Cessna
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Cessna 400 (LC41-550FG)
Avidyne Entegra

PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

Serial Number: _____

Registration Number: _____

Type Certificate No. A00003SE

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE FEDERAL AVIATION REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER, AND CONSTITUTES THE FAA APPROVED AIRPLANE FLIGHT MANUAL.

This Handbook meets GAMA Specification No. 1, *Specification for Pilot's Operating Handbook,* issued February 15, 1975 and revised September 1, 1984.

Approved by the Federal Aviation Administration

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Date: 19 Nov 04 Initial Issue: 10 Nov 04 Revised: 17 Mar 08

RC050002G

POWERPLANT LIMITATIONS

Number of Engines: One (1)
Engine Manufacturer: Teledyne Continental
Engine Model Number: TSIO-550-C
Recommended Time Between Overhaul: 2000 Hours (Time in Service)
Maximum Power: 310 BHP at 2600 RPM
Maximum Manifold Pressure: 35.5 inches of Hg
Minimum Power Setting Above 18,000 ft.: 15 inches of Hg and 2200 RPM
Maximum Recommended Cruise: 262 BHP (85%)
Maximum Cylinder Head Temperature: 460°F (238°C)
Maximum Turbine Inlet Temperature: 1750°F (954°C)/1850°F (1010°C) for 30 sec.

POWERPLANT FUEL AND OIL DATA

Oil Grades Recommended for Various Average Air Temperature Ranges

Below 40°F (4°C) — SAE 30, 10W30, 15W50, or 20W50
Above 40°F (4°C) — SAE 50, 15W50, or 20W50

Oil Temperature

Maximum Allowable: 240°F (116°C)
Recommended takeoff minimum: 100°F (38°C)
Recommended flight operations: 170°F to 220°F (76.7°C to 104.4°C)

Oil Pressures

Normal Operations: 30-60 psi (pounds per square inch)
Idle, minimum: 10 psi
Maximum allowable (cold oil): 100 psi

Approved Fuel Grades

100LL Grade Aviation Fuel (Blue)
100 Grade Aviation Fuel (Green)

Fuel Flow

Normal Operations: 13 to 25 GPH (49 to 95 LPH)
Idle, minimum: 2 to 3 GPH (7 to 11 LPH)
Maximum allowable: 38.5 GPH (146 LPH)

Vapor Suppression

Required Usage:

- The Vapor Suppression rocker switch is required to be on above 18,000 ft.
- The Vapor Suppression rocker switch must be turned ON if TIT is rising above 1460°F at full power with the mixture full rich (at any altitude). Vapor suppression may be turned off below 18,000 ft if power has been reduced below 85% and engine temperatures have stabilized.

POWERPLANT INSTRUMENT MARKINGS

The following table, Figure 2 - 3, shows applicable color-coded ranges for the various powerplant instruments. The primary powerplant instruments are located on the engine instrument panel (see discussion on page 7-25). The Engine page on the MFD also displays all the powerplant instruments listed below (see discussion on page 7-141).

INSTRUMENT	RED LINE Minimum Limit	YELLOW RANGE Warning	WHITE RANGE Limited Time Operations	GREEN RANGE Normal Operating	RED LINE Limit
Tachometer	Minimum for idle 600 RPM*	N/A	2500 – 2600 RPM	2000 – 2500 RPM	2600 RPM
Manifold Pressure	N/A	N/A	33.5 – 35.5 In. of Hg	15 – 33.5 In. of Hg (No Placard)	35.5 In. of Hg
Oil Temperature	Minimum for takeoff 100°F* (38°C)	220°F – 240°F (104°C – 116°C)	100°F – 170°F (38°C – 77°C)	170°F – 220°F (77°C – 104°C)	240°F (116°C)
Oil Pressure	Minimum for idle 10 psi	N/A	10 – 30 psi and 60 – 100 psi	30 – 60 psi	100 psi (Cold Oil)
Fuel Quantity	A red line below "E" or "zero" indicates the remaining four gallons in each tank cannot be used safely in flight.	N/A	N/A	N/A	N/A
Fuel Flow				10 – 22 GPH* (38 – 83 LPH) 15 – 25 GPH‡ (57 – 95 LPH)	40 GPH (151 LPH)
Cylinder Head Temperature	N/A	100°F – 240°F‡ (38°C – 116°C) 200°F – 240°F† (93°C – 116°C) 420°F – 460°F (216°C – 238°C)	N/A	240°F – 420°F (116°C – 16°C)	460°F (238°C)
Turbine Inlet Temperature	N/A	1650°F – 1750°F (538°C – 954°C)	N/A	1000°F – 1650°F* (538°C – 99°C)	1750°F (954°C) (1850°F (1010°C) for 30 sec. limit)*

* These temperatures or pressures are not marked on the gauge. However, it is important information that the pilot must be aware of.

† Range shown on analog gauge

‡ Range shown on MFD Engine page

Figure 2 - 3

Crosswind Takeoff – Crosswind takeoffs should be made with takeoff flaps. When the take off run is initiated, the aileron is fully deflected into the wind. As the airplane accelerates and control response becomes more positive, the aileron deflection should be reduced as necessary. Accelerate the airplane to approximately 75 knots, and then quickly lift the airplane off the ground. When airborne, turn the airplane into the wind as required to maintain alignment over the runway and in the climb out corridor. Maintain the best angle of climb speed (82 to 86 KIAS) until the airplane is clear of all obstacles. Once past all obstacles, accelerate to the best rate of climb speed (110 KIAS); at or above 400 feet AGL, raise the flaps.

