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SUPER SKYMASTER

OWNER'S MANUAL

PERFORMANCE - SPECIFICATIO

Super Skymaster*

GROSS WEIGHT:		
Take-Off	4630 lbs	4200 lbs
Landing	4400 lbs	4200 lbs
SPEED, BEST POWER MIXTURE:		
Top Speed at Sea Level	199 mph	200 mph
Cruise, 75% Power at 5500 ft	190 mph	192 mph
RANGE, NORMAL LEAN MIXTURE:		
Cruise, 75% Power at 5500 ft	755 mi	765 mi
552 Pounds, No Reserve	4.0 hrs	4.0 hrs
	189 mph	191 mph
Cruise, 75% Power at 5500 ft	1060 mi	1070 mi
768 Pounds, No Reserve	5.6 hrs	5.6 hrs
	189 mph	191 mph
Optimum Range at 10,000 ft	925 mi	1000 mi
552 Pounds, No Reserve	6.1 hrs	7.0 hrs
	150 mph	143 mph
Optimum Range at 10,000 ft	1285 mi	1390 mi
768 Pounds, No Reserve	8.6 hrs	9.7 hrs
	150 mph	143 mph
RATE OF CLIMB AT SEA LEVEL:		
Twin Engine	1100 fpm	1300 fpm
Front Engine Only	235 fpm	360 fpm
Rear Engine Only	320 fpm	450 fpm
SERVICE CEILING:		
Twin Engine	18,000 ft	20,500 ft
Front Engine Only	5100 ft	8200 ft
Rear Engine Only	7100 ft	10,200 ft
TAKE-OFF:		
Ground Run	1000 ft	800 ft
Total Distance Over 50-Foot Obstacle	1675 ft	1435 ft
LANDING:		
Ground Roll	700 ft	700 ft
Total Distance Over 50-Foot Obstacle	1650 ft	1650 ft
STALL SPEED:		
Flaps Up, Power Off	80 mph	76 mph
Flaps Down, Power Off	70 mph	67 mph
EMPTY WEIGHT (Approximate)	2695 lbs	2695 lbs
USEFUL LOAD	1935 lbs	1505 lbs
BAGGAGE ALLOWABLE	365 lbs	365 lbs
WING LOADING: Pounds/Sq Foot	22.9	20.7
POWER LOADING: Pounds/HP	11.0	10.0
FUEL CAPACITY: Total		
Standard Tanks	93 gal.	93 gal.
With Optional Auxiliary Tanks	131 gal.	131 gal.
OIL CAPACITY	5 gal.	5 gal.
PROPELLERS: Constant Speed,		
Full Feathering (Diameter)	76 inches	76 inches
ENGINES:		
Two Continental Fuel Injection Engines	IO-360-C	IO-360-C
210 rated BHP at 2800 RPM		

NOTE: Single-engine service ceiling increases 400 feet for each 30 minutes of flight.

* This manual covers operation of the Super Skymaster which is certificated as Model 337F under FAA Type Certificate No. A6CE. The manual also covers operation of the F337 which is certificated as Model F337F under French Type Certification. The F337, manufactured by Reims Aviation S.A., Reims (Marne), France, is identical to the Super Skymaster except that some equipment designated in this manual as optional on the Super Skymaster is standard equipment on the F337. All Super Skymaster information in this manual pertains to the F337 [illegible]

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Cessna Aircraft Company
Wichita, Kansas USA

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 Super Skymaster. It contains information about your Cessna's equipment, operating procedures, and performance; and suggestions for its servicing and care. We urge you to read it from cover to cover, and to refer to it frequently.

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

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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.

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PRINCIPAL DIMENSIONS

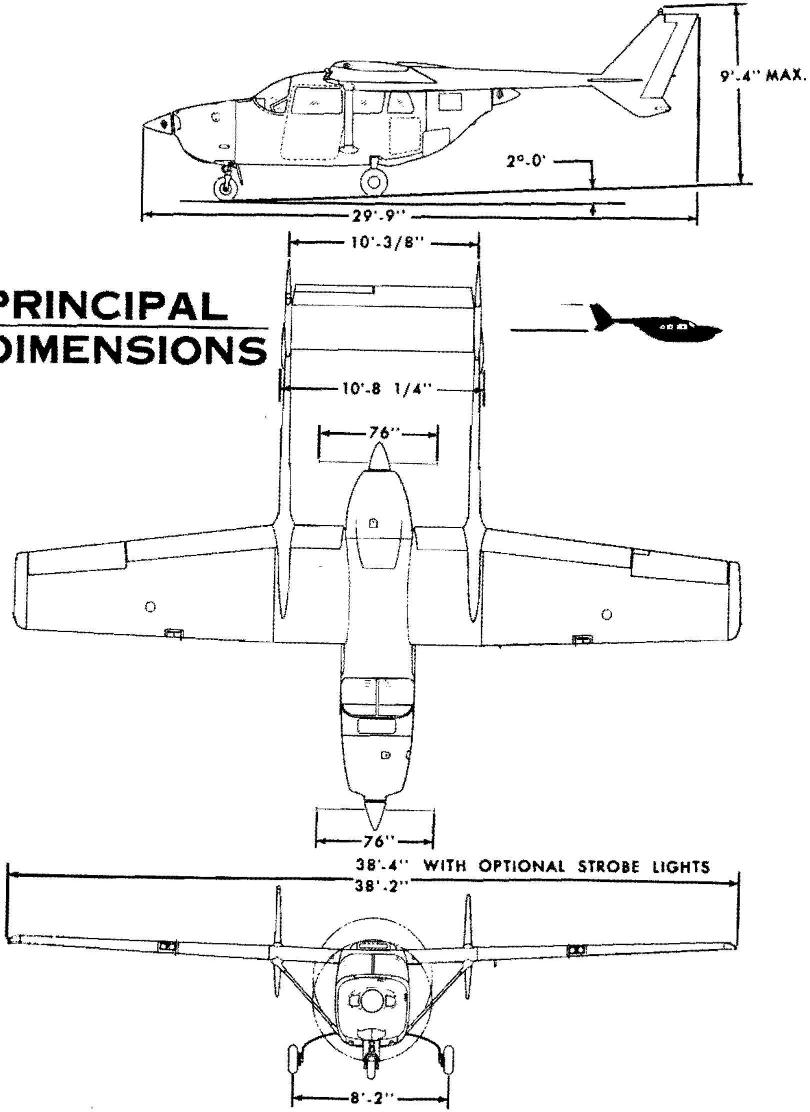


TABLE OF CONTENTS

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.

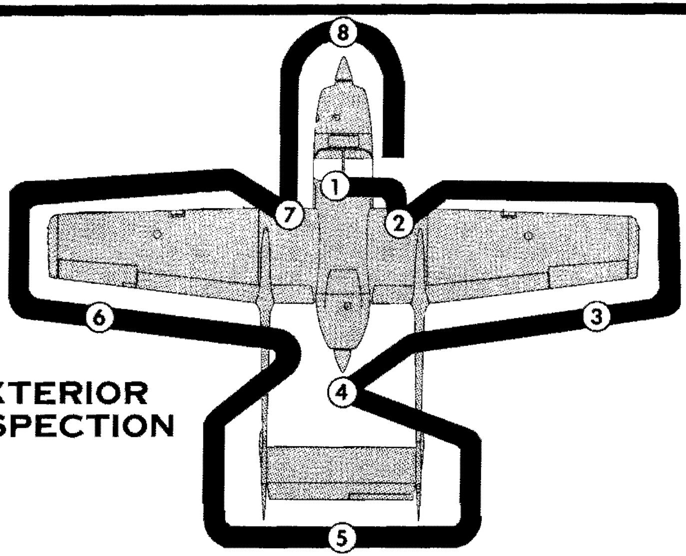
Section I lists, in Pilot's Check List form, the steps necessary to operate your airplane efficiently and safely. It is not a check list in its true form as it is considerably longer, but it does cover briefly all of the points that you should know for a typical flight. All information in this section is based on twin engine operation. For single engine operation and procedures, reference should be made to Section III.

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

BEFORE ENTERING THE AIRPLANE.

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

EXTERIOR INSPECTION



Note

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

(1)
a. Remove control wheel lock.
b. Check ignition switches "OFF."
c. Turn on master switch and check fuel quantity indicators; then turn off master switch.
d. Check front selector valve handle on "LEFT MAIN" position and rear fuel selector valve handle on "RIGHT MAIN" position.

(2)
a. Visually check fuel quantity, then check fuel filler cap secure.
b. Check baggage door for security.
c. Check main wheel tire for proper inflation.
d. Before first flight of day and after each refueling, use a sampler cup and drain a small amount of fuel from quick-drain valves in fuel sump tank and optional auxiliary fuel tank to clear fuel sumps of possible water and sediment.
e. Check auxiliary fuel tank vent opening (at bottom of wing just forward of inboard flap near boom) for stoppage.
f. Disconnect wing tie-down.

(3)
a. Check main fuel tank vent opening (at wing tip trailing edge) for stoppage.
b. Check control surfaces for free and correct movement and security.

(4)
a. Check rear engine oil level. Do not operate with less than 7 quarts. Fill to ten quarts for extended flight. Check oil filler cap for security.
b. Before first flight of day and after each refueling, depress strainer drain lever for about four seconds to clear rear fuel strainer of possible water and sediment. Check strainer drain closed.
c. Check propeller and spinner for nicks and security, and propeller for oil leaks.

(5)
a. Disconnect tail tie-down.
b. Check condition of horizontal and vertical tail surfaces.
c. Inspect flight instrument static source opening on inboard and outboard sides of left boom for stoppage.

(6)
a. Check main fuel tank vent opening (at wing tip trailing edge) for stoppage.
b. Check control surfaces for free and correct movement and security.

(7)
a. Disconnect wing tie-down.
b. Remove pitot tube cover, if installed, and check pitot tube opening for stoppage.
c. Before first flight of day and after each refueling, use sampler cup and drain small amount of fuel from quick-drain valves in fuel sump tank and optional auxiliary fuel tank to clear fuel sumps of possible water and sediment.
d. Check auxiliary fuel tank vent opening (at bottom of wing just forward of inboard flap near boom) for stoppage.
e. Check main wheel tire for proper inflation.
f. Visually check fuel quantity, then check fuel filler cap secure.

(8)
a. Check front engine oil level. Do not operate with less than 7 quarts. Fill to ten quarts for extended flight. Check oil filler cap for security.
b. Before first flight of day and after each refueling, pull out strainer drain knob for about four seconds to clear front fuel strainer of possible water and sediment. Check strainer drain closed.
c. Check propeller and spinner for nicks and security, and propeller for oil leaks.
d. Check nose wheel strut and tire for proper inflation.
e. Disconnect nose tie-down.

Figure 1-1.

BEFORE STARTING THE ENGINES.

(1) Pilot's Check List -- Review check list located in map compartment.
(2) Seats, Seat Belts and Shoulder Harnesses -- Adjust and lock.
(3) Brakes -- Test and set.
(4) Master and Alternator Switches -- "ON."
(5) Voltage Regulator Selector Switch -- "REG 1" or "REG 2" position (as desired).
(6) Landing Gear -- Handle down neutral and green down light on.
(7) Landing Gear Lights and Horn -- Push to test.
(8) Cowl Flaps -- "OPEN."
(9) Fuel Selectors - Front Engine -- "LEFT MAIN."
Rear Engine -- "RIGHT MAIN."
(10) Radios and Electrical Equipment -- "OFF."

STARTING ENGINES.

(1) Mixture -- Rich.
(2) Propeller -- High RPM.
(3) Throttle -- Cracked (one inch).
(4) Auxiliary Fuel Pump Switch -- On "LOW."
(5) Ignition/Starter Switch -- "START" (when fuel flow is steady at 10 to 25 lbs/hr). Hold until engine starts but no longer than 30 seconds.
(6) Auxiliary Fuel Pump Switch -- Off (after engine runs smoothly).

NOTE

The engine should start in two to three revolutions. If it does not, increase the fuel flow by turning the auxiliary fuel pump momentarily on "HI" and crank for two to four additional revolutions. If it still does not start, turn the auxiliary fuel pump off, set the mixture to idle cut-off, and crank until the engine fires or for approximately 15 seconds. If still unsuccessful, start again using the normal starting procedure after allowing the starter to cool.

(7) Oil Pressure Gage -- Check in green arc range within 30 seconds.

BEFORE TAKE-OFF.

(1) Parking Brake -- Set.
(2) Cowl Flaps -- "OPEN."
(3) Flight Controls -- Check for free and correct movement.
(4) Elevator and Rudder Trim -- Take-off settings.
(5) Throttle Settings -- 1800 RPM.
(6) Magnetos -- Check (50 RPM maximum differential between magnetos).
(7) Propellers -- Check feathering to 1200 RPM; return to high RPM (full forward).
(8) Alternators -- Check.
(9) Engine Instruments -- Check.
(10) Suction Gage -- Check sources and suction (5.0 to 5.4 inches of mercury).
(11) Throttles -- Closed (check idle).
(12) Flight Instruments and Radios -- Set.
(13) Optional Autopilot -- "OFF."
(14) Cabin Door and Windows -- Closed and locked.
(15) Parking Brake -- Release.

TAKE-OFF.

NORMAL TAKE-OFF.

(1) Wing Flaps -- "UP" to "1/3" down.
(2) Power -- Full throttle and 2800 RPM.
(3) Mixtures -- Lean for field elevation per fuel flow indicator placard.
(4) Elevator Control -- Lift nose wheel at 75 to 80 MPH.
(5) Brakes -- Apply momentarily when airborne.
(6) Landing Gear -- Retract in climb out.
(7) Climb Speed -- 110 to 120 MPH.
(8) Wing Flaps -- Retract (if extended) after obstacles are cleared.

MAXIMUM PERFORMANCE TAKE-OFF.

(1) Wing Flaps -- "1/3" down.
(2) Brakes -- Apply.
(3) Power -- Full throttle and 2800 RPM.
(4) Mixtures -- Lean for field elevation per fuel flow indicator placard.

(5) Brakes -- Release.
(6) Elevator Control -- Maintain slightly tail-low attitude.
(7) Climb Speed -- 88 MPH (with obstacles ahead).
(8) Landing Gear and Wing Flaps -- Retract (after obstacles are cleared).

CLIMB.

NORMAL CLIMB.

(1) Airspeed -- 120 to 140 MPH.
(2) Power -- 24 inches and 2600 RPM.
(3) Mixtures -- Lean to 78 lbs/hr. fuel flow.
(4) Cowl Flaps -- Open as required.

MAXIMUM PERFORMANCE CLIMB.

(1) Airspeed -- 114 MPH (sea level) to 108 MPH (10,000 feet).
(2) Power -- Full throttle and 2800 RPM.
(3) Mixtures -- Lean for altitude per fuel flow indicator placard.
(4) Cowl Flaps -- Open as required.

CRUISING.

(1) Power -- 15 to 25 inches of manifold pressure and 2200-2600 RPM. Select combination to give no more than 75% power.
(2) Cowl Flaps -- Closed.
(3) Elevator and Rudder Trim -- Adjust.
(4) Mixtures -- Lean for cruise fuel flow as determined from your Cessna Power Computer or the OPERATIONAL DATA in Section VI.

NOTE

If optional auxiliary fuel tanks are installed, auxiliary fuel may be used after 60 minutes of flight. It is recommended that the left and right auxiliary fuel tanks be selected at staggered intervals of at least 10 minutes. This will avoid the possibility of both engines eventually stopping from auxiliary fuel exhaustion at the same time.

LET-DOWN.

(1) Mixtures -- Enrichen as required.
(2) Power -- As desired.
(3) Cowl Flaps -- Closed.
(4) Wing Flaps -- As desired ("UP" to "1/3" down below 160 MPH).

BEFORE LANDING.

(1) Fuel Selectors - Front Engine -- "LEFT MAIN."
Rear Engine -- "RIGHT MAIN."
(2) Landing Gear -- "DOWN" (below 160 MPH).
(3) Landing Gear Light -- Green.
(4) Landing Gear Handle -- Check returned to neutral.
(5) Mixtures -- Rich.
(6) Propellers -- High RPM.
(7) Wing Flaps -- As desired ("1/3" below 160 MPH, "1/3" to "FULL" below 120 MPH).
(8) Airspeed -- 90 to 100 MPH (flaps extended).
(9) Elevator Trim -- Adjust as desired.

BALKED LANDING (GO-AROUND).

(1) Power -- Full throttle and 2800 RPM.
(2) Wing Flaps -- Retract to "1/3" down.
(3) Trim -- Adjust.
(4) Cowl Flaps -- Open.
(5) Wing Flaps -- Retract to 0° after obstacles are cleared and a safe altitude and airspeed are reached.

NOTE

Do not retract landing gear if another landing approach is to be conducted.

LANDING.

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

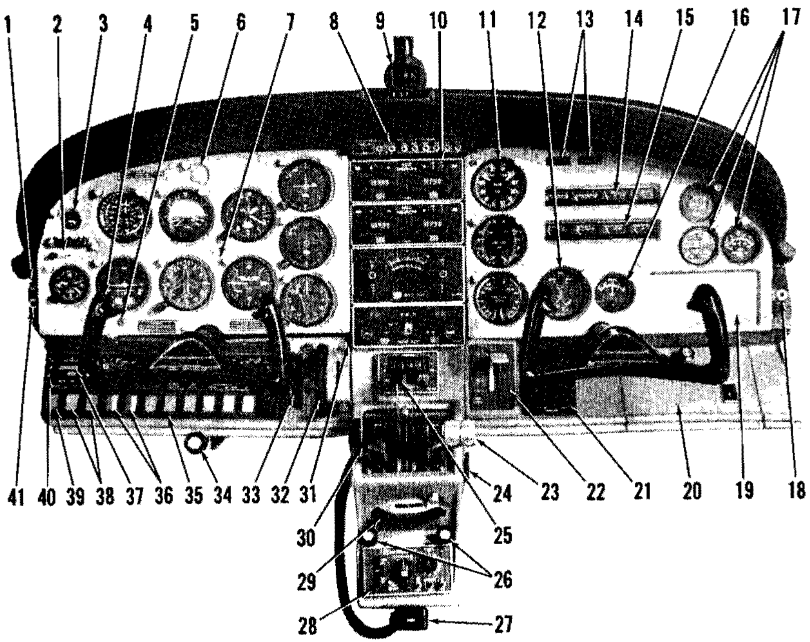
AFTER LANDING.

