SECTION 5
PERFORMANCE

TABLE OF CONTENTS

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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 flight planning in detail 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 does not allow for 45 minutes reserve fuel. Some indeterminate variables such 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 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

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Table 5-1 – Takeoff Distance – 2950 lbs (1338 kg) & 2700 lbs (1225 kg).

TAKEOFF DISTANCE					
Conditions: Flaps 0° - Lift off speed VR =50 KIAS – 93 km/h – 58 MPH V_{50ft} = 60 KIAS – 111 km/h – 69 MPH					
Pressure Altitude (ft)	Temp (°C/°F)	Weight (lb) 2950		Weight (lb) 2700	
		Ground Roll (ft)	Total to clear 50 ft obstacle in(ft)	Ground Roll (ft)	Total to clear 50 ft obstacle in(ft)
0	-5°C /23°F	700	1310	560	1050
	15/°C 59°F	780	1440	625	1150
	45°C /113°F	1085	2185	870	1665
2000	-9°C /16°F	805	1525	645	1205
	11°C /52°F	905	1695	725	1335
	41°C /106°F	1275	2725	1025	2005
4000	-13°C /9°F	930	1795	745	1400
	7°C /45°F	1050	2005	840	1555
	37°C /97°F	1510	3670	1210	2460
6000	-17°C /2°F	1050	2050	845	1585
	3°C /37°F	1195	2325	960	1780
	33°C /91°F			1405	2975
8000	-21°C /-6°F	1155	2235	925	1715
	-1°C /30°F	1320	2565	1060	1945
	29°C /84°F			1605	3525
10000	-25°C /-13°F	1260	2400	1010	1840
	-5°C /23°F	1480	2900	1190	2175
	25°C /77°F			1865	4440
Note 1 : Short field technique as specified in Section 4.					
Note 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.					
Note 3 : Distances> 3900 ft not shown in the table.					
Note 4 : For operation on a dry, grass runway, increase by 15% of the "ground roll" figure.					

Table 5-2 Rate Of Climb

RATE OF CLIMB												
Conditions: Flaps up – Maximum Continuous Power – Cowl flaps open												
Weight LBS	Pressure Altitude		Climb Speed		Rate of climb							
					-20°C (-4°F)		0°C (32°F)		20°C (68°F)		40°C (104°F)	
	ft	m	Km/h	KIAS	m/s	ft/m	m/s	ft/m	m/s	ft/m	m/s	ft/m
2950 (1338 kg)	0	0	167	90	5.64	1111	5.53	1088	5.17	1017	3.76	739
	1000	305	167	90	5.24	1032	5.12	1008	4.67	920	3.21	632
	2000	610	167	90	4.84	953	4.70	924	4.17	822	2.62	516
	3000	914	167	90	4.44	874	4.29	844	3.79	746	1.99	391
	4000	1219	167	90	4.06	799	3.86	760	3.44	678	1.35	266
	5000	1524	167	90	3.74	736	3.56	701	3.24	638		
	6000	1829	167	90	3.60	709	3.38	665	2.69	530		
	7000	2134	167	90	3.53	694	3.22	633	2.22	437		
	8000	2438	167	90	3.46	680	3.01	592	1.79	351		
	9000	2743	167	90	3.43	675	2.80	551	1.35	266		
	10000	3048	167	90	3.35	660	2.50	493	0.92	181		
	11000	3353	167	90	3.24	637	2.25	443				
	12000	3658	167	90	3.09	609	1.88	371				
	12500	3810	167	90	3.02	595	1.68	330				
	Note : 1 - Maximum continuous power obtained full throttle											

Table 5-3 Time, Fuel And Distance To Climb – Normal Climb.

