Q100 DASH 8
The Quiet One

AIRPORT PLANNING MANUAL

SERIES 100

PSM 1-81-13

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AEROSPACE

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de Havilland Inc.
DASH 8 SERIES 100
AIRPORT PLANNING

TABLE OF CONTENTS

de Havilland Inc.
DASH 8 SERIES 100
AIRPORT PLANNING

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Cont'd)

LIST OF ILLUSTRATIONS (Cont'd)

SECTION 1

PREFACE

SECTION 1

PREFACE

1.0 SCOPE

This document provides, in a standardized format, the recommended minimum aircraft characteristics data for the de Havilland Dash 8 Series 100A (Model 102) (Detail Specification No. DS8–100A), as needed for general airport planning. Since operational practices vary among airlines and operators, specific data should be coordinated with the appropriate airlines prior to facility design. Bombardier Regional Aircraft Division (BRAD) should be contacted for any additional information required. The relevant Flight Manual and Detail Specification take precedence over this document.

1.1 INTRODUCTION

This document conforms to NAS 3601 Revision 5 (31 Oct. 1986) as regards to content. NAS 3601 reflects the results of a coordinated effort by representatives from the following organizations:

- Aerospace Industries Association
- Airport Operators Council International
- Air Transport Association of America
- International Air Transport Association

Provided in this report, are characteristics of the de Havilland Dash 8 Series 100A 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 the typical de Havilland Dash 8 Series 100A airplane.

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1.2 A BRIEF DESCRIPTION OF THE DE HAVILLAND DASH 8 SERIES 100 AIRCRAFT

The de Havilland Dash 8 Series 100A is a commercial transport airplane, pressurized and designed to accommodate up to 37 passengers in wide body comfort and to set new standards in fuel efficiency, speed and comfort. The aircraft is powered by two Pratt and Whitney PW120A turboprop engines. Large diameter, slow turning Hamilton Standard 14SF propellers provide high thrust efficiency and low noise levels. The Dash 8 offers excellent short take–off and landing performance and outstanding capabilities under "hot and high" conditions.

The Dash 8 is capable of economic operations over a broad range of applications. These include scheduled airline operations, resource and regional development work carrying both passenger and cargo, and corporate and military transport roles.

The available options provide a wide range of configurations; from all passenger to a mixed cargo/passenger aircraft.

The aircraft is capable of operation in ambient temperatures between −54°C (−65°F) and 48.9°C (120°F), unless otherwise specified. Transfer from one climate to another is accomplished without penalties or extensive modification or adjustments.

Significant features of interest to the airport planner include the following:

- Engines are located high and on the wing.
- The horizontal stabilizer is mounted on top of the fin, which places it higher than conventional locations.
- The aircraft has a self–contained airstair entry door at the forward end of the cabin.
- Servicing connections are provided for single station pressure refueling or overwing gravity refueling.
- All servicing of the Dash 8 is accomplished with standard ground equipment.
- High engine exhaust outlets that generate modest pressure and temperature profiles are another feature of the Dash 8.

1.3 ENGINES

The PW120A installed in the Dash 8 Series 100A (Model 102) is a fuel efficient, turboprop engine with a maximum takeoff rating of 2000 SHP. It has a two stage centrifugal compressor with an overall pressure ratio of approximately 15:1 and airflow of approximately 15 lb./sec. Each compressor stage is driven by an independent single–stage turbine. A two–stage coaxial free power turbine drives the propeller through a reduction gear box with a maximum output speed of 1200 rpm.

1.4 GUIDE TO SERIES / MODEL DESIGNATIONS

BRAD MARKETING REFERENCE	TYPE APPROVAL MODEL NO.	PRODUC-TION STATUS	PWC ENGINE	MTOP	MTOW (lb)	TVA'S	REMARKS
Series 100	102 103	Last Production Aircraft S/N 223.	PW120A PW121	2000 SHP 2150SHP	34,500 34,500	Retrofit Available.	Pre–1990 Interior.
Series 100A	102 103	Current Production. A/C 225 and subsequent.	PW120A PW121	2000 SHP 2150 SHP	34,500 34,500	Retrofit Available. Standard on A/C 338 and Subsequent.	1990 Interior.
Series 100B	106	Current Production. A/C 225 and subsequent.	PW 121	2150 SHP	36,300	Standard on A/C 338 and Subsequent.	1990 Interior. Increased MTOW.

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SECTION 2

AIRCRAFT DESCRIPTION

ILLUSTRATIONS

SECTION 2

AIRCRAFT DESCRIPTION

2.0 INTRODUCTION

General characteristics, arrangements and dimensions of the de Havilland Dash 8 Series 100A (Model 102) are provided in this section.

The Dash 8 Series 100A (Model 102) has a maximum design take–off weight of 34,500 pounds (15,649 kg). Other weight parameters such as ramp weight, landing weight and zero fuel weight are set accordingly.

Definitions refer to Figure 2–1 and are used throughout this document:

MAXIMUM DESIGN TAXI WEIGHT (MTW): Maximum weight for ground maneuvers as limited by aircraft strength and airworthiness requirements. (It includes weight of taxi and run–up fuel).

MAXIMUM DESIGN LANDING WEIGHT (MLW): Maximum weight for landing as limited by aircraft strength and airworthiness requirements.

MAXIMUM DESIGN TAKE–OFF WEIGHT (MTOW): Maximum weight for take–off as limited by aircraft strength and airworthiness requirements. (This is the maximum weight at start of the take–off run).

OPERATING WEIGHT EMPTY (OWE): Weight of structure, power plant, furnishings, systems, unusable fuel and other items of equipment that are considered an integral part of a particular airplane configuration. Also included are certain standard items, personnel, equipment and supplies necessary for full operations, excluding usable fuel and payload.

MAXIMUM DESIGN ZERO FUEL WEIGHT (MZFW): Maximum weight allowed before usable fuel and other specified usable agents must be loaded in defined sections of the aircraft, as limited by strength and airworthiness requirements.

MAXIMUM PAYLOAD: Maximum design zero fuel weight minus operational weight empty.

MAXIMUM SEATING CAPACITY: The maximum number of passengers specifically certified or anticipated for certification.

MAXIMUM CARGO VOLUME: The maximum space available for cargo.

USABLE FUEL: Fuel available for aircraft propulsion and optional A.P.U.

DESCRIPTION	KILOGRAM	POUND
MAXIMUM DESIGN TAXI WEIGHT	15,740 kg	34,700 LB
MAXIMUM DESIGN LANDING WEIGHT	15,380 kg	33,900 LB
MAXIMUM DESIGN TAKE–OFF WEIGHT	15,650 kg	34,500 LB
OPERATING WEIGHT EMPTY (STANDARD AIRCRAFT)	10,245 kg	22,592 LB
MAXIMUM DESIGN ZERO FUEL WEIGHT	14,061 kg	31,000 LB
MAXIMUM PAYLOAD (STANDARD AIRCRAFT)	3,814 kg	8,408 LB
USABLE FUEL – STANDARD TANKS	835 US GAL 5678 LB	3160 Liters 2576 kg
TOTAL USABLE FUEL – OPTIONAL AUXILIARY TANKS	1506 US GAL 10,244 LB	5700 Liters 4646 kg

Figure 2–1 General Airplane Characteristics

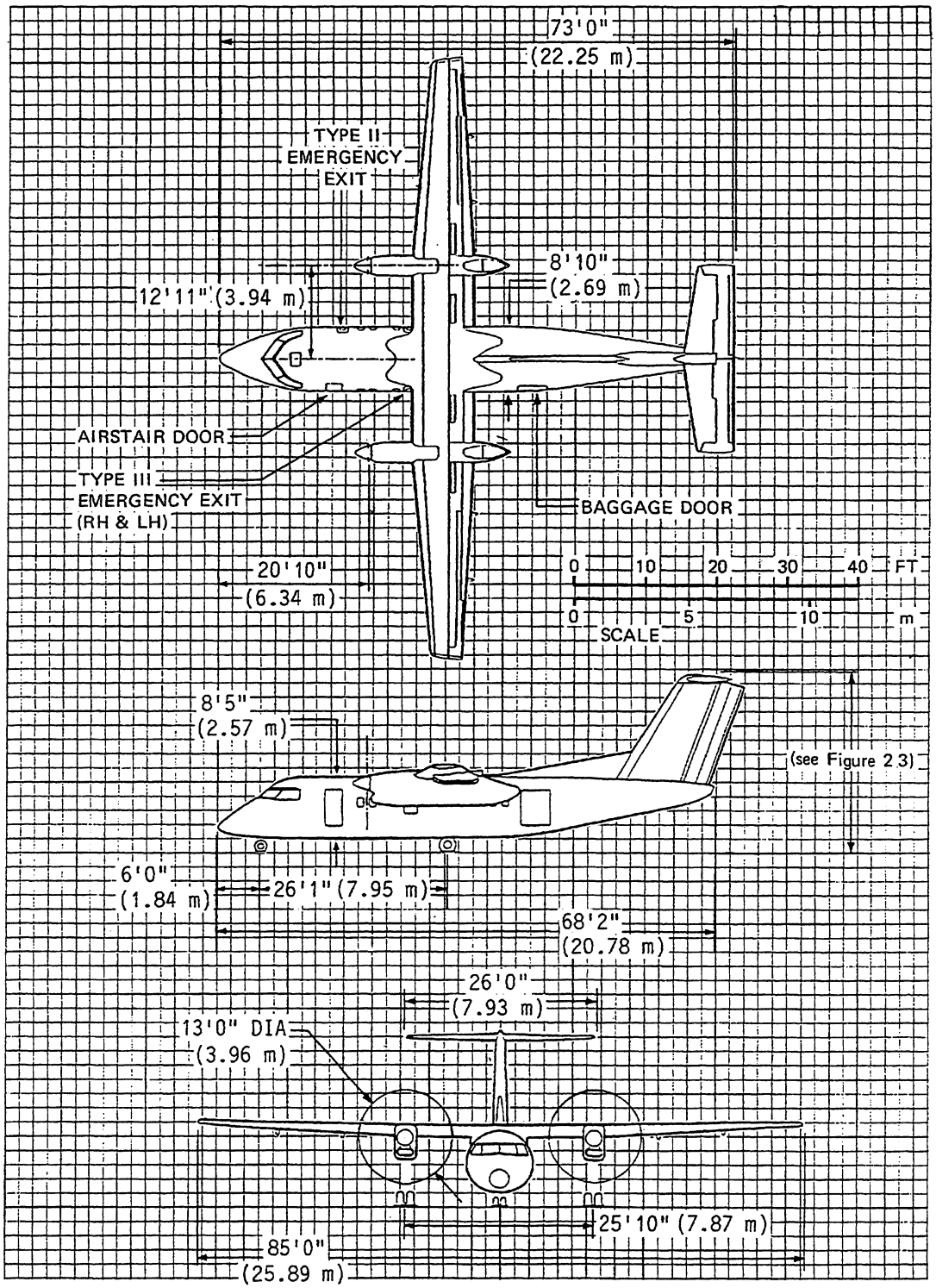
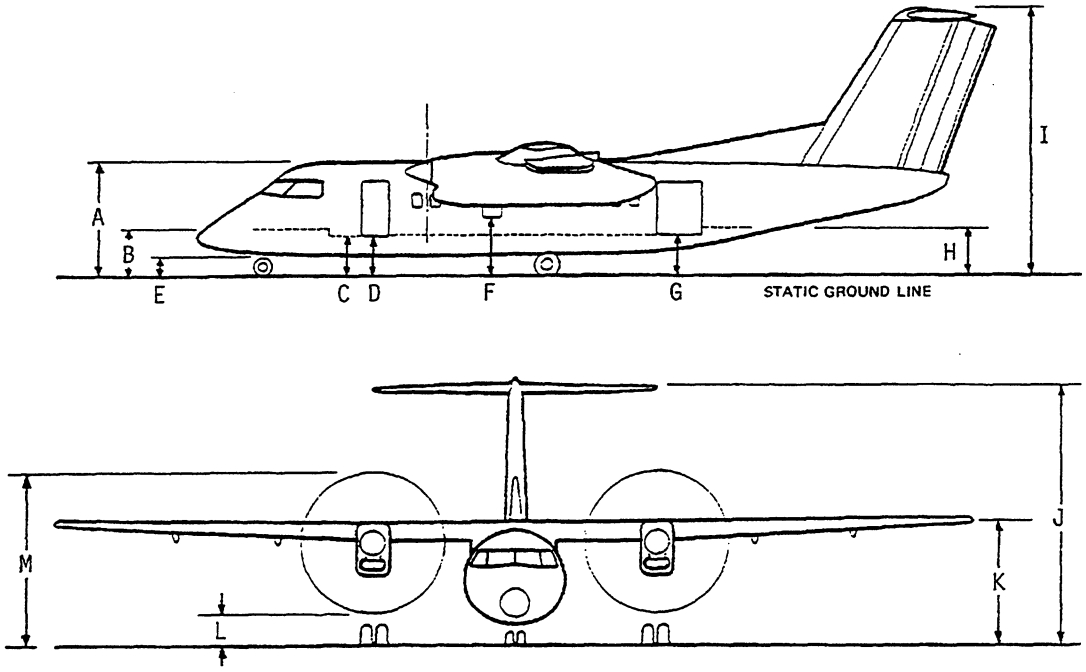


Figure 2–2 General Airplane Dimensions



		MAXIMUM		MINIMUM	
		WEIGHT: 22,000 LB C.G.: X392.3" WT. ON NLG: 2536 LB (1150 kg)		WEIGHT: 34,700 LB C.G.: X410.225" Z155.7" WT. ON NLG: 2013 LB (913 kg)	
ITEM	HEIGHT	FEET	METERS	FEET	METERS
A	TOP OF FUSELAGE	10.39	3.17	10.39	3.17
B	FLIGHT DECK	4.56	1.39	4.57	1.39
C	CABIN FLOOR	3.56	1.09	3.26	0.99
D	AIRSTAIR DOOR TYPE I EXIT SILL	3.39	1.03	3.34	1.02
E	FUSELAGE GROUND CLEARANCE	1.98	0.60	1.68	0.51
F	TYPE III EXIT SILL	5.22	1.59	5.07	0.55
G	BAGGAGE DOOR SILL	3.46	1.06	3.14	0.96
H	BAGGAGE STEP	4.47	1.36	4.14	1.26
I	VERTICAL STABILIZER	24.52	7.47	24.03	7.32
J	HORIZONTAL STABILIZER	23.69	7.22	23.19	7.07
K	WING TIP	11.88	3.62	11.70	3.57
L	PROP GROUND CLEARANCE	3.05	0.93	2.97	0.91
M	PROP HEIGHT CLEARANCE	16.05	4.89	15.97	4.87

NOTES: 1. Dimensions quoted are for standard tires. Nose wheel tires are 18 x 5.50-8, inflated to 80 psi (552 kPa). Main wheel tires are 26.5 x 8.00-13, inflated to 131 psi (903 kPa).

2. Optional low pressure tires add approximately 0.17 ft. (0.05 m) to dimensions. Optional nose wheel tires are 22 x 6.50-10, inflated to 48 psi (331 kPa). Optional main wheel tires are 31 x 9.75-13, inflated to 77 psi (531 kPa).

Figure 2-3 Ground Clearance

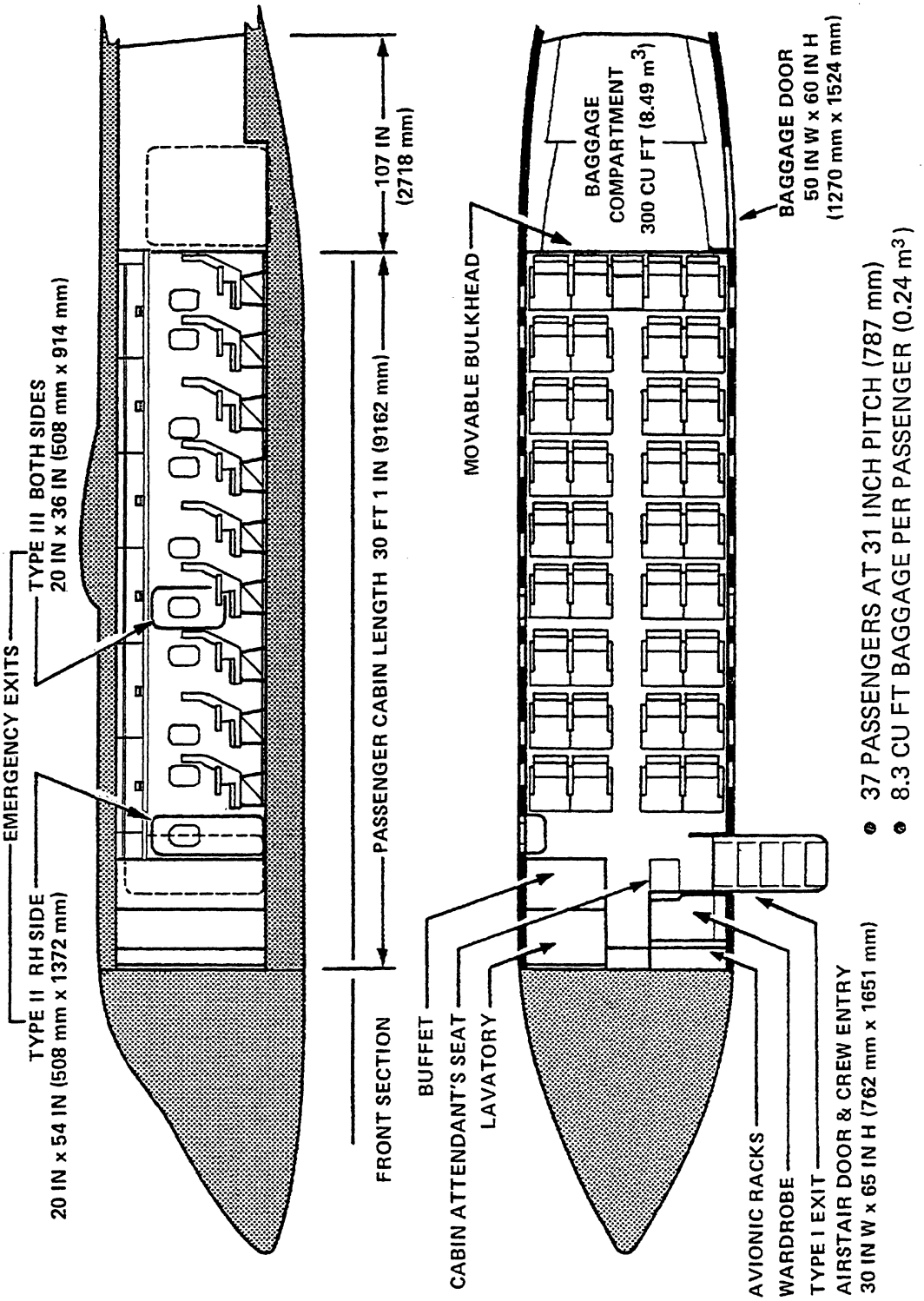


Figure 2-4 Interior Arrangement – 37 Passenger Standard Aircraft
(Sheet 1 of 3)

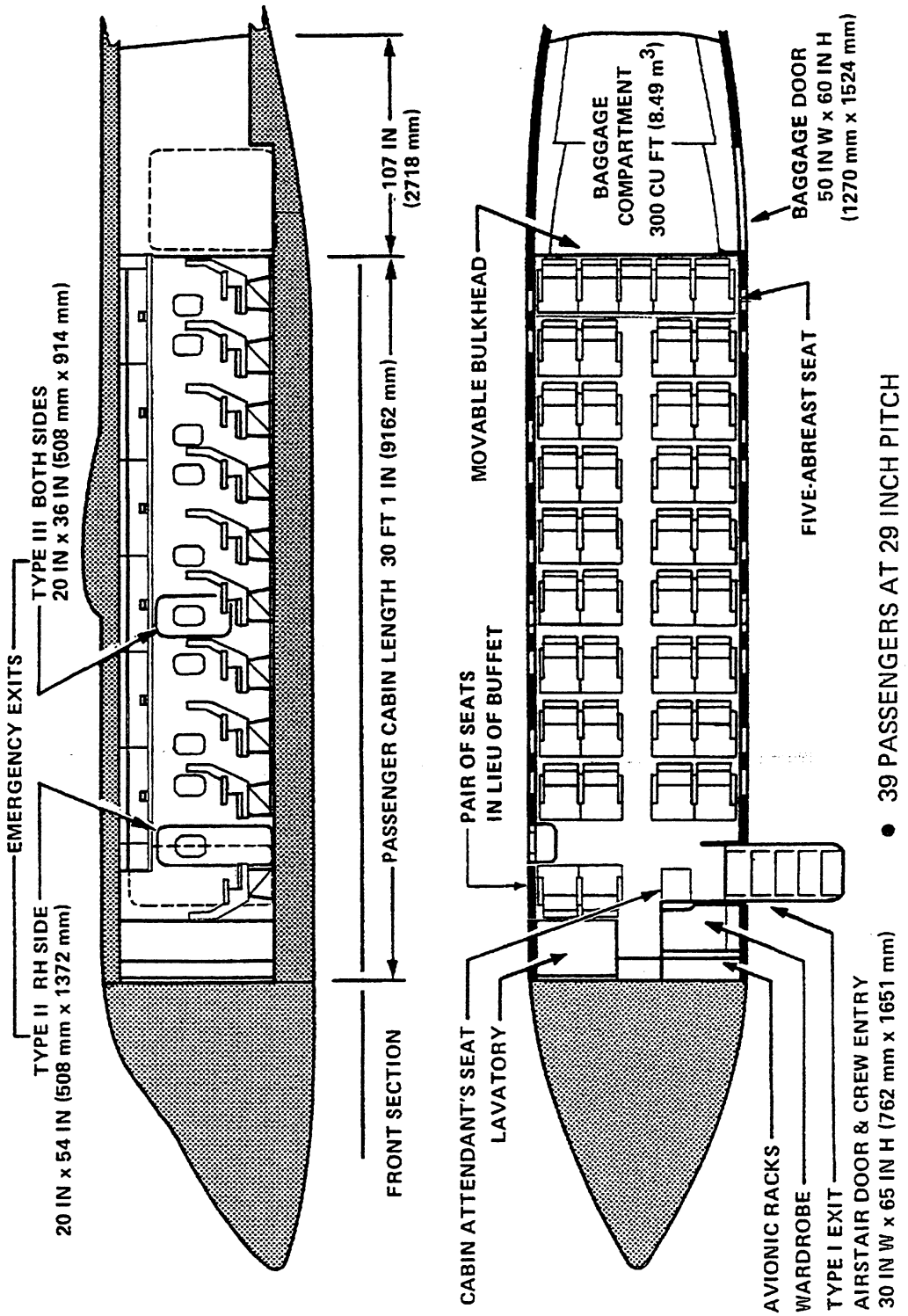


Figure 2–4 Interior Arrangement – Optional 39 Passenger Configuration
(Sheet 2 of 3)

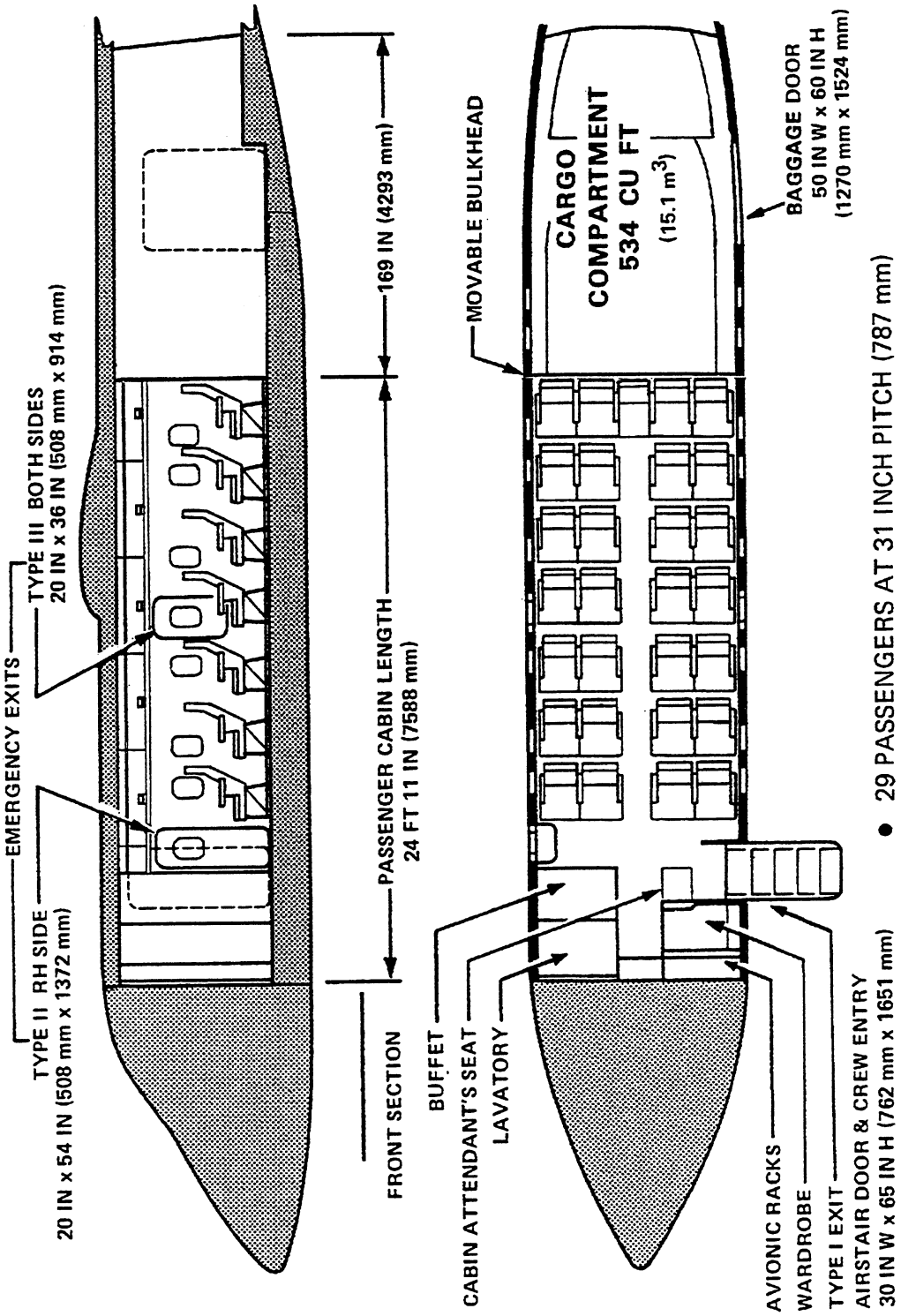


Figure 2–4 Interior Arrangement – Optional Cargo/Passenger 29 Seats
(Sheet 3 of 3)

