Australian Government

Civil Aviation Safety Authority

THE AUSTRALIAN AIR TRANSPORT PILOT LICENCE (HELICOPTER) S76 PERFORMANCE AND OPERATIONS HANDBOOK

VERSION 2.3 - May 2013

TABLE OF CONTENTS

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TABLE OF CONTENTS

PART 1

SIKORSKY S76 FLIGHT MANUAL (EXTRACT)

SECTION 1

PERFORMANCE AND LIMITATIONS

PART 1

SIKORSKY S76 FLIGHT MANUAL (EXTRACT)

SECTION 2

WEIGHT AND BALANCE

PART 2

COMPANY OPERATIONS MANUAL (EXTRACT)

SECTION 1

FLIGHT PLANNING DATA

SECTION 2

OPERATIONAL STANDARDS - PERFORMANCE

SECTION 3

WEIGHT AND BALANCE

PART 1

SIKORSKY S76 FLIGHT MANUAL (EXTRACT)

SECTION 1

PERFORMANCE AND LIMITATIONS

CAUTION

This extract is compiled from data relating to several S76 variants.

The information is for use in examinations only, and is not to be used for any operational purpose.

SIKORSKY 76
OPERATING LIMITATIONS

FUEL FLOW LIMITS (IF FUEL FLOWMETERS ARE INSTALLED)

Normal range: 75 to 497 pounds per hour

NOTE

Fuel flow may go up beyond this range during transient operations including start and idle.

ENGINE TORQUE LIMITS

NOTE

Refer to TRANSMISSION TORQUE LIMIT in this section for additional torque limits.

120.0% Torque - takeoff and maximum continuous limit, dual-engine

129.9% Torque - maximum continuous limit, single-engine

146.5% Torque - 2-1/2-minute limit, single-engine

146.5% to 170.7% Torque - 16 second transient, single-engine

NOTE

Intentional operation above 100% torque, 100% N1, or 845^0C T5 is reserved for actual emergency use only except for required engine maintenance checks described in the engine maintenance manual.

N1 (GAS PRODUCER) SPEED LIMITS

OEI OPERATION:

107.7% N1 - 2-1/2-minute power
101.2% N1 - maximum continuous power
104.35% N1 - 16 second transient power

NOTE

- These OEI power rating values are as indicated on the N1 tachometer in OEI operation and may be biased as much as 1.0% N1. For actual values of N1 at 2-1/2- minute power see placard.
- Maximum continuous OEI N1 is 2-1/2-minute N1 minus 0.5%.

TWO ENGINE OPERATION:

100% N1 - takeoff power
100% N1 - maximum continuous power

TRANSIENT OPERATION:

52% to 68% N1 - avoid continuous operation in this range
105.35% N1 - 16 second transient power

N2 (POWER TURBINE) SPEED LIMITS

114% N2 - maximum at 0% torque varying linearly to 107.1% N2 at 115% torque

Transient: 15 second limit varies linearly from 119% at flight autorotation to 109% at 115% torque

T5 (POWER TURBINE INLET TEMPERATURE) LIMITS

Steady State Limits

885°C - 2-1/2-minute power, one engine inoperative
868°C - Maximum continuous power, one engine inoperative
845°C - Takeoff and maximum continuous, dual-engine

Transient Limit

920°C - 16 seconds, single-engine

Starting and Shutdown

785°C - No time limitation
785°C to 865°C - limited to 5 seconds

TRANSMISSION LIMITS

NOTE

Intentional operation above 100% torque, 100% N1, or 845°C T5 is reserved for actual emergency use only except for required engine maintenance checks described in the engine maintenance manual.

TORQUE LIMITS

Dual-Engine Operation

100% Torque per engine - Takeoff and maximum continuous

NOTE

Takeoff torque may exceed 100% on one engine to a maximum of 104% provided that the torque on the other engine is less than 96% and the sum of the individual torque values does not exceed 200%.

Single-Engine Operation

111.2% Torque - Maximum continuous power
115.0% Torque - 2-1/2-minute limit
115.0% to 155% Torque - 16 second transient power

TRANSMISSION OIL

MIL-L21260 Type I, Grade 30 - Low temperature limit -9°C (15°F)

Dextron II ATF - Low temperature limit -34°C (-30°F)

TRANSMISSION OIL TEMPERATURE LIMITS

Maximum: 120°C (09500 series main gearbox)

Minimum: -20°C

TRANSMISSION OIL PRESSURE LIMITS

Maximum: 120 PSI

Minimum: 20 PSI

ROTOR LIMITS

POWER OFF

Maximum: 115% Nr

Minimum: 87% Nr

Transient: 78% Nr

POWER ON

Maximum: 107% Nr

Minimum: 100% Nr - (dual-engine operation)

Minimum: 96% Nr - (one engine inoperative)

WEIGHT LIMITS

See Figure 1.2.1 for forward and aft centre of gravity limits at various gross weights.

Maximum takeoff and landing weight is 10800 pounds (4898 kg).

LOADING LIMITS

Maximum allowable cabin floor loading is 75 pounds per square foot
(366 kg per square metre).

Maximum baggage compartment load is 600 pounds (272 kg).

CATEGORY "A" OPERATIONS

See Figure 1.1.15 for variation of allowable takeoff and landing gross weight with altitude and temperature.

CATEGORY "B" OPERATIONS

See Figures 1.1.19 to 23 for variation of allowable takeoff and landing gross weight with altitude and temperature.

ENGINE OR DRIVE SYSTEM OPERATING LIMITS

THIS TABLE IS A SUMMARY OF LIMITATIONS
OBSERVE THE FIRST LIMIT ENCOUNTERED FOR ANY GIVEN
OPERATING CONDITIONS

OPERATING CONDITION	TIME	TRANSMISSION LIMIT (%)	ENGINE TORQUE LIMIT (%)	T5°C	%N1	%N2
TAKEOFF	—	100	120.0	845	100	(1)
MAXIMUM CONTINUOUS (4)	—	100	120.0	845	100	(1)
2-1/2 MIN OEI	2-1/2 min	115	146.5	885	101.7 (6)	(1)
MAXIMUM CONTINUOUS OEI	—	111.2	126.9	868	101.2 (6)	(1)
STARTING	5 sec	—	—	865 (5)	—	—
TRANSIENT OEI	16 sec	155(2)	170.7 (2)	920	104.35 (7)	—
TRANSIENT	16 sec	—	—	—	105.35	—
TRANSIENT	15 sec	—	—	—	—	(3)
TRANSIENT	5 sec	115(8)	170.7 (2)	—	—	—

NOTES:

(1) 114 % N2 - maximum at 0% torque varying linearly to 107% N2 at 115% torque.
(2) Cockpit torque indicator does not read above 120% torque. It has been determined that using the specified usual and emergency procedure, 155% torque will not be exceeded under atmospheric conditions for which operation is approved.
(3) 119% N2 at 0% torque varying linearly to 109% N2 at 115.0% torque.
(4) See paragraph titled Engine Ratings and Recommended Usage.
(5) Time between 785 and 865°C is limited to 5 seconds.
(6) N1 values indicated on tachometer in OEI mode.
(7) Under twin-engine conditions the indicated N1 is the actual N1 value. If an N1 excursion above 104% is observed while in single-engine flight, note the prevailing OAT and pressure altitude and refer to maintenance manual for action, if any.
(8) Dual-engine transient limit - 230% total torque (No.1 torque plus No. 2 torque).

