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OWNER'S MANUAL

PERFORMANCE - SPECIFICATIONS

WITH NO DISPERSAL EQUIPMENT INSTALLED

AGWAGON "A"

	ENGINE AND PROPELLER CONFIGURATIONS		
	230 HP FIXED PITCH	230 HP CONSTANT SPEED	300 HP CONSTANT SPEED
GROSS WEIGHT	3300 lbs	3300 lbs	3300 lbs
SPEED, BEST POWER MIXTURE:			
Top Speed at Sea Level	119 mph at rated 2600 rpm	138 mph at rated power	151 mph at max. cont. power
Cruise Speed	70% power at 5000 ft 116 mph	75% power at 6500 ft 128 mph	75% power at 6500 ft 141 mph
RANGE, NORMAL LEAN MIXTURE:			
Cruise. 36.5 Gallons, No Reserve	70% power at 5000 ft 325 mi 2.8 hrs 116 mph	75% power at 6500 ft 335 mi 2.6 hrs 128 mph	75% power at 6500 ft 320 mi 2.3 hrs 140 mph
Cruise. 49 Gallons, No Reserve	--- --- ---	--- --- ---	435 mi 3.1 hrs 140 mph
RATE OF CLIMB AT SEA LEVEL	710 fpm	755 fpm	940 fpm
SERVICE CEILING	13,000 ft	13,700 ft	15,700 ft
TAKE-OFF:			
Ground Run	845 ft	805 ft	610 ft
Total Distance Over 50-Foot Obstacle.	1365 ft	1320 ft	970 ft
LANDING:			
Ground Roll	420 ft	420 ft	420 ft
Total Distance Over 50-Foot Obstacle.	1265 ft	1265 ft	1265 ft
EMPTY WEIGHT (Approximate)	1755 lbs	1775 lbs	1805 lbs
WING LOADING: Pounds/Sq Foot	16.3	16.3	16.3
POWER LOADING: Pounds/HP	14.3	14.3	11.0
FUEL CAPACITY: Total (Standard)	37 gal.	37 gal.	37 gal.
Total (Optional)	---	---	56 gal.
OIL CAPACITY: Total	12 qts	12 qts	12 qts
PROPELLER (Diameter and Type)	90 inches 2-bladed, fixed pitch, (standard)	88 inches 2-bladed constant speed, (optional)	86 inches 2-bladed, constant speed, (standard)
ENGINE (Standard): Continental Carburetor Type Engine 230 rated BHP at 2600 RPM	O-470-R	O-470-R	
ENGINE (Optional): Continental Fuel Injection Engine 300 rated BHP at 2800 (5-Minute Take-Off Rating) 285 rated BHP at 2700 RPM (Maximum Continuous Rating)			IO-520-D
HOPPER CAPACITY	200 gal.	200 gal.	200 gal.

This manual covers operation of the Agwagon "A" which is certificated as Model 188/A188 under FAA Type Certificate No. A9CE.

D726-13-RAND-500-5/69

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

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A current Cessna Dealer Directory accompanies your new airplane. The Directory is revised frequently, and a current copy can be obtained from your Cessna Dealer.

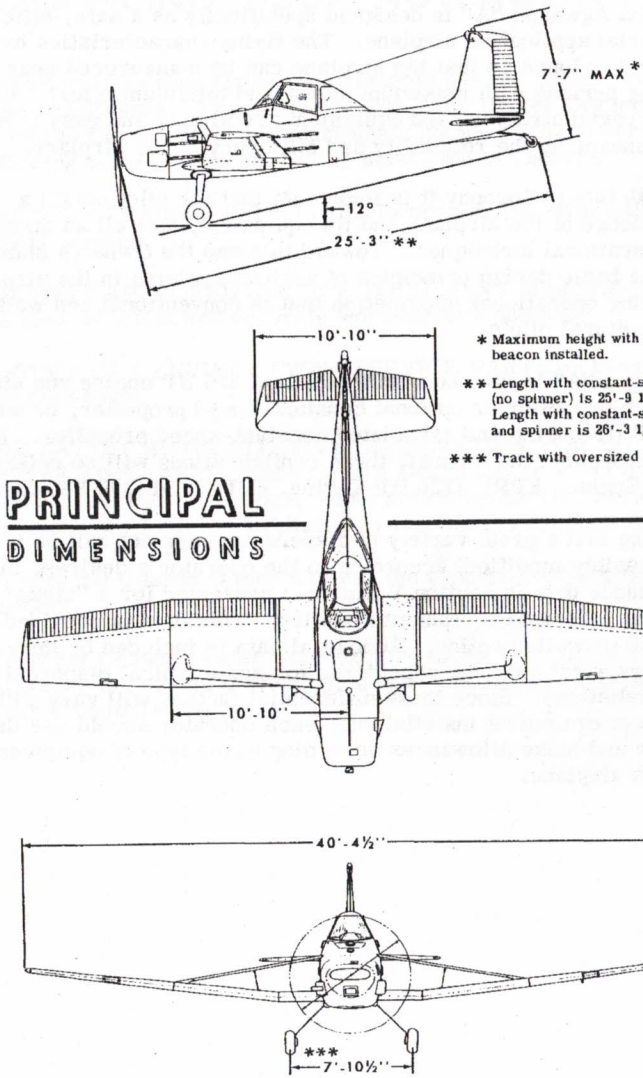
INTRODUCTION . . . . .

