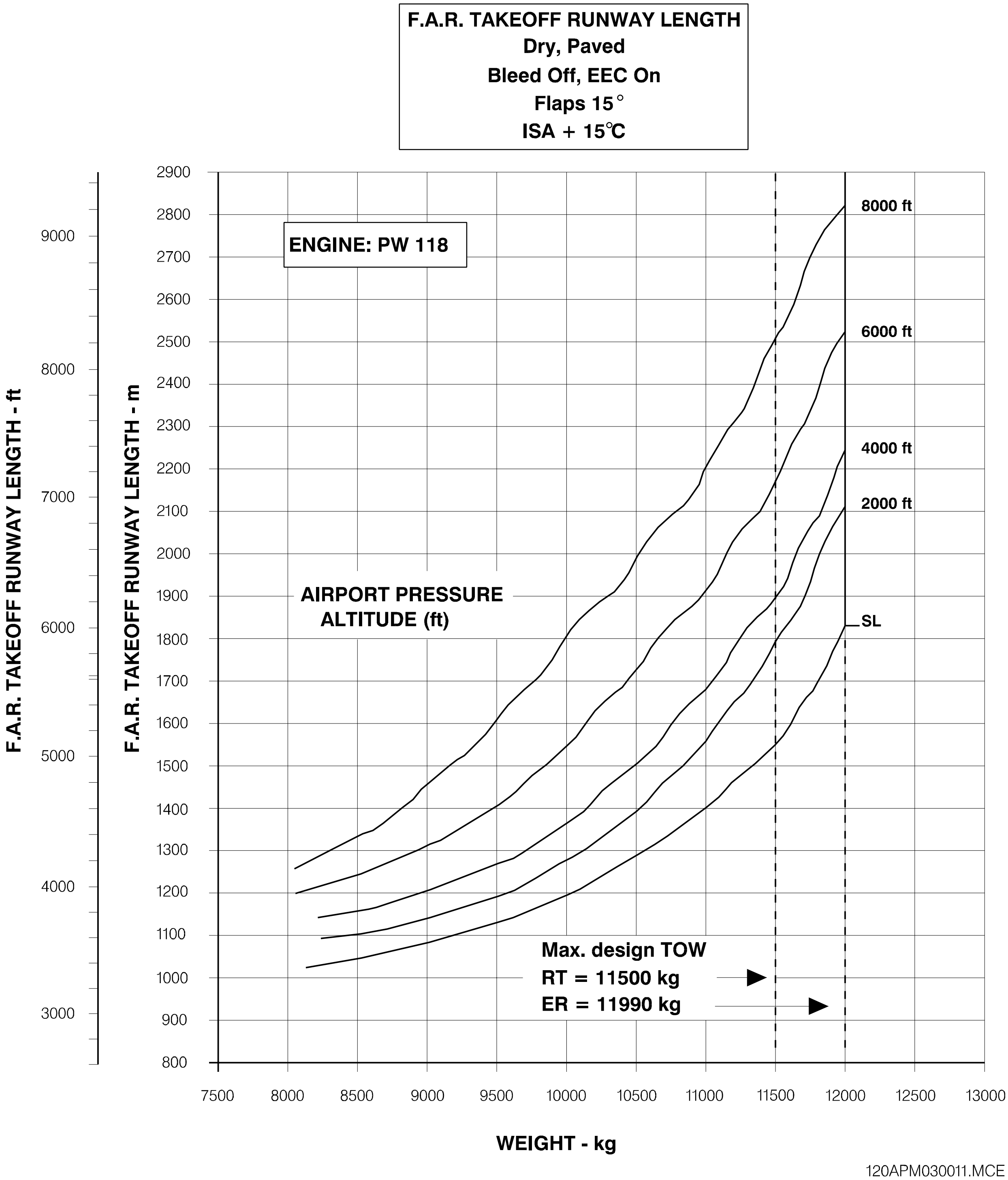


FAR Takeoff Runway Length Requirements - ISA Conditions
Figure 3-5 (Sheet 1)



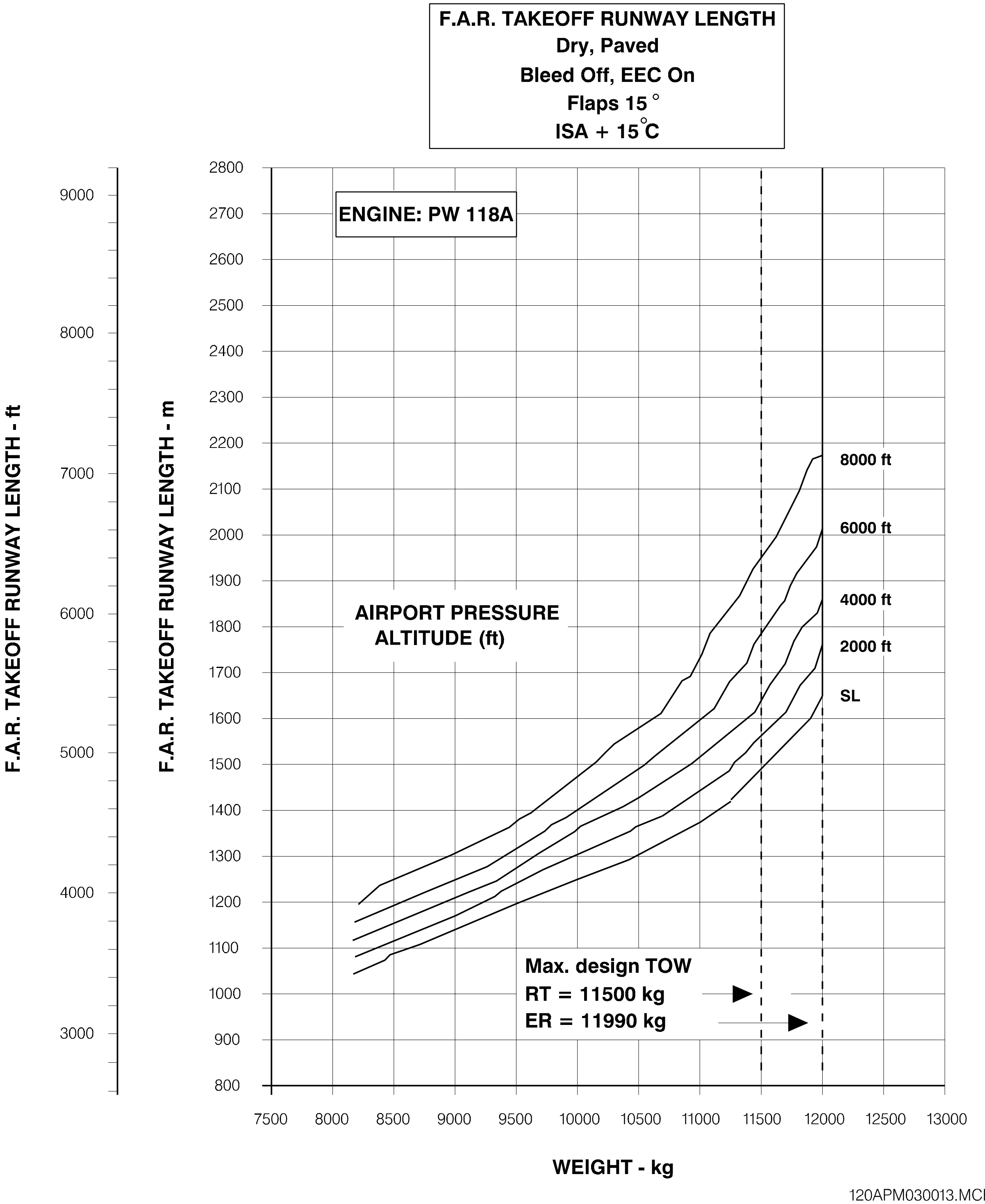
FAR Takeoff Runway Length Requirements - ISA Conditions

Figure 3-5 (Sheet 2)

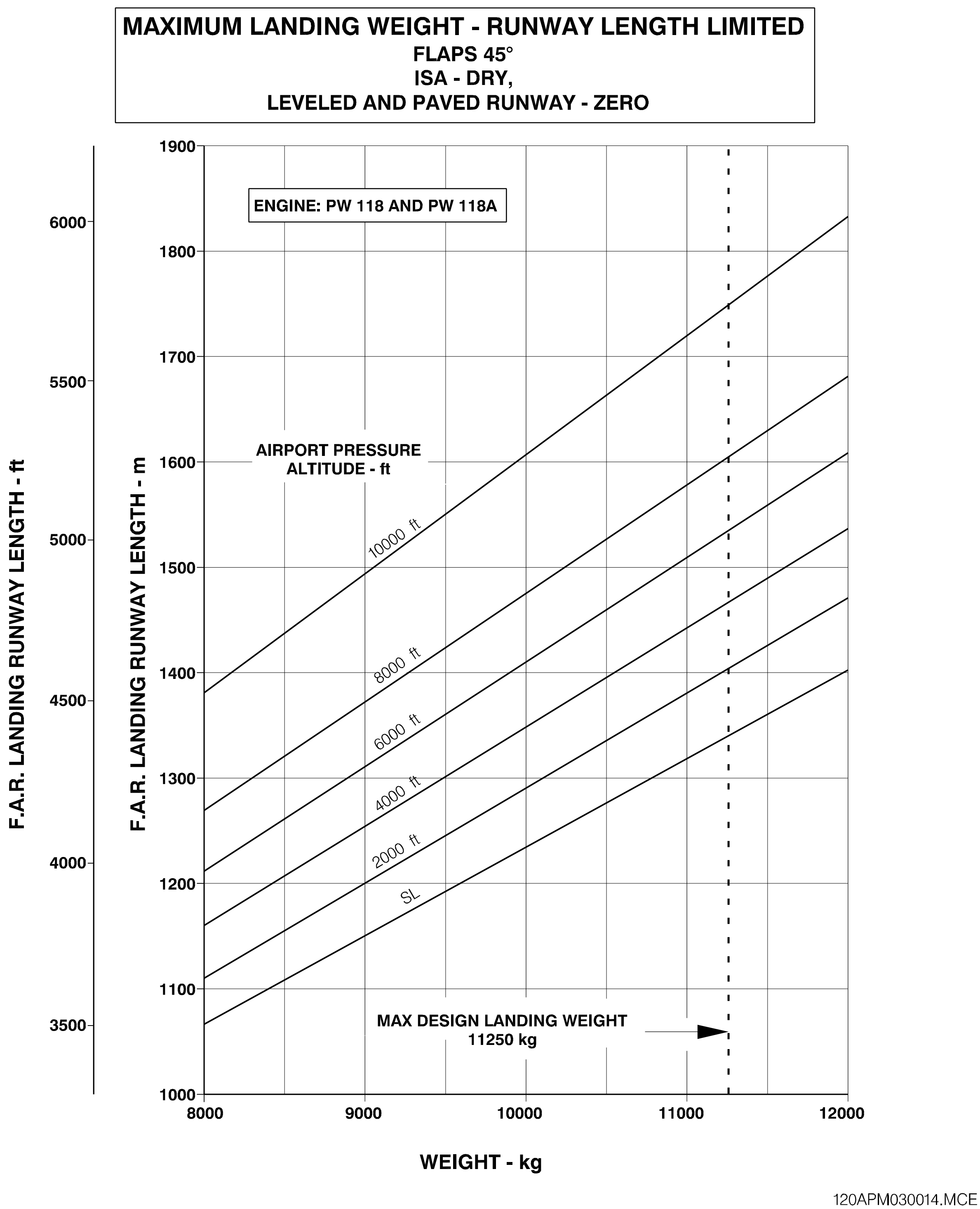


FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions

Figure 3-6 (Sheet 1)



FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions
Figure 3-6 (Sheet 2)



FAR Landing Runway Length Requirements - Flaps 45º

Figure 3-7

SECTION IV

GROUND MANEUVERING

4.1. GENERAL INFORMATION

This section provides airplane turning capability and maneuvering characteristics.

For ease of presentation, these data have been determined from the theoretical limits imposed by the geometry of the aircraft.

As such, they reflect the turning capability of the aircraft in favorable operating circumstances. These data should be used only as guidelines for the method of determination of such parameters and for the maneuvering characteristics of this airplane.

In the ground operating mode, varying airline practices may demand that more conservative turning procedures be adopted to avoid excessive tire wear and reduce possible maintenance problems.

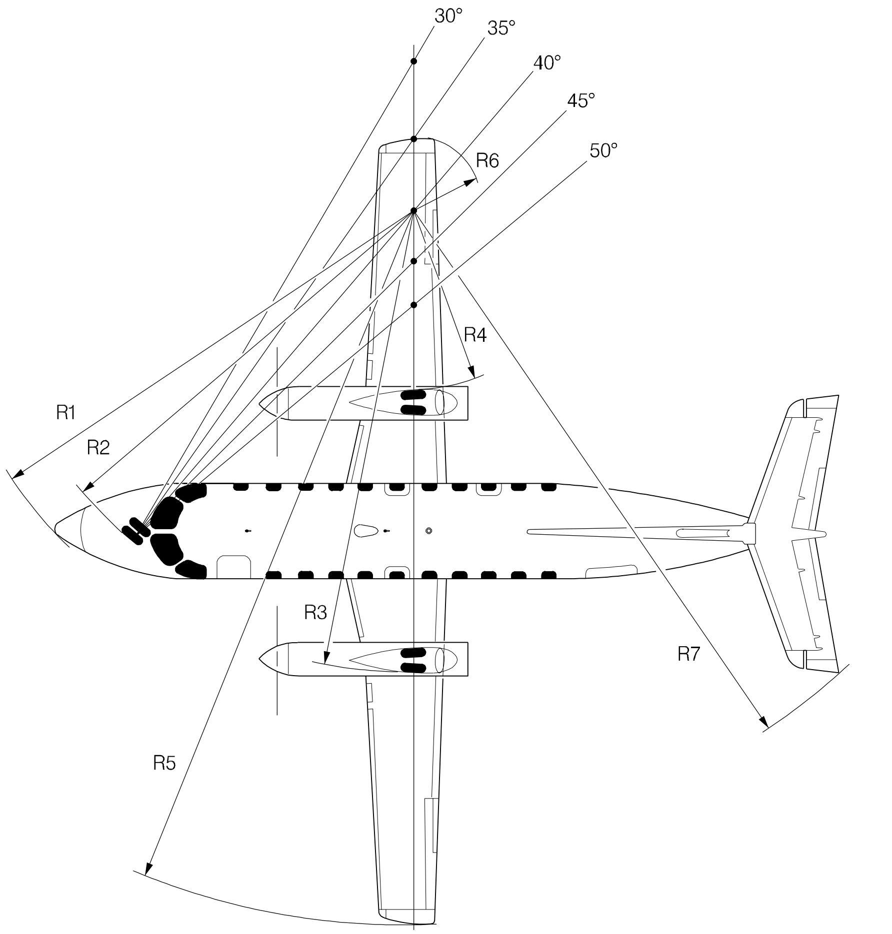
Airline operating techniques will vary, as far as the performance is concerned, over a wide range of operating circumstances throughout the world.

Variations from standard aircraft operating patterns may be necessary to satisfy physical constraints within the maneuvering area, such as adverse grades, limited area or high risk of prop blast and exhaust smoke damage. For these reasons, ground maneuvering requirements should be coordinated with the using airlines prior to layout planning.

This section provides the following information:

- Turning radii for various nose-gear steering angles.
- Data on minimum width pavement for 180º turn.
- Pilot's visibility from the cockpit and the limits of ambinocular vision through the windows. Ambinocular vision is defined as the total field of vision encompassed by both eyes at the same time.
- Performance of the EMB-120 on runway-to-taxiway, and taxiway-to-taxiway turn paths.
- Runway holding bay configuration (illustration).

4.2. TURNING RADII - NO-SLIP ANGLE

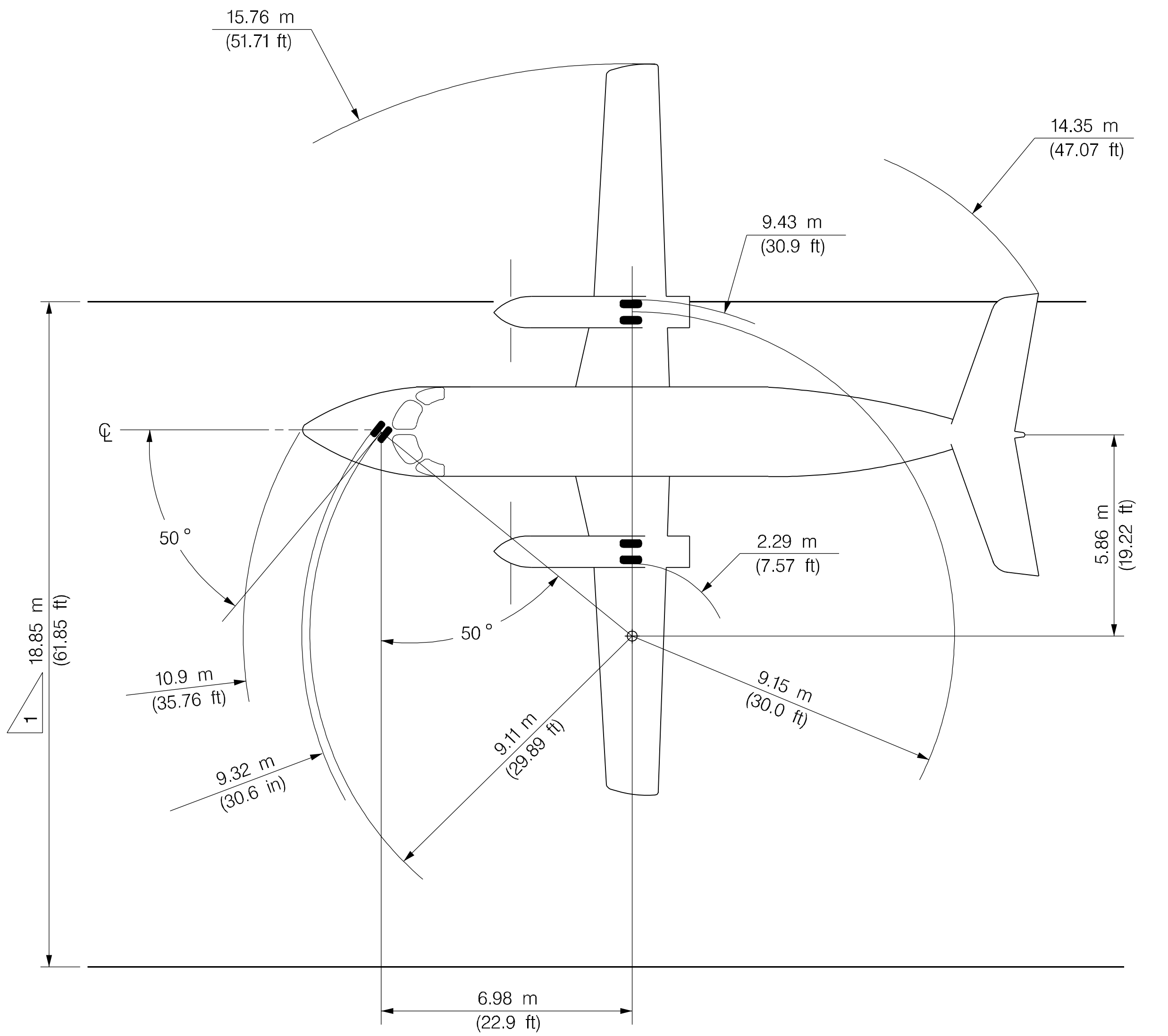


STEERING ANGLE (IN DE-GREES)	NOSE R1		NOSE GEAR R2		OUTBOARD GEAR R3		INBOARD GEAR R4		LH WING TIP R5		RH WING TIP R6		TAIL TIP R7	
	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft
30º	15.24	50.0	14.16	45.5	15.66	51.4	8.52	28.0	21.99	72.1	2.28	7.5	18.96	62.2
35º	13.59	44.6	12.37	40.6	13.54	44.4	6.39	21.0	19.87	65.2	0.63	2.1	17.27	56.7
40º	12.42	40.7	11.06	36.3	11.89	39.0	4.75	15.6	18.22	59.8	1.69	5.5	16.02	52.6
45º	11.55	37.9	10.08	33.1	10.55	34.6	3.41	11.2	16.88	55.4	2.98	9.8	15.06	49.4
50º	10.90	35.8	9.32	30.6	9.43	30.9	2.29	7.5	15.76	51.7	4.08	13.4	14.3	46.9

Turning Radii - No-Slip Angle

Figure 4-1

4.3. MINIMUM TURNING RADII



1 PAVEMENT WIDTH FOR 180° TURN

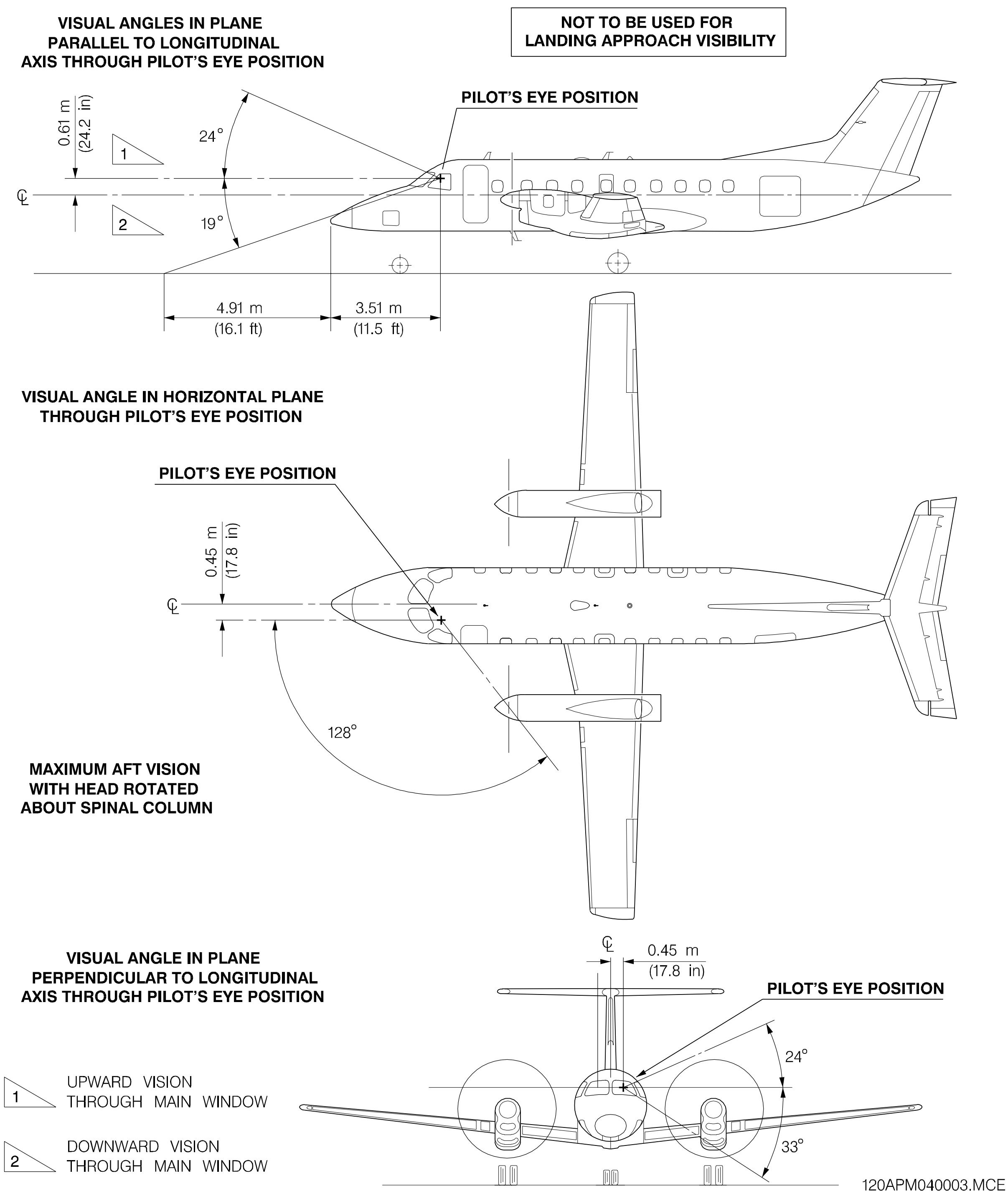
NOTE : THE CORRECT OPERATING DATA WILL BE HIGHER THAN THE VALUES SHOWN BECAUSE TIRE SLIPPAGE IS NOT INCLUDED IN THIS CALCULATION

120APM040002.MCE

Minimum Turning Radii - No-Slip Angle

Figure 4-2

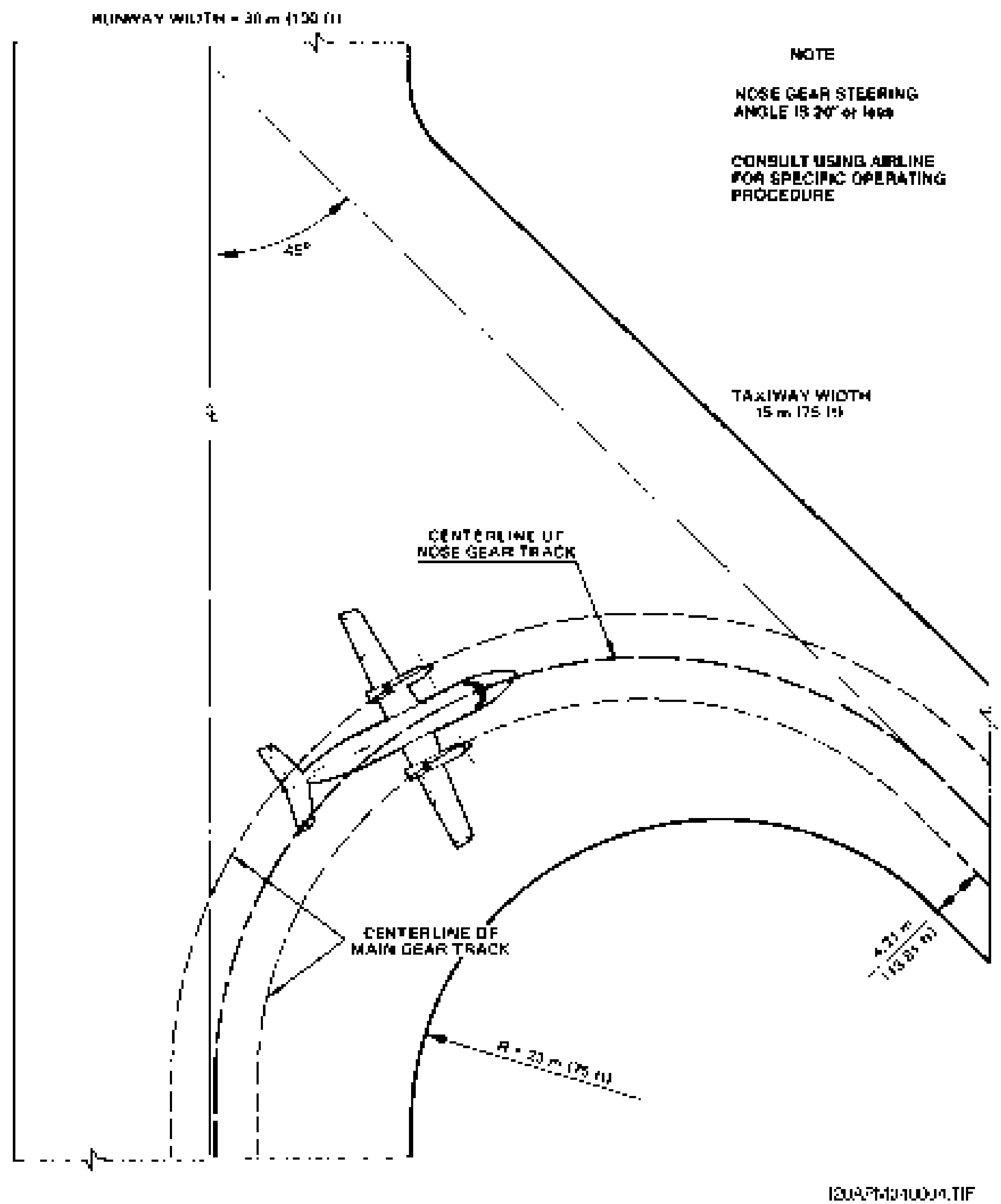
4.4. VISIBILITY FROM COCKPIT IN STATIC POSITION