(1) Wing Flaps -- Retract.
(2) Cowl Flaps -- "OPEN."
(3) Elevator and Rudder Trim -- Reset to take-off position.

SECURING AIRCRAFT.

(1) Parking Brake -- Set.
(2) Radios and Electrical Equipment -- "OFF."
(3) Mixture -- Idle cut-off ("ICO").
(4) Ignition/Starter Switches and Master Switch -- "OFF."
(5) Control Lock -- Installed.

INSTRUMENT PANEL



1. Auxiliary Mike Jack
2. Marker Beacon Indicator Lights and Switches (Opt.)
3. Synchroscope (Opt.)
4. Electric Elevator Trim Switch (Opt.)
5. T & B Test Light
6. Optional Instrument Space
7. Flight Instrument Group
8. Radio Selector Switches (Opt.)
9. Magnetic Compass
10. Radios (Opt.)
11. Dual Indicating Manifold Pressure, Tachometer and Fuel Flow Gages
12. Dual Economy Mixture Indicator (Opt.)
13. Auxiliary Fuel Indicator Lights (Opt.)
14. Fuel Quantity and Oil Pressure Indicators
15. Cylinder Head Temperature and Oil Temperature Indicators
16. Ammeter (Opt.)
17. Flight Hour Recorder, Suction Gage and Outside Air Temperature Gage (Opt.)
18. Phone Jack (Opt.)
19. Optional Instrument or Radio Space
20. Map Compartment
21. Cabin Heating, Ventilating and Defrosting Control Panel
22. Wing Flap Switch and Indicator
23. Mixture Control Levers
24. Control Lever Friction Lock
25. Propeller Pitch Control Levers
26. Manual Engine Primers (Opt.)
27. Microphone (Opt.)
28. Autopilot Control Unit (Opt.)
29. Rudder Trim Control Wheel
30. Throttles
31. Electric Elevator Trim Disengage Switch (Opt.)
32. Elevator Trim Control Wheel
33. Landing Gear Position Handle and Indicator Lights
34. Parking Brake Control Knob
35. Left Switch and Control Panel
36. Auxiliary Fuel Pump Switches
37. Alternator Warning Lights
38. Alternator and Regulator Switches
39. Master Switch
40. Alternator Start and Test Switches
41. Phone Jack

Figure 2-1.

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.

The main fuel system is composed of two main fuel tanks (276 lbs. usable each wing) in each outboard wing panel and one sump tank in the lower portion of each boom. Fuel flows from the sump tanks through a by-pass in each auxiliary fuel pump (when it is not operating) to selector valves located at the wing roots. Fuel is normally fed from the left wing tanks and front selector valve to the front engine, and from the right wing tanks and rear selector valve to the rear engine. It is possible, however, to feed either engine from either main fuel tank.

NOTE

The fuel selector valve handles should be turned to "LEFT MAIN" for the front engine and "RIGHT MAIN" for the rear engine during take-off, landing, and all normal operations.

Depending upon the setting of the selector valves, fuel from the tanks being used flows through the fuel strainers to the engine-driven fuel pumps. From here, the fuel is distributed to the engine cylinders via fuel control units and fuel distributors. Vapor and excess fuel from the engine-driven fuel pumps are returned to the main tanks and fuel sumps. The main fuel tanks are vented at the wing tips and the auxiliary fuel tanks are vented below the wing just forward of the inboard flaps.

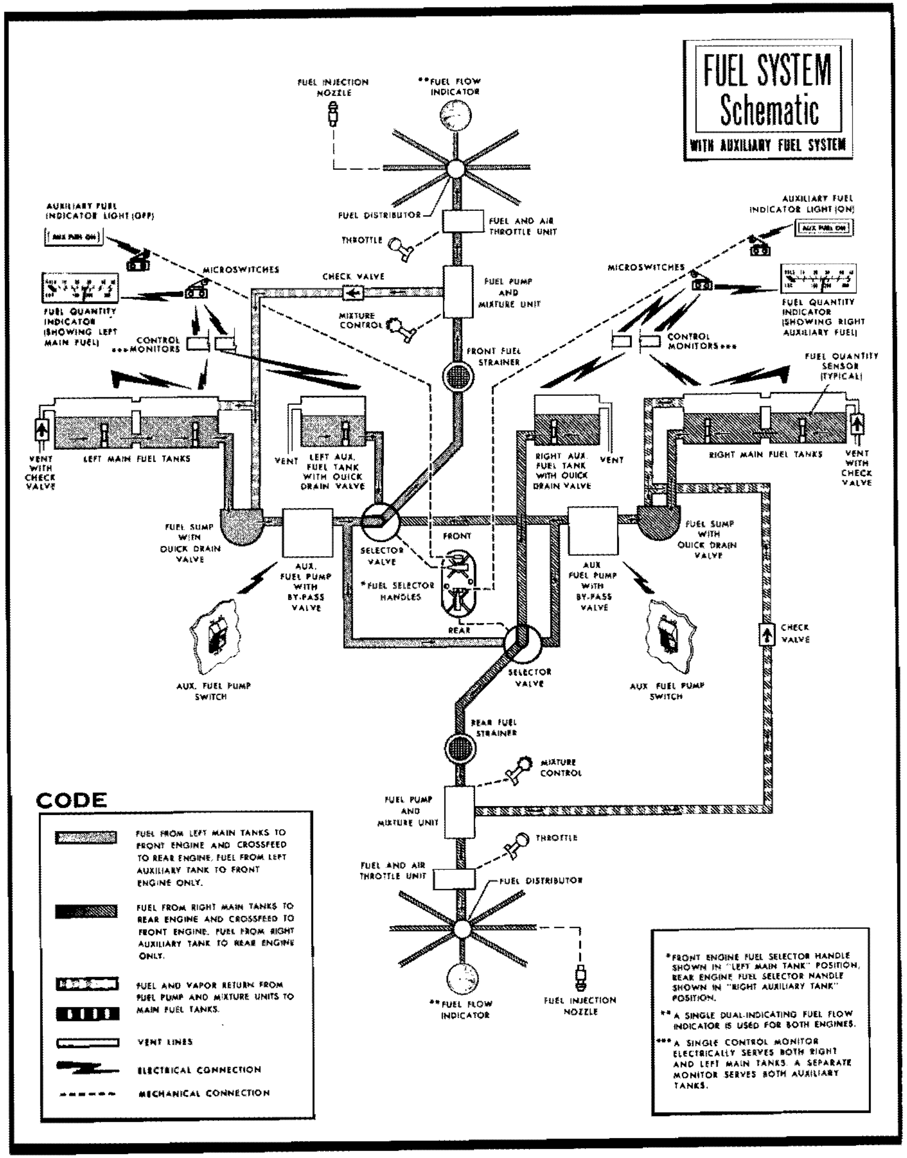


Figure 2-2.

AUXILIARY FUEL PUMP SWITCHES.

The auxiliary fuel pumps are electrically operated and are located in the inboard wing panels near the leading edge. The pumps are controlled by two split rocker-type switches located on the lower left switch and control panel. The switches are labeled "AUX PUMPS", "LEFT MAIN" and "RIGHT MAIN." One side of each switch is red in color and is labeled "HI"; the other side is yellow in color and is labeled "LOW." The "LOW" side operates the pumps at low speed, providing sufficient fuel for priming and starting. The "HI" side operates the pumps at high speed, supplying sufficient fuel flow to maintain normal power in the event of engine-driven fuel pump failure. In addition, the "HI" side should be used for vapor elimination in flight, normal engine starts in very hot or cold weather, and in-flight engine starts after running an auxiliary fuel tank dry.

When the engine-driven fuel pump is functioning and the auxiliary fuel pump is turned on "HI," a fuel/air ratio considerably richer than best power is produced unless the mixture is leaned. With the engine stopped and the master switch on, the cylinder intake ports can be flooded if the "HI" side of the auxiliary fuel pump switch is accidentally turned on.

If it is desired to completely exhaust the contents of an auxiliary fuel tank in flight, the auxiliary fuel pump will be needed to assist in restarting the engine when fuel exhaustion occurs. Therefore, proper operation of the auxiliary fuel pump should be verified prior to running the auxiliary tank dry by turning the auxiliary fuel pump on momentarily (while using from the main tank) and checking for a slight rise in fuel flow indication.

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

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

In normal fuel system operations, the "LEFT MAIN" auxiliary pump supplies the front engine, and the "RIGHT MAIN" auxiliary pump supplies the rear engine. For crossfeeding purposes, use the "RIGHT MAIN" auxiliary pump for the front engine, and the "LEFT MAIN" auxiliary pump for the rear engine.

FUEL QUANTITY INDICATORS AND OPTIONAL AUXILIARY FUEL INDICATOR LIGHTS.

Two fuel quantity indicators in the engine instrument cluster indicate fuel level in the main or optional auxiliary tanks, depending on fuel selector valve handle position. With the selector valves in the "MAIN" position, the indicators will show fuel quantity, in gallons and pounds, in the main tanks. When an optional auxiliary system is installed, and the selector valves are placed in the "AUXILIARY" position, two amber lights marked "AUX FUEL ON " and located above the instrument cluster will illuminate and fuel indicators will show auxiliary fuel quantity.

FUEL STRAINER AND TANK SUMP DRAINS.

Refer to servicing procedures in Section V.

ELECTRICAL SYSTEM.

Electrical energy is supplied by a 28-volt, direct-current system powered by two engine-driven alternators (see figure 2-3). Electrical energy is stored in a 24-volt battery located in the lower left portion of the front engine compartment. Power is supplied to all electrical circuits through a split bus bar, one section containing electronic system circuits and the other section containing lighting and general electrical system circuits.

The entire bus is on at all times except when either an external power

source is connected or the ignition/starter switches are turned to the "START" position; then a split bus contactor is automatically activated to remove power from the electronics section of the bus. This isolates the electronic circuits and prevents harmful transient voltage from damaging the transistors in the electronics equipment.

MASTER SWITCH.

The rocker-type master switch provides a means of isolating the aircraft bus from the power supply system by controlling the battery contactor and both alternator field circuits. The alternators will not function with the master switch turned off.

When using the battery or an external power source for lengthy maintenance checks on the electrical system, the master switch should be turned on. (Refer to Section VII, under GROUND SERVICE PLUG RECEPTACLE, for additional operating details concerning use of an external power source.)

ALTERNATOR SWITCHES.

Both alternator switches are combined in a split rocker-type switch labeled "F. ALT R." The alternator switch controls both front and rear engine alternators and permits switching the front or rear alternator off in the event of an alternator, alternator circuit or engine failure. If an alternator is turned off, operation should be continued on the functioning alternator, using only necessary electrical equipment.

VOLTAGE REGULATOR SELECTOR SWITCH.

The airplane contains two voltage regulators. Both voltage regulators are controlled by a single rocker-type switch labeled "REG," "1" and "2" located adjacent to alternator switch. Each voltage regulator will control output of both alternators, leaving the other regulator available on a standby basis. Either regulator can be placed in operation by switching rocker-type selector switch to the "1" (up) position or the "2" (down) position.

ALTERNATOR RESTART SWITCH.

The alternator restart system is operated by a momentary push-

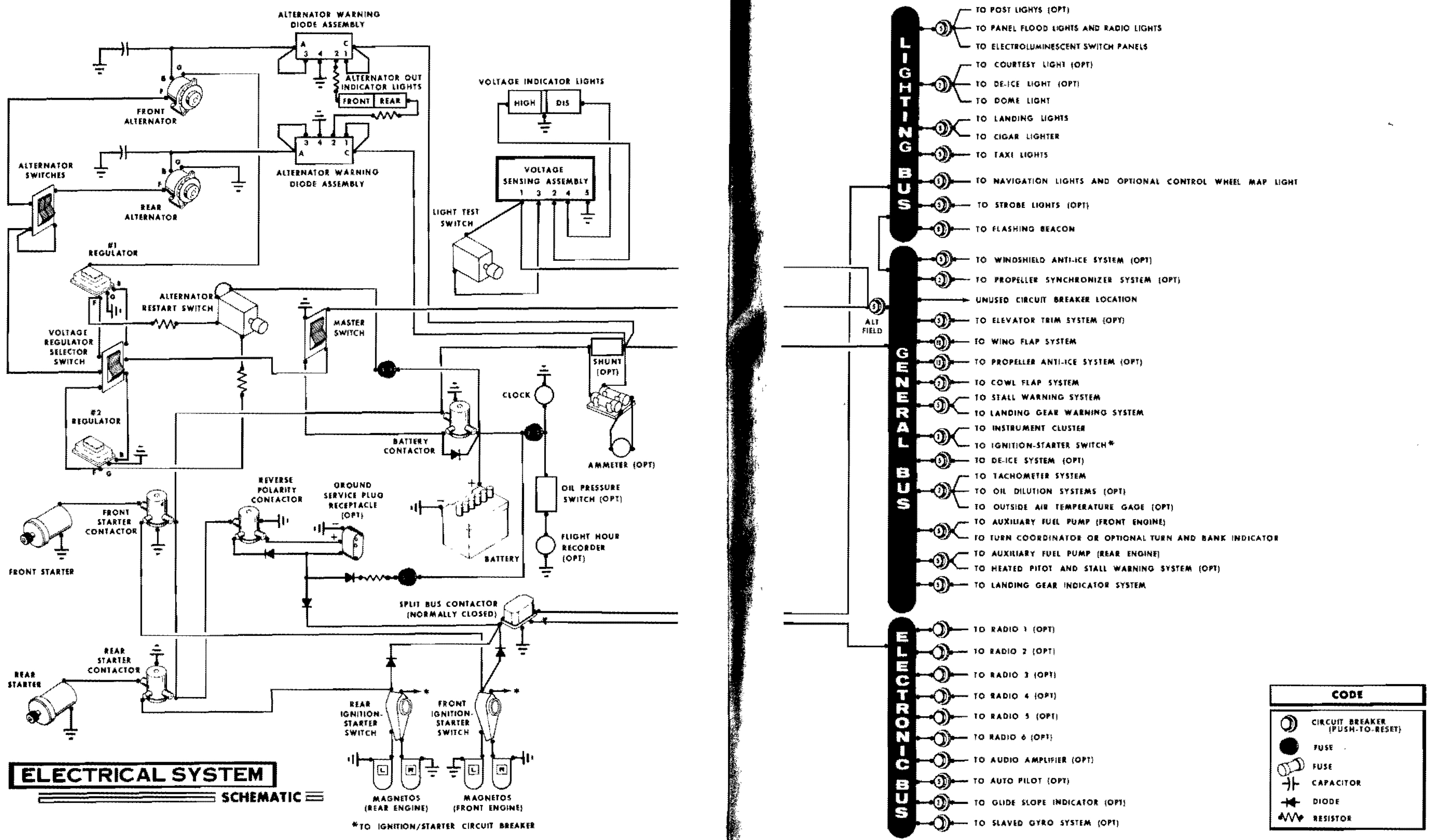

ALTERNATOR WARNING DIODE ASSEMBLY
ALTERNATOR OUT INDICATOR LIGHTS
FRONT
REAR
FRONT ALTERNATOR
ALTERNATOR SWITCHES
REAR ALTERNATOR
ALTERNATOR WARNING DIODE ASSEMBLY
VOLTAGE INDICATOR LIGHTS
HIGH
DIS
VOLTAGE SENSING ASSEMBLY
LIGHT TEST SWITCH
#1 REGULATOR
ALTERNATOR RESTART SWITCH
MASTER SWITCH
VOLTAGE REGULATOR SELECTOR SWITCH
SHUNT (OPT)
CLOCK
#2 REGULATOR
BATTERY CONTACTOR
AMMETER (OPT)
REVERSE POLARITY CONTACTOR
GROUND SERVICE PLUG RECEPTACLE (OPT)
OIL PRESSURE SWITCH (OPT)
FRONT STARTER CONTACTOR
FRONT STARTER
BATTERY
FLIGHT HOUR RECORDER (OPT)
SPLIT BUS CONTACTOR (NORMALLY CLOSED)
REAR STARTER CONTACTOR
REAR STARTER
REAR IGNITION-STARTER SWITCH
FRONT IGNITION-STARTER SWITCH
ELECTRICAL SYSTEM
SCHEMATIC
MAGNETOS (REAR ENGINE)
MAGNETOS (FRONT ENGINE)
*TO IGNITION/STARTER CIRCUIT BREAKER
LIGHTING BUS
TO POST LIGHTS (OPT)
TO PANEL FLOOD LIGHTS AND RADIO LIGHTS
TO ELECTROLUMINESCENT SWITCH PANELS
TO COURTESY LIGHT (OPT)
TO DE-ICE LIGHT (OPT)
TO DOME LIGHT
TO LANDING LIGHTS
TO CIGAR LIGHTER
TO TAXI LIGHTS
TO NAVIGATION LIGHTS AND OPTIONAL CONTROL WHEEL MAP LIGHT
TO STROBE LIGHTS (OPT)
TO FLASHING BEACON
GENERAL BUS
TO WINDSHIELD ANTI-ICE SYSTEM (OPT)
TO PROPELLER SYNCHRONIZER SYSTEM (OPT)
UNUSED CIRCUIT BREAKER LOCATION
ALT FIELD
TO ELEVATOR TRIM SYSTEM (OPT)
TO WING FLAP SYSTEM
TO PROPELLER ANTI-ICE SYSTEM (OPT)
TO COWL FLAP SYSTEM
TO STALL WARNING SYSTEM
TO LANDING GEAR WARNING SYSTEM
TO INSTRUMENT CLUSTER
TO IGNITION-STARTER SWITCH*
TO DE-ICE SYSTEM (OPT)
TO TACHOMETER SYSTEM
TO OIL DILUTION SYSTEMS (OPT)
TO OUTSIDE AIR TEMPERATURE GAGE (OPT)
TO AUXILIARY FUEL PUMP (FRONT ENGINE)
TO TURN COORDINATOR OR OPTIONAL TURN AND BANK INDICATOR
TO AUXILIARY FUEL PUMP (REAR ENGINE)
TO HEATED PITOT AND STALL WARNING SYSTEM (OPT)
TO LANDING GEAR INDICATOR SYSTEM
ELECTRONIC BUS
TO RADIO 1 (OPT)
TO RADIO 2 (OPT)
TO RADIO 3 (OPT)
TO RADIO 4 (OPT)
TO RADIO 5 (OPT)
TO RADIO 6 (OPT)
TO AUDIO AMPLIFIER (OPT)
TO AUTO PILOT (OPT)
TO GLIDE SLOPE INDICATOR (OPT)
TO SLAVED GYRO SYSTEM (OPT)
CODE
CIRCUIT BREAKER (PUSH-TO-RESET)
FUSE
FUSE
CAPACITOR
DIODE
RESISTOR

Figure 2-3.

button type switch labeled "ALT RESTART". This switch is used in the event of a complete loss of electrical power due to a faulty battery contactor. The alternators are self sustaining, and under normal electrical loads will remain in operation even though the battery is isolated from the system. However, under conditions of extreme electrical load (such as IFR conditions), an additional heavy surge load (such as wing flap operation) may lower system voltage below the voltage necessary to maintain alternator output, which will result in a complete loss of electrical power. Refer to Section III under "ELECTRICAL SYSTEM-EMERGENCY OPERATION" for proper alternator restart procedures.