Figure 1.1.1 Engine or Drive System Operating Limits

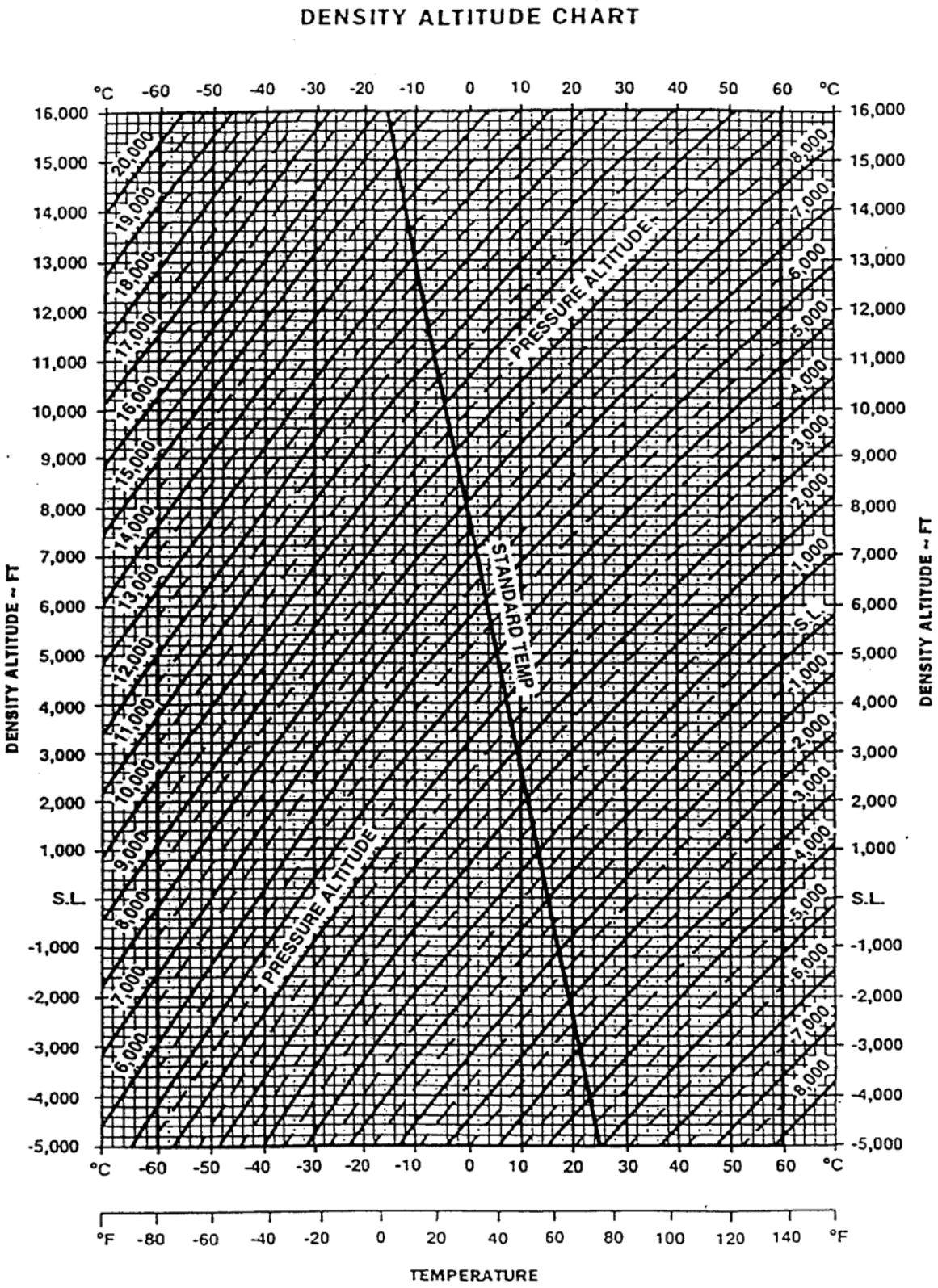


Figure 1.1.2 Density Altitude Chart

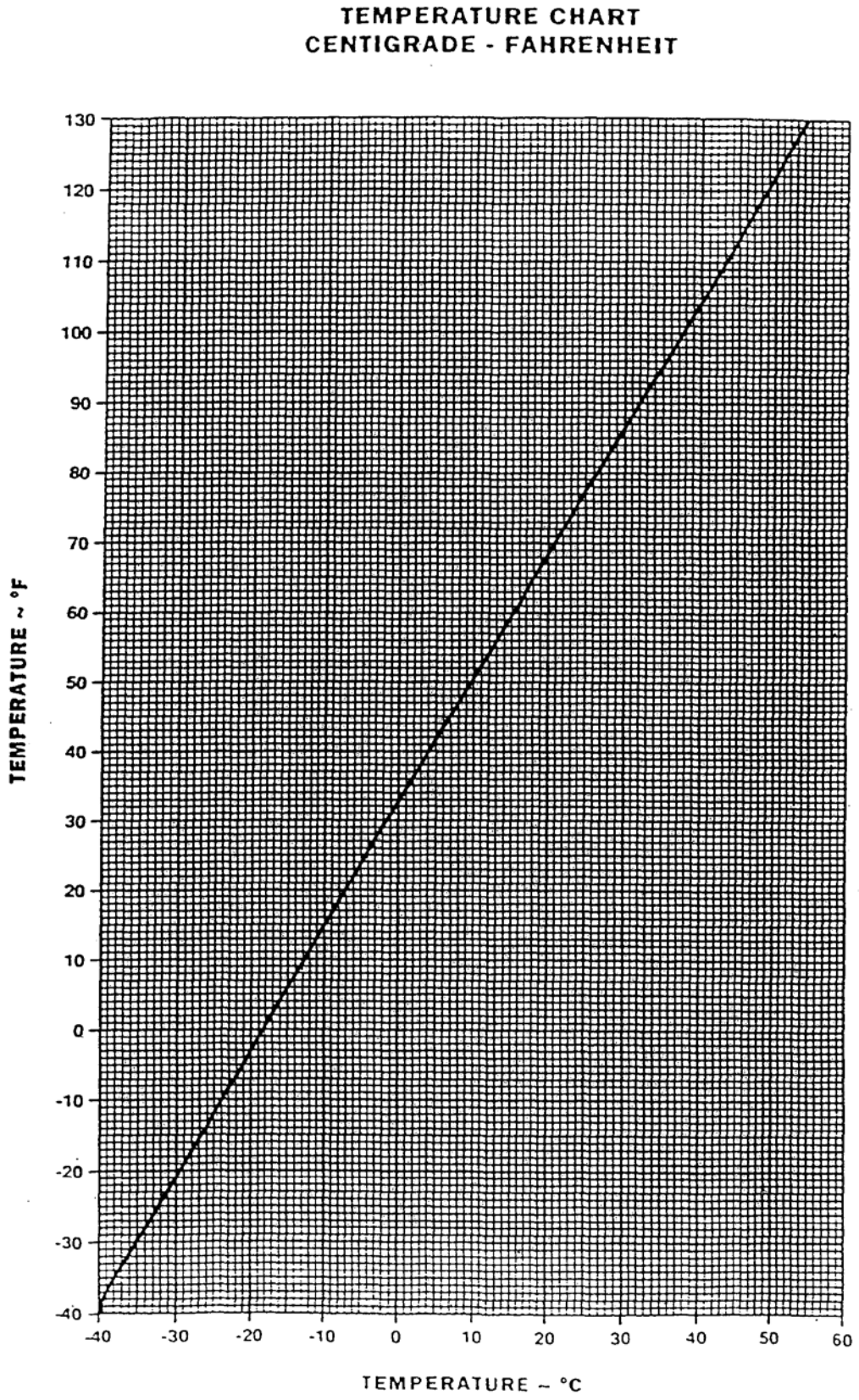


Figure 1.1.3 Temperature Conversion Chart

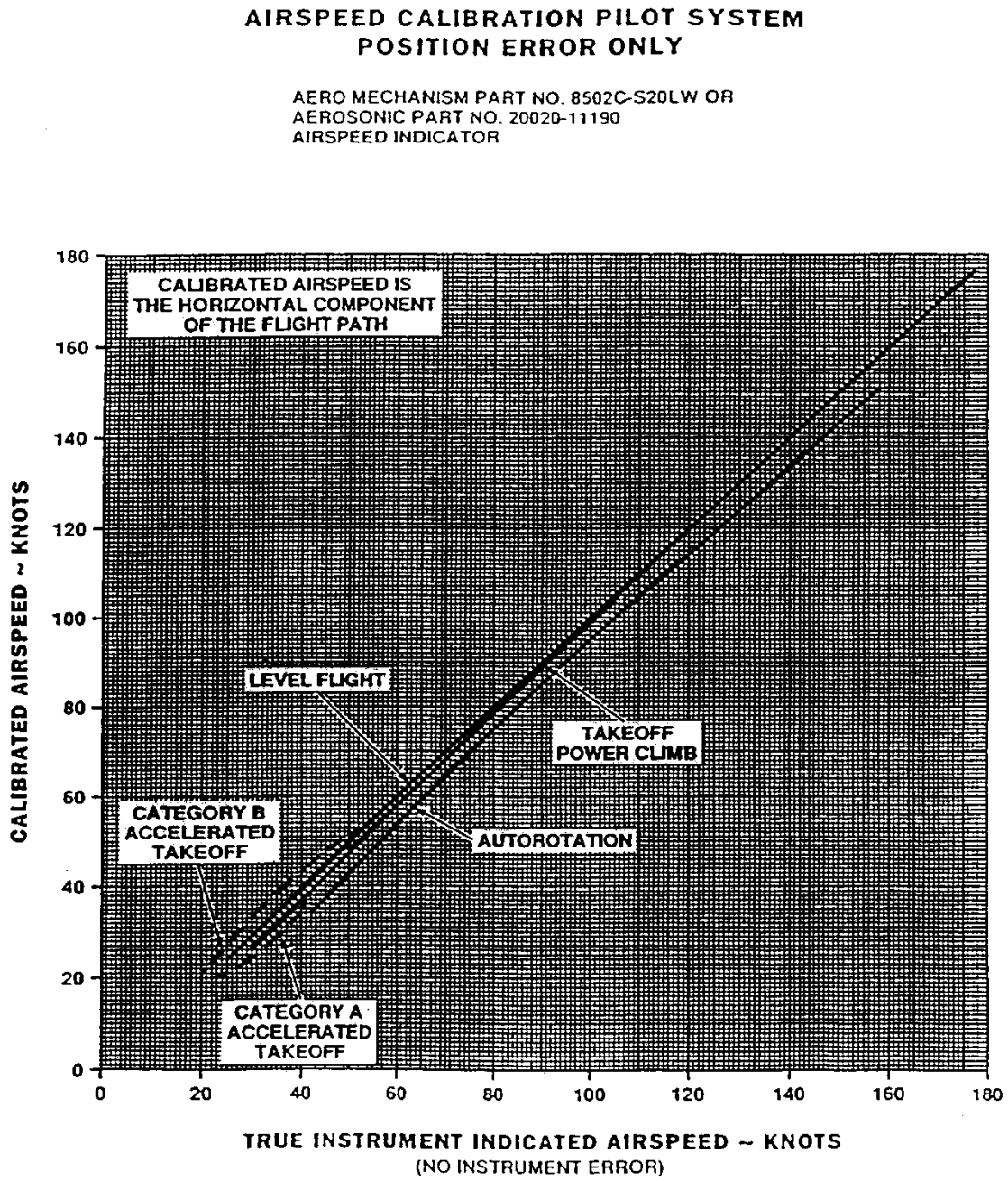


Figure 1.1.4 Airspeed Calibration – Pilot

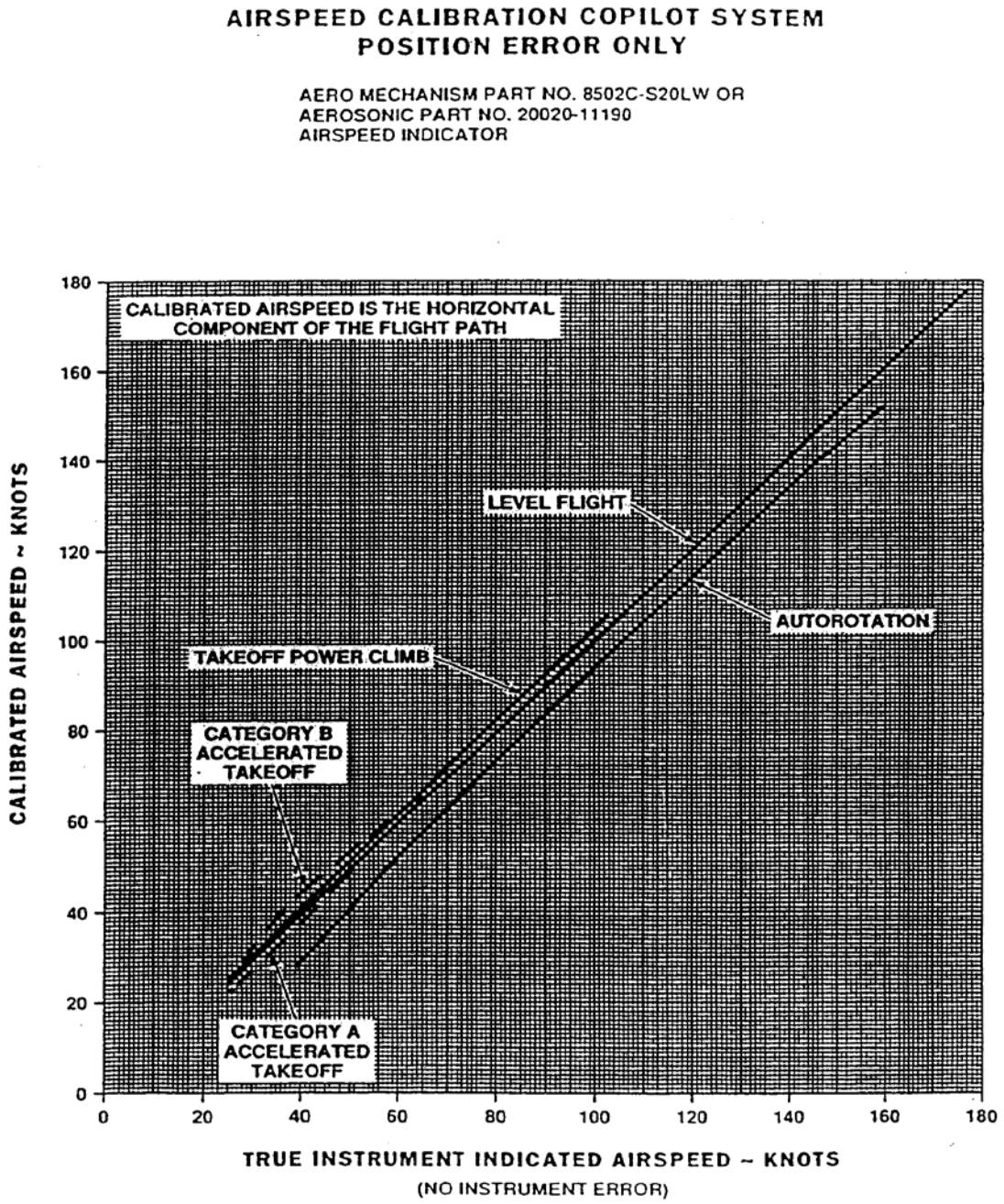


Figure 1.1.5 Airspeed Calibration - Co-pilot

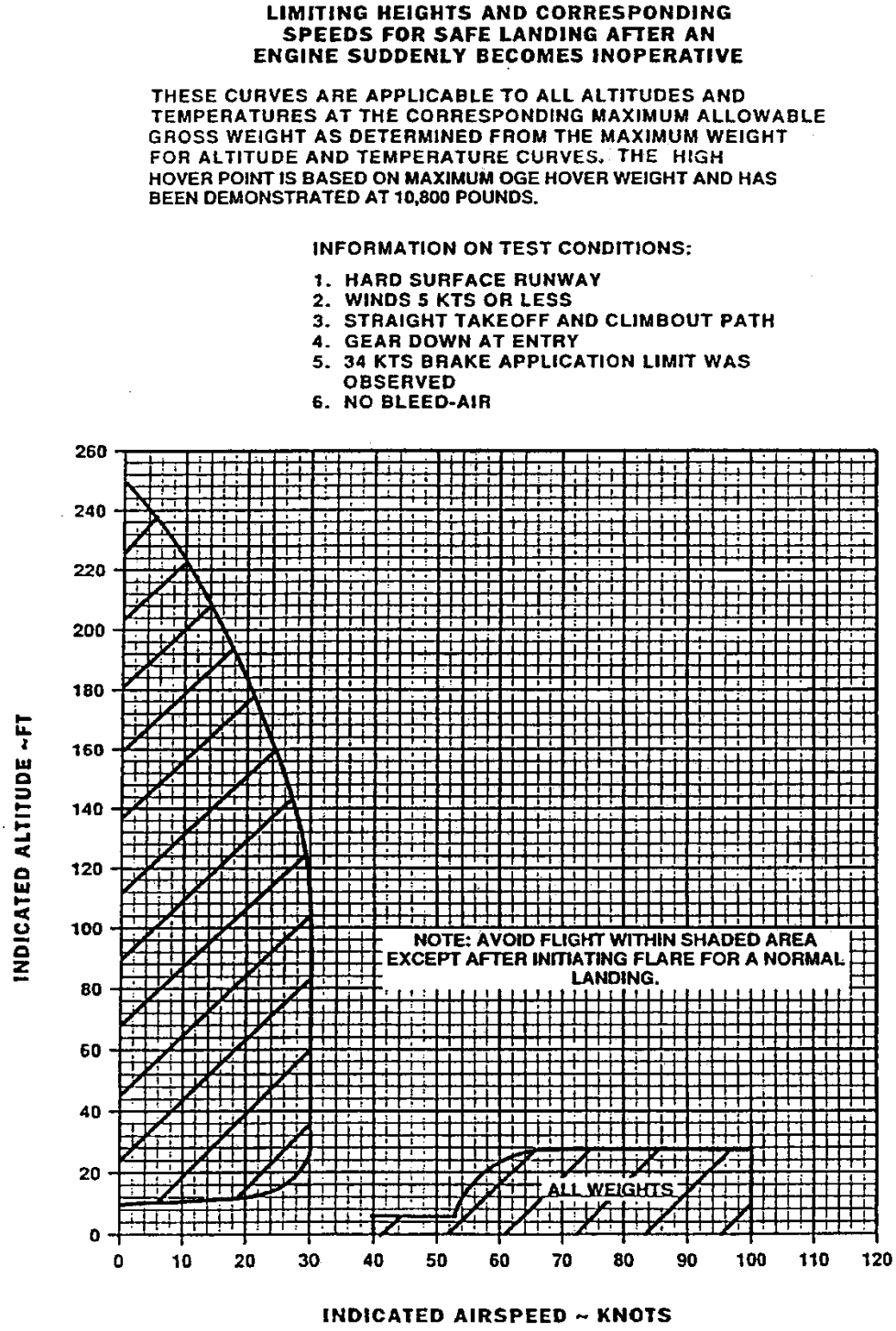


Figure 1.1.6 Height Velocity Diagram

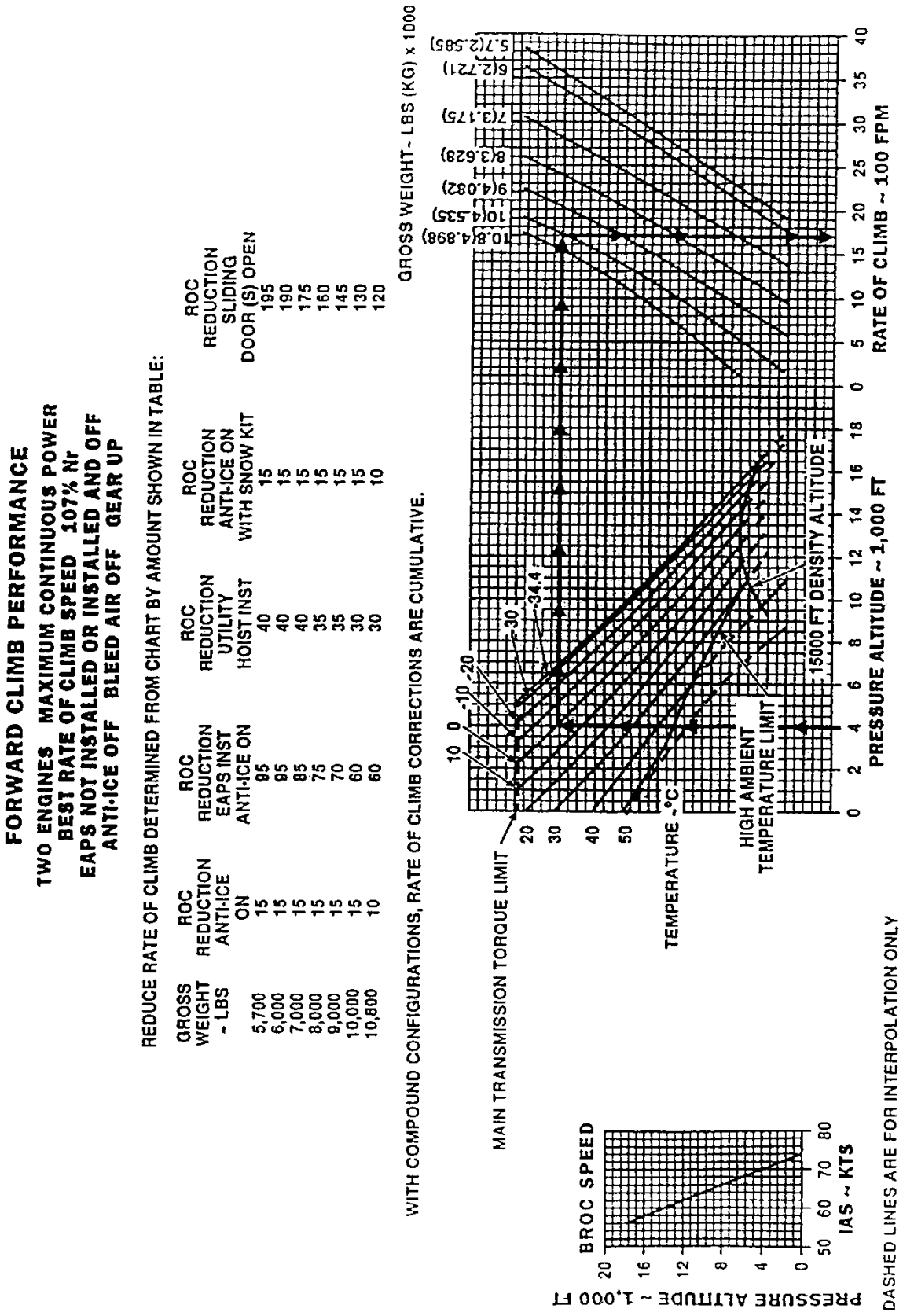


Figure 1.1.7 Forward Climb Performance
Two Engines - Maximum Continuous Power

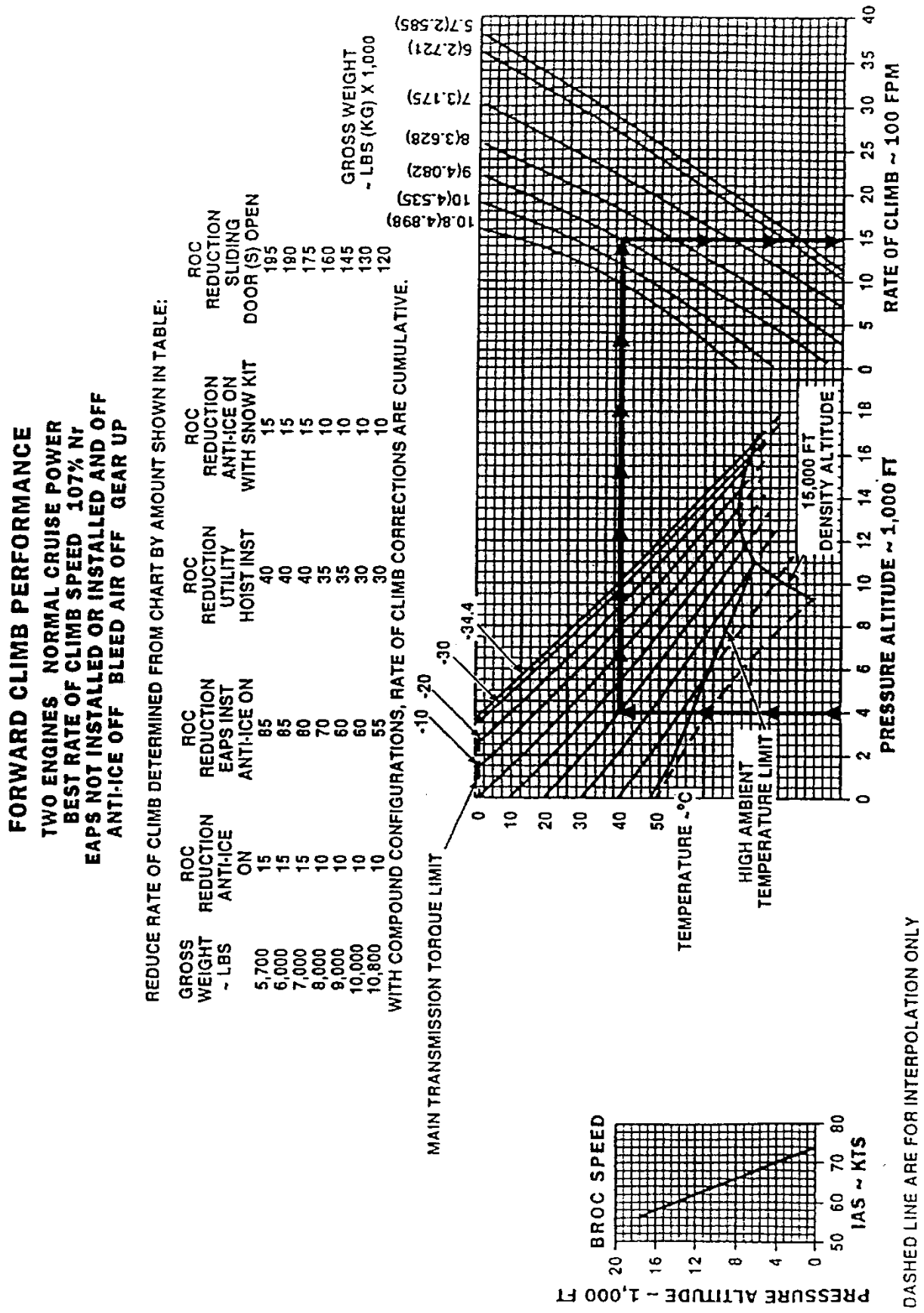


Figure 1.1.8 Forward Climb Performance
Two Engines - Normal Cruise Power

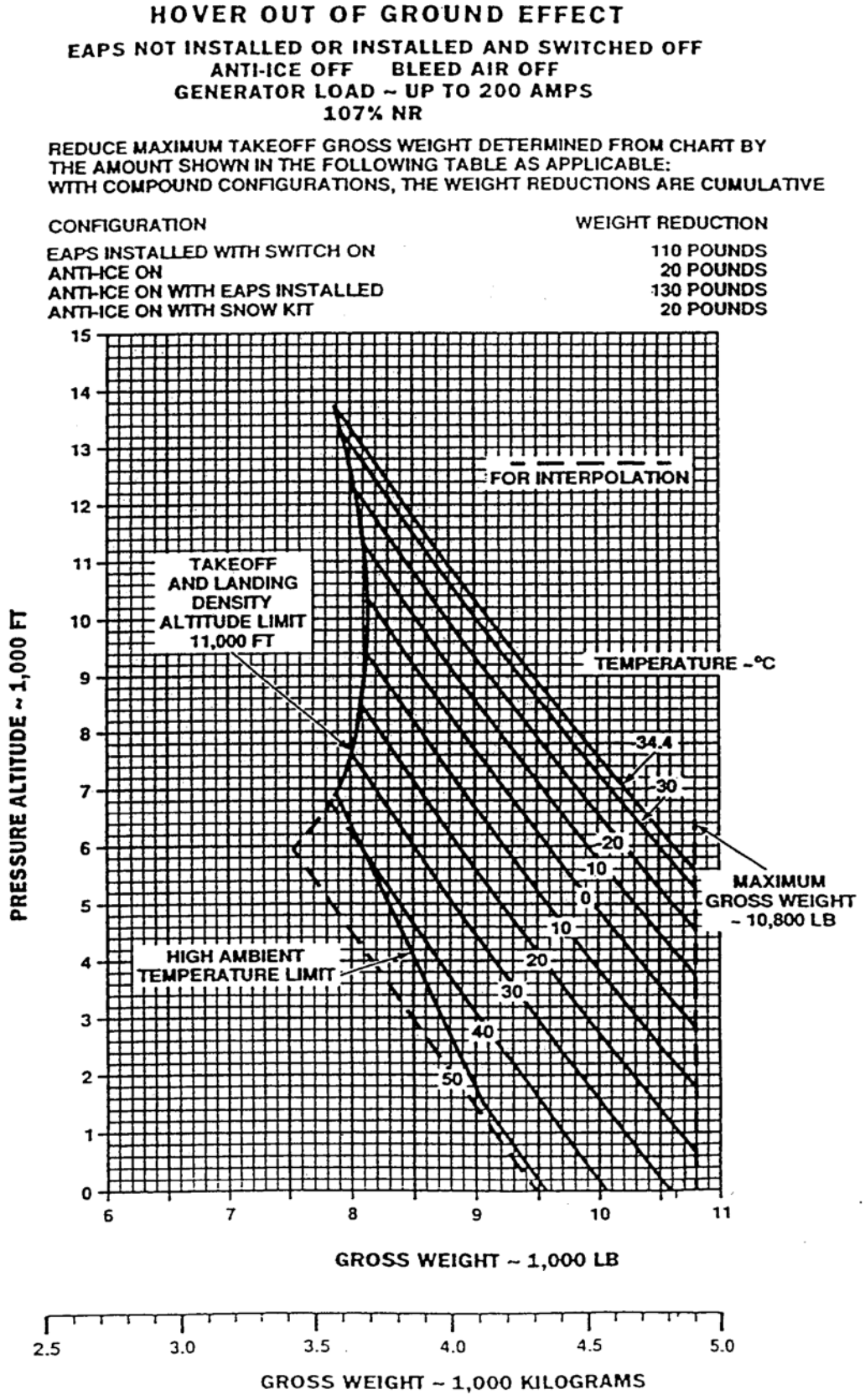


Figure 1.1.9 Hover Out of Ground Effect
Two Engines Operating

TAKEOFF SAFETY SPEED 100% Nr
EAPS NOT INSTALLED OR INSTALLED AND ON/OFF
ANTI-ICE OFF BLEED AIR OFF GEAR DOWN

REDUCE RATE OF CLIMB DETERMINED FROM CHART BY AMOUNT SHOWN IN TABLE:

GROSS WEIGHT - LBS	ROC REDUCTION ANTI-ICE ON	ROC REDUCTION EAPS INST ANTI-ICE ON	ROC REDUCTION UTILITY HOIST INST	ROC REDUCTION ANTI-ICE ON WITH SNOW KIT	ROC REDUCTION SLIDING DOOR (S) OPEN
5,700	35	40	25	85	100
6,000	30	40	25	80	100
7,000	30	40	20	75	95
8,000	25	35	20	65	85
9,000	25	35	20	60	80
10,000	20	30	20	55	75
10,800	20	30	20	55	65

WITH COMPOUND CONFIGURATIONS, RATE OF CLIMB CORRECTIONS ARE CUMULATIVE.

