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1970

WORLD'S LARGEST PRODUCER OF GENERAL AVIATION AIRCRAFT SINCE 1956

CENTURION

OWNER'S MANUAL

PERFORMANCE - SPECIFICATIONS

	Centurion*	
GROSS WEIGHT	3800 lbs	3400 lbs
SPEED, BEST POWER MIXTURE:		
Top Speed at Sea Level	200 mph	200 mph
Cruise, 75% Power at 7500 ft	188 mph	190 mph
RANGE, NORMAL LEAN MIXTURE:		
Cruise, 75% Power at 7500 ft	765 mi	775 mi
64 Gallons, No Reserve	4.1 hrs	4.1 hrs
	187 mph	189 mph
Cruise, 75% Power at 7500 ft	1065 mi	1080 mi
89 Gallons, No Reserve	5.7 hrs	5.7 hrs
	187 mph	189 mph
Optimum Range at 10,000 ft	900 mi	980 mi
64 Gallons, No Reserve	5.8 hrs	6.7 hrs
	154 mph	146 mph
Optimum Range at 10,000 ft	1250 mi	1360 mi
89 Gallons, No Reserve	8.1 hrs	9.3 hrs
	154 mph	146 mph
RATE OF CLIMB AT SEA LEVEL	860 fpm	1025 fpm
SERVICE CEILING	15,500 ft	18,000 ft
TAKE-OFF:		
Ground Run	1100 ft.	850 ft
Total Distance Over 50-Foot Obstacle	1900 ft	1505 ft
LANDING:		
Ground Roll	765 ft	765 ft
Total Distance Over 50-Foot Obstacle	1500 ft	1500 ft
STALL SPEED:		
Flaps Up, Power Off	75 mph	72 mph
Flaps Down, Power Off	65 mph	62 mph
EMPTY WEIGHT (Approximate)	2080 lbs	2080 lbs
USEFUL LOAD	1720 lbs	1320 lbs
WING LOADING: Pounds/Sq Foot	21.6	19.3
POWER LOADING: Pounds/HP	12.7	11.3
FUEL CAPACITY: Total	90 gal.	90 gal.
OIL CAPACITY: Total	10 qts	10 qts
PROPELLER: 2 Bladed Constant Speed (Diameter)	82 inches	82 inches
ENGINE:		
Continental Fuel Injection Engine	IO-520-L	IO-520-L
300 rated BHP at 2850 RPM (5 Minute Take-Off Rating)		
285 rated BHP at 2700 RPM (Maximum Continuous Rating)		

Performance with a 3-bladed propeller is essentially the same as above.

*This manual covers operation of the Centurion which is certificated as Model 210K under FAA Type Certificate No. 3A21.

CONGRATULATIONS . . . . . .

Welcome to the ranks of Cessna Owners! Your Cessna has been designed and constructed to give you the most in performance, economy, and comfort. It is our desire that you will find flying it, either for business or pleasure, a pleasant and profitable experience.

This Owner's Manual has been prepared as a guide to help you get the most pleasure and utility from your CENTURION. It contains information about your Cessna's equipment, operating procedures, and performance; and suggestions for its servicing and care. We urge you to read it from cover to cover, and to refer to it frequently.

Our interest in your flying pleasure has not ceased with your purchase of a Cessna. World-wide, the Cessna Dealer Organization backed by the Cessna Service Department stands ready to serve you. The following services are offered by most Cessna Dealers:

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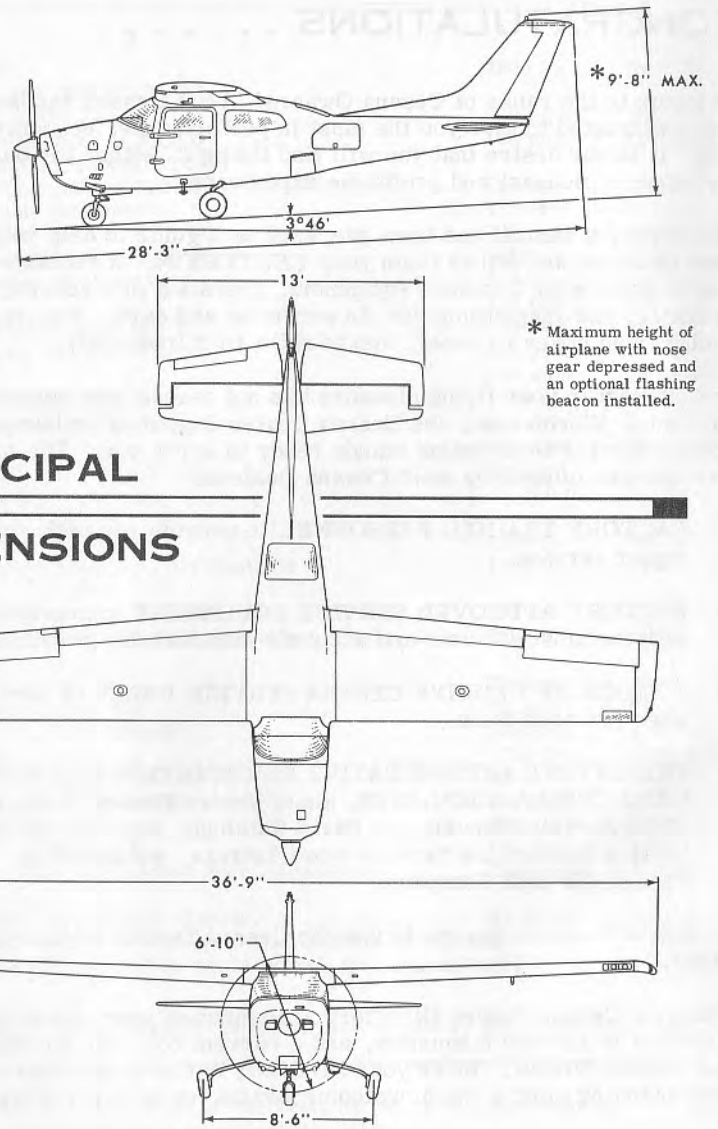
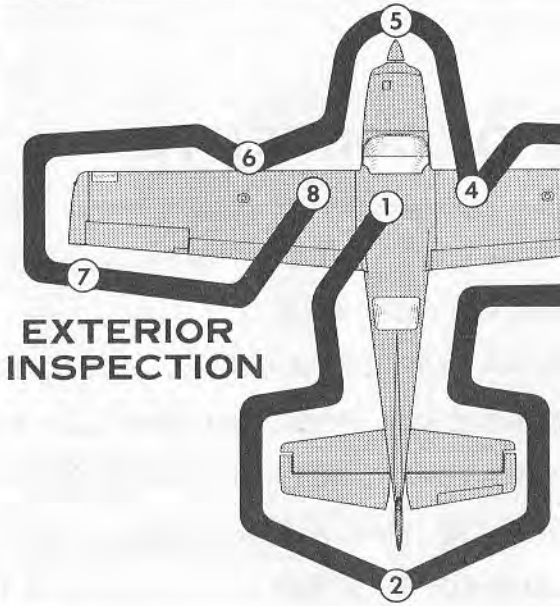


* Maximum height of airplane with nose gear depressed and an optional flashing beacon installed.

PRINCIPAL DIMENSIONS

TABLE OF CONTENTS



EXTERIOR INSPECTION

Note

Visually check aircraft for general condition during walk-around inspection. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also, make sure that control surfaces contain no internal accumulations of ice or debris. If night flight is planned, check operation of all lights, and make sure a flashlight is available.

(1) a. Remove control wheel lock.
b. Check ignition switch "OFF".
c. Turn on master switch and check fuel quantity indicators, then turn master switch "OFF".
d. Check fuel selector valve handle is on fullest bay.
e. Inspect flight instrument static source opening on side of fuselage for stoppage (both sides).
f. Check baggage door for security.

(2) a. Remove rudder gust lock, if installed.
b. Disconnect tail tie-down.
c. Check control surfaces for freedom of movement and security.

(3) a. Check aileron for freedom of movement and security.
b. Check fuel bay vent opening (at wing tip trailing edge) for stoppage.

(4) a. Disconnect wing tie down.
b. Visually check fuel quantity, then check fuel filler cap secure.
c. Check main wheel tire for proper inflation.

(5) a. Check propeller and spinner for nicks and security, and propeller for oil leaks.
b. Check nose wheel strut and tire for proper inflation.
c. Disconnect nose tie-down.
d. Check oil level. Do not operate with less than seven quarts. Fill to 10 quarts for extended flight.
e. Before first flight of the day and after each refueling, pull out strainer drain knob for about four seconds to clear fuel strainer of possible water and sediment. Check strainer drain closed. If water is observed, there is a possibility that the fuel bay sumps contain water. Thus, the fuel bay sump drain plugs and fuel reservoir drain plugs should be removed to check for the presence of water.

(6) a. Remove pitot tube cover, if installed, and check pitot tube opening for stoppage.

(7) Same as (3)

(8) Same as (4)

Figure 1-1.

Section I

OPERATING CHECK LIST

One of the first steps in obtaining the utmost performance, service, and flying enjoyment from your Cessna is to familiarize yourself with your airplane's equipment, systems, and controls. This can best be done by reviewing this equipment while sitting in the airplane. Those items whose function and operation are not obvious are covered in Section II.

Section I lists, in Pilot's Check List form, the steps necessary to operate your airplane efficiently and safely. It is not a check list in its true form as it is considerably longer, but it does cover briefly all of the points that you should know for a typical flight.

The flight and operational characteristics of your airplane are normal in all respects. There are no "unconventional" characteristics or operations that need to be mastered. All controls respond in the normal way within the entire range of operation. All airspeeds mentioned in Sections I, II, and III are indicated airspeeds unless otherwise noted. Corresponding calibrated airspeeds may be obtained from the Airspeed Correction Table in Section VI.

BEFORE ENTERING THE AIRPLANE.

(1) Make an exterior inspection in accordance with figure 1-1.

BEFORE STARTING THE ENGINE.

(1) Pilot's Check List -- Review check list on left front door post.
(2) Seats and Seat Belts -- Adjust and lock.
(3) Brakes -- Test and set.
(4) Cowl Flaps -- "OPEN." (Move lever out of locking hole to reposition.)

(5) Fuel Selector -- Fullest bay.
(6) Radios and Electrical Equipment -- "OFF."
(7) Master Switch --"ON."
(8) Landing Gear -- Handle neutral and green "DN" light on.
(9) Landing Gear Lights and Horn -- Press to test.

STARTING ENGINE.

(1) Mixture -- Full Rich.
(2) Propeller -- High RPM.
(3) Throttle -- Closed.
(4) Auxiliary Fuel Pump Switch -- On "LO."

NOTE

The auxiliary fuel pump will not operate until the ignition switch is turned to the "START" position.

(5) Ignition Key -- "START."
(6) Slowly advance throttle.
(7) Release ignition key when engine starts.

NOTE

If engine fails to continue running, start again from step (3) or use "HI" position of auxiliary fuel pump momentarily to clear vapor from lines.

(8) Reset throttle to desired idle speed.
(9) Auxiliary Fuel Pump Switch -- Off.

BEFORE TAKE-OFF.

(1) Parking Brake -- Set.
(2) Cowl Flaps -- Check full "OPEN."
(3) Flight Controls -- Check for free and correct movement.
(4) Elevator and Rudder Trim -- "TAKE-OFF" settings.
(5) Throttle Setting -- 1700 RPM.
(6) Engine Instruments -- Check.
(7) Ammeter -- Check.

(8) Suction Gage -- Check (4.6 to 5.4 inches of mercury).
(9) Magnetos -- Check (50 RPM maximum differential between magnetos).
(10) Propeller -- Cycle from high to low RPM; return to high RPM (full in).
(11) Flight Instruments and Radios -- Set.
(12) Optional Autopilot or Wing Leveler -- Off.
(13) Cabin Doors and Window -- Closed and locked.

TAKE-OFF.

NORMAL TAKE-OFF.

(1) Wing Flaps -- 0° to 10°.
(2) Power -- Full throttle and 2850 RPM.
(3) Mixture -- Lean for field elevation per fuel flow indicator placard.
(4) Elevator Control -- Lift nose wheel at 60 to 70 MPH.
(5) Climb Speed -- 100 to 110 MPH until all obstacles are cleared; then set up climb speed as shown in "NORMAL CLIMB" check list.
(6) Brakes -- Apply momentarily (when airborne).
(7) Landing Gear -- Retract (in climb out).
(8) Wing Flaps -- Retract (if extended) after obstacles are cleared.

MAXIMUM PERFORMANCE TAKE-OFF.

(1) Wing Flaps -- 10°.
(2) Brakes -- Apply.
(3) Power -- Full throttle and 2850 RPM.
(4) Mixture -- Lean for field elevation per fuel flow indicator placard.
(5) Brakes -- Release.
(6) Elevator Control -- Maintain slightly tail-low attitude.
(7) Climb Speed -- 82 MPH until all obstacles are cleared, then set up climb speed as shown in "MAXIMUM PERFORMANCE CLIMB" check list.
(8) Landing Gear and Wing Flaps -- Retract (after obstacles are cleared and 90 MPH is reached).

NOTE

Do not reduce power until wing flaps and landing gear have been retracted.

CLIMB.

NORMAL CLIMB.

(1) Airspeed -- 120 to 140 MPH.
(2) Power -- 25 inches and 2550 RPM.
(3) Mixture -- Lean to 18 gal/hr. fuel flow.
(4) Cowl Flaps -- Open as required.

MAXIMUM PERFORMANCE CLIMB.

(1) Airspeed -- 109 MPH (sea level) to 102 MPH (10, 000 feet).
(2) Power -- Full throttle and 2700 RPM.
(3) Mixture -- Lean for altitude per fuel flow indicator placard.
(4) Cowl Flaps -- Full "OPEN."

CRUISING.

(1) Power -- 15-25 inches of manifold pressure and 2200-2550 RPM. Select combination to give no more than 75% power.
(2) Cowl Flaps -- Open as required.
(3) Elevator and Rudder Trim -- Adjust.
(4) Mixture -- Lean for cruise fuel flow as determined from your Cessna Power Computer or the OPERATIONAL DATA in Section VI.

LET-DOWN.

(1) Power -- As desired.
(2) Mixture -- Lean for smoothness in power descents. Use full rich mixture for idle power.
(3) Cowl Flaps -- "CLOSED."

BEFORE LANDING.

(1) Fuel Selector -- Fullest bay.
(2) Landing Gear Lever -- "DOWN" (below 160 MPH).
(3) Landing Gear Light -- Green.
(4) Mixture -- Rich.

(5) Propeller -- High RPM.
(6) Wing Flaps -- Down 0°-10° (below 160 MPH), 10°-30° (below 110 MPH).
(7) Airspeed -- 95-105 MPH (flaps retracted), 85-95 MPH (flaps extended).
(8) Elevator Trim -- Adjust.

BALKED LANDING (GO-AROUND).

(1) Power -- Full throttle and 2850 RPM.
(2) Wing Flaps -- Retract to 20°.
(3) Upon reaching an airspeed of approximately 90 MPH, retract flaps slowly.

NORMAL LANDING.

(1) Touch Down -- Main wheels first.
(2) Landing Roll -- Lower nose wheel gently.
(3) Braking -- Minimum required.

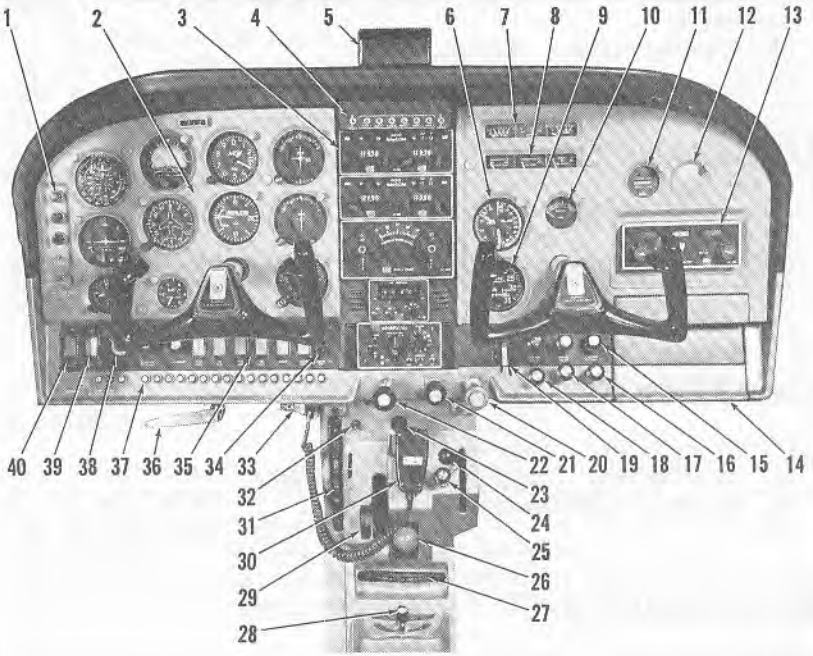
AFTER LANDING.

(1) Cowl Flaps -- "OPEN."
(2) Wing Flaps -- Retract.

SECURING AIRCRAFT.

(1) Parking Brake -- set.
(2) Radios and Electrical Equipment -- "OFF."
(3) Mixture -- Idle cut-off (pulled full out).
(4) Ignition and Master Switch -- "OFF."
(5) Control Lock -- Installed.

INSTRUMENT PANEL



1. Marker Beacon Indicator Lights and Switches (Opt.)
2. Flight Instrument Group
3. Radios (Opt.)
4. Radio Selector Switches (Opt.)
5. Rear View Mirror (Opt.)
6. Manifold Pressure/Fuel Flow Indicator
7. Fuel Quantity Indicators and Ammeter
8. Cylinder Head Temperature, Oil Temperature and Oil Pressure Gages
9. Tachometer
10. Economy Mixture Indicator (Opt.)
11. Flight Hour Recorder (Opt.)
12. Optional Instrument Space
13. Radio (Opt.)
14. Map Compartment
15. Defrost, Cabin Air and Cabin Heat Control Knobs
16. Auxiliary Cabin Air Control Knob
17. Rudder Pedal Stowage Control Knob (Opt.)
18. Cigar Lighter
19. Wing Flap Switch
20. Mixture Control Knob
21. Propeller Control Knob
22. Throttle
23. Reservoir Sight Window
24. Cowl Flap Control Handle
25. Manual Engine Primer (Opt.)
26. Emergency Landing Gear Hand Pump
27. Rudder Trim Control Wheel
28. Fuel Selector Valve Handle
29. Landing Gear Position Handle
30. Microphone (Opt.)
31. Elevator Trim Control Wheel
32. Electric Elevator Trim Circuit Breaker Switch (Opt.)
33. Static Pressure Alternate Source Valve (Opt.)
34. Landing Gear Position Lights
35. Electrical Switches
36. Parking Brake Handle
37. Circuit Breakers
38. Ignition/Starter Switch
39. Auxiliary Fuel Pump Switch
40. Master Switch

Figure 2-1.

