

SECTION 5 PERFORMANCE

TABLE OF CONTENTS

	Page
Introduction	5-3
Use of Performance Charts	5-3
Sample Problem	5-3
Takeoff	5-4
Cruise	5-5
Fuel Required	5-5
Landing	5-7
Demonstrated Operating Temperature	5-7
Figure 5-1, Airspeed Calibration - Normal Static Source	5-8
Airspeed Calibration - Alternate Static Source	5-9
Figure 5-2, Temperature Conversion Chart	5-10
Figure 5-3, Stall Speeds	5-11
Figure 5-4, Takeoff Distance - 2950 Lbs	5-12
Takeoff Distance - 2700 Lbs and 2400 Lbs	5-13
Figure 5-5, Rate Of Climb - Maximum	5-14
Figure 5-6, Time, Fuel, And Distance To Climb - Maximum Rate of Climb	5-15
Time, Fuel, and Distance to Climb - Normal Climb	5-16
Figure 5-7, Cruise Performance - 2000 Feet	5-17
Cruise Performance - 4000 Feet	5-18
Cruise Performance - 6000 Feet	5-19
Cruise Performance - 8000 Feet	5-20
Cruise Performance - 10,000 Feet	5-21
Cruise Performance - 12,000 Feet	5-22
Figure 5-8, Range Profile	5-23
Figure 5-9, Endurance Profile	5-24
Figure 5-10, Landing Distance	5-25



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	2850 Pounds
Usable fuel	88 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

SECTION 5
PERFORMANCE

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CRUISE CONDITIONS

Total distance	830 Nautical Miles
Pressure altitude	7500 Feet
Temperature	16°C (16°C above standard)
Expected wind enroute	10 Knot Headwind

LANDING CONDITIONS

Field pressure altitude	2000 Feet
Temperature	25°C
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 the short field technique. 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 2950 pounds, pressure altitude of 2000 feet and a temperature of 30°C should be used and results in the following:

Ground roll	930 Feet
Total distance to clear a 50-foot obstacle	1800 Feet

These distances are well within the available takeoff field length. However, a correction for the effect of wind may be made based on Note 3 of the takeoff chart. The 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	930
Decrease in ground roll (930 feet × 13%)	<u>121</u>
Corrected ground roll	809 Feet
Total distance to clear a 50-foot obstacle, zero wind	1800
Decrease in total distance (1800 feet × 13%)	<u>234</u>
Corrected total distance to clear 50-foot obstacle	1566 Feet

CRUISE

The cruising altitude should be selected based on a consideration of trip length, winds aloft, and the airplane's performance. A cruising altitude and the expected wind enroute have been given for this sample problem. However, the power setting selection for cruise must be determined based on several considerations. These include the cruise performance characteristics 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 relationship between power and range is illustrated by the range profile chart. Considerable fuel savings and longer range result when lower power settings are used.

The range profile chart indicates that use of 65% power at 7500 feet yields a predicted range of 952 nautical miles with no wind. The endurance profile chart shows a corresponding 7.1 hours. Using this information, the estimated distance can be determined for the expected 10 knot headwind at 7500 feet as follows:

Range, zero wind	952
Decrease in range due to wind (7.1 hours × 10 knot headwind)	<u>71</u>
Corrected range	881 Nautical Miles

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

The cruise performance chart for 8,000 feet pressure altitude is entered using 20°C above standard temperature. These values most nearly correspond to the planned altitude and expected temperature conditions. The power setting chosen is 2200 RPM and 21 inches of manifold pressure, which results in the following:

Power	65%
True airspeed	137 Knots
Cruise fuel flow	11.0 GPH

The power computer may be used to determine power and fuel consumption more accurately 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 normal climb from 2000 feet to 8000 feet requires 2.8

SECTION 5
PERFORMANCE

CESSNA
MODEL 182Q

gallons of fuel. The corresponding distance during the climb is 15 nautical miles. These values are for a standard temperature and are sufficiently accurate for most flight planning purposes. However, a further correction for the effect of temperature may be made as noted 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	2.8
Increase due to non-standard temperature (2.8 × 16%)	<u>0.4</u>
Corrected fuel to climb	<u>3.2</u> Gallons

Using a similar procedure for the distance during climb results in 17 nautical miles.

