SECTION 4

PERFORMANCE DATA

4.1 GENERAL

The performance data given in this section are consistent with the limitations set forth in Section 1 of this manual and the requirements of CAR Part 3, and should be used for Operational Planning. All performance data are based on engine power corrected for intake and accessory losses appropriate to the flight condition.

The maximum structural gross weight for take–off is 12,500 lb and for landing 12,300 lb.

The flap settings are as follows:

Configuration	Flap Setting
Take–off	10°
Enroute climb – both engines	0°
Enroute climb – one engine	10°
Landing	20° and 37 1/2°

4.1.1 TYPE OF OPERATION. The Twin Otter is certified in the Normal Category. Accordingly, the type of operation is limited to those maneuvers incidental to normal flying (including stalls, but not whip stalls) and turns in which the angle of bank is not in excess of 60°.

Aerobatic or even limited aerobatic maneuvers such as steep turns, spins, lazy eights and chandelles are not approved for Normal Category operations.

The type of operation is also limited according to the equipment installed. The standard Twin Otter is equipped for Day and Night VFR operations. Optional equipment is available to make it eligible for other types of operation such as IFR, icing, etc., as specified by the appropriate Operating Rules.

Special purpose operations such as STOL, aerial survey, fire-fighting, agricultural spraying and dusting must be conducted within the limits specified by the appropriate Airworthiness Authority.

4.1.2 LIST OF ABBREVIATIONS.

IAS Indicated airspeed. Airspeed indicator reading corrected for instrument error.

CAS Calibrated airspeed. Indicated airspeed corrected for position error.

V_{SO} Stalling speed with wing flaps setting in the landing configuration.

V_{S1} Stalling speed with specified wing flap setting (other than landing).

ISA International Standard Atmospheric Conditions.

4.1.3 OPERATION IN HEADWINDS GREATER THAN 20 KNOTS. In all configurations of the airplane, unless stated otherwise in any supplement to this manual, when operating in headwinds greater than 20 knots, take-off and landing performance data appropriate to 20 knots should be used.

PERFORMANCE CHARTS: ALL VERSIONS

4.2 STALLING SPEEDS

The power-off stalling speeds in calibrated airspeed at a forward cg limit and for wing flap deflection at various angles are given in figure 4-1. Corrected stalling speeds at various bank angles are also provided. The data is applicable to all versions

Associated conditions:

CG - forward

Engine idling, propellers feathered

Example:

At a gross weight of 11,000 lb, flap setting of 10^{o}, and angle of bank 30^{o}, the stalling speed is 68 kt CAS.

Note

Altitude loss during stall recovery can vary from 200 to 500 feet.

STALLING SPEEDS

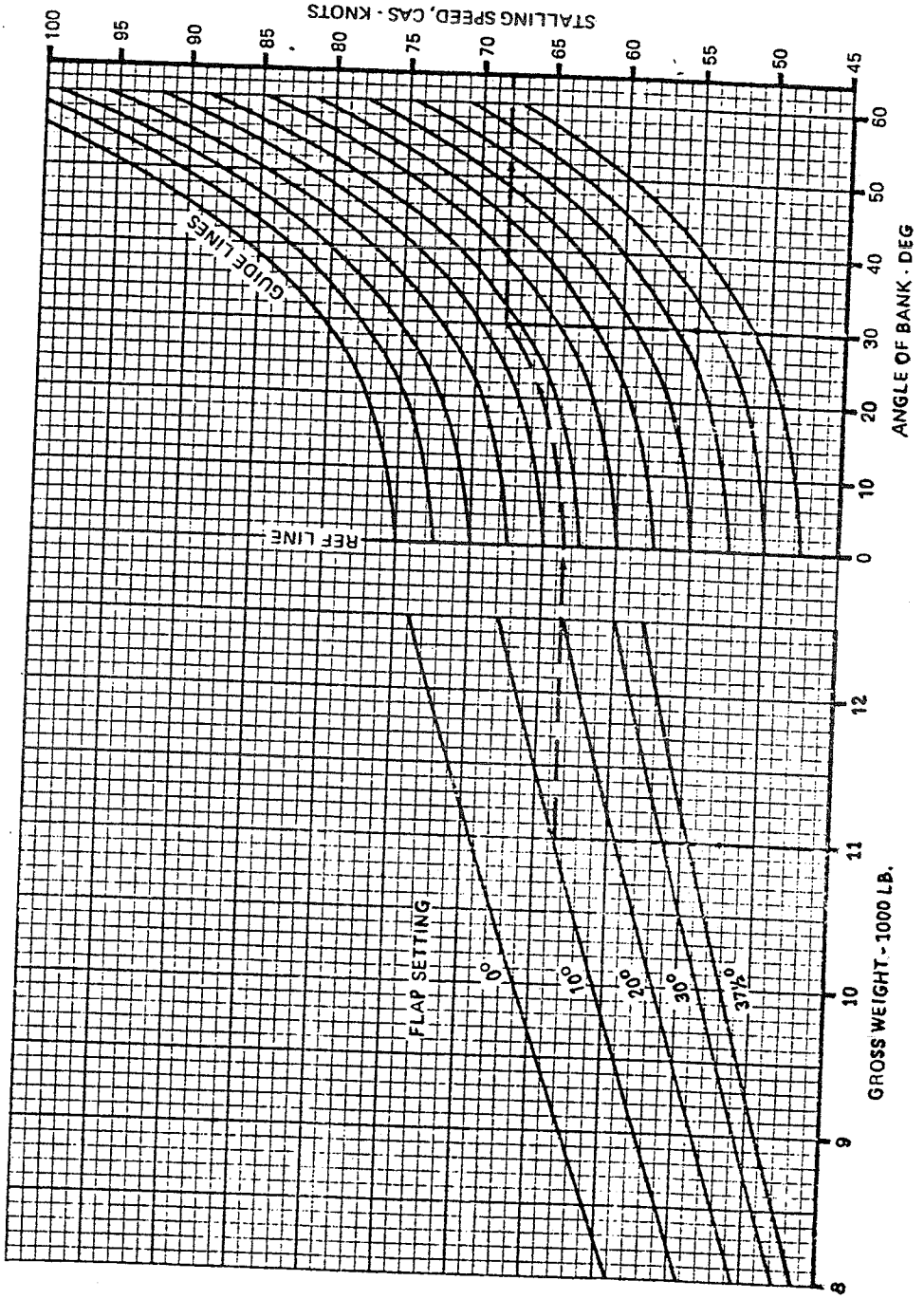


Figure 4-1

4.3 POSITION ERROR CORRECTION

The in-flight position error (CAS-IAS) versus indicated airspeed for the pilot system is shown in figure 4-2 for various flap settings and two gross weights. The data is applicable to all versions.

POSITION ERROR CORRECTION TO INDICATED AIRSPEED (ALL VERSIONS)

ΔV = CAS–IAS (KTS)
CAS = IAS + ΔV (KTS)

