



CANBERRA PR9

The RAF's high altitude eye in the sky!



OPERATING DATA MANUAL

Canberra PR9

Operating Data Manual

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CLIMB

This section contains climb data for the optimum speed of 330 knots IAS until 0.72M is reached at approximately 20,000ft and maintained thereafter.

Figure 1.1 provides climb performance at 97.5% RPM in ISA conditions at 330 knots IAS/0.72M for clean configurations. The data is given in terms of time taken, fuel used and distance travelled for various aircraft weights at the start of the climb.

The effect of non-standard temperature conditions on the climb data is given in Figure 1.2.

Figure 1.1

CLIMB AT 330 KIAS/0.72M, ISA, CLEAN

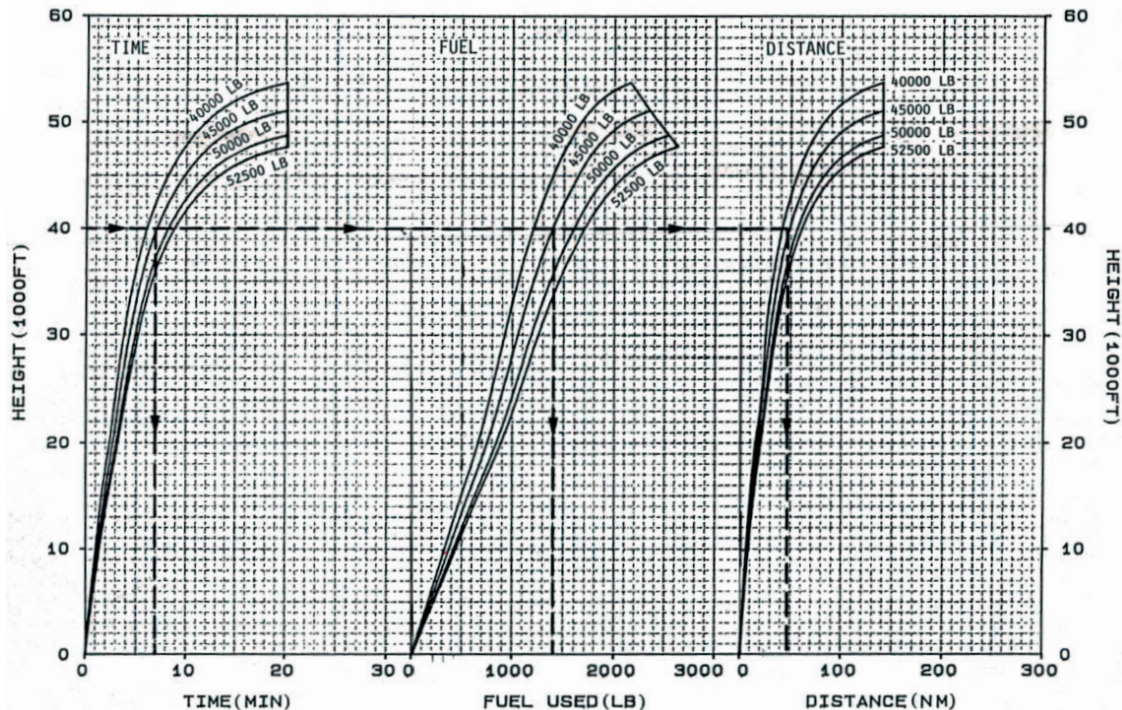
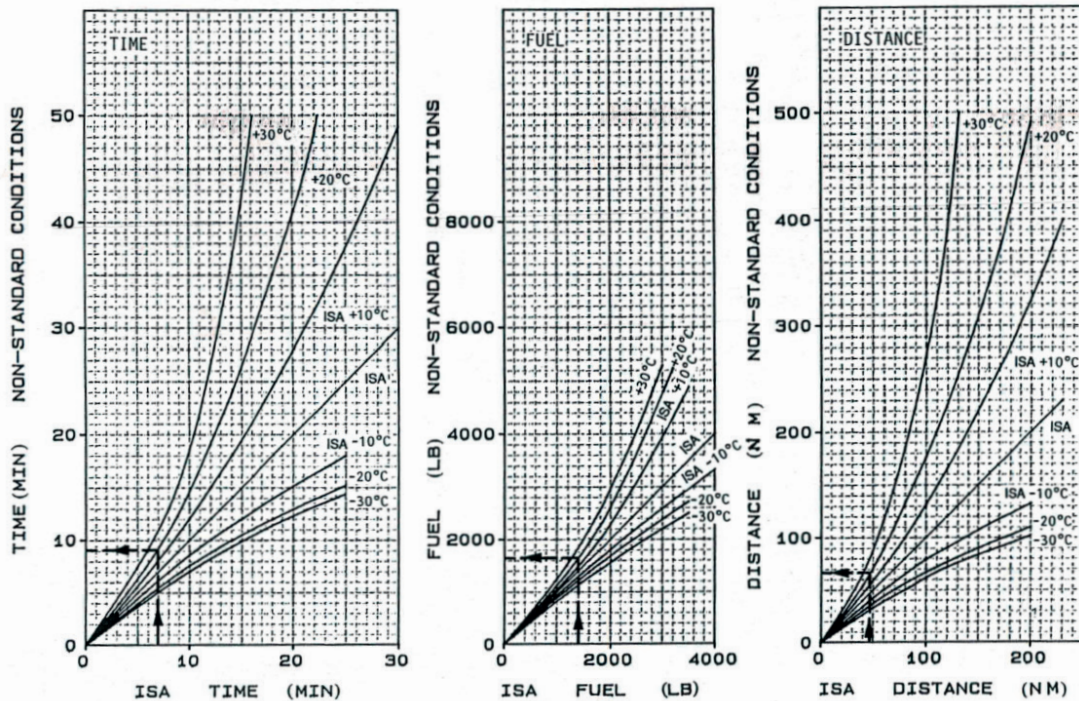


Figure 1.2

TEMPERATURE EFFECT ON CLIMB, CLEAN



CRUISE

This section provides data for level cruise, cruise climb and endurance.

Figures 2.1 to 2.7 provide specific air range and air distance covered for a range of aircraft weights and Mach numbers at various altitudes in ISA conditions. In addition, optimum values for two-engine flight are given. Figure 2.8 provides similar data at a speed of 250 knots CAS. The data is valid for the clean aircraft with two engines operating. Data for optimum single-engine cruise with a clean aircraft is given in Figure 2.9.

To find the air range and overall specific air range (SAR) for level cruise at a stated Mach number or CAS and altitude, given start-of-cruise and end-of-cruise weights:

- a. Using the appropriate figure, find the distances associated with the start-of-cruise and end-of-cruise weights. Subtract one from the other to determine air range.
- b. For a particular Mach number or CAS, the chart gives SAR at any instantaneous weight. Overall SAR may be calculated as:
$$(1000 \times \text{air range obtained at (a) above}) / (\text{start-of-cruise weight minus end-of-cruise weight}).$$

The figures may also be used to find the weight of fuel required to fly a given distance, given end-of-cruise weight:

- a. Using the appropriate figure, find the distance associated with the end-of-cruise weight.
- b. Add the desired still air cruise distance to that obtained at (a).
- c. Read the start-of-cruise weight corresponding to the distance obtained at (b).
- d. Subtract the end-of-cruise weight from the start-of-cruise weight to give the weight of fuel required.

Figures 2.10 to 2.14 provide SAR, air distance covered and altitude for a range of Mach numbers, engine RPM and aircraft weights, in ISA conditions. The data is valid for a clean aircraft with two engines operating.

To find the air range, overall SAR and instantaneous altitude for cruise climb at a stated Mach number and engine RPM, given start-of-cruise and end-of-cruise weights:

- a. Using the appropriate figure, find the distances associated with the start-of-cruise and end-of-cruise weights. Subtract one from the other to determine air range.
- b. For a particular Mach number, the chart gives SAR at any instantaneous weight. Overall SAR may be calculated as:
$$(1000 \times \text{air range obtained at (a) above}) / (\text{start-of-cruise weight minus end-of-cruise weight})$$
- c. Instantaneous pressure altitude may be read directly from the chart.

SAR values, air range for the consumption of a given quantity of fuel and altitude, as derived from figures 2.1 to 2.14, may be regarded as independent of temperature deviation from ISA provided that the RPM are suitably adjusted.