The resultant cruise distance is:

Total distance	830
Climb distance	<u>-17</u>
Cruise distance	813 Nautical Miles

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

$$\begin{array}{r} 137 \\ -10 \\ \hline 127 \text{ Knots} \end{array}$$

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

$$\frac{813 \text{ Nautical Miles}}{127 \text{ Knots}} = 6.4 \text{ Hours}$$

The fuel required for cruise is:

$$6.4 \text{ hours} \times 11.0 \text{ gallons/hour} = 70.4 \text{ Gallons}$$

The total estimated fuel required is as follows:

Engine start, taxi, and takeoff	1.7
Climb	3.2
Cruise	<u>70.4</u>
Total fuel required	<u>75.3</u> Gallons

This will leave a fuel reserve of:

88.0
<u>-75.3</u>
12.7 Gallons

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 takeoff should be used for estimating the landing distance at the destination airport. Figure 5-10 presents landing distance information for the short field technique. The distances corresponding to 2000 feet pressure altitude and a temperature of 30°C are as follows:

Ground roll	670 Feet
Total distance to clear a 50-foot obstacle	1480 Feet

A correction for the effect of wind may be made based on Note 2 of the landing chart using the same procedure as outlined for takeoff.

DEMONSTRATED OPERATING TEMPERATURE

Satisfactory engine cooling has been demonstrated for this airplane with an outside air temperature 23°C above standard. This is not to be considered as an operating limitation. Reference should be made to Section 2 for engine operating limitations.

AIRSPED CALIBRATION
NORMAL STATIC SOURCE

FLAPS UP														
KIAS	50	60	70	80	90	100	110	120	130	140	150	160	---	
KCAS	60	64	71	80	89	99	108	117	127	136	145	155	---	
FLAPS 20°														
KIAS	40	50	60	70	80	90	95	---	---	---	---	---	---	---
KCAS	52	57	64	72	81	90	95	---	---	---	---	---	---	---
FLAPS 40°														
KIAS	40	50	60	70	80	90	95	---	---	---	---	---	---	---
KCAS	51	56	63	72	81	91	95	---	---	---	---	---	---	---

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

AIRSPEED CALIBRATION ALTERNATE STATIC SOURCE

HEATER/VENTS AND WINDOWS CLOSED

FLAPS UP											
NORMAL KIAS	60	70	80	90	100	110	120	130	140	150	160
ALTERNATE KIAS	59	70	80	91	102	112	122	133	143	153	163
FLAPS 20°											
NORMAL KIAS	50	60	70	80	90	95	---	---	---	---	---
ALTERNATE KIAS	51	62	72	82	92	97	---	---	---	---	---
FLAPS 40°											
NORMAL KIAS	40	50	60	70	80	90	95	---	---	---	---
ALTERNATE KIAS	43	51	60	71	81	90	95	---	---	---	---

HEATER/VENTS OPEN AND WINDOWS CLOSED

FLAPS UP											
NORMAL KIAS	60	70	80	90	100	110	120	130	140	150	160
ALTERNATE KIAS	60	70	80	90	100	110	120	130	140	150	160
FLAPS 20°											
NORMAL KIAS	50	60	70	80	90	95	---	---	---	---	---
ALTERNATE KIAS	50	60	70	79	89	93	---	---	---	---	---
FLAPS 40°											
NORMAL KIAS	40	50	60	70	80	90	95	---	---	---	---
ALTERNATE KIAS	41	49	59	68	78	87	92	---	---	---	---

