AIRPORT PLANNING MANUAL

PSM 1-82-13

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BOMBARDIER
AEROSPACE

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PREFACE

1.0 SCOPE

A. This manual provides airport planning data for the Q200 (Model 201 and 202) aircraft in a standardized format. Specific data should be co–ordinated with the operational procedures of end–user airlines and operators prior to facility design.

B. The performance data contained in Section 3 (Aircraft Performance) are for reference only. Refer to the applicable Approved Flight Manual (AFM) Q200 (Model 201 or 202) for specific performance information.

1.1 INTRODUCTION

A. The content of this document conforms to NAS 3601, Revision 6 (15 July/94). NAS 3601 is the result of agreements between representatives of the following organizations:

- Aerospace industries
- Airport Operators
- Air Transport Association of America
- International Air Transport Association

B. This manual provides Q200 (Model 201 and 202) data for airport planners and operators, airlines, architectural and engineering consultant organizations, and other interested industry agencies. Aircraft modifications and available options may alter model characteristics; therefore, the data contained in this manual represents the typical Q200 (Model 201 and 202) aircraft.

C. For more information contact:

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1.2 A BRIEF DESCRIPTION OF THE Q200 (Model 201 and 202) AIRCRAFT

A. The Q200 (Model 201 and 202) is a pressurized, commercial transport airplane designed to accommodate up to 37 passengers. The aircraft establishes new standards in fuel efficiency, speed and comfort.

B. The aircraft is powered by two Pratt and Whitney PW123C or PW123D turboprop engines. Large diameter, slow turning Hamilton Standard 14SF–15 or 14SF–23 propellers provide high thrust efficiency and low noise levels.

C. The Q200 (Model 201 and 202) is capable of economic operations over a broad range of applications. These are:
- Scheduled airline operations
- Resource and regional development work
- Corporate and military transport roles

D. 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.

E. 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 Q200 is accomplished with standard ground equipment.
- High exhaust outlets produce modest pressure and temperature profiles.

1.3 GUIDE TO SERIES / MODEL DESIGNATIONS

TYPE APPROVAL MODEL NO.	PWC ENGINE	MTOP (SHP)	MTOW (lb)	ANVS	REMARKS
201	PW123C (Standard)	2150	36,300	Standard	C & D Interior is current standard
202	PW123D (Optional)	2150	36,300	Standard	C & D Interior is current standard

SECTION 2

AIRCRAFT DESCRIPTION

ILLUSTRATIONS

SECTION 2

AIRCRAFT DESCRIPTION

2.0 INTRODUCTION

General characteristics, arrangements and dimensions of the Q200 (Model 201 and 202) are provided in this section.

The Q200 (Model 201 and 202) has a maximum design take–off weight of 36,300 pounds (16,466 kg). Other weight parameters such as ramp weight, landing weight and zero fuel weight are set accordingly.

The following definitions are used throughout this manual (refer to Figure 2–1):

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	POUNDS
MAXIMUM DESIGN TAXI WEIGHT	16,556 kg	36,500 LB
MAXIMUM DESIGN LANDING WEIGHT	15,650 kg	34,500 LB
MAXIMUM DESIGN TAKE–OFF WEIGHT	16, 466 kg	36, 300 LB
OPERATING WEIGHT EMPTY (STANDARD AIRCRAFT)*	10,501 kg	23,151 LB
MAXIMUM DESIGN ZERO FUEL WEIGHT	14,515 kg	32,000 LB
MAXIMUM PAYLOAD (STANDARD AIRCRAFT) *	4,014 kg	8,849 KG

* Note: Figures shown are approximate. The Operating Empty Weight varies with aircraft configuration and custom installations.

TANK CAPACITY – USABLE FUEL				
STANDARD TANKS	US GALS	LBS	LITRES	KG
	835	5678	3160	2576

Figure 2–1 General Airplane Characteristics

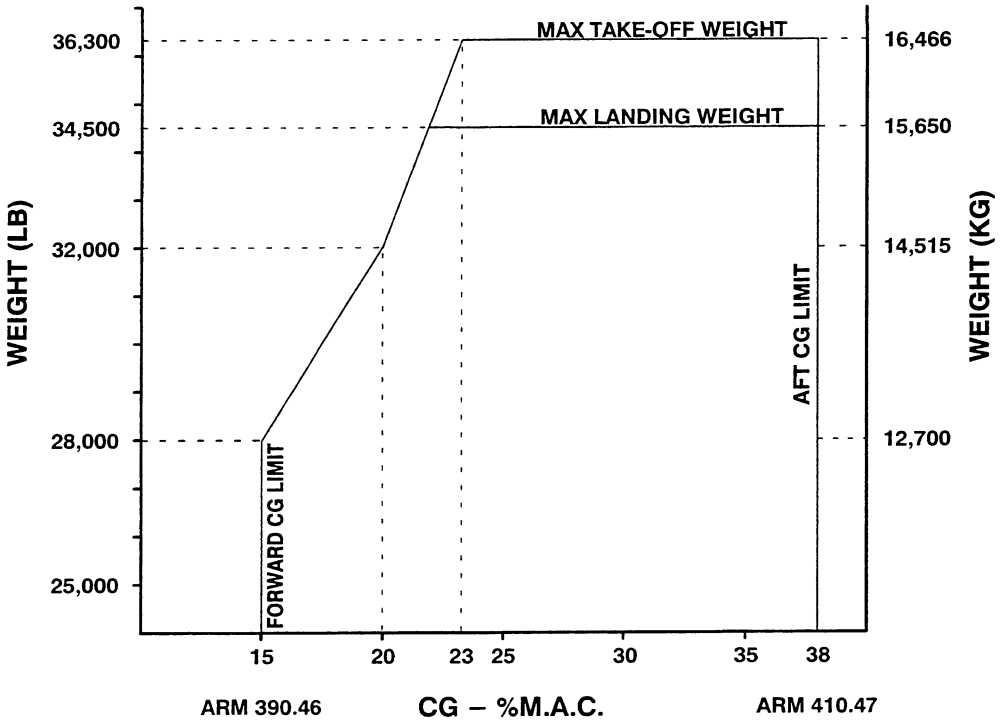

Figure 2–2 CG Limits

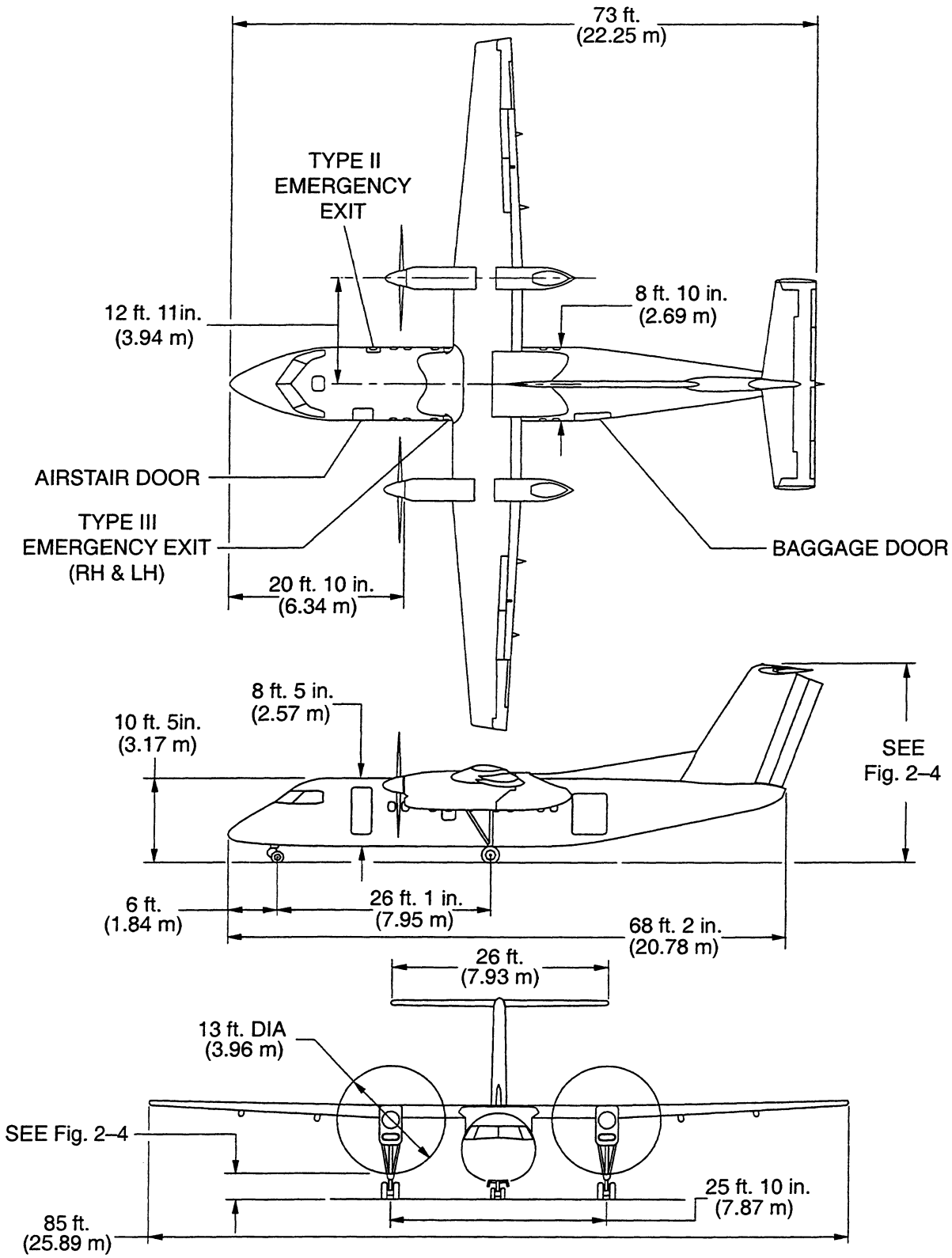

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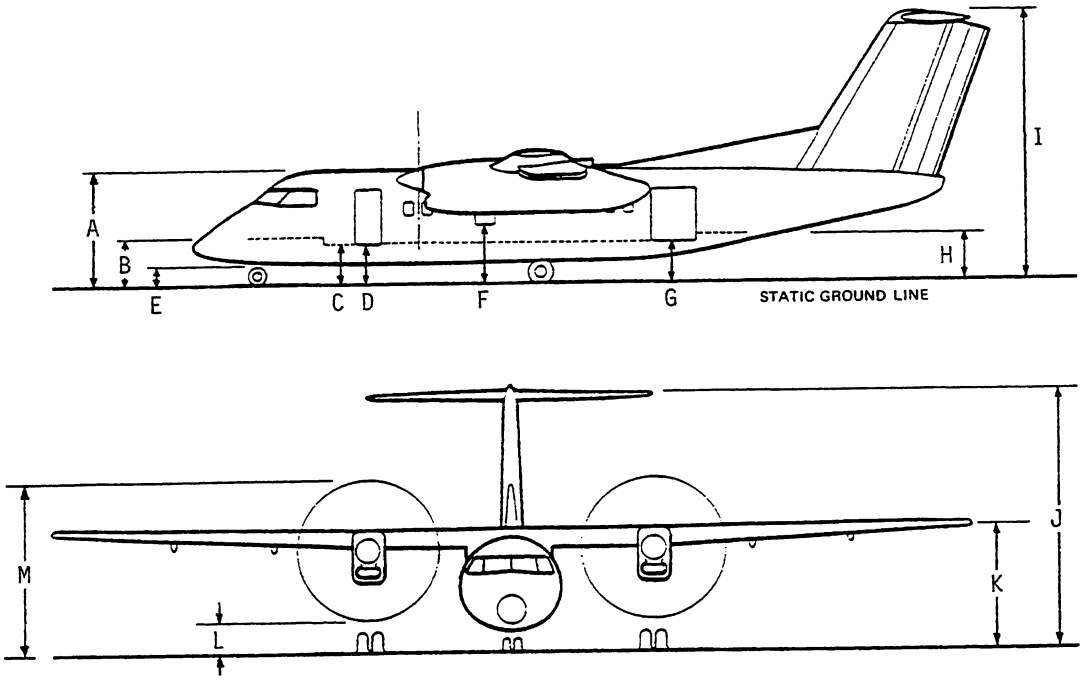
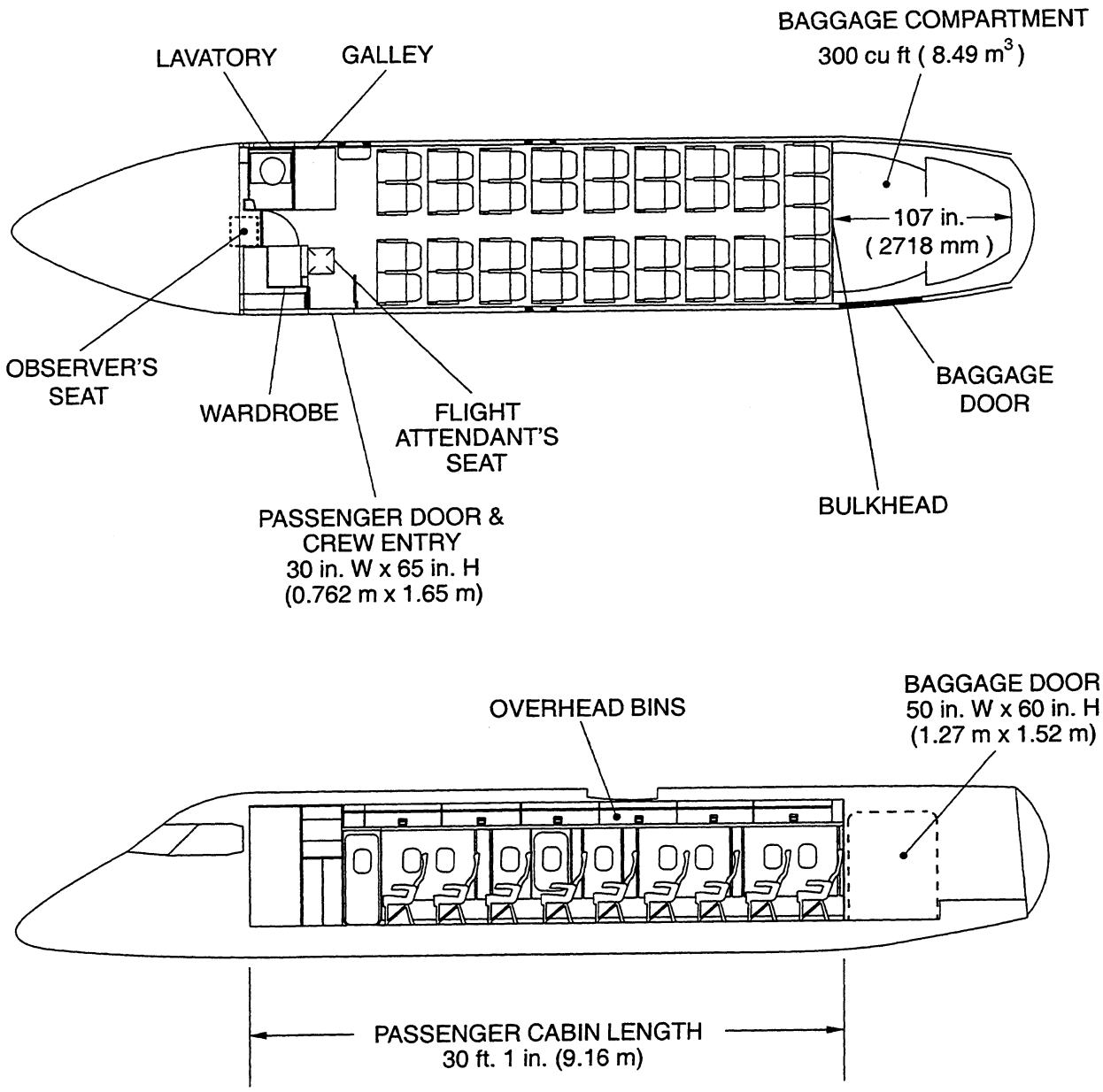
Figure 2–3 General Airplane Dimensions



		MAXIMUM GROUND CLEARANCE		MINIMUM GROUND CLEARANCE	
		WEIGHT: 22,000 LB C.G.: X392.3" WT. ON NLG: 2536 LB (1150 kg)		WEIGHT: 36,500 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

NOTE: Dimensions are approximate.

Figure 2–4 Ground Clearance



37 PASSENGERS

Figure 2–5 Interior Arrangement – Standard 37 Passenger Configuration

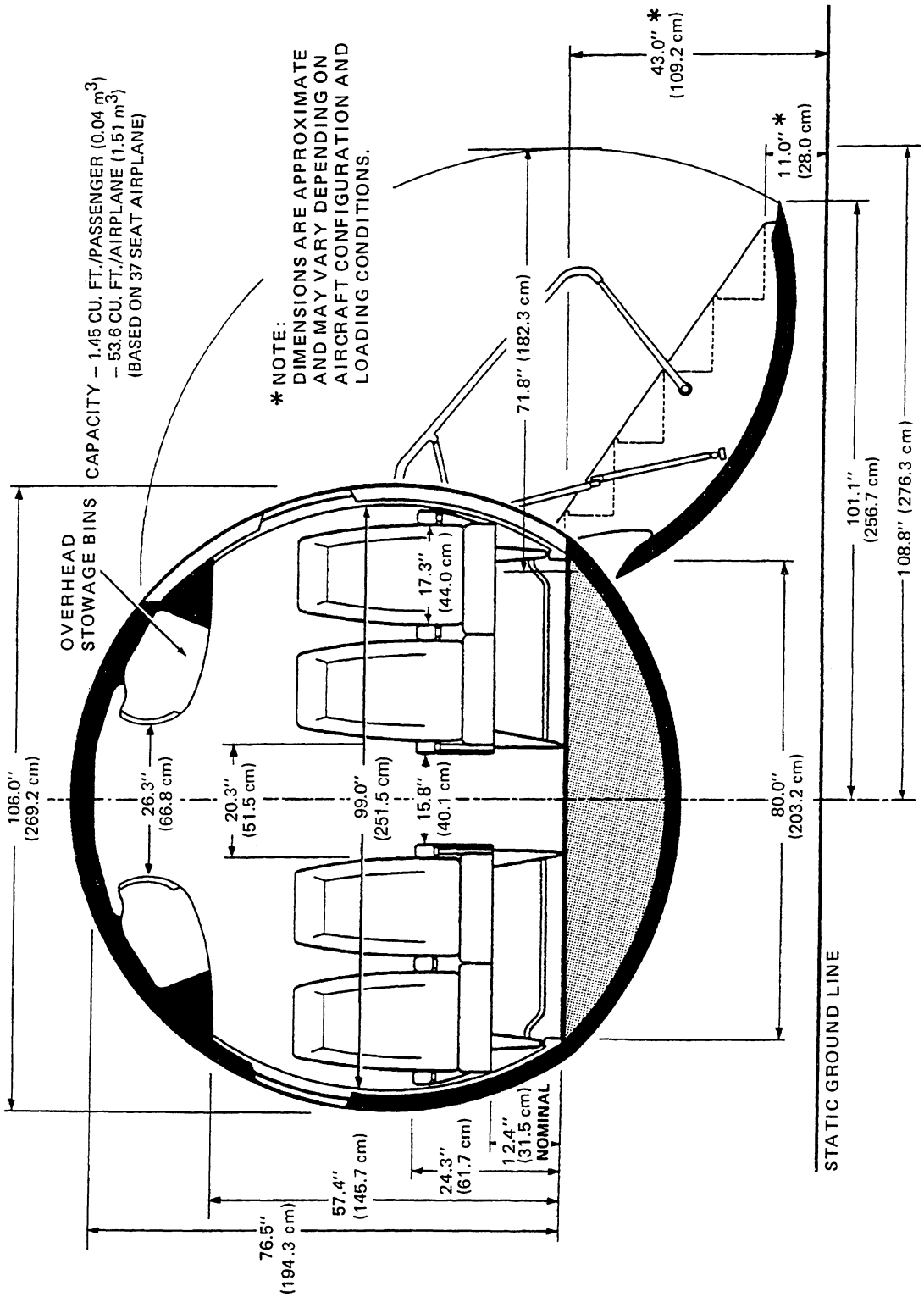
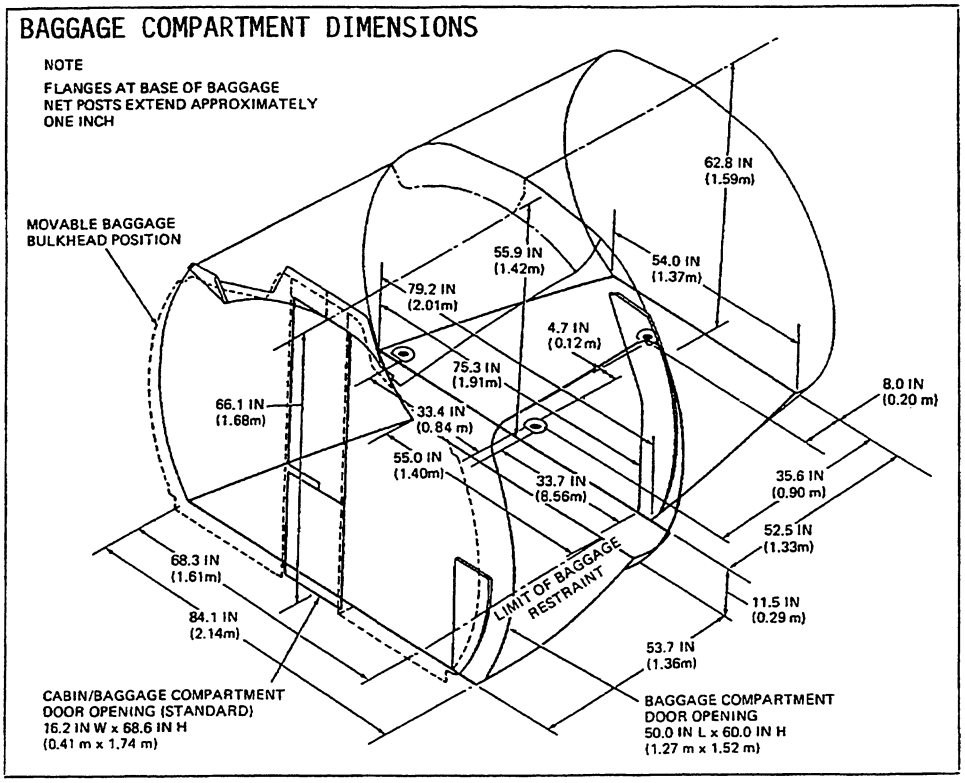


Figure 2–6 Cabin Cross–Section



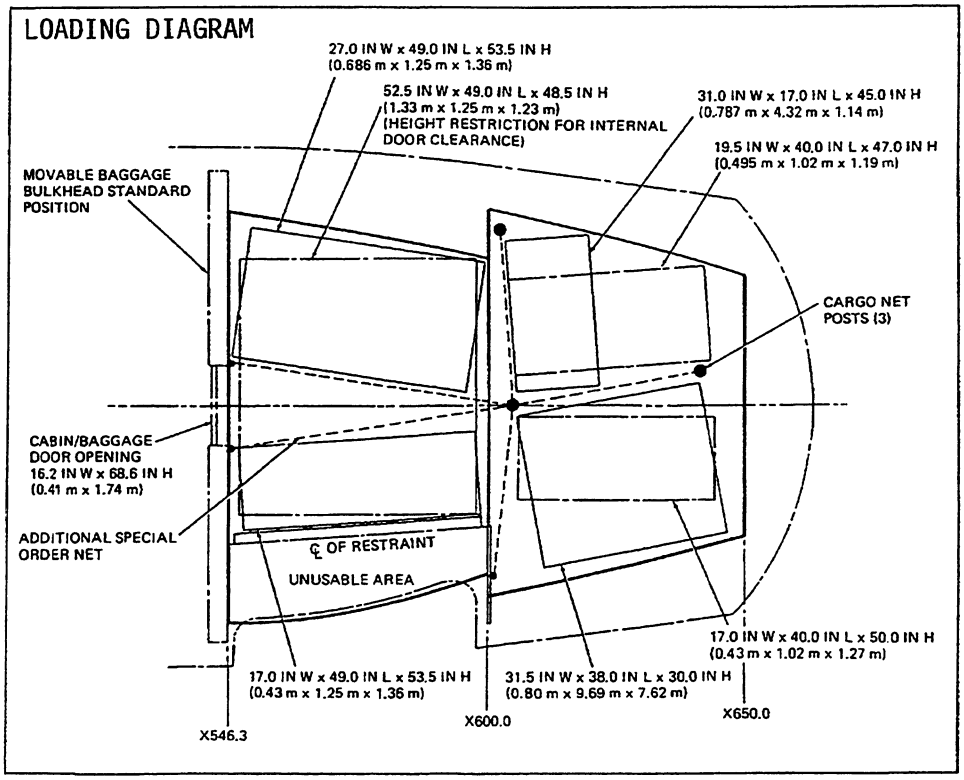


Figure 2–7 Baggage Compartment Dimensions and Loading Diagram

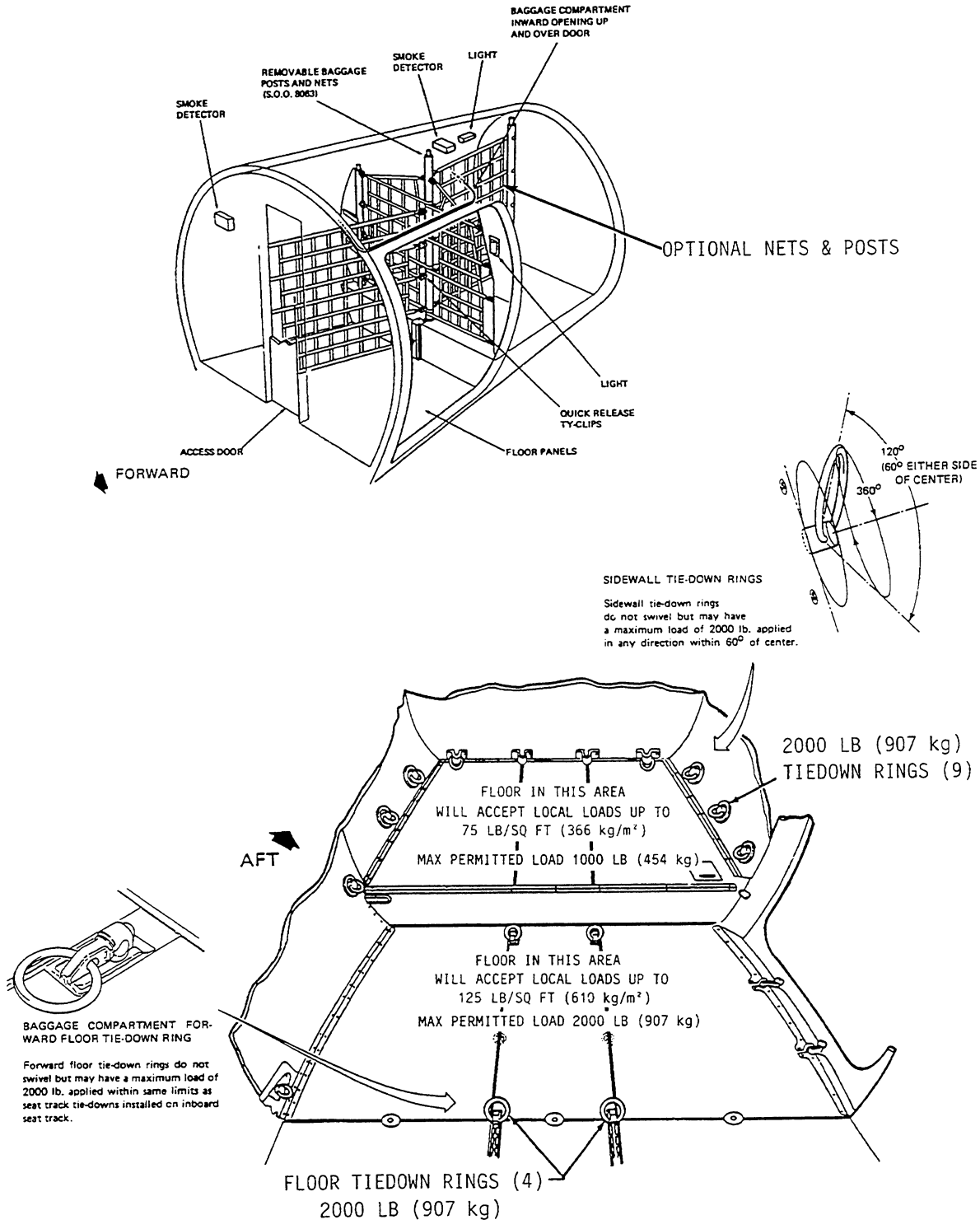


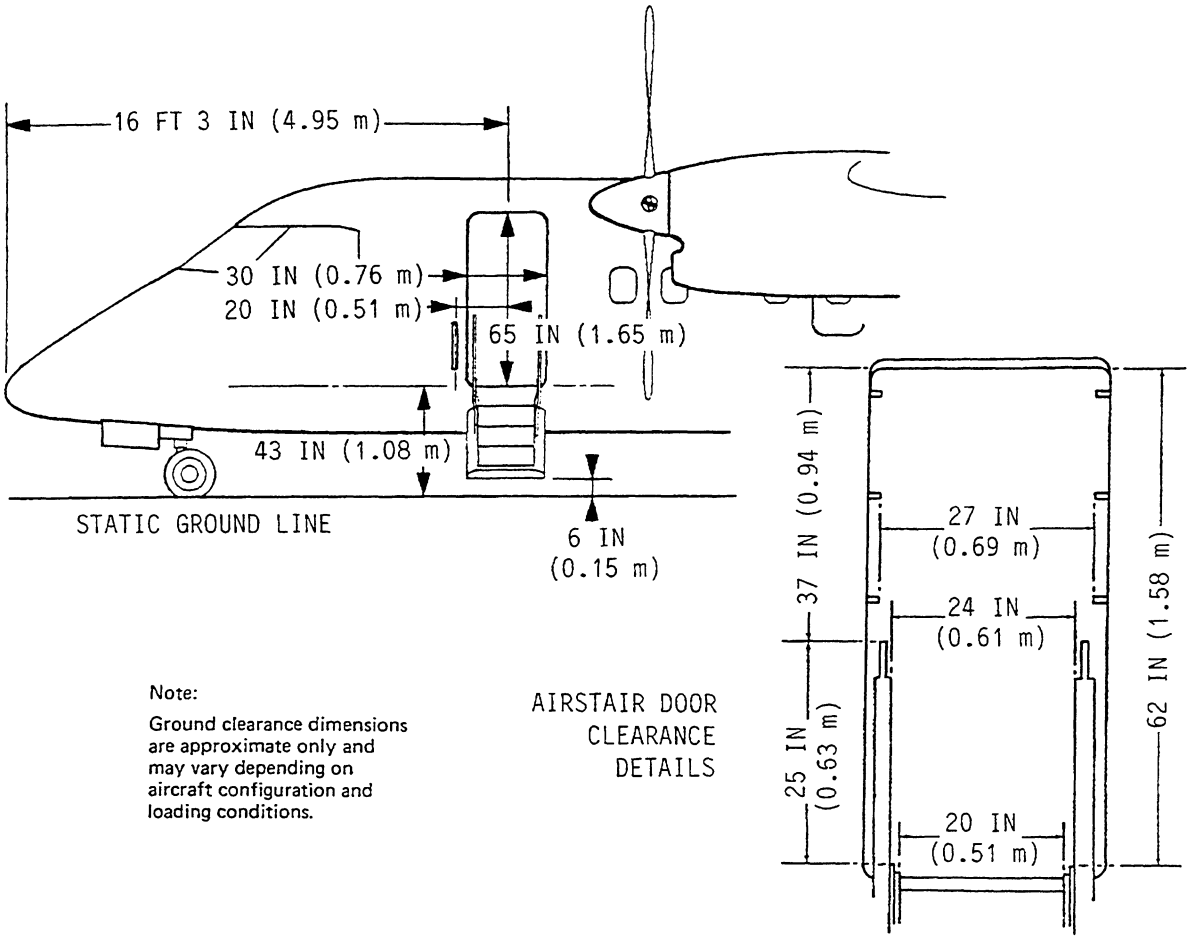
Figure 2–8 Baggage Compartment Nets and Tiedowns

LENGTH - INCHES / WIDTH - INCHES

	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
3	117	115	112	110	108	106	104	102	101	99	98	97	96	91	86	80
6	117	114	112	110	108	106	104	102	100	99	98	97	95	90	85	80
9	116	114	112	110	107	105	104	102	100	99	98	97	95	90	85	80
12	116	114	112	109	107	105	103	102	100	99	97	96	95	90	85	80
15	116	114	112	109	107	105	103	101	100	98	97	96	94	89	84	80
18	115	114	111	109	107	105	103	101	99	98	97	96	94	89	84	80
21	115	113	111	109	107	105	103	101	99	98	97	96	94	89	84	80
24	115	113	111	109	106	104	102	101	99	98	96	95	94	89	84	80
27	115	113	111	108	106	104	102	100	99	97	96	95	93	88	83	79
30	115	113	110	108	106	104	102	100	98	97	96	95	93	88	83	79
33	115	112	110	108	105	103	101	100	98	97	95	94	92	87	82	76
36	75	72	70	67	64	61	60	60	60	59	59	58	58	57	56	55
39	75	72	70	67	64	61	60	60	60	59	59	58	58	57	56	55
42	75	72	70	67	64	61	60	60	60	59	59	58	58	57	56	55
45	75	72	70	67	64	61	60	60	60	59	59	58	58	57	56	55
48	59	59	59	59	58	58	57	56	55	54	54					
51	59	59	59	59	58	58	57	56	55	54	54					
54	57	57	57	57	56	55	55	54	53	52	51					
57	46	45	45	45	45	44	44	43	43	42	42					
60	45	45	44	44	44											

HEIGHT - INCHES

Figure 2–9 Cargo Loading – Maximum Package Chart



Note:

Ground clearance dimensions are approximate only and may vary depending on aircraft configuration and loading conditions.

