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CESSNA AIRCRAFT COMPANY

WICHITA, KANSAS

CESSNA

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1970

WORLD'S LARGEST PRODUCER OF GENERAL AVIATION AIRCRAFT SINCE 1956

SKYWAGON 180

OWNER'S MANUAL

PERFORMANCE - SPECIFICATIONS

Skywagon 180 *

GROSS WEIGHT	2800 lbs
SPEED:	
Top Speed at Sea Level	170 mph
Cruise, 75% Power at 6500 ft	162 mph
RANGE:	
Cruise, 75% Power at 6500 ft	695 mi
60 Gallons, No Reserve	4.3 hrs
	162 mph
Cruise, 75% Power at 6500 ft	925 mi
79 Gallons, No Reserve	5.7 hrs
	162 mph
Optimum Range at 10,000 ft	925 mi
60 Gallons, No Reserve	7.6 hrs
	121 mph
Optimum Range at 10,000 ft	1215 mi
79 Gallons, No Reserve	10.0 hrs
	121 mph
RATE OF CLIMB AT SEA LEVEL	1090 fpm
SERVICE CEILING	19,600 ft
TAKE-OFF:	
Ground Run	625 ft
Total Distance Over 50-Foot Obstacle	1205 ft
LANDING:	
Ground Roll	480 ft
Total Distance Over 50-Foot Obstacle	1365 ft
STALL SPEEDS:	
Flaps Up, Power Off	65 mph
Flaps Down, Power Off	58 mph
EMPTY WEIGHT (Approximate)	1545 lbs
USEFUL LOAD (Approximate)	1255 lbs
BAGGAGE (Total Capacity)	400 lbs
WING LOADING: Pounds/Sq Foot	16.1
POWER LOADING: Pounds/HP	12.2
FUEL CAPACITY: Total	
Standard Tanks	65 gal.
Optional Long Range Tanks	84 gal.
OIL CAPACITY: Total	12 qts
PROPELLER: Constant Speed (Diameter)	82 inches
ENGINE:	
Continental Engine	O-470-R
230 rated HP at 2600 RPM	

* This manual covers operation of the Skywagon 180 which is certificated as Model 180H under FAA Type Certificate No. 5A6.

D765-13–RAND–1,000–12/69

SERVICING REQUIREMENTS

FUEL:

AVIATION GRADE -- 80/87 MINIMUM GRADE
CAPACITY EACH STANDARD TANK -- 32.5 GALLONS
CAPACITY EACH LONG RANGE TANK -- 42.0 GALLONS

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 -- 12 QUARTS
(DO NOT OPERATE ON LESS THAN 9 QUARTS. TO MINIMIZE LOSS OF OIL THROUGH BREATHER, FILL TO 10 QUART LEVEL FOR NORMAL FLIGHTS OF LESS THAN 3 HOURS. FOR EXTENDED FLIGHT, FILL TO 12 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 7-10 FOR FILLING PRESSURES.

TIRE PRESSURE:

MAIN WHEELS -- 30 PSI ON 6.00 × 6 TIRES
23 PSI ON 8.00 × 6 TIRES (OPTIONAL)
TAIL WHEEL -- 55 PSI TO 65 PSI MAXIMUM
(2300 LBS TO 2800 LBS NORMAL OPERATING LOADS)

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.)

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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 Skywagon 180. 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:

FACTORY TRAINED PERSONNEL to provide you with courteous expert service.

FACTORY APPROVED SERVICE EQUIPMENT to provide you with the most efficient and accurate workmanship possible.

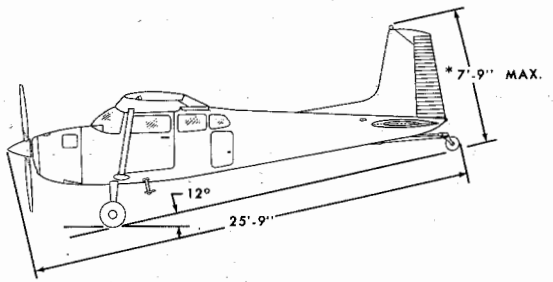
A STOCK OF GENUINE CESSNA SERVICE PARTS on hand when you need them.

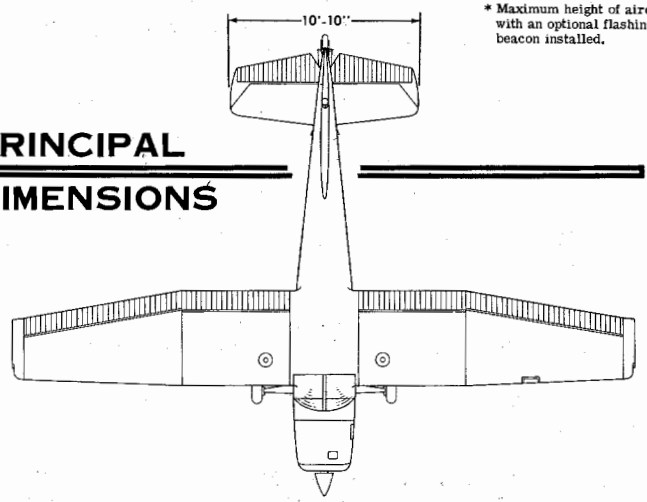
THE LATEST AUTHORITATIVE INFORMATION FOR SERVICING CESSNA AIRPLANES, since Cessna Dealers have all of the Service Manuals and Parts Catalogs, kept current by Service Letters and Service News Letters, published by Cessna Aircraft Company.

We urge all Cessna owners to use the Cessna Dealer Organization to the fullest.

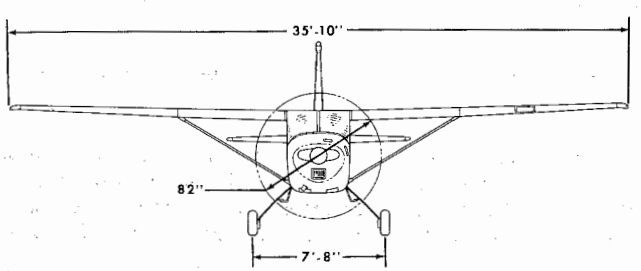
A current Cessna Dealer Directory accompanies your new airplane. The Directory is revised frequently, and a current copy can be obtained from your Cessna Dealer. Make your Directory one of your cross-country flight planning aids; a warm welcome awaits you at every Cessna Dealer.

PRINCIPAL DIMENSIONS





* Maximum height of aircraft with an optional flashing beacon installed.



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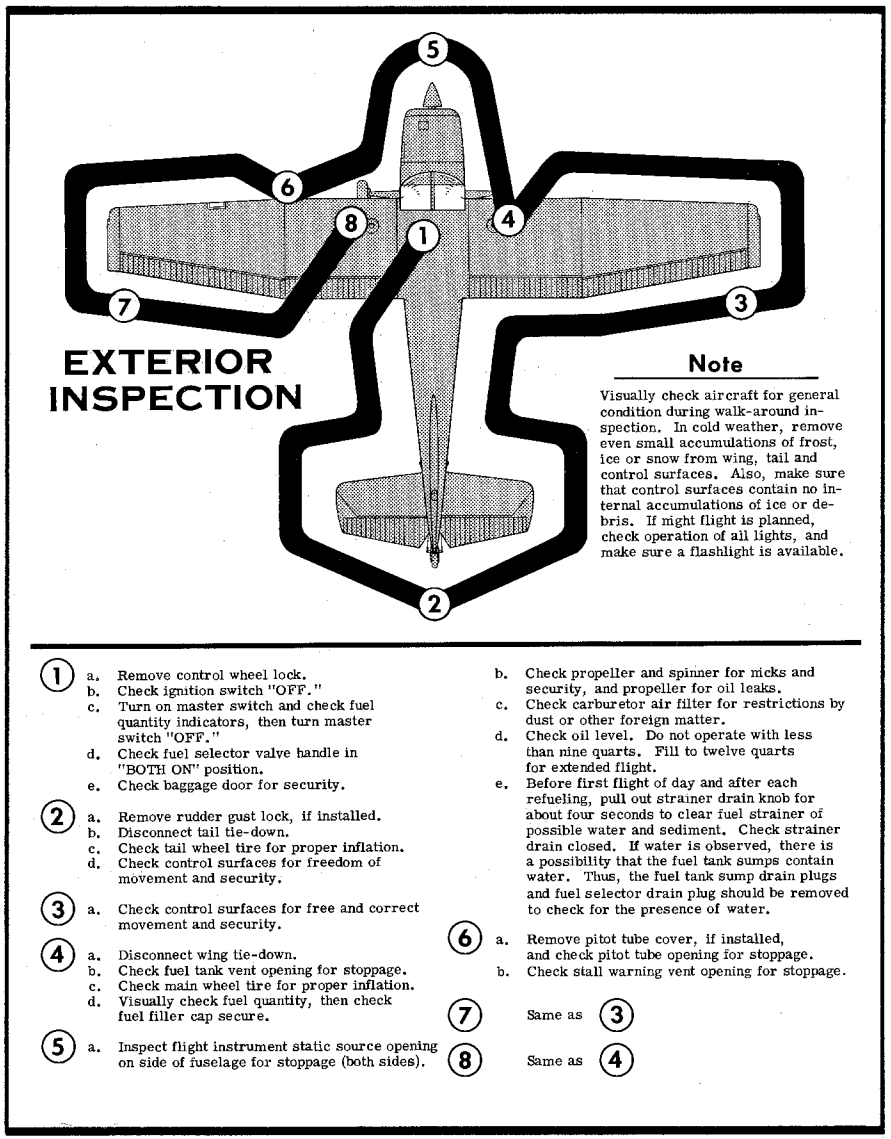

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Section I

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. 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) Seats and Seat Belts -- Adjust and lock.
(2) Brakes -- Test and set.
(3) Radios and Electrical Equipment -- "OFF."
(4) Fuel Selector Valve -- "BOTH ON."
(5) Wing Flaps -- Check all positions.
(6) Cowl Flaps -- "OPEN." (Move lever out of locking detent to reposition.)

STARTING ENGINE.

(1) Master Switch -- "ON."
(2) Carburetor Heat -- Cold.
(3) Mixture -- Rich.
(4) Primer -- As required.
(5) Propeller -- High RPM.
(6) Throttle -- Cracked (one-half inch).
(7) Propeller Area -- Clear.
(8) Ignition Switch -- "START" (hold until engine fires, but not longer than 30 seconds).
(9) Ignition Switch -- Release to "BOTH" (immediately after engine fires).

NOTE

If engine has been overprimed, start with throttle open 1/4 to 1/2 full open. Reduce throttle to idle when engine fires.

NOTE

After starting, check for oil pressure indication within 30 seconds in normal temperatures and 60 seconds in cold temperatures. If no indication appears, shut off engine and investigate.

BEFORE TAKE-OFF.

