

## SECTION 5

# PERFORMANCE

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## INTRODUCTION

Section 5 presents performance data charts to indicate the expected airplane performance under various ambient and field conditions. It also provides general guidelines for flight planning with reasonable accuracy. Performance data is presented for takeoff, climb and cruise. The data in the charts has been prepared and derived from actual flight test with an airplane in good condition and using average piloting techniques.

Unless specifically noted, ambient conditions are for a standard day. The charts in this section provide data for ambient temperatures from  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) to  $40^{\circ}\text{C}$  ( $104^{\circ}\text{F}$ ) unless specified otherwise. If the ambient temperature is below the chart value, use the lowest temperature on chart to compute performance. This will result in more conservative performance calculations. **If the ambient temperature is above the highest number on chart, use extreme caution as performance degrades rapidly at higher temperatures.**

## FLIGHT PLANNING

The performance tables in this section provide sufficient information to predict airplane performance with reasonable accuracy. However, variables in fuel metering characteristic, engine and propeller condition, mixture leaning technique, air turbulence and other variables may account for variations of 10% or more in range and endurance. Therefore, selecting the most conservative values from the following charts provides an extra margin of safety and accounts for events that could occur during a flight.

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## **HEIGHT LOSS IN STALLS**

The height loss in a stall is up to 100 ft.

## **CONDITIONS FOR FULL USABLE FUEL**

The full amount of usable fuel in each tank is available in normal level flight conditions down to conditions with only the unusable fuel remaining in the airplane.

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## USE OF PERFORMANCE CHARTS

The data contained in this section has been compiled from actual flight test evaluations of the airplane and powerplant while in good operating condition. All performance figures are based on average piloting techniques.

Fuel flow data for cruise assumes that the engine has been leaned to the *Recommended Lean Mixture Setting* at all altitudes. However, range and endurance may vary by as much as 10% because of variables such as mixture leaning technique, fuel metering characteristics, engine and propeller condition, and atmospheric turbulence. It is therefore important to use all available information to plan a particular flight, and to conservatively estimate the fuel required.

Performance data is presented in tabular 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.

**EXAMPLE:**

The example to follow uses the performance charts to establish the performance predicted for a given flight. The following initial information is assumed available for flight planning:

**Aircraft Information:**

Airplane take-off weight	3300 pounds
Usable fuel	70 US gallons

**Takeoff Conditions:**

Pressure Altitude	3000 feet
Ambient Temperature	30 °C (21°C above standard day)
Headwind Component	8 knots
Available Field Length	4000 feet

**Cruise Conditions:**

Total Distance	400 nautical miles
Pressure Altitude	8000 feet
Ambient Temperature	20 °C (21°C above standard Day)
Enroute Headwind	10 knots TAS

**Landing Conditions:**

Field Pressure Altitude	3000 feet
Ambient Temperature	30 °C
Headwind	5 knots
Field Length	3000 feet



## TAKEOFF

The chart gives the Ground Roll = 1441 feet for zero wind.  
This is corrected for the headwind using 10% decrease per 10 knot headwind

$$\begin{aligned} \text{\% Decrease} &= (8 / 10) \times 10 = 8, \text{ giving} \\ \text{Distance correction} &= - (8/100) \times 1441 = - 115 \text{ feet} \\ \text{Giving :} \\ \text{Corrected Ground Roll} &= 1441 \\ &\quad \underline{- 115} \\ &= \underline{1326 \text{ feet}} \end{aligned}$$

Similarly the chart gives Total Distance to clear 50ft  
= 2403 feet for zero wind

This is corrected for the headwind by

$$\begin{aligned} \text{\% Decrease} &= (8 / 10) \times 10 = 8, \text{ giving} \\ \text{Correction} &= - (8/100) \times 2403 = - 192 \text{ feet} \\ \text{Giving:} \\ \text{Corrected Total Distance} &= 2403 \\ &\quad \underline{- 192} \\ &= \underline{2211 \text{ feet}} \end{aligned}$$

The available field length is 4000 feet so ample distance is available for the takeoff.