Figure 2.15 provides maximum specific endurance in ISA conditions and optimum endurance speed (knots CAS) for a clean aircraft with two engines and one engine operating, for a range of altitudes and weights. The highest value of maximum specific endurance on two engines at each weight is printed in red, indicating the optimum altitude for endurance at that weight.

Specific endurance as derived from Figure 2.15 may be corrected by increasing/decreasing the values by 1% for every 5°C that the temperature is below/above ISA.

Figure 2.1

LEVEL CRUISE, ISA, CLEAN, SEA LEVEL

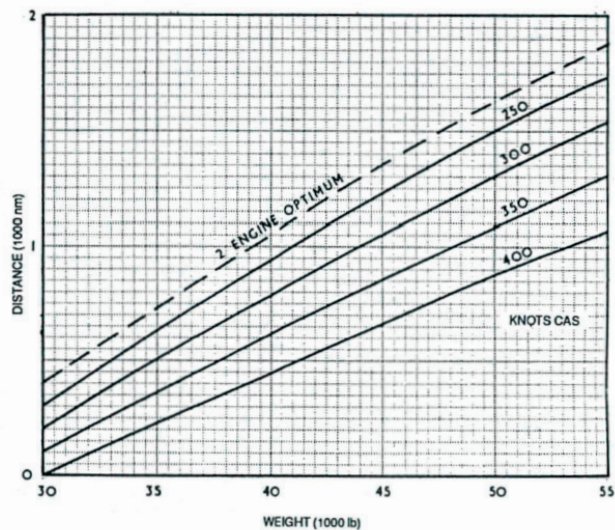
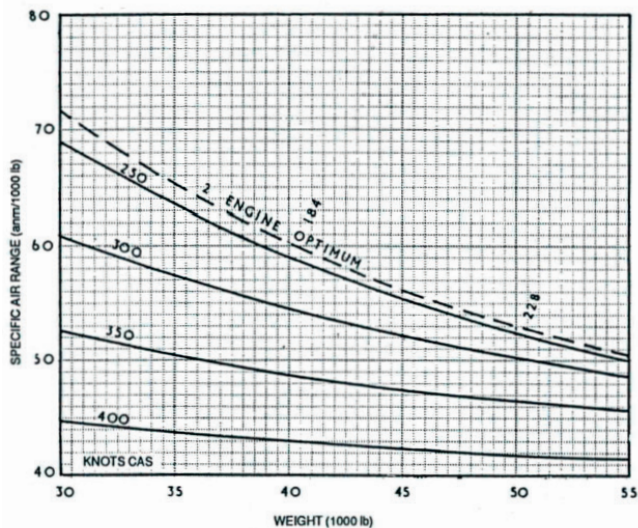


Figure 2.2

LEVEL CRUISE, ISA, CLEAN, 10 000 FEET

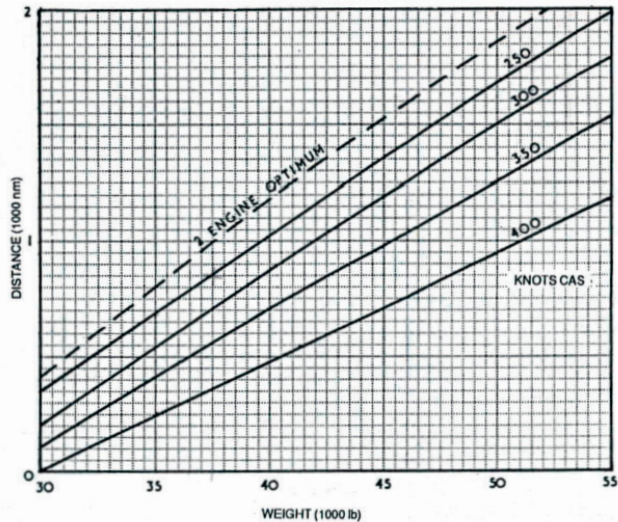
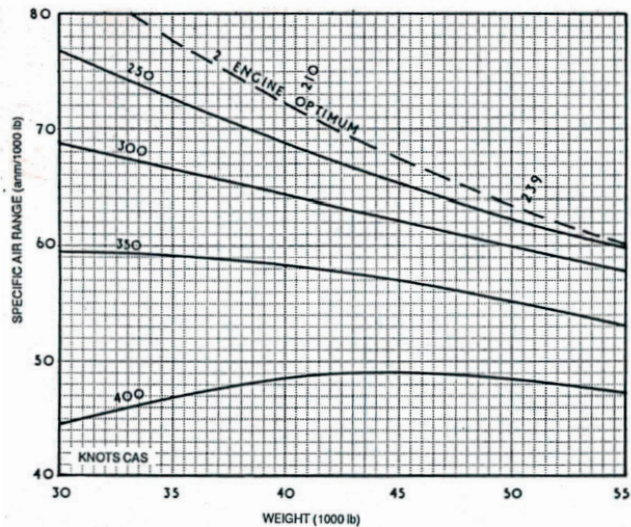


Figure 2.3

LEVEL CRUISE, ISA, CLEAN, 20 000 FEET

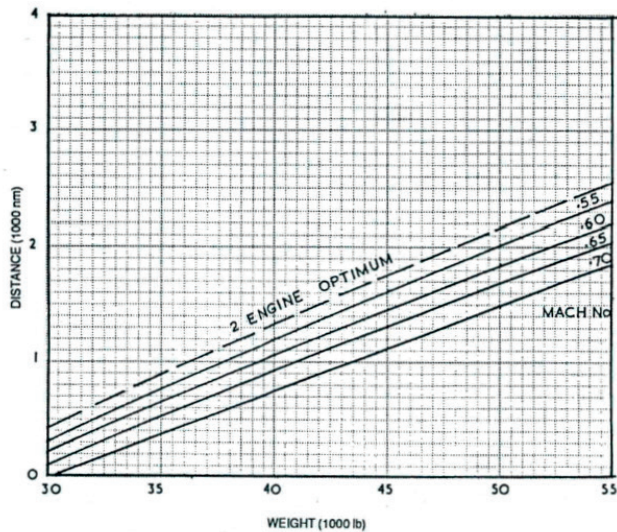
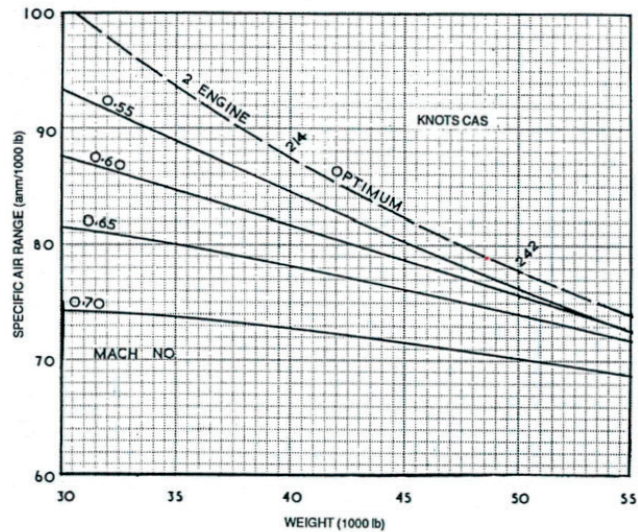


Figure 2.4

LEVEL CRUISE, ISA, CLEAN, 30 000 FEET

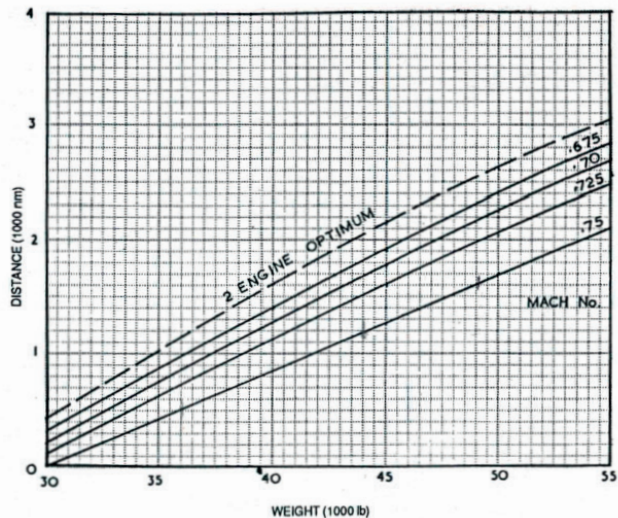
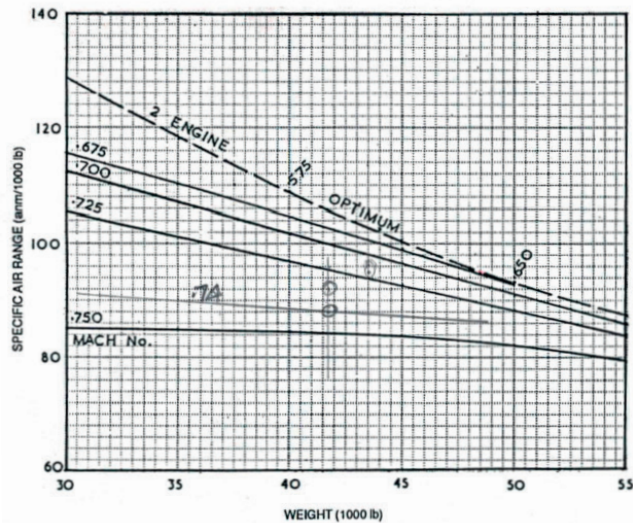