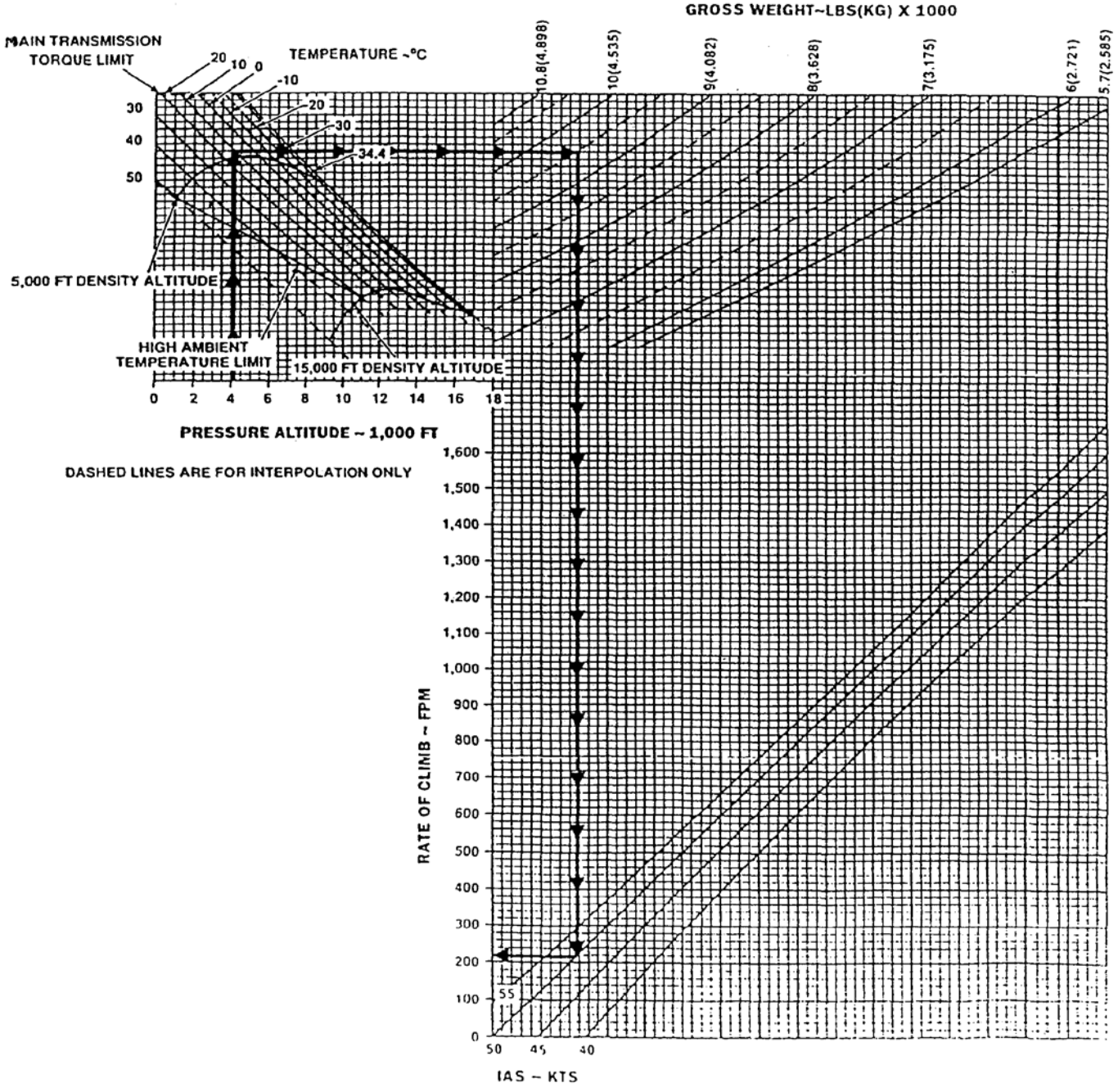


Figure 1.1.10 Forward Climb Performance OEI - 2½ Minute Power

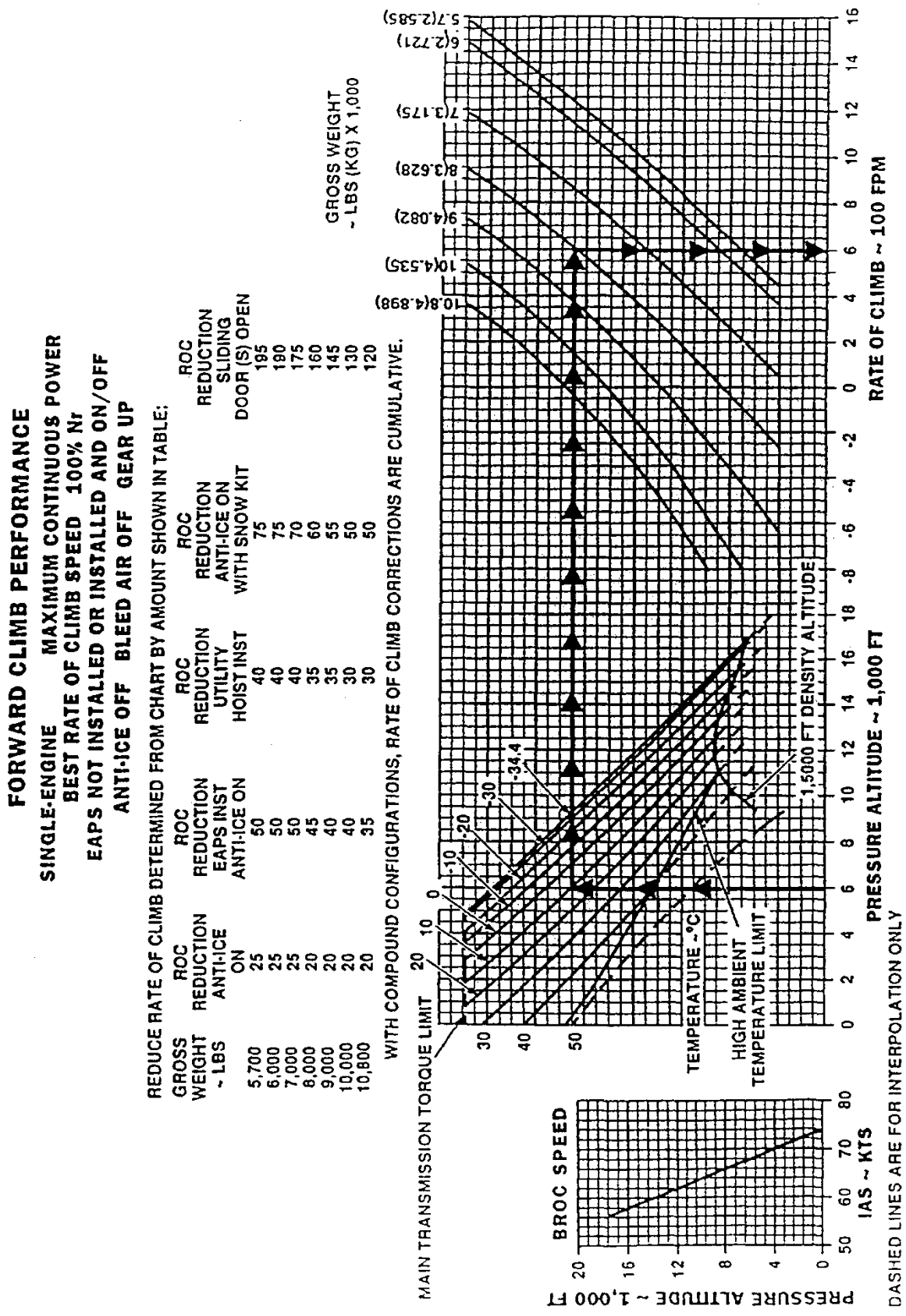


Figure 1.1.11 Forward Climb Performance
OEI - Maximum Continuous Power

CATEGORY "A" OPERATIONS

CATEGORY "A" TAKEOFF

DESCRIPTION

The Category "A" takeoff procedure shown diagrammatically in Figure 1.1.12 features variable Critical Decision Point (CDP) and Takeoff Safety Speed (V2). The CDP, expressed only in terms of airspeed, is selectable in 1 knot increments between 30 and 45 knots while V2, defined as CDP + 10 knots, varies in 1 knot increments between 40 and 55 knots. This permits payload to be traded off against available field length in such a manner that Category "A" One Engine Inoperative (OEI) climb performance minima can be maintained over a wide range of environmental conditions.

Figure 1.1.14 shows the Rejected Takeoff (RTO) and Continued Takeoff (CTO) distances as a function of pressure altitude, temperature, headwind component, CDP speed and V2 speed. RTO and CTO distances are directly proportional to CDP and V2 speeds respectively, therefore lower CDP and V2 speeds equate to shorter field lengths. Figure 1.1.15 shows the maximum takeoff and landing gross weight as a function of pressure altitude, temperature, and CDP/V2 speeds. Maximum takeoff and landing gross weight is also directly proportional to CDP/V2 speeds, therefore higher CDP/V2 speeds can equate to higher maximum takeoff gross weights.

The Category "A" takeoff procedure provides the flexibility to address specific payload and/or field length requirements appropriate to either of the following operational scenarios:

1. Determine the maximum takeoff gross weight, given the available field length.

2. Determine the required field length, given the desired mission takeoff gross weight.

Specific numerical examples follow which illustrate the use of the charts for each of the above stated scenarios.

Example 1

Determine the maximum takeoff gross weight, given the RTO field length, pressure altitude, temperature, and headwind component.

1. Enter Figure 1.1.14 with the RTO space available, and using the headwind component, pressure altitude, and temperature, read the resultant CDP speed. Note: If resultant CDP is greater than 45 knots, use 45 knots as CDP.

2. Enter Figure 1.1.15 with pressure altitude, temperature, and CDP speed from Step 1, and determine the maximum takeoff gross weight.

3. **Notes**: (1) If the horizontal line defined by pressure altitude and temperature intersects 10800 pounds at a CDP speed lower than the CDP from Step 1, use the lower CDP speed, or (2) if the desired takeoff gross weight is less than the maximum permitted takeoff gross weight, use the lower CDP speed corresponding to the desired takeoff gross weight.

4. Using Figure 1.1.14, verify that the CTO distance for V2 (CDP + 10 knots) is suitable for the takeoff area.

   Given:

Available RTO Field Length:	850 ft
Pressure Altitude:	3000 ft
Temperature:	+10 deg C
Headwind Component:	20 kt
EAPS:	Off

   Determine:

CDP Speed:	31 kt
Maximum Takeoff Gross Weight:	9400 lb
V2 Speed:	41 kt
CTO Distance:	1010 ft

Example 2

Determine the required field length, given the desired mission takeoff gross weight, pressure altitude, temperature, and headwind component.

1. Enter Figure 1.1.15 for the appropriate EAPS configuration with the desired takeoff gross weight, and using the pressure altitude and temperature, read the resultant CDP and V2 (CDP + 10 kt) speeds.

2. Enter Figure 1.1.14 with pressure altitude and temperature, and using the CDP from Step 1, determine the RTO distance required.

3. For the same values of pressure altitude and temperature as used in Step 2, use V2 (CDP + 10 kt) to determine CTO distance required.

   Given:

Mission Takeoff Gross weight:	10000 lb
Pressure Altitude:	3000 ft
Temperature:	+10 deg C
Headwind Component:	20 kt
EAPS:	OFF

Determine:

CDP speed:	37 kt
V2 speed:	47 kt
RTO Distance:	1100 ft
CTO Distance:	1200 ft

TECHNIQUE

Refer to Figure 1.1.12

After determining and setting bugs for CDP and V2 on airspeed indicator, hover at 5-foot wheel height. Increase collective pitch to achieve a 6% torque above hover torque and accelerate forward maintaining 5 to 10 foot wheel height until reaching CDP. After passing CDP rotate nose-up to initiate climb at V2. When clear of obstacles, gradually accelerate to best rate of climb speed (Vy) and retract landing gear.

ASSOCIATED CONDITIONS

Bleed Air:	OFF
EAPS/Anti-Ice:	OFF or ON

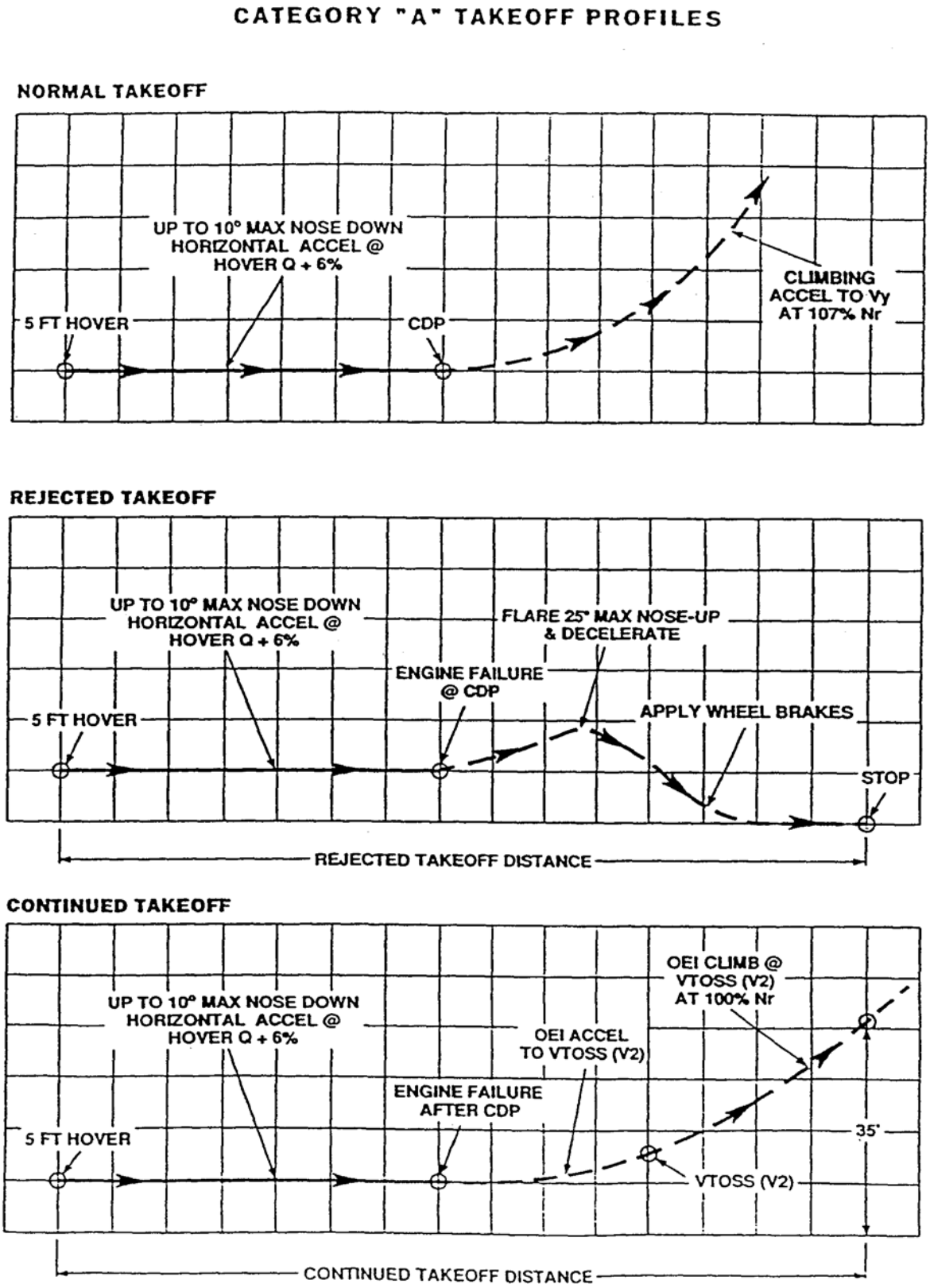
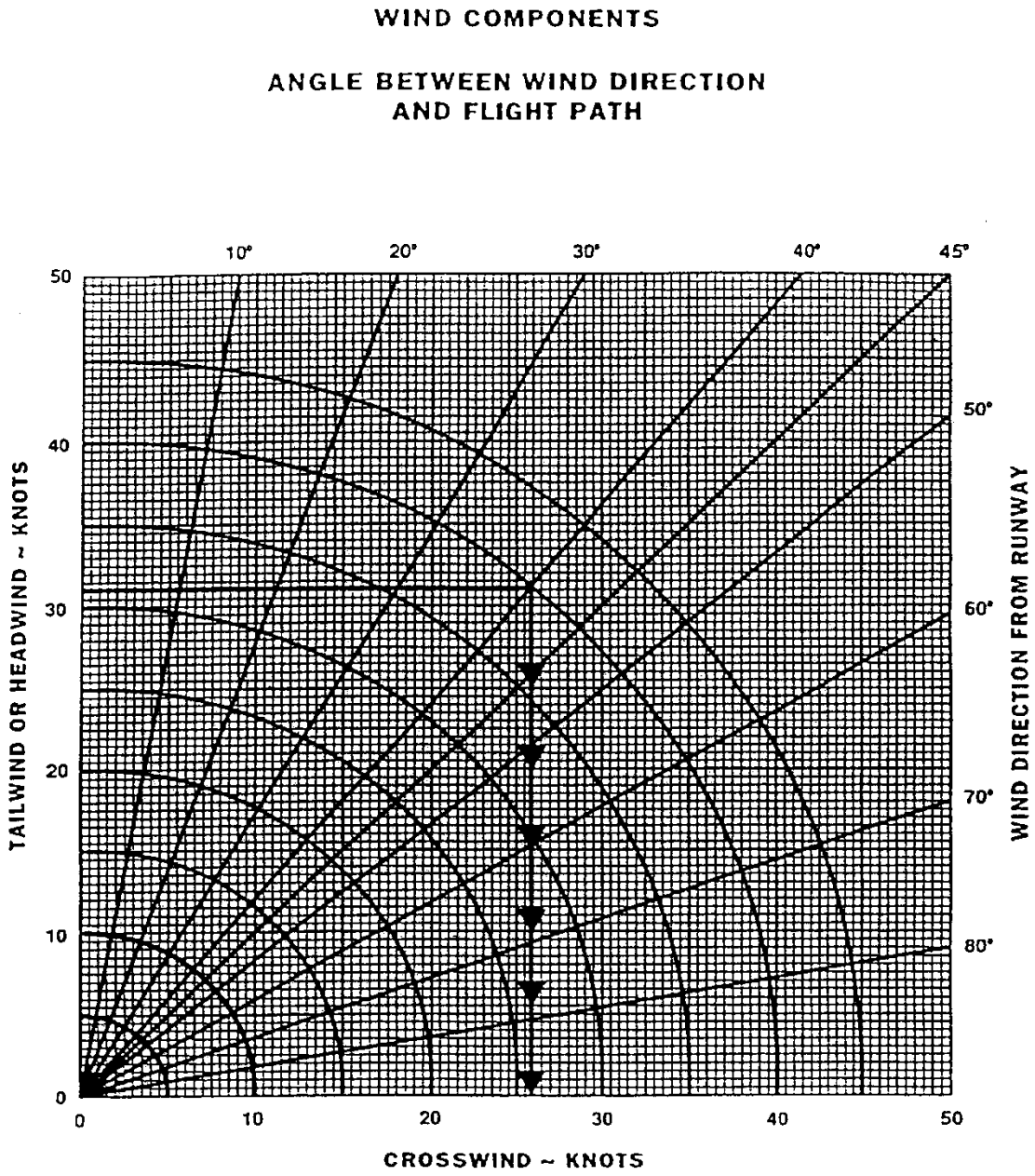