NORMAL CLIMB – TIME, FUEL AND DISTANCE TO CLIMB												
Conditions : Flaps up – Max. Continuous Power – Cowl flaps open – Standard Temperature												
Masse LBS	Pressure Altitude		Temperature °C / °F	Climb Speed		Rate of climb		From sea level				
								Time	Consumption		distance	
	ft	m		KIAS	Km/h	Ft/ min	m/s	min	US gal.	Litres	NM	km
2950 (1338 kg)	0	0	15°C / 59°F	90	167	1039	5.28	0	0.0	0	0	0
	1000	305	13°C / 55°F	90	167	962	4.89	1	0.2	1	1	3
	2000	610	11°C / 52°F	90	167	881	4.48	2	0.4	2	3	6
	3000	914	9°C / 48°F	90	167	805	4.09	3	0.6	2	5	9
	4000	1219	7°C / 45°F	90	167	724	3.68	5	0.8	3	7	13
	5000	1524	5°C / 41°F	90	167	669	3.40	6	1.0	4	9	17
	6000	1829	3°C / 37°F	90	167	646	3.28	8	1.3	5	12	22
	7000	2134	1°C / 34°F	90	167	622	3.16	9	1.6	6	14	27
	8000	2438	-1°C / 30°F	90	167	598	3.04	11	1.8	7	17	32
	9000	2743	-3°C / 27°F	90	167	575	2.92	12	2.1	8	20	37
	10000	3048	-5°C / 23°F	90	167	551	2.80	14	2.4	9	23	43
	11000	3353	-7°C / 19°F	90	167	528	2.68	16	2.7	10	26	48
	12000	3658	-9°C / 16°F	90	167	504	2.56	18	3.0	11	30	55
	12500	3810	-10°C / 14°F	90	167	492	2.50	19	3.1	12	31	58
	Note : 1 - Fuel for engine start, taxiing and takeoff are balanced with descent 2 - Maximum continuous power obtained full throttle 3 - Increase time, fuel and distance by 10% for each 10°C above standard temperature of concerned altitude 4 - Distances are based on zero wind											

Table 5-4 Cruise Performance
-ISA/Usable Fuel 333 L (88 US Gal) - (Sheet 1/2)

CRUISE PERFORMANCE (standard atmosphere - ISA)							
Pressure Altitude (ft)	T ISA (°C/°F) OAT	Power	GPH(L/h)	MAP In.Hg	KTAS	Endurance h:min	Range without reserve (NM)
0	15°C / 59°F	Max. Continuous Power	12.2 (46)	Full Throttle	135	07:20	985
0	15°C / 59°F	Recommended Cruise	9.8 (37)	72	122	09:00	1100
0	15°C / 59°F	Economic Cruise	7.9 (30)	62	113	11:05	1250
2500	10°C / 50°F	Max. Continuous Power	11.4 (43)	Full Throttle	135	07:50	1055
2500	10°C / 50°F	Recommended Cruise	9.8(37)	70	125	09:00	1120
2500	10°C / 50°F	Economic Cruise	7.9 (30)	60	115	11:05	1275
5000	5°C / 41°F	Max. Continuous Power	10.6 (40)	Full Throttle	134	08:25	1125
5000	5°C / 41°F	Recommended Cruise	9.8(37)	64	127	09:05	1155
5000	5°C / 41°F	Economic Cruise	7.9 (30)	55	117	11:10	1310
7500	0°C / 32°F	Max. Continuous Power	10.3 (39)	Full Throttle	136	08:35	1165
7500	0°C / 32°F	Recommended Cruise	9.5 (36)	61	129	09:15	1195
7500	0°C / 32°F	Economic Cruise	7.7 (29)	53	120	11:25	1365
10000	-5°C / 23°F	Max. Continuous Power	10 (38)	Full Throttle	138	08:45	1205
10000	-5°C / 23°F	Recommended Cruise	9.2 (35)	60	131	09:30	1240
10000	-5°C / 23°F	Economic Cruise	7.7 (29)	51	121	11:40	1415
12500	-10°C / 14°F	Max. Continuous Power	9.8(37)	Full Throttle	140	09:00	1255
12500	-10°C / 14°F	Recommended Cruise	9 (34)	56	133	09:40	1285
12500	-10°C / 14°F	Economic Cruise	7.4 (28)	48	123	11:55	1470

Note : 1 - Standard Atmosphere ISA
2 - Weight 2950 lbs (1338 kg)°
3 - Usable fuel 88 US Gal (333 L)
4 - Cowl flaps closed

Table 5-4 Cruise Performance
- ISA+30°C/Usable Fuel 333 L (88 US Gal) - (Sheet 2/2)