ALTERNATOR WARNING LIGHTS.

Rectangular amber lights labeled "ALT NOT CHARGING, FRONT, REAR" will light if either or both alternators stop supplying current to the electrical system. If a light comes on, the faulty alternator should be turned off. The "ALT NOT CHARGING" light or lights will remain on until the flight is terminated. If the "FRONT" and "REAR" lights come on simultaneously, it may mean a faulty voltage regulator. To check this, switch to the regulator not in use. If the voltage regulator was faulty, the lights will go out. The warning lights can be checked by turning on the master switch before the engines are started, or by turning the alternator switches off while the engines are running.

HIGH VOLT AND BATTERY DISCHARGE LIGHTS.

Two rectangular warning lights, one red and one amber, are under the alternator warning lights and indicate high voltage and low voltage conditions in the electrical system. They are labeled "VOLTS BAT, HIGH, DIS." The red light, labeled "HIGH" indicates any unusually high voltage occurring in the electrical system. High voltage can be caused by a faulty alternator system, or a voltage regulator not functioning properly. The red "HIGH" voltage light can be tested by pressing a push-to-test type switch labeled "TEST." This also tests the high voltage sensing circuitry, and does not subject the electrical system to high voltage anytime it is used. The amber light, labeled "DIS," indicates a low voltage condition in the electrical system. This light does not necessarily indicate a malfunction. A low voltage condition, as indicated by the amber light, may be due to the battery supplying all of the electrical load, or the electrical load may be exceeding the alternator output. The latter usually occurs when one of the alternators is out of the system. The amber "DIS" light may be tested by turning the master switch on prior to starting the

engines. Refer to Section III under "ELECTRICAL SYSTEM-EMERGENCY OPERATION" for proper emergency procedures in the event of a red "HIGH" or amber "DIS" light.

TURN-AND-BANK TEST LIGHT.

An amber "T & B TEST" light is mounted in the shock panel directly below the turn coordinator or optional turn and bank indicator. When the light is depressed, (master switch "ON") the light will illuminate if electrical power is being supplied to the instrument.

CIRCUIT BREAKERS AND FUSES.

Most of the electrical circuits in the airplane are protected by "push-to-reset" type circuit breakers mounted in a panel located on the left side of the cabin beside the pilot. Exceptions to this are the clock circuit, the alternator restart circuit, the optional battery contactor closing (external power) circuit, the optional flight hour recorder circuit and the optional ammeter circuit which are protected by fuses. The fuses for the clock, flight hour recorder, alternator restart circuit, and battery contactor closing circuit are located near the upper left hand side of the front firewall. Two fuses near the lower left hand side of the front firewall protect the optional ammeter. Fuses are provided in addition to circuit breakers for the cigar lighter and optional control wheel map light circuit. The cigar lighter fuse is located behind the engine control pedestal. The optional control wheel map light fuse is mounted behind the left side of the instrument panel.

INTERIOR LIGHTING.

INSTRUMENT AND CONTROL PANEL LIGHTING.

Instrument and control panel lighting is provided by three main sources: electroluminescent lighting, flood lighting and optional post lighting. The magnetic compass, engine instrument cluster, and radios have integral lighting. All instrument and control panel lighting is operated by two rheostat control knobs on the left switch and control panel.

One knob, labeled "INST-RADIO LTS--PULL-FLOOD", controls both flood and post lights. The other knob, labeled "SWITCH PANEL LTS", operates the switch and control panel lighting. Clockwise rotation of the knobs increases light intensity.

ELECTROLUMINESCENT LIGHTING.

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

INSTRUMENT FLOOD LIGHTS.

Illumination of the instrument panel is provided by four red flood lights on the under side of the anti-glare shield and three standard post lights, two lighting the radio selector switch panel, and one lighting the control pedestal. To operate these lights, pull out on the rheostat knob labeled "INST-RADIO LTS".

POST LIGHTS (OPT).

The instrument panel may be equipped with optional post lights which are mounted at the edge of each instrument or control to be lighted. The post lights provide direct light to the instruments and controls, and are operated by pushing in on the rheostat knob labeled "INST-RADIO LTS". Switching to post lights will automatically turn off the flood lighting.

MAP LIGHTS.

A map light mounted above the storm window on the pilot's side is standard equipment and contains two light bulbs, one red and one white. The light can be used to supplement instrument panel lighting by selecting the red bulb, or as a map light by utilizing the white bulb. A three position switch mounted vertically just below the light is used to select the desired type of light, or turn off the light. The switch positions are "RED", "OFF", and "WHITE". A second map light of the same type is mounted on the forward door post and is optional. The switch for this light is mounted horizontally on a ledge between the instrument panel and door post. The switch positions are "RED", "OFF", and "WHITE".

An optional map light mounted on the bottom of the pilot's control wheel illuminates the lower portion of the cabin in front of the pilot and is used when checking maps and other flight data during night operation. To operate the light, turn on the "NAV" light switch and adjust the light intensity with the knurled disk type rheostat control located at the bottom of the control wheel.

DOME LIGHTS.

The cabin interior is lighted by two dome lights, one above each center side window. The lights, which may be used in conjunction with the exterior courtesy light, are operated by a three position switch on the aft side of the rear door post. The three positions are marked: "COURTESY-DOME", "OFF", and "DOME".

EXTERIOR LIGHTING.

Standard exterior lighting consists of navigation lights on the wing tips and lower tips of the vertical fins, a flashing beacon on top of the right vertical fin, and dual beam landing and taxi lights in the leading edge of the left wing. Optional lighting includes dual beam landing and taxi lights in the leading edge of the right wing, a strobe light on each wing tip, and a courtesy light under the right wing outboard of the cabin door. The courtesy light is operated by a switch located on the aft side of the rear door post. To turn on the light, place the switch in the top ("COURTESY-DOME") position. All exterior lights, except the courtesy light, are controlled by rocker type switches on the left switch and control panel. The switches are "ON" in the up position and "OFF" in the down position.

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.

The two high intensity strobe lights will enhance anti-collision protection. However, the lights should be turned off when taxiing in the vicinity of other aircraft, or during flight through clouds, fog or haze.

PROPELLER SYNCHROSCOPE.

An electrically-operated synchroscope is installed to allow more accurate propeller synchronization. The synchroscope, located on the left upper portion of the instrument panel provides a visual indicator for synchronization. The system utilizes a transmitter electrically connected in parallel with the dual engine tachometers, and electrical pick-up coils mounted on the right magneto of each engine. The individual signals on each magneto are compared in the synchroscope transmitter and their variation in electrical phase is displayed by the sweeping pointer on the synchroscope. A large variation in electrical phase (caused by RPM differential between engines) causes a rapid oscillation of the pointer. As the RPM of the engines are more closely adjusted, pointer oscillation will slow until finally, with properly synchronized engines, pointer motion is minimal. When synchronizing engine RPM, either engine RPM may be established as a "master," and the other engine synchronized to match it.

WING FLAP SYSTEM.

Wing flap settings are accomplished in one simple up or down movement of the wing flap control knob to the flap setting desired. To extend the wing flaps from "UP" to "1/3" down (normal take-off range), merely push the control knob down until it hits the mechanical stop. For flap settings greater than "1/3" down, move the control knob to the right to clear the stop, and position it as desired. To retract the flaps, simply raise the control knob to the setting desired. Flap positions are identified as "UP," "1/3," "2/3" and "FULL." The "FULL" flap position is 25 degrees.

WING FLAP-ELEVATOR TAB INTERCONNECT SYSTEM.

The wing flap system is mechanically interconnected with the elevator trim tab system to automatically eliminate excessive nose-up trim while the wing flaps are being retracted.

With the flaps retracted, the trim control wheel can be rotated in one direction until the trim position indicator reaches the "NOSE DN" position, or in the opposite direction until it reaches the lower half of the "TAKE-OFF" range marking for nose-up trim. As the flaps are extended, additional nose-up trim beyond the "TAKE-OFF" range can be utilized. Maximum nose-up trim is available when the flaps are fully extended. As the

flaps are retracted, the interconnect will automatically rotate the trim wheel back to the "TAKE-OFF" range.

COWL FLAP SYSTEM.

Two three-position toggle switches located on the left switch and control panel near the landing gear handle operate the front and rear engine cowl flaps. The switches are labeled "COWL FLAPS," "FRONT" and "REAR," and their positions are labeled "OPEN" (up), "OFF" (center) and "CLOSE" (down). Two blue indicator lights, one located beside each switch, illuminate when the cowl flaps have reached either the full open or full closed position and remain lighted until the switches are placed in the "OFF" position. The indicator lights also incorporate dimming shutters for night operation.

To fully open or close the cowl flaps, place the cowl flap switches in either the "OPEN" or "CLOSE" position. When the opening or closing operation is completed (approximately two seconds) the blue indicator lights will illuminate. If intermediate positioning of the cowl flaps is required, for example half open, actuate the switches for approximately one second and return them to the "OFF" position. Other settings can be approximated in a similar manner. Proper cowl flap settings should be determined by carefully monitoring the cylinder head temperature gages.

LANDING GEAR SYSTEM.

The retractable tricycle landing gear is extended and retracted by hydraulic actuators, powered by an engine-driven hydraulic pump on the front engine. An optional engine-driven hydraulic pump is offered for the rear engine to provide decreased gear operation time and dual pump safety.

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

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

LANDING GEAR POSITION HANDLE.

The gear position handle has two neutral positions (slightly above center for gear up, and slightly below center for gear down) which give a mechanical indication of the gear position. From either position, the handle must be pulled out to clear a detent before it can be repositioned; operation of the gear and doors will not begin until the handle has been repositioned.

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

IMPORTANT

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

During a normal cycle, the gear locks up or down and the position indicator light comes on. When the light illuminates, hydraulic pressure is switched from the gear actuators to the door actuators to close the gear doors. When the doors are closed, the gear handle returns to neutral and the cycle is complete. The normal time interval between the indicator lighting and the handle returning to neutral is 3-9 seconds. If the position indicator light does not light, the gear doors will not close and hydraulic pressure will be retained on the landing gear actuators.

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

EMERGENCY HAND PUMP.

For emergency use, if the engine-driven hydraulic pump (pumps) fails, a manual pump on the cabin floor between the front seats may be used to extend the gear. The system reservoir is arranged to retain sufficient fluid to extend the gear with the hand pump if a failure between the engine-driven pump (pumps) and reservoir results in fluid loss. See Section III for emergency operation of the hand pump.

OPERATION OF LANDING GEAR DOORS (AIRPLANE ON GROUND).

For inspection purposes, the landing gear doors may be opened and closed while the airplane is on the ground with the engine stopped. Operate the doors with the landing gear handle in the "down-neutral" position. To open the doors, turn off the master switch and operate the hand pump until the doors open. To close the doors, turn the master switch on and operate the hand pump.

NOTE

The position of the master switch for gear door operation is easily remembered by the following rule:
OPEN circuit = OPEN doors
CLOSED circuit = CLOSED doors

PARKING BRAKE SYSTEM.

A double-button push-pull control knob, located below the left hand switch and control panel, is used to set the hydraulic parking brakes. Simply apply pressure to the brake pedals, and, at the same time, squeeze the buttons of the parking brake control knob and pull the knob out. If desired, the brake pedals may be "pumped" to insure an absolute "full pedal" after setting the brake knob. To release the parking brake, push the control knob in.

CABIN HEATING, VENTILATING AND DEFROSTING SYSTEM.

Three levers located on the lower right side of the instrument panel control the cabin heating, ventilation and windshield defrosting system. Moving the lever labeled "AIR" from the "OFF" (top) position to the "MAX" position increases the volume of fresh (unheated) air to the cabin. Moving the lever labeled "HEAT," from the top to the "MAX" position increases the volume of heated air to maximum. For maximum heating, the "AIR" lever should be in the full up "OFF" position. For maximum cooling the "HEAT" lever should be in the full up "OFF" position. For desired temperature, adjust both levers to provide the proper mixture of heated and unheated air. The defroster lever is labeled "DFR" and "OFF" at the top and "MAX" at the bottom. To operate the defrosting system, move the "DFR" lever down to the "MAX" position and position the "AIR" and "HEAT" levers to provide the desired temperature and volume of defrost air to the windshield.

Front cabin heat and ventilating air is supplied by a flat duct extending from cabin manifolds in front of the pilot's and copilot's feet. Rear cabin heat and air is supplied by two ducts, one extending from each cabin manifold along each side of the cabin to an outlet at the front doorpost at floor level. Windshield defrosting air is also supplied by ducts leading from the cabin manifolds.

Separate adjustable ventilators supply additional air; two in the center of the cabin ceiling just aft of the windshield supply air for the pilot and copilot, and four in the rear cabin ceiling above the side windows supply air to the rear seat passengers.

An air exhaust vent at the rear of the cabin removes stale air and increases the flow of fresh air through the cabin.

SHOULDER HARNESSES.

Shoulder harnesses are provided as standard equipment for the pilot and front seat passenger; harness installations for all other seats are optional.

Each front seat harness is attached above the window line between the front and center side windows. When stowed, the harness is held in place by two retaining clips, one above the front side window, and one on the front side of the windshield post. Stow the harness by placing it behind both retaining clips.

With four place seating, each rear seat shoulder harness is attached

above the aft side window and is stowed behind retaining clips above the cabin side windows. In the five or six-place arrangement, the aft seat or seats utilize harnesses attached to the aft cabin wall. Each harness is stowed behind a retaining clip above the aft side window.

To use the front and rear seat shoulder harnesses, fasten and adjust the seat belt first. Remove the harness from the stowed position, and lengthen as required by pulling on the end of the harness and the narrow release strap. Snap the harness metal stud firmly into the retaining slot adjacent to the seat belt buckle. Then adjust to length by pulling down on the free end of the harness. A properly adjusted harness will permit the occupant to lean forward enough to sit completely erect but is tight enough to prevent excessive forward movement and contact with objects during sudden deceleration. Also, the pilot will want the freedom to reach all controls easily.

Releasing and removing the shoulder harness is accomplished by pulling upward on the narrow release strap, then removing the harness stud from the slot in the seat belt buckle. In an emergency, the shoulder harness may be removed by releasing the seat belt first, then pulling the harness over the head by pulling up on the release strap.

CABIN DOOR OPERATION.

Cabin door operation is conventional except for a special locking feature.

To enter the aircraft, depress the thumb button located at the front end of the cabin door handle and pull out on the handle to unlatch the door. To open the door from the inside, rotate the door handle clockwise.

To close the cabin door from the inside, pull the door shut and rotate the door handle counterclockwise to the "LOCKED" position. As the handle is turned to the locked position, the door will be drawn in tight against the seal. The outside door handle incorporates the same locking action and should be used anytime the aircraft is parked outside. When leaving the aircraft, close the cabin door, pull the door handle out until it meets resistance, then depress the thumb button and return the door handle to its recess. As the handle is pushed back in, the cabin door will be drawn tight.

STARTING ENGINES.

Although either engine may be started first and the procedure is identical for both, the front engine is normally started first. The cable from the battery to this engine is much shorter which permits more electrical power to be delivered to the starter. If the battery is low, the front engine should start more readily.

The continuous-flow fuel injection system will start spraying fuel in the intake ports as soon as the throttle and mixture controls are opened and the auxiliary pump is turned on. If the auxiliary pump is turned on accidentally while the engine is stopped, with the throttle open and the mixture rich, solid fuel will collect temporarily in the cylinder intake ports, the quantity depending on the amount of throttle opening and the length of time the pump has been operating. If this happens, it is advisable to wait a few minutes until this fuel drains away before starting the engine. To avoid flooding, be sure you are ready to crank the engine as soon as a steady fuel flow of 10 to 25 lbs/hr is obtained.

Engine mis-starts characterized by weak, intermittent firing followed by puffs of black smoke from the exhaust are caused by overpriming or flooding. This situation is more apt to develop in hot weather, or when the engine is hot. If it occurs, repeat the starting routine with the throttle approximately 1/2 open, the mixture in idle cut-off and the auxiliary pump off. As the engine fires, move the mixture control to full rich and decrease the throttle to idle.

Engine mis-starts characterized by sufficient power to take the engine away from the starter but dying in 3 to 5 revolutions are the result of an excessively lean mixture after the start and can occur in warm or cold temperatures. Repeat the starting procedure but allow additional priming time with the auxiliary fuel pump switch in the "LOW" position before cranking is started, or place the auxiliary fuel pump switch in the "HI" position immediately for a richer mixture while cranking.

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

TAXIING.

Taxiing over loose gravel or cinders should be done using primarily the rear engine. This prevents the front propeller from picking up and throwing particles into the rear propeller. In addition, the rear propeller has greater ground clearance, minimizing stone damage to the propeller tips. Full throttle runups over loose gravel should be avoided unless the airplane has obtained considerable forward speed.

NOTE

> Taxiing, as in any twin-engine airplane, should be done with both engines operating.

BEFORE TAKE-OFF.