AIRSTAIR DOOR CLEARANCE DETAILS

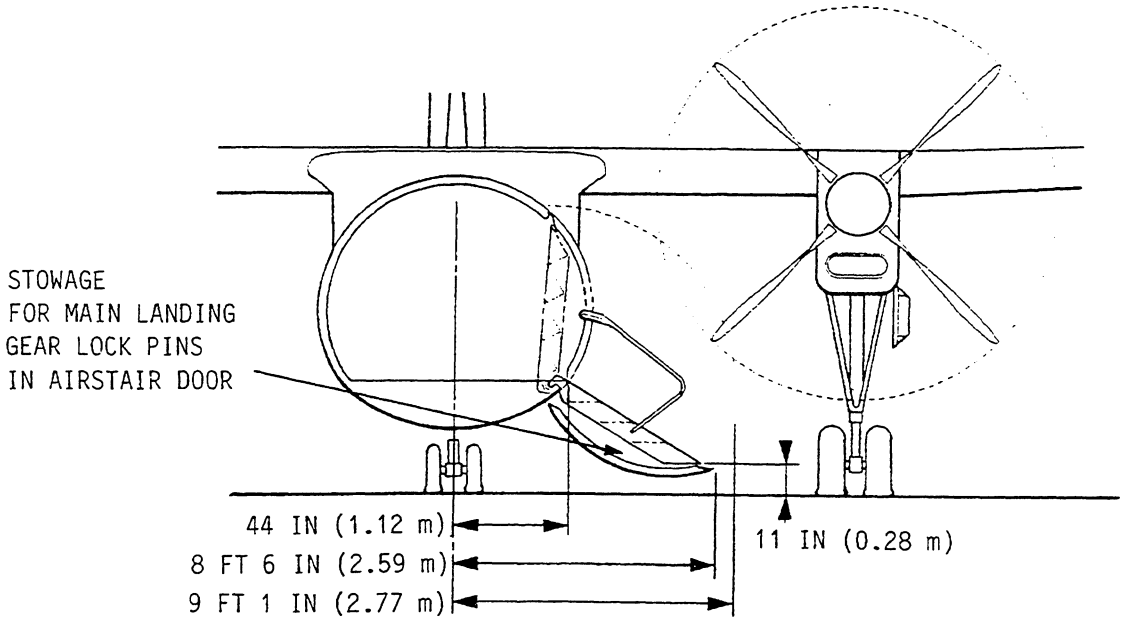


Figure 2–10 Airstair Door Clearance

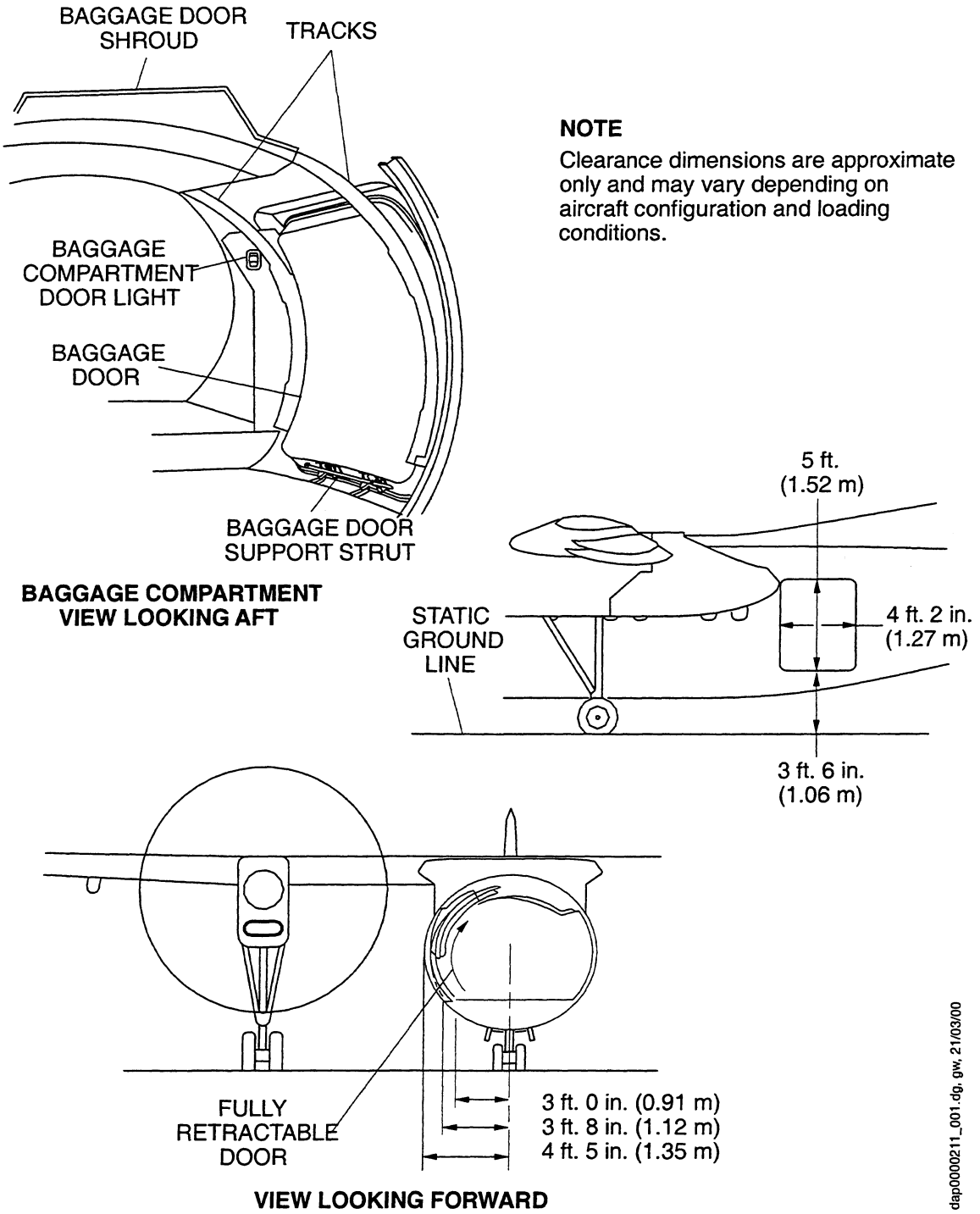


Figure 2–11 Baggage Compartment Door Clearance

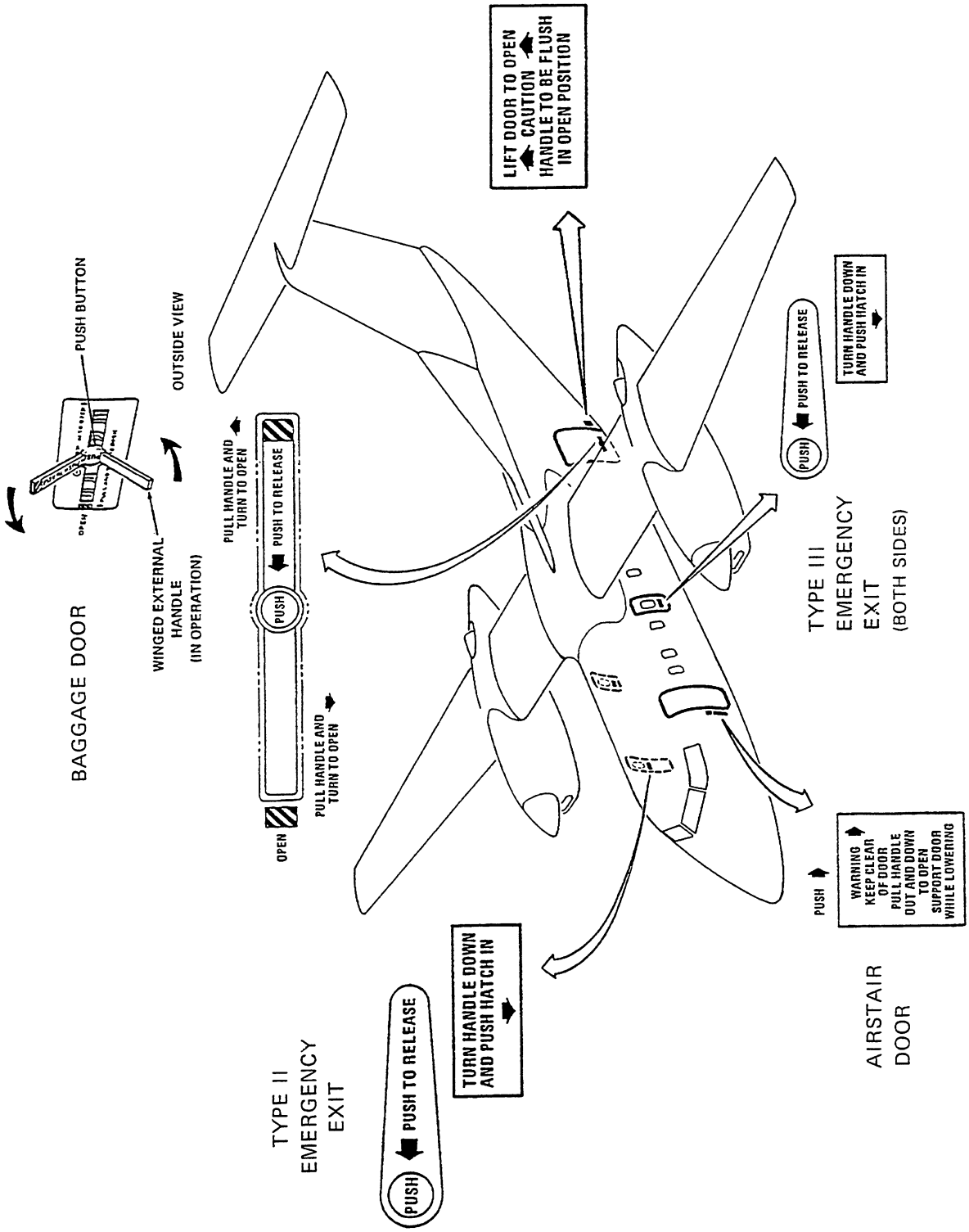


Figure 2–12 Exterior Handles

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SECTION 3
AIRCRAFT PERFORMANCE

ILLUSTRATIONS

SECTION 3
AIRCRAFT PERFORMANCE

ILLUSTRATIONS CONT'D.

SECTION 3

AIRCRAFT PERFORMANCE

3.0 INTRODUCTION

This section contains the performance data for the Q200 (Model 201 and 202), as required for operations and Airport Planning purposes.

3.1 DEFINITIONS

The following are the definitions used in this Section:

Maximum Structural Weights

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

Maximum Take–off Weight:	16,466 kg (36,300 lb)
Maximum Landing Weight:	15,650 kg (34,500 lb)

WAT Limits

The maximum permissible take–off weight (Model 201: figure 3–2, figure 3–4 and figure 3–5), (Model 202: figure 3–3, figure 3–5 and figure 3–7) and landing weight (Model 201: figure 3–14 and figure 3–16), (Model 202: figure 3–15 and figure 3–17) are based on the limiting one engine inoperative climb requirements of FAR 25.

Take–Off Field Length

The take–off field length (Model 201: figure 3–8, figure 3–10 and figure 3–12), (Model 202: figure 3–9, figure 3–11 and figure 3–13) is the longest of:

(i) Accelerate stop distance.
(ii) Take–off distance to 35 ft. with one 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 determined using figures 3–18 to 3–20 are 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) Both propellers in discing

b) Landing – (i) Main wheel anti–skid brakes
(ii) Both propellers at flight idle

3.2 USE OF CHARTS (Model 201)

The use of 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 with flaps 5°.

From figure 3–4: The maximum permissible take–off weight is 15,000 kg (33,070 lb).

EXAMPLE 2

Given: Outside Air Temperature = 26° C
Airfield Altitude = 6,000 ft
Aircraft Weight =14,900 kg (32,850 lb)

Find: Take–off field length with flaps 5°.

From figure 3–10: The take–off field length is 1,525 m (5,005 ft).

EXAMPLE 3

Given: Outside Air Temperature = –4° C
Airfield Altitude = 9,000 ft

Find: Maximum permissible landing weight with flaps 35°.

From figure 3–16: The maximum permissible landing weight is 15,200 kg (33,520 lb).

EXAMPLE 4

Given: Airfield Altitude = 6,000 ft
Aircraft Weight = 14,700 kg (32,410 lb)

Find: Landing field length with flaps 15°.

From figure 3–18: The unfactored landing distance is 570 m (1,870 ft).

From figure 3–20: The landing field length at an operational factor of 1.67 ($=\frac{1}{0.6}$) is 950 m (3,120 ft).
The landing field length at an operational factor of 1.43 ($=\frac{1}{0.7}$) is 815 m (2,670 ft).

3.2.1 USE OF CHARTS (Model 202)

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

EXAMPLE 1

Given:	Outside Air Temperature	= 26° C
	Airfield Altitude	= 7,000 ft
Find:	Maximum permissible take–off weight with flaps 5°.	

From figure 3–5: The maximum permissible take–off weight is 15,950 kg (35,170 lb).

EXAMPLE 2

Given:	Outside Air Temperature	= 26° C
	Airfield Altitude	= 6,000 ft
	Aircraft Weight	=14,900 kg (32,850 lb)
Find:	Take–off field length with flaps 5°.	

From figure 3–11: The take–off field length is 1,350 m (4,430 ft).

EXAMPLE 3

Given:	Outside Air Temperature	= 26° C
	Airfield Altitude	= 8,000 ft
Find:	Maximum permissible landing weight with flaps 35°.	

From figure 3–17: The maximum permissible landing weight is 14,500 kg (31,970 lb).

EXAMPLE 4

Given:	Airfield Altitude	= 6,000 ft
	Aircraft Weight	= 14,700 kg (32,410 lb)
Find:	Landing field length with flaps 15°.	

From figure 3–18: The unfactored landing distance is 570 m (1,870 ft).

From figure 3–20: The landing field length at an operational factor of 1.67 ($=\frac{1}{0.6}$) is 950 m (3,120 ft).

The landing field length at an operational factor of 1.43 ($=\frac{1}{0.7}$) is 815 m (2,670 ft).

PAYLOAD-RANGE AT MAXIMUM CRUISE RATING AND LONG RANGE CRUISE

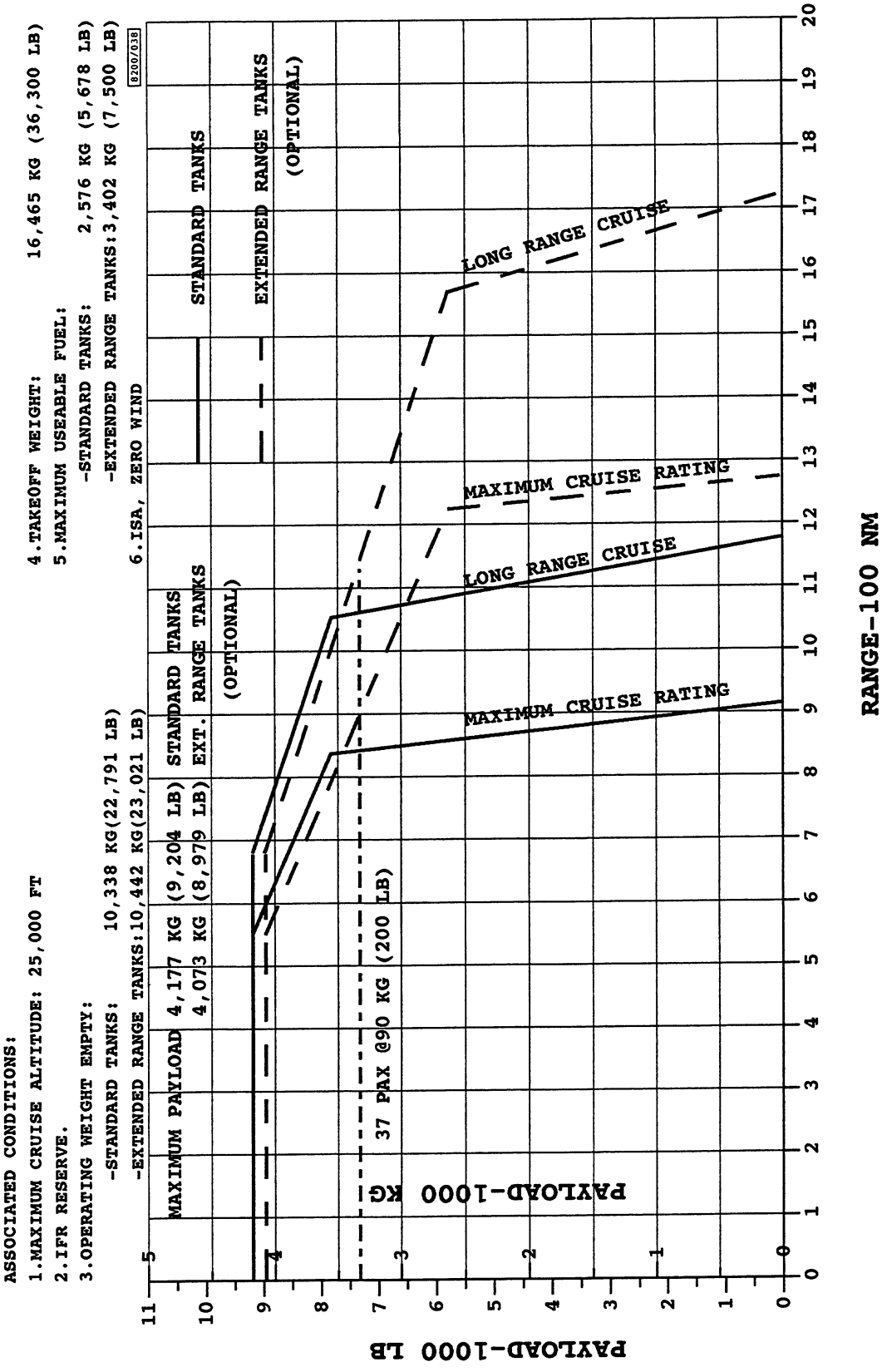

Figure 3–1 Payload Range at Maximum Cruise Rating and Long Range Cruise

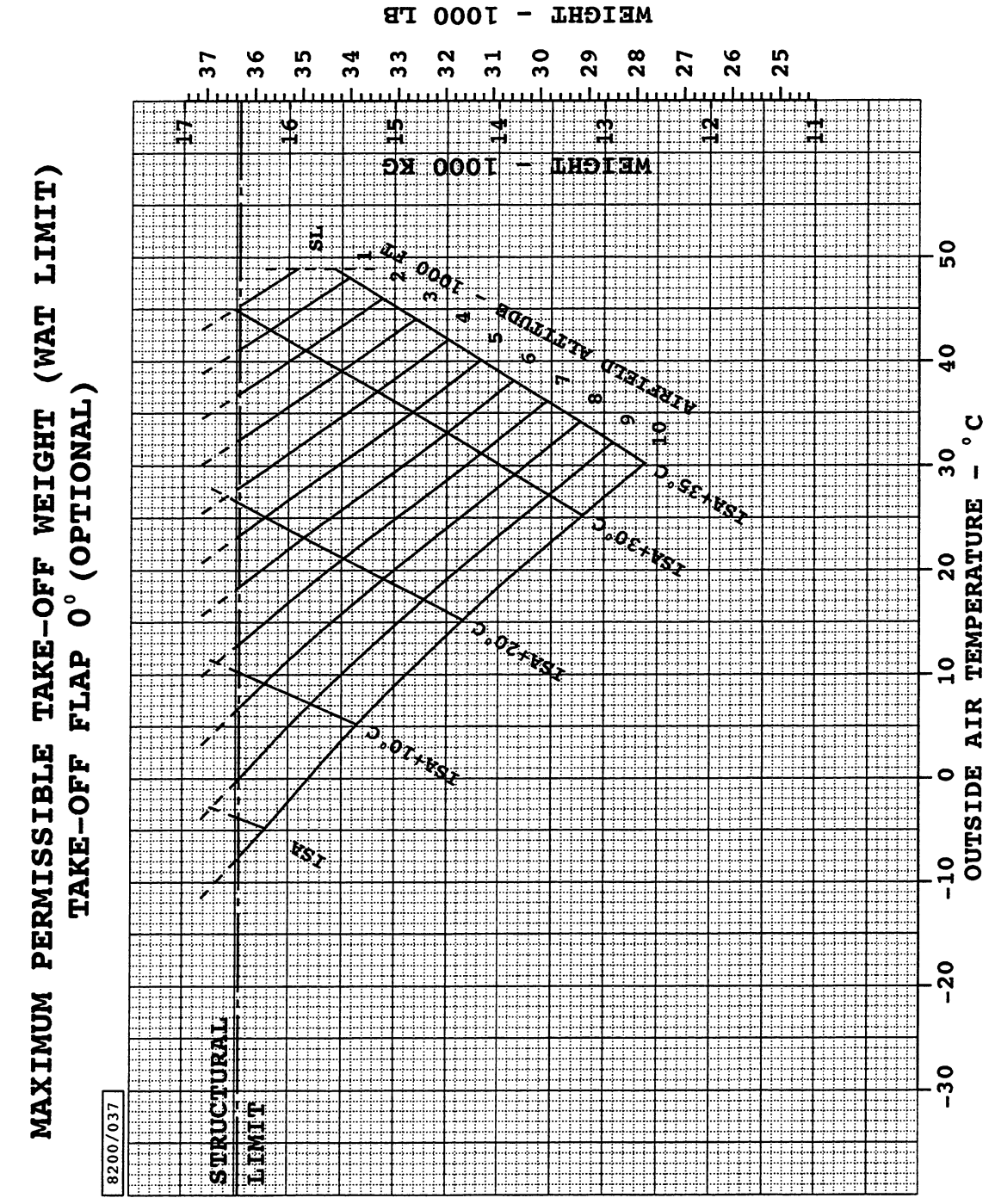

Figure 3–2 (Model 201)

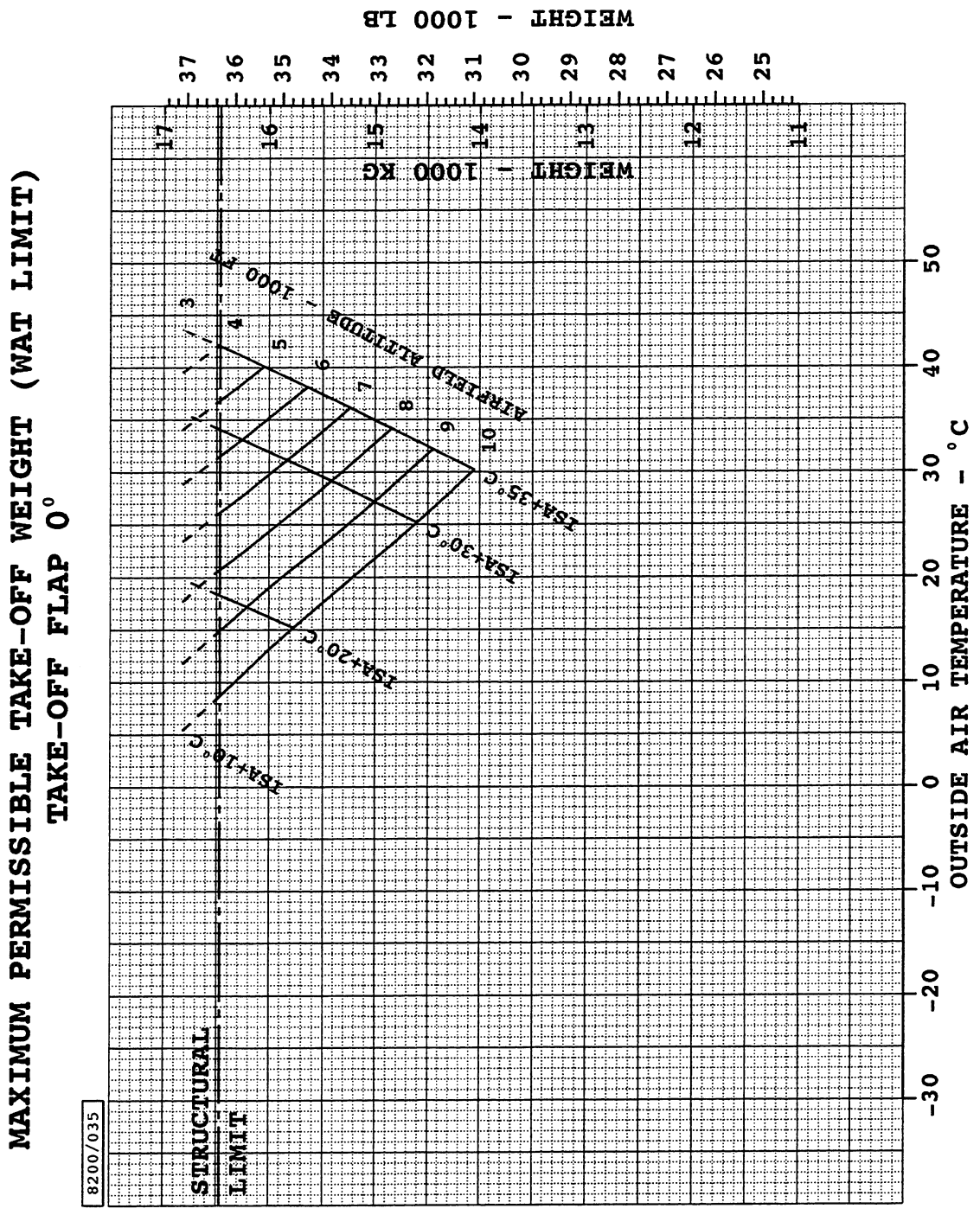

Figure 3–3 (Model 202)

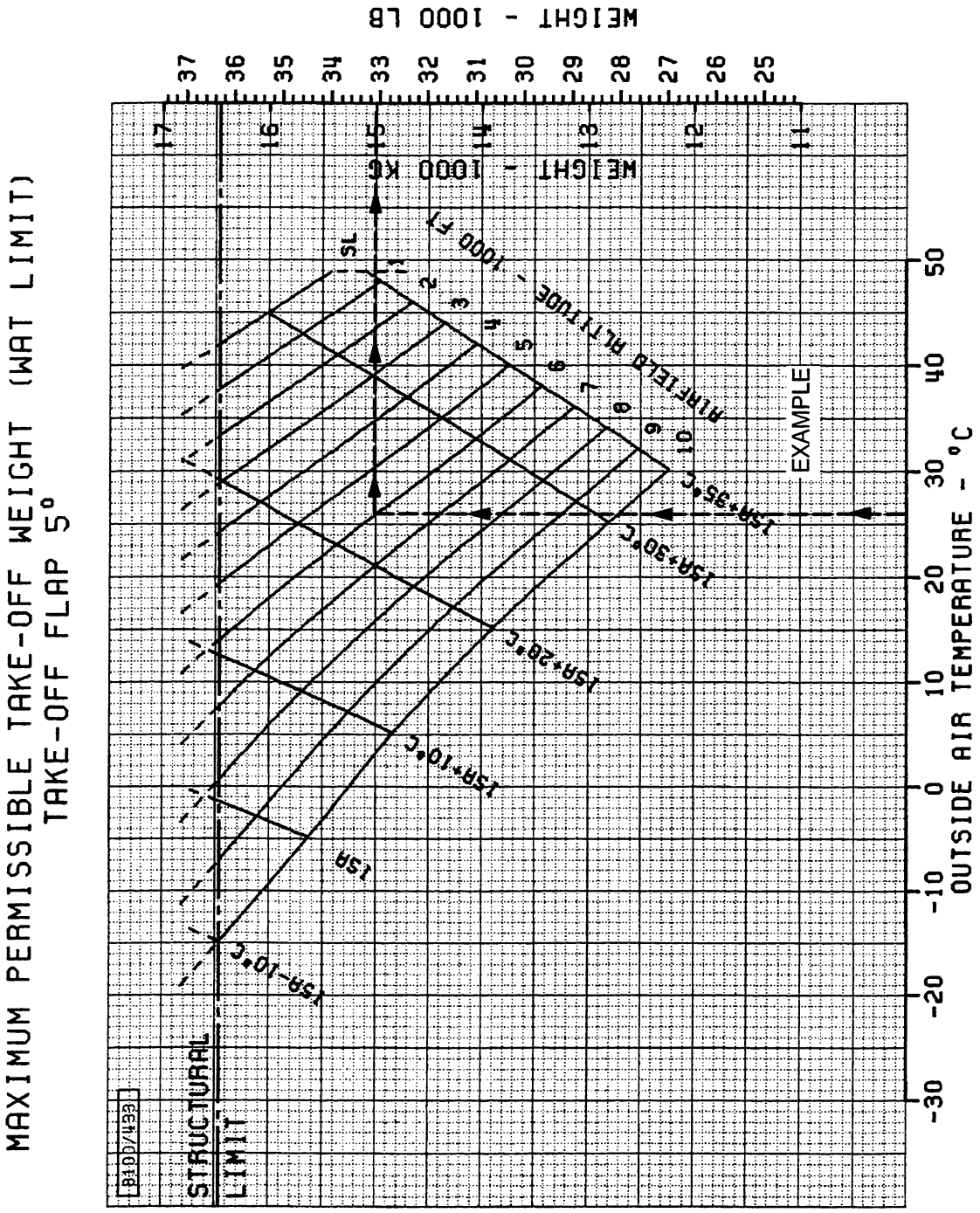

Figure 3–4 (Model 201)