CRUISE PERFORMANCE (standard atmosphere – ISA+30°C)							
Pressure Altitude (ft)	T ISA +30°C (°C/°F) OAT	Power	Fuel Flow GPH (L/h)	MAP In.Hg	KTAS	Endurance h:min	Range without reserve (NM)
0	45°C / 113°F	Max. Continuous Power	10 (38)	Full Throttle	127	08:43	1105
0	45°C / 113°F	Recommended Cruise	9.2 (35)	67	120	09:25	1130
0	45°C / 113°F	Economic Cruise	7.7 (29)	58	111	11:40	1290
2500	40°C / 104°F	Max. Continuous Power	9.8(37)	Full Throttle	129	09:00	1160
2500	40°C / 104°F	Recommended Cruise	9 (34)	62	121	09:45	1180
2500	40°C / 104°F	Economic Cruise	7.4 (28)	54	112	12:00	1345
5000	35°C / 95°F	Max. Continuous Power	9 (34)	Full Throttle	127	09:50	1245
5000	35°C / 95°F	Recommended Cruise	8.2 (31)	56	121	10:35	1280
5000	35°C / 95°F	Economic Cruise	6.9 (26)	49	111	13:05	1450
7500	30°C / 86°F	Max. Continuous Power	8.2 (31)	Full Throttle	126	10:50	1360
7500	30°C / 86°F	Recommended Cruise	7.4 (28)	52	119	11:40	1395
7500	30°C / 86°F	Economic Cruise	6.1 (23)	45	111	14:25	1595
10000	25°C / 77°F	Max. Continuous Power	7.4 (28)	Full Throttle	125	11:45	1465
10000	25°C / 77°F	Recommended Cruise	6.9 (26)	48	119	12:40	1505
10000	25°C / 77°F	Economic Cruise	5.5 (21)	42	110	15:40	1720
12500	20°C / 68°F	Max. Continuous Power	7.9 (30)	Full Throttle	130	11:05	1445
12500	20°C / 68°F	Recommended Cruise	7.4 (28)	47	124	12:00	1485
12500	20°C / 68°F	Economic Cruise	6.1 (23)	41	114	14:50	1695

Note : 1 - Standard Atmosphere ISA+30

2 - Weight 2950 lbs (1338 kg)°

3 - Usable fuel 88 US Gal (333 L)

4 - Cowl flaps closed

Table 5-4A Cruise Performance
- ISA/Usable Fuel 212 L (56 US Gal) -(Sheet 1/2)

CRUISE PERFORMANCE (standard atmosphere - ISA)							
Pressure Altitude (ft)	T ISA +30°C (°C/°F) OAT	Power	Fuel Flow GPH (L/h)	MAP In.Hg	KTAS	Endurance h:min	Range without reserve (NM)
0	15°C / 59°F	Max. Continuous Power	12.2 (46)	Full Throttle	135	04:35	620
0	15°C / 59°F	Recommended Cruise	9.8 (37)	72	122	05:45	695
0	15°C / 59°F	Economic Cruise	7.9 (30)	62	113	07:05	800
2500	10°C / 50°F	Max. Continuous Power	11.4 (43)	Full Throttle	135	04:55	665
2500	10°C / 50°F	Recommended Cruise	9.8(37)	70	125	05:45	715
2500	10°C / 50°F	Economic Cruise	7.9 (30)	60	115	07:05	815
5000	5°C / 41°F	Max. Continuous Power	10.6 (40)	Full Throttle	134	05:15	710
5000	5°C / 41°F	Recommended Cruise	9.8(37)	64	127	05:45	725
5000	5°C / 41°F	Economic Cruise	7.9 (30)	55	117	07:05	830
7500	0°C / 32°F	Max. Continuous Power	10.3 (39)	Full Throttle	136	05:25	740
7500	0°C / 32°F	Recommended Cruise	9.5 (36)	61	129	05:55	760
7500	0°C / 32°F	Economic Cruise	7.7 (29)	53	120	07:15	875
10000	-5°C / 23°F	Max. Continuous Power	10 (38)	Full Throttle	138	05:35	775
10000	-5°C / 23°F	Recommended Cruise	9.2 (35)	60	131	06:05	795
10000	-5°C / 23°F	Economic Cruise	7.7 (29)	51	121	07:15	880
12500	-10°C / 14°F	Max. Continuous Power	9.8(37)	Full Throttle	140	05:45	800
12500	-10°C / 14°F	Recommended Cruise	9 (34)	56	133	06:15	830
12500	-10°C / 14°F	Economic Cruise	7.4 (28)	48	123	07:35	930