Section II

DESCRIPTION AND OPERATING DETAILS

The following paragraphs describe the systems and equipment whose function and operation is not obvious when sitting in the airplane. This section also covers in somewhat greater detail some of the items listed in Check List form in Section I that require further explanation.

FUEL SYSTEM.

Fuel is supplied to the engine from two integral fuel bays, one in each wing. Usable fuel in each bay, for all flight conditions, is 44.5 gallons when completely filled.

The fuel capacity of this aircraft has been designed to provide the owner with a choice of long range capability with partial cabin loading or reduced range with full cabin loading. For example, with full cabin loading, it normally will be necessary to reduce the fuel load to keep the aircraft within approved weight and balance limits. (Refer to Section IV for weight and balance control procedures.) For a reduced fuel load of 32 gallons of usable fuel in each bay, fill each bay to bottom edge of fuel filler collar.

NOTE

Unusable fuel is at a minimum due to the design of the fuel system. However, when the fuel bays are 1/4 full or less, prolonged uncoordinated flight such as slips or skids can uncover the fuel bay outlets, causing fuel starvation and engine stoppage. Therefore, with low fuel reserves, do not allow the aircraft to remain in uncoordinated flight for periods in excess of one minute.

Fuel from each wing fuel bay flows through a reservoir tank to the fuel selector valve. Depending upon the setting of the selector valve, fuel from the left or right fuel bay and reservoir tank flows through a by-pass in the electric auxiliary fuel pump (when it is not operating) and the fuel strainer to the engine-driven fuel pump. From here fuel is distributed to the engine cylinders via a control unit and manifold.

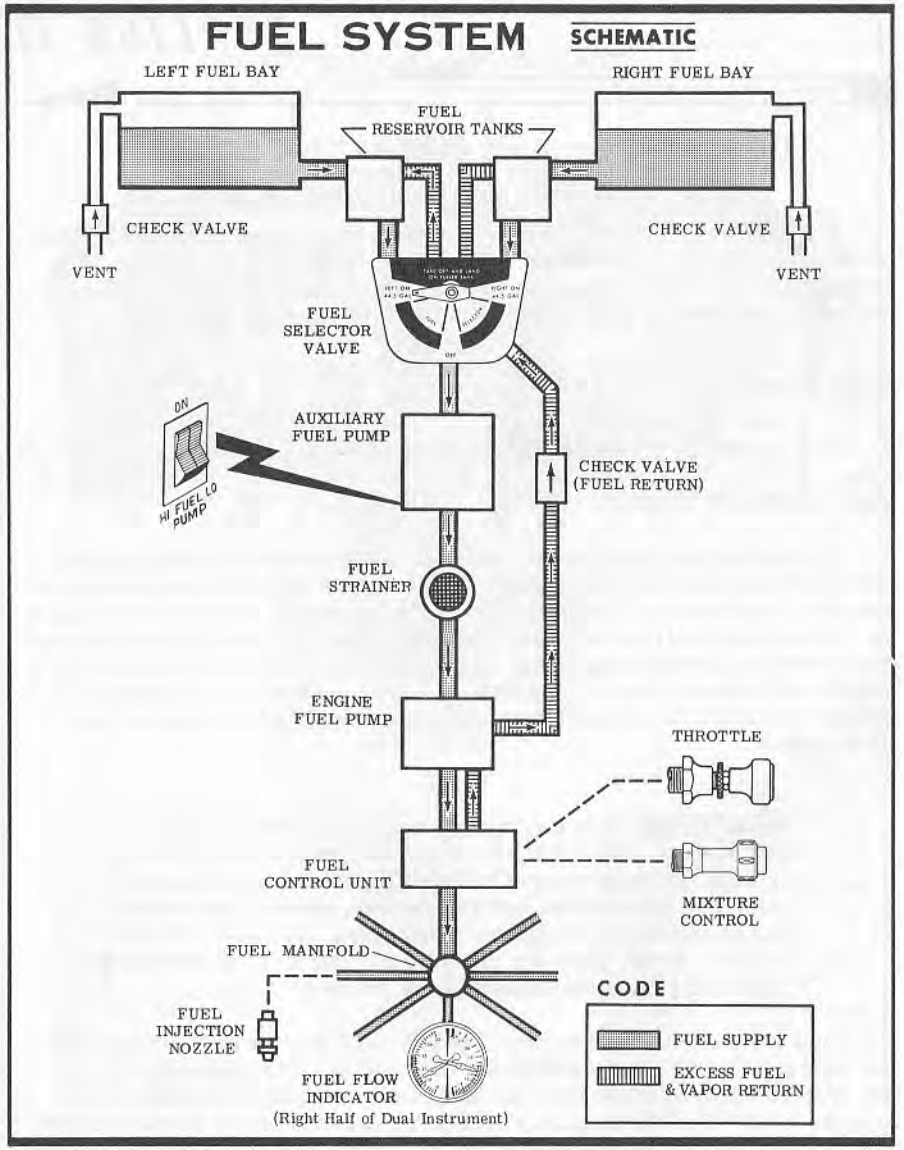


Figure 2-2.

NOTE

Fuel cannot be used from both fuel bays simultaneously.

Vapor and excess fuel from the engine-driven fuel pump and fuel control unit are returned by way of the selector valve to the reservoir tank of the wing fuel bay system being used.

AUXILIARY FUEL PUMP SWITCH.

The right half of the auxiliary fuel pump switch, labeled "LO," is used for starting. With the switch in the "LO" position, and the ignition-starter switch turned to "START," the auxiliary fuel pump will operate at a low flow rate (providing proper fuel mixture for starting) as the engine is being turned over with the starter.

NOTE

The auxiliary fuel pump will not operate in the "LO" position until the ignition switch is turned to the "START" position.

The left half of the switch, labeled "HI," is used for engine operation if the engine-driven pump should fail. When the switch is in this position, the pump operates at one of two flow rates depending upon the setting of the throttle. With the throttle at a cruise setting, the pump is operating at maximum capacity, supplying sufficient fuel flow to maintain flight. When the throttle is moved toward the closed position (as during let-down, landing and taxiing), the auxiliary fuel pump flow rate is automatically reduced, preventing an excessively rich mixture during these periods of reduced engine speed.

When the engine-driven fuel pump is functioning and the auxiliary fuel pump is turned on "HI," a fuel/air ratio considerably richer than best power is produced unless the mixture is leaned.

If it is desired to completely exhaust a fuel bay quantity in flight, the auxiliary fuel pump will be needed to assist in restarting the engine when fuel exhaustion occurs. Therefore, it is recommended that proper operation of the auxiliary fuel pump be verified prior to running a fuel bay dry by turning the auxiliary fuel pump on momentarily and checking for a slight rise in fuel flow indication.

To ensure a prompt engine restart in flight after running a fuel bay

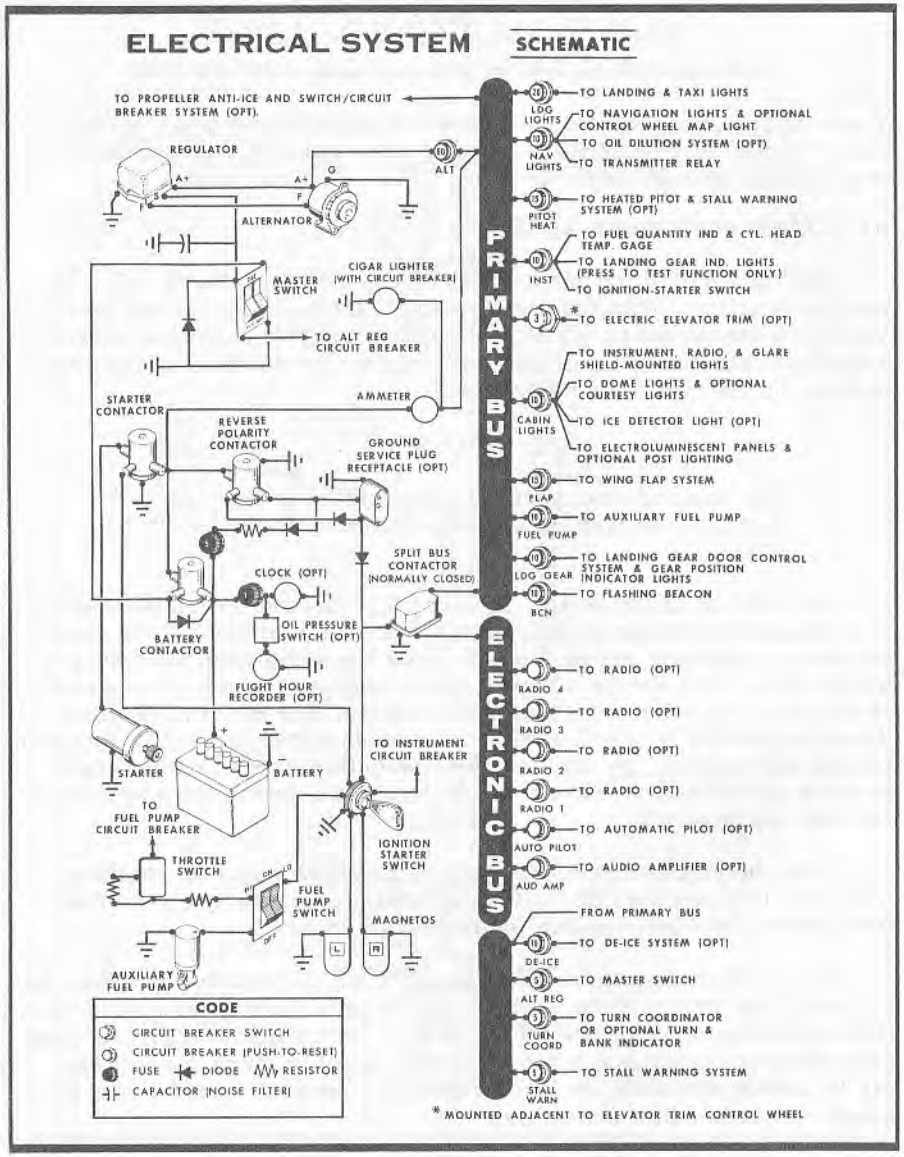


Figure 2-3.

dry, switch to the bay containing fuel at the first indication of fuel pressure fluctuation and/or a power loss, and place the auxiliary fuel pump switch in the "HI" position momentarily (3 to 5 seconds) with the throttle at least 1/2 open. Excessive use of the "HI" position of the auxiliary pump can cause flooding of the engine as indicated by a short (1 to 2 second) period of power followed by a loss of power. This can later be detected by a fuel flow indication accompanied by a lack of power. If flooding does occur, turn off the auxiliary fuel pump switch and normal propeller windmilling should start the engine in 1 to 2 seconds.

If the propeller should stop (possible at very low airspeeds) before the bay containing fuel is selected, place the auxiliary fuel pump switch in the "HI" position and advance the throttle promptly until the fuel flow indicator registers approximately 1/2 way into the green arc for 1 to 2 seconds duration. Then retard the throttle, turn off the auxiliary fuel pump, and use the starter to turn the engine over until a start is obtained.

If the auxiliary fuel pump switch is accidentally on "HI" (with master switch on) with the engine stopped, the intake manifolds will be flooded.

ELECTRICAL SYSTEM.

Electrical energy is supplied by a 14-volt, direct-current system powered by an engine-driven alternator (see figure 2-3). The 12-volt battery is located on the upper left-hand forward portion of the firewall. Power is supplied to all electrical circuits through a split bus bar, one side containing electronic system circuits and the other side having general electrical system circuits. Both sides of the bus are on at all times except when either an external power source is connected or the starter switch is turned on; then a power contactor is automatically activated to open the circuit to the electronics bus. Isolating the electronic circuits in this manner prevents harmful transient voltages from damaging the transistors in the electronics equipment.

MASTER SWITCH.

The master switch is a split-rocker type switch labeled "MASTER," and is "ON" in the up position and "OFF" in the down position. The right half of the switch, labeled "BAT," controls all electrical power to the airplane. The left half, labeled "ALT," controls the alternator.

Normally, both sides of the master switch should be used simulta-

neously; however, the "BAT" side of the switch could be turned "ON" separately to check equipment while on the ground. The "ALT" side of the switch, when placed in the "OFF" position, removes the alternator from the electrical system. With this switch in the "OFF" position, the entire electrical load is placed on the battery, and all non-essential electrical equipment should be turned off for the remainder of the flight.

AMMETER.

The ammeter indicates flow of current, in amperes, from the alternator to the battery or from the battery to the aircraft electrical system. When the engine is operating and the master switch is "ON," the ammeter indicates the charging rate applied to the battery. In the event the alternator is not functioning or the electrical load exceeds the output of the alternator, the ammeter indicates the discharge rate of the battery.

CIRCUIT BREAKERS AND FUSES.

Most electrical circuits in the airplane are protected by "push-to-reset" circuit breakers mounted on the left side of the instrument panel. Exceptions to this are the battery contactor closing (external power) circuit which has a fuse mounted near the ground service plug receptacle, and the clock and optional flight hour recorder circuits which have a fuse mounted near the battery. Also, the cigar lighter is protected by a manually-reset type circuit breaker mounted directly on the back of the lighter behind the instrument panel. The optional electric elevator trim system is protected by a switch type circuit breaker mounted on the control pedestal by the elevator trim wheel. Optional propeller anti-icing circuitry is protected by an automatic resetting circuit breaker built into the back of the anti-ice switch on the instrument panel.

The radio transmitter relay is protected by the navigation lights circuit breaker labeled "NAV LTS." If a malfunction in the nav lights system causes the circuit breaker to open, de-activating the transmitter relay and nav lights system, turn off the nav light switch and reset the circuit breaker. This will re-activate the transmitter relay and permit its usage. Do not turn the nav light switch on again until the malfunction is corrected.

INSTRUMENT AND CONTROL PANEL LIGHTING.

Instrument and control panel lighting is provided by three main sources, electroluminescent lighting, flood lighting, and optional post lighting. The engine instruments and radios have their own light source.

All instrument and control panel lights (including engine instruments and radios) are controlled by two dimming rheostats and one selector switch used for selecting post or flood lighting.

ELECTROLUMINESCENT LIGHTING.

Switches and controls on the lower part of the instrument panel are lighted by electroluminescent panels which do not require light bulbs for illumination. This lighting is controlled by the inner intensity control knob labeled "LWR PANEL."

GLARE SHIELD MOUNTED LIGHTS.

Four lights are located in the glare shield above the instrument panel, and are covered by red lenses. When optional post lights are installed, the light above the radio selector switches is changed to a white lens. The light above the radio selector switches is controlled by the outer intensity control knob labeled "ENG-RADIO," and the remaining three lights are controlled by the intensity control knob labeled "INSTRUMENTS" for flood lighting. When post lights are turned on, all of the glare shield lights will turn off except the light above the radio selector switches.

OVERHEAD CONSOLE LIGHTS.

The overhead console contains instrument panel flood lighting and map lighting. Two openings facing forward from the console provide flood lighting. Two additional openings facing aft function as map lights. The aft openings have sliding covers which are controlled by small round knobs. To utilize the map lighting, slide the covers open by moving the two knobs toward each other. If map lighting is not needed, close the sliding covers. To use the console lights, place the switch labeled "POST-FLOOD LIGHTS" in the "FLOOD LIGHTS" position, and adjust the intensity with the control knob labeled "INSTRUMENTS."

POST LIGHTS (OPT).

The instrument panel, and overhead oxygen console (optional) may be equipped with optional post lights to further increase night lighting. The post lights are located at the edge of each instrument or control to be lighted and are controlled by a rocker-type switch labeled "POST-FLOOD LIGHTS" and the intensity control knob labeled "INSTRUMENTS." To operate the post lights, place the switch in the "POST" position and adjust the light intensity with the "INSTRUMENTS" intensity control knob.

CONTROL WHEEL MAP LIGHT (OPT).

A map light may be mounted on the bottom of the pilot's control wheel. The light illuminates the lower portion of the cabin just forward of the pilot and is helpful when checking maps and other flight data during night operations. To operate the light, first turn the "NAV LIGHTS" switch on, then adjust the map light's intensity with the knurled rheostat knob located at the bottom of the control wheel.

FLASHING BEACON (OPT).

The flashing beacon should not be used when flying through clouds or overcast; the flashing light reflected from water droplets or particles in the atmosphere, particularly at night, can produce vertigo and loss of orientation.

LANDING GEAR SYSTEM.

The retractable tricycle landing gear is retracted and extended by hydraulic actuators, powered by an engine-driven hydraulic pump. The nose gear hydraulic actuator also operates a mechanical down lock upon extension of the nose gear. A positive mechanical uplock is actuated by a separate hydraulic actuator when the nose gear is retracted. The main gear have positive mechanical up and down locks, operated by separate hydraulic actuators.

Two position-indicator lights show that the gear is either up or down and locked. The lights are the press-to-test type. The gear-down indicator light (green) has two test positions; with the light pushed in half-way (throttle pulled out) the gear warning horn should sound intermittently, and with the light pushed full in, the light should illuminate. The gear-up indicator light (amber) has only one test position; with the light pushed full in, it should illuminate. The indicator lights contain dimming shutters for night operation.

As an additional reminder that the gear is retracted, a warning horn sounds intermittently whenever the throttle is retarded with the gear up.

LANDING GEAR POSITION HANDLE.

The gear position handle has two neutral positions (slightly above center for gear up, and slightly below center for gear-down) which give a mechanical indication of the gear position. From either position, the handle

must be pulled out to clear a detent before it can be repositioned; operation of the gear and doors will not begin until the handle has been repositioned.

To reposition the gear, the handle is pulled out and moved to the desired position, then released. Pressure is created in the system by the engine-driven hydraulic pump and the gear is actuated to the selected position. A detent in the gear handle system holds the handle in the operating position until the cycle is completed; then the handle automatically returns to neutral.

IMPORTANT

> The landing gear position handle should be returned to neutral manually if a malfunction occurs in the hydraulic system which prevents the gear position handle from returning to neutral after a cycle has been completed. Continuous operation with the handle out of neutral will eventually result in overheating and possible damage.

During a normal cycle, the gear locks up or down and the position indicator light comes on. When the light illuminates, hydraulic pressure is switched from the gear actuators to the door actuators to close the gear doors. When the doors are closed, the gear handle returns to neutral and the cycle is complete. The normal time interval between the indicator lighting and the handle returning to neutral is 4-5 seconds. If the position indicator light does not light, the gear doors will not close and hydraulic pressure will be retained on the landing gear actuators.