NORMAL AND MAXIMUM PERFORMANCE CLIMBS

Best Rate of Climb Speeds – The normal climb speed of the airplane, 110 KIAS, produces the most altitude gain in a given time period while allowing for proper engine cooling and good forward visibility. The best rate of climb airspeed is used in situations which require the most altitude gain in a given time period, such as after takeoff when an initial 2,000 feet or so height above the ground is desirable as a safety buffer. In another situation, ATC might require the fastest altitude change possible. The mixture should always be full rich in climbs.

Cruise Climb – Climbing at speeds above 115 KIAS is preferable, particularly when climbing to higher altitudes, i.e., those that require more than 6,000 feet of altitude change. A 500 FPM rate climb at cruise power provides better forward visibility and engine cooling. The engine should not be leaned during climb.

CAUTION

Do not lean the engine during climb.

Best Angle of Climb Speeds – The best angle of climb airspeed (V_X) for the airplane is 82 KIAS at sea level to 86 KIAS at 10,000 feet, with flaps in the up position. The best angle of climb airspeed produces the maximum altitude change in a given distance and is used in a situation where clearance of obstructions is required. When using the best angle of climb airspeed, the rate at which the airplane approaches an obstruction is reduced, which allows more space in which to climb. For example, if a pilot is approaching the end of a canyon and must gain altitude, the appropriate V_X speed should be used. Variations in the V_X speeds from sea level to 10,000 feet are more or less linear, assuming ISA conditions.

Power Settings – Use maximum continuous power until the airplane reaches a safe altitude above the ground. Ensure the propeller RPM does not exceed the red line limitation. It is recommended to use full throttle and 2600 RPM in climb because this setting provides the engine with extra fuel for cooling at the slower airspeeds. When changing power, the sequence control usage is important. To decrease power, decrease manifold pressure first with the throttle control and then decrease RPM with the propeller control. The traditional practice of initially squaring power settings (for example, 25 in. MAP and 2500 RPM) is an acceptable procedure, but not required. The engine's turbochargers keep manifold pressure constant from MSL to approximately 18,000 ft.

NOTE

During normal operations above 18,000 feet, a minimum engine condition of 2,200 RPM and 15 in.Hg of manifold air pressure are required to insure proper turbocharger operation is maintained. If engine operation below 15

in.Hg of manifold air pressure is necessary, the fuel mixture must be properly leaned or engine stoppage will result.

WARNING

Continuous overboost operation may damage the engine and require engine inspection.

Vapor Suppression – The vapor suppression rocker switch must be turned on in the following situations:

- Operations above 18,000 ft.
- If TIT is rising above 1460°F at full power with the mixture full rich (at any altitude).

Once engine temperatures have stabilized and if the aircraft is below 18,000 ft, the vapor suppression switch may be turned off.

The vapor suppression switch should also be turned on any time the engine is not running smooth or it is suspected there is vapor in the lines. Vapor in the lines is most likely to happen in hot weather or at high altitudes.

NORMAL OPERATIONS ABOVE 18,000 FT

During normal cruise and descent operations above 18,000 ft., a minimum engine condition of 2200 RPM and 15 in.Hg of manifold air pressure are required to insure proper turbocharger operation is maintained. If engine operation below 15 in.Hg of manifold air pressure is necessary, the fuel mixture must be properly leaned or engine stoppage will result.

CRUISE

Flight Planning – Several considerations are necessary in selecting a cruise airspeed, power setting, and altitude. The primary issues are time, range, and fuel consumption. High cruise speeds shorten the time en route, but at the expense of decreased range and increased fuel consumption.

Cruising at higher altitudes increases true airspeed and improves fuel consumption, but the time and fuel used to reach the higher cruise altitude must be considered. Clearly, numerous factors are weighed to determine what altitude, airspeed, and power settings are optimal for a particular flight. Section 5 in this manual contains detailed information to assist the pilot in the flight planning process.

In general, the airplane cruises at 50% to 85% of available power. The maximum recommended cruise power setting is 85%. The minimum cruise power setting is 40%, but higher power settings may be required in colder weather to maintain minimum engine temperatures.

Mixture Settings – In cruise flight and cruise climb, care is needed to ensure that engine instrument indications are maintained within normal operating ranges. After reaching the desired altitude and engine temperatures stabilize (usually within five minutes), the mixture must be adjusted. The engine is equipped with an altitude sensing fuel pump which will automatically make some mixture adjustments for altitude effects, however additional adjustments may be required.

Control by Turbine Inlet Temperature (TIT) – When leaning the mixture using TIT, the pilot should use the aircraft's TIT gauge on the left hand kidney panel as primary. Be aware that the TIT displayed on the Avidyne MFD Engine page, under certain conditions, may indicate a higher value. If this occurs the pilot may wish to use the most conservative (higher) number for leaning the engine. At power settings below 85% power, starting at full rich mixture, lean slowly while observing the TIT. When changing the mixture to lean of peak, it is acceptable to have TIT indications temporarily in the yellow range, but indications must return to the normal range upon leaning completion. Best power is obtained at 1650°F rich of peak. The engine can be leaned past peak and be operated 50°F lean of peak TIT. Lean of peak operation improves the efficiency of the airplane and provides about 30°F lower CHT at the same RPM/MAP combination. Fuel flow can be used as a reference to judge the resulting power setting, but should not be used for leaning.

CAUTION

Do not lean the engine when operating above 85% power. At power settings above 85%, the mixture must be full rich. Do not lean the engine during climb.

CAUTION

To prevent detonation, when increasing power, enrich mixture, advance RPM, and adjust throttle setting, in that order. When reducing power, retard throttle, then adjust RPM and mixture.