The Cessna Agwagon "A" is designed specifically as a safe, efficient, easy-to-fly aerial application airplane. The flying characteristics have been carefully developed so that the airplane can be maneuvered near the ground for long periods with maximum safety and minimum effort. In addition, the rugged structure and equipment are simple and easy to maintain, further enhancing the reliability and efficiency of the airplane.

In line with this philosophy it is important that the pilot obtain a thorough knowledge of the airplane and its equipment, as well as an understanding of operational techniques. Toward this end the Owner's Manual emphasizes the basic design principles of various systems in the airplane, while minimizing operational information that is conventional and well known to agricultural pilots.

The Agwagon "A" is offered with a standard 230 HP engine and standard fixed-pitch propeller or optional constant-speed propeller, or with an optional 300 HP engine and associated constant-speed propeller. For convenience throughout the manual, these configurations will be referred to as (230 HP Engine, FPP), (230 HP Engine, CSP), and (300 HP Engine).

Recognizing that a great variety of dispersal equipment will be installed (and possibly modified) according to the operator's desires, most of the performance data in Section V has been presented for a "clean" airplane without dispersal equipment installed. This data is provided for each engine and propeller option. Additional data is included to show differential factors which must be considered for some typical dispersal equipment installations. Since these differential factors will vary with different types of equipment installations, each operator should use the data as a guide and make allowances according to the type of equipment installed on his airplane.



PRINCIPAL DIMENSIONS

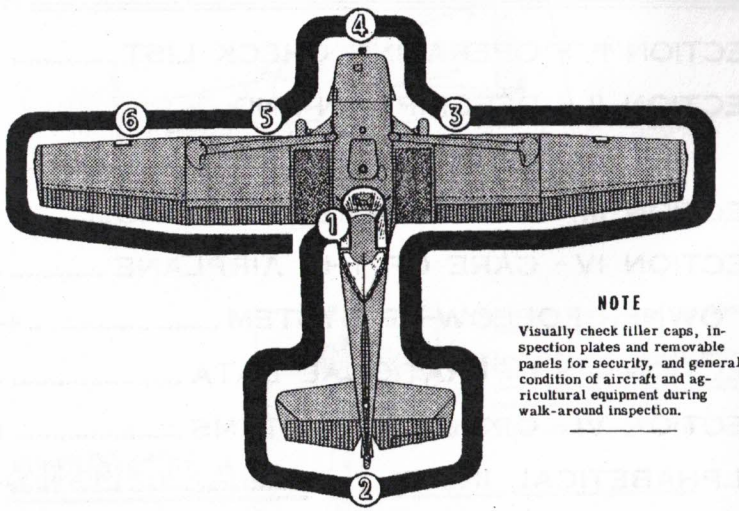
* Maximum height with optional flashing beacon installed.

** Length with constant-speed propeller (no spinner) is 25'-9 1/2"; Length with constant-speed propeller and spinner is 26'-3 1/2".

*** Track with oversized tires is 7'-11 1/2".

TABLE OF CONTENTS

This manual describes the operation and performance of the Agwagon "A" with the standard 230 HP engine and the optional 300 HP engine. Equipment described as "Optional" indicates the equipment is optional on airplanes with the standard 230 HP engine. Some of this equipment is standard on airplanes equipped with the optional 300 HP engine.



NOTE

Visually check filler caps, inspection plates and removable panels for security, and general condition of aircraft and agricultural equipment during walk-around inspection.

EXTERIOR INSPECTION

(1) a. Turn master switch "ON" and check fuel quantity indicator(s), then turn master switch off.
b. Check magneto switches "OFF."
c. Check fuel shut-off valve knob "ON" (full in).
d. Same as 4b, if optional wing tank fuel system is installed.
e. Release control lock, if installed (opt).
f. Check all items in cockpit secured, control cables clear of obstructions.

(2) a. Remove rudder gust lock, if installed.
b. Disconnect tail tie-down.
c. Check tail wheel tire for proper inflation.
d. Check static source holes on each side of tailcone for stoppage.

(3) a. Disconnect wing tie-down.
b. Check main wheel tire for proper inflation.
c. Check wing strut outboard fairings for damage and security. (Never fly with fairings removed as adverse stall characteristics will result.)
d. Check fuel vent for stoppage if aircraft is equipped with optional wing fuel tank system.

(4) a. Check propeller for nicks, oil leaks, and security.
b. On first flight of day and after each refueling, pull out strainer drain knob for about four seconds, to clear fuel strainer of possible water and sediment. Check valve closed after draining.
c. Check oil level. Do not operate on less than 9 quarts. Fill for extended flights. Check oil filler cap secure.
d. Check fuel vent for stoppage (on aircraft with standard fuselage fuel tank system).

(5) Same as (3).

