

SECTION 5 PERFORMANCE

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INTRODUCTION

Performance data charts on the following pages are presented so that you may know what to expect from the airplane under various conditions, and also, to facilitate the planning of flights in detail and with reasonable accuracy. The data in the charts has been computed from actual flight tests with the airplane and engine in good condition and using average piloting techniques.

It should be noted that the performance information presented in the range and endurance profile charts allows for 45 minutes reserve fuel based on 45% power. Fuel flow data for cruise is based on the recommended lean mixture setting. Some indeterminate variables such as mixture leaning technique, fuel metering characteristics, engine and propeller condition, and air turbulence may account for variations of 10% or more in range and endurance. Therefore, it is important to utilize all available information to estimate the fuel required for the particular flight.

USE OF PERFORMANCE CHARTS

Performance data is presented in tabular or graphical form to illustrate the effect of different variables. Sufficiently detailed information is provided in the tables so that conservative values can be selected and used to determine the particular performance figure with reasonable accuracy.

SAMPLE PROBLEM

The following sample flight problem utilizes information from the various charts to determine the predicted performance data for a typical flight. The following information is known:

AIRPLANE CONFIGURATION

| | |
|----------------|-------------|
| Takeoff weight | 2250 Pounds |
| Usable fuel | 38 Gallons |

TAKEOFF CONDITIONS

| | |
|-----------------------------|----------------------------|
| Field pressure altitude | 1500 Feet |
| Temperature | 28°C (16°C above standard) |
| Wind component along runway | 12 Knot Headwind |
| Field length | 3500 Feet |

ENDURANCE PROFILE
45 MINUTES RESERVE
48.0 GALLONS USABLE FUEL

CONDITIONS:
2300 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature

- NOTES:
- This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the time during climb as shown in figure 5-6.
 - Reserve fuel is based on 45 minutes at 45% BHP and is 4.3 gallons.

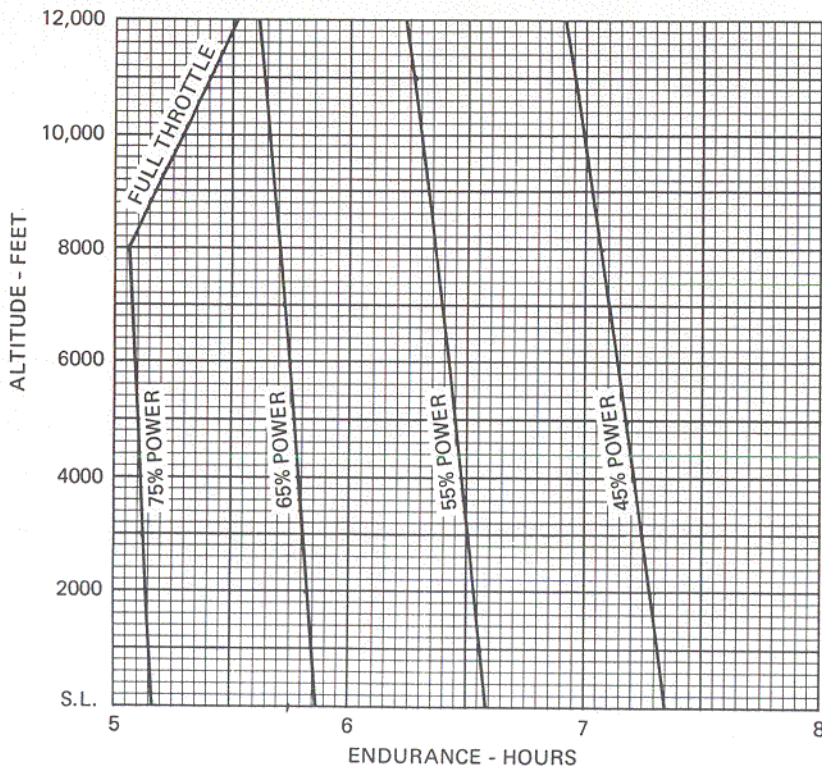


Figure 5-9. Endurance Profile (Sheet 2 of 2)

LANDING DISTANCE

CONDITIONS:
Flaps 40°
Power Off
Maximum Braking
Paved, Level, Dry Runway
Zero Wind

- NOTES:
- Maximum performance technique as specified in Section 4.
 - Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
 - For operation on a dry, grass runway, increase distances by 45% of the "ground roll" figure.

| WEIGHT LBS | SPEED AT 50 FT KIAS | PRESS ALT FT | 0°C | | 10°C | | 20°C | | 30°C | | 40°C | |
|---------------|------------------------------|--------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|
| | | | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS |
| 2300 | 60 | S.L. | 495 | 1205 | 510 | 1235 | 530 | 1265 | 545 | 1295 | 565 | 1330 |
| | | 1000 | 510 | 1235 | 530 | 1265 | 550 | 1300 | 565 | 1330 | 585 | 1365 |
| | | 2000 | 530 | 1265 | 550 | 1300 | 570 | 1335 | 590 | 1370 | 610 | 1405 |
| | | 3000 | 550 | 1300 | 570 | 1335 | 590 | 1370 | 610 | 1405 | 630 | 1440 |
| | | 4000 | 570 | 1335 | 590 | 1370 | 615 | 1410 | 635 | 1445 | 655 | 1480 |
| | | 5000 | 590 | 1370 | 615 | 1415 | 635 | 1450 | 655 | 1485 | 680 | 1525 |
| | | 6000 | 615 | 1415 | 640 | 1455 | 660 | 1490 | 685 | 1535 | 705 | 1570 |
| | | 7000 | 640 | 1455 | 660 | 1495 | 685 | 1535 | 710 | 1575 | 730 | 1615 |
| 8000 | 665 | 1500 | 690 | 1540 | 710 | 1580 | 735 | 1620 | 760 | 1665 | | |