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

TEMPERATURE CONVERSION CHART

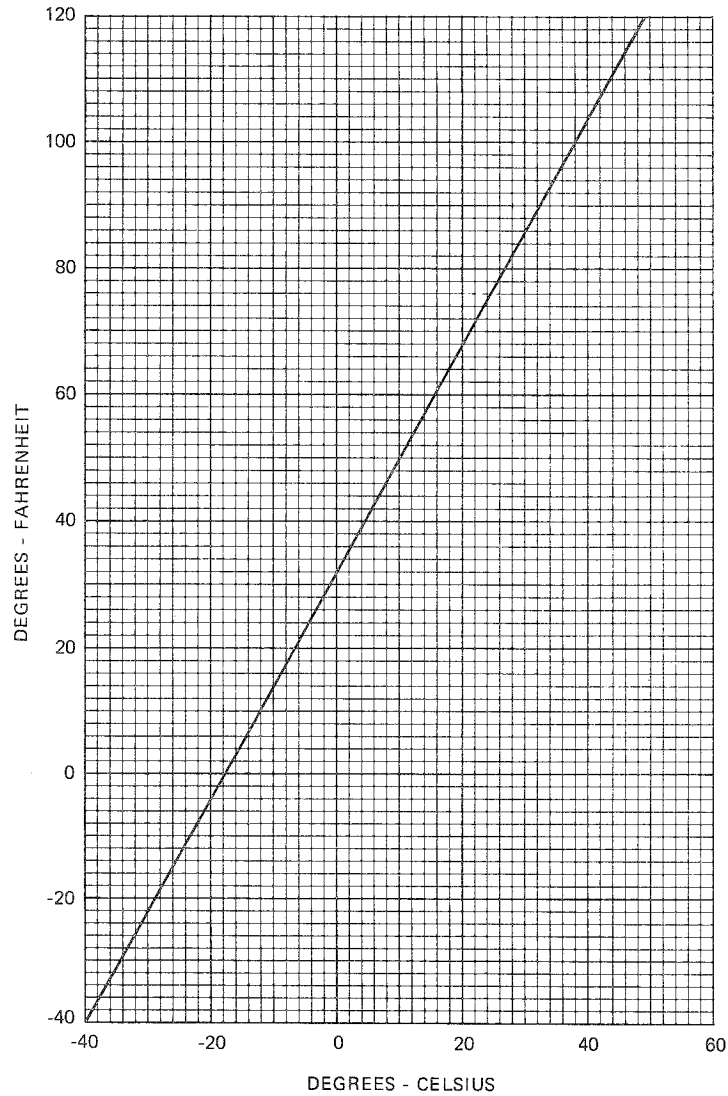


Figure 5-2. Temperature Conversion Chart

STALL SPEEDS

CONDITIONS:
Power Off

NOTES:

1. Maximum altitude loss during a stall recovery may be as much as 160 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
2950	UP	41	56	44	60	49	67	58	79
	20°	38	51	41	55	45	61	54	72
	40°	38	50	41	54	45	59	54	71

MOST FORWARD CENTER OF GRAVITY

WEIGHT LBS	FLAP DEFLECTION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
2950	UP	48	59	52	63	57	70	68	83
	20°	47	55	51	59	56	65	66	78
	40°	45	54	48	58	54	64	64	76

Figure 5-3. Stall Speeds

TAKEOFF DISTANCE
MAXIMUM WEIGHT 2950 LBS

SHORT FIELD

CONDITIONS:
Flaps 20°
2400 RPM, Full Throttle and Mixture Set Prior to
Brake Release
Cowl Flaps Open
Paved, Level, Dry Runway
Zero Wind

NOTES:

1. Short field technique as specified in Section 4.
2. Prior to takeoff from fields above 5000 feet elevation, the mixture should be leaned to give maximum power 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	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	
2950	49	57	S.L.	635	1220	680	1305	730	1395	780	1490	835	1590	910	1635	910	1745	1590	
			1000	690	1335	745	1430	795	1530	850	1635	850	1745	910	1635	910	1745	1745	
			2000	755	1465	810	1565	870	1680	930	1800	930	1925	995	1800	995	1925	1925	
			3000	825	1605	890	1725	950	1850	1020	1985	1020	2130	1090	1985	1090	2130	2130	
			4000	905	1770	970	1905	1045	2050	1120	2205	1120	2370	1195	2205	1195	2370	2370	
			5000	995	1965	1065	2115	1145	2280	1230	2460	1230	2655	1315	2460	1315	2655	2655	
			6000	1090	2185	1175	2360	1260	2555	1350	2765	1350	3005	1450	2765	1450	3005	3005	
			7000	1200	2450	1290	2655	1390	2885	1490	3145	1490	---	---	---	---	---	---	---
			8000	1325	2765	1425	3015	1530	3300	---	---	---	---	---	---	---	---	---	---