Visibility From Cockpit in Static Position

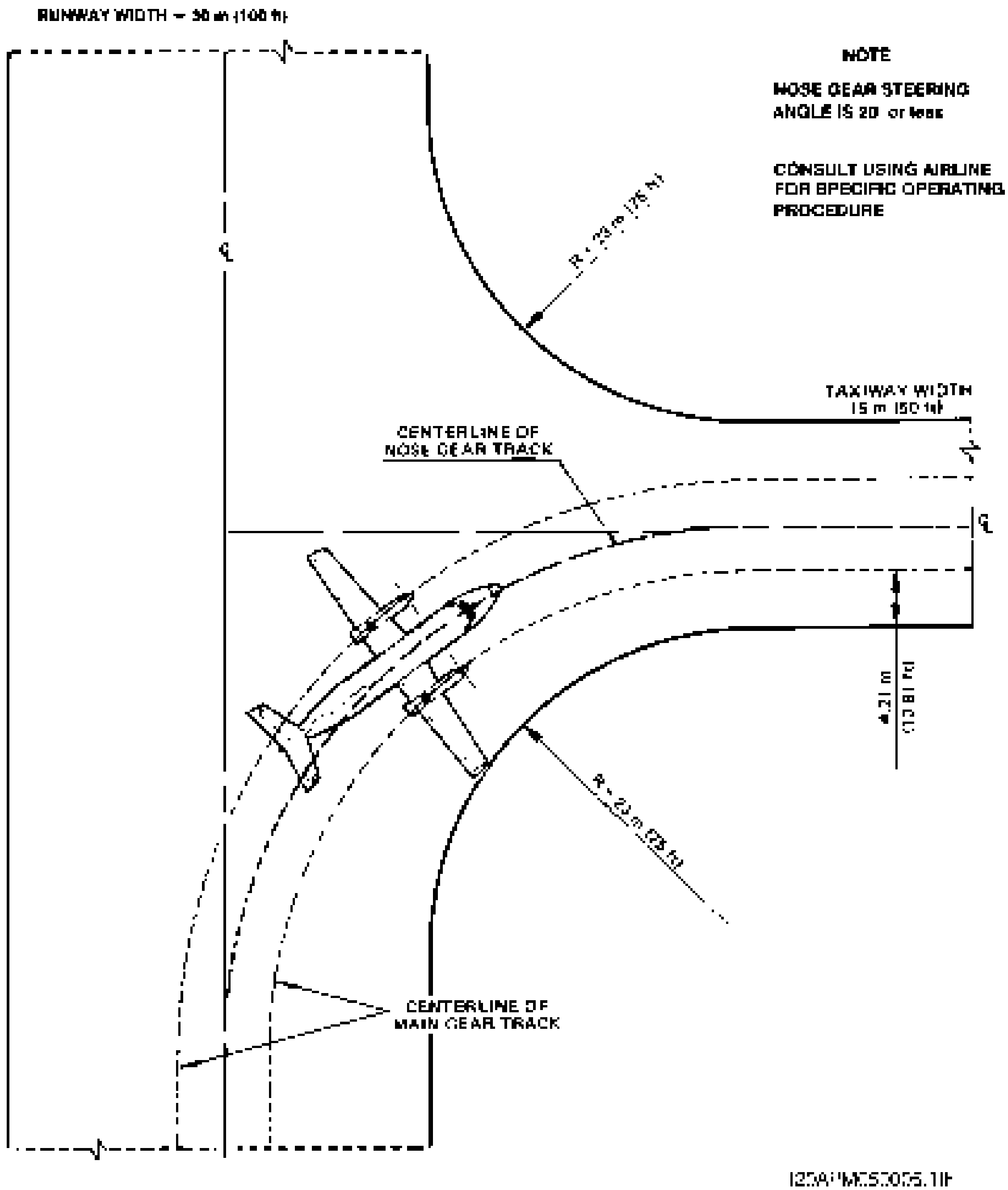
Figure 4-3

4.5. RUNWAY AND TAXIWAY TURN PATHS



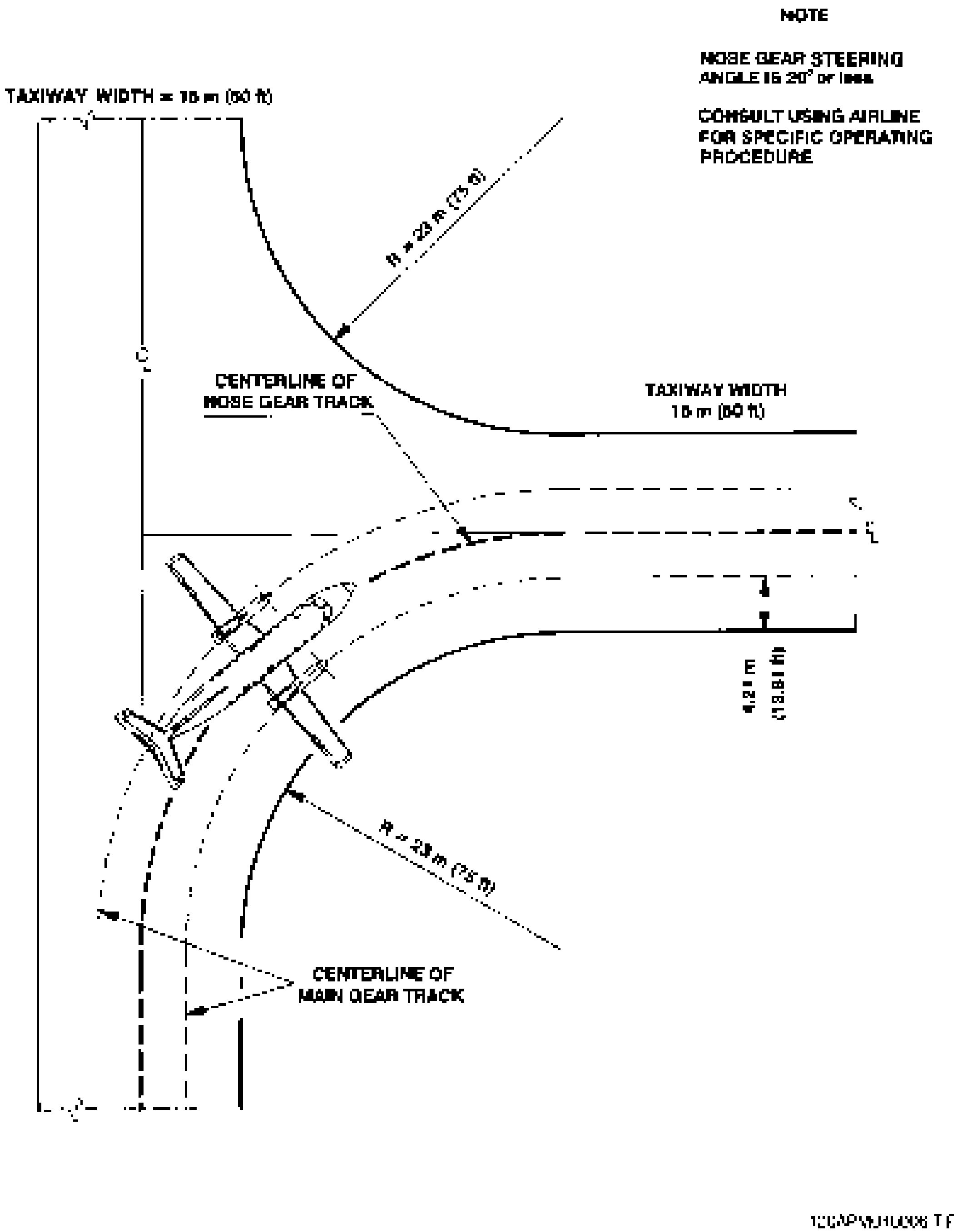
Runway and Taxiway Turn Paths - More Than 90º Turn, Runway to Taxiway

Figure 4-4



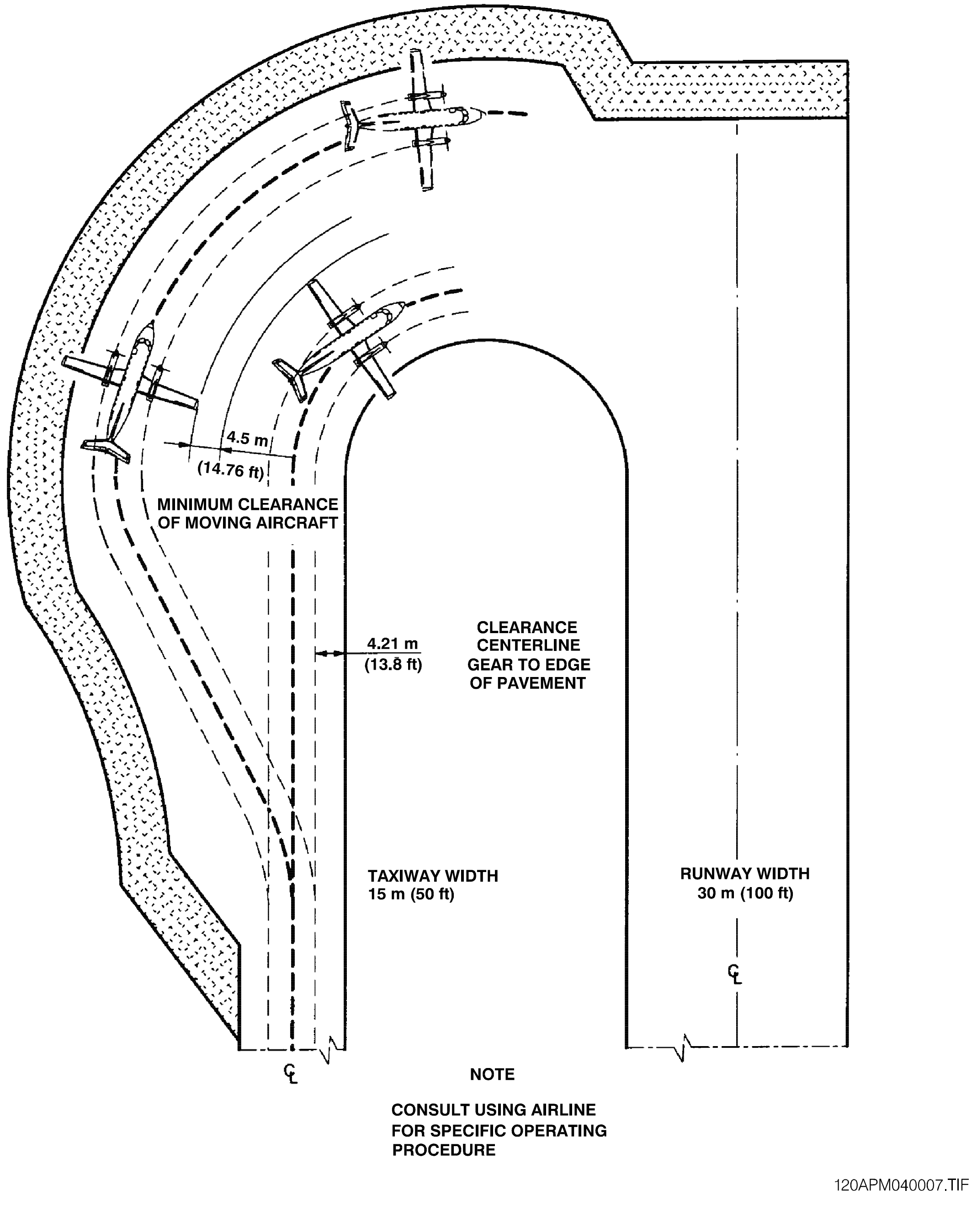
Runway and Taxiway Turn Paths - 90° Turn, Runway to Taxiway

Figure 4-5



Runway and Taxiway Turn Paths - 90° Turn, Taxiway to Taxiway
Figure 4-6

4.6. RUNWAY HOLDING BAY



Runway Holding Bay (Apron)

Figure 4-7

SECTION V

TERMINAL SERVICING

5.1 GENERAL INFORMATION

During turnaround at the terminal, certain services must be performed on aircraft, usually within a given time to meet flight schedules. This section shows service vehicle arrangements, schedules, locations of service points, and typical service requirements. The data presented herein reflect ideal conditions for a single airplane. Service requirements may vary according to airplane condition and airline procedure.

This section provides the following information:

- Typical arrangements of ground support equipment during turnaround.

- Typical turnaround and enroute servicing times at an air terminal. These charts give typical schedules for performing servicing on the airplane within a given time. Servicing times could be rearranged to suit availability of personnel, airplane configuration, and degree of servicing required.

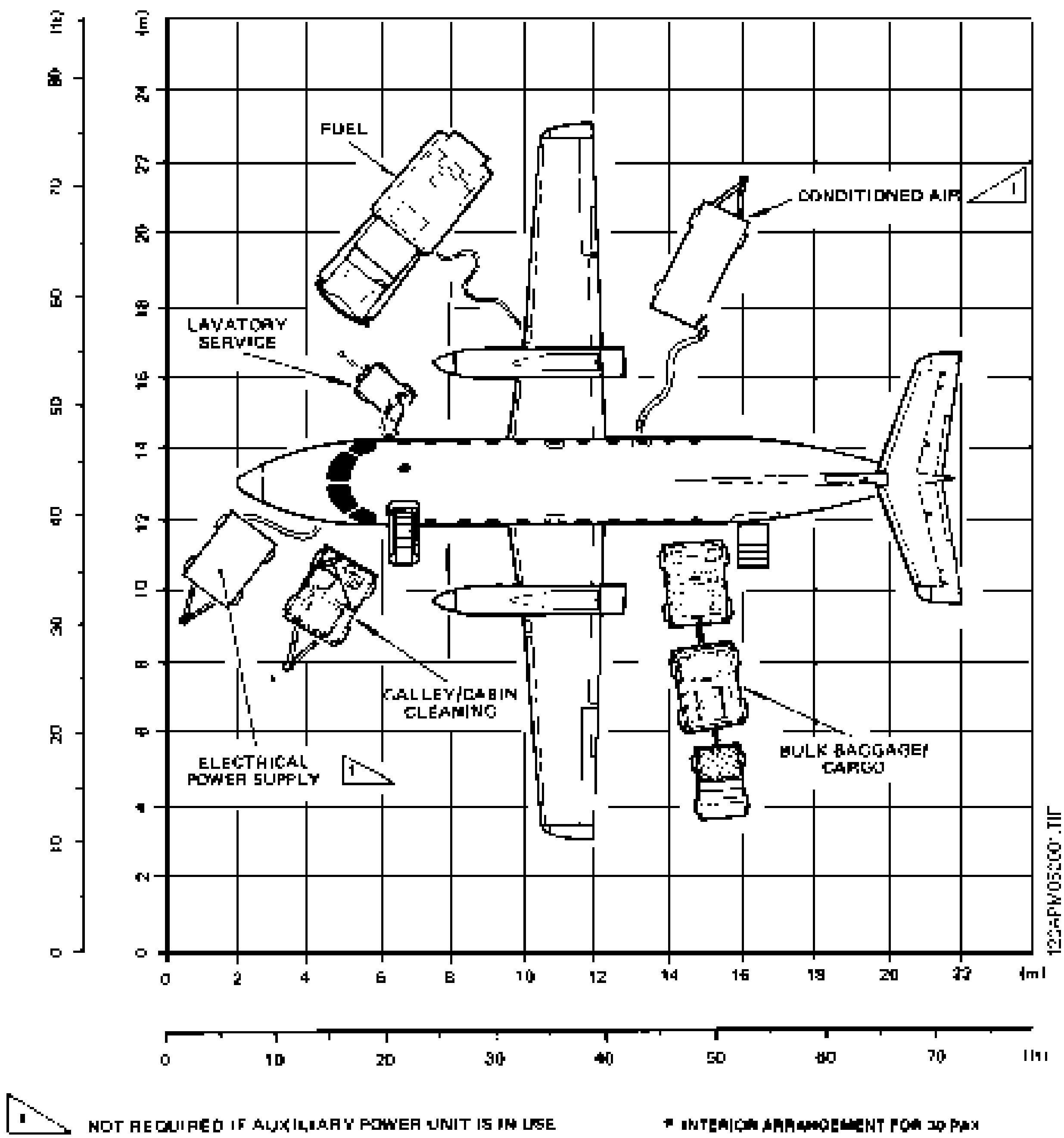
- The locations of ground servicing connections in graphic and tabular forms. Typical capacities and servicing requirements are shown in the figures. Services with requirements that vary with conditions are described in subsequent figures.

- Air conditioning requirements for heating and cooling the airplane, using low-pressure conditioned air. This conditioned air is supplied through an 8-inch GAC directly to the air distribution system, bypassing the air-cycle machines. Normally, a 36000-Bh/hr source would be sufficient to meet air conditioning requirements.

- Ground towing requirements for various towing conditions. Drawbar pull and total traction wheel load may be determined by considering airplane weight, pavement slope, coefficient of friction and engine idle thrust.

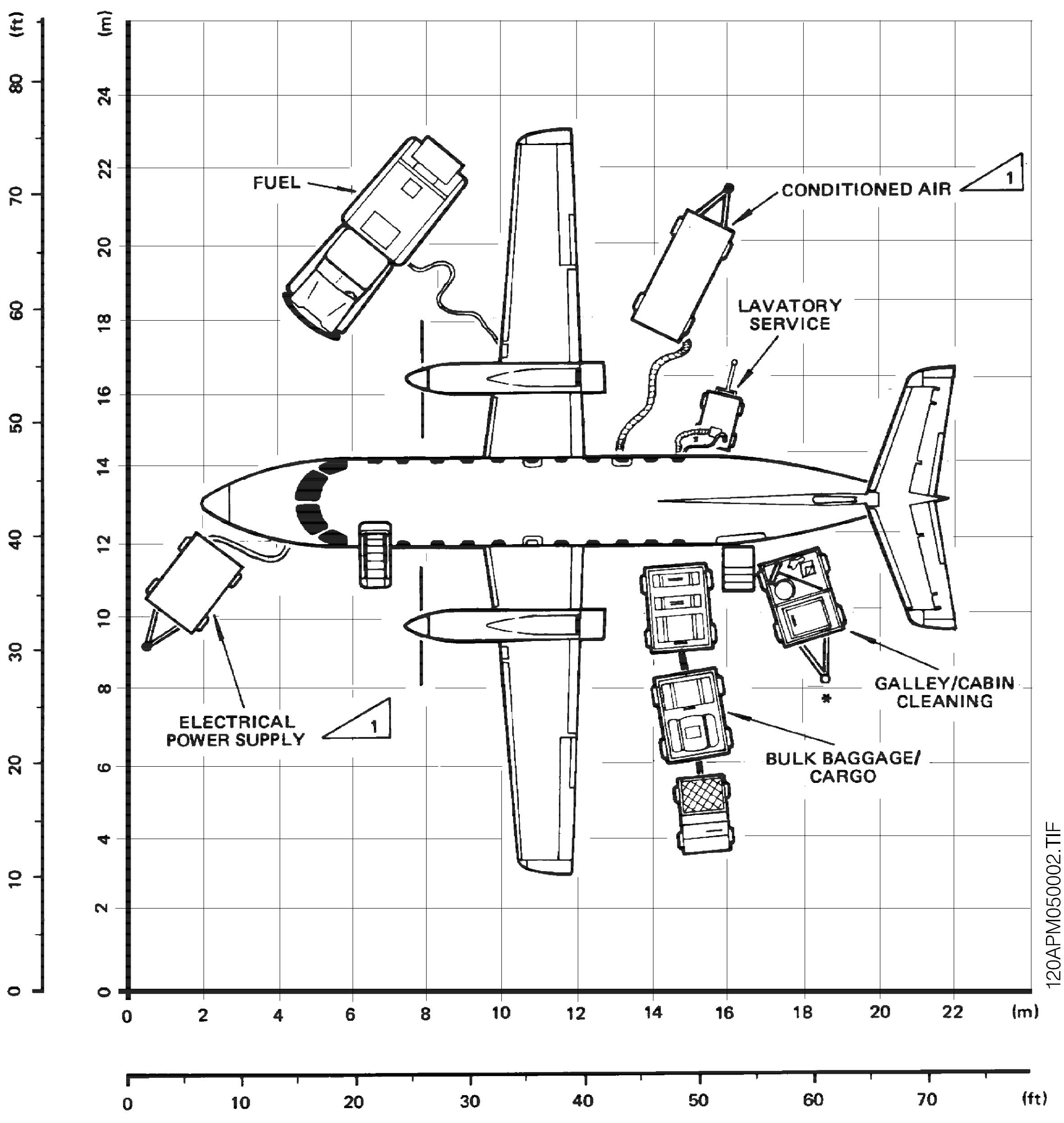
  An example is included with an airplane gross weight of 10000 kg (22046 lb) and two engines with flight idle thrust. When the pavement is assumed to be wet asphalt with a 2% slope, the required total traction wheel load would be 1800 kg (3968 lb) and the drawbar pull would be 1340 kg (2954 lb) (Example A of figure 5-8). When the airplane is backed without idle thrust or with ground idle thrust, these numbers would change to 675 kg (1488 lb) and 500 kg (1102 lb), respectively (Example B of figure 5-8).

5.2. AIRPLANE SERVICING ARRANGEMENT



Airplane Servicing Arrangement (Typical Turnaround)

Figure 5-1 (Sheet 1)

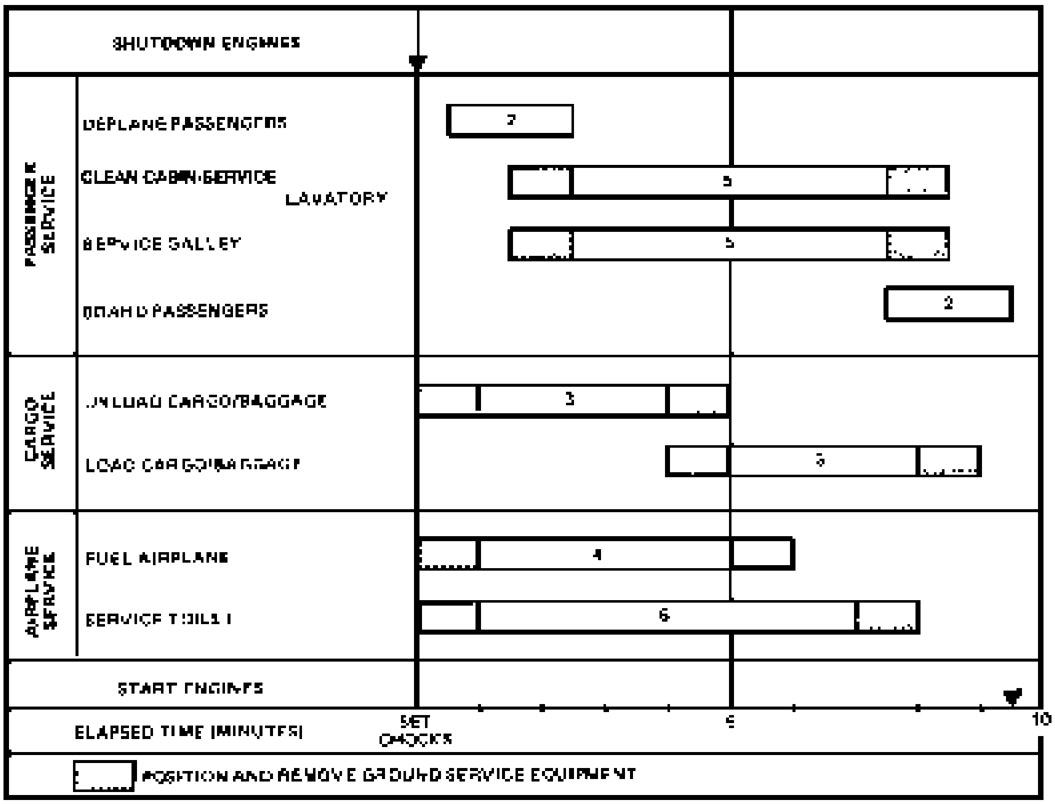


1 NOT REQUIRED IF AUXILIARY POWER UNIT IS IN USE

* INTERIOR ARRENGEMENT FOR 28 PAX

Airplane Servicing Arrangement (Typical Turnaround)
Figure 5-1 (Sheet 2)

5.3. AIR TERMINAL OPERATION - TURNAROUND STATION



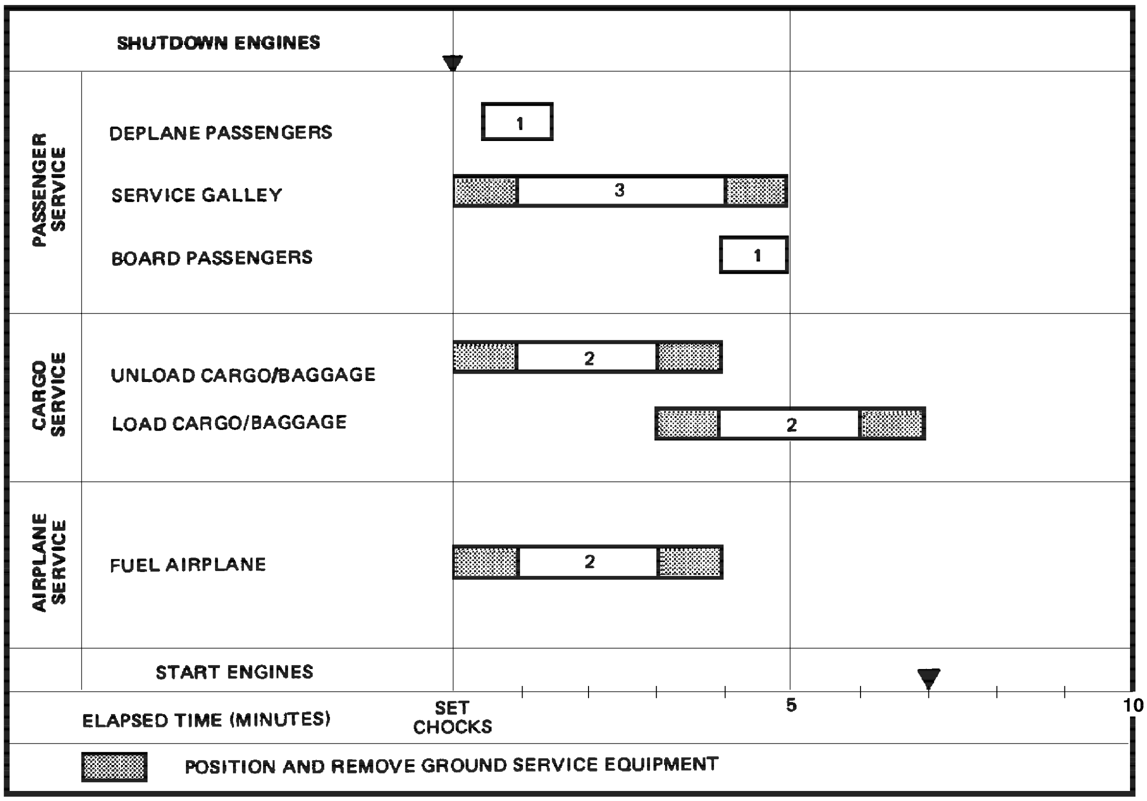
120APM052XXX3.TIF

NOTE. THESE DATA ARE PROVIDED TO ILLUSTRATE THE GENERAL SCOPE AND TYPES OF TASKS INVOLVED IN TERMINAL OPERATIONS. VARYING AIRLINE PRACTICES AND OPERATING CIRCUMSTANCES THROUGHOUT THE WORLD WILL RESULT IN DIFFERENT SEQUENCES AND TIME INTERVALS TO ACCOMPLISH THE TASKS SHOWN. BECAUSE OF THIS, GROUND OPERATION REQUIREMENTS SHOULD BE COORDINATED WITH THE USING AIRLINES PRIOR TO RAMP PLANNING.