## CRUISE

The selection of cruise speed and altitude is done considering the available fuel, the distance to be covered and the time available. The selected cruise power setting will not usually exceed 75% if the engine is to be run at the recommended maximum lean conditions.

For the mission considered, using the Figure 5-9 with an altitude of 8000 feet and selecting a manifold pressure of 20 inches at 2400 rpm gives 55% Power

$$\begin{aligned} \text{Cruise Speed} &= 119 \text{ knots TAS and} \\ \text{Fuel Flow} &= 12.2 \text{ USG per hour.} \end{aligned}$$

## FUEL REQUIRED

The total fuel required can be estimated using the climb information in Figure 5-8 combined with the cruise performance in Figure 5-9. For the example considered:

Allowances for start, taxi, takeoff, circuit and landing

Fuel = 2.0 US gallons

Time = 5 minutes

Climb distance = 14 nautical miles

Climb fuel = 3.0 US gallons

Climb time = 10 minutes

If climb conditions are non-standard day then the prescribed corrections of 10% penalty per 10°C increase are to be applied.

Cruise distance =  $400 - 14 = 386$  nautical miles

Ground speed =  $119 - 10 = 109$  knots

Cruise time =  $386 / 109 = 3.5$  hours

Cruise fuel =  $3.5 \times 12.2 = 43.0$  US gallons

If cruise conditions are non standard day then the appropriate chart corrections are to be made using interpolation.

Reserve fuel = 45 minutes continued cruise

=  $0.75 \times 12.2 = 9.2$  US gallons

Total fuel =  $2.0 + 3.0 + 43.0 + 9.2$

= 57.2 US gallons

Total time =  $(5 + 10) / 60 + 3.5 = 3.75$  hours

The usable fuel available is 70 US gallons so the prescribed mission profile can be planned for the airplane. During the flight the ground speed and engine fuel flows should be checked and adjustments made to meet the mission with ample reserves.

## LANDING

A similar procedure to the takeoff is taken for conservatively estimating landing performance at the destination. The landing performance information is presented in Figure 5-8.

The distances corresponding to conditions of 3000 feet altitude and 30°C are :

Ground Roll	= 695 feet, in zero wind.
Head Wind correction 10% reduction for 10 knots	
5 knots wind	= 5% reduction
	= - 695 x 5/100 = - 35 feet
Corrected Ground Roll	= 695
	<u>-35</u>
	= <u>660 feet</u>

Total Distance to clear 50 feet	= 1587 feet in zero wind
Head Wind correction 10% reduction for 10 knots	
5 knots wind	= 5% reduction
	= - 1587 x 5/100 = - 79 feet
Corrected Total Distance	= 1587
	<u>-79</u>
	= <u>1508 feet</u>

Given the available field length of 3000 feet there is ample margin available for landing the airplane at the destination.

**AIRSPEED CALIBRATION**

NORMAL STATIC SOURCE

KIAS	KCAS			
	Flaps 0°	Flaps 10°	Flaps 20°	Flaps 30°
50	---	---	47	49
55	---	55	52	54
60	60	60	58	60
70	70	70	69	70
80	80	80	80	80
90	90	89	90	90
100	100	99	100	100
110	109	109	110	110
115	114	114	114	114
120	119	---	---	---
130	129	---	---	---
140	139	---	---	---
150	148	---	---	---
160	158	---	---	---

Figure 5-1 Airspeed Calibration – Normal Static Source

### AIRSPEED CALIBRATION

#### ALTERNATE STATIC SOURCE

KIAS	KCAS			
	Flaps 0°	Flaps 10°	Flaps 20°	Flaps 30°
50	---	---	42	46
55	---	53	48	51
60	55	57	53	56
70	65	66	64	66
80	75	76	75	76
90	85	85	85	85
100	94	94	94	95
110	104	103	103	104
115	109	108	108	108
120	114	112	112	112
130	124	---	---	---
140	134	---	---	---
150	144	---	---	---
160	154	---	---	---

Figure 5-2 Airspeed Calibration – Alternate Static Source

**ALTITUDE CORRECTION**

ALTERNATE STATIC SOURCE

ALTERNATE STATIC SOURCE ALTITUDE CORRECTION	
ALL FLAP SETTINGS	
CIAS - ALTERNATE STATIC SOURCE	CORRECTION TO BE ADDED
(KTS)	(FT)
50	0
55	0
60	0
70	15
80	30
90	46
100	61
110	77
115	85
120	93
130	108
140	124
150	140
160	155

**NOTES:**

Add the above correction to the desired altitude to determine the indicated altitude to fly.