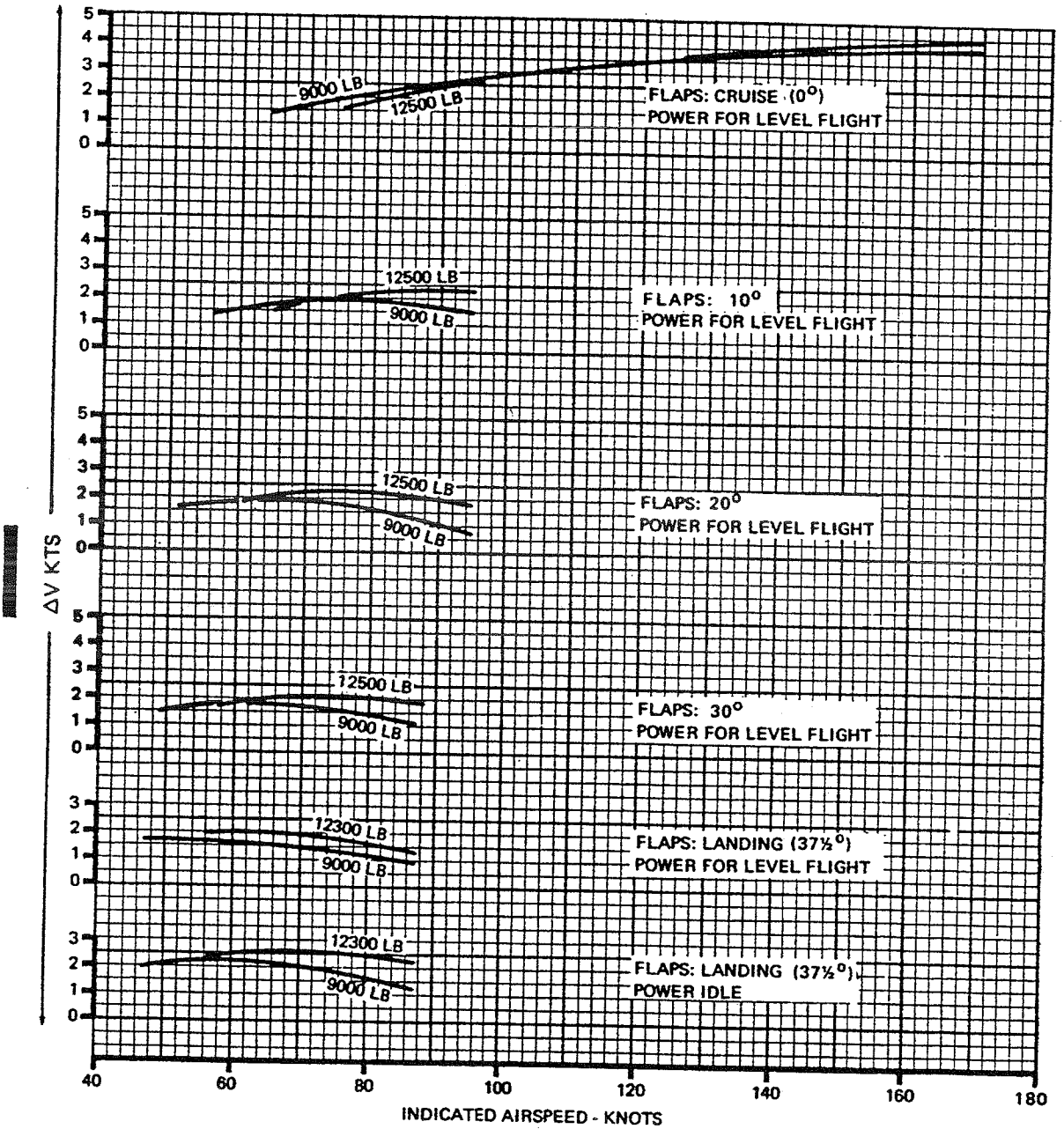


Figure 4–2

4.4 ENGINE TORQUE PRESSURE SETTING DATA

4.4.1 This Section contains engine torquemeter pressure setting data that must be used for the calculation of required take-off, maximum continuous, maximum climb and maximum cruise power.

4.4.2 Power thus calculated is the rated installed power of the engine, and is therefore that to which the airplane has been certified. Accordingly, torque must be set for the desired operating condition using the relevant chart or Torque Computer (Pt. No. C6GT1004), and not by indiscriminately advancing power levers until a limit (especially T5) is reached. The engine limits (torque, T5, and gas generator speeds) must be considered as limits not to be exceeded, rather than as a means by which to set engine power. It should be possible for the pilot to set the torque, as derived from the charts or Torque Computer, without exceeding any of the engine operating limits, i.e., T5, Ng, torque or Np; if not, the performance of the engine has deteriorated and must be investigated.

Note

The data in the power setting charts is condensed in the Torque Computer (Pt. No. C6GT1004) which may be used alternatively. Instructions for its use may be found on the back of the computer. As the data on all four power setting charts is condensed in a small Torque Computer, readings from the Torque Computer may differ slightly from those obtained from the power setting charts. In such cases the values from the power setting charts should be used.

4.4.3 TAKE-OFF POWER SETTING. Take-off power settings for various altitudes, airspeeds and temperatures can be obtained from figure 4-3. The data is corrected for appropriate installation losses.

Example (arrowed broken lines on chart)

At an outside air temperature of 25°C, pressure altitude of 5000 ft, rating index 2 (intake deflector extended, heater off) the take-off power torque setting is 42.2 psi at static conditions.

Note

T5 must not exceed 725°C.

TAKE-OFF POWER SETTING

NOTES: 1. 96% PROPELLER RPM.
2. MAXIMUM T6 725°C.

RATING INDEX: 1. INTAKE DEFLECTOR RETRACTED, HEATER OFF.
2. INTAKE DEFLECTOR EXTENDED, HEATER OFF.
3. HEATER ON, INTAKE DEFLECTOR RETRACTED.
4. HEATER ON, INTAKE DEFLECTOR EXTENDED.

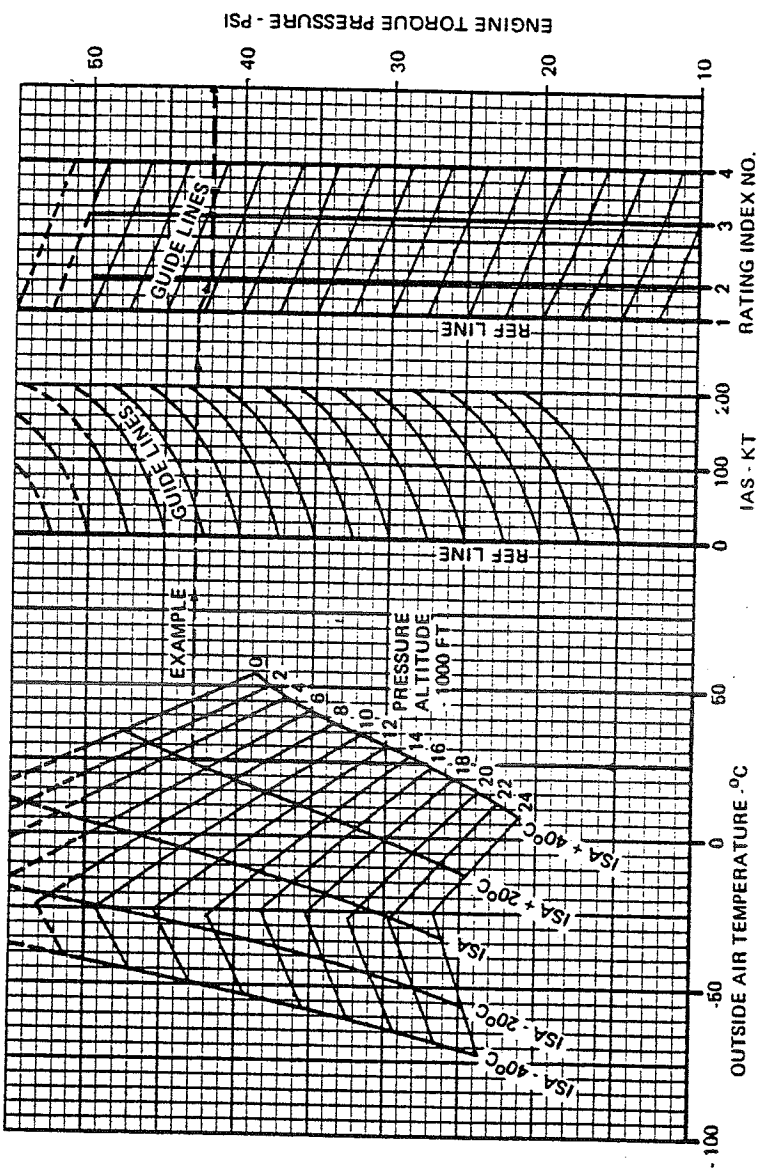


Figure 4-3

4.4.4 MAXIMUM CONTINUOUS POWER SETTING. Maximum continuous power setting for various altitudes, airspeeds and temperatures can be obtained from figure 4-4. The data is corrected for appropriate installation losses.

Example (arrowed broken lines on chart)

At an outside air temperature of -20°C, pressure altitude of 14, 000 ft, IAS of 100 kt, rating index 3 (heater on, intake deflector retracted), the maximum continuous power torque setting is 39. 5 psi.

Note

T5 must not exceed 725°C.

MAXIMUM CONTINUOUS POWER SETTING

NOTES:
1. 96% PROPELLER RPM.
2. MAXIMUM T5 725°C.

RATING INDEX:
1. INTAKE DEFLECTOR RETRACTED, HEATER OFF.
2. INTAKE DEFLECTOR EXTENDED, HEATER OFF.
3. HEATER ON, INTAKE DEFLECTOR RETRACTED.
4. HEATER ON, INTAKE DEFLECTOR EXTENDED.