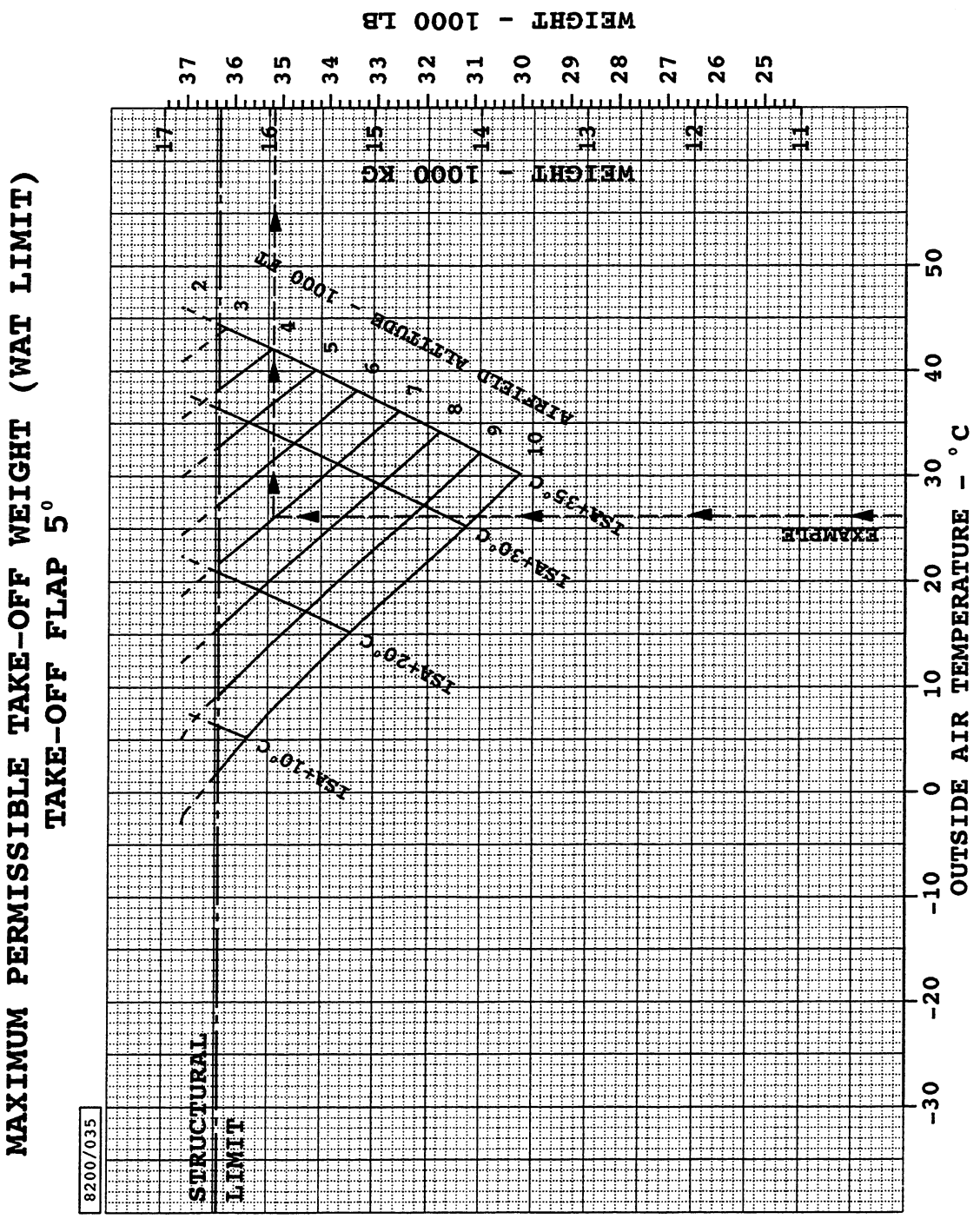

Figure 3–5 (Model 202)

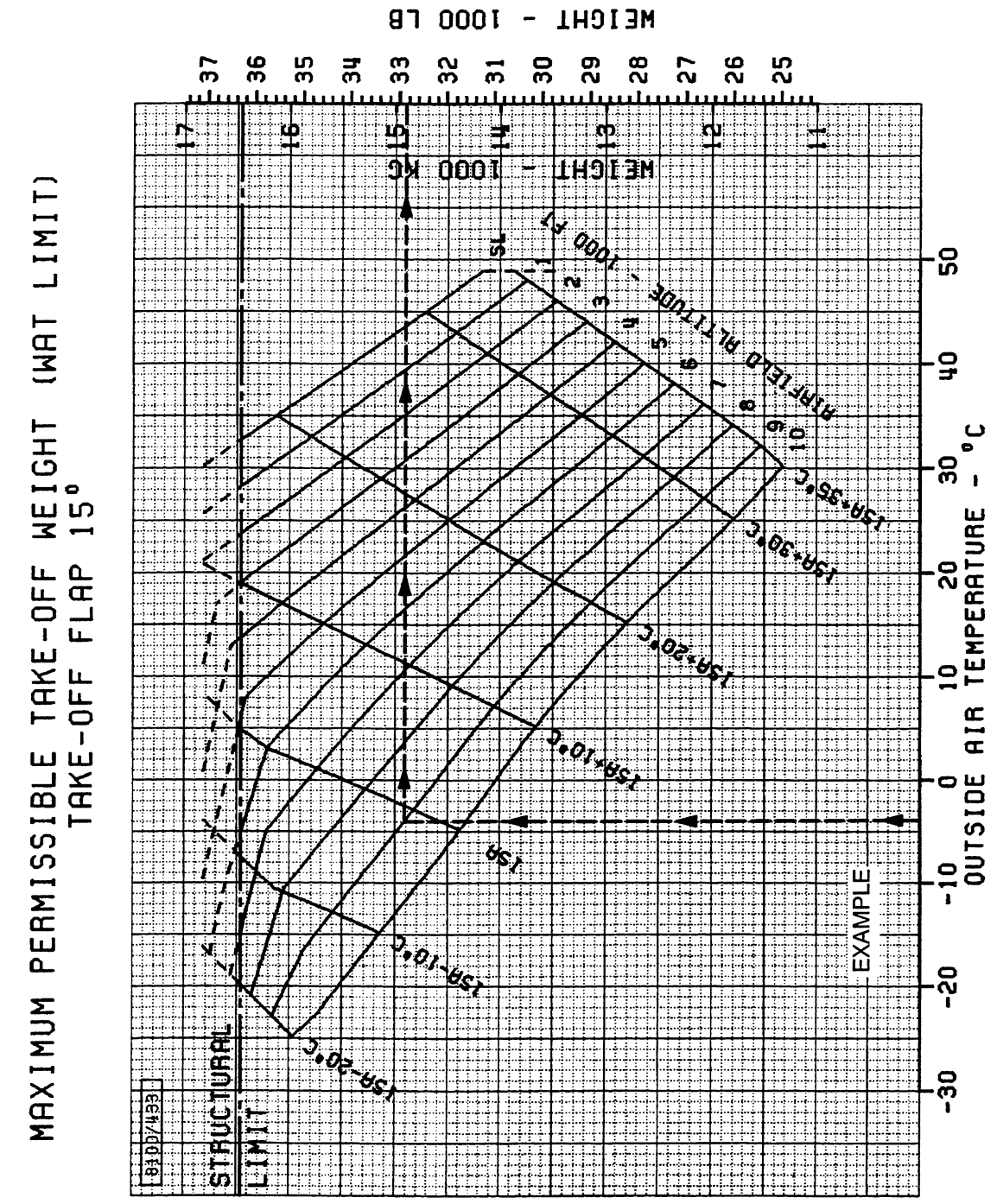

Figure 3–6 (Model 201)

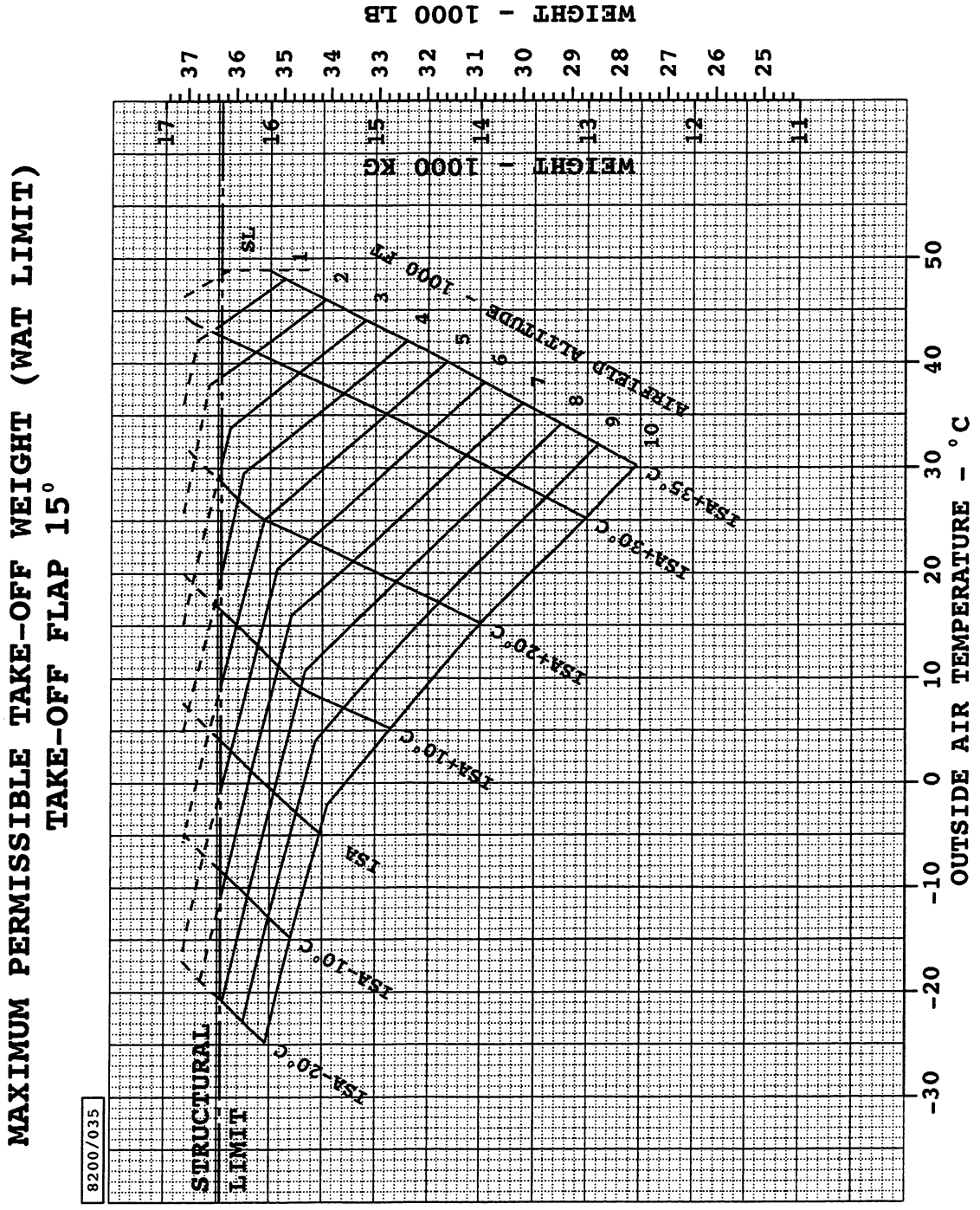

Figure 3–7 (Model 202)

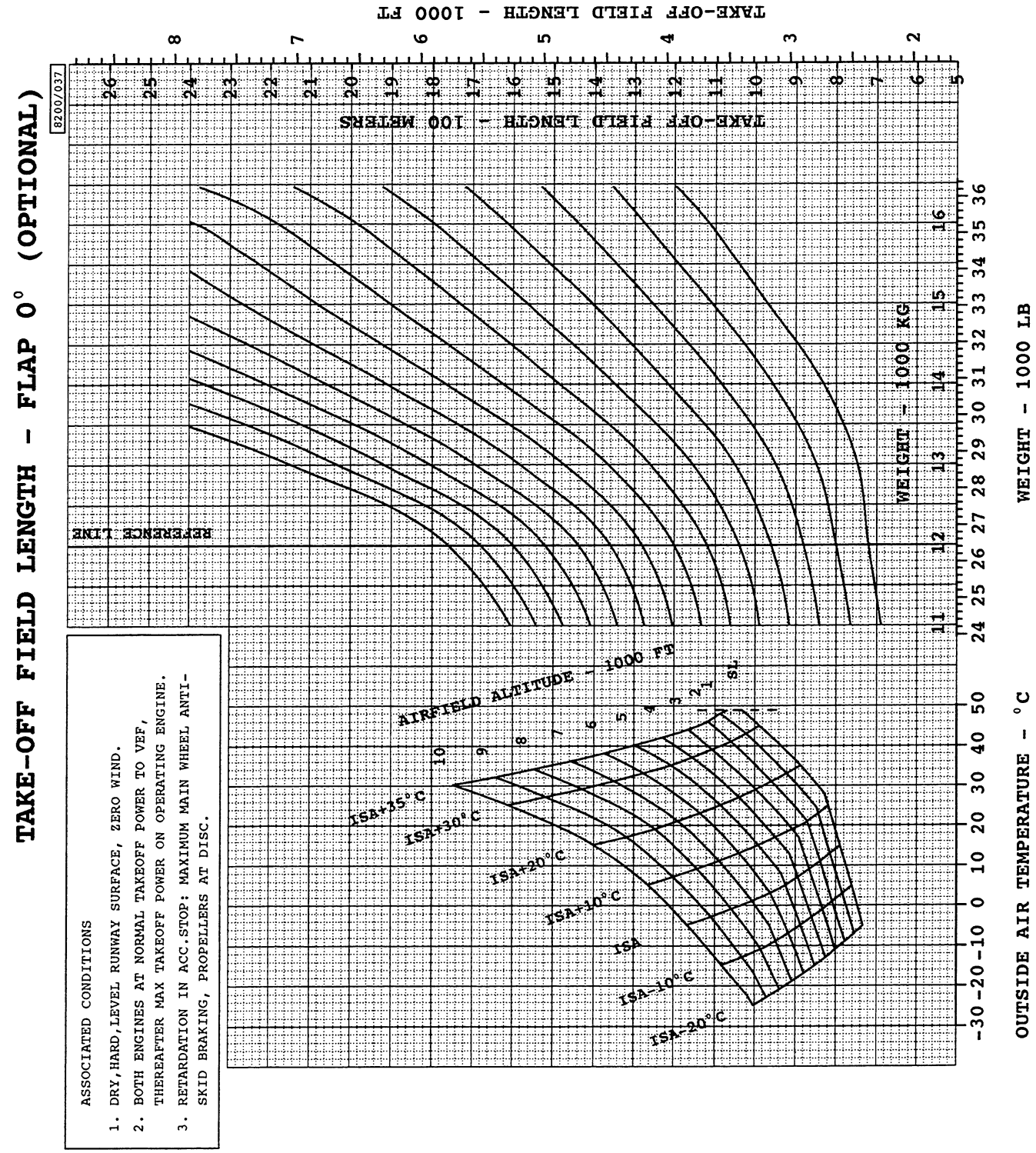

Figure 3–8 (Model 201)

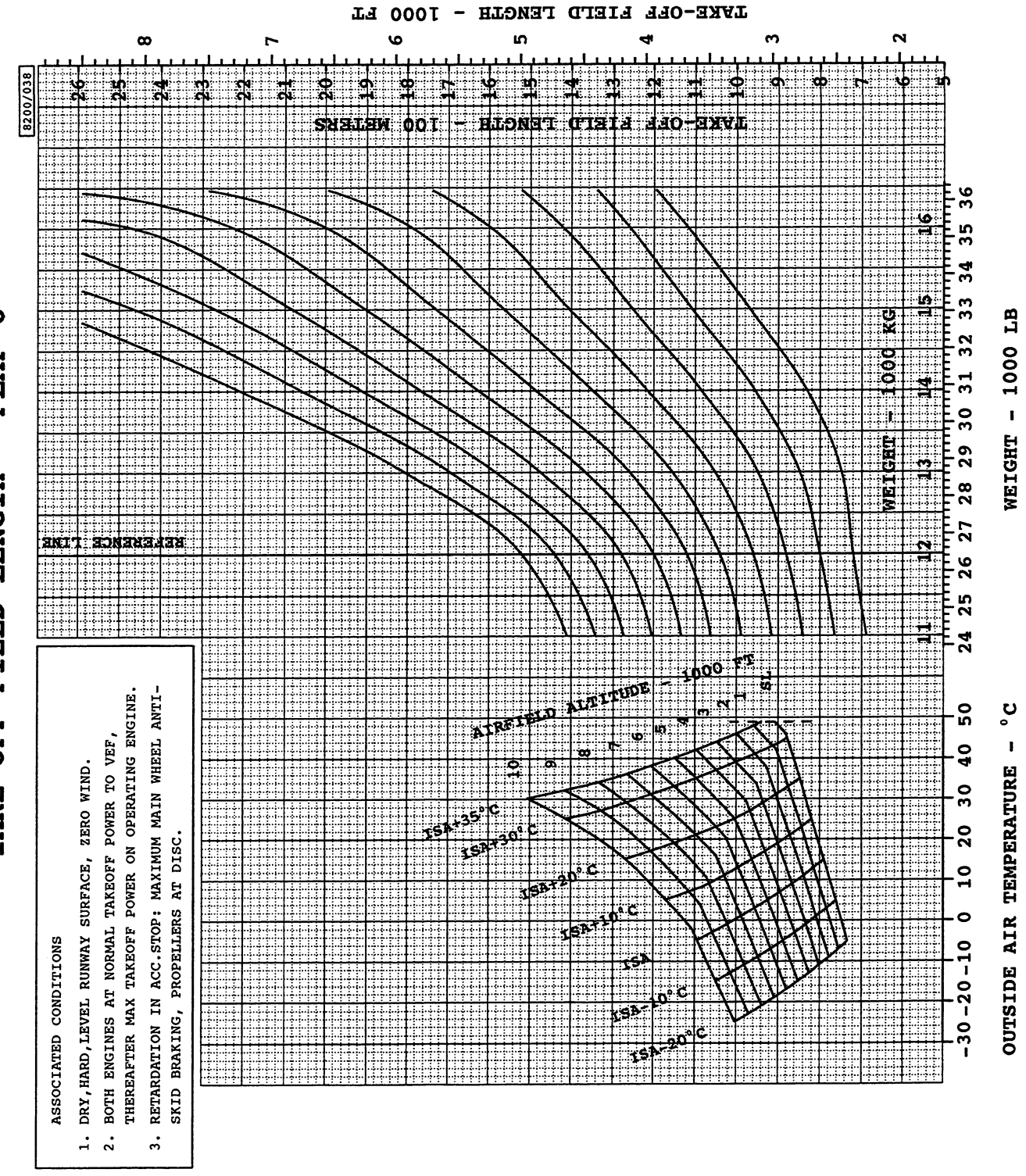

Figure 3–9 (Model 202)

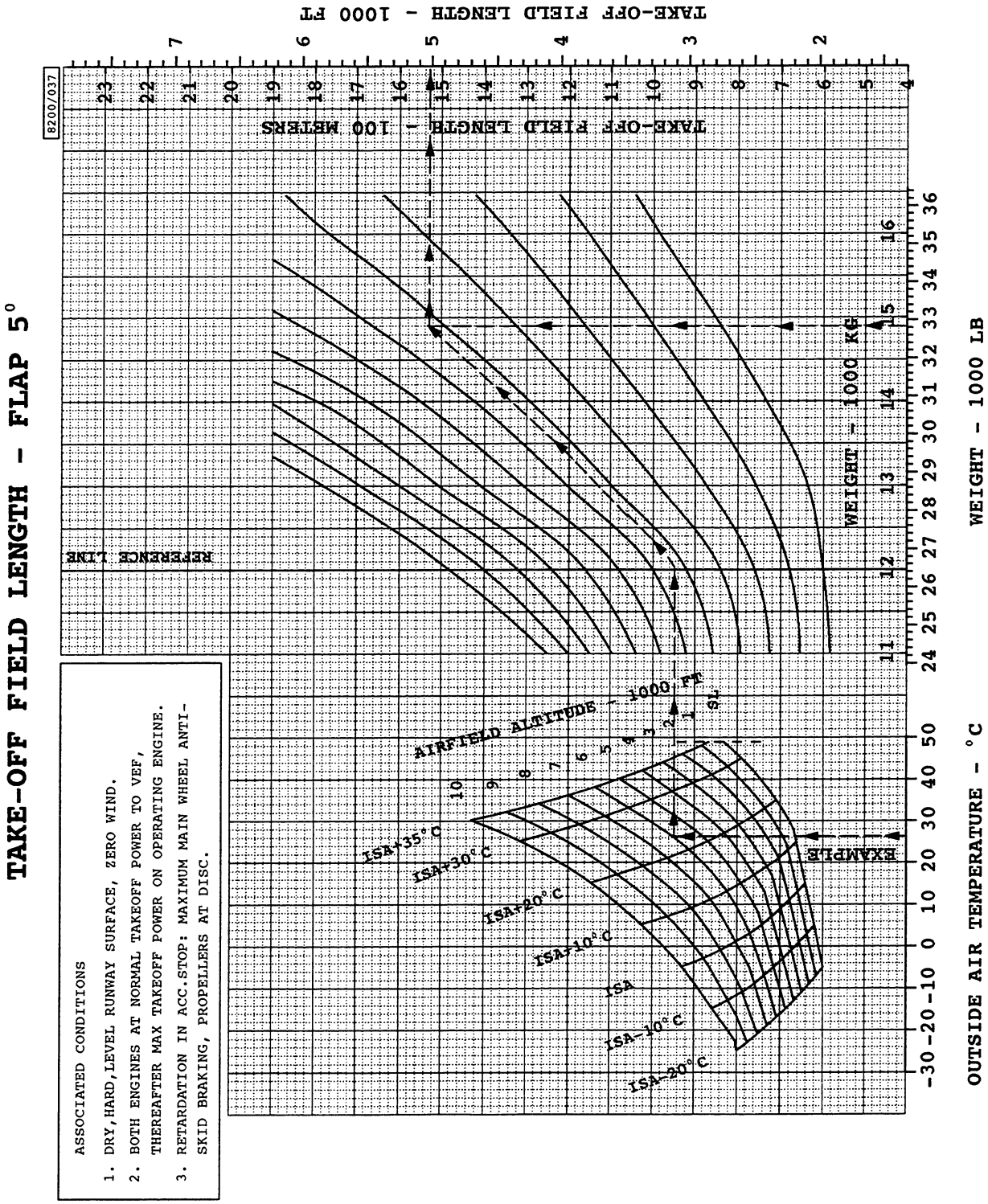

Figure 3–10 (Model 201)

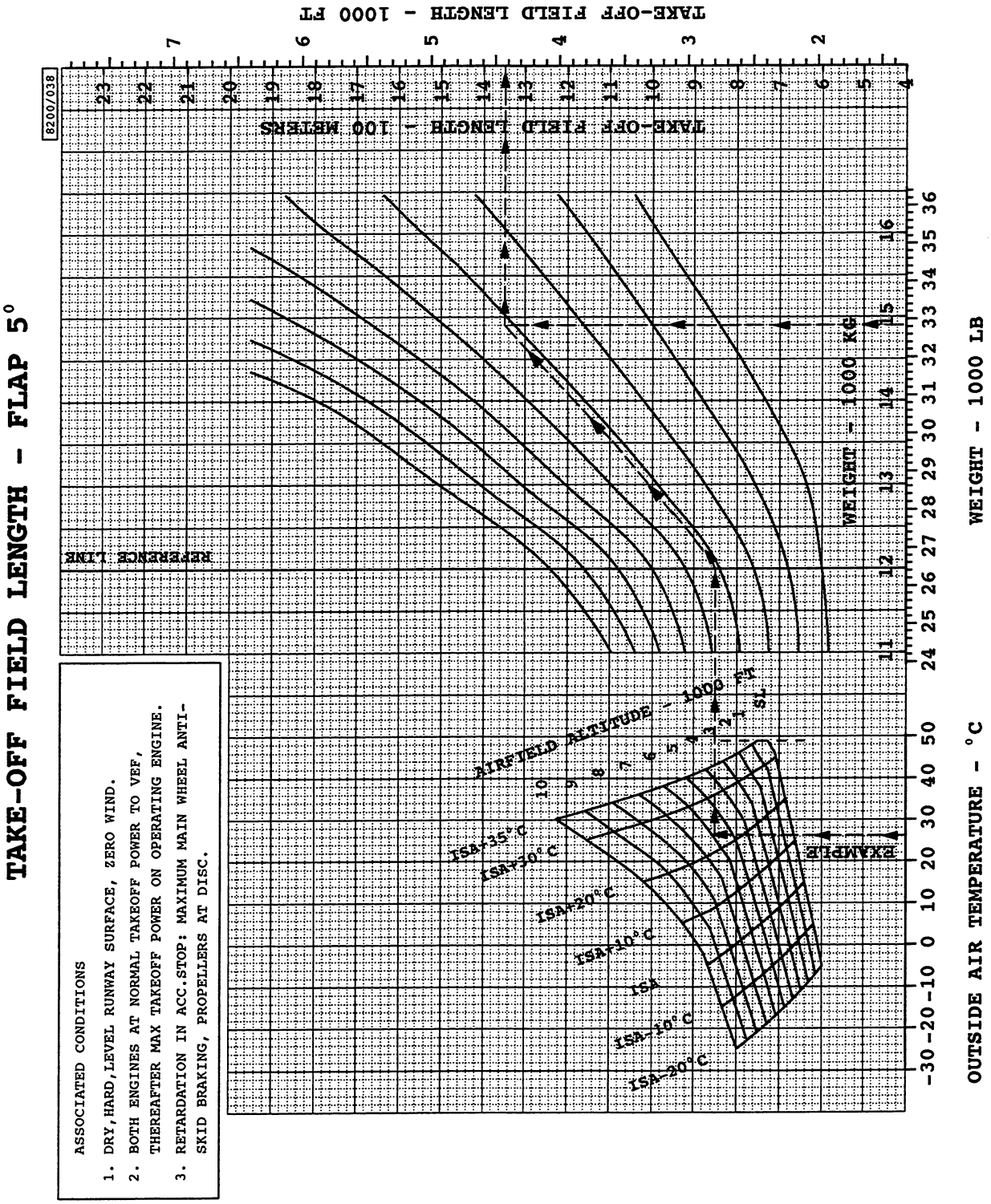

Figure 3–11 (Model 202)

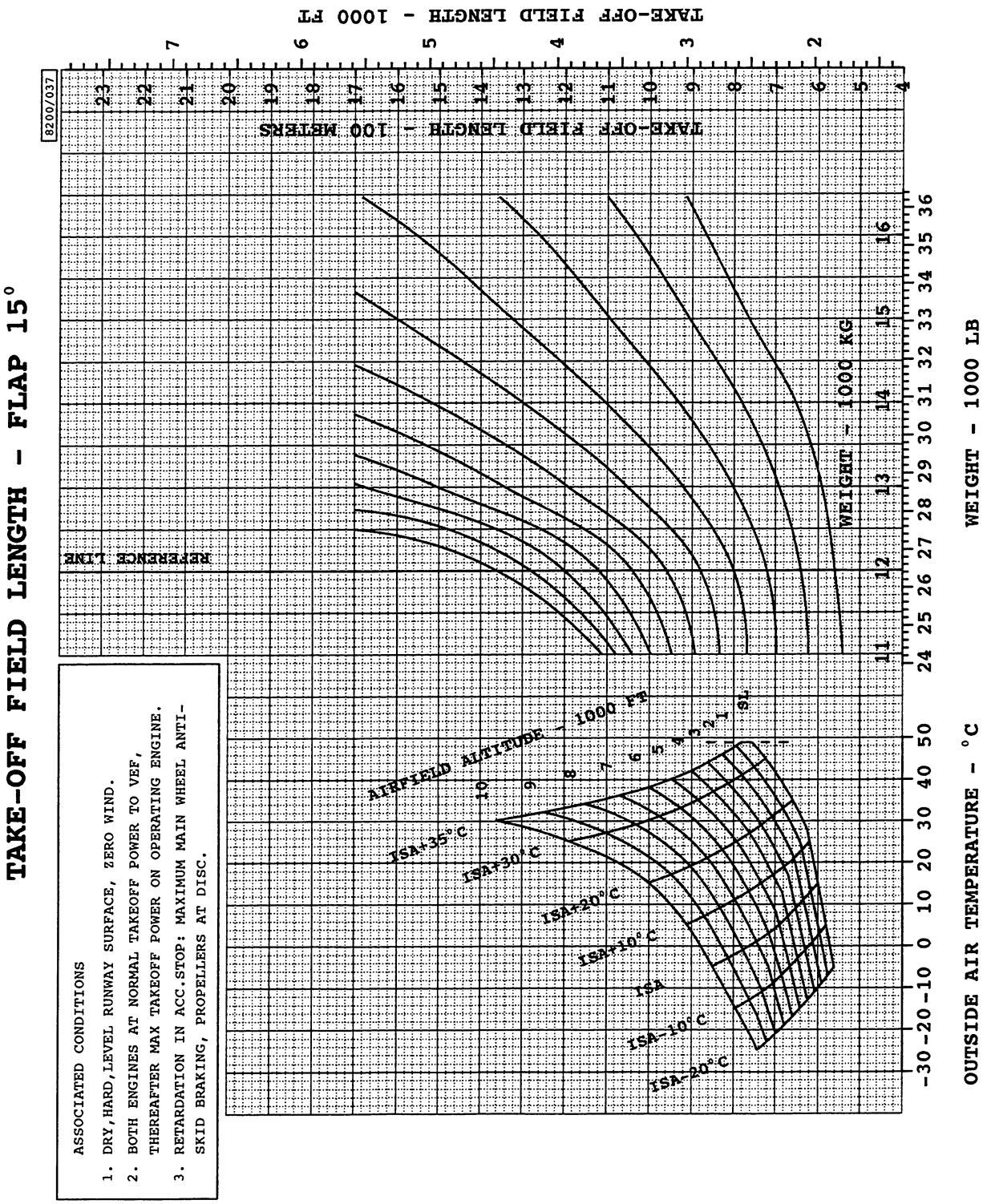

Figure 3–12 (Model 201)