Figure 2.5

LEVEL CRUISE, ISA, CLEAN, 40 000 FEET

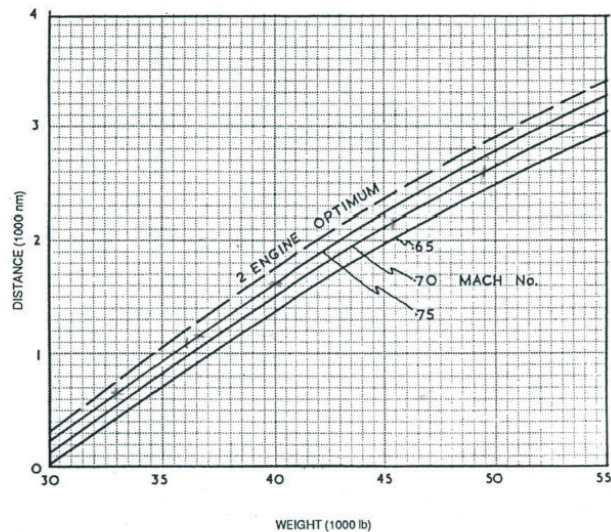
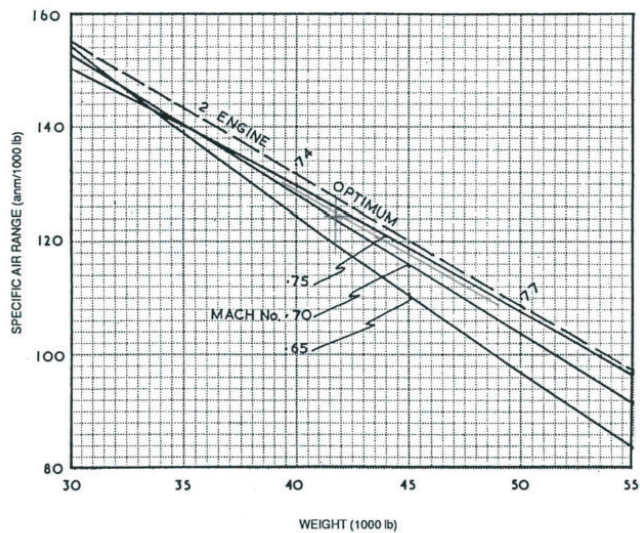


Figure 2.6

LEVEL CRUISE, ISA, CLEAN, 45 000 FEET

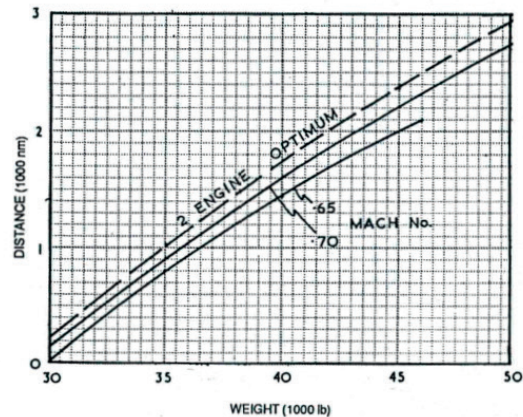
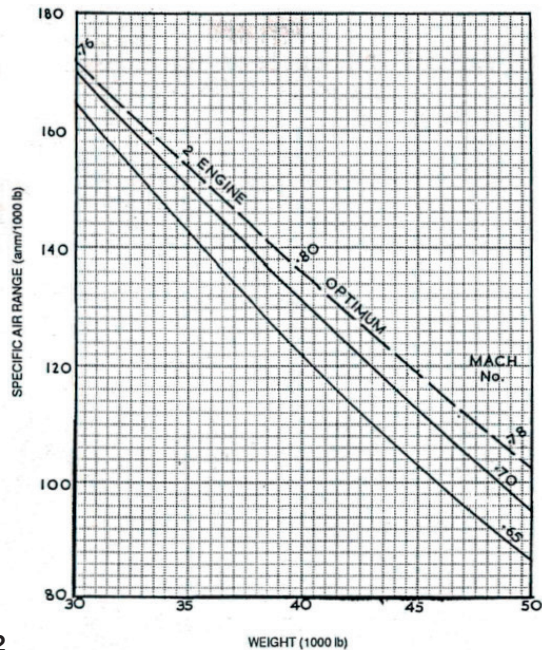


Figure 2.7

LEVEL CRUISE, ISA, CLEAN, 50 000 FEET

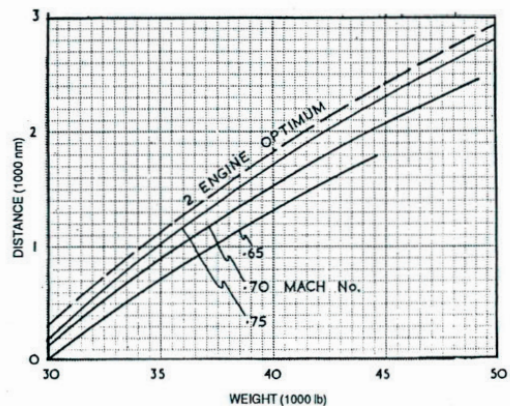
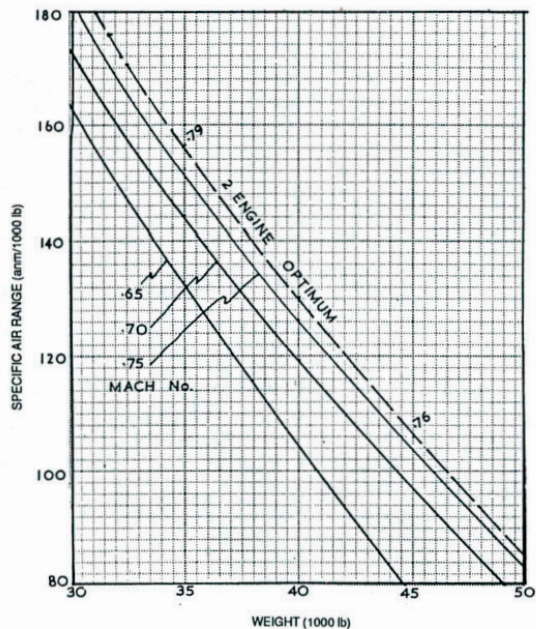