(1) Parking Brake -- Set.
(2) Fuel Selector Valve -- "BOTH ON."
(3) Flight Controls -- Check for free and correct movement.
(4) Stabilizer and Optional Rudder Trim Control Wheels -- Take-off settings.
(5) Cowl Flaps -- Check full "OPEN."
(6) Throttle Setting -- 1700 RPM.
(7) Magnetos -- Check (50 RPM maximum differential between magnetos).
(8) Propeller -- Cycle from high to low RPM; return to high RPM (full in).
(9) Carburetor Heat -- Check operation.

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(10) Engine Instruments -- Check.
(11) Suction Gage -- Check (4.6 to 5.4 inches of mercury).
(12) Ammeter -- Check.
(13) Throttle -- Closed (check idle).
(14) Flight Instruments and Radios -- Set.
(15) Optional Autopilot or Wing Leveler -- "OFF."
(16) Cabin Doors and Windows -- Closed and locked.
(17) Parking Brake -- Release.

TAKE-OFF.

NORMAL TAKE-OFF.

(1) Wing Flaps -- Up.
(2) Carburetor Heat -- Cold.
(3) Power -- Full throttle and 2600 RPM.
(4) Elevator Control -- Maintain moderately tail-low attitude.
(5) Climb Speed -- 95 MPH.

MAXIMUM PERFORMANCE TAKE-OFF.

(1) Wing Flaps -- 20°.
(2) Carburetor Heat -- Cold.
(3) Brakes -- Apply.
(4) Power -- Full throttle and 2600 RPM.
(5) Brakes -- Release.
(6) Elevator Control - Maintain slightly tail-low attitude.
(7) Climb Speed -- 61 MPH until all obstacles are cleared, then set up climb speed as shown in "MAXIMUM PERFORMANCE CLIMB."
(8) Wing Flaps -- Up after obstacles are cleared.

CLIMB.

NORMAL CLIMB.

(1) Airspeed -- 100 to 120 MPH.
(2) Power -- 23 inches and 2450 RPM.
(3) Fuel Selector Valve -- "BOTH ON."

(4) Mixture -- Full rich (unless engine is rough).
(5) Cowl Flaps -- Open as required.

MAXIMUM PERFORMANCE CLIMB.

(1) Airspeed -- 95 MPH (sea level) to 87 MPH (10,000 feet).
(2) Power -- Full throttle and 2600 RPM.
(3) Fuel Selector Valve -- "BOTH ON."
(4) Mixture -- Full rich (unless engine is rough).
(5) Cowl Flaps -- Full "OPEN."

CRUISING.

(1) Engine Power -- 15 - 23 inches of manifold pressure and 2200-2450 RPM.
(2) Cowl Flaps -- Adjust to maintain normal cylinder head temperature.
(3) Stabilizer and Optional Rudder Trim Control Wheels -- Adjust.
(4) Mixture -- Lean.

LET-DOWN.

(1) Mixture -- Rich.
(2) Power -- As desired.
(3) Carburetor Heat -- Apply (if icing conditions exist).

BEFORE LANDING.

(1) Mixture -- Rich.
(2) Fuel Selector Valve -- "BOTH ON."
(3) Cowl Flaps -- "CLOSED."
(4) Carburetor Heat -- Apply before closing throttle.
(5) Propeller -- High RPM.
(6) Airspeed -- 80 to 90 MPH (flaps retracted).
(7) Wing Flaps -- 0° to 40° (below 110 MPH).
(8) Airspeed -- 70 to 80 MPH (flaps extended).
(9) Stabilizer and Optional Rudder Trim Contol Wheels -- Adjust for landing.

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NOTE

The ability of the airplane to land three-point is dependent upon the stabilizer being adjusted for hands-off trim in the glide.

BALKED LANDING (GO-AROUND).

(1) Throttle -- Full "OPEN."
(2) Carburetor Heat -- Cold.
(3) Wing Flaps -- Retract to 20°.
(4) Upon reaching an airspeed of approximately 65 MPH, retract flaps slowly.

NORMAL LANDING.

(1) Landing Technique -- Conventional for all flap settings.

AFTER LANDING.

(1) Wing Flaps -- Retract.
(2) Carburetor Heat -- Cold.
(3) Cowl Flaps -- "OPEN."

SECURING AIRCRAFT.

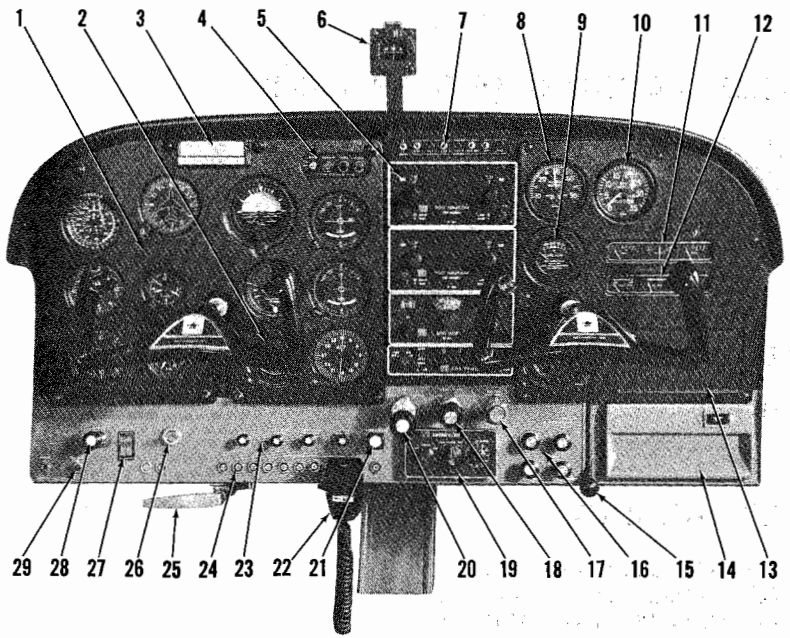
(1) Parking Brake -- Set.
(2) Radios and Electrical Equipment -- "OFF."
(3) Mixture -- Idle cut-off (pulled full out.)

NOTE

Do not open throttle as engine stops since this actuates the accelerator pump.

(4) Ignition and Master Switch -- "OFF."
(5) Control Lock -- Installed.

INSTRUMENT PANEL



1. Flight Instrument Group
2. Optional Instrument Space (Typical)
3. Compass Correction Card
4. Marker Beacon Indicator Lights and Switch (Opt.)
5. Radios (Opt.)
6. Magnetic Compass
7. Radio Selector Switches (Opt.)
8. Manifold Pressure Gage
9. Carburetor Air Temperature Gage (Opt.)
10. Tachometer
11. Fuel Quantity Indicators and Ammeter
12. Cylinder Head Temperature, Oil Temperature and Oil Pressure Gages
13. Optional Radio Space
14. Map Compartment
15. Cowl Flap Handle
16. Cabin Air and Heat Control Knobs, Cigar Lighter, and Optional Stowable Rudder Pedal Control
17. Mixture Control Knob
18. Propeller Control Knob
19. Autopilot Control Unit (Opt.)
20. Throttle
21. Carburetor Air Heat Knob
22. Microphone (Opt.)
23. Electrical Switches
24. Circuit Breakers
25. Parking Brake Handle
26. Ignition/Starter Switch
27. Master Switch
28. Primer
29. Oil Dilution Switch (Opt.)

Figure 2-1.

OIL QUICK-DRAIN VALVE

An oil quick-drain valve is optionally offered to replace the drain plug in the oil sump drain port. The valve provides a quicker and cleaner method of draining engine oil. To drain the oil with this valve installed, slip a hose over the end of the valve, route the hose to a suitable container, then push upward on the end of the valve until it snaps into the open position. Spring clips will hold the valve open. After draining, use a screwdriver or suitable tool to snap the valve into the extended (closed) position and remove the drain hose.

CARBURETOR AIR TEMPERATURE GAGE

A carburetor air temperature gage may be installed in the airplane to help detect carburetor icing conditions. The gage is marked with a yellow arc between -15° and +5°C. The yellow arc indicates the carburetor temperature range where carburetor icing can occur; a placard on the gage reads "KEEP NEEDLE OUT OF YELLOW ARC DURING POSSIBLE ICING CONDITIONS."

Visible moisture or high humidity can cause carburetor ice formation, especially in idle or low power conditions. Under cruising conditions, the formation of ice is usually slow, providing time to detect the loss of manifold pressure caused by the ice. Carburetor icing during take-off is rare since the full-open throttle condition is less susceptible to ice obstruction.

If the carburetor air temperature gage needle moves into the yellow arc during potential carburetor icing conditions, or there is an unexplained drop in manifold pressure, apply full carburetor heat. Upon regaining the original manifold pressure (with heat off), determine by trial and error the minimum amount of carburetor heat required for ice-free operation.

NOTE

Carburetor heat should not be applied during take-off unless absolutely necessary to obtain smooth engine acceleration (usually in sub-zero temperatures).

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.

FUEL TANK QUICK-DRAIN VALVE KIT

Two fuel tank quick-drain valves and a fuel sampler cup are available as a kit to facilitate daily draining and inspection of fuel in the main tanks for the presence of water and sediment. The valves replace existing fuel tank 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.

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 tanks, one in each wing. With the fuel selector valve on "BOTH," the total usable fuel for all flight conditions is 60 gallons for the standard tanks and 79 gallons for optional long range tanks.

Fuel from each wing tank flows by gravity to a selector valve. Depending upon the setting of the selector valve, fuel from the left, right, or both tanks flows through a fuel strainer and carburetor to the engine induction system.

IMPORTANT

The fuel selector valve should be in the "BOTH" position for take-off, climb, landing, and maneuvers that involve prolonged slips or skids. Operation from either "LEFT" or "RIGHT" tank is reserved for cruising flight.

NOTE

When the fuel selector valve handle is in the "BOTH" position in cruising flight, unequal fuel flow from each tank may occur if the wings are not maintained exactly level. Resulting wing heaviness can be alleviated gradually by turning the selector valve handle to the tank in the "heavy" wing.

For fuel system servicing information, refer to Lubrication and Servicing Procedures in Section V.