Figure 1.1.12 Category "A" - Takeoff Profiles



CONDITION:

WIND VELOCITY - 40 KT
WIND DIRECTION - 130^{O}
FLIGHT PATH - 090^{O}

EXAMPLE:

ENTER CHART AT WIND DIRECTION FROM FLIGHT PATH = 40^{O}
MOVE DOWN TO WIND VELOCITY ARC = 40 KT
MOVE LEFT TO HEADWIND COMPONENT = 30.6 KT
MOVE DOWN TO CROSSWIND COMPONENT = 25.7 KT

Figure 1.1.13 Wind Components

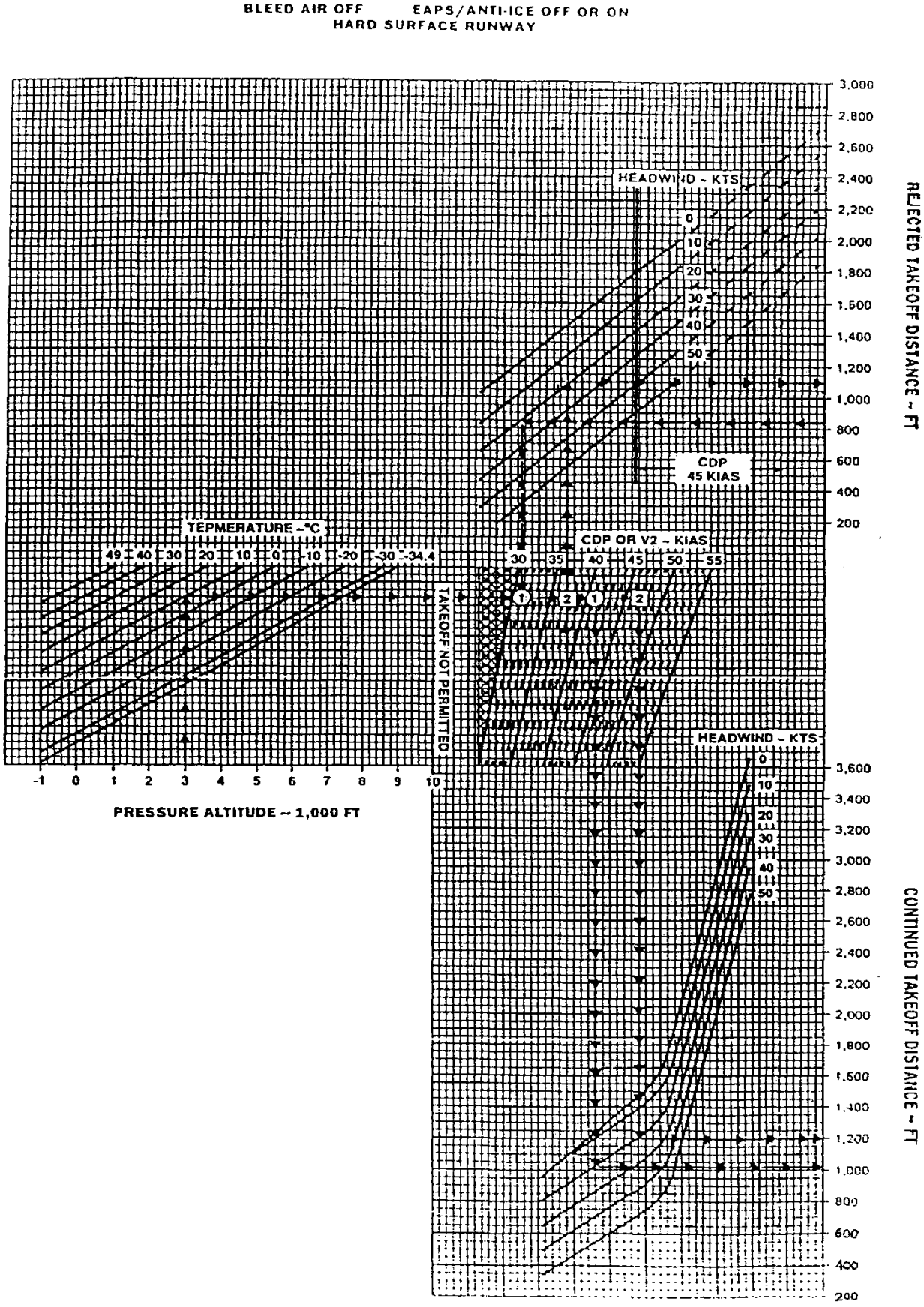


Figure 1.1.14 Category "A" - Rejected and Continued Takeoff Distance

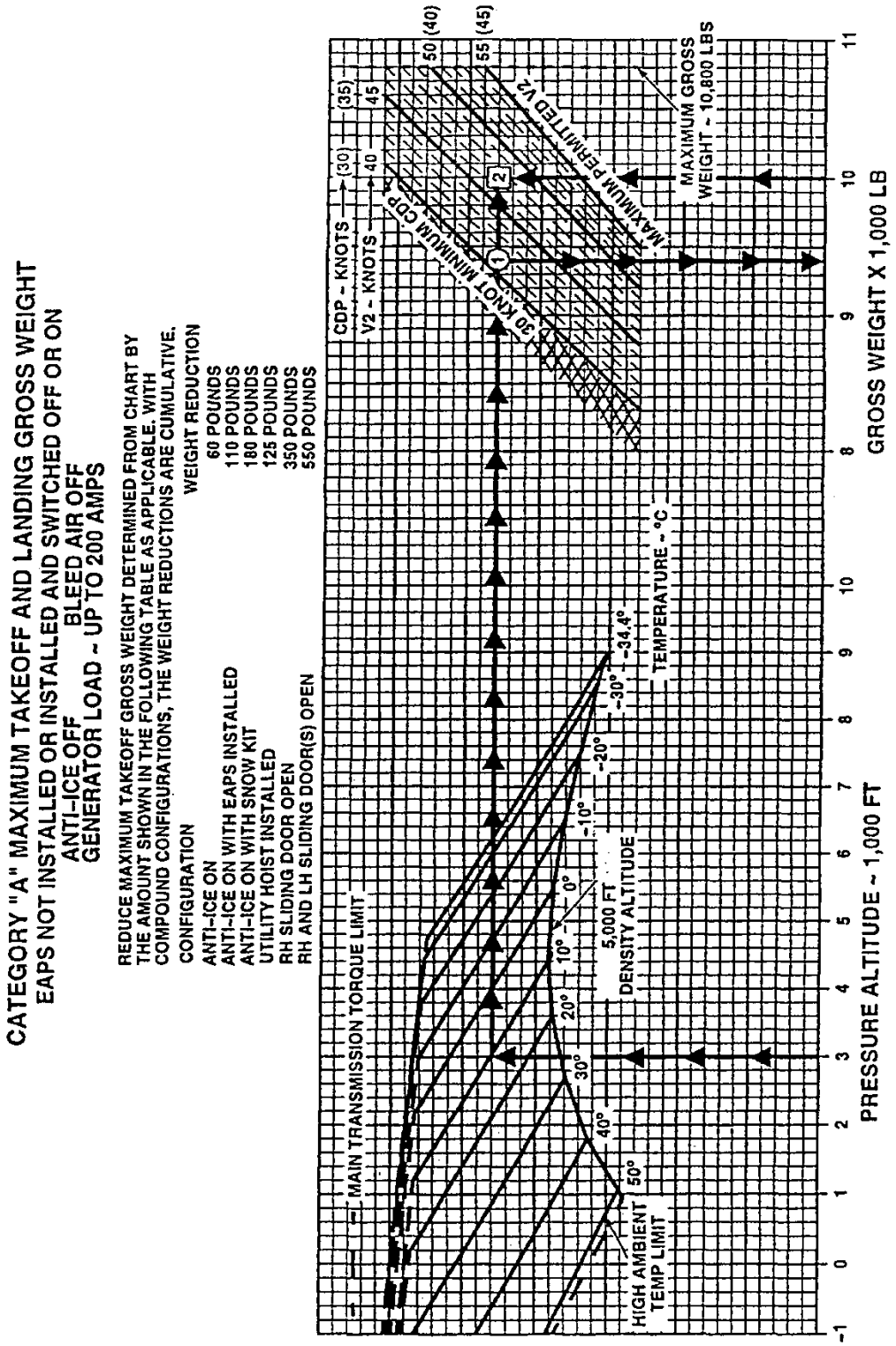


Figure 1.1.15 Category "A" - Maximum Takeoff and Landing Gross Weight

CATEGORY "A" LANDING

TECHNIQUE

Refer to Figure 1.1.16

Establish an approach to arrive at the LDP, a point 200 feet above the touchdown elevation, with 45 KIAS, 107% Nr, and a rate of descent of no more than 600 FPM. Initiate deceleration passing 50 feet at 45 KIAS. Continue approach and deceleration to a running touchdown or hover. Refer to emergency procedures for single-engine landing.

ASSOCIATED CONDITIONS

Bleed Air: OFF

EAPS/Anti-ice: OFF or ON

LANDING DISTANCE

The landing distances shown in Figure 1.1.18 reflect the one-engine inoperative landings to a hard surfaced runway.

Example

Determine landing distance required, given pressure altitude, temperature, and headwind component.

1. Enter Figure 1.1.18 at 4000 feet pressure altitude, and using the temperature and headwind component (Figure 1.1.13), read the resultant landing distance required.

   Given:

Pressure Altitude:	4000 ft
Temperature:	+10 deg C
Headwind Component:	10 kt
EAPS:	OFF

   Determine:

Landing Distance Required:	750 ft

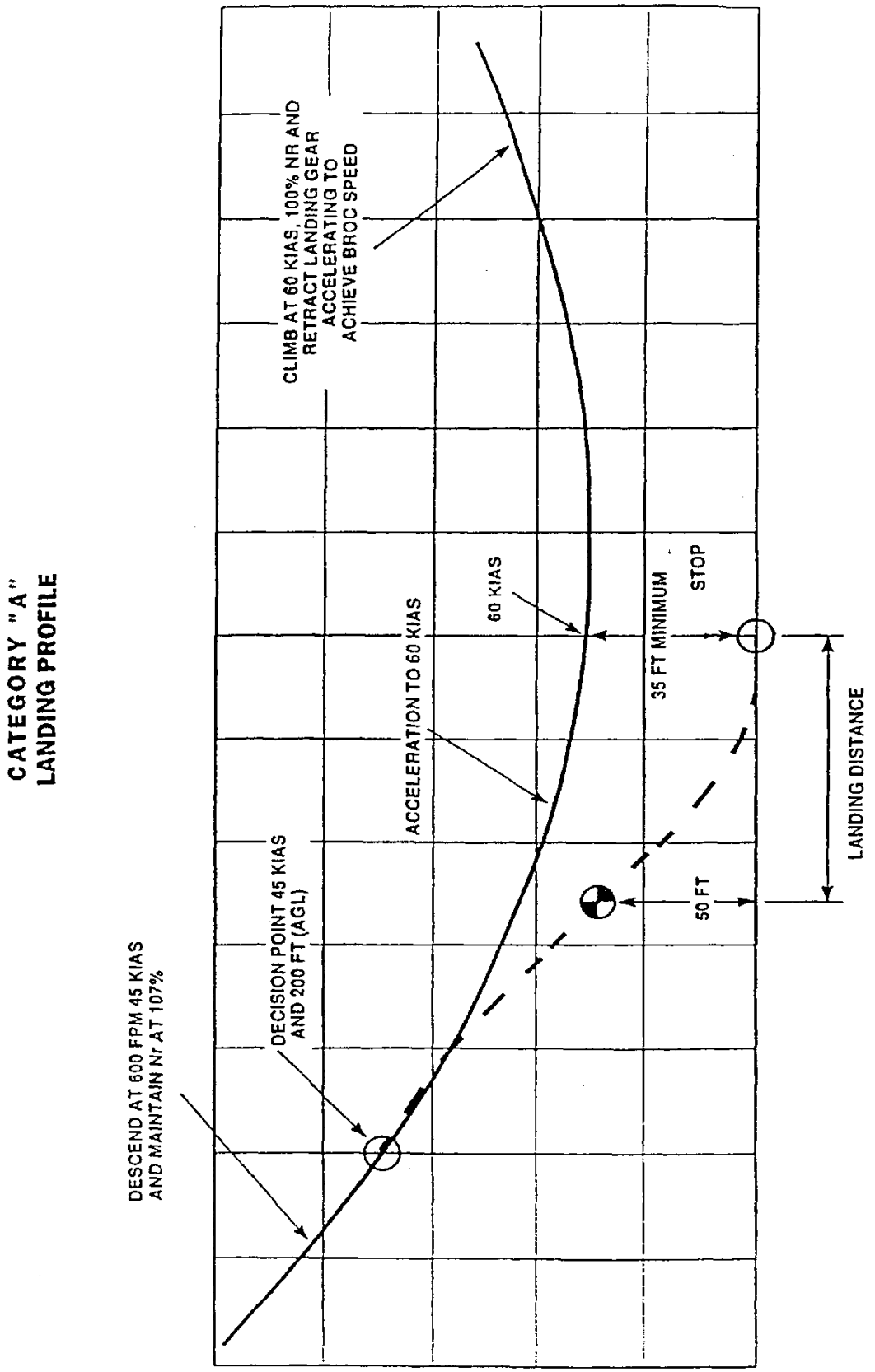


Figure 1.1.16 Category "A" - Landing Profile

ALTERNATE CATEGORY "A" LANDING

TECHNIQUE

Refer to Figure 1.1.17

Establish an approach to arrive at the LDP, a point 75 feet above the touchdown elevation, with 60 KIAS, 107% Nr, and a rate of descent of no more than 300 FPM. Upon passing the LDP, initiate a smooth deceleration with collective to continue descent through 50 feet with up to 20 to 25 degree flare attitude. Apply collective to reduce descent rate and decrease flare attitude to pass 20 feet at approximately 30 KIAS. Continue approach and deceleration to a running touchdown or hover. Refer to emergency procedures for single engine landing.

ASSOCIATED CONDITIONS

Bleed Air: OFF

EAPS/Anti-ice: OFF or ON

LANDING DISTANCE

The landing distance reflects the one engine inoperative landings to a hard surfaced runway. The landing distance is 1000 feet for all weight, altitude, and temperature combinations.