Since the engines are 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 engines are not turning up properly.

The magneto check should be made at 1800 RPM 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, note RPM and return the switch to the "BOTH" position. 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.

To run a functional check of the battery and alternator circuits, use the following procedure:

(1) Run both engines at 1000 RPM with some electrical equipment on.
(2) Turn front and rear alternator switches off.
(3) The battery discharge light and front and rear alternator warning lights should be on.
(4) Turn front alternator switch on. Both the battery discharge light and the front alternator warning light should go out.
(5) Turn front alternator switch off following check.
(6) Turn rear alternator switch on. Both the battery discharge light and rear alternator warning light should go out.

(7) **Turn both alternator** switches on for normal operation.
(8) **Switch regulator** selector switch from the "1" (up) position to the "2" (down) position. The battery discharge light and alternator warning lights should remain off. Either regulator position may be used for flight.
(9) **Press** light "TEST" switch to check "VOLTS HIGH" light and high voltage sensing circuitry for proper operation.

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.

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

For normal take-offs, the use of 1/3 flaps results in easier nose wheel lift-off and lower initial climb attitude, as well as a 10% reduction in take-off distance compared to flaps-up take-off. The airplane should be leveled off as soon as any obstacles are cleared to accelerate to a normal climb speed of 120 MPH while slowly retracting the flaps. The take-off performance in Section VI is based on using an obstacle climb speed 20% above the power-off stall speed with 1/3 flaps.

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.

On long runways, the landing gear should be retracted after reaching the point over the runway where a wheels down forced landing on that runway would become impractical. However, on short runways it may be preferable to retract the landing gear after the airplane is safely airborne. This would get the airplane into a more favorable configuration for a possible engine-out emergency.

Since the landing gear swings downward approximately two feet as it starts the retraction cycle, retraction should be avoided until obtaining at least that much ground clearance and a positive climb is established.

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

When taking off from a gravel or cinder field, the possibility of gravel damaging the rear propeller from the front propeller slipstream can be reduced considerably by using 1/3 flaps, and using only the rear engine for initial acceleration. When doing this, the nose gear should be raised clear of the ground as soon as possible, followed by full throttle application on the front engine.

CLIMB.

To save time and fuel for the overall trip, it is recommended that a normal cruising climb be conducted at 120 - 140 MPH using approximately 75% power (24 inches of manifold pressure and 2600 RPM).

Cruising climbs should be conducted at approximately 78 lbs/hr up to 5500 feet and at 6 lbs/hr more than the normal lean fuel flow shown on the Power Computer at higher altitudes and lower power.

TWIN-ENGINE CLIMB SPEEDS (IAS)
AT SEA LEVEL

	BEST RATE OF CLIMB	BEST ANGLE OF CLIMB
WING FLAPS UP, GEAR UP	114 MPH	85 MPH
WING FLAPS 1/3 DOWN, GEAR DOWN	98 MPH	82 MPH
WING FLAPS FULL DOWN, GEAR DOWN	85 MPH	76 MPH

Figure 2-4.

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 (full throttle and 2800 RPM). This speed is 114 MPH at sea level, decreasing 3 MPH for each 5000 feet above sea level. The mixture should be leaned as shown by the Maximum Performance Take-Off and Climb Settings placard located adjacent to the fuel flow indicator.

If an obstruction ahead requires a steep climb angle, an obstacle clearance speed should be used with flaps up and maximum power. This speed is 85 MPH at sea level and increases to 92 MPH at 10,000 feet.

CRUISE.

Normal cruising is done between 65% and 75% of rated 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 Maximum Cruise Speed Performance table (figure 2-5) shows that cruising at full throttle can be done most efficiently at higher altitudes because very nearly the same cruising speeds can be maintained at much less power.

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

MAXIMUM CRUISE SPEED PERFORMANCE
NORMAL LEAN MIXTURE

% BHP	TRUE AIRSPEED	ALTITUDE	LBS/HR	RANGE (552 LBS. FUEL)
75	189	5500	137	755
70	185	7500	128	800
65	181	9500	119	840

Figure 2-5.

The cowl flaps should be fully closed for cruising in cold and normal outside air temperatures. However, in hot weather, the cowl flaps should be adjusted to maintain cylinder head temperatures at approximately two-thirds of the green arc range.

The fuel injection system employed on these engines is considered to be non-icing. In the event that unusual conditions cause the intake air filter to become clogged or iced over, an alternate intake air valve opens automatically for the most efficient use of either normal or alternate air, depending on the amount of filter blockage.

STALLS.

The stall characteristics are conventional and aural warning is provided by a stall warning horn which sounds between 5 and 10 MPH above the stall in all configurations. A mild aerodynamic tail buffet will occur almost simultaneously with the stall warning horn.

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

SPINS.

Intentional spins are prohibited in this aircraft. Because of the aural stall warning system, it is not probable that an inadvertent spin will be encountered. However, should a spin occur, the following recovery procedure should be employed:

(1) Cut power on both engines.
(2) Apply full rudder against the direction of rotation and neutralize ailerons.
(3) Approximately 1/4 turn after applying rudder, apply full down elevator.
(4) Neutralize rudder after rotation stops.
(5) Pull out of the resulting dive with smooth steady control pressure. Approximately 1200 feet of altitude will be lost in a 1-1/2 turn spin and recovery.

BEFORE LANDING.

In view of the relatively low drag of the extended landing gear and the high allowable gear-down speed (160 MPH), the landing gear should be extended before entering the traffic pattern. This practice will allow more time to confirm that the landing gear is down and locked.

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

LANDINGS.

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

SHORT FIELD LANDING.

For short field landings, make a power approach at 94 MPH with full flaps. After all approach obstacles are cleared, progressively reduce power. Maintain 94 MPH approach speed by lowering the nose of the airplane. Touchdown should be made with the throttles closed and on the main wheels first. Immediately after touchdown, lower the nose gear and apply heavy braking as required. For maximum brake effectiveness after all three wheels are on the ground, retract the flaps, hold full nose up elevator and apply maximum possible brake pressure without sliding the tires.

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

BALKED LANDING (GO-AROUND CLIMB).

In a balked landing (go-around) climb, the wing flap setting should be reduced to 1/3 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. Retraction of the landing gear is not recommended if another landing approach is to be conducted.

COLD WEATHER OPERATION.

The starting procedure is normal; the front engine should be started first since it is closer to the battery. Starting can be expedited by switching the auxiliary fuel pumps to "HI" position and advancing the throttle for a fuel flow of 50 to 60 lbs/hr for 3 to 6 seconds.

The use of an external pre-heater and an external power source is recommended whenever possible to reduce wear and abuse to the engines and the electrical system. Pre-heat will thaw the oil trapped in the oil coolers, which may be partially congealed prior to starting in extremely cold temperatures. When using an external power source, the master switch should be turned on. Refer to Section VII, paragraph GROUND SERVICE PLUG RECEPTACLE, for operating details.

For quick, smooth engine starts in zero degree temperatures, use six strokes of the manual primers before cranking, with an additional one or two strokes as the engines start. In colder temperatures, use additional priming before cranking.

In very cold weather, no oil temperature indication need be apparent before take-off. After a suitable warm-up period (2 to 5 minutes at 1000 RPM), with cylinder head temperatures showing above 200°F, the engines are ready for take-off if they accelerate smoothly and the oil pressure is normal and steady.

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

EMERGENCY PROCEDURES

ENGINE FAILURE DURING TAKE-OFF.

An engine-out on take-off presents no difficult directional control problem with the centerline thrust Super Skymaster, since there is no unbalanced thrust as with a conventional twin-engine airplane. Therefore, there is no minimum single-engine control speed, as normally defined for conventional twins.

The most critical time for an engine failure in a twin-engine airplane is a two or three-second period late in the take-off run while the airplane is accelerating to the single-engine best rate-of-climb speed. The following paragraphs present a detailed discussion of the problems associated with engine failure during take-off.

The airplane's climb performance in the event of an engine-out is at the optimum at the best single-engine rate-of-climb speed. This speed is approximately 100 MPH and is marked by a blue line on the airspeed indicator dial. In the event of engine failure, altitude could be maintained more easily at this speed while the propeller is being feathered. Therefore, it is recommended that this speed be obtained as promptly as possible after lift-off. Although 100 MPH is the preferred speed, 95 MPH may be used with obstacles immediately ahead.

Upon engine failure on take-off, the twin-engine airplane has a significant advantage over a single-engine airplane, for the pilot would have the choice of stopping or continuing the take-off. This would be similar to the choice facing a single-engine pilot who has suddenly lost approximately half of his take-off power. In this situation, the single-engine pilot would be extremely reluctant to continue the take-off if he had to climb over obstructions. However, if the failure occured at an altitude as high or higher than surrounding obstructions, he would feel free to maneuver for a landing back at the airport if adequate performance was available under the existing conditions of weight, altitude, and temperature.

Fortunately, the airplane accelerates through the "area of decision" in just a few seconds. However, to make an intelligent decision in this

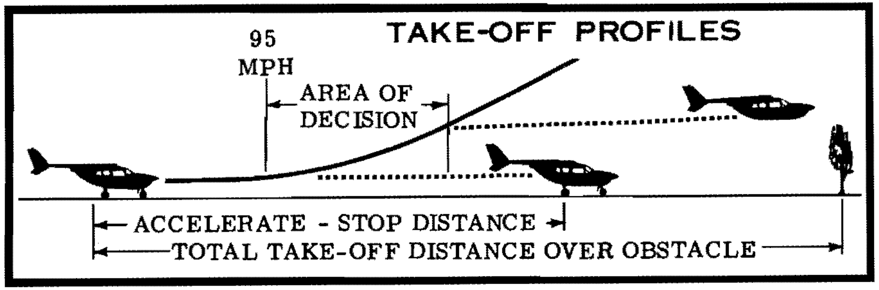


Figure 3-1.

type of an emergency, one must consider the field length, obstruction height, field elevation, air temperature, headwind, and the gross weight. In addition, the speed must be considered since a continued take-off is not recommended if an engine failure occurs below 95 MPH. The flight paths illustrated in figure 3-1 indicate the "area of decision" is bounded by: (1) the point at which 95 MPH is reached, and (2) the point where the obstruction altitude is reached. An engine failure in this area requires an immediate decision as to whether or not continued take-off should be attempted.

To aid in making this decision, a chart is included in Section VI which shows the total distance required for the airplane to be accelerated from a standing start to various speeds and then decelerated to a stop with heavy braking.

In some cases, airspeed and height above the runway at engine failure may be great enough to allow a slight deceleration and altitude loss while the gear is being retracted and the airplane is being prepared for a single-engine climb. However, it is recommended that in most cases, it would be better to discontinue the take-off, since any slight mismanagement of single-engine procedures would more than offset any advantages offered by continuing the take-off. The total take-off distance with an engine failure lengthens disproportionately under hot day, high altitude and heavy weight conditions until the point is quickly reached where a successful take-off climb would not be possible.

The following facts should be used as a guide at the time of engine failure:

(1) Discontinuing a take-off upon engine failure is advisable under most circumstances.

(2) Altitude is more valuable to safety after take-off than is airspeed in excess of the best single-engine climb speed, since excess airspeed is lost much more rapidly than is altitude.
(3) Climb or continued level flight is not possible with a propeller windmilling. Therefore, prompt identification of the inoperative engine and feathering the propeller is of utmost importance if the take-off is continued.
(4) In no case should the airspeed be allowed to fall below 95 MPH. even though altitude is lost since this speed will provide a better chance of climb or a smaller altitude loss than any lesser speed.

It is important to remember that the hydraulic pump for operating the landing gear system is driven by the front engine only (unless an optional rear-engine hydraulic pump is installed); therefore, when the front propeller is feathered, the landing gear must be actuated by using the emergency hydraulic hand pump.

If a front engine-out should occur while gear retraction is in progress, allow the propeller to windmill (airspeed at least 95 MPH) until the retraction cycle is complete (which is 3 to 5 seconds after the amber light is illuminated) before feathering the propeller.

Airplane drag with the landing gear doors opened and the gear partially extended is greater than the drag with the landing gear fully extended. Corresponding rate-of-climb penalties are - 240 FPM and -110 FPM respectively. Therefore, since there is a drag increase with the initiation of gear retraction, it should not be attempted unless adequate airspeed and altitude margins exist for sustained flight. This is especially important under the conditions of weight, altitude and temperature that result in little or no single engine climb. If necessary, use the emergency hydraulic pump to complete a gear up cycle.

DISCONTINUED TAKE-OFF PROCEDURE.

(1) Throttles -- Close immediately.
(2) Brakes -- As required.

NOTE

Total distances required to accelerate to various speeds and then stop are shown in Section VI.

CONTINUED TAKE-OFF WITH ENGINE-OUT (SPEED ABOVE 95 MPH).

(1) Throttles -- Full forward.

(2) Propellers -- Full forward.
(3) Determine inoperative engine (from engine RPM).

NOTE

Verify inoperative engine by closing throttle and noting power response to throttle movement.

(4) Inoperative Propeller -- Feather immediately.

NOTE

If gear retraction has been started and the front engine is out, delay feathering until gear-up cycle is completed. This delay is not necessary if an optional rear engine hydraulic pump is installed.

(5) Wing Flaps -- Retract.
(6) Climb out at 100 MPH (95 MPH with obstacles ahead).
(7) Landing Gear - Retract after immediate obstacles are cleared.

NOTE

Retraction with the emergency hydraulic pump is not recommended. If an engine is lost during gear retraction, do not reverse cycle, permit gear to fully retract. Reversing the cycle will prolong the period of gear door "open" operation.

(8) Cowl Flaps (Operative Engine) -- Check full "OPEN."
(9) Secure inoperative engine as follows:
a. Ignition/Starter Switch -- "OFF."
b. Alternator Switch -- Off.
c. Mixture -- Idle cut-off.
d. Cowl Flaps -- "CLOSE."
e. Fuel Selector -- "FUEL OFF."

SINGLE ENGINE SPEEDS
—FLAPS UP—

Best rate-of-climb speed	100 MPH
Obstacle clearance speed	95 MPH

ENGINE-OUT DURING FLIGHT.

(1) Power -- Increase as required.
(2) Determine inoperative engine (check power response to throttle movement.
(3) Cowl Flaps -- Open on operative engine as required.
(4) Mixture -- Adjust for new power setting (if used).

Before securing inoperative engine, take the following corrective action:

(1) Check fuel flow; if deficient, turn on auxiliary fuel pump of main tank selected for the inoperative engine.
(2) If fuel selector handle is on "AUXILIARY TANK," switch to main tank.
(3) Fuel Quantity Indicators -- Check; if necessary, switch to opposite tank and turn its auxiliary fuel pump on "HI" until fuel flow is restored.
(4) Ignition/Starter Switches -- Check in "BOTH" position.

If proper corrective action was taken, engine will restart. If it does not, secure it as follows:

(1) Mixture -- Idle cut-off.
(2) Propeller -- Feather.
(3) Turn off auxiliary fuel pump, alternator and ignition switches and fuel selector valve.
(4) Cowl Flaps -- "CLOSE."

ENGINE RESTARTS IN FLIGHT (AFTER FEATHERING).

(1) Radio Switches -- "OFF."
(2) Fuel Selector - Front Engine -- "LEFT MAIN."
Rear Engine -- "RIGHT MAIN."
(3) Throttle -- Advance (one inch).
(4) Propeller -- Cruise RPM.

NOTE

With the optional propeller unfeathering system installed, the propeller will automatically windmill when the propeller pitch lever is moved to the high RPM position, at speeds above 110 MPH.

(5) Auxiliary Fuel Pump Switch -- "HI."
(6) Ignition Switch -- "START" (until engine starts windmilling).
(7) Mixture -- Adjust for a fuel flow between 10 to 35 lbs/hr while starting. Then adjust for maximum engine acceleration to 1000 RPM.
(8) Auxiliary Fuel Pump Switch -- Off.
(9) Throttle -- Adjust for smooth engine acceleration and to prevent propeller overspeed.
(10) Power -- Increase slowly until cylinder head temperature reaches 200°F.

SINGLE-ENGINE APPROACH.

(1) Landing Gear -- Extend on downwind leg.

NOTE

If the front propeller is feathered, the landing gear must be extended with the emergency hydraulic hand pump (unless an optional rear-engine hydraulic pump is installed). Allow 2 to 3 minutes for emergency gear extension operation.

(2) Wing Flaps -- Minimum setting necessary (until landing is assured).
(3) Airspeed -- 90 to 100 MPH in approach.

SINGLE-ENGINE GO-AROUND.

(1) Power -- Full throttle and 2800 RPM.
(2) Airspeed -- 100 MPH (95 MPH with obstacles ahead).
(3) Wing Flaps -- Retract to "1/3" down.
(4) Cowl Flaps -- Open on operating engine.
(5) Wing Flaps -- Retract after obstacles are cleared and a safe altitude and airspeed are reached.
(6) Landing Gear -- Retract after obstacles are cleared.

NOTE

With the front engine inoperative, leave the landing gear extended (unless an optional rear-engine hydraulic pump is installed).

PROPELLER RPM FOR ZERO THRUST

AT 100 MPH, IAS

IDLING ENGINE CONDITIONS
Propeller Control - Full High RPM
Throttle - Adjust for RPM Below

ALTITUDE & TEMPERATURE	FRONT ENGINE RPM	REAR ENGINE RPM
Sea Level & 59°F.	1860	2240
2500 Ft. & 50°F.	1930	2320
5000 Ft. & 41°F.	2010	2410
7500 Ft. & 32°F.	2090	2510
10,000 Ft. & 23°F.	2170	2610

NOTES: 1. When setting up the rear engine for zero thrust, the front engine should be at full throttle and 2800 RPM.
2. Altitude and temperature values shown are for a standard day. Add 50 RPM for each 25°F. above standard, and subtract 50 RPM for each 25°F. below standard.

Figure 3-2.

SIMULATED ENGINE-OUT OPERATION.

Engine-out procedures should be practiced in anticipation of an emergency. This practice should be conducted at a safe altitude with full power operation on both engines. Practice should be continued until (1) an instinctive corrective reaction is developed, and the corrective procedure is automatic, and (2) airspeed, altitude, and heading can be maintained easily while the airplane is being prepared for climb. In order to simulate an engine failure, set both engines at full power operation, then at a chosen speed, pull the mixture control of one engine into "ICO" (idle cut-off) and proceed with single-engine emergency procedures.