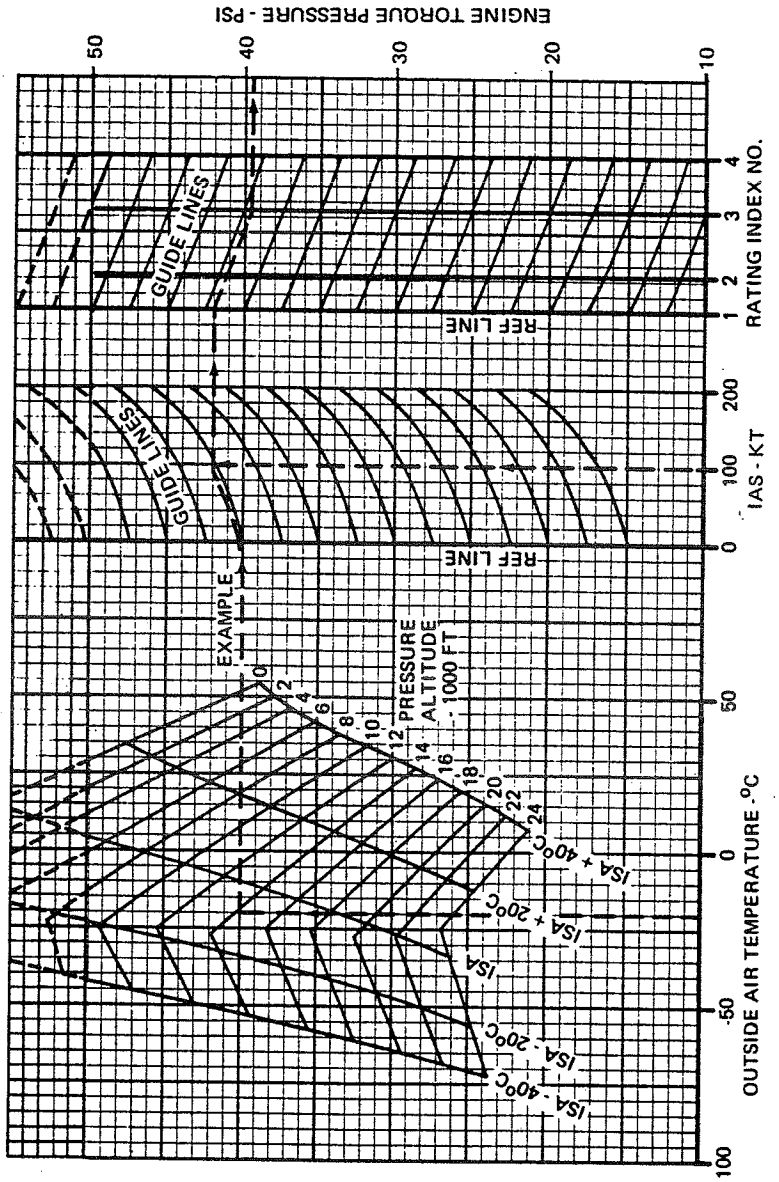


Figure 4-4

4.4.5 MAXIMUM CLIMB AND CRUISE POWER SETTING. Maximum climb and cruise power settings for various altitudes, airspeeds, and temperatures can be obtained from figures 4-5 and 4-6 respectively. The data is corrected for appropriate installation losses.

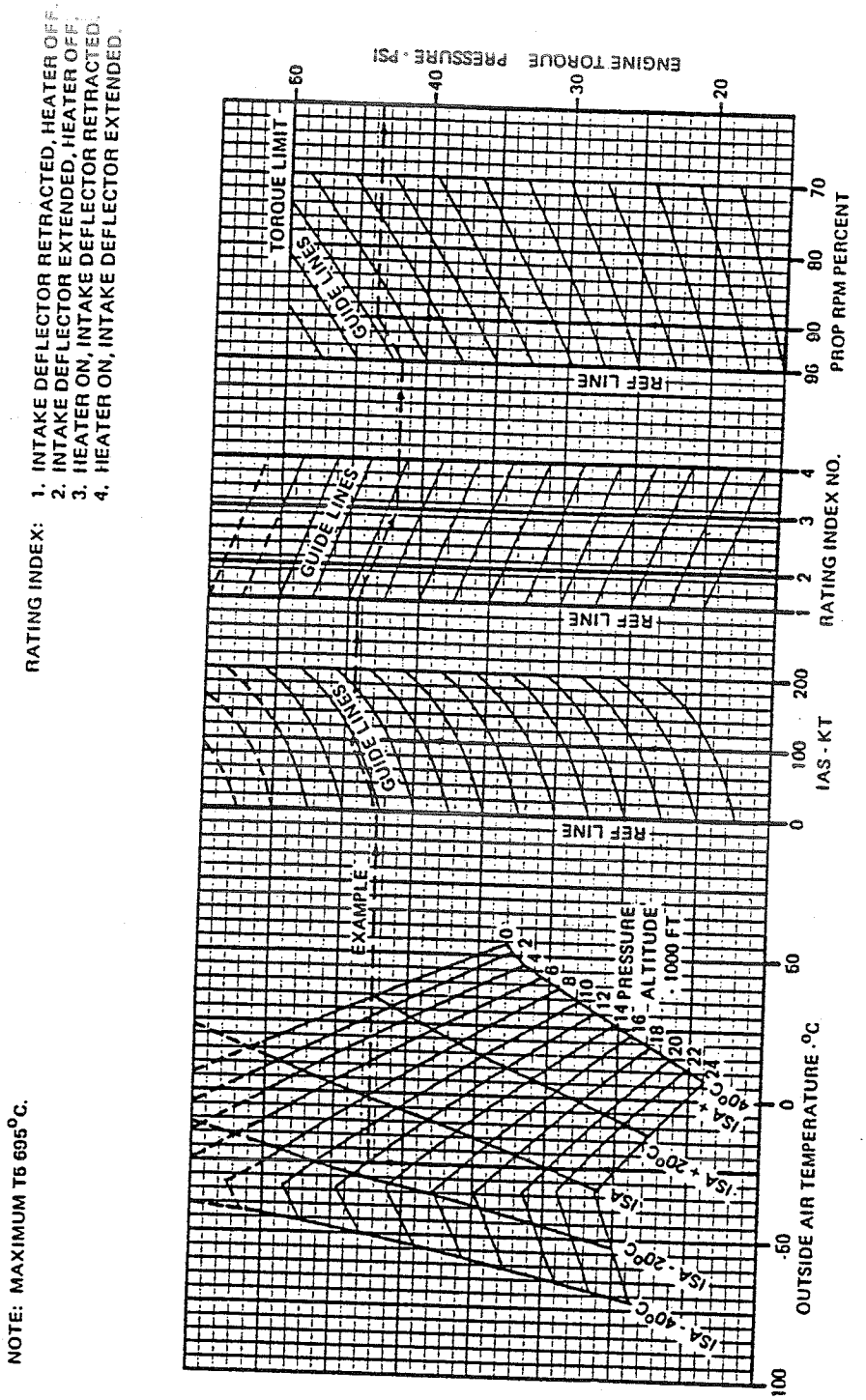
Example (arrowed broken lines on chart)

At an outside air temperature of -25°C, pressure altitude of 12, 000 ft, IAS of 100 kt, rating index 3 (heater on, intake deflector retracted), propeller rpm 90%, the maximum climb power torque setting is 43. 7 psi (Figure 4-5).

Note

T5 must not exceed 695°C.

MAXIMUM CLIMB POWER SETTING



RATING INDEX:
1. INTAKE DEFLECTOR RETRACTED, HEATER OFF.
2. INTAKE DEFLECTOR EXTENDED, HEATER OFF.
3. HEATER ON, INTAKE DEFLECTOR RETRACTED.
4. HEATER ON, INTAKE DEFLECTOR EXTENDED.

NOTE: MAXIMUM T5 695°C.