Figure 2.8

LEVEL CRUISE, ISA, CLEAN, 250 KNOTS CAS

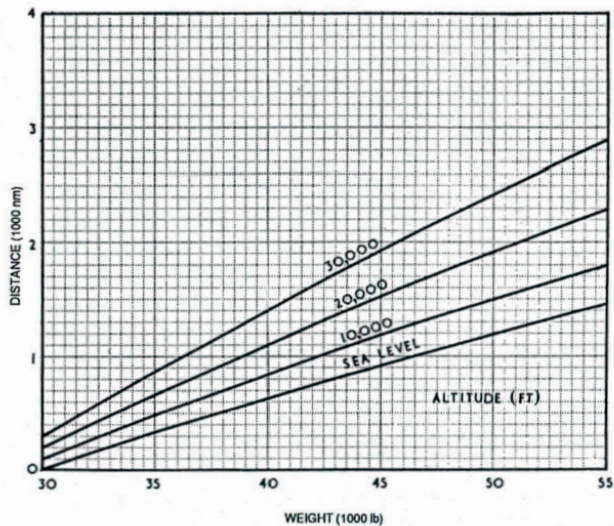
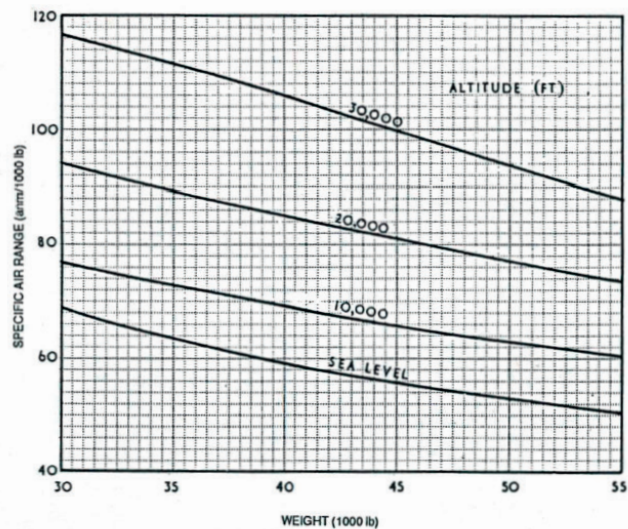


Figure 2.9

LEVEL CRUISE, ISA, CLEAN, SINGLE ENGINE OPTIMUM

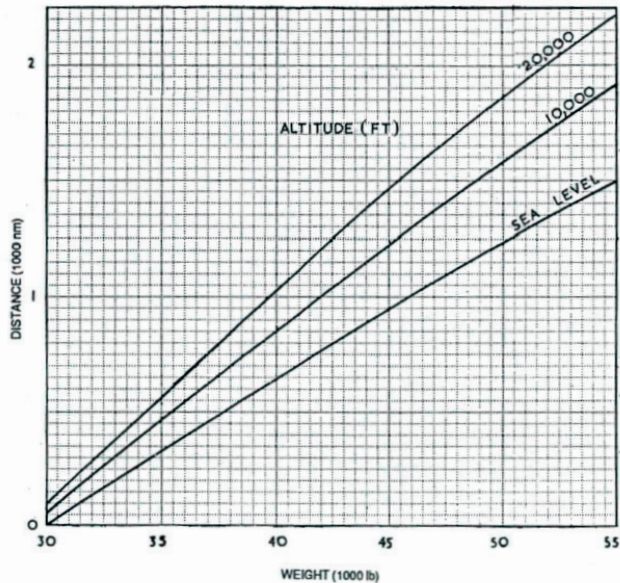
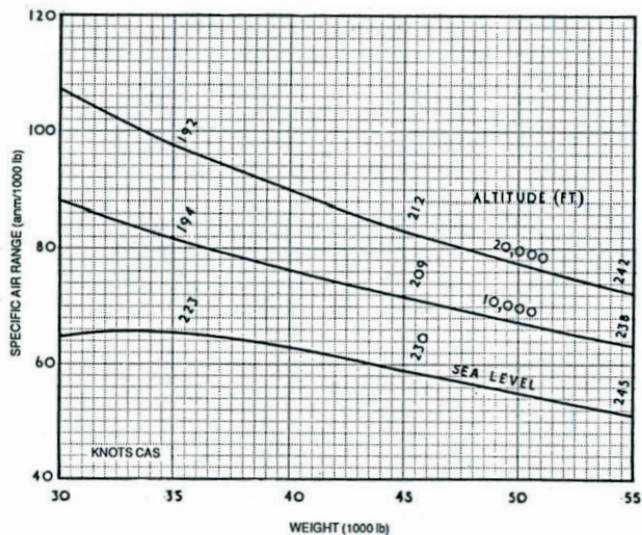


Figure 2.10

CRUISE CLIMB, ISA, CLEAN, 0.71M

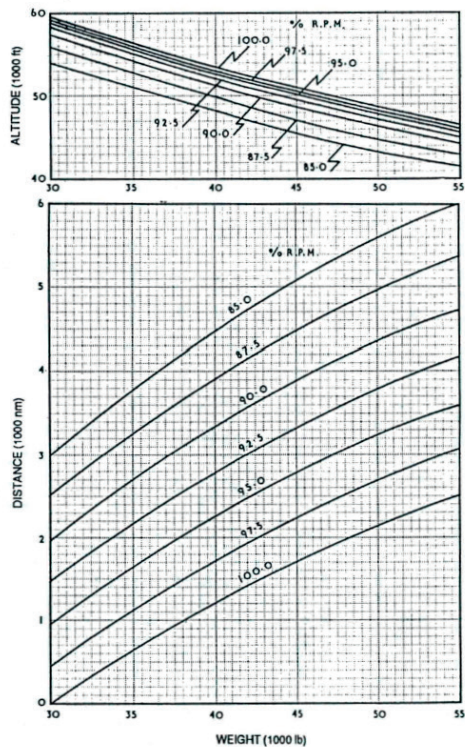
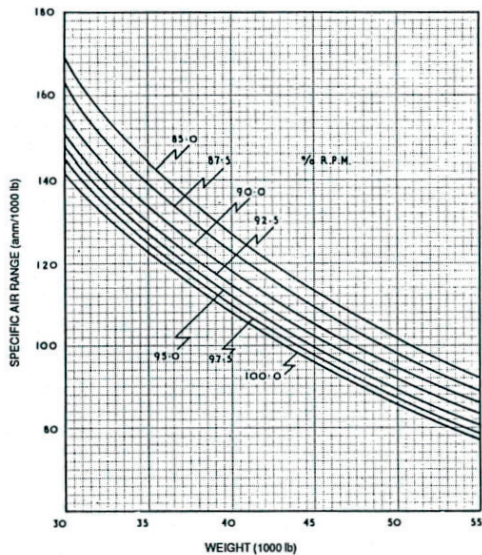


Figure 2.11

CRUISE CLIMB, ISA, CLEAN, 0.73M

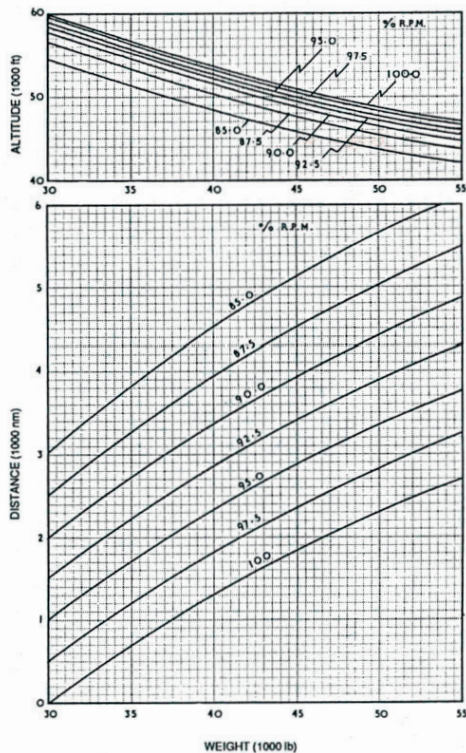
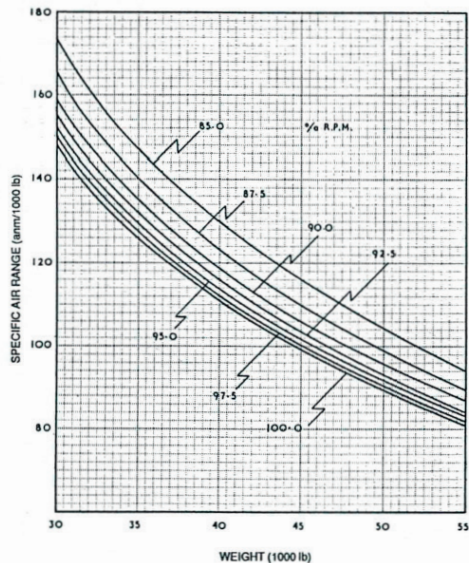