Simulated single-engine procedures can also be practiced by setting the propeller RPM of an idling engine at zero thrust as shown in figure 3-2. In this case, the mixture would be left at the position required for full power as appropriate for the particular altitude.

ROUGH ENGINE OPERATION OR LOSS OF POWER.

SPARK PLUG FOULING.

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

MAGNETO MALFUNCTION.

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

LOW OIL PRESSURE.

If low oil pressure is accompanied by normal oil temperature, there is a possibility the oil pressure gage or relief valve is malfunctioning. A leak in the line to the gage is not cause for immediate concern because an orifice in this line will prevent a sudden loss of oil from the engine sump. However, power should be reduced as a precautionary measure and a landing planned at the next airport having service facilities.

If a total loss of oil pressure is accompanied by a sudden rise in oil temperature, there is reason to suspect an engine failure is imminent. Close throttle and verify faulty engine before feathering the propeller. After reviewing single-engine approach procedures in this section, perform an engine-out landing at the nearest suitable airport.

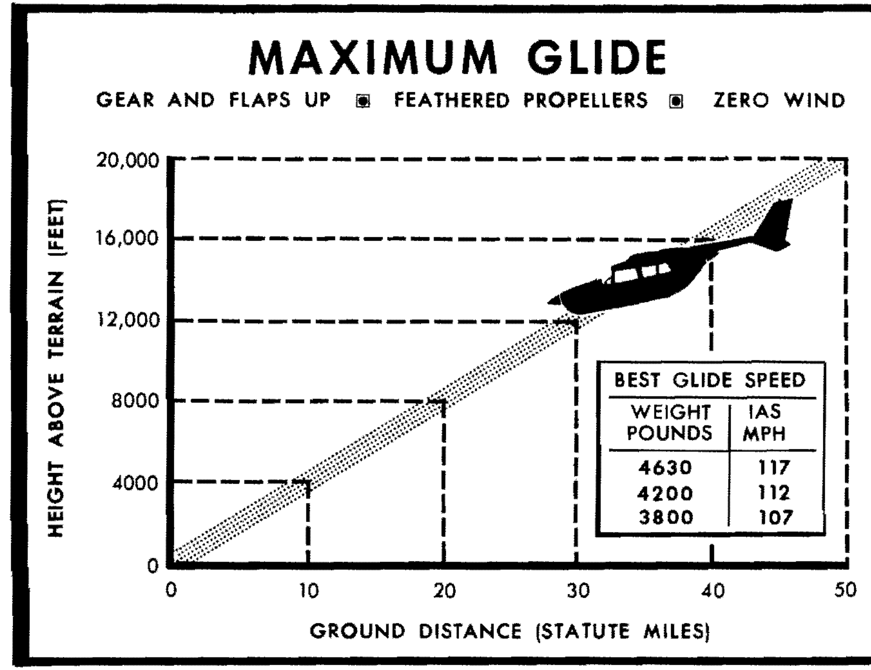


Figure 3-3.

LANDING EMERGENCIES.

LANDING GEAR SYSTEM - EMERGENCY OPERATION.

When the landing gear will not extend normally, it may be extended manually as follows:

NOTE

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

(1) Place the gear handle in the full "DOWN" position.
(2) Pull the emergency hand pump out to its full extension.

(3) Operate the hand pump up and down until the down indicator (green) light comes on, and continue pumping until the landing gear handle returns to "down neutral". Allow 2 to 3 minutes for this operation.

NOTE

If the emergency hand pump cannot be operated and seems to be "frozen," it is because there is normal hydraulic pressure from the engine-driven pump, and the hand pump cannot be operated against it. In this event, refer to the instructions in the following paragraphs.

LANDING WITHOUT POSITIVE INDICATION OF GEAR LOCKING.

If during landing gear extension, the gear handle does not return to neutral and the green light does not illuminate, it is possible that a malfunctioning limit switch is preventing the transfer of hydraulic pressure from the landing gear system to the gear door actuators. In this case the landing gear doors would remain open. Observe that the main gear is extended and have a tower operator or another airplane confirm that the nose gear is extended. In the absence of outside help, a nose wheel shadow can be observed at low altitude in sunlight by banking so as to obtain a side profile of the airplane. At nighttime the nose wheel shadow can be seen by the copilot when the airplane is within 50 feet of the ground with the landing light on. The landing should then be accomplished as in steps (1) through (5) below.

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

NOTE

Maintaining 1000 RPM on the front engine and holding the gear handle "DOWN" secures the landing gear in the extended position by hydraulic pressure. (When an optional rear-engine hydraulic pump is installed, hydraulic pressure is available from the rear engine also.)

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

NOTE

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

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

LANDING WITH DEFECTIVE NOSE GEAR.

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

(1) Transfer movable load to baggage area, and front seat passenger to rear seat if a rear seat position is unoccupied.
(2) Select a hard-surfaced or smooth sod runway.

NOTE

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

(3) Place landing gear handle "DOWN."
(4) Extend flaps full down.
(5) Turn off master switch.
(6) Land in slightly tail-low attitude.
(7) Pull mixture controls to idle cut-off (ICO").
(8) Turn ignition/starter switches "OFF."
(9) Hold nose off the ground as long as possible.
(10) Turn fuel selectors to "FUEL OFF."
(11) Evacuate the airplane as soon as it stops.

LANDING WITH DEFECTIVE MAIN GEAR.

If the main gear does not extend or only partially extends, prepare for a wheels-up landing as follows:

(1) Landing Gear -- Retract.
(2) Select a hard-surfaced runway or a sod runway known to be smooth and level.
(3) Feather the front propeller and position it horizontally with the starter.

(4) Approach at 95 MPH with the wing flaps full down.
(5) All switches (except rear-engine ignition) -- Off.
(6) Touchdown in a level attitude for minimum damage.
(7) Mixtures -- Idle cut-off (ICO").
(8) Rear-Engine Ignition/Starter Switch -- "OFF."
(9) Turn fuel selectors to "FUEL OFF."

FORCED LANDING (Precautionary Landing With Power).

(1) Drag over selected field with flaps "1/3" and 100 MPH airspeed, noting type of terrain and obstructions.
(2) If surface is smooth and hard, plan a wheels-down landing using full flaps and keeping the nose wheel off ground as long as practical.
(3) If surface is rough or soft, plan a wheels-up landing as follows:

a. Approach with flaps down at 90 MPH.
b. Turn off all switches except ignition switches.
c. Unlatch cabin door prior to flare-out.
d. Reduce power to a minimum during flare-out.
e. Prior to contact turn ignition switches "OFF."
f. Land in a slightly tail-low attitude.
g. Attempt to hold the tail low throughout slide.

FORCED LANDING (Complete Power Loss).

In the event both engines are out, maximum gliding distance can be obtained by maintaining indicated airspeeds (with the landing gear and wing flaps retracted and propellers feathered) as shown in the Maximum Glide Diagram, figure 3-3.

(1) Pull mixture control levers to idle cut-off.
(2) Turn both fuel selector valve handles to "FUEL OFF."
(3) Turn off all switches except master switch.
(4) Glide at 115 MPH.
(5) If field is smooth and hard, extend landing gear within gliding distance of field (manual extension requires approximately 85 full strokes of the emergency hand pump).
(6) Approach at 95 MPH with the wing flaps full down.
(7) Turn off master switch.
(8) Make a normal landing, keeping nose wheel off ground as long as practical.

(9) If terrain is rough or soft, plan a wheels-up landing as follows:

a. Approach at 95 MPH with flaps full down.
b. Turn off master switch.
c. Unlatch cabin door prior to flare-out.
d. Land in a slightly tail-low attitude.
e. Attempt to hold tail low throughout slide.

ELECTRICAL SYSTEM - EMERGENCY OPERATION.

The following corrective action should be taken when electrical system malfunctions occur.

Red "VOLTS HIGH" light comes on:

(1) Turn off both alternators. ("VOLTS HIGH" light will go out.)
(2) Switch to alternate regulator.
(3) Turn on alternators one at a time. ("VOLTS HIGH" light should remain out.)
(4) If "VOLTS HIGH" light illuminates again, turn off both alternators. Turn off all non-essential electrical equipment and terminate flight as soon as practical.

Amber "BAT DIS" light comes on:

The amber "BAT DIS" light does not necessarily indicate a malfunction. Its main function is to indicate current being drawn from the battery.

(1) Check "ALT NOT CHARGING" light for an indication. If there is no indication, or if only one light is on, reduce electrical load until "BAT DIS" light goes out.

NOTE

If both "ALT NOT CHARGING" lights are on, turn off all non-essential electrical equipment and terminate flight as soon as possible.

Total loss of electrical power:

(1) Turn off all electrical equipment (DO NOT TURN OFF MASTER SWITCH).
(2) Press "ALT RESTART" switch and release button, and allow a few seconds for alternators to build up.
(3) Turn electrical equipment on again.

FIRES.

ENGINE FIRE IN FLIGHT.

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

(1) Propeller Control Lever -- Feather (affected engine).
(2) Mixture Control Lever -- Idle cut-off ("ICO") (affected engine).
(3) Fuel Selector Valve Handle -- "OFF" (affected engine).
(4) Power -- As required (operating engine).
(5) Ignition/Starter Switch -- "OFF" (inoperative engine).
(6) Cowl Flap Switches -- As required.
(7) Electrical Load -- Reduce.
(8) Alternator Switch -- Off (inoperative engine).
(9) Land as soon as practical.

NOTE

Refer to engine-out operation and single-engine landing in this section for additional information.

ELECTRICAL FIRE IN FLIGHT.

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

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

(1) Master Switch -- Off.
(2) All other switches (except ignition/starter 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.

Flight in known or forecast icing conditions should be avoided whenever possible. If icing conditions cannot be avoided, and the aircraft is not equipped with de-icing provisions, the following procedures are recommended.

(1) Turn pitot heat switch "ON" (if installed).
(2) Turn back or change altitude to obtain an outside air temperature that is less conducive to icing.
(3) Move cabin air and defrost levers to full "ON" and position cabin temperature lever to "HIGH" for maximum windshield defroster output.
(4) Increase RPM to minimize ice build-up on propeller blades. If excessive vibration is noted, momentarily reduce engine speed to 2200 RPM with the propeller control, then rapidly move the control full forward.

NOTE

Repeating this operation several times should result in a smoother running engine at normal engine operating speeds since flexing of the propeller blades and increased centrifugal force causes ice to shed more readily.

(5) If icing conditions are unavoidable, plan a landing at the nearest suitable airport. With an extremely rapid ice build-up, select a suitable "off airport" landing site.

(6) With ice accumulation of 1/4 inch or more on the wing leading edges, be prepared for a significantly higher power requirement, approach speed, stall speed and longer landing roll.
(7) Open window and scrape ice from a portion of the windshield for visibility in the landing approach. The metal control lock shield may be used as a scraper.
(8) Set wing flaps at "1/3" down for ice accumulations of 1 inch or less. With larger ice formations, approach with flaps retracted to ensure adequate elevator effectiveness in the approach and landing.
(9) Approach at 100 to 110 MPH with 1/3 flaps and 110 to 120 MPH with flaps retracted, depending on the amount of ice accumulation. If ice accumulation is unusually large, decelerate to the planned approach speed while in the approach configuration at an altitude high enough to permit recovery in the event of an inadvertent stall.
(10) Land in level attitude using power as required to control rate of descent prior to touchdown.
(11) Missed approaches should be avoided if possible because of severely reduced climb capability. However, if a go-around is mandatory, make the decision much earlier in the approach than normal. Apply maximum power and maintain 110 MPH while retracting the flaps in small increments. Retract the landing gear after immediate obstacles are cleared.

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 full flaps and sufficient power for a 300 ft./min. rate of descent at 95 MPH.
(3) Unlatch the cabin door.
(4) Maintain a continuous descent until touchdown in level attitude. Avoid a landing flare because of difficulty in judging airplane height over a water surface.
(5) Place folded coat or cushion in front of face at time of touchdown.

It is expected that the aircraft will skip clear of the water once or twice using the optimum technique outlined above. If final contact is made in the desired level attitude, the nose will submerge completely during two or three seconds of moderately abrupt deceleration, and then the aircraft will float for only a short time. Exit through cabin door or emergency window. If the fuselage is submerged and the exits will not open, flood the cabin through the pilot's storm window and jettison the emergency window. Life vests and raft (if available) should be inflated after leaving the cabin.

EMERGENCY WINDOW EXIT.

If the aircraft is equipped with the optional emergency window installation, the pilot's cabin window can be jettisoned for emergency cabin egress. An emergency release handle is located just aft of the pilot's seat on the left side wall of the cabin. To jettison the window, remove the clear protective plastic plate covering the handle, pull the handle forward, then push the window outward.

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. A6CE as Cessna Model No. 337F.

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. 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:		
Take-Off		4630 lbs
Landing		4400 lbs
Flight Load Factor (at design gross weight of 4630 lbs):		
*Flaps Up	+ 3.8	-1.52
*Flaps Down	+ 2.0	

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

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

AIRSPEED LIMITATIONS (CAS).

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

Never Exceed Speed (glide or dive, smooth air)	228 MPH
Maximum Structural Cruising Speed	190 MPH
Maximum Speed	
Flaps Extended 1/3	160 MPH
Flaps Extended 1/3 to Full Down	120 MPH
Gear Extended	160 MPH
*Maneuvering Speed	155 MPH

*The maximum speed at which you may use abrupt control travel.

AIRSPEED INDICATOR MARKINGS.

The following is a list of the certificated calibrated airspeed markings (CAS) for the airplane, except where noted:

Never Exceed (glide or dive, smooth air)	228 MPH (red line)
Caution Range	190-228 MPH (yellow arc)
Normal Operating Range	80-190 MPH (green arc)
Flap Operating Range (1/3 to full down)	70-120 MPH (white arc)
Best Single-Engine Rate of Climb	100 MPH (blue line) (IAS)

ENGINE OPERATION LIMITATIONS.

Power and Speed . . . . 210 BHP at 2800 RPM

ENGINE INSTRUMENT MARKINGS.

FUEL QUANTITY INDICATORS.

Empty (2.5 pounds unusable each tank) . . . . Red Line

OIL PRESSURE GAGES.

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

OIL TEMPERATURE GAGES.

Normal Operating Range	75°-240° (green arc)
Do Not Exceed	240° (red line)

CYLINDER HEAD TEMPERATURE GAGES.

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

MANIFOLD PRESSURE GAGE (DUAL).

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

TACHOMETER (DUAL).

Normal Operating Range	2200-2600 RPM (green arc)
Maximum (Engine rated speed)	2800 RPM (red line)

FUEL FLOW INDICATOR (DUAL).

Normal Operating Range	27-69 lbs/hr (green arc)
Minimum and Maximum	3.0 and 18.5 psi (108 lbs/hr) (red lines)

NOTE

A placard, located adjacent to the dual fuel flow indicator, provides maximum performance (full throttle and 2800 RPM) take-off and climb fuel flow settings at altitude. These settings, as called out on the placard, are as follows:

Sea Level	102 lbs/hr
4000 Feet	90 lbs/hr
8000 Feet	78 lbs/hr
12000 Feet	66 lbs/hr

WEIGHT AND BALANCE.

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

Take the "Licensed Empty Weight" and "Moment" from the Weight and Balance Data sheet (or changes noted on FAA Form 337) carried in your airplane, and write them down in the column titled "YOUR AIRPLANE" on the Sample Loading Problem.

NOTE

The Weight and Balance Data sheet is included in the aircraft file. In addition to the licensed empty weight and moment noted on this sheet, the c.g. arm (fuselage station) is shown. The c.g. arm figure need not be used on the Sample Loading Problem. The moment shown on the sheet must be divided by 1000 and this value used as the moment/1000 on the loading problem.

Use the Loading Graph to determine the moment/1000 for each additional item to be carried, then list these on the loading problem.

NOTE

Loading Graph information is based on seats positioned for average occupants and baggage loaded in the center of the baggage area. For other than average loading situations, the Sample Loading Problem lists fuselage stations for these items to indicate their forward and aft c.g. range limitation (seat travel or baggage area limitation). Additional moment calculations, based on the actual weight and c.g. arm (fuselage station) of the item being loaded, must be made if the position of the load is different from that shown on the Loading Graph.

Total the weights and moments/1000 and plot these values on the Center of Gravity Moment Envelope to determine whether the point falls within the envelope, and if the loading is acceptable.

When an optional cargo pack is installed, it is necessary to determine the c.g. arm and calculate the moment/1000 of items carried in the pack.

The c.g. arm (fuselage station) for any location in the pack can be determined from the diagram on page 4-9. Multiply the weight of the item by the c.g. arm, then divide by 1000 to get the moment/1000. The maximum loading capacity of the pack is 300 pounds.

NOTE

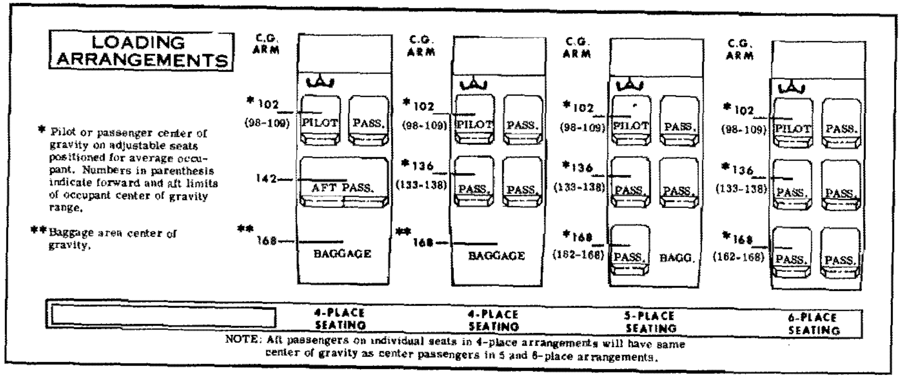
Each loading should be figured in accordance with the above paragraphs. When loading is light (such as pilot and copilot, and no rear seats or cargo), be sure to check the forward balance limits. When loading is heavy (near gross weight), be sure to check the aft balance limits.