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

Figure 1-1.

Section I

OPERATING CHECK LIST

Section I lists, in Pilot's Check List form, the steps necessary to operate the airplane. For a more comprehensive description of operating details and the airplane's equipment, systems, and controls, refer to Section II. All airspeeds given in Sections I, II and III are indicated airspeeds unless otherwise noted.

BEFORE STARTING THE ENGINE.

(1) Exterior Inspection -- Check.
(2) Seat and Seat Belts -- Adjust and lock.
(3) Brakes -- Test and set.
(4) Fuel Shutoff Valve -- "ON" (knob pushed full in).
(5) Radio and Electrical Equipment -- Off.

STARTING THE 230 HP ENGINE.

(1) Mixture -- Rich.
(2) Carburetor Heat -- Cold.
(3) Propeller (if applicable) -- High RPM.
(4) Master Switch -- "ON."
(5) Magneto Switches -- "ON."
(6) Primer -- As required in cold weather.
(7) Throttle -- Cracked (after pumping twice).
(8) Starter -- Engage.

STARTING THE 300 HP ENGINE.

(1) Mixture -- Rich.
(2) Propeller -- High RPM.
(3) Throttle -- Closed.

(4) Master Switch -- "ON."
(5) Magneto Switches -- "ON."
(6) Auxiliary Fuel Pump Switch -- "START."
(7) Starter -- Engage.
(8) Very slowly advance throttle until engine starts.
(9) Auxiliary Fuel Pump Switch -- "OFF."

BEFORE TAKE-OFF.

(1) Flight Controls -- Check.
(2) Elevator Trim Tab -- Set.
(3) Canopy Doors -- Closed.
(4) Throttle Setting -- 1700 RPM.
(5) Engine Instruments -- Check.
(6) Carburetor Heat (230 HP Engine) -- Check operation.
(7) Magnetos -- Check (50 RPM maximum differential between magnetos).
(8) Propeller (if applicable) -- Cycle from high to low RPM; return to high RPM (full in).
(9) Wing Flaps -- 0 to 20°.

TAKE-OFF.

NORMAL TAKE-OFF.

(1) Wing Flaps -- 10°.
(2) Power -- Full throttle and:
2600 RPM for 230 HP engine,
2850 RPM for 300 HP engine.
(3) Elevator Control -- Lift tail wheel and assume level flight attitude for best acceleration.
(4) Climb Speed -- 70 to 80 MPH.
(5) Wing Flaps -- Retract.

RESTRICTED CATEGORY TAKE-OFF (Dispersal Equipment Installed).

(1) Wing Flaps -- 10°.
(2) Brakes -- Apply.
(3) Power -- Full throttle and:
2600 RPM for 230 HP engine,
2850 RPM for 300 HP engine.
(4) Mixture -- Lean for field elevation (300 HP engine).

(5) Brakes -- Release.
(6) Elevator Control -- Lift tail wheel and assume level flight attitude for best acceleration.
(7) Climb Speed -- 75 to 85 MPH until all obstacles are cleared.
(8) Wing Flaps -- Retract after obstacles are cleared.

CLIMB.

NORMAL CLIMB (Without Dispersal Equipment).

(1) Airspeed -- 85 to 95 MPH.
(2) Power -- 23 inches and 2450 RPM for 230 HP engine or 25 inches and 2550 RPM for 300 HP engine.
(3) Mixture -- Lean for altitude.

MAXIMUM PERFORMANCE CLIMB (Without Dispersal Equipment).

(1) Airspeed -- 88 MPH.
(2) Power -- Full throttle and:
2600 RPM for 230 HP engine,
2700 RPM for 300 HP engine.
(3) Mixture -- Lean for altitude.

NOTE

The climb speeds listed above in "Normal Climb" and "Maximum Performance Climb" check lists will decrease approximately 13 MPH with dispersal equipment installed.

BEFORE LANDING.

(1) Mixture -- Rich.
(2) Carburetor Heat (230 HP Engine) -- Apply before closing throttle.
(3) Propeller (if applicable) -- High RPM.
(4) Airspeed -- 80 to 90 MPH (flaps up).
(5) Wing Flaps -- As desired.
(6) Airspeed -- 75 to 85 MPH (flaps down).

NOTE

Increase the above listed airspeeds by 5 MPH if landing at maximum RESTRICTED CATEGORY weight.

AFTER LANDING.

(1) Wing Flaps -- Up.
(2) Carburetor Heat (if applicable) -- Cold.

SECURE AIRCRAFT.

(1) Mixture-- Idle Cut-Off (pulled full out).
(2) All Switches-- Off.
(3) Brakes-- Set.
(4) Control Lock-- Attached.

Section II

DESCRIPTION AND OPERATING DETAILS

The following paragraphs describe the systems and equipment in the airplane. Operating procedures that are not obvious are described in detail.

ENGINE CONTROLS.