Figure 2.12

CRUISE CLIMB, ISA, CLEAN, 0.75M

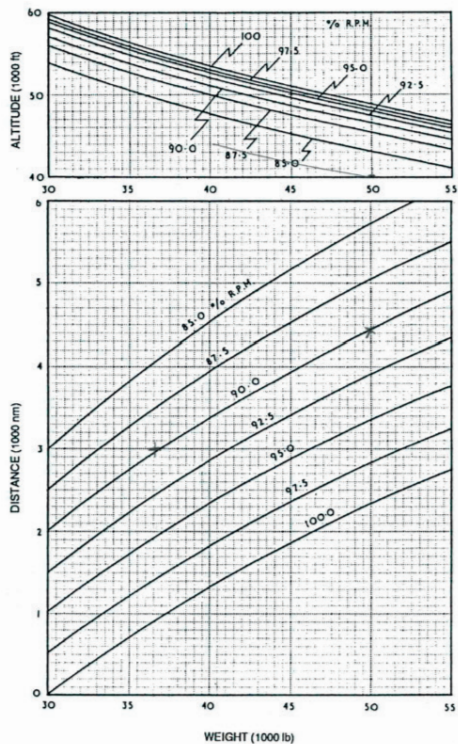
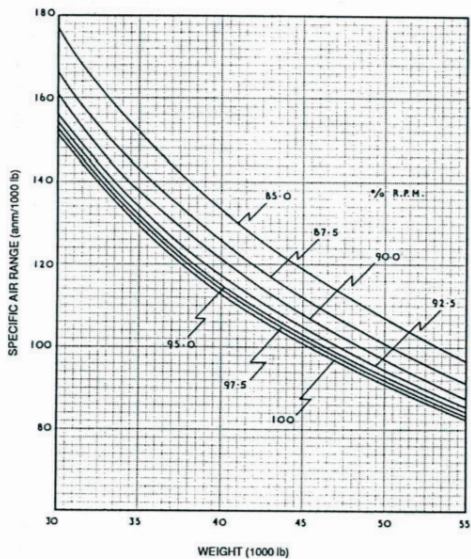


Figure 2.13

CRUISE CLIMB, ISA, CLEAN, 0.77M

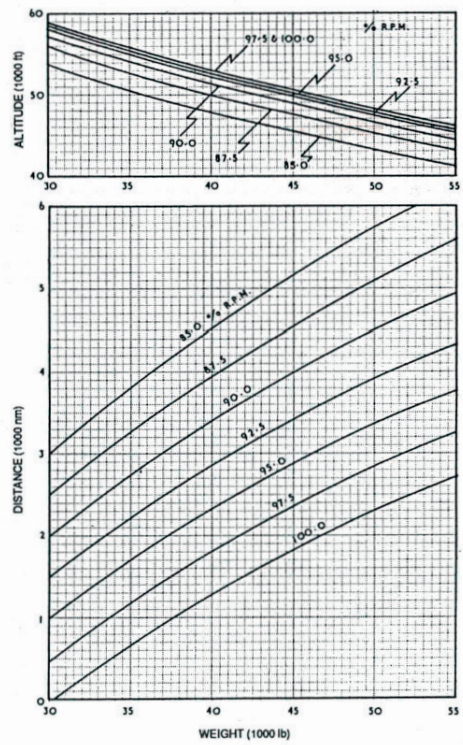
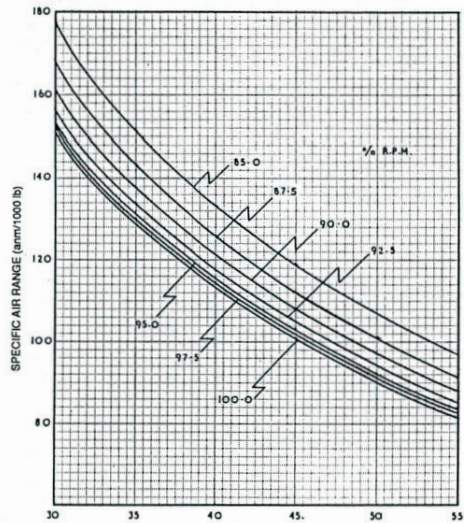


Figure 2.14

CRUISE CLIMB, ISA, CLEAN, 0.79M

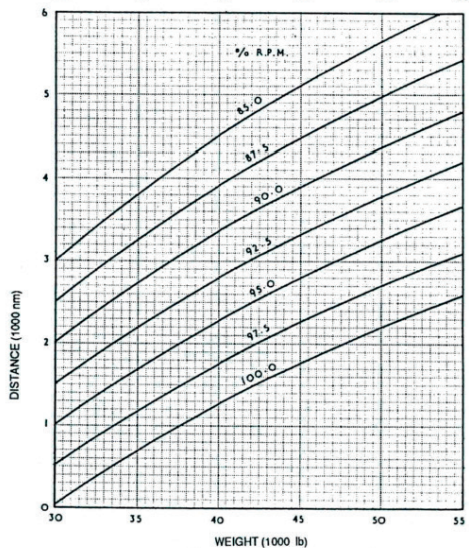
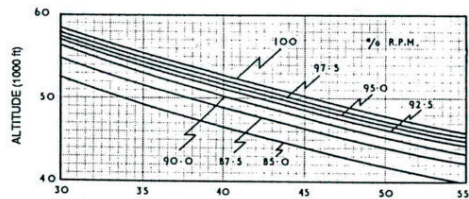
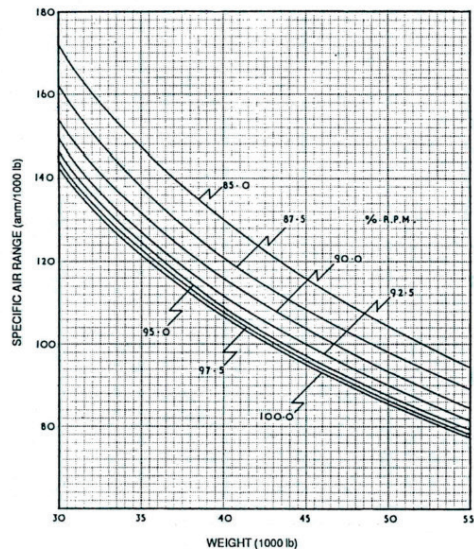


Figure 2.15

ENDURANCE, ISA, CLEAN**WT 30 000 lb**

Height (ft)	min/1000 lb fuel		Speed (KCAS)
	2 Engines	1 Engine	
SL	15.0	22.0	158
10 000	19.5	26.5	158
20 000	23.7	30.3	159
30 000	28.4	33.5	160
40 000	32.0	—	167
50 000	30.5	—	150
55 000	28.0	—	145

WT 35 000 lb

Height (ft)	min/1000 lb fuel		Speed (KCAS)
	2 Engines	1 Engine	
SL	14.0	20.0	170
10 000	17.5	23.5	171
20 000	21.5	26.7	172
30 000	25.8	28.0	174
40 000	27.9	—	181
50 000	25.2	—	159
55 000	21.4	—	145

WT 40 000 lb

SL	13.2	18.3	182
10 000	16.0	21.2	183
20 000	19.7	23.7	184
30 000	23.2	24.0	185
40 000	24.3	—	190
50 000	20.7	—	165

WT 45 000 lb

SL	12.6	15.9	192
10 000	15.0	19.9	192
20 000	18.2	22.2	193
30 000	20.6	21.4	194
40 000	20.7	—	199
50 000	16.9	—	166

TACTICAL DATA

Figure 3.1 is a nomogram presenting the relationship between the parameters involved in a steady level turn; these are airspeed (TAS), bank angle (degrees), normal acceleration (G-force), turn rate (degrees per second) and turn radius (nm/km).

Any straight line crossing these four basic scales gives, at its intersection points, a consistent set of values descriptive of a possible level turn. Thus, if the values of any two parameters are known (e.g. airspeed and normal acceleration), the other two (turn rate and radius) are given by the other two intersections.

Figure 3.2 presents the radius of turn with maximum power for a range of altitudes and weights, at 0.6M, 0.7M and 0.8M.