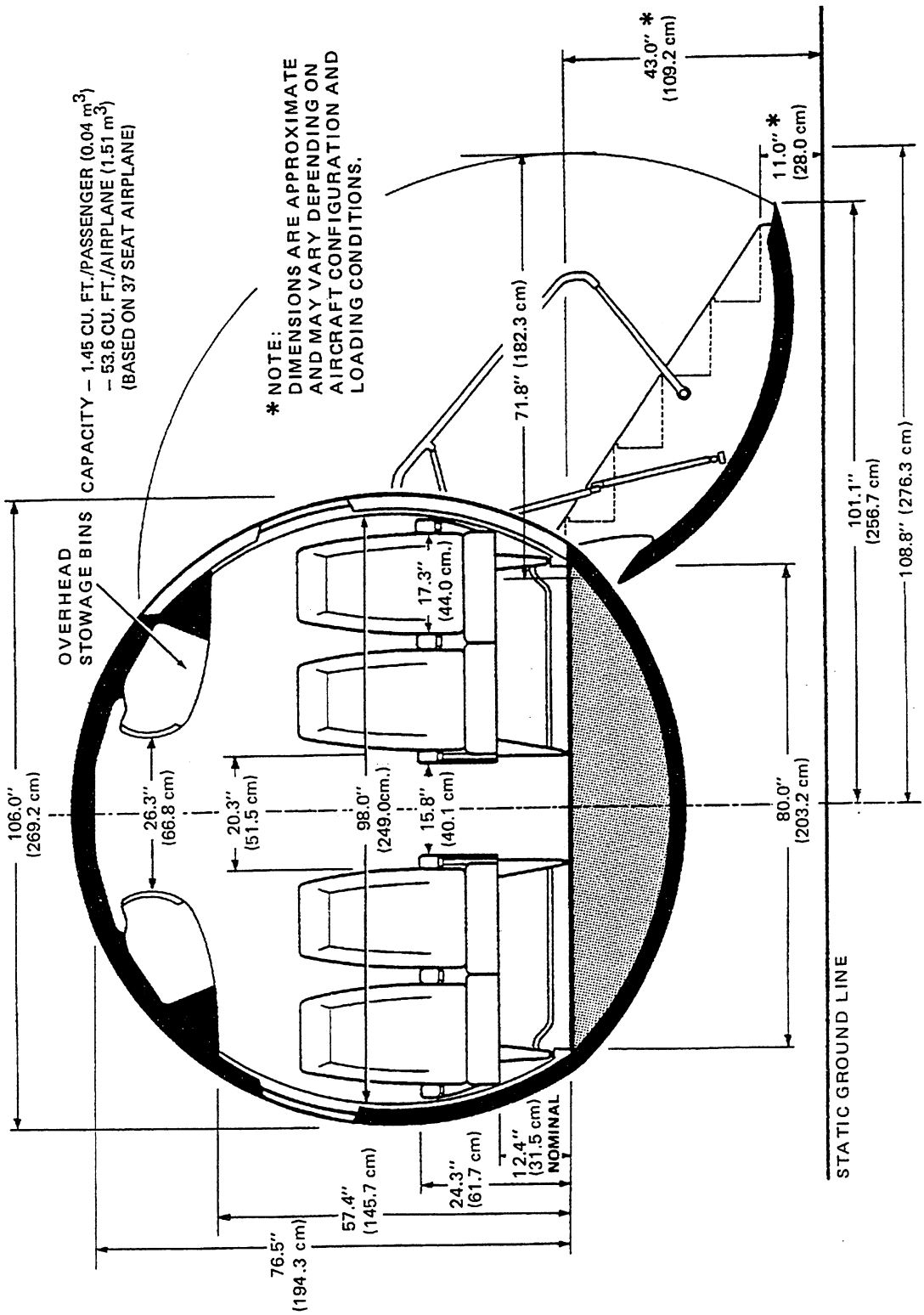


Figure 2-5 Cabin Cross-Section

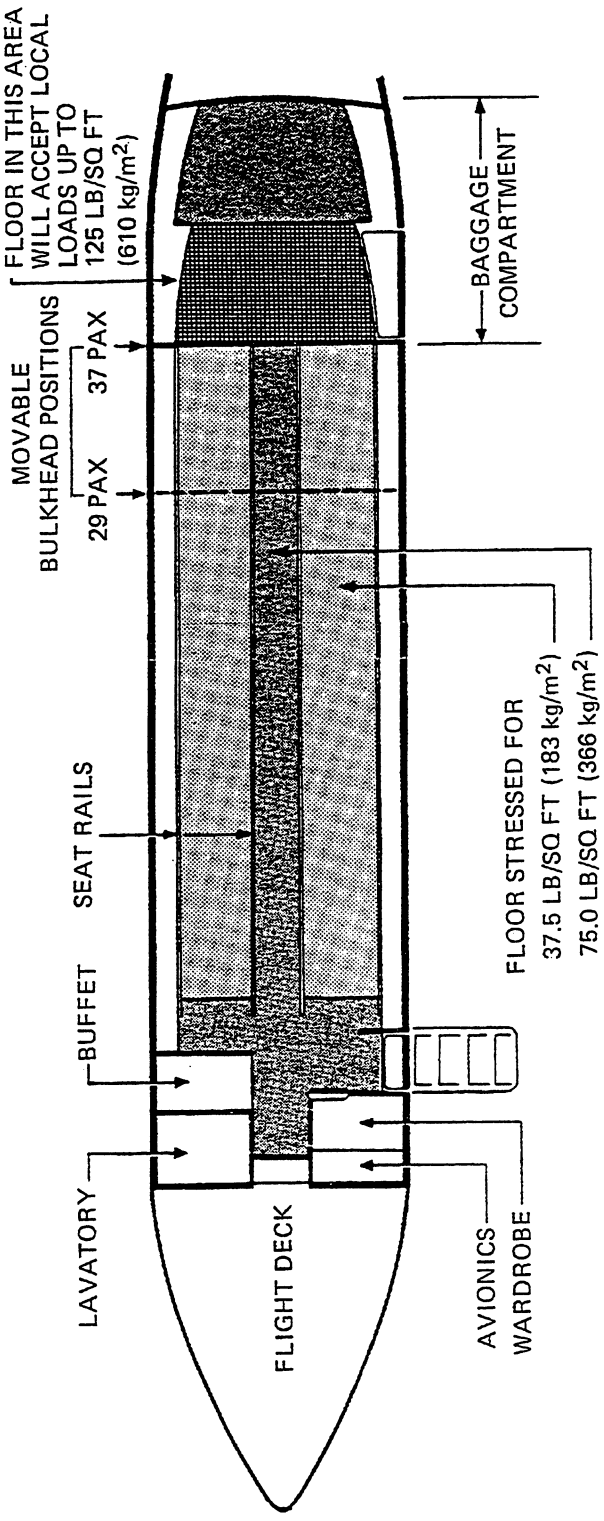


Figure 2–6 Standard Floor Loading Diagram

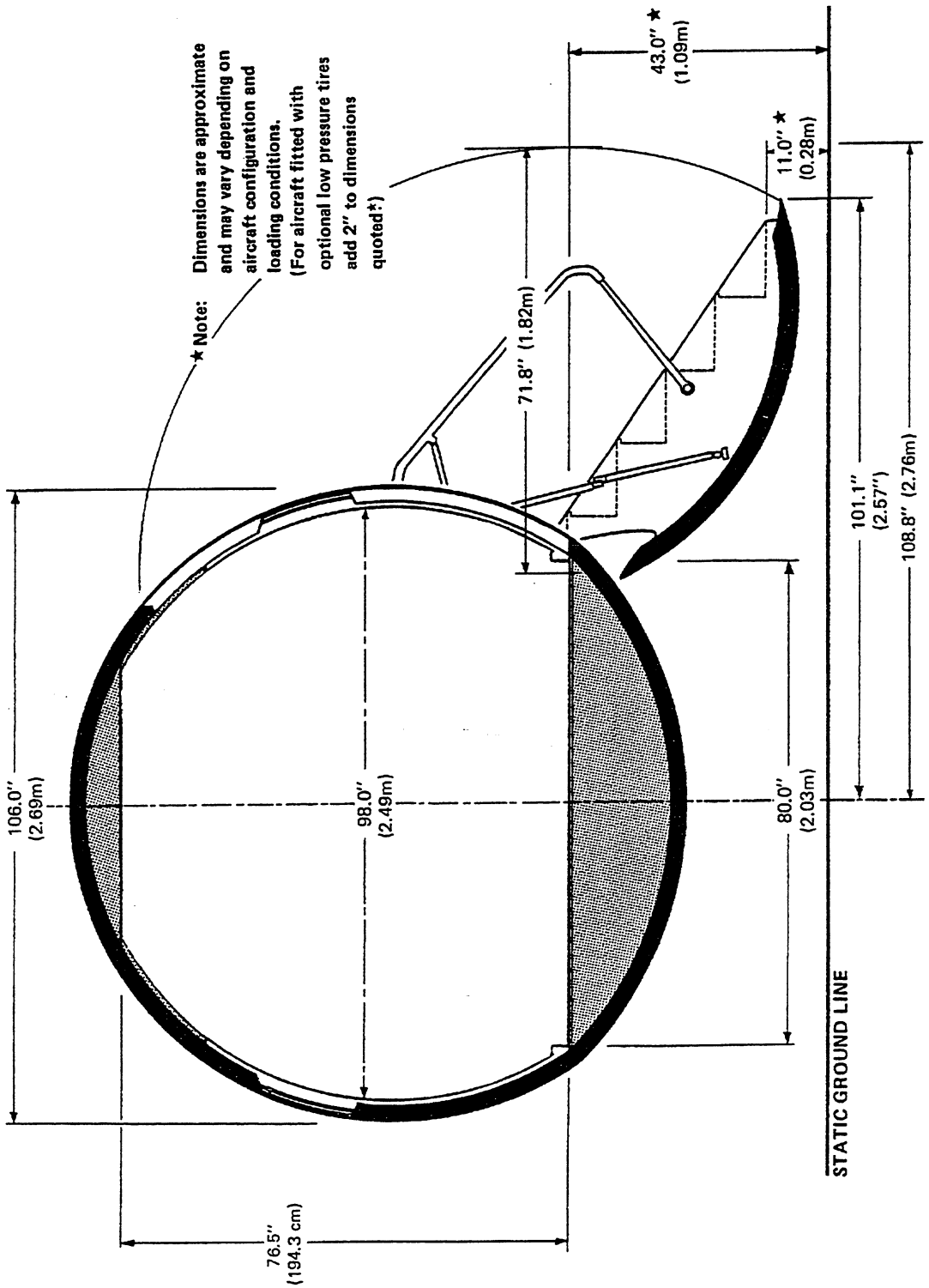
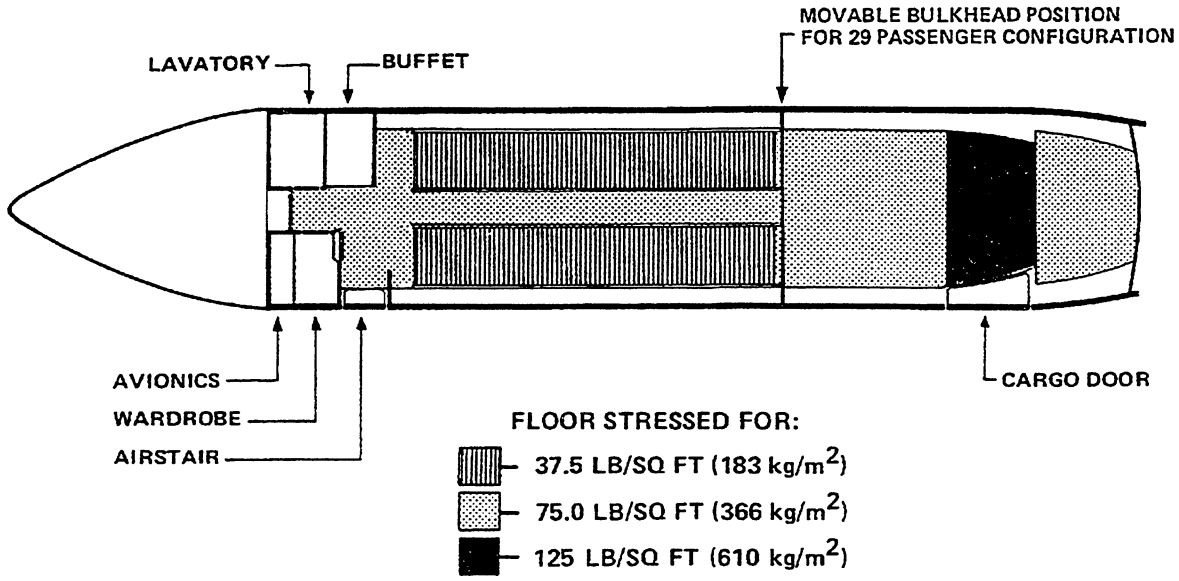


Figure 2–7 Cabin Cross Section – Cargo Aircraft

CR825SO08068-1
HEAVY DUTY FLOOR – 75 LB/SQ FT – REAR CABIN



CR825SO08068-3
HEAVY DUTY FLOOR – 75 LB/SQ FT – COMPLETE CABIN

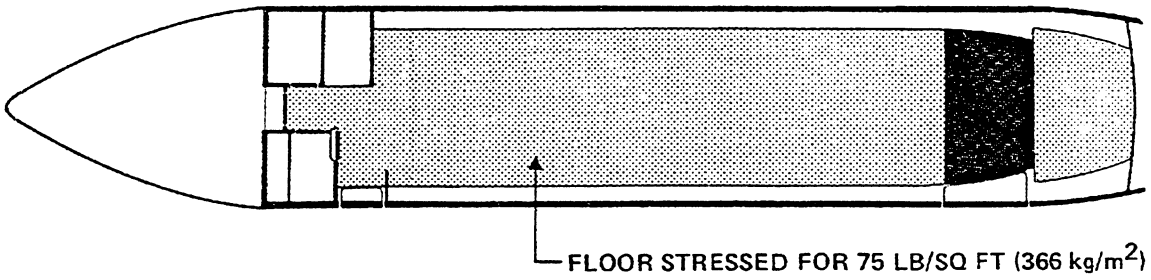
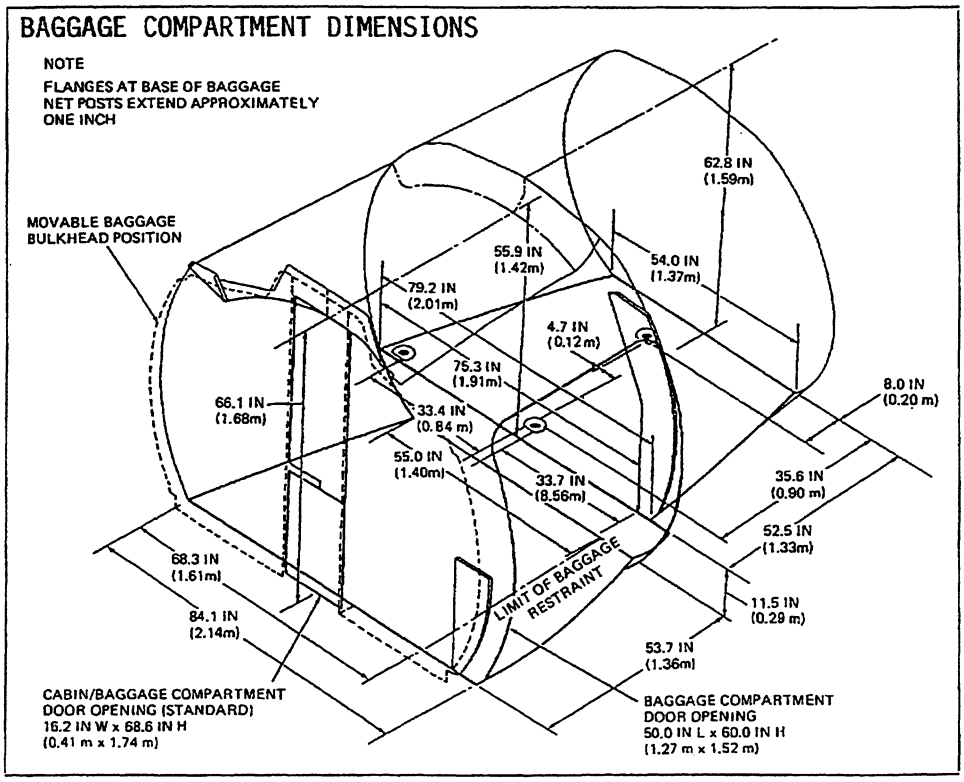


Figure 2–8 Floor Loading Diagram – Optional Configuration



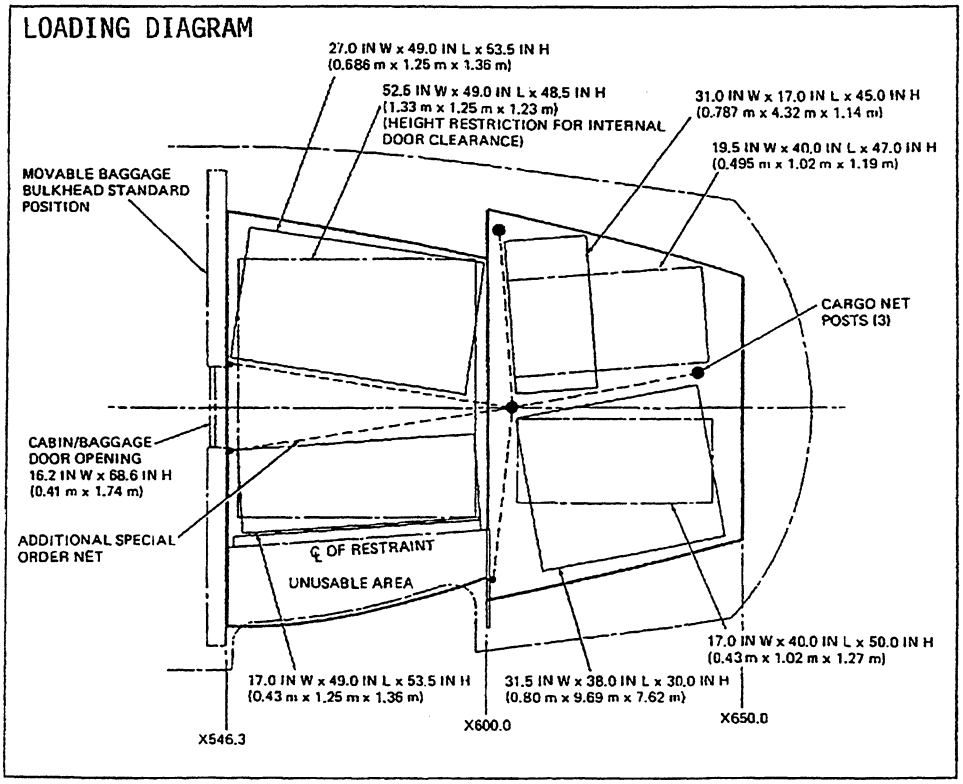


Figure 2-9 Baggage Compartment Dimensions and Loading Diagram

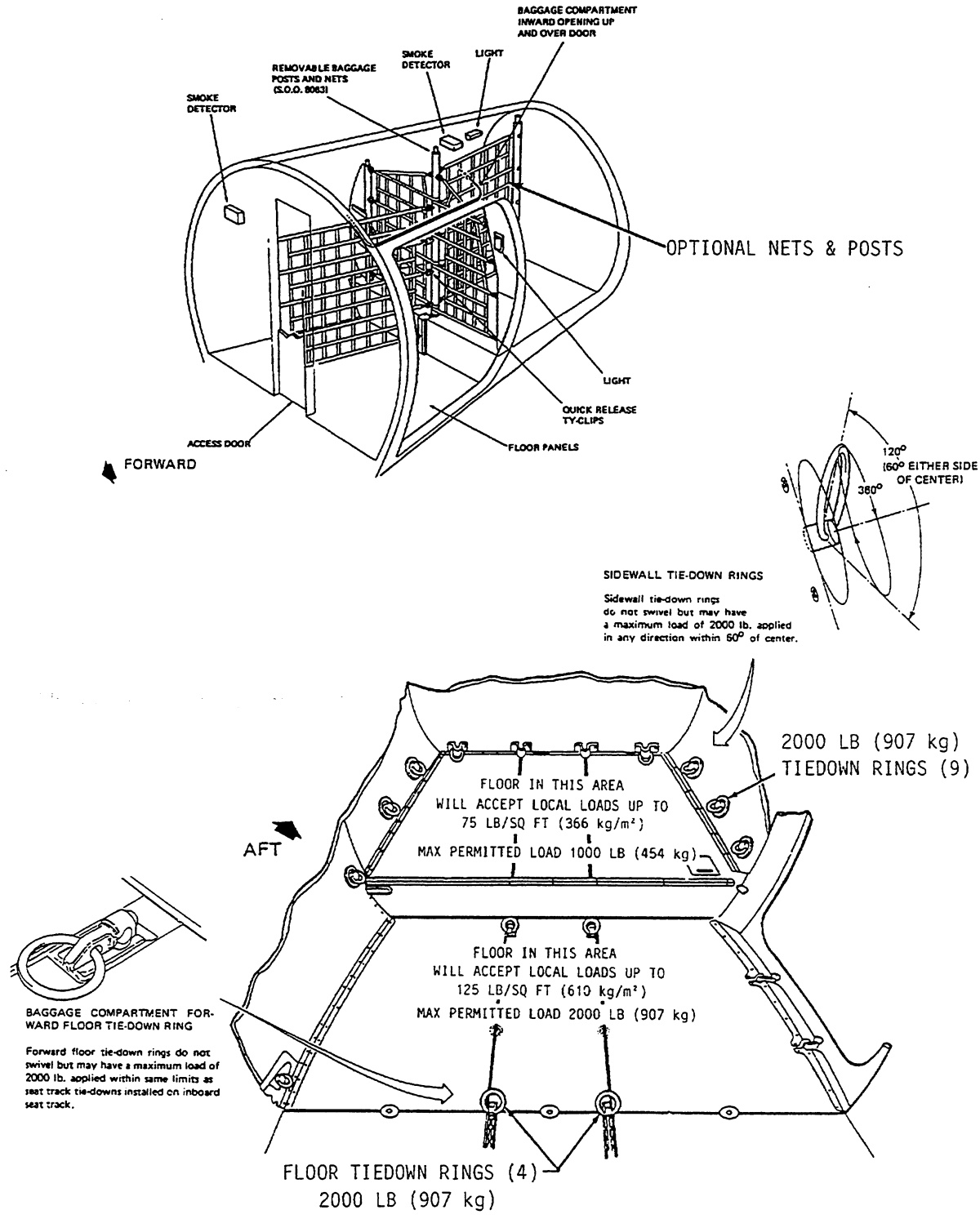
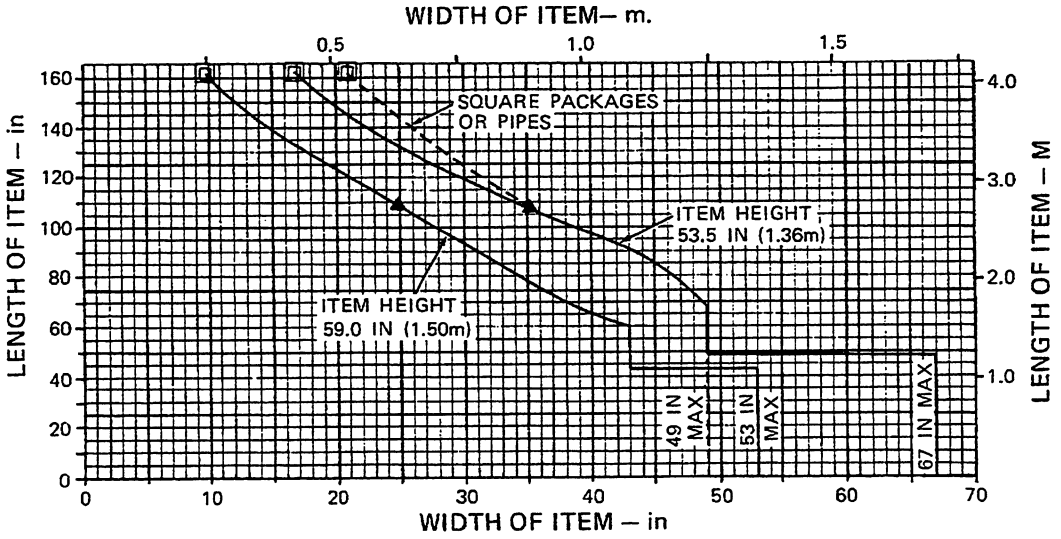


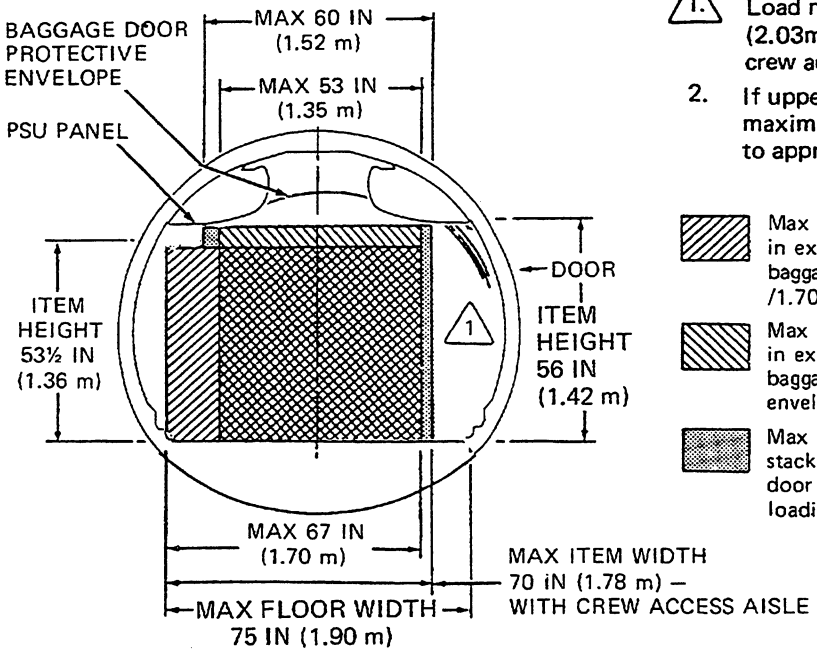
Figure 2-10 Baggage Compartment Nets and Tiedowns

NOTE
1. GRAPH REPRESENTS MAX SIZE OF SINGLE ITEM ALLOWABLE WITH .5 IN CLEARANCE GAP.
2. FOR MAX SIZE OF SINGLE ITEM WITH BULKHEAD IN AFT POSITION SEE BAGGAGE COMPARTMENT LOADING DIAGRAM.
3. GRAPH DOES NOT MAKE ALLOWANCES FOR FIRE ACCESS ROUTE (SEE NOTE IN PARA. 2.1).

▲ MAX SINGLE ITEM WITH BULKH'D IN MID POSITION

▣ MAX SINGLE ITEM WITH BULKH'D IN FWD POSITION





NOTES:

1. Load may be between 70" (1.78m) & 80" (2.03m) wide if low enough to allow quick crew access to all parts of cabin.
2. If upper baggage restraint is installed, maximun single item height is limited to approximately 56" (1.42m).

KEY

Max single item 53½" (1.36 m) high anywhere in extended baggage area (height is limited by baggage door envelope; width is limited to 67" /1.70 m so item will clear baggage door track).

Max single item 59" (1.50 m) high anywhere in extended baggage area (height is limited by baggage door; width is limited by baggage door envelope & baggage door track).

Max cargo area for smaller items that can be stacked (this area is increased due to baggage door envelope & track not interfering with loading of smaller items).

Figure 2–11 Cargo Loading

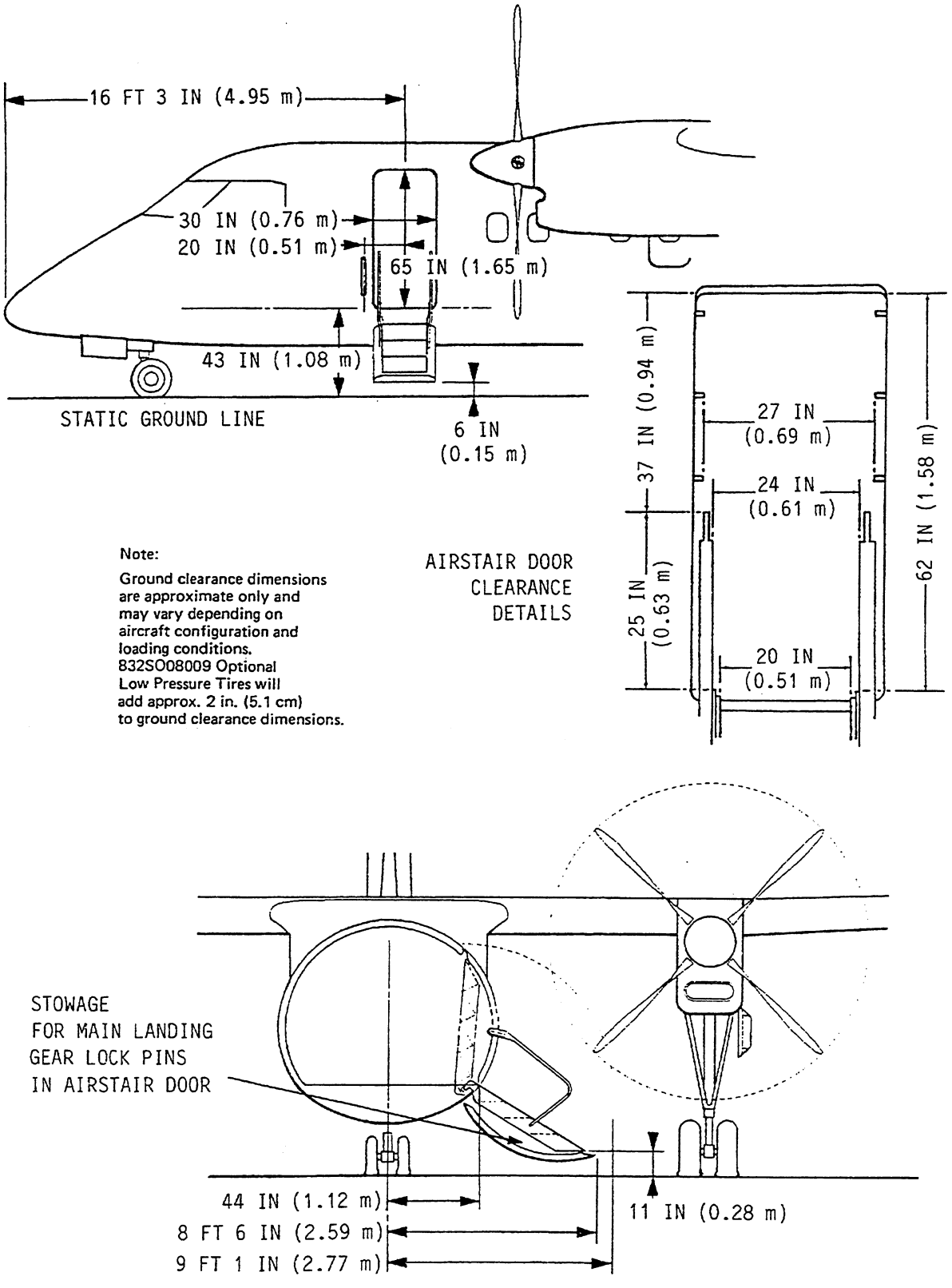


Figure 2–12 Airstair Door Clearance

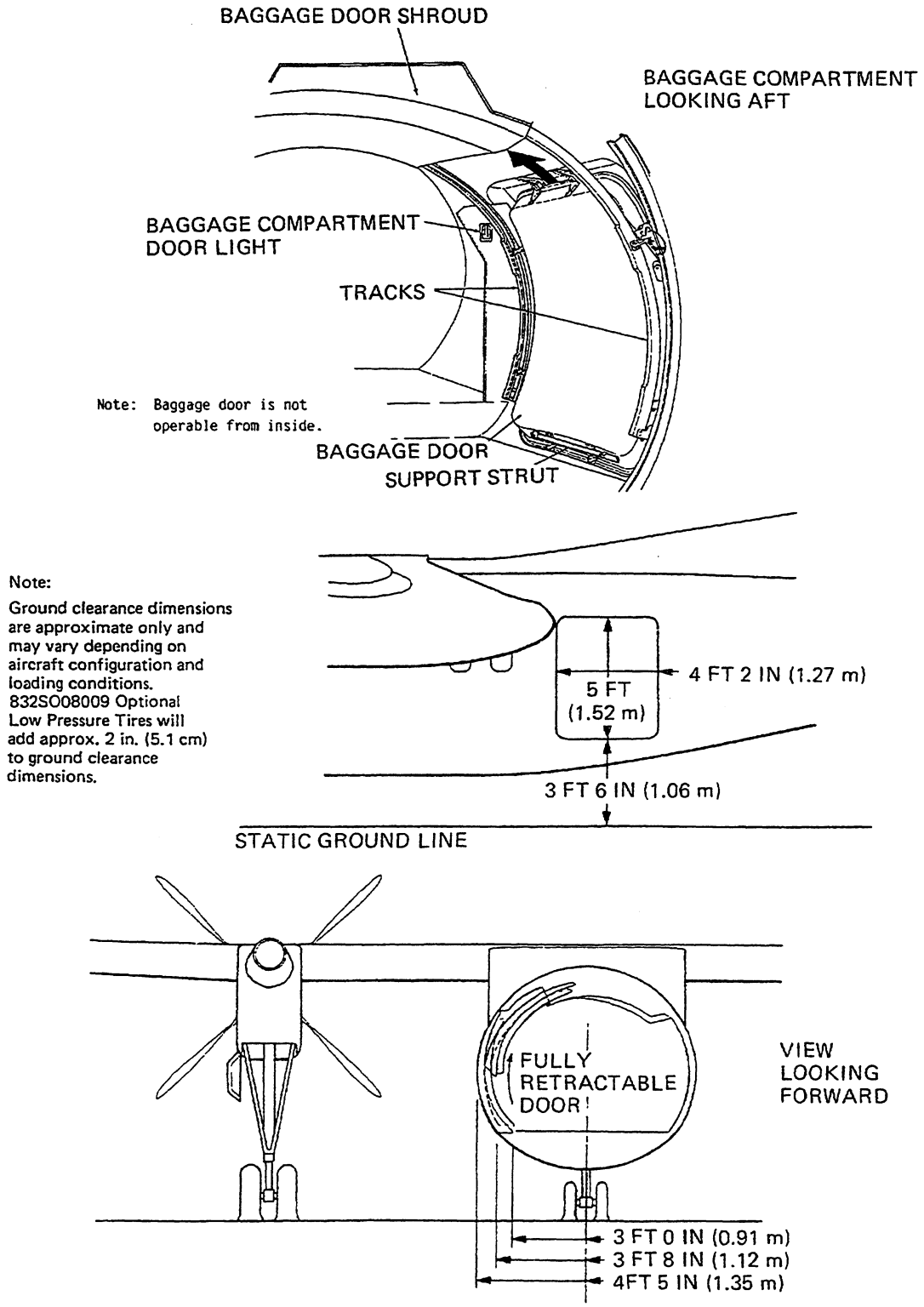


Figure 2–13 Baggage Compartment Door Clearance

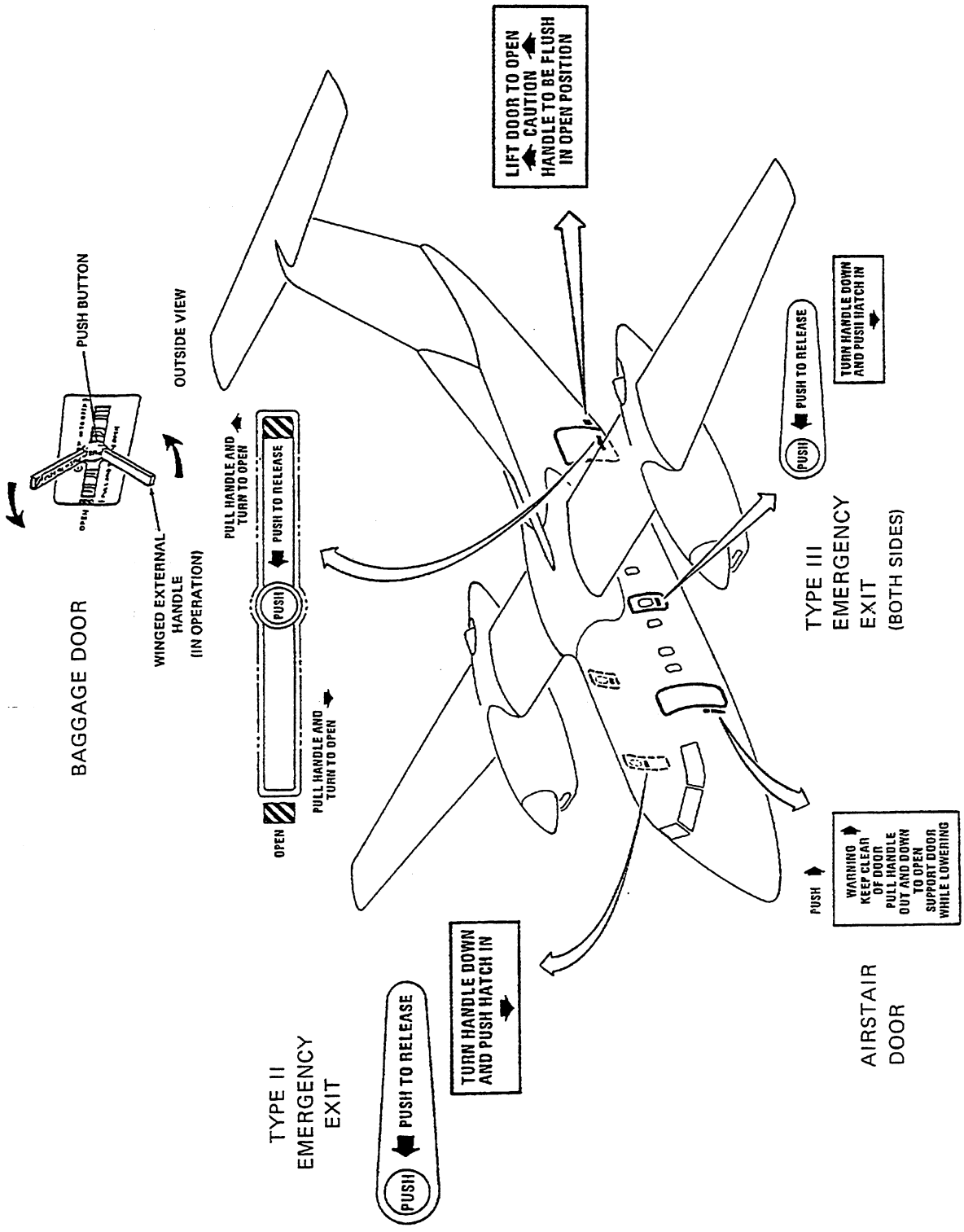


Figure 2–14 Exterior Handles

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SECTION 3

AIRCRAFT PERFORMANCE

ILLUSTRATIONS

SECTION 3

AIRCRAFT PERFORMANCE

3.0 INTRODUCTION

This section contains the performance data for the de Havilland Dash 8 Series 100A (Model 102), as required for operations and Airport Planning purposes. The data is taken from the Advanced Issue of Dash 8 Performance Data Report Aeroc 8.2 (102). AC. 20.

Maximum Structural Weights

The maximum structural take–off and landing weights are as follows:

Maximum Take–off Weight:	15,650 kg (34,500 lb)
Maximum Landing Weight:	15,380 kg (33,900 lb)

WAT Limits

The maximum permissible take–off weight (figures 3–2 and 3–3) and landing weight (figure 3–8) are based on the limiting one engine inoperative climb requirements of FAR 25.

Take–Off Field Length

The take–off field length shown in figures 3–4 through 3–7 is the longest of:

(i) Accelerate stop distance.
(ii) Take–off distance to 35 ft. with an engine inoperative at V_1.
(iii) 1.15 x all engine operating take–off distance to 35 ft.

Landing Field Length

The landing field length in figure 3–9 is based on an approach speed of 1.3 V_S and a screen height of 50 ft. The landing field length factors, which are those required by FAR 121 are:

a) Destination Airport
Landing Field Length = Actual Landing Distance X $\frac{1}{0.6}$

b) Alternate Airport
Landing Field Length = Actual Landing Distance X $\frac{1}{0.7}$

Retardation Devices

The following retardation devices are used:

a)	Accelerate Stop –	(i)	Main wheel anti–skid brakes
		(ii)	Ground and flight spoilers extended
		(iii)	Both propellers in discing
b)	Landing –	(i)	Main wheel anti–skid brakes
		(ii)	Ground and flight spoilers extended
		(iii)	Both propellers at flight idle

3.1 USE OF CHARTS (Illustrative Examples)

The use of the charts is illustrated by "examples", which are depicted as arrowed broken lines.

Example 1

Given:	Outside Air Temperature	=	26°C
	Airfield Altitude	=	6,000 ft

Find: Maximum Permissible Take–Off Weight Take–Off Flap 5°.