A safety switch, actuated by the nose gear strut, restricts the gear position handle to prevent inadvertent retraction whenever the nose gear strut is compressed by the weight of the airplane.

EMERGENCY HAND PUMP.

For emergency use, if the hydraulic pump fails, the hydraulic control unit contains a manual pump which may be used to extend the gear. The system reservoir is arranged to retain sufficient fluid to extend the gear with the hand pump if a failure between the engine-driven pump and reservoir results in fluid loss. See Section III for emergency operation of the hand pump.

OPERATION OF LANDING GEAR DOORS (AIRPLANE ON GROUND).

For inspection purposes, the landing gear doors may be opened and closed while the airplane is on the ground with the engine stopped. Oper-

ate the doors with the landing gear handle in the "down-neutral" position. To open the doors, turn off the master switch and operate the hand pump until the doors open. To close the doors, turn the master switch on and operate the hand pump.

NOTE

The position of the master switch for gear door operation is easily remembered by the following rule:

OPEN circuit = OPEN doors
CLOSED circuit = CLOSED doors

CABIN HEATING, VENTILATING AND DEFROSTING SYSTEM.

The temperature and volume of airflow into the cabin can be regulated to any degree desired by manipulation of the push-pull "CABIN HEAT" and "CABIN AIR" knobs. When partial cabin heat is desired, blending warm and cold air will result in improved ventilation and heat distribution throughout the cabin. Additional outside air for summer ventilation is provided through the heat and vent system by operation of the push-pull "AUX CABIN AIR" knob. The rotary type "DEFROST" knob regulates the airflow for windshield defrosting.

Front cabin heat and ventilating air is supplied by outlet holes spaced across a cabin manifold just forward of the pilot's and copilot's feet. Rear cabin heat and air is supplied by two ducts from the manifold, one extending down each side of the cabin to an outlet at the front door post at floor level. Windshield defrost air is also supplied by a duct leading from the cabin manifold.

For additional cabin air, six adjustable ventilators are provided; two each in consoles above the front seats and center passenger seats, and one each in two separate consoles near the aft passenger seats.

STARTING ENGINE.

Proper fuel management and throttle adjustments are the determining

factors in securing an easy start from your continuous-flow fuel-injection engine. The procedure outlined in Section I should be followed closely as it is effective under nearly all operating conditions, including hot and cold weather conditions. Slight variations from this procedure may be necessary at times to compensate for extreme conditions.

Conventional full rich mixture and high RPM propeller settings are used for starting; the throttle, however, should be fully closed initially. When ready to start, depress the right half of the auxiliary fuel pump switch to "LO" and turn the ignition-starter switch to "START" position. At the same time the starter engages and turns the engine, the auxiliary fuel pump will operate at a low flow rate, supplying fuel for starting. While cranking, slowly advance the throttle until the engine starts. Slow throttle advancement is essential since the engine will start readily when the correct fuel/air ratio is obtained. On the other hand, fast throttle movement may prevent starting since an excessively rich mixture will be obtained due to greater fuel flow metered by the throttle position. In this case, another starting attempt must be made. When the engine has started, reset the throttle to the desired idle speed and turn the fuel pump switch off.

Engine starting in hot weather or with a hot engine is sometimes hampered by vapor formation in the fuel lines. To purge the vapor, move the mixture control to full rich, open the throttle 1 1/2 inches, and prime with the auxiliary fuel pump switch in the "HI" position until the fuel flow indicator reads 4 - 6 gal/hr. Then shut off the fuel pump switch and engage the starter. As the flooded mixture becomes progressively leaner, reaching a combustible mixture, the engine will start. If the engine tends to die, turn the auxiliary fuel pump switch momentarily to "HI" at appropriate intervals until the vapor is fully cleared and the engine runs smoothly.

If prolonged cranking is necessary, allow the starter motor to cool at frequent intervals, since excessive heat may damage the armature.

TAXIING.

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips. Refer to figure 2-4 for additional taxiing instructions.

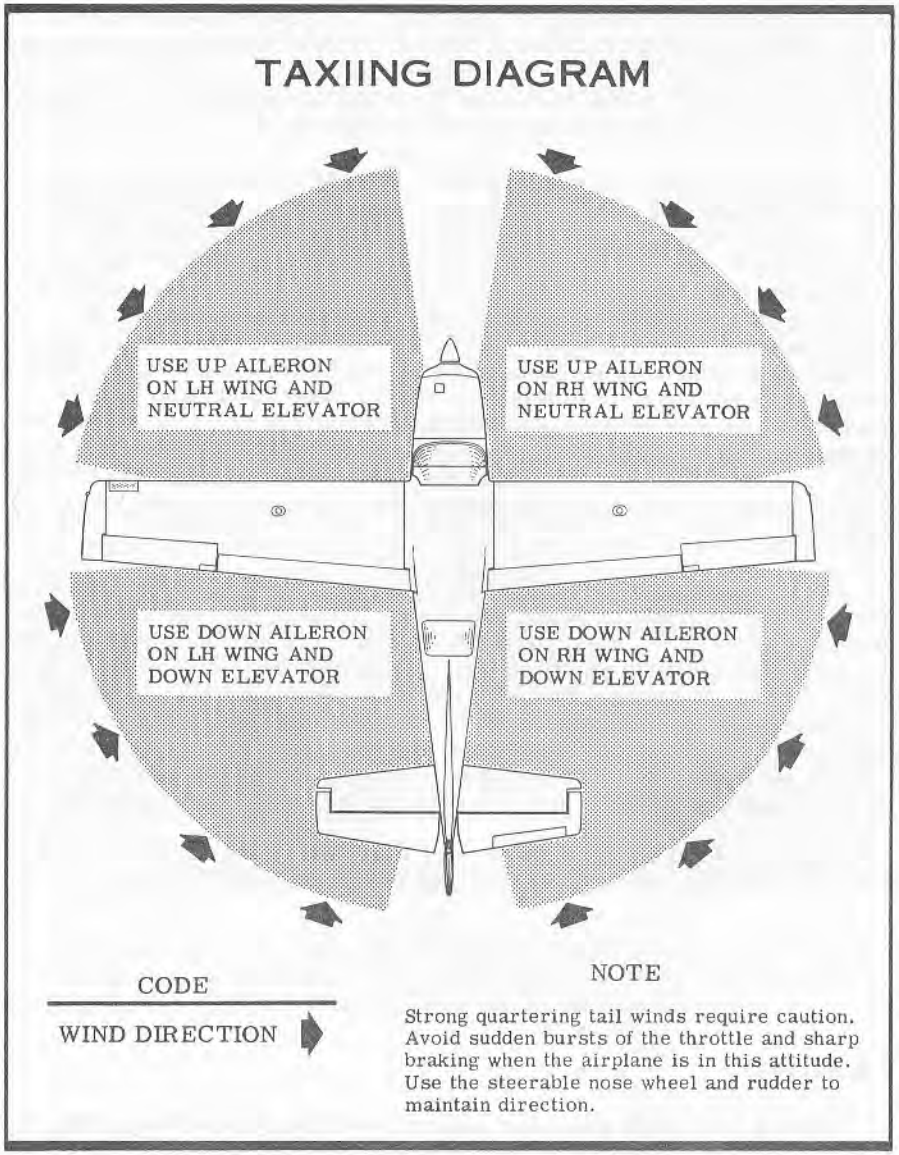


Figure 2-4.

BEFORE TAKE-OFF.

Since the engine is closely cowled for efficient in-flight cooling, precautions should be taken to avoid overheating on the ground. Full throttle checks on the ground are not recommended unless the pilot has good reason to suspect that the engine is not turning up properly.

The magneto check should be made at 1700 RPM with the propeller in flat pitch as follows: Move the ignition switch first to "R" position and note RPM. Then move switch back to "BOTH" position to clear the other set of plugs. Then move switch to "L" position and note RPM. The difference between the two magnetos operated singly should not be more than 50 RPM. If there is a doubt concerning the operation of the ignition system, RPM checks at a higher engine speed will usually confirm whether a deficiency exists.

An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system or should be cause for suspicion that the magneto timing is set in advance of the setting specified.

Prior to flights where verification of proper alternator and voltage regulator operation is essential (such as night or instrument flights), a positive verification can be made by loading the electrical system momentarily (3 to 5 seconds) with the landing light during the engine run-up (1700 RPM). The ammeter will remain within a needle width of zero if the alternator and voltage regulator are operating properly.

TAKE-OFF.

It is important to check full-throttle engine operation early in the take-off run. Any signs of rough engine operation or sluggish engine acceleration is good cause for discontinuing the take-off.

Full throttle runups over loose gravel are especially harmful to propeller tips. When take-offs must be made over a gravel surface, it is very important that the throttle be advanced slowly. This allows the airplane to start rolling before high RPM is developed, and the gravel will be blown back of the propeller rather than pulled into it.

For maximum engine power, the mixture should be adjusted during the initial take-off roll to the fuel flow corresponding to the field elevation. (Refer to Maximum Performance Take-Off and Climb Settings placard located adjacent to fuel flow indicator.) The power increase is significant above 3000 feet and this procedure always should be employed for field elevations greater than 5000 feet above sea level.

Using 10° flaps reduces the ground run and total distance over the obstacle by approximately 10 percent. Soft field take-offs are performed with 10° flaps by lifting the nose wheel off the ground as soon as practical and leaving the ground in a slightly tail-low attitude. However, the airplane should be leveled off immediately to accelerate to a safe climb speed.

Take-offs into strong crosswinds normally are performed with the minimum flap setting necessary for the field length, to minimize the drift angle immediately after take-off. The airplane is accelerated to a speed higher than normal, then pulled off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

Landing gear retraction normally is started after reaching the point over the runway where a wheels-down, forced landing on that runway would become impractical. Since the landing gear swings downward approximately two feet as it starts the retraction cycle, damage can result by retracting it before obtaining at least that much ground clearance. In addition, the landing gear would extend slowly in the event of an engine failure during take-off, and might not be completely down while a wheels-down landing could still be made on the runway.

Before retracting the landing gear, the brakes should be applied momentarily to stop wheel rotation. Centrifugal force caused by the rapidly-spinning wheel expands the diameter of the tire. If there is an accumulation of mud or ice in the wheel wells, the rotating wheel may rub as it is retracted into the wheel well.

CLIMB.

A cruising climb at 25 inches of manifold pressure, 2550 RPM (approximately 75% power) and 120 to 140 MPH is recommended to save

time and fuel for the overall trip. In addition, this type of climb provides better engine cooling, less engine wear, and more passenger comfort due to lower noise level.

Cruising climbs should be conducted at approximately 18.0 GPH up to 5000 feet and at 1 GPH more than the normal lean fuel flow shown on the Cessna Power Computer at higher altitudes and lower power.

If it is necessary to climb rapidly to clear mountains or reach favorable winds at high altitudes, the best rate-of-climb speed should be used with maximum power. This speed is 109 MPH at sea level, decreasing to 102 MPH at an altitude of 10,000 feet. The mixture should be leaned as shown by the Maximum Performance Take-off and Climb Settings placard located adjacent to the fuel flow indicator.

If an obstruction dictates the use of a steep climb angle, climb with flaps retracted and maximum continuous power at 85 MPH at sea level, to 90 MPH at 10,000 ft.

CRUISE.

Normal cruising is done between 65% and 75% power. The power settings required to obtain these powers at various altitudes and outside air temperatures can be determined by using your Cessna Power Computer or the OPERATIONAL DATA, Section VI.

OPTIMUM CRUISE PERFORMANCE

%BHP	GAL/HR	ALTITUDE	TRUE AIRSPEED	RANGE (89 GAL. FUEL)
75	15.7	7500	187	1065
70	14.6	9000	185	1130
65	13.6	11,000	183	1200

Figure 2-5.

The Optimum Cruise Performance table (figure 2-5) shows that cruising can be done most efficiently at higher altitudes because very nearly the same cruising speed can be maintained at much less power.

For greater cruising range at a given throttle setting, select the lowest engine RPM in the green arc range that will give smooth engine operation.

Cowl flaps should be adjusted to maintain the cylinder head temperature at approximately two-thirds of the normal operating (green arc) range to assure prolonged engine life.

The fuel injection system employed on this engine is considered to be non-icing. In the event that unusual conditions cause both intake air filters to become clogged or iced over, an alternate intake air valve opens automatically. Due to a one to two inch decrease in manifold pressure and a significant increase in intake air temperature when the filters are blocked, power at full throttle decreases approximately 10%.

STALLS.

The stall characteristics are conventional and aural warning is provided by a stall warning horn which sounds between 5 and 10 MPH above the stall in all configurations.

Power-off stall speeds at maximum gross weight and aft c.g. position are presented on page 6-2 as calibrated airspeeds since indicated airspeeds are unreliable near the stall.

SPINS.

Intentional spins are prohibited in this airplane. Should an inadvertent spin occur, standard light plane recovery techniques should be used.

BEFORE LANDING.

In view of the relatively low drag of the extended landing gear and the

high allowable gear-down speed (160 MPH), the landing gear should be extended before entering the traffic pattern. This practice will allow more time to confirm that the landing gear is down and locked. As a further precaution, leave the landing gear extended in go-around procedures or traffic patterns for touch-and-go landing.

Landing gear extension can be detected by illumination of the gear down indicator light (green), absence of a gear warning horn with the throttle retarded below 12 inches of manifold pressure, and visual inspection of the main gear position. Should the gear indicator light fail to illuminate, the light should be checked for a burned-out bulb by pushing to test. A burned-out bulb can be replaced in flight with the bulb from the compass light or the landing gear up (amber) indicator light.

LANDINGS.

Landings should be made on the main wheels first to reduce the landing speed and subsequent need for braking in the landing roll. The nose wheel is lowered to the runway after the speed has diminished to avoid unnecessary nose gear load. This procedure is especially important in rough field landings.

SHORT FIELD LANDINGS.

For short field landings, make a power approach at 82 MPH with full flaps. After all approach obstacles are cleared, progressively reduce power. Maintain 82 MPH approach speed by lowering the nose of the airplane. Touchdown should be made with the throttle closed, and on the main wheels first. Immediately after touchdown, lower the nose gear and apply heavy braking as required. For maximum brake effectiveness after all three wheels are on the ground, retract the flaps, hold full nose up elevator and apply maximum possible brake pressure without sliding the tires.

At light operating weights, during ground roll with full flaps, hold the control wheel full back to insure maximum weight on the main wheels for braking. Under these conditions, full nose down elevator (control wheel full forward) will raise the main wheels off the ground.

BALKED LANDING (GO-AROUND).

In a balked landing (go-around) climb, the wing flap setting should

be reduced to 20° immediately after full power is applied. After all obstacles are cleared and a safe altitude and airspeed are obtained, the wing flaps should be retracted.

COLD WEATHER OPERATION.

The use of an external pre-heater and an external power source is recommended whenever possible to reduce wear and abuse to the engine and the electrical system. If external preheat is not available, the oil should be diluted before stopping the engine when very cold temperatures are anticipated.

Pre-heat will thaw the oil trapped in the oil cooler, which probably will be congealed prior to starting in extremely cold temperatures. When using an external power source, the position of the master switch is important. Refer to Section VII, paragraph Ground Service Plug Receptacle, for operating details.

In very cold weather, no oil temperature indication need be apparent before take-off. After a suitable warm-up period (2 to 5 minutes at 1000 RPM), the engine is ready for take-off if it accelerates smoothly and the oil pressure is normal and steady.

During let-down, observe engine temperatures closely and carry sufficient power to maintain them in the recommended operating range.

Refer to Section VII for discussion of additional cold weather equipment.

Section III

EMERGENCY PROCEDURES

Emergencies caused by aircraft or engine malfunctions are extremely rare if proper pre-flight inspections and maintenance are practiced. Enroute weather emergencies can be minimized or eliminated by careful flight planning and good judgement when unexpected weather is encountered. However, should an emergency arise the basic guidelines described in this section should be considered and applied as necessary to correct the problem.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS.

Malfunctions in the electrical power supply system can be detected by periodic monitoring of the ammeter; however, the cause of these malfunctions is usually difficult to determine. A broken alternator drive belt or wiring is most likely the cause of alternator failures, although other factors could cause the problem. A damaged or improperly adjusted voltage regulator can also cause malfunctions. All electrical problems of this nature constitute an electrical emergency and should be dealt with immediately. Electrical power malfunctions usually fall into two categories, excessive rate of charge and insufficient rate of charge. The paragraphs below describe the recommended remedy for each situation.

EXCESSIVE RATE OF CHARGE.

After periods of engine starting and heavy electrical usage at low engine speeds (such as extended taxiing) the battery condition will be low enough to accept above normal charging during the initial part of a flight. However, after thirty minutes of cruising flight, the ammeter should be indicating less than two needle widths of charging current. If the charging rate remains above this value on a long flight, it is possible that the battery will overheat and evaporate the electrolyte at an excessive rate. In addition, electronic components in the electrical system could be adversely affected by the higher than normal voltage if a faulty voltage regulator setting is causing the overcharging.

To preclude these possibilities, the alternator side of the split master switch should be turned "OFF." The flight should be terminated and/or the current drain on the battery minimized as soon as practical because the battery can supply the electrical system for only a limited period of time. If it becomes apparent that the battery voltage is getting too low to operate the electrical system, the alternator switch can be turned back on for several minutes at a time until the battery is partially recharged. If the emergency occurs at night, the alternator switch should be returned to the "ON" position just before landing lights and flaps will be required for landing.

INSUFFICIENT RATE OF CHARGE.

If the ammeter indicates a continuous discharge in flight, the alternator is not supplying power to the system and should be shut down since the alternator field circuit may be placing an unnecessary load on the system. All non-essential equipment should be turned "OFF" and the flight terminated as soon as practical.

ELECTRIC TRIM MALFUNCTIONS.

In the event of an electric trim "runaway" malfunction, immediate corrective measures are required as follows:

(1) Minimize the pitch attitude changes of the aircraft by applying pressure on the control wheel as required.
(2) Promptly grasp the trim wheel to stop its rotation.
(3) Immediately pull the electric elevator trim circuit breaker switch out. The switch is located to the right of the trim wheel above the trim indicator.
(4) Leave the circuit breaker switch pulled out for the remainder of the flight.
(5) Manually retrim the aircraft as desired with the elevator trim wheel.

ROUGH ENGINE OPERATION OR LOSS OF POWER.

SPARK PLUG FOULING.