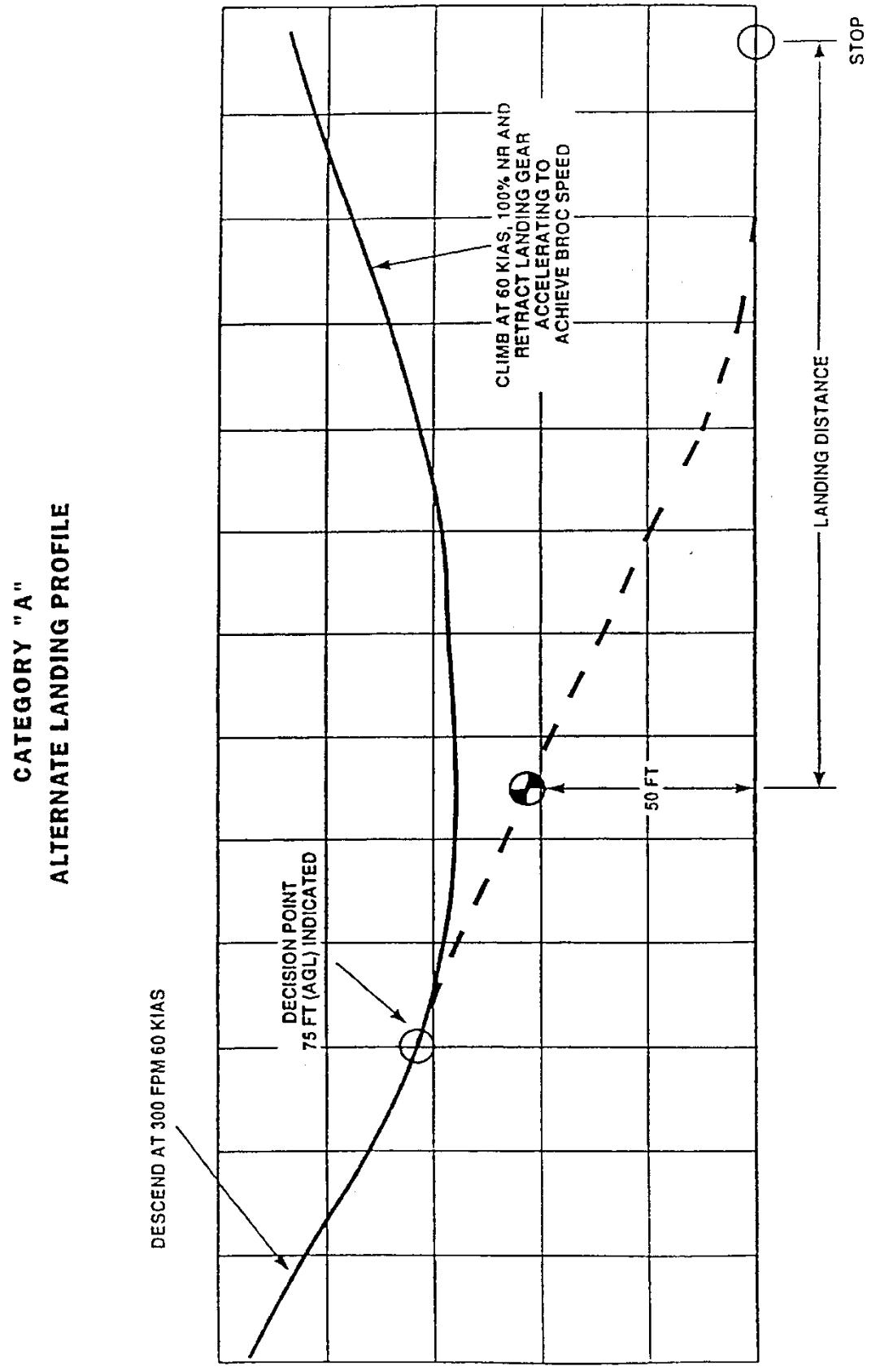


Figure 1.1.17 Category "A" - Alternate Landing Profile

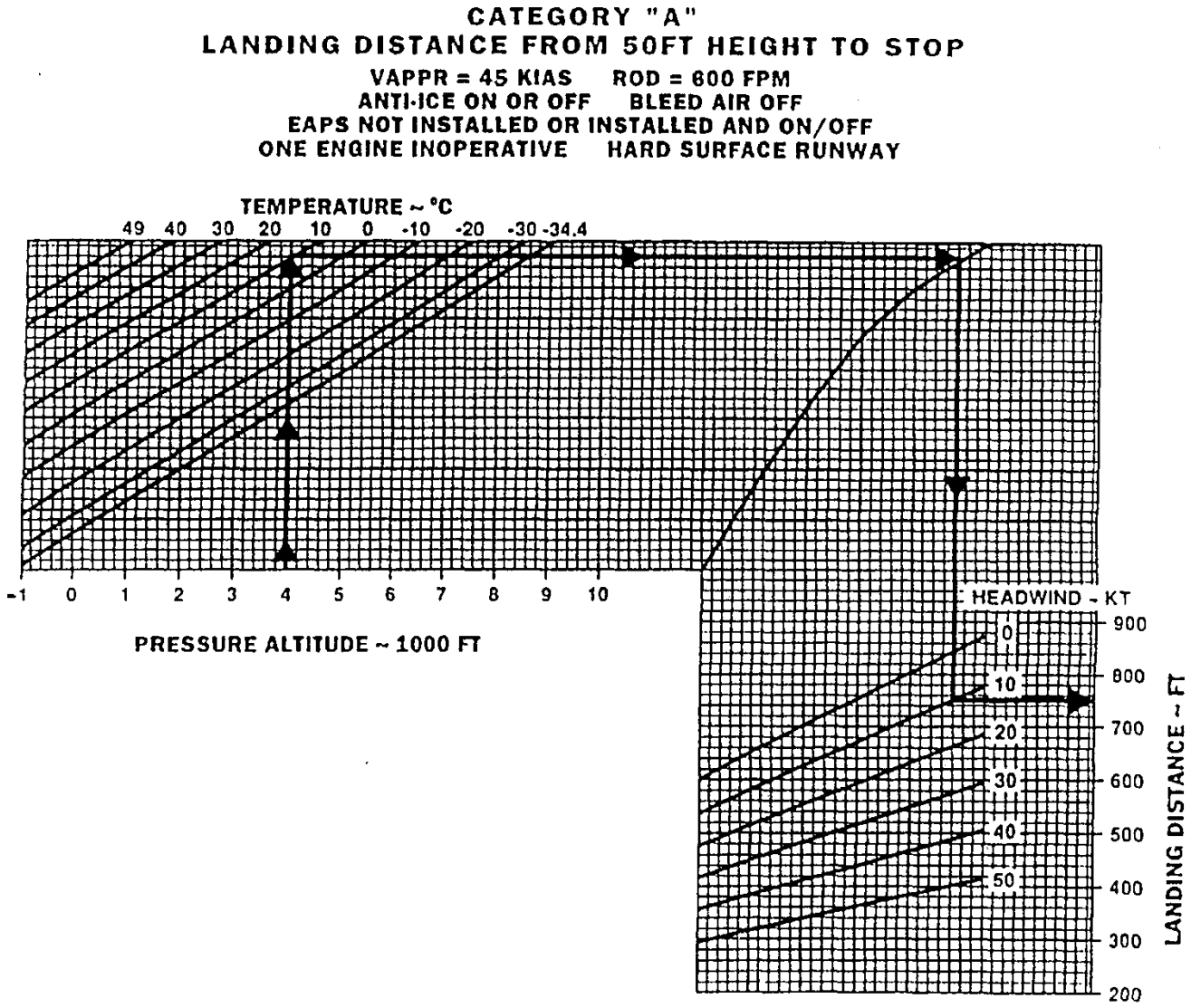


Figure 1.1.18 Category "A" - Landing Distance from 50 ft Height to Stop

CATEGORY "B" OPERATIONS

CATEGORY "B" TAKEOFF

TECHNIQUE

Rise vertically to 5 foot wheel height. Increase collective pitch to achieve up to 10% torque above hover torque (not to exceed takeoff power limits) and accelerate forward maintaining 5 to 10 foot wheel height. Rotate nose-up at 50 KIAS, and climb at 55 KIAS until obstructions are cleared.

ASSOCIATED CONDITIONS

Bleed Air: OFF

EAPS/Anti-ice: OFF or ON

TAKEOFF DISTANCE

The takeoff distances from 5 foot hover to 50 foot hover height are shown in Figures 1.1.20 to 1.1.23.

Example

Determine the take off distance required, given temperature, pressure altitude, and mission takeoff gross weight.

1. Enter table for appropriate EAPS configuration with the desired takeoff gross weight, and using temperature and pressure altitude, read takeoff distance required.

   Given:

Mission Takeoff Gross Weight:	9000 lb
Temperature:	+20 deg C
Pressure Altitude:	5000 ft
EAPS:	OFF

   Determine:

Takeoff Distance:	1100 ft

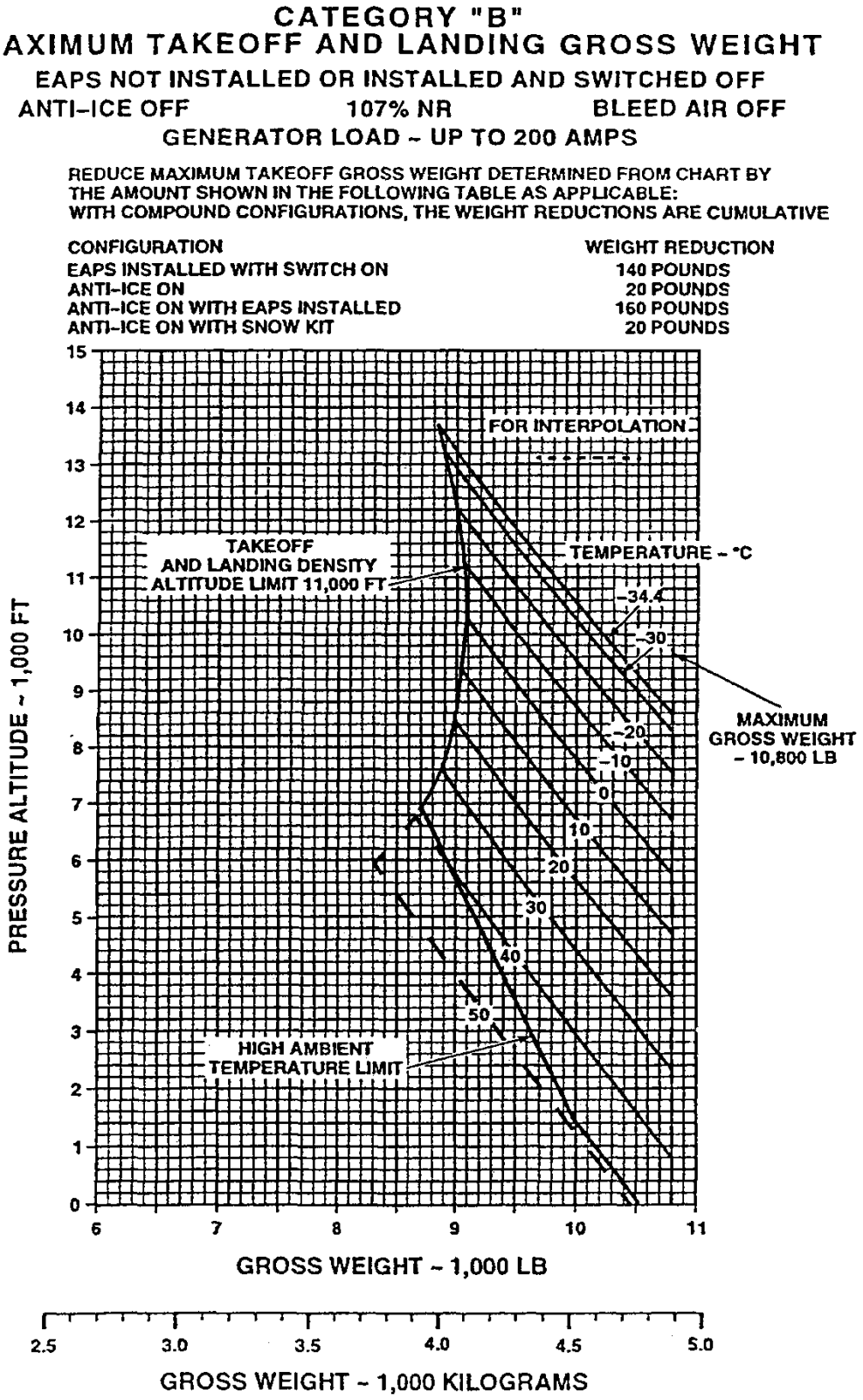


Figure 1.1.19 Category "B" - Maximum Takeoff and Landing Gross Weight

CATEGORY "B" TAKEOFF DISTANCE
EAPS NOT INSTALLED OR INSTALLED AND SWITCHED OFF
BLEED AIR OFF WIND CALM
ANTI-ICE: OFF OR ON WITHOUT EAPS INSTALLED,
OFF WITH EAPS INSTALLED AND SWITCHED OFF,
WITH OR WITHOUT SNOW KIT INSTALLED

OAT °C	PRESSURE ALTITUDE 1,000 FT.	GROSS WEIGHT - LBS						
		5,700	6,000	7,000	8,000	9,000	10,000	10,800
−34.4	0	600	610	660	700	750	790	830
	1	640	650	700	740	780	830	860
	2	680	690	730	780	820	860	900
	3	720	730	770	810	860	900	930
	4	750	770	810	850	890	930	970
	5	790	800	840	880	920	970	1,000
	6	830	840	880	920	960	1,000	1,030
	7	870	880	920	950	990	1,030	1,090
	8	910	920	960	990	1,030	1,060	1,260
	9	950	960	990	1,020	1,060	1,130	1,500*
	10	1,000	1,000	1,030	1,060	1,090	1,310	
	11	1,040	1,050	1,070	1,090	1,120	1,550*	
	12	1,080	1,090	1,100	1,120	1,240		
	13	1,120	1,120	1,130	1,150	1,440	FLIGHT NOT ALLOWED	
	14	1,150+	1,150+	1,160+	1,190+	1,720*		
−30	0	620	630	680	720	760	810	840
	1	660	670	710	760	800	840	880
	2	700	710	750	790	840	880	910
	3	730	750	790	830	870	910	950
	4	770	780	830	870	910	950	980
	5	810	820	860	900	940	980	1,010
	6	850	860	900	940	970	1,010	1,040
	7	890	900	940	970	1,010	1,040	1,140
	8	930	940	970	1,010	1,040	1,080	1,340
	9	970	980	1,010	1,040	1,070	1,180	1,590*
	10	1,020	1,020	1,050	1,080	1,100	1,390	
	11	1,060	1,070	1,090	1,110	1,150	1,640*	
	12	1,100	1,100	1,120	1,130	1,300		
	13	1,130	1,130	1,150	1,160	1,540*	FLIGHT NOT ALLOWED	
	14	1,160+	1,160+	1,170+	1,230+			
−20	0	660	670	720	760	800	850	880
	1	700	710	750	800	840	880	920
	2	740	750	790	830	880	920	950
	3	780	790	830	870	910	950	980
	4	810	820	860	900	940	980	1,020
	5	850	860	900	940	980	1,010	1,050
	6	890	900	940	970	1,010	1,050	1,120
	7	930	940	980	1,010	1,040	1,080	1,300
	8	980	980	1,010	1,040	1,070	1,160	1,540*
	9	1,020	1,030	1,050	1,080	1,100	1,340	
	10	1,060	1,070	1,090	1,110	1,130	1,580*	
	11	1,100	1,100	1,120	1,130	1,260		
	12	1,130	1,130	1,150	1,160	1,480	FLIGHT NOT ALLOWED	
	13	1,160+	1,160+	1,170+	1,200+	1,740*		
	14	1,190+	1,190+	1,200+	1,350+			

Figure 1.1.20 Category "B" - Takeoff Distance
(Sheet 1 of 4)

CATEGORY "B" TAKEOFF DISTANCE
EAPS NOT INSTALLED OR INSTALLED AND SWITCHED OFF
BLEED AIR OFF WIND CALM
ANTI-ICE: OFF OR ON WITHOUT EAPS INSTALLED,
OFF WITH EAPS INSTALLED AND SWITCHED OFF,
WITH OR WITHOUT SNOW KIT INSTALLED (CONTINUED)

OAT °C	PRESSURE ALTITUDE 1,000 FT.	GROSS WEIGHT - LBS						
		5,700	6,000	7,000	8,000	9,000	10,000	10,800
0	0	740	750	790	840	880	920	950
	1	780	790	830	870	910	950	990
	2	810	830	870	910	950	990	1,020
	3	850	860	900	940	980	1,020	1,050
	4	890	900	940	980	1,010	1,050	1,110
	5	930	940	980	1,010	1,040	1,080	1,280
	6	980	980	1,010	1,040	1,070	1,150	1,500*
	7	1,020	1,030	1,050	1,080	1,100	1,310	
	8	1,060	1,070	1,090	1,110	1,130	1,540*	
	9	1,100	1,100	1,120	1,130	1,240		
	10	1,130	1,130	1,150	1,160	1,430		
	11	1,160+	1,160+	1,170+	1,190+	1,680*	FLIGHT	
	12	1,190+	1,190+	1,200+	1,320+		NOT ALLOWED	
	13	1,210+	1,220+	1,220+	1,520+			
20	0	810	820	860	900	940	980	1,020
	1	850	860	900	940	980	1,010	1,040
	2	890	900	940	970	1,010	1,040	1,130
	3	930	940	970	1,010	1,040	1,070	1,300
	4	970	980	1,010	1,040	1,070	1,160	1,510*
	5	1,010	1,020	1,050	1,070	1,100	1,320	
	6	1,050	1,060	1,080	1,100	1,130	1,540*	
	7	1,090	1,100	1,110	1,130	1,250		
	8	1,120	1,130	1,140	1,150	1,430		
	9	1,150+	1,160+	1,170+	1,200+	1,660*	FLIGHT	
	10	1,180+	1,190+	1,190+	1,320+		NOT ALLOWED	
	11	1,210+	1,210+	1,210+	1,510+			
40	0	880	890	930	970	1,000	1,040	1,220
	1	920	930	970	1,000	1,030	1,120	1,400*
	2	960	970	1,000	1,030	1,070	1,250	
	3	1,000	1,010	1,040	1,070	1,090	1,430	
	4	1,040	1,050	1,070	1,100	1,200	1,630*	
	5	1,080	1,090	1,110	1,120	1,330		
	6	1,120	1,120	1,130	1,160	1,530*		
	7	1,150+	1,150+	1,160+	1,260+		FLIGHT	
	8	1,180+	1,180+	1,180+	1,410+		NOT ALLOWED	
	9	1,200+	1,200+	1,220+	1,620+			
49	0	910	920	960	990	1,030	1,170	1,470*
	1	950	960	990	1,030	1,060	1,310	
	2	1,000	1,000	1,030	1,060	1,130	1,490*	
	3	1,030+	1,040+	1,070+	1,090+	1,250+		
	4	1,070+	1,080+	1,100+	1,120+	1,390+		
	5	1,110+	1,110+	1,130+	1,190+	1,590+	FLIGHT	
	6	1,140+	1,140+	1,150+	1,320+	1,810*	NOT ALLOWED	
	7	1,170+	1,170+	1,180+	1,460+	2,040*		

+/* PRESENTED FOR INTERPOLATION ONLY.
+ DATA ABOVE 11,000 FT DENSITY ALTITUDE OR HIGH AMBIENT TEMPERATURE LIMIT.
* DATA ABOVE MAXIMUM PERMITTED TAKEOFF ALTITUDE FOR GROSS WEIGHT.

Figure 1.1.21 Category "B" - Takeoff Distance
(Sheet 2 of 4)

CATEGORY "B" TAKEOFF DISTANCE
EAPS INSTALLED AND ON
BLEED AIR OFF WIND CALM ANTI-ICE OFF OR ON

OAT °C	PRESSURE ALTITUDE 1,000 FT.	GROSS WEIGHT - LBS						
		5,700	6,000	7,000	8,000	9,000	10,000	10,800
−34.4	0	600	610	660	700	740	790	830
	1	640	650	690	740	780	830	860
	2	670	690	730	770	820	860	900
	3	710	730	770	810	850	900	930
	4	750	770	810	850	890	930	960
	5	790	800	840	880	920	960	1,000
	6	830	840	880	920	960	1,000	1,030
	7	870	880	920	950	990	1,030	1,120
	8	910	920	950	990	1,020	1,060	1,310
	9	950	960	990	1,030	1,060	1,160	1,540*
	10	1,000	1,000	1,030	1,060	1,090	1,350	
	11	1,040	1,050	1,070	1,090	1,130	1,600*	
	12	1,080	1,090	1,100	1,120	1,270		
	13	1,120	1,120	1,130	1,150	1,490	FLIGHT	
	14	1,150	1,150+	1,160+	1,210+	1,760*	NOT ALLOWED	
−30	0	620	630	670	720	760	810	840
	1	660	670	710	760	800	840	880
	2	690	710	750	790	840	880	910
	3	730	750	790	830	870	910	950
	4	770	780	820	870	910	950	980
	5	810	820	860	900	940	980	1,010
	6	850	860	900	930	970	1,010	1,040
	7	890	900	930	970	1,010	1,040	1,180
	8	930	940	970	1,010	1,040	1,080	1,390
	9	970	980	1,010	1,040	1,070	1,210	1,630*
	10	1,020	1,020	1,050	1,080	1,100	1,430	
	11	1,060	1,060	1,090	1,110	1,170	1,680*	
	12	1,100	1,100	1,120	1,130	1,340		
	13	1,130	1,130	1,150	1,160	1,580*	FLIGHT	
	14	1,160	1,160+	1,170+	1,260+		NOT ALLOWED	
−20	0	660	670	720	760	802	850	880
	1	700	710	750	800	840	880	920
	2	740	750	790	830	880	920	950
	3	770	790	830	870	910	950	980
	4	810	820	860	900	940	980	1,010
	5	850	860	900	940	980	1,010	1,040
	6	890	900	940	970	1,010	1,050	1,150
	7	930	940	970	1,010	1,040	1,080	1,350
	8	970	980	1,010	1,040	1,070	1,190	1,590*
	9	1,020	1,030	1,050	1,080	1,100	1,390	
	10	1,060	1,070	1,090	1,110	1,150	1,640*	
	11	1,100	1,100	1,120	1,130	1,300		
	12	1,130	1,130	1,150	1,160	1,530	FLIGHT	
	13	1,160	1,160+	1,170+	1,230+	1,790*	NOT ALLOWED	
	14	1,190	1,190+	1,200+	1,390+			

Figure 1.1.22 Category "B" - Takeoff Distance
(Sheet 3 of 4)

CATEGORY "B" TAKEOFF DISTANCE
EAPS INSTALLED AND ON
BLEED AIR OFF WIND CALM ANTI-ICE OFF OR ON
(CONTINUED)