From Figure 3–3:
The maximum permissible take–off weight is 14,720 kg. (32,450 lb).

Example 2

Given:	Outside Air Temperature	=	26°C
	Airfield Altitude	=	6,000 ft
	Weight	=	14,700 kg (32,400 lb)

Find: The Take–Off Field Length Flap 5°.

From Figure 3–5:
The take–off field length is 1530 m (5020 ft).

Example 3

Given:	Outside Air Temperature	=	18°C
	Airfield Altitude	=	10,000 ft

Find: The Maximum Permissible Landing Weight with Landing Flap 15°.

From Figure 3–8:
The maximum permissible landing weight is 13,550 kg (29,870 lb).

Example 4

Given:	Airfield Altitude	=	4,000 ft
	Weight	=	14,750 kg (32,520 lb)

Find: The Landing Field Length with Flap 15°.

From Figure 3–9:
The landing field length at the destination airport is 1080m (3540 ft).
The landing field length at the alternate airport is 920m (3020 ft).

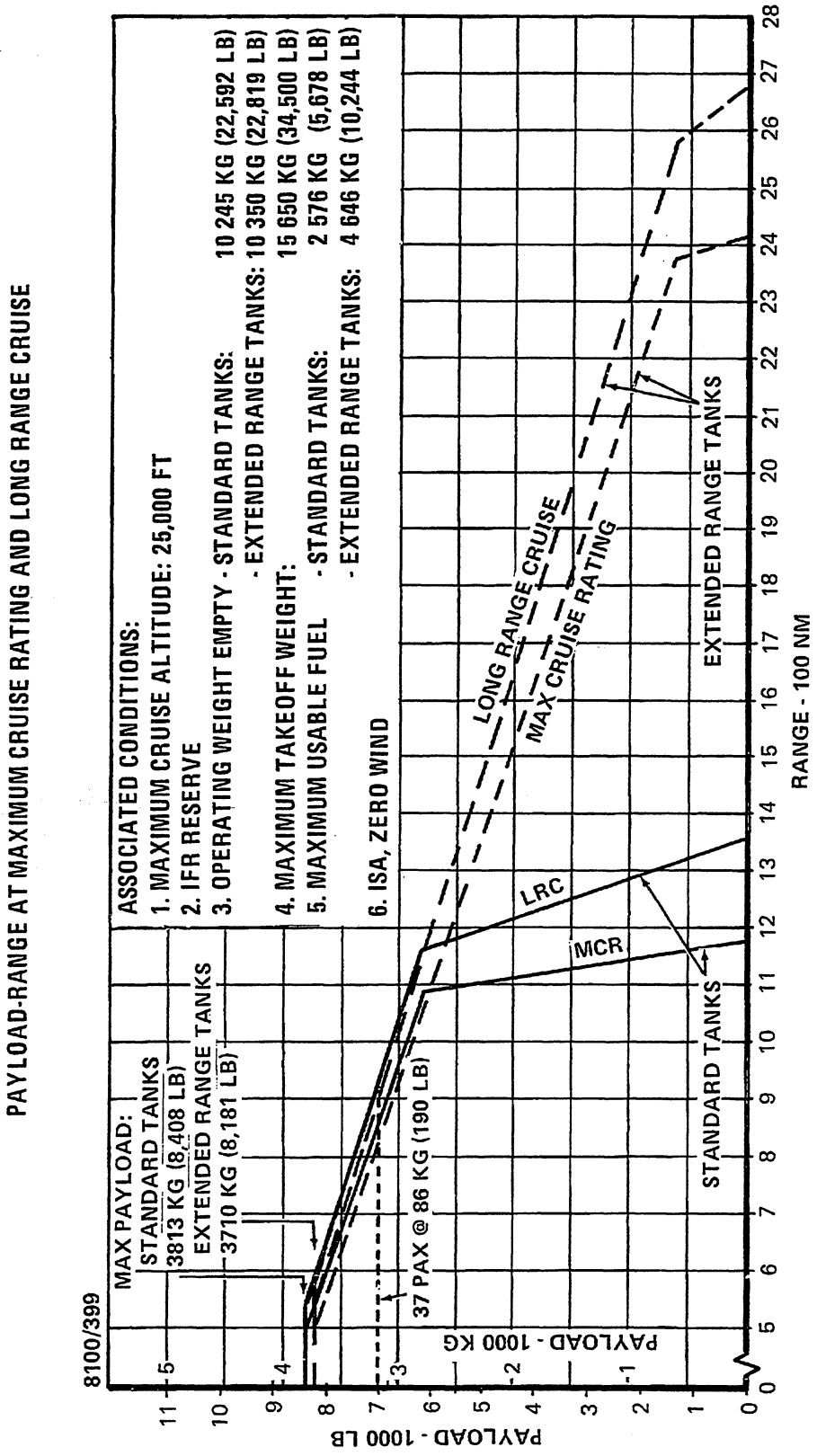


Figure 3–1 Payload Range at Maximum Cruise Rating and Long Range Cruise

MAXIMUM PERMISSIBLE TAKEOFF WEIGHT (WAT LIMIT)

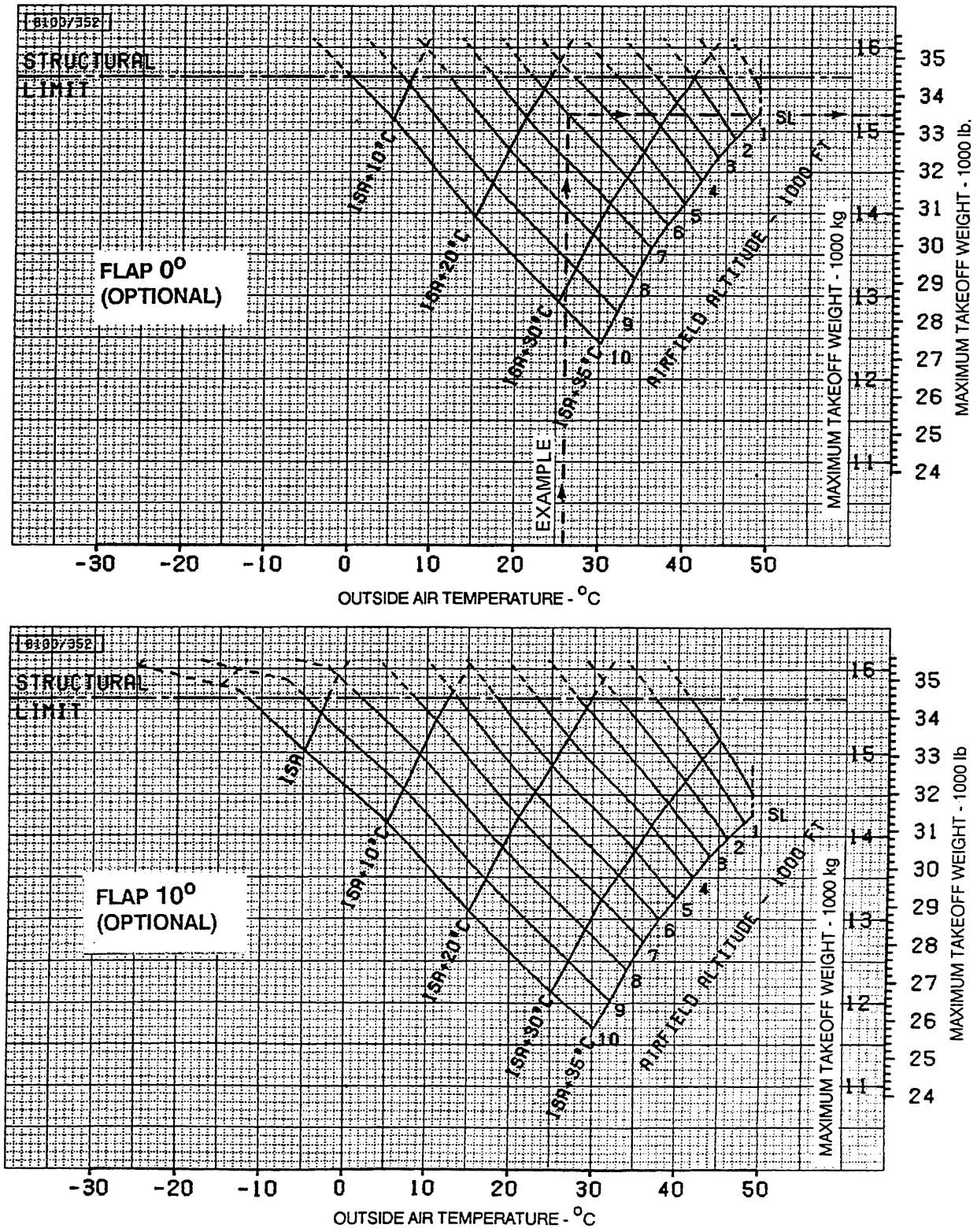
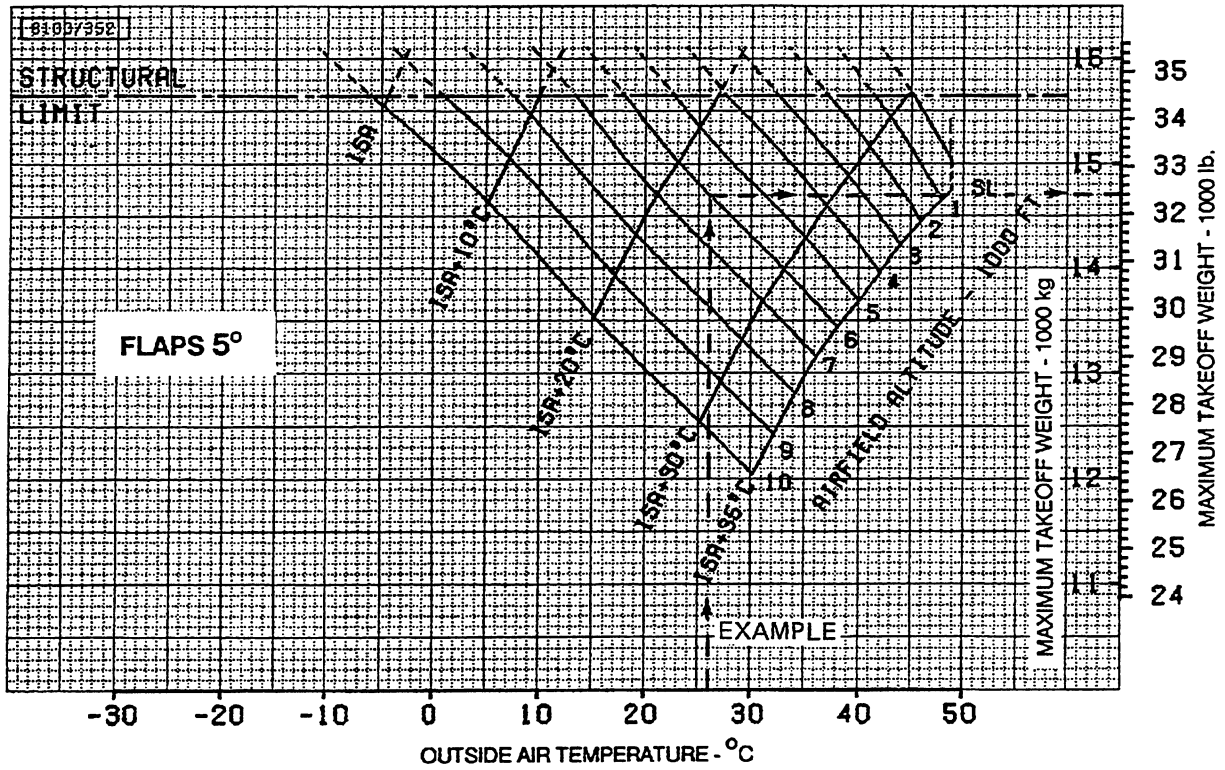


Figure 3–2 Maximum Permissible Take–Off Weight Flap 0° & 10°

MAXIMUM PERMISSIBLE TAKEOFF WEIGHT (WAT LIMIT)



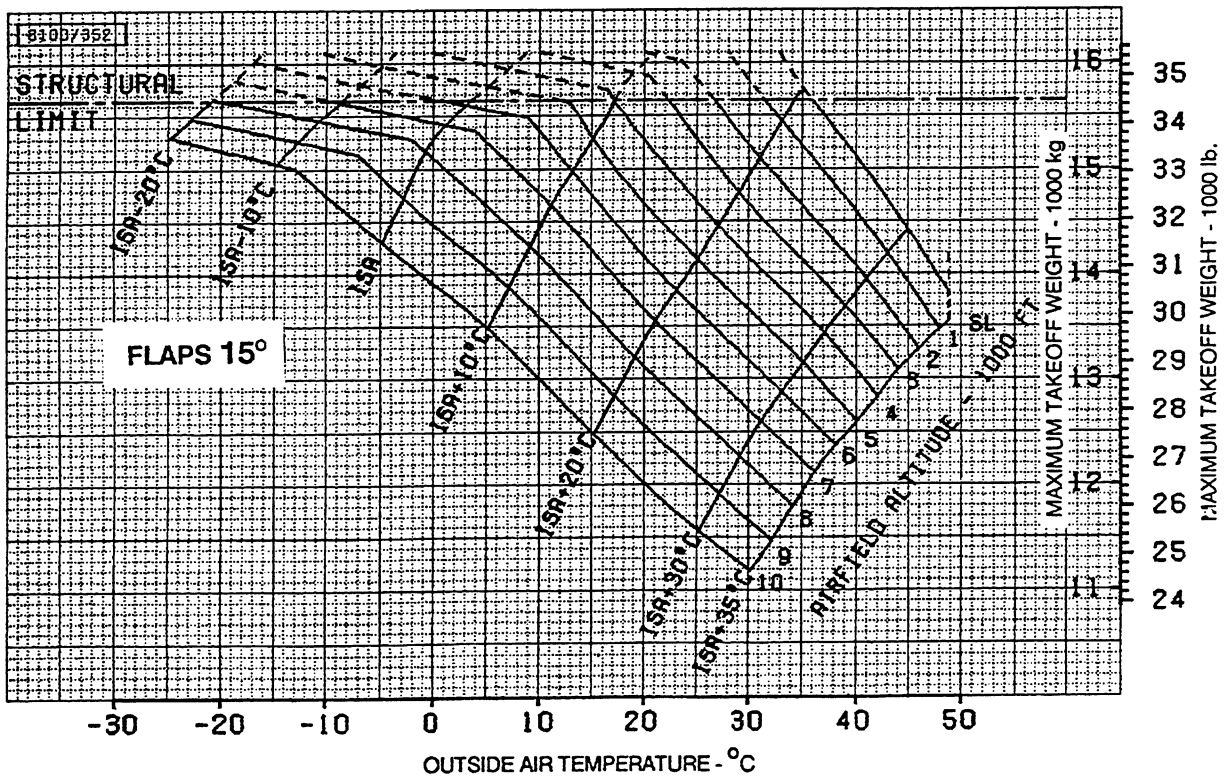


Figure 3–3 Maximum Permissible Take–Off Weight Flap 5° & 15°

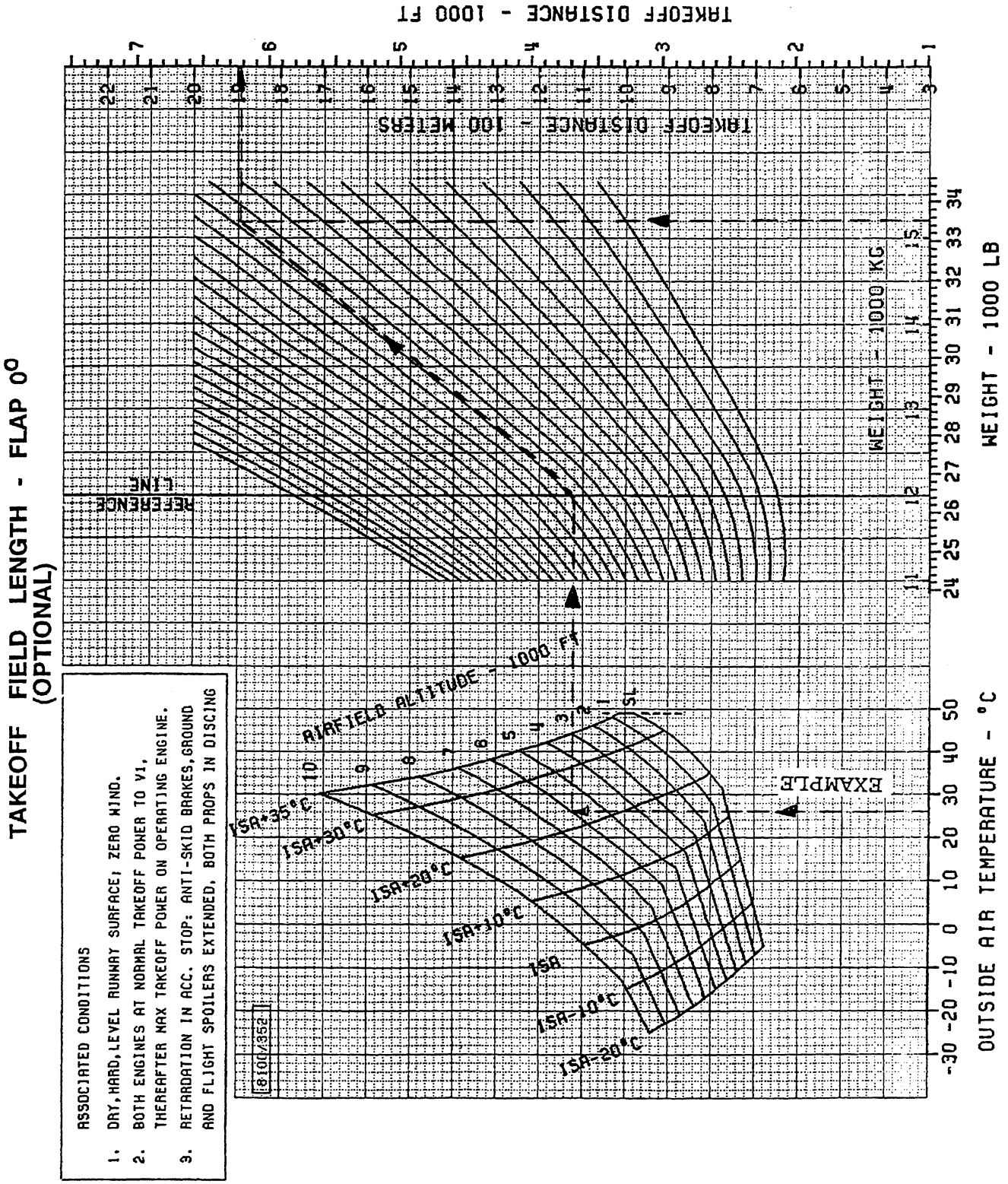


Figure 3-4 Take-Off Field Length – Flap 0°

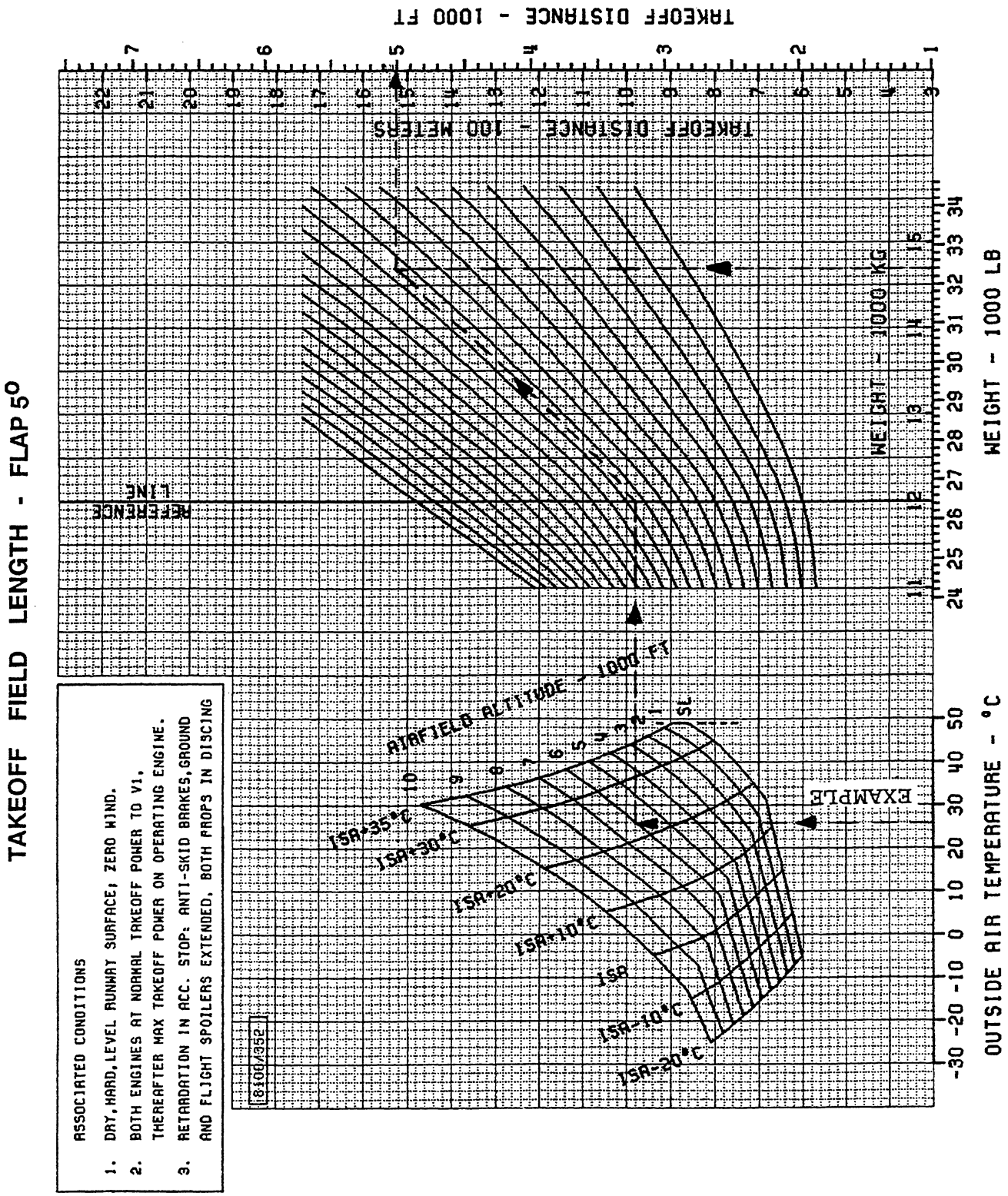


Figure 3-5 Take-Off Field Length – Flap 5°

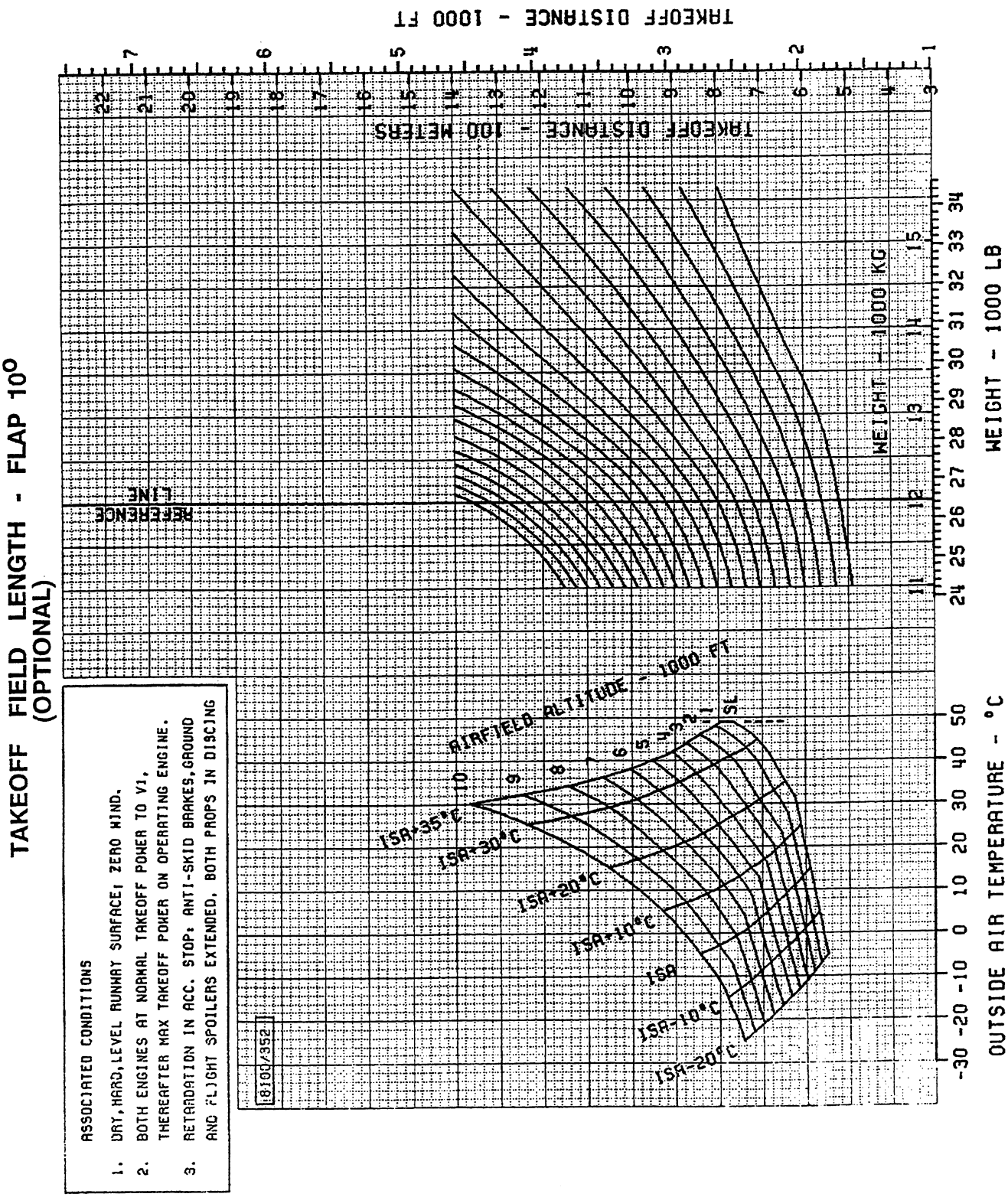


Figure 3-6 Take-Off Field Length – Flap 10°

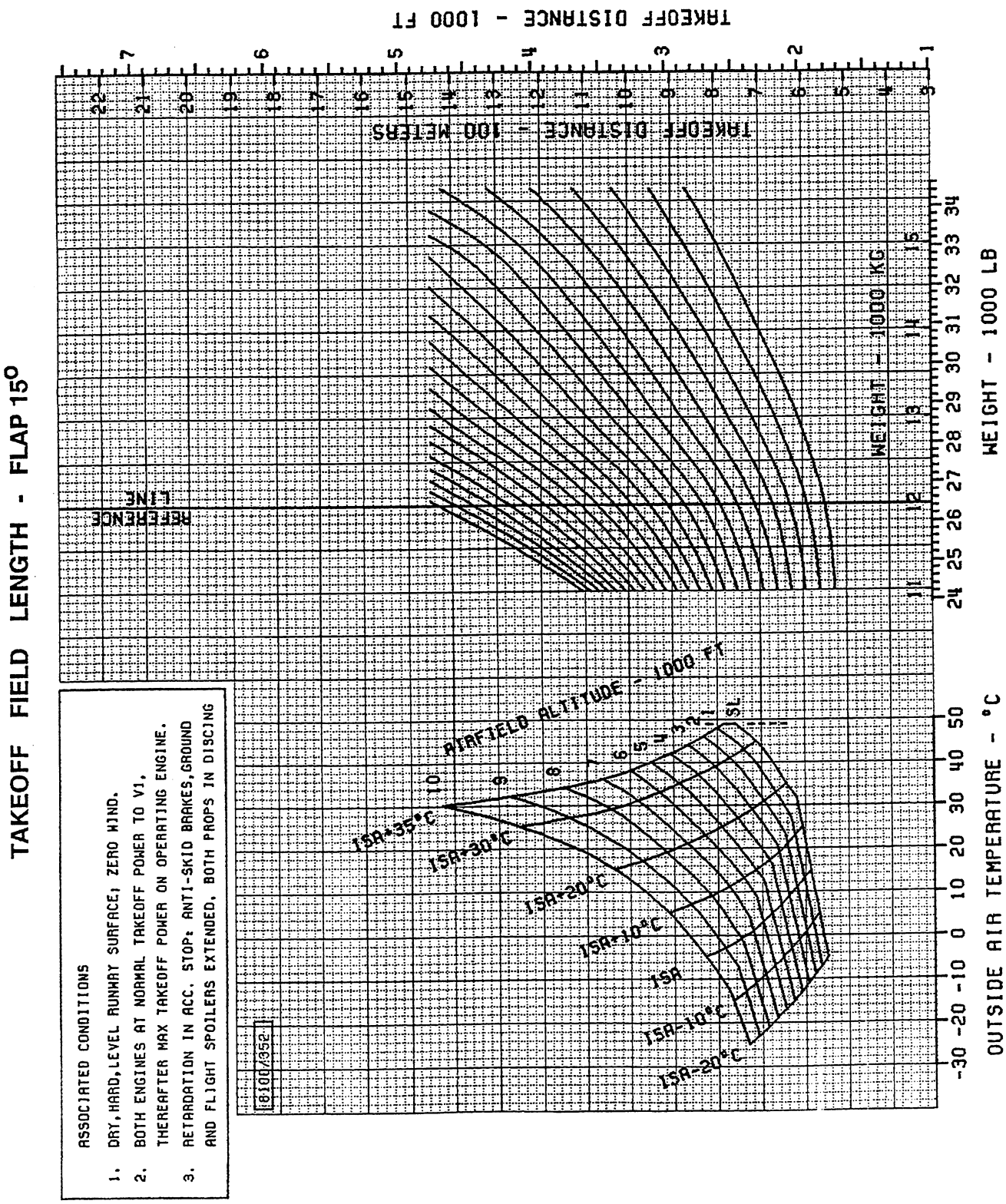
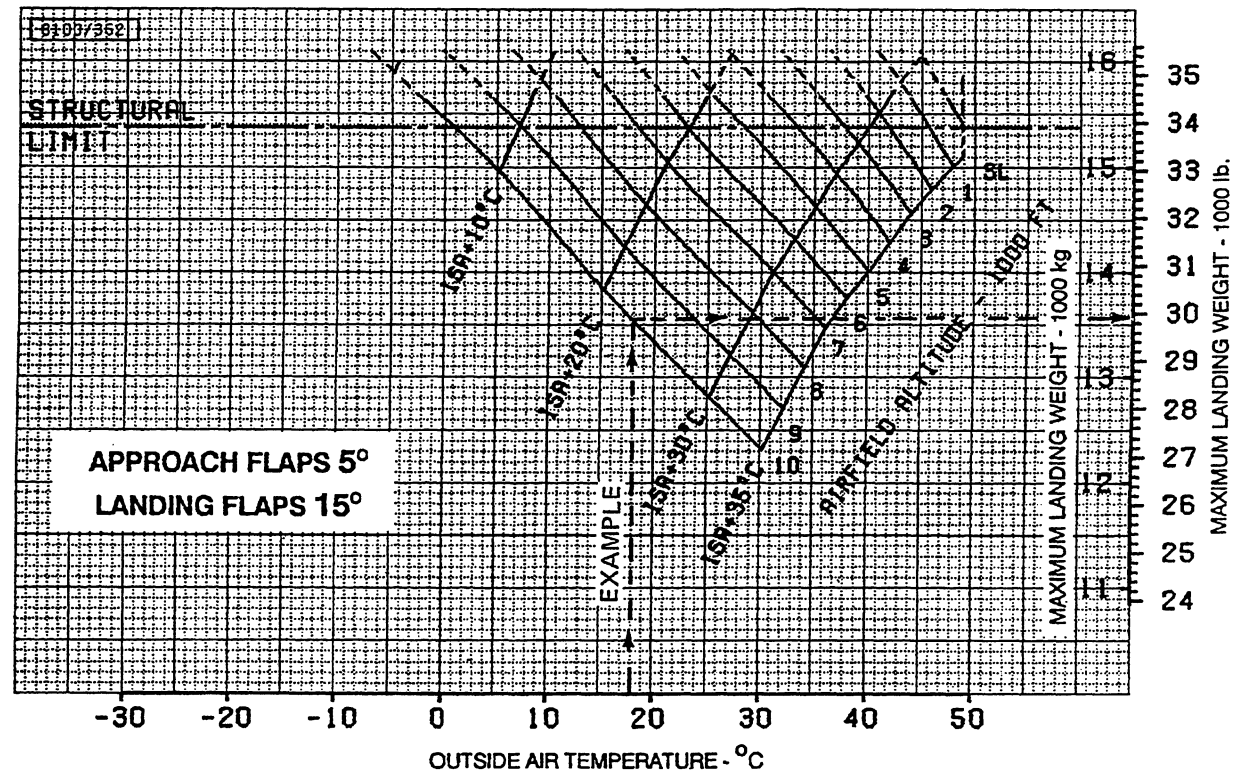


Figure 3-7 Take-Off Field Length – Flap 15°

MAXIMUM PERMISSIBLE LANDING WEIGHT (WAT LIMIT)