A slight engine roughness in flight may be caused by one or more

spark plugs becoming fouled by carbon or lead deposits. This may be verified by turning the ignition switch momentarily from "BOTH" to either "LEFT" or "RIGHT" position. An obvious power loss in single ignition operation is evidence of spark plug or magneto trouble. Assuming that spark plugs are the more likely cause, lean the mixture to the normal lean setting for cruising flight. If the problem does not clear up in several minutes, determine if a richer mixture setting will produce smoother operation. If not, proceed to the nearest airport for repairs using the "BOTH" position of the ignition switch unless extreme roughness dictates the use of a single ignition position.

MAGNETO MALFUNCTION.

A sudden engine roughness or misfiring is usually evidence of magneto problems. Switching from "BOTH" to either "LEFT" or "RIGHT" ignition switch position will identify which magneto is malfunctioning. Select different power settings and enrichen the mixture to determine if continued operation on "BOTH" magnetos is practicable. If not, switch to the good magneto and proceed to the nearest airport for repairs.

LOW OIL PRESSURE.

If low oil pressure is accompanied by normal oil temperature, there is a possibility the oil pressure gage or relief valve is malfunctioning. A leak in the line to the gage is not necessarily cause for an immediate precautionary landing because an orifice in this line will prevent a sudden loss of oil from the engine sump. However, a landing at the nearest airport would be advisable to inspect the source of trouble.

If a total loss of oil pressure is accompanied by a rise in oil temperature, there is good reason to suspect an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field. Leave the engine running at low power during the approach, using only the minimum power required to reach the desired touchdown spot.

LANDING GEAR EMERGENCY OPERATION.

If the landing gear will not retract normally, leave it extended and land as soon as practical. When the landing gear will not extend nor-

mally, it may be extended manually as follows:

NOTE

Prior to following the emergency extension procedures, it is recommended that the landing gear handle be moved from "UP" to "DOWN" with a firm action several times. In certain cases, this procedure can dislodge foreign matter which may be causing the malfunction.

(1) Place the gear handle in the full "DOWN" position.
(2) Pull the emergency hand pump out to its full extension.
(3) Operate the hand pump up and down until the down indicator (green) light comes on, and continue pumping until the landing gear handle returns to neutral (approximately 75 strokes).

LANDING WITHOUT POSITIVE INDICATION OF GEAR LOCKING.

Should a flickering, unsteady, or inoperative gear-down (green) light be obtained, and observers verify that the gear is down and apparently in the locked position, proceed as follows:

(1) Make a normal full-flaps approach.
(2) Holding the landing gear handle in the "DOWN" position and maintaining a minimum of 1000 RPM, complete the landing and taxi clear of the runway.

NOTE

Maintaining 1000 RPM and holding the gear handle "DOWN" secures the landing gear in the extended position by hydraulic pressure.

(3) BEFORE reducing engine RPM or releasing gear handle, have ground personnel depress the tail until nose gear is off ground.

NOTE

The nose gear requires hydraulic pressure to hold it in the "DOWN" position if it is not mechanically locked.

(4) Stop the engine and determine that the nose gear is mechanically locked down BEFORE lowering the nose wheel to the ground.

LANDING WITH DEFECTIVE NOSE GEAR.

If the nose gear does not extend or only partially extends, and observers verify that it is not down, prepare for a wheels-down landing as follows:

(1) Transfer movable load to baggage area, and passengers to aft seats as much as practical.
(2) Select a hard-surfaced or smooth sod runway.

NOTE

If terrain is rough or soft, plan a wheels-up landing as presented under "FORCED LANDING (Precautionary Landing with Power)" in lieu of the following steps.

(3) Place landing gear handle "DOWN."
(4) Extend flaps to 30°.
(5) Turn off master switch.
(6) Land in a slightly tail-low attitude.
(7) Pull mixture control knob to idle cut-off.
(8) Turn ignition switch "OFF."
(9) Turn fuel selector valve handle to "OFF."
(10) Hold nose off the ground as long as possible.
(11) Evacuate the airplane as soon as it stops.

FORCED LANDINGS.

PRECAUTIONARY LANDING WITH ENGINE POWER.

Before attempting an "off airport" landing, one should drag the landing area at low altitude to inspect the terrain for obstructions and surface conditions, proceeding as follows:

(1) Drag over selected field with flaps 10° and 100 MPH airspeed, noting the preferred area for touchdown for the next landing approach. Then retract flaps upon reaching a safe altitude and airspeed.
(2) On downwind leg, turn off all switches except the ignition and master switches.
(3) Approach with flaps down at 85 to 95 MPH.
(4) Unlatch cabin doors prior to final approach.

(5) Before touchdown, turn ignition and master switches "OFF."
(6) Land in a slightly tail-low attitude.

EMERGENCY LANDING WITHOUT ENGINE POWER.

If an engine stoppage occurs, establish flaps up glide at 95 MPH. If time permits, attempt to determine the cause of failure by checking for fuel quantity, proper fuel selector valve position, mixture control setting, and fuel flow indication. Also check that engine primer is full in and locked and ignition switch is properly positioned.

If all attempts to restart the engine fail and a forced landing is imminent, select a suitable field and prepare for the landing as follows:

(1) Pull mixture control to idle cut-off position.
(2) Turn fuel selector valve handle "OFF."
(3) Turn all switches "OFF" except master switch.
(4) If selected field is smooth and hard, extend landing gear within gliding distance of field.
(5) Make approach at 95 to 105 MPH.
(6) If electrical power is available, extend flaps as necessary within gliding distance of field and approach at 85 to 95 MPH.
(7) Turn off master switch.
(8) Unlatch cabin doors prior to final approach.
(9) Make a slightly tail low landing and apply heavy braking.
(10) If terrain is rough or soft, plan a wheels-up landing as follows:
   a. Make approach at 95 to 105 MPH, gear and flaps retracted.
   b. Extend flaps as necessary within gliding distance of field and approach at 85 to 95 MPH.
   c. Turn off master switch.
   d. Unlatch cabin doors prior to final approach.
   e. Land in a slightly tail-low attitude.
   f. Attempt to hold tail low throughout slide.

DITCHING.

Prepare for ditching by securing or jettisoning heavy objects located in the baggage area, and collect folded coats or cushions for protection of occupant's face at touchdown. Transmit Mayday message on 121.5 MHz. giving location and intentions.

(1) Plan approach into wind if winds are high and seas are heavy. With heavy swells and light wind, land parallel to swells.

(2) Approach with landing gear retracted, flaps 30°, and sufficient power for a 300 ft./min. rate of descent at 85 to 95 MPH.
(3) Unlatch the cabin doors.
(4) Maintain a continuous descent until touchdown in level attitude. Avoid a landing flare because of difficulty in judging airplane height over a water surface.
(5) Place folded coat or cushion in front of face at time of touchdown.
(6) Expect a second impact for the airplane may skip after touchdown.
(7) Evacuate airplane through cabin doors. If necessary, open window to flood cabin compartment for equalizing pressure so that door can be opened.
(8) Inflate life vests and raft (if available) after evacuation of cabin.

The aircraft can not be depended on for floatation for more than a few minutes.

DISORIENTATION IN CLOUDS.

In the event of a gyro horizon failure during flight in marginal weather the pilot should make sure that the Wing Leveler (if installed) control knob is "ON." This device will stabilize the airplane. However, if the vacuum system fails, the directional gyro, gyro horizon, and Wing Leveler will all be disabled, and the pilot will have to rely on the turn coordinator (or turn and bank indicator) if he is required to fly into clouds. The following instructions assume that only the electrically powered turn coordinator is operative and that the pilot is not proficient in partial panel instrument flying.

EXECUTING A 180° TURN IN CLOUDS.

Upon entering the clouds, an immediate plan should be made to turn back as follows:

(1) Note the time of the minute hand and observe the position of the sweep second hand on the clock.
(2) When the sweep second hand indicates the nearest half-minute, initiate a standard rate left turn, holding the turn coordinator symbolic airplane wing opposite the lower left index mark for 60 seconds. Then roll back to level flight by leveling the miniature airplane.
(3) Check accuracy of the turn by observing the compass heading which should be the reciprocal of the original heading.

(4) If necessary, adjust heading primarily with skidding motions rather than rolling motions so that the compass will read more accurately.
(5) Maintain altitude and airspeed by cautious application of elevator control. Avoid overcontrolling by keeping the hands off the control wheel and steering only with rudder.

EMERGENCY LET-DOWNS THROUGH CLOUDS.

If possible, obtain radio clearance for an emergency descent through clouds. To guard against a spiral dive, choose an easterly or westerly heading to minimize compass card swings due to changing bank angles. In addition, keep hands off the control wheel and steer a straight course with rudder control by monitoring the turn coordinator. Occasionally check the compass heading and make minor corrections to hold an approximate course. Before descending into the clouds, set up a stabilized let-down condition as follows:

(1) Extend landing gear.
(2) Reduce power to set up a 500 to 800 ft./min. rate of descent.
(3) Adjust mixture for smooth operation.
(4) Adjust the elevator and rudder trim for a stabilized descent at 120 MPH.
(5) Monitor turn coordinator and make corrections by rudder alone.
(6) Check trend of compass card movement and make cautious corrections with rudder to stop the turn.
(7) Upon breaking out of clouds resume normal cruising flight.

RECOVERY FROM A SPIRAL DIVE.

If a spiral is encountered, proceed as follows:

(1) Close the throttle and place propeller control in high RPM.
(2) Stop the turn by using coordinated aileron and rudder control to align the symbolic airplane in the turn coordinator with the horizon reference line.
(3) Cautiously apply elevator back pressure to slowly reduce the indicated airspeed to 120 MPH.
(4) Adjust the elevator trim control to maintain a 120 MPH glide.
(5) Use rudder control to hold a straight heading.
(6) Clear engine occasionally, but avoid using enough power to disturb the trimmed glide.
(7) Upon breaking out of clouds, apply normal cruising power and RPM; resume normal flight.

FIRES.

ENGINE FIRE IN FLIGHT.

Although engine fires are extremely rare in flight, the following steps should be taken if one is encountered:

(1) Pull mixture control to idle cut-off.
(2) Turn fuel selector valve handle "OFF."
(3) Turn master switch "OFF."
(4) Establish a 140 MPH glide.
(5) Close cabin heat control.
(6) Select a field suitable for a forced landing.
(7) If fire is not extinguished, increase glide speed in an attempt to find an airspeed that will provide an incombustible mixture.
(8) Execute a forced landing as described in paragraph Emergency Landing Without Engine Power. Do not attempt to restart the engine.

ELECTRICAL FIRE IN FLIGHT.

The initial indication of an electrical fire is the odor of burning insulation. The immediate response should be to turn the master switch "OFF." Then close off ventilating air as much as practicable to reduce the chances of a sustained fire. If an oxygen system is available in the aircraft and dense smoke makes breathing difficult, occupants should use oxygen masks until the smoke clears.

If electrical power is indispensable for the flight, an attempt may be made to identify and cut off the defective circuit as follows:

(1) Master Switch -- "OFF."
(2) All other switches (except ignition switch) -- "OFF."
(3) Check condition of circuit breakers to identify faulty circuit if possible. Leave faulty circuit deactivated.
(4) Master Switch -- "ON."
(5) Select switches "ON" successively, permitting a short time delay to elapse after each switch is turned on until the short circuit is localized.
(6) Make sure fire is completely extinguished before opening vents.

FLIGHT IN ICING CONDITIONS.

The following procedures are for aircraft not equipped with optional

ice protection equipment. Although flight into known icing conditions should be avoided, an unexpected icing encounter should be handled as follows:

(1) Turn pitot heat switch "ON" (if installed).
(2) Turn back or change altitude to obtain an outside air temperature that is less conducive to icing.
(3) Pull "CABIN HEAT" control knob full out and rotate "DEFROST" control knob clockwise to obtain windshield defrost air flow.
(4) Increase RPM to minimize ice build-up on propeller blades.
(5) Watch for signs of induction air filter ice, and regain manifold pressure by increasing the throttle setting.

NOTE

If ice accumulates on the intake filters (causing the alternate air valve to open) a decrease of 1 to 2 inches of full throttle manifold pressure will be experienced.

(6) Plan a landing at the nearest airport, if icing conditions are unavoidable. With an extremely rapid ice build-up, select a suitable "off airport" landing site.
(7) With ice accumulation of one inch or more on the wing leading edges, be prepared for significantly higher power setting, approach speed, stall speed, and landing roll.
(8) Leave wing flaps retracted. With a severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
(9) Open window and scrape ice from a portion of the windshield for visibility in the landing approach. The metal control lock shield may be used as a scraper.
(10) Approach at 110 to 120 MPH, depending upon the amount of ice accumulation. Avoid becoming too low during approach.
(11) Land in a near-level attitude.

Section IV

OPERATING LIMITATIONS

OPERATIONS AUTHORIZED.

Your Cessna exceeds the requirements of airworthiness as set forth by the United States Government, and is certificated under FAA Type Certificate No. 3A21 as Cessna Model No. 210K.

With standard equipment, the airplane is approved for day and night operation under VFR. Additional optional equipment is available to increase its utility and to make it authorized for use under IFR day and night. An owner of a properly equipped Cessna is eligible to obtain approval for its operation on single-engine scheduled airline service. Your Cessna Dealer will be happy to assist you in selecting equipment best suited to your needs.

MANEUVERS – NORMAL CATEGORY.

The airplane is certificated in the normal category. The normal category is applicable to airplanes intended for non-aerobatic operations. These include any maneuvers incidental to normal flying, stalls (except whip stalls) and turns in which the angle of bank is not more than 60°. In connection with the foregoing, the following gross weight and flight load factors apply:

Gross Weight	3800 lbs	
Flight Load Factor		
*Flaps Up	+3.8	-1.52
*Flaps Down	+2.0	

*The design load factors are 150% of the above, and in all cases, the structure meets or exceeds design loads.

Your airplane must be operated in accordance with all FAA-approved markings, placards and check lists in the airplane. If there is any information in this section which contradicts the FAA-approved markings, placards and check lists, it is to be disregarded.

AIRSPEED LIMITATIONS (CAS).

The following is a list of the certificated calibrated airspeed (CAS) limitations for the airplane.

Never Exceed Speed (Glide or dive, smooth air)	225 MPH
Maximum Structural Cruising Speed	190 MPH
Maximum Speed, Gear Extended	160 MPH
Maximum Speed, Flaps Extended	
Flaps 10°	160 MPH
Flaps 10° - 30°	110 MPH
*Maneuvering Speed	135 MPH

*The speed at which abrupt control travel can be used without exceeding the specified flight maneuvering load factor.

AIRSPEED INDICATOR MARKINGS.

The following is a list of the certificated calibrated airspeed markings (CAS) for the airplane.

Never Exceed (Glide or dive, smooth air)	225 MPH (red line)
Caution Range	190-225 MPH (yellow arc)
Normal Operating Range	79-190 MPH (green arc)
Flap Operating Range	70-110 MPH (white arc)

ENGINE OPERATION LIMITATIONS.

Power and Speed	300 BHP at 2850 RPM (5-Minute Take-Off) 285 BHP at 2700 RPM (Maximum Continuous)

ENGINE INSTRUMENT MARKINGS.

FUEL QUANTITY INDICATORS.

Empty (0.5 gallon unusable each fuel bay)	E (red line)

CYLINDER HEAD TEMPERATURE GAGE.

Normal Operating Range	200-460°F (green arc)
Do Not Exceed	460°F (red line)

OIL TEMPERATURE GAGE.

Normal Operating Range	Green Arc
Do Not Exceed	240°F (red line)

OIL PRESSURE GAGE.

Idling Pressure	10 psi (red line)
Normal Operating Range	30-60 psi (green arc)
Maximum Pressure	100 psi (red line)

TACHOMETER.

Normal Operating Range	2200-2550 RPM (green arc)
Caution Range	2700-2850 RPM (yellow arc)
Maximum (Engine rated speed)	2850 RPM (red line)

MANIFOLD PRESSURE GAGE.

Normal Operating Range	15-25 in. Hg (green arc)

FUEL FLOW INDICATOR.

Normal Operating Range	7.0-17.0 gal/hr (green arc)
Minimum and Maximum	3.5 and 19.5 psi (25.2 gal/hr) (red lines)

NOTE

A placard, located adjacent to the fuel flow indicator, provides maximum performance take-off/climb fuel flow settings at altitude. These settings, as called out on the placard, are as follows:

	2700 RPM	2850 RPM
Sea Level	23 gal/hr	24 gal/hr
4000 Feet	21 gal/hr	22 gal/hr
8000 Feet	19 gal/hr	20 gal/hr

WEIGHT AND BALANCE.

The following information will enable you to operate your Cessna within the prescribed weight and center of gravity limitations. To figure the weight and balance for your particular airplane, use the Sample Problem, Loading Graph, and Center of Gravity Moment Envelope, as follows:

Take the licensed Empty Weight and Moment/1000 from the Weight and Balance Data sheet, plus any changes noted on forms FAA-337

carried in your airplane, and write them down in the proper columns. Using the Loading Graph, determine the moment/1000 of each item to be carried. Total the weights and moments/1000 and use the Center of Gravity Moment Envelope to determine whether the point falls within the envelope, and if the loading is acceptable.

NOTE

The Weight and Balance Data Sheet noted above is included in the aircraft file. The Loading Graph and Center of Gravity Moment Envelope shown in this section are also on the sheet titled Loading/Center of Gravity Charts and Weighing Procedures which is provided in the aircraft file.

BAGGAGE TIE-DOWN

A nylon baggage net having six tie-down straps is provided to secure baggage in the area aft of the wheel well with standard seating, or the areas forward and aft of the wheel well with optional four-place seating.

When using the baggage net with standard six-place seating, only four of the net tie-down straps are used. They are fastened to two tie-down rings located on the forward edge of the wheel well and two rings at the bottom edge of the rear cabin window. If the fifth and sixth seats are not occupied, the seat backs may be folded forward to create more baggage area. If this area is used, all six tie-down straps must be used. Tie the front straps of the net to the front legs of the fifth and sixth seats, and the remaining four straps to the tie-down rings provided.

If the aircraft is equipped with optional four-place seating, and the areas forward and aft of the wheel well are to be used for baggage, all six tie-down straps must be used. The following is a suggested method for loading and securing baggage.

(1) Tie front straps of baggage net to the two outside rear legs of the aft seats.
(2) Load baggage into area between seats and wheel well (120 lbs. maximum).
(3) Pull net over baggage and secure middle tie-down straps to tie-down rings on wheel well.

(4) Tie aft end of baggage net to tie-down rings at bottom edge of rear cabin window.
(5) Load remainder of baggage aft of wheel well through baggage door (120 lbs. maximum).