**EXAMPLE:**

Indicated Airspeed	110	knots
Desired Altitude	8000	ft
Altitude Correction	+77	ft
<hr/>		
Altitude to Fly	8077	ft

Figure 5-3 Altitude Correction – Alternate Static Source

**STALL SPEED  
AT 3500 POUNDS**

CONDITIONS:  
Power Off

Most Forward Centre of Gravity

Flap Setting	Angle-of-Bank							
	0°		30°		45°		60°	
	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	57	58	61	63	68	69	81	82
10°	54	56	58	60	64	66	76	78
20°	52	53	56	57	62	63	74	75
30°	50	52	54	55	59	61	71	73

**NOTES:**

1. Altitude loss during stall recovery may be up to 100 ft.
2. KIAS values are approximate.

Figure 5-4 Stall Speeds

**SHORT FIELD TAKEOFF DISTANCE ON LAND  
AT 3500 POUNDS**

CONDITIONS:

FLAPS: 20 degree

FULL THROTTLE PRIOR TO BRAKE RELEASE, 2700 RPM

PAVED, LEVEL, DRY RUNWAY

ZERO WIND

LIFT OFF SPEED 60 KIAS

50FT SPEED 65 KIAS

	0°C		10°C		20°C		30°C		40°C	
Pressure Altitude	GND DIST.	TOTAL DIST.	GND DIST.	TOTAL DIST.	GND DIST.	TOTAL DIST.	GND DIST.	TOTAL DIST.	GND DIST.	TOTAL DIST.
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0	820	1413	880	1506	946	1608	1017	1718	1093	1836
1000	911	1558	979	1664	1054	1781	1135	1906	1222	2043
2000	1017	1729	1095	1851	1181	1986	1274	2131	1374	2290
3000	1143	1934	1233	2077	1333	2234	1441	2403	1558	2590
4000	1285	2165	1391	2332	1506	2515	1632	2718	1769	2938
5000	1458	2448	1580	2644	1716	2862	1866	3107	2031	3378
6000	1668	2796	1814	3033	1978	3301	2160	3604	2364	3948
7000	1931	3303	2110	3608	2313	3954	2543	4351	2802	4811
8000	2273	3975	2499	4378	2760	4850	---	---	---	---

**NOTES:**

1. Decrease total distance by 10% for each 10 knots headwind.
2. In tailwinds, increase total distance 10% for each 2 knots.
3. For operation on dry glass runways, increase above ground roll distances by 15%
4. For operation in outside air temperatures colder than this table provides, use coldest data shown.
5. For operation in outside air temperatures warmer than this table provides, use extreme caution.

Figure 5-5 Short Field Takeoff Distance



**BEST ANGLE-OF-CLIMB  
 AT 3500 POUNDS**

CONDITIONS:  
 Flaps Up  
 2600 RPM  
 Full Throttle  
 Mixture at Best Power Schedule

Pressure Altitude Feet	Climb Speed KIAS	Angle-of-Climb (deg)			
		-20°C	0°C	20°C	40°C
Sea Level	65	8.9	8.2	7.4	6.7
2000	67	7.7	7.0	6.3	5.7
4000	68	6.4	5.7	5.1	4.6
6000	70	5.2	4.6	4.0	3.5
8000	70	4.0	3.5	3.0	2.5
10,000	71	3.0	2.5	2.0	1.6
12,000	72	2.0	1.6	1.1	0.7
14,000	73	1.1	0.7	0.3	---

Figure 5-6 Best Angle-of-Climb

**BEST RATE-OF-CLIMB  
AT 3500 POUNDS**

CONDITIONS:  
Flaps Up  
2600 RPM  
Full Throttle  
Mixture at Best Power Schedule