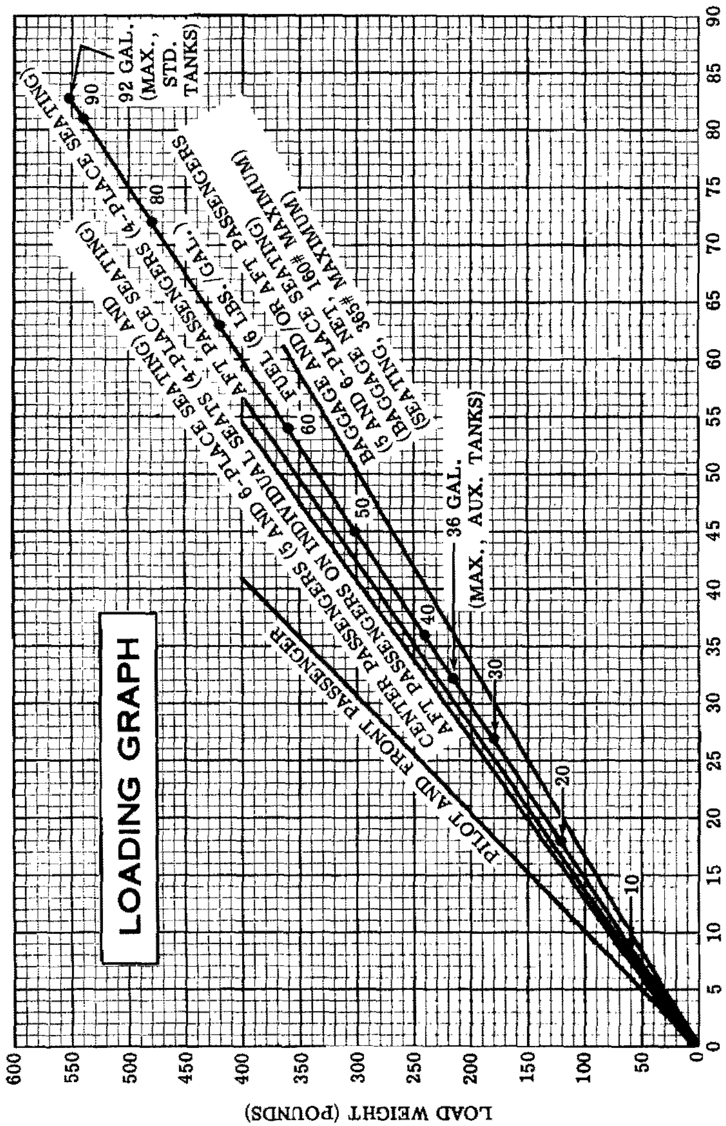
To avoid time consuming delays in cargo and/or passenger shifting, plan your load so that the heaviest cargo and/or passengers are in the forward part of the aircraft or cargo pack, and the lightest in the rear. Always plan to have any vacant space at the rear of the aircraft or pack. For example, do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

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)	2794	392.5		
2. Oil - *10 qts. (Front Engine) . . . . Oil - *10 qts. (Rear Engine)	19 19	0.8 3.9	19 19	0.8 3.9
3. Fuel-(Standard-92 Gal. at 6 lbs/gallon)	552	82.8		
Fuel-(Auxiliary-36 Gal. at 6 lbs/gallon).	216	32.4		
4. Pilot and Front Passenger (Station 98 to 109) . . .	340	34.7		
5. Center Passengers (5 and 6-Place) and Aft Passengers On Individual Seats (4-Place Seating) (Station 133 to 138)	340	46.2		
6. Aft Passengers (4-Place Seating)				
7. Aft Passengers (5 and 6-Place Seating) (Station 162 to 168)	340	57.1		
8. Baggage (Station 151 to 183)	10	1.7		
9. Items in Optional Cargo Pack (Station 68 to 158)				
10. TOTAL WEIGHT AND MOMENT	4630	652.1		

11. Locate this point (4630 at 652.1) on the center of gravity moment envelope, and since this point falls within the envelope, the loading is acceptable.

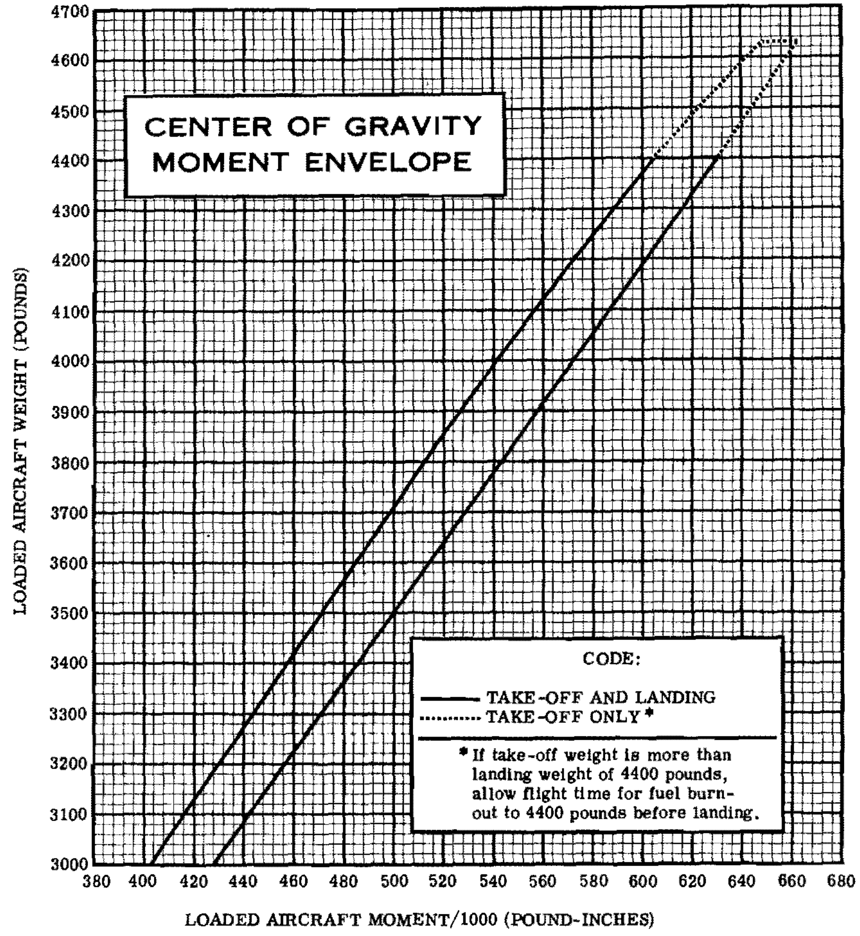
* NOTE: Normally full oil may be assumed for all flights.



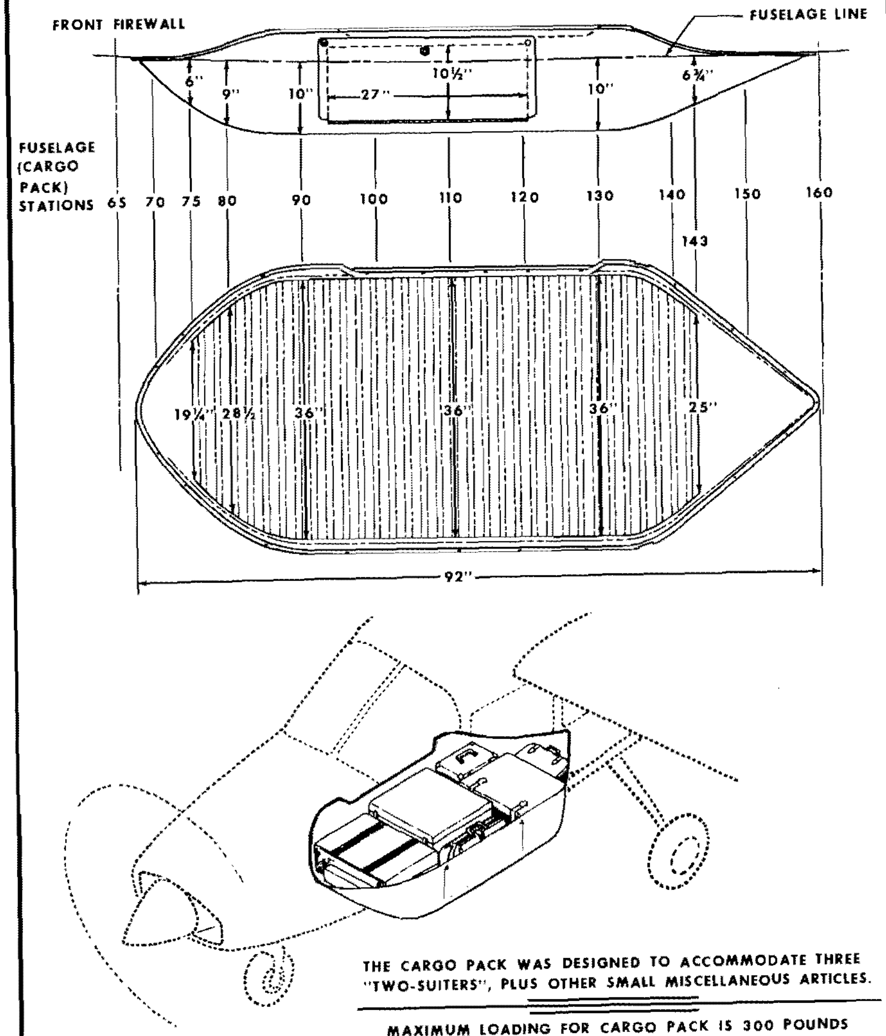


NOTES: (1) Lines representing adjustable seats show the pilot or passenger center of gravity on adjustable seats positioned for an average occupant. Refer to the Loading Arrangements diagram for forward and aft limits of occupant c.g. range.

(2) Front Engine Oil: 10 Qts. = 19 Lbs. at 0.8 Moment/1000.
Rear Engine Oil: 10 Qts. = 19 Lbs. at 3.9 Moment/1000.



CARGO PACK



THE CARGO PACK WAS DESIGNED TO ACCOMMODATE THREE "TWO-SUITERS", PLUS OTHER SMALL MISCELLANEOUS ARTICLES.

MAXIMUM LOADING FOR CARGO PACK IS 300 POUNDS

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 preventive maintenance based on climatic and flying conditions encountered in your locality.

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

GROUND HANDLING.

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

NOTE

When using the tow-bar, never exceed the nose wheel turning angle of 39° either side of center, or damage to the gear will result.

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) Tie the middle of a rope (do not use chain or cable) to the nose gear trunnion. Pull each end away at 45 degrees and secure to ramp tie-downs.

(3) Tie sufficiently strong ropes or chain (700 pounds tensile strength) to the wing tie-down rings and secure each rope, or chain to a ramp tie-down ring.

(4) Install a surface control lock between each fin and rudder.

(5) Tie a sufficiently strong rope or chain (700 pounds tensile strength) to the tie-down ring on each boom and secure each rope to a common ramp tie-down.

NOTE

In areas where heavy snow accumulations occur, additional precautions should be taken when storing the airplane outside. A heavy accumulation of snow on the stabilizer can cause the tail section to rotate downward, resulting in damage to the fins. Proper nose gear tie-down and a simple tail support attached to one of the boom tie-down rings will protect against such damage.

(6) Install a pitot tube cover.

WINDSHIELD—WINDOWS.

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

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

NOTE

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

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

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

PAINTED SURFACES.

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

Generally, the painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with cloths or a chamois. Harsh or abrasive soaps or detergents which cause corrosion or make 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. Small nicks on the propellers, particularly near the tips and on the leading edges, should be dressed out as soon as possible since these nicks produce stress concentrations, and if ignored, may result in cracks. Never use an alkaline cleaner on the blades; remove grease and dirt with carbon tetrachloride or Stoddard solvent.

LANDING GEAR CARE.

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

INTERIOR CARE.

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

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

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

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

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

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

Radio and autopilot faceplates are finished with a suede coating which produces a soft, rich appearance and warm feel comparable to suede. Unlike suede leather, dust and dirt marks can be removed easily with a

damp sponge. Remove non-greasy stains with a liquid cleaner such as "Mr. Clean", "Handy Andy", "Lestoil", "Liquid Ajax", or "Cinch". Greasy stains can be removed with a naptha-dampened sponge, scrub brush or lint-free cloth.

FLYABLE STORAGE.

Aircraft which are not in daily flight should have the engines 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 airspaces in the engine. Keep fuel tanks full to minimize condensation in the tanks. Keep the battery fully charged to prevent the electrolyte from freezing in cold weather. If the aircraft is to be stored temporarily, or indefinitely, refer to the Service Manual for proper storage procedures.

INSPECTION SERVICE AND INSPECTION PERIODS.

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

Federal Aviation Regulations require that all airplanes have a periodic (annual) inspection as prescribed by the administrator, and performed by a person designated by the administrator. In addition, 100-hour periodic inspections made by an "appropriately-rated mechanic" are required if the airplane is flown for hire. The Cessna Aircraft Company recommends the 100-hour periodic inspection for your airplane. The procedure for this 100-hour inspection has been carefully worked out by the factory and is followed by the Cessna Dealer Organization. The complete familiarity of the Cessna Dealer Organization with Cessna equipment and with factory-approved procedures provides the highest type of service possible at lower cost.

AIRCRAFT FILE.

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

A. To be displayed in the aircraft at all times:
   (1) Aircraft Airworthiness Certificate (FAA Form 8100-2).
   (2) Aircraft Registration Certificate (FAA Form 8050-3).
   (3) Aircraft Radio Station License, if transmitter installed (FCC Form 556).

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, FAA Form 337, if applicable).
   (2) Aircraft Equipment List.

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

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.

MAA PLATE/FINISH AND TRIM PLATE.

Information concerning the Type Certificate Number (TC), Production Certificate Number (PC), Model Number and Serial Number of your particular aircraft can be found on the MAA (Manufacturers Aircraft Association) plate located on the right forward door post.

A Finish and Trim Plate contains a code describing the interior color scheme and exterior paint combination of the aircraft. The code may be used in conjunction with an applicable Parts Catalog if finish and trim information is needed. This plate is also located on the right forward door post.

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 100/130 minimum grade fuel. The capacity of each main tank is 46.4 gallons. The capacity of each optional auxiliary tank is 19.0 gallons.

FUEL TANK SUMP DRAINS:
Before the first flight of the day and after each refueling, use fuel sampler cup stored in the map compartment and drain a small amount of fuel from the quick-drain valve in each fuel sump tank (at bottom of boom) and in each optional auxiliary fuel tank.

FUEL STRAINERS:
Before the first flight of the day and after each refueling, open fuel strainer drains (accessible through oil dipstick access doors) for about four seconds, to clear front and rear fuel strainers of possible water and sediment. Check that strainer drains are closed after draining.

OIL FILLERS:
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.

DAILY (Continued)

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

OXYGEN CYLINDERS (OPT):
Check oxygen pressure gage in cabin overhead console for anticipated requirements before each flight. Use filler valve (accessible under cover plate on top of right wing leading edge at wing root) to refill cylinders with aviator's breathing oxygen (Spec. No. MIL-O-27210). Maximum pressure (cylinder temperature stabilized after filling), 1800 psi at 70° F. Refer to page 7-16 for filling pressures.

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 FILTERS -- Change engine oil and replace filter elements. If optional oil filters are not installed, change oil and clean screens 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 filters, if installed.

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

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

EACH 100 HOURS

SPARK PLUGS -- Clean, test and regap.

FUEL STRAINERS -- Disassemble and clean.

FUEL SELECTOR VALVES (located at wing root) -- Lubricate detents and selector valve arm pivot points.

BRAKE MASTER CYLINDERS -- Check and fill.

SHIMMY DAMPENER -- Check and fill.

LANDING GEAR UNIVERSAL JOINTS -- Lubricate.

LANDING GEAR DOWN LOCK -- Lubricate down lock pawls, down lock stops, and cam surface on down lock switch brackets.

HYDRAULIC SYSTEM FILTER -- Disassemble and clean.

SUCTION RELIEF VALVE INLET FILTERS (OPT) -- Clean. Replace at engine overhaul period.

SERVICING INTERVALS CHECK LIST

EACH 500 HOURS

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

VACUUM SYSTEM CENTRAL AIR FILTER (OPT) -- Replace filter element. Replace sooner if erratic or sluggish gyro responses are noted with normal suction gage readings.

AS REQUIRED

NOSE GEAR SHOCK STRUT -- Keep filled with hydraulic fluid and inflated with air to 35 psi.

HYDRAULIC FLUID RESERVOIR -- Check fluid level through sight window at least every 25 hours. The sight window is located on the outside of the fuselage on the left hand side forward of the windshield. Fill reservoir through filler fitting as required. Use MIL-H-5606 hydraulic fluid.

ADDITIONAL SERVICE AND TEST REGULATIONS

Servicing Intervals of items in the preceding check list are recommended by The Cessna Aircraft Company. Government regulations may require that additional items be inspected, serviced or tested at specific intervals for various types of flight operations. For these regulations, owners should check with aviation officials in the country where the aircraft is being operated.

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 Customer Services Department. A subscription form is supplied in your Owner's Service Policy booklet for your use, should you choose to request this service. Your Cessna Dealer will be glad to supply you with details concerning these follow-up programs, and stands ready through his Service Department to supply you with fast, efficient, low cost service.

PUBLICATIONS

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

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

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

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

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

Section VI

OPERATIONAL DATA

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

The data in the charts has been compiled from actual flight tests with the airplane and engines 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, fuel reserve, etc. You must estimate these variables for yourself and make allowances accordingly.

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

AIRSPEED CORRECTION TABLE

WING FLAPS UP	IAS	80	100	120	140	160	180	200
	CAS	77	97	116	136	156	176	196
WING FLAPS 1/3 TO FULL	IAS	70	80	90	100	120	140	160
	CAS	66	75	85	95	115	135	154

MAXIMUM FLAP SPEEDS: Flaps 0 to 1/3 - 160 MPH, CAS
Flaps 1/3 to Full - 120 MPH, CAS

Figure 6-1.