Figure 5-10. Landing Distance

CRUISE CONDITIONS

| | |
|-----------------------|----------------------------|
| Total distance | 420 Nautical Miles |
| Pressure altitude | 5500 Feet |
| Temperature | 20°C (16°C above standard) |
| Expected wind enroute | 10 Knot Headwind |

LANDING CONDITIONS

| | |
|-----------------------------|-----------------|
| Field pressure altitude | 2000 Feet |
| Temperature | 25°C |
| Wind component along runway | 6 Knot Headwind |
| Field length | 3000 Feet |

TAKEOFF

The takeoff distance chart, figure 5-4, should be consulted, keeping in mind that the distances shown are based on maximum performance techniques. Conservative distances can be established by reading the chart at the next higher value of weight, altitude and temperature. For example, in this particular sample problem, the takeoff distance information presented for a weight of 2300 lbs., a pressure altitude of 2000 feet and a temperature of 30°C should be used and results in the following:

| | |
|--|-----------|
| Ground roll | 1155 Feet |
| Total distance to clear a 50-foot obstacle | 2030 Feet |

A correction for the effect of wind may be made based on Note 3 of the takeoff chart. The distance correction for a 12 knot headwind is:

$$\frac{12 \text{ Knots}}{9 \text{ Knots}} \times 10\% = 13\% \text{ Decrease}$$

This results in the following distances, corrected for wind:

| | |
|--|------------|
| Ground roll, zero wind | 1155 |
| Decrease in ground roll (1155 feet x 13%) | <u>150</u> |
| Corrected ground roll | 1005 Feet |
| Total distance to clear a 50-foot obstacle, zero wind | 2030 |
| Decrease in total distance (2030 feet x 13%) | <u>264</u> |
| Corrected total distance to clear 50-foot obstacle | 1766 Feet |

These distances are well within the takeoff field length quoted earlier for

the sample problem.

CRUISE

The cruising altitude and winds aloft information have been given for this flight. However, the power setting selection for cruise must be determined based on several considerations. These include the cruise performance characteristics of the airplane presented in figure 5-7, the range profile chart presented in figure 5-8, and the endurance profile chart presented in figure 5-9.

The range profile chart illustrates the relationship between power and range. Considerable fuel savings and longer range result when lower power settings are used.

For this sample problem with a cruise altitude of 5500 feet and distance of 420 nautical miles, the range profile chart indicates that use of a 75% power setting will necessitate a fuel stop, in view of the anticipated 10 knot headwind component. However, selecting a 65% power setting from the range profile chart yields a predicted range of 477 nautical miles under zero wind conditions. The endurance profile chart, figure 5-9, shows a corresponding 4.4 hours.

The range figure of 477 nautical miles is corrected to account for the expected 10 knot headwind at 5500 feet.

| | |
|---|--------------------|
| Range, zero wind | 477 |
| Decrease in range due to wind (4.4 hours x 10 knot headwind) | <u>44</u> |
| Corrected range | 433 Nautical Miles |

This indicates that the trip can be made without a fuel stop using approximately 65% power.

The cruise performance chart, figure 5-7, is entered at 6000 feet altitude and 20°C above standard temperature. These values most nearly correspond to the expected altitude and temperature conditions. The engine speed chosen is 2500 RPM, which results in the following:

| | |
|------------------|-----------|
| Power | 62% |
| True airspeed | 109 Knots |
| Cruise fuel flow | 7.0 GPH |

The power computer may be used to determine power and fuel consumption during the flight.

FUEL REQUIRED

The total fuel requirement for the flight may be estimated using the performance information in figures 5-6 and 5-7. For this sample problem, figure 5-6 shows that a climb from 1000 feet to 6000 feet requires 2.0 gallons of fuel and may be used as a conservative estimate for this problem. This is for a standard temperature (as shown on the climb chart). The approximate effect of a non-standard temperature is to increase the time, fuel, and distance by 10% for each 10°C above standard temperature, due to the lower rate of climb. In this case, assuming a temperature 16°C above standard, the correction would be:

$$\frac{16^{\circ}\text{C}}{10^{\circ}\text{C}} \times 10\% = 16\% \text{ Increase}$$

With this factor included, the fuel estimate would be calculated as follows:

| | |
|---|-------------|
| Fuel to climb, standard temperature | 2.0 |
| Increase due to non-standard temperature (2.0 x 16%) | 0.3 |
| Corrected fuel to climb | 2.3 Gallons |