Pressure Altitude Feet	Climb Speed KIAS	Rate-of-Climb (FPM)			
		-20°C	0°C	20°C	40°C
Sea Level	81	1112	1055	994	931
2000	81	998	939	876	811
4000	81	862	801	736	674
6000	81	724	660	597	535
8000	79	585	521	459	397
10,000	77	447	384	322	261
12,000	75	312	250	188	126
14,000	70	177	118	---	---

Figure 5-7 Best Rate-of-Climb

**TIME, FUEL AND DISTANCE TO CLIMB  
AT 3500 POUNDS**

**AT Best Rate-of-Climb**

**CONDITIONS:**

Flaps Up  
Full Throttle  
2600 RPM  
Mixture at Best Power Schedule  
Standard Temperatures

Pressure Altitude Feet	Temp. °C	Climb Speed KIAS	Rate-of- Climb FPM	From Sea Level			
				Time Minute	Fuel Used Litres	Fuel Used US gal.	Distance NM
S.L	15	81	1010	0	0	0.0	
1000	13	81	965	1	2	0.4	1
2000	11	81	904	2	3	0.8	3
3000	9	81	842	3	5	1.2	4
4000	7	81	778	4	6	1.7	6
5000	5	81	714	6	8	2.1	8
6000	3	81	650	7	10	2.6	10
7000	1	80	587	9	12	3.2	13
8000	-1	79	524	11	14	3.8	15
9000	-3	79	461	13	17	4.4	18
10000	-5	78	399	15	19	5.1	22
11000	-7	77	338	18	22	5.9	26
12000	-9	76	277	21	26	6.8	31
13000	-11	76	217	25	30	8.0	37
14000	-13	75	158	30	36	9.4	45

**NOTES:**

1. Add 7.5 litres (2 US gallons) of fuel for engine start, run-up, taxi and take off allowance.
2. Mixture leaned to climb schedule.
3. Increase time, fuel and distance by 10% for each 10° C above standard temperature.
4. Distances shown are based on zero wind.

Figure 5-8 Time, Fuel and Distance to Climb

**CRUISE PERFORMANCE**  
PRESSURE ALTITUDE SEA LEVEL

Conditions:  
Recommended Lean Mixture  
3500 pounds

RPM	Manifold Pressure	Standard -20 °C					Standard Temp.					Standard +20 °C		
		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.		
				USG/HR	LT/HR			USG/HR	LT/HR			USG/HR	LT/HR	
2600	27	86	140	18.5	70.2	83	141	17.8	67.8	81	142	17.3	65.7	
	26	82	137	17.6	66.8	79	138	17.0	64.6	76	139	16.5	62.7	
	25	78	134	16.7	63.5	75	135	16.2	61.5	72	135	15.7	59.7	
	24	73	131	15.9	60.3	71	131	15.4	58.5	68	131	15.0	56.9	
	23	69	126	15.1	57.3	66	127	14.7	55.7	64	127	14.3	54.2	
	22	65	123	14.3	54.4	62	122	13.9	52.9	60	122	13.6	51.7	
	21	60	118	13.6	51.6	58	117	13.2	50.3	56	117	12.9	49.2	
	20	56	112	12.9	49.0	54	111	12.6	47.8	52	110	12.3	46.8	
	19	52	106	12.2	46.5	50	104	12.0	45.5	48	101	11.7	44.6	
	2400	27	79	136	16.6	63.0	77	137	16.0	60.8	74	138	15.5	58.9
26		76	133	15.8	60.0	73	134	15.3	58.0	70	133	14.8	56.3	
25		72	129	15.0	57.1	69	130	14.6	55.3	67	130	14.1	53.7	
24		68	126	14.3	54.4	65	126	13.9	52.8	63	126	13.5	51.3	
23		64	123	13.6	51.8	62	122	13.2	50.3	60	122	12.9	49.0	
22		60	119	13.0	49.3	58	118	12.6	48.0	56	117	12.3	46.8	
21		56	114	12.3	46.9	54	112	12.0	45.7	52	111	11.8	44.7	
20		52	108	11.8	44.7	50	107	11.5	43.6	49	104	11.3	42.8	
19		48	102	11.2	42.6	47	99	11.0	41.7	45	93	10.8	40.9	
2200		28	76	134	15.3	58.2	73	134	14.8	56.3	71	134	14.4	54.6
	27	72	131	14.7	55.8	70	131	14.2	54.0	68	131	13.8	52.4	
	26	69	128	14.1	53.4	67	128	13.6	51.8	64	128	13.2	50.3	
	25	66	124	13.4	51.1	63	125	13.0	49.6	61	124	12.7	48.2	
	24	62	122	12.9	48.9	60	121	12.5	47.5	58	120	12.2	46.2	
	23	59	118	12.3	46.7	57	117	12.0	45.4	55	116	11.7	44.3	
	22	55	114	11.7	44.6	53	112	11.4	43.4	52	111	11.2	42.4	
	21	52	109	11.2	42.6	50	107	10.9	41.5	49	104	10.8	40.9	
	20	48	102	10.7	40.6	47	100	10.4	39.7	45	93	10.4	39.7	