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

TAKEOFF DISTANCE
2700 LBS AND 2400 LBS
[SHORT FIELD]

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	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL
2700	47	55	S.L.	520	1000	555	1065	595	1135	635	1210	680	1285	1285	740	1405	1405	
			1000	1085	605	1160	650	1235	695	1320	740	1405	740	1405	1405			
	2000	1185	660	1265	710	1355	760	1445	810	1540	810	1540	1540					
	3000	675	725	1385	775	1485	830	1585	885	1695	885	1695	1695					
	4000	735	1425	1525	850	1630	910	1745	970	1870	970	1870	1870					
	5000	805	1565	1680	930	1800	995	1930	1065	2075	1065	2075	2075					
	6000	885	1730	1860	1020	1995	1095	2150	1170	2310	1170	2310	2310					
	7000	970	1920	2065	1120	2225	1205	2400	1290	2595	1290	2595	2595					
	8000	1070	2140	2310	1235	2500	1325	2705	1420	2935	1420	2935	2935					
	2400	44	52	S.L.	395	775	425	825	455	875	485	930	520	990	990	565	1075	1075
1000				840	465	895	495	950	530	1010	565	1075	565	1075	1075			
2000		470	915	505	975	540	1035	575	1105	575	1105	1105	1105					
3000		515	995	550	1060	590	1130	630	1205	630	1205	1205	1205					
4000		560	1085	600	1160	645	1235	690	1320	690	1320	1320	1320					
5000		615	1185	655	1270	705	1355	755	1445	755	1445	1445	1445					
6000		670	1300	720	1395	770	1490	825	1595	825	1595	1595	1595					
7000		735	1435	790	1535	845	1645	905	1765	905	1765	1765	1765					
8000		810	1585	870	1700	930	1825	1000	1960	1000	1960	1960	1960					

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

RATE OF CLIMB

MAXIMUM

CONDITIONS:

Flaps Up
2400 RPM
Full Throttle
Cowl Flaps Open

NOTE:

Mixture leaned above 5000 feet for smooth engine operation and increased power.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM			
			-20°C	0°C	20°C	40°C
2950	S.L.	78	1155	1070	990	910
	2000	76	1020	945	865	790
	4000	75	890	815	740	670
	6000	74	760	690	620	550
	8000	73	635	565	500	430
	10,000	72	510	440	375	---
	12,000	71	385	320	255	---

Figure 5-5. Rate of Climb

TIME, FUEL, AND DISTANCE TO CLIMB

MAXIMUM RATE OF CLIMB

CONDITIONS:

Flaps Up
2400 RPM
Full Throttle
Cowl Flaps Open
Standard Temperature

NOTES:

1. Add 1.7 gallons of fuel for engine start, taxi and takeoff allowance.
2. Mixture leaned above 5000 feet for smooth engine operation and increased power.
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
2950	S.L.	15	78	1010	0	0	0
	1000	13	77	955	1	0.3	1
	2000	11	76	900	2	0.7	3
	3000	9	76	845	3	1.1	4
	4000	7	75	790	5	1.5	6
	5000	5	75	735	6	1.9	8
	6000	3	74	680	7	2.3	10
	7000	1	74	625	9	2.8	12
	8000	-1	73	570	11	3.2	14
	9000	-3	72	515	12	3.8	17
	10,000	-5	72	460	15	4.3	20
	11,000	-7	71	405	17	4.9	23
	12,000	-9	71	350	20	5.6	27

Figure 5-6. Time, Fuel, and Distance to Climb (Sheet 1 of 2)

TIME, FUEL, AND DISTANCE TO CLIMB

NORMAL CLIMB - 90 KIAS

CONDITIONS:

Flaps Up
2400 RPM
23 Inches Hg or Full Throttle
Cowl Flaps Open
Standard Temperature

NOTES:

1. Add 1.7 gallons of fuel for engine start, taxi and takeoff allowance.
2. Mixture leaned above 5000 feet for smooth engine operation and increased power.
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	RATE OF CLIMB FPM	FROM SEA LEVEL		
				TIME MIN	FUEL USED GALLONS	DISTANCE NM
2950	S.L.	15	670	0	0	0
	1000	13	670	1	0.4	2
	2000	11	670	3	0.8	5
	3000	9	670	4	1.2	7
	4000	7	670	6	1.7	9
	5000	5	670	7	2.1	12
	6000	3	640	9	2.6	14
	7000	1	575	11	3.0	17
	8000	-1	510	13	3.6	20
	9000	-3	450	15	4.2	24
	10,000	-5	385	17	4.8	28
	11,000	-7	320	20	5.6	33
12,000	-9	260	24	6.5	39	

Figure 5-6. Time, Fuel, and Distance to Climb (Sheet 2 of 2)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 2000 FEET

CONDITIONS:
2950 Pounds
Recommended Lean Mixture
Cowl Flaps Closed

NOTE

For best fuel economy at 65% power or less, operate at the leanest mixture that results in smooth engine operation or at peak EGT if an EGT indicator is installed.

		20°C BELOW STANDARD TEMP -9°C			STANDARD TEMPERATURE 11°C			20°C ABOVE STANDARD TEMP 31°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2400	22	77	134	13.1	74	135	12.6	71	136	12.2
	21	72	131	12.3	69	132	11.8	67	133	11.4
	20	67	128	11.5	65	128	11.1	63	129	10.7
	19	62	124	10.7	60	124	10.3	58	125	10.0
2300	23	78	135	13.3	75	136	12.8	72	137	12.4
	22	73	132	12.5	70	133	12.0	68	133	11.6
	21	68	128	11.7	66	129	11.3	64	130	10.9
	20	64	125	10.9	62	125	10.5	60	126	10.2
2200	23	73	132	12.5	70	133	12.0	68	133	11.6
	22	69	129	11.7	66	129	11.3	64	130	10.9
	21	64	125	11.0	62	126	10.6	60	126	10.2
	20	60	121	10.2	58	122	9.9	56	122	9.6
2100	23	68	128	11.6	66	129	11.2	64	130	10.8
	22	64	125	10.9	62	126	10.5	60	126	10.2
	21	60	121	10.2	58	122	9.9	56	122	9.6
	20	56	118	9.6	54	118	9.3	52	118	9.0
	19	52	113	9.0	50	114	8.7	48	113	8.5
	18	47	109	8.4	46	109	8.1	44	108	7.9

Figure 5-7. Cruise Performance (Sheet 1 of 6)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 4000 FEET

CONDITIONS:
2950 Pounds
Recommended Lean Mixture
Cowl Flaps Closed

NOTE

For best fuel economy at 65% power or less, operate at the leanest mixture that results in smooth engine operation or at peak EGT if an EGT indicator is installed.

		20°C BELOW STANDARD TEMP -13°C			STANDARD TEMPERATURE 7°C			20°C ABOVE STANDARD TEMP 27°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2400	22	---	---	---	76	139	13.0	73	140	12.5
	21	74	135	12.6	71	136	12.1	69	136	11.7
	20	69	131	11.8	66	132	11.3	64	133	11.0
	19	64	127	10.9	62	128	10.6	60	128	10.2
2300	23	---	---	---	76	140	13.1	74	141	12.6
	22	75	135	12.8	72	136	12.3	70	137	11.9
	21	70	132	12.0	68	133	11.5	65	134	11.2
	20	66	128	11.2	63	129	10.8	61	130	10.4
2200	23	75	135	12.8	72	136	12.3	70	137	11.9
	22	70	132	12.0	68	133	11.6	66	134	11.2
	21	66	129	11.3	64	129	10.9	61	130	10.5
	20	62	125	10.5	59	126	10.2	57	126	9.8
	19	57	121	9.8	55	121	9.5	53	121	9.2
2100	23	70	132	11.9	67	133	11.5	65	133	11.1
	22	66	128	11.2	63	129	10.8	61	130	10.4
	21	62	125	10.5	59	126	10.1	57	126	9.8
	20	57	121	9.8	55	121	9.5	53	122	9.3
	19	53	117	9.2	51	117	8.9	50	117	8.7
	18	49	112	8.6	47	112	8.3	46	112	8.1
	17	45	107	8.0	43	107	7.8	42	106	7.6