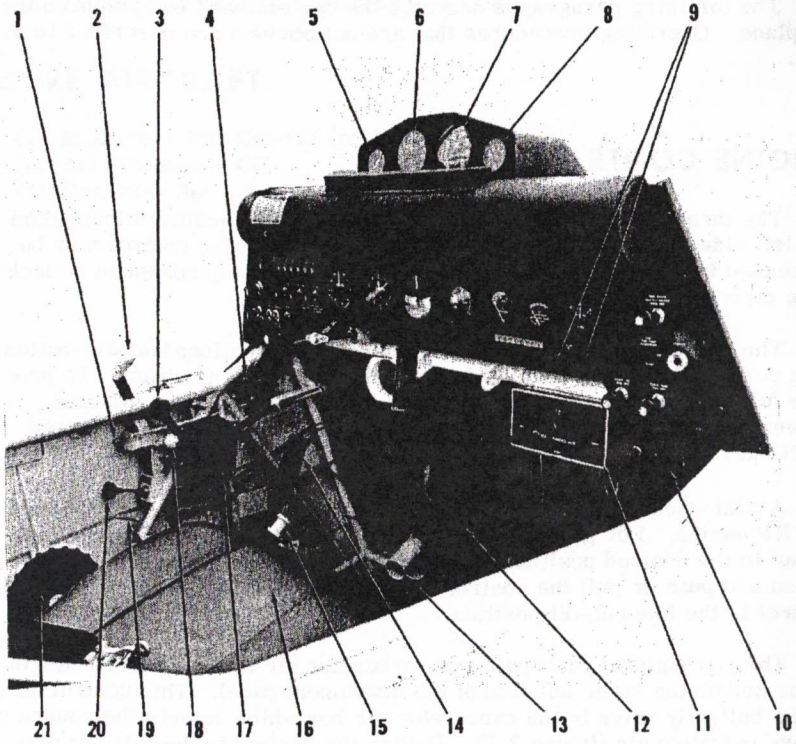
The throttle is the outboard lever in the control quadrant located on the left side of the cockpit (figure 2-1). Friction on the control may be increased by rotating the knurled knob on the control quadrant in a clockwise direction.

The mixture control (230 HP Engine) is a conventional double-button type push-pull control, located just aft of the throttle quadrant. To provide full rich mixture, push the control full in. To lean the mixture, squeeze the two buttons together and pull the control out to the desired position.

A push-pull mixture control with a vernier feature is used for the 300 HP engine. For precise mixture adjustments, screw the control in or out to the desired position. For larger adjustments, depress the thumb button and push or pull the control as desired. The full-out position of the control is the idle cut-off position.

The conventional push-pull type carburetor air control (230 HP Engine) is located on the lower left side of the instrument panel. This control actuates a butterfly valve in the carburetor air box which selects the source of engine induction air (figure 2-2). Pulling the control to the full-out position cuts off the flow of filtered ram air to the carburetor and causes nonfiltered, heated air to be ducted to the carburetor. The carburetor air control should be in the full-in position for normal operation, except during power-off or low-power descents. In atmospheric conditions that are conducive to carburetor icing, select the minimum amount of carburetor heat for normal operation that will keep ice cleared from the carburetor.

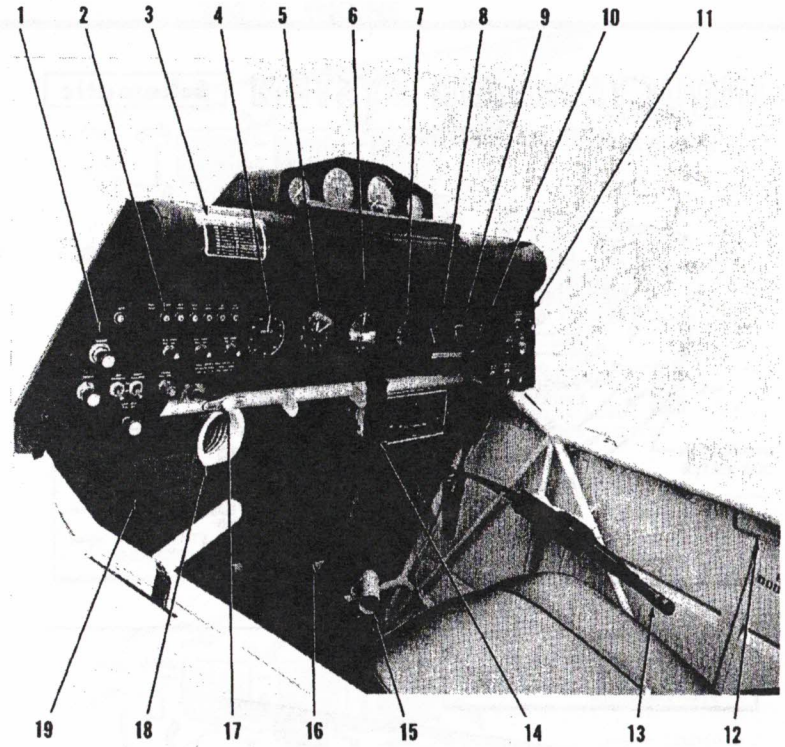
COCKPIT CONTROLS



1. Spray Valve Control Handle Adjustment Knob
2. Spray Valve Control Handle
3. Throttle
4. Ash Tray
5. Spray Pressure Gage
6. Manifold Pressure Gage (230 HP Engine, CSP)
   Manifold Pressure Gage/Fuel Flow Indicator (300 HP Engine)
7. Tachometer
8. Fuel Quantity Indicator
9. Instrument Panel and Radio Dial Light Control Knobs
10. Microphone
11. Radio
12. Left Rudder Pedal
13. Left Cockpit Heat Outlet
14. Hopper Control and Dump Handle
15. Wing Flap Control Handle
16. Pilot's Seat
17. Friction Control Knob
18. Propeller Control (CSP Engines Only)
19. Hopper Control Crank
20. Engine Mixture Control
21. Elevator Trim Tab Control Wheel