Air Terminal Operation - Turnaround Station

Figure 5-2

5.4. AIR TERMINAL OPERATIONS - EN-ROUTE STATION



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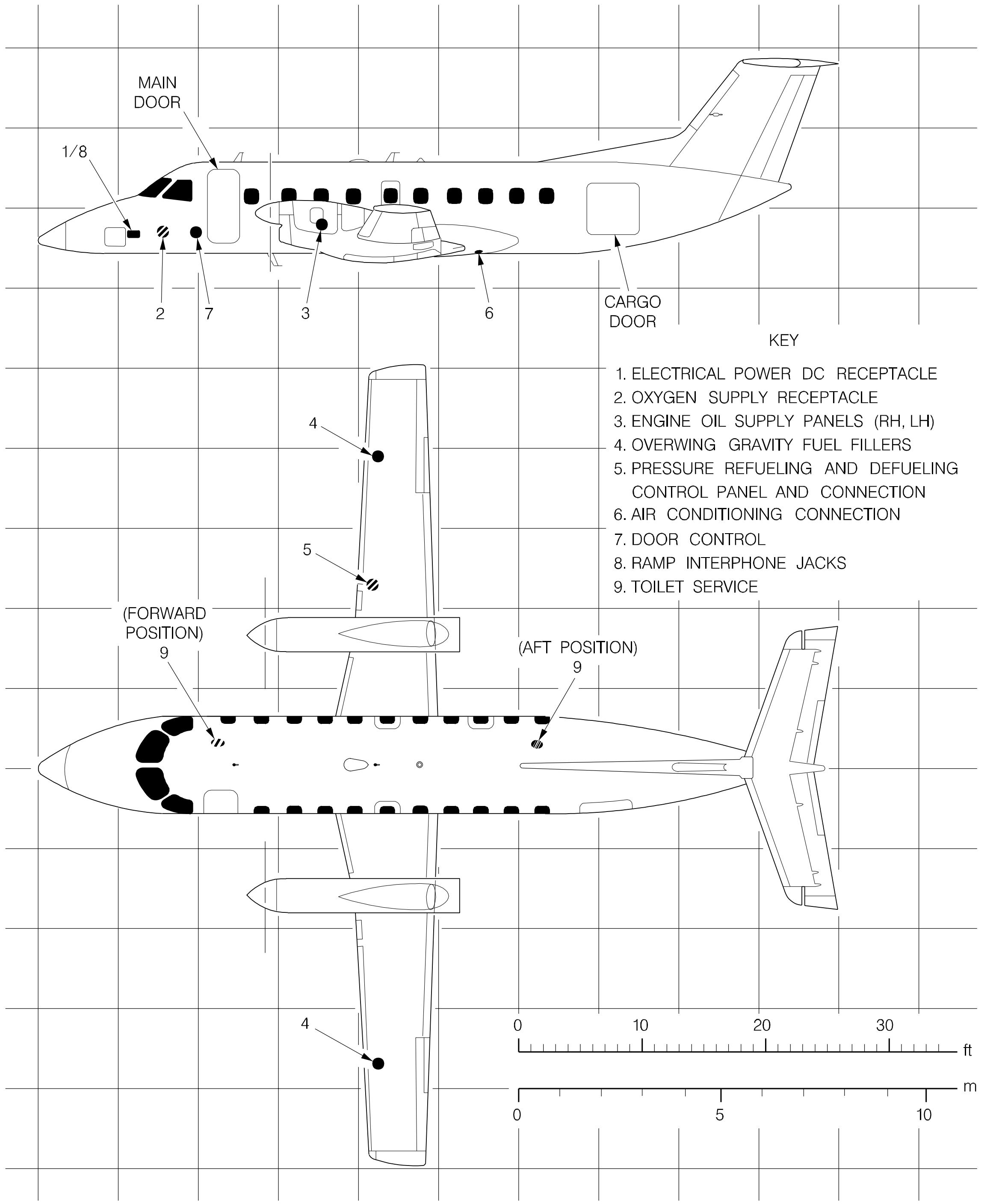
NOTE: 50% PASSENGER EXCHANGE
THESE DATA ARE PROVIDED TO ILLUSTRATE THE GENERAL SCOPE AND TYPES OF TASKS INVOLVED IN TERMINAL OPERATIONS. VARYING AIRLINE PRACTICES AND OPERATING CIRCUMSTANCES THROUGHOUT THE WORLD WILL RESULT IN DIFFERENT SEQUENCES AND TIME INTERVALS TO ACCOMPLISH THE TASKS SHOWN. BECAUSE OF THIS, GROUND OPERATION REQUIREMENTS SHOULD BE COORDINATED WITH THE USING AIRLINES PRIOR TO RAMP PLANNING. GALLEY SERVICE THROUGH BAGGAGE DOOR ENTRY.

Air Terminal Operations - En-route Station

Figure 5-3

5.5. GROUND SERVICING CONNECTIONS



Ground Servicing Connections

Figure 5-4

SERVICING POINTS	NOSE DISTANCE		DISTANCE FROM CENTER LINE				HEIGHT	
			RH SIDE		LH SIDE			
	m	ft	m	ft	m	ft	m	ft
External Electrical Power - An external electrical power receptable accessible through an access door. Nominal voltage - 28 V DC. During ground operations, the electrical power may be supplied by the APU generator (if applicable) or by an external electrical power suply with 28 V DC, 300A thru 1500A, as required.	2.3	7.4			1.0	3.3	1.6	5.4
Oxygen System - A panel with a pressure gage and a valve for recharging. System charging pressure is 1275 Kpa(1850 psig) at a temperature of 21°C (70°F)	4.0	12.8	0.8	2.6			1.5	4.9
Air Conditioning System - An air conditioning service connection of 8.0 in (20.3 cm) GAC (MS33562). See figures 5-6 and 5-7. Maximum Flow: 90 lb/min (40.8 kg/min) Maximum Pressure: 254 mm H_2O (10 in H_2O)	10.8	35.2	0.3	1.0			1.1	3.6

Ground Servicing Connection Data

Figure 5-5 (Sheet 1)

SERVICING POINTS	NOSE DISTANCE		DISTANCE FROM CENTER LINE				HEIGHT	
			RH SIDE		LH SIDE			
	m	ft	m	ft	m	ft	m	ft
Aft toilet position Forward toilet position - Toilet - A 4.0 in (10.16 cm) servicing connection and a 1.0 in (2.54 cm) connection for waste water and toilet bowl refilling. Pre-charge of toilet bowl - 6.5 l (17 US Gal)	12.7 4.6	41.5 15.2	0.4 0.7	1.3 2.2			1.2 1.3	4.1 4.2
Engine Oil Refilling - Accessible through an access door installed at the engine left upper cowling. System total capacity: 6.6 US Gal (25.0 l) Oil tank total capacity - 8.9 l (2.4 US Gal) Residual (non-drainable) quantity - 1.1 l (0.3 US Gal)	6.9	22.5	3.4	11.2	2.7	9.0	1.8	6.0
Fuel System - Pressure Refueling Adapter The adapter inlet port is provided with a flange which allows connections with standard MS29520 type fueling nozzle. It is located on the right wing leading edge underside. Refueling pressure - 241.3 thru 344.7 Kpa (35 thru 50 (psig)	8.4	27.6	4.3	14.3			1.5	4.9

Ground Servicing Connection Data

Figure 5-5 (Sheet 2)

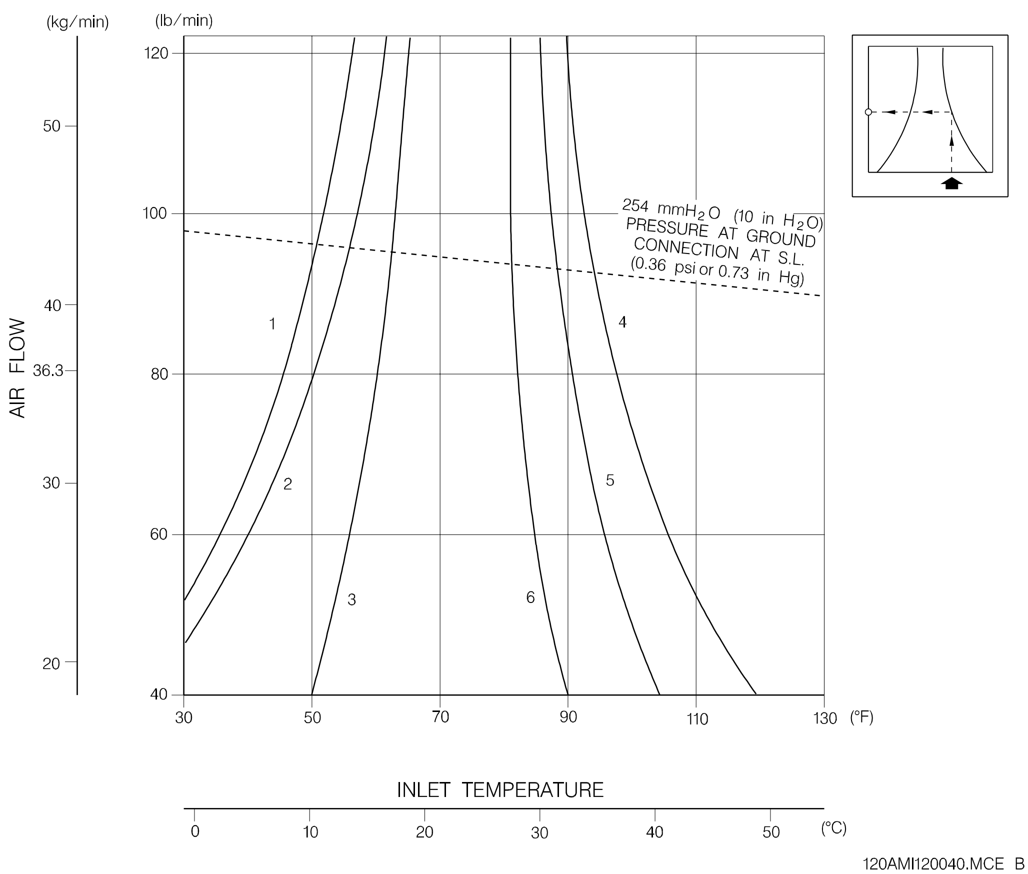
SERVICING POINTS	NOSE DISTANCE		DISTANCE FROM CENTER LINE				HEIGHT	
			RH SIDE		LH SIDE			
	m	ft	m	ft	m	ft	m	ft
Gravity Refueling Filler Caps - A filler cap installed on each wing upper surface. Total fuel capacity - 882 US Gal (3340 l). Usable fuel 33121 (874 US Gal) Left wing outboard and inboard tanks - 1670 l (441 US Gal) Right wing outboard and inboard tanks - 1670 l (441 US Gal)	8.6	28.4	8.4	27.6	8.4	27.6	2.1	7.0
Hydraulic Fluid Refilling - Two systems (two reservoir), one service panel with two couplings Capacity of each reservoir - 4.3 l (1.1 US Gal)	9.5	31.2			3.4	11.2	1.1	3.6
A.P.U. Oil Refilling - Accessible through an access door installed on the left side of tail cone. Capacity - 4.2 l (0.6 US Gal)	17.1	56.0			0.2	0.6	2.4	7.9

Ground Servicing Connection Data

Figure 5-5 (Sheet 3)

5.6. CONDITIONED AIR REQUIREMENTS

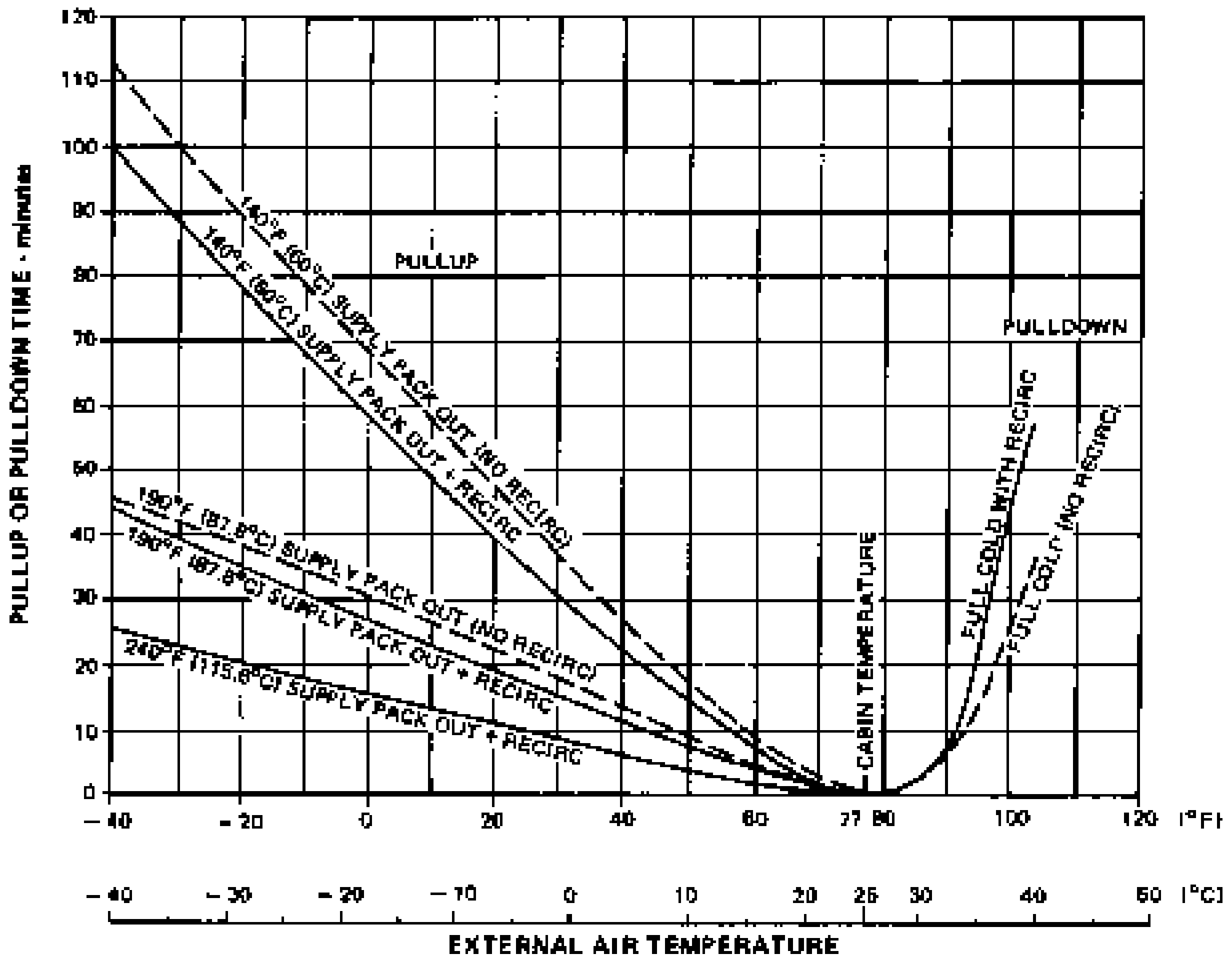
CONDITIONS	AMBIENT TEMP		SOLAR LOAD (BTU/H)	ELECTRICAL LOAD (BTU/H)	OCCUPANTS	CABIN TEMP	
	(ºC)	(ºF)				(ºC)	(ºF)
1	39	103	7034	8799	33	24	75
2	39	103	7034	8799	33	27	80
3	39	103	0	8799	3	21	70
4	-40	-40	0	0	3	24	75
5	-29	-20	0	0	3	24	75
6	-18	0	0	0	3	24	75



Pre-Conditioned Airflow Requirements

Figure 5-6

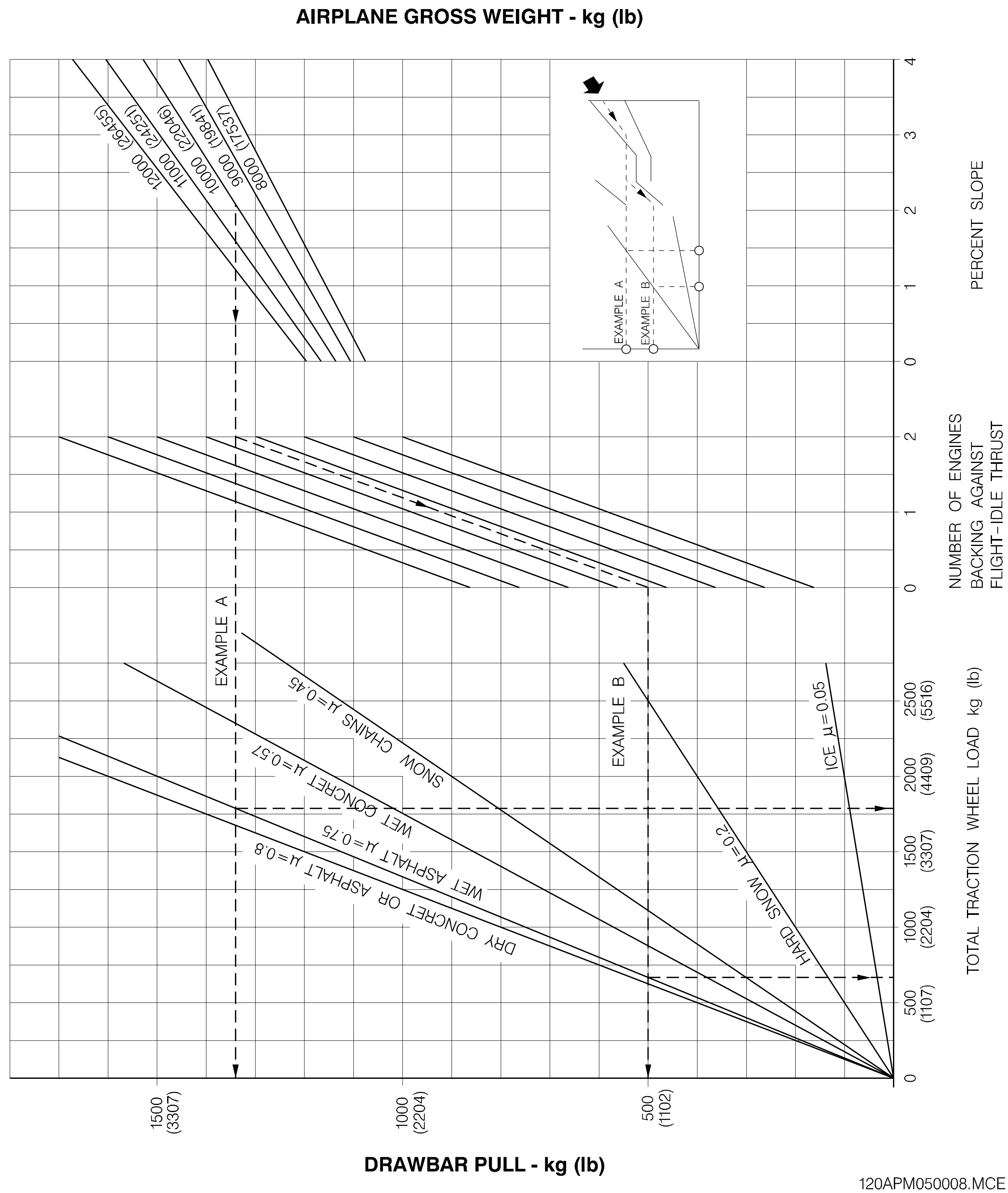
5.7. CABIN PULLUP/PULLDOWN TIME



Cabin Pullup/Pulldown Time - APU Bleed Source

Figure 5-7

5.8. GROUND TOWING REQUIREMENTS



Ground Towing Requirements

Figure 5-8

SECTION VI

OPERATING CONDITIONS

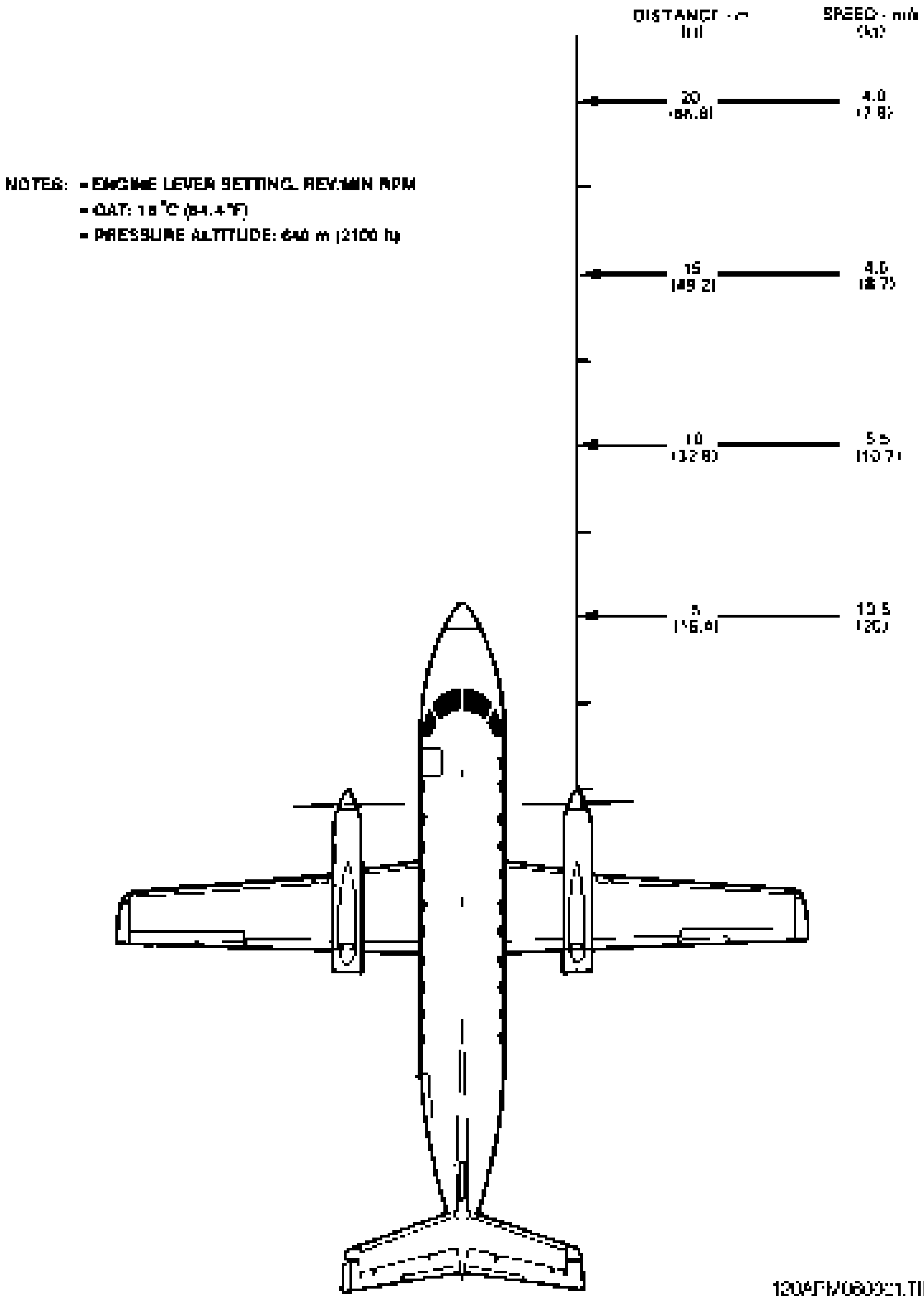
6.1. PROPELLER AND ENGINE WAKE AND DANGER AREAS

6.1.1. General Information

This section provides information on prop blast and engine exhaust velocities and temperatures for different engine power conditions.
In addition, data of engine propeller and APU areas are presented.

NOTE: In engine power settings above FLIGHT IDLE/FEATHER (FI/FEA), the prop slipstream cools the exhaust gases, thus redering the temperature data unsignificant.