Figure 5-9 Cruise Performance (1 of 6)

**CRUISE PERFORMANCE**  
PRESSURE ALTITUDE 2000 FEET

Conditions:  
Recommended Lean Mixture  
3500 pounds

RPM	Manifold Pressure	Standard -20 °C						Standard Temp.						Standard +20 °C												
		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.	% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.											
				USG/HR	LT/HR						USG/HR	LT/HR			USG/HR	LT/HR	USG/HR	LT/HR								
2600	27	89	144	19.0	72.4	86	145	18.4	69.8	83	146	17.8	67.5	2400	86	143	17.9	68.2	83	144	17.3	65.6	80	145	16.7	63.4
	26	85	141	18.1	68.8	82	142	17.5	66.5	79	143	17.0	64.4		78	140	17.1	64.9	79	141	16.5	62.6	76	142	15.9	60.5
	25	80	138	17.2	65.4	77	138	16.7	63.3	75	139	16.2	61.4		74	137	16.3	61.8	75	138	15.7	59.6	72	137	15.2	57.8
	24	76	135	16.4	62.2	73	135	15.8	60.2	71	135	15.4	58.5		70	133	15.5	58.8	71	134	15.0	56.8	69	134	14.5	55.1
	23	71	131	15.5	59.0	69	131	15.1	57.2	67	131	14.7	55.7		66	129	14.7	55.9	67	130	14.2	54.1	65	130	13.8	52.6
	22	67	127	14.7	56.0	65	127	14.3	54.4	62	127	14.0	53.0		62	126	14.0	53.1	64	126	13.6	51.6	61	126	13.2	50.2
2200	21	63	122	14.0	53.1	60	122	13.6	51.7	58	120	13.3	50.4	57	121	13.3	50.5	60	122	12.9	49.1	58	120	12.6	47.9	
	20	58	116	13.2	50.3	56	115	12.9	49.1	54	114	12.6	48.0	54	117	12.6	48.1	56	116	12.3	46.8	54	115	12.0	45.7	
	19	54	110	12.6	47.7	52	109	12.3	46.6	50	110	11.7	44.6	50	112	12.0	45.7	52	110	11.7	44.6	50	108	11.5	43.7	
	28	78	137	15.7	59.5	75	138	15.1	57.5	72	137	14.7	55.8	72	135	15.5	59.5	75	138	15.1	57.5	72	137	14.7	55.8	
	27	74	135	15.0	57.1	72	135	14.5	55.2	69	134	14.1	53.6	69	132	15.0	57.1	72	135	14.5	55.2	69	134	14.1	53.6	
	26	71	131	14.4	54.7	68	132	13.9	52.9	66	131	13.5	51.4	66	128	14.4	54.7	68	132	13.9	52.9	66	131	13.5	51.4	
2200	25	67	128	13.8	52.3	65	128	13.3	50.7	63	128	13.0	49.3	63	125	13.8	52.3	65	128	13.3	50.7	63	128	13.0	49.3	
	24	64	125	13.2	50.0	62	125	12.8	48.5	60	124	12.4	47.2	60	121	13.2	50.0	62	125	12.8	48.5	60	124	12.4	47.2	
	23	60	121	12.6	47.8	58	120	12.2	46.4	56	118	11.9	45.2	56	117	12.6	47.8	58	120	12.2	46.4	56	118	11.9	45.2	
	22	57	117	12.0	45.6	55	115	11.7	44.4	53	114	11.4	43.3	53	112	12.0	45.6	55	115	11.7	44.4	53	114	11.4	43.3	
	21	53	112	11.4	43.5	51	110	11.2	42.5	49	108	10.9	41.4	49	106	11.4	43.5	51	110	11.2	42.5	49	108	10.9	41.4	
	20	50	106	10.9	41.5	48	103	10.7	40.5	47	102	10.4	39.5	47	100	10.9	41.5	48	103	10.7	40.5	47	100	10.4	39.5	
19	46	99	10.4	39.5	45	94	10.2	38.6	44	94	10.2	38.6	44	94	10.4	39.5	45	94	10.2	38.6	44	94	10.4	39.5		

