SECTION VII
OPTIONAL SYSTEMS

This section contains a description, operating procedures, and performance data (when applicable) for some of the optional equipment which may be installed in your Cessna Model 310. Contact your Cessna Dealer for a complete list of available Cessna Model 310 Optional Equipment.

AUXILIARY FUEL SYSTEM

Auxiliary tanks (20 gal. usable each wing) are installed in each wing just outboard of each engine nacelle and feed directly to the fuel selector valves. Fuel vapor and excess fuel from the engines are returned to the main fuel tanks.

When the selector valve handles are in the "AUXILIARY" position, the left auxiliary tank feeds the left engine and the right auxiliary tank feeds the right engine. If the auxiliary tanks are to be used, select fuel from the main tanks for 60 minutes prior to switching to auxiliary tanks. This is necessary to provide space in the main tanks for vapor and fuel returned from the engine-driven fuel pumps when operating on auxiliary tanks. If sufficient space is not available in the main tanks for this diverted fuel, the tanks may overflow through the vent line. Since part of the fuel from the auxiliary tanks is diverted back to the main tanks instead of being consumed by the engines these tanks will run dry sooner than may be anticipated. However, the main tank endurance will be increased by the returned fuel. Since the auxiliary fuel tanks are designed for cruising flight, they are not equipped with pumps and operation near the ground (below 1000 feet) using auxiliary fuel tanks is not recommended because of this limitation.

OXYGEN SYSTEM

The oxygen system is designed to provide adequate oxygen flow rates for altitudes up to 30, 000 feet. The system is calibrated for two different altitude ranges, which are: 14, 000 to 22, 000 feet and 22, 000 to 30, 000 feet. Selection of the desired altitude range is accomplished by appropriate selection of color coded hose assemblies. See figure 7-1 for oxygen consumption.

NOTE

The pilot should always select the red hose assembly.

OXYGEN SYSTEM OPERATION

BEFORE FLIGHT:

(1) Oxygen Knob -- PULL ON.
(2) Oxygen Pressure Gauge -- Check for sufficient pressure for anticipated requirements of flight. (See figure 7-1.)
(3) Check that oxygen masks and hose assemblies are available.

ALTITUDE-OXYGEN CONSUMPTION RATE CHART

RANGE-FEET ALTITUDE	14000 22000	22000 30000
HOSE ASSEMBLY COLOR	ORANGE	RED
CONSUMPTION PSI/HOUR	197	308

OXYGEN DURATION CALCULATION:

Total Oxygen Duration (Hours) = 1800 ÷ oxygen consumption (PSI/HR) x number of passengers + pilot consumption rate.

EXAMPLE:

1. Planned Flight - Pilot and three passengers at 15, 000 feet.
2. From Chart - At 15, 000 feet passenger flow rate is 197 PSI/HR and the pilot's flow rate is 308 PSI/HR.
3. Oxygen Duration = 1800 ÷ (3 x 197 + 308) = 2. 0 hours.

Figure 7-1

DURING FLIGHT:

WARNING

Permit no smoking when using oxygen. Oil, grease, soap, lipstick, lip balm, and other fatty materials constitute a serious fire hazard when in contact with oxygen. Be sure hands and clothing are oil-free before handling oxygen equipment.

(1) Hose Assembly -- Select proper hose assembly for altitude.
(2) Mask -- Connect mask and hose assembly and put mask on.
(3) Hose Coupling -- Plug into console.
(4) Oxygen Flow Indication -- Check flow. (Ball toward mask indicates proper flow.)
(5) Disconnect hose coupling from console when not in use.

OXYGEN SYSTEM SERVICING

The oxygen cylinder, when fully charged, contains approximately 48.3 cubic feet of oxygen, under a pressure of 1800 psi at 70° F. Filling pressures will vary, however, due to the ambient temperature in the filling area, and because of the temperature rise resulting from compression of the oxygen. Because of this, merely filling to 1800 psi will not result in a properly filled cylinder. Fill to the pressures indicated in figure 7-2 for the ambient temperature.