CAUTION

When leaning the mixture, it is acceptable to have TIT indications temporarily in the yellow range to detect peak. Once leaning is complete, the temperatures are in the normal range.

WARNING

Continuous overboost operation may damage the engine and require engine inspection.

Door Seals – Normally, the door seal switch remains in the On position for the entire flight. If the system pressure drops below 12 psi, the air pump will cycle on until pressure is restored. If the pump runs continuously, it is an indication that a seal is damaged and incapable of holding pressure. In this situation, the door seal system should not be operated until repairs are made.

Inoperative Door Seal Dump Valve – If the door seal dump valve should fail, the door seal system can still be operated. However, the door seals must not be turned on until after takeoff and must be turned off before landing. This procedure ensures rapid egress from the airplane in an emergency situation. Moreover, opening the doors with the seals inflated can damage the inflatable gaskets. For more information on the door seals and dump valve refer to page 7-18.

DESCENT

The primary considerations during the descent phase of the flight are to maintain the engine temperatures within normal indications and to systematically increase mixture settings as altitude is decreased. The descent from altitude is best performed through gradual power reductions and gradual enrichment of the mixture. Avoid long descents at low manifold pressure as the engine

CRUISE PERFORMANCE OVERVIEW

The tables on pages 5-15 through 5-28 contain cruise data to assist in the flight planning process. This information is tabulated for even thousand altitude increments and ranges from Sea Level feet to 25,000 feet. Interpolation is required for the odd number altitudes, i.e., 5000 feet, 7000 feet, etc., as well as altitude increments of 500 feet, such as 7500 and 9500.

The tables assume proper leaning at the various operating horsepowers. Between 65% and 85% of brake horsepower, the mixtures should be leaned through use of the turbine inlet temperature (TIT) gauge. Please refer to page 4-30 in this handbook for proper leaning techniques.

KTAS values in the tables are valid without the nose wheel pant installed. If the nose wheel pant is installed add 4 kts to the KTAS values.

The maximum recommended cruise setting is 85% of brake horsepower. The mixture must not be leaned above settings that produce more than 85% of brake horsepower. During cruise power settings above 65%, ambient temperature conditions need to be considered. In hot weather and high altitudes, it may be necessary to set the fuel flow to a lower TIT to maintain cylinder head temperatures within the recommended range for cruise.

CRUISE PERFORMANCE SEA LEVEL PRESSURE ALTITUDE

		-5°C (20°C Below Standard)				15°C (Standard Temperature)				45°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	26	97	182	85	23	87	182	76	20	75	180
	30	86	24	90	179	80	21	81	178	71	18	69	176
	29	83	23	85	177	77	20	77	176	68	17	66	173
	27	77	20	77	172	71	18	69	170	62	16	60	167
	25	71	18	69	166	65	16	62	164	56	14	54	160
	24	68	17	65	163	62	16	59	161	53	13	51	156
	22	61	15	58	157	55	14	53	154	46	12	45	148
	20	54	14	52	150	48	12	47	146	39	10	40	140
2400	33	90	26	97	182	84	23	87	182	75	20	74	179
	31	85	23	88	178	79	21	79	177	70	18	68	174
	30	82	22	84	176	76	20	75	175	67	17	65	172
	28	77	20	76	171	71	18	68	170	62	16	59	166
	26	70	18	68	166	64	16	62	164	55	14	53	159
	25	67	17	65	163	61	15	59	161	52	13	51	156
	23	61	15	58	157	55	14	53	154	46	12	45	148
	20	51	13	49	146	45	12	44	143	36	10	37	136
2300	34	88	25	93	180	82	22	83	180	73	19	71	177
	33	86	23	89	178	80	21	80	178	71	18	68	175
	31	81	21	81	174	75	19	73	173	66	17	63	170
	29	75	20	74	170	69	18	67	168	60	15	58	165
	27	70	18	67	165	64	16	61	163	55	14	53	158
	26	67	17	64	162	61	15	58	160	52	13	50	155
	24	61	15	58	157	55	14	53	154	46	12	45	148
	21	51	13	50	147	45	12	45	143	36	10	38	136

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

EXAMPLE PROBLEM AND SOLUTION

Conditions

Cruise Altitude .....1000 feet
Temperature ..... 13°C
Manifold Pressure .....25 inch Hg
RPM 2500

Determine

1. ..... % of BHP
2. ..... Fuel Consumption (GPH)
3. .....True Airspeed

Solution

% of BHP..... 65%
Fuel Consumption.....16.0 GPH (62 LPH)
True Airspeed ..... 165.5 Knots

Figure 5 - 15

CRUISE PERFORMANCE 2000 FEET PRESSURE ALTITUDE

		-9°C (20°C Below Standard)				11°C (Standard Temperature)				41°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	26	97	185	85	23	87	185	76	20	75	183
	30	86	24	90	182	80	21	81	182	71	18	69	179
	29	83	23	85	180	77	20	77	179	68	17	66	176
	27	77	20	77	175	71	18	69	173	62	16	60	170
	25	71	18	69	169	65	16	62	167	56	14	54	163
	24	68	17	65	166	62	16	59	164	53	13	51	159
	22	61	15	58	160	55	14	53	157	46	12	45	151
	20	54	14	52	152	48	12	47	149	39	10	40	143
2400	33	90	26	97	185	84	23	87	185	75	20	74	183
	31	85	23	88	181	79	21	79	180	70	18	68	178
	30	82	22	84	179	76	20	75	178	67	17	65	175
	28	77	20	76	174	71	18	68	173	62	16	59	169
	26	70	18	68	169	64	16	62	167	55	14	53	162
	25	67	17	65	166	61	15	59	164	52	13	51	159
	23	61	15	58	160	55	14	53	157	46	12	45	151
	20	51	13	49	149	45	12	44	145	36	10	37	139
2300	34	88	25	93	184	82	22	83	183	73	19	71	181
	33	86	23	89	182	80	21	80	181	71	18	68	178
	31	81	21	81	178	75	19	73	176	66	17	63	173
	29	75	20	74	173	69	18	67	172	60	15	58	168
	27	70	18	67	168	64	16	61	166	55	14	53	161
	26	67	17	64	165	61	15	58	163	52	13	50	158
	24	61	15	58	159	55	14	53	157	46	12	45	151
	21	51	13	50	149	45	12	45	146	36	10	38	139