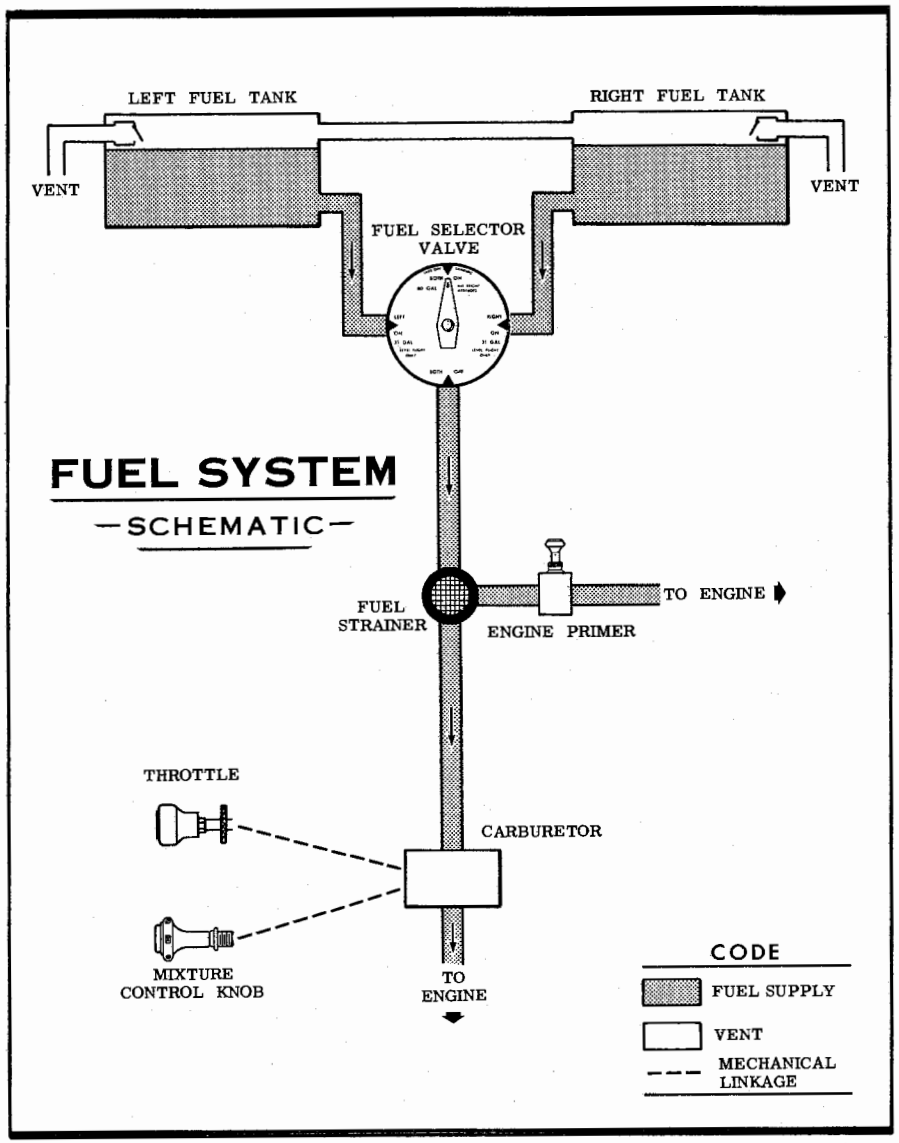


Figure 2-2.

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.

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 stabilizer and optional 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, stabilizer and optional rudder trim for level flight.
(2) "ROLL TRIM" Control Knob -- Adjust as desired.

DESCENT.

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

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 aft of the rear cabin wall below the aft baggage floor. 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 simultaneously; 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 the 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 of the electrical circuits in the airplane are protected by "push-to-reset" circuit breakers mounted on the instrument panel. Exceptions to this are the battery contactor closing (external power) circuit and optional clock and flight hour recorder circuits which have fuses mounted

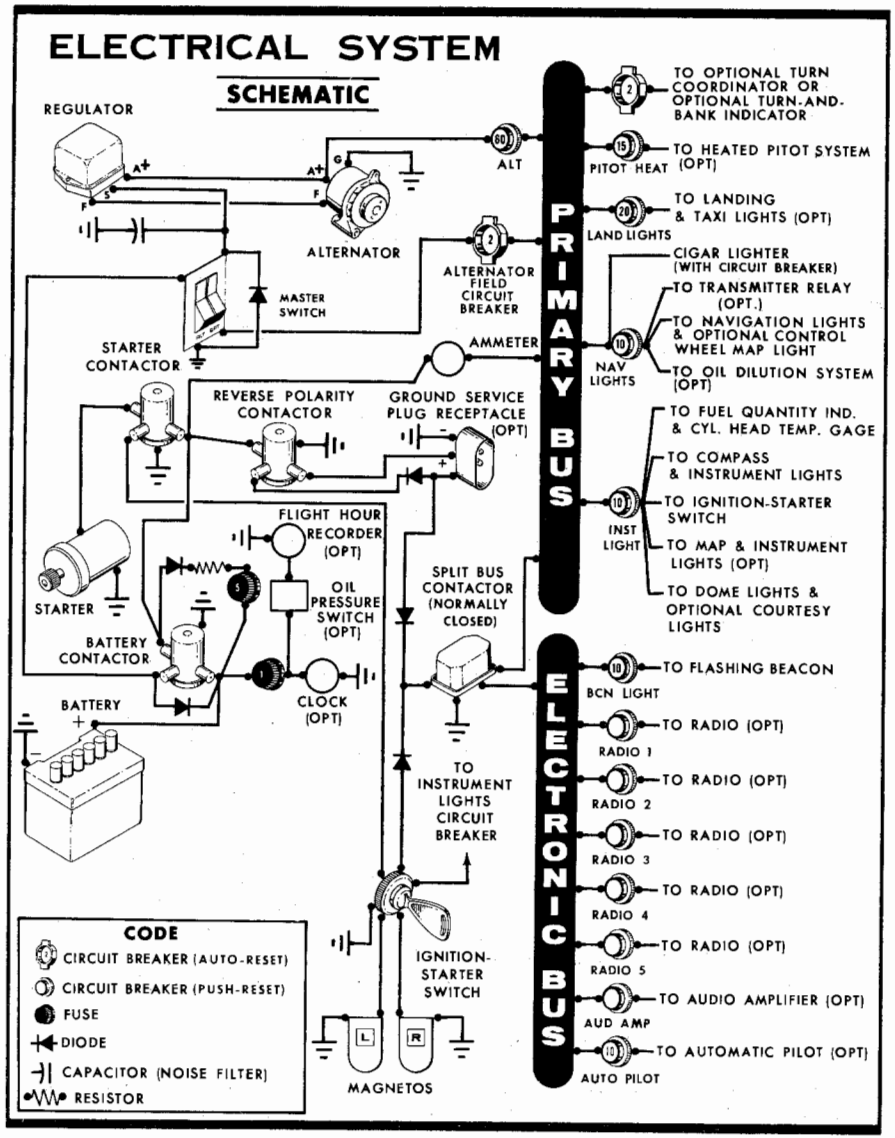


Figure 2-3.

CESSNA CASTERING AXLES

Castering axles may be installed on the main landing gear as optional equipment. The axles are essentially spring-loaded, fluid-filled, orifice-dampened cylinders.

In the event of improper drift correction at touchdown, the castering axles permit the main wheel on the downwind side of the airplane to momentarily swivel outboard to align with the drifting ground track of the airplane. However, the opposite (upwind) wheel is incapable of swiveling inboard, and it scrubs slightly until the drifting motion has ceased. The net effect is to minimize the lurching action at touchdown caused by sideward drift and to restore the intended ground track during the landing roll. During normal taxi, the castering axles will not swivel.

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.

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.

The chart on page 7-11 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.

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. Automatically resetting circuit breakers mounted behind the instrument panel protect the alternator field and wiring circuit and the optional turn coordinator or optional turn-and-bank indicator circuit.

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.

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.

NOTE

Always pull out the "CABIN AIR" knob slightly when the "CABIN HEAT" knob is out. This action increases the airflow through the system, increasing efficiency, and blends cool outside air with the exhaust manifold heated air, thus eliminating the possibility of overheating the system ducting.

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.

Separate adjustable ventilators supply additional air; one near each upper corner of the windshield supplies air for the pilot and copilot, and two in the rear cabin ceiling supply air to the rear seat passengers.

REMOVABLE CABIN DOOR.

The right cabin door has removable hinge pins and a detachable door stop permitting door removal when large or bulky cargo must be loaded.

AFT BAGGAGE COMPARTMENT.

An aft baggage compartment is provided just back of the rear cabin wall and is accessible by taking off the quick-removable wall panel. The compartment is useful for storing utility type seating when large cargo is to be carried in the cabin area. Also, it provides an extra storage space for light, but bulky articles. A total of 50 pounds of baggage or cargo may be carried in this area. Four tie-down rings and a baggage net are used to tie down the baggage. Weight and balance data and illustrations of the compartment may be found in Section IV.

STARTING ENGINE.

Ordinarily the engine starts easily with one or two strokes of the primer in warm temperatures to six strokes in cold weather, with the throttle open approximately 1/2 inch. In extremely cold temperatures, it may be necessary to continue priming while cranking. Weak intermittent firing followed by puffs of black smoke from the exhaust stack indicate overpriming or flooding. Excess fuel can be cleared from the combustion chambers by the following procedure: Set the mixture control full lean and the throttle full open; then crank the engine through several revolutions with the starter. Repeat the starting procedure without any additional priming.

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 2450 RPM and part throttle.

(2) Carefully lean to peak EGT. This is the reference EGT.

FLIGHT CONDITION	POWER SETTING	EGT	REMARKS
TAKE-OFF AND CLIMB	Full throttle and 2600 RPM	200° richer than REFERENCE EGT	Use FULL RICH mixture below 3000'
NORMAL CLIMB	23" MP and 2450 RPM	125° richer than REFERENCE EGT	Above 10,000' use BEST POWER mixture
MAXIMUM CRUISE SPEED	75% or less	Peak minus 125° F (ENRICHEN)	BEST POWER mixture, 1 MPH TAS increase and 10% range loss from NORMAL LEAN
NORMAL CRUISE	75% or less	Peak minus 75° (ENRICHEN)	NORMAL LEAN mixture-Owner's Manual and Power Computer performance
MAXIMUM RANGE	65% or less	Peak minus 25° (ENRICHEN)	2 MPH TAS loss and 10% range increase from NORMAL LEAN

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

cubic feet of oxygen, under a pressure of 1800 psi at 70°F. Filling pressures will vary, however, due to the ambient temperature in the filling area, and because of the temperature rise resulting from compression of the oxygen. Because of this, merely filling to 1800 psi will not result in a properly filled cylinder. Fill to the pressures indicated in table above for the 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.

If the engine is underprimed (most likely in cold weather with a cold engine), it will not fire at all. Additional priming will be necessary for the next starting attempt.

As soon as the cylinders begin to fire, open the throttle slightly to keep it running.

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

TAXIING.

The carburetor air heat knob should be pushed full in during all ground operations unless heat is absolutely necessary for smooth engine operation. When the knob is pulled out to the heat position, air entering the engine is not filtered.

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips.

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 optional landing light (if so equipped) 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 the propeller tips and stabilizer leading edge. 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.

Most engine wear occurs from improper operation before the engine is up to normal operating temperatures, and operating at high power and RPM's. For this reason, the use of maximum power for take-off should be limited to that absolutely necessary for safety. Whenever possible, reduce take-off power to normal climb power.

Normal take-offs are accomplished with wing flaps up, cowl flaps open, full throttle, and 2600 RPM. Reduce power to 23 inches of manifold pressure and 2450 RPM as soon as practical to minimize engine wear.

Using 20° wing flaps reduces the total distance over an obstacle by approximately 20 per cent. Soft field take-offs are performed with 20° flaps by lifting the airplane off the ground as soon as practical in a slightly tail-low attitude. However, the airplane should be leveled off immediately to accelerate to a safe climb speed.