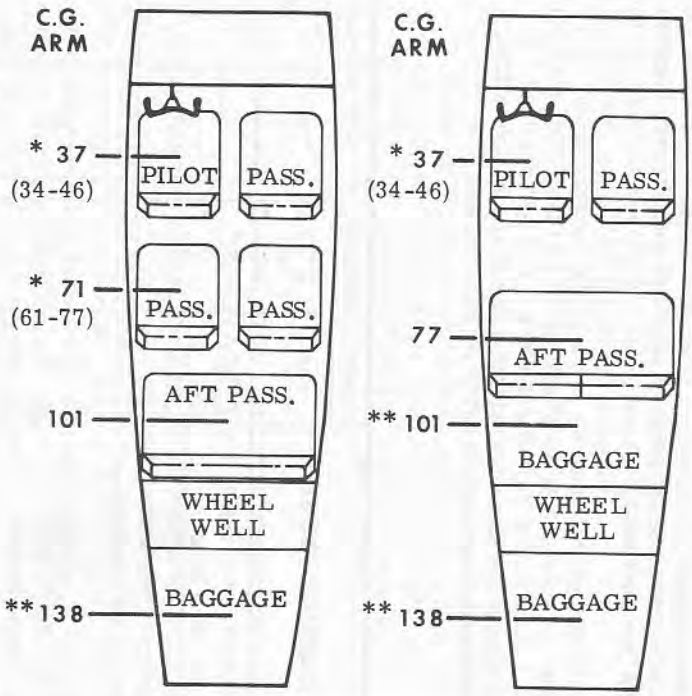
Weight and balance calculations for baggage forward of the wheel well in the four or six-place arrangement (limited to 120 lbs. maximum) can be approximated on the "Aft Passengers - 6-Place Seating" line of the loading graph. A line is provided on the graph for computing weight and balance of baggage in the aft baggage area.

SAMPLE LOADING PROBLEM	SAMPLE AIRPLANE		YOUR AIRPLANE	
	Weight (lbs.)	Moment (lb.-ins. /1000)	Weight (lbs.)	Moment (lb.-ins. /1000)
1. Licensed Empty Weight (Sample Airplane) . . .	2107	85.9		
2. Oil - Total Capacity 10 qts. (Includes 2 qts. unusable) (Full oil may be assumed for all flights)	19	-0.2	19	-0.2
3. Fuel - (Partial Capacity - 64 gal. at 6 lbs./gal.)				
Fuel - (Total Capacity - 89 gal. at 6 lbs./gal.)	534	23.0		
4. Pilot and Front Passenger	340	13.3		
5. Center Passengers - (6-Place Seating)	340	24.1		
6. Aft Passengers - (6-Place Seating)	340	34.3		
7. Aft Passengers - (4-Place Seating)				
8. Baggage - Aft of Wheel Well (120 lbs. max.) .	120	16.6		
9. Baggage - Forward of Wheel Well (120 lbs. max.)				
10. TOTAL WEIGHT AND MOMENT	3800	197.0		
11. Locate this point (3800 at 197.0) on the center of gravity moment envelope. Since this loading falls within the shaded area of the moment envelope, proceed with steps 12, 13 and 14. If the computed loading point falls within the clear area of the moment envelope, no further steps are required and the loading is assumed satisfactory for take-off and landing.				
12. Estimated Fuel Burn-Off (Climb and Cruise) (38 gallons at 6 lbs./gal.)	-228	-9.8		
13. Subtract step 12 from step 10 for estimated aircraft landing weight	3572	187.2		
14. Locate this point (3572 at 187.2) on the center of gravity moment envelope. If this point falls within the overall envelope, the loading may be assumed acceptable for landing.				

LOADING ARRANGEMENTS

* Pilot or passenger center of gravity on adjustable seats positioned for average occupant. Numbers in parenthesis indicate forward and aft limits of occupant center of gravity range.

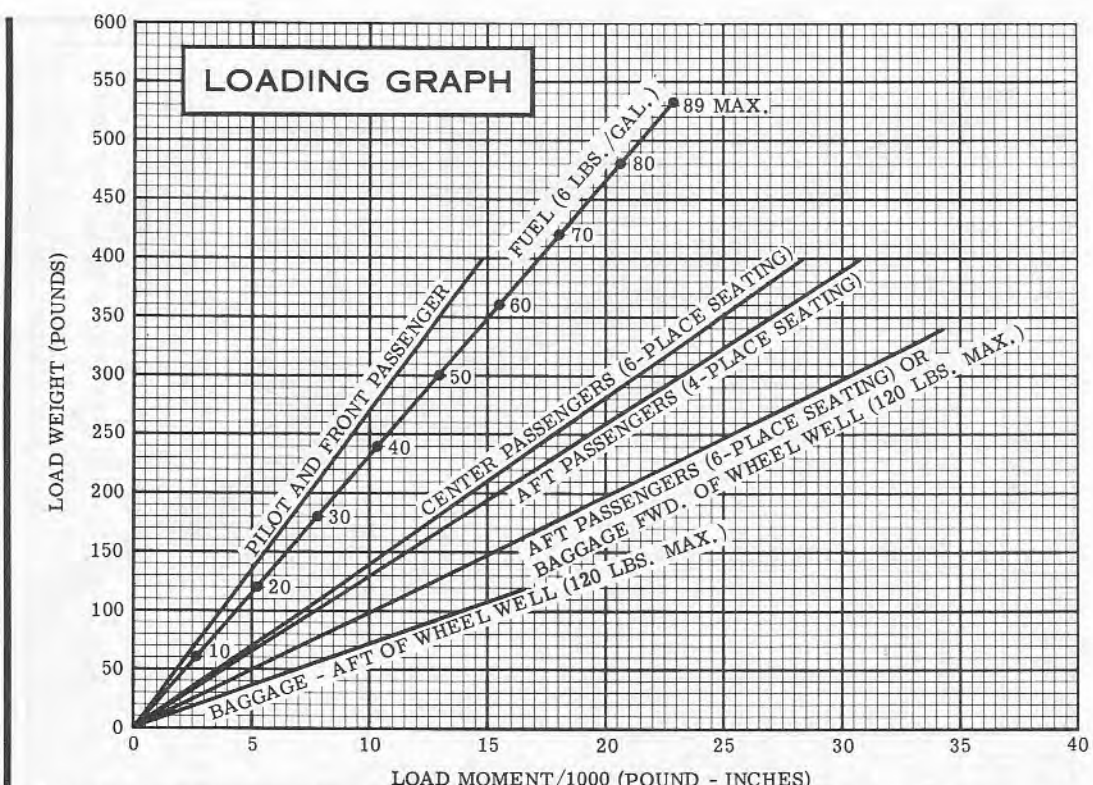
**Baggage area center of gravity.



6-PLACE SEATING

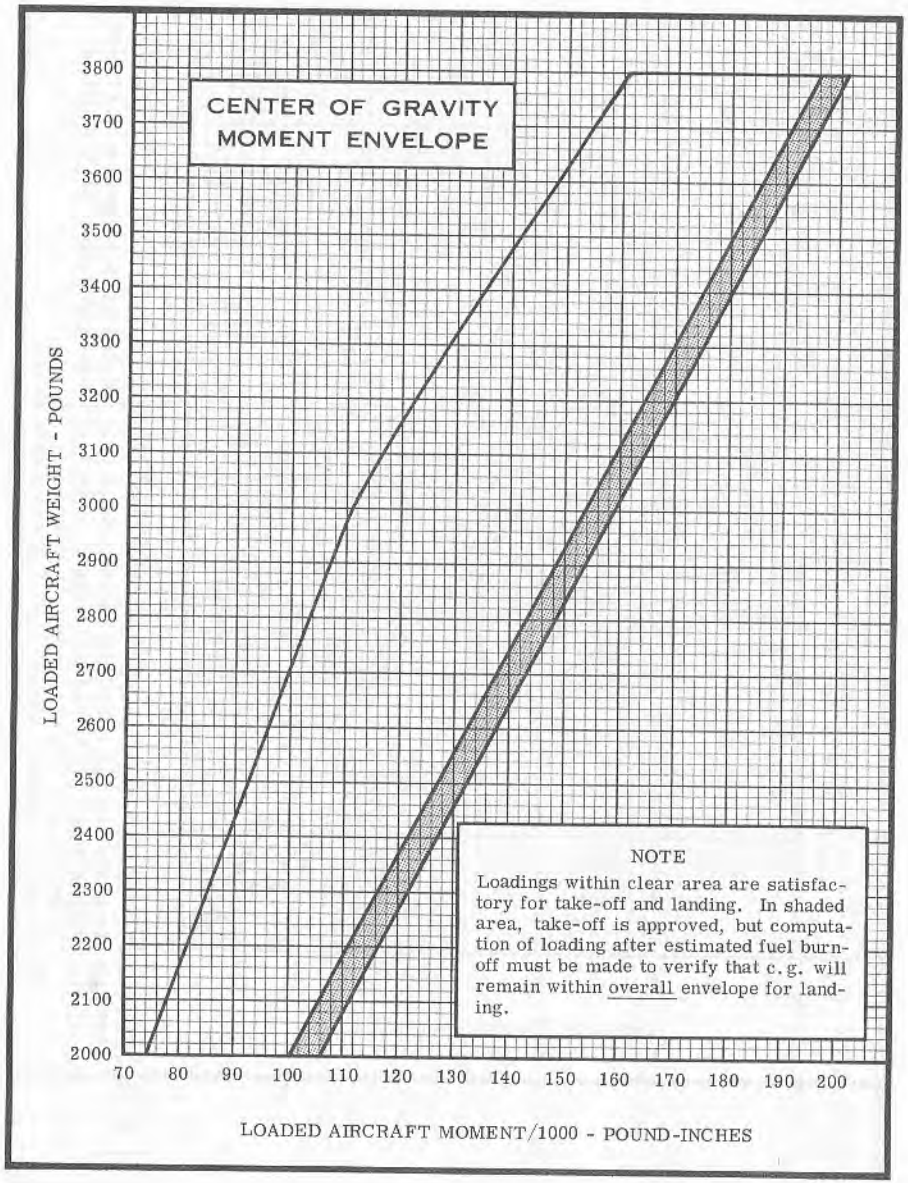
4-PLACE SEATING

LOADING GRAPH



NOTES: (1) Lines representing adjustable seats show the pilot or passenger center of gravity on adjustable seats positioned for an average occupant. Refer to the Loading Arrangements diagram for forward and aft limits of occupant c.g. range.

(2) Engine Oil: 10 Qts. = 19 Lbs. at -0.2 Moment/1000. (210)



Section V

CARE OF THE AIRPLANE

If your airplane is to retain that new-plane performance and dependability, certain inspection and maintenance requirements must be followed. It is wise to follow a planned schedule of lubrication and preventative maintenance based on climatic and flying conditions encountered in your locality.

Keep in touch with your Cessna Dealer, and take advantage of his knowledge and experience. He knows your airplane and how to maintain it. He will remind you when lubrications and oil changes are necessary, and about other seasonal and periodic services.

GROUND HANDLING.

The airplane is most easily and safely maneuvered during ground handling by the tow bar attached to the nose wheel.

NOTE

When using the tow bar, do not exceed the nose wheel turning angle of 30° either side of center.

MOORING YOUR AIRPLANE.

Proper tie-down procedure is your best precaution against damage to your parked airplane by gusty or strong winds. To tie down your airplane securely, proceed as follows:

(1) Set the parking brake and install the control wheel lock.
(2) Install a surface control lock over the fin and rudder.
(3) Tie sufficiently strong ropes or chains (700 pounds tensile strength) to the wing and tail tie-down fittings, and secure each rope or chain to a ramp tie-down.
(4) Tie a sufficiently strong rope to the nose gear torque link, and secure it to a ramp tie-down.
(5) Install a pitot tube cover.

WINDSHIELD-WINDOWS.

The plastic windshield and windows should be cleaned with an aircraft windshield cleaner. Apply the cleaner sparingly with soft cloths, and rub with moderate pressure until all dirt, oil scum and bug stains are removed. Allow the cleaner to dry, then wipe it off with soft flannel cloths.

If a windshield cleaner is not available, the plastic can be cleaned with soft cloths moistened with Stoddard solvent to remove oil and grease.

NOTE

Never use gasoline, benzine, alcohol, acetone, carbon tetrachloride, fire extinguisher or anti-ice fluid, lacquer thinner or glass cleaner to clean the plastic. These materials will attack the plastic and may cause it to craze.

Follow by carefully washing with a mild detergent and plenty of water. Rinse thoroughly, then dry with a clean moist chamois. Do not rub the plastic with a dry cloth since this builds up an electrostatic charge which attracts dust. Waxing with a good commercial wax will finish the cleaning job. A thin, even coat of wax, polished out by hand with clean soft flannel cloths, will fill in minor scratches and help prevent further scratching.

Do not use a canvas cover on the windshield unless freezing rain or sleet is anticipated since the cover may scratch the plastic surface.

PAINTED SURFACES.

The painted exterior surfaces of your new Cessna have a durable, long lasting finish and, under normal conditions, require no polishing or buffing. Approximately 15 days are required for the paint to cure completely; in most cases, the curing period will have been completed prior to delivery of the airplane. In the event that polishing or buffing is required within the curing period, it is recommended that the work be done by someone experienced in handling uncured paint. Any Cessna Dealer can accomplish this work.

Generally, the painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with cloths or a chamois. Harsh or abrasive soaps or detergents which cause corrosion or scratches should never be used. Remove stubborn oil and grease with a cloth moistened with Stoddard solvent.

Waxing is unnecessary to keep the painted surfaces bright. However, if desired, the airplane may be waxed with a good automotive wax. A heavier coating of wax on the leading edges of the wings and tail and on the engine nose cap and propeller spinner will help reduce the abrasion encountered in these areas.

When the airplane is parked outside in cold climates and it is necessary to remove ice before flight, care should be taken to protect the painted surfaces during ice removal with chemical liquids. A 50-50 solution of isopropyl alcohol and water will satisfactorily remove ice accumulations without damaging the paint. A solution with more than 50% alcohol is harmful and should be avoided. While applying the de-icing solution, keep it away from the windshield and cabin windows since the alcohol will attack the plastic and may cause it to craze.

PROPELLER CARE.

Preflight inspection of propeller blades for nicks, and wiping them occasionally with an oily cloth to clean off grass and bug stains will assure long, trouble-free service. It is vital that small nicks on the propeller, particularly near the tips and on the leading edges, are dressed out as soon as possible since these nicks produce stress concentrations, and if ignored, may result in cracks. Never use an alkaline cleaner on the blades; remove grease and dirt with carbon tetrachloride or Stoddard solvent.

LANDING GEAR CARE.

Cessna Dealer's mechanics have been trained in the proper adjustment and rigging procedures on the aircraft hydraulic system. To assure trouble-free gear operation, have your Cessna Dealer check the gear regularly and make any necessary adjustments. Only properly trained mechanics should attempt to repair or adjust the landing gear.

INTERIOR CARE.

To remove dust and loose dirt from the upholstery fabric and carpet, clean the interior regularly with a vacuum cleaner.

Blot up any spilled liquid promptly with cleansing tissue or rags. Don't pat the spot; press the blotting material firmly and hold it for several seconds. Continue blotting until no more liquid is taken up. Scrape off sticky materials with a dull knife, then spot-clean the area.

Oily spots may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place on the fabric to be cleaned. Never saturate the fabric with a volatile solvent; it may damage the padding and backing materials.

Soiled upholstery fabric and carpet may be cleaned with a foam-type detergent, used according to the manufacturer's instructions. Keep the foam as dry as possible and remove it with a vacuum cleaner, to minimize wetting the fabric.

If your airplane is equipped with leather seating, cleaning of the seats is accomplished using a soft cloth or sponge dipped in mild soap suds. The soap suds, used sparingly, will remove traces of dirt and grease. The soap should be removed with a clean damp cloth.

The plastic trim, headliner, instrument panel and control knobs need only be wiped off with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with Stoddard solvent. Volatile solvents, such as mentioned in paragraphs on care of the windshield, must never be used since they soften and craze the plastic.

Radio and autopilot faceplates are finished with a suede coating which produces a soft, rich appearance and warm feel comparable to suede. Unlike suede leather, dust and dirt marks can be removed easily with a damp sponge. Remove non-greasy stains with a liquid cleaner such as "Mr. Clean", "Handy Andy", "Lestoil", "Liquid Ajax", or "Cinch". Greasy stains can be removed with a naptha-dampened sponge, scrub brush or lint-free cloth.

FLYABLE STORAGE.

Aircraft which are not in daily flight should have the engine started and warmed up at least once each week. In damp climates and in storage areas where the daily temperature variation can cause condensation, the warm-up operation should be accomplished more frequently. Warming

up the engine replaces oil which has drained from surfaces of internal parts while standing idle. Warm up should be accomplished at a throttle setting necessary to produce an oil temperature within the lower green arc range.

NOTE

Excessive ground operation is to be avoided so that maximum cylinder head temperatures are not exceeded.

Engine warm up also helps to eliminate excessive accumulations of water in the fuel system and other air spaces in the engine. Keep fuel tanks full to minimize condensation in the tanks. Keep the battery fully charged to prevent the electrolyte from freezing in cold weather. If the aircraft is to be stored temporarily, or indefinitely, refer to the Service Manual for proper storage procedures.

INSPECTION SERVICE AND INSPECTION PERIODS.

With your airplane you will receive an Owner's Service Policy. Coupons attached to the policy entitle you to an initial inspection and the first 100-hour inspection at no charge. If you take delivery from your Dealer, he will perform the initial inspection before delivery of the airplane to you. If you pick up the airplane at the factory, plan to take it to your Dealer reasonably soon after you take delivery on it. This will permit him to check it over and to make any minor adjustments that may appear necessary. Also, plan an inspection by your Dealer at 100 hours or 180 days, whichever comes first. This inspection also is performed by your Dealer for you at no charge. While these important inspections will be performed for you by any Cessna Dealer, in most cases you will prefer to have the Dealer from whom you purchased the airplane accomplish this work.

Federal Aviation Regulations require that all airplanes have a periodic (annual) inspection as prescribed by the administrator, and performed by a person designated by the administrator. In addition, 100-hour periodic inspections made by an "appropriately-rated mechanic" are required if the airplane is flown for hire. The Cessna Aircraft Company recommends the 100-hour periodic inspection for your airplane. The procedure for this 100-hour inspection has been carefully worked out by the factory and is followed

by the Cessna Dealer Organization. The complete familiarity of the Cessna Dealer Organization with Cessna equipment and with factory-approved procedures provides the highest type of service possible at lower cost.

AIRCRAFT FILE.

There are miscellaneous data, information and licenses that are a part of the aircraft file. The following is a check list for that file. In addition, a periodic check should be made of the latest Federal Aviation Regulations to insure that all data requirements are met.