Figure

and INSTRUMENT PANEL



1. Left Switch and Control Panel
2. Circuit Breakers
3. Liquid Measure Conversion Table
4. Airspeed Indicator
5. Altimeter
6. Turn-and-Bank Indicator (Opt.)
   Turn Coordinator (Opt.)
7. Cylinder Head Temperature Gage (Opt.)
8. Oil Pressure Gage
9. Oil Temperature Gage
10. Ammeter
11. Right Switch and Control Panel
12. Emergency Cockpit Door Release Handle (One on Each Side of Cockpit.)
13. Fan Brake Control
14. Control Stick
15. Right Cockpit Heat Outlet
16. Right Rudder Pedal
17. Parking Brake Handle
18. Fresh Air Outlet
19. Hopper Quantity Indicator Markings

2-1.

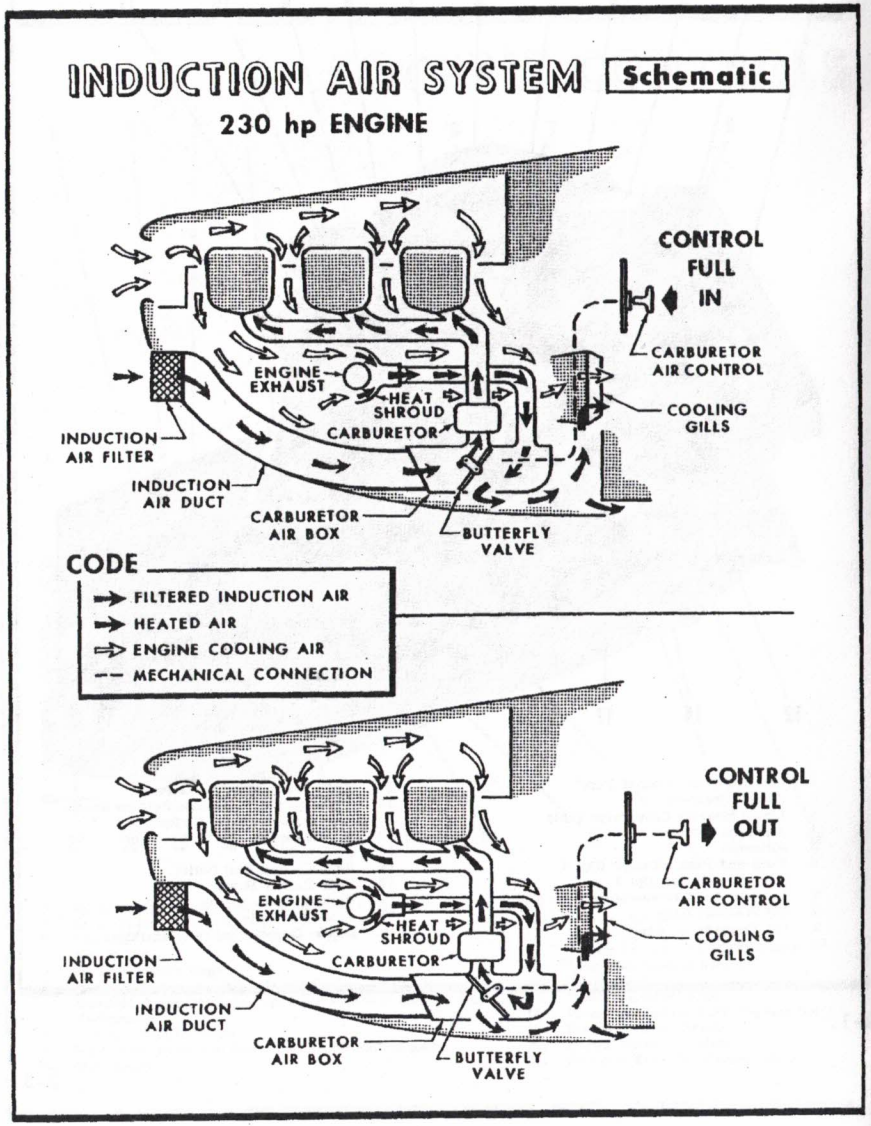


Figure 2-2.