If 20° wing flaps are used for take-off, they should be left down until all obstacles are cleared. To clear an obstacle with wing flaps 20°, a 61 MPH climb speed should be used. If no obstructions are ahead, a best "flaps up" rate-of-climb speed (95 MPH) would be most efficient. These

(6) Unplug the delivery hose from the outlet coupling when discontinuing use of the oxygen system. This automatically stops the flow of oxygen.
(7) Position oxygen supply control knob "OFF."

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, 1400 psi of pressure will safely sustain the pilot only for nearly 6 hours and 15 minutes. The same pressure will sustain the pilot and three passengers for approximately 2 hours and 30 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 cylinder, when fully charged, contains approximately 48

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 rate 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 the 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 auxiliary mike jack, located on the lower left edge of the instrument panel, disconnect the boom mike lead from the auxiliary mike jack, connect the mask lead to the adapter cord and plug the adapter cord into the auxiliary 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.

speeds vary slightly with altitude, but they are close enough for average field elevations. Flap deflections of 30° and 40° are not recommended for take-off.

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 slightly 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.

CLIMB.

A cruising climb at 23 inches of manifold pressure, 2450 RPM (approximately 75% power) and 100 to 120 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.

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 95 MPH at sea level, decreasing uniformly to 87 MPH at 10,000 feet.

If an obstruction ahead requires a steep climb angle, the airplane should be flown at an obstacle clearance speed of approximately 70 MPH with flaps up and maximum power.

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.

The Optimum Cruise Performance table (figure 2-4) 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.

OPTIMUM CRUISE PERFORMANCE

%BHP	ALTITUDE	TRUE AIRSPEED	RANGE (Std. Tanks)
75	6500	162	695
70	8000	160	735
65	10,000	158	785

Figure 2-4.

For a given throttle setting, select the lowest engine speed 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.

To achieve the range figures shown in Section VI, the mixture should be leaned as follows: pull mixture control out until engine becomes rough; then enrich mixture slightly from this point. Any change in altitude, power, or carburetor heat will require a change in the lean mixture setting.

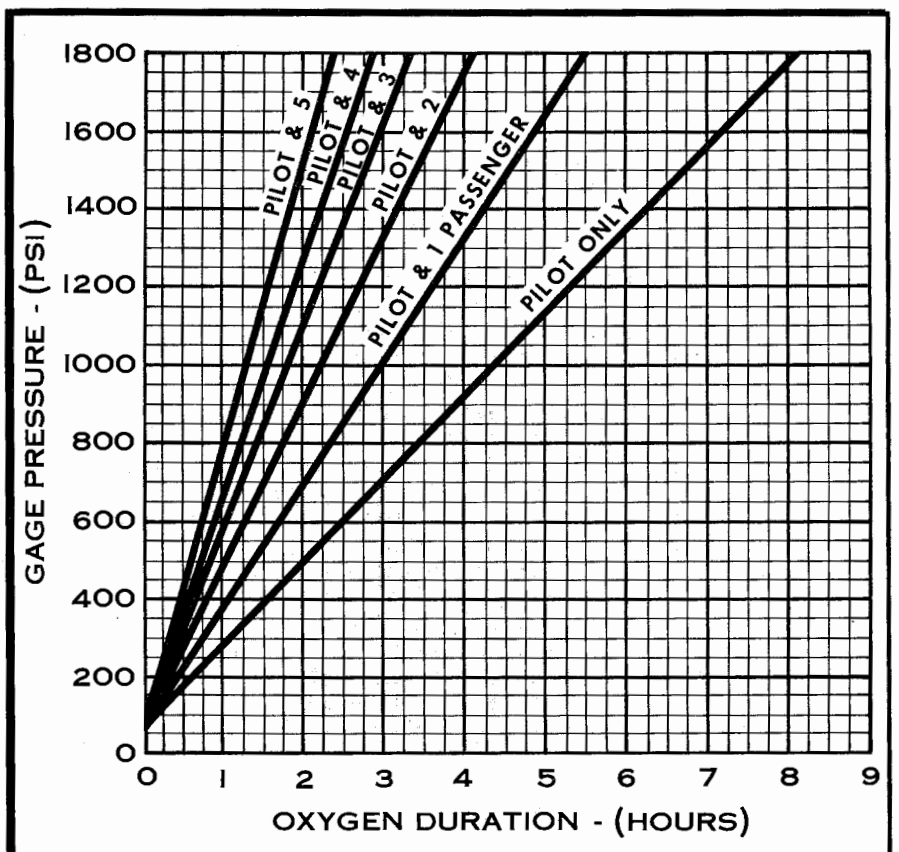
Application of full carburetor heat may enrichen the mixture to the point of engine roughness. To avoid this, lean the mixture as instructed in the preceding paragraph.

The use of full carburetor heat is recommended during flight in very heavy rain to avoid the possibility of engine stoppage due to excessive water ingestion. The mixture setting should be readjusted for smoothest operation.

STALLS.

The stall characteristics are conventional and aural warning is pro-

OXYGEN DURATION CHART
(48 CUBIC FEET CAPACITY)



NOTE: This chart is based on a pilot with an orange color-coded oxygen line fitting and passengers with green color-coded line fittings.

Figure 7-3.

OXYGEN SYSTEM

A six place oxygen system is available for this aircraft. In this system, an oxygen cylinder, located behind the rear cabin wall, supplies the oxygen. Cylinder pressure is reduced to an operating pressure of 70 psi by a pressure regulator attached to the cylinder. A shutoff valve is included as part of the regulator assembly. An oxygen cylinder filler valve is located on the left side of the fuselage aft of the cabin side windows under a round cover plate. Cylinder pressure is indicated by a pressure gage located on the rear cabin wall.

Six oxygen outlets are provided; two outlets for the aft seat passengers are located on the rear wall adjacent to the pressure gage, two are in the cabin ceiling for the center seat passengers, and one each is located on each side of the cabin in the wing root area for use by the pilot and front seat passenger. 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 shutoff 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 shutoff valve at the cylinder. With the exception of the shutoff 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

vided 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 in figure 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, the following recovery procedure should be used.

(1) Retard power to idle.
(2) Apply full opposite rudder against the direction of rotation.
(3) After one-fourth turn, move the control wheel forward of neutral in a brisk motion.
(4) As rotation stops, neutralize rudder, roll the wings level and make a smooth recovery from the resulting dive.

LANDING.

Since the ability of the elevator to produce a stall is dependent upon the adjustable stabilizer being set "NOSE UP," it is important that the airplane be completely trimmed in the approach glide. If the airplane fails to land three point with the control wheel fully back, it is probable that the adjustable stabilizer is not adjusted for the landing condition.

For short field landings, make a power-off approach at 70 MPH with 40° flaps, and land three point. Immediately after touchdown, apply heavy braking as required. For maximum brake effectiveness, retract the flaps, hold full nose up elevator and apply maximum possible brake pressure without sliding the tires.

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.

STARTING.

Prior to starting on cold mornings, it is advisable to pull the propeller through several times by hand to "break loose" or "limber" the oil, thus conserving battery energy. In extremely cold (0°F and lower) weather, the use of an external preheater (for both the engine and battery) and an external power source is recommended whenever possible to obtain positive starting and to reduce wear and abuse to the engine and the electrical system.

Preheat 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.

Cold weather starting procedures are as follows:

With Preheat:

(1) With ignition switch "OFF" and throttle open 1/2", prime the engine four to eight strokes as the propeller is being turned over by hand.

NOTE

Use heavy strokes of primer for best atomization of fuel. After priming, push primer all the way in and turn to locked position to avoid possibility of engine drawing fuel through the primer.

(2) Mixture -- Full Rich.
(3) Clear Propeller.
(4) Turn master switch "ON."
(5) Turn ignition switch to "BOTH."
(6) Open throttle 1/2" and engage starter.
(7) Pull carburetor heat on after engine has started, and leave on until engine is running smoothly.

Without Preheat:

(1) Prime the engine six to eight strokes while the propeller is

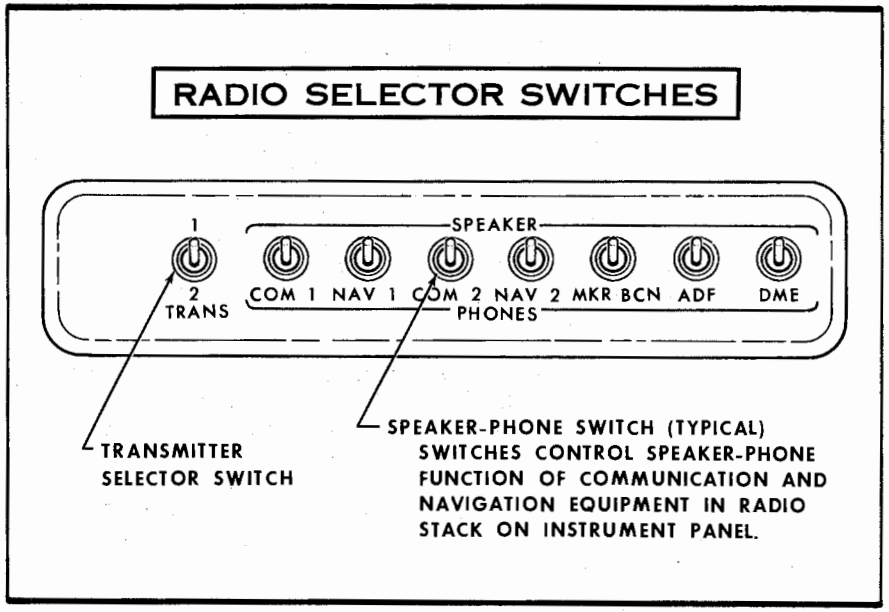


Figure 7-2.

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 installed adjacent to the Nav-O-Matic control unit on the instrument panel. 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.

STATIC PRESSURE ALTERNATE SOURCE VALVE.

A static pressure alternate source valve may be installed in the static system for use when the external static sources are malfunctioning. This valve also permits draining condensate from the static lines.

If erroneous instrument readings are suspected due to water or ice in the static pressure lines, the static pressure alternate source valve should be opened, thereby supplying static pressure from the cabin. Cabin pressures will vary, however, with open cabin ventilators or windows. The most adverse combinations will result in airspeed and altimeter variations of no more than 2 MPH and 20 feet, respectively.

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. Figure 7-2 illustrates the radio selector switch panel.

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.

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.

being turned by hand with throttle open 1/2". Leave primer charged and ready for stroke.
(2) Mixture -- Full rich.
(3) Clear propeller.
(4) Turn master switch "ON."
(5) Turn ignition switch to "BOTH."
(6) Pump throttle rapidly to full open twice. Return to 1/2" open position.
(7) Engage starter and continue to prime engine until it is running smoothly, or alternately, pump throttle rapidly over first 1/4 of total travel.
(8) Pull carburetor heat on after engine has started. Leave on until engine is running smoothly.
(9) Lock primer.

NOTE

If the engine does not start during the first few attempts, or if engine firing diminishes in strength, it is probable that the spark plugs have been frosted over. Preheat must be used before another start is attempted.