In addition, the distance to climb, as given in figure 5-6, may be corrected for non-standard temperature as follows:

| | |
|---|-------------------|
| Distance to climb, standard temperature | 14 |
| Increase due to non-standard temperature (14 nautical miles x 16%) | 2 |
| Corrected distance to climb | 16 Nautical Miles |

The resultant cruise distance is:

| | |
|-----------------|--------------------|
| Total distance | 420 |
| Climb distance | -16 |
| Cruise distance | 404 Nautical Miles |

With an expected 10 knot headwind, the ground speed for cruise is predicted to be:

$$\begin{array}{r} 109 \\ -10 \\ \hline 99 \text{ Knots} \end{array}$$

Therefore, the time required for the cruise portion of the trip is:

$$\frac{404 \text{ Nautical Miles}}{99 \text{ Knots}} = 4.1 \text{ Hours}$$

The fuel required for cruise is endurance times fuel consumption:

$$4.1 \text{ hours} \times 7.0 \text{ gallons/hour} = 28.7 \text{ Gallons}$$

The total estimated fuel required is as follows:

| | |
|---------------------------------|--------------|
| Engine start, taxi, and takeoff | 1.1 |
| Climb | 2.3 |
| Cruise | 28.7 |
| Total fuel required | 32.1 Gallons |

This will leave a fuel reserve of:

$$\begin{array}{r} 38.0 \\ -32.1 \\ \hline 5.9 \text{ Gallons} \end{array}$$

Once the flight is underway, ground speed checks will provide a more accurate basis for estimating the time enroute and the corresponding fuel required to complete the trip with ample reserve.

LANDING

A procedure similar to the takeoff calculations should be used for estimating the landing distance at the destination airport. Figure 5-10 presents maximum performance technique landing distances for various airport altitude and temperature combinations. The distances corresponding to 2000 feet altitude and 30°C should be used and result in the following:

| | |
|--|-----------|
| Ground roll | 590 Feet |
| Total distance to clear a 50-foot obstacle | 1370 Feet |

A correction for wind may be made based on Note 2 of the landing chart. The distance correction for a 6 knot headwind is:

$$\frac{6 \text{ Knots}}{9 \text{ Knots}} \times 10\% = 7\% \text{ Decrease}$$

This results in the following wind-corrected figures:

| | |
|--|-----------|
| Ground roll | 549 Feet |
| Total distance over a 50-foot obstacle | 1274 Feet |

These distances are well within the landing field length quoted previously for this sample problem.

AIRSPEED CALIBRATION
NORMAL STATIC SOURCE

| | | | | | | | | | | | | |
|-----------|----|----|----|----|----|----|-----|-----|-----|-----|-----|--|
| FLAPS UP | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | |
| KCAS | 49 | 55 | 62 | 70 | 80 | 89 | 99 | 108 | 118 | 128 | 138 | |
| FLAPS 10° | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 85 | --- | --- | --- | --- | --- | |
| KCAS | 49 | 55 | 62 | 71 | 80 | 85 | --- | --- | --- | --- | --- | |
| FLAPS 40° | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 85 | --- | --- | --- | --- | --- | |
| KCAS | 47 | 54 | 62 | 71 | 81 | 86 | --- | --- | --- | --- | --- | |

Figure 5-1. Airspeed Calibration (Sheet 1 of 2)

AIRSPEED CALIBRATION
ALTERNATE STATIC SOURCE

HEATER/VENTS AND WINDOWS CLOSED

| | | | | | | | | | | | | |
|----------------|----|----|----|----|----|----|-----|-----|-----|-----|-----|--|
| FLAPS UP | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | |
| ALTERNATE KIAS | 39 | 51 | 61 | 71 | 82 | 91 | 101 | 111 | 121 | 131 | 141 | |
| FLAPS 10° | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 85 | --- | --- | --- | --- | --- | |
| ALTERNATE KIAS | 40 | 51 | 61 | 71 | 81 | 85 | --- | --- | --- | --- | --- | |
| FLAPS 40° | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 85 | --- | --- | --- | --- | --- | |
| ALTERNATE KIAS | 38 | 50 | 60 | 70 | 79 | 83 | --- | --- | --- | --- | --- | |

HEATER/VENTS OPEN AND WINDOWS CLOSED

| | | | | | | | | | | | | |
|----------------|----|----|----|----|----|----|-----|-----|-----|-----|-----|--|
| FLAPS UP | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | |
| ALTERNATE KIAS | 36 | 48 | 59 | 70 | 80 | 89 | 99 | 108 | 118 | 128 | 139 | |
| FLAPS 10° | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 85 | --- | --- | --- | --- | --- | |
| ALTERNATE KIAS | 38 | 49 | 59 | 69 | 79 | 84 | --- | --- | --- | --- | --- | |
| FLAPS 40° | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 85 | --- | --- | --- | --- | --- | |
| ALTERNATE KIAS | 34 | 47 | 57 | 67 | 77 | 81 | --- | --- | --- | --- | --- | |