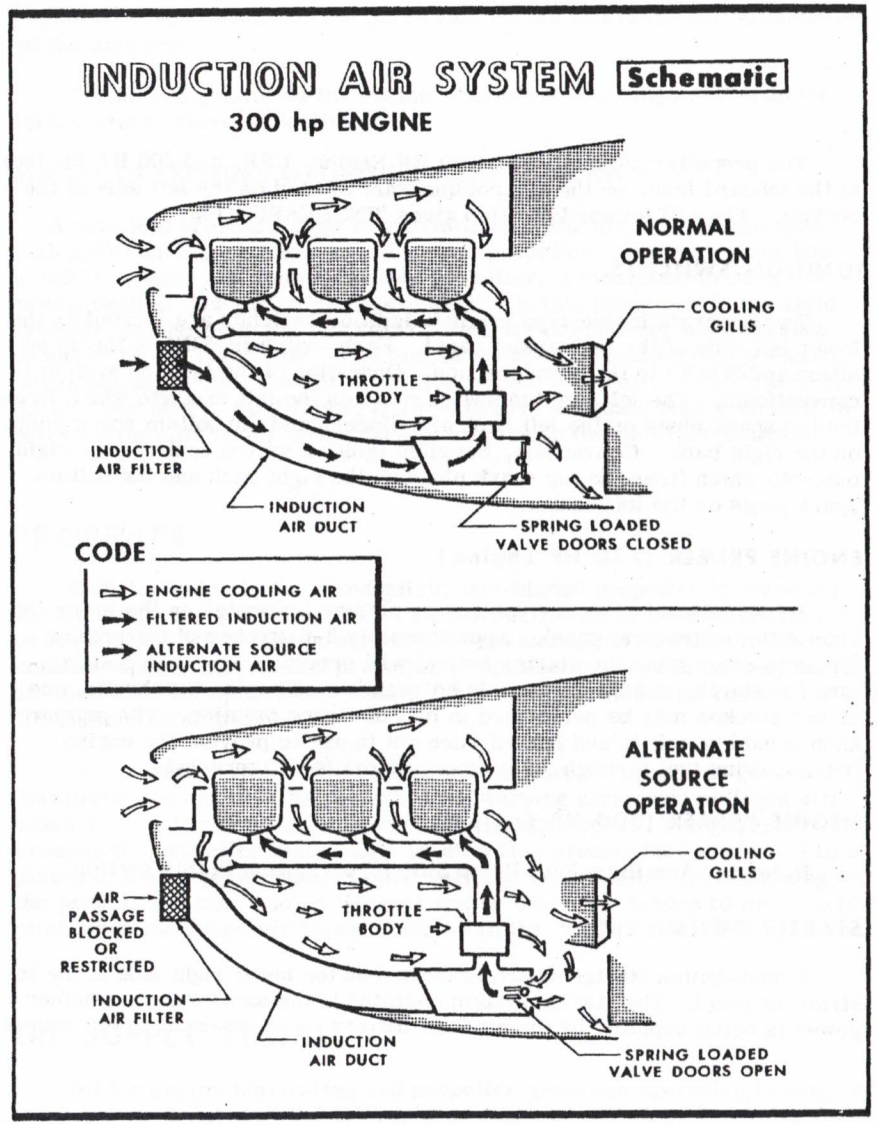


Figure 2-3.

The propeller control lever (230 HP Engine, CSP, and 300 HP Engine) is the inboard lever on the control quadrant located on the left side of the cockpit. The full forward position gives "INCREASE RPM."

IGNITION SWITCHES.

Two separate toggle-type magneto ignition switches are located on the lower left side of the instrument panel. Each switch is "ON" in the up position and "OFF" in the down position. Operation of the ignition system is conventional. The left ignition switch controls the left magneto which fires the top spark plugs on the left bank of cylinders and the bottom spark plugs on the right bank. Conversely, the right ignition switch controls the right magneto which fires the top spark plugs on the right bank and the bottom spark plugs on the left bank.

ENGINE PRIMER (230 HP Engine.)

A conventional plunger-type engine primer is located on the lower left side of the instrument panel. Approximately 2-6 strokes of the primer (prior to depressing the starter button) will provide the proper fuel mixture for starting a cold engine. In hot weather, pumping the throttle one or two strokes may be performed in lieu of engine priming. The primer knob should be full in and locked when not in use to prevent the engine from drawing fuel through the primer system (see figure 2-5).

ENGINE PRIMER (300 HP Engine).

Refer to "Auxiliary Fuel Pump Switch" paragraph in this section.

STARTER BUTTON.

A push-button starter switch is located on the lower right side of the instrument panel. The starter system operates in the same manner whether power is being supplied by the aircraft battery or an external power source.

ENGINE INSTRUMENTS.

TACHOMETER.

A mechanically-driven recording tachometer is located in the instrument console on the instrument panel deck. The recorder is set to record

engine time accurately for the particular engine and propeller combination on the airplane.

For an explanation of the engine instrument markings shown on the tachometers, refer to Section III.

MANIFOLD PRESSURE GAGE/FUEL FLOW INDICATOR.