STALL SPEEDS, POWER OFF

	CONDITION	ANGLE OF BANK 0°	20°	40°	60°
4630 LBS. GROSS WEIGHT	FLAPS UP	80	82	90	113
	FLAPS 1/3	75	77	85	106
	FULL FLAPS	70	72	80	99

SPEEDS ARE MPH - CAS GEAR UP OR DOWN

Figure 6-2.

SINGLE-ENGINE SERVICE CEILING (R/C=50 FPM)

CRITICAL (REAR) ENGINE INOPERATIVE - PROPELLER FEATHERED
FRONT ENGINE OPERATING MCP - 2800 RPM
FLAPS UP ——— GEAR UP

GROSS WEIGHT POUNDS	OUTSIDE AIR TEMPERATURE AT ALTITUDE °F						
	0	10	20	30	40	50	60
	INDICATED ALTITUDE - FEET (ALT. SET. 29.92 inches Hg)						
4630	6600	6200	5900	5500	5100	4800	4400
4400	8000	7700	7300	6900	6600	6200	5900
4200	9200	8900	8500	8100	7800	7400	7100
4000	10,400	10,100	9700	9300	9000	8600	8300
3800	11,600	11,200	10,900	10,500	10,200	9800	9500

NOTES: 1. This table provides performance information to aid in route selection when operating under FAR 135.145 and FAR 91.119 requirements.
2. For each 0.1 inch Hg altimeter setting greater than 29.92, increase indicated service ceiling from above table by 100 feet.
3. For each 0.1 inch Hg altimeter setting less than 29.92, decrease indicated service ceiling from above table by 100 feet.

Figure 6-3.

TAKE-OFF DATA

TAKE-OFF DISTANCE WITH 1/3 FLAPS FROM A HARD SURFACED RUNWAY

GROSS WEIGHT LBS.	IAS @ 50' MPH	HEAD WIND KNOTS	@ S.L. & 59°F		@ 2500 FT. & 50°F		@ 5000 FT. & 41°F		@ 7500 FT. & 32°F	
			GROUND RUN	TOTAL TO CLEAR 50' OBS	GROUND RUN	TOTAL TO CLEAR 50' OBS	GROUND RUN	TOTAL TO CLEAR 50' OBS	GROUND RUN	TOTAL TO CLEAR 50' OBS
4630	88	0	1000	1675	1200	1920	1440	2230	1740	2650
		10	740	1315	900	1515	1090	1770	1330	2125
		20	510	990	635	1155	780	1360	970	1645
4200	84	0	800	1435	960	1625	1145	1850	1380	2155
		10	580	1120	705	1270	855	1460	1040	1710
		20	395	835	490	955	600	1105	745	1310
3800	80	0	640	1245	765	1390	910	1565	1095	1785
		10	455	965	550	1080	665	1225	810	1405
		20	300	710	370	805	460	920	565	1060

NOTES: 1. Increase distances 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 4% of the "total to clear 50 ft. obstacle" figure.

ACCELERATE - STOP DATA

ACCELERATE - STOP DISTANCE WITH 1/3 FLAPS ON HARD SURFACED RUNWAY

GROSS WEIGHT LBS.	HEAD WIND KNOTS	@ S.L. & 59°F			@ 2500 FT. & 50°F			@ 5000 FT. & 41°F			@ 7500 FT. & 32°F		
		IAS - MPH			IAS - MPH			IAS - MPH			IAS - MPH		
		90	95	100	90	95	100	90	95	100	90	95	100
4630	0	2885	3305	3795	3260	3765	4315	3735	4315	4960	4315	4995	5750
	10	2220	2585	3005	2535	2965	3450	2930	3435	3995	3420	4015	4675
	20	1635	1940	2295	1890	2260	2670	2220	2650	3130	2620	3130	3700

NOTES: (1) Distances shown are based on full throttle and 2800 RPM to speed noted, then power off and heavy braking during deceleration.
(2) Increase distances 10% for each 25° above standard temperature for particular altitude.
(3) Decrease distances 1% for each 100 pounds decrease in gross weight.

Figure 6-4.

TWIN-ENGINE MAXIMUM RATE-OF-CLIMB DATA

GROSS WEIGHT POUNDS	@S. L. & 59°F			@5000 FT. & 41° F			@10,000 FT. & 23°F			@15,000 FT. & 5°F			@20,000 FT. & -12°F		
	IAS MPH	RATE OF CLIMB FT./MIN.	LBS. 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
4630	114	1100	18	111	820	35	108	545	55	105	265	83	--	---	----
4200	111	1300	18	108	1005	32	105	710	48	102	415	67	99	125	101
3800	108	1520	18	105	1200	30	102	885	43	99	570	58	96	265	79

NOTES: 1. Full throttle, 2800 RPM, flaps and gear up, mixture at recommended leaning schedule.
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.

SINGLE-ENGINE MAXIMUM RATE-OF-CLIMB DATA

GROSS WEIGHT POUNDS	@S. L. & 59°F		@2500 FT. & 50°F		@5000 FT. & 41°F		@7500 FT. & 32°F		@10,000 FT. & 23°F	
	IAS MPH	RATE OF CLIMB FT./MIN.	IAS MPH	RATE OF CLIMB FT./MIN.	IAS MPH	RATE OF CLIMB FT./MIN.	IAS MPH	RATE OF CLIMB FT./MIN.	IAS MPH	RATE OF CLIMB FT./MIN.
FRONT ENGINE OPERATING - REAR PROPELLER FEATHERED										
4630	101	235	100	145	99	55	99	-35	98	-125
4200	99	360	98	265	97	170	97	75	96	-20
3800	98	490	97	390	96	290	96	190	95	90
REAR ENGINE OPERATING - FRONT PROPELLER FEATHERED										
4630	101	320	100	225	99	130	99	35	98	-60
4200	99	450	98	350	97	255	97	155	96	55
3800	98	590	97	485	96	385	96	275	95	170

NOTES: 1. Full throttle, 2800 RPM, flaps and gear up, mixture at recommended leaning schedule.
2. For hot weather, decrease rate of climb 15 ft./min. for each 10°F above standard day temperature for particular altitude.

Figure 6-5.

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions ✓ Zero Wind ✓ Gross Weight-4630 Pounds

2500 FEET

RPM	MP	% BHP	TAS MPH	TOTAL LBS/HOUR	552 LBS (NO RESERVE) ENDR. HOURS	552 LBS (NO RESERVE) RANGE MILES	768 LBS (NO RESERVE) ENDR. HOURS	768 LBS (NO RESERVE) RANGE MILES
2600	24	77	185	140	3.9	730	5.5	1020
	23	72	180	131	4.2	760	5.9	1055
	22	67	175	123	4.5	785	6.3	1095
	21	62	168	114	4.8	815	6.7	1135
2500	25	78	186	142	3.9	725	5.4	1010
	24	73	182	134	4.1	750	5.7	1045
	23	69	177	125	4.4	780	6.1	1080
	22	64	170	117	4.7	805	6.6	1120
2400	25	73	181	133	4.2	755	5.8	1050
	24	69	177	125	4.4	780	6.1	1080
	23	64	171	118	4.7	800	6.5	1115
	22	60	165	110	5.0	830	7.0	1150
2300	25	68	176	125	4.4	780	6.2	1085
	24	64	171	117	4.7	805	6.6	1120
	23	60	165	110	5.0	830	7.0	1155
	22	56	159	103	5.4	855	7.5	1190
2200	25	63	170	116	4.8	810	6.6	1125
	24	60	164	109	5.1	835	7.0	1160
	23	56	159	103	5.4	855	7.5	1190
	22	52	153	96	5.7	880	8.0	1220
	21	48	145	90	6.1	895	8.5	1240
	20	44	137	84	6.6	910	9.2	1265
	19	41	128	77	7.1	910	9.9	1265

Figure 6-6 (Sheet 1 of 6).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight-4630 Pounds

5000 FEET

RPM	MP	% BHP	TAS MPH	TOTAL LBS/ HOUR	552 LBS (NO RESERVE) ENDR. HOURS	552 LBS (NO RESERVE) RANGE MILES	768 LBS (NO RESERVE) ENDR. HOURS	768 LBS (NO RESERVE) RANGE MILES
2600	23	75	188	137	4.0	755	5.6	1050
	22	70	182	129	4.3	780	6.0	1090
	21	66	176	120	4.6	810	6.4	1125
	20	61	170	111	5.0	840	6.9	1170
2500	23	72	184	131	4.2	775	5.8	1075
	22	67	178	123	4.5	800	6.2	1110
	21	63	172	115	4.8	830	6.7	1150
	20	58	166	107	5.2	855	7.2	1190
2400	23	67	178	123	4.5	800	6.2	1110
	22	63	173	116	4.8	825	6.6	1145
	21	59	167	108	5.1	850	7.1	1185
	20	55	160	101	5.5	875	7.6	1220
2300	23	63	173	115	4.8	825	6.7	1150
	22	59	167	108	5.1	850	7.1	1185
	21	55	160	101	5.5	875	7.6	1215
	20	51	153	94	5.9	895	8.1	1245
2200	23	59	167	108	5.1	855	7.1	1185
	22	55	160	101	5.5	875	7.6	1215
	21	51	153	95	5.8	895	8.1	1240
	20	47	145	88	6.2	910	8.7	1265
	19	43	136	82	6.7	915	9.4	1275
	18	39	124	76	7.3	905	10.1	1260

Figure 6-6 (Sheet 2 of 6).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight-4630 Pounds

7500 FEET

RPM	MP	% BHP	TAS MPH	TOTAL LBS/ HOUR	552 LBS (NO RESERVE) ENDR. HOURS	552 LBS (NO RESERVE) RANGE MILES	768 LBS (NO RESERVE) ENDR. HOURS	768 LBS (NO RESERVE) RANGE MILES
2600	21	69	184	126	4.4	805	6.1	1120
	20	64	178	117	4.7	835	6.5	1160
	19	59	170	109	5.1	865	7.1	1200
	18	55	162	100	5.5	890	7.6	1240
2500	21	66	180	121	4.6	825	6.4	1145
	20	61	174	112	4.9	855	6.8	1190
	19	57	166	104	5.3	880	7.4	1225
	18	52	157	96	5.7	900	8.0	1255
2400	21	62	175	113	4.9	850	6.8	1185
	20	58	168	106	5.2	875	7.3	1215
	19	53	160	98	5.6	895	7.8	1245
	18	49	151	91	6.1	910	8.4	1270
2300	21	58	168	106	5.2	875	7.2	1215
	20	54	160	99	5.6	895	7.7	1245
	19	50	152	92	6.0	910	8.3	1265
	18	45	142	85	6.5	920	9.0	1280
2200	21	54	161	100	5.5	890	7.7	1240
	20	50	153	93	5.9	910	8.2	1265
	19	46	144	87	6.4	920	8.9	1280
	18	42	133	80	6.9	920	9.6	1280

Figure 6-6 (Sheet 3 of 6).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions ↘ Zero Wind ↘ Gross Weight-4630 Pounds

10,000 FEET

RPM	MP	% BHP	TAS MPH	TOTAL LBS/ HOUR	552 LBS (NO RESERVE) ENDR. HOURS	552 LBS (NO RESERVE) RANGE MILES	768 LBS (NO RESERVE) ENDR. HOURS	768 LBS (NO RESERVE) RANGE MILES
2600	19	63	179	115	4.8	860	6.7	1195
	18	58	171	106	5.2	890	7.2	1235
	17	53	161	98	5.7	910	7.9	1265
	16	48	149	89	6.2	925	8.6	1285
2500	19	60	174	110	5.0	875	7.0	1220
	18	55	165	102	5.4	900	7.6	1250
	17	50	155	93	5.9	920	8.2	1275
	16	45	143	85	6.5	925	9.0	1285
2400	19	56	168	103	5.3	895	7.4	1245
	18	52	159	96	5.8	915	8.0	1270
	17	47	148	88	6.2	925	8.7	1285
	16	43	135	81	6.8	920	9.5	1280
2300	19	52	160	97	5.7	910	7.9	1270
	18	48	150	90	6.1	925	8.6	1285
	17	44	138	83	6.7	925	9.3	1285
	16	40	120	76	7.3	875	10.1	1215
2200	19	49	152	91	6.1	920	8.4	1280
	18	45	142	84	6.5	925	9.1	1285
	17	41	127	78	7.1	900	9.8	1250

Figure 6-6 (Sheet 4 of 6).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions ↘ Zero Wind ↘ Gross Weight-4630 Pounds

12,500 FEET

RPM	MP	% BHP	TAS MPH	TOTAL LBS/ HOUR	552 LBS (NO RESERVE) ENDR. HOURS	552 LBS (NO RESERVE) RANGE MILES	768 LBS (NO RESERVE) ENDR. HOURS	768 LBS (NO RESERVE) RANGE MILES
2600	17	56	170	103	5.3	905	7.4	1260
	16	51	159	95	5.8	925	8.1	1290
	15	46	144	86	6.4	930	8.9	1290
2500	17	53	164	99	5.6	920	7.8	1280
	16	49	152	90	6.1	930	8.5	1295
	15	44	137	82	6.7	920	9.4	1280
2400	17	50	156	93	5.9	930	8.3	1290
	16	45	143	85	6.5	925	9.0	1290
	15	41	123	78	7.1	875	9.9	1215
2300	17	47	147	87	6.3	930	8.8	1295
	16	42	130	80	6.9	900	9.6	1250
2200	17	44	137	82	6.7	920	9.4	1280

Figure 6-6 (Sheet 5 of 6).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions ✓ Zero Wind ✓ Gross Weight-4630 Pounds

15,000 FEET

RPM	MP	% BHP	TAS MPH	TOTAL LBS/ HOUR	552 LBS (NO RESERVE) ENDR. HOURS	552 LBS (NO RESERVE) RANGE MILES	768 LBS (NO RESERVE) ENDR. HOURS	768 LBS (NO RESERVE) RANGE MILES
2600	15 14	49 43	154 133	91 82	6.1 6.7	935 895	8.4 9.4	1300 1250
2500	15 14	46 41	147 122	87 79	6.3 7.0	930 855	8.8 9.8	1290 1190
2400	15	43	133	82	6.7	900	9.4	1250

Figure 6-6 (Sheet 6 of 6).

LANDING DATA

LANDING DISTANCE WITH FULL FLAPS ON A HARD SURFACED RUNWAY

GROSS WEIGHT POUNDS	IAS AT 50' MPH	AT SEA LEVEL & 59°F		AT 2500 FT. & 50°F		AT 5000 FT. & 41°F		AT 7500 FT. & 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.
4400	94	700	1650	745	1755	795	1870	845	1990

NOTES:
1. Distances shown are based on zero wind, power off, and heavy braking.
2. Reduce landing distances 10% for each 5 knots headwind.
3. For operation on a dry, grass runway, increase distances (both "ground roll" and "total to clear 50 ft. obstacle") by 27% of the "total to clear 50 ft. obstacle" figure.

Figure 6-7.

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.

AUXILIARY FUEL SYSTEM

An auxiliary fuel system is available as optional equipment. The system consists of two tanks, each containing 18 gallons (108 pounds) usable, one located in each inboard wing panel. The tanks feed directly to the fuel selector valves, the left tank providing fuel to the front engine only and the right tank providing fuel to the rear engine only. Fuel quantity for the auxiliary tanks is read on the same fuel quantity indicators used for the main fuel tanks. This is accomplished when the fuel selector valve handles are turned to the "AUXILIARY" position. As a selector valve handle is turned to this position, it depresses a gaging button, labeled "PUSH TO GAGE", located in the "AUXILIARY" quadrant of the fuel selector valve placard. The depressed button actuates a microswitch and electrically senses auxiliary fuel rather than main fuel quantity. Auxiliary fuel quantity can be checked without changing the selector valve handle, by depressing the "PUSH TO GAGE" button manually.

Whenever fuel is being used from the auxiliary fuel tanks, fuel vapor and excess fuel from the engine-driven fuel pumps are returned to the main fuel tanks. Therefore, if the auxiliary tanks are to be used, select fuel from the main tanks for 60 minutes prior to switching to auxiliary tanks. This is necessary to provide space in the main tanks for the returned auxiliary fuel and vapor. If sufficient space is not available in the main tanks for this returned fuel, the main tanks may overflow through the vent line.

When operating from the auxiliary fuel tanks, the tanks will run dry sooner and endurance will be less than may be anticipated since part of the fuel is being diverted back to the main tanks instead of being consumed by the engines. However, main tank endurance will be increased by the returned fuel.

COLD WEATHER EQUIPMENT

WINTERIZATION KIT.

For continuous operation in temperatures consistently below 20°F, the Cessna winterization kit, available from your Cessna Dealer, should be installed to improve engine operation. The kit consists of two baffles for the front engine, one baffle for the rear engine, and crankcase breather insulation for both engines. Once installed, the crankcase breather insulation is approved for permanent use in both cold and hot weather.

Use of the cowl flaps as required is also recommended to keep the engine temperatures within the normal operating range.

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 section of the bus and lighting and general electrical circuits on the other section of the bus.

When an external power source is connected, a split bus contactor automatically removes power from the electronic section of the split bus to protect against damage to the transistors in the electronic equipment by transient voltage from the power source. Therefore, the external power source can not be used 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 on the master switch will close the battery contactor.

OIL DILUTION SYSTEM.

If your airplane is equipped with an oil dilution system and very low temperatures are anticipated, dilute the oil in each engine prior to engine shut down by energizing the oil dilution switch with the engines operating at 1500 RPM, and with the auxiliary fuel pump switches in the "LOW" position. (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 fuel.

NOTE

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

OIL DILUTION TABLE

	TEMPERATURE		
	0° F.	-10° F.	-20° F.
DILUTION TIME	30 seconds	1 minute	1 minute 30 seconds
FUEL ADDED	1 quart	2 quarts	3 quarts

Maximum sump capacity for take-off, 10 quarts.

Figure 7-1.

If the full dilution time was used, beginning with a full oil sump (10 quarts), subsequent starts and engine warm-up should be prolonged to evaporate enough of the fuel to lower the oil sump level to 10 quarts prior to take-off. Otherwise, the sumps 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 dilution operations.

STATIC PRESSURE ALTERNATE SOURCE VALVE.