WINDOWS OPEN

| | | | | | | | | | | | | |
|----------------|----|----|----|----|----|----|-----|-----|-----|-----|-----|--|
| FLAPS UP | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | |
| ALTERNATE KIAS | 26 | 43 | 57 | 70 | 82 | 93 | 103 | 113 | 123 | 133 | 143 | |
| FLAPS 10° | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 85 | --- | --- | --- | --- | --- | |
| ALTERNATE KIAS | 25 | 43 | 57 | 69 | 80 | 85 | --- | --- | --- | --- | --- | |
| FLAPS 40° | | | | | | | | | | | | |
| NIAS | 40 | 50 | 60 | 70 | 80 | 85 | --- | --- | --- | --- | --- | |
| ALTERNATE KIAS | 25 | 41 | 54 | 67 | 78 | 84 | --- | --- | --- | --- | --- | |

Figure 5-1. Airspeed Calibration (Sheet 2 of 2)

TEMPERATURE CONVERSION CHART

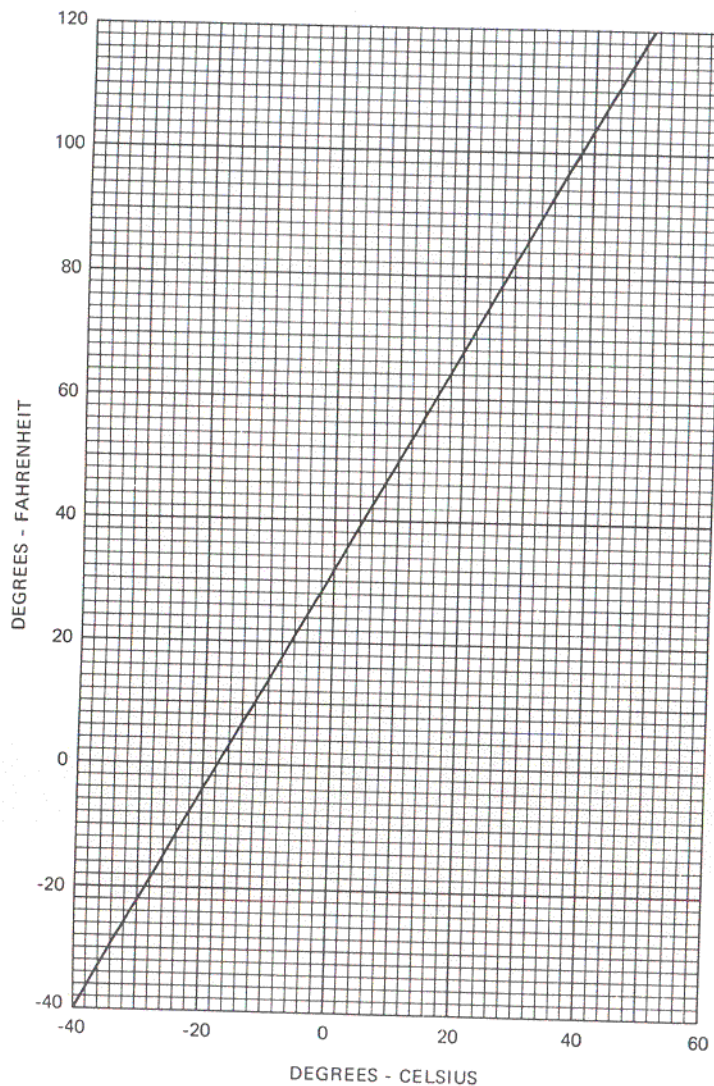


Figure 5-2. Temperature Conversion Chart

STALL SPEEDS

CONDITIONS:
Power Off

NOTES:

1. Maximum altitude loss during a stall recovery is approximately 180 feet.
2. KIAS values are approximate.

MOST REARWARD CENTER OF GRAVITY

| WEIGHT LBS | FLAP DEFLECTION | ANGLE OF BANK | | | | | | | |
|---------------|--------------------|---------------|------|------|------|------|------|------|------|
| | | 0° | | 30° | | 45° | | 60° | |
| | | KIAS | KCAS | KIAS | KCAS | KIAS | KCAS | KIAS | KCAS |
| 2300 | UP | 42 | 50 | 45 | 54 | 50 | 59 | 59 | 71 |
| | 10° | 38 | 47 | 40 | 51 | 45 | 56 | 54 | 66 |
| | 40° | 36 | 44 | 38 | 47 | 43 | 52 | 51 | 62 |

MOST FORWARD CENTER OF GRAVITY

| WEIGHT LBS | FLAP DEFLECTION | ANGLE OF BANK | | | | | | | |
|---------------|--------------------|---------------|------|------|------|------|------|------|------|
| | | 0° | | 30° | | 45° | | 60° | |
| | | KIAS | KCAS | KIAS | KCAS | KIAS | KCAS | KIAS | KCAS |
| 2300 | UP | 47 | 53 | 51 | 57 | 56 | 63 | 66 | 75 |
| | 10° | 44 | 51 | 47 | 55 | 52 | 61 | 62 | 72 |
| | 40° | 41 | 47 | 44 | 51 | 49 | 56 | 58 | 66 |

Figure 5-3. Stall Speeds

TAKEOFF DISTANCE MAXIMUM WEIGHT 2300 LBS

CONDITIONS:
Flaps Up
Full Throttle Prior to Brake Release
Paved, Level, Dry Runway
Zero Wind