A manifold pressure gage is provided when the airplane is equipped with a 230 HP engine and constant-speed propeller. If the airplane has a 300 HP engine and constant-speed propeller, a combination manifold pressure/fuel flow indicator is provided. On this instrument, manifold pressure is shown on the left side of the instrument face, and fuel flow is shown on the right side. The fuel flow indicator senses fuel pressure developed at the fuel distribution valve (figure 2-6), and is calibrated in gallons per hour. Fuel flows required to give adequate engine cooling in full throttle climbs are shown on a placard near the fuel flow indicator.

PROPELLER.

A 90-inch aluminum, fixed-pitch, two-bladed propeller is standard equipment on the 230 HP engine. This propeller has a relatively flat pitch to permit high RPM (and power) at take-off and climb speed. An 88-inch constant speed, two-bladed propeller is optional on the 230 HP engine. An 86-inch constant speed, two-bladed propeller is provided as part of the 300 HP engine installation.

On aircraft having constant speed propellers, a propeller governor maintains a selected RPM regardless of varying airspeeds or flight attitudes when sufficient engine power is being developed. The governor increases the propeller blade angle by directing pressurized engine oil to a piston in the propeller hub. Conversely the aerodynamic forces acting on the propeller blades and an internal spring cause the blades to move to low pitch when the propeller lever is moved to the "INCREASE RPM" position.

OIL SUPPLY SYSTEM.

Oil for engine lubrication and propeller governor operation is supplied from a sump located at the bottom of the engine. Oil is picked up by the engine-driven pump, and is pumped through the engine oil filter screen (or

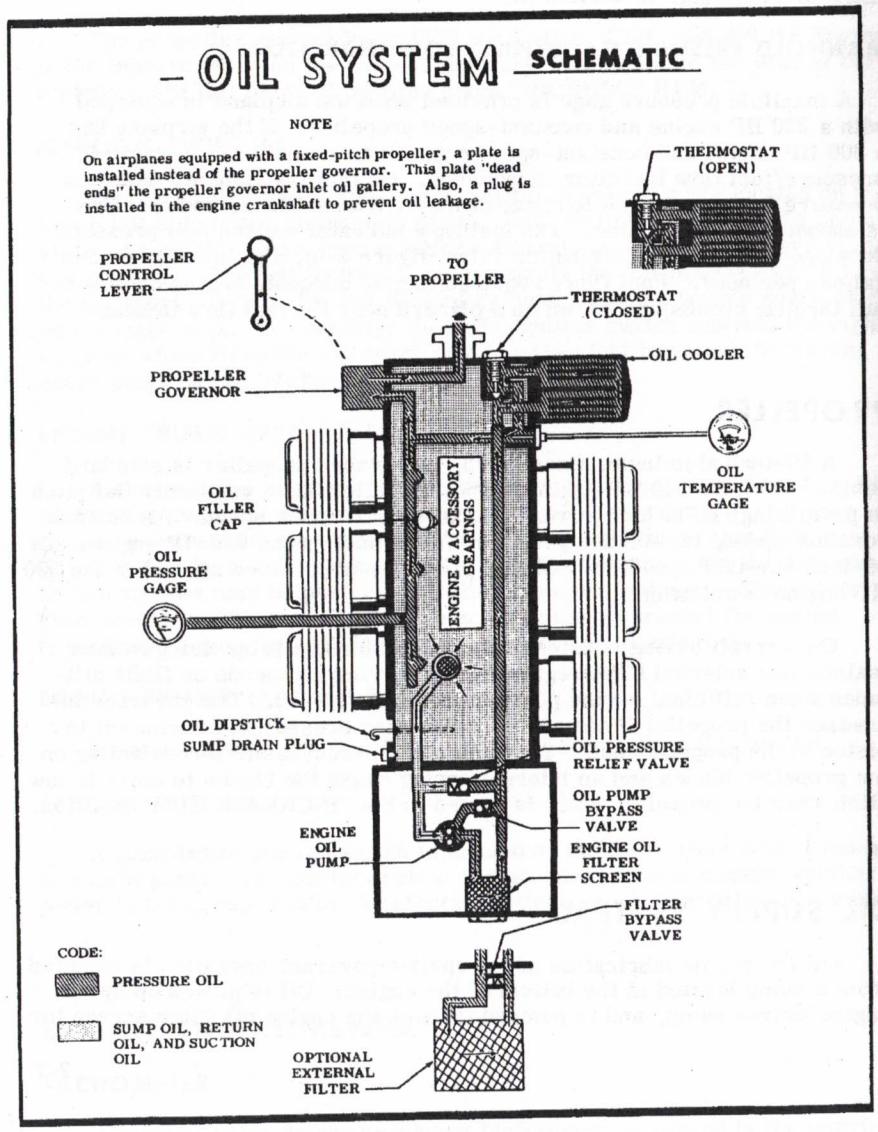


Figure 2-4.

the optional oil filter) through the right oil gallery to the thermostat. When the temperature of the oil is below 150°, the thermostat causes the oil to bypass the oil cooler. As the temperature rises above 150°, the thermostat closes, causing the oil to be forced through the oil cooler. From the thermostat and oil cooler, the oil is directed to various engine lubrication passages and the propeller governor and back to the sump. The capacity of the engine oil sump is 12 quarts. One additional quart is required if the optional oil filter is installed. However, the oil level should never be higher than the 12-quart mark on the dipstick. Refer to inside back cover for service information.