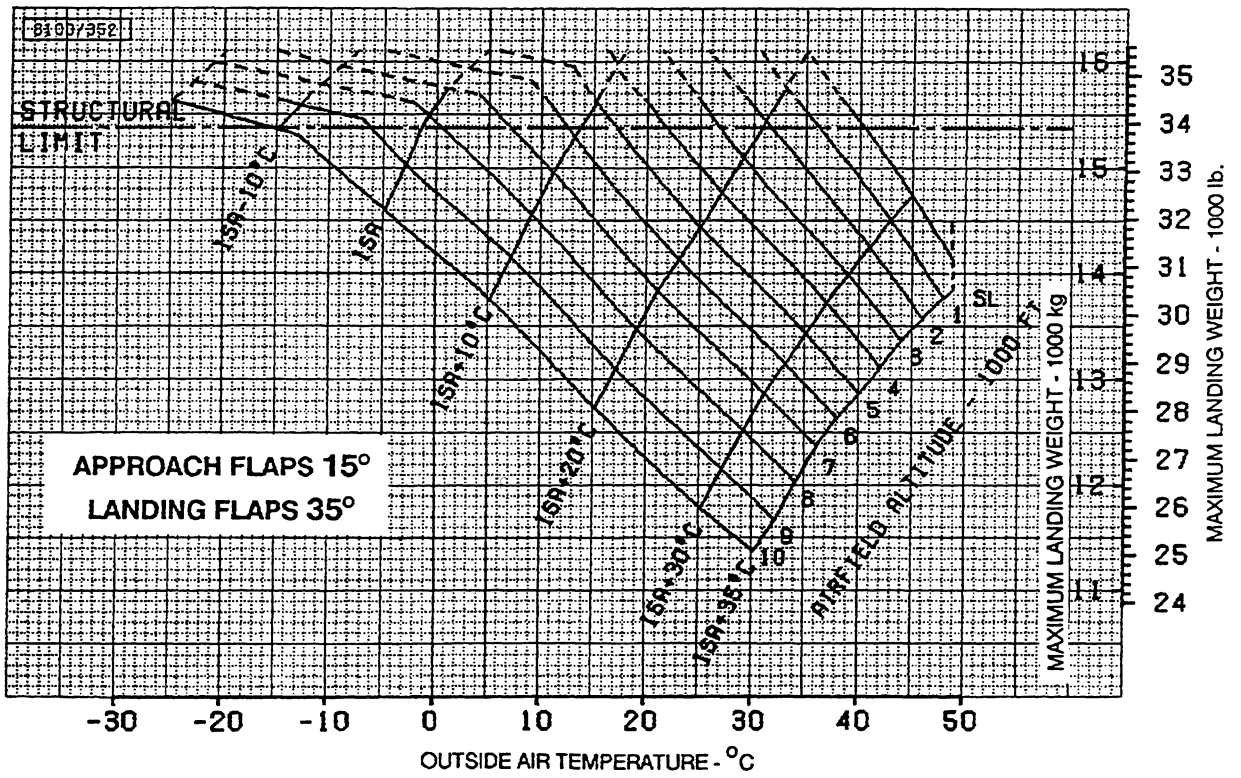


Figure 3–8 Maximum Permissible Landing Weight – Landing Flap 15° & 35°

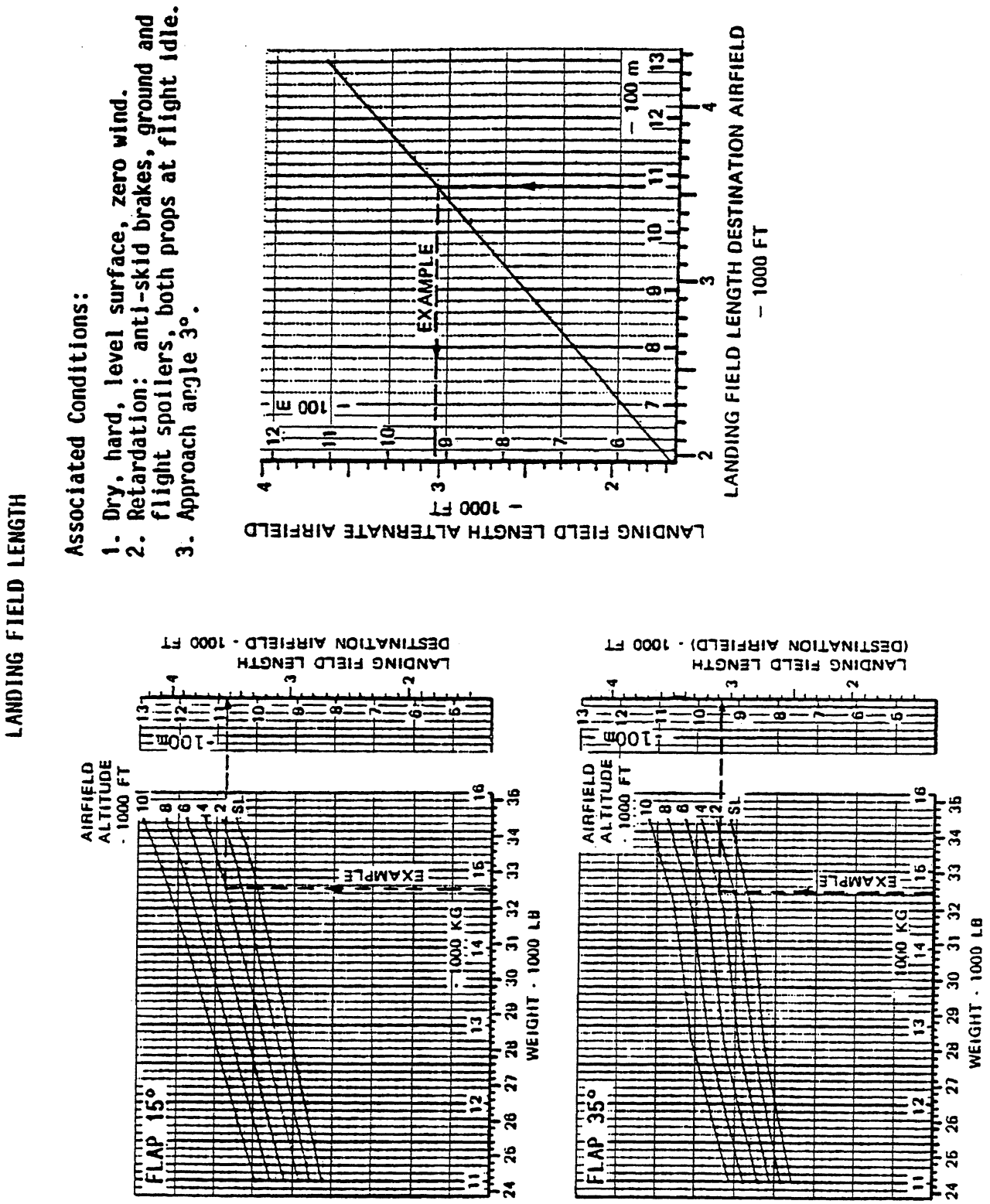


Figure 3-9 Landing Field Length

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SECTION 4

GROUND MANEUVERING

ILLUSTRATIONS

SECTION 4

GROUND MANEUVERING

4.0 INTRODUCTION

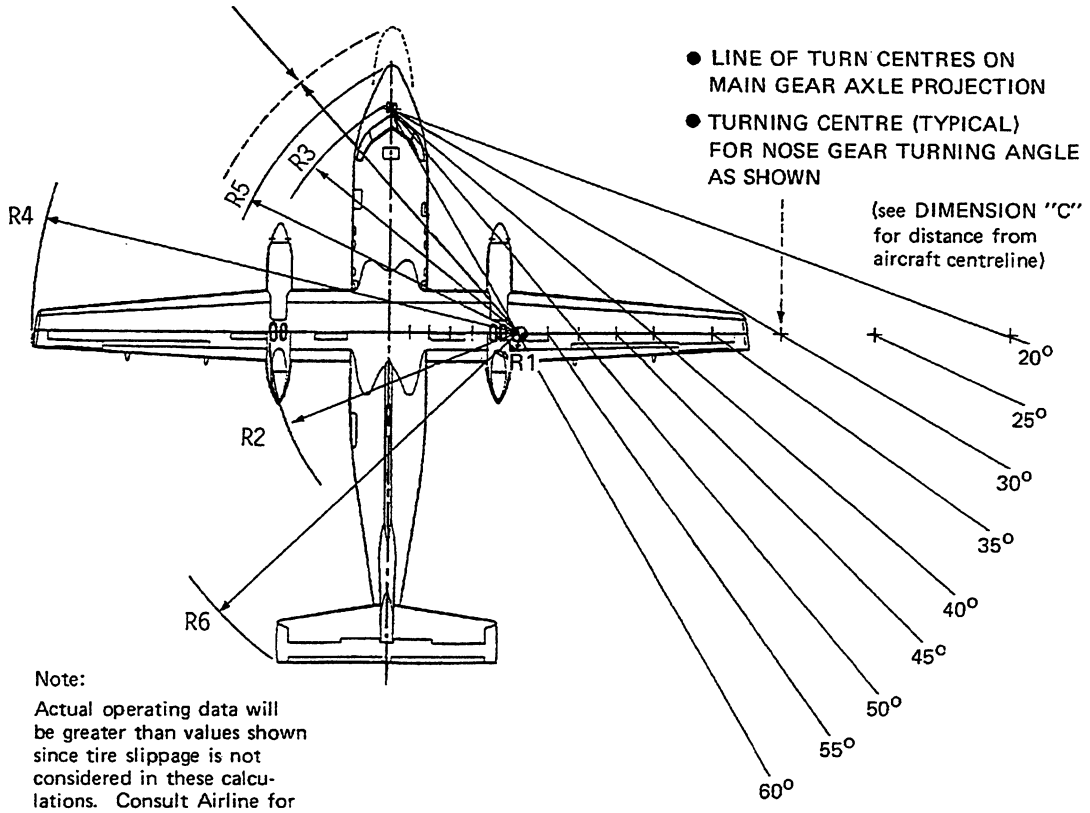
This section provides airplane turning capability, visibility, maneuvering characteristics, nose lifting precautions and mooring data.

For ease of presentation, this data has been determined from the theoretical limits imposed by the geometry of the airplane, and where noted, provides normal allowance for tire slippage. As such, it reflects the turning capability of the aircraft in favorable operating circumstances without the use of reverse thrust or differential braking. This data should only be used as a guideline for the method of determination of such parameters and for the maneuvering characteristics of the Dash 8 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, in the level of performance, over a wide range of operating circumstances throughout the world. Variations from standard aircraft operating patterns and techniques may be necessary to satisfy physical constraints within the maneuvering area, such as: adverse grades, limited area or high risk of jet engine exhaust or propeller slipstream damage. For these reasons, ground maneuvering requirements should be coordinated with the using airlines prior to layout planning.

The use of a nose lift dolly as detailed in Figure 4-9 is not a procedure recommended by de Havilland. It should only be used when absolutely necessary for operational purposes. The use of a nose lift dolly is at the sole risk of the operator of the aircraft.

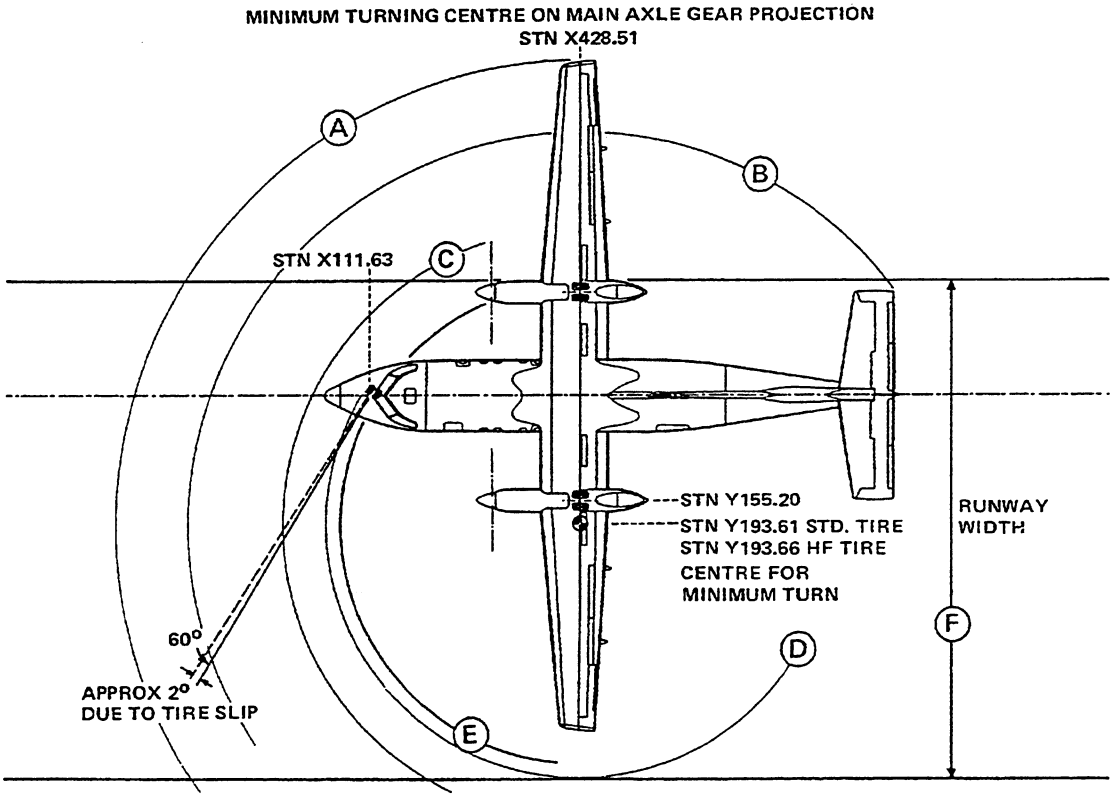
Note: Nose radius (R5) will be increased by 4ft. 6in. (1.37 m) for DND CT142 version with nose radar installation.



Note:
Actual operating data will be greater than values shown since tire slippage is not considered in these calculations. Consult Airline for operating procedures.

STEERING ANGLE (DEGREES)	R1 INNER GEAR		R2 OUTER GEAR		R3 NOSE GEAR		R4 WING TIP		R5 NOSE		R6 TAIL		DIMENSION "C"	
	FT	m	FT	m	FT	m	FT	m	FT	m	FT	m	FT	m
5	292.38	89.12	320.34	97.64	308.34	93.98	348.84	106.32	308.04	93.89	321.77	98.07	306.36	93.74
10	138.02	42.07	165.99	50.59	155.16	47.29	194.49	59.28	155.37	47.35	169.62	51.70	152.01	47.05
15	86.05	26.23	114.01	34.75	104.37	31.81	142.52	43.44	105.06	32.02	119.67	36.47	100.03	31.57
20	59.66	18.18	87.62	26.71	79.18	24.13	116.13	35.40	80.34	24.49	95.14	29.00	73.64	23.89
25	43.50	13.26	71.46	21.78	64.23	19.58	99.97	30.47	65.85	20.07	80.70	24.59	57.48	19.33
30	32.44	9.89	60.41	18.41	54.42	16.59	88.92	27.10	56.46	17.21	71.24	21.71	46.42	16.34
35	24.30	7.41	52.26	15.93	47.54	14.49	80.78	24.62	49.97	15.23	64.61	19.69	38.28	14.24
40	17.96	5.47	45.93	14.00	42.51	12.96	74.44	22.69	45.30	13.81	59.70	18.20	31.94	12.71
45	12.82	3.91	40.79	12.43	38.72	11.80	69.30	21.12	41.84	12.75	55.93	17.05	26.80	11.55
50	8.51	2.59	36.47	11.12	35.80	10.91	64.99	19.81	39.22	11.95	52.95	16.14	22.49	10.67
55	4.78	1.46	32.75	9.98	33.53	10.22	61.27	18.67	37.21	11.34	50.53	15.40	18.77	9.97
60	1.49	0.45	29.46	8.98	31.76	9.68	57.98	17.67	35.66	10.87	48.53	14.79	15.48	9.43
65	-1.48	-0.45	26.48	8.07	30.38	9.26	55.01	16.76	34.47	10.51	46.85	14.28	12.50	9.01
70	-4.23	-1.29	23.74	7.24	29.33	8.94	52.26	15.93	33.57	10.23	45.41	13.84	9.76	8.69
75	-6.80	-2.07	21.17	6.45	28.56	8.71	49.69	15.15	32.92	10.03	44.18	13.46	7.18	8.46
80	-9.26	-2.82	18.71	5.70	28.03	8.54	47.24	14.40	32.47	9.90	43.11	13.14	4.73	8.30
85	-11.64	-3.55	16.33	4.98	27.72	8.45	44.86	13.67	32.21	9.82	42.19	12.86	2.35	8.20
90	-13.98	-4.26	13.98	4.26	27.61	8.42	42.52	12.96	32.13	9.79	41.39	12.62	0.00	8.17

Figure 4-1 Turning Radii, No Slip Angle



ITEM	RADIUS (STANDARD & HIGH FLOTATION TIRES)
A – OUTER WING TIP	59 FT 4 IN (18.06 m)
B – ELEVATOR TIP	49 FT 4 IN (15.02 m)
C – PROPELLER TIP	37 FT 4 IN (11.38 m)
D – NOSE WHEEL (OUTER TIRE)	31 FT 10 IN (9.70 m)
E – MAIN WHEEL (OUTER TIRE)	30 FT 3 IN (9.22 m)
F – RUNWAY WIDTH MINIMUM FOR 180° TURN	62 FT 0 IN (18.90 m)

NOTES:

1. DIMENSIONS QUOTED ARE GIVEN FOR DRY, HARD, LEVEL SURFACE AT RECOMMENDED TIRE PRESSURES FOR STANDARD AIRCRAFT
2. NOSE WHEEL STEERING LIMIT IS APPROXIMATELY 60° LEFT & RIGHT
3. SLIP ANGLE OF 2° IS APPROXIMATE ONLY AND MAY VARY DEPENDING ON AIRCRAFT CONFIGURATION, LOADING & TIRE WEAR
4. DIMENSIONS GIVEN FOR MANEUVERING CLEARANCE & TURNING RADII ARE MINIMUM RECOMMENDED LIMITS

Figure 4–2 Turning Radius at Minimum Power

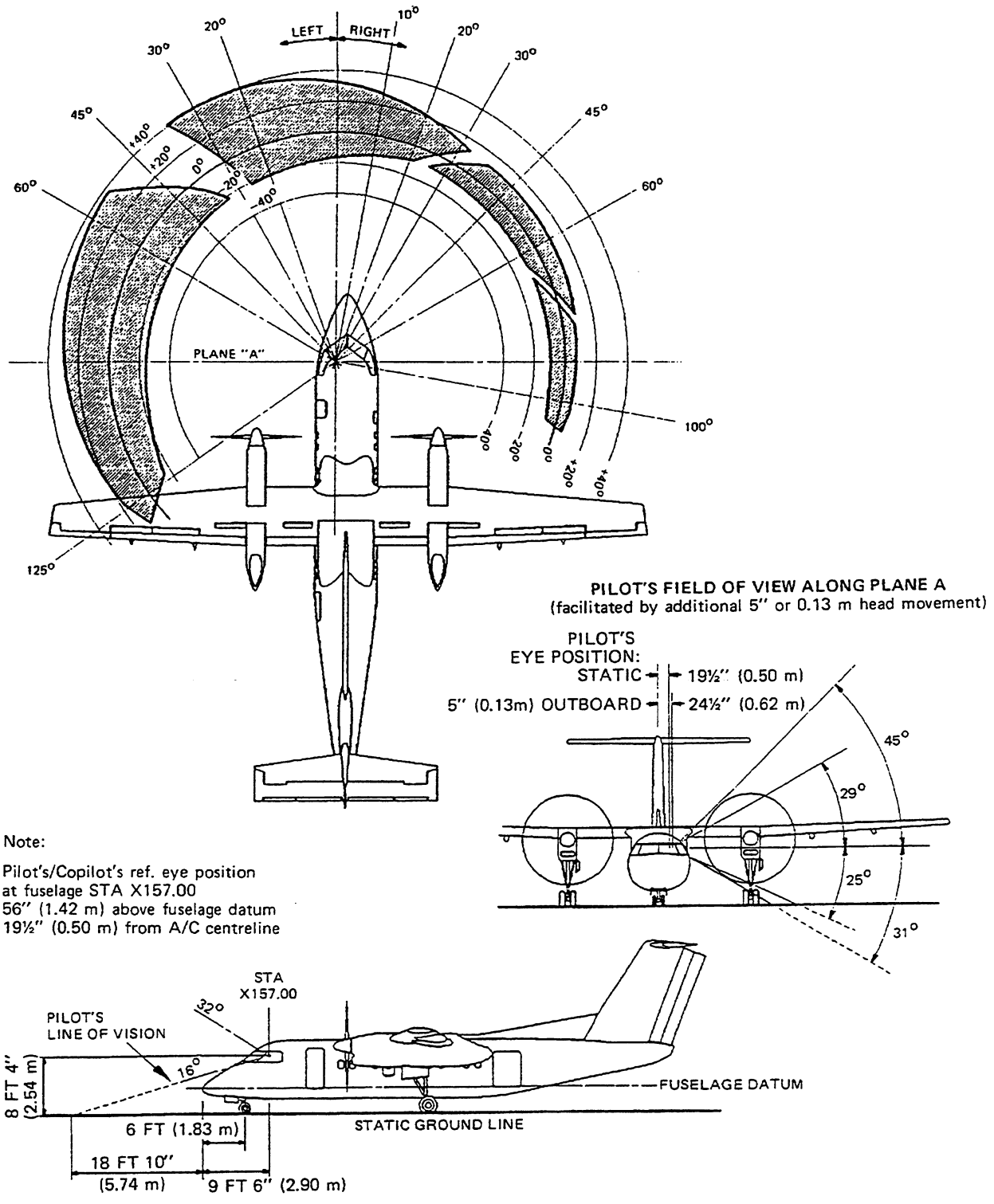


Figure 4-3 Visibility from Cockpit in Static Position

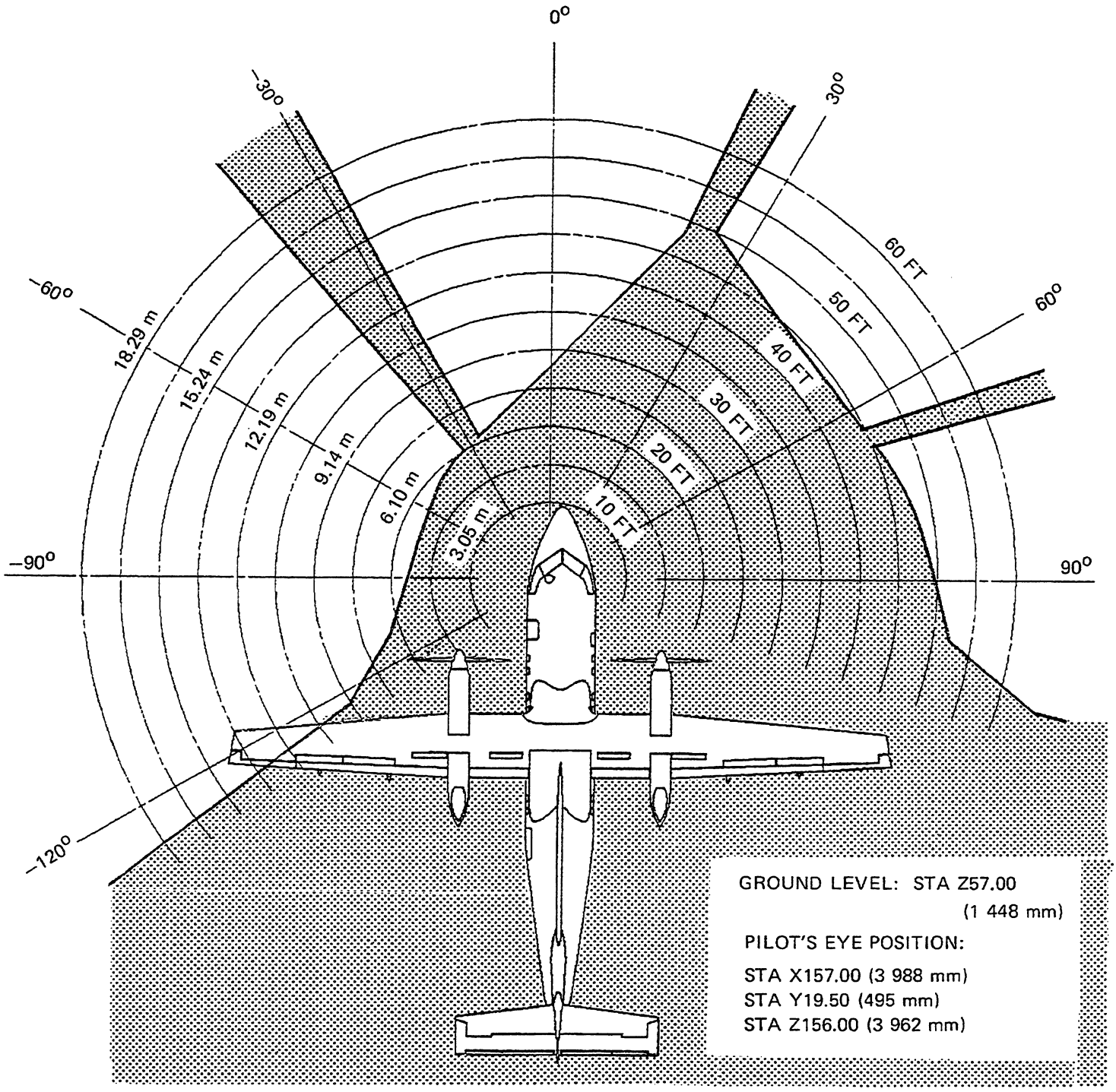


Figure 4–4 Ground Line Visibility from Cockpit, Static Position

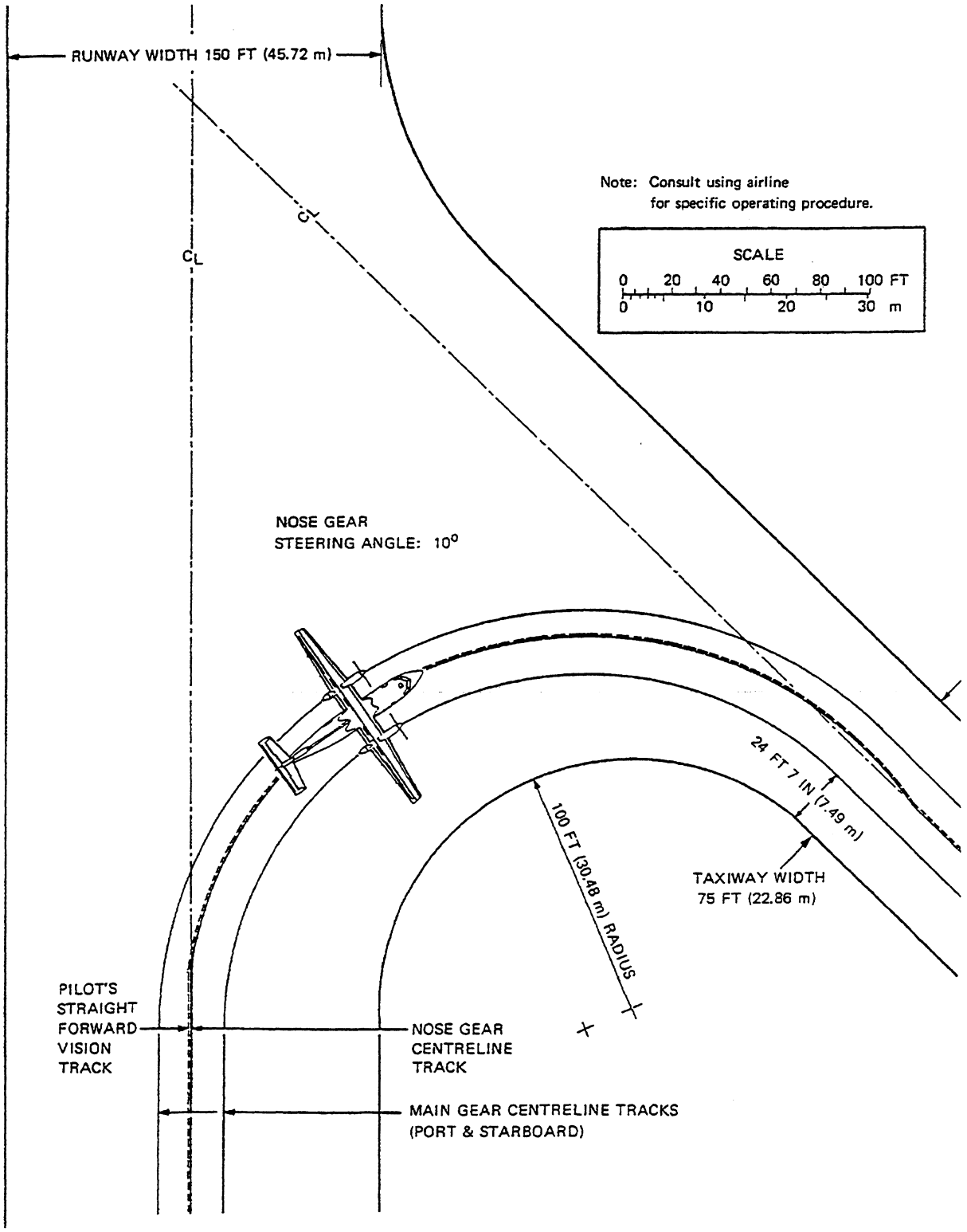


Figure 4–5 Greater Than 90° Turn – Runway to Taxiway with Nose Gear and Cockpit Tracks