Figure 3.1

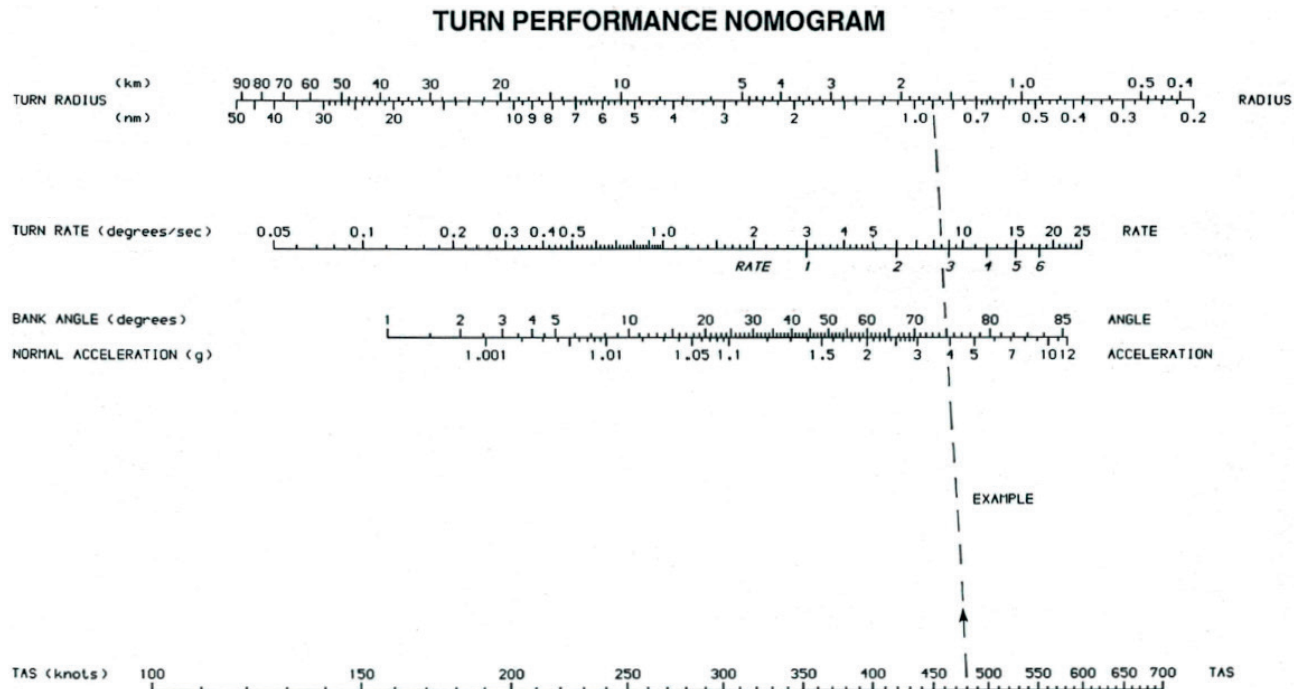
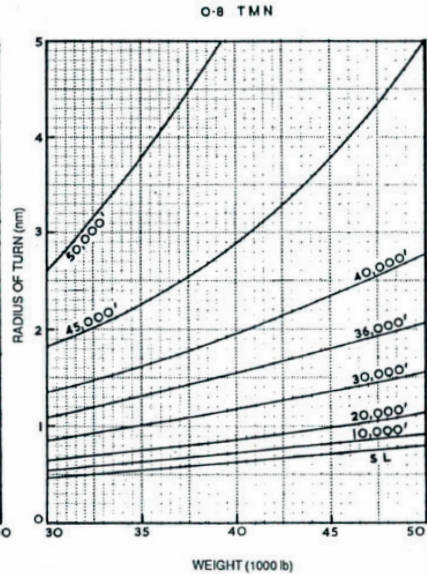
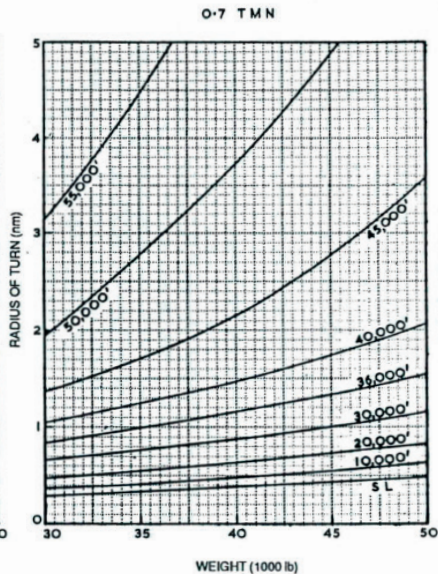
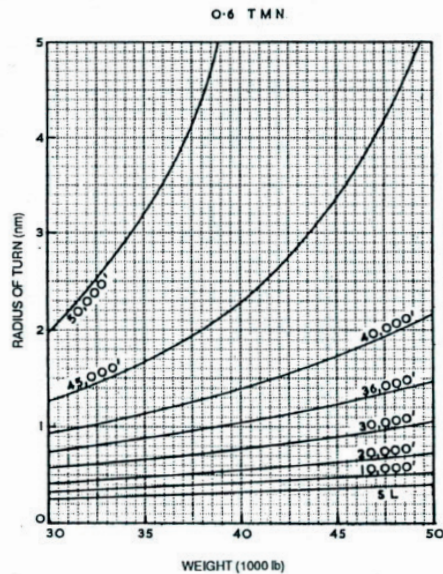


Figure 3.2

RADIUS OF TURN, MAXIMUM POWER, CLEAN



DESCENT

The data in this section is given for an aircraft weight of 40,000lb in ISA conditions. Variations due to changes in temperature are small, but a weight increase/decrease of 5,000lb results in a 10% increase/decrease in the descent time, distance and fuel.

Figure 4.1 gives data for a rapid descent.

The data assumes that idle RPM is set, airbrakes are OUT, and descent is made at 0.79M above 25,000ft and 0.75M/350 knots IAS below 25,000ft.

Figure 4.2 gives data for a normal descent. It assumes that idle RPM is set, airbrakes are at the MID position, and descent is made at 0.75M until a coincident speed of 250 knots IAS is reached, and at 250 knots IAS thereafter.