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

EXAMPLE PROBLEM AND SOLUTION

Conditions

Cruise Altitude ..... 2000 feet
Temperature ..... 22°C
Manifold Pressure ..... 29 inch Hg
RPM 2700

Solution

% of BHP 73%
Fuel Consumption ..... 18.5 GPH (73 LPH)
True Airspeed ..... 177.5 Knots

Determine

1. ..... % of BHP
2. ..... Fuel Consumption (GPH)
3. ..... True Airspeed

Figure 5 - 16

CRUISE PERFORMANCE 4000 FT PRESSURE ALTITUDE

		-13°C (20°C Below Standard)				7°C (Standard Temperature)				37°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	26	97	189	85	23	87	189	76	20	75	187
	30	86	24	90	186	80	21	81	185	71	18	69	182
	29	83	23	85	183	77	20	77	182	68	17	66	179
	27	77	20	77	178	71	18	69	177	62	16	60	173
	25	71	18	69	172	65	16	62	170	56	14	54	166
	24	68	17	65	169	62	16	59	167	53	13	51	162
	22	61	15	58	162	55	14	53	160	46	12	45	154
	20	54	14	52	155	48	12	47	152	39	10	40	146
2400	33	90	26	97	189	84	23	87	188	75	20	74	186
	31	85	23	88	185	79	21	79	184	70	18	68	181
	30	82	22	84	182	76	20	75	181	67	17	65	178
	28	77	20	76	177	71	18	68	176	62	16	59	172
	26	70	18	68	172	64	16	62	170	55	14	53	165
	25	67	17	65	169	61	15	59	167	52	13	51	162
	23	61	15	58	162	55	14	53	160	46	12	45	154
	20	51	13	49	152	45	12	44	148	36	10	37	141
2300	34	88	25	93	187	82	22	83	186	73	19	71	184
	33	86	23	89	185	80	21	80	184	71	18	68	182
	31	81	21	81	181	75	19	73	180	66	17	63	176
	29	75	20	74	176	69	18	67	175	60	15	58	171
	27	70	18	67	171	64	16	61	169	55	14	53	165
	26	67	17	64	168	61	15	58	166	52	13	50	161
	24	61	15	58	162	55	14	53	160	46	12	45	154
	21	51	13	50	152	45	12	45	149	36	10	38	142

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

EXAMPLE PROBLEM AND SOLUTION

Conditions

Cruise Altitude ..... 4000 feet
Temperature ..... -9°C
Manifold Pressure..... 33 inch Hg
RPM 2400

Determine

1. .....% of BHP
2. .....Fuel Consumption (GPH)
3. ..... True Airspeed

Solution

% of BHP 87%
Fuel Consumption ..... 24.5 GPH (92 LPH)
True Airspeed.....188 Knots*

*As a rule, always round to the more conservative number when using the various performance tables in this handbook.

Figure 5 - 17

CRUISE PERFORMANCE 6000 FT PRESSURE ALTITUDE

		-17°C (20°C Below Standard)				3°C (Standard Temperature)				33°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	26	97	193	85	23	87	192	76	20	75	190
	30	86	24	90	189	80	21	81	188	71	18	69	186
	29	83	23	85	187	77	20	77	186	68	17	66	183
	27	77	20	77	181	71	18	69	180	62	16	60	176
	25	71	18	69	175	65	16	62	173	56	14	54	169
	24	68	17	65	172	62	16	59	170	53	13	51	165
	22	61	15	58	165	55	14	53	163	46	12	45	157
	20	54	14	52	158	48	12	47	155	39	10	40	149
2400	33	90	26	97	192	84	23	87	192	75	20	74	190
	31	85	23	88	188	79	21	79	187	70	18	68	184
	30	82	22	84	186	76	20	75	185	67	17	65	182
	28	77	20	76	181	71	18	68	179	62	16	59	175
	26	70	18	68	175	64	16	62	173	55	14	53	169
	25	67	17	65	172	61	15	59	170	52	13	51	165
	23	61	15	58	165	55	14	53	163	46	12	45	157
	20	51	13	49	154	45	12	44	151	36	10	37	144
2300	34	88	25	93	191	82	22	83	190	73	19	71	187
	33	86	23	89	189	80	21	80	188	71	18	68	185
	31	81	21	81	184	75	19	73	183	66	17	63	180
	29	75	20	74	180	69	18	67	178	60	15	58	174
	27	70	18	67	174	64	16	61	172	55	14	53	168
	26	67	17	64	171	61	15	58	169	52	13	50	164
	24	61	15	58	165	55	14	53	163	46	12	45	157
	21	51	13	50	155	45	12	45	151	36	10	38	145

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

EXAMPLE PROBLEM AND SOLUTION

Conditions		Solution	
Cruise Altitude	6000 feet	% of BHP	49%
Temperature	33°C	Fuel Consumption	12.5 GPH (48.0 LPH)
Manifold Pressure	23 inch Hg	True Airspeed	161 Knots
RPM	2500		