Figure 5-9 Cruise Performance (2 of 6)

**CRUISE PERFORMANCE**  
PRESSURE ALTITUDE 4000 FEET

Conditions:  
Recommended Lean Mixture  
3500 pounds

RPM	Manifold Pressure	Standard -20 °C				Standard Temp.				Standard +20 °C			
		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.	
				USG/HR	LT/HR			USG/HR	LT/HR			USG/HR	LT/HR
2600	26	87	143	18.7	71.0	84	146	18.0	68.4	81	147	17.4	66.2
	25	83	139	17.7	67.4	80	142	17.1	65.1	77	143	16.6	63.1
	24	78	136	16.8	64.0	76	139	16.3	61.9	73	139	15.8	60.1
	23	74	132	16.0	60.7	71	135	15.5	58.9	69	135	15.1	57.2
	22	69	128	15.2	57.6	67	131	14.7	55.9	65	131	14.3	54.4
	21	65	127	14.4	54.6	62	126	14.0	53.1	60	125	13.6	51.7
2400	20	60	121	13.6	51.7	58	120	13.3	50.4	56	119	12.9	49.2
	19	56	115	12.9	49.0	54	114	12.6	47.8	52	111	12.3	46.7
	18	51	107	12.2	46.4	50	104	11.9	45.3	48	99	11.7	44.4
	26	80	141	16.7	63.6	77	141	16.1	61.3	75	142	15.6	59.3
	25	76	137	15.9	60.4	73	138	15.4	58.3	71	138	14.9	56.5
	24	72	134	15.1	57.4	69	134	14.6	55.5	67	134	14.2	53.9
2200	23	68	130	14.4	54.6	66	129	13.9	52.9	63	130	13.5	51.4
	22	64	126	13.6	51.8	62	125	13.2	50.3	60	124	12.9	49.0
	21	60	122	13.0	49.3	58	120	12.6	47.9	56	119	12.3	46.7
	20	56	116	12.3	46.8	54	115	12.0	45.6	52	112	11.7	44.6
	19	52	109	11.7	44.5	50	107	11.4	43.5	48	102	11.2	42.6
	18	48	101	11.1	42.4	46	97	10.9	41.5	44	97	10.6	40.4
2200	26	73	135	14.7	55.9	70	135	14.2	54.1	68	134	13.8	52.5
	25	69	132	14.1	53.5	67	132	13.6	51.8	64	131	13.2	50.3
	24	66	128	13.5	51.1	63	127	13.0	49.6	61	126	12.7	48.2
	23	62	125	12.9	48.8	60	123	12.5	47.4	58	122	12.1	46.2
	22	59	120	12.3	46.6	56	119	11.9	45.3	54	116	11.6	44.2
	21	55	116	11.7	44.5	53	114	11.4	43.3	51	111	11.1	42.2
2200	20	51	109	11.1	42.4	50	107	10.9	41.3	48	102	10.6	40.4
	19	48	102	10.6	40.4	46	98	10.4	39.4	44	94	10.0	38.4

Figure 5-9 Cruise Performance (3 of 6)