A. To be displayed in the aircraft at all times:

(1) Aircraft Airworthiness Certificate (Form FAA-8100-2).
(2) Aircraft Registration Certificate (Form FAA-8050-3).
(3) Aircraft Radio Station License (Form FCC 404-2, if transmitter installed).

B. To be carried in the aircraft at all times:

(1) Weight and Balance, and associated papers (latest copy of the Repair and Alteration Form, Form FAA 337, if applicable).
(2) Aircraft Equipment List.

C. To be made available upon request:

(1) Aircraft Log Book.
(2) Engine Log Book.

NOTE

Cessna recommends that these items, plus the Owner's Manual, "Cessna Flight Guide" (Flight Computer), and Service Policies, be carried in the aircraft at all times.

Most of the items listed are required by the United States Federal Aviation Regulations. Since the regulations of other nations may require other documents and data, owners of exported aircraft should check with their own aviation officials to determine their individual requirements.

LUBRICATION AND SERVICING PROCEDURES

Specific servicing information is provided here for items requiring daily attention. A Servicing Intervals Check List is included to inform the pilot when to have other items checked and serviced.

DAILY

FUEL BAY FILLERS:

Service after each flight with 100/130 minimum grade fuel. Fill each bay to the top of the filler for a total capacity of 45 gallons in each bay, or fill to the bottom edge of the fuel filler collar for reduced fuel loading of 32.5 gallons in each bay.

FUEL STRAINER:

Before the first flight of the day and after each refueling, pull out strainer drain knob for about four seconds to clear fuel strainer of possible water and sediment. Make sure drain valve is closed after draining. If water is observed, there is a possibility that the fuel bay sumps contain water. Thus, the fuel bay sump drain plugs and fuel reservoir drain plugs should be removed to check for the presence of water.

OIL FILLER:

When preflight check shows low oil level, service with aviation grade engine oil, SAE 50 above 40°F and SAE 10W30 or SAE 30 below 40°F. (Multi-viscosity oil with a range of SAE 10W30 is recommended for improved starting in cold weather.) Detergent or disperant oil, conforming to Continental Motors Specification MHS-24A, must be used. Your Cessna Dealer can supply approved brands of oil.

NOTE

To promote faster ring seating and improved oil control, your Cessna was delivered from the factory with straight mineral oil (non-detergent). This "break-in" oil should be used only for the first 20 to 30 hours of operation, at which time it must be replaced with detergent oil.

LUBRICATION AND SERVICING PROCEDURES

DAILY (Continued)

OIL DIPSTICK:

Check oil level before each flight. Do not operate on less than 7 quarts. To minimize loss of oil through breather, fill to 8 quart level for normal flights of less than 3 hours. For extended flight, fill to 10 quarts. If optional oil filter is installed, one additional quart is required when the filter element is changed.

OXYGEN CYLINDERS AND FILLER VALVE (OPT):

Check oxygen pressure gage for anticipated requirements before each flight. Use filler valve located on the bottom of the right wing just outboard of the rear door post under a round cover plate to refill cylinders with aviator's breathing oxygen (Spec. No. MIL-O-27210). Maximum pressure (cylinder temperature stabilized after filling), 1800 psi at 70°F. Refer to page 7-14 for filling pressures.

SERVICING INTERVALS CHECK LIST

EACH 50 HOURS

BATTERY -- Check and service. Check oftener (at least every 30 days) if operating in hot weather.

ENGINE OIL AND OIL FILTER -- Change engine oil and replace filter element. If optional oil filter is not installed, change oil and clean screen every 25 hours. Change engine oil at least every four months even though less than 50 hours have been accumulated. Reduce periods for prolonged operation in dusty areas, cold climates, or when short flights and long idle periods result in sludging conditions.

NOTE

After first 20 to 30 hours of engine operation, an initial oil change should be made to remove "break-in" oil and change the filter, if installed.

INDUCTION AIR FILTER -- Clean or replace. Under extremely dusty conditions, daily maintenance of the filter is recommended.

NOSE GEAR TORQUE LINKS -- Lubricate. When operating under dusty conditions, more frequent lubrication is recommended.

SHIMMY DAMPENER -- Refer to Service Manual for detailed instructions on checking and filling.

EACH 100 HOURS

SPARK PLUGS -- Clean, test and regap.

FUEL STRAINER -- Disassemble and clean.

FUEL BAY SUMP DRAIN PLUGS -- Drain.

FUEL RESERVOIR DRAIN PLUGS -- Drain.

FUEL/AIR CONTROL UNIT SCREEN -- Clean.

BRAKE MASTER CYLINDERS -- Check and fill.

HYDRAULIC SYSTEM FILTER -- Disassemble and clean.

VACUUM SYSTEM OIL SEPARATOR (OPT) -- Clean.

SUCTION RELIEF VALVE INLET SCREEN (OPT) -- Clean.

SERVICING INTERVALS CHECK LIST
(Continued)

EACH 500 HOURS

WHEEL BEARINGS -- Lubricate at first 100 hours and at 500 hours thereafter. Reduce lubrication interval to 100 hours when operating in dusty or seacoast areas, during periods of extensive taxiing, or when numerous take-offs and landings are made.

LANDING GEAR PIVOT SHAFT BEARINGS -- Lubricate.

VACUUM SYSTEM AIR FILTER (OPT) -- Replace filter element. Replace sooner if suction gage reading drops to 4.6 in. Hg.

AS REQUIRED

NOSE GEAR SHOCK STRUT -- Keep filled with fluid and inflated to 90 psi.

HYDRAULIC FLUID RESERVOIR -- Check fluid level through sight window and fill through filler fitting with MIL-H-5606 hydraulic fluid.

OXYGEN CYLINDERS -- The oxygen cylinders must be hydrostatically tested at specific intervals in accordance with Federal Regulations. Refer to Service Manual for detailed instructions.

OWNER FOLLOW-UP SYSTEM

Your Cessna Dealer has an owner follow-up system to notify you when he receives information that applies to your Cessna. In addition, if you wish, you may choose to receive similar notification directly from the Cessna Service Department. A subscription card is supplied in your aircraft file for your use, should you choose to request this service. Your Cessna Dealer will be glad to supply you with details concerning these follow-up programs, and stands ready through his Service Department to supply you with fast, efficient, low cost service.

PUBLICATIONS

Various publications and flight operation aids are furnished in the aircraft when delivered from the factory. These items are listed below.

- OWNER'S MANUALS FOR YOUR
  AIRCRAFT
  ELECTRONICS AND AUTOPILOT
- CESSNA FLIGHT GUIDE (FLIGHT COMPUTER)
- SALES AND SERVICE DEALER DIRECTORY
- DO'S AND DON'TS ENGINE BOOKLET

The following additional publications, plus many other supplies that are applicable to your aircraft, are available from your Cessna Dealer.

- SERVICE MANUALS AND PARTS CATALOGS FOR YOUR
  AIRCRAFT
  ENGINE AND ACCESSORIES
  ELECTRONICS AND AUTOPILOT

Your Cessna Dealer has a current catalog of all available Customer Services Supplies, many of which he keeps on hand. If supplies are not in stock, your Cessna Dealer will be happy to order for you.

Section VI

OPERATIONAL DATA

The operational data charts on the following pages are presented for two purposes: first, so that you may know what to expect from your airplane under various conditions; and second, to enable you to plan your flights in detail and with reasonable accuracy.

The data in the charts has been compiled from actual flight tests with the airplane and engine in good condition and using average piloting techniques. Note also that the range charts make no allowances for wind, navigational errors, warm-up, take-off, climb, etc. You must estimate these variables for yourself and make allowances accordingly.

Remember that the charts contained herein are based on standard day conditions. For more precise power, fuel consumption, and endurance information, consult the Cessna Flight Guide (Power Computer) supplied with your aircraft. With the Flight Guide, you can easily take into account temperature variations from standard at any flight altitude.

AIRSPEED CORRECTION TABLE

FLAPS 0°	IAS	80	100	120	140	160	180	200
	CAS	81	101	121	140	160	180	200
*FLAPS 10°	IAS	70	80	90	100	120	140	160
	CAS	72	81	91	101	121	141	161
**FLAPS 30°	IAS	50	60	70	80	90	100	110
	CAS	60	68	76	85	94	104	113

*MAXIMUM SPEED, FLAPS EXTENDED-160 MPH CAS
**MAXIMUM SPEED, FLAPS EXTENDED-110 MPH CAS

Figure 6-1.

STALL SPEEDS, POWER OFF

	CONDITION	ANGLE OF BANK 0°	20°	40°	60°
3800 LBS GROSS WEIGHT	FLAPS UP	75	77	85	106
	FLAPS 10°	73	74	82	103
	FLAPS 30°	65	66	73	92

SPEEDS ARE MPH - CAS GEAR UP OR DOWN

Figure 6-2.

TAKE-OFF DATA

TAKE-OFF DISTANCE WITH 10° FLAPS FROM HARD SURFACE RUNWAY

GROSS WEIGHT POUNDS	IAS @50' MPH	HEAD WIND KNOTS	AT SEA LEVEL & 59°F GROUND RUN	AT SEA LEVEL & 59°F TOTAL TO CLEAR 50 FT OBS	AT 2500 FT & 50°F GROUND RUN	AT 2500 FT & 50°F TOTAL TO CLEAR 50 FT OBS	AT 5000 FT & 41°F GROUND RUN	AT 5000 FT & 41°F TOTAL TO CLEAR 50 FT OBS	AT 7500 FT & 32°F GROUND RUN	AT 7500 FT & 32°F TOTAL TO CLEAR 50 FT OBS
3800	82	0	1100	1900	1325	2305	1600	2855	1955	3790
		10	820	1505	1000	1840	1215	2305	1505	3110
		20	575	1150	715	1425	885	1810	1110	2480
3400	77	0	850	1505	1020	1780	1225	2130	1495	2655
		10	620	1175	755	1400	920	1695	1130	2135
		20	425	880	525	1065	650	1300	815	1665
3000	72	0	640	1190	765	1380	915	1610	1110	1940
		10	455	920	555	1070	675	1265	825	1535
		20	305	675	375	800	465	950	580	1170

NOTES:
1. Increase distances 10% for each 20°F above standard temperature for particular altitude.
2. For operation on a dry, grass runway, increase distances (both "ground run" and "total to clear 50 ft. obstacle") by 5% of the "total to clear 50 ft. obstacle" figure.

MAXIMUM RATE-OF-CLIMB DATA

GROSS WEIGHT POUNDS	AT SEA LEVEL & 59°F IAS MPH	AT SEA LEVEL & 59°F RATE OF CLIMB FT/MIN.	AT SEA LEVEL & 59°F GAL OF FUEL USED	AT 5000 FT & 41°F IAS MPH	AT 5000 FT & 41°F RATE OF CLIMB FT/MIN.	AT 5000 FT & 41°F FROM S.L. FUEL USED	AT 10,000 FT & 23°F IAS MPH	AT 10,000 FT & 23°F RATE OF CLIMB FT/MIN.	AT 10,000 FT & 23°F FROM S.L. FUEL USED	AT 15,000 FT & 5°F IAS MPH	AT 15,000 FT & 5°F RATE OF CLIMB FT/MIN.	AT 15,000 FT & 5°F FROM S.L. FUEL USED
3800	109	860	2.0	105	610	4.4	102	365	7.7	98	120	14.0
3400	106	1025	2.0	102	770	4.0	99	505	6.5	95	250	10.3
3000	103	1230	2.0	99	950	3.6	96	670	5.6	92	395	8.2

NOTES:
1. Full throttle, 2700 RPM, mixture at recommended leaning schedule, flaps up.
2. Fuel used includes warm-up and take-off allowance.
3. For hot weather, decrease rate of climb 30 ft./min. for each 10°F above standard day temperature for particular altitude.

Figure 6-3.

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 3800 Pounds

2500 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	64 GAL(NO RESERVE)		89 GAL(NO RESERVE)	
					ENDR. HOURS	RANGE MILES	ENDR. HOURS	RANGE MILES
2550	25	79	178	16.4	3.9	695	5.4	965
	24	74	174	15.5	4.1	720	5.7	1000
	23	70	170	14.7	4.4	740	6.1	1030
	22	66	166	13.8	4.6	765	6.4	1065
2500	25	76	176	15.9	4.0	710	5.6	985
	24	72	172	15.1	4.2	730	5.9	1015
	23	68	168	14.3	4.5	755	6.2	1050
	22	64	163	13.5	4.8	775	6.6	1080
2400	25	71	171	14.9	4.3	735	6.0	1025
	24	67	167	14.1	4.5	755	6.3	1055
	23	64	163	13.4	4.8	780	6.7	1080
	22	60	157	12.6	5.1	800	7.1	1110
2300	25	67	166	14.0	4.6	760	6.4	1060
	24	63	162	13.3	4.8	780	6.7	1085
	23	60	157	12.6	5.1	800	7.1	1115
	22	56	152	11.9	5.4	815	7.5	1135
2200	25	62	160	13.0	4.9	790	6.9	1100
	24	58	155	12.3	5.2	805	7.2	1120
	23	55	150	11.7	5.5	820	7.6	1140
	22	52	145	11.1	5.8	835	8.0	1160
	21	48	138	10.4	6.1	845	8.5	1175
	20	45	130	9.8	6.5	845	9.1	1175
	19	42	120	9.2	7.0	835	9.7	1160

Figure 6-4 (Sheet 1 of 6).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 3800 Pounds

5000 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	64 GAL(NO RESERVE)		89 GAL(NO RESERVE)	
					ENDR. HOURS	RANGE MILES	ENDR. HOURS	RANGE MILES
2550	25	81	187	16.9	3.8	705	5.3	985
	24	77	183	16.0	4.0	730	5.5	1015
	23	73	179	15.2	4.2	755	5.9	1050
	22	68	174	14.3	4.5	775	6.2	1080
2500	25	78	184	16.4	3.9	720	5.4	1000
	24	74	181	15.6	4.1	740	5.7	1030
	23	70	176	14.7	4.3	765	6.0	1065
	22	66	172	13.9	4.6	790	6.4	1095
2400	25	73	179	15.3	4.2	750	5.8	1045
	24	69	175	14.5	4.4	770	6.1	1075
	23	66	171	13.8	4.6	790	6.5	1100
	22	62	165	13.0	4.9	810	6.8	1130
2300	25	69	174	14.4	4.4	775	6.2	1080
	24	65	170	13.7	4.7	795	6.5	1105
	23	62	165	13.0	4.9	815	6.9	1130
	22	58	160	12.3	5.2	830	7.3	1155
2200	25	63	167	13.3	4.8	805	6.7	1120
	24	60	163	12.7	5.0	820	7.0	1140
	23	57	158	12.1	5.3	835	7.4	1165
	22	54	152	11.4	5.6	850	7.8	1185
	21	50	146	10.8	5.9	860	8.2	1200
	20	47	138	10.2	6.3	865	8.7	1200
	19	44	128	9.6	6.7	855	9.3	1190

Figure 6-4 (Sheet 2 of 6).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 3800 Pounds

7500 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	64 GAL(NO RESERVE) ENDR. HOURS	64 GAL(NO RESERVE) RANGE MILES	89 GAL(NO RESERVE) ENDR. HOURS	89 GAL(NO RESERVE) RANGE MILES
2550	23	75	187	15.7	4.1	765	5.7	1065
	22	71	183	14.8	4.3	790	6.0	1095
	21	67	178	14.0	4.6	810	6.4	1130
	20	63	172	13.2	4.9	835	6.8	1160
2500	23	73	185	15.2	4.2	780	5.8	1080
	22	69	180	14.4	4.4	800	6.2	1115
	21	65	175	13.6	4.7	820	6.5	1145
	20	61	168	12.8	5.0	845	7.0	1175
2400	23	68	179	14.2	4.5	805	6.3	1120
	22	64	174	13.5	4.8	825	6.6	1150
	21	60	168	12.7	5.0	845	7.0	1175
	20	57	162	12.0	5.3	865	7.4	1200
2300	23	64	173	13.4	4.8	830	6.6	1150
	22	60	168	12.7	5.0	845	7.0	1175
	21	57	162	12.0	5.3	865	7.4	1200
	20	53	155	11.3	5.7	875	7.9	1220
2200	23	59	166	12.4	5.1	855	7.2	1185
	22	56	160	11.8	5.4	870	7.5	1205
	21	52	154	11.2	5.7	880	7.9	1220
	20	49	146	10.6	6.1	880	8.4	1225
	19	46	136	9.9	6.4	875	9.0	1220

Figure 6-4 (Sheet 3 of 6).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 3800 Pounds

10,000 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	64 GAL(NO RESERVE) ENDR. HOURS	64 GAL(NO RESERVE) RANGE MILES	89 GAL(NO RESERVE) ENDR. HOURS	89 GAL(NO RESERVE) RANGE MILES
2550	21	69	187	14.5	4.4	825	6.1	1145
	20	65	181	13.7	4.7	845	6.5	1175
	19	61	174	12.8	5.0	870	6.9	1210
	18	56	166	12.0	5.3	890	7.4	1235
2500	21	67	184	14.1	4.5	835	6.3	1160
	20	63	177	13.3	4.8	855	6.7	1190
	19	59	171	12.4	5.1	880	7.2	1220
	18	55	163	11.6	5.5	895	7.7	1245
2400	21	63	177	13.2	4.9	860	6.8	1195
	20	59	171	12.4	5.1	880	7.2	1220
	19	55	163	11.7	5.5	895	7.6	1245
	18	51	154	11.0	5.8	900	8.1	1250
2300	21	59	170	12.4	5.2	880	7.2	1225
	20	55	163	11.7	5.5	895	7.6	1245
	19	51	155	11.0	5.8	900	8.1	1250
	18	48	144	10.3	6.2	895	8.6	1245
2200	21	54	162	11.6	5.5	895	7.7	1245
	20	51	154	11.0	5.8	900	8.1	1250
	19	48	144	10.3	6.2	895	8.6	1245
	18	44	134	9.7	6.6	885	9.2	1230

Figure 6-4 (Sheet 4 of 6).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 3800 Pounds

12,500 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	64 GAL(NO RESERVE) ENDR. HOURS	64 GAL(NO RESERVE) RANGE MILES	89 GAL(NO RESERVE) ENDR. HOURS	89 GAL(NO RESERVE) RANGE MILES
2550	19	63	183	13.3	4.8	880	6.7	1225
	18	59	176	12.4	5.1	905	7.2	1255
	17	55	166	11.6	5.5	920	7.7	1275
	16	50	154	10.8	5.9	915	8.3	1275
2500	19	61	180	12.9	5.0	895	6.9	1240
	18	57	172	12.1	5.3	910	7.4	1270
	17	53	161	11.3	5.7	920	7.9	1275
	16	48	149	10.4	6.1	910	8.5	1270
2400	19	57	173	12.1	5.3	910	7.3	1265
	18	53	163	11.4	5.6	920	7.8	1275
	17	49	152	10.6	6.0	915	8.4	1270
	16	45	139	9.9	6.5	900	9.0	1250
2300	19	54	164	11.4	5.6	920	7.8	1275
	18	50	153	10.7	6.0	915	8.3	1270
	17	46	141	10.0	6.4	905	8.9	1260
2200	19	50	153	10.7	6.0	915	8.3	1270
	18	46	142	10.0	6.4	905	8.9	1260

Figure 6-4 (Sheet 5 of 6).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 3800 Pounds

15,000 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	64 GAL(NO RESERVE) ENDR. HOURS	64 GAL(NO RESERVE) RANGE MILES	89 GAL(NO RESERVE) ENDR. HOURS	89 GAL(NO RESERVE) RANGE MILES
2550	17	57	176	12.1	5.3	935	7.4	1300
	16	52	164	11.2	5.7	935	8.0	1300
	15	48	149	10.3	6.2	925	8.6	1285
2500	17	55	171	11.7	5.5	935	7.6	1300
	16	51	158	10.9	5.9	930	8.2	1295
	15	46	143	10.0	6.4	915	8.9	1275
2400	17	52	161	11.1	5.8	935	8.1	1300
	16	47	148	10.3	6.2	925	8.7	1285
2300	17	48	150	10.4	6.2	925	8.6	1290
	16	44	136	9.6	6.6	900	9.2	1255
2200	17	45	138	9.7	6.6	905	9.1	1260

Figure 6-4 (Sheet 6 of 6).