Figure 5-7. Cruise Performance (Sheet 2 of 6)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 6000 FEET

CONDITIONS:
2950 Pounds
Recommended Lean Mixture
Cowl Flaps Closed

NOTE

For best fuel economy at 65% power or less, operate at the leanest mixture that results in smooth engine operation or at peak EGT if an EGT indicator is installed.

		20°C BELOW STANDARD TEMP -17°C			STANDARD TEMPERATURE 3°C			20°C ABOVE STANDARD TEMP 23°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2400	22	---	---	---	77	143	13.3	75	144	12.8
	21	75	138	12.9	73	139	12.4	70	140	12.0
	20	71	135	12.1	68	136	11.6	66	136	11.2
	19	66	131	11.2	64	132	10.8	61	132	10.5
2300	22	77	139	13.1	74	140	12.6	71	141	12.2
	21	72	136	12.3	69	137	11.8	67	137	11.4
	20	67	132	11.5	65	133	11.1	63	133	10.7
	19	63	128	10.7	60	129	10.3	58	129	10.0
2200	22	72	136	12.3	69	137	11.9	67	137	11.5
	21	68	132	11.6	65	133	11.1	63	134	10.8
	20	63	129	10.8	61	129	10.4	59	130	10.1
	19	59	125	10.1	57	125	9.7	55	125	9.5
2100	22	67	132	11.5	65	133	11.1	63	133	10.7
	21	63	129	10.8	61	129	10.4	59	129	10.1
	19	55	121	9.5	53	121	9.2	51	121	8.9
	18	51	116	8.8	49	116	8.6	47	115	8.3
	17	47	111	8.2	45	110	8.0	43	109	7.8

Figure 5-7. Cruise Performance (Sheet 3 of 6)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 8000 FEET

CONDITIONS:
2950 Pounds
Recommended Lean Mixture
Cowl Flaps Closed

NOTE

For best fuel economy at 65% power or less, operate at the leanest mixture that results in smooth engine operation or at peak EGT if an EGT indicator is installed.

		20°C BELOW STANDARD TEMP -21°C			STANDARD TEMPERATURE -1°C			20°C ABOVE STANDARD TEMP 19°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2400	21	77	142	13.3	74	143	12.7	72	144	12.3
	20	72	139	12.4	70	139	11.9	67	140	11.5
	19	68	135	11.5	65	135	11.1	63	136	10.7
	18	63	130	10.7	60	131	10.3	58	131	10.0
2300	21	74	139	12.6	71	140	12.1	69	141	11.7
	20	69	136	11.8	66	137	11.3	64	137	11.0
	19	64	132	11.0	62	132	10.6	60	133	10.2
	18	60	127	10.2	58	128	9.9	56	128	9.6
2200	21	69	136	11.8	67	137	11.4	65	137	11.0
	20	65	132	11.1	63	133	10.7	60	133	10.3
	19	61	128	10.3	58	129	10.0	56	129	9.7
	18	56	124	9.7	54	124	9.3	52	124	9.1
2100	21	65	132	11.1	63	133	10.7	60	133	10.3
	20	61	129	10.4	59	129	10.0	57	129	9.7
	19	57	124	9.7	54	124	9.4	53	124	9.1
	18	52	120	9.1	50	120	8.8	49	119	8.5
	17	48	115	8.5	46	114	8.2	45	113	8.0

Figure 5-7. Cruise Performance (Sheet 4 of 6)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 10,000 FEET

CONDITIONS:
2950 Pounds
Recommended Lean Mixture
Cowl Flaps Closed

NOTE

For best fuel economy at 65% power or less, operate at the leanest mixture that results in smooth engine operation or at peak EGT if an EGT indicator is installed.