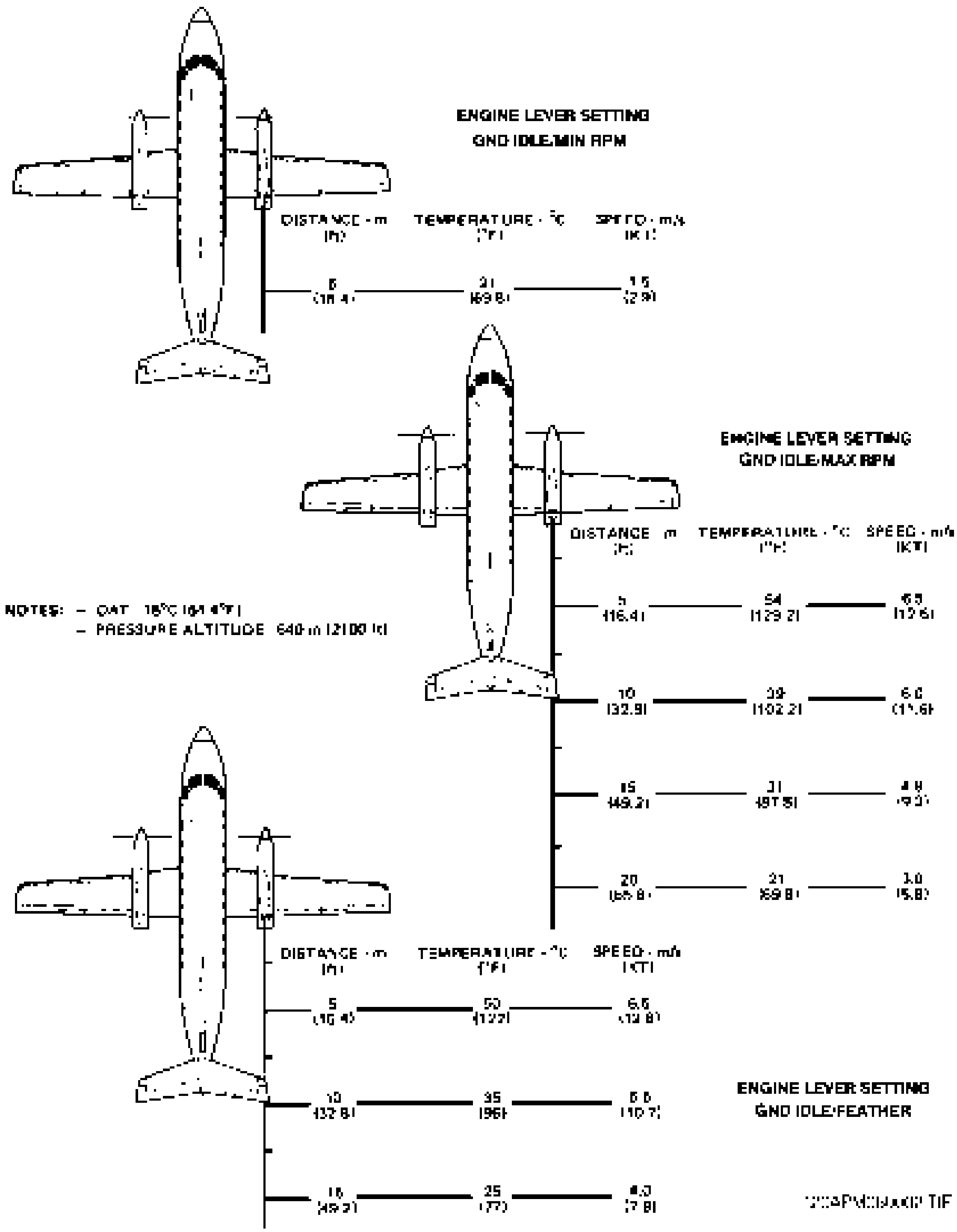
6.1.2. Propeller Blast Velocities



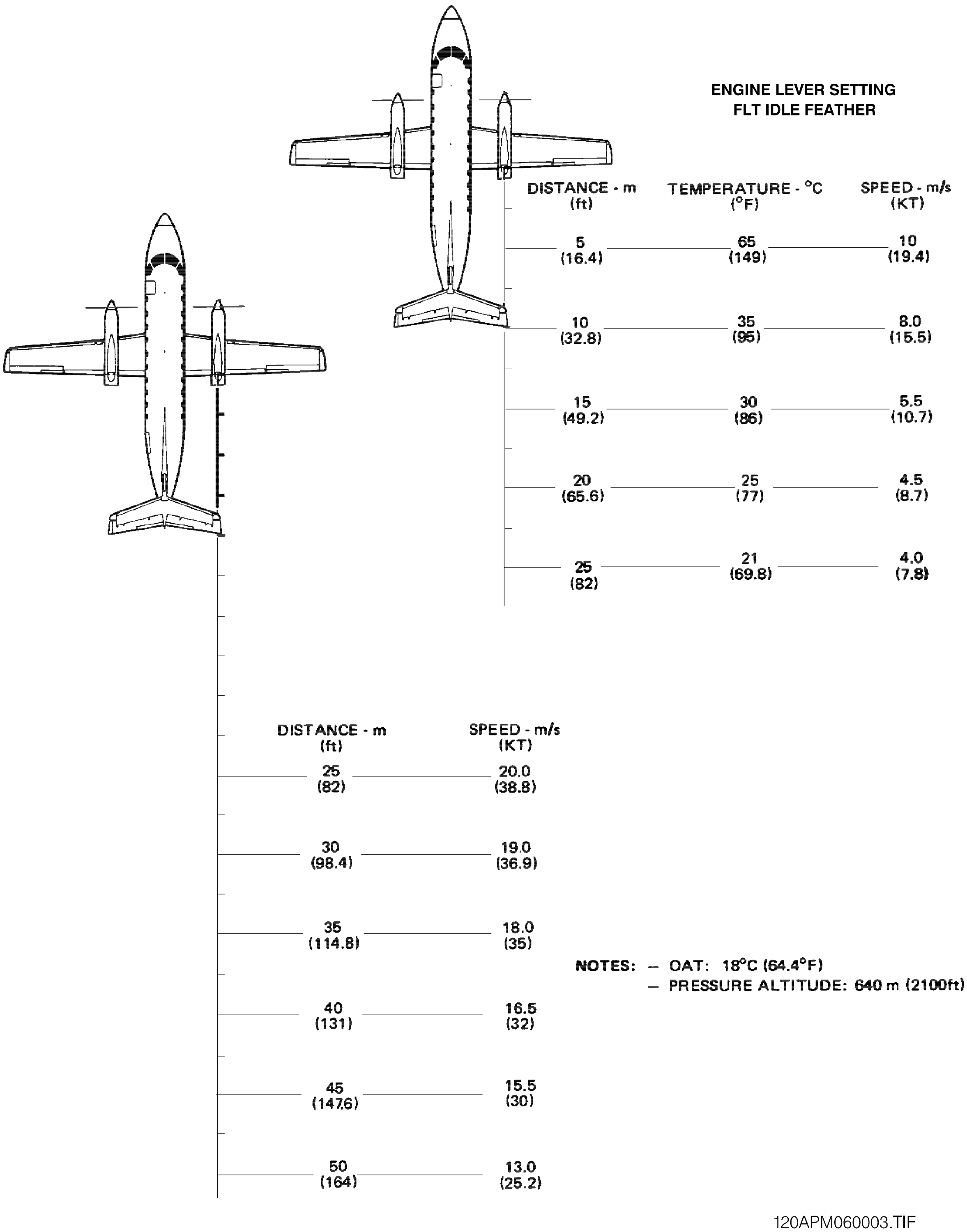
Propeller Blast Velocities

Figure 6-1

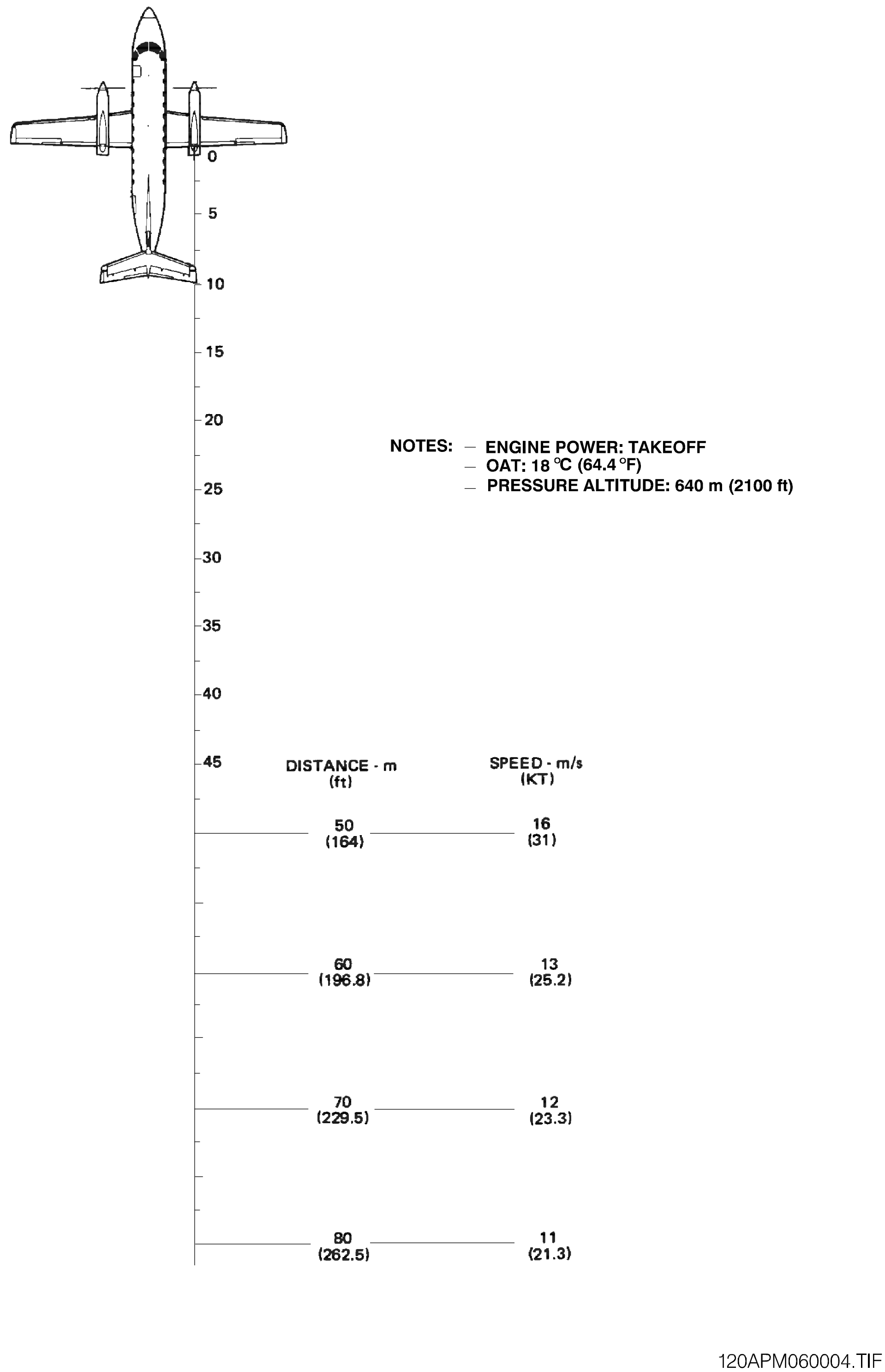
6.1.3. Propeller Blast/Engine Exhaust Velocities



Propeller Blast/Engine Exhaust Velocities
Figure 6-2 (Sheet 1)



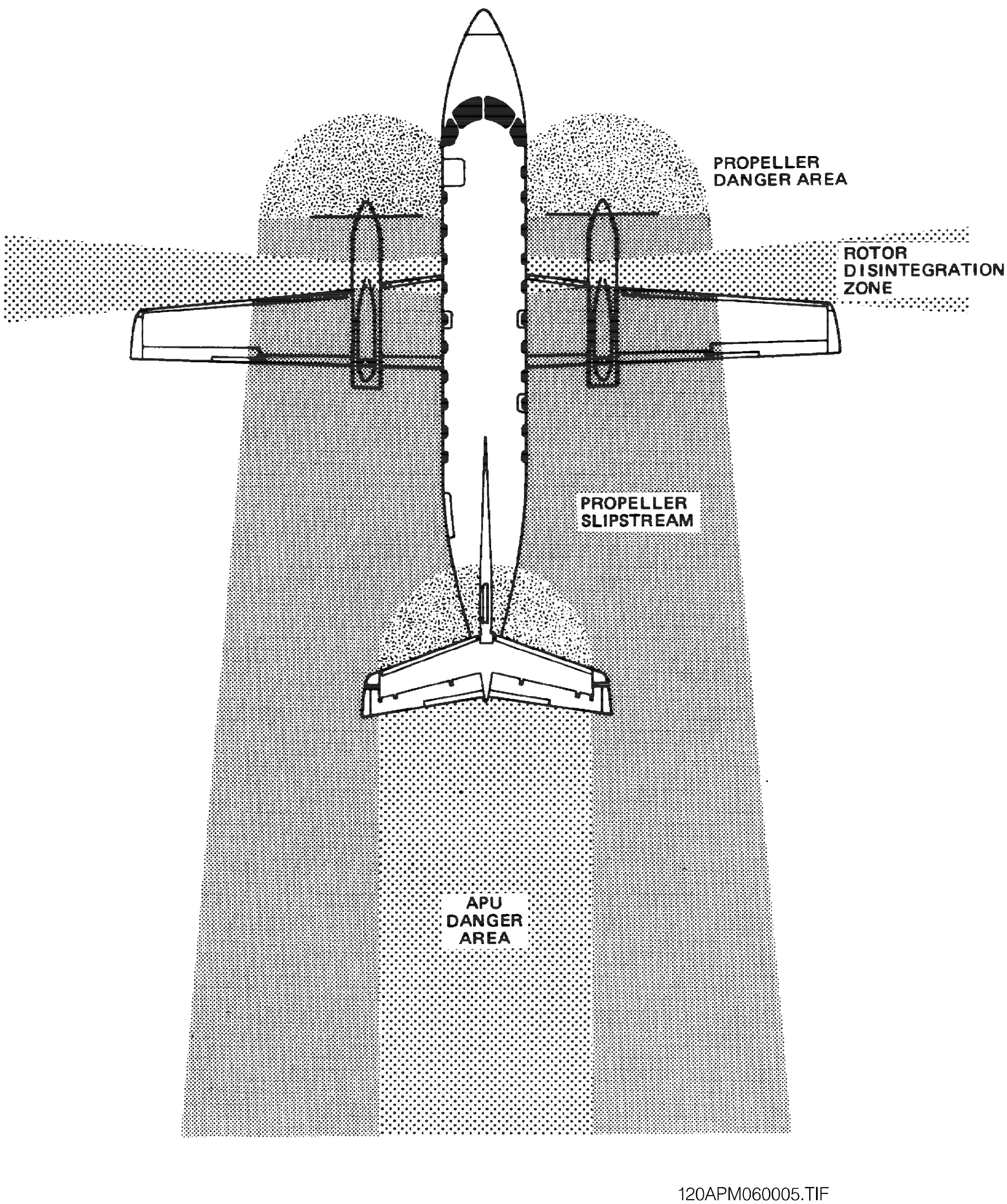
Propeller Blast/Engine Exhaust Velocities
Figure 6-2 (Sheet 2)



Propeller Blast/Engine Exhaust Velocities

Figure 6-2 (Sheet 3)

6.1.4. Danger Areas



Danger Areas

Figure 6-3

6.2. AIRPORT AND COMMUNITY NOISE

Aircraft noise is of major concern to the airport and community planner.
The airport is a major element in the community's transportation system and, as such, is vital to local growth. However, the airport must also be a good neighbor, and this can be accomplished only with proper planning.

Since aircraft noise extends beyond the boundaries of the airport, it is vital to consider the noise impact on surrounding communities. Many means have been devised to provide the planner with a tool to estimate the impact of airport operations. Too often they oversimplify noise to the point where the results become erroneous.

Noise is not a simple matter; therefore, there are no simple answers.
The cumulative noise contour is an effective tool. However, care must be exercised to ensure that the contours, used correctly, estimate the noise resulting from aircraft operations conducted at an airport.

The size and shape of the single-event contours, which are inputs into the cumulative noise contours, are dependent upon numerous factors.
They include:

6.2.1. Operational Factors

(a) Aircraft Weight - Aircraft weight is dependent on distance to be traveled, en-route winds, payload, and anticipated aircraft delay upon reaching the destination.

(b) Engine Power Settings - The rates of ascent and descent and the noise levels emitted at the source are influenced by the power setting used.

(c) Airport Altitude - Higher airport altitude will affect engine performance and thus can influence noise.

6.2.2. Atmospheric Conditions - Sound Propagation

(a) Wind - With stronger headwinds, the aircraft can take off and climb more rapidly relatively to the ground. Also, winds can influence the distribution of noise in the surrounding communities.

(b) Temperature and Relative Humidity - The absorption of noise in the atmosphere along the transmission path between the aircraft and the ground observer varies with both temperature and relative humidity.

6.2.3. Surface Condition-shielding, Extra Ground Attenuation (EGA)

(a) Terrain - If the ground slopes down after takeoff or up before landing, noise will be reduced since the aircraft will be at a higher altitude above the ground. Additionally, hills, shrubs, trees, and large buildings can act as sound buffers.

All of these factors can alter the shape and size of the contours appreciably.

To demonstrate the effect of some of these factors, estimated noise level contours for two different operating conditions are shown below. These contours reflect a given noise level upon a ground level plane at runway elevation for EPNL and SEL scales, at the following conditions:

Condition 1

ISA + 10ºC
Sea level
Humidity 70%

No wind
No runway slope
Without noise

LANDING

Maximum design landing weight
1.3 Vs + 10 knots
ILS standard approach angle - 3°

TAKEOFF

Maximum design takeoff weight
V2 + 10 knots

Condition 2

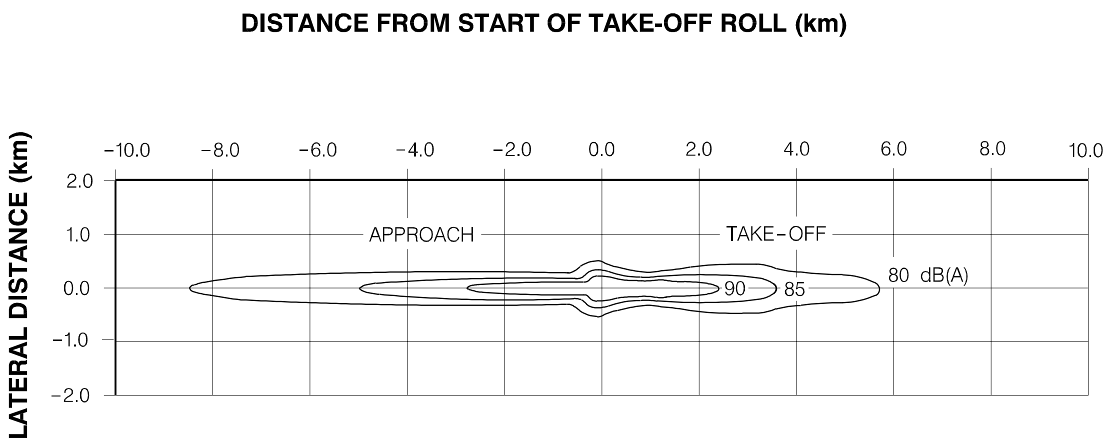
ISA + 10ºC	No wind
Sea level	No runway slope
Humidity 70%	Without noise abatement procedure

LANDING	TAKEOFF
90% of maximum design landing weight	90% of maximum design takeoff weight
1.3 Vs + 10 knots	V2 + 10 knots
ILS standard approach angle - 3°	

As indicated from these data, the contour size varies substantially with operating and atmospheric conditions. Most aircraft operations are, of course, conducted at less than maximum gross weights because average flight distances are much shorter than maximum aircraft range capability and the average load factors are less than 100 percent. Therefore, in developing cumulative contours for planning purposes, it is recommended that the airlines servicing a particular city be contacted to provide operational information.

In addition, there are no universally accepted methods for developing aircraft noise contours for relating the acceptability of specific noise zones to specific land uses. It is therefore expected that the noise contour data for a particular aircraft and the impact assessment methodology change. To ensure that currently available information of this type is used in any planning study, it is recommended that it be obtained directly from the local Environmental Quality agency.

It should be noted that the contours shown herein are only for illustrating the impact of operating and atmospheric conditions and do not represent the single-event contour of the EMB-120 BRASILIA. It is expected that the cumulative contours be developed as required by planners using the data and methodology applicable to their specific study.



CONDITION 1

ISA+10°C
SEA LEVEL
HUMIDITY 70%
NO WIND
NO RUNWAY SLOPE
WITHOUT NOISE ABATEMENT PROCEDURE

LANDING	TAKEOFF
100% OF MLW: 11700 kg (25794 lb)	100% OF MTOW: 11990 kg (26433 lb)
1.3Vs+10 knots	V2+10 knots
ILS STANDARD APPROACH ANGLE 3°	FLAP 15°

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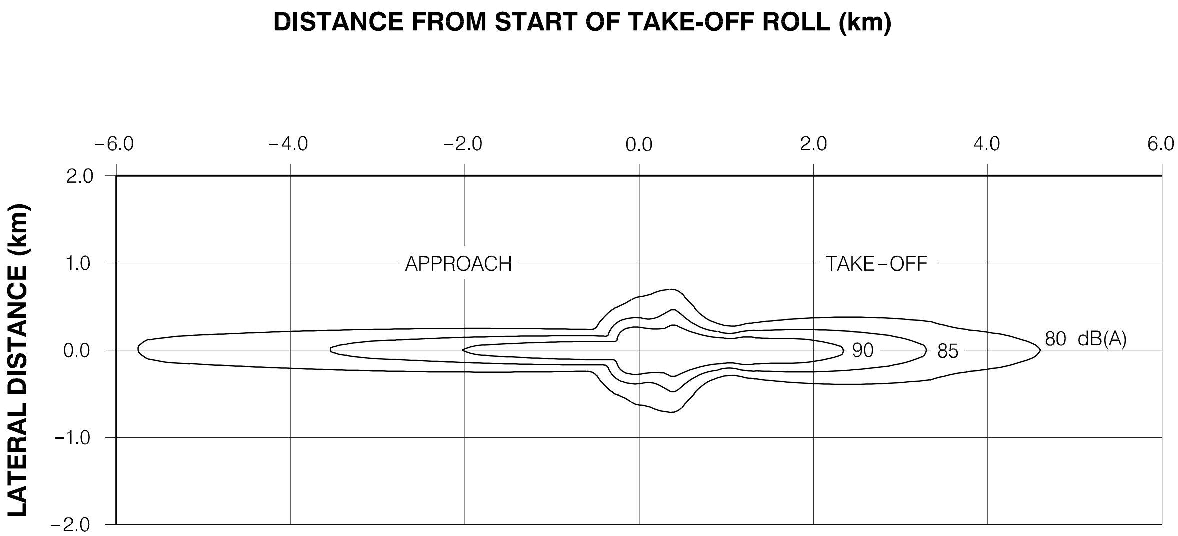
EMB-120 EPNL Noise Contours

Condition 1

Figure 6-4



CONDITION 1

ISA+10°C
SEA LEVEL
HUMIDITY 70%
NO WIND
NO RUNWAY SLOPE
WITHOUT NOISE ABATEMENT PROCEDURE

LANDING

100% OF MLW: 11700 kg (25794 lb)
1.3Vs+10 knots
ILS STANDARD APPROACH ANGLE 3°

TAKEOFF

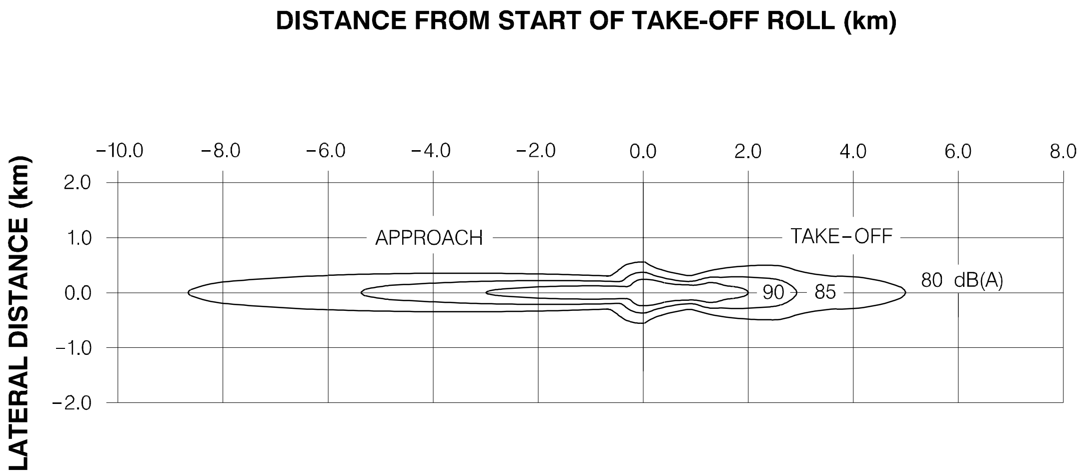
100% OF MTOW: 11990 kg (26433 lb)
V2+10 knots
FLAP 15°

120APM060007.MCE

EMB-120 SEL Noise Contours

Condition 1

Figure 6-5



CONDITION 2

ISA + 10° C
SEA LEVEL
HUMIDITY 70%
NO WIND
NO RUNWAY SLOPE
WITHOUT NOISE ABATEMENT PROCEDURE

LANDING

90% OF MLW: 10530 kg (23215 lb)
1.3Vs + 10 knots
ILS STANDARD APPROACH ANGLE 3°

TAKEOFF

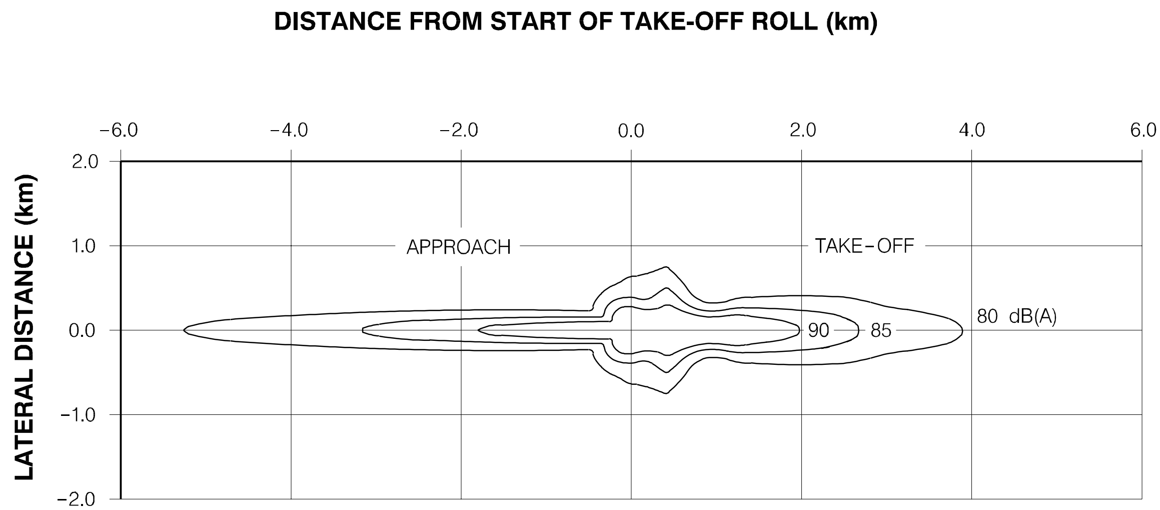
90% OF MTOW: 10791 kg (23790 lb)
V2 + 10 knots
FLAP 15°

120APM060008.MCE

EMB-120 EPNL Noise Contours

Condition 2

Figure 6-6



CONDITION 2

ISA+10°C
SEA LEVEL
HUMIDITY 70%
NO WIND
NO RUNWAY SLOPE
WITHOUT NOISE ABATEMENT PROCEDURE

LANDING

90% OF MLW: 10530 kg (23215 lb)
1.3Vs+10 knots
ILS STANDARD APPROACH ANGLE 3°

TAKEOFF

90% OF MTOW: 10791 kg (23790 lb)
V2+10 knots
FLAP 15°

120APM060009.MCE

EMB-120 SEL Noise Contours

Condition 2

Figure 6-7

SECTION VII

PAVEMENT DATA

7.1. GENERAL INFORMATION

Pavement or Pavement Structure is defined as a structure consisting of one or more layers of processed materials.

The primary function of a pavement is to distribute concentrated loads so that the supporting capacity of the subgrade soil is not exceeded. The subgrade soil is defined as the material on which the pavement rests, whether embankment or excavation.

Several methods for design of airport pavements have been developed that differ considerably in their approach.

Generally speaking, the design methods are derived from observation of pavements in service or experimental pavements. Thus, the reliability of any method is proportional to the amount of experience or experimental verification behind the method, and all methods require a considerable amount of common sense and judgment on the part of the engineer who applies them.

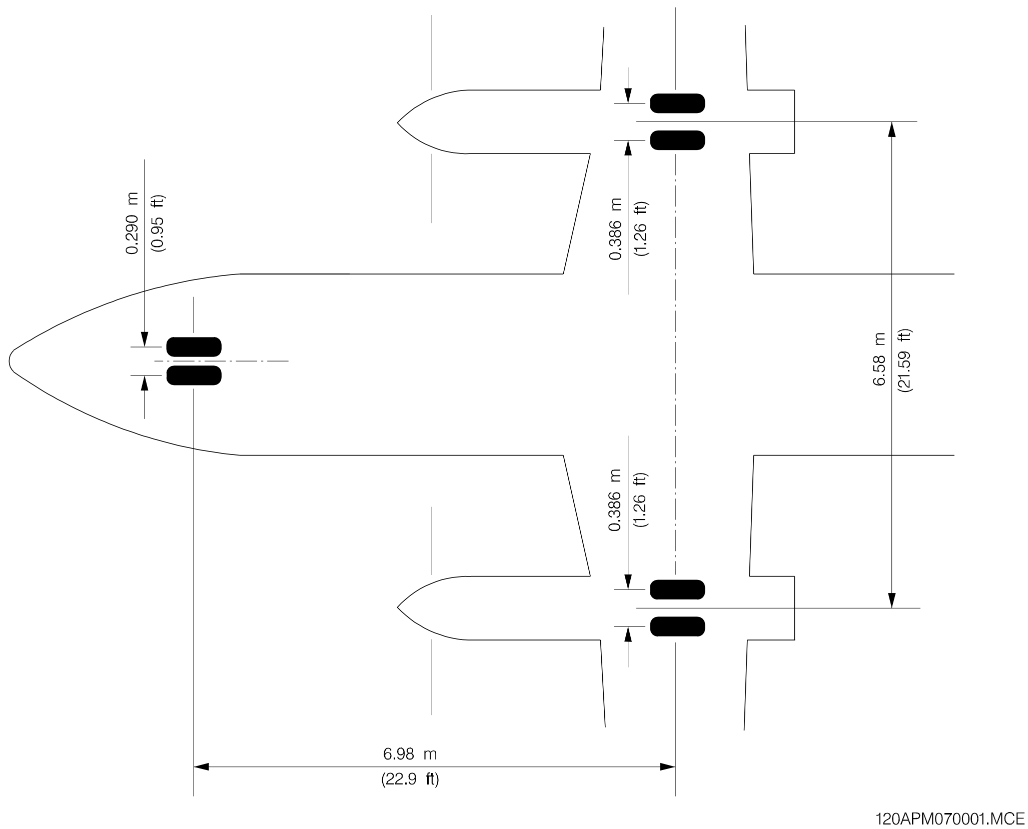
Each airplane configuration is depicted with a minimum range of five loads imposed on the main landing gear to aid in the interpolation between the discrete values shown. The tire pressure used for the 120 model charts will produce the recommended tire deflection with the airplane loaded to its maximum taxi weight and with center of gravity position. The tire pressure where specifically designated on table and charts are values obtained under loaded conditions as certificated for commercial use.

This section presents EMB-120 basic data on landing gear footprint configuration, maximum design taxi loads, and tire sizes and pressures. The tire pressures shown are given for optimum flotation at the condition of maximum design taxi weight. In addition, maximum pavement loads for certain critical conditions at the tire-ground interface are presented.

Pavement requirements for commercial airplanes are customarily derived from the static analysis of loads imposed on the main landing gear struts.