Note : 1 - Standard Atmosphere ISA

2 - Weight 2950 lbs (1338 kg)°

3 - Usable fuel 56 US Gal (212 L)

4 - Cowl flaps closed

Tableau 5-4A Cruise Performance - ISA+30°C / Unusable Fuel 212 L (56 US Gal) - (Sheet 2/2)

CRUISE PERFORMANCE (standard atmosphere – ISA+30°C)							
Pressure Altitude (ft)	T ISA +30°C (°C/°F) OAT	Power	Fuel Flow GPH (L/h)	MAP In.Hg	KTAS	Endurance h:min	Range without reserve (NM)
0	45°C / 113°F	Max. Continuous Power	10 (38)	Full Throttle	127	05:35	710
0	45°C / 113°F	Recommended Cruise	9.2 (35)	67	120	06:05	730
0	45°C / 113°F	Economic Cruise	7.7 (29)	58	111	07:15	870
2500	40°C / 104°F	Max. Continuous Power	9.8(37)	Full Throttle	129	05:45	735
2500	40°C / 104°F	Recommended Cruise	9 (34)	62	121	06:15	755
2500	40°C / 104°F	Economic Cruise	7.4 (28)	54	112	07:35	850
5000	35°C / 95°F	Max. Continuous Power	9 (34)	Full Throttle	127	06:15	790
5000	35°C / 95°F	Recommended Cruise	8.2 (31)	56	121	06:50	825
5000	35°C / 95°F	Economic Cruise	6.9 (26)	49	111	08:05	900
7500	30°C / 86°F	Max. Continuous Power	8.2 (31)	Full Throttle	126	06:50	860
7500	30°C / 86°F	Recommended Cruise	7.4 (28)	52	119	07:35	900
7500	30°C / 86°F	Economic Cruise	6.1 (23)	45	111	09:10	1020
10000	25°C / 77°F	Max. Continuous Power	7.4 (28)	Full Throttle	125	07:35	945
10000	25°C / 77°F	Recommended Cruise	6.9 (26)	48	119	08:05	965
10000	25°C / 77°F	Economic Cruise	5.5 (21)	42	110	10:10	1120
12500	20°C / 68°F	Max. Continuous Power	7.9 (30)	Full Throttle	130	07:05	920
12500	20°C / 68°F	Recommended Cruise	7.4 (28)	47	124	07:35	940
12500	20°C / 68°F	Economic Cruise	6.1 (23)	41	114	09:10	1045

Note : 1 - Standard Atmosphere ISA + 30°C

2 - Weight 2950 lbs (1338 kg)°

3 - Usable fuel 56 US Gal (212 L)

4 - Cowl flaps closed

Table 5-5 Minimum Take-off MAP in.Hg

Minimum Take-off MAP in.Hg.						
	Pressure Altitude (ft)					
OAT (° C/ °F)	0	2500	5000	7500	10000	12500
-25℃/13℉	81	73	65	63	60	54
-20℃/-4℉	80	72	65	61	60	56
-15℃/5℉	80	72	65	61	60	56
-10℃/14℉	80	72	65	61	60	56
-5℃/23℉	80	72	64	61	60	56
0℃/32℉	80	72	64	61	60	56
5℃/41℉	80	72	64	61	60	56
10 ℃/50℉	80	72	63	61	60	56
15℃/59℉	80	72	63	61	60	56
20℃/68℉	77	70	62	60	57	54
25℃/77℉	75	68	62	58	54	53
30℃/86℉	71	65	61	56	52	50
35℃/95℉	68	62	57	53	49	47