AMBIENT TEMPERATURE °F	FILLING PRESSURE PSIG	AMBIENT TEMPERATURE °F	FILLING PRESSURE PSIG
0	1600	70	1925
10	1650	80	1950
20	1675	90	2000
30	1725	100	2050
40	1775	110	2100
50	1825	120	2150
60	1875	130	2200

Example - If ambient temperature is 70° F, fill oxygen cylinder to approximately 1925 psi - as close to this pressure as the gauge may be read. Upon cooling, cylinder should have approximately 1800 psi pressure.

Figure 7-2

IMPORTANT

Oil, grease, or other lubricants in contact with oxygen create a serious fire hazard, and such contact must be avoided when handling oxygen equipment.

The cylinder is serviced through an external filler valve located just above the aft end of the nosewheel doors. The Servicing Requirements table, located on the inside back cover of the manual, lists the correct type of oxygen for refilling the cylinder.

The face masks used with the oxygen system are the partial-rebreathing type. The pilot's mask is a permanent type mask, while the remainder are the disposable type. A frequent user can mark and reuse his disposable type mask many times. Additional masks and hoses are available from your Cessna Dealer.

COLD WEATHER EQUIPMENT

OIL DILUTION SYSTEM

If your airplane is equipped with an optional oil dilution system and very low temperatures are expected, dilute oil in each engine before stopping the engines. With the engines operating at 1000 RPM and the auxiliary fuel pumps in the ON position, hold the oil dilution switch to the L or R position. Refer to figure 7-3, Oil Dilution Table.

While diluting the engine oil, watch the oil pressure for any fluctuations that might indicate a filter or screen being clogged with sludge washed down by the fuel.

NOTE

On the first operation of the oil dilution system each season, use the full dilution period, drain the oil in each engine, change the filters or clean the screens, refill with new oil and redilute as required.

If the full dilution time was used, beginning with a full oil sump (12 quarts), subsequent starts and engine warm-up should be prolonged to evaporate enough of the fuel to lower the oil sump level to 12 quarts prior to takeoff. Otherwise, the sumps may overflow when the airplane is nosed-up for climb.

To avoid progressive dilution of the oil, flights of at least one hour's duration should be made between oil dilution operations.

OIL DILUTION TABLE			
	TEMPERATURE		
	0° F	-10° F	-20° F
Dilution Time	20 sec.	50 sec.	80 sec.
Fuel Added	1 qt.	2.5 qt.	4 qt.
MAXIMUM SUMP CAPACITY——— 16 qt.			
MAXIMUM FOR TAKEOFF——— 12 qt.			

Figure 7-3

PROPELLER DEICE SYSTEM

The propeller deice system consists of electrically heated boots on the propeller blades. Each boot consists of two heating elements "Outboard" and "Inboard", which receive their electrical power through a deice timer. To reduce power drain and maintain propeller balance, the timer directs current to the propeller boots in cycles between boot elements and between propellers.

NORMAL OPERATION

To operate the propeller deice system proceed as follows:

(1) Battery Switch -- ON.
(2) Propeller Deice Circuit Breaker -- Check in.
(3) Propeller Deice Switch -- ON (up position).
(4) Ammeter -- Check.

NOTE

Periodic fluctuation (7 to 12 Amps.) of the propeller deice ammeter pointer indicates normal operation of the deicing elements of first one propeller and then the other.

NOTE

To check all the heating elements of both propellers and the deice timer for normal operation, the system must be left ON for approximately two to two and one-half minutes.

The timer directs current to the propeller boots in cycles between boot elements and between propellers in the following cycling sequence:

Heating Period No. 1 - Outboard halves - right engine blades.
Heating Period No. 2 - Inboard halves - right engine blades.
Heating Period No. 3 - Outboard halves - left engine blades.
Heating Period No. 4 - Inboard halves - left engine blades.

Each heating period lasts for approximately one-half minute.

EMERGENCY OPERATION

Abnormal operation of the propeller deice system is indicated by the circuit breaker on the circuit breaker panel opening the circuit. Failure of the circuit breaker to stay reset indicates that deicing is impossible for the propellers.