NOTES:

1. Maximum performance technique as specified in Section 4.
2. Prior to takeoff from fields above 3000 feet elevation, the mixture should be leaned to give maximum RPM in a full throttle, static runup.
3. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
4. Where distance value has been deleted, climb performance after lift-off is less than 150 fpm at takeoff speed.
5. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.

| WEIGHT LBS | TAKEOFF SPEED KIAS | | PRESS ALT FT | 0°C | | 10°C | | 20°C | | 30°C | | 40°C | |
|---------------|--------------------------|-------------|--------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|
| | LIFT OFF | AT 50 FT | | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS |
| | | | | | | | | | | | | | |
| 2300 | 52 | 59 | S.L. | 775 | 1380 | 835 | 1475 | 895 | 1575 | 960 | 1685 | 1030 | 1795 |
| | | | 1000 | 850 | 1510 | 915 | 1615 | 980 | 1725 | 1050 | 1845 | 1125 | 1970 |
| | | | 2000 | 930 | 1650 | 1000 | 1770 | 1075 | 1895 | 1155 | 2030 | 1235 | 2170 |
| | | | 3000 | 1020 | 1815 | 1100 | 1945 | 1180 | 2085 | 1270 | 2235 | 1360 | 2395 |
| | | | 4000 | 1125 | 2000 | 1210 | 2145 | 1300 | 2305 | 1395 | 2475 | 1495 | 2655 |
| | | | 5000 | 1235 | 2210 | 1330 | 2375 | 1430 | 2555 | 1540 | 2750 | 1650 | 2960 |
| | | | 6000 | 1365 | 2450 | 1470 | 2640 | 1580 | 2850 | 1700 | 3070 | --- | --- |
| | | | 7000 | 1505 | 2730 | 1625 | 2955 | 1750 | 3190 | --- | --- | --- | --- |
| | | | 8000 | 1665 | 3065 | 1800 | 3320 | --- | --- | --- | --- | --- | --- |

Figure 5-4. Takeoff Distance (Sheet 1 of 2)

TAKEOFF DISTANCE 2100 LBS AND 1900 LBS

REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES.

| WEIGHT LBS | TAKEOFF SPEED KIAS | | PRESS ALT FT | 0°C | | 10°C | | 20°C | | 30°C | | 40°C | |
|---------------|--------------------------|-------------|--------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|
| | LIFT OFF | AT 50 FT | | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS | GRND ROLL | TOTAL TO CLEAR 50 FT OBS |
| | | | | | | | | | | | | | |
| 2100 | 50 | 56 | S.L. | 630 | 1130 | 680 | 1210 | 725 | 1290 | 780 | 1375 | 835 | 1465 |
| | | | 1000 | 690 | 1235 | 740 | 1320 | 795 | 1405 | 855 | 1500 | 915 | 1600 |
| | | | 2000 | 755 | 1350 | 810 | 1440 | 870 | 1540 | 935 | 1645 | 1000 | 1755 |
| | | | 3000 | 830 | 1475 | 890 | 1580 | 955 | 1690 | 1025 | 1805 | 1100 | 1930 |
| | | | 4000 | 910 | 1620 | 980 | 1735 | 1050 | 1860 | 1125 | 1990 | 1210 | 2130 |
| | | | 5000 | 1000 | 1780 | 1075 | 1910 | 1155 | 2050 | 1240 | 2195 | 1330 | 2355 |
| | | | 6000 | 1100 | 1965 | 1185 | 2115 | 1275 | 2270 | 1370 | 2435 | 1465 | 2615 |
| | | | 7000 | 1215 | 2180 | 1305 | 2345 | 1405 | 2520 | 1510 | 2715 | 1620 | 2920 |
| | | | 8000 | 1340 | 2425 | 1445 | 2615 | 1555 | 2815 | 1675 | 3040 | 1795 | 3280 |
| | | | 1900 | 47 | 54 | S.L. | 505 | 915 | 540 | 975 | 580 | 1035 | 620 |
| 1000 | 550 | 995 | | | | 590 | 1060 | 635 | 1130 | 680 | 1205 | 725 | 1280 |
| 2000 | 600 | 1085 | | | | 645 | 1155 | 695 | 1230 | 745 | 1315 | 795 | 1400 |
| 3000 | 660 | 1180 | | | | 710 | 1260 | 760 | 1345 | 815 | 1435 | 870 | 1530 |
| 4000 | 725 | 1290 | | | | 775 | 1380 | 835 | 1475 | 895 | 1575 | 955 | 1680 |
| 5000 | 795 | 1415 | | | | 855 | 1515 | 915 | 1620 | 985 | 1735 | 1055 | 1850 |
| 6000 | 870 | 1555 | | | | 940 | 1670 | 1010 | 1785 | 1080 | 1910 | 1160 | 2045 |
| 7000 | 960 | 1715 | | | | 1035 | 1840 | 1110 | 1975 | 1195 | 2115 | 1280 | 2265 |
| 8000 | 1060 | 1900 | | | | 1140 | 2040 | 1225 | 2190 | 1320 | 2350 | 1415 | 2520 |