		20°C BELOW STANDARD TEMP -25°C			STANDARD TEMPERATURE -5°C			20°C ABOVE STANDARD TEMP 15°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2400	20	74	142	12.7	71	143	12.2	69	144	11.8
	19	69	138	11.8	67	139	11.4	64	140	11.0
	18	65	134	11.0	62	135	10.6	60	135	10.2
	17	60	129	10.2	57	130	9.8	55	130	9.5
2300	20	71	140	12.1	68	140	11.6	66	141	11.2
	19	66	136	11.3	64	136	10.9	61	136	10.5
	18	61	131	10.5	59	131	10.1	57	132	9.8
	17	57	126	9.7	55	126	9.4	53	126	9.1
2200	20	67	136	11.4	64	137	11.0	62	137	10.6
	19	62	132	10.6	60	132	10.2	58	133	9.9
	18	58	128	9.9	56	128	9.6	54	128	9.3
	17	53	123	9.2	51	123	8.9	50	122	8.7
2100	20	63	132	10.7	60	133	10.3	58	133	9.9
	19	58	128	10.0	56	128	9.6	54	128	9.4
	18	54	123	9.3	52	123	9.0	50	123	8.8
	17	50	118	8.7	48	118	8.4	46	116	8.2
	16	46	112	8.1	44	111	7.8	42	109	7.6

Figure 5-7. Cruise Performance (Sheet 5 of 6)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 12,000 FEET

CONDITIONS:
2950 Pounds
Recommended Lean Mixture
Cowl Flaps Closed

NOTE
For best fuel economy at 65% power or less, operate at the leanest mixture that results in smooth engine operation or at peak EGT if an EGT indicator is installed.

		20°C BELOW STANDARD TEMP -29°C			STANDARD TEMPERATURE -9°C			20°C ABOVE STANDARD TEMP 11°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2400	18	66	138	11.3	64	139	10.9	61	139	10.5
	17	61	133	10.5	59	133	10.1	57	133	9.8
	16	56	128	9.7	54	128	9.4	52	127	9.1
	15	51	122	9.0	50	121	8.7	48	120	8.4
2300	18	63	135	10.8	61	135	10.4	59	135	10.0
	17	58	130	10.0	56	130	9.7	54	130	9.4
	16	54	125	9.3	52	125	9.0	50	124	8.7
	15	49	119	8.6	47	118	8.3	45	116	8.1
2200	18	59	131	10.2	57	131	9.8	55	131	9.5
	17	55	126	9.5	53	126	9.2	51	125	8.9
	16	51	121	8.8	49	120	8.5	47	119	8.3
	15	46	114	8.2	44	113	7.9	43	111	7.7
2100	18	56	127	9.6	54	127	9.3	52	126	9.0
	17	51	122	8.9	49	121	8.7	48	120	8.4
	16	47	116	8.3	45	115	8.1	44	113	7.8

Figure 5-7. Cruise Performance (Sheet 6 of 6)

RANGE PROFILE 45 MINUTES RESERVE 88 GALLONS USABLE FUEL

CONDITIONS:
2950 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 a normal climb as shown in figure 5-6.
2. Reserve fuel is based on 45 minutes at 45% BHP and is 6 gallons.