IMPORTANT

Excessive priming and pumping throttle may cause raw fuel to accumulate in the intake air duct, creating a fire hazard in the event of a backfire. If this occurs, maintain a cranking action to suck flames into the engine. An outside attendant with a fire extinguisher is advised for cold starts without preheat.

OPERATION.

During cold weather operations, no indication will be apparent on the oil temperature gage prior to take-off if outside air temperatures are very cold. After a suitable warm-up period (2 to 5 minutes at 1000 RPM), accelerate the engine several times to higher engine RPM. If the engine accelerates smoothly and the oil pressure remains normal and steady, the airplane is ready for take-off.

Rough engine operation in cold weather can be caused by a combination of an inherently leaner mixture due to the dense air and poor vaporization and distribution of the fuel-air mixture to the cylinders.

The effects of these conditions are especially noticeable during operation on one magneto in ground checks where only one spark plug fires in each cylinder.

To operate the engine without a winterization kit in occasional outside air temperatures from 10°F to 20°F, the following procedure is recommended:

(1) Use full carburetor heat during engine warm-up and ground check.
(2) Use minimum carburetor heat required for smooth operation in take-off, climb, and cruise.
(3) Select relatively high manifold pressure and RPM settings for optimum mixture distribution, and avoid excessive manual leaning in cruising flight.
(4) Avoid sudden throttle movements during ground and flight operation.

When operating in sub-zero temperatures, avoid using partial carburetor heat. Partial heat may raise the carburetor air temperature to the 32° to 70° range where icing is critical under certain atmospheric conditions.

Refer to Section VII for cold weather equipment and operating details for the OIL DILUTION SYSTEM.

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.

If the full dilution time was used, beginning with a full oil sump (12 quarts), subsequent starts and engine warm-up should be prolonged to evaporate enough of the fuel to lower the oil sump level to 13 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.

OIL DILUTION TABLE

	TEMPERATURE		
	0°F	−10°F	−20°F
Dilution Time	1½ min.	3¾ min.	6 min.
Fuel Added	1 qt.	2½ qt.	4 qt.

NOTE: Maximum fuel and oil in sump for take-off is 13 quarts.

Figure 7-1.

two shields to partially cover the cowl nose cap opening, one shield to cover the carburetor air intake, 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 accidentally 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.

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 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 are required for landing.

INSUFFICIENT RATE OF CHARGE.

If the ammeter indicates a continuous discharge rate 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.

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.

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.

LONG RANGE FUEL TANKS

Special wings with long range fuel tanks are available to replace the standard wings and fuel tanks for greater endurance and range. When these tanks are installed, the total usable fuel, for all flight conditions, is 79 gallons.

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

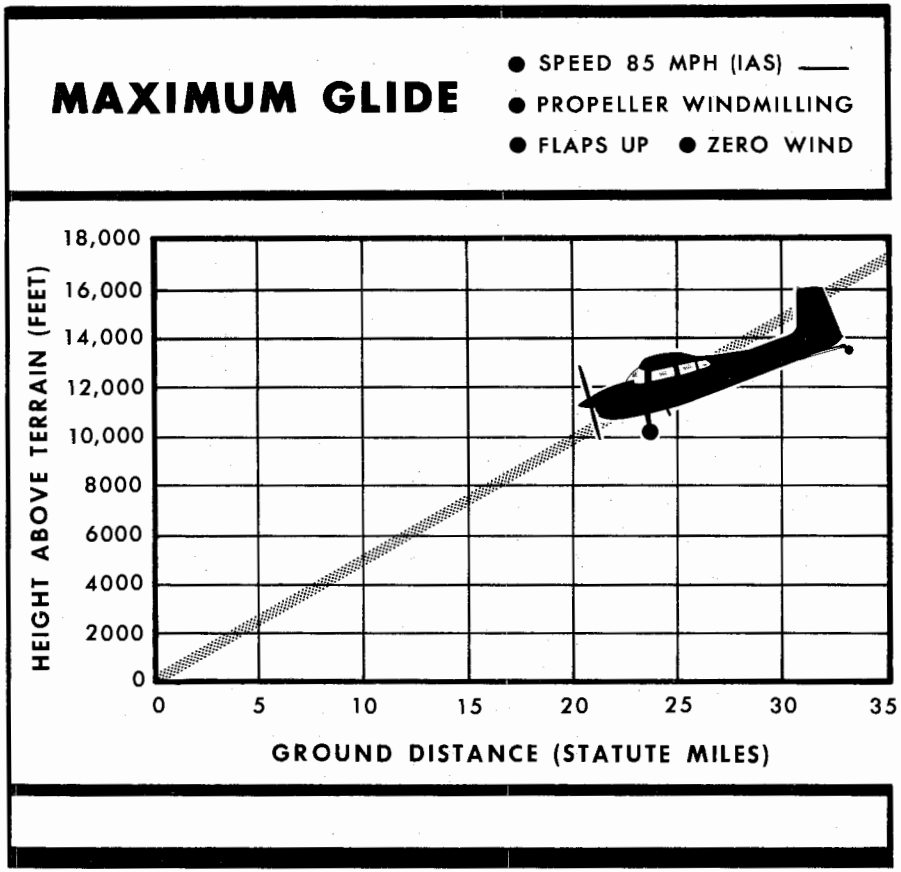


Figure 6-6.

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 sudden 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.

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 20° and 80 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 switch.
(3) Approach with flaps 40° at 75 MPH.
(4) Unlatch cabin doors prior to final approach.
(5) Before touchdown, turn ignition switch "OFF."
(6) Land in a three-point attitude.

EMERGENCY LANDING WITHOUT ENGINE POWER.

If an engine stoppage occurs, establish a flaps up glide at 85 MPH. If time permits, attempt to restart the engine by checking for fuel quantity, proper fuel selector valve position, and mixture control setting. 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 "OFF."
(3) Turn all switches "OFF."
(4) Approach at 85 MPH.
(5) Extend wing flaps as necessary within gliding distance of field.
(6) Unlatch cabin doors prior to final approach.
(7) Land in a three-point attitude.
(8) Apply heavy braking.

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 flaps 40° and sufficient power for a 300 ft./min. rate of descent at 75 MPH.
(3) Unlatch the cabin doors.
(4) Maintain a continuous descent until touchdown in a tail-low 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) Evacuate airplane through cabin doors. If necessary, open windows to flood cabin compartment for equalizing pressure so that door can be opened.
(7) Inflate life vests and raft (if available) after evacuation of cabin.

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

DISORIENTATION IN CLOUDS.

When flying in marginal weather, the pilot should make sure that the Wing Leveler (if installed) control knob is "ON." However, if the airplane is not equipped with this device or gyro horizon and directional gyro

LANDING DISTANCE TABLE

LANDING DISTANCE WITH 40° 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
2800	70	480	1365	505	1445	540	1535	570	1625

NOTES:
1. Distances shown are based on zero wind, power off, and heavy braking.
2. Reduce landing distances 10% for each 4 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.

CRUISE PERFORMANCE

LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight-2800 Pounds

RPM	MP	% BHP	GAL/ HOUR	TAS MPH	60 GAL (NO RESERVE) ENDR. HOURS	60 GAL (NO RESERVE) RANGE MILES	79 GAL (NO RESERVE) ENDR. HOURS	79 GAL (NO RESERVE) RANGE MILES
15,000 FEET								
2450	16	54	10.4	150	5.8	865	7.6	1135
	15	50	9.8	142	6.1	875	8.1	1155
	14	46	9.2	135	6.5	880	8.6	1160
2300	16	50	9.6	143	6.2	890	8.2	1170
	15	47	9.1	136	6.6	900	8.7	1185
	14	42	8.5	127	7.1	900	9.3	1185
2200	16	47	9.1	138	6.6	910	8.7	1200
	15	44	8.6	130	7.0	910	9.2	1200
	14	40	8.0	120	7.5	905	9.9	1190
2000 MAXIMUM RANGE SETTINGS	16	40	7.8	122	7.7	940	10.1	1240
	15	37	7.3	112	8.2	920	10.8	1210
	14	34	6.8	101	8.8	895	11.6	1175
20,000 FEET								
2450	13	44	9.0	133	6.7	895	8.8	1175
	12	40	8.3	122	7.2	875	9.5	1155
2300	13	42	8.4	126	7.1	905	9.4	1190
	12	38	7.7	113	7.8	875	10.3	1155
2200	13	39	7.8	118	7.7	905	10.1	1190
	12	35	7.2	103	8.3	865	11.0	1135

Figure 6-4 (Sheet 3 of 3).

instruments, the pilot will have to rely on the turn coordinator (or turn and bank indicator) if he inadvertently flies into clouds. The following instructions assume that only one of the latter two instruments is available.

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) Reduce power to set up a 500 to 800 ft./min. rate of descent.
(2) Use full carburetor heat.
(3) Adjust the stabilizer trim control for a stabilized descent at 100 MPH.
(4) Keep hands off the control wheel.
(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.
(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 100 MPH.
(4) Adjust stabilizer trim control to maintain a 100 MPH glide.
(5) Keep hands off the control wheel, using rudder control to hold a straight heading.
(6) Check engine operation occasionally, but avoid using enough power to disturb the trimmed glide.
(7) Upon breaking out of clouds, apply normal cruising power and resume 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) Turn fuel selector valve "OFF."
(2) Pull mixture control to idle cut-off.
(3) Turn master switch "OFF."
(4) Establish a 120 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

CRUISE PERFORMANCE

LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 2800 Pounds

RPM	MP	% BHP	GAL/ HOUR	TAS MPH	60 GAL (NO RESERVE) ENDR. HOURS	60 GAL (NO RESERVE) RANGE MILES	79 GAL (NO RESERVE) ENDR. HOURS	79 GAL (NO RESERVE) RANGE MILES
7500 FEET								
2450	21	71	13.1	161	4.6	730	6.0	960
	20	67	12.4	157	4.8	760	6.4	1005
	19	62	11.7	152	5.1	780	6.8	1025
	18	58	11.0	147	5.5	805	7.2	1055
2300	21	66	12.2	156	4.9	760	6.5	1005
	20	62	11.6	151	5.2	780	6.8	1025
	19	58	11.0	147	5.5	800	7.2	1050
	18	54	10.5	142	5.7	810	7.5	1065
2200	21	62	11.4	152	5.3	805	6.9	1055
	20	58	10.7	148	5.6	830	7.4	1090
	19	54	10.2	143	5.9	840	7.7	1105
	18	51	9.7	138	6.2	860	8.1	1130
2000 MAXIMUM RANGE SETTINGS	19	47	8.7	131	6.9	900	9.1	1185
	18	43	8.1	123	7.4	910	9.8	1200
	17	39	7.6	116	7.9	920	10.4	1210
	16	36	7.0	107	8.6	920	11.3	1210
10,000 FEET								
2450	19	63	11.9	156	5.0	785	6.6	1035
	18	60	11.2	152	5.3	810	7.1	1065
	17	55	10.6	146	5.7	830	7.5	1090
	16	51	10.0	141	6.0	840	7.9	1105
2300	19	60	11.1	152	5.4	820	7.1	1080
	18	56	10.5	147	5.7	840	7.5	1105
	17	51	9.8	141	6.1	860	8.1	1130
	16	47	9.2	134	6.5	870	8.6	1145
2200	19	56	10.4	148	5.7	850	7.6	1120
	18	52	9.8	142	6.1	875	8.1	1155
	17	49	9.3	136	6.5	880	8.5	1160
	16	45	8.7	129	6.9	895	9.1	1175
2000 MAXIMUM RANGE SETTINGS	18	44	8.4	128	7.1	910	9.4	1200
	17	40	7.8	120	7.7	925	10.1	1215
	16	38	7.4	114	8.1	925	10.7	1215
	15	35	6.9	105	8.7	910	11.4	1200

Figure 6-4 (Sheet 2 of 3).