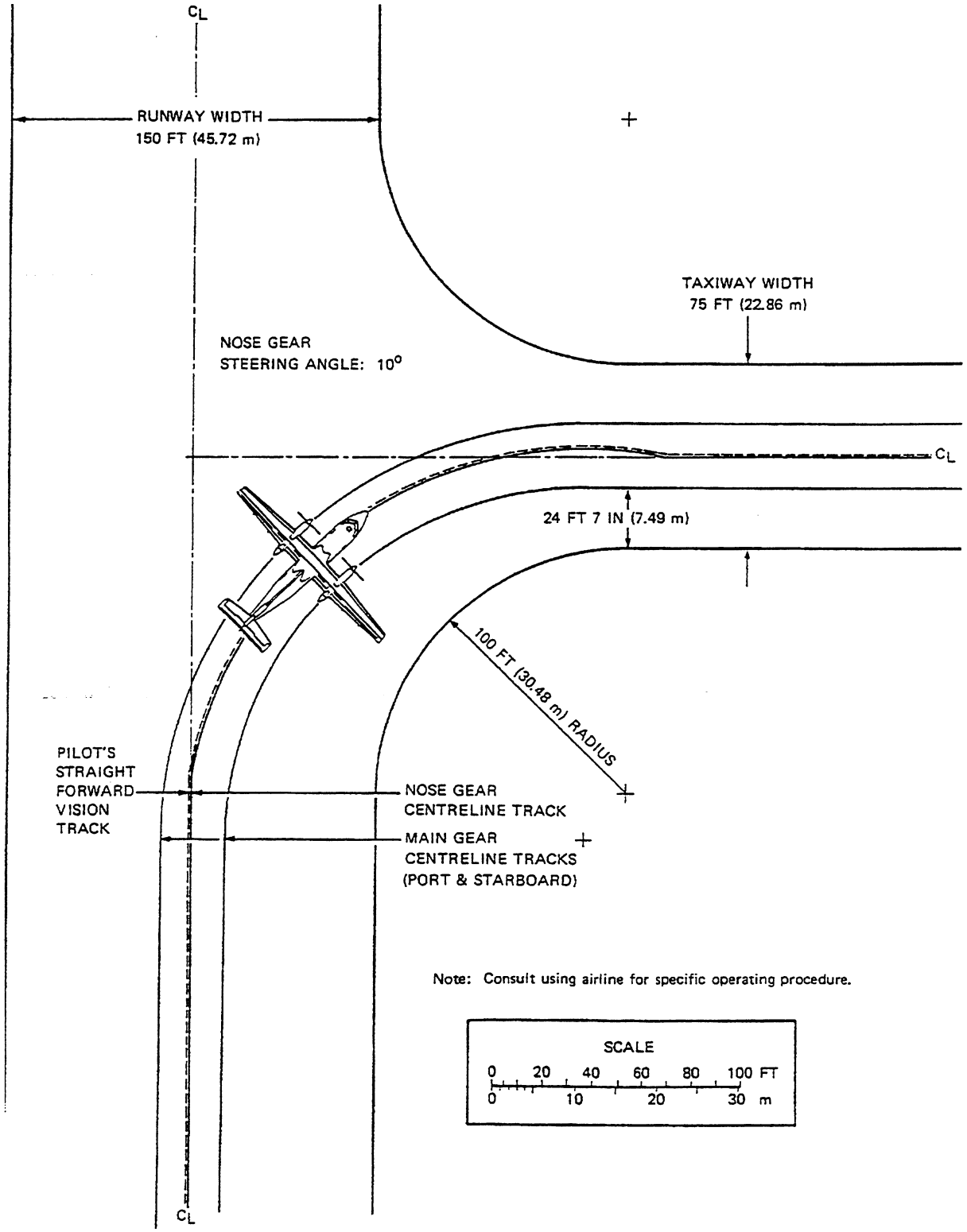


Figure 4-6 90° Turn-Runway to Taxiway with Nose Gear and Cockpit Tracks

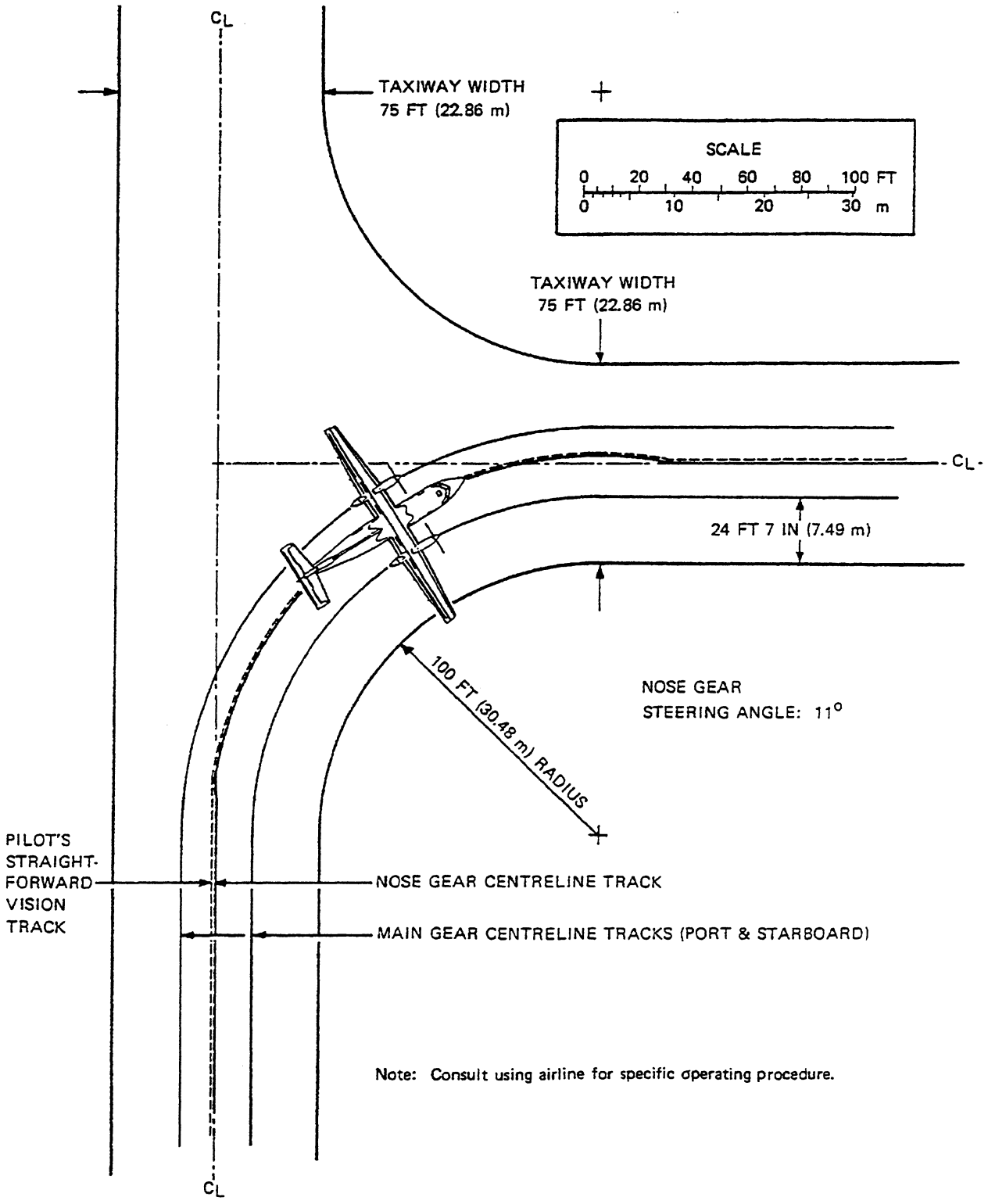


Figure 4–7 90° Turn–Taxiway to Runway with Nose Gear and Cockpit Tracks

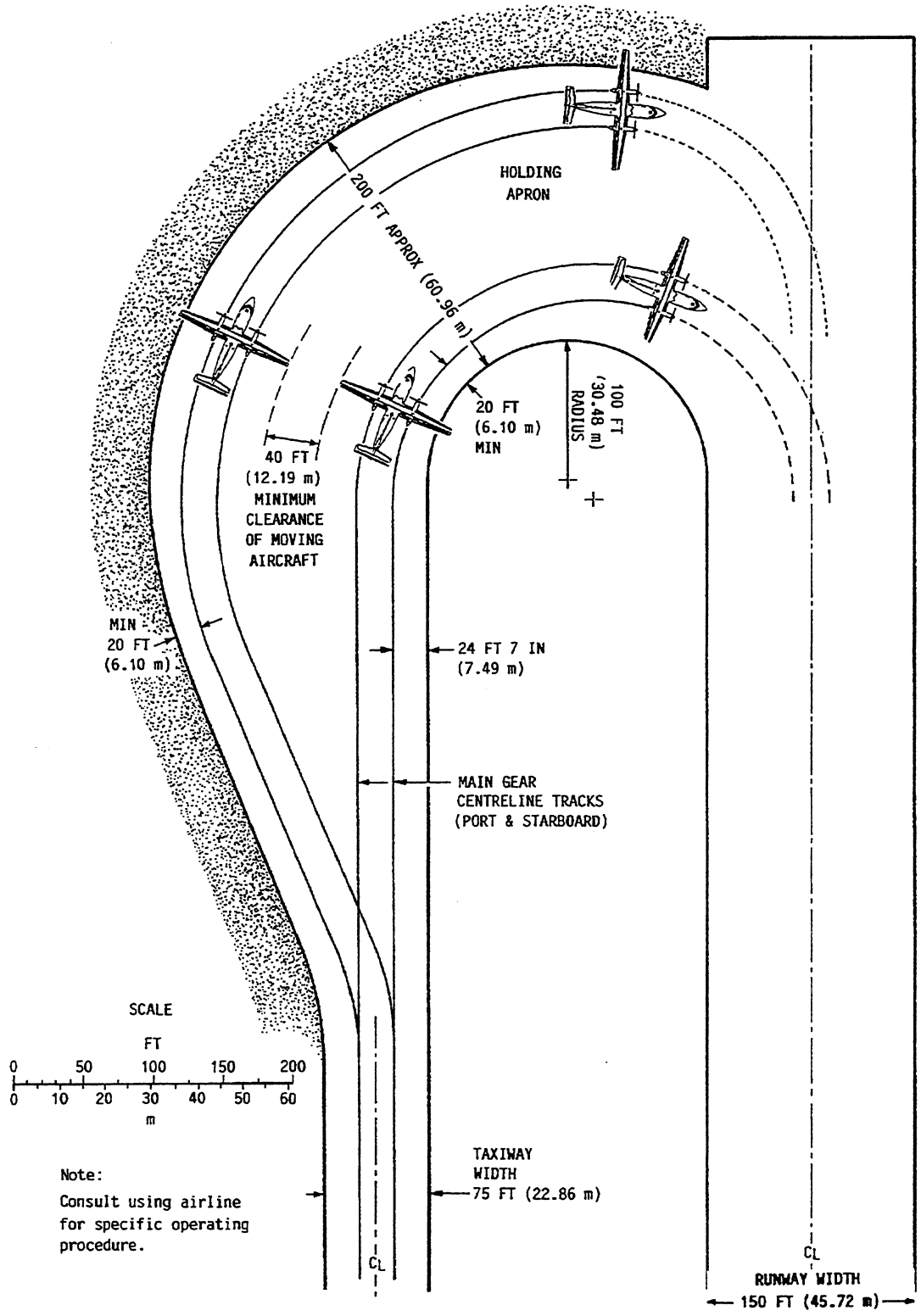
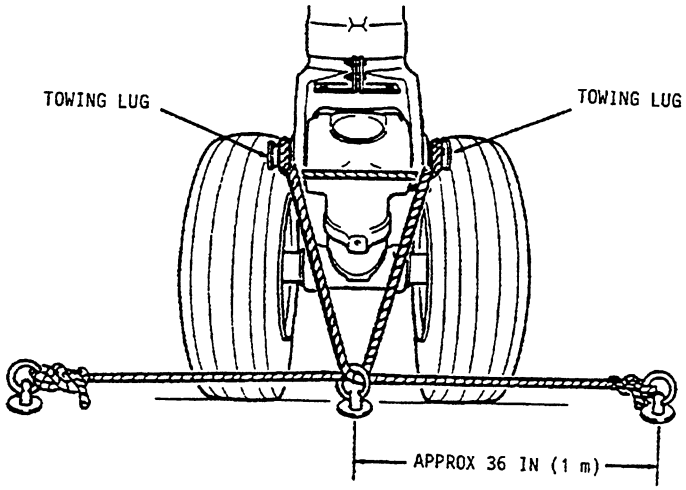


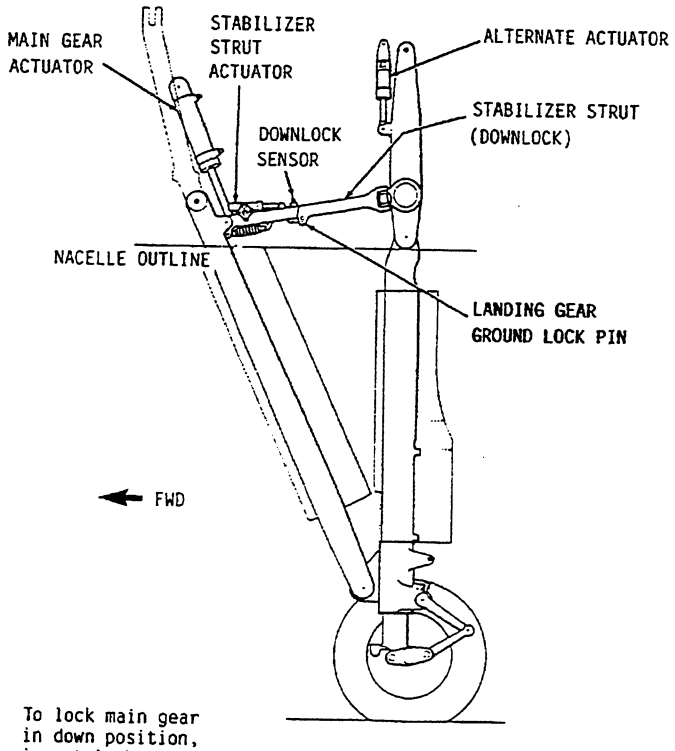
Figure 4-8 Runway Holding Bay (Apron)

PARKING & MOORING PROCEDURE

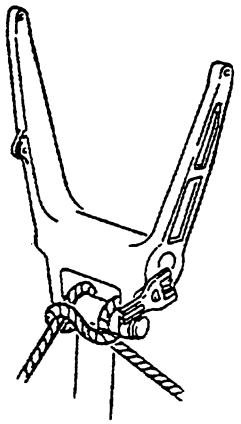
1. Park airplane heading into wind with flaps up and nose wheel centered.
2. Engage parking brake, check brake accumulator gauge and pump up as required.
3. Lock control surfaces.
4. Engage nose gear ground lock.
5. Install main gear ground lock pins (see illustration).
6. Install protective covers.
7. Install propeller restraints.
8. Close all doors and windows.
9. Statically ground airplane on undercarriage drag strut crossbeam (both sides).
10. Chock nose and main wheels.
11. Moor airplane (see illustrations).



NOSE GEAR TIEDOWN



To lock main gear in down position, insert lock pin in stabilizer strut downlock mechanism (as shown).



MAIN GEAR TIEDOWN

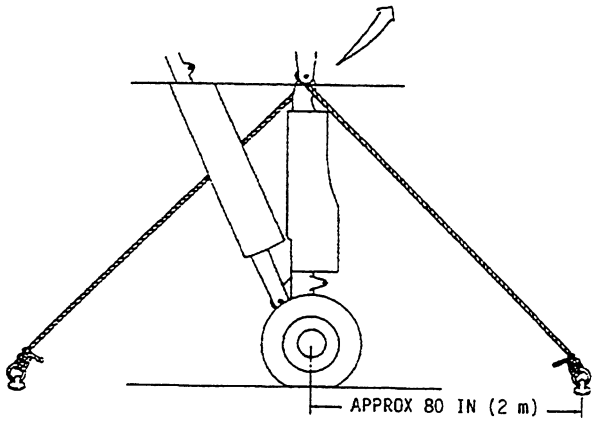
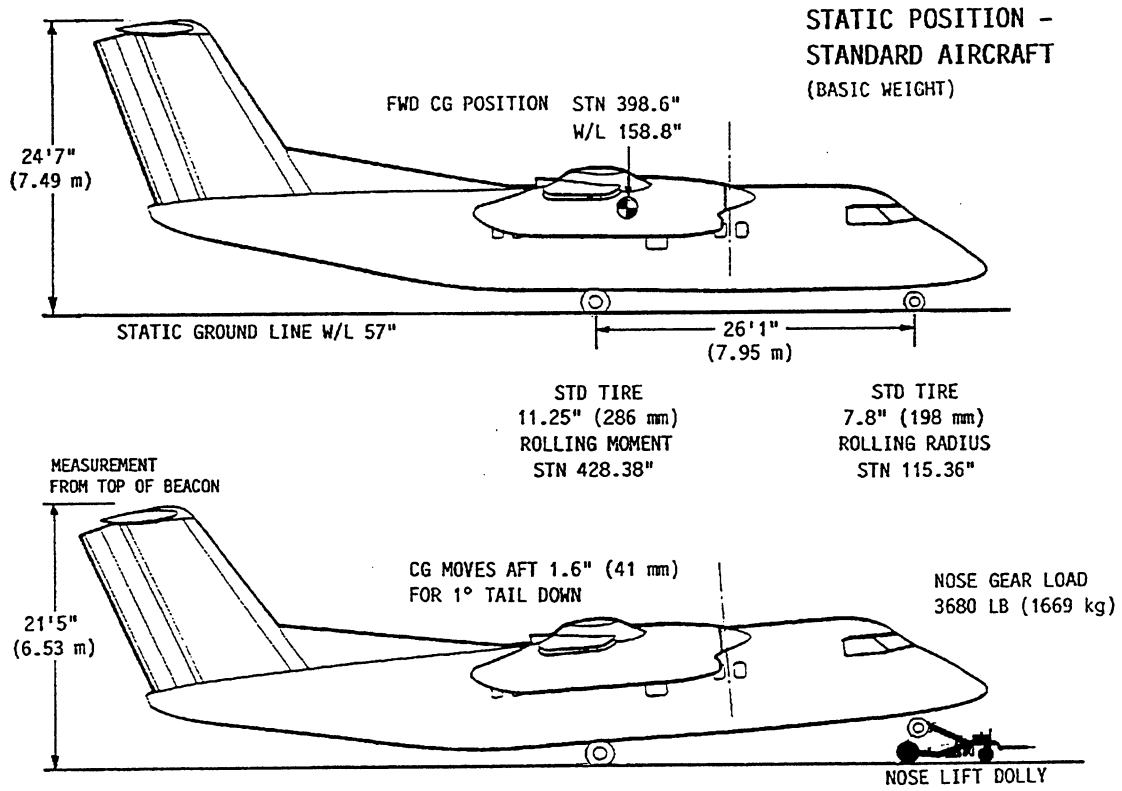
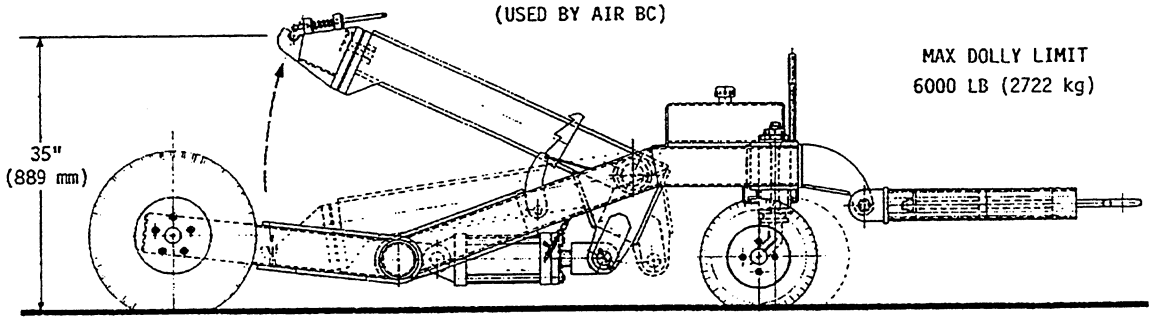


Figure 4-9 Parking and Mooring



TYPICAL NOSE LIFT DOLLY
MFG. BY JAY FABRICATIONS LTD.,
20076 WHARF ST., MAPLE RIDGE, B.C. V2X 1A1
(USED BY AIR BC)



Associated Conditions:

1. Limit use in lift mode for hangar storage only.
2. Aircraft at basic weight with one brake operator.
3. Maximum tilt angle to be avoided if aircraft has appreciable fuel load.
4. Nose landing gear and main landing gear locked and MLG Pins installed.
5. Hard level surface.
6. Use of ramps over steps (i.e. hangar door tracks).
7. Zero to 5 mph wind velocity.
8. Limit turns to +10° to -10°.
9. Maximum tractor speed 5 mph (8 kmh).
10. Nose wheel steering switch "off".
11. Check aircraft brake system.
12. During towing use brakes only in emergency.

Figure 4-10 Nose Lift Dolly (For Hangar Storage Only)

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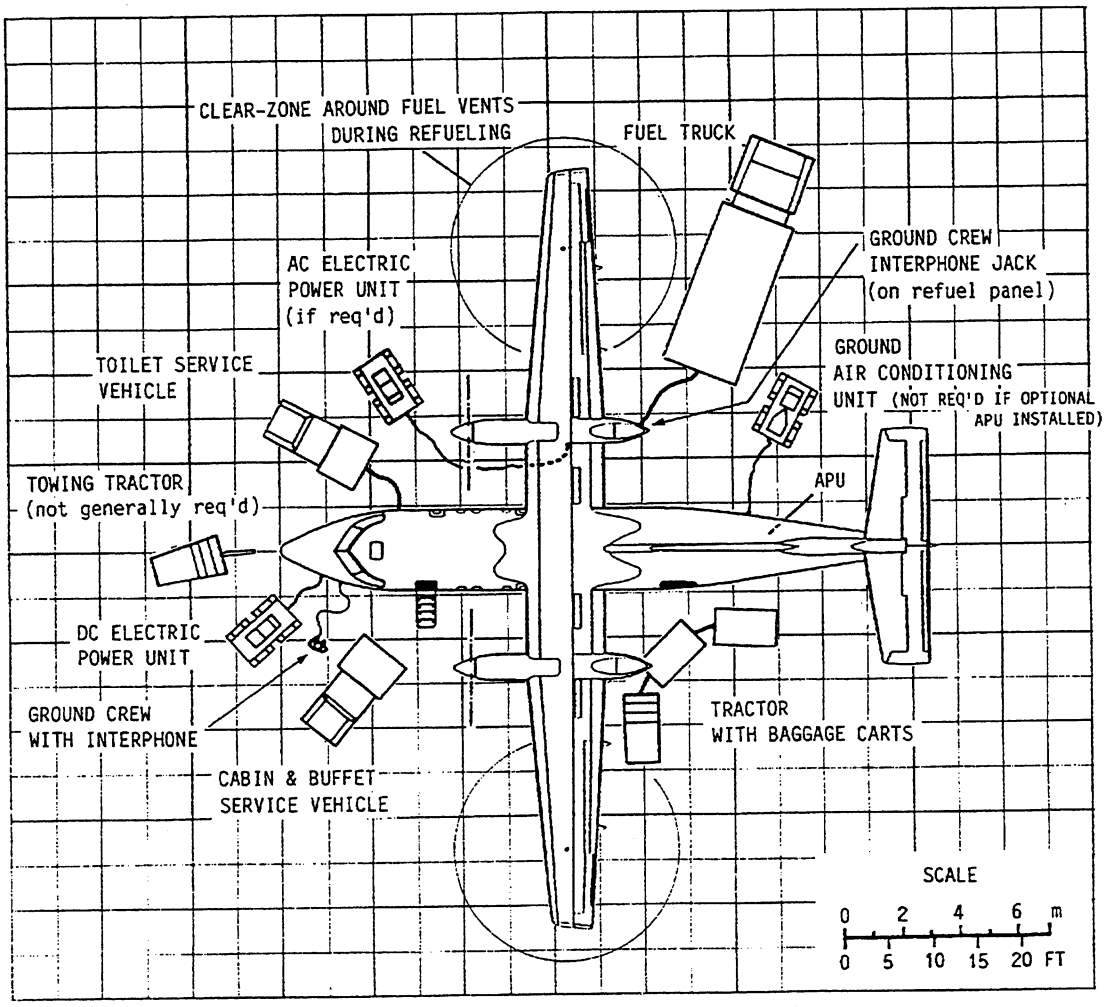
SECTION 5

TERMINAL SERVICING

ILLUSTRATIONS

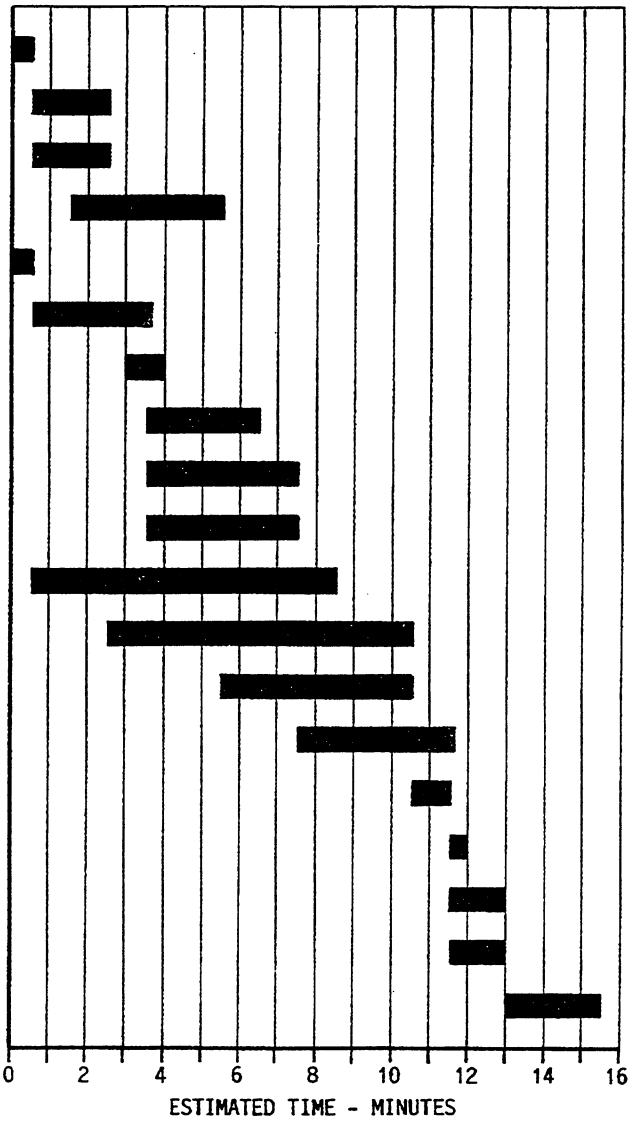
SECTION 5
TERMINAL SERVICING



SYSTEM	ADAPTER
PRESSURE REFUELLING	MS 24484-2
DC ELECTRICAL POWER	MS 3506-1 (AIRCRAFT CONNECTOR); MS 25488 (MATING GROUND CONNECTOR)
AC ELECTRICAL POWER	CANNON CE9310-10 (AIRCRAFT CONNECTOR) CE9183 (MATING GROUND CONNECTOR)
GROUND AIR CONDITIONING	MS 33562 8" (20.3 cm); RECEPTACLE (OPTIONAL INSTALLATION)
TOILET SERVICING	MS2651-133 ROYLYN 'Y' DRAIN COUPLING PLUS STANDARD 1" (2.5 cm) FILLPORT
GROUND CREW INTERPHONE	300 OHM IMPEDENCE THROAT MICROPHONE WITH SWITCH - AIRCRAFT CONNECTOR 72340012-001 (SWITCHCRAFT C-55B); MATING GROUND CONNECTOR PJ051B (NATO 4-WAY JACK PLUG)

Figure 5-1 Airplane Servicing Arrangement (TYPICAL - NO APU)

1. SHUTDOWN ENGINES
2. PROVIDE GROUND ELECTRICAL POWER
3. POSITION SERVICE EQUIPMENT
4. UNLOAD BAGGAGE
5. LOWER AIRSTAIR DOOR
6. DEPLANE 37 PASSENGERS
7. CHECK AIRPLANE LOG BOOK
8. SERVICE TOILET
9. SERVICE GALLEY (see 'A')
10. SERVICE AIRPLANE INTERIOR (see 'A')
11. PERFORM MAINTENANCE CHECK
12. REFUEL AIRPLANE (see 'B')
13. LOAD BAGGAGE
14. ENPLANE 37 PASSENGERS
15. CHECK AIRPLANE LOG BOOK
16. RAISE AIRSTAIR DOOR
17. START ENGINES
18. MONITOR ENGINE STARTS
19. CLEAR AIRPLANE FOR DEPARTURE



'A' - Galley and cabin serviced through airstair door.

'B' - Pumping time only, at a rate of 75 U.S. gpm (283.9 ℓ/min).

Note:

This data is provided to illustrate the general scope and types of tasks involved in terminal operations. Varying airline practices and operating circumstances will result in different sequences and time intervals to accomplish the tasks shown. Because of this, ground operations requirements should be coordinated with the using airline prior to ramp planning.

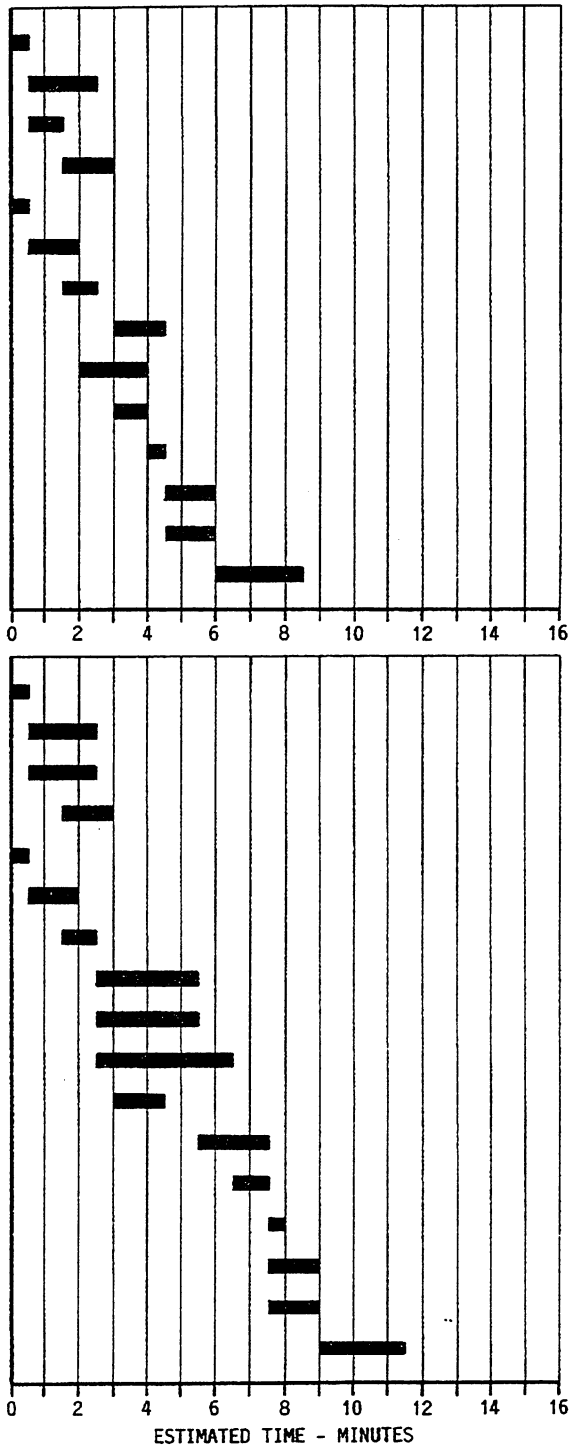
Figure 5-2 Terminal Operations, Turnaround Station (100% Passenger Exchange)

NO REFUELLING OR SERVICING

1. SHUTDOWN ENGINES
2. PROVIDE GROUND ELECTRICAL POWER
3. POSITION BAGGAGE HANDLING EQUIPMENT
4. UNLOAD BAGGAGE
5. LOWER AIRSTAIR DOOR
6. DEPLANE 18 PASSENGERS
7. CHECK AIRPLANE LOG BOOK
8. LOAD BAGGAGE
9. ENPLANE 18 PASSENGERS
10. CHECK AIRPLANE LOG BOOK
11. RAISE AIRSTAIR DOOR
12. START ENGINES
13. MONITOR ENGINE STARTS
14. CLEAR AIRPLANE FOR DEPARTURE

WITH REFUELLING & SERVICING

1. SHUTDOWN ENGINES
2. PROVIDE GROUND ELECTRICAL POWER
3. POSITION SERVICE EQUIPMENT
4. UNLOAD BAGGAGE
5. LOWER AIRSTAIR DOOR
6. DEPLANE 18 PASSENGERS
7. CHECK AIRPLANE LOG BOOK
8. SERVICE TOILET
9. SERVICE GALLEY (see 'A')
10. REFUEL AIRPLANE (see 'B')
11. LOAD BAGGAGE
12. ENPLANE 18 PASSENGERS
13. CHECK AIRPLANE LOG BOOK
14. RAISE AIRSTAIR DOOR
15. START ENGINES
16. MONITOR ENGINE STARTS
17. CLEAR AIRPLANE FOR DEPARTURE

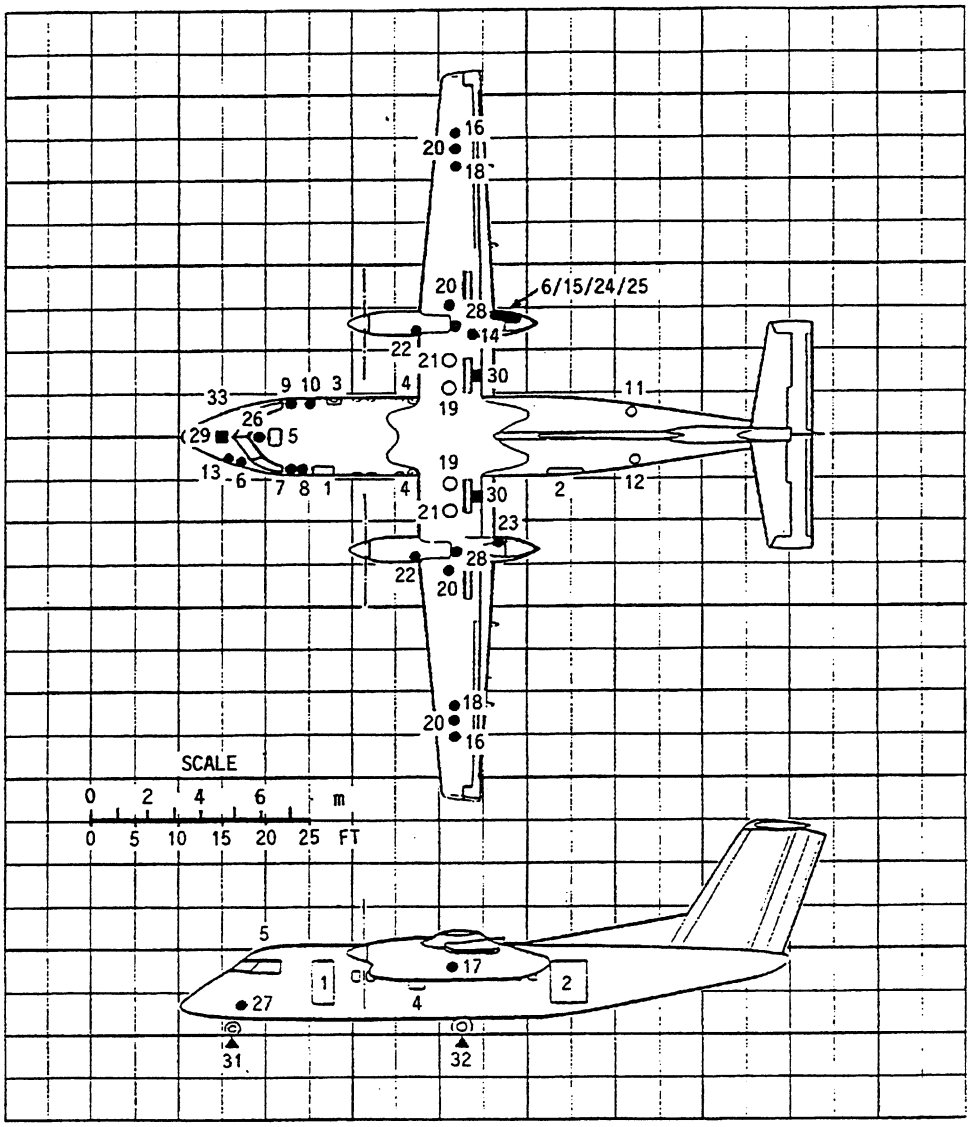


'A' - Galley serviced through airstair door.

'B' - Pumping time only, at a rate of 75 U.S. gpm (283.9 ℓ/min).

Note: This data is provided to illustrate the general scope and types of tasks involved in terminal operations. Varying airline practices and operating circumstances will result in different sequences and time intervals to accomplish the tasks shown. Because of this, ground operations requirements should be coordinated with the using airline prior to ramp planning.