A reading below 7 amperes on the propeller deice ammeter indicates that the blades of the propeller are not being deiced uniformly.

WARNING

When uneven deicing of the propeller blades is indicated, it is imperative that the deicing system be turned OFF. Uneven deicing of the blades can result in propeller unbalance and engine failure.

DEICING SYSTEM

OPERATING CHECKLIST

BEFORE ENTERING AIRPLANE:

(1) During the exterior inspection, check the boots for tears, abrasions, and cleanliness. Have boots cleaned and any major damage repaired before takeoff.

DURING ENGINE RUNUP:

(1) Position deicer switch to ACTUATE and check inflation and deflation cycle. The pressure indicator light (green in color) should light when the system reaches 10 PSI. The system may be recycled as soon as the light goes OFF, or as required.

NOTE

The deicer system is manually controlled. Every time a deicing cycle is desired, the switch must be positioned to ACTUATE. The switch will instantly spring back to OFF, but a 6 second delay action in the timing relay will complete the deicing inflation cycle.

(2) Check boots visually for complete deflation to the vacuum hold-down position.

NOTE

Complete inflation and deflation cycle will last approximately 30 seconds.

IN FLIGHT

(1) When ice has accumulated to approximately 1/2 inch thick on the leading edges, position deicer switch to ACTUATE.

AFTER LANDING

(1) Check boots for damage and cleanliness. Remove any accumulations of engine oil or grease.

OPERATING DETAILS

Cycling the deice boots produces no adverse aerodynamic effects in any attitude within the allowable flight limitations.

Deice boots are intended to remove ice after it has accumulated rather than preventing its formation. If the rate of ice accumulation is slow, best results can be obtained by leaving the deice system OFF until 1/4 to 3/4 inch of ice has accumulated. After clearing this accumulation with one or two cycles of operation, the system should remain OFF until a significant quantity of ice has again accumulated. Rapid cycling of the

system is not recommended, as this may cause the ice to grow outside the contour of the inflated boots, preventing its removal.

NOTE

Since wing and horizontal stabilizer deicer boots alone do not provide adequate protection for the entire airplane, known icing conditions should be avoided whenever possible. If icing is encountered, close attention should be given to the pitot-static system, propellers, induction systems, and other components subject to icing.

The deice system will operate satisfactorily on either or both engines. During single-engine operation, suction to the gyros will drop momentarily during the boot inflation cycle.

DEICER BOOT CARE

Deicer boots have a special, electrically-conductive coating to bleed off static charges which cause radio interference and may perforate the boots. Fueling and other servicing operations should be done carefully, to avoid damaging this conductive coat or tearing the boots.

Keep the boots clean and free from oil and grease, which swell the rubber. Wash the boots with mild soap and water, using benzol or unleaded gasoline, if necessary, to remove stubborn grease. Do not scrub the boots and be sure to wipe off all solvent before it dries.

Small tears and abrasions can be repaired temporarily without removing the boots and the conductive coating can be renewed. Your Cessna Dealer has the proper materials and know-how to do this correctly.

PROPELLER SYNCHRONIZER

The Cessna Propeller Synchronizer matches propeller RPM of the two engines on the airplane. The propeller RPM of the slave (right) engine will follow changes in RPM of the master (left) engine over a limited range. This limited range feature prevents the slave engine losing more than a fixed amount of propeller RPM in case the master engine is feathered with the synchronizer on. The synchronizer switch in the OFF position will automatically actuate the synchronizer to the center of its range before stopping, to insure that the control will function normally when next turned on. The system indicator light should light when the synchronizer switch is in the ON position.

NOTE

- Manually synchronize the RPM of the engines prior to switching the propeller synchronizer system ON.

- The propeller synchronizer must be switched OFF during takeoff, landing and single-engine operation.

ECONOMY MIXTURE INDICATOR

The Cessna Economy Mixture Indicator is an exhaust gas temperature sensing device which is used to aid the pilot in selecting the most desirable fuel-air mixture for cruising flight at less than 75% power. Exhaust gas temperature (EGT) varies with the ratio of fuel-to-air mixture entering the engine cylinders.