CRUISE PERFORMANCE

LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight-2800 Pounds

RPM	MP	% BHP	GAL/ HOUR	TAS MPH	60 GAL (NO RESERVE) ENDR. HOURS	60 GAL (NO RESERVE) RANGE MILES	79 GAL (NO RESERVE) ENDR. HOURS	79 GAL (NO RESERVE) RANGE MILES
2500 FEET								
2450	23	76	14.2	158	4.2	670	5.6	885
	22	72	13.4	154	4.5	690	5.9	910
	21	68	12.7	151	4.7	715	6.2	940
	20	63	12.0	148	5.0	730	6.6	965
2300	23	71	13.1	154	4.6	700	6.0	925
	22	67	12.2	149	4.9	740	6.5	970
	21	62	11.5	145	5.2	760	6.9	1005
	20	59	11.0	142	5.5	775	7.2	1020
2200	23	67	12.1	149	5.0	745	6.5	980
	22	63	11.4	146	5.3	770	6.9	1010
	21	59	10.8	142	5.6	790	7.3	1040
	20	55	10.2	138	5.9	810	7.7	1065
2000 MAXIMUM RANGE SETTINGS	20	47	8.7	126	6.9	865	9.1	1135
	19	43	8.2	121	7.3	890	9.6	1170
	18	39	7.5	113	8.0	900	10.5	1185
	17	35	7.0	105	8.6	905	11.3	1190
5000 FEET								
2450	23	78	14.5	163	4.1	670	5.4	885
	22	73	13.6	159	4.4	700	5.8	925
	21	70	13.0	156	4.6	720	6.1	950
	20	65	12.2	151	4.9	750	6.5	985
2300	23	73	13.4	158	4.5	710	5.9	930
	22	69	12.6	155	4.7	730	6.3	965
	21	64	11.9	151	5.0	760	6.6	1005
	20	60	11.2	146	5.4	785	7.1	1035
2200	23	68	12.4	155	4.8	750	6.4	985
	22	64	11.7	151	5.1	775	6.8	1020
	21	60	11.0	146	5.5	800	7.2	1050
	20	57	10.5	143	5.7	815	7.5	1075
2000 MAXIMUM RANGE SETTINGS	19	45	8.5	126	7.1	895	9.3	1175
	18	41	7.9	118	7.6	905	10.0	1190
	17	37	7.3	111	8.2	910	10.8	1200
	16	34	6.8	103	8.8	905	11.6	1190

Figure 6-4 (Sheet 1 of 3).

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.

Although flying in known icing conditions is prohibited, an unexpected icing encounter should be handled as follows:

(1) Check 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 full out to obtain windshield defroster airflow. Adjust cabin air control to get maximum defroster heat and airflow.
(4) Increase engine speed to minimize ice build-up on the propeller blades.
(5) Watch for signs of carburetor air filter ice and apply carburetor heat as required. An unexplained loss in manifold pressure could be caused by carburetor ice or air intake filter ice. Adjust the mixture for smooth operation if continuous operation with carburetor heat "ON" is required.
(6) Plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable "off airport" landing site.
(7) With an ice accumulation of one inch or more on the wing leading edges, be prepared for significantly higher stall speed.
(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 left 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) Perform a landing approach using a forward slip, if necessary, for improved visibility.

(11) Approach at 90 to 100 MPH, depending upon the amount of ice accumulation.

(12) Perform a wheel landing at a speed slightly higher than normal.

LANDPLANE

TAKE-OFF DATA

LANDPLANE

TAKE-OFF DISTANCE WITH 20° FLAPS FROM HARD SURFACE RUNWAY

GROSS WEIGHT POUNDS	IAS @ 50' MPH	HEAD WIND KNOTS	AT SEA LEVEL & 59° F		AT 2500 FT & 50° F		AT 5000 FT & 41° F		AT 7500 FT & 32° F	
			GROUND RUN	TOTAL TO CLEAR 50 FT OBS	GROUND RUN	TOTAL TO CLEAR 50 FT OBS	GROUND RUN	TOTAL TO CLEAR 50 FT OBS	GROUND RUN	TOTAL TO CLEAR 50 FT OBS
2000	52	0	295	655	350	745	415	855	505	1005
		10	190	475	225	545	275	630	340	750
		20	105	315	130	370	160	435	205	525
2400	57	0	440	895	525	1040	630	1215	765	1465
		10	295	665	355	775	435	920	535	1120
		20	175	460	215	545	270	655	340	810
2800	61	0	625	1205	750	1425	900	1700	1100	2110
		10	430	915	525	1085	635	1310	790	1645
		20	270	650	335	785	420	965	530	1230

NOTES: 1. Increase distance 10% for each 25°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 7% of the "total to clear 50 ft. obstacle" figure.

LANDPLANE

MAXIMUM RATE-OF-CLIMB DATA

LANDPLANE

GROSS WEIGHT POUNDS	AT SEA LEVEL & 59°F			AT 5000 FT & 41°F			AT 10,000 FT & 23° F			AT 15,000 FT & 5° F			AT 20,000 FT & -12°F		
	IAS MPH	RATE OF CLIMB FT/MIN.	GAL. OF FUEL USED	IAS MPH	RATE OF CLIMB FT/MIN.	FROM S.L. / FUEL USED	IAS MPH	RATE OF CLIMB FT/MIN.	FROM S.L. / FUEL USED	IAS MPH	RATE OF CLIMB FT/MIN.	FROM S.L. / FUEL USED	IAS MPH	RATE OF CLIMB FT/MIN.	FROM S.L. / FUEL USED
2000	91	1765	1.5	87	1450	2.6	82	1125	3.9	76	805	5.4	72	480	7.6
2400	93	1380	1.5	89	1105	2.9	85	825	4.6	79	550	6.8	75	270	10.5
2800	95	1090	1.5	91	840	3.4	87	590	5.6	82	335	8.9	78	80	16.9

NOTES: 1. Full throttle, 2600 RPM, flaps up, mixture leaned for smooth operation above 5000 ft.
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.

AIRSPEED CORRECTION TABLE
(LANDPLANE)

FLAPS UP								
IAS	60	80	100	120	140	160	180	
CAS	68	82	100	118	136	155	175	
*FLAPS DOWN								
IAS	40	50	60	70	80	90	100	110
CAS	56	61	67	74	82	91	101	111

*MAXIMUM FLAP SPEED 110 MPH, CAS

Figure 6-1.

STALL SPEEDS, POWER OFF

Gross Weight 2800 LBS.	ANGLE OF BANK			
CONFIGURATION	0°	20°	40°	60°
FLAPS UP	65	67	75	92
FLAPS 20°	59	61	67	83
FLAPS 40°	58	60	66	82

LANDPLANE SPEEDS ARE MPH, CAS LANDPLANE

Figure 6-2.

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. 5A6 as Cessna Model No. 180H.

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 . . . . . 2800 lbs
Flight Load Factor
*Flaps Up . . . . . +3.8 -1.52
*Flaps Down . . . . . +3.5

*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)	192 MPH
Maximum Structural Cruising Speed	160 MPH
Maximum Speed, Flaps Extended	110 MPH
*Maneuvering Speed	128 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)	192 MPH (red line)
Caution Range	160-192 MPH (yellow arc)
Normal Operating Range	68-160 MPH (green arc)
Flap Operating Range	60-110 MPH (white arc)

ENGINE OPERATION LIMITATIONS.

Power and Speed	230 BHP at 2600 RPM

ENGINE INSTRUMENT MARKINGS.

FUEL QUANTITY INDICATORS.

Empty (2.5 gallons unusable each tank in normal flight maneuvers with fuel selector valve in "BOTH ON" position.)	E (red line)

OIL TEMPERATURE GAGE.

Normal Operating Range	Green Arc
Do Not Exceed	225°F (red line)

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.

A power setting selected from the range charts usually will be more efficient than a random setting, since it will permit you to estimate your fuel consumption more accurately. You will find that using the charts and your Power Computer will pay dividends in overall efficiency.

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.

OIL PRESSURE GAGE.

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

CYLINDER HEAD TEMPERATURE GAGE.

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

TACHOMETER.

Normal Operating Range	2200-2450 RPM (green arc)
Do Not Exceed (engine rated speed)	2600 RPM (red line)

MANIFOLD PRESSURE GAGE.

Normal Operating Range	15-23 in. Hg (green arc)

CARBURETOR AIR TEMPERATURE GAGE (OPT).

Icing Range	-15° to 5°C (yellow arc)

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.

NOTE

To differentiate between the rearmost passengers of the four-place and six-place seating version in the following diagrams, the term "REAR PASSENGERS" is used for the four-place version, and "AFT PASSENGERS" is used for the six-place version.

NOTE

Each loading should be figured in accordance with the above paragraph. When loading is light (such as pilot and copilot, and no rear seats or cargo), be sure to check the forward balance limits. When loading is heavy (near gross weight), be sure to check the aft balance limits.

To avoid time consuming delays in cargo and/or passenger shifting, plan your load so that the heaviest cargo and/or passengers are in the forward part of the aircraft, and the lightest in the rear. Always plan to have any vacant space at the rear of the aircraft. For example, do not have passengers occupy the aft seat unless the front and center seats are to be occupied.

The arm for any location in the aircraft can be determined from the diagram on page 4-9 (the station is the same as the c.g. arm). Multiply the weight of the object by the arm and divide by 1000 to get the moment/1000.

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.