Figure 4.1

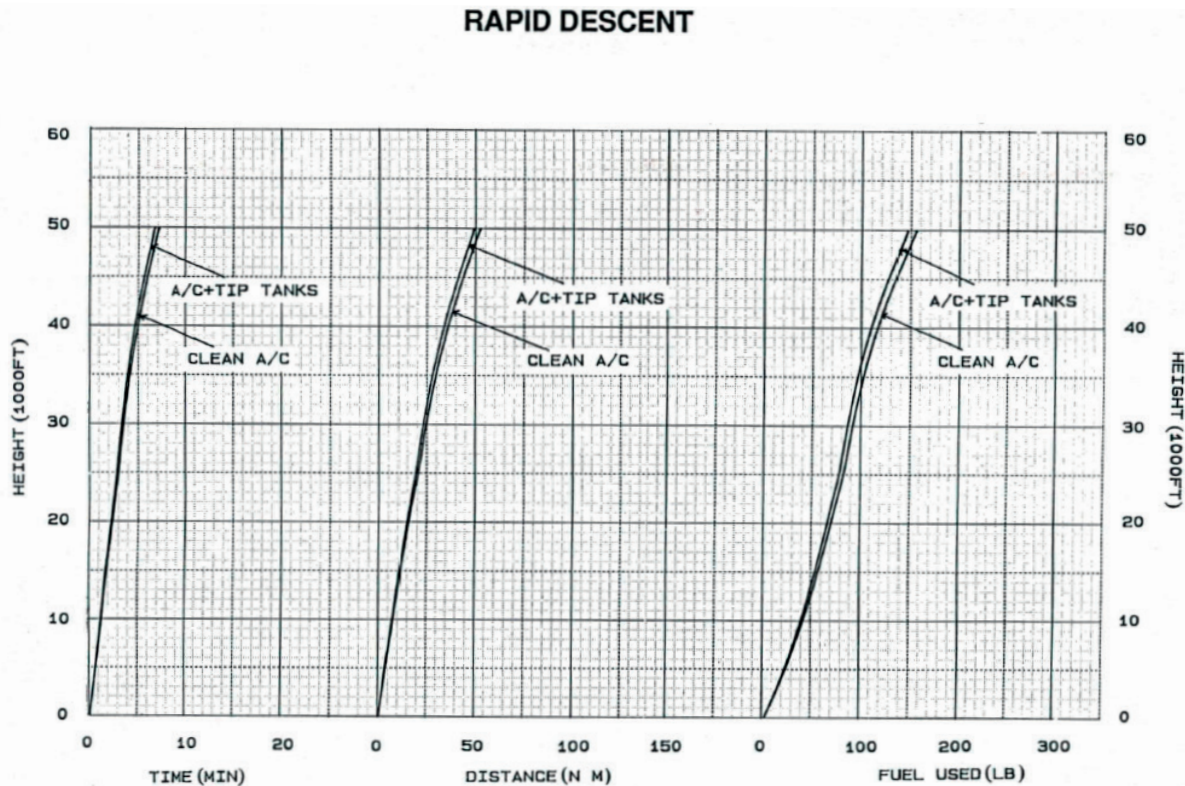
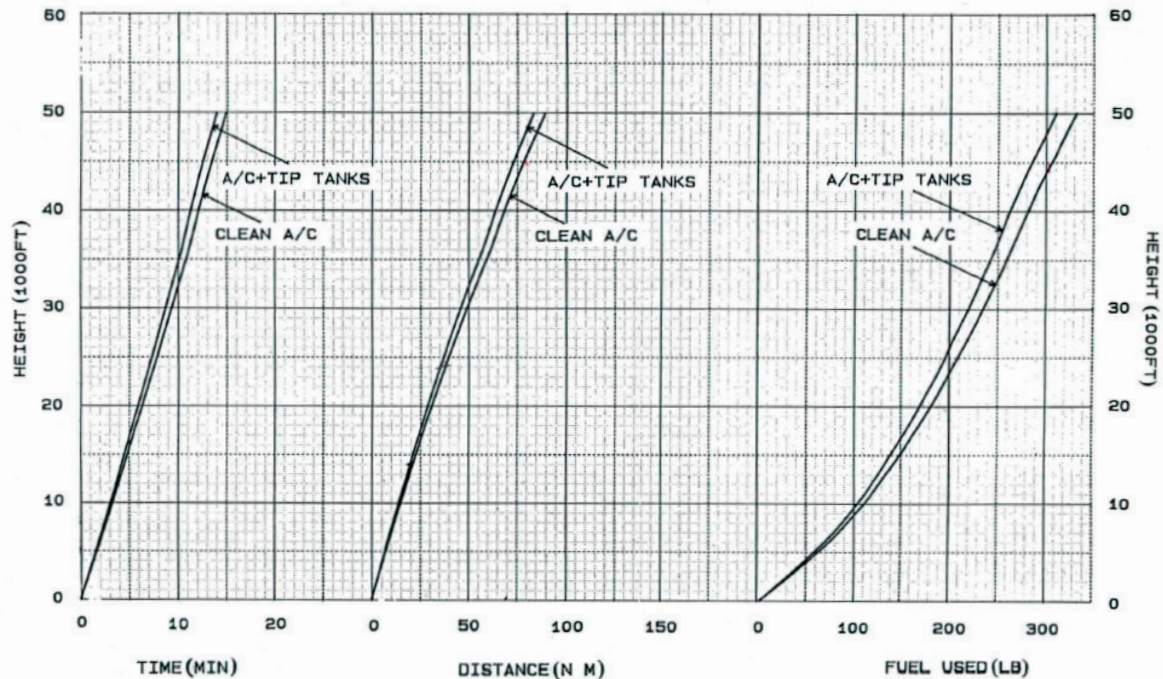


Figure 4.2

NORMAL DESCENT



LANDING

The data in this section is based on use of the landing technique described in the manual, with the following assumptions:

- a. The aircraft crosses the runway threshold at a height of 50ft, and at the threshold speed.
- b. Flaps are selected DOWN.
- c. Continuous maximum wheel braking is applied four seconds after touchdown or at the normal maximum braking speed (NMBS), whichever occurs later.

Wind correction grids include factors of 0.5 and 1.5 to reported headwind and tailwind components respectively, thus permitting direct application of reported wind components when using the graphs.

Approach and threshold speeds are given in Figure 5.1.

Figures 5.2 and 5.3 enable normal maximum braking speeds (NMBS) to be determined for dry and wet runways respectively. The data covers a range of airfield pressure and temperature, aircraft weight, runway slope and wind.

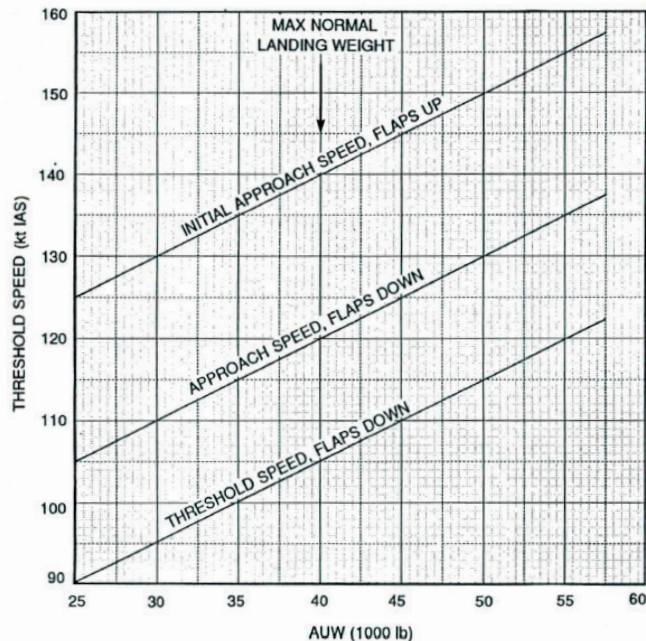
Note: The NMBS are based on the landing configuration (flaps DOWN).

Figure 5.4 provides values of landing ground run for wet and dry runways using maximum braking.

Figure 5.5 provides values of landing distance from 50 feet for wet and dry runways using maximum braking.

Figure 5.1

APPROACH AND THRESHOLD SPEEDS



Normal Approach Speed:

Initial approach speed (flaps up) Threshold + 35 knots (minimum)
 Minimum approach speed (flaps down) Threshold + 15 knots

Flapless Landing:

Initial approach speed Normal threshold + 35 knots (minimum)
 Minimum approach speed Normal threshold + 20 knots
 Threshold speed Normal threshold + 10 knots

Instrument Approach Speeds

Pattern and initial approach Threshold + 45 knots (minimum)
 Glidepath Initially threshold + 35 knots, reducing to threshold + 15 knots until committed to landing

Asymmetric Approach Speeds:

	Below 45 000 lb AUV	Above 45 000 lb AUV
Minimum to 600 feet AGL (VCH)	150 knots	160 knots
Minimum from 600 feet AGL (VCH) until certain of landing	135 knots	145 knots