OAT °C	PRESSURE ALTITUDE 1,000 FT.	GROSS WEIGHT - LBS						
		5,700	6,000	7,000	8,000	9,000	10,000	10,800
0	0	740	750	790	840	880	920	950
	1	780	790	830	870	910	950	990
	2	810	830	870	910	950	990	1,020
	3	850	860	900	940	980	1,020	1,050
	4	890	900	940	970	1,010	1,050	1,150
	5	930	940	980	1,010	1,040	1,080	1,330
	6	970	980	1,010	1,040	1,070	1,180	1,550*
	7	1,020	1,030	1,050	1,080	1,100	1,370	
	8	1,060	1,060	1,090	1,110	1,150	1,590*	
	9	1,100	1,100	1,120	1,130	1,280		
	10	1,130	1,130	1,140	1,160	1,490		
	11	1,160	1,160+	1,170+	1,220+	1,730*	FLIGHT NOT ALLOWED	
	12	1,190	1,190+	1,190+	1,360+			
	13	1,210	1,210+	1,220+	1,580+			
20	0	810	820	860	900	940	980	1,020
	1	850	860	900	940	970	1,010	1,050
	2	890	900	940	970	1,010	1,040	1,180
	3	930	940	970	1,010	1,040	1,080	1,350
	4	970	980	1,010	1,040	1,070	1,200	1,560*
	5	1,010	1,020	1,050	1,070	1,100	1,380	
	6	1,050	1,060	1,080	1,100	1,160	1,600*	
	7	1,090	1,100	1,110	1,130	1,300		
	8	1,120	1,130	1,140	1,150	1,500		
	9	1,150	1,160+	1,170+	1,230+	1,730*	FLIGHT NOT ALLOWED	
	10	1,180	1,180+	1,190+	1,370+			
	11	1,210	1,210+	1,210+	1,570+			
40	0	880	890	930	960	1,000	1,050	1,280
	1	920	930	960	1,000	1,030	1,160	1,470*
	2	960	970	1,000	1,030	1,060	1,310	
	3	1,000	1,010	1,040	1,070	1,130	1,490*	
	4	1,040	1,050	1,070	1,100	1,250		
	5	1,080	1,090	1,110	1,120	1,400		
	6	1,120	1,120	1,130	1,190	1,600*		
	7	1,150	1,150+	1,160+	1,300+	FLIGHT NOT ALLOWED		
	8	1,170	1,180+	1,180+	1,440+			
	9	1,200	1,200+	1,230+	1,640+			
49	0	910	920	960	990	1,030	1,220	1,530*
	1	950	960	990	1,030	1,070	1,370	
	2	990	1,000	1,030	1,060	1,170	1,550*	
	3	1,030	1,040+	1,070+	1,090+	1,300+		
	4	1,070	1,080+	1,100+	1,130+	1,450*		
	5	1,110	1,110+	1,130+	1,230+	FLIGHT NOT ALLOWED		
	6	1,140	1,140+	1,150+	1,360+			
	7	1,170	1,170+	1,180+	1,490+			

+/* PRESENTED FOR INTERPOLATION ONLY.
+ DATA ABOVE 11,000 FT DENSITY ALTITUDE OR HIGH AMBIENT TEMPERATURE LIMIT.
* DATA ABOVE MAXIMUM PERMITTED TAKEOFF ALTITUDE FOR GROSS WEIGHT.

Figure 1.1.23 Category "B" - Takeoff Distance
(Sheet 4 of 4)

CATEGORY "B" LANDING

TECHNIQUE

Establish approach to pass through a point 200 feet above the touchdown elevation at 45 KIAS and 600 FPM rate of descent. Initiate deceleration passing through 50 feet at 45 KIAS. Continue approach and deceleration to a running touchdown or hover. Refer to emergency procedures for single engine landing.

ASSOCIATED CONDITIONS

Bleed Air: OFF

EAPS/Anti-ice: OFF or ON

LANDING DISTANCE

The landing distances shown in Figure 1.1.24 reflect one engine inoperative landings to a hard surfaced runway.

Example

Determine landing distance required, given temperature and pressure altitude.

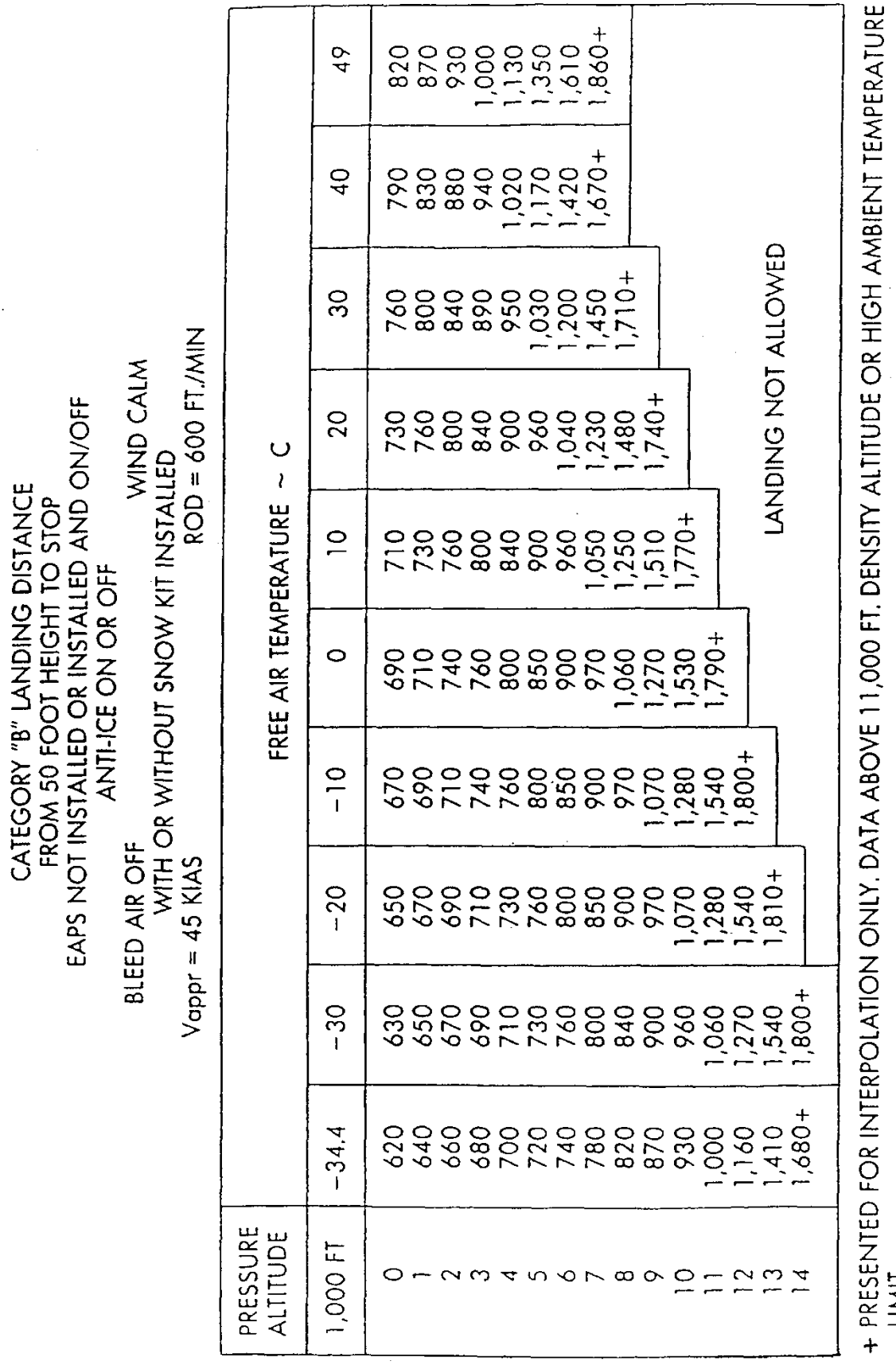
1. Enter Figure 1.1.24 and using temperature and pressure altitude, read landing distance required.

   Given:

   Temperature: +30 deg C
   Pressure Altitude: 3000 ft

   Determine:

   Landing Distance: 890 ft



CATEGORY "B" LANDING DISTANCE
FROM 50 FOOT HEIGHT TO STOP
EAPS NOT INSTALLED OR INSTALLED AND ON/OFF
ANTI-ICE ON OR OFF
BLEED AIR OFF WIND CALM
WITH OR WITHOUT SNOW KIT INSTALLED
Vappr = 45 KIAS ROD = 600 FT./MIN

PRESSURE ALTITUDE	FREE AIR TEMPERATURE ~ C									
1,000 FT	−34.4	−30	−20	−10	0	10	20	30	40	49
0	620	630	650	670	690	710	730	760	790	820
1	640	650	670	690	710	730	760	800	830	870
2	660	670	690	710	740	760	800	840	880	930
3	680	690	710	740	760	800	840	890	940	1,000
4	700	710	730	760	800	840	900	950	1,020	1,130
5	720	730	760	800	850	900	960	1,030	1,170	1,350
6	740	760	800	850	900	960	1,040	1,200	1,420	1,610
7	780	800	850	900	970	1,050	1,230	1,450	1,670+	1,860+
8	820	840	900	970	1,060	1,250	1,480	1,710+		
9	870	900	970	1,070	1,270	1,510	1,740+			
10	930	960	1,070	1,280	1,530	1,770+				
11	1,000	1,060	1,280	1,540	1,790+					
12	1,160	1,270	1,540	1,800+						
13	1,410	1,540	1,810+							
14	1,680+	1,800+								

LANDING NOT ALLOWED

+ PRESENTED FOR INTERPOLATION ONLY. DATA ABOVE 11,000 FT. DENSITY ALTITUDE OR HIGH AMBIENT TEMPERATURE LIMIT.

Figure 1.1.24 Category "B" - Landing Distance from 50 ft Height to Stop

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PART 1

SIKORSKY S76 FLIGHT MANUAL (EXTRACT)

SECTION 2

WEIGHT AND BALANCE

WEIGHT AND BALANCE

GENERAL

EMPTY WEIGHT AND HORIZONTAL CENTRE OF GRAVITY LOCATION

The current weight, moment and centre of gravity location of this aircraft are as shown in the Load Data Sheet, Figure 1.2.2, herein.

1. The current weight includes all items listed in the Empty Weight Record, Figure 1.2.3, herein.

2. Figure 1.2.3 must be kept up to date. If any items of equipment are added to or removed from the aircraft, Figure 1.2.3 must be updated as follows:

    a. When items are added, make the appropriate entry in the 'Added' column of the Empty Weight Record, Figure 1.2.3, dating the columns where indicated. Add the new entry or entries to the previous totals of empty weight and moment and calculate the new empty weight, moment and centre of gravity location.

    b. When items are removed from the aircraft, follow a similar procedure to a. above, using the 'Removed' column and subtract the new entry or entries from the previous totals of empty weight and moment.

    c. New items to be added to the aircraft and not previously listed, may be 'written in' on the next available line in the appropriate column of Figure 1.2.3. Do not erase or obliterate any chart entries when items are removed from the aircraft.

    d. The aircraft empty weight centre of gravity location (CG) is initially obtained by actual weighing (Figure 1.2.2). The updated CG is obtained by dividing the updated moment by the updated empty weight.

    e. The Empty Weight Record (Figure 1.2.3) may be used for periodic checking of the aircraft inventory.

LOADING INSTRUCTIONS

1. Obtain the current Aircraft Empty Weight and Aircraft Empty Weight moment/1000 from Figure 1.2.2 or Figure 1.2.3, were items have been added to or removed from aircraft and enter each in the appropriate columns of the manifest.

2. Obtain the aircraft takeoff gross weight and moment by adding to the current aircraft empty weight and moment/1000, the weight and moment/1000 of each useful load item to be carried. The weight and moment/1000 of useful load items is shown in Figure 1.2.6/7, Figure 1.2.8, Figure 1.2.9 and Figure 1.2.10. Useful load items include fuel, crew, passengers, baggage and/or cargo. Do not exceed limitations for the specified compartments at any time.

3. Determine by reference to the Centre of Gravity chart (Figure 1.2.1) that the takeoff gross weight and moment thus obtained is within the recommended weight and CG limits. The aft CG has been adjusted to account for the landing gear retraction moment of plus (+) 838. Therefore, loading based on wheels down conditions which fall within the limiting moments of Figure 1.2.1 will be within CG limits for flight with the landing gear retracted.

4. Check that the aircraft will remain within CG limits throughout the flight:

    a. compute the landing gross weight and moment/1000, and
    b. determine by reference to the CG chart, Figure 1.2.1, if landing gross weight and moment is within the recommended weight and CG limits. Bring the aircraft weight and/or balance within limits if either the weight or the moment is outside the recommended limits by off loading and/or redistribution of useful load.

EXAMPLE

ITEM	WEIGHT (kg)	ARM (mm)	MOMENT / 1000
AIRCRAFT PREPARED FOR SERVICE	3100	5435	16848.5
PILOT	80	2604	208.3
COPILOT PAX	80	2604	208.3
PASSENGERS / C1	300	3442	1032.6
PASSENGERS / C2	200	4229	845.8
PASSENGERS / C3	120	5017	602.0
BAGGAGE / CARGO	100	5969	596.9
ZERO FUEL WEIGHT	3980	5111	20342.4
FUEL @ (T/O)	725.7	Refer Figure 1.2.10	3992.6
TAKEOFF WEIGHT	4705.7	5171	24335.0
C of G @ TAKEOFF = (24335.0 X 1000) / 4705.7 = 5171			
FUEL BURN	490.5		
FUEL REMAINING	235.2	Refer Figure 1.2.10	1286.5
LANDING WEIGHT	4215.2	5131	21628.9
C of G @ LANDING = (21628.9 X 1000) / 4215.2 = 5131			

WEIGHT AND CENTRE OF GRAVITY LIMITS

See Figure 1.2.1 for forward and aft centre of gravity limits at various gross weights.

Lateral CG limits: Left or right 3-1/2 inches (89 mm) up to 10500 pounds (4764 kg) gross weight.
Left or right 2-1/2 inches (63.5 mm) above 10500 pounds (4764 kg) gross weight.

WEIGHT DEFINITIONS

AIRCRAFT EMPTY WEIGHT (AEW):

As weighed empty weight as described in Figure 1.2.2.

AIRCRAFT PREPARED FOR SERVICE (APS):

Aircraft Empty Weight plus weight of all additional equipment, fixed or temporary, as described in Figure 1.2.3.

OPERATING EMPTY WEIGHT (OEW):

Aircraft Prepared for Service weight plus weight of crew.

ZERO FUEL WEIGHT (ZFW):

Operating Empty Weight plus weight of all useful load items, excluding fuel.

RAMP WEIGHT (RW):

Zero Fuel Weight plus fuel at engine start.

TAKEOFF WEIGHT (TOW):

Ramp Weight less fuel burned during start and taxi.

LANDING WEIGHT (LW):

Takeoff Weight less fuel burn from takeoff to landing.

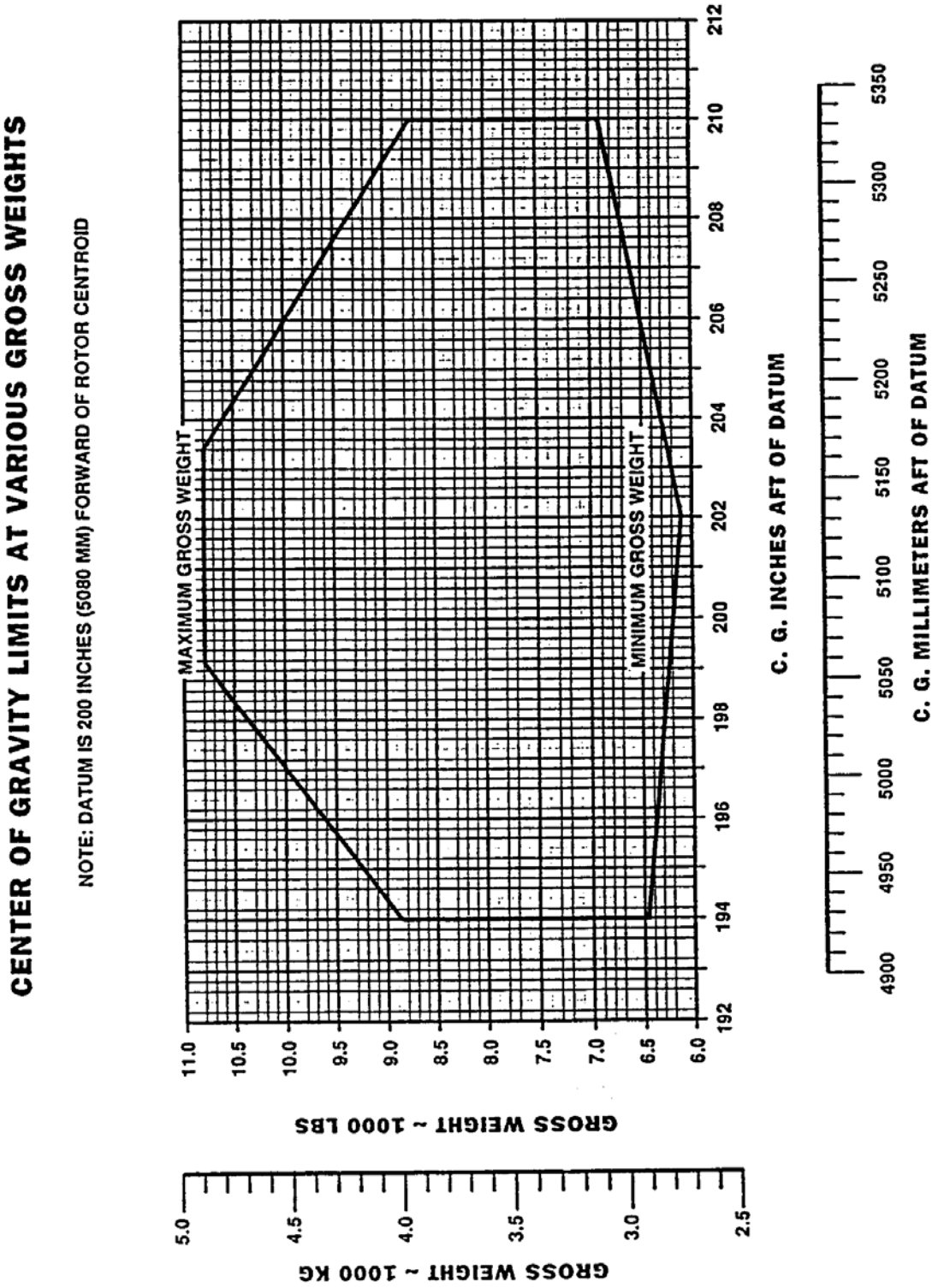


Figure 1.2.1 Centre of Gravity Limits

LOAD DATA SHEET

AIRCRAFT TYPE: SIKORSKY S76

AIRCRAFT TYPE MAXIMUM TAKEOFF WEIGHT: 4898 kg

THIS AIRCRAFT

As weighed empty weight	2850 kg
As weighed empty longitudinal arm	5420 mm
As weighed empty longitudinal moment / 1000	15447.0 kg/mm
As weighed empty lateral arm	-0.40 mm
As weighed empty lateral moment	-1140 kg/mm

MANUFACTURER'S LONGITUDINAL LIMITS

Refer to Figure 1.2.1, Section 2, Approved Rotorcraft Flight Manual for longitudinal limits.

MANUFACTURER'S LATERAL LIMITS

Lateral limit is 89 mm left or right of centreline for gross weight up to 4764 kg, reducing to 63.5 mm left or right of centreline for gross weights above 4764 kg.