**CRUISE PERFORMANCE**  
PRESSURE ALTITUDE 6000 FEET

Conditions:  
Recommended Lean Mixture  
3500 pounds

RPM	Manifold Pressure	Standard -20 °C				Standard Temp.				Standard +20 °C			
		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.	
				USG/HR	L/HR			USG/HR	L/HR			USG/HR	L/HR
2600	25	85	144	18.3	69.5	82	147	17.6	67.0	79	147	17.1	64.9
	24	81	140	17.3	65.9	78	143	16.8	63.7	75	144	16.2	61.7
	23	76	136	16.5	62.5	74	139	15.9	60.5	71	139	15.5	58.7
	22	72	132	15.6	59.3	69	135	15.1	57.4	67	135	14.7	55.8
	21	67	127	14.8	56.1	65	130	14.3	54.5	62	129	14.0	53.1
	20	63	122	14.0	53.1	60	125	13.6	51.7	58	122	13.3	50.4
2400	19	58	114	13.2	50.3	56	118	12.9	49.0	54	116	12.6	47.9
	18	53	107	12.5	47.6	52	109	12.2	46.5	50	103	12.0	45.5
	25	78	141	16.3	62.1	75	142	15.8	59.9	73	142	15.3	58.0
	24	74	138	15.5	59.0	71	138	15.0	57.0	69	138	14.5	55.2
	23	70	134	14.7	56.0	67	133	14.3	54.2	65	134	13.8	52.6
	22	66	130	14.0	53.2	64	129	13.6	51.5	61	128	13.2	50.1
2200	21	62	124	13.3	50.5	60	124	12.9	49.0	58	122	12.6	47.8
	20	58	120	12.6	47.9	56	118	12.3	46.7	54	116	12.0	45.6
	19	54	114	12.0	45.5	52	110	11.7	44.4	50	106	11.4	43.4
	18	50	106	11.4	43.3	48	101	11.1	42.3				
	25	71	136	14.4	54.7	68	135	13.9	53.0	66	134	13.5	51.4
	24	67	132	13.8	52.3	65	131	13.3	50.7	63	130	12.9	49.2
2200	23	64	127	13.1	49.9	61	127	12.7	48.4	59	126	12.4	47.1
	22	60	123	12.5	47.6	58	123	12.2	46.3	56	120	11.9	45.0
	21	57	119	12.0	45.4	54	117	11.6	44.2	53	113	11.3	43.1
	20	53	113	11.4	43.3	51	110	11.1	42.1	49	105	10.8	41.1
19	49	106	10.8	41.2	48	101	10.6	40.2					

Figure 5-9 Cruise Performance (4 of 6)

**CRUISE PERFORMANCE**  
PRESSURE ALTITUDE 8000 FEET

**Conditions:**  
Recommended Lean Mixture  
3500 pounds

RPM	Manifold Pressure	Standard -20 °C						Standard Temp.						Standard +20 °C							
		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.					
				USG/HR	LT/HR			USG/HR	LT/HR			USG/HR	LT/HR			USG/HR	LT/HR				
2600	23	79	140	16.9	64.3	76	143	16.4	62.2	73	144	15.9	60.3								
	22	74	136	16.0	61.0	71	139	15.5	59.0	69	138	15.1	57.3								
	21	69	131	15.2	57.7	67	134	14.7	55.9	65	133	14.3	54.4								
	20	65	126	14.4	54.6	62	129	14.0	53.0	60	127	13.6	51.7								
	19	60	121	13.6	51.6	58	122	13.2	50.3	56	119	12.9	49.0								
2400	18	56	111	12.8	48.8	54	114	12.5	47.6	52	109	12.2	46.5								
	17	51	96	12.1	46.2	49	100	11.9	45.1												
	23	72	138	15.1	57.5	69	138	14.6	55.6									67	138	14.2	53.9
	22	68	134	14.4	54.5	65	133	13.9	52.8									63	132	13.5	51.3
	21	64	128	13.6	51.7	61	127	13.2	50.2									59	126	12.9	48.8
20	60	123	12.9	49.1	57	122	12.6	47.7	55					119	12.2	46.5					
2200	19	56	117	12.3	46.6	53	115	11.9	45.4	52	110	11.7	44.3								
	18	51	110	11.6	44.2	49	105	11.4	43.2												
	23	65	131	13.4	51.0	63	131	13.0	49.4									61	129	12.6	48.0
	22	62	127	12.8	48.7	60	125	12.4	47.2									57	123	12.1	45.9
	21	58	123	12.2	46.4	56	120	11.9	45.1									54	116	11.6	43.9
20	55	116	11.6	44.2	52	113	11.3	43.0	51					106	11.0	41.9					
19	51	110	11.1	42.0	49	104	10.8	41.0													