Determine

1. % of BHP
2. Fuel Consumption (GPH)
3. True Airspeed

Figure 5 - 18

CRUISE PERFORMANCE 8000 FT PRESSURE ALTITUDE

		-21°C (20°C Below Standard)				-1°C (Standard Temperature)				29°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	27	101	200	85	24	90	199	76	20	77	196
	30	86	25	93	196	80	22	83	195	71	19	71	192
	29	83	23	88	193	77	21	79	192	68	18	68	189
	27	77	21	79	188	71	19	71	186	62	16	61	182
	25	71	19	71	181	65	17	64	179	56	14	55	174
	24	68	18	67	178	62	16	60	175	53	14	52	170
	22	61	16	60	171	55	14	54	168	46	12	46	162
	20	54	14	53	163	48	13	48	159	39	11	40	153
2400	33	90	26	100	200	84	24	90	199	75	20	77	196
	31	85	24	91	195	79	22	82	194	70	18	70	190
	30	82	23	86	192	76	21	78	191	67	18	66	187
	28	77	21	78	187	71	19	70	185	62	16	60	181
	26	70	19	70	181	64	17	63	178	55	14	54	174
	25	67	18	67	177	61	16	60	175	52	14	52	170
	23	61	16	60	171	55	14	54	168	46	12	46	162
	20	51	13	50	159	45	12	45	155	36	10	38	148
2300	34	88	25	96	197	82	23	86	197	73	19	73	194
	33	86	24	92	195	80	22	82	194	71	19	70	191
	31	81	22	84	191	75	20	75	189	66	17	65	185
	29	75	20	76	186	69	18	69	184	60	16	59	179
	27	70	18	69	180	64	17	63	178	55	14	54	173
	26	67	17	66	177	61	16	60	174	52	13	51	169
	24	61	16	60	170	55	14	54	167	46	12	46	162
	21	51	13	51	159	45	12	45	156	36	10	38	149

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

EXAMPLE PROBLEM AND SOLUTION

Conditions

Cruise Altitude ..... 8000 feet
Temperature ..... -2°C
Manifold Pressure..... 29 inch Hg
RPM 2500

Determine

1. .....% of BHP
2. .....Fuel Consumption (GPH)
3. ..... True Airspeed

Solution

% of BHP 86%*
Fuel Consumption ..... 25 GPH (93 LPH)
True Airspeed..... 196 Knots

*This power setting is above the maximum recommended cruise setting of 85% and does not represent a recommended mixture setting.

Figure 5 - 19

CRUISE PERFORMANCE 10000 FT PRESSURE ALTITUDE

		-25°C (20°C Below Standard)				-5°C (Standard Temperature)				25°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	27	101	205	85	24	90	204	76	20	77	200
	30	86	25	93	201	80	22	83	199	71	19	71	195
	29	83	23	88	198	77	21	79	196	68	18	68	192
	27	77	21	79	191	71	19	71	189	62	16	61	185
	25	71	19	71	185	65	17	64	182	56	14	55	178
	24	68	18	67	181	62	16	60	178	53	14	52	174
	22	61	16	60	174	55	14	54	171	46	12	46	166
	20	54	14	53	166	48	13	48	163	39	11	40	157
2400	33	90	26	100	205	84	24	90	203	75	20	77	200
	31	85	24	91	200	79	22	82	198	70	18	70	194
	30	82	23	86	197	76	21	78	195	67	18	66	191
	28	77	21	78	191	71	19	70	188	62	16	60	184
	26	70	19	70	184	64	17	63	182	55	14	54	177
	25	67	18	67	181	61	16	60	178	52	14	52	174
	23	61	16	60	174	55	14	54	171	46	12	46	166
	20	51	13	50	162	45	12	45	159	36	10	38	154
2300	34	88	25	96	203	82	23	86	201	73	19	73	197
	33	86	24	92	200	80	22	82	198	71	19	70	195
	31	81	22	84	195	75	20	75	193	66	17	65	189
	29	75	20	76	189	69	18	69	187	60	16	59	183
	27	70	18	69	183	64	17	63	181	55	14	54	176
	26	67	17	66	180	61	16	60	178	52	13	51	173
	24	61	16	60	173	55	14	54	171	46	12	46	166
	21	51	13	51	163	45	12	45	159	36	10	38	154

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

EXAMPLE PROBLEM AND SOLUTION

Conditions

Cruise Altitude ..... 9000 feet
Temperature ..... -9°C
Manifold Pressure ..... 29 inch Hg
RPM 2500

Determine

1. ..... % of BHP
2. ..... Fuel Consumption (GPH)
3. ..... True Airspeed

Solution

% of BHP 77%
Fuel Consumption ..... 21 GPH (79 LPH)
True Airspeed ..... 194 Knots