Figure 5-4. Takeoff Distance (Sheet 2 of 2)

RATE OF CLIMB

CONDITIONS:

Flaps Up
Full Throttle
Mixture Leaned for Maximum RPM During Climb

| WEIGHT LBS | PRESS ALT FT | CLIMB SPEED KIAS | RATE OF CLIMB - FPM | | | |
|---------------|--------------------|------------------------|---------------------|-----|------|------|
| | | | -20°C | 0°C | 20°C | 40°C |
| 2300 | S.L. | 78 | 755 | 695 | 630 | 565 |
| | 2000 | 76 | 655 | 595 | 535 | 470 |
| | 4000 | 74 | 555 | 500 | 440 | 380 |
| | 6000 | 72 | 460 | 405 | 350 | 290 |
| | 8000 | 70 | 365 | 310 | 255 | 200 |
| | 10,000 | 68 | 270 | 215 | 165 | --- |
| | 12,000 | 66 | 175 | 125 | --- | --- |

Figure 5-5. Rate of Climb

TIME, FUEL, AND DISTANCE TO CLIMB

CONDITIONS:

Flaps Up
Full Throttle
Standard Temperature

NOTES:

1. Add 1.1 gallons of fuel for engine start, taxi and takeoff allowance.
2. To obtain maximum rate of climb as shown in this chart, lean to maximum RPM during climb.
3. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
4. Distances shown are based on zero wind.

↓

| WEIGHT LBS | PRESSURE ALTITUDE FT | TEMP °C | CLIMB SPEED KIAS | RATE OF CLIMB FPM | FROM SEA LEVEL | | |
|---------------|----------------------------|------------|------------------------|-------------------------|----------------|----------------------|----------------|
| | | | | | TIME MIN | FUEL USED GALLONS | DISTANCE NM |
| 2300 | S.L. | 15 | 78 | 645 | 0 | 0.0 | 0 |
| | 1000 | 13 | 77 | 605 | 2 | 0.3 | 2 |
| | 2000 | 11 | 76 | 560 | 3 | 0.7 | 4 |
| | 3000 | 9 | 75 | 520 | 5 | 1.1 | 7 |
| | 4000 | 7 | 74 | 480 | 7 | 1.5 | 9 |
| | 5000 | 5 | 73 | 435 | 9 | 1.9 | 12 |
| | 6000 | 3 | 72 | 395 | 12 | 2.3 | 16 |
| | 7000 | 1 | 71 | 355 | 15 | 2.8 | 19 |
| | 8000 | -1 | 70 | 315 | 18 | 3.3 | 23 |
| | 9000 | -3 | 69 | 270 | 21 | 3.9 | 28 |
| | 10,000 | -5 | 68 | 230 | 25 | 4.5 | 33 |
| | 11,000 | -7 | 67 | 185 | 30 | 5.2 | 40 |
| | 12,000 | -9 | 66 | 145 | 36 | 6.1 | 48 |