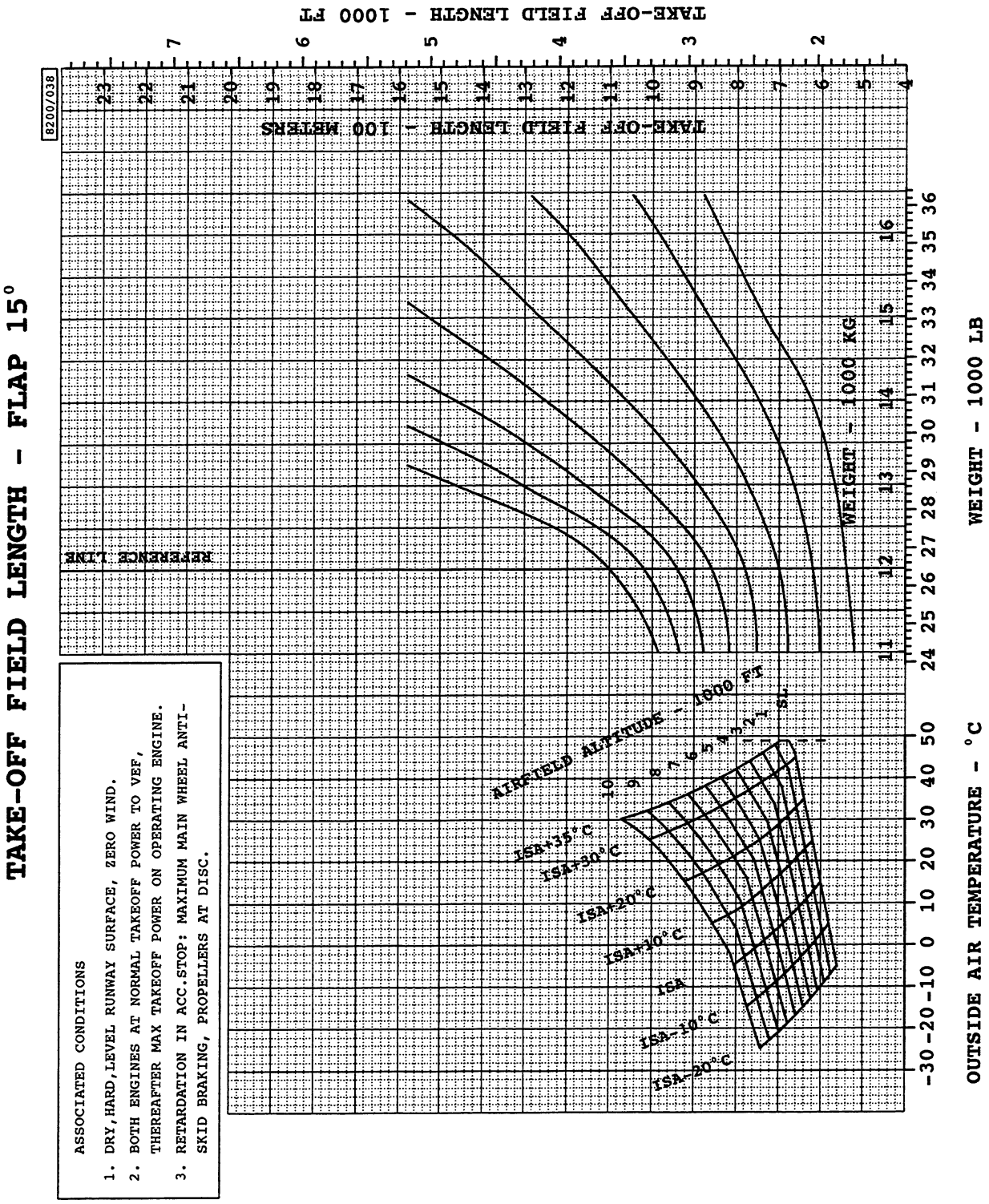

Figure 3–13 (Model 202)

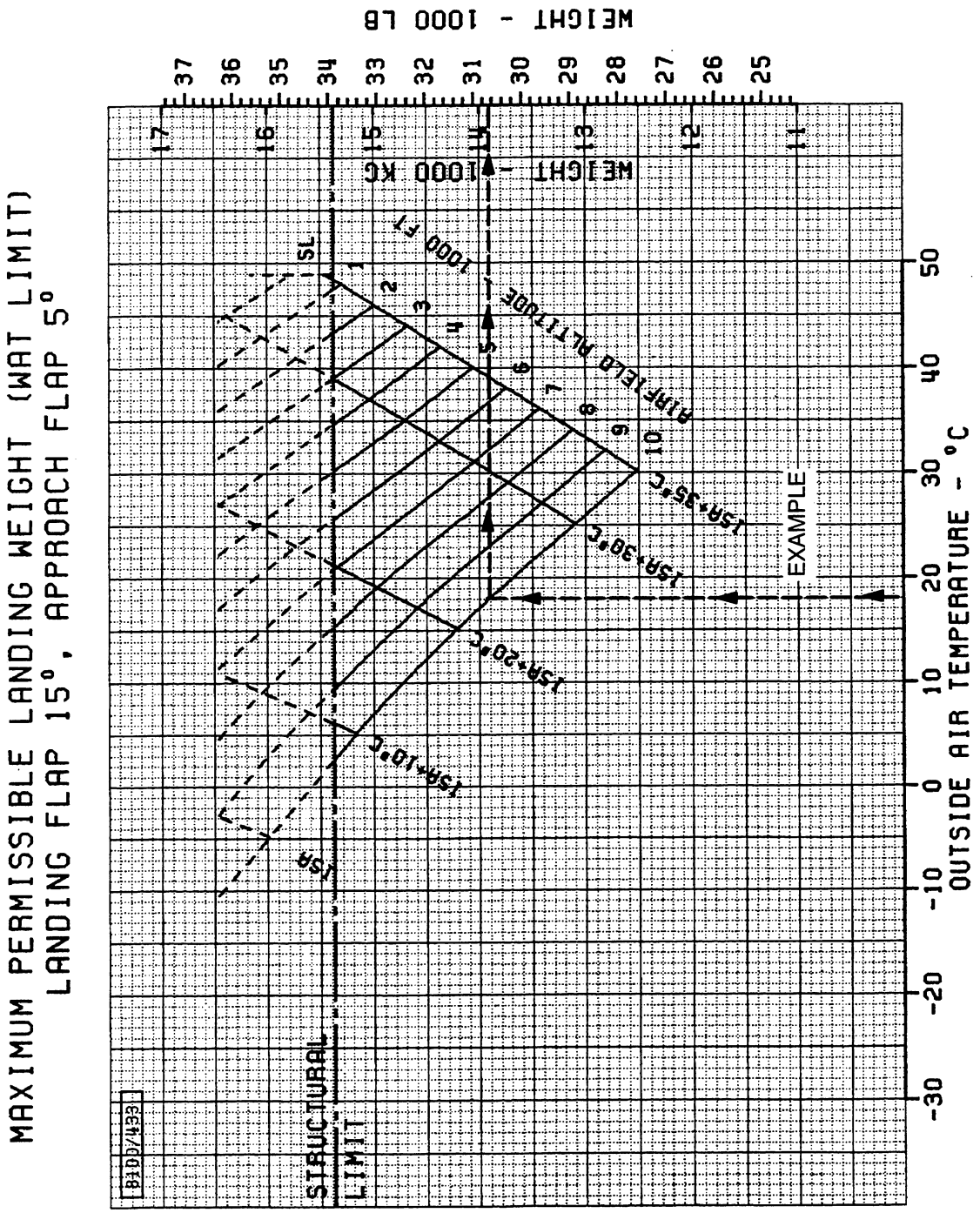

Figure 3–14 (Model 201)

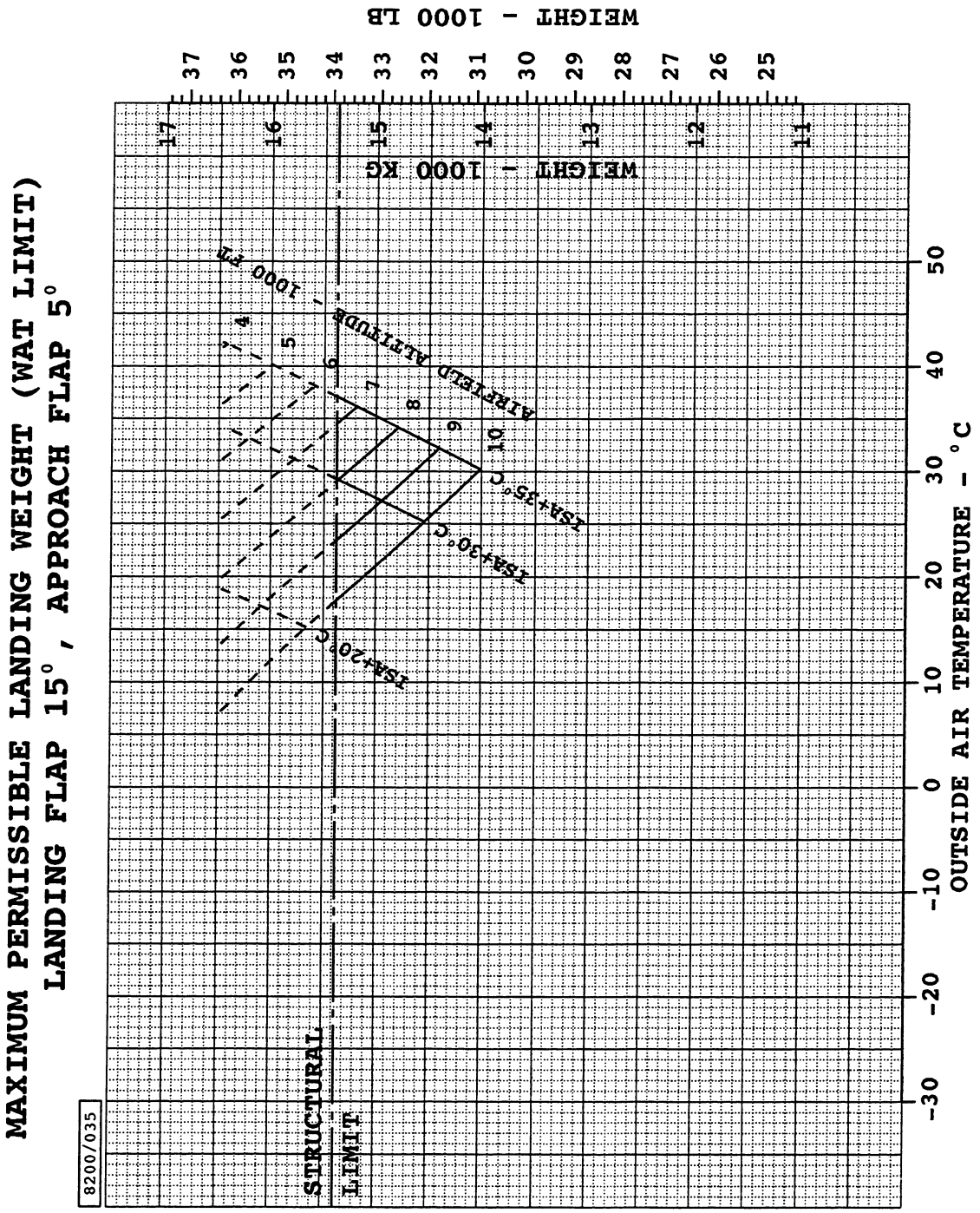

Figure 3–15 (Model 202)

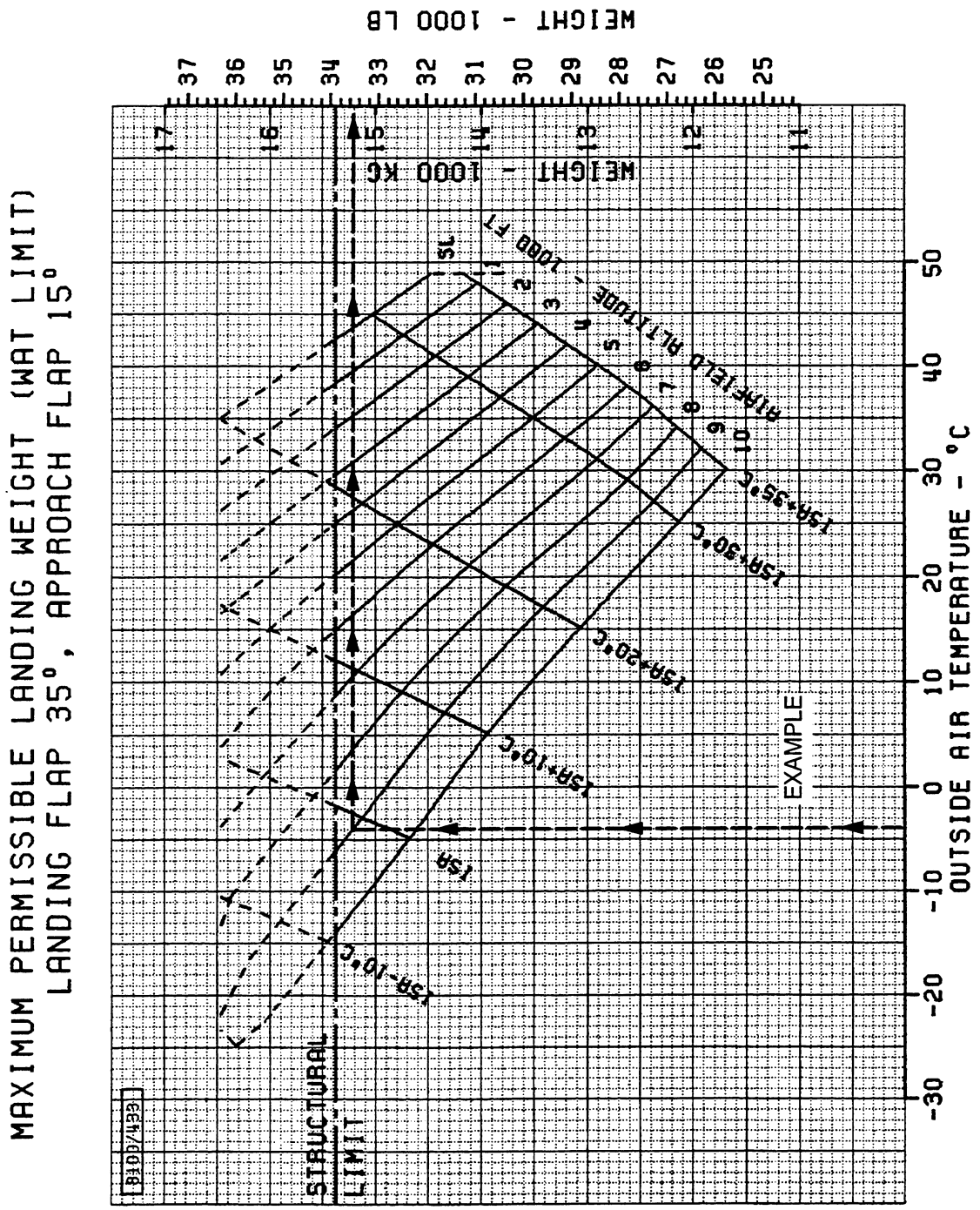

Figure 3–16 (Model 201)

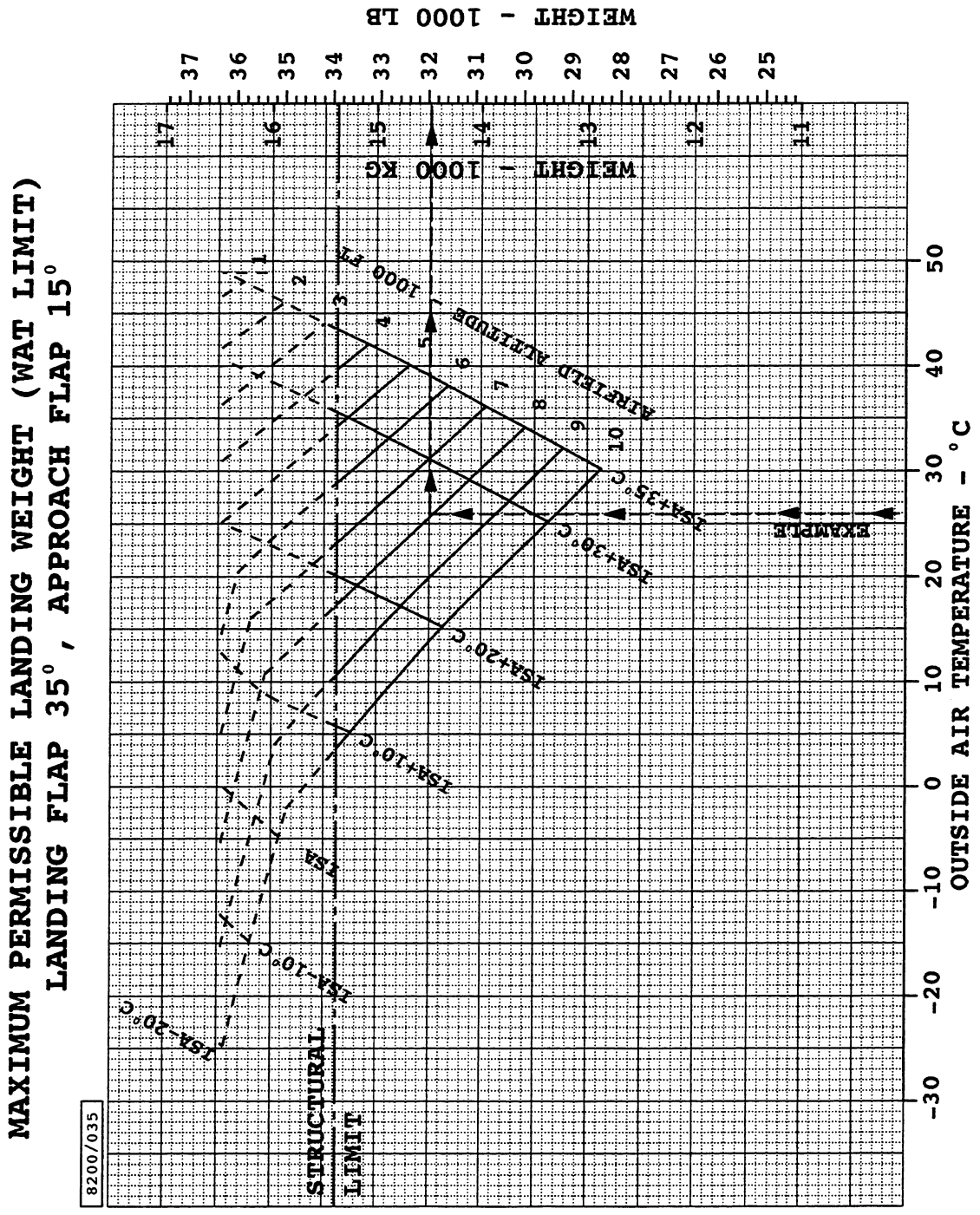

Figure 3–17 (Model 202)

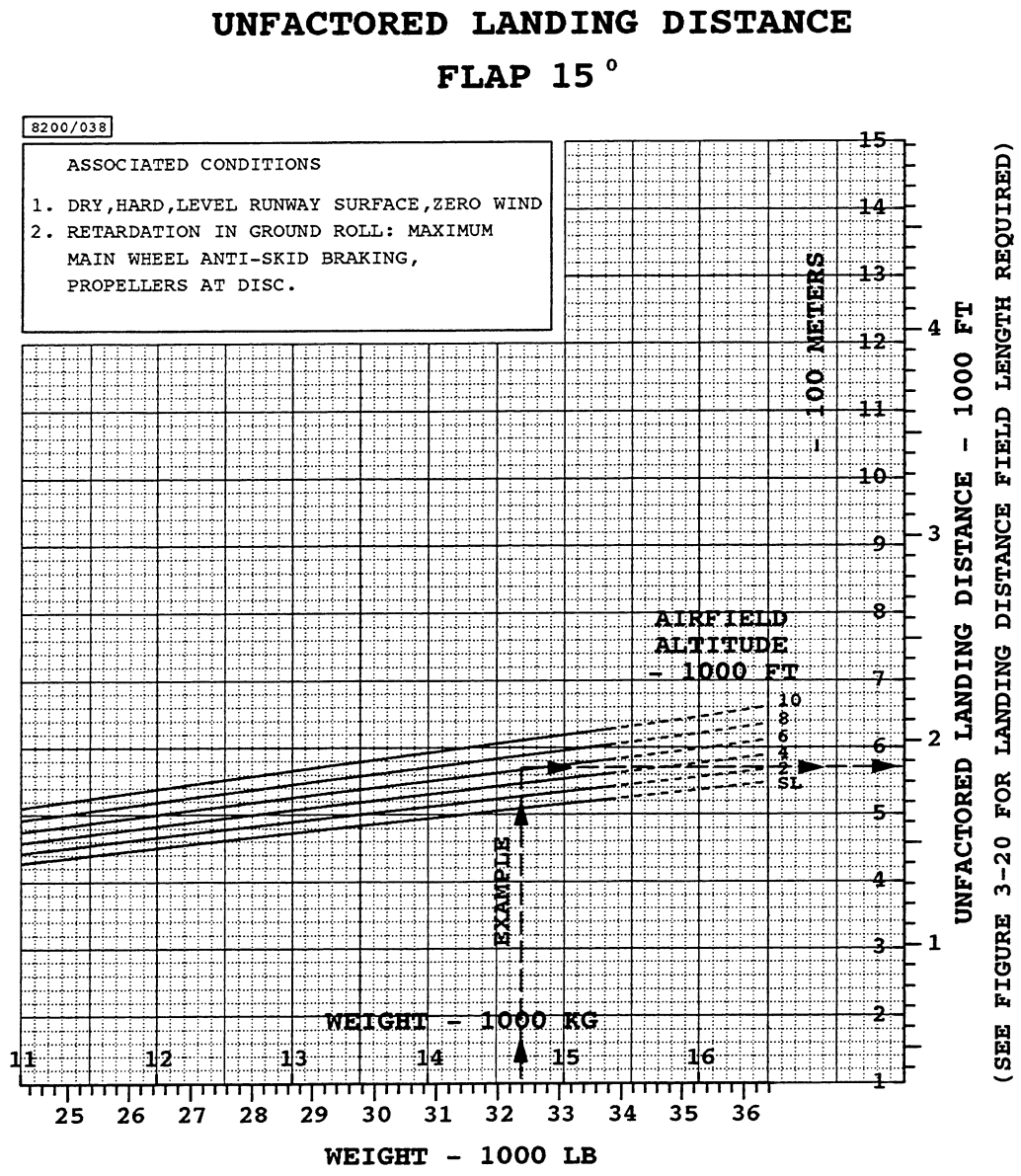

Figure 3–18 (Model 201/202)

UNFACTORED LANDING DISTANCE

FLAP 35°

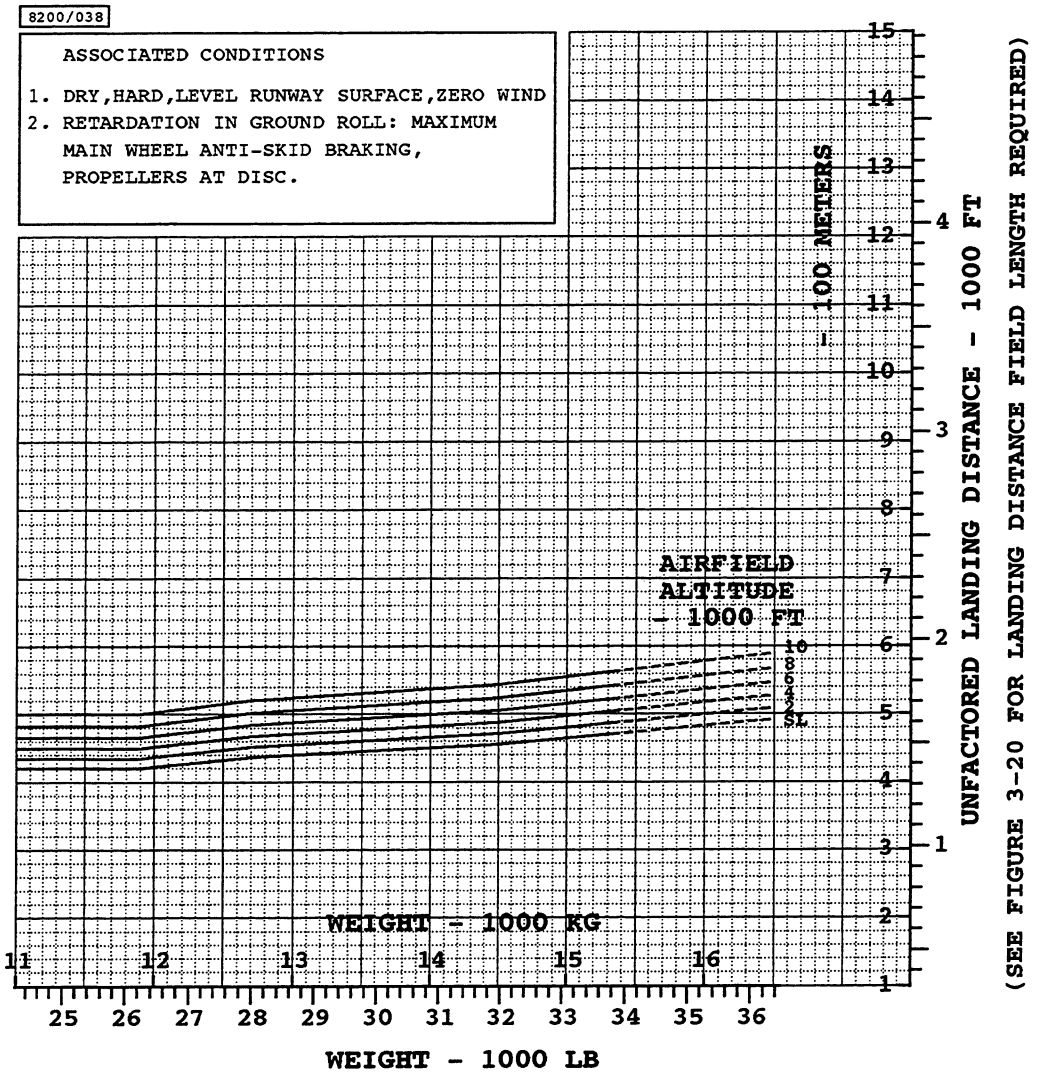

Figure 3–19

LANDING FIELD LENGTH REQUIRED

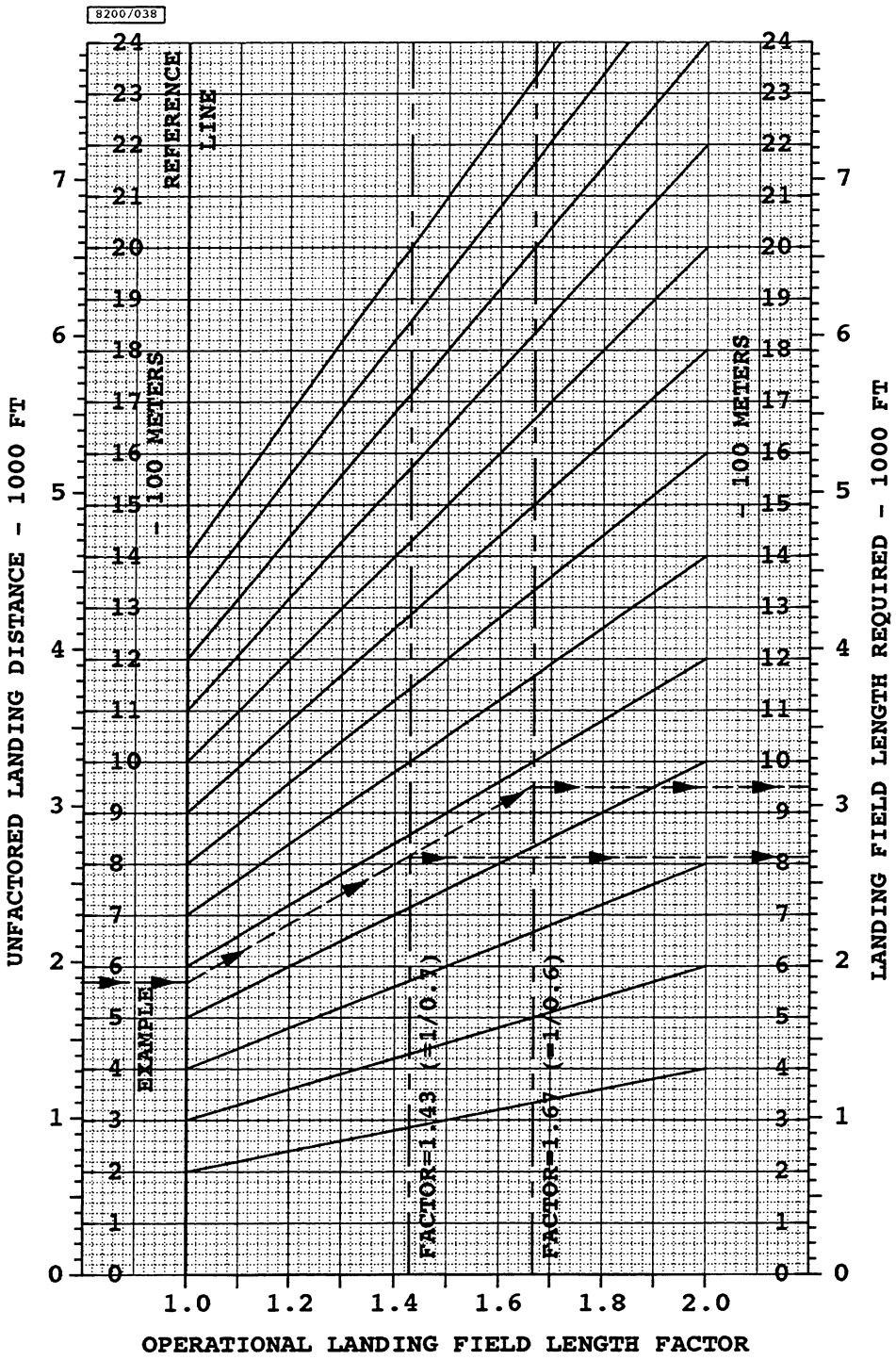

Figure 3–20

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SECTION 4

GROUND MANEUVERING

ILLUSTRATIONS

SECTION 4

GROUND MANEUVERING

4.0 INTRODUCTION

This section provides data on the following items:

- Aircraft turning Capability (refer to Figure 4–1, and Figure 4–2)
- Visibility from cockpit (refer to Figure 4–3, and Figure 4–4)
- Maneuvering characteristics (refer to Figure 4–5, Figure 4–6, Figure 4–7, and Figure 4–8)
- Mooring data (refer to Figure 4–9)
- Nose lifting precautions (refer to Figure 4–10)

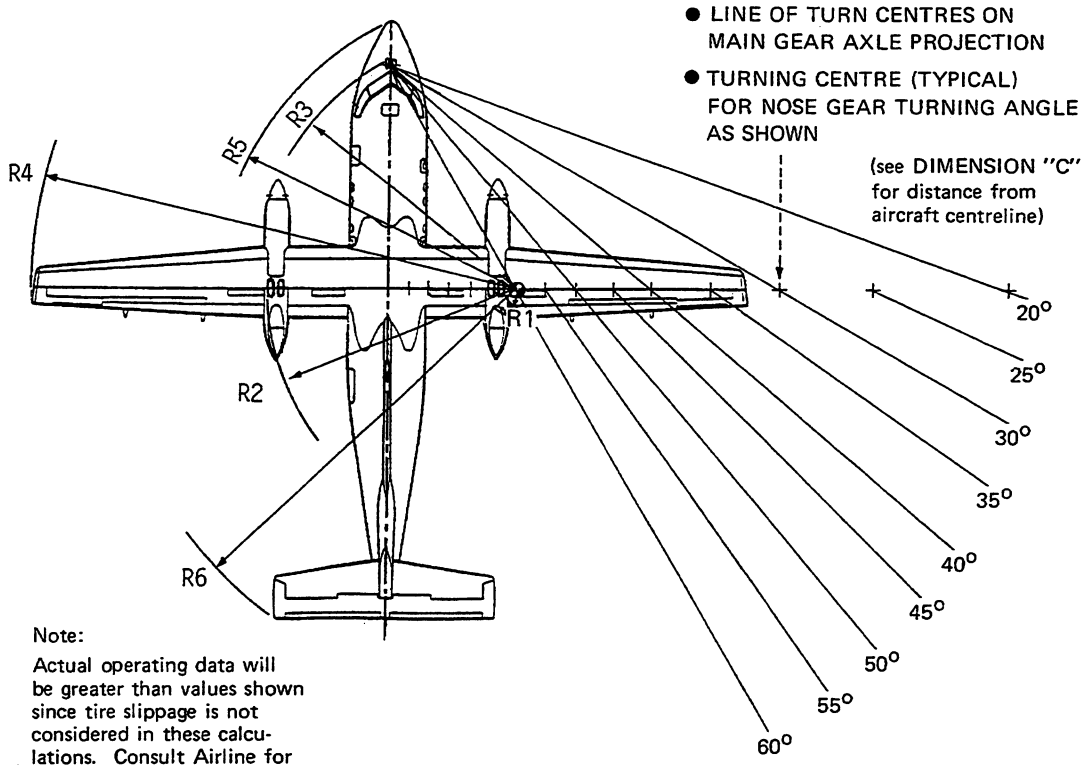
This data has been determined from the theoretical limits imposed by the geometry of the aircraft and includes normal allowance for tire slippage (as indicated). The purpose of this section is to show the turning capability of the aircraft in favorable operating circumstances (without the use of reverse thrust or differential braking). Use this data as a guideline only.