OPERATING INSTRUCTIONS

(1) In takeoff and full power climb, lean mixture as indicated by altitude markings on the fuel flow indicator.

NOTE

Leaning in accordance with altitude markings on the fuel flow indicator will provide sufficiently rich mixture for engine cooling. Leaner mixtures are not recommended for climb power settings in excess of 75%.

(2) In level flight (or cruising climb at less than 75% power), lean the mixture to peak EGT, then enrichen as desired using figure 7-4 as a guide.

NOTE

- Changes in altitude or power setting require the EGT to be rechecked and the mixture reset.

- Operation at peak EGT is not authorized for normal continuous operation, except to establish peak EGT for reference. Operation within 25° of peak EGT is not approved.

(3) Use rich mixture (or mixture appropriate for field elevation) in idle descents or landing approaches. Leaning technique for cruise descents may be with EGT reference method (at least every 5000 feet) or by simply enriching to avoid engine roughness, if numerous power reductions are made.

MIXTURE DESCRIPTION	EGT	TAS LOSS FROM BEST POWER	RANGE INCREASE FROM BEST POWER
BEST POWER (Maximum Speed)	Peak Minus 75° (enrichen)	0 MPH	0%
NORMAL LEAN (Owner's Manual & Computer Performance)	Peak Minus 25° (enrichen)	2 MPH	10%

Figure 7-4

310L ALPHABETICAL INDEX

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WARRANTY

The Cessna Aircraft Company (Cessna) warrants each new aircraft manufactured by it, including factory installed equipment and accessories, and warrants all new aircraft equipment and accessories bearing the name "Cessna," to be free from defects in material and workmanship under normal use and service. Cessna's obligation under this warranty is limited to supplying a part or parts to replace any part or parts which, within six (6) months after delivery of such aircraft or such aircraft equipment or accessories to the original retail purchaser or first user, shall be returned transportation charges prepaid to Cessna at Wichita, Kansas, or such other place as Cessna may designate and which upon examination shall disclose to Cessna's satisfaction to have been thus defective.

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SERVICING REQUIREMENTS

FUEL:

AVIATION GRADE -- 100/130 MINIMUM
CAPACITY EACH MAIN TANK -- 51 GALLONS
CAPACITY EACH AUXILIARY TANK -- 20.5 GALLONS

ENGINE OIL:

AVIATION GRADE -- SAE 30 BELOW 40° F
SAE 50 ABOVE 40° F

(MULTI-VISCOSITY OIL WITH A RANGE OF SAE 10W30 IS RECOMMENDED FOR IMPROVED STARTING IN COLD WEATHER. DETERGENT OR DISPERSANT OIL CONFORMING TO CONTINENTAL MOTORS SPECIFICATION MHS-24A IS RECOMMENDED, BUT STRAIGHT MINERAL OIL MAY BE USED. THE AIRCRAFT IS DELIVERED FROM THE FACTORY WITH STRAIGHT MINERAL OIL.)

CAPACITY EACH ENGINE SUMP -- 12 QUARTS

(DO NOT OPERATE ON LESS THAN 9 QUARTS, FILL TO 10 QUART LEVEL FOR NORMAL FLIGHTS OF LESS THAN 3 HOURS, AND FILL TO CAPACITY IF EXTENDED FLIGHT IS PLANNED. IF OPTIONAL OIL FILTER IS INSTALLED, ONE ADDITIONAL QUART IS REQUIRED WHEN THE FILTER ELEMENT IS CHANGED.)

OPTIONAL OIL FILTER ELEMENT -- CESSNA C294505-0102

HYDRAULIC FLUID: MIL-H-5606 HYDRAULIC FLUID (RED)

OXYGEN:

AVIATOR'S BREATHING OXYGEN -- MIL-O-27210
MAXIMUM PRESSURE -- 1800 PSI (EXCEPT WHEN FILLING)

TIRE PRESSURE:

MAIN WHEELS -- 60 PSI
NOSE WHEEL -- 24 PSI

VACUUM AIR FILTER:

ELEMENT -- C294501-0103

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