Figure 5-9 Cruise Performance (5 of 6)



**CRUISE PERFORMANCE**  
PRESSURE ALTITUDE 10000 FEET

**Conditions:**  
Recommended Lean Mixture  
3500 pounds

RPM	Manifold Pressure	Standard -20 °C					Standard Temp.					Standard +20 °C		
		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.		% BHP	KTAS	Fuel Cons.		
				USG/HR	LT/HR			USG/HR	LT/HR			USG/HR	LT/HR	
2600	21	72	135	15.6	59.3	69	137	15.1	57.4	67	138	14.7	55.8	
	20	67	130	14.8	56.1	65	133	14.3	54.4	62	130	13.9	52.9	
	19	62	124	14.0	53.0	60	126	13.6	51.5	58	123	13.2	50.2	
	18	58	118	13.2	50.1	56	118	12.8	48.8	54	113	12.5	47.6	
	17	53	104	12.5	47.3	51	105	12.2	46.2					
	21	66	132	14.0	53.0	63	131	13.5	51.4	61	130	13.1	49.9	
2400	20	62	126	13.2	50.3	59	126	12.8	48.8	57	123	12.5	47.5	
	19	57	121	12.5	47.7	55	118	12.2	46.4	53	112	11.9	45.3	
	18	53	113	11.9	45.2	51	108	11.6	44.1					
2200	21	60	125	12.5	47.4	58	123	12.1	46.0	55	118	11.8	44.7	
	20	56	120	11.9	45.1	54	116	11.5	43.8	52	107	11.2	42.7	
	19	52	113	11.3	42.9	50	106	11.0	41.8					
2600	18	60	121	13.5	51.4	58	121	13.2	50.0	55	117	12.8	48.8	
	17	55	112	12.8	48.5	53	109	12.4	47.3					
	2400	18	55	117	12.2	46.2	53	110	11.8	45.0				

Figure 5-9 Cruise Performance (6 of 6)

**SHORT FIELD LANDING DISTANCE  
AT 3500 POUNDS**

Flaps 30°  
Power Off  
Maximum Braking  
Paved, level, dry runway  
Zero Wind  
Speed at 50 ft 66KIAS

Pressure Altitude	0°C		10°C		20°C		30°C		40°C	
	GND Roll	Total Dist. to 50ft Obst.	GND Roll	Total Dist. to 50ft Obst.	GND Roll	Total Dist. to 50ft Obst.	GND Roll	Total Dist. to 50ft Obst.	GND Roll	Total Dist. to 50ft Obst.
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
SL	585	1336	602	1374	618	1413	635	1452	652	1490
1000	602	1375	619	1415	637	1455	654	1495	672	1535
2000	620	1415	638	1457	656	1499	674	1540	692	1582
3000	638	1458	657	1501	676	1544	695	1587	714	1630
4000	658	1549	677	1547	697	1592	716	1637	736	1681
5000	678	1549	698	1595	719	1642	739	1688	759	1735
6000	699	1597	720	1646	741	1694	762	1742	784	1790
7000	721	1701	743	1698	765	1748	787	1798	809	1848
8000	745	1701	767	1753	790	1805	813	1857	836	1909

NOTES:

1. Landing technique specified in Section 4
2. Reduce total distances 10% for each 10 knot headwind.  
For operation in tail winds up to 10 knots increase 10% for each 2 knots.
3. For dry, grass runways increase landing ground roll by 50%.

Figure 5-10 Short Field Landing Distance