Figures 7-3 are provided in order to determine these loads throughout the stability limits of the airplane at rest on pavement. These main landing gear loads are used to center the pavement design charts which follow, interpolating load values where necessary.

7.2. LANDING GEAR FOOTPRINT

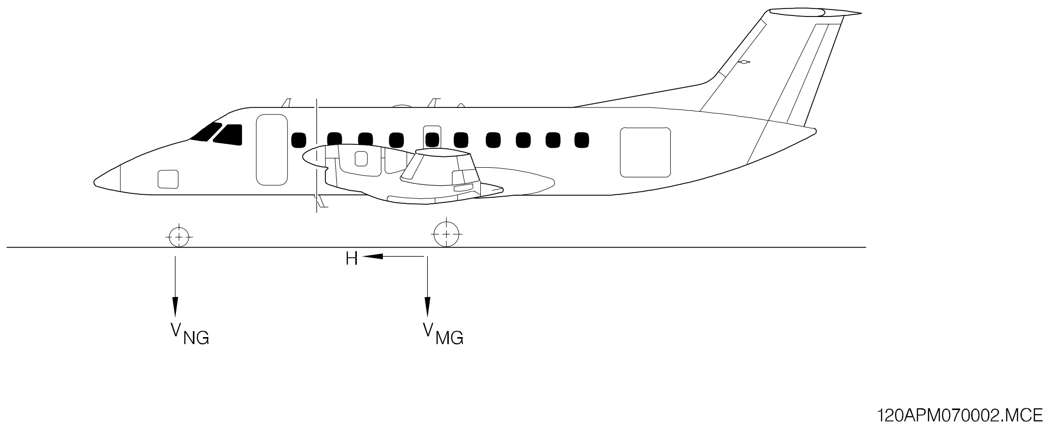


	EMB-120 MODEL	
	RT	ER
MAXIMUM DESIGN TAXI WEIGHT	11580 kg 22529 lb	12070 kg 26610 lb
NOSE TIRE SIZE	18 x 5.5 (10 PR)	18 x 5.5 (10 PR)
NOSE TIRE PRESSURE	483-552 kPa 70-80 psi	538-565 kPa 78-82 psi
MAIN GEAR TIRE SIZE	24 x 7.25-12 (10 PR)	24 x 7.25-12 (12 PR)
MAIN GEAR TIRE PRESSURE	759-828 kPa 110-120 psi	910-938 kPa 132-136 psi

Landing Gear Footprint

Figure 7-1

7.3. MAXIMUM PAVEMENT LOADS



VNG = Maximum vertical nose gear ground load at most forward center of gravity

VMG = Maximum vertical main gear ground load at most aft center of gravity

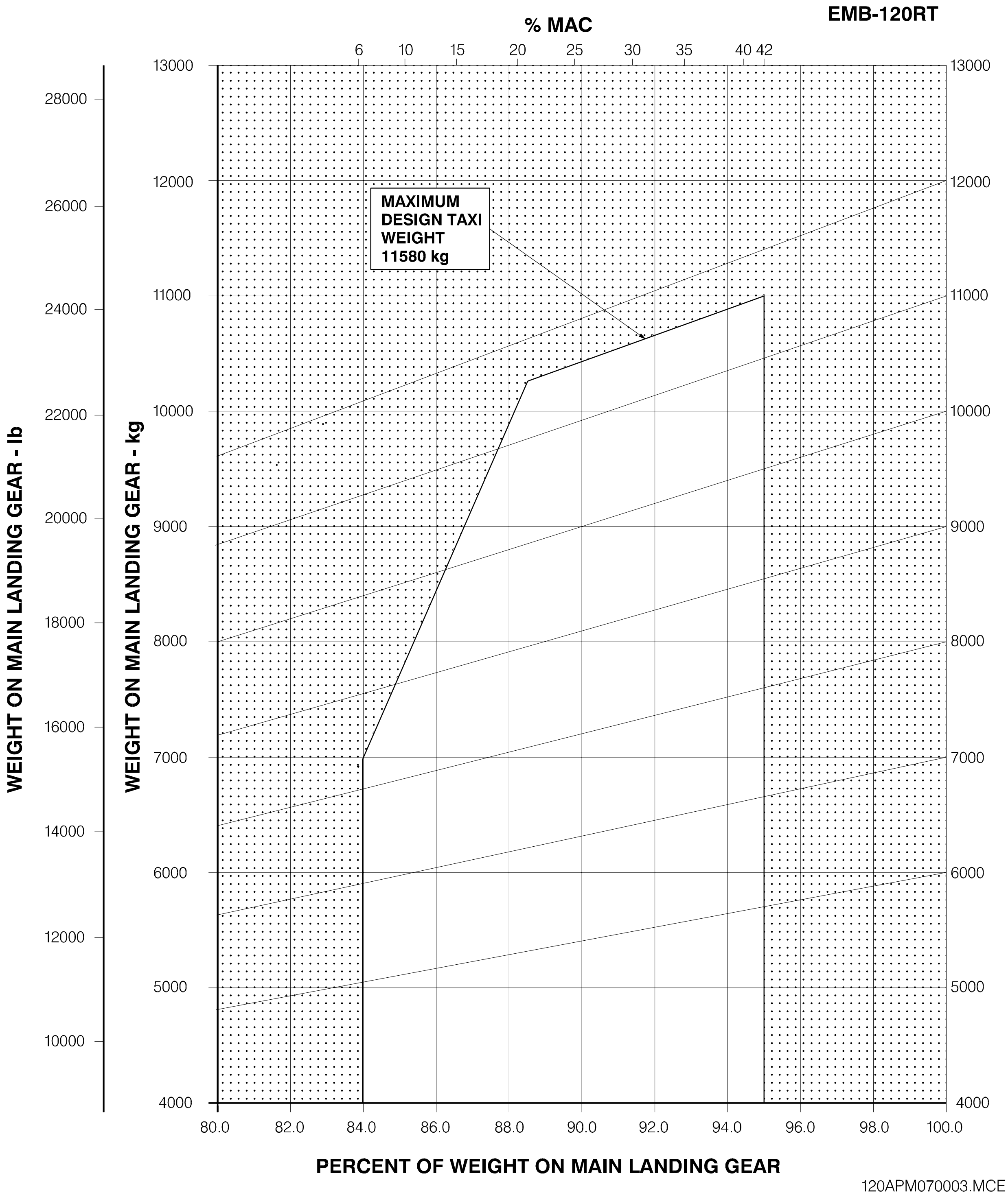
H = Maximum horizontal ground load from braking

NOTE: All loads calculated using airplane maximum design taxi weight.

			EMB-120 MODEL	
			RT	ER
MAXIMUM DESIGN TAXI WEIGHT		kg (lb)	11580 (25529)	12070 (26610)
VNG	Static at most forward center of gravity	kg (lb)	1335 (2943)	1315 (2899)
	Steady braking with deceleration of 3m/s2	kg (lb)	2200 (4850)	2225 (4905)
VMG PER STRUT	Static at most aft center of gravity	kg (lb)	5490 (12103)	5720 (12610)
H PER STRUT	Steady braking with deceleration of 3m/s2	kg (lb)	1555 (3428)	1620 (3571)
	Instantaneous braking (coefficient of friction -0.8)	kg (lb)	3535 (7793)	3680 (8113)

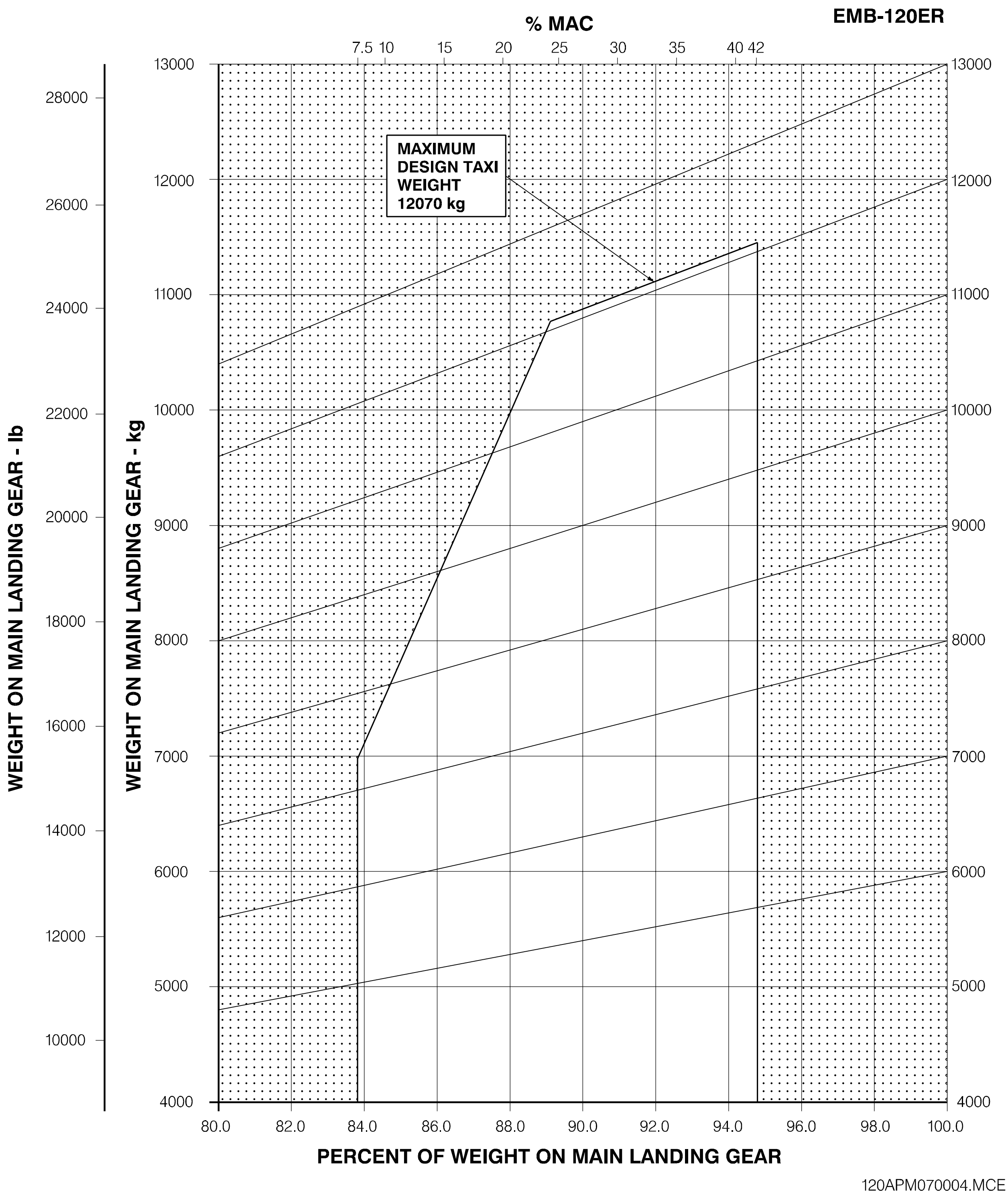
Maximum Pavement Loads
Figure 7-2

7.4. LANDING GEAR LOADING ON PAVEMENT



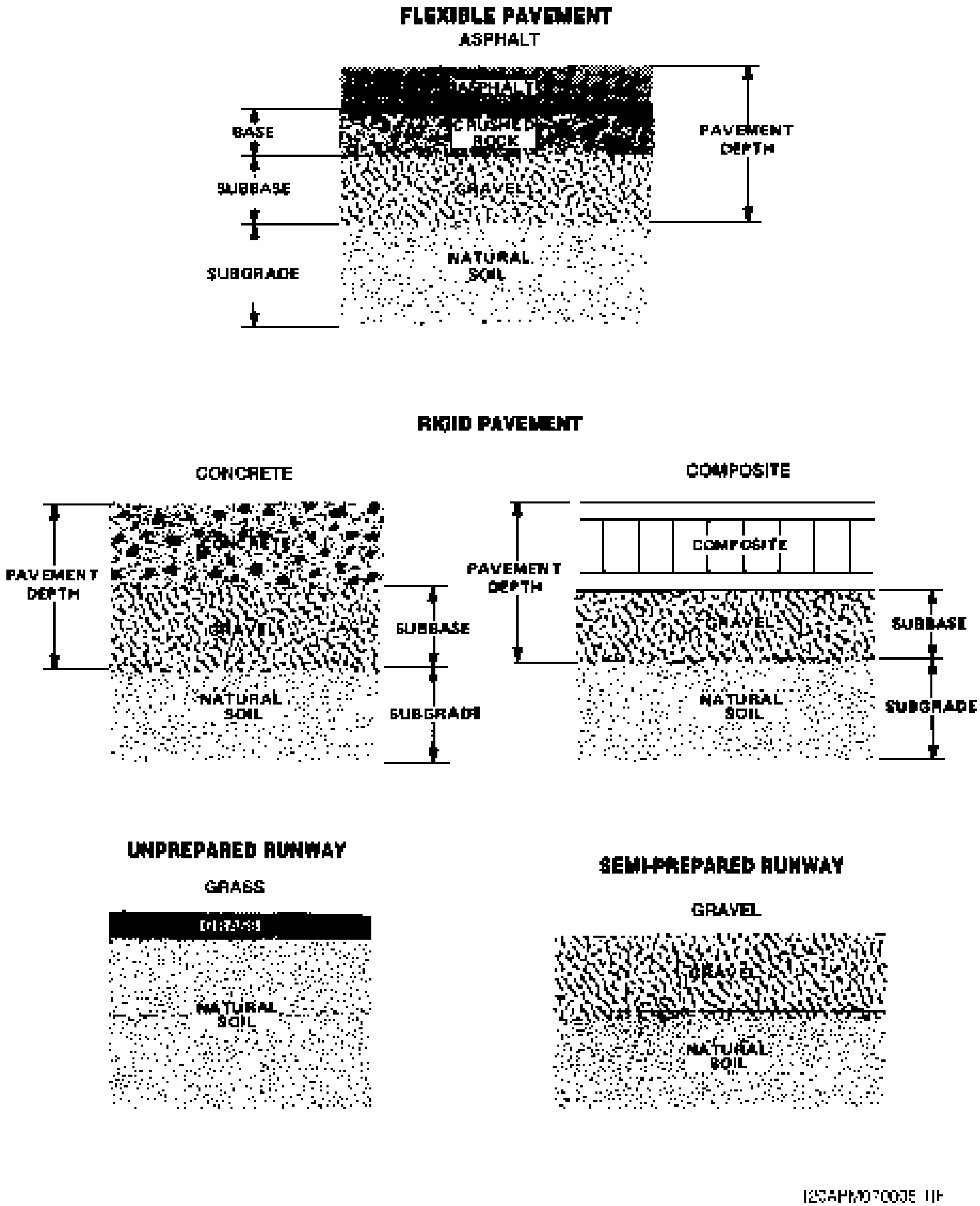
Main Landing Gear Loading on Pavement

Figure 7-3 (Sheet 1)



Main Landing Gear Loading Pavement

Figure 7-3 (Sheet 2)

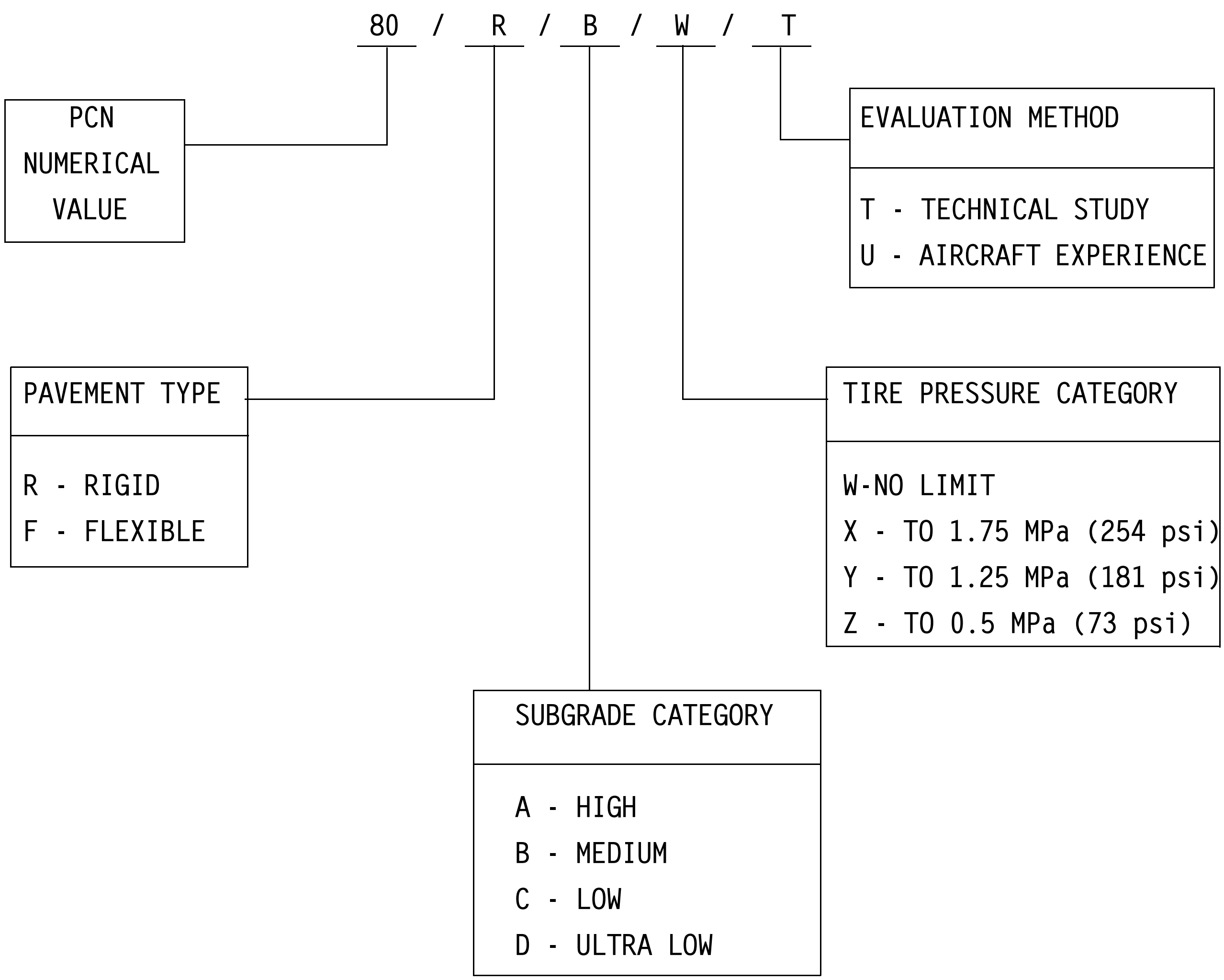


Runway Types and Nomenclature

Figure 7-4

7.5. ACN-PCN METHOD

The ACN/PCN METHOD as referenced in Annex 14, "Aerodromes", 8th Edition, March 1983, provides a standardized international airplane/pavement rating system.
ACN is the Aircraft Classification Number and PCN is the corresponding Pavement Classification Number. To determine the ACN of an aircraft on flexible or rigid pavement, both the aircraft gross weight and the subgrade strength must be known. An aircraft having an ACN equal to or less than the PCN can operate without restriction on the pavement. Numerically, the ACN is two times derived single-well load expressed in thousands of kilograms, where the derived single wheel load is defined as the load on a single tire inflated to 1.25 MPa (181 psi) that would have the same pavement requirements as the aircraft. Computationally, the ACN/PCN METHOD uses the PCA program PDILB for rigid pavements and S-77-1 for flexible pavements to calculate ACN values.
The method of pavement evaluation is left up to the airport with the results of their evaluation presented as follows:



The following table shows the ACN values for flexible and rigid pavements:

EMB-120RT and EMB-120ER Aircraft Classification Number (ACN)

SUBGRADE STRENGTH			HIGH	MEDIUM	LOW	ULTRA LOW
EMB-120 RT	RIGID PAVEMENT	Maximum Taxi Weight	6.4	6.8	7.2	7.5
		Operational Empty Weight	2.8	3.0	3.2	3.4
	FLEXIBLE PAVEMENT	Maximum Taxi Weight	5.3	5.8	6.6	7.7
		Operational Empty Weight	2.4	2.6	2.8	3.3
EMB-120 ER	RIGID PAVEMENT	Maximum Taxi Weight	6.9	7.3	7.7	8.0
		Operational Empty Weight	2.9	3.1	3.3	3.5
	FLEXIBLE PAVEMENT	Maximum Taxi Weight	5.8	6.1	7.0	8.0
		Operational Empty Weight	2.5	2.6	2.9	3.3

NOTE: The value used for Operational Empty Weight (6500 kg) in the ACN charts (Figures 7-5 and 7-6) is the minimum value for both versions of EMB-120 (RT and ER).

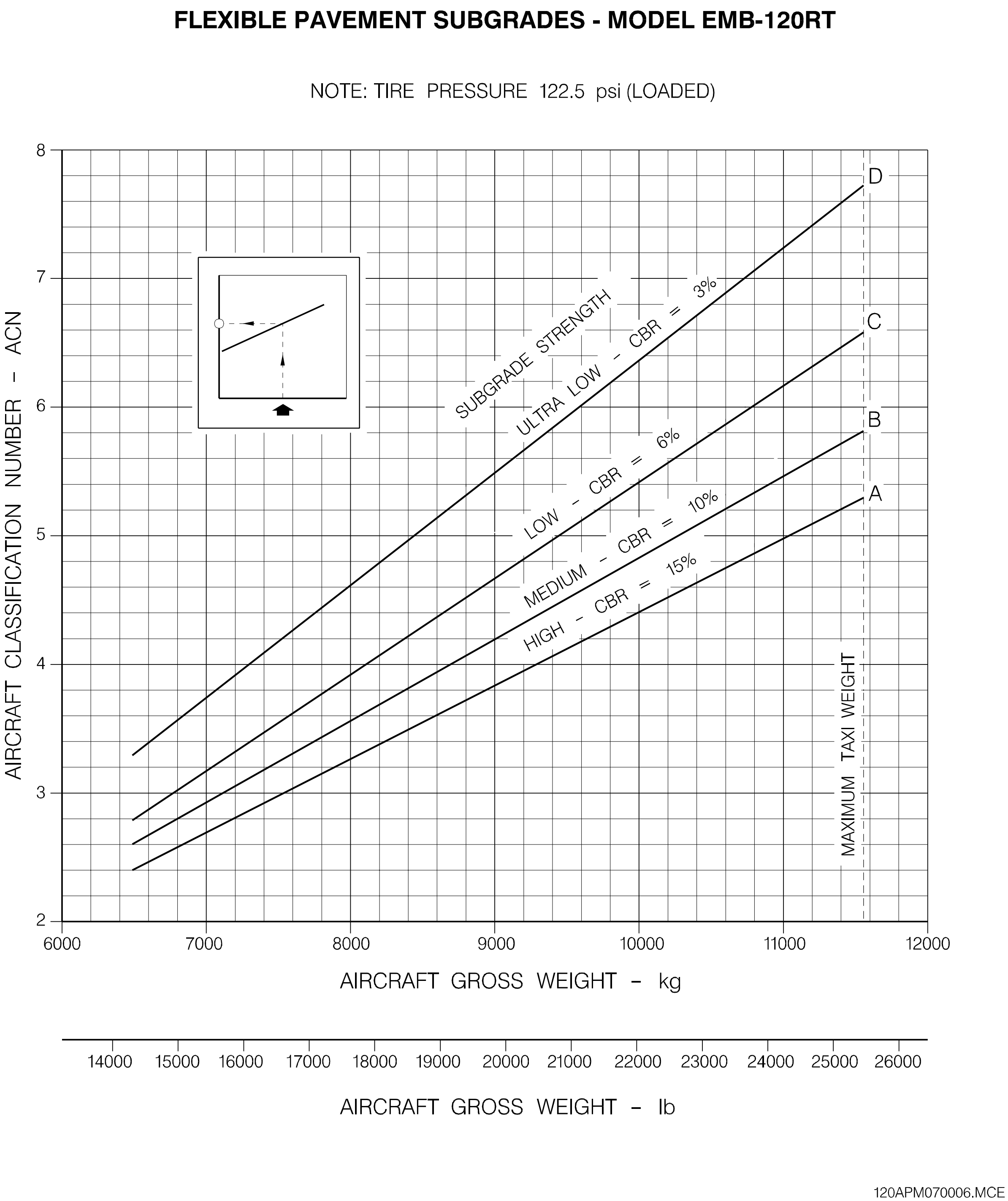
The four subgrade categories for flexible pavements are.

Code A	High Strength...............	CBR 15
Code B	Medium Strength.............	CBR 10
Code C	Low Strength................	CBR 5
Code D	Ultra Low Strength..........	CBR 3

The four subgrade categories for rigid pavements are.