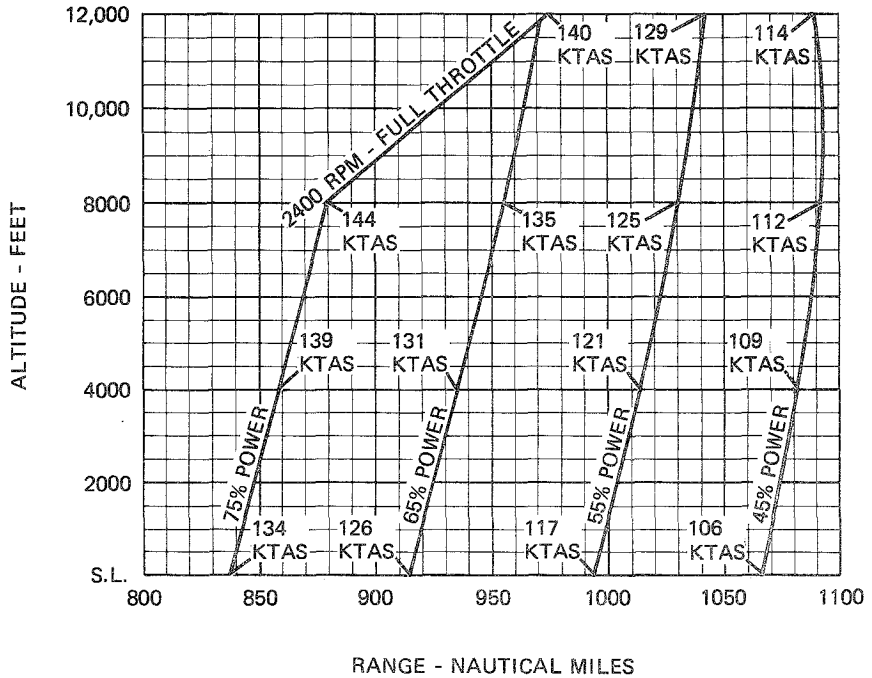


Figure 5-8. Range Profile

ENDURANCE PROFILE

45 MINUTES RESERVE
88 GALLONS USABLE FUEL

CONDITIONS:

2950 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 a normal climb as shown in figure 5-6.
2. Reserve fuel is based on 45 minutes at 45% BHP and is 6 gallons.

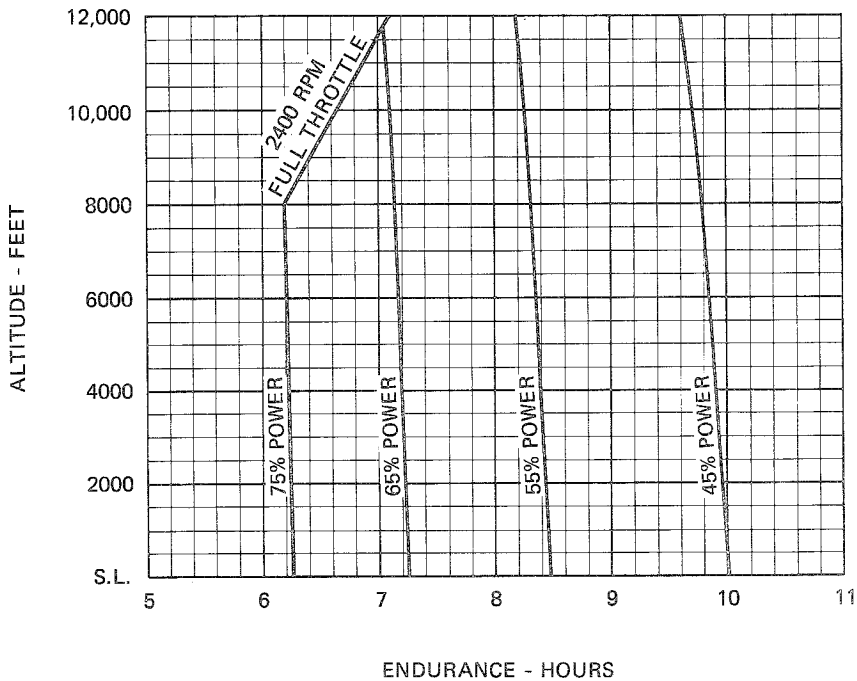


Figure 5-9. Endurance Profile

LANDING DISTANCE

SHORT FIELD

CONDITIONS:

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

NOTES:

1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
3. For operation on a dry, grass runway, increase distances by 40% 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
2950	60	S.L.	560	1300	580	1335	600	1365	620	1400	620	1400
		1000	580	1335	600	1365	620	1400	645	1440	665	1475
		2000	600	1370	625	1405	645	1440	670	1480	690	1515
		3000	625	1410	645	1445	670	1485	695	1525	715	1560
		4000	650	1450	670	1485	695	1525	720	1565	740	1600
		5000	670	1485	695	1525	720	1565	745	1610	770	1650
		6000	700	1530	725	1575	750	1615	775	1660	800	1700
		8000	755	1625	780	1665	810	1715	835	1760	865	1805

Figure 5-10. Landing Distance