Varying airline practices may use more conservative turning procedures to avoid excessive tire wear and reduce possible maintenance problems. The operating techniques of each airline will vary and may be modified from the standard operating patterns due to the following physical factors within the maneuvering area:

- Adverse grades
- Limited area
- High risk of jet engine exhaust or propeller slipstream damage

Because of these reasons, ground maneuvering requirements should be coordinated with the user airline prior to layout planning.

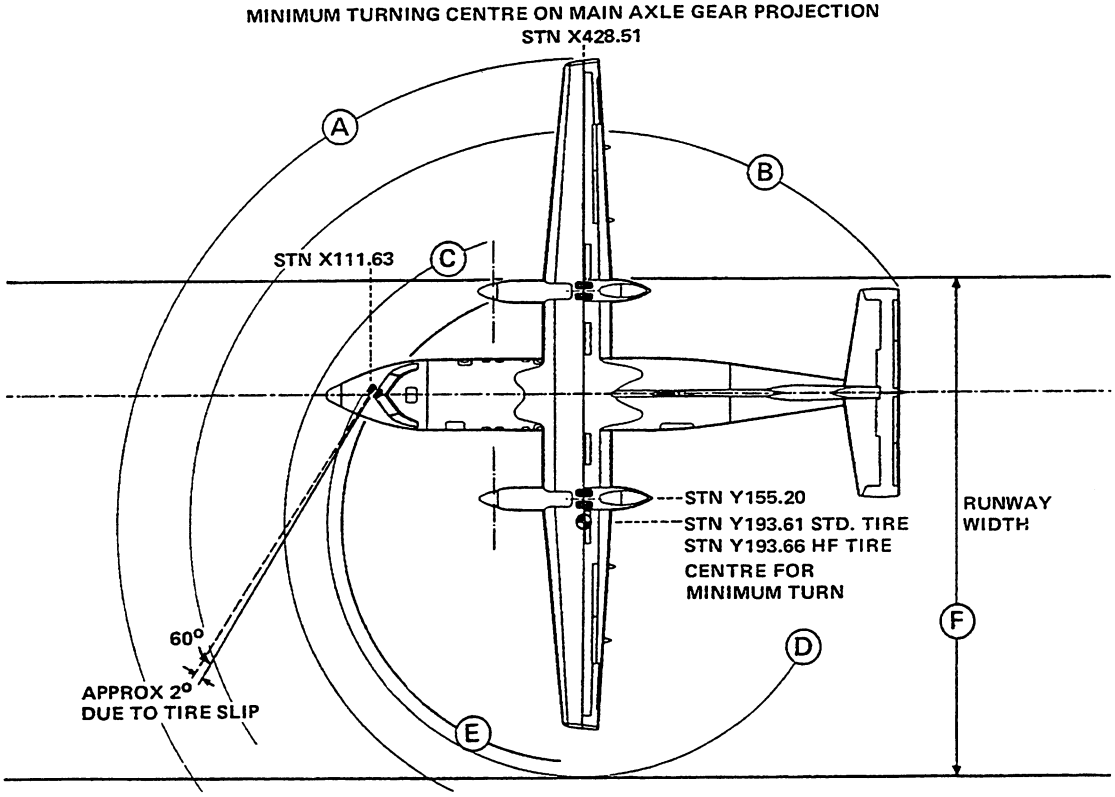
The use of a nose lift dolly as detailed in Figure 4–10 is not a procedure recommended by Bombardier. It should only be used when absolutely necessary for operational purposes. The use of a nose lift dolly is at the sole risk of the operator of the aircraft.



Note:
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

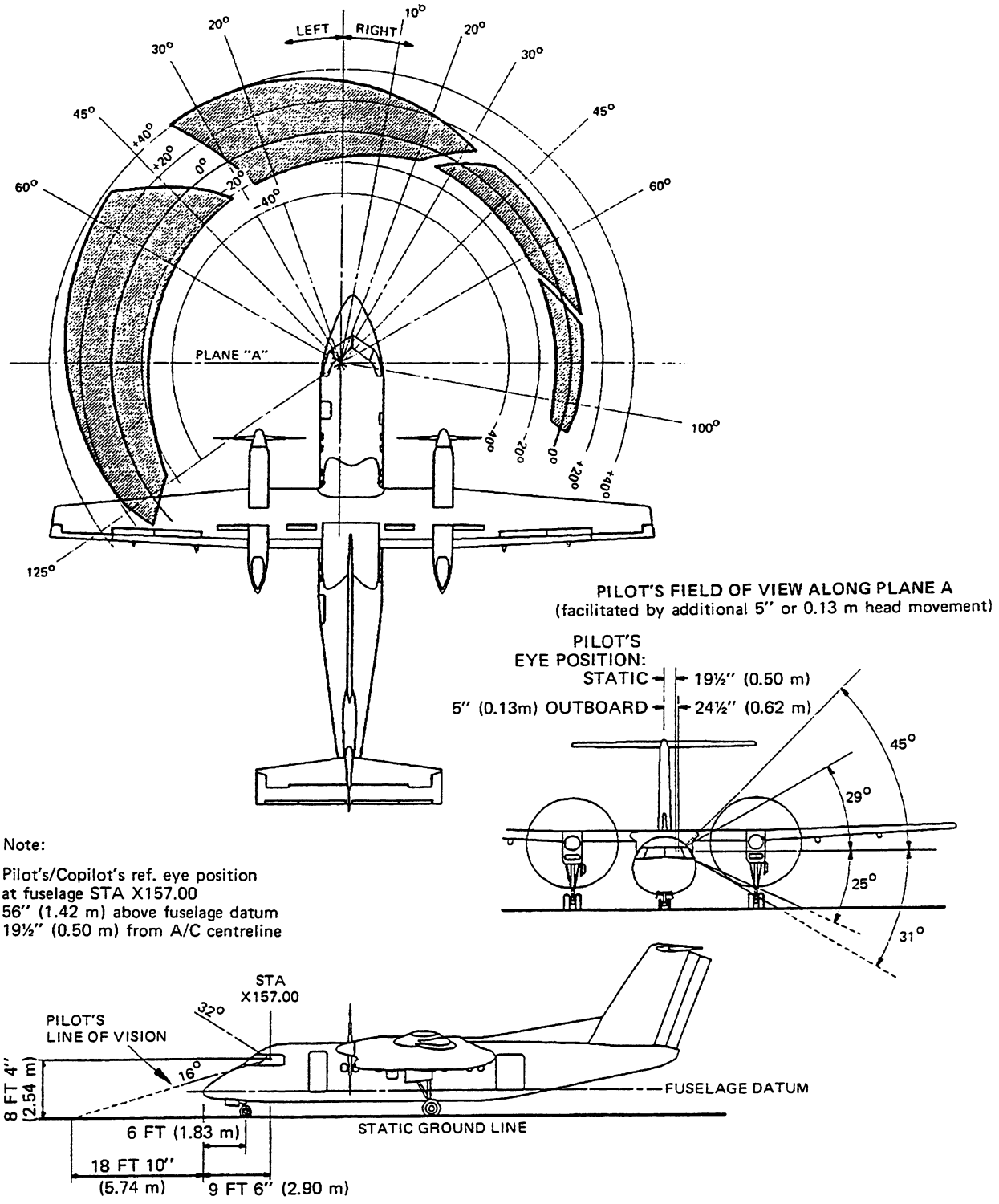


Figure 4–3 Visibility from Cockpit in Static Position

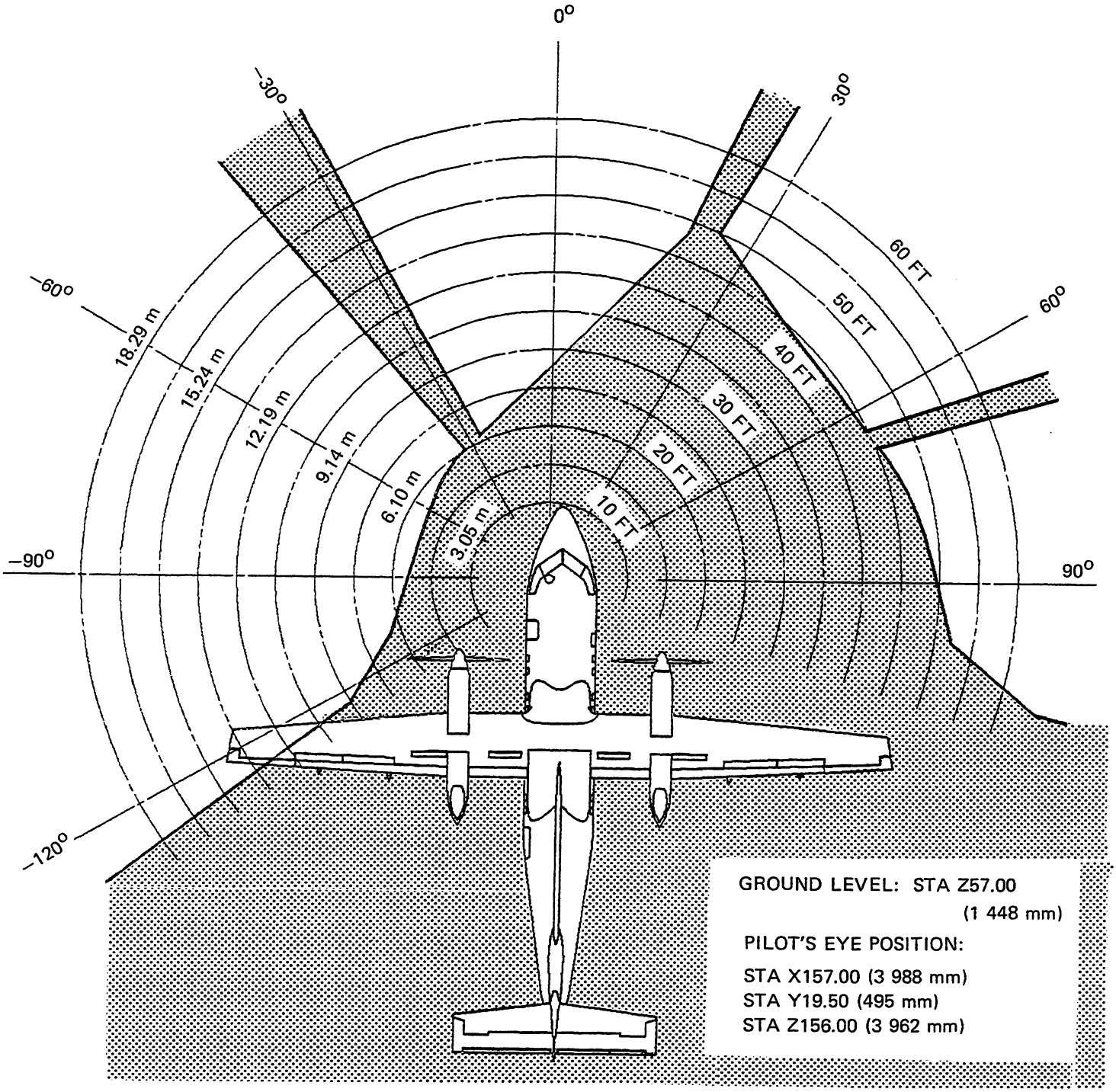


Figure 4–4 Ground Line Visibility from Cockpit, Static Position

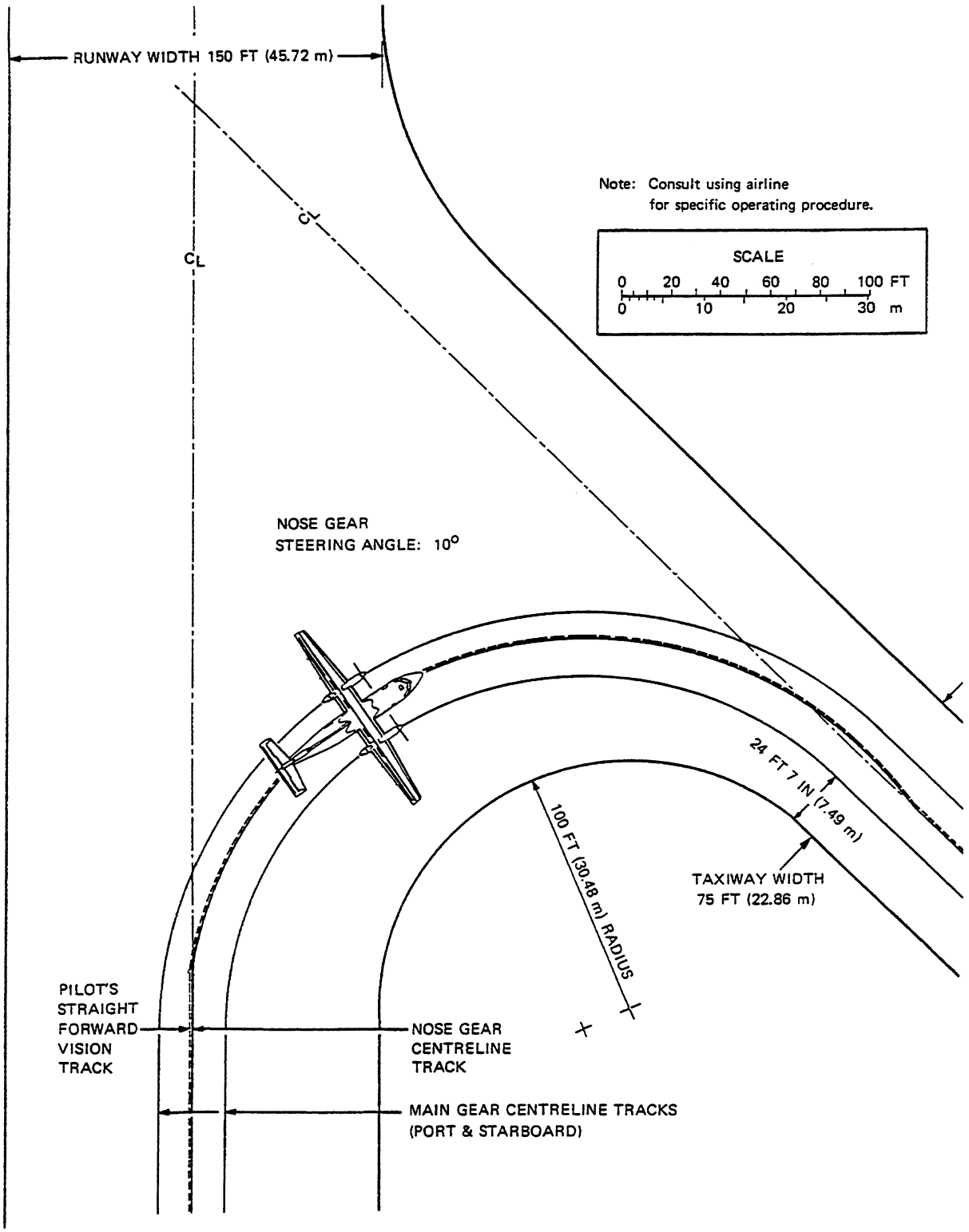


Figure 4–5 Greater Than 90° Turn – Runway to Taxiway with Nose Gear and Cockpit Tracks

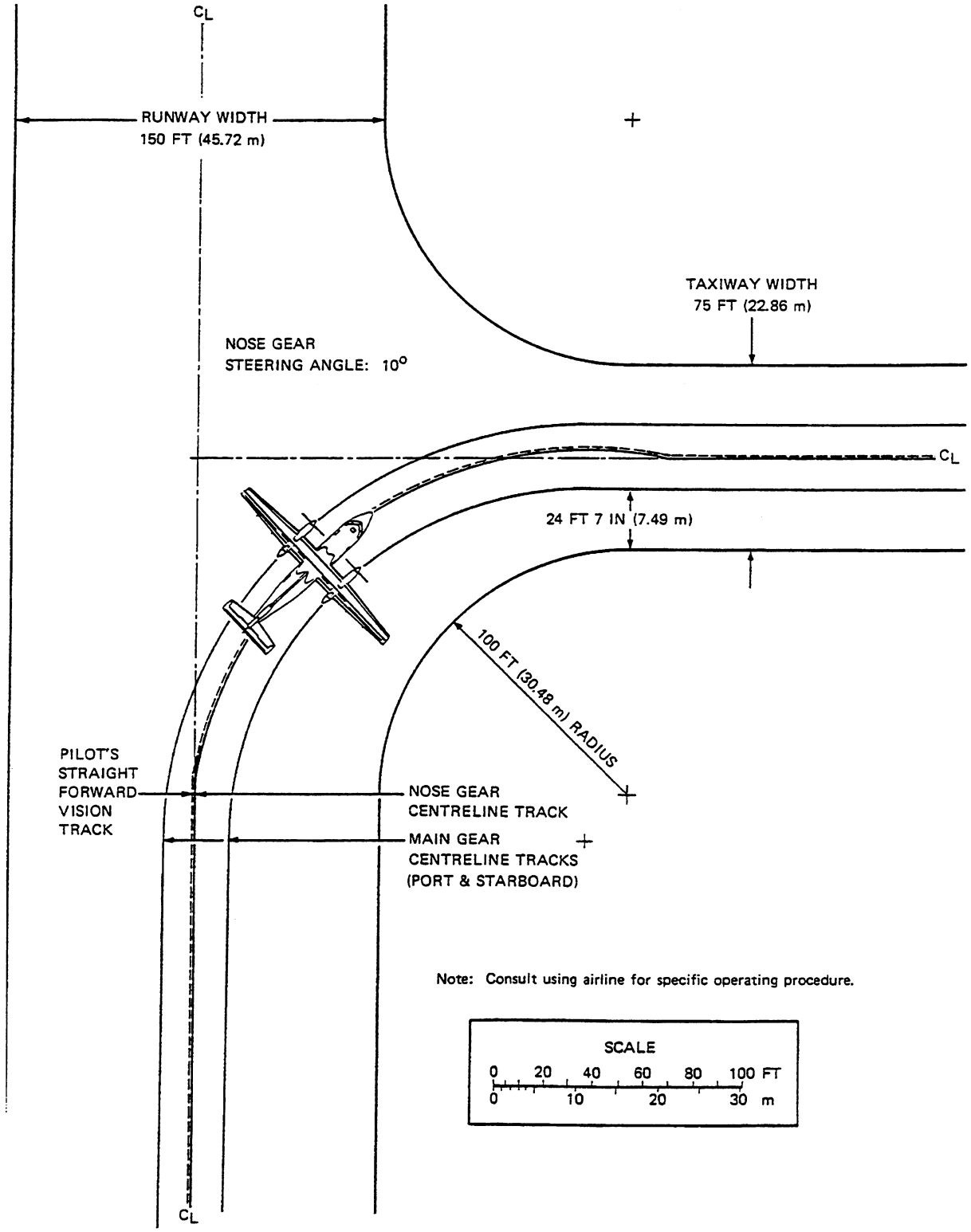


Figure 4–6 90° Turn–Runway to Taxiway with Nose Gear and Cockpit Tracks

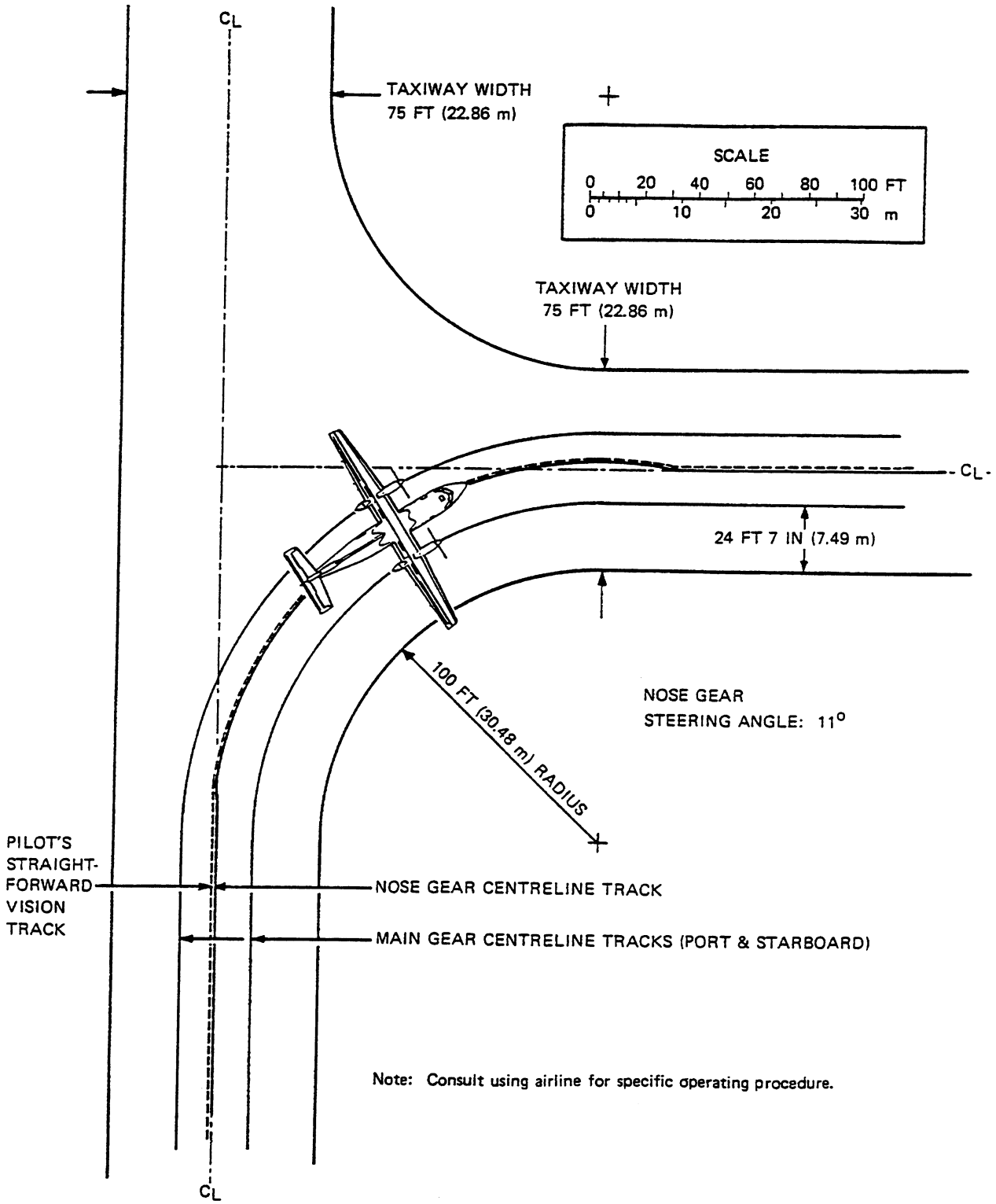


Figure 4–7 90° Turn–Taxiway to Taxiway with Nose Gear and Cockpit Tracks

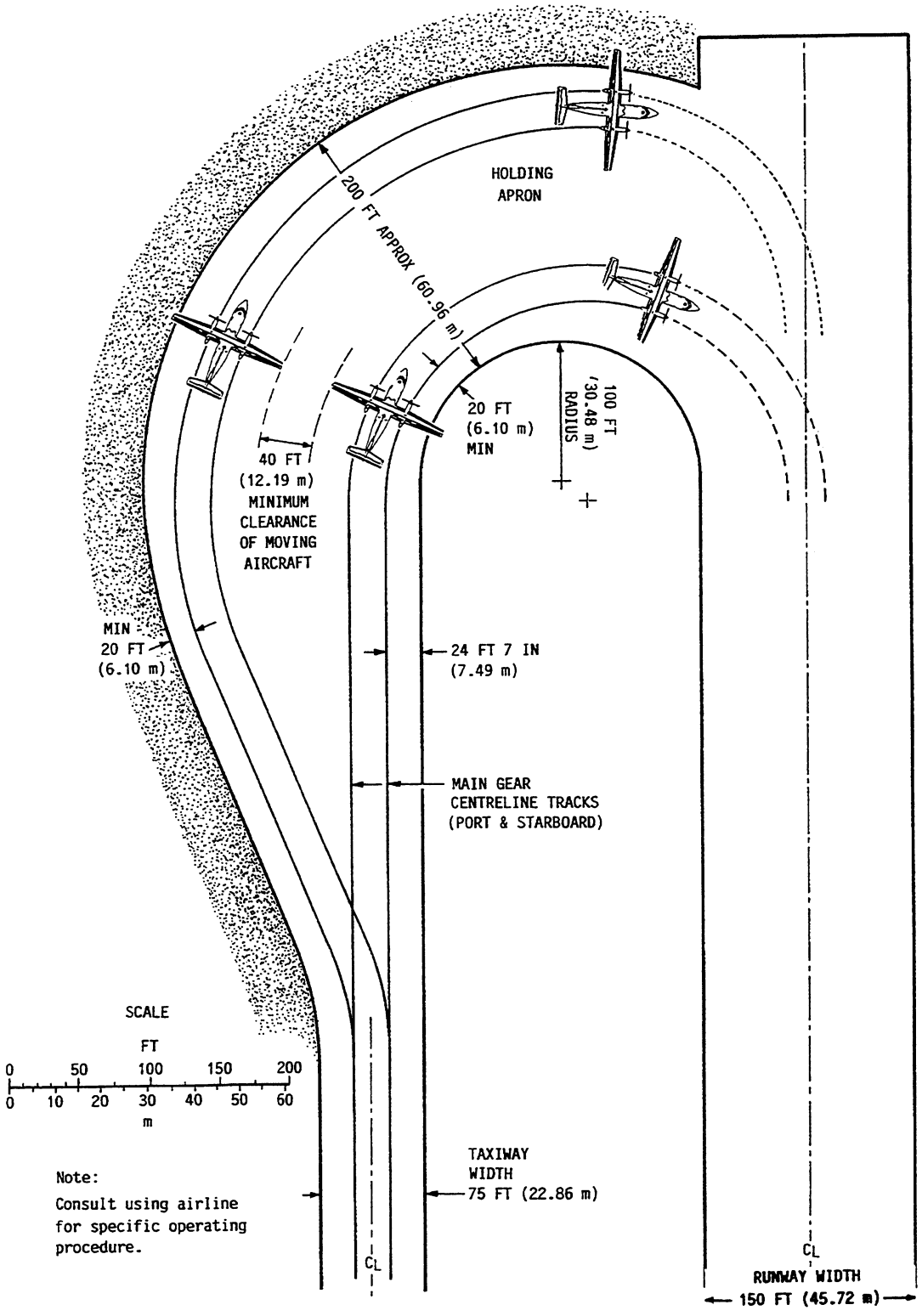
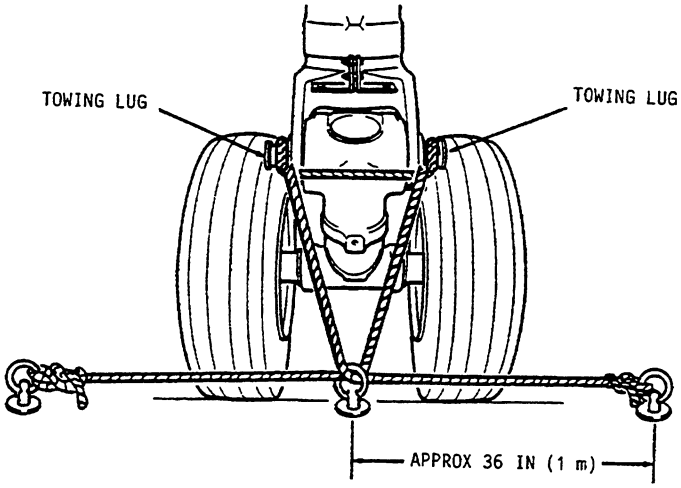