Figure 5-6. Time, Fuel, and Distance to Climb

CRUISE PERFORMANCE

CONDITIONS:
Recommended Lean Mixture
2300 Pounds

*SE
5-15*

| PRESSURE ALTITUDE | RPM | 20°C BELOW STANDARD TEMP | | | STANDARD TEMPERATURE | | | 20°C ABOVE STANDARD TEMP | | |
|-------------------|------|--------------------------|------|-----|----------------------|------|-----|--------------------------|------|-----|
| | | % BHP | KTAS | GPH | % BHP | KTAS | GPH | % BHP | KTAS | GPH |
| 2000 | 2550 | 80 | 114 | 8.8 | 75 | 113 | 8.2 | 71 | 113 | 7.8 |
| | 2500 | 76 | 111 | 8.3 | 71 | 111 | 7.8 | 67 | 111 | 7.5 |
| | 2400 | 68 | 107 | 7.5 | 64 | 107 | 7.2 | 61 | 106 | 6.9 |
| | 2300 | 61 | 102 | 6.9 | 58 | 101 | 6.7 | 55 | 99 | 6.5 |
| | 2200 | 55 | 96 | 6.4 | 52 | 95 | 6.2 | 49 | 93 | 6.1 |
| 4000 | 2600 | 80 | 116 | 8.8 | 75 | 116 | 8.3 | 71 | 116 | 7.8 |
| | 2500 | 72 | 111 | 7.9 | 68 | 111 | 7.5 | 64 | 110 | 7.2 |
| | 2400 | 65 | 107 | 7.3 | 61 | 106 | 6.9 | 58 | 104 | 6.7 |
| | 2300 | 58 | 101 | 6.7 | 55 | 100 | 6.5 | 53 | 98 | 6.3 |
| | 2200 | 52 | 95 | 6.3 | 49 | 93 | 6.1 | 47 | 92 | 5.9 |
| 6000 | 2650 | 80 | 118 | 8.8 | 75 | 118 | 8.2 | 71 | 118 | 7.8 |
| | 2600 | 76 | 116 | 8.3 | 71 | 116 | 7.9 | 68 | 115 | 7.5 |
| | 2500 | 69 | 111 | 7.6 | 65 | 110 | 7.2 | 62 | 109 | 7.0 |
| | 2400 | 62 | 106 | 7.0 | 59 | 104 | 6.7 | 56 | 103 | 6.5 |
| | 2300 | 56 | 100 | 6.5 | 53 | 98 | 6.3 | 50 | 97 | 6.1 |
| 2200 | 50 | 94 | 6.1 | 47 | 92 | 5.9 | 45 | 91 | 5.8 | |
| 8000 | 2700 | 80 | 120 | 8.8 | 75 | 120 | 8.3 | 71 | 120 | 7.8 |
| | 2600 | 72 | 116 | 8.0 | 68 | 115 | 7.5 | 65 | 114 | 7.3 |
| | 2500 | 65 | 111 | 7.3 | 62 | 109 | 7.0 | 59 | 108 | 6.8 |
| | 2400 | 59 | 105 | 6.8 | 56 | 103 | 6.6 | 53 | 101 | 6.3 |
| | 2300 | 54 | 99 | 6.4 | 51 | 97 | 6.2 | 48 | 96 | 6.0 |
| 2200 | 48 | 93 | 6.0 | 45 | 91 | 5.8 | 43 | 90 | 5.7 | |
| 10,000 | 2700 | 76 | 120 | 8.4 | 72 | 120 | 7.9 | 68 | 119 | 7.6 |
| | 2600 | 69 | 115 | 7.6 | 65 | 114 | 7.3 | 62 | 112 | 7.0 |
| | 2500 | 63 | 110 | 7.1 | 59 | 108 | 6.8 | 56 | 106 | 6.6 |
| | 2400 | 57 | 104 | 6.6 | 54 | 102 | 6.4 | 51 | 100 | 6.2 |
| | 2300 | 51 | 97 | 6.2 | 48 | 96 | 6.0 | 46 | 95 | 5.8 |
| 2200 | 46 | 92 | 5.8 | 43 | 90 | 5.7 | 41 | 89 | 5.5 | |
| 12,000 | 2650 | 69 | 117 | 7.6 | 65 | 116 | 7.3 | 62 | 114 | 7.0 |
| | 2600 | 66 | 114 | 7.4 | 62 | 113 | 7.0 | 59 | 111 | 6.8 |
| | 2500 | 60 | 108 | 6.8 | 57 | 106 | 6.6 | 54 | 105 | 6.4 |
| | 2400 | 54 | 102 | 6.4 | 51 | 100 | 6.2 | 49 | 99 | 6.0 |
| | 2300 | 49 | 96 | 6.0 | 46 | 95 | 5.9 | 43 | 94 | 5.7 |
| 2200 | 44 | 91 | 5.7 | 41 | 89 | 5.5 | 38 | 88 | 5.3 | |

Figure 5-7. Cruise Performance

RANGE PROFILE
45 MINUTES RESERVE
38.0 GALLONS USABLE FUEL

CONDITIONS:
2300 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature
Zero Wind

NOTES:

1. This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during climb as shown in figure 5-6.
2. Reserve fuel is based on 45 minutes at 45% BHP and is 4.3 gallons.

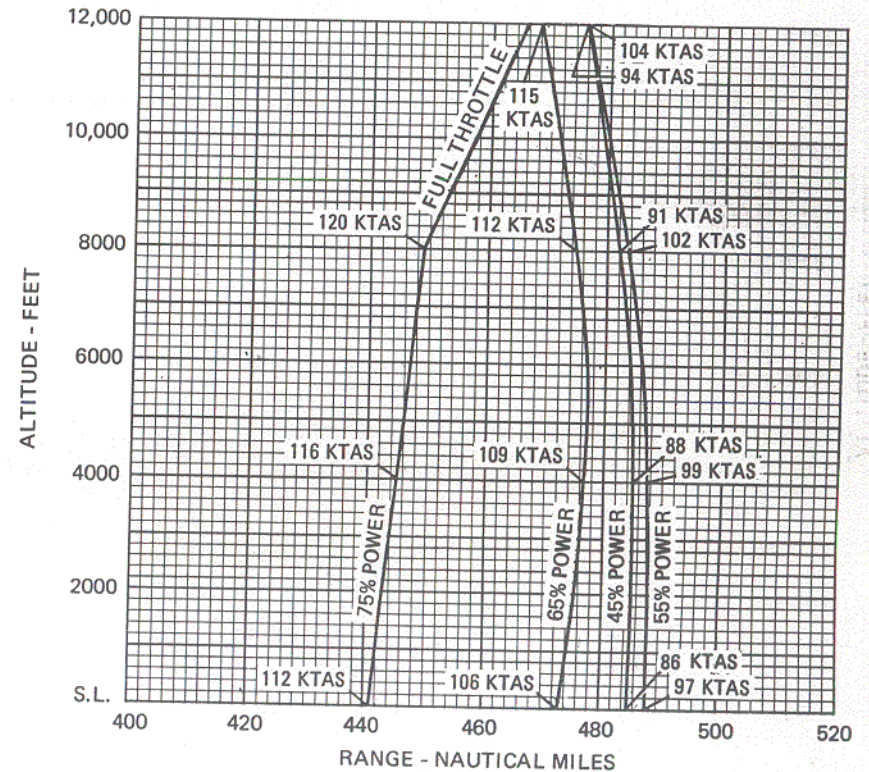


Figure 5-8. Range Profile (Sheet 1 of 2)

RANGE PROFILE
45 MINUTES RESERVE
48.0 GALLONS USABLE FUEL

CONDITIONS:
2300 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature
Zero Wind

NOTES:

1. This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during climb as shown in figure 5-6.
2. Reserve fuel is based on 45 minutes at 45% BHP and is 4.3 gallons.