SERVICING INTERVALS CHECK LIST
(Continued)

EACH 500 HOURS

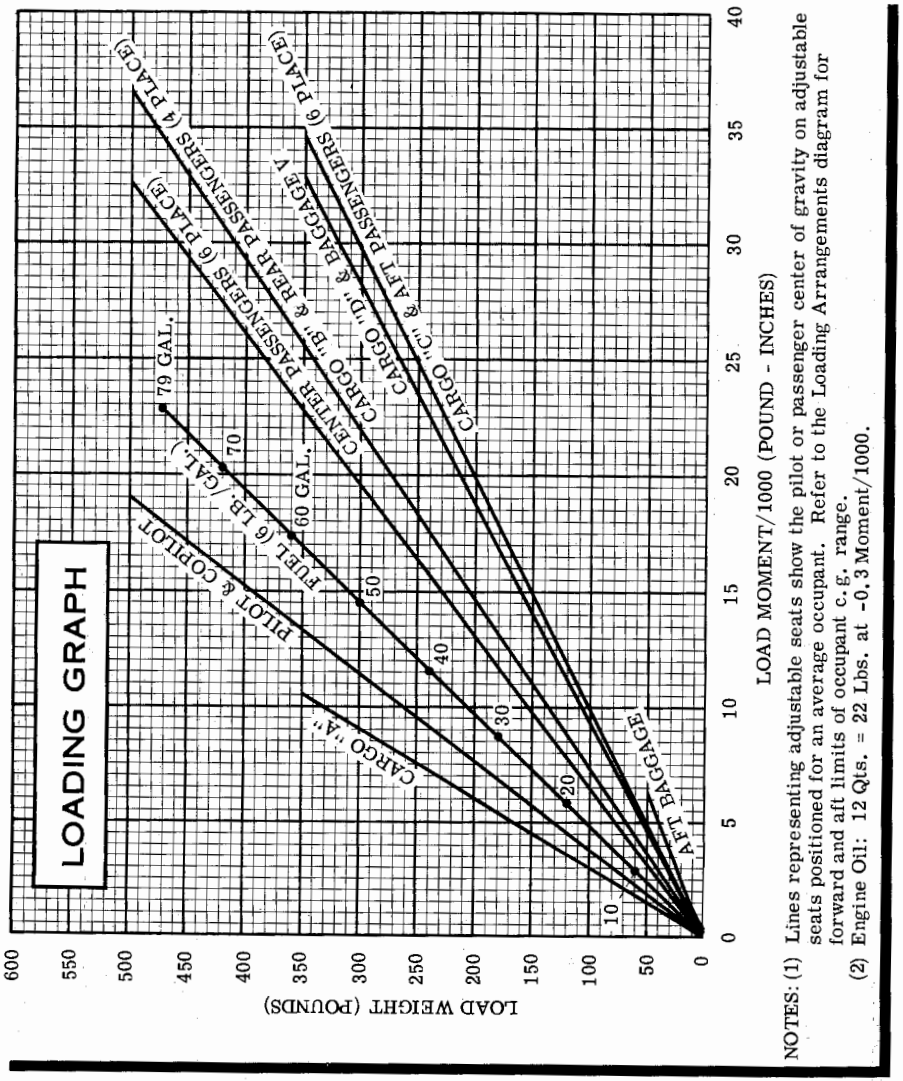
VACUUM SYSTEM AIR FILTER (OPT) -- Replace filter element. Replace sooner if suction gage reading drops to 4.6 in. Hg.
MAIN WHEEL BEARINGS -- Lubricate at first 100 hours and at 500 hours thereafter. Reduce lubrication interval to 100 hours when operating in dusty or seacoast areas, during periods of extensive taxiing, or when numerous take-offs and landings are made.
ADJUSTABLE STABILIZER JACKSCREWS -- Disconnect rubber boots and lubricate actuator threads; reinstall boots. Test operate stabilizer system.

AS REQUIRED

OXYGEN CYLINDER (OPT) -- The oxygen cylinder must be hydrostatically tested at specific intervals in accordance with Federal Regulations. Refer to Service Manual for detailed instructions.

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)	1651	58.5		
2. Oil (12 qts. - Full oil may be assumed for all flights.)	22	-0.3	22	-0.3
3. Fuel (Standard - 60 Gal. @ 6 Lbs./Gallon)	360	17.3		
Fuel (Long Range - 79 Gal. @ 6 Lbs./Gallon)				
4. Pilot and Copilot (Sta. 36 to 50)	340	12.9		
5. Center Passengers (6-Place Version)				
Aft Passengers IV (6-Place Version 120 Lbs Max.)				
Rear Passengers V (4-Place Version)	340	24.8		
6. Baggage V (Sta. 82 to 108, 350 Lbs Max.)	80	7.5		
Cargo "A" (Sta. 10 to 50, 350 Lbs Max.)				
Cargo "B" (Sta. 50 to 90, 1000 Lbs Max.)				
Cargo "C" (Sta. 90 to 108, 350 Lbs Max.)				
Cargo "D" (Sta. 78 to 108, 350 Lbs Max.)				
Aft Baggage (Sta. 108 to 140, 50 Lbs Max.)	7	0.9		
7. TOTAL WEIGHT AND MOMENT	2800	121.6		

8. Locate this point (2800 at 121.6) on the Center of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable.



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: 12 Qts. = 22 Lbs. at -0.3 Moment/1000.

SERVICING INTERVALS CHECK LIST

EACH 50 HOURS

BATTERY -- Check and service. Check more often (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.

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

EACH 100 HOURS

SPARK PLUGS -- Clean, test and regap.
FUEL STRAINER -- Disassemble and clean.
FUEL TANK SUMP DRAIN PLUGS -- Remove and drain.
FUEL SELECTOR VALVE DRAIN PLUG -- Remove and drain.
BRAKE MASTER CYLINDERS -- Check and fill.
TAIL WHEEL PIVOT -- Lubricate. Lubricate more often if excessive amounts of water, mud, ice or snow are encountered.
TAIL WHEEL BEARINGS -- Lubricate. Lubricate more often if excessive amounts of water, mud, ice or snow are encountered.
CESSNA CASTERING AXLES (OPT) -- Lubricate and perform functional check to determine if refilling is necessary. Refer to Service Manual for servicing procedures.
VACUUM SYSTEM OIL SEPARATOR (OPT) -- Clean.
SUCTION RELIEF VALVE INLET SCREEN (OPT) -- Clean.

LUBRICATION AND SERVICING PROCEDURES

DAILY (Continued)

OIL DIPSTICK:

Check oil level before each flight. Do not operate on less than 9 quarts. To minimize loss of oil through breather, fill to 10 quart level for normal flights of less than 3 hours. For extended flight, fill to 12 quarts. If optional oil filter is installed, one additional quart is required when the filter element is changed.