Figure 5 - 20

CRUISE PERFORMANCE 12000 FT PRESSURE ALTITUDE

		-29°C (20°C Below Standard)				-9°C (Standard Temperature)				21°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	27	101	209	85	24	90	207	76	20	77	204
	30	86	25	93	204	80	22	83	203	71	19	71	199
	29	83	23	88	201	77	21	79	199	68	18	68	196
	27	77	21	79	195	71	19	71	193	62	16	61	189
	25	71	19	71	188	65	17	64	186	56	14	55	181
	24	68	18	67	184	62	16	60	182	53	14	52	178
	22	61	16	60	177	55	14	54	174	46	12	46	170
	20	54	14	53	169	48	13	48	166	39	11	40	161
2400	33	90	26	100	209	84	24	90	207	75	20	77	204
	31	85	24	91	203	79	22	82	201	70	18	70	198
	30	82	23	86	200	76	21	78	198	67	18	66	195
	28	77	21	78	194	71	19	70	192	62	16	60	188
	26	70	19	70	187	64	17	63	185	55	14	54	181
	25	67	18	67	184	61	16	60	182	52	14	52	177
	23	61	16	60	177	55	14	54	174	46	12	46	170
	20	51	13	50	165	45	12	45	162	36	10	38	157
2300	34	88	25	96	206	82	23	86	204	73	19	73	201
	33	86	24	92	204	80	22	82	202	71	19	70	198
	31	81	22	84	198	75	20	75	196	66	17	65	193
	29	75	20	76	193	69	18	69	191	60	16	59	187
	27	70	18	69	187	64	17	63	184	55	14	54	180
	26	67	17	66	183	61	16	60	181	52	13	51	177
	24	61	16	60	177	55	14	54	174	46	12	46	169
	21	51	13	51	166	45	12	45	163	36	10	38	158

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

EXAMPLE PROBLEM AND SOLUTION

Conditions

Cruise Altitude ..... 12000 feet
Temperature ..... -9°C
Manifold Pressure..... 26 inch Hg
RPM 2300

Determine

1. .....% of BHP
2. .....Fuel Consumption (GPH)
3. ..... True Airspeed

Solution

% of BHP 61%
Fuel Consumption ..... 16 GPH (60 LPH)
True Airspeed.....181 Knots

Figure 5 - 21

CRUISE PERFORMANCE 14000 FT PRESSURE ALTITUDE

		-33°C (20°C Below Standard)				-13°C (Standard Temperature)				17°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	27	101	211	85	24	91	212	76	21	78	210
	30	86	25	94	208	80	22	85	208	71	19	72	205
	29	83	24	89	205	77	21	80	205	68	18	69	202
	27	77	21	80	199	71	19	72	198	62	16	62	194
	25	71	19	72	193	65	17	65	191	56	15	55	186
	24	68	18	68	190	62	16	61	187	53	14	52	181
	22	61	16	60	182	55	14	54	179	46	12	46	172
	20	54	14	53	173	48	13	48	169	39	10	40	161
2400	33	90	27	101	211	84	24	91	211	75	21	78	210
	31	85	24	92	206	79	22	83	206	70	19	71	204
	30	82	23	87	204	76	21	79	204	67	18	67	200
	28	77	21	79	199	71	19	71	197	62	16	61	193
	26	70	19	71	193	64	17	64	191	55	14	55	185
	25	67	18	68	189	61	16	61	187	52	14	52	181
	23	61	16	60	182	55	14	54	179	46	12	46	172
	20	51	13	50	169	45	12	45	165	36	10	37	156
2300	34	88	25	96	209	82	23	87	209	73	20	75	207
	33	86	24	93	207	80	22	84	207	71	19	72	204
	31	81	22	85	203	75	20	77	202	66	17	66	198
	29	75	20	78	198	69	18	70	196	60	16	60	192
	27	70	19	70	192	64	17	63	190	55	14	54	184
	26	67	18	67	189	61	16	60	186	52	14	51	180
	24	61	16	60	182	55	14	54	178	46	12	46	171
	21	51	13	51	170	45	12	45	165	36	10	37	157

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

Figure 5 - 22

CRUISE PERFORMANCE 16000 FT PRESSURE ALTITUDE

		-37°C (20°C Below Standard)				-17°C (Standard Temperature)				13°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	27	101	216	85	24	91	216	76	21	78	215
	30	86	25	94	212	80	22	85	212	71	19	72	210
	29	83	24	89	210	77	21	80	209	68	18	69	207
	27	77	21	80	204	71	19	72	203	62	16	62	200
	25	71	19	72	198	65	17	65	196	56	15	55	192
	24	68	18	68	194	62	16	61	192	53	14	52	188
	22	61	16	60	187	55	14	54	184	46	12	46	178
	20	54	14	53	178	48	13	48	175	39	10	40	168
2400	33	90	27	101	215	84	24	91	216	75	21	78	215
	31	85	24	92	211	79	22	83	211	70	19	71	209
	30	82	23	87	209	76	21	79	208	67	18	67	206
	28	77	21	79	203	71	19	71	202	62	16	61	199
	26	70	19	71	197	64	17	64	196	55	14	55	191
	25	67	18	68	194	61	16	61	192	52	14	52	187
	23	61	16	60	187	55	14	54	184	46	12	46	178
	20	51	13	50	174	45	12	45	171	36	10	37	164
2300	34	88	25	96	213	82	23	87	214	73	20	75	212
	33	86	24	93	212	80	22	84	212	71	19	72	210
	31	81	22	85	207	75	20	77	207	66	17	66	204
	29	75	20	78	202	69	18	70	201	60	16	60	197
	27	70	19	70	196	64	17	63	195	55	14	54	190
	26	67	18	67	193	61	16	60	191	52	14	51	186
	24	61	16	60	187	55	14	54	184	46	12	46	178
	21	51	13	51	175	45	12	45	171	36	10	37	164