A control knob to the left side of the control pedestal, under the instrument panel, operates the static pressure alternate source valve. The valve provides continued operation of the airspeed, altimeter and vertical speed indicators in the event that the static system ports or lines become obstructed. If erroneous instrument readings are suspected, due to water or ice in the static system ports or lines, the static pressure alternate

source valve should be opened by pulling out the control knob, thus venting the static system into the left wing.

A placard on the left side of the control pedestal lists the following corrections to be used for indicated airspeed and altitude when the alternate static source must be used.

ALTERNATE STATIC SOURCE CORRECTION

AIRSPEED

FLY 3 MPH FASTER THAN NORMAL.

ALTITUDE

CRUISE: FLY 270 FEET HIGHER THAN NORMAL.

APPROACH: FLY 100 FEET HIGHER THAN NORMAL.

ICE DETECTOR LIGHT

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

The ice detector light system consists of a split rocker-type switch labeled "WING DEICE LITE" located on the left switch and control panel, and a light positioned on the upper left side of the fuselage forward of the wing to illuminate the leading edge of the wing. To operate the light, place the right half of the split rocker-type switch (single rocker without de-ice system) in the up (on) position.

DE-ICING SYSTEM

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

BEFORE ENTERING THE AIRPLANE.

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

DURING ENGINE RUN-UP.

(1) Place de-icing switch (left half of split rocker-type switch labeled "WING DE-ICE LITE") in the "ON" position and check inflation and deflation cycles. The pressure indicator light labeled "DE-ICE PRESSURE" should be on during the inflation part of cycle (approximately 6 seconds). Allow approximately three minutes for the second inflation cycle to start.

NOTE

When the de-icing switch is placed in the "ON" position, the de-icing system will automatically cycle until stopped by placing the switch in the off (down) position.

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

IN FLIGHT.

(1) When ice has accumulated to approximately 1/2 inch thick on the leading edges, place de-icing switch in the "ON" position.
(2) Place de-icing system switch in the off position when ice accumulation has been removed. If ice accumulates again, repeat de-icing procedure.

AFTER LANDING.

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

OPERATING DETAILS

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

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

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

NOTE

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

DE-ICER BOOT CARE

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

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

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

PROPELLER ANTI-ICE SYSTEM

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

NORMAL OPERATION.

(1) Master Switch -- "ON."
(2) Propeller Anti-Ice Circuit Breaker -- Check in.
(3) Propeller Anti-Ice Switch -- "ON."
(4) Propeller Anti-Ice Ammeter -- Check in green arc range (7 to 12 amps).

NOTE

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

IMPORTANT

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

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

RADIO SELECTOR SWITCHES

RADIO SELECTOR SWITCH OPERATION.

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

TRANSMITTER SELECTOR SWITCH

The transmitter selector switch, labeled "COMM," 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.

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, labeled "OMNI 1-2" on some air-

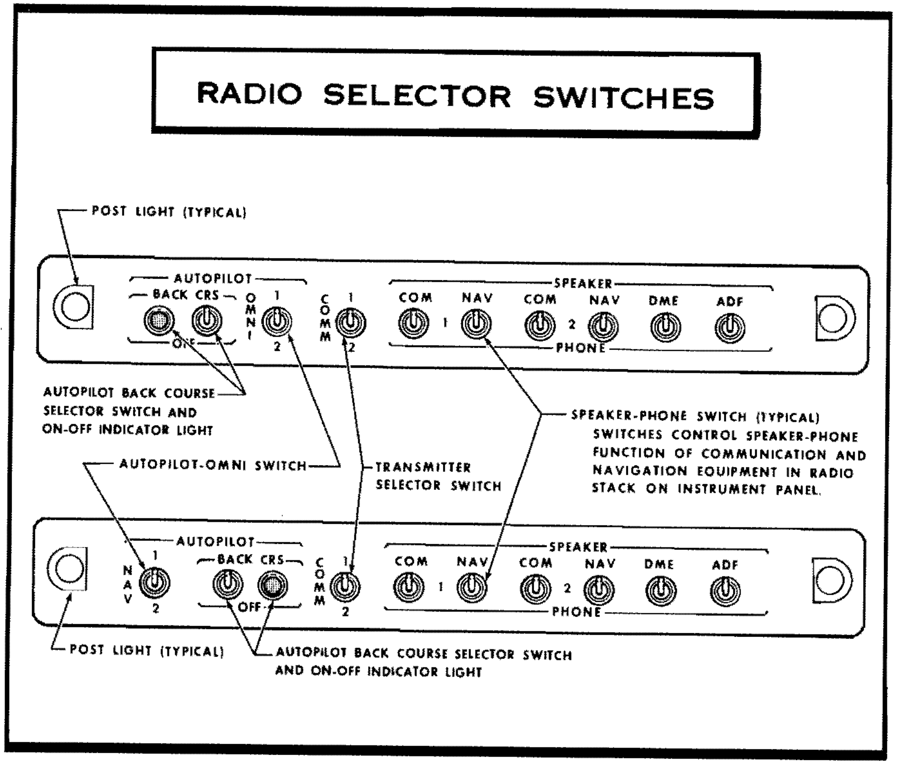


Figure 7-2.

craft and "NAV 1-2" on all others, is utilized. This switch selects the omni receiver to be used for the omni course sensing function of the autopilot. This is accomplished by placing the selector switch in the position corresponding to the receiver which is to be used.

If the Nav-O-Matic 400A is installed, an additional switch and light are used on the selector switch panel. They are labeled "AUTOPILOT, BACK CRS, OFF" and are used in conjunction with the autopilot-omni switch. In the event of a back course approach, select the omni to be used and place the back course selector switch in the "BACK CRS" position. This should activate the indicator light and cause the omni indicator to read the same as during a front course approach.

BOOM MICROPHONE

A boom microphone may be mounted near the upper left corner of the windshield. Use of the boom microphone allows radio communication without the necessity of releasing any controls to handle the normal hand microphone. The microphone keying switch is a push button located on the left side of the pilot's control wheel.

STATIC DISCHARGERS

If frequent IFR flights are planned, installation of optional static dischargers is recommended to improve radio communications, during flight through dust or various forms of precipitation (rain, freezing rain, snow or ice crystals). Under these conditions, the build up and discharge of static electricity from the trailing edges of the wings, rudders, elevator, propeller tips and radio antennas, can result in loss of usable radio signals on all communications and navigation radio equipment. Usually the ADF is first to be affected and VHF communication equipment is the last to be affected.

Installation of static dischargers reduces interference from precipitation static, but it is possible to encounter severe precipitation static conditions which might cause the loss of radio signals, even with static dischargers installed. Whenever possible, avoid known severe precipitation areas to prevent loss of dependable radio signals. If avoidance is impractical, minimize airspeed and anticipate temporary loss of radio signals while in these areas.

OXYGEN SYSTEM

Two oxygen cylinders, located side by side in the cabin ceiling, supply oxygen for the system. The left-hand cylinder is equipped with a pressure regulator which reduces cylinder pressure to an operating pressure of 70 psi. A line from the right-hand cylinder is connected to this same regulator, and oxygen is supplied from both cylinders simultaneously. A shut-off valve is included as part of the regulator assembly to control the flow from both cylinders. An oxygen cylinder filler valve is located in the right wing root and is accessible by removing the small cover plate on top of the right wing leading edge. Cylinder pressure is indicated by a pressure gage located in the overhead console.

Six oxygen outlets are provided; two in the overhead oxygen console and four in the cabin ceiling just above the side windows, one at each of the rear seating positions. 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. Storage space for six masks is provided in the overhead console and is accessible by opening the sliding cover.

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

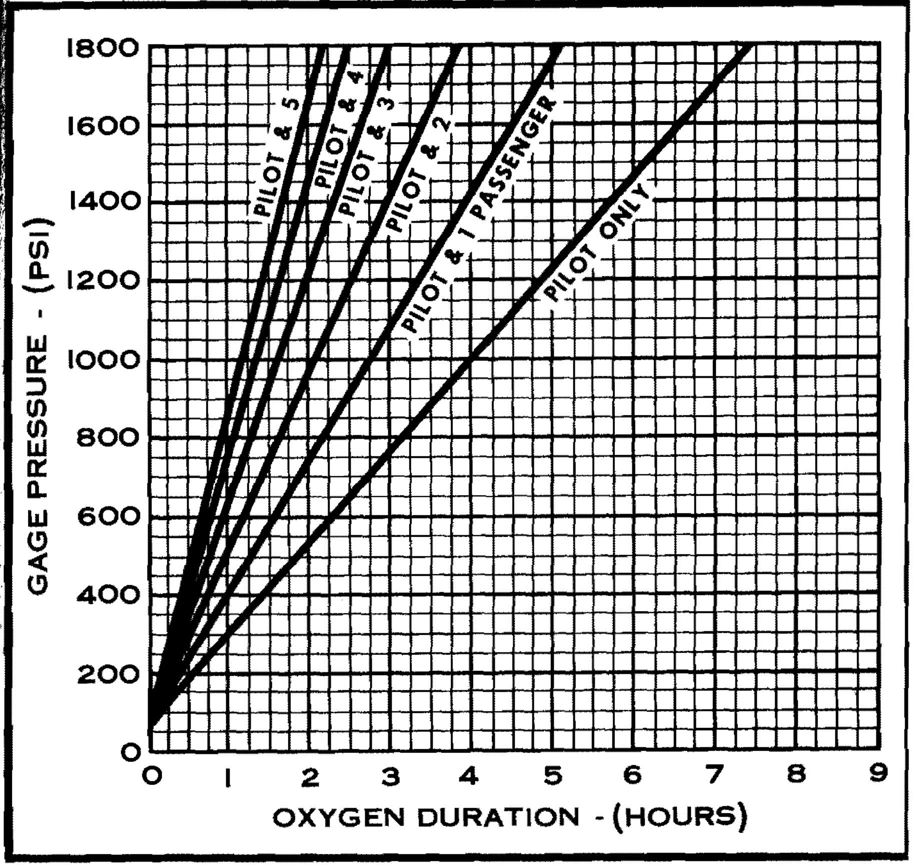
OXYGEN SYSTEM OPERATION.

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

Supplemental oxygen should be used by all occupants when cruising above 10,000 feet. As described in the Cessna booklet "Man At Altitude," it is often advisable to use oxygen at altitudes lower than 10,000 feet under conditions of night flying, fatigue, or periods of physiological or emo-

OXYGEN DURATION CHART

(44 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.

tional 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 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 passenger hoses 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. An adapter cord is furnished with the microphone-equipped mask to mate the mask microphone lead to the auxiliary microphone jack located at the left edge of the instrument panel. To connect the oxygen mask microphone, connect the mask lead to the adapter cord and plug the cord into the auxiliary microphone jack. (In aircraft that are equipped with the optional boom microphone, it will be necessary to disconnect the boom microphone lead from the auxiliary microphone jack so that the adapter cord from the oxygen mask microphone can be plugged into the jack). A switch is incorporated on the pilot's control wheel to operate the microphone.

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

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

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 5 hours and 45 minutes. The same pressure will sustain the pilot and three passengers for approximately 2 hours and 20 minutes.

NOTE

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

OXYGEN SYSTEM SERVICING.

The oxygen cylinders, when fully charged, contain 44 cubic feet of oxygen (22 cubic feet each cylinder), 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

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

from compression of the oxygen. Because of this, merely filling to 1800 psi will not result in properly filled cylinders. Fill to the pressures indicated in 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.

CARGO PACK

FLIGHT OPERATION WITH A CARGO PACK.

All flight characteristics for a cargo pack equipped airplane are identical to an airplane without a cargo pack. There is, however, a slight performance reduction with the cargo pack installed. This is as follows:

ITEM	DIFFERENTIAL
Top Speed and Cruise Speed.	3 MPH
Rate of Climb with either both engines operating or with single engine.	15 FPM
Service Ceiling with both engines operating.	300 Ft.
Service Ceiling with single engine operation.	450 Ft.

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 2600 RPM and part throttle.

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

NOTE

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

FLIGHT CONDITION	POWER SETTING	EGT	REMARKS
TAKE-OFF AND CLIMB	Full throttle and 2800 RPM	150° to 200° richer than REFERENCE EGT	Use FULL RICH mixture below 3000"
NORMAL CLIMB	24" MP and 2600 RPM	125° richer than REFERENCE EGT	Above 10,000' use BEST POWER mixture
MAXIMUM CRUISE SPEED	75% or less	Peak minus 100° F (ENRICHEN)	BEST POWER mixture, 1 MPH TAS increase and 8% range loss from NORMAL LEAN
NORMAL CRUISE	75% or less	Peak minus 50° F (ENRICHEN)	NORMAL LEAN mixture-Owner's Manual and Power Computer performance

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

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.

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.

ELECTRIC ELEVATOR TRIM SYSTEM

An electric trim system is available to facilitate trimming the airplane. The system is controlled by a slide-type trim switch on the left side of the pilot's control wheel and a disengage switch located above the elevator trim control wheel. Pushing the trim switch to the forward position, labeled "DN," moves the elevator trim tab in the "nose down" direction; conversely, pulling the switch aft to the "UP" position moves the tab in the "nose up" direction. When the switch is released, it automatically returns to the center off position, and elevator trim tab motion stops. The disengage switch, when in the "DISENGAGE" position, removes all electrical power from the system by de-energizing the motor and clutch circuits.

A servo unit, (which includes a motor and chain-driven, solenoid operated clutch) in the right tail boom, actuates the trim tab to the selected position. When the clutch is not energized (trim switch off) the electric portion of the trim system freewheels so that manual operation is not affected. It also freewheels while the wing flaps - elevator tab interconnect system is operating. The electric trim system can be overpowered at any time by manually rotating the trim wheel, thus overriding the servo that drives the electric trim tab.

NORMAL OPERATION.

To operate the electric elevator trim system, proceed as follows:

(1) Master Switch -- "ON."
(2) Elevator Trim Disengage Switch -- "ON" (aft position).
(3) Trim Switch -- Actuate as desired.
(4) Elevator Trim Position Indicator -- Check.

NOTE

To check the operation of the disengage switch, actuate the elevator trim switch with the disengage switch in the disengage position. Observe that the manual trim wheel and indicator do not rotate when the elevator trim switch is activated.

EMERGENCY OPERATION.

(1) Elevator Trim Disengage Switch -- "DISENGAGE," (forward position).
(2) Manual Trim -- As Required.

AUTOMATIC PROPELLER SYNCHRONIZER

An optional propeller synchronizer system is available to automatically match the propeller RPM of both engines. This provides proper propeller synchronization and a significant reduction in cabin noise level. The system is comprised of a synchronizer "ON-OFF" control switch mounted on top of the engine control pedestal, modified propeller governors, magnetic speed pick ups for each engine, flexible governor shafts and other associated mechanical components.

When the synchronizer switch is turned "ON," the propeller RPM of the "Slave" engine will automatically adjust to changes in RPM of the "Master" engine over a limited range. This limiting feature prevents the slave engine from losing more than 75 to 100 RPM in the event the master engine is feathered with the synchronizer "ON". Placing the synchronizer switch in the "OFF" position will automatically center a synchronizer speed adjustment actuator so that the synchronizer will function normally when the system is again turned "ON." Optimum operation will be obtained by first manually synchronizing propeller RPM, with reference to the panel mounted synchroscope (standard equipment) and then placing the synchronizer switch "ON".

NOTE

The propeller synchronizer control switch should be "OFF" during take-off, landing and single engine operation.

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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 Avionics as herein defined) and service parts therefor, and for a period of one (1) year after such delivery in the case of Cessna-Crafted Avionics (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, except import duties, sales or use taxes, if any, on replacements. (Locations of such dealers will be furnished by Cessna on request.)

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

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

SERVICING REQUIREMENTS

L:

AVIATION GRADE -- 100/130 MINIMUM GRADE
CAPACITY EACH MAIN TANK -- 46.4 GALLONS
CAPACITY EACH AUXILIARY TANK -- 19.0 GALLONS

NGINE OIL:

AVIATION GRADE -- SAE 50 ABOVE 40°F.
SAE 10W30 OR SAE 30 BELOW 40°F.
(MULTI-VISCOSITY OIL WITH A RANGE OF SAE 10W30 IS RECOMMENDED FOR IMPROVED STARTING IN COLD WEATHER. DETERGENT OR DISPERSANT OIL, CONFORMING TO CONTINENTAL MOTORS SPECIFICATION MHS-24A, MUST BE USED.)

CAPACITY OF ENGINE SUMP -- 10 QUARTS
(DO NOT OPERATE ON LESS THAN 7 QUARTS FOR EACH ENGINE. TO MINIMIZE LOSS OF OIL THROUGH BREATHER FILL TO 8 QUART LEVEL FOR NORMAL FLIGHTS OF LESS THAN 3 HOURS. FOR EXTENDED FLIGHT, FILL TO 10 QUARTS. IF OPTIONAL OIL FILTERS ARE INSTALLED, ONE ADDITIONAL QUART IS REQUIRED FOR EACH ENGINE WHEN FILTER ELEMENTS ARE CHANGED.)

DRAULIC FLUID:

MIL-H-5606 HYDRAULIC FLUID.

XYGEN:

AVIATOR'S BREATHING OXYGEN -- SPEC. NO. MIL-O-27210
MAXIMUM PRESSURE -- 1800 PSI AT 70° F.
(CYLINDER TEMPERATURE STABILIZED AFTER FILLING)
REFER TO PAGE 7-16 FOR FILLING PRESSURES.

IRE PRESSURE:

MAIN WHEELS -- 55 PSI ON 6.00 x 6, 8 PLY RATED TIRES
64 PSI ON 18 x 5.5, 8 PLY RATED TIRES (OPT)
NOSE WHEEL -- 42 PSI ON 15 x 6.00 - 6, 4 PLY RATED TIRE

NOSE GEAR SHOCK STRUT:

KEEP FILLED WITH HYDRAULIC FLUID AND INFLATED WITH AIR TO 35 PSI.

Cessna®

SALES AND SERVICE

"TAKE YOUR CESSNA HOME
FOR SERVICE AT THE SIGN
OF THE CESSNA SHIELD".

CESSNA AIRCRAFT COMPANY

WICHITA, KANSAS