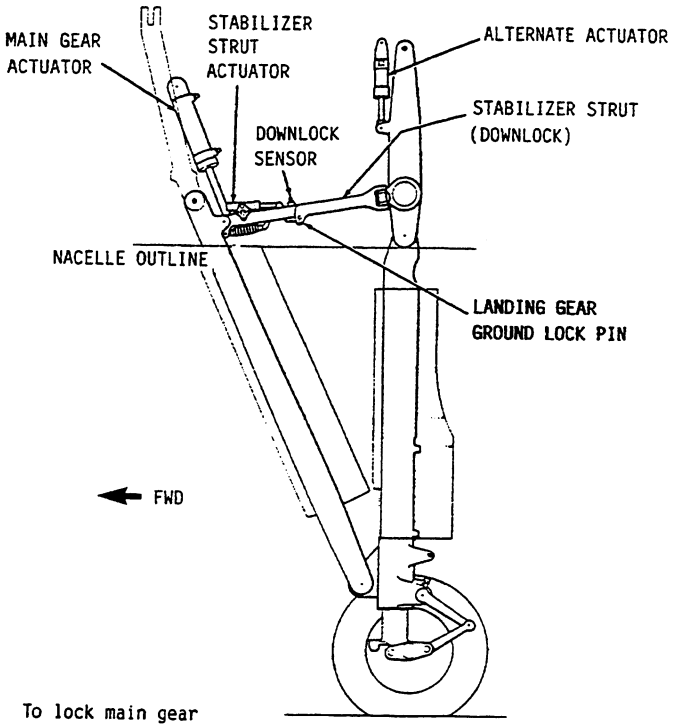
Figure 4–8 Runway Holding Bay (Apron)

PARKING & MOORING PROCEDURE

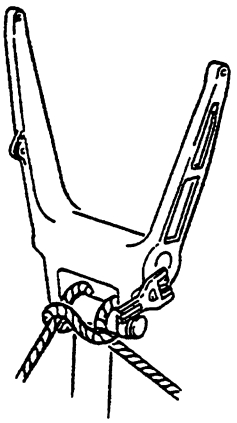
1. Park airplane heading into wind with flaps up and nose wheel centered.
2. Engage parking brake, check brake accumulator gauge and pump up as required.
3. Lock control surfaces.
4. Engage nose gear ground lock.
5. Install main gear ground lock pins (see illustration).
6. Install protective covers.
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

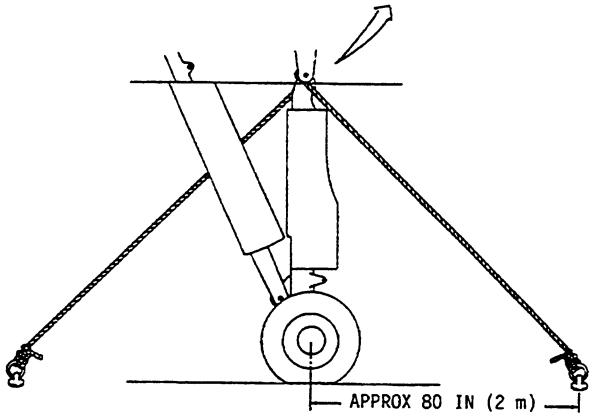
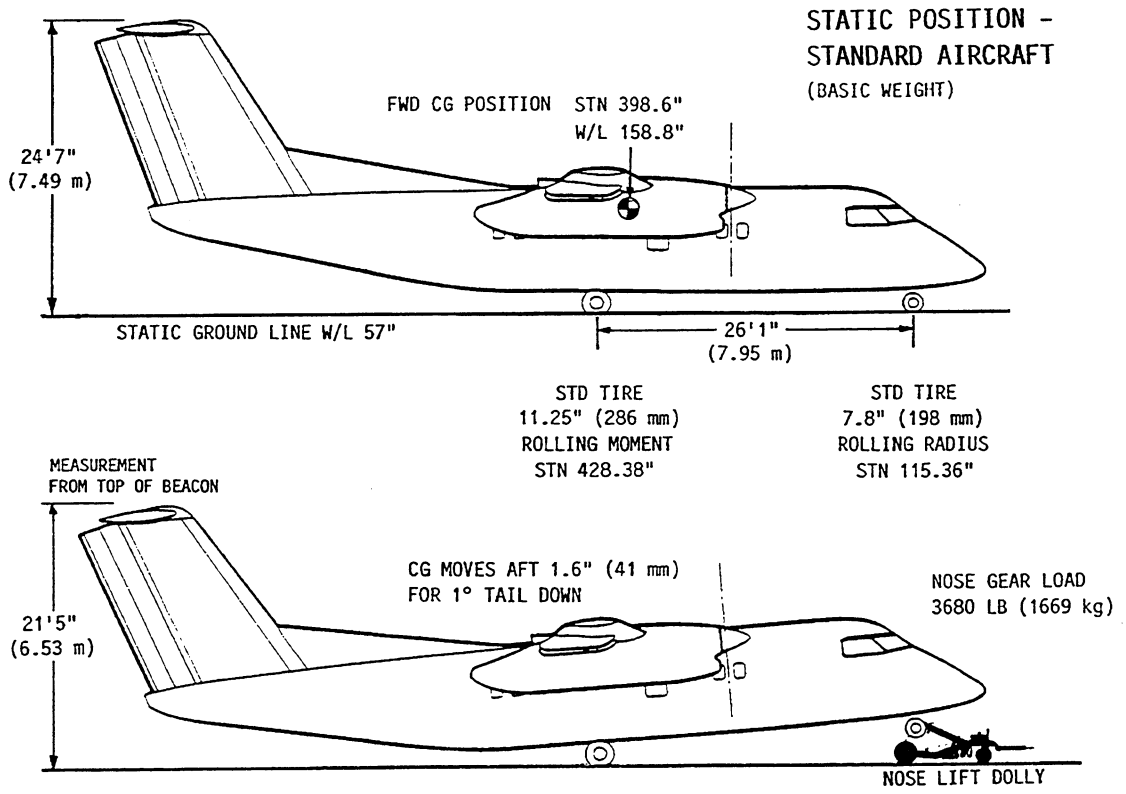
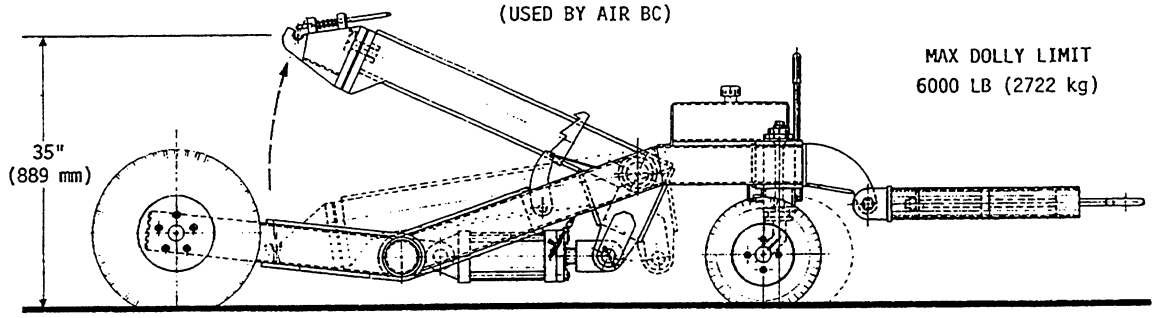


Figure 4–9 Parking and Mooring



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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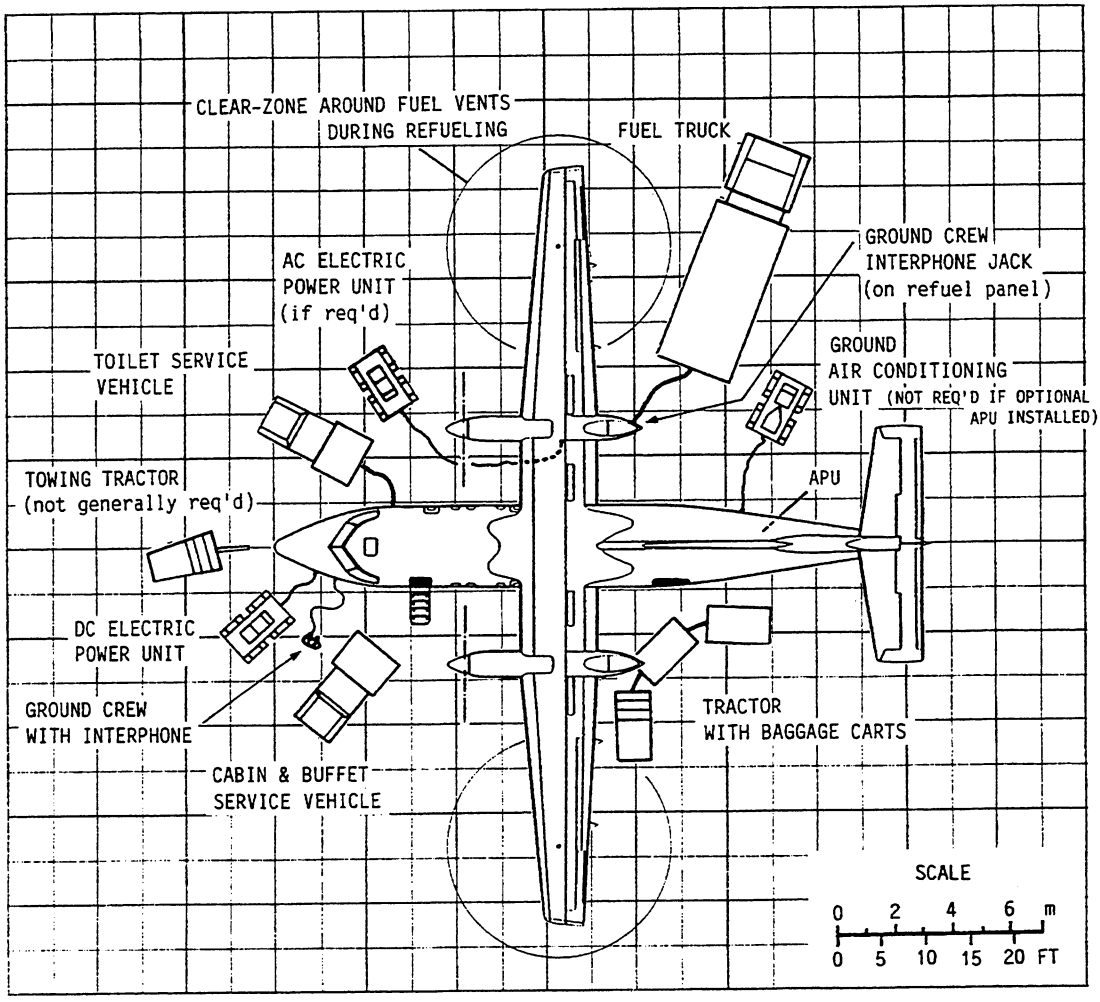
SECTION 5

TERMINAL SERVICING

ILLUSTRATIONS

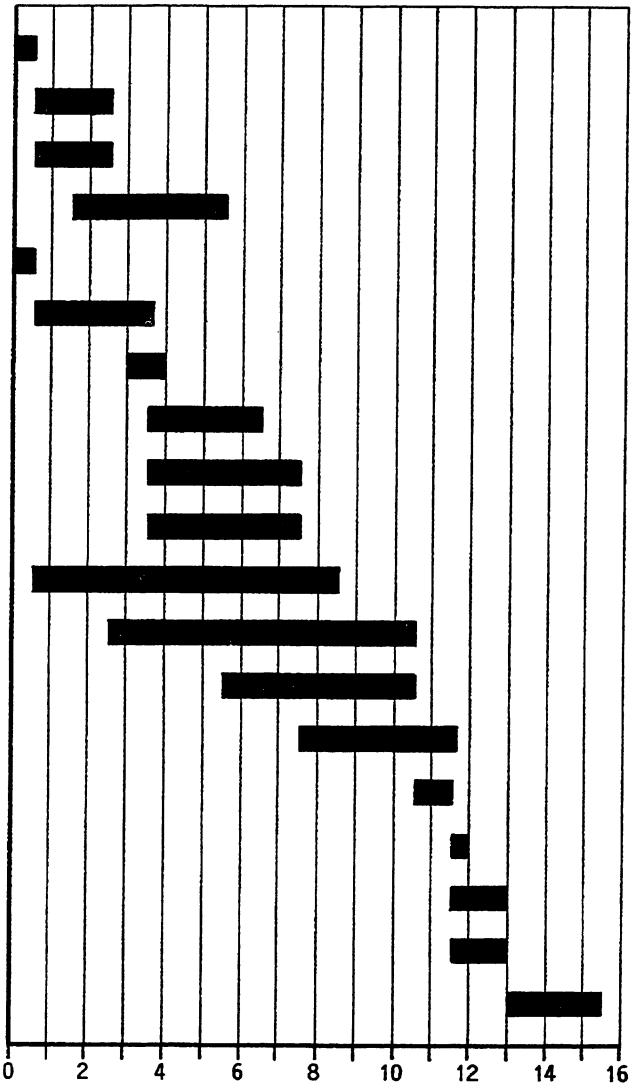
SECTION 5
TERMINAL SERVICING



SYSTEM	ADAPTER
PRESSURE REFUELING	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 IMPEDANCE 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



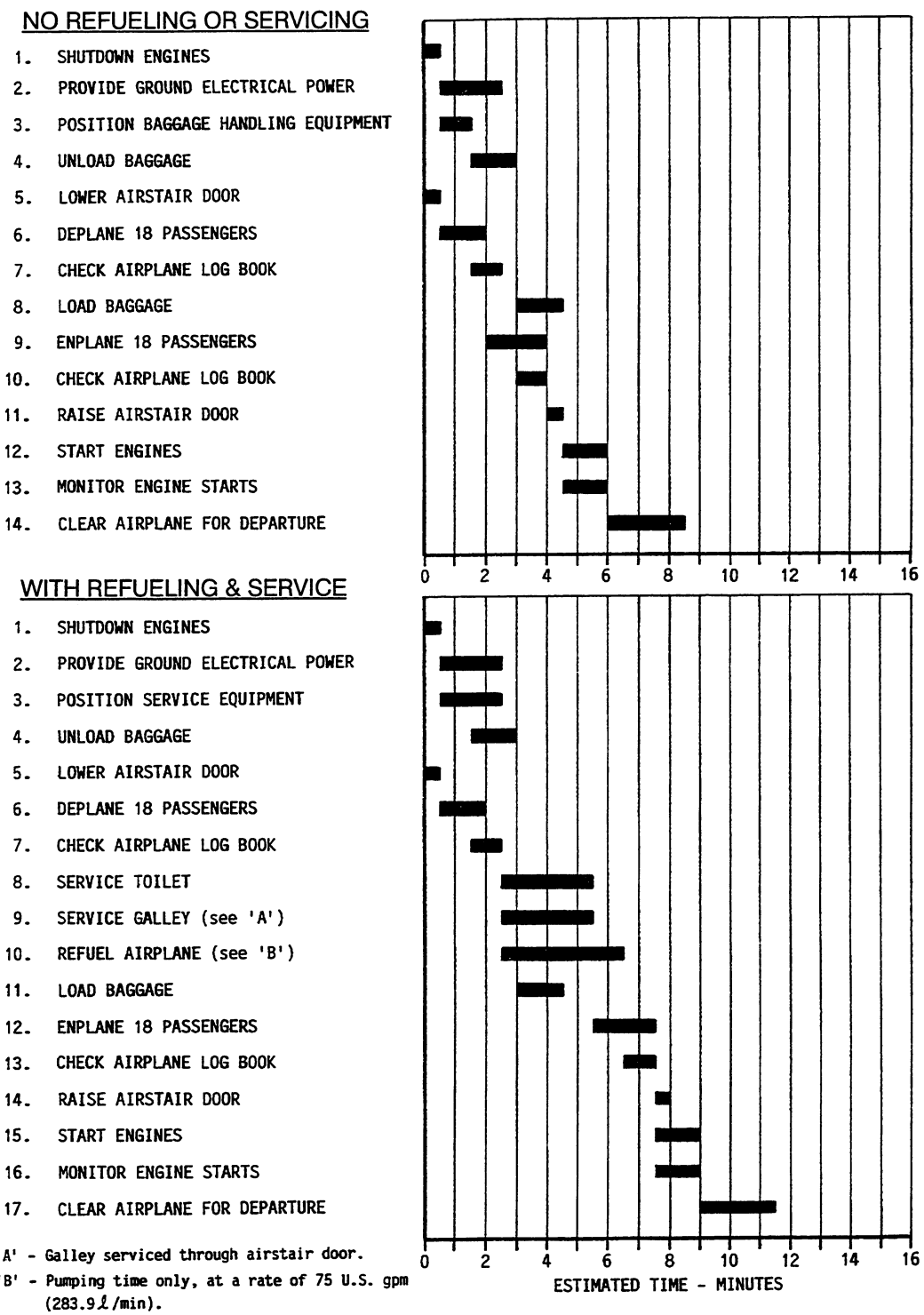
'A' - Galley and cabin serviced through airstair door.

'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)

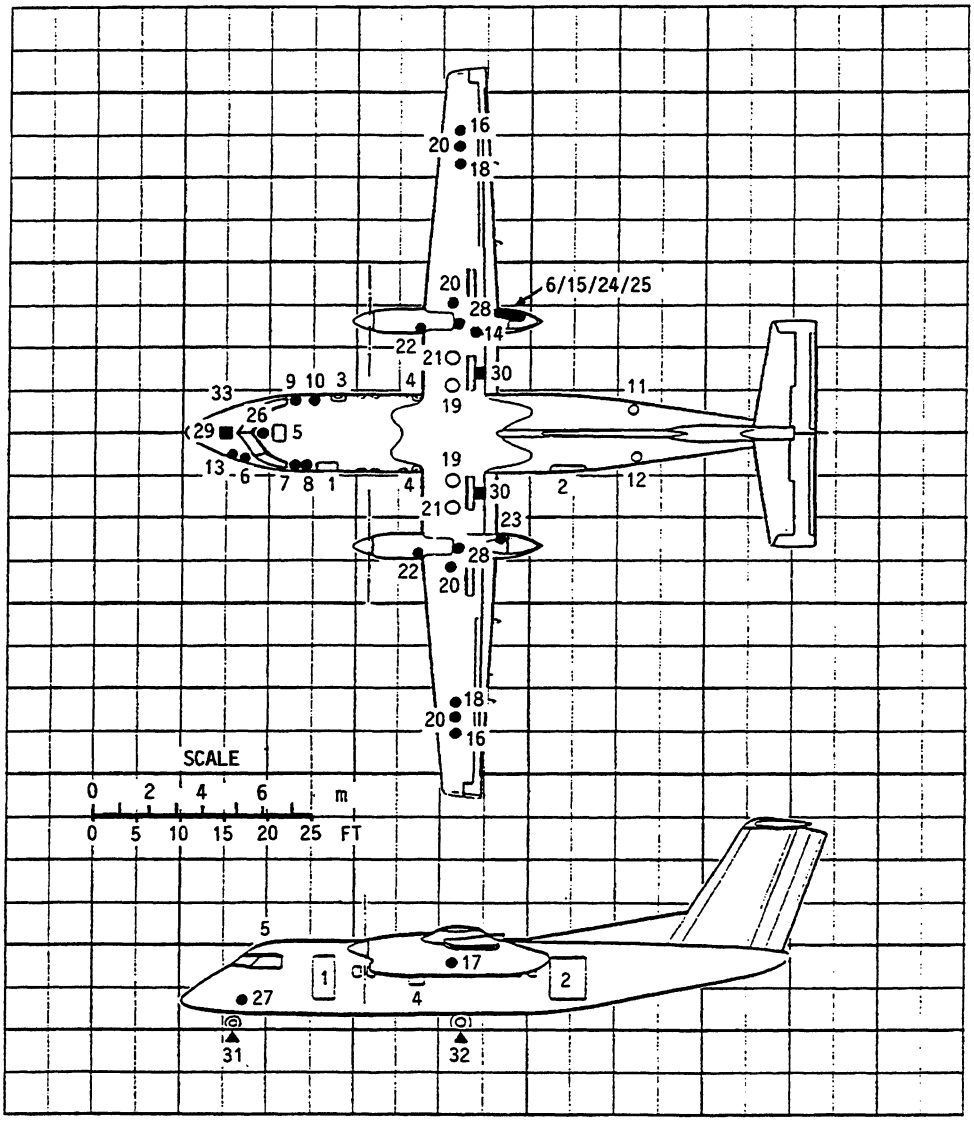


'A' - Galley serviced through airstair door.

'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 GALLEY 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.**

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)								
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
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
PARKING BRAKE ACCUMULATOR – CHARGED WITH 900–1000 psi (6205–6895 kPa) NITROGEN	34'5"	10.49	–	–	13'11"	4.24	6'11"	2.11

* **Dimensions are approximate and vary depending on airplane configuration and loading conditions.**

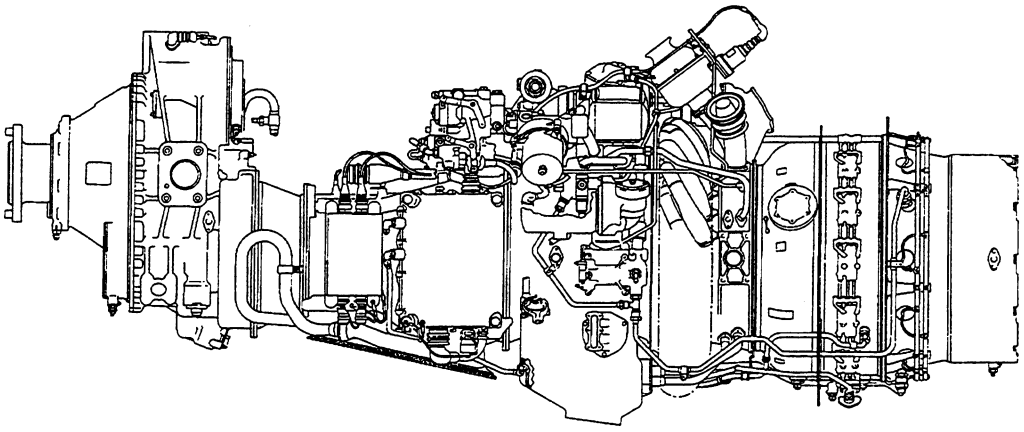
Figure 5–5 Ground Service Connection Data (Sheet 2 of 3)

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
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
POTABLE 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
LAVATORY 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.**

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

PW 123 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.

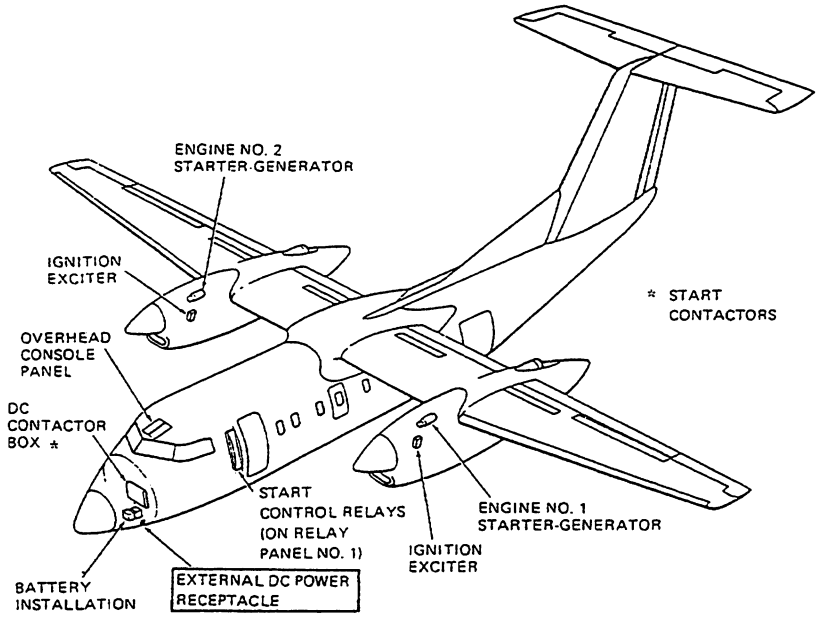


Figure 5–6 Engine Starting Electrical Requirements

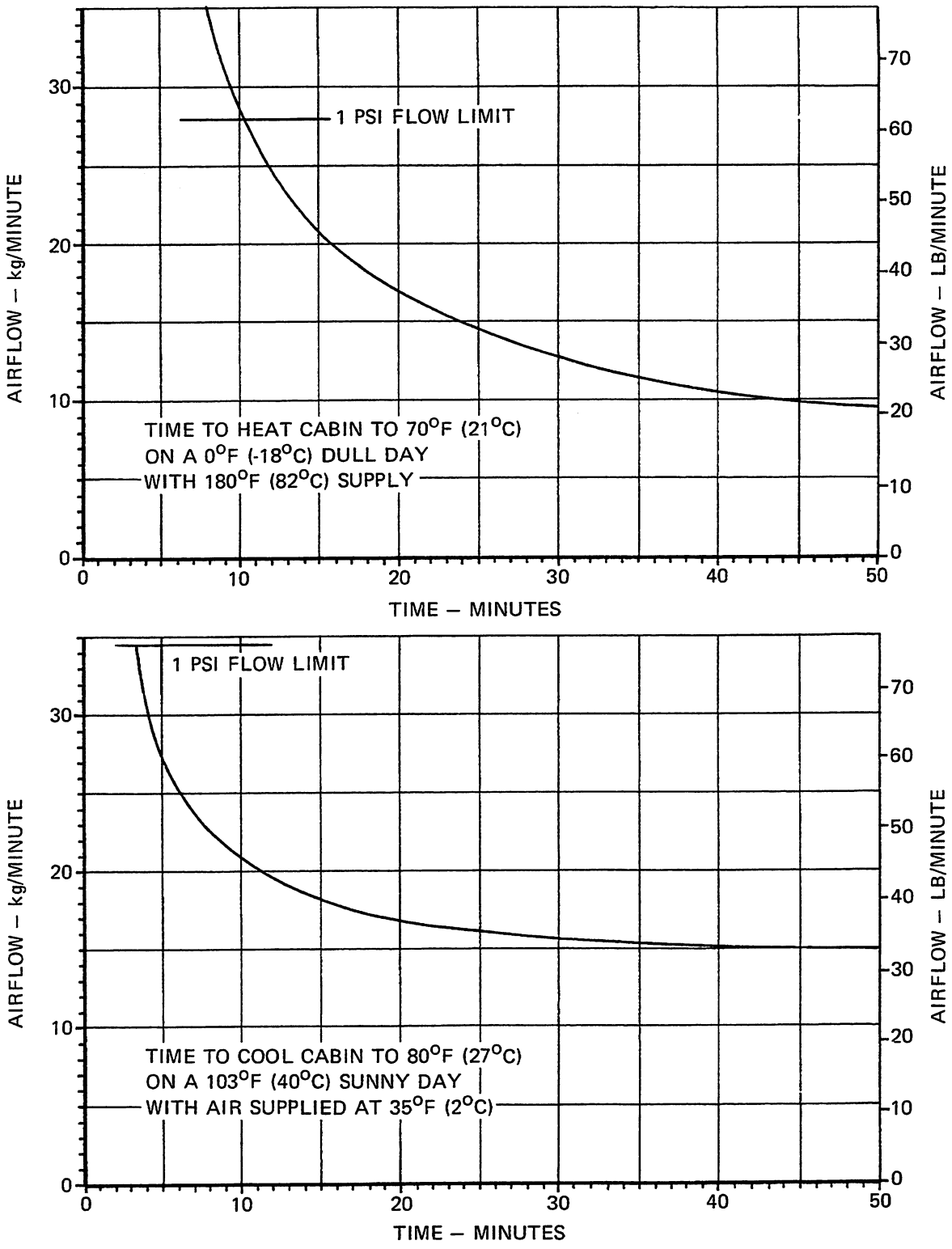


Figure 5–7 Ground Pneumatic Power Requirements – Heating and Cooling

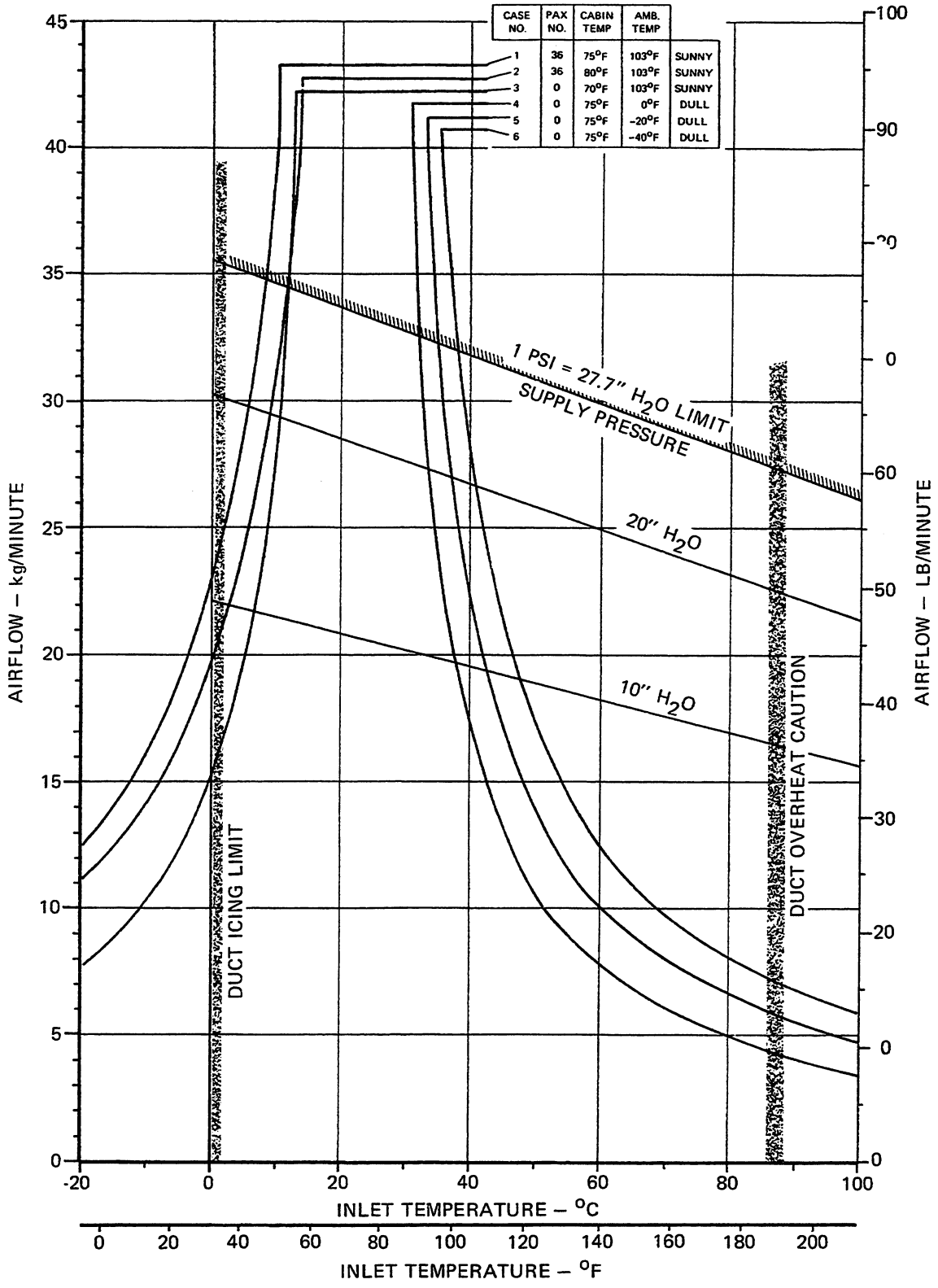
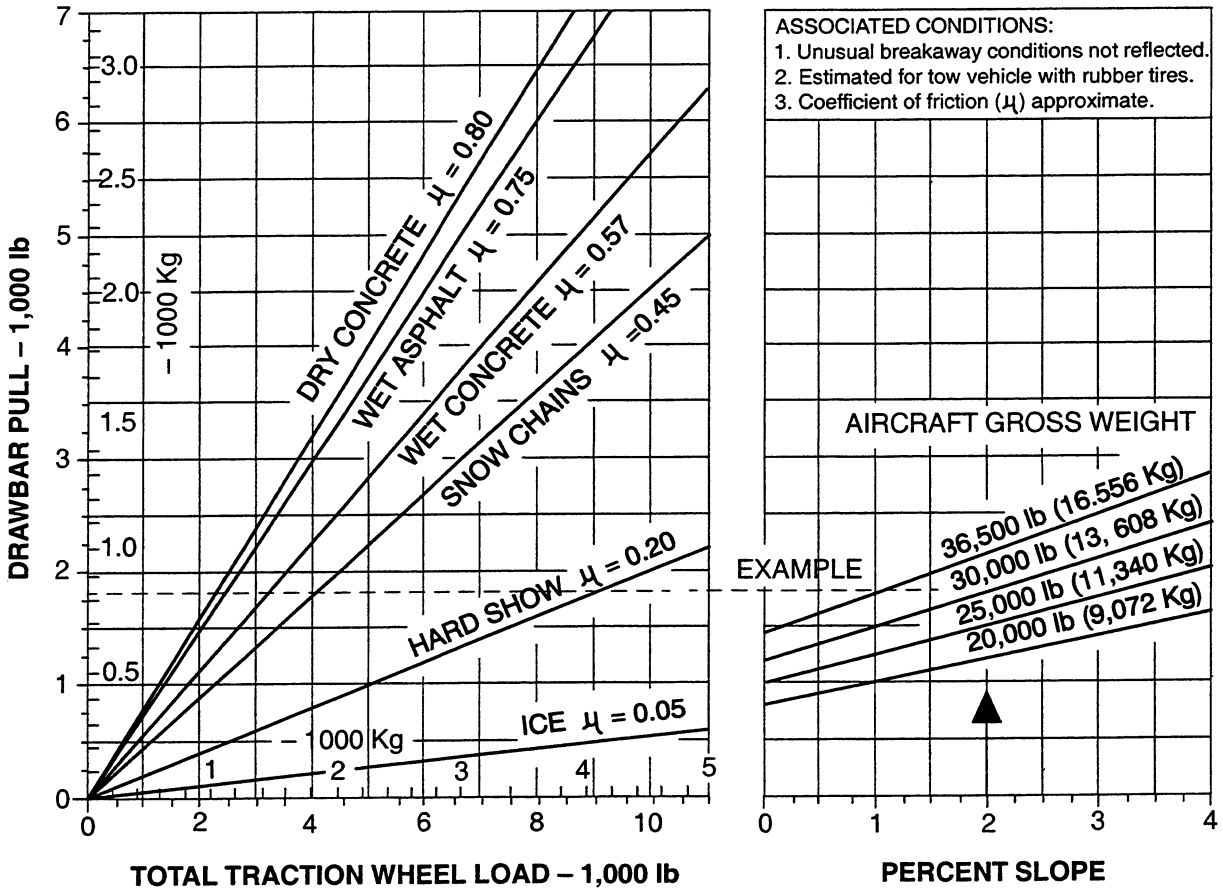