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

Figure 5 - 23

CRUISE PERFORMANCE 18000 FT PRESSURE ALTITUDE

		-41°C (20°C Below Standard)				-21°C (Standard Temperature)				9°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	27	102	217	85	25	95	219	76	21	79	220
	30	86	25	95	214	80	23	87	216	71	20	76	216
	29	83	24	91	212	77	22	83	213	68	19	72	213
	27	77	22	83	207	71	20	76	208	62	17	64	207
	25	71	19	72	201	65	18	68	202	56	15	57	200
	24	68	18	68	198	62	17	64	198	53	15	57	196
	22	61	17	64	192	55	15	57	191	46	13	49	189
	20	54	15	57	185	48	14	53	184	39	12	45	180
2400	33	90	27	102	217	84	24	91	219	75	21	79	220
	31	85	25	95	213	79	22	83	214	70	19	72	215
	30	82	24	91	211	76	21	79	212	67	18	68	212
	28	77	21	79	206	71	19	72	207	62	17	64	206
	26	70	19	72	201	64	18	68	201	55	15	57	199
	25	67	18	68	198	61	17	64	198	52	15	57	196
	23	61	17	64	192	55	15	57	191	46	13	49	189
	20	51	14	53	182	45	13	49	180	36	11	42	176
2300	34	88	26	98	215	82	23	87	217	73	20	76	217
	33	86	25	95	214	80	22	83	215	71	19	72	215
	31	81	23	87	210	75	21	79	211	66	18	68	210
	29	75	21	79	205	69	19	72	206	60	16	61	205
	27	70	19	72	200	64	17	64	200	55	15	57	199
	26	67	18	68	198	61	17	64	197	52	14	53	195
	24	61	17	64	192	55	15	57	191	46	13	49	188
	21	51	14	53	182	45	13	49	180	36	11	42	177

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

Figure 5 - 24

CRUISE PERFORMANCE 20000 FT PRESSURE ALTITUDE

		-45°C (20°C Below Standard)				-25°C (Standard Temperature)				5°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	27	103	221	85	25	93	222	76	21	80	223
	30	86	25	96	217	80	23	86	219	71	20	74	219
	29	83	24	91	215	77	22	82	216	68	19	71	216
	27	77	22	82	210	71	20	74	211	62	17	64	210
	25	71	19	74	204	65	18	67	205	56	15	58	204
	24	68	18	70	201	62	17	64	201	53	15	55	201
	22	61	17	63	195	55	15	57	195	46	13	49	194
	20	54	15	56	188	48	14	51	188	39	12	44	186
2400	33	90	27	103	221	84	24	92	222	75	21	79	223
	31	85	25	93	216	79	22	84	218	70	19	73	218
	30	82	24	89	214	76	21	80	215	67	18	69	215
	28	77	21	81	209	71	19	73	210	62	17	63	210
	26	70	19	73	204	64	18	66	204	55	15	58	204
	25	67	18	70	201	61	17	63	201	52	15	55	200
	23	61	17	63	195	55	15	57	195	46	13	49	194
	20	51	14	54	185	45	13	49	184	36	11	41	182
2300	34	88	26	98	219	82	23	89	220	73	20	76	221
	33	86	25	94	217	80	22	85	218	71	19	73	218
	31	81	23	86	213	75	21	78	214	66	18	68	214
	29	75	21	79	208	69	19	72	209	60	16	62	208
	27	70	19	72	203	64	17	66	203	55	15	57	203
	26	67	18	69	201	61	17	63	201	52	14	54	200
	24	61	17	63	195	55	15	57	195	46	13	49	193
	21	51	14	54	185	45	13	49	185	36	11	41	183

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

Figure 5 - 25

CRUISE PERFORMANCE 22000 FT PRESSURE ALTITUDE

		-49°C (20°C Below Standard)				-29°C (Standard Temperature)				1°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	27	103	226	85	25	93	228	76	21	80	229
	30	86	25	96	222	80	23	86	224	71	20	74	225
	29	83	24	91	220	77	22	82	221	68	19	71	222
	27	77	22	82	215	71	20	74	216	62	17	64	216
	25	71	19	74	209	65	18	67	210	56	15	58	209
	24	68	18	70	206	62	17	64	206	53	15	55	206
	22	61	17	63	200	55	15	57	200	46	13	49	199
	20	54	15	56	193	48	14	51	193	39	12	44	191
2400	33	90	27	103	226	84	24	92	227	75	21	79	228
	31	85	25	93	221	79	22	84	223	70	19	73	223
	30	82	24	89	219	76	21	80	220	67	18	69	221
	28	77	21	81	214	71	19	73	215	62	17	63	215
	26	70	19	73	209	64	18	66	209	55	15	58	209
	25	67	18	70	206	61	17	63	206	52	15	55	206
	23	61	17	63	200	55	15	57	200	46	13	49	199
	20	51	14	54	190	45	13	49	189	36	11	41	188
2300	34	88	26	98	224	82	23	89	225	73	20	76	226
	33	86	25	94	222	80	22	85	223	71	19	73	224
	31	81	23	86	218	75	21	78	219	66	18	68	219
	29	75	21	79	213	69	19	72	214	60	16	62	214
	27	70	19	72	208	64	17	66	208	55	15	57	208
	26	67	18	69	205	61	17	63	206	52	14	54	205
	24	61	17	63	199	55	15	57	200	46	13	49	199
	21	51	14	54	190	45	13	49	190	36	11	41	188