Code A	High Strength....................	K = 150 MN/m^3 (550 lb/in^3)
Code B	Medium Strength....................	K = 80 MN/m^3 (300 lb/in^3)
Code C	Low Strength.......................	K = 40 MN/m^3 (150 lb/in^3)
Code D	Ultra Low Strength.................	K = 20 MN/m^3 (75 lb/in^3)

7.5.1. AIRCRAFT CLASSIFICATION NUMBER FLEXIBLE PAVEMENT EMB-120RT

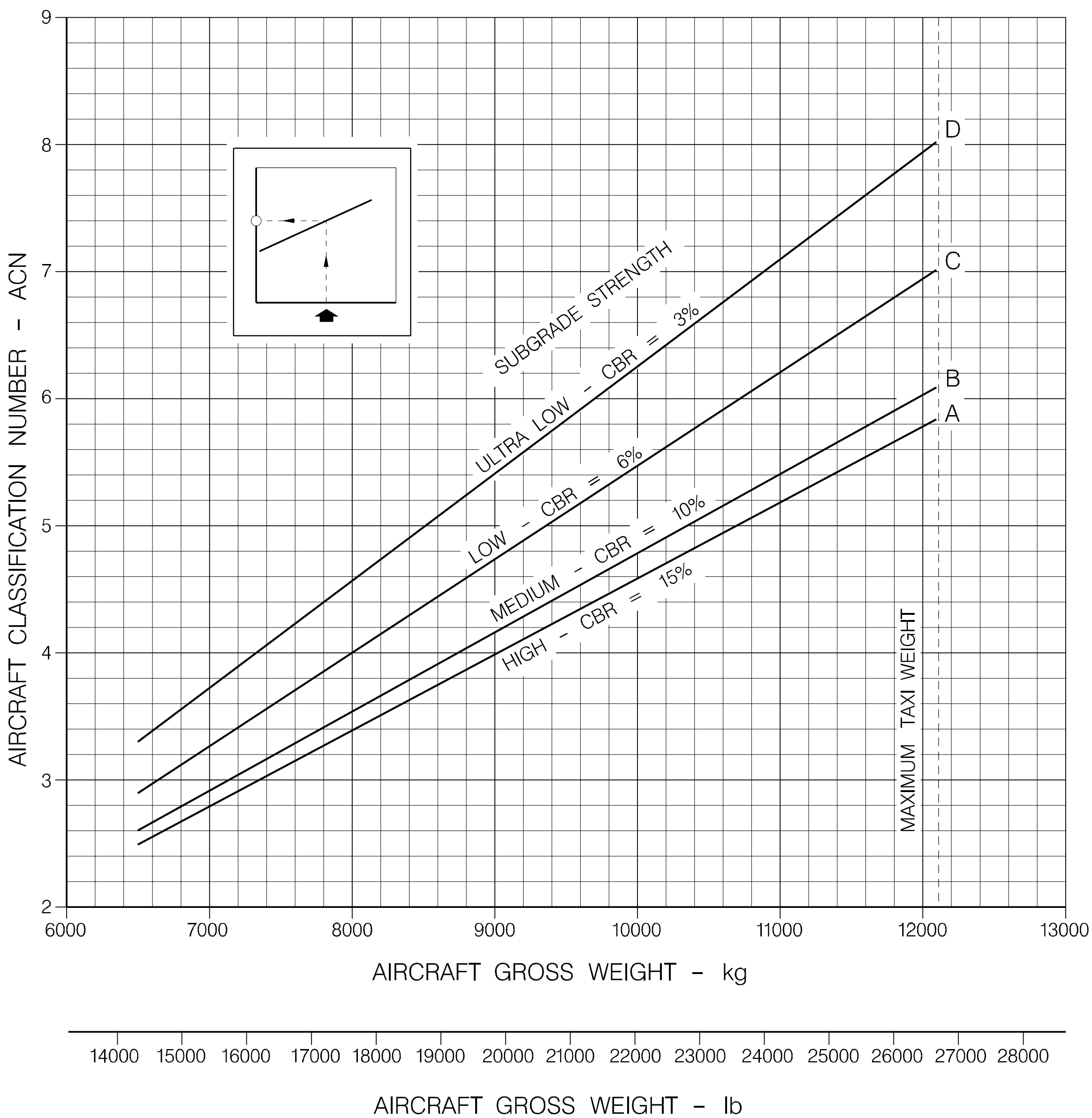


Aircraft Classification Number - Flexible Pavement

Figure 7-5 (Sheet 1)

FLEXIBLE PAVEMENT SUBGRADES - MODEL EMB-120ER

NOTE: TIRE PRESSURE 134 psi (LOADED)



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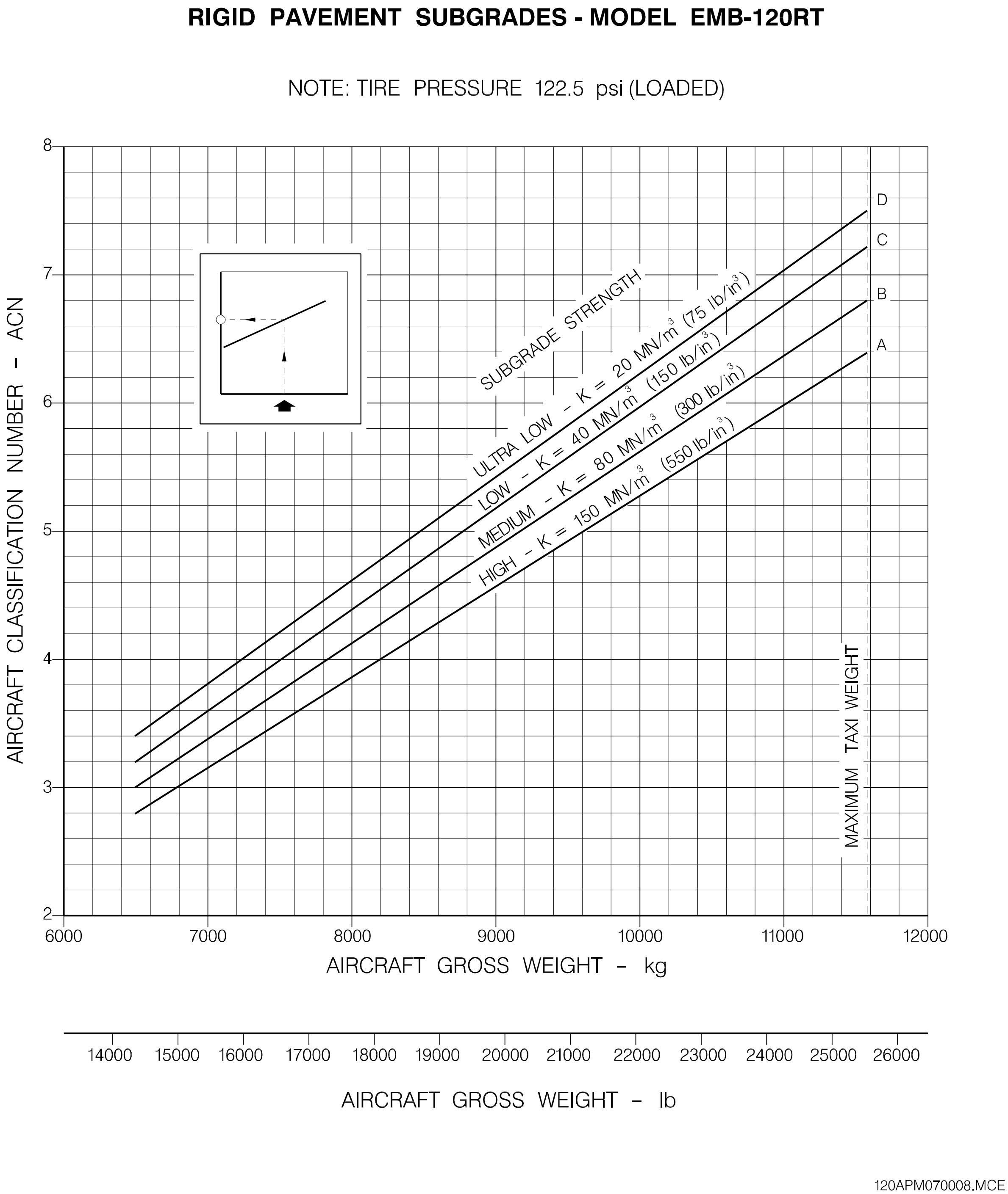
Aircraft Classification Number - Flexible Pavement
Figure 7-5 (Sheet 2)

7.5.2. AIRCRAFT CLASSIFICATION NUMBER RIGID PAVEMENT EMB-120RT

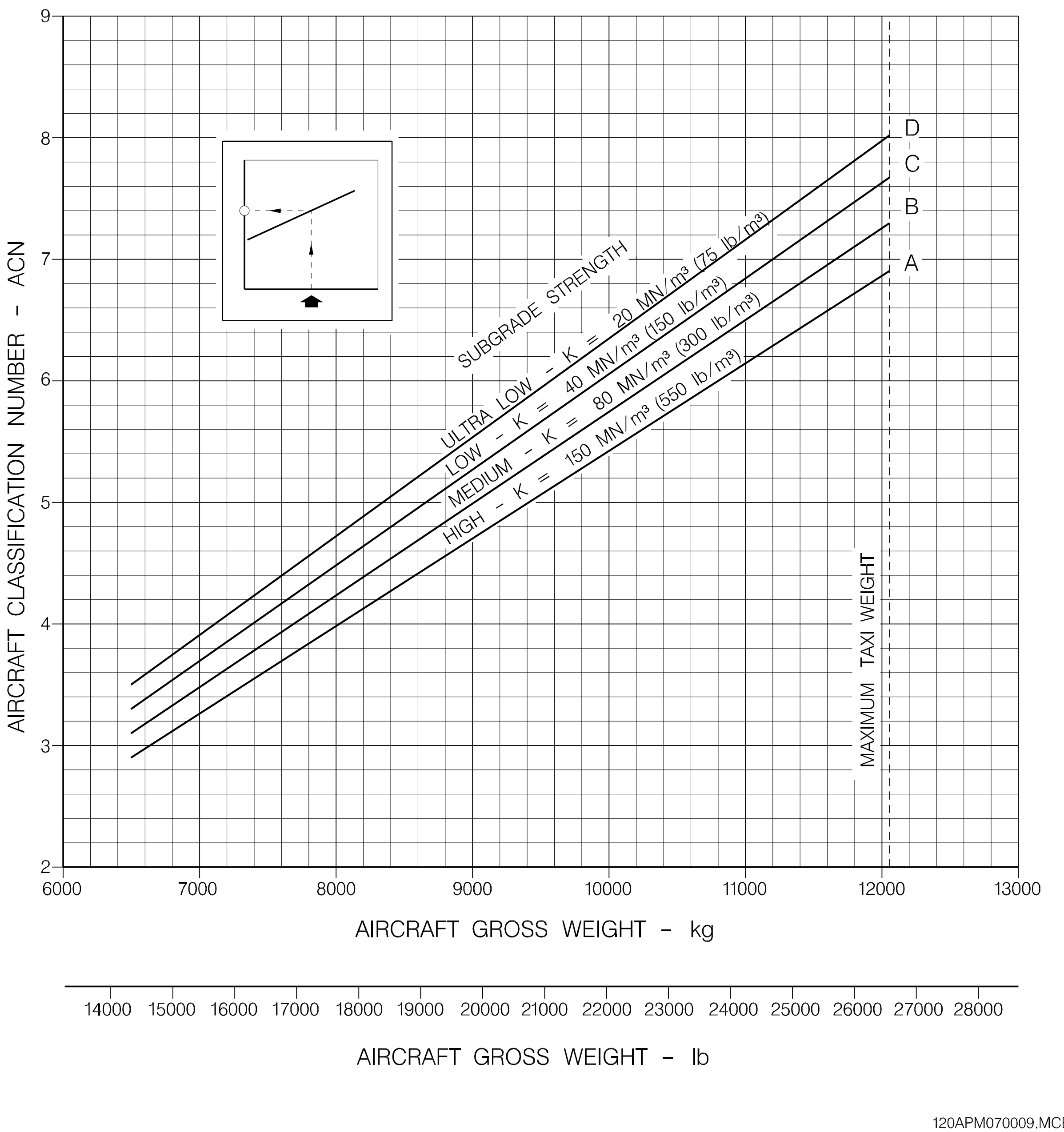


Aircraft Classification Number - Rigid Pavement

Figure 7-6 (Sheet 1)

RIGID PAVEMENT SUBGRADES - MODEL EMB-120ER

NOTE: TIRE PRESSURE 134 psi (LOADED)



Aircraft Classification Number - Rigid Pavement

Figure 7-6 (Sheet 2)

7.6. FLEXIBLE PAVEMENT REQUIREMENTS

The flexible pavement design curves (Figure 7-7 Sheets 1 and 2) are based on procedures set forth in Instruction Report No. S-77-1, "Procedures for Development of CBR Design Curves", dated June 1977, and as modified according to the methods described in FAA Advisory Circular 150/5320-6D, "Airport Pavement Design and Evaluation", dated July 7, 1995. Instruction Report No. S-77-1 was prepared by the US Army Corps of Engineers Waterways Experiment Station, Soils and Pavements Laboratory, Vicksburg, Mississippi. The line showing 10,000 coverages is used to calculate Aircraft Classification Number (ACN).

The design criteria involve the use of several significant parameters, including load, load distribution, load repetitions, strength and thickness. The first three are concerned with the loading delivered to the pavement, whereas strength and thickness are concerned with the pavement and the materials of which it is constructed.

The design curves presented treat load in terms of gross aircraft weight.

In working with the design criteria, load repetitions were dealt with in terms of annual departures. The criteria are for a 20-year life.

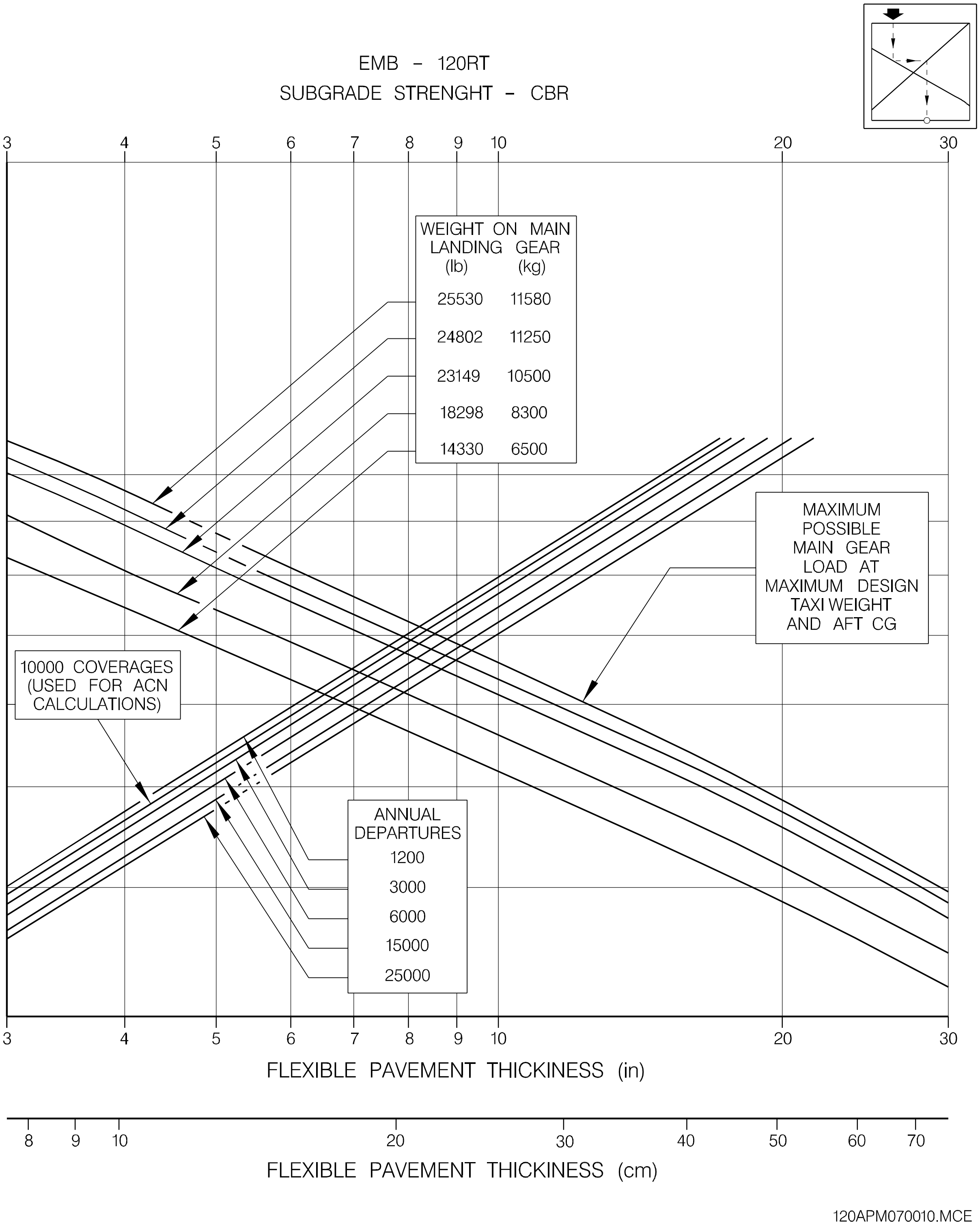
Strength consideration include the ability of the pavement to resist shear deformation and densification. The strength of soil in regard to its resistance to shear deformation is assessed by use of the California Bearing Ratio (CBR).

Thickness of overlying construction is the parameter which determines the protection of a layer of given strength from the load applied to the pavement surface above it.

In the example show in Figure 7-7 Sheet 1, for a CBR of 5 and an annual departure level of 1.200, the required flexible pavement thickness for a gross weight of 11.580 kg (25.530 lb) is 31 cm (12.2 in).

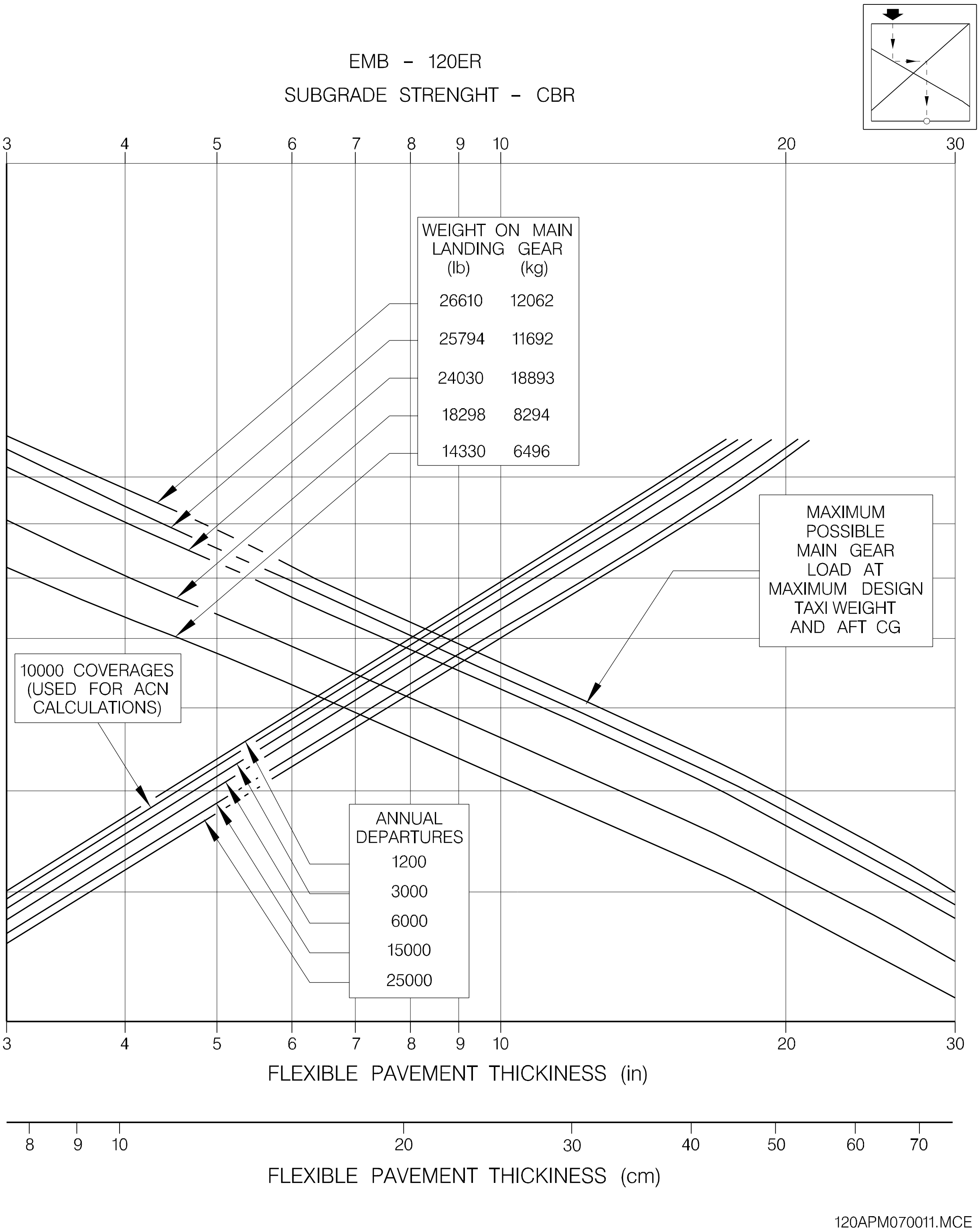
The LCN Method curves for flexible pavements (Figure 7-8 Sheets 1 and 2) have been built using procedures and curves in the International Civil Aviation Organization (ICAO) Aerodrome Design Manual, Part 3 - Pavements, Document 9157-AN/901, 1983.
The same chart includes the data of equivalent single-wheel load versus pavement thickness.

7.6.1. FLEXIBLE PAVEMENT REQUIREMENTS - US ARMY CORPS OF ENGINEERS DESIGN METHOD



Flexible Pavement Requirements - US Army Corps of Engineers Design Method

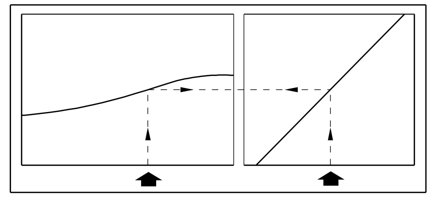
Figure 7-7 (Sheet 1)

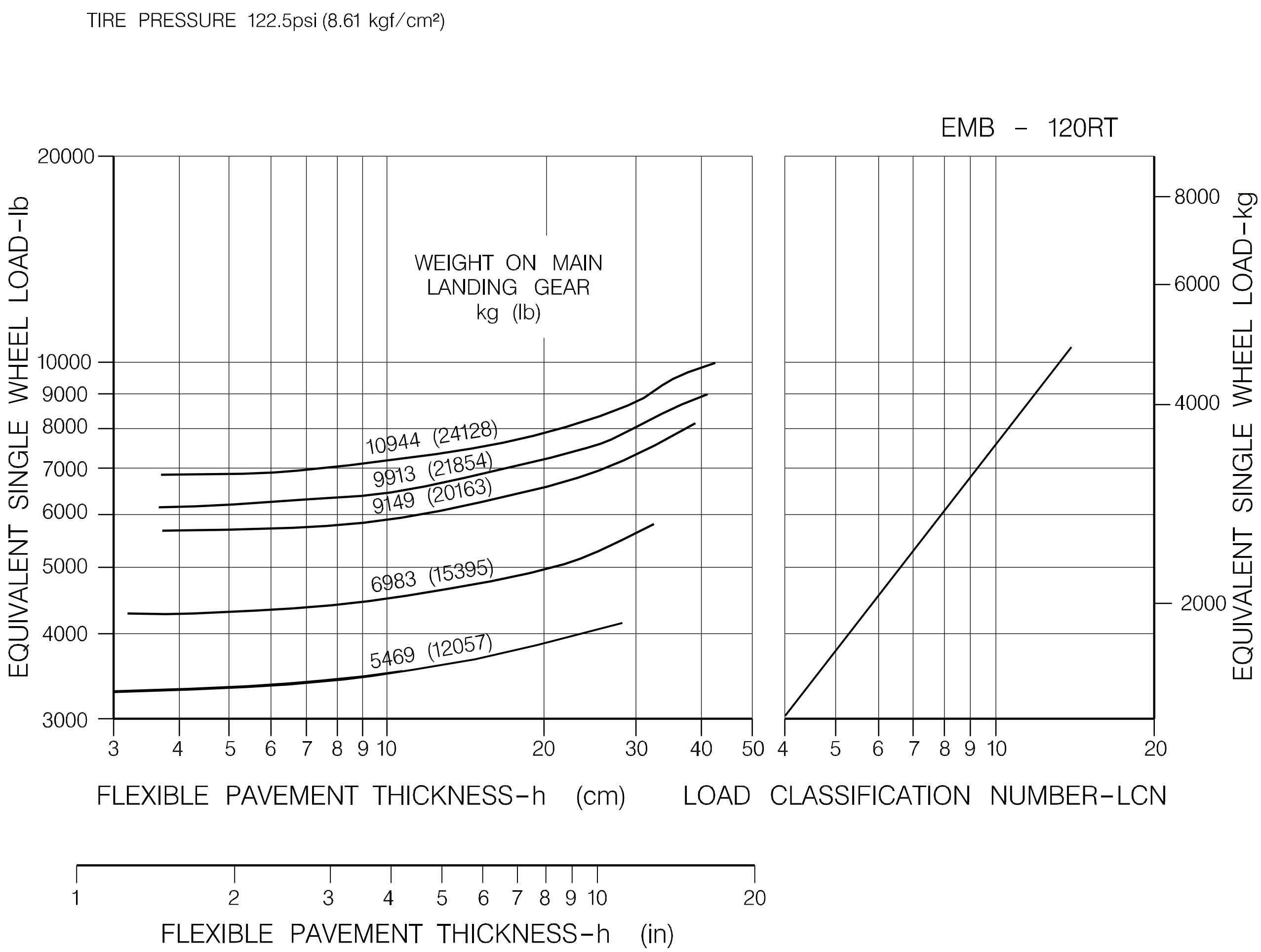


Flexible Pavement Requirements - US Army Corps of Engineers Design Method

Figure 7-7 (Sheet 2)

7.6.2. FLEXIBLE PAVEMENT REQUIREMENT - LCN METHOD





NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN I C A O AERODROME MANUAL. PART 2, PAR. 4.1.3

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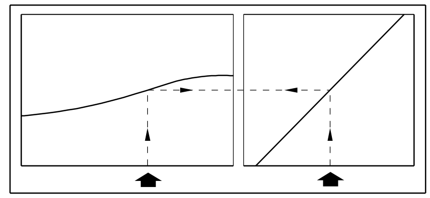
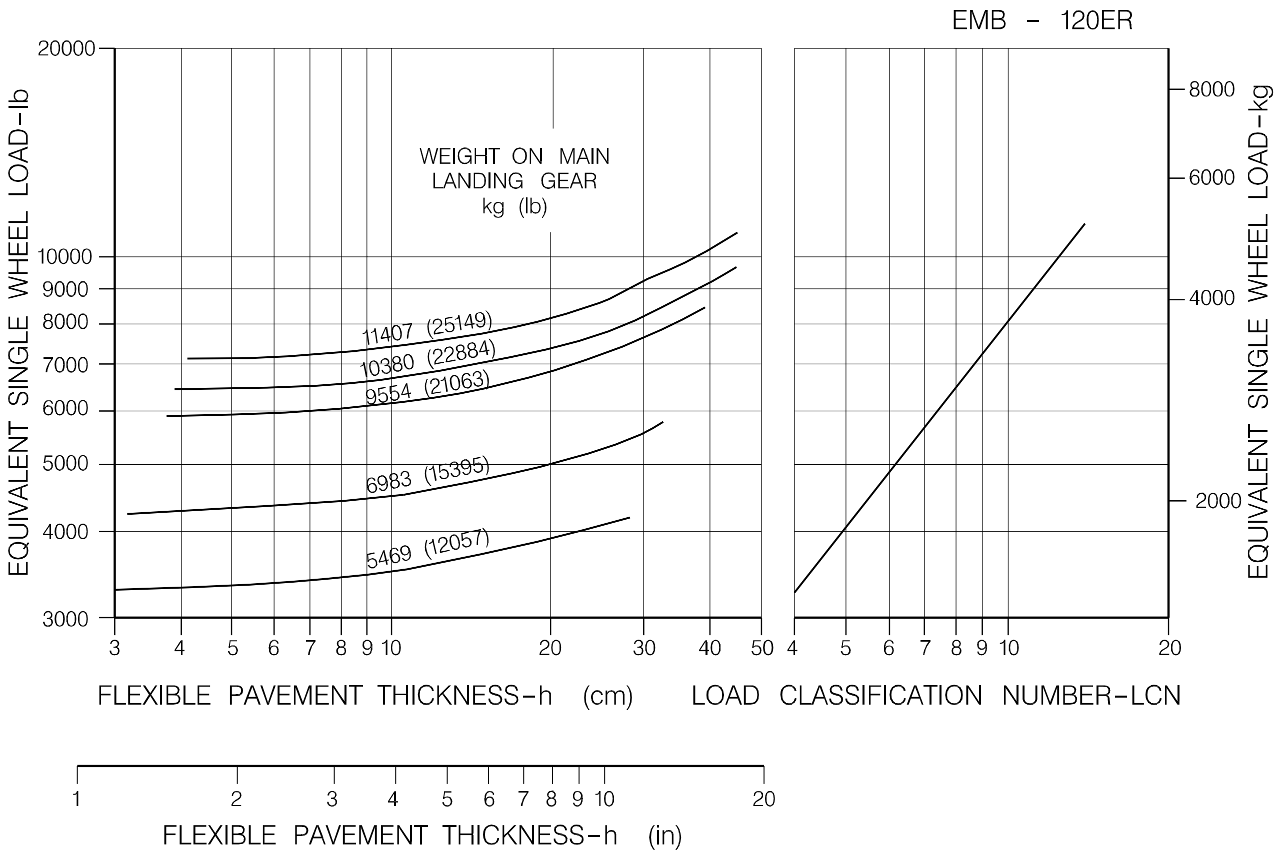
Flexible Pavement Requirements - LCN Method

Figure 7-8 (Sheet 1)



TIRES PRESSURE 134 psi (9.42 kgf/cm²) (LOADED)



NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN I C A O AERODROME MANUAL. PART 2, PAR. 4.1.3

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Flexible Pavement Requirements - LCN Method

Figure 7-8 (Sheet 2)

7.7. RIGID PAVEMENT REQUIREMENTS - PORTLAND CEMENT ASSOCIATION (PCA) DESIGN METHOD

Rigid pavement design curves (Figure 7-9 Sheets 1 and 2) have been prepared with the use of the Westergaard Equation in general accordance with the procedures outlined in the 1955 edition of “Design of Concrete Airport Pavement” published by the Portland Cement Association, 33 W. Grand Ave., Chicago 10, Illinois, but modified to the new format described in the 1968 Portland Cement Association publication, “Computer Program for Concrete Airport Pavement Design” (Program PDILB) by Robert G. Packard. The following procedure is used to develop rigid pavement design curves such as that shown in the Figures 7-9.