Figure 5-3 Terminal Operations, Enroute Station (50% Passenger Exchange)



1. Airstair Door
2. Cargo Door
3. Type II Emergency Exit
4. Type III Emergency Exit
5. Flight Compartment Emergency Exit
6. Interphone Connectors (fore & aft)
7. Avionics Bay
8. Wardrobe
9. Lavatory
10. Galley
11. Optional APU
12. Optional Air Conditioning Ground Connection - on RH side if no APU
13. Electrical DC Power Receptacle
14. Electrical AC Power Receptacle
15. Pressure Refueling Panel & Grounding Point
16. Grounding Point (overwing)
17. Grounding Point (on u/c drag strut crossbeam - both sides)
18. Gravity Fuel Filler (overwing)
19. Aux. Tank Gravity Fuel Filler (optional)
20. Magnastick (fuel contents - underwing)
21. Aux. Tank Magnastick
22. Engine Oil Filler Panel
23. No. 1 Hydraulic System
24. No. 2 Hydraulic System
25. Brake Accumulator & Hydraulic Handpump
26. Emergency Landing Gear Hydraulic Reservoir & Handpump
27. Nose Gear Shock Strut Air Charging Points
28. Main Gear Shock Strut Air Charging Points (under nacelle)
29. Nose Jacking Point
30. Wing Jacking Point
31. Nose Gear Jacking Point
32. Main Gear Jacking Point
33. Crew oxygen supply

Figure 5-4 Ground Service Connections

SYSTEM	DISTANCE AFT OF NOSE		DISTANCE FROM AIRPLANE CENTER-LINE				HEIGHT FROM GROUND*	
			LEFT SIDE		RIGHT SIDE			
	FT	m	FT	m	FT	m	FT	m
HYDRAULIC SYSTEM								
No. 1 SYSTEM – 2.68 U.S. QUARTS (2.5 L) CAPACITY RESERVOIR	34'1"	10.39	12'1"	3.68	–	–	6'11"	2.11
No. 2 SYSTEM – 5.19 U.S. QUARTS (4.9 L) CAPACITY RESERVOIR	34'1"	10.39	–	–	13'9"	4.19	6'11"	2.11
ALTERNATIVE EXTENSION SYSTEM RESERVOIR (IN NOSE EQUIPMENT COMPARTMENT)	5'4"	1.63	–	–	1'10"	0.56	3'11"	1.19
MAIN GEAR SHOCK STRUT VALVES	32'4"	9.86	12'11"	3.94	12'11"	3.94	4'1"	1.25
NOSE GEAR SHOCK STRUT VALVE	5'7"	1.70	0	0	0	0	2'4"	0.71
PARKING BRAKE ACCUMULATOR	34'5"	10.49	–	–	13'11"	4.24	6'11"	2.11
ELECTRICAL SYSTEM								
28v DC EXTERNAL CONNECTION (250 AMP CONTINUOUS, 1200 AMP PEAK)	5'3"	1.60	2'8"	0.81	–	–	4'0"	1.22
115/200v AC EXTERNAL CONNECTION (3–PHASE 400 Hz FREQ., AMP 20 kvA MIN)	33'4"	10.16	–	–	11'8"	3.56	7'3"	2.21
OXYGEN SYSTEM								
CREW OXYGEN SUPPLY IN NOSE COMPARTMENT – 39.4 CU FT (1100 L) CAPACITY	4'3"	1.30	–	–	1'8"	0.51	4'0"	1.22
PORTABLE CYLINDER IN–FLIGHT COMPARTMENT – 11.3 CU FT (320 L) CAPACITY	11'4"	3.45	–	–	1'11"	0.58	5'0"	1.52
2 PORTABLE CYLINDERS IN BUFFET UNIT FOR PASSENGERS – 4.3 CU FT (122 L) EACH	15'11"	4.85	–	–	3'2"	0.97	4'7"	1.40

* **Dimensions are approximate and vary depending on airplane configuration and loading conditions. CR832SO08009 Optional Low Pressure Tires will add approximately 2" (5.1 cm) to dimensions quoted above.**

Figure 5–5 Ground Service Connection Data (Sheet 1 of 3)

SYSTEM	DISTANCE AFT OF NOSE		DISTANCE FROM AIRPLANE CENTER-LINE				HEIGHT FROM GROUND*	
			LEFT SIDE		RIGHT SIDE			
	FT	m	FT	m	FT	m	FT	m
FUEL SYSTEM								
1 STANDARD TANK PER WING – 423 U.S. GAL. (1601 L) EACH, TOTALLING 846 U.S. GAL. (3202 L)								
1 AUX. LONG RANGE TANK PER WING (OPTIONAL) –354 U.S. GAL. (1341 L) EACH, INCREASING TOTAL CAPACITY TO 1554 U.S. GAL. (5884 L)								
REFUELING AT MAX PRESSURE OF 50 PSI (345 kPa) AT RATE OF 75 U.S. GAL./MIN. (284L/MIN.)								
STANDARD CONNECTIONS								
1 REFUEL/DEFUEL ADAPTER	39'5"	12.01	–	–	12'11"	3.94	7'1"	2.16
2 OVERWING GRAVITY FILLERS	30'10"	9.40	31'5"	9.58	31'5"	9.58	11'10"	3.61
FUEL VENTS	30'11"	9.42	33'4"	10.16	33'4"	10.16	10'6"	3.20
AUXILIARY TANK CONNECTIONS (OPTIONAL)								
2 OVERWING FILLERS	30'3"	9.22	7'2"	2.18	7'2"	2.18	11'4"	3.45
PNEUMATIC SYSTEM								
NOSE LANDING GEAR – UPPER SHOCK STRUT VALVE (NITROGEN) – 290 psi (2000 kPa)	5'7"	1.70	0	0	0	0	2'4"	0.71
MAIN LANDING GEAR – UPPER SHOCK STRUT VALVES (NITROGEN) – 287 psi (1979 kPa)	32'4"	9.86	12'11"	3.94	12'11"	3.94	4'1"	1.25

* **Dimensions are approximate and vary depending on airplane configuration and loading conditions. CR832SO08009 Optional Low Pressure Tires will add approximately 2" (5.1 cm) to dimensions quoted above.**

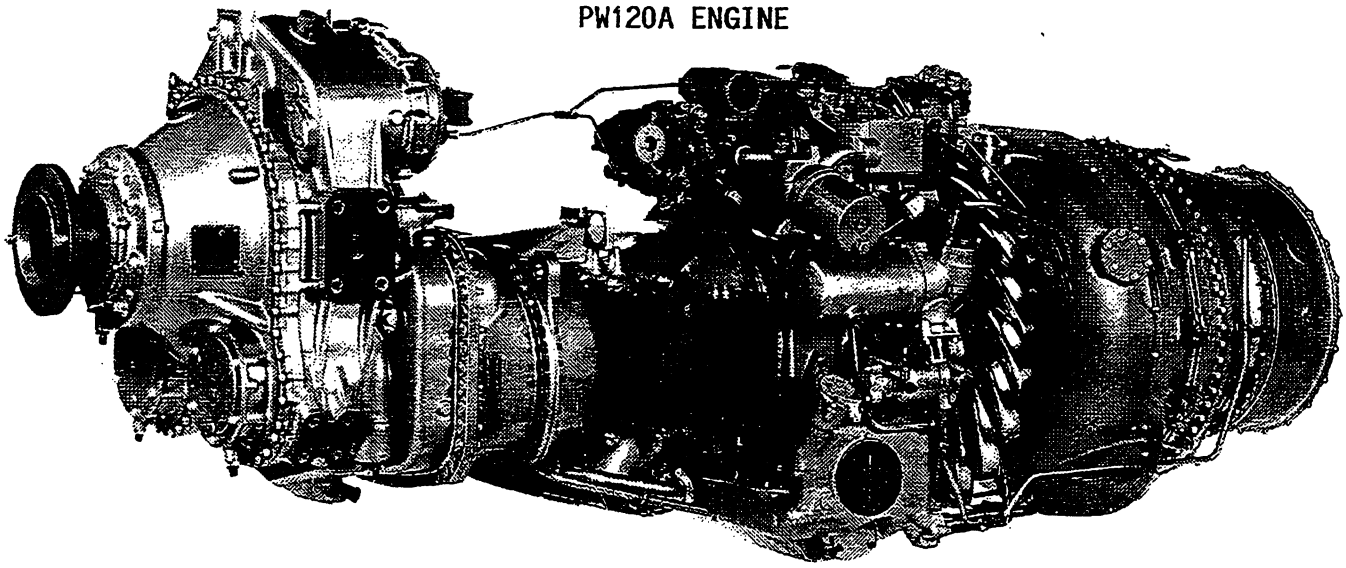
Figure 5–5 Ground Service Connection Data (Sheet 2 of 3)

SYSTEM	DISTANCE AFT OF NOSE		DISTANCE FROM AIRPLANE CENTER-LINE				HEIGHT FROM GROUND*	
			LEFT SIDE		RIGHT SIDE			
	FT	m	FT	m	FT	m	FT	m
PARKING BRAKE ACCUMULATOR – CHARGED WITH 900–1000 psi (6205–6895 kPa) NITROGEN	34'5"	10.49	–	–	13'11"	4.24	6'11"	2.11
AIR CONDITIONING GROUND CONNECTION (OPTIONAL) 8" (20.3 cm) RECEPTACLE (ON L.H. SIDE IF OPTIONAL APU INSTALLED)	54'1"	16.49	2'10"	0.86	–	–	7'2"	2.18
PORTABLE WATER OPTIONAL WATER–WASH INSTALLATION IN LAVATORY – 5.8 U.S. GAL. (22 L) CAPACITY	14'3"	4.34	–	–	2'5"	0.74	8'0"	2.44
TOILET 3.5 U.S. GAL. (13 L) CAPACITY FLUSH SOLUTION RESERVOIR WITH DRAIN	13'9"	4.19	–	–	2'9"	0.84	3'3"	0.99
OIL 5.5 U.S. GAL. (21 L) PER ENGINE – ACCESS TO FILLER THROUGH DOOR ON L.H. SIDE OF EACH NACELLE	24'10"	7.57	14'3"	4.34	11'8"	3.56	8'11"	2.72
WINDSHIELD WASHER SYSTEM (OPTIONAL) 2 U.S. GAL. (7.6 L) RESERVOIR THROUGH THE RIGHT UPPER NOSE COMPARTMENT ACCESS DOOR	4'1"	1.25	–	–	1'3"	0.38	5'7"	1.70

* **Dimensions are approximate and vary depending on airplane configuration and loading conditions. CR832SO08009 Optional Low Pressure Tires will add approximately 2" (5.1 cm) to dimensions quoted above.**

Figure 5–5 Ground Service Connection Data (Sheet 3 of 3)

PW120A ENGINE



NOMINAL VOLTAGE	STARTING CURRENT	DURATION
28	1100 – 1300 AMPS	2 – 3 SECONDS
28	500 – 700 AMPS	5 SECONDS
28	300 AMPS	60 SECONDS

The 28 volt DC electrical system which supplies the external DC starting power is connected to the aircraft by means of a DC external power receptacle – (type MS 3506–1) located on the left side of the aircraft nose section approximately 52 inches (1.32 m) above the static ground line.

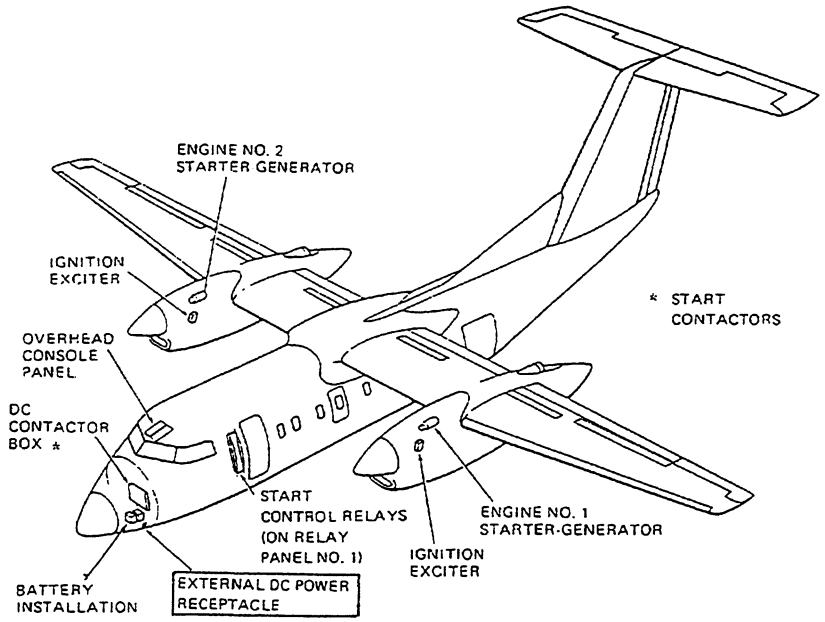


Figure 5–6 Engine Starting Electrical Requirements

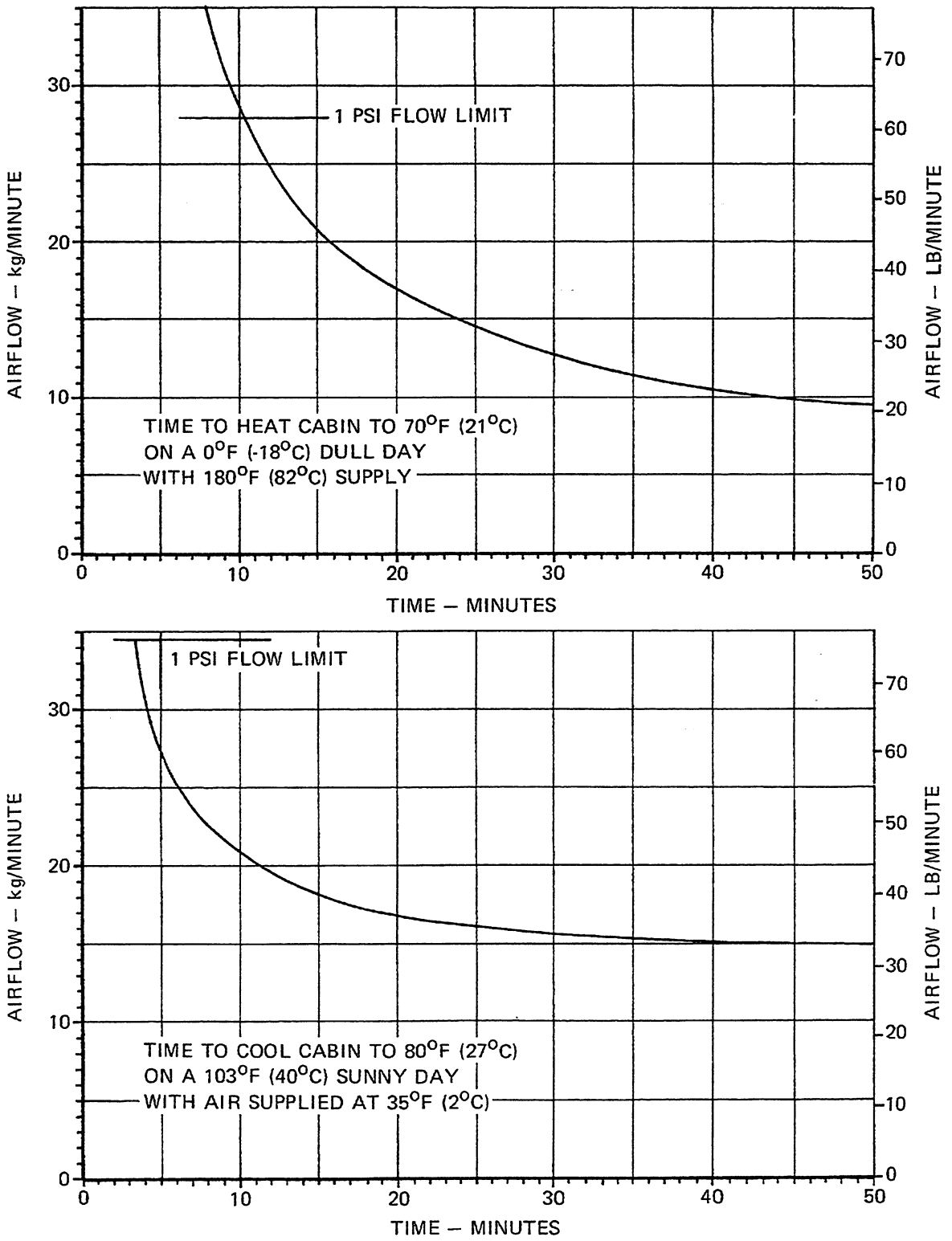


Figure 5–7 Ground Pneumatic Power Requirements – Heating and Cooling

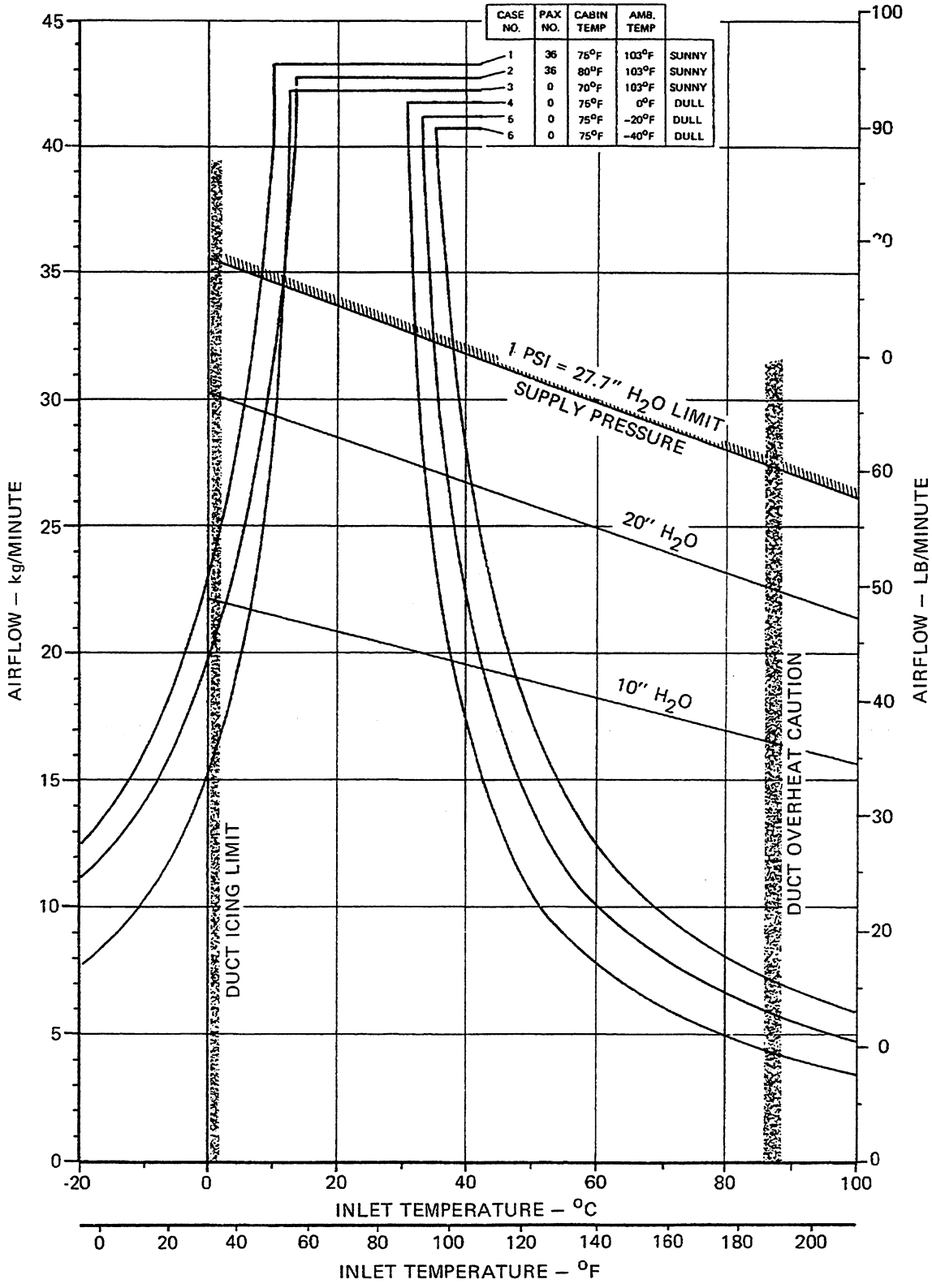
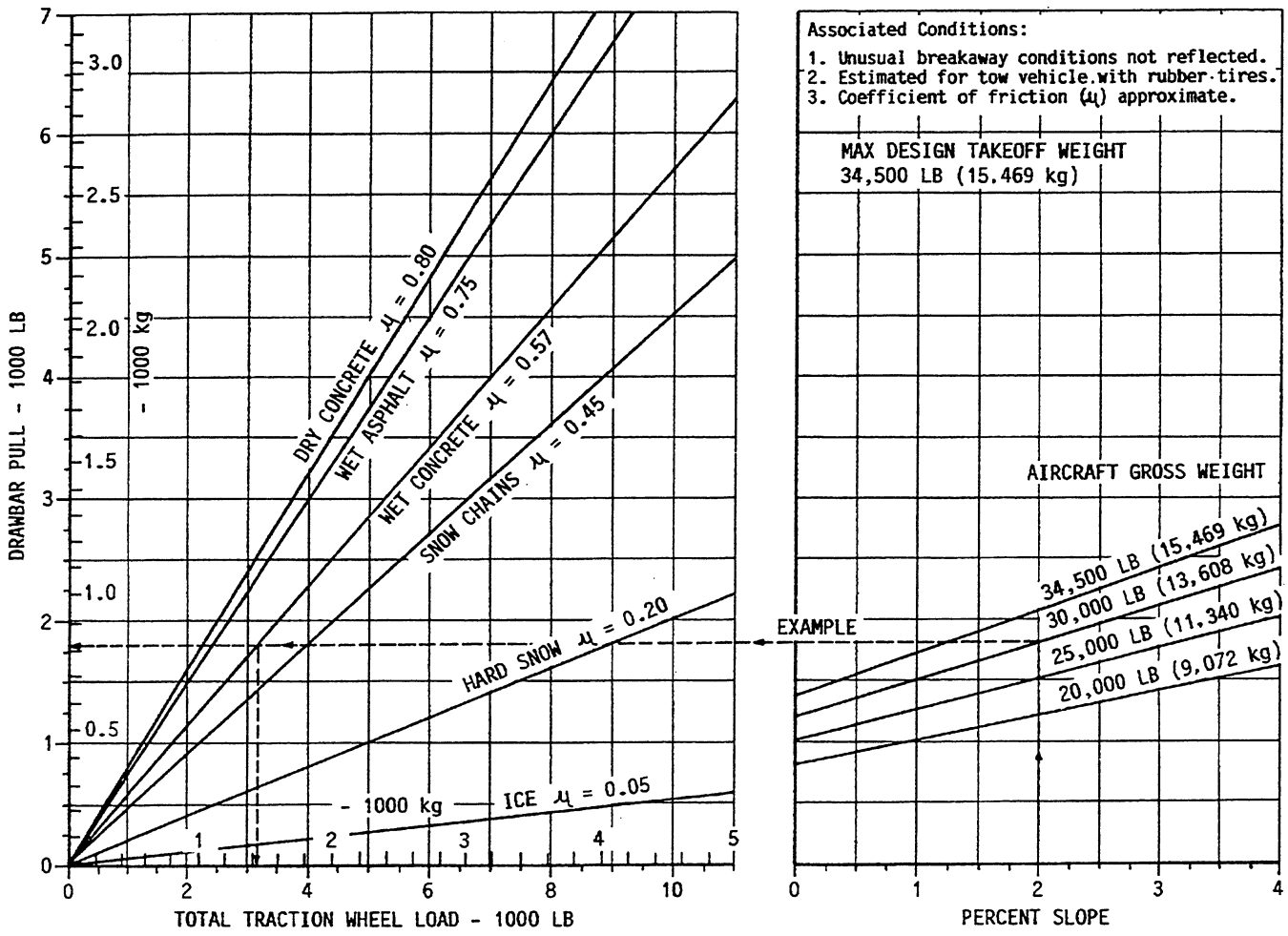


Figure 5–8 Ground Air Conditioning Requirements – Preconditioned Airplane

Drawbar pull and total traction wheel load may be determined for straight-line tow by considering aircraft weight, pavement slope, and coefficient of friction.



Example:

At an aircraft gross weight of 30,000 lb. (13,608 kg), an uphill slope of 2%, and with a wet concrete surface, the corresponding drawbar pull or push required is 1800 lb. (817 kg) and the total traction wheel load is 3200 lb. (1452 kg).

Figure 5–9 Ground Towing Requirements

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SECTION 6

OPERATING CONDITIONS AND NOISE DATA

ILLUSTRATIONS

SECTION 6

OPERATING CONDITIONS AND NOISE DATA

6.0 INTRODUCTION

Aircraft operating conditions and noise are of 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 its growth. However, the airport must also be a good neighbour, 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 impact on surrounding communities.

To assist the airport planner in estimating the impact of the Dash 8 on airport operations, the following data is provided: Jet Engine Exhaust Temperature and Prop/Engine Slipstream Velocity Contours, 'A' Level Noise Contours for take–off and landing for 1 and 2 engine idle power with aircraft parked.

The Dash 8 commuter aircraft is designed with advanced quiet turboprop technology. Its noise impact is minimal compared to most aircraft, larger and smaller, currently being operated in a typical airport.

Assuming maximum take–off and landing weights, typical single event A–level noise contours are plotted on Figure 6–5 page 6–8 at the quoted standard conditions. Contours of 65, 70, 75 and 80 dBA are plotted. 65 dBA is equivalent to the average quiet suburban vehicular street traffic.

The noise levels as measured and corrected to the requirements of FAR Part 36 demonstrate that the Dash 8 Series 100A (Model 102) complies with the noise level limits specified. A summary of the certified noise levels is as follows:

	FAR 36 Limit (EPNdB)	DHC–8 Noise Level (EPNdB)	Margin (EPNdB)
Take–off	89	80.8	8.2
Sideline	94	86.3	7.7
Approach	98	94.8	3.2
Approach Reduced R.P.M.	98	90.7	7.3

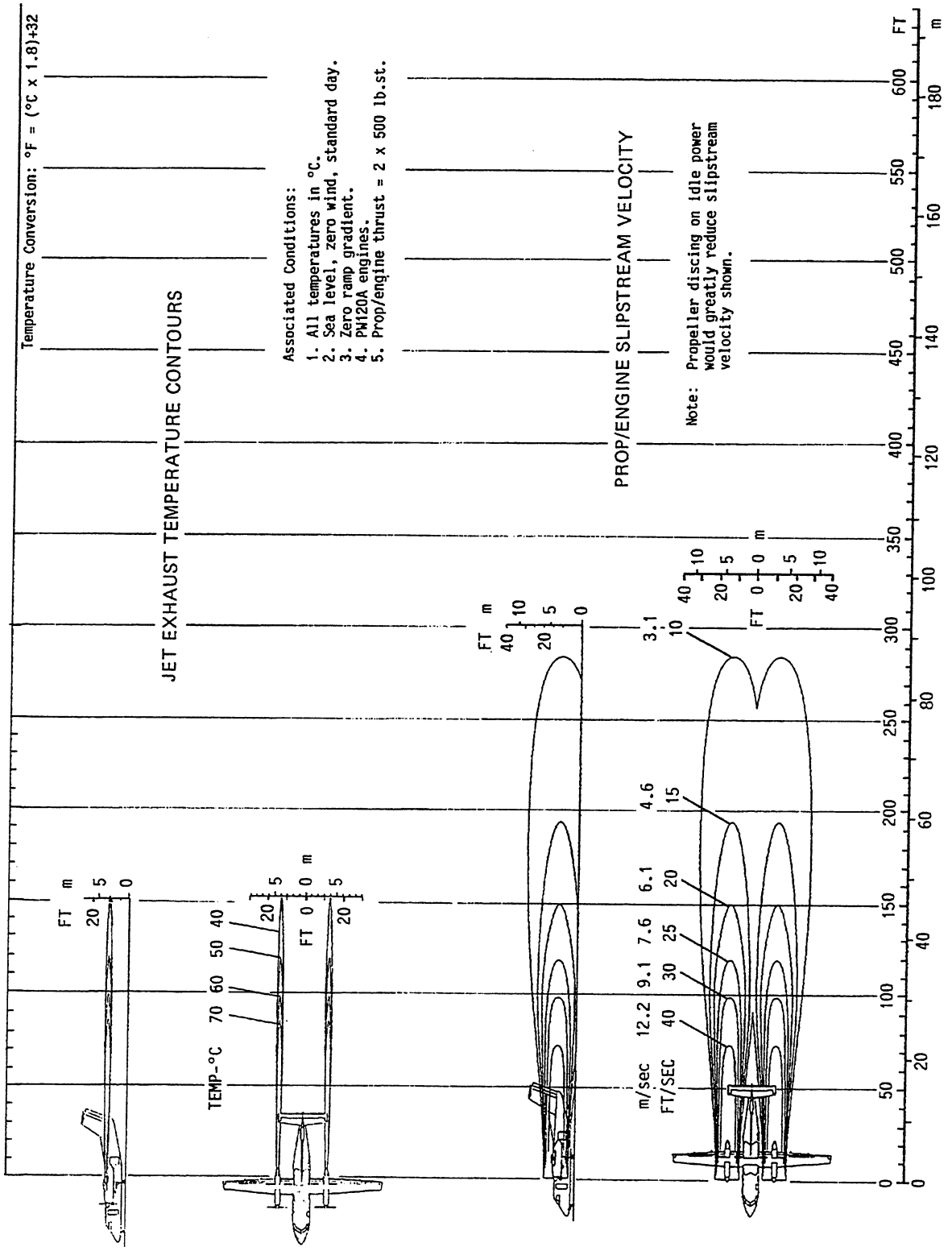


Figure 6–1 Jet Engine Exhaust Temperature and Prop/Engine Slipstream Velocity Contours – Idle Power

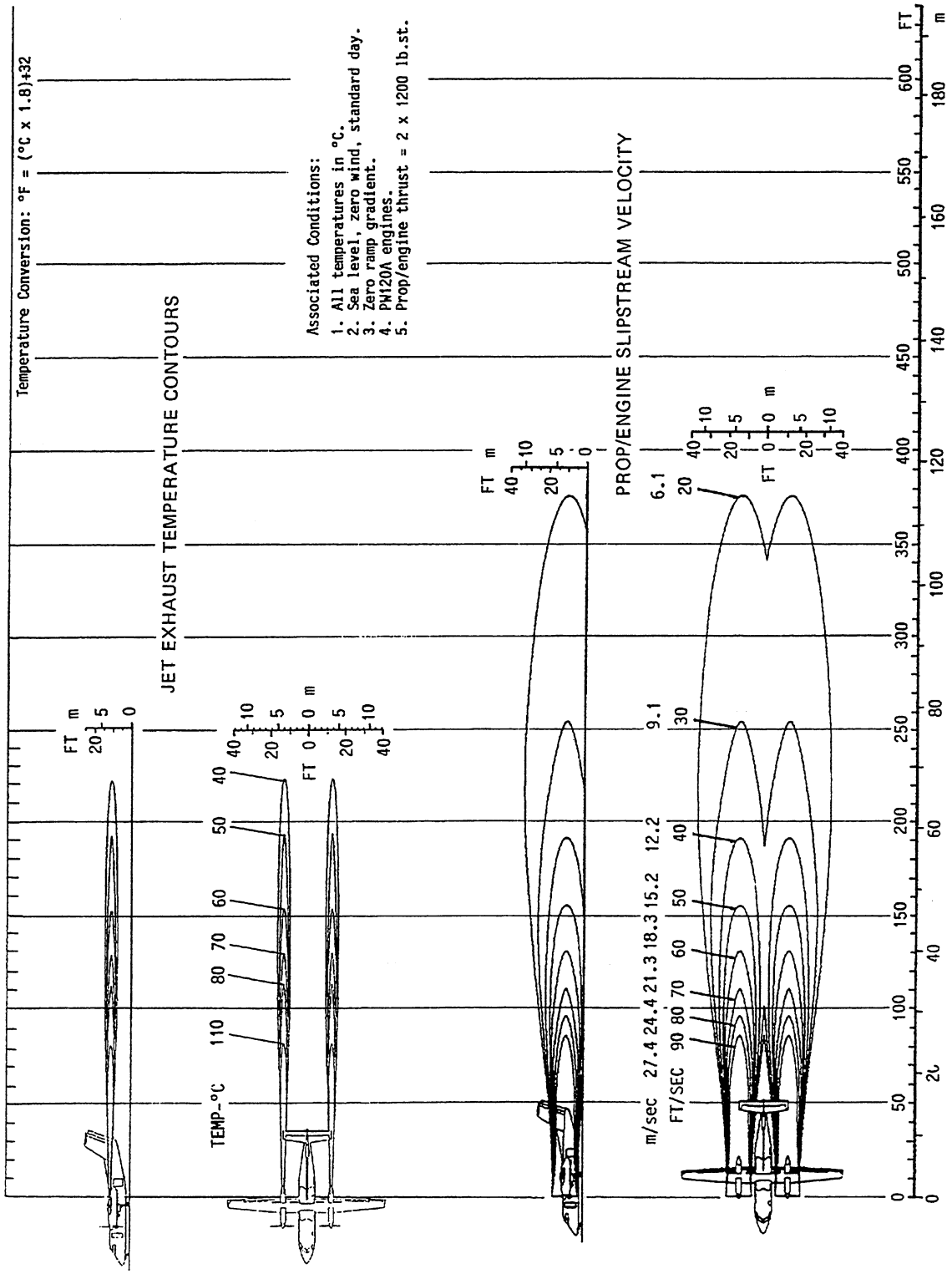


Figure 6–2 Jet Engine Exhaust Temperature and Prop/Engine Slipstream Velocity Contours – Taxi Power