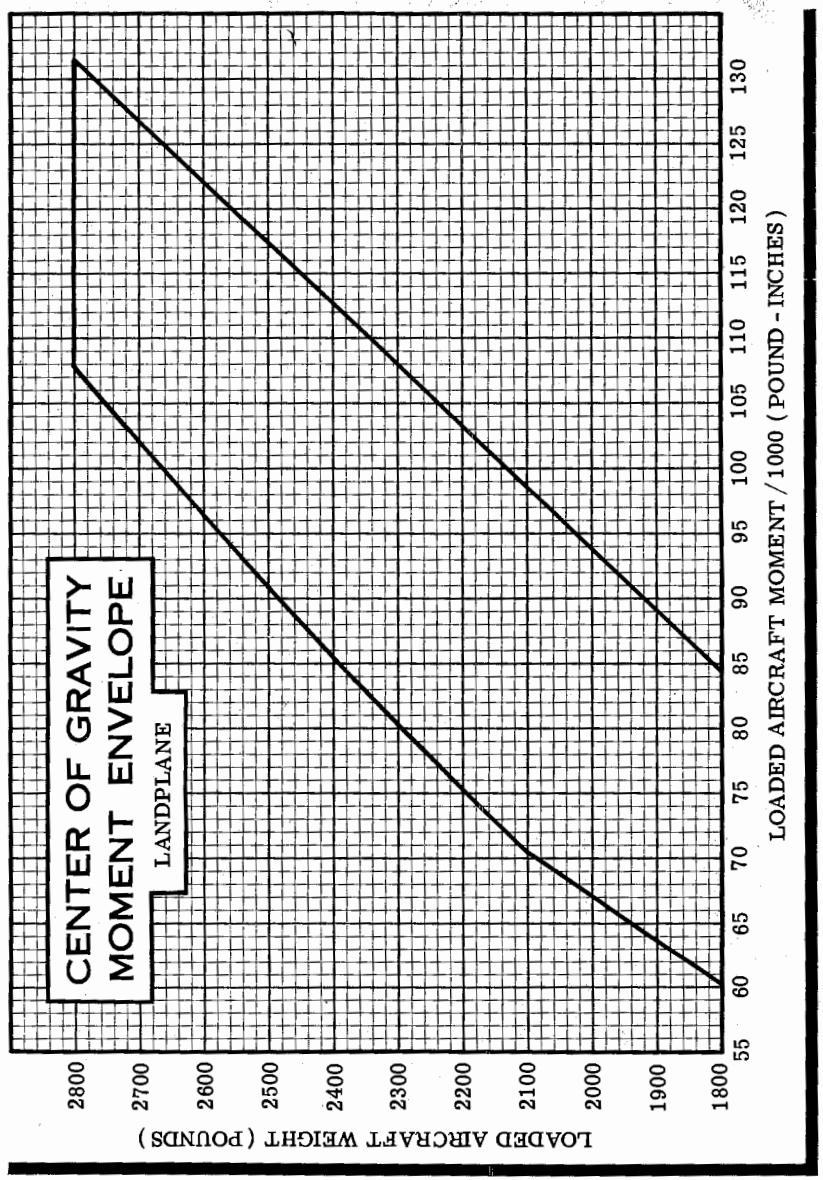
OIL DIPSTICK CALIBRATIONS

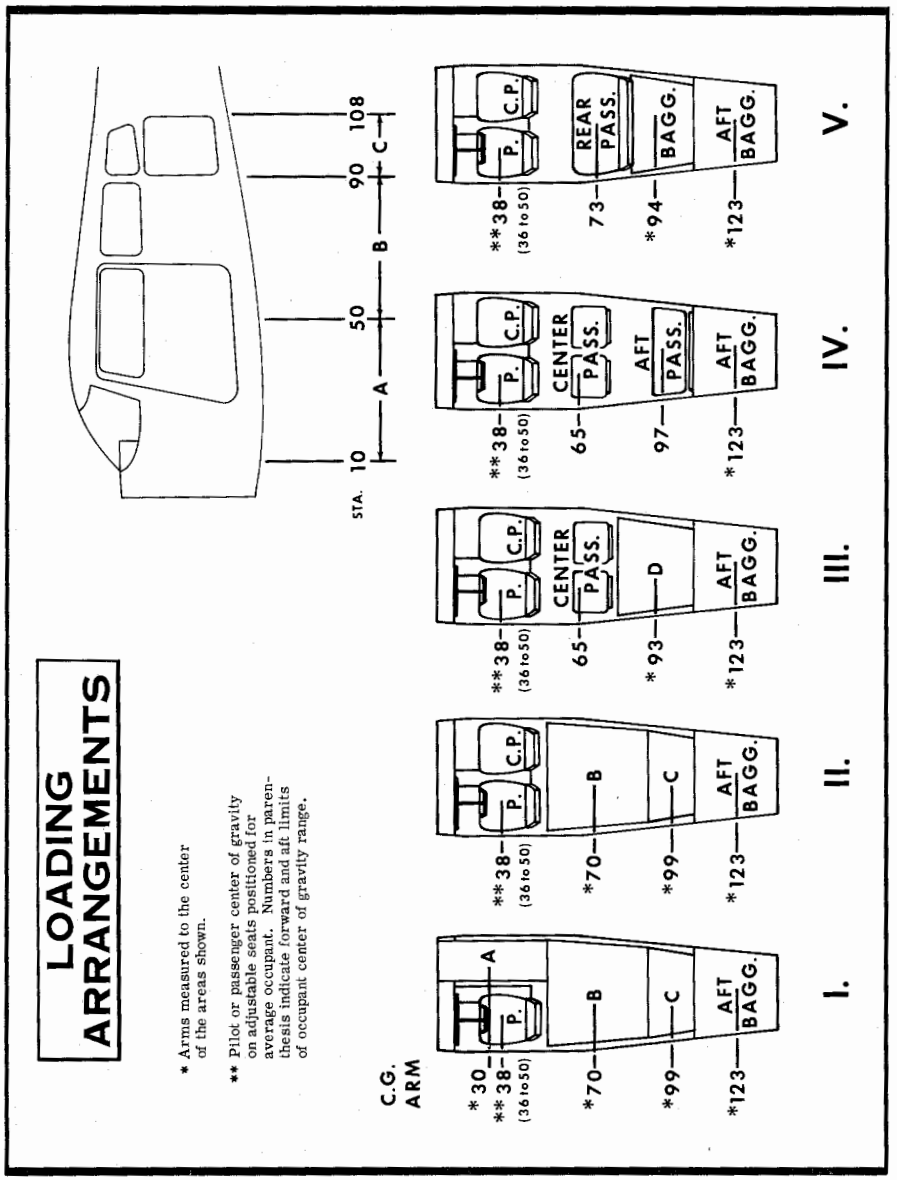
The engine oil dipstick in your airplane is calibrated for both landplane and floatplane/amphibian use. Oil level readings for the floatplane/amphibian will register considerably below the equivalent calibrations for the landplane due to the difference in attitude of the airplanes when being serviced. When checking the oil level, take precautions to assure that you are using the correct calibrations for the configuration of your airplane.

The landplane side of the dipstick is marked with four lines representing the six, eight, ten and twelve quart levels. The bottom line is the six quart level and the top line is the twelve quart (full) level. The floatplane/amphibian side of the dipstick has two asterisk marks. The lower asterisk indicates nine quarts and the upper asterisk indicates twelve quarts.

OXYGEN CYLINDER AND FILLER VALVE (OPT):

Check oxygen pressure gage for anticipated requirements before each flight. Use filler valve located on left side of fuselage aft of cabin windows under round cover plate to refill cylinder 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 7-10 for filling pressures.





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 TANK FILLERS:

Service after each flight with 80/87 minimum grade fuel. The capacity of each tank is 32.5 gallons. When optional long range fuel tanks are installed, the capacity of each tank is 42.0 gallons.

FUEL STRAINER:

Before the first flight of the day and after each refueling, pull out fuel strainer drain knob for about four seconds, to clear fuel strainer of possible water and sediment. Release drain knob, then check that strainer drain is closed after draining. If water is observed, there is a possibility that the fuel tank sumps contain water. Thus, the fuel tank sump drain plugs and fuel line drain plug 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 dispersant 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.

(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).

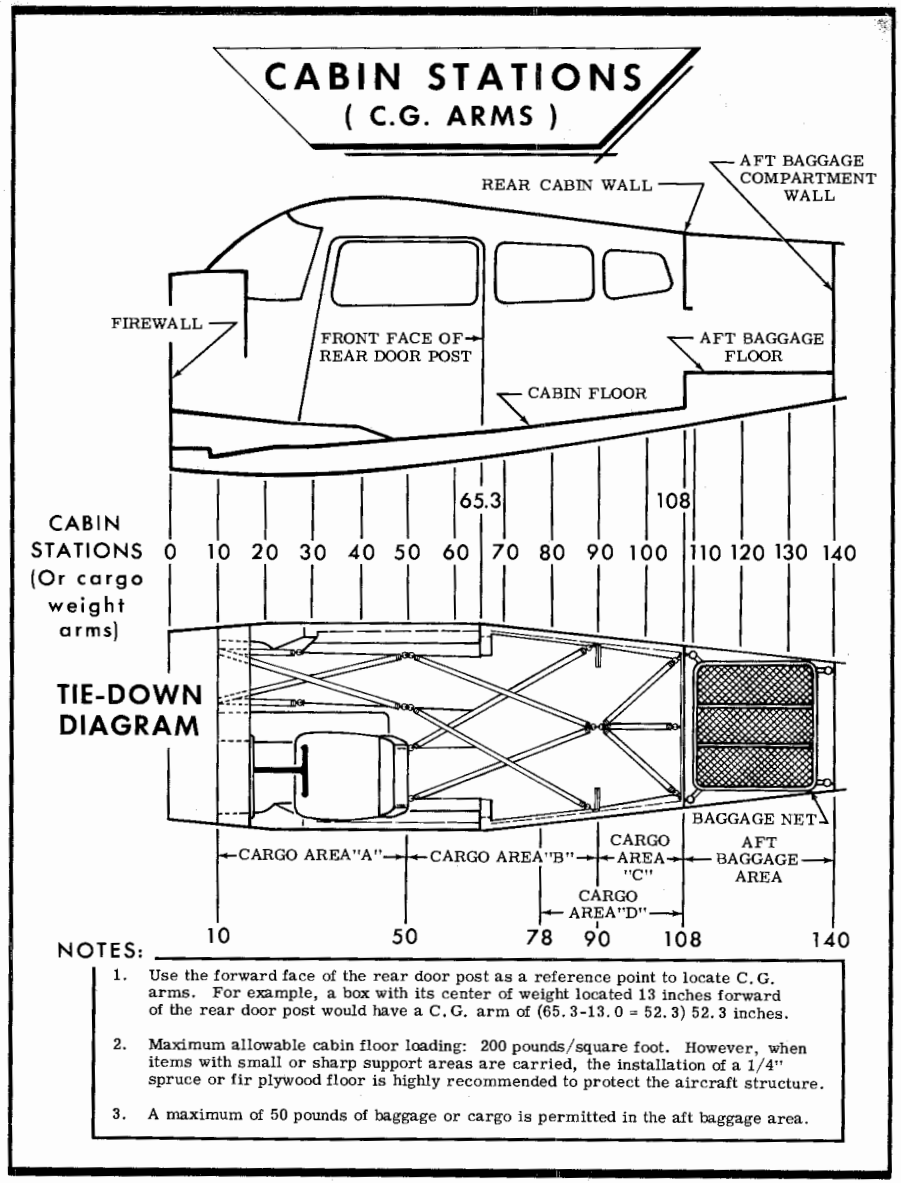
B. To be carried in the aircraft at all times:
   (1) Weight and Balance, and associated papers (latest copy of the Repair and Alteration Form, Form FAA 337, if applicable).
   (2) Aircraft Equipment List.

C. To be made available upon request:
   (1) Aircraft Log Book.
   (2) Engine Log Book.

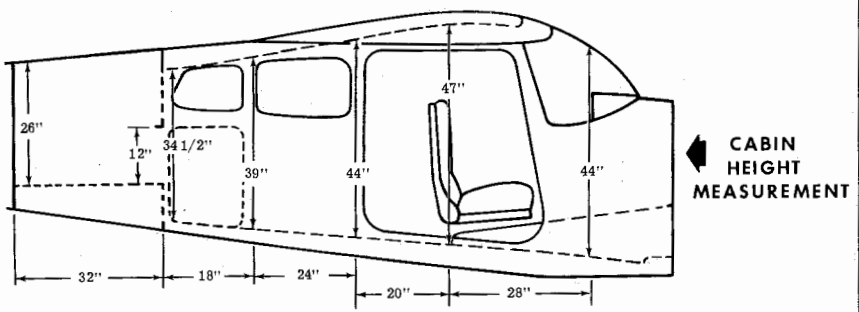
NOTE

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.

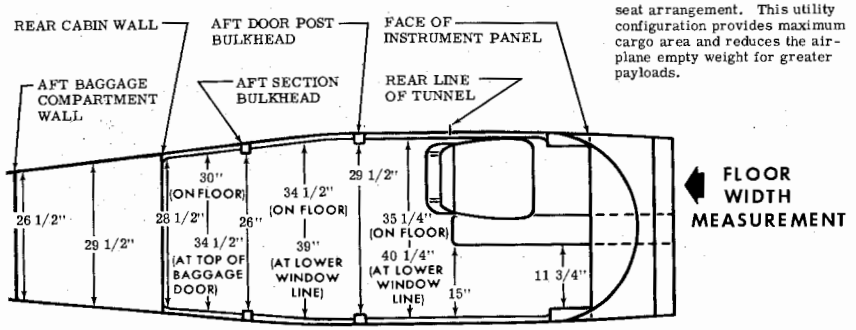


INTERNAL CABIN DIMENSIONS



NOTE

Measurements are with standard seat arrangement. This utility configuration provides maximum cargo area and reduces the airplane empty weight for greater payloads.



DOOR OPENING DIMENSIONS

	WIDTH (TOP)	WIDTH (BOTTOM)	HEIGHT (FRONT)	HEIGHT (REAR)
CABIN DOOR	32"	37"	41"	38½"
BAGGAGE DOOR	15¼"	15½"	22¼"	21"

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 — 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

INTERIOR CARE.

The interior of your airplane is furnished with wear-resistant, hard surface materials designed for maximum usage with minimum upkeep. However, as with any furnishing, the measure of lasting appearance and endurance afforded by the interior is dependent upon the degree of care.

Materials used on the cabin floor and sidewalls are impervious to absorption and, therefore, are not easily soiled or stained. Dust and loose dirt should be picked up with a vacuum cleaner. Stubborn dirt can be wiped off with a cloth moistened in clean water. Mild soap suds, used sparingly, will remove grease. The soap should be removed with a clean damp cloth.

The headliner, instrument panel, plastic trim 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.

Care of the seating materials is identical to care of the furnishings in your home. Vacuum clean regularly to remove dust and loose dirt.

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

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".

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.

When maneuvering the airplane by hand, push at the front spar of the stabilizer adjacent to the fuselage, at the root of the dorsal fin, and at the landing gear or strut root fitting. Do not lift the empennage by the tip of the elevator; likewise, do not shove sidewise on the upper portion of the fin.

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 a rope or chain to the tail gear tie-down fitting and secure the opposite end to a tie-down.
(4) Tie sufficiently strong ropes or chains (700 pounds tensile strength) to the wing tie-down fittings, and secure the opposite ends of the ropes or chains to tie-downs.
(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.

ALUMINUM SURFACES.

The clad aluminum surfaces of your Cessna may be washed with clear water to remove dirt; oil and grease may be removed with gasoline, naphtha, carbon tetrachloride or other non-alkaline solvents. Dulled aluminum surfaces may be cleaned effectively with an aircraft aluminum polish.

After cleaning, and periodically thereafter, waxing with a good automotive wax will preserve the bright appearance and retard corrosion. Regular waxing is especially recommended for airplanes operated in salt water areas as a protection against corrosion.

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.