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

Figure 5 - 26

CRUISE PERFORMANCE 24000 FT PRESSURE ALTITUDE

		-53°C (20°C Below Standard)				-33°C (Standard Temperature)				-3°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	27	103	228	85	25	93	232	76	21	80	235
	30	86	25	96	225	80	23	86	229	71	20	74	231
	29	83	24	91	223	77	22	82	226	68	19	71	228
	27	77	22	82	219	71	20	74	221	62	17	64	222
	25	71	19	74	214	65	18	67	216	56	15	58	215
	24	68	18	70	211	62	17	64	212	53	15	55	212
	22	61	17	63	205	55	15	57	206	46	13	49	204
	20	54	15	56	198	48	14	51	198	39	12	44	195
2400	33	90	27	103	228	84	24	92	232	75	21	79	235
	31	85	25	93	224	79	22	84	228	70	19	73	230
	30	82	24	89	223	76	21	80	226	67	18	69	227
	28	77	21	81	219	71	19	73	221	62	17	63	221
	26	70	19	73	214	64	18	66	215	55	15	58	215
	25	67	18	70	211	61	17	63	212	52	15	55	211
	23	61	17	63	205	55	15	57	206	46	13	49	204
	20	51	14	54	195	45	13	49	194	36	11	41	190
2300	34	88	26	98	226	82	23	89	230	73	20	76	233
	33	86	25	94	225	80	22	85	228	71	19	73	230
	31	81	23	86	222	75	21	78	224	66	18	68	226
	29	75	21	79	218	69	19	72	220	60	16	62	220
	27	70	19	72	213	64	17	66	215	55	15	57	214
	26	67	18	69	211	61	17	63	212	52	14	54	211
	24	61	17	63	205	55	15	57	205	46	13	49	203
	21	51	14	54	195	45	13	49	194	36	11	41	191

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

Figure 5 - 27

CRUISE PERFORMANCE 25000 FT PRESSURE ALTITUDE

		-55°C (20°C Below Standard)				-35°C (Standard Temperature)				-5°C (30°C Above Standard)			
RPM	MP	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS	% BHP	GPH	LPH	KTAS
2500	31.5	91	27	103	231	85	25	93	235	76	21	80	238
	30	86	25	96	228	80	23	86	232	71	20	74	234
	29	83	24	91	226	77	22	82	229	68	19	71	231
	27	77	22	82	222	71	20	74	224	62	17	64	225
	25	71	19	74	217	65	18	67	218	56	15	58	218
	24	68	18	70	214	62	17	64	215	53	15	55	214
	22	61	17	63	208	55	15	57	208	46	13	49	206
	20	54	15	56	201	48	14	51	200	39	12	44	197
2400	33	90	27	103	231	84	24	92	235	75	21	79	238
	31	85	25	93	227	79	22	84	231	70	19	73	233
	30	82	24	89	226	76	21	80	228	67	18	69	230
	28	77	21	81	221	71	19	73	224	62	17	63	224
	26	70	19	73	217	64	18	66	218	55	15	58	218
	25	67	18	70	214	61	17	63	215	52	15	55	214
	23	61	17	63	208	55	15	57	208	46	13	49	206
	20	51	14	54	197	45	13	49	196	36	11	41	193
2300	34	88	26	98	229	82	23	89	233	73	20	76	236
	33	86	25	94	228	80	22	85	231	71	19	73	233
	31	81	23	86	224	75	21	78	227	66	18	68	228
	29	75	21	79	221	69	19	72	222	60	16	62	223
	27	70	19	72	216	64	17	66	217	55	15	57	217
	26	67	18	69	213	61	17	63	214	52	14	54	213
	24	61	17	63	208	55	15	57	208	46	13	49	206
	21	51	14	54	198	45	13	49	197	36	11	41	194

3600 lbs. (1633 kg) Gross Weight
Recommended Mixture Setting. Data in these charts are based on this leaning schedule discussed on page 4-30.
Best Power

Figure 5 - 28

LEAN OF PEAK ENGINE OPERATION

The TSIO-550C engine can be operated lean of peak at lower power settings. At higher power settings the TIT limit could be exceeded during the leaning process, in general leaning past peak TIT is only possible below about 65% power (varies with ambient conditions). The Avidyne MFD will not show a reduction in % power during the leaning process even though it changes. Starting from full rich, the power increases about 1% as "Best Power" mixture is reached. For cruise operation, best power is at or near 1650ºF TIT rich of peak. If the mixture is leaned further past peak EGT (TIT), the power drops 8-12%. "Best Economy" is reached at about 50ºF lean of peak. Because of the drop in power, speed will be reduced even though the MFD will show the same % power. Once a lean of peak mixture setting is reached, the rpm and manifold pressure can be increased carefully. By increasing the manifold pressure while operating lean of peak (do not exceed 29 in.Hg), the power loss from leaning can be compensated. For continuous operation, TIT should be at or below 1650ºF. Figure 5 - 30 below shows a comparison of fuel flows for best power and best economy and is valid for one rpm (about 2400 rpm). At higher rpm the fuel flow is slightly higher or slightly lower at lower rpm respectively. The power setting in Figure 5 - 30 is actual power and not the MFD indication in the case of the lean of peak curve.

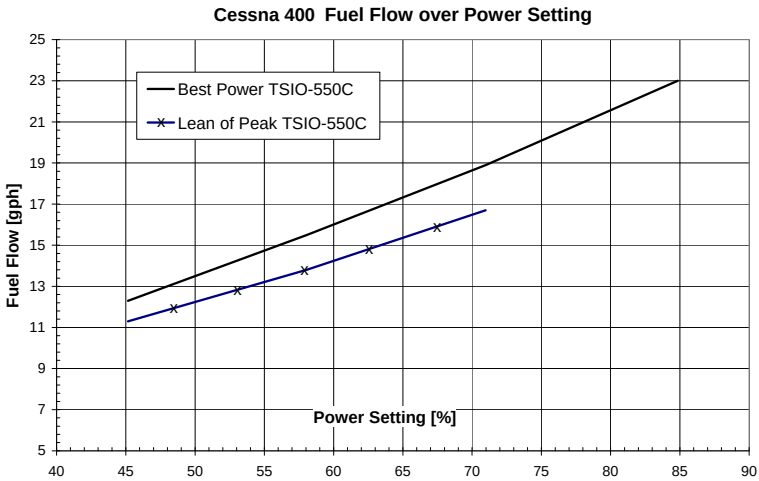

Figure 5 - 29