Figure 4-5

MAXIMUM CRUISE POWER SETTING

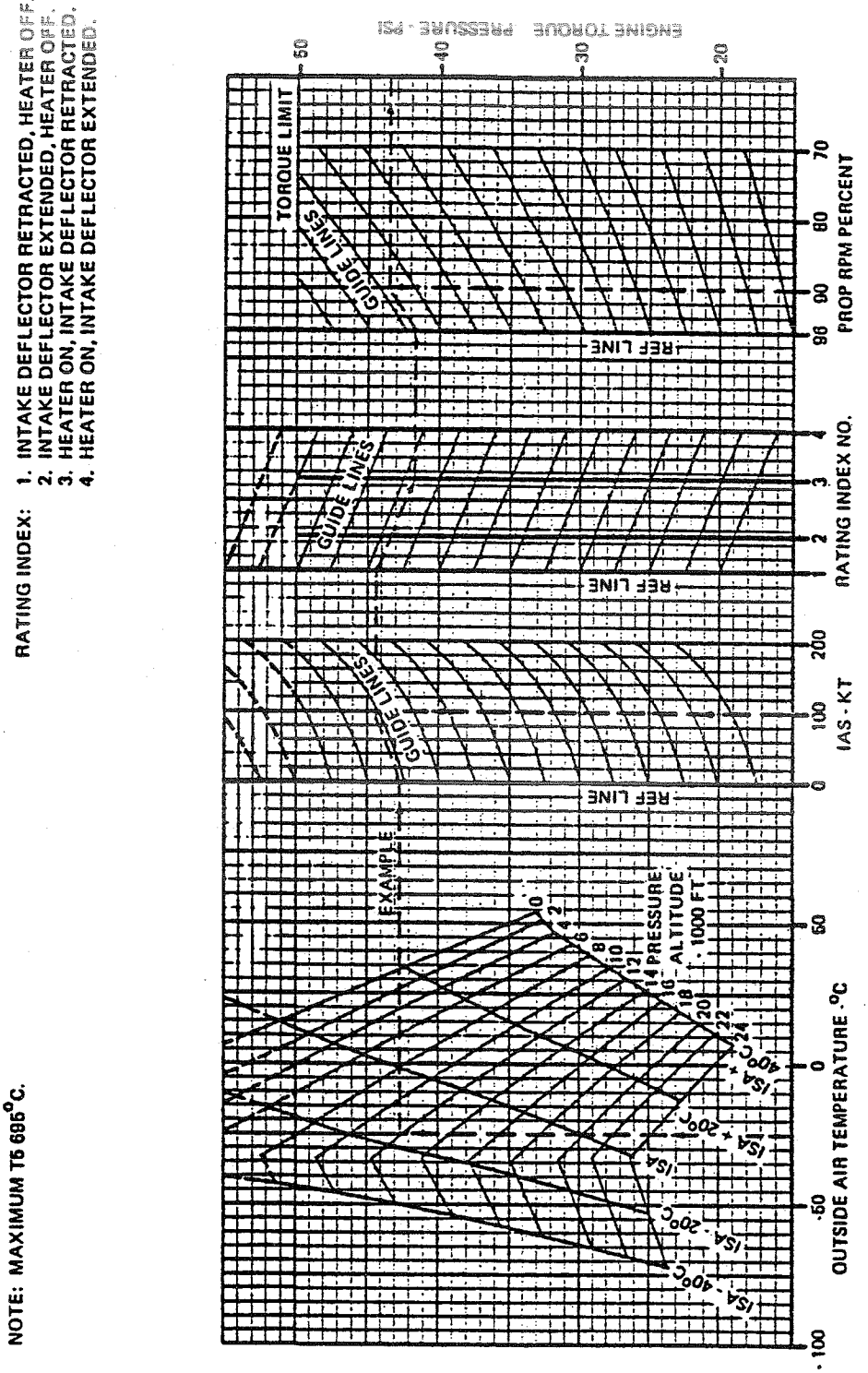


Figure 4-6

PERFORMANCE CHARTS: LANDPLANE

4.5 MAXIMUM PERMISSIBLE TAKE–OFF WEIGHT AT OR BELOW 5000 FT BASED ON ONE ENGINE INOPERATIVE ENROUTE CLIMB

The structural limits of the maximum take–off and landing weights are given in paragraph 4.1. One engine inoperative enroute climb requirement of CAR Part 3 and special conditions are met at the maximum structural weight (figure 4–7).

Associated conditions:

Configuration	= CAR 3.85(b)
Wing flaps	= 10°
Engines	= One engine inoperative, propeller feathered and other engine at Maximum Continuous Power, prop rpm 96%.

MAXIMUM PERMISSIBLE TAKE-OFF WEIGHT AT OR BELOW 5000 FT BASED ON ONE ENGINE INOPERATIVE ENROUTE CLIMB

LANDPLANE

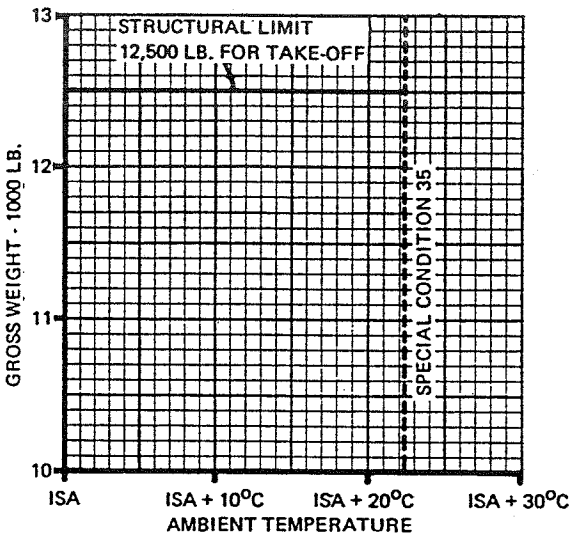


Figure 4-7

4.6 TAKE-OFF DATA

The take-off speeds and the take-off distance from a standing start to a 50 ft height is given in figure 4-8. The distances are calculated with the procedure and technique specified in CAR Part 3 and are consistent with those specified in Section 2 of this manual.

Associated conditions:

Wing flaps	= Take-off (10°)
Intake deflectors	= Retracted
Engines	= Both at take-off power, prop rpm 96%
Speeds at lift-off and at 50 ft	= See Chart
Airfield	= Dry, hard, level surface

The use of the chart is shown by the following example:

Given:

Airfield pressure altitude	= 2000 ft
Airfield temperature	= 18°C
Take-off weight	= 10,500 lb
Headwind	= 10 kt

Find:

Total distance to 50 ft

Procedure:

Enter figure 4-8 at 18°C on the horizontal scale at left side of the chart and move vertically to intersect the 2000 ft pressure altitude line. Move horizontally right to meet the weight REF LINE, and then parallel to the guide lines to intersect the 10,500 lb weight line. From this point move horizontally right to the wind REF LINE, then parallel to the guide lines to intersect the 10 kt headwind line. From this point move horizontally to the right and read on the vertical scale:

Total distance to 50 ft - 930 ft

Note

1. The distances are calculated for actual winds.

2. With intake deflectors extended, increase distances by 2 1/2% when engine torque is less than 50 psi.

3. When operating in headwinds greater than 20 kt, use take-off performance data appropriate to 20 kt.

CAR 3 TAKE-OFF - TOTAL DISTANCE TO 50 FT

LANDPLANE

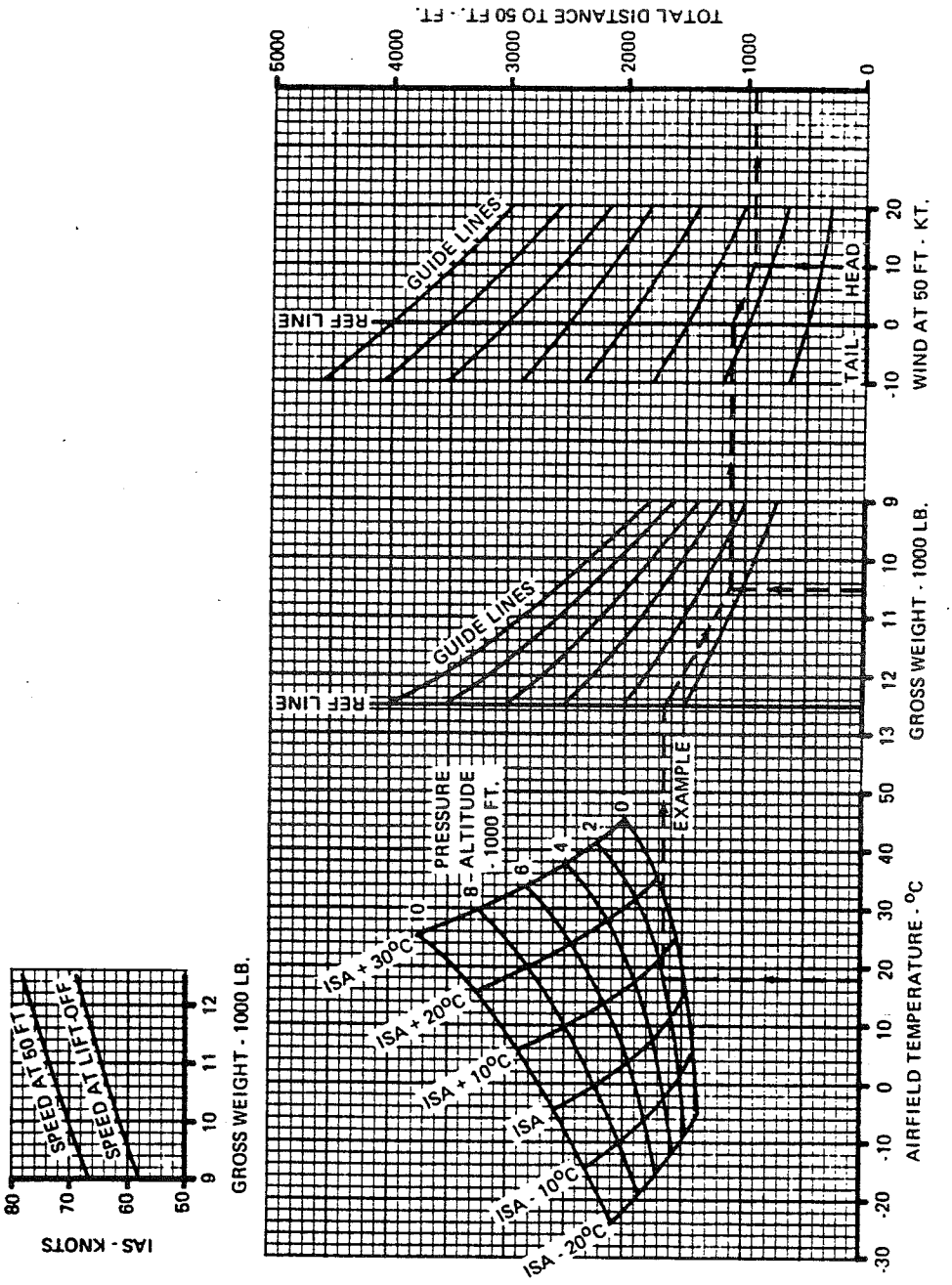


Figure 4-8

4.7 CLIMB DATA

4.7.1 TAKE-OFF CLIMB DATA CAR 3.85(a). The rates and gradients of climb are given in figures 4-9 and 4-10 respectively with the airplane in the take-off configuration. The climb speeds are also shown on each chart.

Associated conditions:

Wing flaps	=	Take-off (10^{o})
Intake deflectors	=	Retracted
Engines	=	Both operating at take-off power, prop rpm 96%
Speed	=	See Chart

Example:

Ambient temperature 13^{o}C, pressure altitude 6000 ft, gross weight 11,000 lb. The rate of climb is 1545 feet per min and the gradient of climb is 0.18.

Note

With intake deflectors extended, reduce rate of climb by 30 feet per min and gradient of climb by 0.004 when engine torque is less than 50 psi.

TAKE-OFF RATE OF CLIMB - CAR 3.85(a)

LANDPLANE

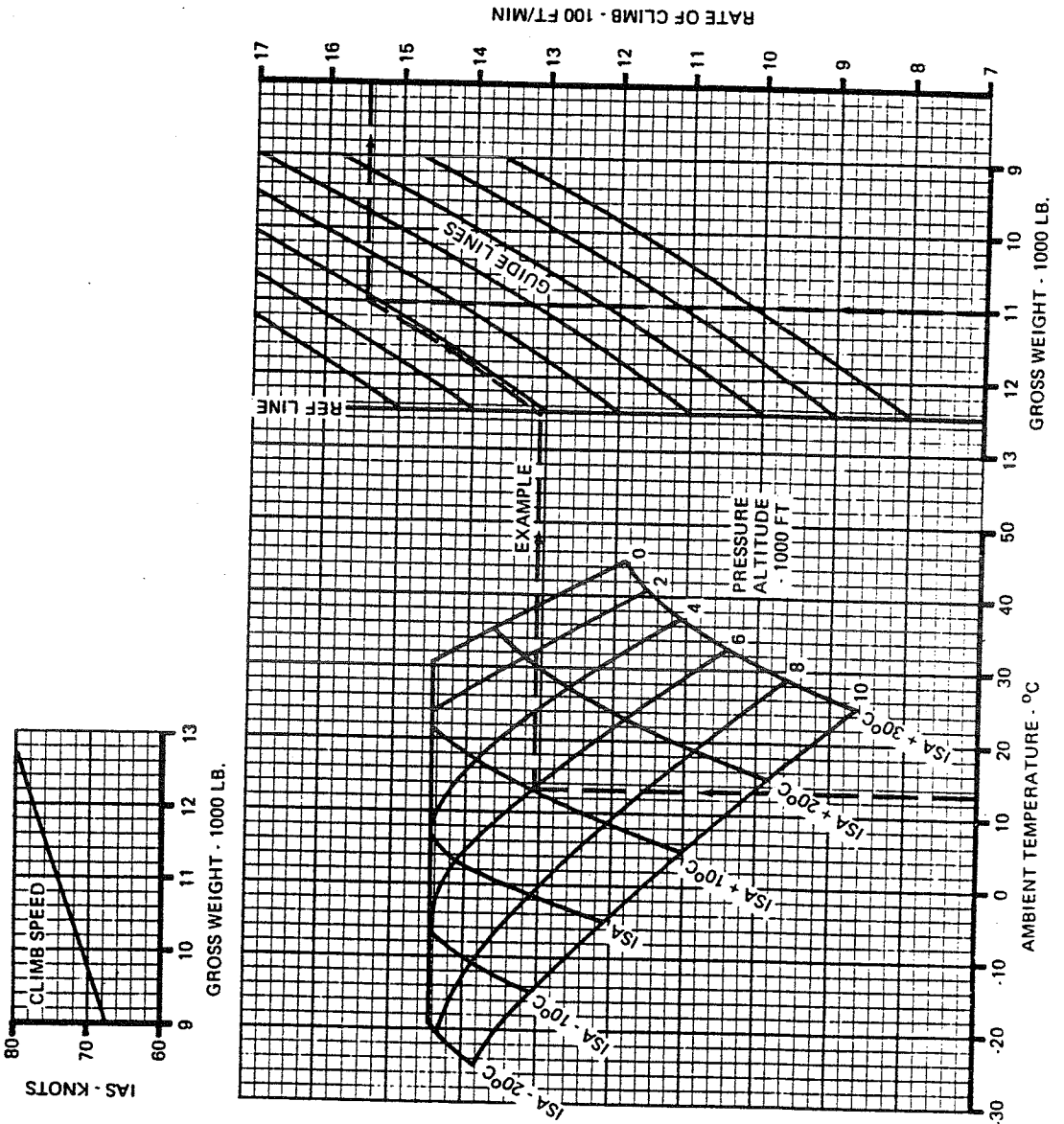


Figure 4-9

ASSOCIATED CONDITIONS FOR FIGURE 4-10

Wing flaps	=	Take-off (10°)
Intake deflectors	=	Retracted
Engines	=	Both operating at take-off power, prop rpm 96%
Speed	=	See Chart

TAKE-OFF CLIMB GRADIENT - CAR 3.85(a)