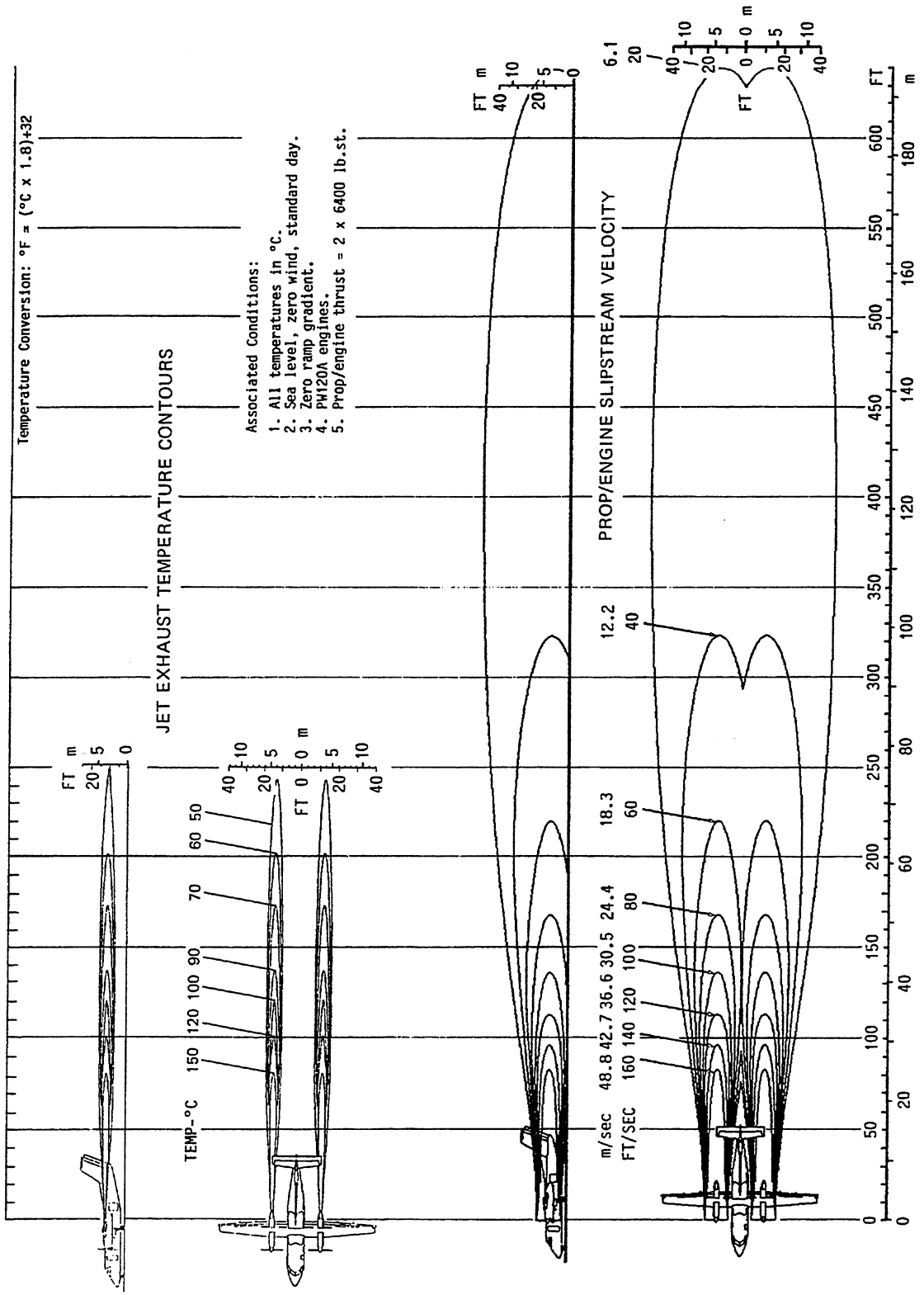
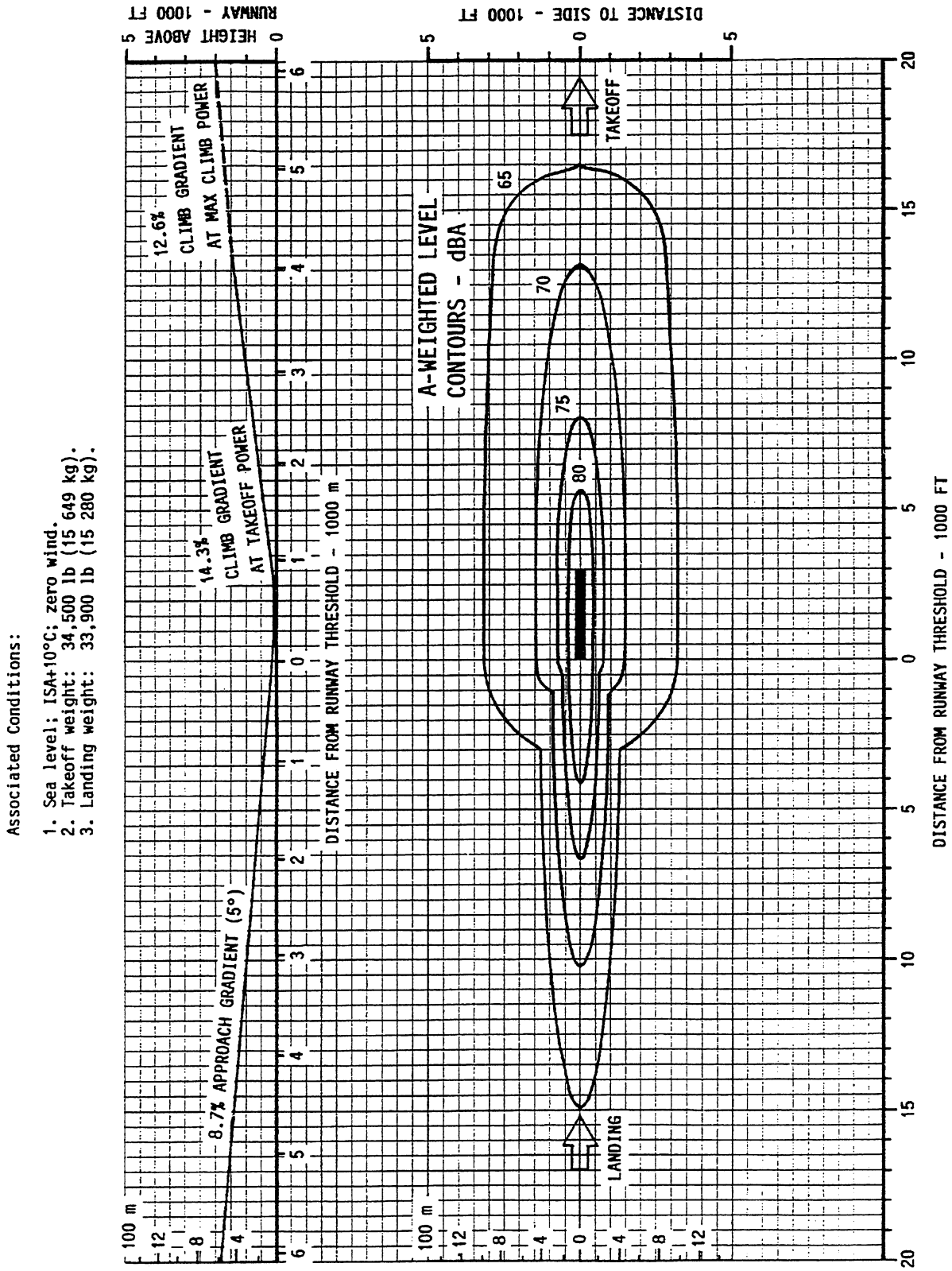


Figure 6–3 Jet Engine Exhaust Temperature and Prop/Engine Slipstream Velocity Contours – Take–Off Power



Associated Conditions:

1. Sea level; ISA+10°C; zero wind.
2. Takeoff weight: 34,500 lb (15 649 kg).
3. Landing weight: 33,900 lb (15 280 kg).

Figure 6-4 Take-Off and Landing Noise Footprint (A-Level Contours)

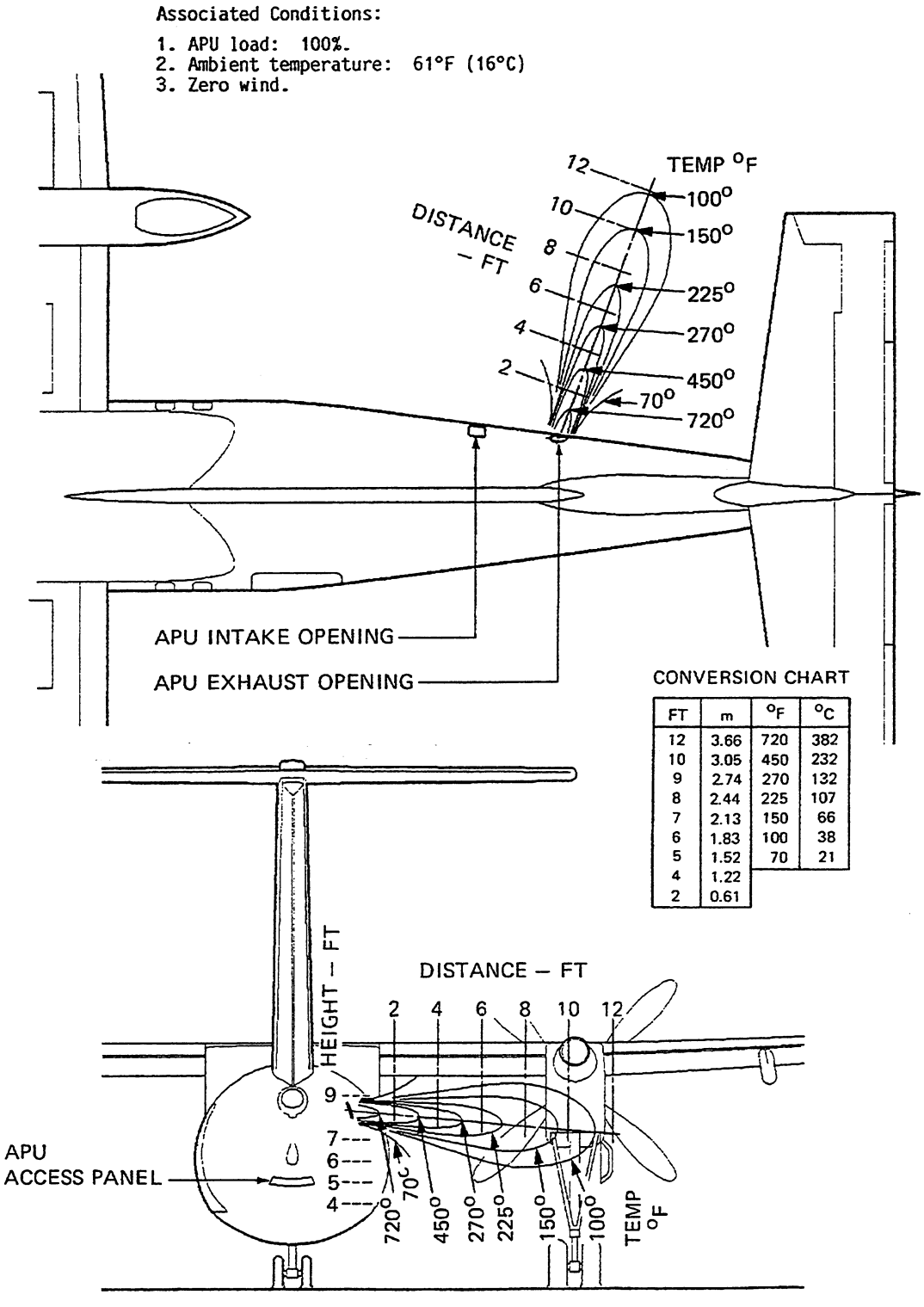


Figure 6-5 Optional APU – Exhaust Temperature and Distance Pattern

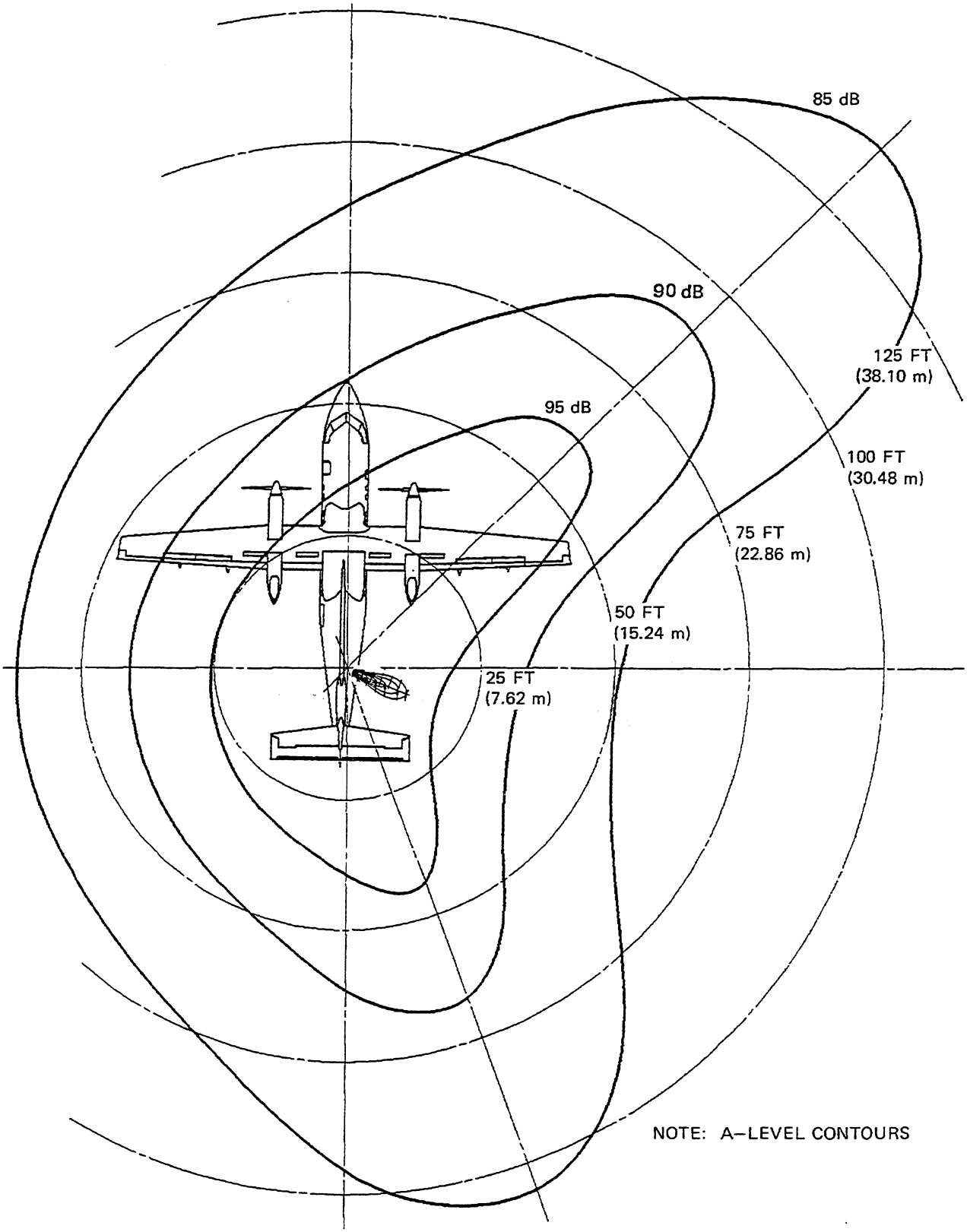


Figure 6–6 Optional APU – Exhaust A–Level Noise Contours

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SECTION 7
PAVEMENT DATA

ILLUSTRATIONS

Standard Tires

Optional Tires

SECTION 7

PAVEMENT DATA

7.0 INTRODUCTION

The pavement requirements for commercial airplanes are customarily derived from the static analysis loads imposed on the main landing gear wheels and tires via the shock struts.

The minimum Aircraft Classification Number (ACN), or Load Classification Number (LCN), for rigid and flexible pavements, plus the California Bearing Ratio (CBR) for unlimited commercial use at all aircraft weights, are presented in figures 7–4 through 7–13. Ensure that all runways or pavements to be used meet these minimum ACN, LCN or CBR requirements.

The illustrations presented in this section are for the Dash 8 Series 100A aircraft fitted with standard tires and optional high flotation tires as shown.

LANDING GEAR FOOTPRINT DATA	STANDARD TIRES	OPTIONAL TIRES
MAXIMUM DESIGN TAXI WEIGHT	34,700 LB (15 740 kg)	
PERCENT OF WEIGHT ON MAIN GEAR	(see Figure 7-3)	
NOSE GEAR TIRE SIZE	18 x 5.5-8	22 x 6.5-10
NOSE GEAR TIRE PRESSURE	80 psi (552 kPa)	60 psi (414 kPa)
MAIN GEAR TIRE SIZE	26.5 x 8-13	31 x 9.75-13
MAIN GEAR TIRE PRESSURE	131 psi (903 kPa)	77 psi (531 kPa)

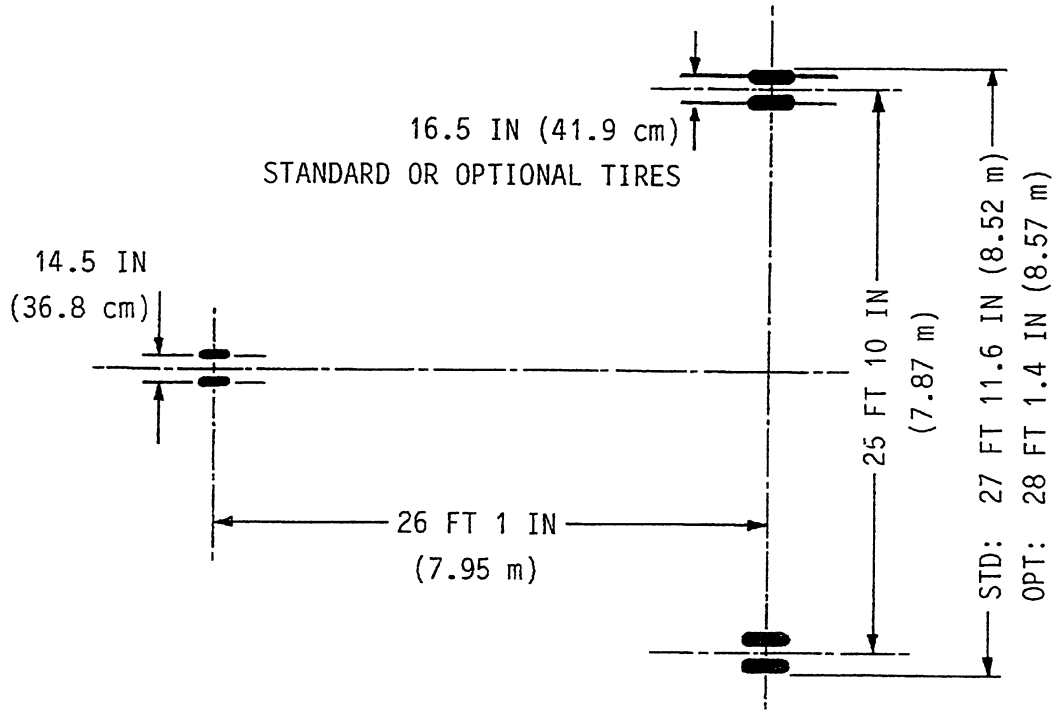
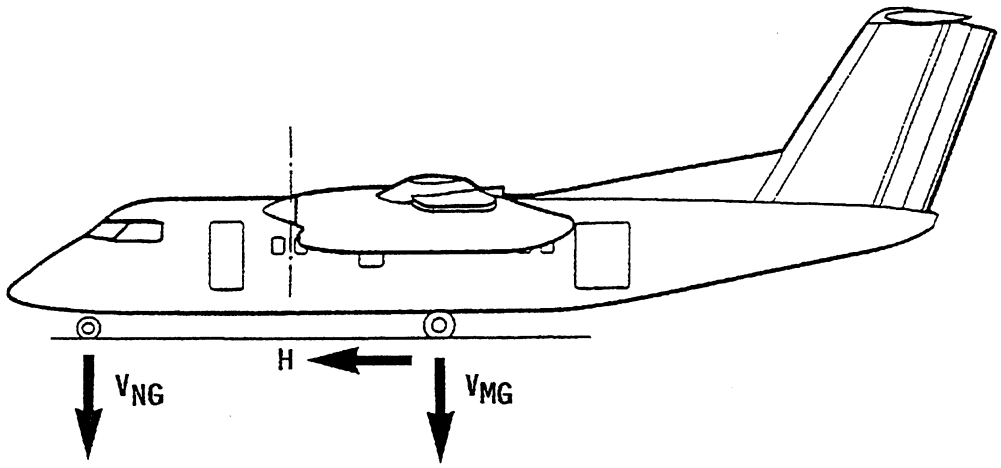


Figure 7-1 Landing Gear Footprint



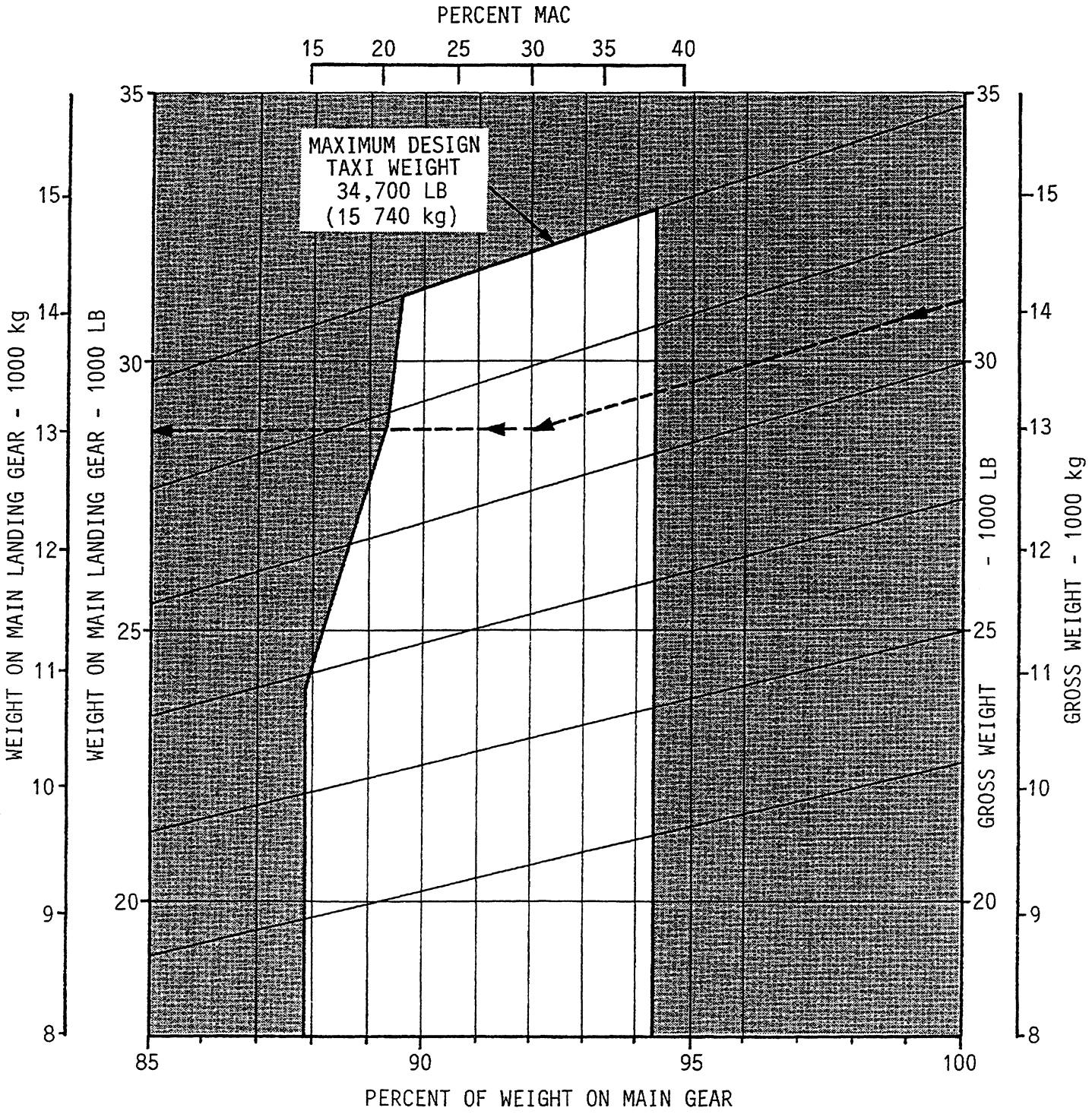
LEGEND: V_{NG} = MAXIMUM VERTICAL NOSE GEAR GROUND LOAD AT MOST FORWARD CG.
V_{MG} = MAXIMUM VERTICAL MAIN GEAR GROUND LOAD AT MOST AFT CG.
H = MAXIMUM HORIZONTAL GROUND LOAD FROM BRAKING

Note: all loads calculated using airplane maximum gross weight.

	V_{NG} AT FORWARD CG		V_{MG} (PER STRUT)	H (PER STRUT)	
MAXIMUM DESIGN TAXI WEIGHT	STATIC	STATIC + BRAKING @ 10 FT/SEC² (3.05 m/SEC²) DECEL.(1)	MAXIMUM LOAD OCCURRING AT STATIC AFT CG	AT STEADY BRAKING OF 10 FT/SEC² (3.05 m/SEC²) DECEL.(2)	AT INSTANTANEOUS BRAKING COEFF OF FRICTION 0.8 (3)
LB 34,700	3625	7023	16,357	5388	13,086
kg 15,740	1644	3186	7419	2444	5936

Notes:
1. Upper CG limit approximately 8 ft. 3 in. (2.52 m) above ground line.
2. Maximum main gear horizontal force excludes alleviating effect of nose gear rolling friction.
3. Instantaneous braking applied during a steady braking run.

Figure 7-2 Maximum Pavement Loads



(Note: unshaded area represents operational limits.)

Figure 7-3 Landing Gear Loading on Pavement

Associated Conditions: 1. FAA design method.
2. 26.5 x 8-13 main gear tires inflated to 131 psi (903 kPa).
3. All calculations at max. aft CG of 94.2% main gear.

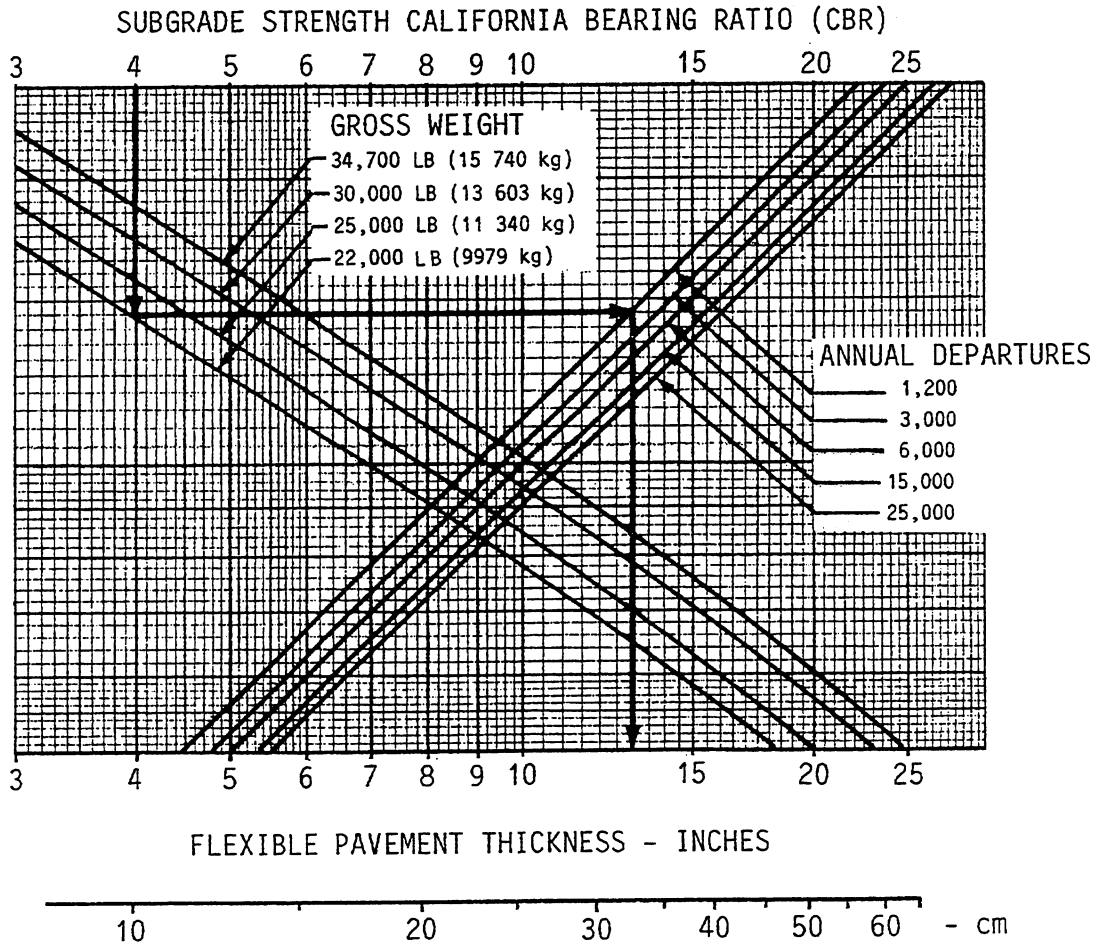


Figure 7–4 Flexible Pavement Design Curves for Critical Areas (Dual Wheel Gear – Standard Tires)

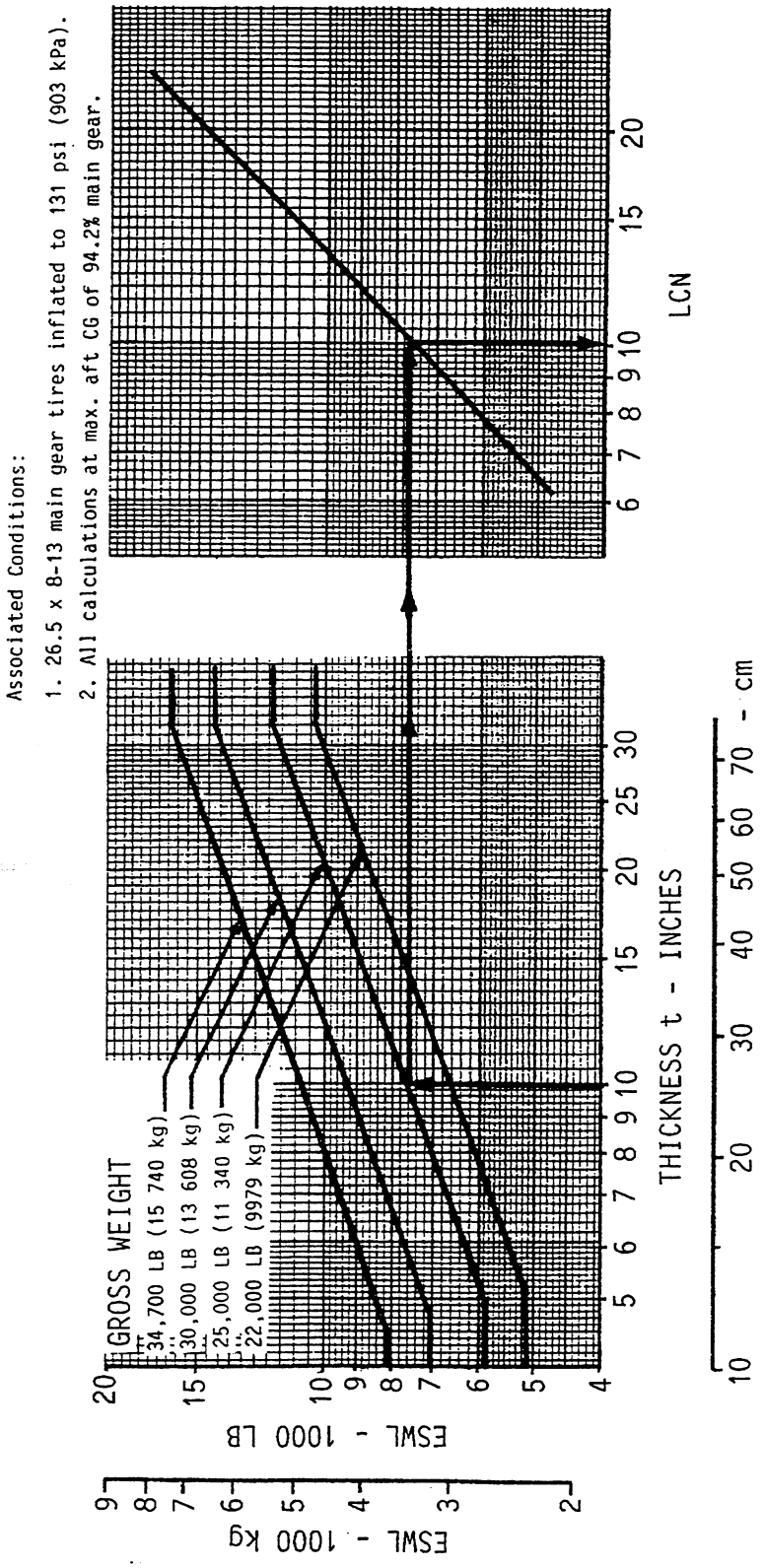


Figure 7-5 Flexible Pavement Requirements – LCN Conversion (Standard Tires)

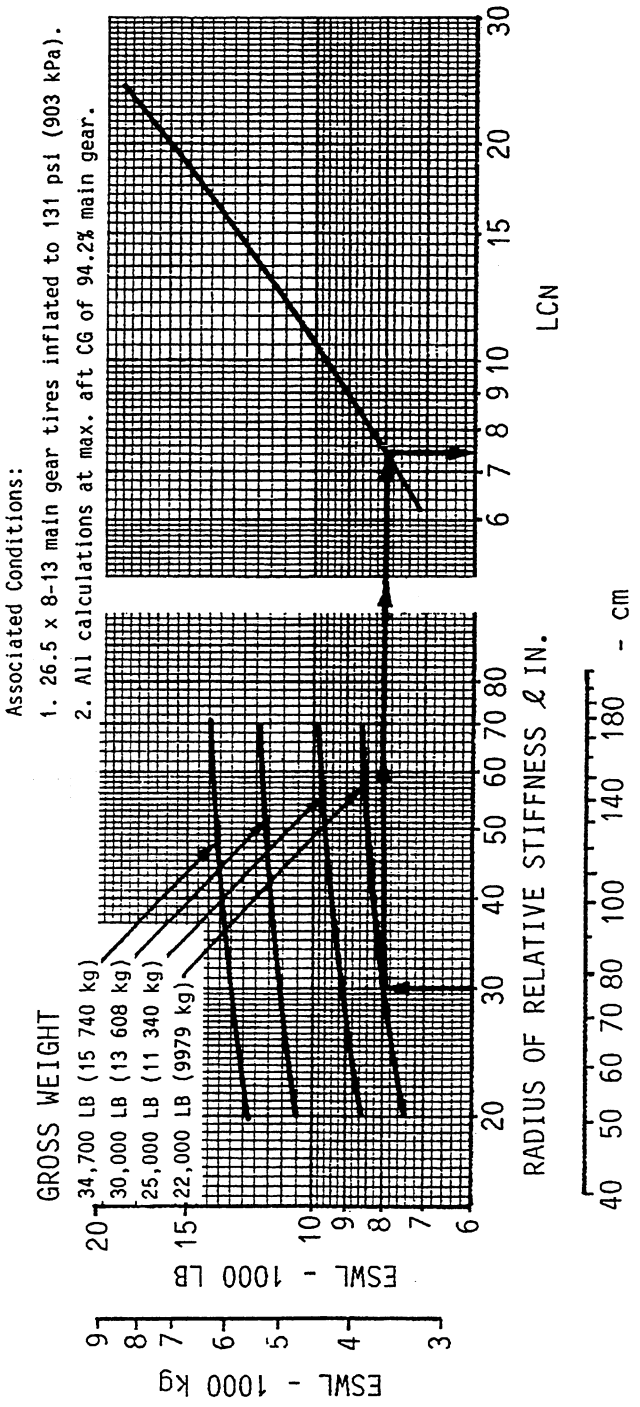


Figure 7–6 Rigid Pavement Requirements – LCN Conversion (Standard Tires)