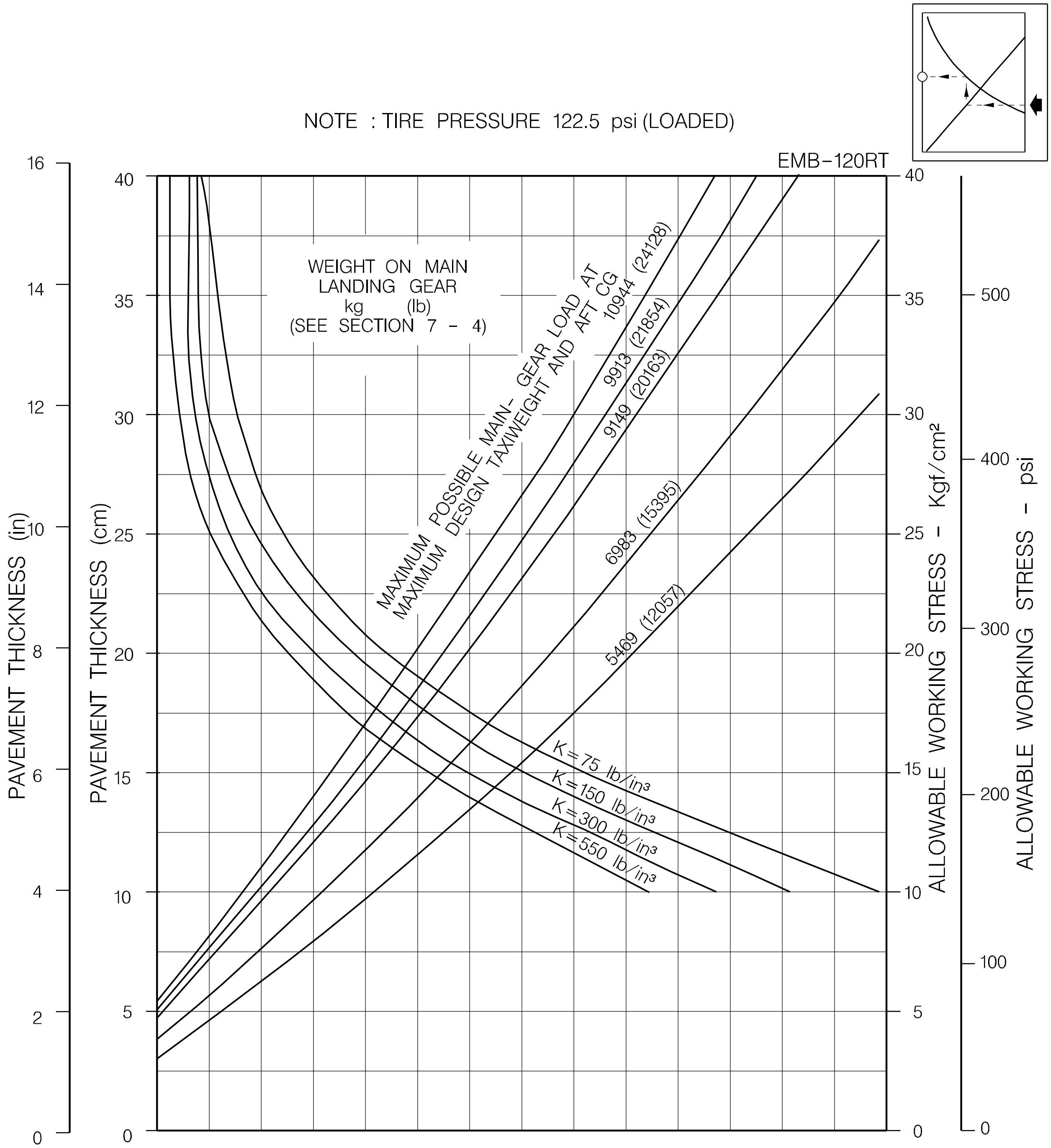
1. Once the scale for the pavement thickness to the left and the scale for allowable working stress to the right have been established, an arbitrary load line is drawn representing the main landing gear maximum weight to be shown.

2. All values of the subgrade modulus (k-values) are then plotted.

3. Additional load lines for the incremental values of weight on the main landing gear are then established on the basis of the curve for k = 300, already established.

Strength considerations include resisting stresses applied to the foundation by the loaded slab. Stress can be controlled by increasing the strength of the soil layer supporting the pavement slab or by increasing the thickness of the slab.

The design of rigid pavements is based upon the critical tensile stresses produced by the aircraft loads. The ability of the pavement to withstand these stresses is, in turn determined by the strength of the concrete.



NOTE : THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUE OF "K" ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K=300 BUT DEVIATE SLIGHTLY FOR OTHER VALUES OF "K".

REFERENCE: PORTLAND CEMENT ASSOCIATION METHOD.

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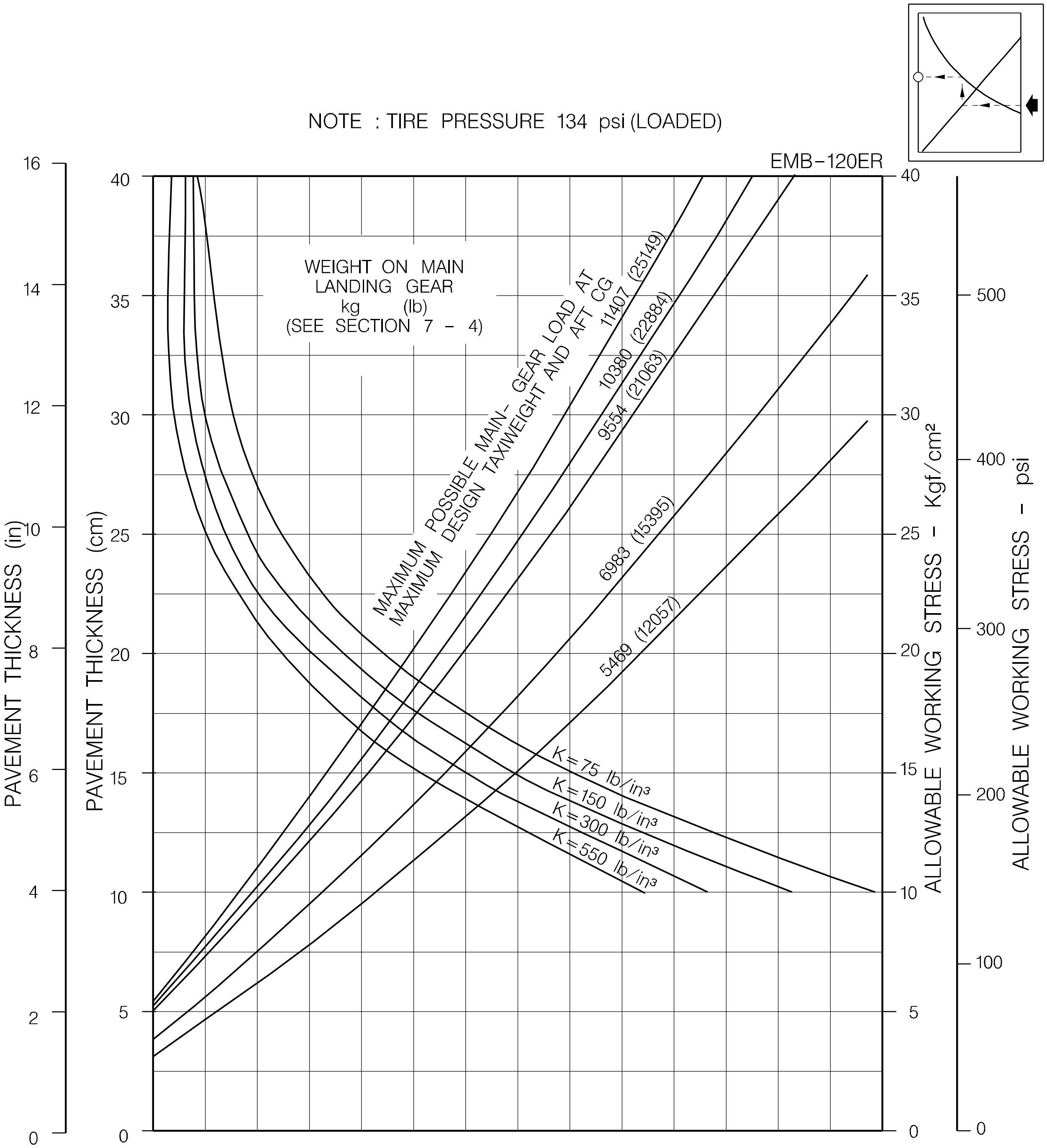
Rigid Pavement Requirements - Portland Cement Association Design Method

Figure 7-9 (Sheet 1)



NOTE : THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUE OF "K" ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K=300 BUT DEVIATE SLIGHTLY FOR OTHER VALUES OF "K".

REFERENCE: PORTLAND CEMENT ASSOCIATION METHOD.

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Rigid Pavement Requirements - Portland Cement Association Design Method

Figure 7-9 (Sheet 2)

7.8. RIGID PAVEMENT REQUIREMENTS - LCN METHOD

The LCN conversion curves for rigid pavements (Figure 12 - Sheets 1 and 2) have been built using procedures and curves in (ICAO) Aerodrome Design Manual, Part 3 - Pavements, document 9157-AN/901, 1983. The same chart includes the data of equivalent single-wheel load versus radius of relative stiffness. Radius of relative stiffness values are obtained from Subsections 7.8.1. and 7.8.2.

To determine the airplane weight that can be accommodated on a particular rigid airport pavement, both the LCN of the pavement and the radius of relative stiffness must be known.

7.8.1. RADIUS OF RELATIVE STIFFNESS

RADIUS OF RELATIVE STIFFNESS (ℓ)
VALUES IN INCHES

$$\ell = \sqrt[4]{\frac{Ed^3}{12(1-\mu^2)k}} = 24.1652 \sqrt[4]{\frac{d^3}{k}}$$

WHERE: E = YOUNG'S MODULUS = 4×10^6 psi
k = SUBGRADE MODULUS, lb/in^3
d = RIGID-PAVEMENT THICKNESS. in.
μ = POISSON'S RATIO = 0.15

d(in)	k=75	k=100	k=150	k=200	k=250	k=300	k=350	k=400	k=500	k=550
6.0	31.48	29.30	26.47	24.63	23.30	22.26	21.42	20.72	19.59	19.13
6.5	33.43	31.11	28.11	26.16	24.74	23.64	22.74	22.00	20.80	20.31
7.0	35.34	32.89	29.72	27.65	26.15	24.99	24.04	23.25	21.99	21.47
7.5	37.22	34.63	31.29	29.12	27.54	26.32	25.32	24.49	23.16	22.61
8.0	39.06	36.35	32.85	30.57	28.91	27.62	26.58	25.70	24.31	23.74
8.5	40.88	38.04	34.37	31.99	30.25	28.91	27.81	26.90	25.44	24.84
9.0	42.67	39.71	35.88	33.39	31.58	30.17	29.03	28.08	26.55	25.93
9.5	44.43	41.35	37.36	34.77	32.89	31.42	30.23	29.24	27.65	27.00
10.0	46.18	42.97	38.83	36.14	34.17	32.65	31.42	30.39	28.74	28.06
10.5	47.90	44.57	40.28	37.48	35.45	33.87	32.59	31.52	29.81	29.11
11.0	49.60	46.16	41.71	38.81	36.71	35.07	33.75	32.64	30.87	30.14
11.5	51.28	47.72	43.12	40.13	37.95	36.26	34.89	33.74	31.91	31.16
12.0	52.94	49.27	44.52	41.43	39.18	37.44	36.02	34.84	32.95	32.17
12.5	54.59	50.80	45.90	42.72	40.40	38.60	37.14	35.92	33.97	33.17
13.0	56.22	52.32	47.27	43.99	41.61	39.75	38.25	36.99	34.99	34.16
13.5	57.83	53.82	48.63	45.26	42.80	40.89	39.35	38.06	35.99	35.14
14.0	59.43	55.31	49.98	46.51	43.98	42.02	40.44	39.11	36.99	36.12
14.5	61.02	56.78	51.31	47.75	45.16	43.15	41.51	40.15	37.97	37.08
15.0	62.59	58.25	52.63	48.98	46.32	44.26	42.58	41.19	38.95	38.03
15.5	64.15	59.70	53.94	50.20	47.47	45.36	43.64	42.21	39.92	38.98
16.0	65.69	61.13	55.24	51.41	48.62	46.45	44.70	43.23	40.88	39.92
16.5	67.23	62.56	56.53	52.61	49.75	47.54	45.74	44.24	41.84	40.85
17.0	68.75	63.98	57.81	53.80	50.88	48.61	46.77	45.24	42.78	41.78
17.5	70.26	65.38	59.08	54.98	52.00	49.68	47.80	46.23	43.72	42.70
18.0	71.76	66.78	60.34	56.15	53.11	50.74	48.82	47.22	44.66	43.61
18.5	73.25	68.17	61.60	57.32	54.21	51.80	49.84	48.20	45.59	44.51
19.0	74.73	69.54	62.84	58.48	55.31	52.84	50.84	49.17	46.51	45.41
19.5	76.20	70.91	64.08	59.63	56.39	53.88	51.84	50.14	47.42	46.30
20.0	77.66	72.27	65.30	60.77	57.47	54.91	52.84	51.10	48.33	47.19
20.5	79.11	73.62	66.52	61.91	58.55	55.94	53.83	52.06	49.23	48.07
21.0	80.55	74.96	67.74	63.04	59.62	56.96	54.81	53.01	50.13	48.95
21.5	81.99	76.30	68.94	64.16	60.68	57.97	55.78	53.95	51.02	49.82
22.0	83.41	77.63	70.14	65.28	61.73	58.98	56.75	54.89	51.91	50.69
22.5	84.83	78.95	71.34	66.38	62.78	59.99	57.72	55.82	52.79	51.55
23.0	86.24	80.26	72.52	67.49	63.83	60.98	58.68	56.75	53.67	52.41
23.5	87.64	81.56	73.70	68.59	64.86	61.97	59.63	57.67	54.54	53.26
24.0	89.04	82.86	74.87	69.68	65.90	62.96	60.58	58.59	55.41	54.11
24.5	90.43	84.15	76.04	70.76	66.92	63.94	61.52	59.50	56.28	54.95
25.0	91.81	85.44	77.20	71.84	67.95	64.92	62.46	60.41	57.14	55.79

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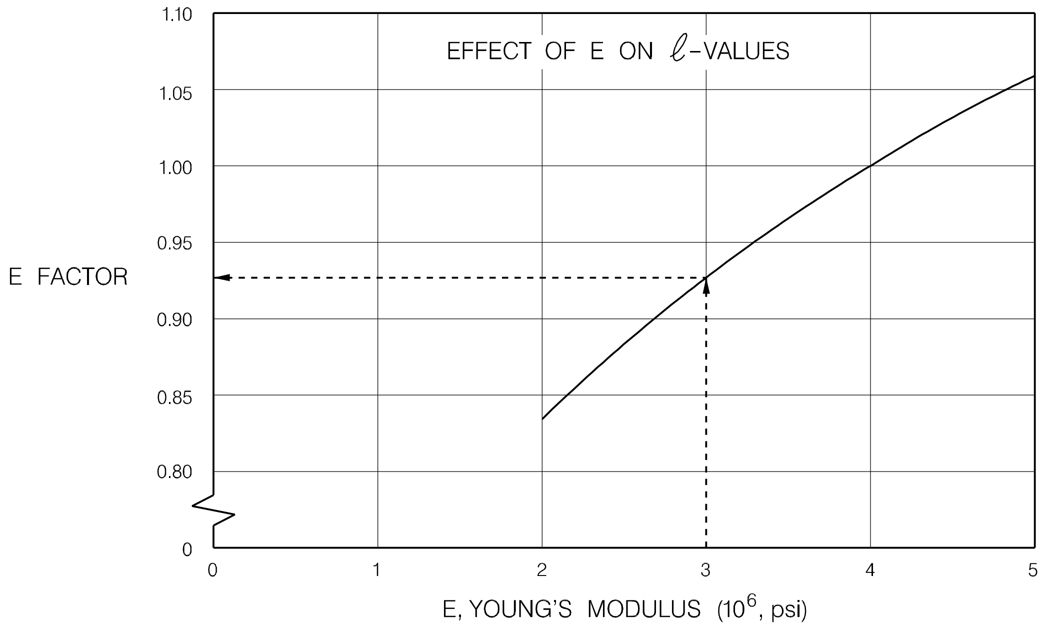
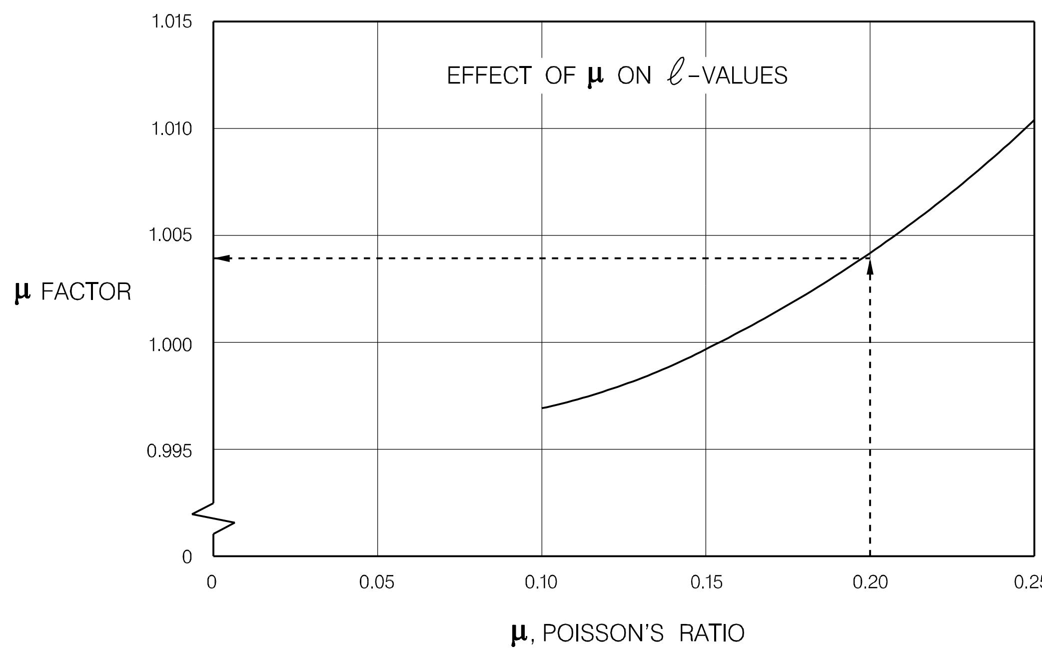
Radius of Relative Stiffness

Figure 7-10

7.8.2. RADIUS OF RELATIVE STIFFNESS (OTHER VALUES)

The table of section 7.8.1. (Figure 7-10) presents the (RRS) Radius of Relative Stiffness values based on Young's modulus (E) of 4,000,000 psi and Poisson's ratio (μ) of 0.15.
For convenience in finding this Radius based on other values of E and μ, the curves of section 7.8.2. are included.
For example, to find a RRS value based on an E of 3,000,000 psi, the "E" factor of 0.931 is multiplied by the RRS value found in figure 7-11. The effect of the variations of μ on the RRS value is treated in a similar manner.





NOTE: BOTH CURVES ON THIS PAGE ARE USED TO ADJUST THE ℓ-VALUES.

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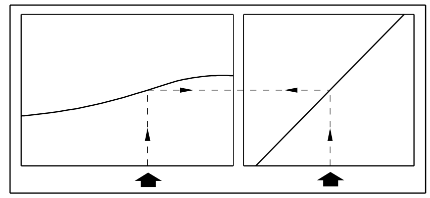
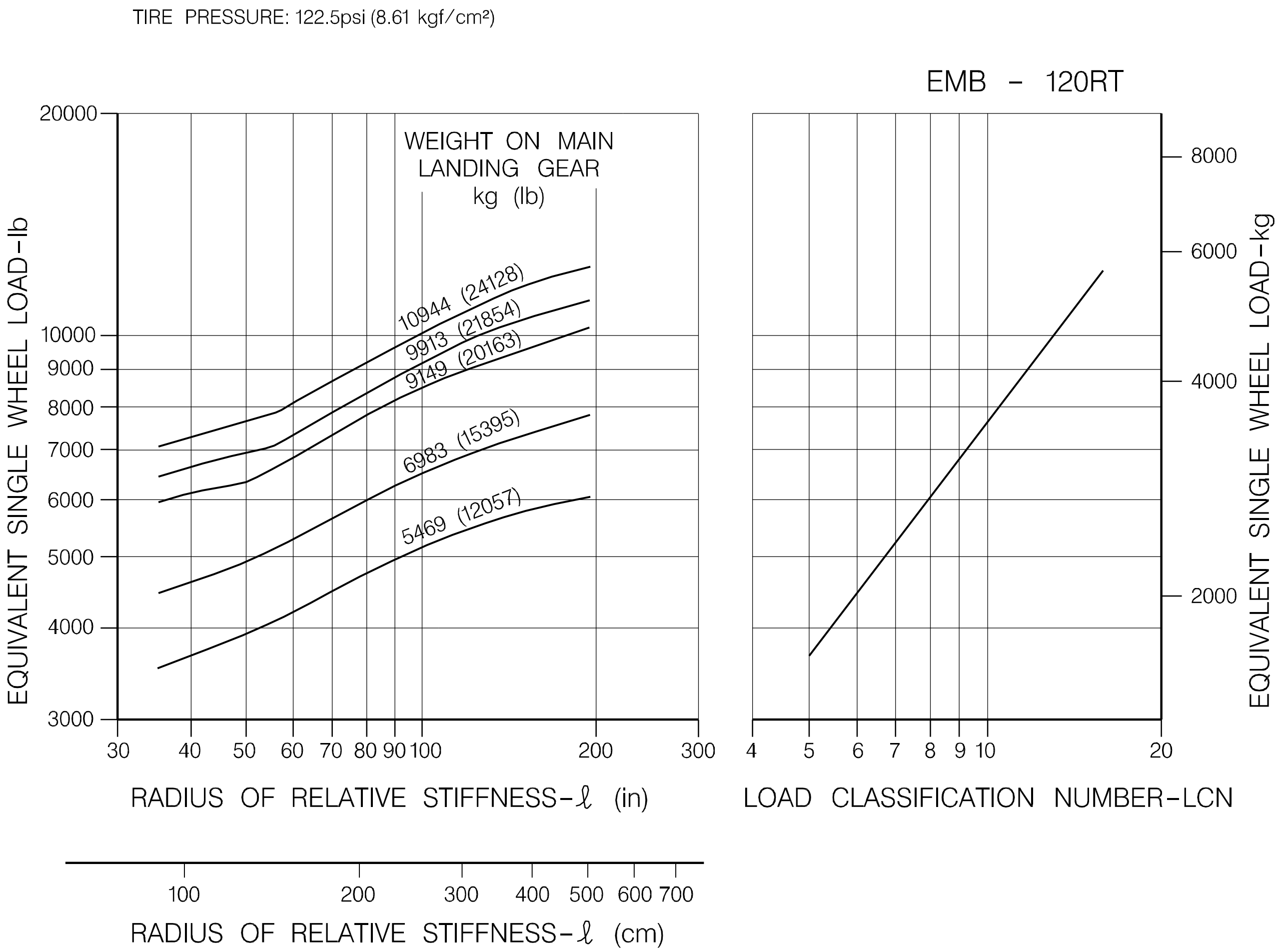
Radius of Relative Stiffness (Other Values)
Figure 7-11





NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN I C A O AERODROME MANUAL. PART 2, PAR. 4.1.3

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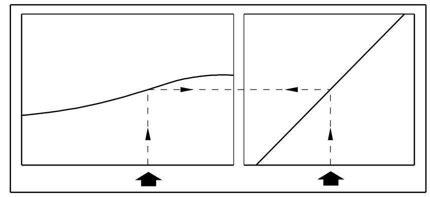
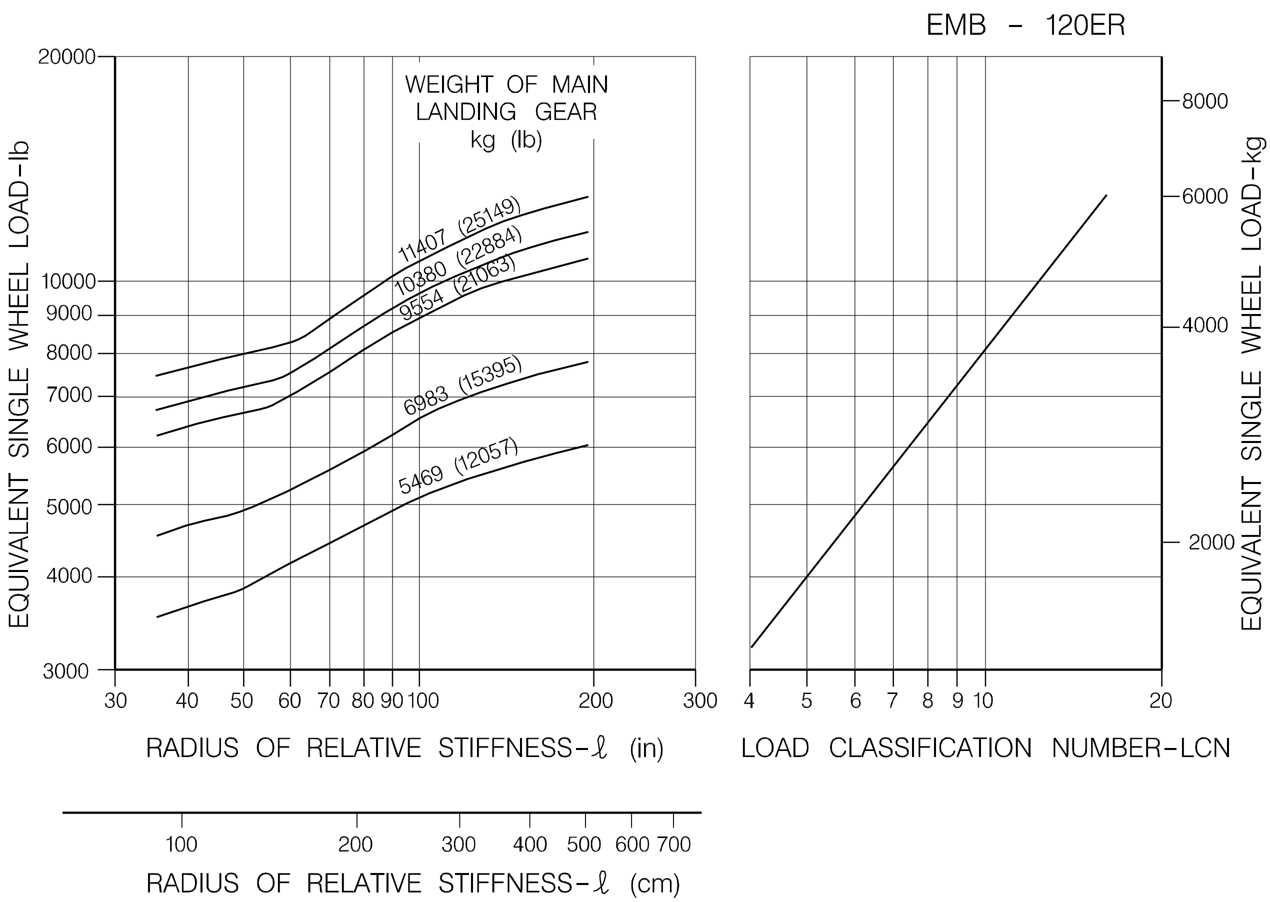
Rigid Pavement Requirements - LCN Method

Figure 7-12 (Sheet 1)



TIRES PRESSURE 134 psi (9.42 kgf/cm²) (LOADED)



NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN I C A O AERODROME MANUAL. PART 2, PAR. 4.1.3

120APM070018.MCE

Rigid Pavement Requirements - LCN Method

Figure 7-12 (Sheet 2)

7.9. UNSURFACED SOIL AREAS REQUIREMENTS

Unsurfaced soil areas may be used by aircraft where the strength is sufficient.