CONFIGURATION AT TIME OF WEIGHING

Empty weight includes 2 pilot seats, emergency floats, hoist provisions, right hand sliding door, cargo hook, 2 x portable fire extinguishers, 2 x first aid kits.

Figure 1.2.2 Load Data Sheet

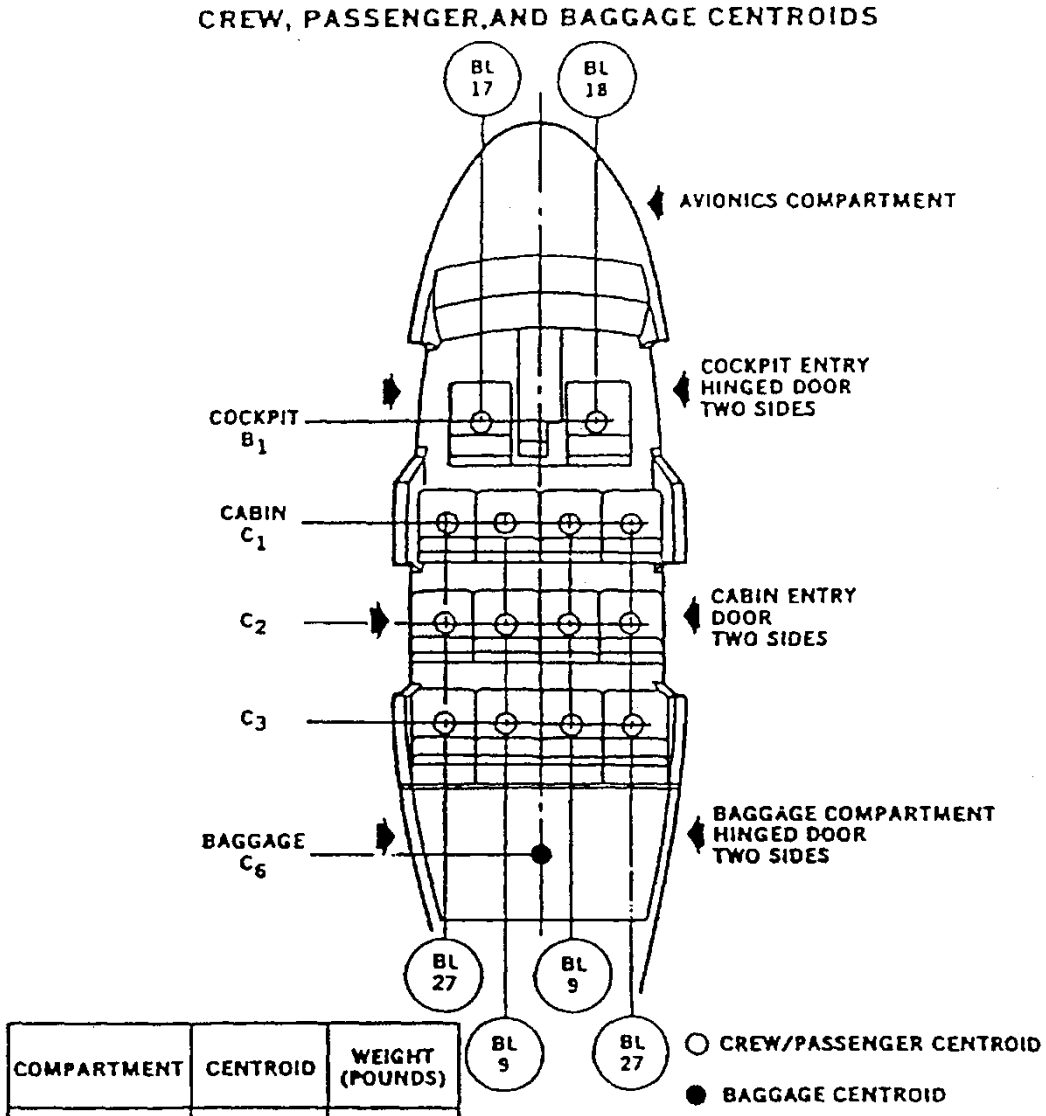
EMPTY WEIGHT AND BALANCE RECORD

Refer to Figure 1.2.2 for Aircraft Empty Weight and Centre of Gravity details.

ITEM	ARM mm aft of Datum	ALTERATION				TOTAL	
		ADDED		REMOVED		APS Weight	Moment/1000
		Weight	Moment/1000	Weight	Moment/1000		
Empty Weight	5420					2850	15447.0
Row 1 seats	3430	30	102.9			2880	15549.9
Row 2 seats	4230	25	105.8			2905	15655.7
Row 3 seats	5010	20	100.2			2925	15755.9
Life Rafts	4038	52	210.0			2977	15965.9
Marine EPIRB	2623.5	8	21.0			2985	15986.6
Deck Protection	4229	10	42.3			2995	16029.2

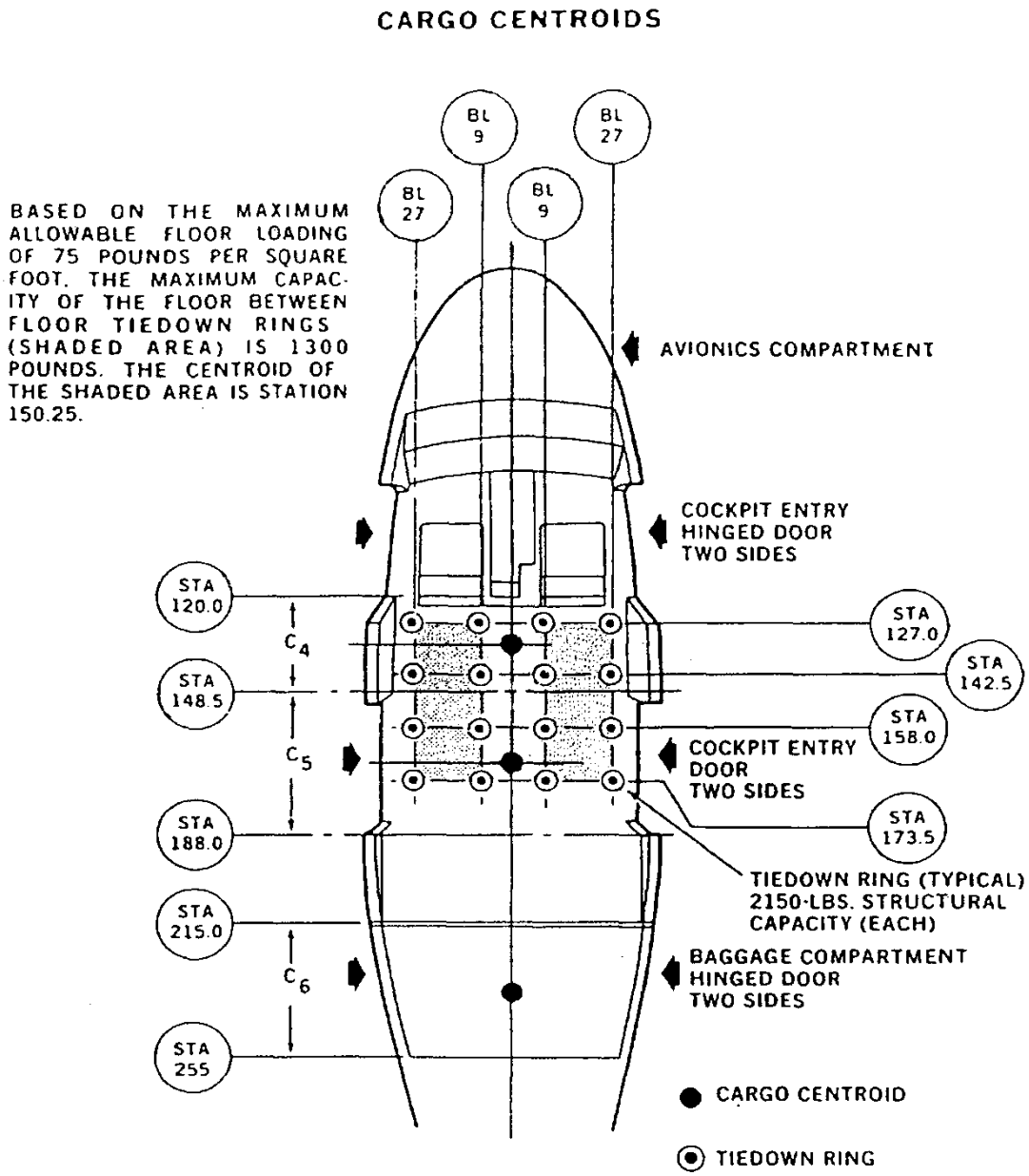
NOTE: All items of equipment added to or removed from this aircraft must be entered on this table. No other entries made on this table may be obliterated or erased.

Figure 1.2.3 Empty Weight and Balance Record



COMPARTMENT	CENTROID	WEIGHT (POUNDS)
COCKPIT B_1	102.5	340
CABIN C_1	135.5	680
C_2	166.5	680
C_3	197.5	680
BAGGAGE C_6	235.0	600

Figure 1.2.4 Crew, Passenger and Baggage Centroids



COMPARTMENT	CENTROID	MAXIMUM WEIGHT (POUNDS)
C_4	134 25	965*
C_5	168 25	1337*
C_6	235 00	600*

*MAXIMUM ALLOWABLE FLOOR LOADING FOR CABIN FLOOR IS 75 POUNDS PER SQUARE FOOT. MAXIMUM ALLOWABLE FLOOR LOADING FOR BAGGAGE COMPARTMENT FLOOR IS 75 POUNDS PER SQUARE FOOT FOR WEIGHTS UP TO THE MAXIMUM BAGGAGE COMPARTMENT WEIGHT OF 600 POUNDS.

Figure 1.2.5 Cargo Centroids

WEIGHT (KILOGRAMS)	COCKPIT	CABIN			
	PILOT AND CO-PILOT/ PASSENGER	PASSENGERS			BAGGAGE/ CARGO
	B_1	C_1	C_2	C_3	C_6
	ARM = 2604 MOMENT/1000 (Kg. mm.)	ARM = 3442 MOMENT/1000 (Kg. mm.)	ARM = 4229 MOMENT/1000 (Kg. mm.)	ARM = 5017 MOMENT/1000 (Kg. mm.)	ARM = 5969 MOMENT/1000 (Kg. mm.)
25	65	86	106	125	149
30	78	103	127	150	179
35	91	120	148	176	209
40	104	138	169	201	239
45	117	155	190	226	269
50	130	172	211	251	298
55	143	189	232	276	328
60	156	206	254	301	358
65	169	224	275	326	388
70	182	241	296	351	418
75	195	258	317	376	448
80	208	275	338	401	478
85	221	292	359	426	507
90	234	310	381	452	537
95	247	327	402	477	567
100	260	344	423	502	597
105	273	361	444	527	627
110	286	379	465	552	656
115	299	396	486	577	686
120	312	413	507	602	716
125	326	430	529	627	746
130	338	447	540	652	776
135	352	465	571	677	806
140	364	482	592	702	836
145	378	499	613	727	866
150	391	516	634	752	895
154	401	530	651	773	919
160		551	677	803	955
165		568	698	828	985
170		585	719	853	1015
175		602	740	878	1044
180		620	761	903	1074
185		637	782	928	1104
190		654	804	953	1134
195		671	825	978	1164
200		688	846	1003	1194
205		706	867	1028	1224

Figure 1.2.6 Cockpit and Cabin Compartment Weight and Moment Table (Sheet 1 of 2)

WEIGHT (KILOGRAMS)	COCKPIT	CABIN			
	PILOT AND CO-PILOT/ PASSENGER	PASSENGERS			BAGGAGE/ CARGO
	B_1	C_1	C_2	C_3	C_6
	ARM = 2604 MOMENT/1000 (Kg. mm.)	ARM = 3442 MOMENT/1000 (Kg. mm.)	ARM = 4229 MOMENT/1000 (Kg. mm.)	ARM = 5017 MOMENT/1000 (Kg. mm.)	ARM = 5969 MOMENT/1000 (Kg. mm.)
210		723	888	1054	1253
215		740	909	1079	1283
220		757	930	1104	1313
225		774	952	1129	1343
230		792	973	1154	1373
235		809	994	1179	1403
240		826	1015	1204	1432
245		843	1036	1229	1462
250		860	1057	1254	1492
255		878	1078	1279	1522
260		895	1100	1304	1552
265		912	1121	1330	1582
270		929	1142	1354	1612
272*		936	1150	1365	1624
275		946	1163	1380	
280		964	1184	1405	
285		981	1205	1430	
290		998	1226	1455	
295		1015	1248	1480	
300		1033	1269	1505	
305		1050	1290	1530	
308		1060	1302	1545	

NOTE: 1. CAUTION MUST BE TAKEN TO BE SURE THAT PASSENGER AND/OR BAGGAGE/CARGO COMPARTMENT LOADING DOES NOT CAUSE AIRCRAFT MAXIMUM GROSS WEIGHT AND/OR C.G. LIMITS TO BE EXCEEDED.

2. BAGGAGE/CARGO CENTROID MUST BE LOCATED AT COMPARTMENT CENTROID.

3. MAXIMUM ALLOWABLE UNIFORM FLOOR LOADING FOR THE BAGGAGE COMPARTMENT IS 366 KILOGRAMS PER SQUARE METER FOR WEIGHTS UP TO 272 KILOGRAM MAXIMUM COMPARTMENT WEIGHT.

4. MOMENT ARM IS MILLIMETERS FROM HORIZONTAL DATUM.

*MAXIMUM CAPACITY OF COMPARTMENT C_6

Figure 1.2.7 Cockpit and Cabin Compartment Weight and Moment Table (Sheet 2 of 2)

INTERNAL CARGO TABLE

WEIGHT (KILOGRAMS)	CABIN		WEIGHT (KILOGRAMS)	CABIN	
	C_4	C_5		C_4	C_5
	ARM = 3410 MOMENT/1000 (Kg. mm.)	ARM = 4274 MOMENT/1000 (Kg. mm.)		ARM = 3410 MOMENT/1000 (Kg. mm.)	ARM = 4274 MOMENT/1000 (Kg. mm.)
5	17	21	250	852	1068
10	34	43	275	938	1175
15	51	64	300	1023	1282
20	68	85	325	1108	1389
25	85	107	350	1194	1496
30	102	128	375	1279	1603
35	119	150	400	1364	1710
40	136	171	425	1449	1816
45	153	192	438*	1494	1872
50	170	214	450		1923
75	256	320	475		2030
100	341	427	500		2137
125	426	534	525		2244
150	512	641	550		2351
175	597	748	575		2458
200	682	855	600		2564
225	767	962	606**		2590

*MAXIMUM CAPACITY OF COMPARTMENT C_4

**MAXIMUM CAPACITY OF COMPARTMENT C_5

NOTE:
1. CAUTION MUST BE TAKEN TO BE SURE THAT CARGO LOADING DOES NOT CAUSE AIRCRAFT MAXIMUM GROSS WEIGHT AND/OR C.G. LIMITS TO BE EXCEEDED.
2. CARGO CENTROID MUST BE LOCATED AT COMPARTMENT CENTROID.
3. MAXIMUM ALLOWABLE UNIFORM FLOOR LOADING FOR CARGO IS 366 KILOGRAMS PER SQUARE METER.
4. SEE COCKPIT AND CABIN COMPARTMENT TABLE FOR BAGGAGE COMPARTMENT (C_6) WEIGHT AND MOMENT/1000 VALUES AND LOADING REQUIREMENTS.
5. MOMENT ARM IS MILLIMETERS FROM HORIZONTAL DATUM.

Figure 1.2.8 Internal Cargo Weight and Moment Table

EXTERNAL CARGO TABLE

WEIGHT (KILOGRAMS)	ARM = 4610 MOMENT/1000 (Kg. mm.)	WEIGHT (KILOGRAMS)	ARM = 4610 MOMENT/1000 (Kg. mm.)
10	46	700	3227
20	92	750	3458
30	138	800	3688
40	184	850	3918
50	230	900	4149
100	461	950	4380
150	692	1000	4610
200	922	1050	4840
250	1152	1100	5071
300	1383	1150	5302
350	1614	1200	5532
400	1844	1250	5762
450	2074	1300	5993
500	2305	1350	6224
550	2536	1400	6454
600	2766	1450	6684
650	2996	* 1497	6901

* MAXIMUM EXTERNAL CARGO WEIGHT

NOTE: 1. THIS TABLE IS APPLICABLE ONLY WHEN THE EXTERNAL LOAD SYSTEM OPTION IS INSTALLED.

2. CAUTION MUST BE TAKEN TO BE SURE THAT EXTERNAL CARGO LOADING DOES NOT CAUSE AIRCRAFT MAXIMUM GROSS WEIGHT AND/OR C.G. LIMITS TO BE EXCEEDED.

3. MOMENT ARM IS MILLIMETRES FROM HORIZONTAL DATUM.

Figure 1.2.9 External Cargo Weight and Moment Table

FUEL SYSTEM — 2 TANKS					
CAPACITY = 281.2 GALLONS (2 TANKS)					
TOTAL WEIGHT-LB	MOMENT/100	TOTAL WEIGHT-LB	MOMENT/100	TOTAL WEIGHT-LB	MOMENT/100
20	44	640	1379	1360	2944
40	86	680	1465	1400	3031
60	128	720	1552	1440	3118
80	171	760	1639	1480	3204
100	213	800	1727	1520	3292
120	255	840	1814	1560	3379
160	341	880	1901	1600	3466
200	426	920	1988	1640	3552
240	512	960	2075	1680	3641
280	598	1000	2161	1720	3727
320	685	1040	2248	1760	3814
360	772	1080	2335	1800	3901
400	858	1120	2423	*1828(JP-4)	3961
440	946	1160	2509	1840	3987
480	1032	1200	2597	1880	4074
520	1119	1240	2683	**1898(JP-1)	4113
560	1205	1280	2770	***1912(JP-5)	4143
600	1292	1320	2856		

NOTES:
1. (*) THE SINGLE ASTERISK INDICATES THE APPROXIMATE WEIGHT AND MOMENT/100 FOR FULL FUEL TANKS USING JP-4 FUEL AT 6.5 POUNDS PER GALLON UNDER STANDARD CONDITIONS (60°F).
2. (**) THE DOUBLE ASTERISK INDICATES THE APPROXIMATE WEIGHT AND MOMENT/100 FOR FULL FUEL TANKS USING JP-1 FUEL AT 6.75 POUNDS PER GALLON UNDER STANDARD CONDITIONS (60°F).
3. (***) THE TRIPLE ASTERISK INDICATES THE APPROXIMATE WEIGHT AND MOMENT/100 FOR FULL FUEL TANKS USING JP-5 FUEL AT 6.8 POUNDS PER GALLON UNDER STANDARD CONDITIONS (60°F).
4. THE TOTAL USABLE CAPACITY OF 281.2 U.S. GALLONS (140.6 GALLONS PER TANK) IS BASED ON ACTUAL TEST RESULTS.
5. THE USABLE FUEL TABLE (GRAVITY FUELING) AND THE FUEL ARM TABLE ARE FOR EQUAL WEIGHTS OF FUEL IN EACH TANK.
6. THE STANDARD S-76 HELICOPTER IS EQUIPPED WITH A CAPACITOR TYPE FUEL QUANTITY GAGE WHICH IS CALIBRATED IN POUNDS. AIRCRAFT FUEL VARIES IN WEIGHT PER GALLON DEPENDENT UPON THE SPECIFIC GRAVITY AND TEMPERATURE OF THE FUEL. THEREFORE, THE NOTATION "FULL" DOES NOT APPEAR ON THE INSTRUMENT DIAL. THE PILOT SHOULD ANTICIPATE VARIATIONS IN THE INSTRUMENT READINGS WHEN TANKS ARE FULL.
7. THE FUEL ARM TABLE IS INCLUDED FOR REFERENCE.