Figure 5–8 Ground Air Conditioning Requirements – Preconditioned Airplane

Drawbar pull and total traction wheel load may not 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 1,800 lb (817 Kg) and the total traction wheel load is 3,200 lb (1,452 Kg).

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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 important to airport and community planners. Although an airport is a major element in a community transportation system and is vital to its growth, it must also be accountable to the best interests of the neighborhood in which it is located. This can only be accomplished with proper planning. Because aircraft noise extends beyond the boundaries of the airport, it is vital to consider the impact on surrounding communities.

The Q200 (Model 201 and 202) 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.

To help the airport planner estimate the impact of the Q200 (Model 201 and 202) on airport operations, the following material is provided:

1. Data on the Exhaust Temperature Contours at Idle Power, Taxi Power and Take–Off Power setting are shown in Figure 6–1, Figure 6–2, and Figure 6–3.

2. Data on the Take–Off and Landing Noise Footprint (A–Level Contours) is shown in Figure 6–4.

3. Data on the optional APU for Exhaust Temperature and Distance Patterns is shown in Figure 6–5.

4. Data on the Optional APU – Exhaust A – Level Noise Contours is shown in Figure 6–6.

5. The Q200 (Model 201 and 202) complies with the Stage 3 noise–level limits under the trade–off clause specified in FAR 36, Section C36.5b and also under AWM 516 and JAR 36 standards. A summary of the certified noise levels, measured and corrected to these standards, is shown in the following table:

	FAR 36 Limit Stage 3 (EPNdB)	DHC–8 Noise Level (EPNdB)
Take–off (Flap 5°; 36,300 lbs)	89	80.5
Sideline (Flap 5°)	94	85.6
Approach (Flap 35°; 34,500 lbs)	98	94.7

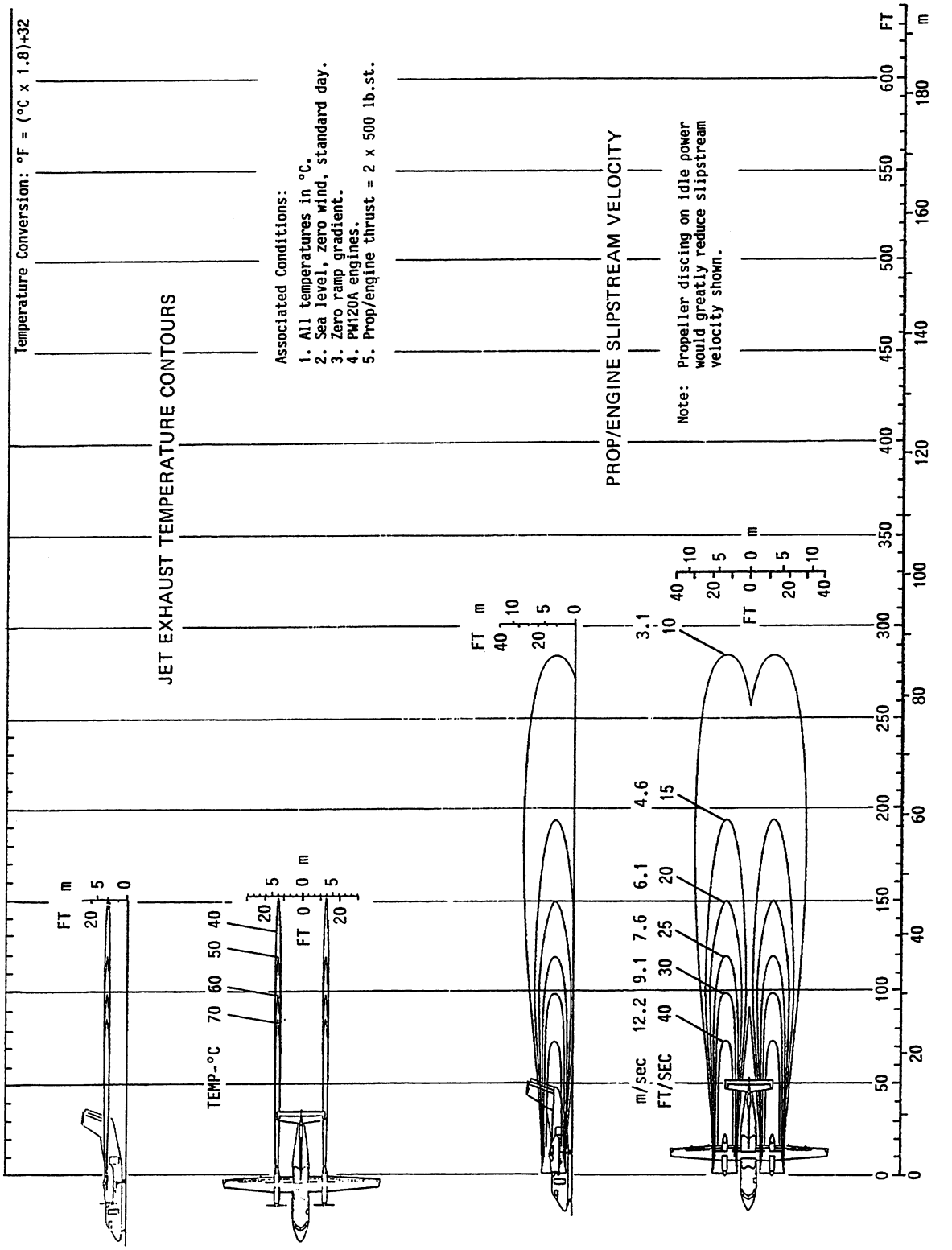

Figure 6–1 Jet Engine Exhaust Temperature and Prop/Engine Slipstream Velocity Contours – Idle Power

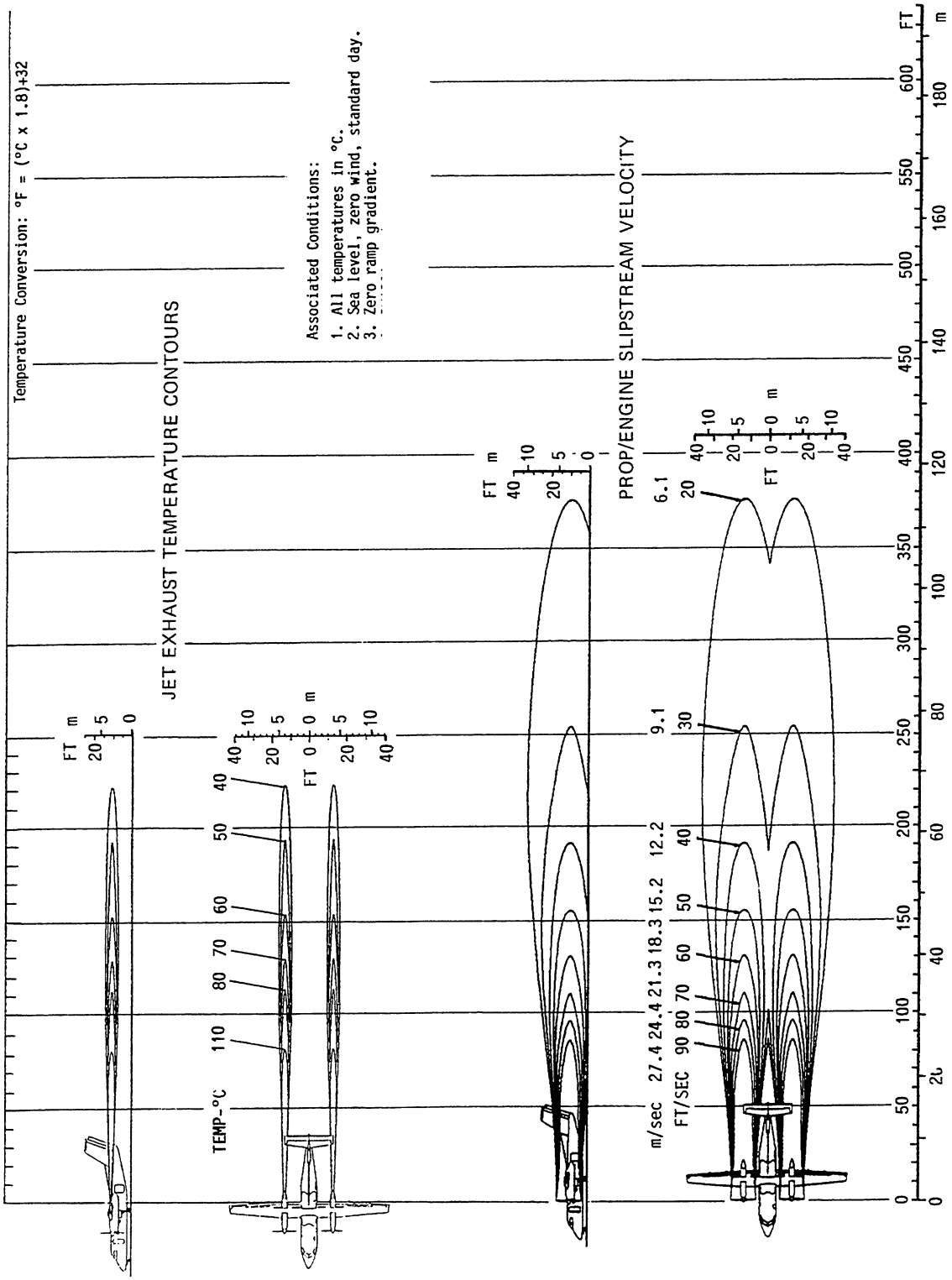

Figure 6–2 Jet Engine Exhaust Temperature and Prop/Engine Slipstream Velocity Contours – Taxi Power

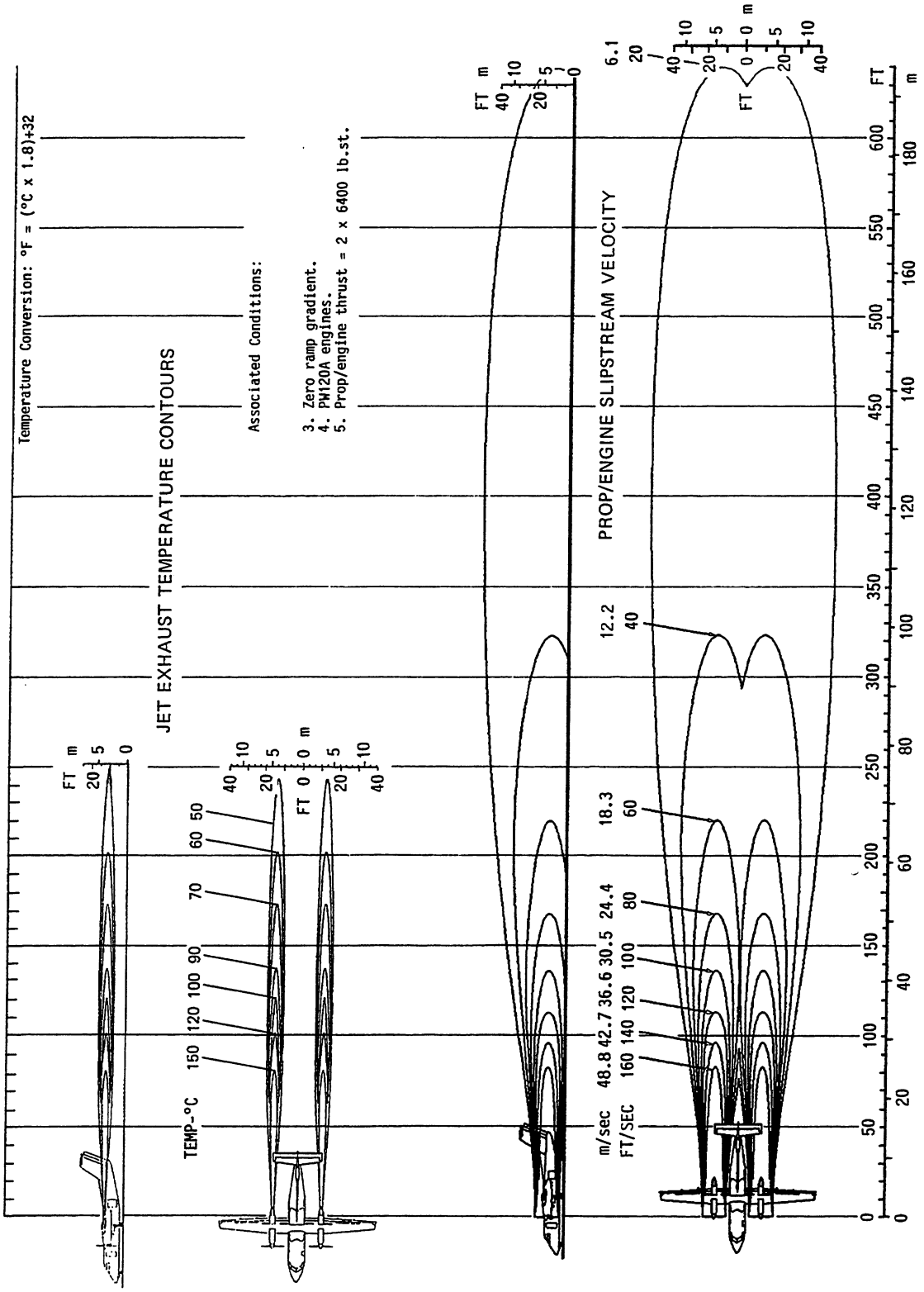

Figure 6–3 Jet Engine Exhaust Temperature and Prop/Engine Slipstream Velocity Contours – Take–Off Power

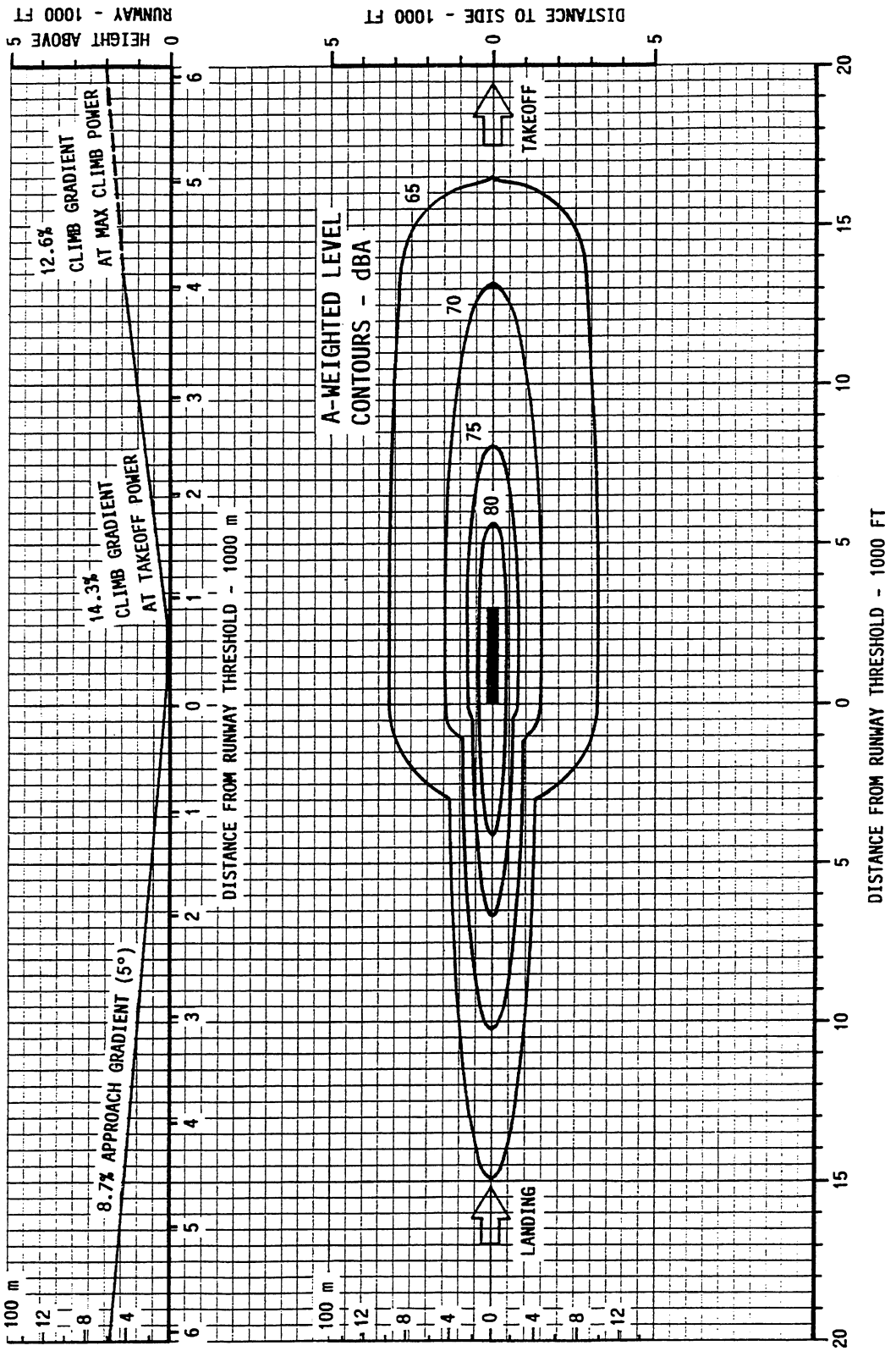

Figure 6–4 Take–Off and Landing Noise Footprint (A–Level Contours)

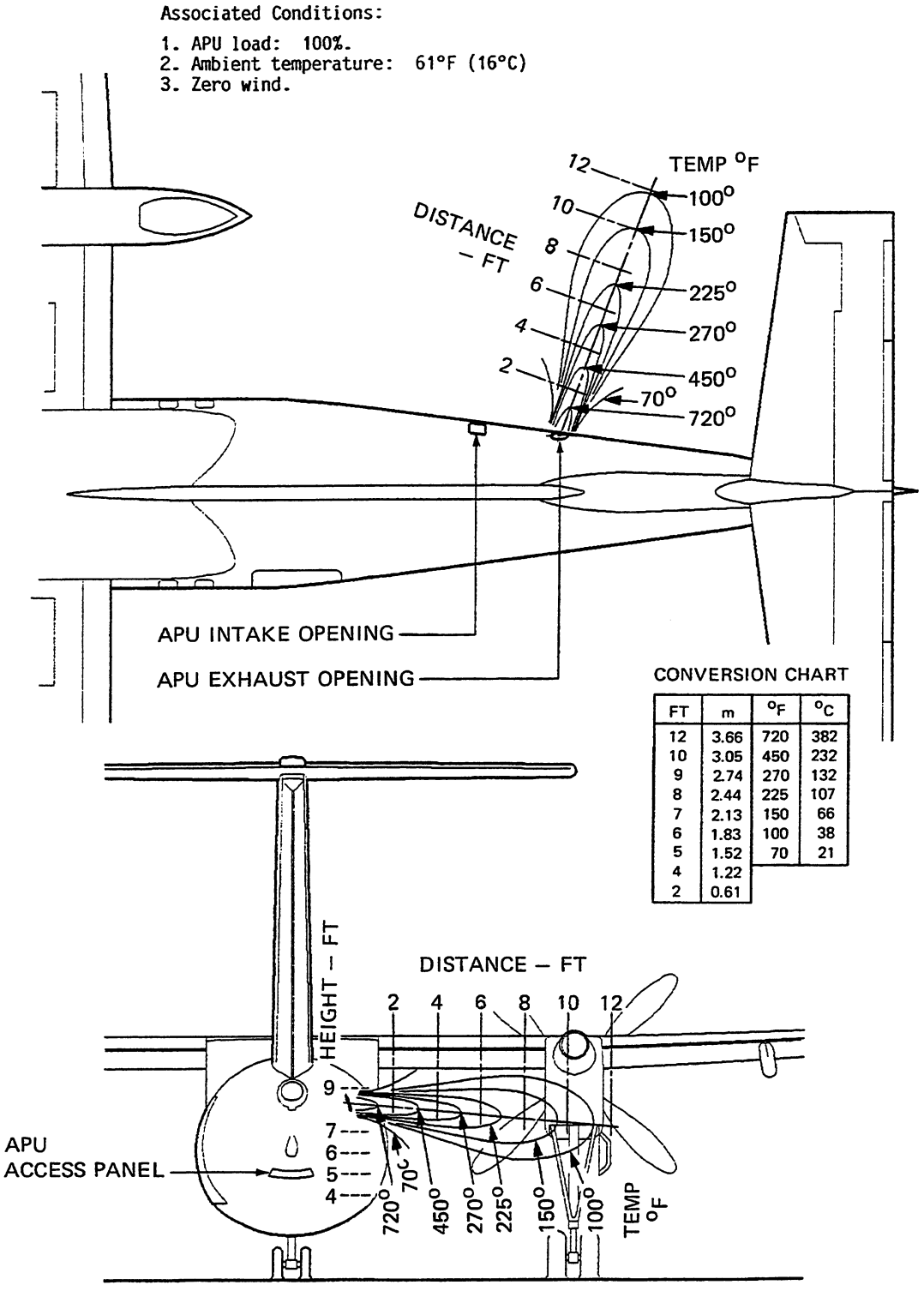

Figure 6–5 Optional APU – Exhaust Temperature and Distance Pattern

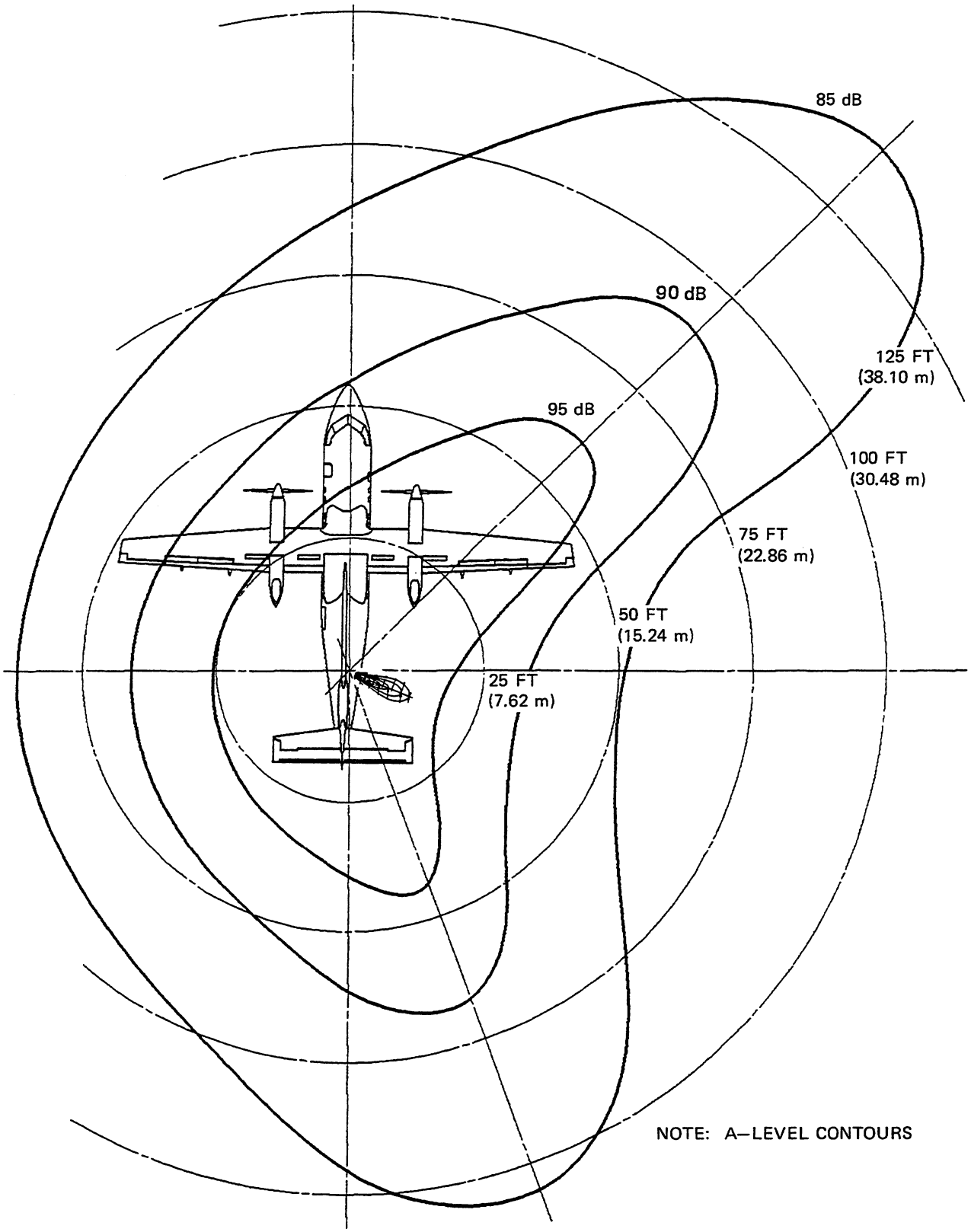

Figure 6–6 Optional APU – Exhaust A–Level Noise Contours

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SECTION 7
PAVEMENT DATA

ILLUSTRATIONS

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.

1. Basic data on the landing–gear footprint configuration, maximum–design taxi loads, and tire sizes and pressures are shown in Figure 7–1.
2. Maximum pavement loads for certain critical conditions at the tire–ground interfaces are shown in Figure 7–2.
3. Landing gear loading on pavement for aircraft weights and position of Percent MAC (Mean Aerodynamic Chord) are shown in Figure 7–3.
4. The California Bearing Ratio (CBR) for unlimited commercial use at all aircraft weights is shown in Figure 7–4.
5. The minimum Load Classification Number (LCN) for flexible and rigid pavement are shown in Figure 7–5 through Figure 7–8.

Make sure that all runways or pavements to be used meet these minimum CBR, LCN and ACN requirements.