LANDING DISTANCE TABLE

LANDING DISTANCE WITH 30° FLAPS ON HARD SURFACED RUNWAY

GROSS WEIGHT POUNDS	APPROACH IAS MPH	@ SEA LEVEL & 59°F		@ 2500 FEET & 50°F		@ 5000 FEET & 41°F		@ 7500 FEET & 32°F	
		GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS.	GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS.	GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS.	GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS.
3800	82	765	1500	815	1595	865	1695	920	1805

NOTES:
1. Distances shown are based on zero wind, power off, and heavy braking.
2. Reduce landing distances 10% for each 5 knots headwind.
3. For operation on a dry, grass runway, increase distances (both "ground roll" and "total to clear 50 ft. obstacle") by 20% of the "total to clear 50 ft. obstacle" figure.

Figure 6-5.

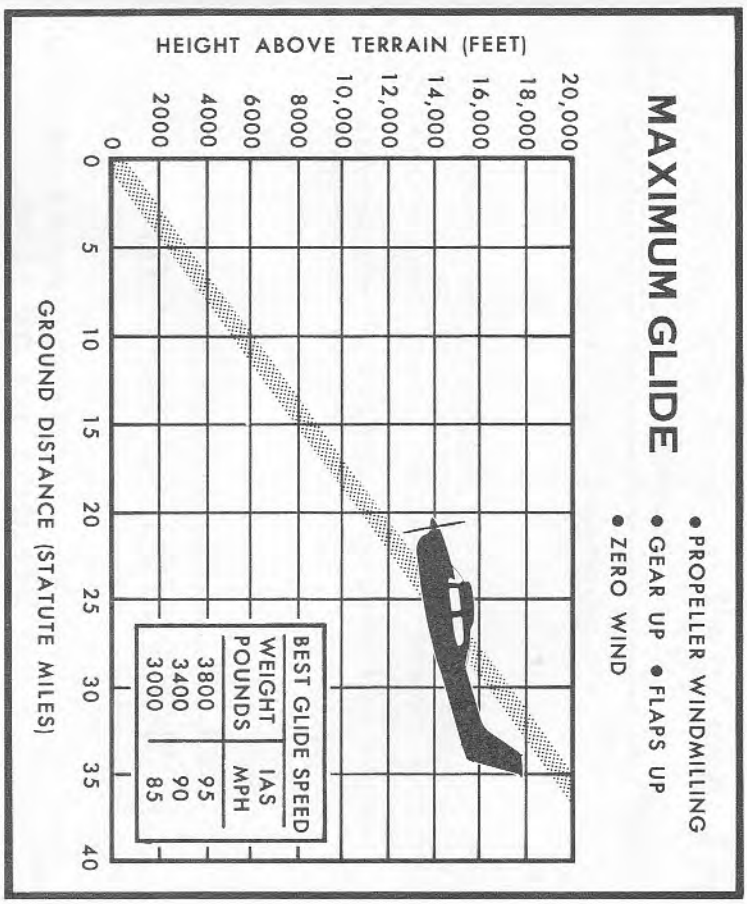


Figure 6-6.

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. Owner's Manual Supplements are provided to cover operation of other optional equipment systems when installed in your airplane. Contact your Cessna Dealer for a complete list of available optional equipment.

COLD WEATHER EQUIPMENT

WINTERIZATION KIT AND NON-CONGEALING OIL COOLER.

For continuous operation in temperatures consistently below 20°F, the Cessna winterization kit and non-congealing oil cooler should be installed to improve engine operation. The winterization kit consists of two shields to partially cover the cowl nose cap opening, and insulation for the crankcase breather line. Once installed, the crankcase breather insulation is approved for permanent use in both cold and hot weather. The non-congealing oil cooler replaces the standard oil cooler and provides improved oil flow through the cooler in cold weather.

GROUND SERVICE PLUG RECEPTACLE.

A ground service plug receptacle may be installed to permit the use of an external power source for cold weather starting and during lengthy maintenance work on the airplane electrical system (with the exception of electronic equipment).

NOTE

Electrical power for the airplane electrical circuits is provided through a split bus bar having all electronic circuits on one side of the bus and other electrical circuits on the other side of the bus. When an external power source is connected, a contactor automatically opens the circuit to the electronic portion of the split bus bar as a protection against damage to the transistors in the electronic equipment by transient voltages from the power source. Therefore, the external power source can not be used as a source of power when checking electronic components.

Just before connecting an external power source (generator type or battery cart), the master switch should be turned "ON."

The ground service plug receptacle circuit incorporates a polarity reversal protection. Power from the external power source will flow only if the ground service plug is correctly connected to the airplane. If the plug is accidently connected backwards, no power will flow to the airplane's electrical system, thereby preventing any damage to electrical equipment.

The battery and external power circuits have been designed to completely eliminate the need to "jumper" across the battery contactor to close it for charging a completely "dead" battery. A special fused circuit in the external power system supplies the needed "jumper" across the contacts so that with a "dead" battery and an external power source applied, turning the master switch "ON" will close the battery contactor.

ENGINE PRIMER SYSTEM.

A manually-operated, plunger-type engine primer may be installed in the control pedestal.

For quick smooth engine starts in zero degree temperatures, use six strokes of the primer before cranking, with an additional one or two strokes as the engine starts. In colder temperatures, use additional priming before cranking, and turn the auxiliary fuel pump switch on "HI" while cranking. After priming, make sure the primer is full in and locked.

STATIC PRESSURE ALTERNATE SOURCE VALVE.

A static pressure alternate source valve is available to provide continued operation of the airspeed indicator, altimeter and vertical speed indicator in the event that the static system ports or lines become obstructed. In addition, the valve permits draining of condensate from the static pressure lines.

If erroneous instrument readings are suspected due to water or ice in the static system ports or lines, the static pressure alternate source valve should be opened, venting the static system to the cabin as well as the static ports. However, cabin pressures will vary with open cabin ventilators or windows and varying airspeeds. The most adverse combinations will result in airspeed and altimeter variations of no more than 8 MPH and 80 feet respectively in the climb and approach speed ranges.

In cruising flight, the airspeed and altimeter will read high. However, in the landing approach (when instrument readings are more important) the instruments will generally read low. Therefore, using the normal published approach speeds and altitudes will result in a slightly faster approach speed and higher approach path than normal, giving an extra margin of safety.

OIL DILUTION SYSTEM.

If your airplane is equipped with an oil dilution system and very low temperatures are anticipated, dilute the oil prior to engine shut down by energizing the oil dilution switch with the engine operating at 1000 RPM. (Refer to figure 7-1 for dilution time for the anticipated temperature.) While diluting the oil, the oil pressure should be watched for any unusual fluctuations that might indicate a 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, clean the screen, refill with new oil and redilute as required.

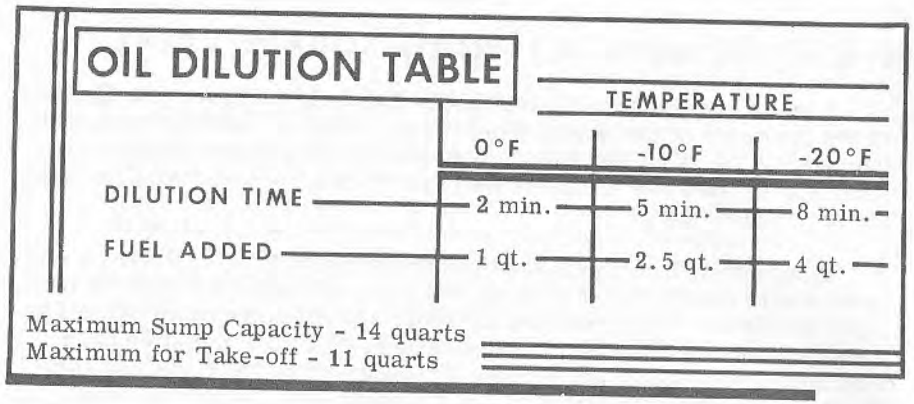


Figure 7-1.

If the full dilution time was used, beginning with a full oil sump (10 quarts), subsequent starts and engine warm-up should be prolonged to evaporate enough of the fuel to lower the oil sump level to 11 quarts prior to take-off. Otherwise, the sump may overflow when the airplane is in a nose high attitude.

To avoid progressive dilution of the oil, flights of at least two hours' duration should be made between oil dilution operations.

DE-ICING SYSTEM

Pneumatic de-icing boots are available as optional equipment for installation on the leading edges of the wings and horizontal stabilizer.

BEFORE ENTERING AIRPLANE.

Make an exterior inspection to check de-icing boots for tears, abrasions, and cleanliness. Boots must be cleaned and damage repaired prior to flight.

DURING ENGINE RUN-UP.

(1) Move de-icing switch to "ON" position and check inflation and deflation cycle. The pressure indicator light should be on during inflation part of cycle (approximately 6 seconds). The system should be checked through several cycles.

NOTE

The de-icing switch is a three position switch spring-loaded to the normal off (center) position. When pushed to the "ON" (up) position and released, it will activate one de-icing cycle. Each time a cycle is desired, the switch must be pushed to the "ON" position and released. When pushed to the "OFF" (down) position and released, the switch will stop the system at any point in its cycle.

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

IN FLIGHT.

Flight into known or forecast icing conditions should be avoided whenever possible. If unexpected icing conditions are encountered, the following procedure is recommended.

(1) When ice has accumulated to approximately 1/2 inch thick on the leading edges, push de-icing switch to the "ON" position and release. The switch must be pushed again if additional cycles are required.

NOTE

The de-icing system will operate up to a maximum altitude of 14,500 feet; however, at or near this altitude, engine RPM must be a minimum of 2500 RPM.

AFTER LANDING.

Check de-icing boots for damage and cleanliness. Remove any accumulations of engine oil or grease.

OPERATING DETAILS

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

De-icing boots are intended for removal of ice after it has accumulated rather than prevent its formation. If ice accumulation is slow, best results can be obtained by not using the de-ice system until approximately 1/2 inch of ice has accumulated. Clear the accumulation with one or two cycles of operation. Do not repeat de-icing procedure until ice has again accumulated.

Continual cycling of the de-ice system is not recommended as this may cause ice to form outside the contour of the inflated boots, preventing its removal.

NOTE

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

DE-ICER BOOT CARE.

De-icing boots have a special electrically-conductive coating to bleed off static electricity which causes radio interference and could perforate the boots. Fueling and other servicing should be done carefully to avoid damage to the conductive coating or tearing of the boot.

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

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

ICE DETECTOR LIGHT

An ice detector light may be installed to facilitate the detection of wing ice at night or during reduced visibility.

The ice detector light system consists of a light installed on the left side of the cowl deck forward of the windshield which is positioned to illuminate the leading edge of the wing, and a momentary push-button type switch located to the left of the circuit breakers. The switch button must be held in as long as the light is required.

PROPELLER ANTI-ICE SYSTEM

A propeller anti-ice system is available to facilitate all-weather operation. The system is operated by a toggle switch located above the right hand switch and control panel. When the switch is placed in the "ON" position, current flows to an anti-ice timer which supplies electric power in cycles every 30 seconds to elements in the anti-icing boots located on the propeller blades. Operation of the anti-ice system can be checked by a propeller anti-ice ammeter located on the extreme right side of the instrument panel. The anti-ice system is protected by a circuit breaker located in the circuit breaker panel.

NORMAL OPERATION.

(1) Master Switch -- "ON."
(2) Propeller Anti-Ice Circuit Breaker -- Check in.
(3) Propeller Anti-Ice Switch -- "ON."
(4) Propeller Anti-Ice Ammeter -- Check in green arc range (2-bladed propeller -- 20 to 24 amps, 3-bladed -- 30 to 34 amps).

NOTE

To check the heating elements and anti-ice timer for one complete cycle, the system must be left on for approximately 1-1/2 minutes. Ammeter readings must remain in the green arc except during momentary change.

NOTE

While using the anti-ice system, limit the use of other electrical equipment so that the aircraft system ammeter maintains a slight charge indication, assuring that the electrical system is not overloaded.

IMPORTANT

If the ammeter indicates unusually high or low amperage during the 30 second cycle of operation, a malfunction has occurred and it is imperative that the system be turned off. Uneven anti-icing may result, causing propeller unbalance and engine roughness.

(5) When anti-icing is no longer needed, move propeller anti-ice switch to the "OFF" position.

RADIO SELECTOR SWITCHES

RADIO SELECTOR SWITCH OPERATION.

Operation of the radio equipment is normal as covered in the respective radio manuals. When more than one radio is installed, an audio switching system is necessary. The operation of this switching system is described below.

TRANSMITTER SELECTOR SWITCH.

The transmitter selector switch has two positions. When two transmitters are installed, it is necessary to switch the microphone to the radio unit the pilot desires to use for transmission. This is accomplished by placing the transmitter selector switch in the position corresponding to the radio unit which is to be used. The up position selects the upper transmitter and the down position selects the lower transmitter.

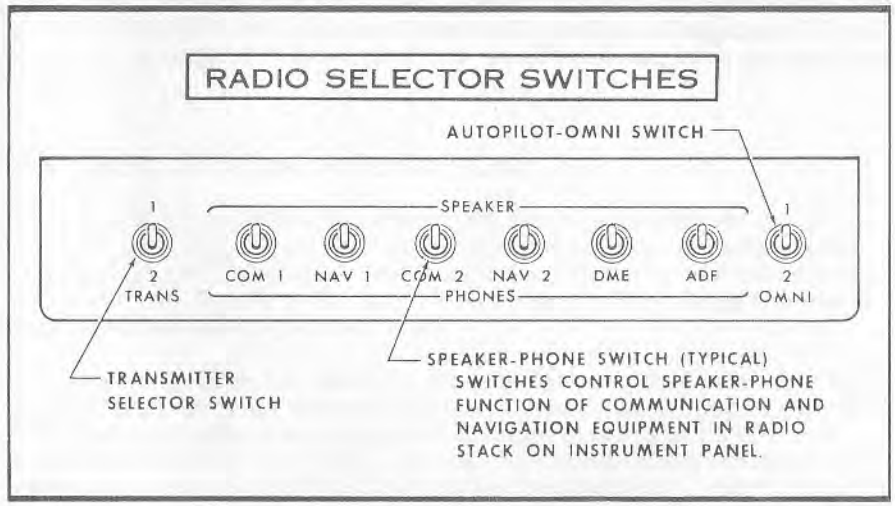


Figure 7-2.

The installation of Cessna radio equipment provides certain audio back-up capabilities and transmitter selector switch functions that the pilot should be familiar with. When the transmitter selector switch is placed in position 1 or 2, the audio amplifier of the corresponding transceiver is utilized to provide the speaker audio for all radios. If the audio amplifier in the selected transceiver fails, as evidenced by loss of speaker audio for all radios, place the transmitter selector switch in the other transceiver position. Since an audio amplifier is not utilized for headphones, a malfunctioning amplifier will not affect headphone operation.

SPEAKER-PHONE SWITCHES.

The speaker-phone switches determine whether the output of the receiver in use is fed to the headphones or through the audio amplifier to the speaker. Place the switch for the desired receiving system either in the up position for speaker operation or in the down position for headphones.

AUTOPILOT-OMNI SWITCH.

When a Nav-O-Matic autopilot is installed with two compatible omni receivers, an autopilot-omni switch is utilized. This switch selects the omni receiver to be used for the omni course sensing function of the autopilot. The up position selects the upper omni receiver in the radio panel stack and the down position selects the lower omni receiver.

OXYGEN SYSTEM

Four oxygen cylinders, located in the fuselage cabin top, supply oxygen for the system. Cylinder pressure is reduced to an operating pressure of 70 PSI by a pressure regulator/shut-off valve assembly attached to the left front cylinder. An oxygen cylinder filler valve is located on the bottom of the right wing just outboard of the rear door post under a round cover plate. Cylinder pressure is indicated by a pressure gage located in the overhead oxygen console above the pilot and front passenger's seats.

Six oxygen outlets are provided; two each in consoles above the front seats and center passenger seats, and one each in two separate consoles near the aft passenger seats. One permanent, microphone equipped mask is provided for the pilot, and five disposable type masks are provided for the passengers. All masks are the partial rebreathing type, equipped with vinyl plastic hoses and flow indicators.

A remote shut-off valve control, located adjacent to the pilot's oxygen outlet, is used to shut off the supply of oxygen to the system when not in use. The control is mechanically connected to the shut-off valve at the cylinder. With the exception of the shut-off function, the system is completely automatic and requires no manual regulation for change of altitude.

OXYGEN SYSTEM OPERATION.

Prior to flight, check to be sure that there is an adequate oxygen supply for the trip, by noting the oxygen pressure gage reading. Refer to paragraph OXYGEN DURATION CALCULATION, and to the Oxygen Duration Chart (figure 7-3). Also, check that the face masks and hoses are accessible and in good condition.

Supplemental oxygen should be used by all occupants when cruising above 10,000 feet. As described in the Cessna booklet "Man At Altitude," it is often advisable to use oxygen at altitudes lower than 10,000 feet under conditions of night flying, fatigue, or periods of physiological or emotional disturbances. Also, the habitual and excessive use of tobacco or alcohol will usually necessitate the use of oxygen at less than 10,000 feet.