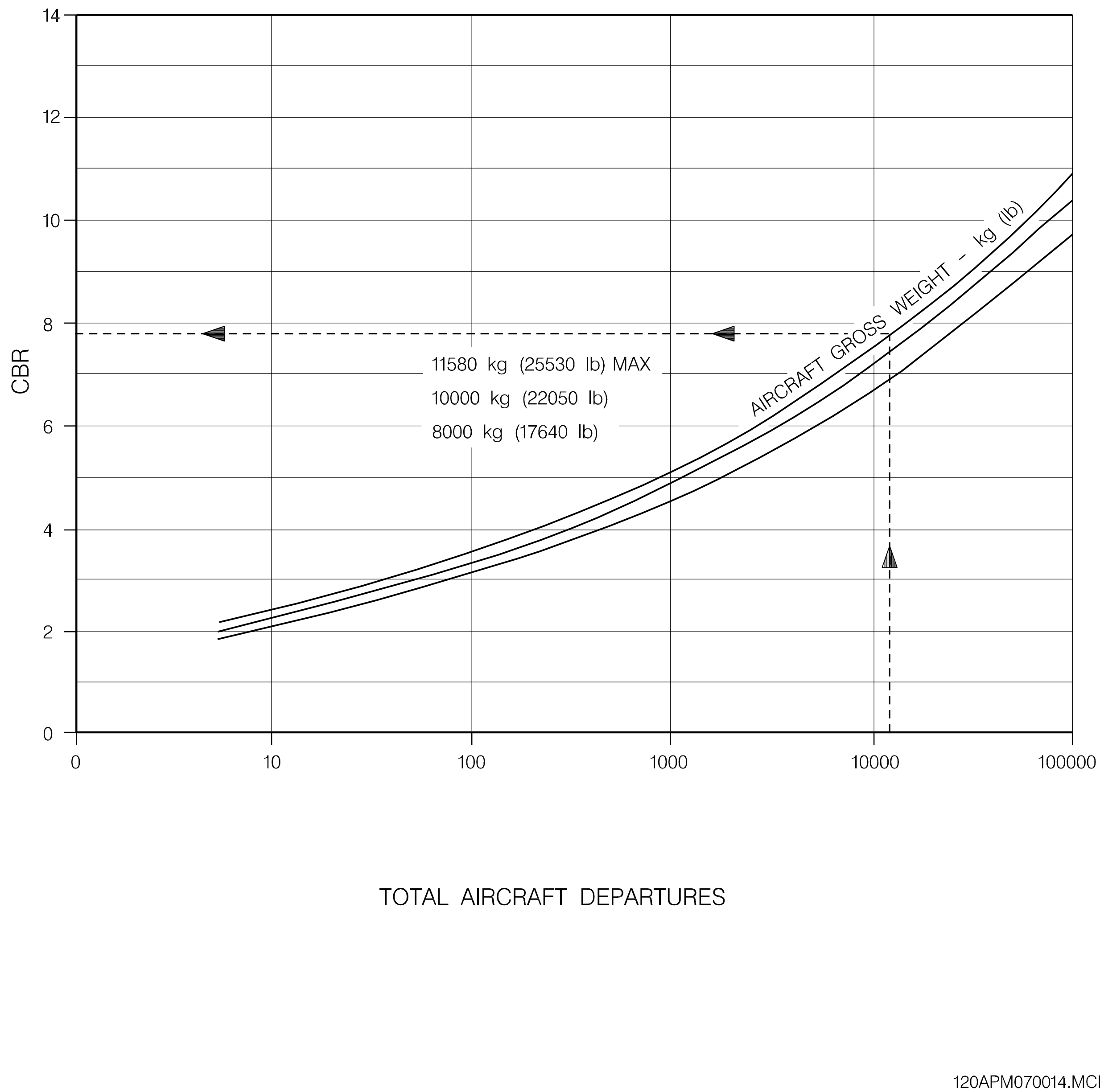
There are instances when the natural subgrade do not have sufficient strength to support a particular load, so that a soil or aggregate strengthening layer is required on top of the subgrade.

The CBR is the soil strength parameter used in unsurfaced soil strength determinations.

A thickness of higher strength soil is at times needed above the subgrade to upgrade the capacity of an unsurfaced soil area, when the is situ soil does not have the strength needed to support the antecipated traffic.

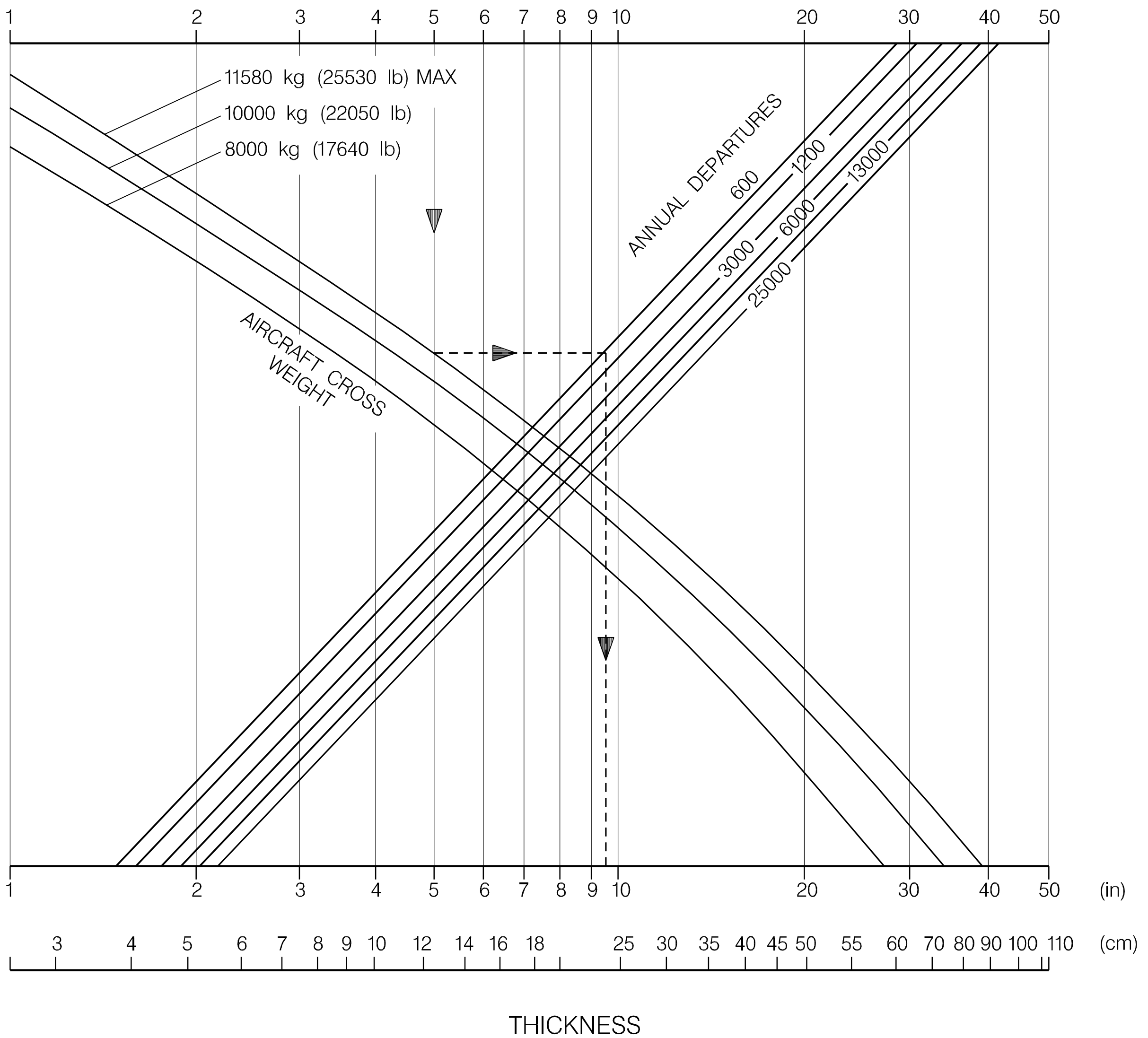
To illustrate the use of the soil strength criteria, assume that an unsurfaced airfield is to be designed for 12.000 departures of EMB-120 (BRASILIA), having a gross weight of 11.580 kg (25.530 lb). Enter the curves in Figure 7-13, with the 12.000 aircraft departures, move vertically to the 11.580 kg line, then horizontally to the CBR scale and read a value of 7.8. This indicates that a soil having a CBR of 7.8 or greater will support 12.000 departures of EMB-120 with a gross weight of 11.580 kg (25.530 lb).

The above example illustrating the soil strength criteria indicated that a CBR of 7.8 was required in order to support 12.000 departures of EMB-120 having a gross weight of 11.580 kg (25.530 lb). Assume that an airfield is to be provided for EMB-120 at a location where the in-place CBR is 5. This will required some thickness of soil to be placed over the 5 CBR in order to support the EMB-120. The traffic level of 12.000 departures represents 600 annual departures for a 20-year life. From Figure 7-14, the thickness requirement for a 5 CBR, 600 annual departures and 11.580 kg (25.530 lb) gross weight is 23.4 cm (9.2 in). This thickness of soil must have a strength equal to the soil strength requirement of 7.8 CBR.



CBR Required for Supporting EMB-120 Brasilia on Unsurfaced Soils

Figure 7-13



Unsurfaced Soil Thickness Design for EMB-120 Brasilia

Figure 7-14

SECTION VIII

HANGAR AND SHOP ARRANGEMENTS

8.1. GENERAL INFORMATION

This section provides concepts of hangar and workstands for preliminary planning purposes. These concepts are not the result of detailed studies but are included to show the approximate area.

A maintenance hangar should provide a weather safe space where aircraft maintenance and repair may be accomplished. It may include space for aircraft shops, support equipment, and administration functions.
Plans for a maintenance facility should include the following considerations:

(a) Level of maintenance to be performed.

(b) Clearances - (i. e., hangar door height and ability to jack airplane to swing landing gear).

(c) Tug drive-through capability.

(d) Structural Materials/Design.

(e) Security.

(f) Local union working requirements.

(g) Environmental controls - prevailing winds and temperatures.

(h) Airplane capacity and storage space.

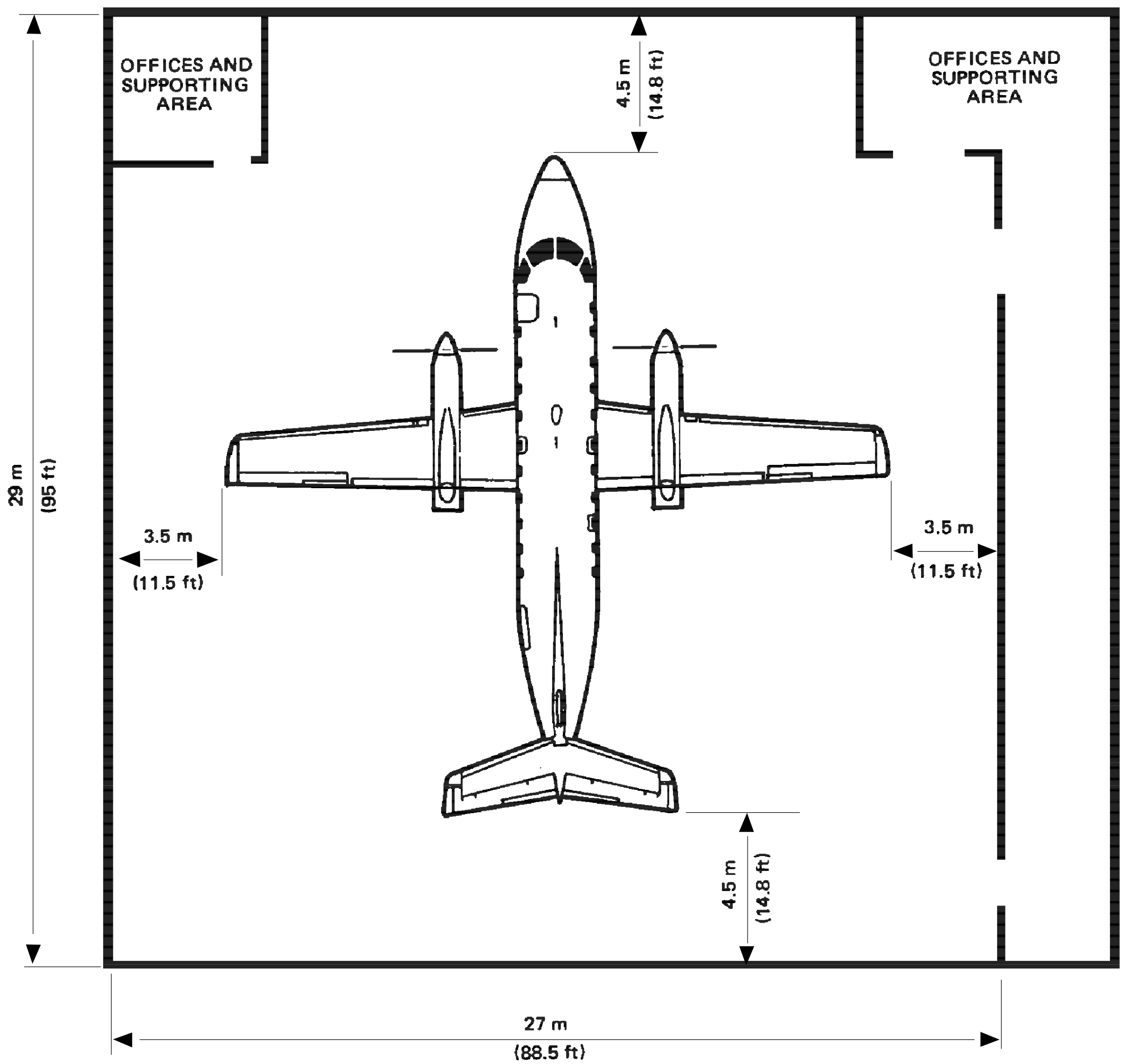
(i) Local building codes.

(j) Site location - with respect to taxiways, runways, and electronic requirements.

(k) Expansion.

(l) Special features:

- Cranes
- Landing gear pits
- Workstands
- Cleaning and painting
- Fire protection
- Drainage
- Pneumatic, electrical, and hydraulic connections



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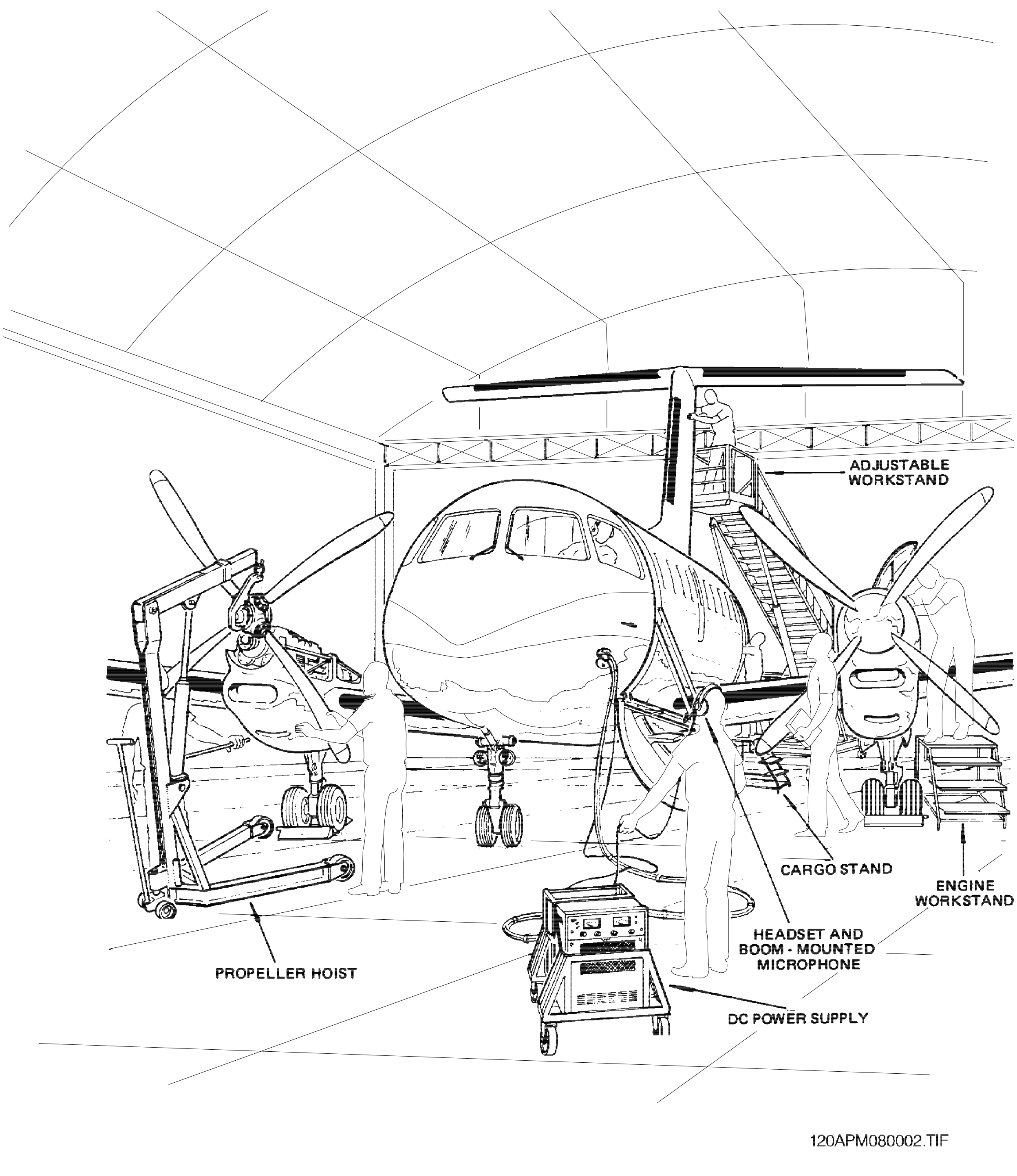
NOTE: CLEARANCES SHOWN ARE SUGGESTED AND ARE SUBJECT TO CHANGE DEPENDING ON TOW TRACTOR/TOW BAR COMBINATION AND TAIL STANDS USED

Single-bay Hangar and Supporting Area

Figure 8-1



Hangar and Supporting Equipment

Figure 8-2

SECTION IX

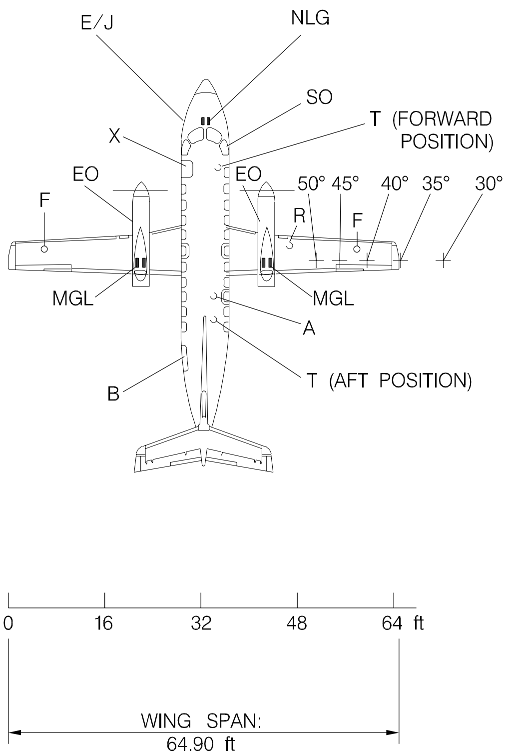
EMB-120 SCALE DRAWINGS

9.1. GENERAL INFORMATION

This section provides EMB-120 plan views to the following scales:

- English
  1 inch = 32 feet
  1 inch = 50 feet
  1 inch = 100 feet

- Metric
  1:500
  1:1000



LEGEND:

A	AIR CONDITIONING CONNECTION
B	BAGGAGE DOOR
E	ELECTRICAL POWER DC RECEPTACLE
EO	ENGINE OIL SUPPLY PANEL
F	GRAVITY FUEL FILLER
J	RAMP INTERPHONE JACKS
MLG	MAIN LANDING GEAR
NLG	NOSE LANDING GEAR
R	PRESSURE REFUELING AND DEFUELING CONNECTION
SO	OXYGEN SUPPLY RECEPTACLE
T	TOILET SERVICE
X	PASSENGER DOOR
+	TURNING RADIUS POINTS: 50°, 45°, 40°, 35°, 30°

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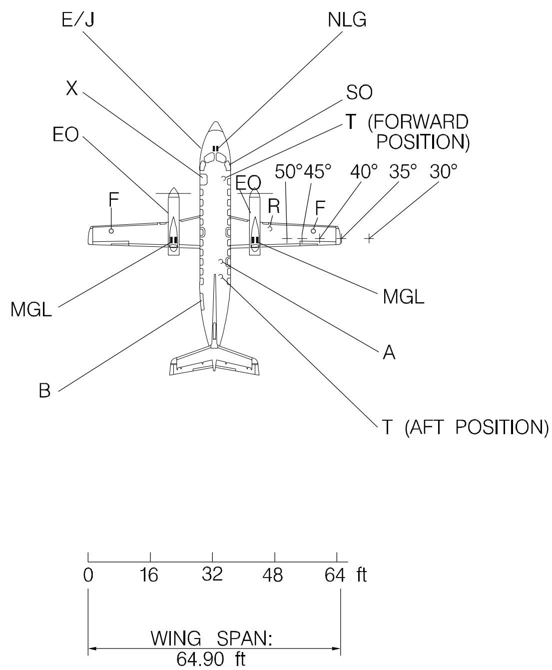
EMB-120 Scale: 1 inch equals 32 feet

Figure 9-1 (Sheet 1)



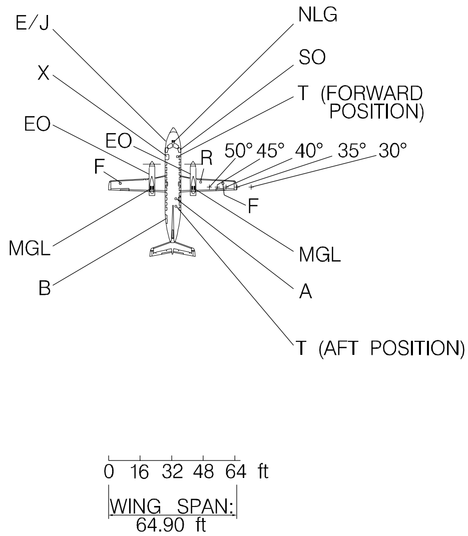
LEGEND:

A	AIR CONDITIONING CONNECTION
B	BAGGAGE DOOR
E	ELECTRICAL POWER DC RECEPTACLE
EO	ENGINE OIL SUPPLY PANEL
F	GRAVITY FUEL FILLER
J	RAMP INTERPHONE JACKS
MLG	MAIN LANDING GEAR
NLG	NOSE LANDING GEAR
R	PRESSURE REFUELING AND DEFUELING CONNECTION
SO	OXYGEN SUPPLY RECEPTACLE
T	TOILET SERVICE
X	PASSENGER DOOR
+	TURNING RADIUS POINTS: 50°, 45°, 40°, 35°, 30°

120APM090002.MCE

EMB-120 Scale: 1 inch equals 50 feet

Figure 9-1 (Sheet 2)



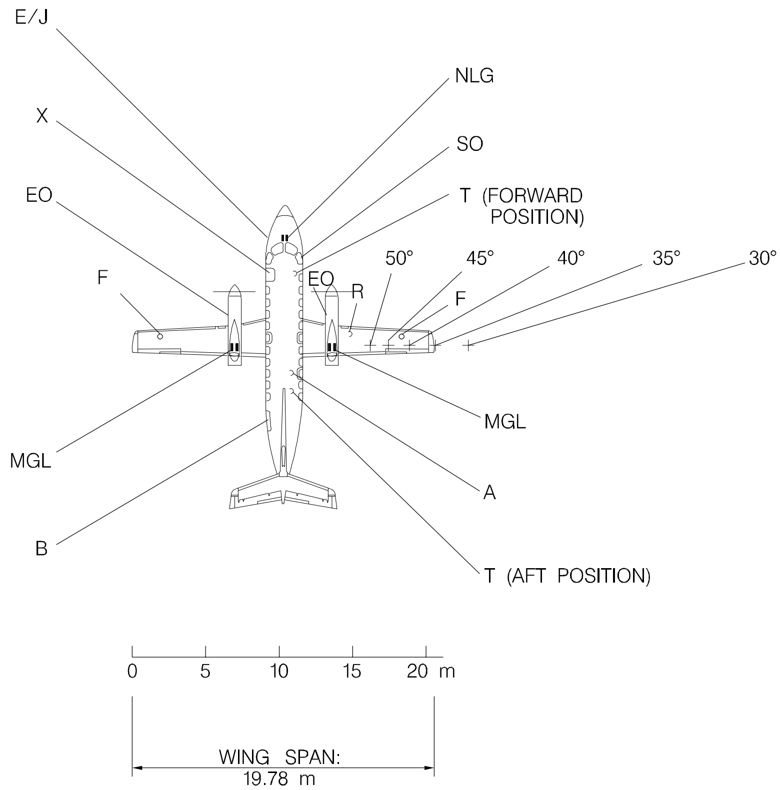
LEGEND:

A	AIR CONDITIONING CONNECTION
B	BAGGAGE DOOR
E	ELECTRICAL POWER DC RECEPTACLE
EO	ENGINE OIL SUPPLY PANEL
F	GRAVITY FUEL FILLER
J	RAMP INTERPHONE JACKS
MLG	MAIN LANDING GEAR
NLG	NOSE LANDING GEAR
R	PRESSURE REFUELING AND DEFUELING CONNECTION
SO	OXYGEN SUPPLY RECEPTACLE
T	TOILET SERVICE
X	PASSENGER DOOR
+	TURNING RADIUS POINTS: 50°, 45°, 40°, 35°, 30°

120APM090003.MCE

EMB-120 Scale: 1 inch equals 100 feet

Figure 9-1 (Sheet 3)



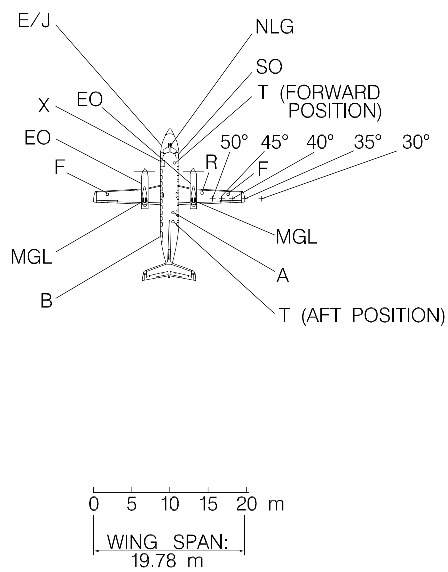
LEGEND:

A	AIR CONDITIONING CONNECTION
B	BAGGAGE DOOR
E	ELECTRICAL POWER DC RECEPTACLE
EO	ENGINE OIL SUPPLY PANEL
F	GRAVITY FUEL FILLER
J	RAMP INTERPHONE JACKS
MLG	MAIN LANDING GEAR
NLG	NOSE LANDING GEAR
R	PRESSURE REFUELING AND DEFUELING CONNECTION
SO	OXYGEN SUPPLY RECEPTACLE
T	TOILET SERVICE
X	PASSENGER DOOR
+	TURNING RADIUS POINTS: 50°, 45°, 40°, 35°, 30°

120APM090004.MCE

EMB-120 Scale: 1 to 500

Figure 9-2 (Sheet 1)



LEGEND:

A	AIR CONDITIONING CONNECTION
B	BAGGAGE DOOR
E	ELECTRICAL POWER DC RECEPTACLE
EO	ENGINE OIL SUPPLY PANEL
F	GRAVITY FUEL FILLER
J	RAMP INTERPHONE JACKS
MLG	MAIN LANDING GEAR
NLG	NOSE LANDING GEAR
R	PRESSURE REFUELING AND DEFUELING CONNECTION
SO	OXYGEN SUPPLY RECEPTACLE
T	TOILET SERVICE
X	PASSENGER DOOR
+	TURNING RADIUS POINTS: 50°, 45°, 40°, 35°, 30°

120APM090005.MCE

EMB-120 Scale: 1 to 1000

Figure 9-2 (Sheet 2)