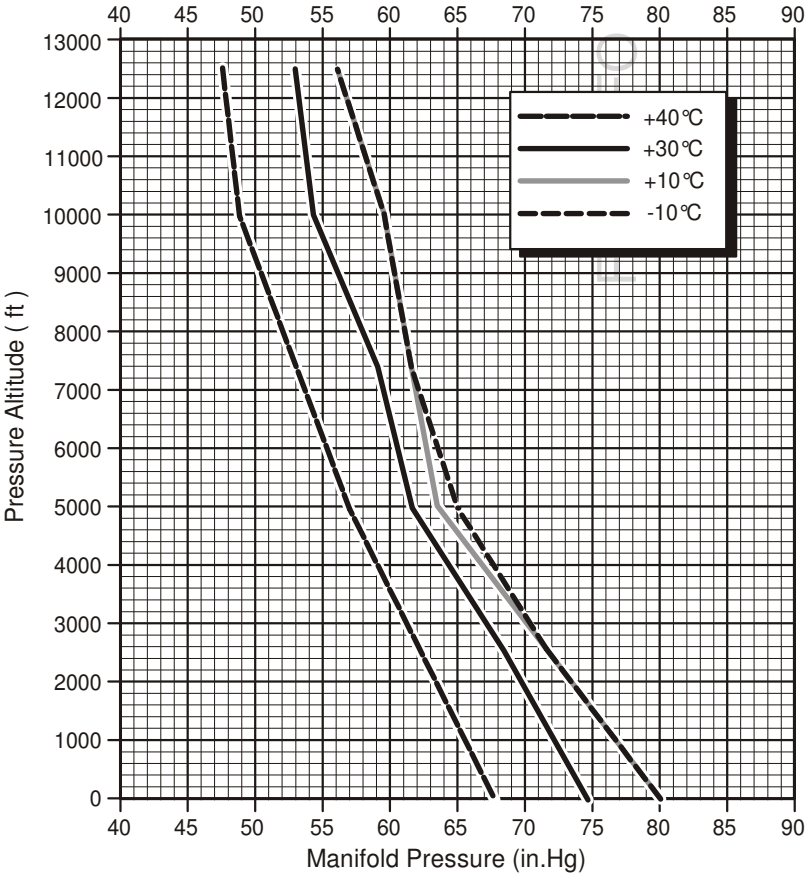

Figure 5-1 Minimum Take-off Manifold Pressure

Table 5-6 Recommended cruise Manifold Pressure

Recommended cruise MAP						
OAT (° C/ °F)	Pressure Altitude (ft)					
	0	2500	5000	7500	10000	12500
-25℃/-13℉	75	72	65	63	60	54
-20℃/-4℉	74	71	65	61	60	56
-15℃/5℉	74	71	65	61	60	56
-10℃/14℉	73	70	65	61	60	56
-5℃/23℉	73	70	64	61	60	56
0℃/32℉	73	70	64	61	60	56
5℃/41℉	72	69	64	61	60	56
10 ℃/50℉	72	69	63	61	60	56
15℃/59℉	71	69	63	61	60	56
20℃/68℉	71	68	62	60	57	54
25℃/77℉	70	68	62	58	54	53
30℃/86℉	69	65	61	56	52	50
35℃/95℉	68	62	57	53	49	47