NOTE

For safety reasons, no smoking should be allowed in the aircraft while oxygen is being used.

When ready to use the oxygen system, proceed as follows:

(1) Select mask and hose.

NOTE

The hose assembly provided for the pilot is of a higher flow rate than those for the passengers; it is color-coded with an orange band adjacent to the plug-in fitting. The hoses provided for the passengers are color-coded with a green band. If the aircraft owner prefers, he may provide higher flow hoses for all passengers. In any case, it is recommended that the pilot use the larger capacity hose. The pilot's mask is equipped with a microphone to facilitate use of the radio while using oxygen. A microphone adapter cord is provided to allow the pilot to utilize an oxygen mask microphone in aircraft that are equipped with the optional boom microphone. To connect the oxygen mask microphone to the "AUX MIKE JACK," located under the lower left edge of the instrument panel, disconnect the boom mike lead from the "AUX MIKE JACK," connect the mask lead to the adapter cord and plug the adapter cord into the "AUX MIKE JACK." A switch is incorporated on the left hand control wheel to operate the microphone.

(2) Attach mask to face and adjust metallic nose strap for snug mask fit.
(3) Select oxygen outlet located nearest to the seat you are occupying, and plug delivery hose into it. When the oxygen supply is turned on, oxygen will flow continuously at the proper rate of flow for any altitude without any manual adjustments.
(4) Position oxygen supply control knob "ON."
(5) Check the flow indicator in the face mask hose. Oxygen is flowing if the indicator is being forced toward the mask.
(6) Unplug the delivery hose from the outlet coupling when discontinuing use of oxygen system. This automatically stops the flow of oxygen.
(7) Position oxygen supply control knob "OFF."

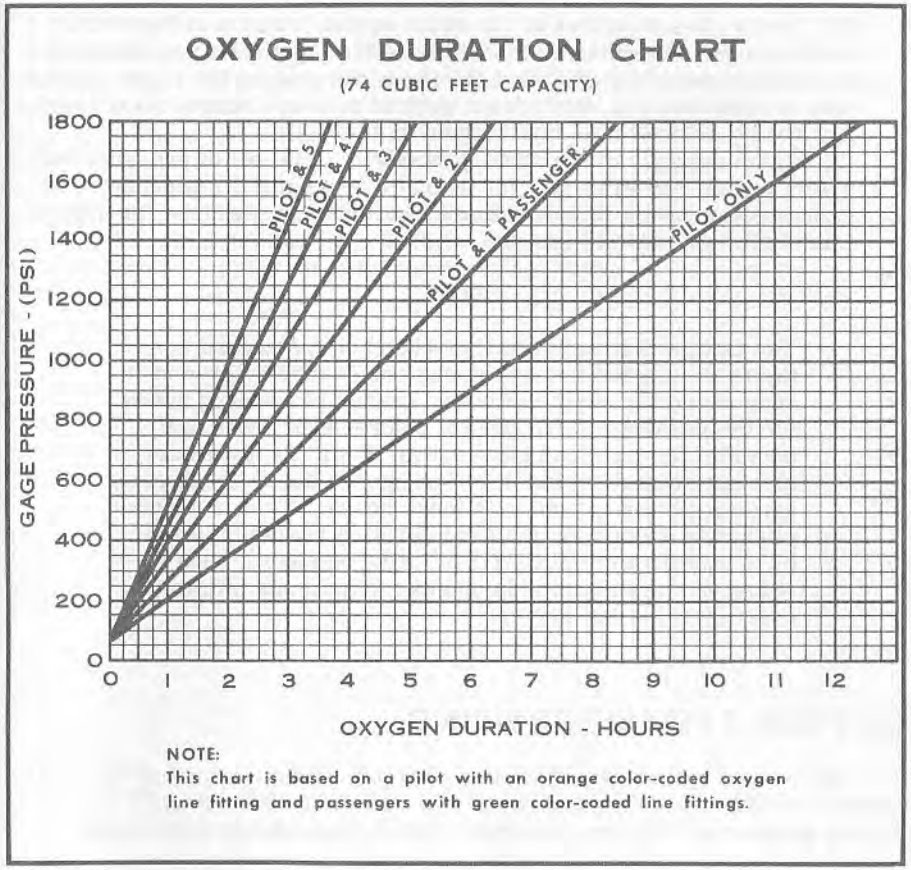


Figure 7-3.

OXYGEN DURATION CALCULATION.

The Oxygen Duration Chart (figure 7-3) should be used in determining the usable duration (in hours) of the oxygen supply in your airplane. The following procedure outlines the method of finding the duration from the chart.

(1) Note the available oxygen pressure shown on the pressure gage.

(2) Locate this pressure on the scale on the left side of the chart, then go across the chart horizontally to the right until you intersect the line representing the number of persons making the flight. After intersecting the line, drop down vertically to the bottom of the chart and read the duration in hours given on the scale.
(3) As an example of the above procedure, 1200 psi of pressure will safely sustain the pilot only for nearly 8 hours and 10 minutes. The same pressure will sustain the pilot and three passengers for approximately 3 hours and 20 minutes.

NOTE

The Oxygen Duration Chart is based on a standard configuration oxygen system having one orange color-coded hose assembly for the pilot and green color-coded hoses for the passengers. If orange color-coded hoses are provided for pilot and passengers, it will be necessary to compute new oxygen duration figures due to the greater consumption of oxygen with these hoses. This is accomplished by computing the total duration available to the pilot only (from "PILOT ONLY" line on chart), then dividing this duration by the number of persons (pilot and passengers) using oxygen.

OXYGEN SYSTEM SERVICING.

The oxygen cylinders, when fully charged, contain a total of approximately 74 cubic feet of oxygen under a pressure of 1800 psi at 70°F. Filling pressures will vary, however, due to the ambient temperature

AMBIENT TEMPERATURE °F	FILLING PRESSURE PSIG	AMBIENT TEMPERATURE °F	FILLING PRESSURE PSIG
0	1600	50	1825
10	1650	60	1875
20	1700	70	1925
30	1725	80	1975
40	1775	90	2000

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 properly filled cylinders. Fill to the pressures indicated in the table on the preceding page for ambient temperature.

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.

CESSNA ECONOMY MIXTURE INDICATOR

The Cessna Economy Mixture Indicator is an exhaust gas temperature (EGT) sensing device which visually aids the pilot in obtaining either an efficient maximum power mixture or a desired cruise mixture. Exhaust gas temperature varies with cylinder fuel-to-air ratio, power, and RPM.

OPERATING INSTRUCTIONS.

The reference EGT must be known before the EGT indicator can be used for take-off and climb. Determine the reference EGT periodically as follows:

(1) Establish 65% power in level flight at 2550 RPM and part throttle.
(2) Carefully lean to peak EGT. This is the reference EGT.

NOTE

Operation at peak EGT is not authorized for continuous operation, except to establish peak EGT for reference at 75% power or less. Operation on the lean side of peak EGT or within 25° of peak EGT is not approved.

FLIGHT CONDITION	POWER SETTING	EGT	REMARKS
TAKE-OFF	Full throttle 2850 RPM	150° to 200° F richer than REFERENCE EGT	Use FULL RICH mixture below 3000'
CLIMB	Full throttle 2700 RPM		
NORMAL CLIMB	25" MP and 2550 RPM	125° richer than REFERENCE EGT	Above 10,000' use BEST POWER mixture
MAXIMUM CRUISE SPEED	75% or less	Peak minus 75°F (ENRICHEN)	BEST POWER mixture, 2 MPH TAS increase and 6% range loss from NORMAL LEAN
NORMAL CRUISE	75% or less	Peak minus 25°F (ENRICHEN)	NORMAL LEAN mixture-Owner's Manual and Power Computer performance

The chart on page 7-16 should be used to establish mixture settings in take-off, climb and cruise conditions.

The yellow index pointer may be set at the reference point, or to a specific point to lean to. It can be positioned manually by turning the screw adjustment on the face of the instrument.

For maximum performance take-off, mixture may be set during static full power run-up, if feasible, or during the ground roll.

NOTE

Enrichen mixture during climb if excessive cylinder head temperatures occur.

In the event that a distinct peak is not obtained, use the corresponding maximum EGT as the reference point for enriching the mixture to the desired cruise setting.

Changes in altitude or power setting require the EGT to be rechecked. Mixture may be controlled in cruise descent by simply enriching to avoid engine roughness. During prolonged descents, maintain sufficient power to keep the EGT needle on scale. In idle descents or landing approaches use full rich mixture. For idle descents or landing approaches at high elevations, the mixture control may be set in a position to permit smooth engine acceleration to maximum power.

WING LEVELER

A wing leveler may be installed to augment the lateral stability of the airplane. The system uses the Turn Coordinator for roll and yaw sensing. Vacuum pressure, from the engine-driven vacuum pump, is routed from the Turn Coordinator to cylinder-piston servo units attached to the aileron control system. As the airplane deviates from a wing level attitude, vacuum pressure in the servo units is increased or relieved as needed to actuate the ailerons to oppose the deviations.

A separately mounted push-pull control knob, labeled "WING LVLR", is provided on the left side of the instrument panel to turn the system on and off. A "ROLL TRIM" control knob on the Turn Coordinator is used for manual roll trim control to compensate for asymmetrical loading of fuel and passengers, and to optimize system performance in climb, cruise and let-down.

OPERATING CHECK LIST

TAKE-OFF.

(1) "WING LVLR" Control Knob -- Check in off position (full in).

CLIMB.

(1) Adjust elevator and rudder trim for climb.
(2) "WING LVLR" Control Knob -- Pull control knob "ON."
(3) "ROLL TRIM" Control Knob -- Adjust for wings level attitude.

CRUISE.

(1) Adjust power and elevator and rudder trim for level flight.
(2) "ROLL TRIM" Control Knob -- Adjust as desired.

DESCENT.

(1) Adjust power and elevator and rudder trim for desired speed and rate of descent.
(2) "ROLL TRIM" Control Knob -- Adjust as desired.

LANDING.

(1) Before landing, push "WING LVLR" control knob full in to the off position.

EMERGENCY PROCEDURES

If a malfunction should occur, the system is easily overpowered with pressure on the control wheel. The system should then be turned off. In the event of partial or complete vacuum failure, the wing leveler will automatically become inoperative. However, the Turn Coordinator used with the wing leveler system will not be affected by loss of vacuum since it is designed with a "back-up" system enabling it to operate from either vacuum or electrical power in the event of failure of one of these sources.

OPERATING NOTES

(1) The wing leveler system may be overpowered at any time without damage or wear. However, for extended periods of maneuvering it may be desirable to turn the system off.
(2) It is recommended that the system not be engaged during take-off and landing. Although the system can be easily overpowered, servo forces could significantly alter the manual "feel" of the aileron control, especially should a malfunction occur.

3-BLADED PROPELLER

A Cessna-Crafted three-bladed propeller is optionally offered. This option provides greater propeller ground clearance for rough field operation and slightly smoother operation at cruise. However, there is no significant performance change with the three-bladed propeller.

ELECTRIC ELEVATOR TRIM SYSTEM

An electric elevator trim system is available to facilitate trimming the airplane. The system is controlled by a switch on the left side of the pilot's control wheel. Pushing the switch forward, labeled "DN", moves the elevator trim tab in the "nose-down" direction; conversely, pushing the switch aft, labeled "UP", moves the tab in the "nose-up" direction. When the switch is released, it automatically returns to the center (off) position and elevator tab motions stops.

A servo unit (which includes a motor and a chain-driven, solenoid-operated clutch) in the fuselage actuates the trim tab to the selected position. When the clutch is not energized (trim switch off), the electric portion of the trim system freewheels so that manual operation is not affected. The electric trim system can be overridden at any time by the manual system, if necessary.

STOWABLE RUDDER PEDALS

Stowable right-hand rudder pedals are available as part of the optional right-hand flight controls installation. The pedals fold forward and stow against the firewall, thereby permitting the right front passenger to extend his feet forward for greater comfort, and also to rest his feet on the rudder pedals during flight without, in any way, interfering with the flight operation of the pilot's rudder pedals.

A push-pull control on the instrument panel actuates the pedal unlocking mechanism. The pedals are stowed simply by squeezing the double buttons of the control knob and pulling the knob out to release the pedals; the pedals can then be pushed forward against the firewall where they are retained by spring clips within a bracket. The pedals are restored to their operating positions by pushing the control knob full in, and inserting the toe of the shoe underneath each pedal and pulling each pedal aft until it snaps into position. The pedals are again ready for flight use by the right front passenger.

FUEL BAY QUICK-DRAIN VALVE KIT

Two fuel bay quick-drain valves and a fuel sampler cup are available as a kit to facilitate daily draining and inspection of fuel in the fuel bays for the presence of water and sediment. The valves replace existing fuel bay drain plugs located at the lower inboard area of the wing. The fuel sampler cup, which may be stowed in the map compartment, is used to drain the valves. The sampler cup has a probe in the center of the cup. When the probe is inserted into the hole in the bottom of the drain valve and pushed upward, fuel flows into the cup to facilitate visual inspection of the fuel. As the cup is removed, the drain valve seats, stopping the flow of fuel.

TRUE AIRSPEED INDICATOR

A true airspeed indicator is available to replace the standard airspeed indicator in your airplane. The true airspeed indicator has a calibrated rotatable ring which works in conjunction with the airspeed indicator dial in a manner similar to the operation of a flight computer.

TO OBTAIN TRUE AIRSPEED, rotate ring until pressure altitude is aligned with outside air temperature in degrees Fahrenheit. Then read true airspeed on rotatable ring opposite airspeed needle.

NOTE

Pressure altitude should not be confused with indicated altitude. To obtain pressure altitude, set barometric scale on altimeter to "29.92" and read pressure altitude on altimeter. Be sure to return altimeter barometric scale to original barometric setting after pressure altitude has been obtained.

ALPHABETICAL INDEX

A

B

C

D

E

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W

WARRANTY

The Cessna Aircraft Company ("Cessna") warrants each new aircraft manufactured by it and such new aircraft equipment, accessories and service parts as are sold through its Commercial Aircraft Marketing Division to be free from defects in material and workmanship under normal use and service for a period of six (6) months after delivery to the original retail purchaser or first user in the case of aircraft, aircraft equipment and accessories (except Cessna-Crafted Electronics as herein defined) and service parts therefor, and for a period of one (1) year after such delivery in the case of Cessna-Crafted Electronics (which term includes all communication, navigation and autopilot systems bearing the name "Cessna", beginning at the connection to the aircraft electrical system (bus bar) and including "black boxes", antennas, microphones, speakers and other components and associated wiring but excluding gyro instruments used in connection with autopilot and navigation systems) and service parts therefor.

Cessna's obligation under this warranty is limited to repairing or replacing, at its option, any part or parts which, within the applicable six (6) or twelve (12) months period as above set forth, shall be returned transportation charges prepaid to Cessna at Wichita, Kansas, or to any Cessna appointed or Cessna Distributor appointed dealer authorized by such appointment to sell the aircraft, equipment, accessories and service parts of the type involved and which upon examination shall disclose to Cessna's satisfaction to have been thus defective. (A new warranty period is not established for replacements. Replacements are warranted for the remainder of the applicable six (6) or twelve (12) months original warranty period.) The repair or replacement of defective parts under this warranty will be made by Cessna or the dealer without charge for parts, or labor for removal, installation and/or actual repair of such defective parts. (Locations of such dealers will be furnished by Cessna on request.)

The provisions of this warranty do not apply to any aircraft, equipment, accessories (including Cessna-Crafted Electronics) or service parts therefor manufactured or sold by Cessna which have been subject to misuse, negligence, or accident, or which shall have been repaired or altered outside of Cessna's factory in any way so as in the judgment of Cessna to affect adversely its performance, stability and reliability, nor to normal maintenance services (such as engine tune up, cleaning, control rigging, brake and other mechanical adjustments, maintenance inspections, etc.) and the replacement of service items (such as spark plugs, brake linings, filters, hoses, belts, tires, etc.) made in connection with such services or required as maintenance, nor to normal deterioration of soft trim and appearance items (such as paint, upholstery, rubber-like items, etc.) due to wear and exposure.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED IN FACT OR BY LAW, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATION OR LIABILITY ON THE PART OF CESSNA TO ANYONE OF ANY NATURE WHATSOEVER BY REASON OF THE MANUFACTURE AND/OR SALE OR THE USE OF SUCH AIRCRAFT PRODUCTS, INCLUDING LIABILITY FOR CONSEQUENTIAL OR SPECIAL DAMAGES, AND CESSNA NEITHER ASSUMES NOR AUTHORIZES ANYONE TO ASSUME FOR IT ANY OTHER OBLIGATION OR LIABILITY IN CONNECTION WITH SUCH AIRCRAFT PRODUCTS.

SERVICING REQUIREMENTS

FUEL:

AVIATION GRADE -- 100/130 MINIMUM GRADE
TOTAL CAPACITY EACH BAY -- 45 GAL. (44.5 GAL. USABLE)
REDUCED CAPACITY EACH BAY (INDICATED BY FILLING BAY TO BOTTOM EDGE OF FUEL FILLER COLLAR) -- 32.5 GAL. (32 GAL. USABLE).

ENGINE OIL:

AVIATION GRADE -- SAE 50 ABOVE 40°F.
SAE 10W30 OR SAE 30 BELOW 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, MUST BE USED.)
CAPACITY OF ENGINE SUMP -- 10 QUARTS
(DO NOT OPERATE ON LESS THAN 7 QUARTS. TO MINIMIZE LOSS OF OIL THROUGH BREATHER, FILL TO 8 QUART LEVEL FOR NORMAL FLIGHTS OF LESS THAN 3 HOURS. FOR EXTENDED FLIGHT, FILL TO 10 QUARTS. IF OPTIONAL OIL FILTER IS INSTALLED, ONE ADDITIONAL QUART IS REQUIRED WHEN THE FILTER ELEMENT IS CHANGED.)

HYDRAULIC FLUID:

MIL-H-5606 HYDRAULIC FLUID

OXYGEN:

AVIATOR'S BREATHING OXYGEN -- SPEC. NO. MIL-O-27210
MAXIMUM PRESSURE -- 1800 PSI AT 70°F.
(CYLINDER TEMPERATURE STABILIZED AFTER FILLING)
REFER TO PAGE 7-14 FOR FILLING PRESSURES.

TIRE PRESSURE:

MAIN WHEELS -- 55 PSI ON 6.00 X 6 TIRES
NOSE WHEEL -- 50 PSI ON 5.00 X 5 TIRE

NOSE GEAR SHOCK STRUT:

KEEP FILLED WITH FLUID AND INFLATED TO 90 PSI.