Warning: Flaps must not be lowered above 100 feet AGL

Figure 5.2

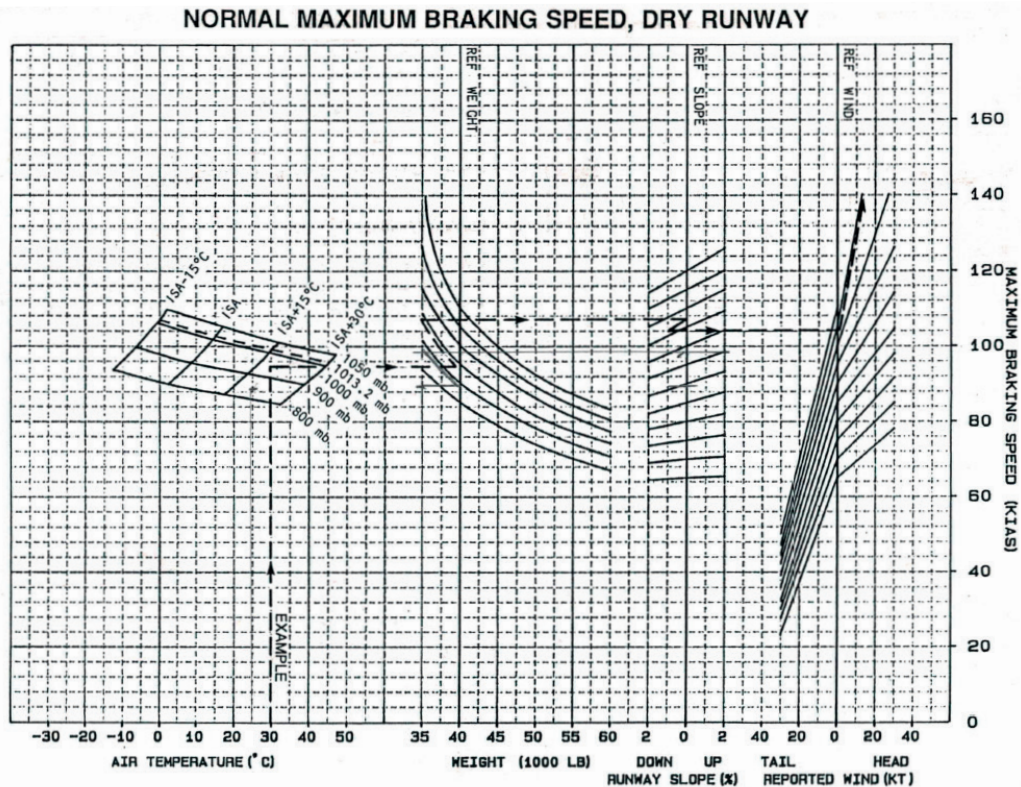


Figure 5.3

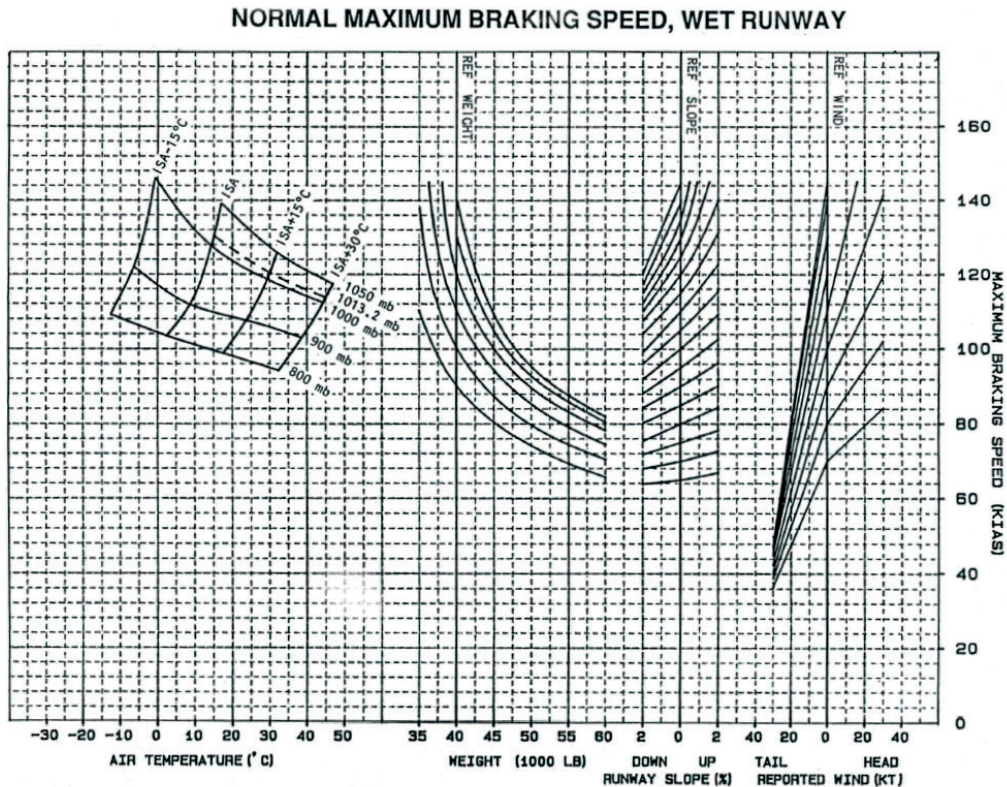


Figure 5.4

LANDING GROUND RUN, DRY AND WET RUNWAY

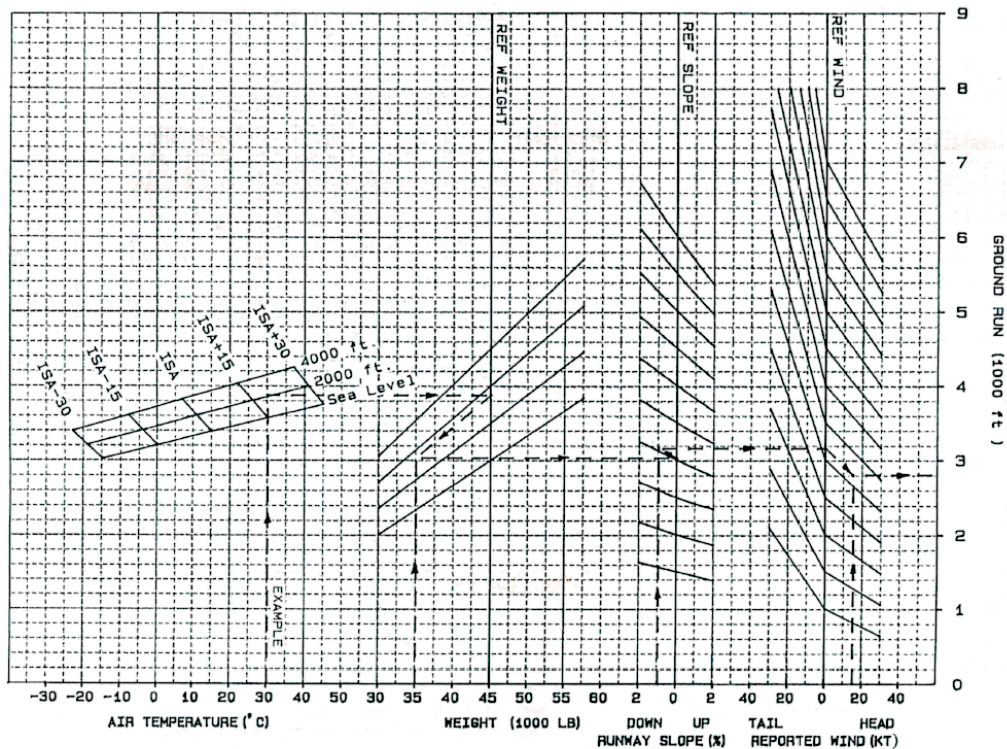
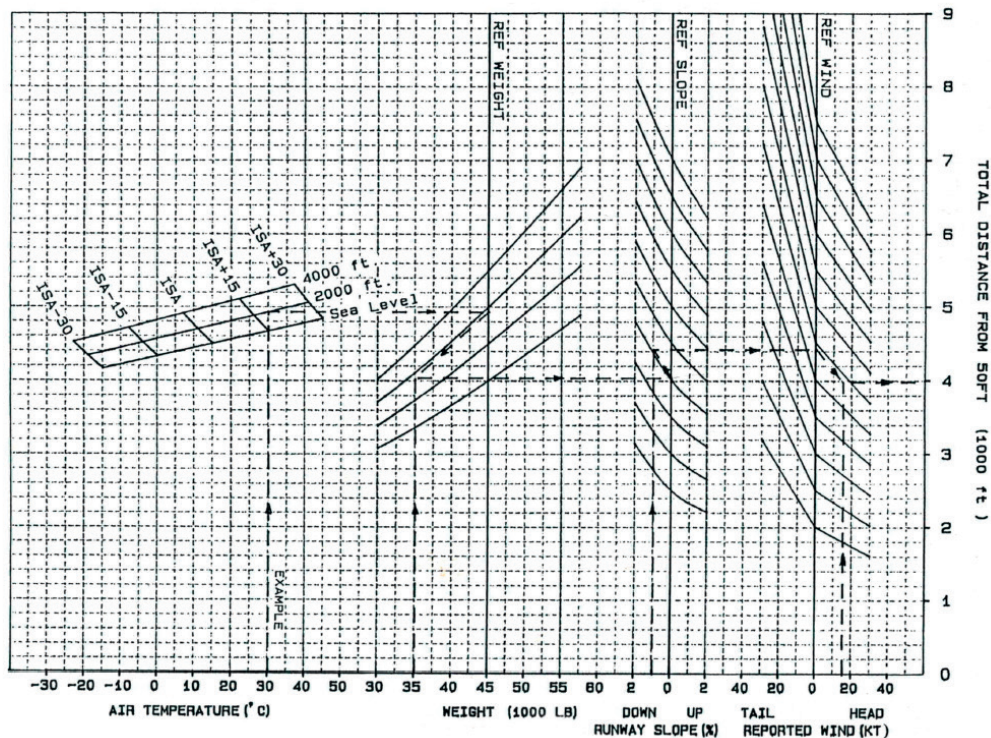


Figure 5.5

LANDING DISTANCE FROM 50 FEET, DRY AND WET RUNWAY



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