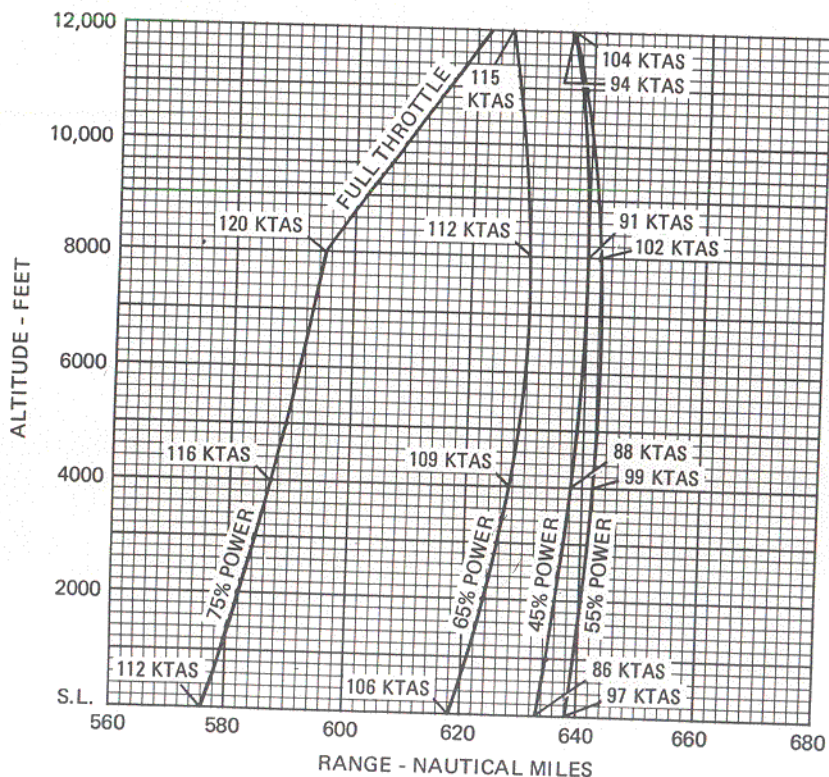


Figure 5-8. Range Profile (Sheet 2 of 2)

ENDURANCE PROFILE
45 MINUTES RESERVE
38.0 GALLONS USABLE FUEL

CONDITIONS:
2300 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature

NOTES:

1. This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the time during climb as shown in figure 5-6.
2. Reserve fuel is based on 45 minutes at 45% BHP and is 4.3 gallons.

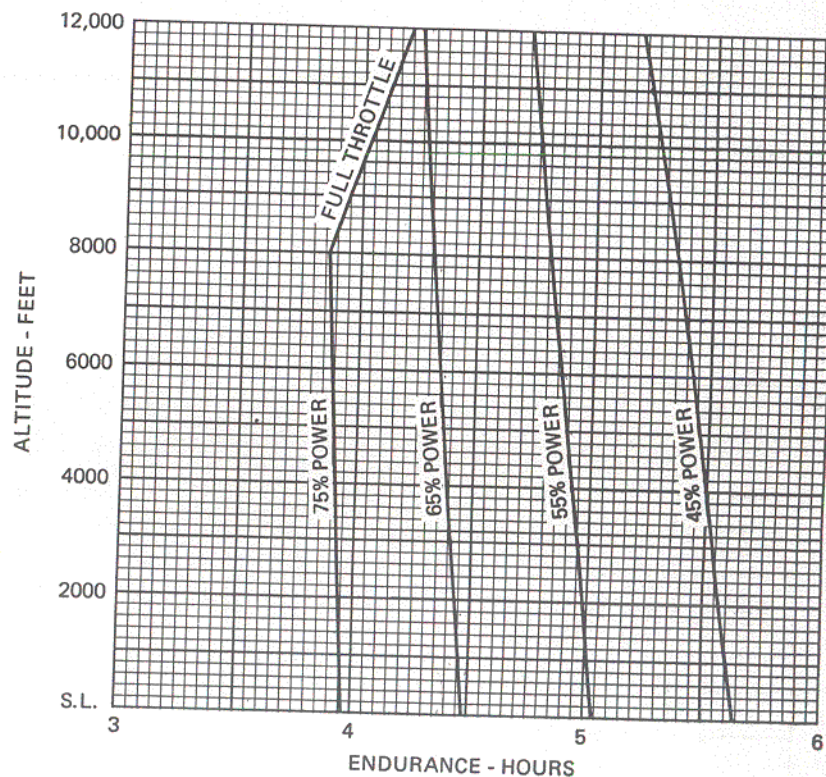


Figure 5-9. Endurance Profile (Sheet 1 of 2)