LANDPLANE

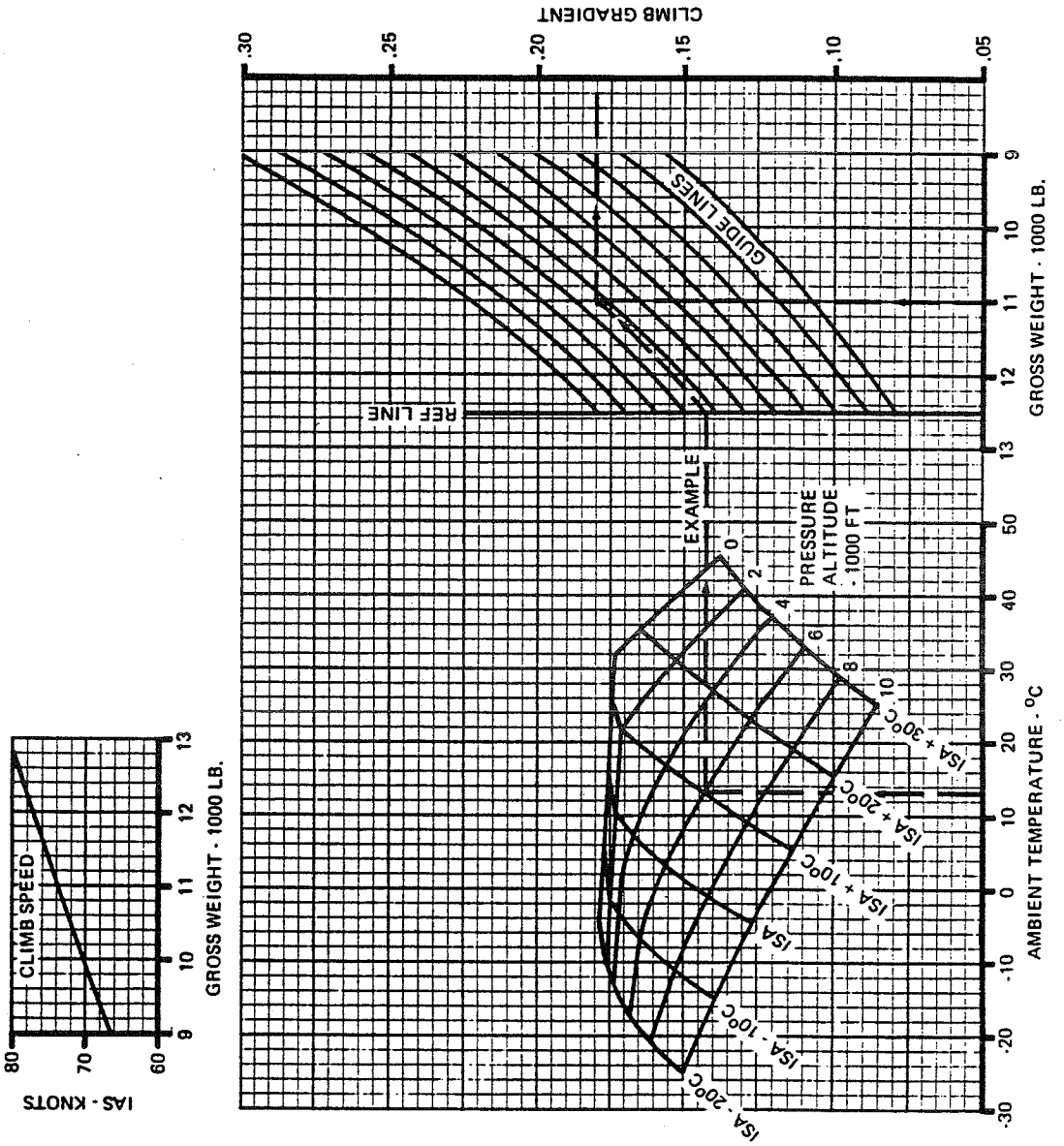


Figure 4-10

4.7.2 ENROUTE CLIMB DATA ONE ENGINE INOPERATIVE CAR 3.85(b). The rates and gradients of climb are given in figures 4-11 and 4-12 respectively, with the airplane in the one-engine inoperative enroute climb configuration. The climb speeds are also shown on each chart.

Associated conditions:

Wing flaps	=	Enroute (10^{o})
Intake deflectors	=	Retracted
Engines	=	One engine inoperative, propeller feathered and other engine at Maximum Continuous Power, prop rpm 96%
Speeds	=	See Chart

Example:

Ambient temperature 13^{o}C pressure altitude 6000 ft, gross weight 11,000 lb. The rate of climb is 370 feet per min and the gradient of climb is 0.044.

Note

With intake deflectors extended reduce rate of climb by 15 feet per min and gradient of climb by 0.002 when engine torque is less than 50 psi.

ENROUTE RATE OF CLIMB - ONE ENGINE INOPERATIVE - CAR 3.85(b)

LANDPLANE

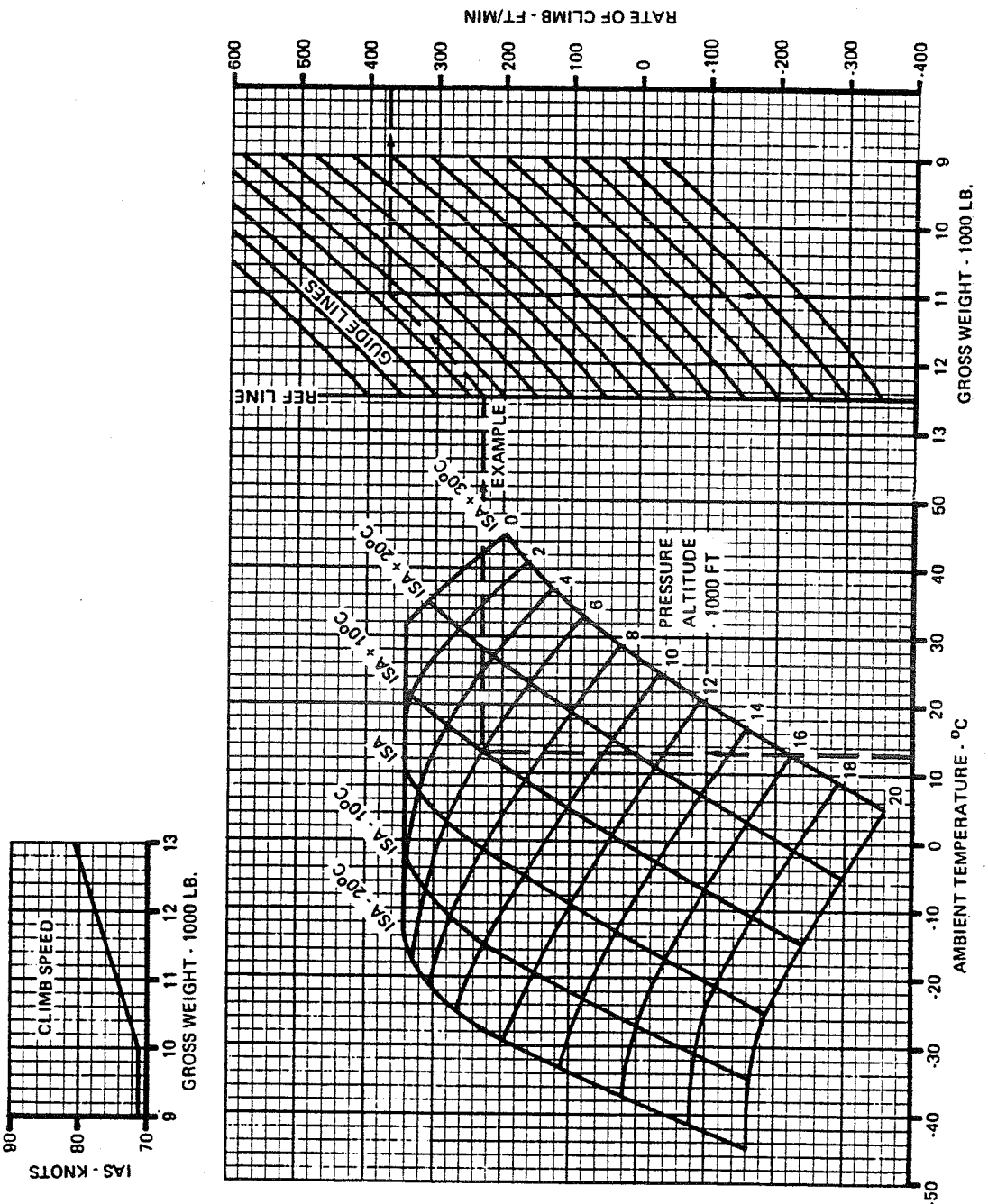


Figure 4-11

ASSOCIATED CONDITIONS FOR FIGURE 4-12

Wing flaps	=	Enroute (10^{o})
Intake deflectors	=	Retracted
Engines	=	One engine inoperative, propeller feathered and other engine at Maximum Continuous Power, prop rpm 96%
Speeds	=	See Chart

ENROUTE CLIMB GRADIENT - ONE ENGINE INOPERATIVE - CAR 3.85(b)