LANDING GEAR FOOTPRINT DATA	
MAXIMUM DESIGN TAXI WEIGHT	36,500 lb (16,556 Kg)
PERCENT OF WEIGHT ON MAIN GEAR	(See Figure 7–3)
NOSE GEAR TIRE SIZE / PRESSURE	18 X 5.50–8 99 psi (loaded)
MAIN GEAR TIRE SIZE / PRESSURE	31 X 9.75–13 92 psi (loaded)

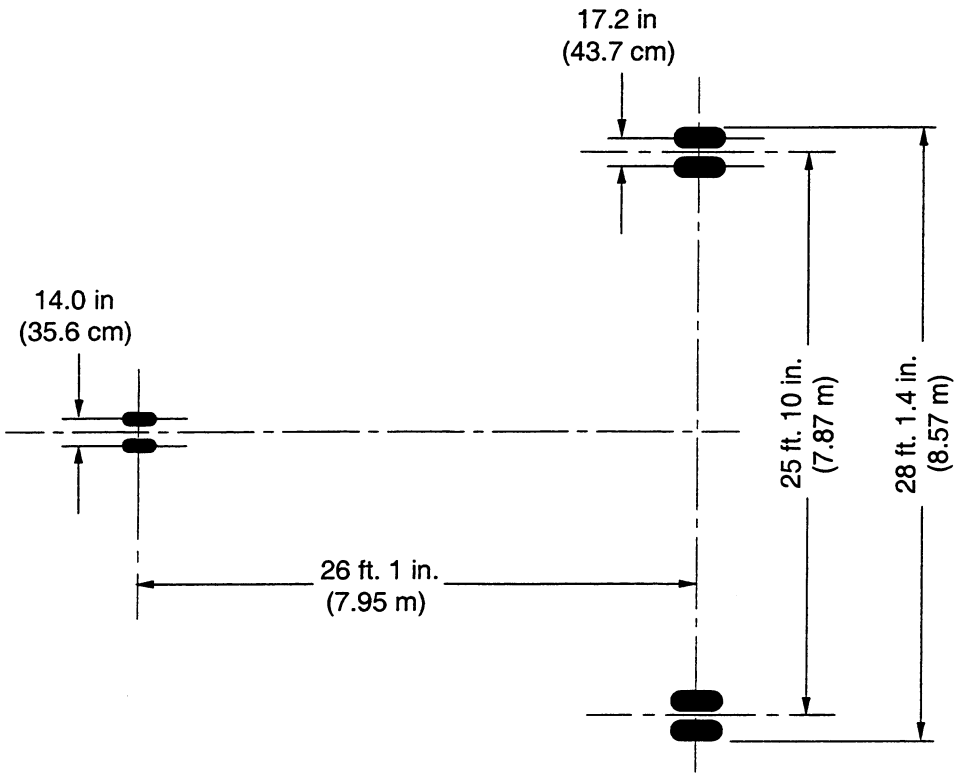
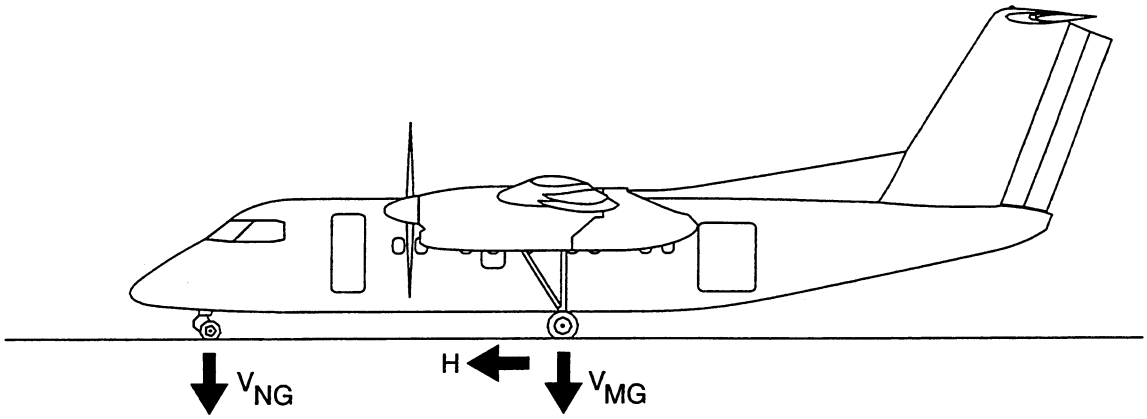


Figure 7–1 Landing Gear Footprint



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.

		V_{NG} AT FORWARD CG		V_{MG} (PER STRUT)	H (PER STRUT)	
TAXI WEIGHT		STATIC	STATIC + BRAKING @ 10 FT/SEC^2 (3.05 m/SEC^2) DECEL.	MAXIMUM LOAD OCCURRING AT STATIC AFT CG	AT STEADY BRAKING OF @ 10 FT/SEC^2 (3.05 m/SEC^2) DECEL. (1)	AT INSTANTANEOUS BRAKING COEFF OF FRICTION 0.8 (2)
LB	36,500	4,435	8,417	17,046	5,294	13,637
Kg	16,556	2,012	3,818	7,732	2,401	6,186

NOTES
1. Maximum main gear horizontal force excludes alleviating effect of nose gear rolling friction.
2. Instantaneous braking applied during a steady braking run.

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Figure 7–2 Maximum Pavement Loads

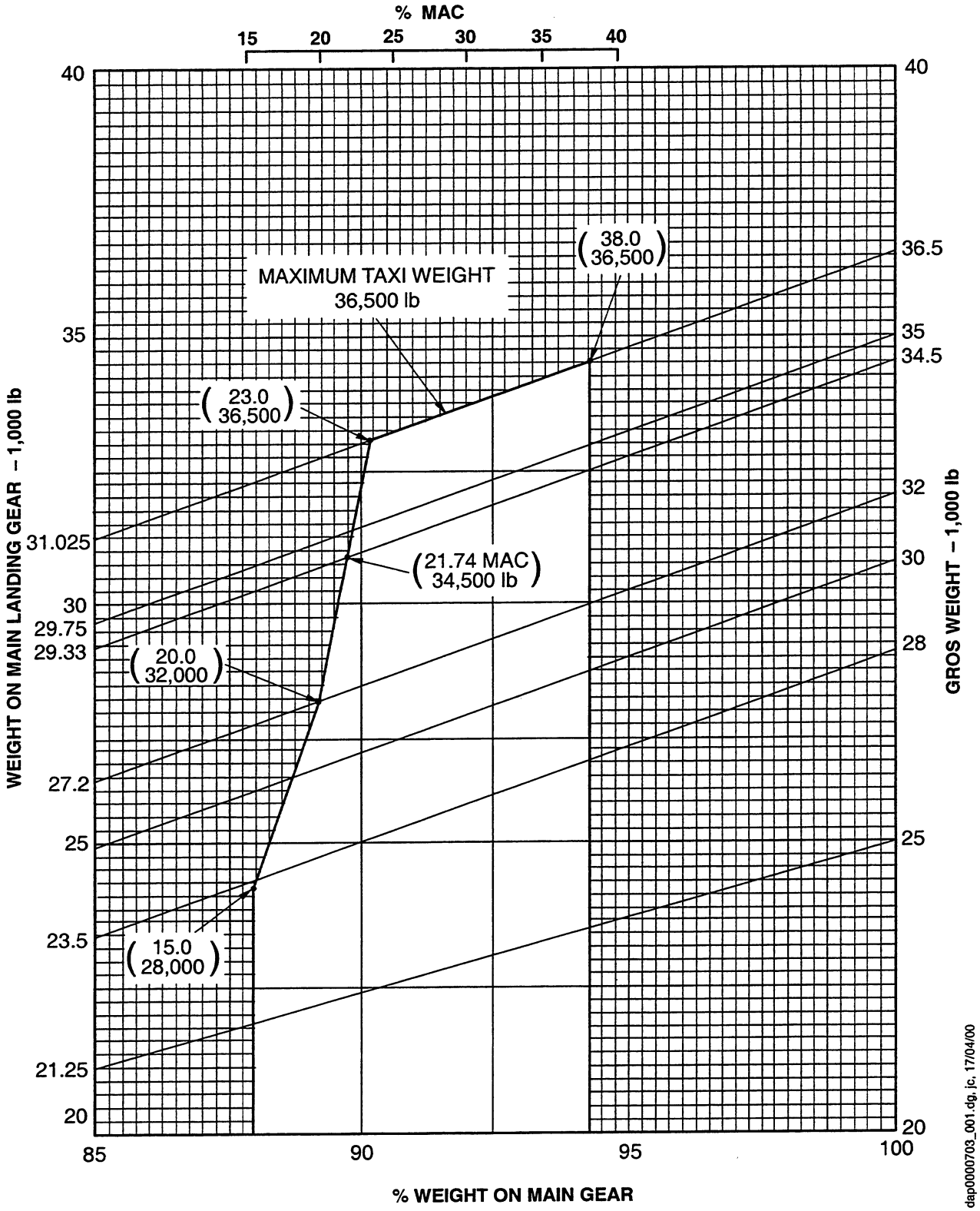
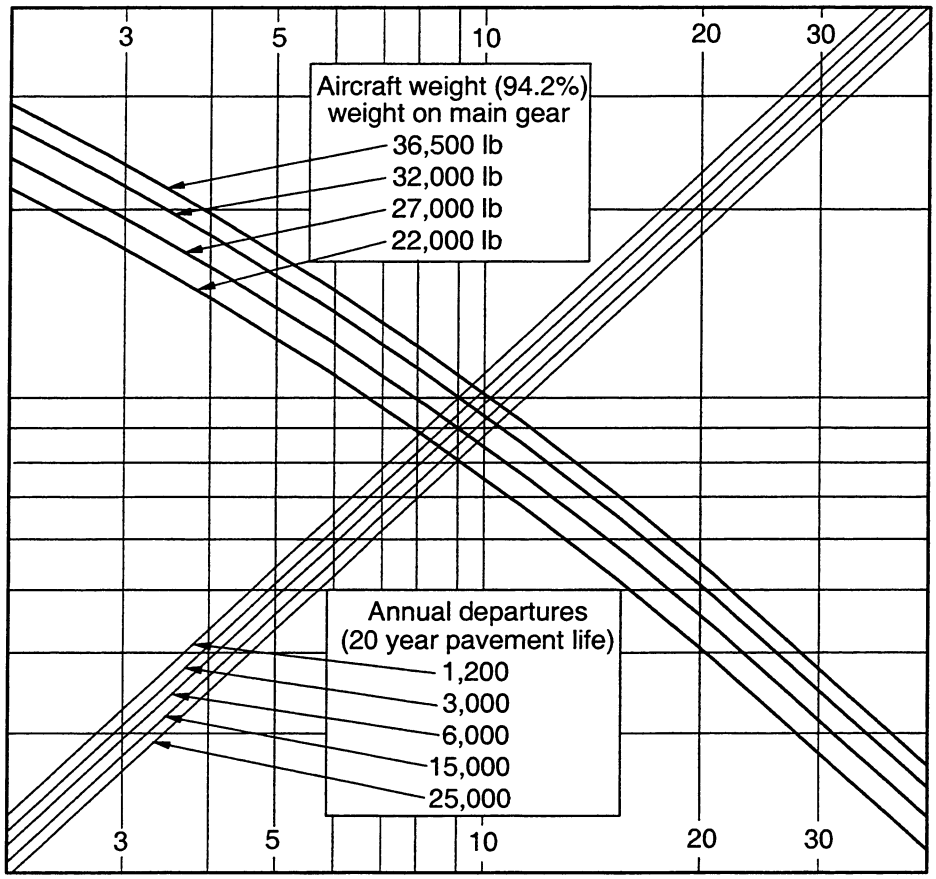


Figure 7–3 Landing Gear Loading on Pavement

31 X 9.75–13 main tire at 92 psi (loaded)

CALIFORNIA BEARING RATIO (CBR)



FLEXIBLE PAVEMENT THICKNESS (inches)

Flexible Pavement Requirements – US Army Corps of Engineers Design Method (S–77–1) and FAA Design Method

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

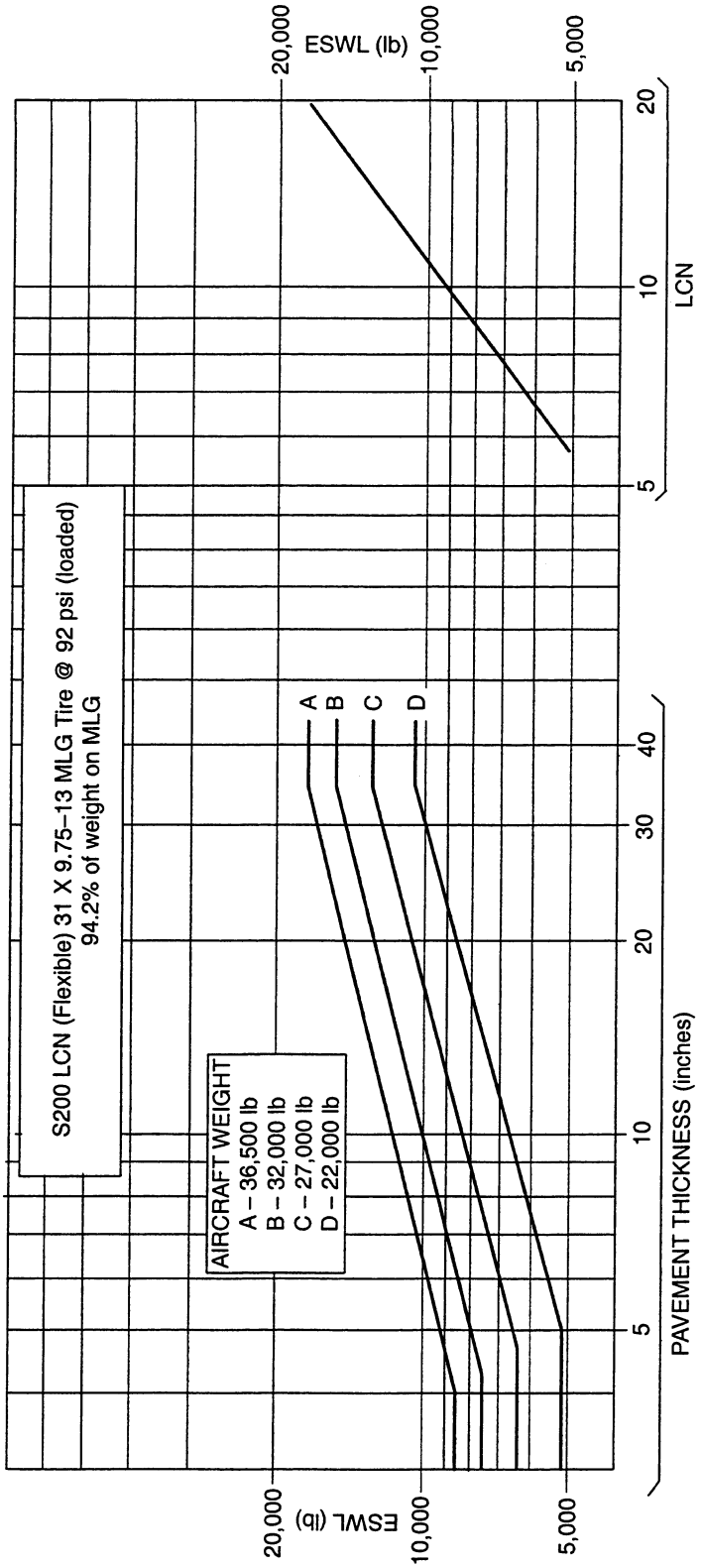

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Figure 7–5 Flexible Pavement Requirements – LCN Conversion

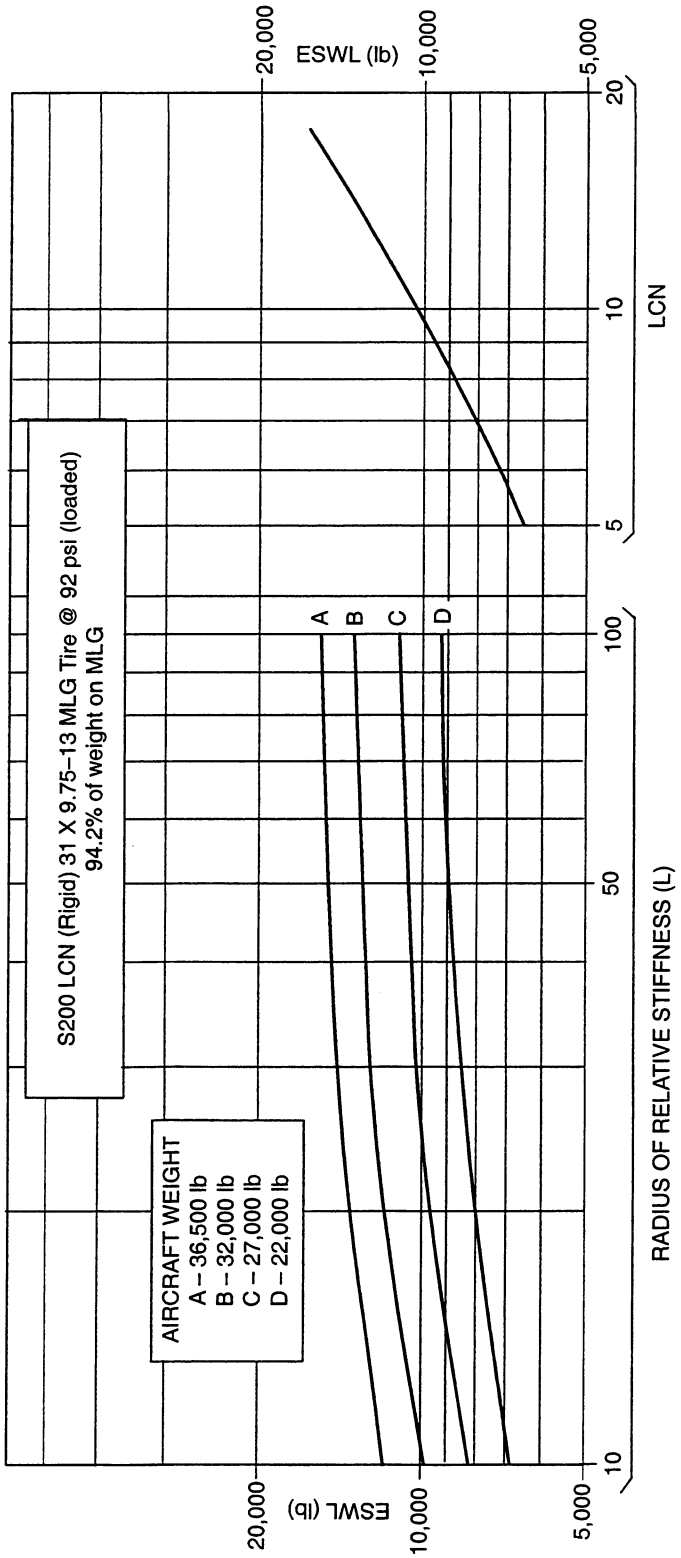

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Figure 7–6 Rigid Pavement Requirements – LCN Conversion

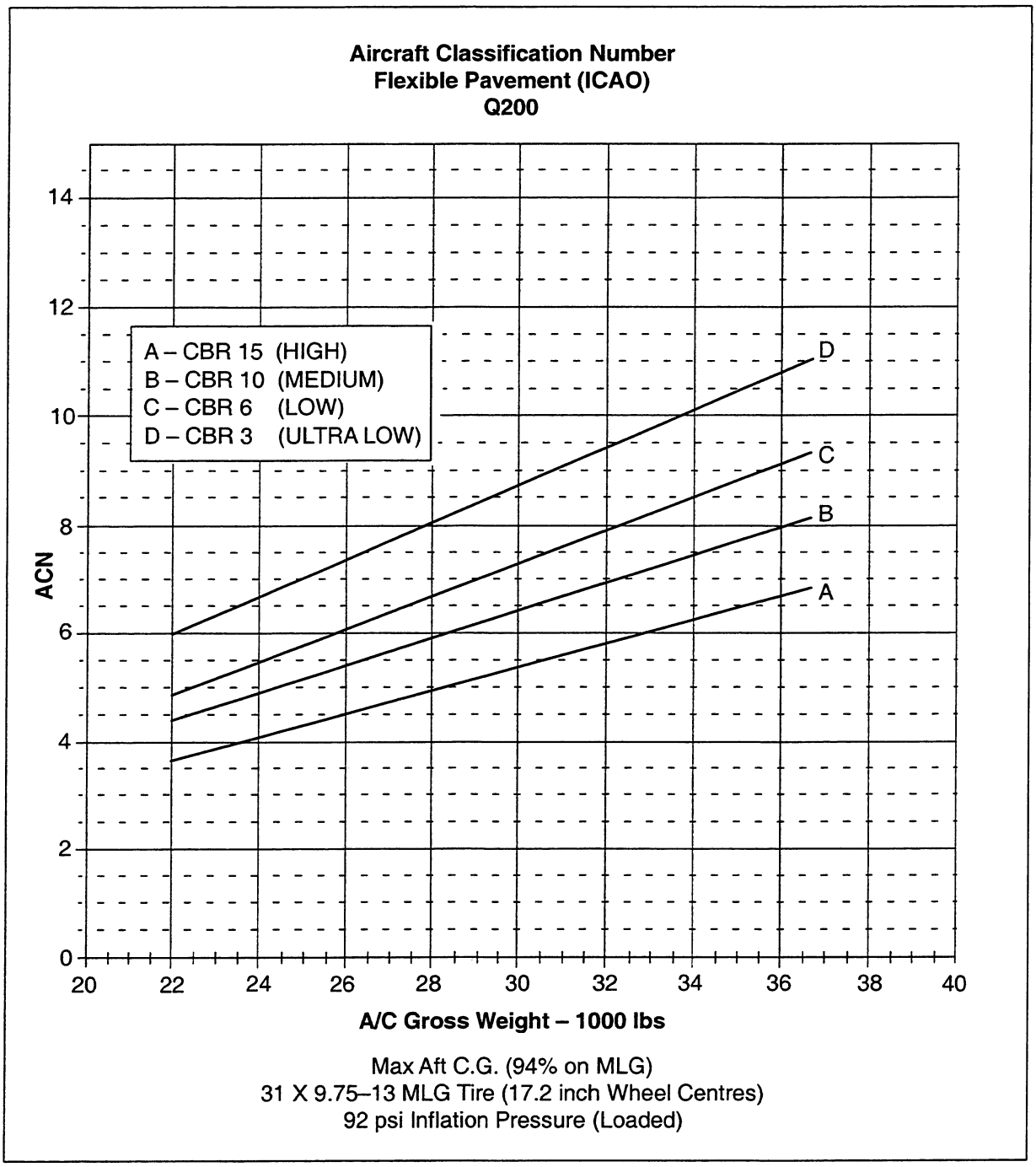

Figure 7–7 Aircraft Classification Number – Flexible Pavement

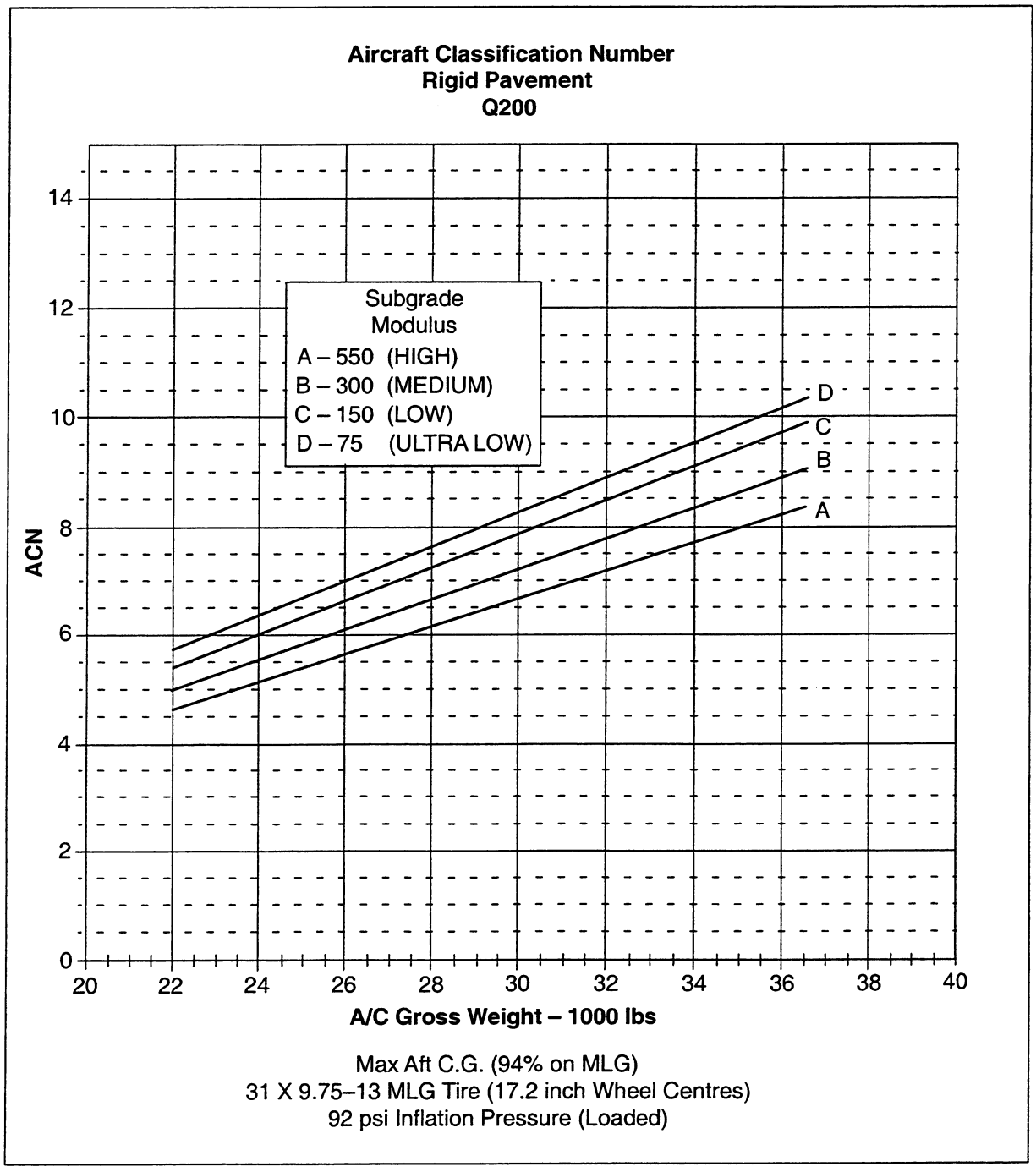

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Figure 7–8 Aircraft Classification Number – Rigid Pavement

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SECTION 8

DERIVATIVE AIRCRAFT

SECTION 8

DERIVATIVE AIRCRAFT

8.0 INTRODUCTION

Additional versions of the Q200 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 airline requirements.

8.1 Q200 (MODEL 201)

The Q200 (Model 201) is powered by two Pratt & Whitney PW123C engines, each developing a MTOP (Maximum Take–off Power) of 2150 SHP. The maximum take–off weight is 36,300 lb (16,466 kg) and the landing weights is 15,650 kg (34,500 lb).

For more information regarding the performance of this aircraft refer to AEROC 8.2 (201). AC. 20.

8.2 Q200 (MODEL 202)

The Q200 (Model 202) is powered by two Pratt & Whitney PW123D engines, each developing a MTOP (Maximum Take–off Power) of 2150 SHP. The maximum take–off weight and the maximum landing weight are identical to the Model 201. However, the PW123D engine installed on the Model 202 features increased thermodynamic power for enhanced "hot and high" performance.

For more information regarding the performance of this aircraft refer to AEROC 8.2 (202). AC. 20.

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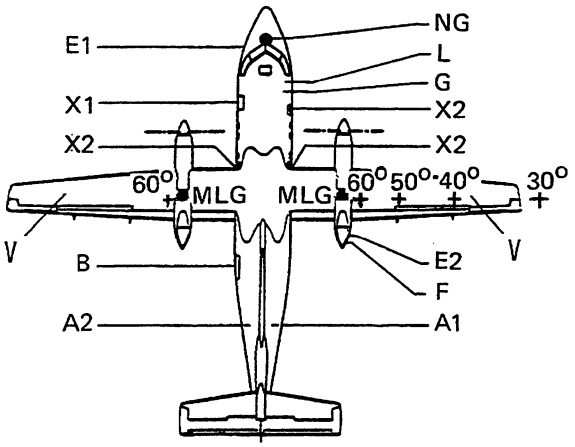
SECTION 9

SCALED Q200 DRAWINGS

ILLUSTRATIONS

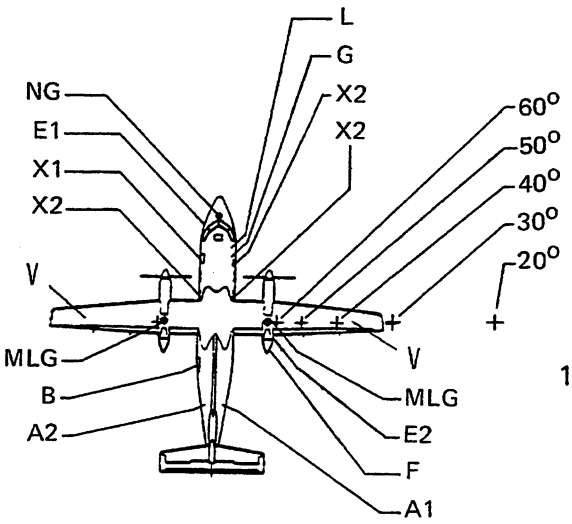


TURNING RADIUS POINTS

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 Q200 Drawing 1" = 32' (1:384)



TURNING RADIUS POINTS

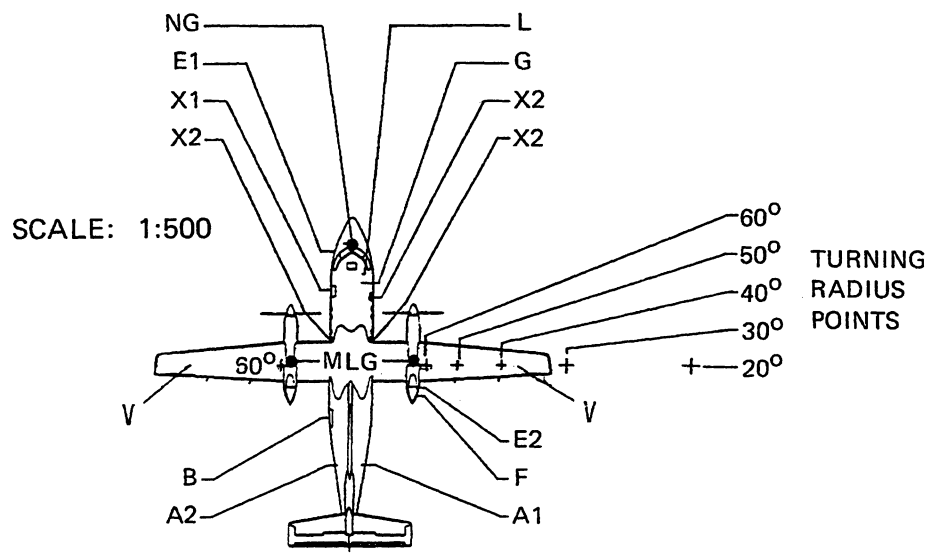
1 IN = 50 FT (1:600)

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 Q200 Drawing 1" = 50' (1:600) and 1" = 100' (1:1200)



SCALE: 1:1000

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 Q200 Drawing 1:500 and 1:1000

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