FUEL ARM TABLE

FUEL SYSTEM - 2 TANKS				
FUEL QUANTITY	TOTAL WEIGHT		ARM (MILLIMETERS)	MOMENT/1000 (Kg. mm.)
	POUNDS	KILOGRAMS		
¼ FULL	457	207	5464	1131
½ FULL	914	415	5489	2278
¾ FULL	1371	622	5499	3420
FULL (JP-4)	*1828	*829	5504	4563
FULL (JP-1)	**1898	**861	5504	4739
FULL (JP-5)	***1912	***867	5504	4772

Figure 1.2.10 Useable Fuel Weight and Moment Table (Gravity Fuelling)

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PART 2

COMPANY OPERATIONS MANUAL (EXTRACT)

SECTION 1

FLIGHT PLANNING DATA

FLIGHT PLANNING DATA

AIRCRAFT FUEL CAPACITIES USEABLE

	US GAL	LITRES	LB	KG
Basic Aircraft	276	1052	1850	840

STANDARD TAS and FUEL FLOWS

		Speed (TAS)	Fuel Flow
Cruise All Weights - 2 engines operating		140 kt	600 lb/hr
Holding All Weights - 2 engines operating		100 kt	480 lb/hr
Cruise and Holding All Weights - OEI ISA		100 kt	420 lb/hr
	ISA+20	100 kt	440 lb/hr

STANDARD FUEL ALLOWANCES

Instrument Approach Fuel	50 lb
Start/Wheel-Taxi Fuel	40 lb
Rotors Running Turnaround	80 lb

MID ZONE FUEL WEIGHTS

Unless otherwise advised by a responsible company officer, the Mid Zone Weight vs Fuel Flow table (Figure 2.1.1) must be used to derive fuel flows for all sectors flown with 2 engines operating.

To determine the Mid Zone Weight, calculate fuel burn to the mid zone (half-way) position of the entire flight at the standard rate and subtract this weight from the aircraft takeoff weight. The Mid Zone Weight derived will be used for all sectors. Enter the table at the appropriate Density Altitude for each sector and read the fuel flow for the sector from the corresponding weight column.

Mid Zone Weights are not required for OEI operations. Use standard fuel flows when calculating fuel requirements for sectors flown in the OEI configuration.

These figures are for planning purposes only. The pilot in command must carefully monitor actual fuel flows to ensure that all statutory requirements are met.

DA X 1000	10800 lbs (4898 kgs)		10500 lbs (4764 kgs)		10000 lbs (4537 kgs)		9500 lbs (4310 kgs)		9000 lbs (4083 kgs)		8500 lbs (3856 kgs)		8000 lbs (3629 kgs)	
	F/F	SA	F/F	SAR	F/F	SA	F/F	SAR	F/F	SAR	F/F	SAR	F/	SAR
1	596	.235	594	.236	590	.237	585	.239	581	.241	577	.242	574	.243
2	576	.243	574	.244	570	.246	567	.247	563	.249	560	.250	555	.252
3	561	.249	560	.250	557	.251	555	.252	552	.254	550	.254	546	.256
4	541	.259	540	.259	538	.260	536	.261	534	.262	533	.263	530	.264
5	527	.266	526	.266	524	.267	522	.268	519	.270	517	.271	514	.272
6	515	.272	514	.272	512	.273	509	.275	507	.276	505	.277	502	.279
7	506	.277	505	.277	502	.279	499	.280	496	.282	494	.283	490	.286
8	494	.283	492	.284	488	.287	484	.289	480	.292	476	.294	470	.298

Figure 2.1.1 Mid Zone Weight vs Fuel Flow (pounds per hour) and Specific Air Range (nm/ lb fuel) TAS 140 kt

NOTE: Fuel Flow figures for fractional altitudes (to the nearest 100 ft) must be derived by interpolation.

Example: Fuel Flow at 7800 feet DA at 10800 lb. = 506 - ([506 - 494] x.8)
= 506 - 9.6
= 496.4
= 496

NOTE: Fuel Flows for fractional weights (to the nearest <u>higher</u> 250 lb) must be derived by interpolation.

Example: Fuel Flow at 10100 lb at 8000 ft DA. (round up to 10250 lb) = 492 - ([492 - 488] x .5)
= 492 - 2
= 490

CLIMB

Initial climb to cruise level with 2 engines operating shall be conducted at 80 KIAS. Flight plan estimates shall be increased by 1 minute per two thousand feet of climb or part thereof. When a destination requires an ALTN, no allowance for climb shall be made when planning sectors from the destination to the ALTN.

Following an engine failure on take-off, initial climb in the OEI configuration shall be conducted at VBROC. Where the flight continues to the destination, flight plan estimates shall be increased by 1 minute per one thousand feet of climb or part thereof.

DESCENT

Descent should be conducted at cruise speed unless dictated by performance category for instrument approach, or other limitations, e.g. undercarriage restrictions.

CALCULATION OF PNR AND CP (ETP)

When planning fights over long distances (greater than 180 nm) where no suitable enroute alternates exist, and for all operations offshore, pilots must assess the options available to them in the event of an in-flight emergency.

To this end, pilots shall, for the operations above and other times at their own discretion, calculate a PNR and CP/ETP during pre-flight planning. In particular, the pilot in command should ensure there is sufficient fuel on board at takeoff to allow for flight with two engines operating to the CP/ETP OEI, and for OEI flight from the CP/ETP OEI to a location suitable for an OEI landing, and be able to land with the appropriate fuel reserves intact.

Where actual conditions vary significantly from anticipated conditions, both PNR and CP/ETP shall be re-calculated using actual conditions.

AERODROME/HELIPORT/HELIPAD DEFINITIONS

Acceptable Aerodrome/Heliport/Helipad is an landing area approved for S76 operations which is forecast to be above landing minima for the period of intended use.

Suitable Aerodrome/Heliport/Helipad is a landing area approved for S76 operations which is forecast to be above alternate minima for the period of intended use.

FUEL RESERVES

DAY VFR

Variable Reserve	10% of the sum of cruise fuel required to reach destination plus cruise fuel required to reach alternate (CRZ + ALTN) x 10%
Fixed Reserve - 2 engines operating	20 minutes
OEI	10 minutes

IFR AND NIGHT VFR

Variable Reserve	10% of the sum of cruise fuel required to reach destination plus cruise fuel required to reach alternate, or 10 minutes, whichever is the greater
Fixed Reserve - 2 engines operating	30 minutes
OEI	10 minutes

IFR OVER WATER IN VMC BY DAY

Variable Reserve	10% of the sum of cruise fuel required to reach destination plus cruise fuel required to reach alternate (CRZ + ALTN) x 10%
Fixed Reserve - 2 engines operating	20 minutes
OEI	10 minutes

CALCULATION OF FIXED RESERVE

2 engines operating	Fixed Reserve shall be calculated at the cruise fuel flow used for the flight. Where the flight consists of multiple sectors, the Fixed Reserve shall be calculated using the cruise fuel flow for the final sector flown before landing. Where an ALTN is planned the Fixed Reserve shall be calculated using the cruise fuel flow for the final sector flown to the ALTN
OEI	Fixed Reserve for all OEI operations shall be calculated at the OEI fuel flow used from the point of engine failure to a landing

PROVISION OF ALTERNATES - OFFSHORE

The pilot in command must make provision for flight to a suitable alternate for any flight planned to an offshore platform, production facility, drilling ship, support vessel or other marine landing platform. In the case of an aircraft which is conducting Category "A" operations, another such suitable offshore facility may be nominated as an alternate. See Company Operations Manual page 70.

This requirement is based on the possibility of there arising, in the course of the flight, some situation which will preclude a safe landing on the destination oil rig or platform. Such situations might include:

i) Gas or oil blowout, uncontained fire or other similar emergency

ii) Excessive pitch, roll, or heave in the case of a floating facility

iii) Weather conditions at destination

iv) An in-flight emergency that would render the aircraft incapable of carrying out a safe landing on the offshore rig or platform

INFLIGHT REVISIONS

For any inflight fuel planning, or re-planning, the same data as per “Flight Planning” is to be used. For the calculation of 2 engines operating cruise fuel flow, use the original flight plan Mid Zone Weight. Inflight re-calculation of Mid Zone Weight is not required.

For any inflight fuel planning, or re-planning, the same fuel reserve, fuel allowance and ALTN requirements as per “Flight Planning” are applicable, with the following exception:

IFR AND NIGHT VFR

VARIABLE RESERVE	10% of the sum of cruise fuel required to reach destination plus cruise fuel required to reach alternate (CRZ + ALTN) x 10%

PART 2

COMPANY OPERATIONS MANUAL (EXTRACT)

SECTION 2

OPERATIONAL STANDARDS - PERFORMANCE

OPERATIONAL STANDARDS - PERFORMANCE

TAKEOFF WEIGHT LIMITATIONS

The maximum weight for takeoff shall not exceed the lesser of the following:

a. The maximum certified weight for take off
b. For Category "A" operations, the maximum weight for takeoff as determined by Flight Manual, Figure 1.1.15 Category "A" Maximum Takeoff and Landing Gross Weight
c. For Category "B" operations, the maximum weight for takeoff as determined by Flight Manual, Figure 1.1.19 Category "B" Maximum Takeoff and Landing Gross Weight, and Figures 1.1.20 to 1.1.23 Category "B" Takeoff distance
d. The following Obstacle Clearance and Performance Requirements

DAY VFR OPERATIONS

TAKEOFF

The maximum gross weight for takeoff is limited to that at which, in the ambient conditions, with One Engine Inoperative (OEI), the helicopter is capable of a net ZERO PER CENT gradient of climb, in accordance with Flight Manual, Figure 1.1.11 Forward Climb Performance, at 500 feet above the takeoff level.

ENROUTE

The helicopter, in the OEI configuration, shall be able to maintain 500 feet terrain clearance to a location suitable for an OEI landing. Drift-down techniques may be applied to meet this requirement.

APPROACH AND LANDING

At the destination or the OEI alternate, the helicopter, in the OEI configuration, shall be capable of a net ZERO PER CENT gradient of climb, in accordance with Flight Manual, Figure 1.1.11 Forward Climb Performance, at 500 feet above the landing surface.

Note: The OEI CONFIGURATION means that the helicopter is flown at the Best Rate Of Climb Speed (Vyse or BROC) with the remaining engine operating at the Maximum Continuous OEI power limit (Flight Manual, Figure 1.1.1 Engine or Drive System Operating Limits).

IFR AND NIGHT VFR OPERATIONS

TAKEOFF/CLIMB

The maximum gross weight for takeoff is limited to that at which, in the ambient conditions, the helicopter, in the OEI configuration, is capable of a net ONE PER CENT gradient of climb in accordance with Flight Manual, Figure 1.1.11, at the initial route segment Lowest Safe Altitude (LSALT) or Minimum Safe Altitude (MSA), whichever is the higher.

NOTE: No OEI accountability is required below Single Engine Best Rate of Climb Speed (Vyse or VBROC). The responsibility for obstacle clearance during climb to LSALT/MSA rests with the Pilot in Command.

EN-ROUTE

The helicopter, in the OEI configuration, shall be capable of a net ONE PER CENT gradient of climb in accordance with Flight Manual, Figure 1.1.11, at the highest route segment LSALT en-route to the destination or a suitable OEI landing area.

APPROACH AND LANDING

At the destination or the OEI alternate the helicopter, in the OEI configuration, shall be capable of a net ONE PER CENT gradient of climb at the last route segment LSALT or MSA, whichever is the higher.

OEI CONFIGURATION

The OEI CONFIGURATION means that the helicopter is flown at the Best Rate Of Climb Speed (VBROC) with the remaining engine operating a the Maximum Continuous OEI power limit (Flight Manual, Figure 1.1.1 Engine or Drive System Operating Limits).

OEI ACCOUNTABILITY

No OEI accountability is required below Single Engine Best Rate of Climb Speed (Vyse or VBROC).

MISSED APPROACH - OBSTACLE CLEARANCE GRADIENT

For IFR operations, the Pilot in Command must ensure that, with the helicopter in the OEI configuration, the requirement for a 2.5 per cent missed approach gradient can be met, or otherwise raise the approach minima accordingly (refer to AIP).

RATE OF CLIMB - STANDARD

For the purposes of this section, a net ONE PER CENT gradient of climb shall equal an indicated Rate Of Climb of 80 feet per minute.

OEI LANDING AREA

A Suitable OEI landing area may be the departure point, the destination or a selected alternate. In all cases it shall provide:

a. a smooth, level, firm surface
b. an obstacle free approach gradient of 5 degrees from 500 feet AGL to touchdown
c. two directions of approach not less than 150 degrees apart
d. a minimum length equal to that derived from Flight Manual, Figure 1.1.24 Category "B" Landing Distance
e. a minimum width of 30 metres

HELIDECK TAKEOFF AND LANDING LIMITATIONS

Takeoff or landing weight for helideck operations shall be the lesser of that derived from Flight Manual, Figure 1.1.9 Hover Out of Ground Effect, or that weight required for compliance with the Takeoff, En-route and Landing operational performance standards above.

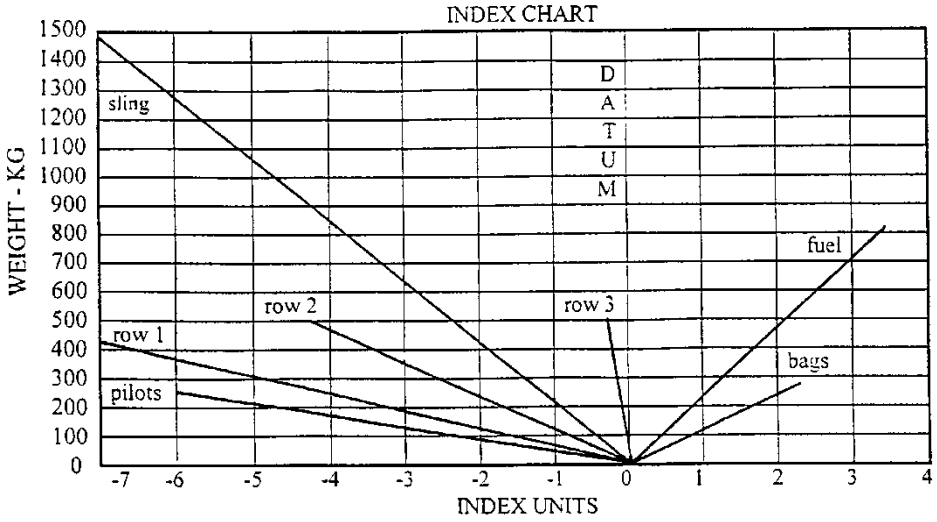
PART 2

COMPANY OPERATIONS MANUAL (EXTRACT)

SECTION 3

WEIGHT AND BALANCE

S76 - Load and Trim	VH -	Date:	*Start Index:
Crew:		Capt. Signature:	
*Start Index = [Weight x (C of G - 508)] + 30 / 10000		NOTE: Weight in KG C of G in CM	



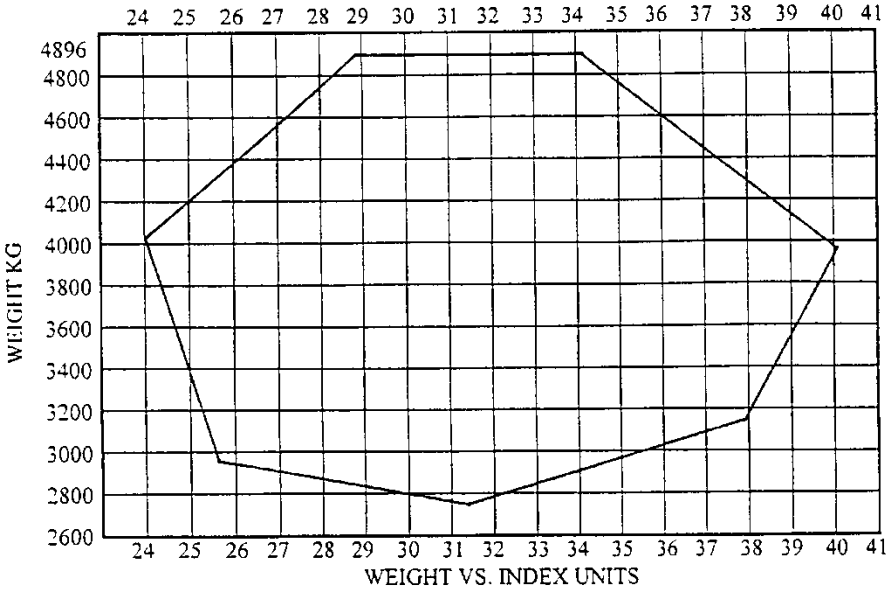


Figure 2.3.1 Load and Trim Sheet (Sheet 1 of 2)

WEIGHT

ITEM	Sector 1	Sector 2	Sector 3
APS			
PILOTS			
SUB TOTAL			
ROW 1			
ROW 2			
ROW 3			
BAGS			
SUB TOTAL			
FUEL			
TOW			

BALANCE

ITEM	Sector 1		Sector 2		Sector 3	
	-	+	-	+	-	+
START						
PILOTS						
ROW 1						
ROW 2						
ROW 3						
BAGS						
SUB TOTAL						
ZFW I/U	⇒		⇒		⇒	
FUEL						
TOTAL I/U						

Figure 2.3.2 Load and Trim Sheet (Sheet 2 of 2)

SIKORSKY S76 LOAD AND TRIM SHEET

EXAMPLE:

Given the following data:

APS Weight = 2900 kg APS Moment = 15529.5 / 1000

ITEM	Sector 1	Sector 2	Sector 3
APS	2900		
PILOTS	200		
SUB TOTAL	3100		
ROW 1	300		
ROW 2	400		
ROW 3	NIL		
BAGS	200		
SUB TOTAL	4000		
FUEL	700		
TOW	4700		

APS C of G = [(15529.5 x 1000) / 2900 kg] = 5355 mm

Start Index (**NOTE:** C of G in CM) = {[2900 x (535.5 - 508)] / 10000} + 30 = 38.0 IU

From Index Chart, derive the following Index Units:

ITEM	Sector 1		Sector 2		Sector 3	
	-	+	-	+	-	+
START		38.0				
PILOTS	4.7					
ROW 1	4.7					
ROW 2	3.4					
ROW 3	NIL					
BAGS		1.7				
SUB TOTAL	-12.8	39.7				
ZFW I/U	⇒	26.9	⇒		⇒	
FUEL		3.0				
TOTAL I/U		29.9				

Check Total I/U against Takeoff Weight on Centre of Gravity envelope graph.
The aircraft is within limits of weight and balance for this flight.