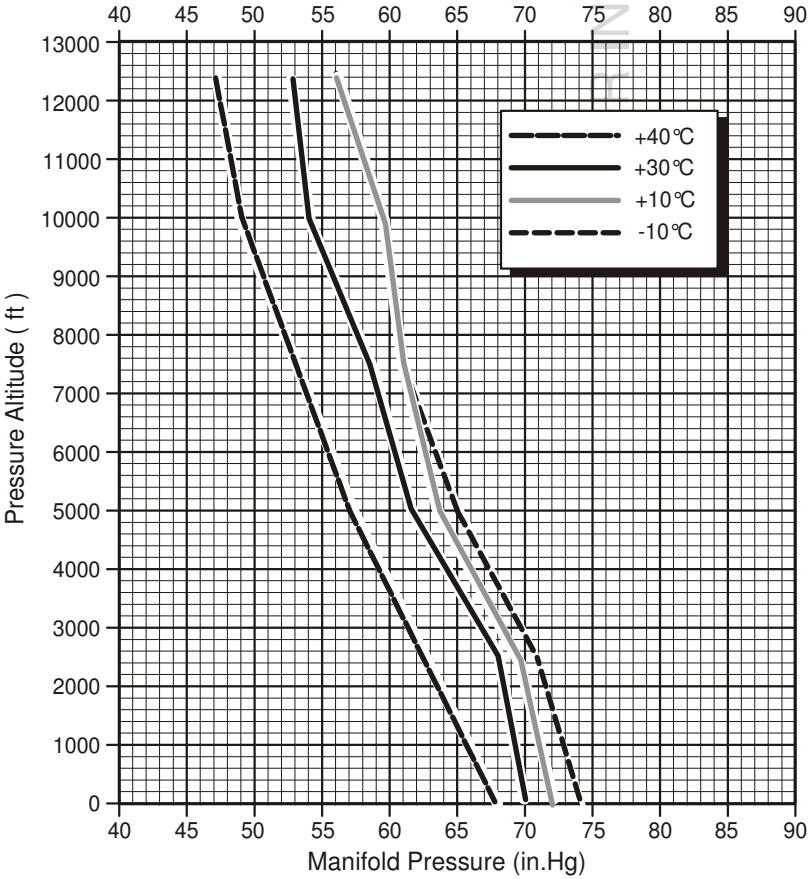

Figure 5-2 Recommended Cruise Manifold Pressure

Table 5-7 Economic Cruise Manifold Pressure

Economic Cruise MAP						
OAT (° C/ °F)	Pressure Altitude (ft)					
	0	2500	5000	7500	10000	12500
-25℃/-13℉	64	62	58	55	53	48
-20℃/-4℉	64	61	57	54	52	49
-15℃/5℉	63	61	57	54	52	49
-10℃/14℉	63	60	56	53	52	49
-5℃/23℉	62	60	56	53	52	48
0℃/32℉	62	60	55	53	52	48
5℃/41℉	61	59	55	53	51	48
10 ℃/50℉	61	59	54	53	51	48
15℃/59℉	60	58	54	52	51	48
20℃/68℉	60	58	53	51	49	47
25℃/77℉	59	58	53	50	47	45
30℃/86℉	59	56	52	48	44	43
35℃/95℉	59	54	49	46	42	41

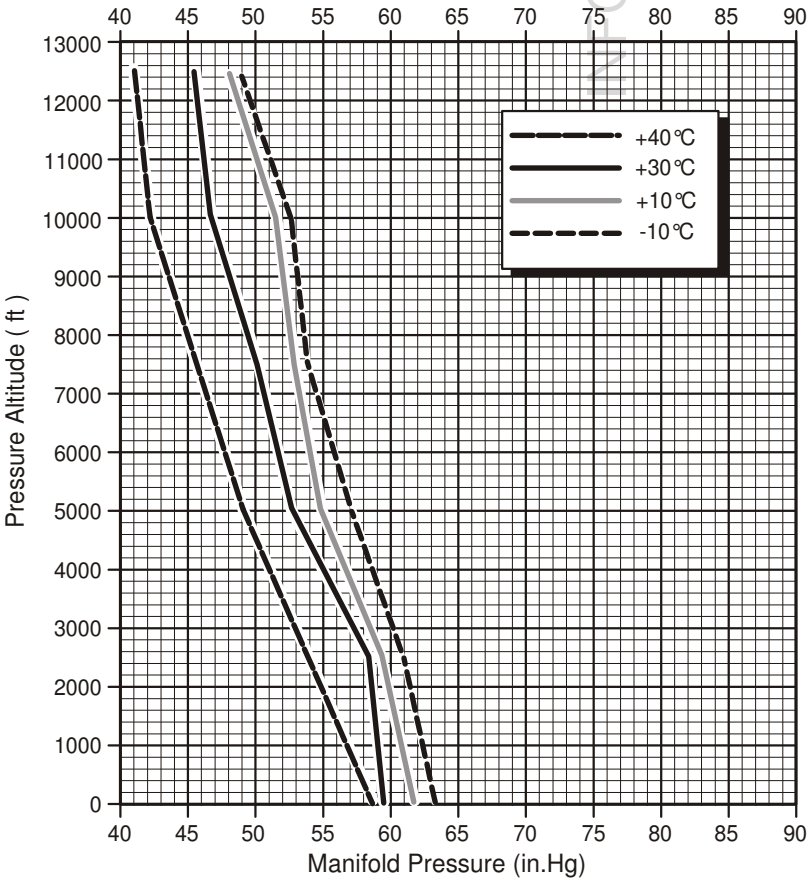

Figure 5-3 Economic Cruise Manifold Pressure

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