LANDPLANE

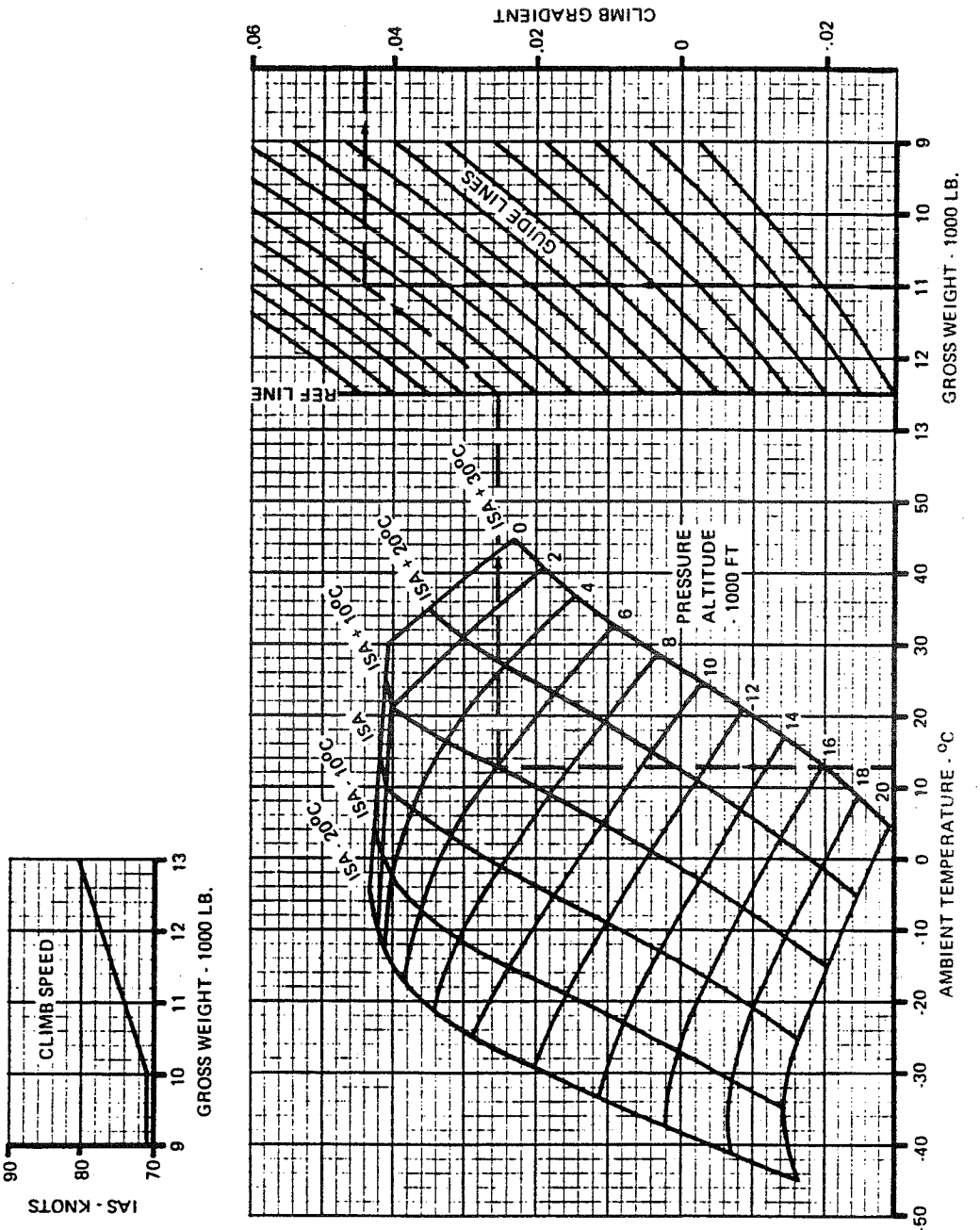


Figure 4-12

4.7.3 BALKED LANDING CLIMB DATA CAR 3.85(c). The rates and gradients of climb are given in figures 4-13 and 4-14 respectively with the airplane in the balked landing configuration. The climb speeds are also shown on the charts.

Associated conditions:

Wing flaps	=	Landing (37 1/2°)
Intake deflectors	=	Retracted
Engines	=	Both at take-off power, prop rpm 96%
Speeds	=	See Chart

Example:

Ambient temperature 13°C, pressure altitude 6000 ft, gross weight 11,000 lb. The rate of climb is 1030 feet per min and the gradient of climb is 0.128.

Note

With intake deflectors extended reduce rate of climb by 30 feet per min and gradient of climb by 0.004 when engine torque is less than 50 psi.

BALKED LANDING RATE OF CLIMB - CAR 3.85(c)

LANDPLANE

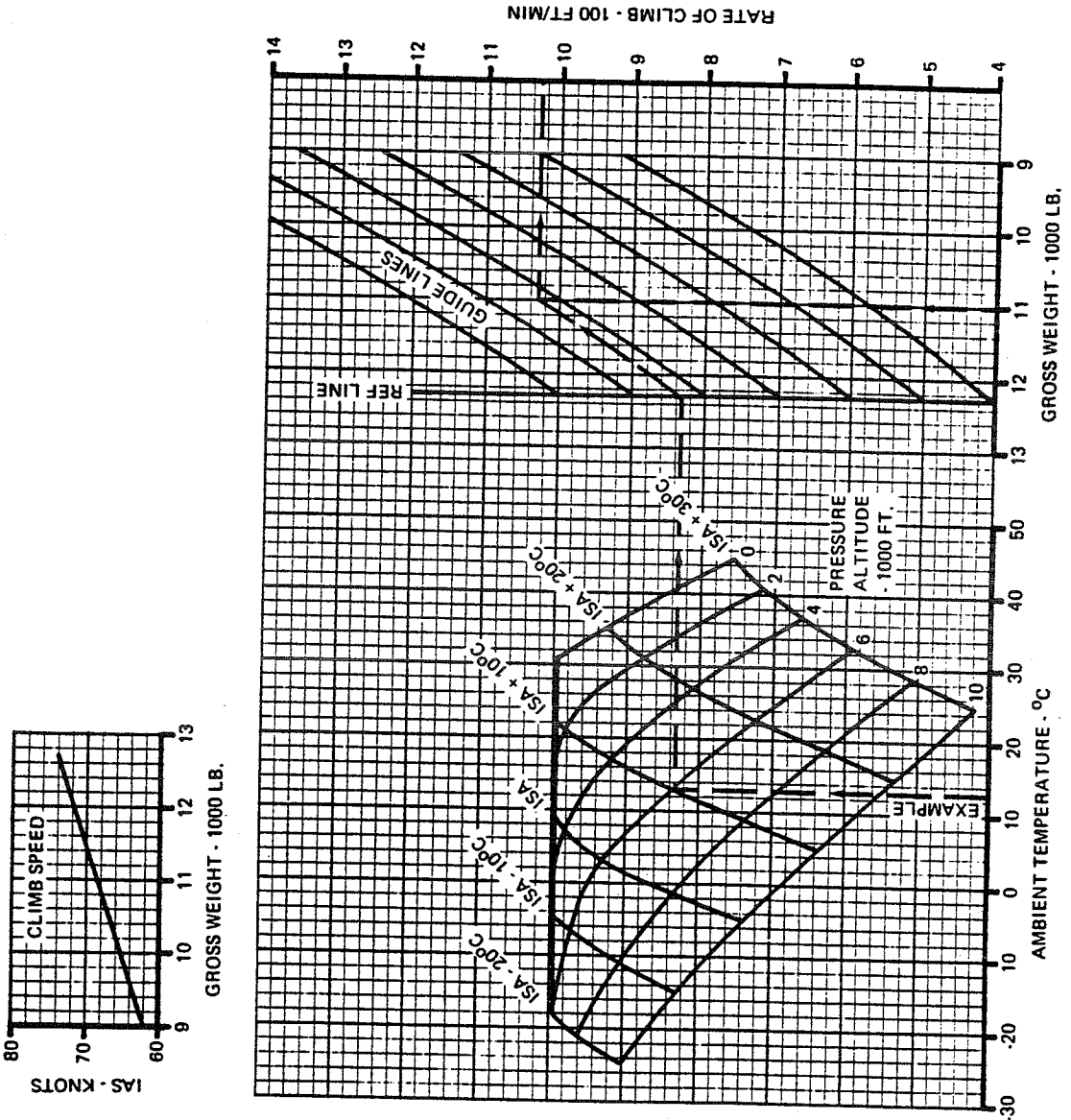


Figure 4-13

ASSOCIATED CONDITIONS FOR FIGURE 4-14

Wing flaps	=	Landing (37 1/2°)
Intake deflectors	=	Retracted
Engines	=	Both at take-off power, prop rpm 96%
Speeds	=	See Chart

BALKED LANDING CLIMB GRADIENT - CAR 3.85(c)