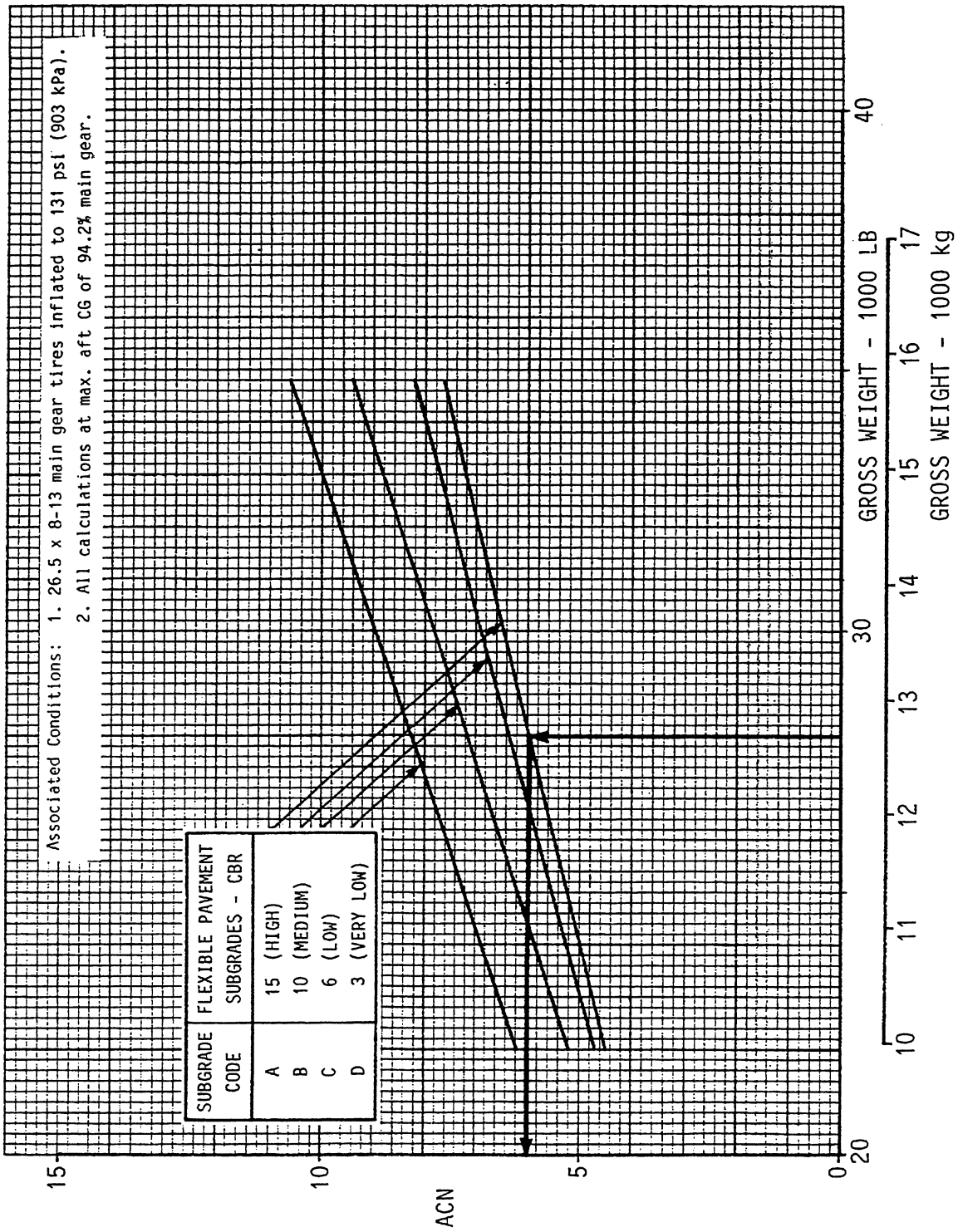


Figure 7–7 Aircraft Classification Number – Flexible Pavement (Standard Tires)

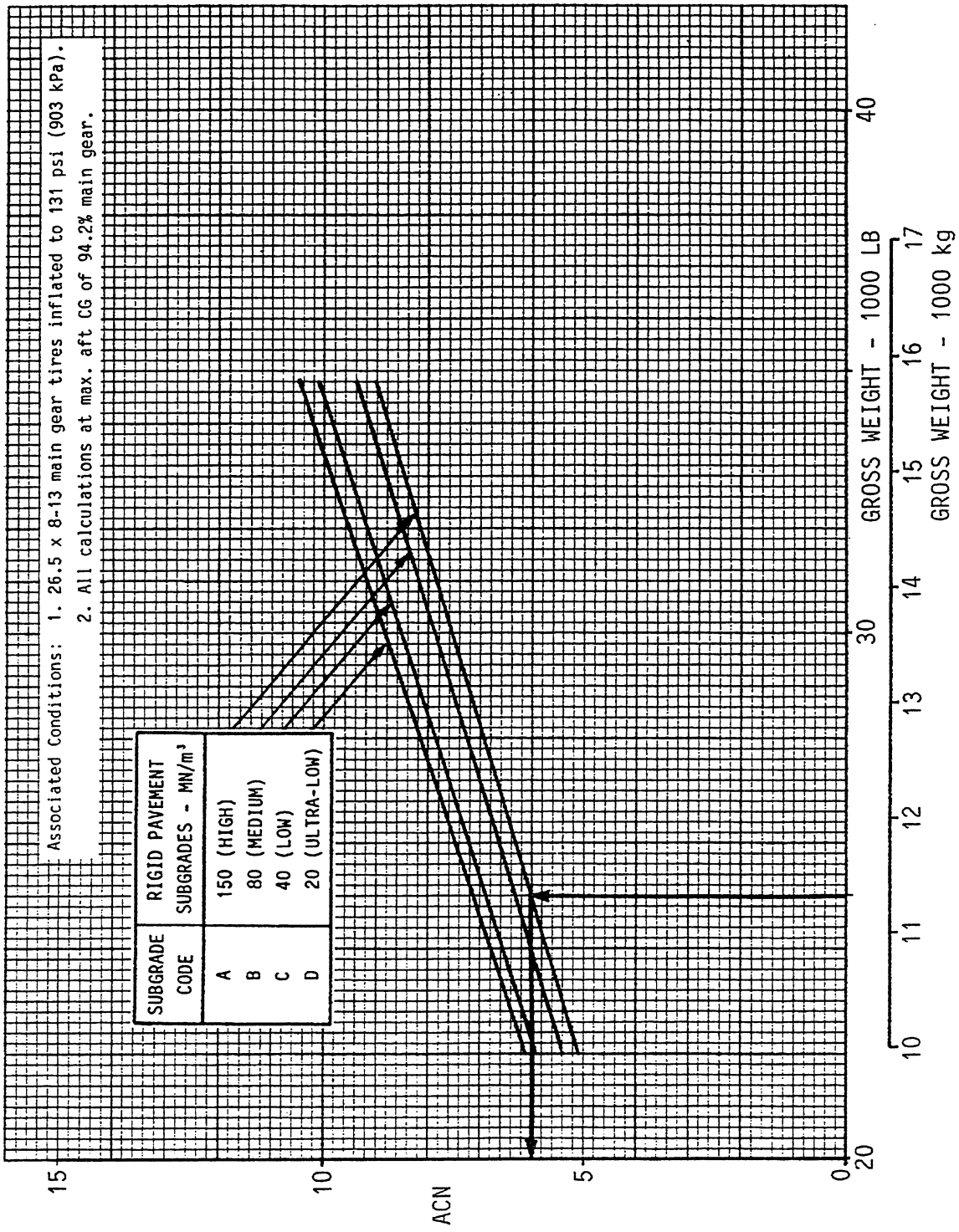


Figure 7–8 Aircraft Classification Number – Rigid Pavement (Standard Tires)

Associated Conditions: 1. FAA design method.
2. 31 x 9.75-13 main gear tires inflated to 77 psi (531 kPa).
3. All calculations at max. aft CG of 94.2% main gear.

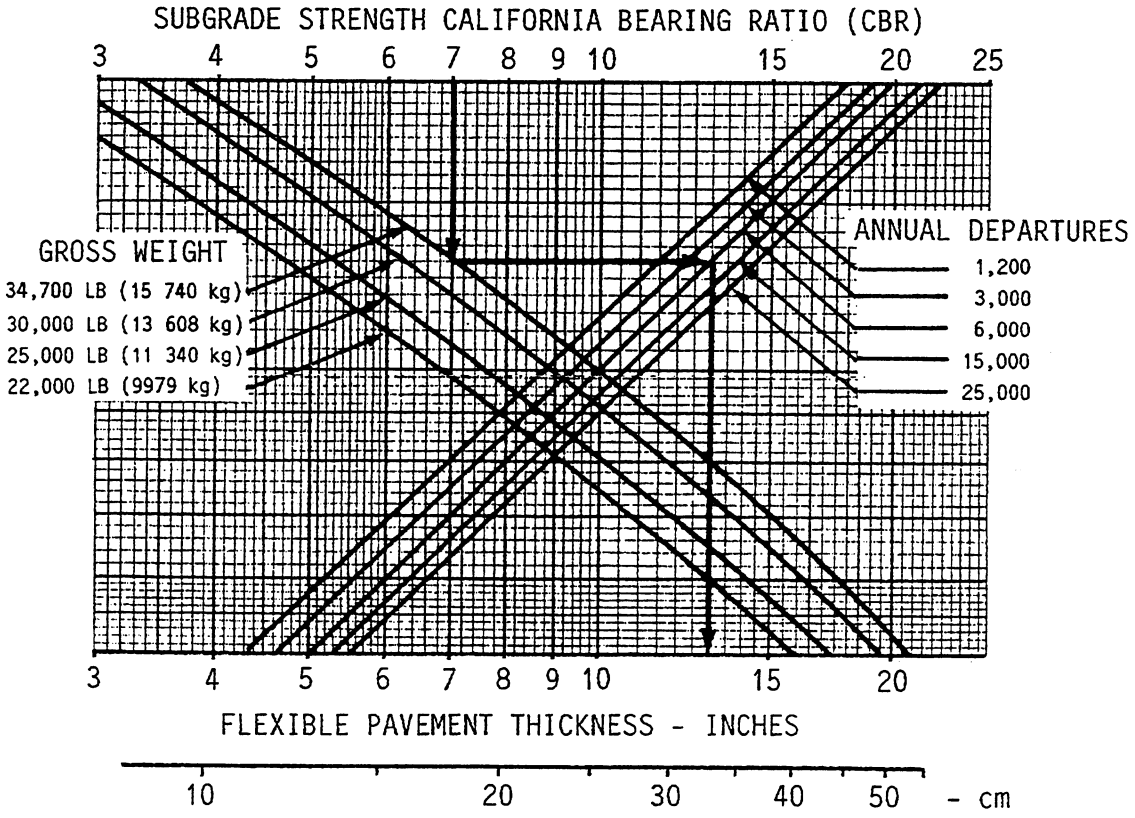


Figure 7–9 Flexible Pavement Design Curves for Critical Areas (Dual Wheel Gear – Optional Tires)

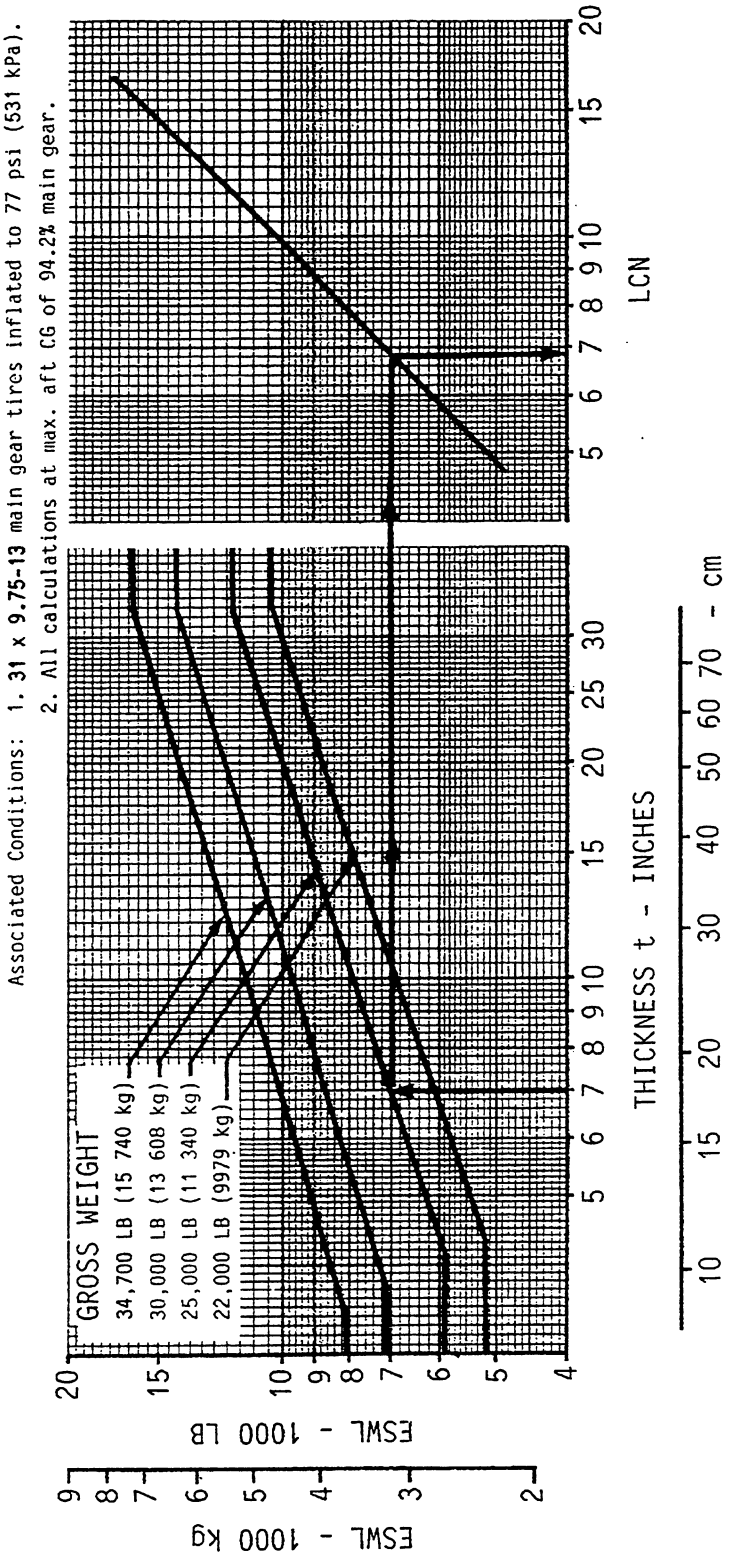


Figure 7–10 Flexible Pavement Requirements – LCN Conversion (Optional Tires)

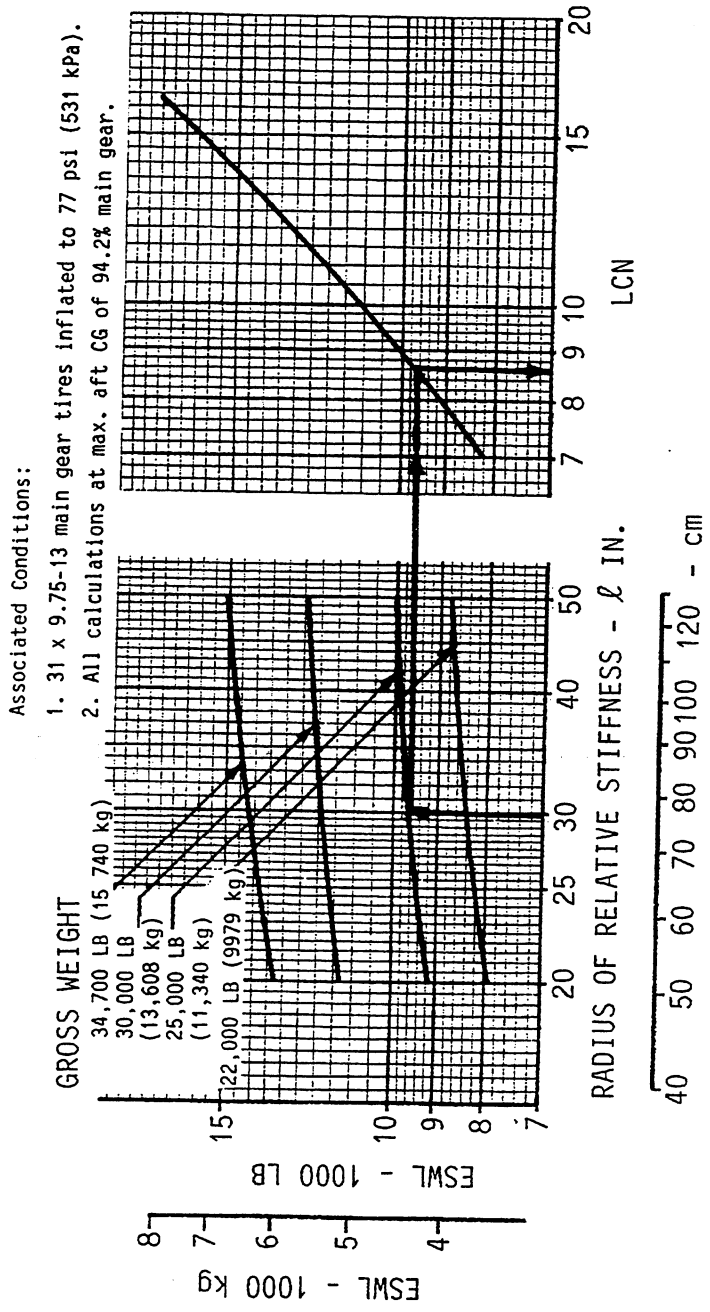


Figure 7–11 – Rigid Pavement Requirements – LCN Conversion (Optional Tires)

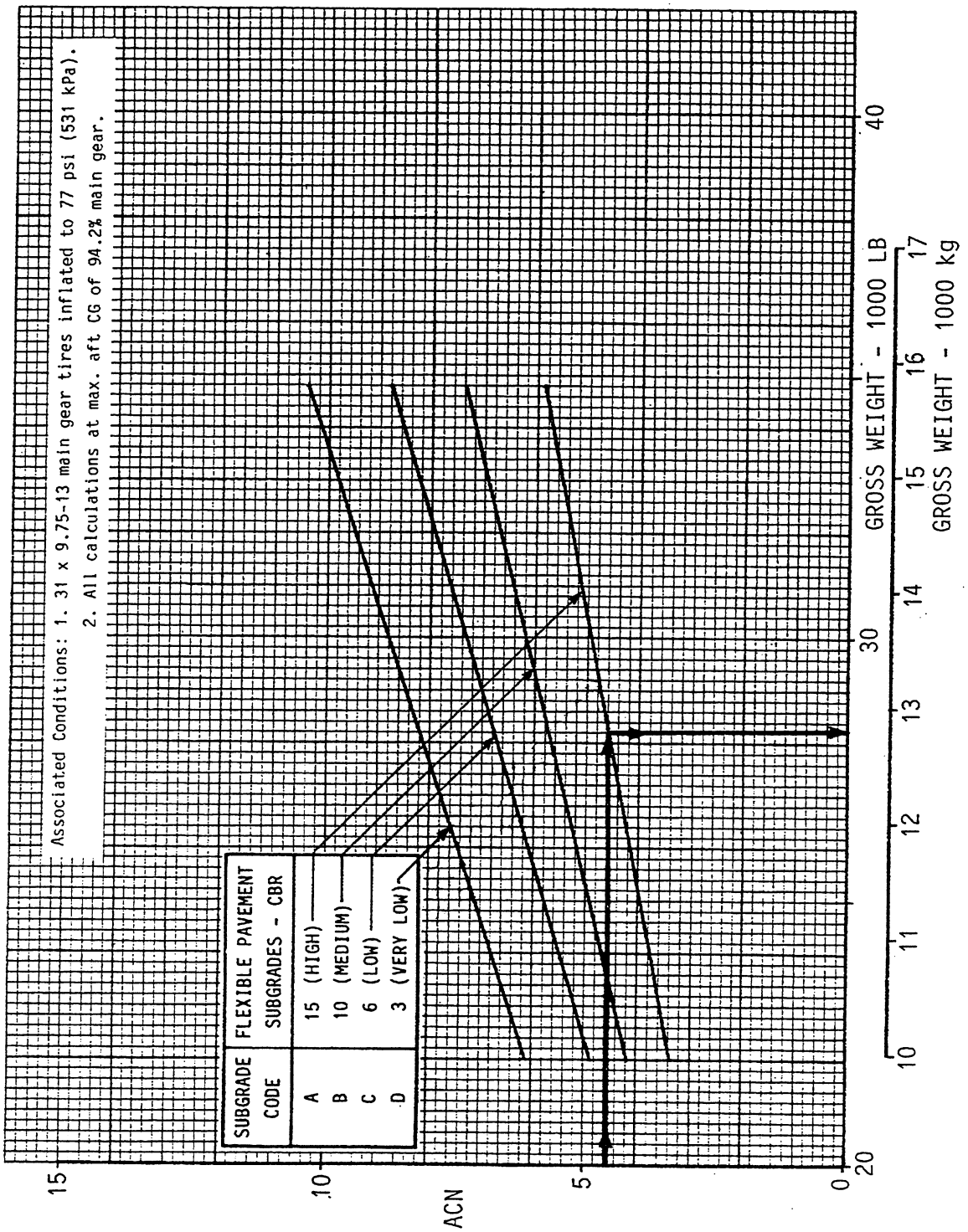


Figure 7–12 Aircraft Classification Number – Flexible Pavement (Optional Tires)

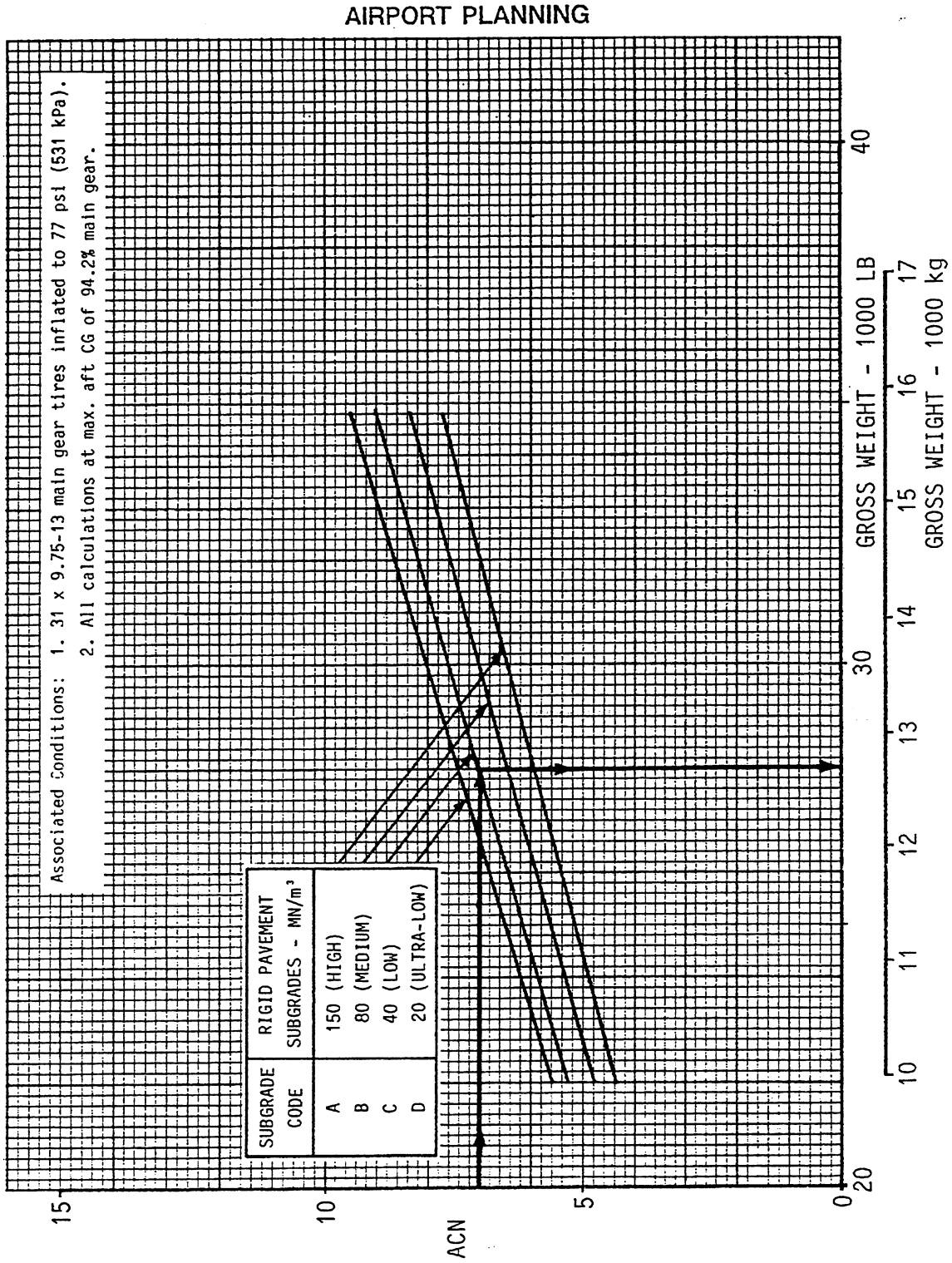


Figure 7-13 Aircraft Classification Number – Rigid Pavement (Optional Tires)

SECTION 8

DERIVATIVE AIRCRAFT

SECTION 8

DERIVATIVE AIRCRAFT

8.0 INTRODUCTION

Additional versions of the de Havilland Dash 8 airplane are currently available. All products are continually evaluated for possible modifications with the potential of leading to new derivative models tailored to meet specific new airline requirements.

8.1 DASH 8 SERIES 100A (MODEL 103)

The Dash 8 Series100A (Model 103) is powered by two Pratt & Whitney PW121 engines. The PW121 is built to the same standard as the PW120A, used on the basic Dash 8 Series 100A (Model 102), but the MTOP rating is increased by 7.5% and is rated at 2150 SHP

The maximum take-off and landing weights remain unchanged at 34,500 lb (15,650 kg) and 33,900 lb (15,380 kg) respectively.

For more information regarding the performance of this aircraft refer to AEROC 8.2 (103). AC. 20.

8.2 DASH 8 SERIES 100B (MODEL 106)

The de Havilland Dash 8 Series100B (Model 106) is powered by two Pratt & Whitney PW121 engines as is the Dash 8 Series 100A (Model 103). However, the maximum take-off weight is increased to 36,300 lb (16,466 kg). The maximum landing weight remains unchanged at 33,900 lb (15,380 kg).

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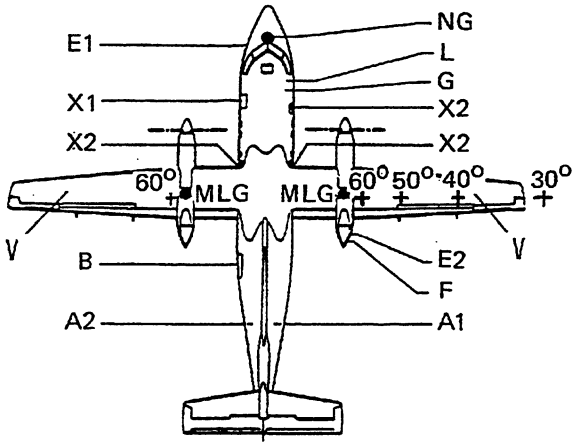
SECTION 9

SCALED DASH 8 DRAWINGS

ILLUSTRATIONS



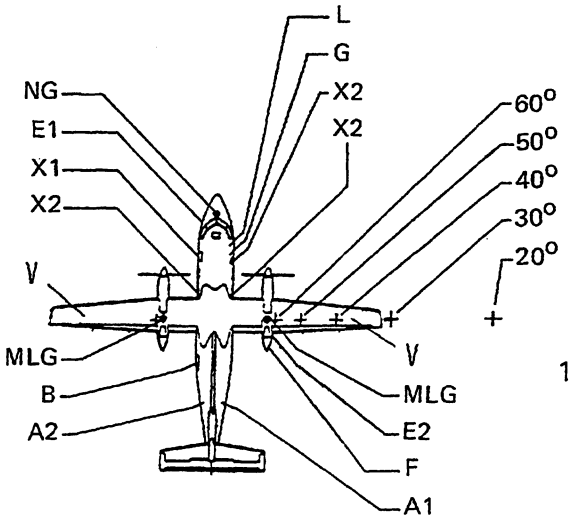
20° TURNING RADIUS POINTS

LEGEND

A1	AIR CONDITIONING
A2	GROUND AIR CONDITIONING CONNECTION
B	BAGGAGE DOOR
E1	ELECTRICAL CONNECTION (DC)
E2	ELECTRICAL CONNECTION (AC)
F	PRESSURE REFUELING POINT
G	GALLEY
L	LAVATORY
MLG	MAIN LANDING GEAR
NG	NOSE GEAR
V	FUEL VENT (STD & LONG RANGE TANKS)
X1	AIRSTAIR DOOR
X2	EMERGENCY EXITS

Figure 9–1 Scaled Dash 8 Drawing 1" = 32' (1:384)

de Havilland Inc.
DASH 8 SERIES 100
AIRPORT PLANNING



TURNING RADIUS POINTS

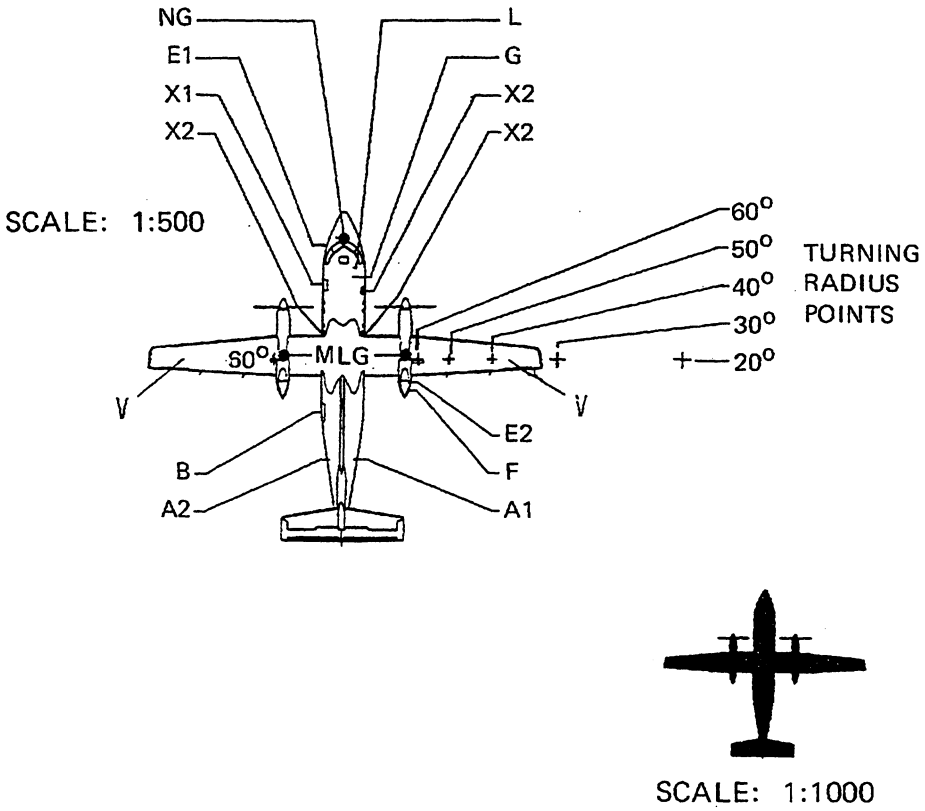
1 IN = 50 FT (1:600)

1 IN = 100 FT (1:1200)

LEGEND

A1	AIR CONDITIONING
A2	GROUND AIR CONDITIONING CONNECTION
B	BAGGAGE DOOR
E1	ELECTRICAL CONNECTION (DC)
E2	ELECTRICAL CONNECTION (AC)
F	PRESSURE REFUELING POINT
G	GALLEY
L	LAVATORY
MLG	MAIN LANDING GEAR
NG	NOSE GEAR
V	FUEL VENT (STD & LONG RANGE TANKS)
X1	AIRSTAIR DOOR
X2	EMERGENCY EXITS

Figure 9–2 Scaled Dash 8 Drawing 1" = 50' (1:600) and 1" = 100' (1:1200)



LEGEND	
A1	AIR CONDITIONING
A2	GROUND AIR CONDITIONING CONNECTION
B	BAGGAGE DOOR
E1	ELECTRICAL CONNECTION (DC)
E2	ELECTRICAL CONNECTION (AC)
F	PRESSURE REFUELING POINT
G	GALLEY
L	LAVATORY
MLG	MAIN LANDING GEAR
NG	NOSE GEAR
V	FUEL VENT (STD & LONG RANGE TANKS)
X1	AIRSTAIR DOOR
X2	EMERGENCY EXITS

Figure 9-3 Scaled Dash 8 Drawing 1:500 and 1:1000

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