LANDPLANE

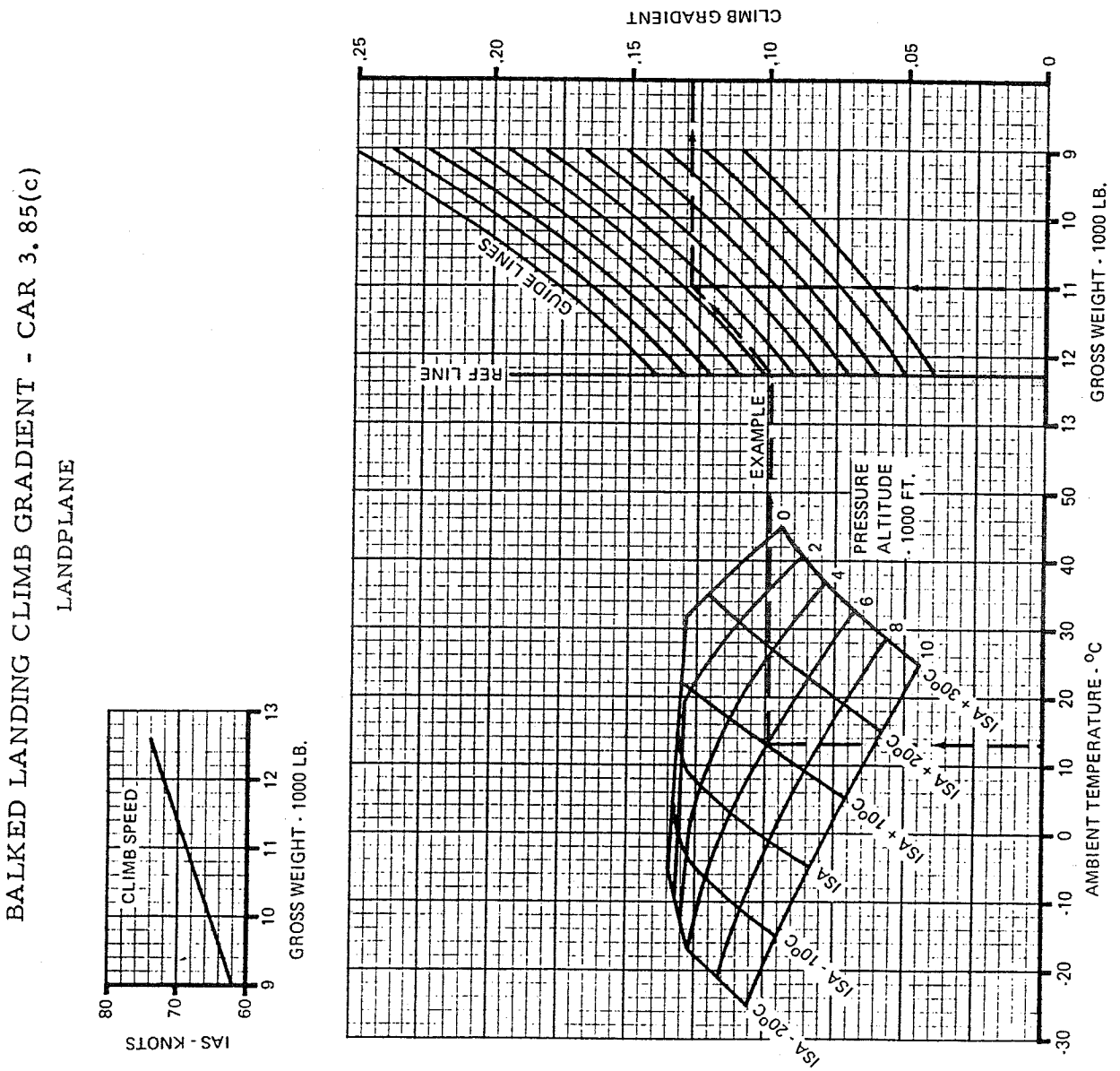


Figure 4-14

4.8 LANDING DATA

The landing distance from a height of 50 ft to a full stop is given in figure 4-15. The distance is calculated with the procedure and technique specified in CAR Part 3. However, the procedure and technique given in Section 2 of this manual meets all the safety requirements of CAR Part 3 and result in distances considerably less than shown on the charts.

Associated conditions:

Wing flaps	= Landing (37 1/2° or 20°)
Intake deflectors	= Retracted or extended
Engines	= Both at idle
Airfield	= Dry, hard, level surface
Retardation	= Brakes only

Example:

Airfield temperature 18°C, pressure altitude 2000 ft, gross weight 10,500 lb, headwind 10 kt. The landing distance from 50 ft is 1500 ft.

Note

1. The distances are calculated for actual winds.
2. When operating in headwinds greater than 20 kt, use landing performance data appropriate to 20 kt.
3. For landing distance required flap 20°; multiply landing distance flap 37 1/2° (Figure 4-15) by 1.3.

CAR 3 LANDING - TOTAL DISTANCE FROM 50 FT

LANDPLANE

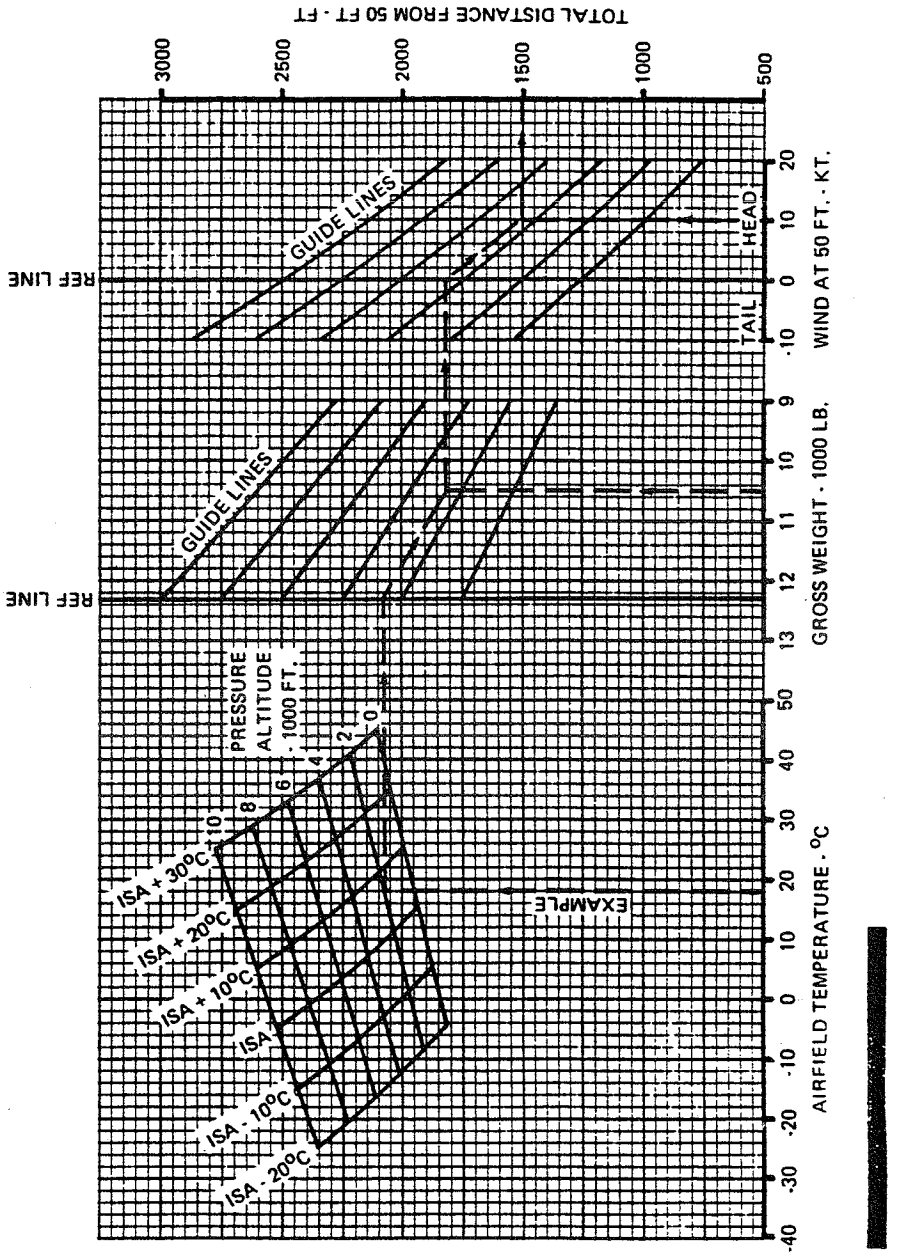


Figure 4-15