FUEL SYSTEM.

Fuel from the standard fuselage fuel tank system is supplied to the engine from a 37-gallon aluminum tank located just aft of the engine compartment firewall. The tank is enclosed in a plastic vapor barrier bag equipped with three drain tubes equally spaced across the bottom of the fuel tank. The tank is vented from the filler neck through a vent line routed to a point under the left side of the fuselage ahead of the landing gear attach structure. In addition, small bleed holes are located in the internal portion of the fuel filler cap to provide tank venting if the main fuel vent becomes obstructed.

Fuel flows from the tank to a shutoff valve beneath the tank. When the shutoff valve is open and the mixture control is in the rich position with the engine running, fuel flows by gravity through the fuel strainer to the carburetor on 230 HP airplanes. On 300 HP airplanes, fuel is drawn through a check valve in the auxiliary fuel pump, through the fuel strainer to the engine-driven fuel pump, where it is pumped into the fuel metering unit. In the metering unit, fuel is regulated by the setting of the throttle and mixture controls. The metered fuel is pumped through the fuel distribution valve to the injection nozzles. The remainder of the unmetered fuel is returned to the engine-driven fuel pump where excess fuel and vapor are directed through a return line to the top of the fuel tank. For operation of the auxiliary fuel pump, refer to the "Auxiliary Fuel Pump Switch" paragraph in this section.

An optional wing tank fuel system is available for aircraft having the 300 HP engine. Refer to Section VI for discussion of this system.

FUEL SHUTOFF VALVE KNOB (Reference Figures 2-5 and 2-6).

The double-button fuel shutoff valve knob, located on the right side

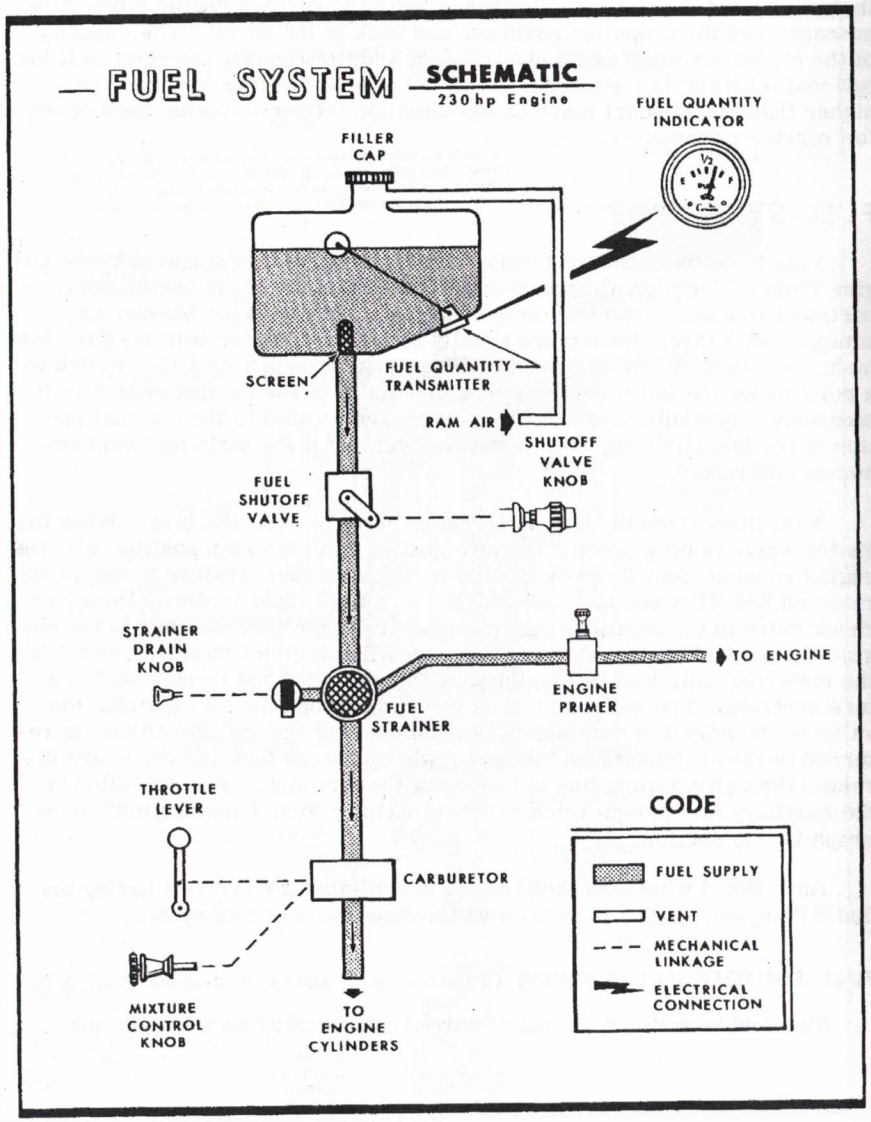


Figure 2-5.

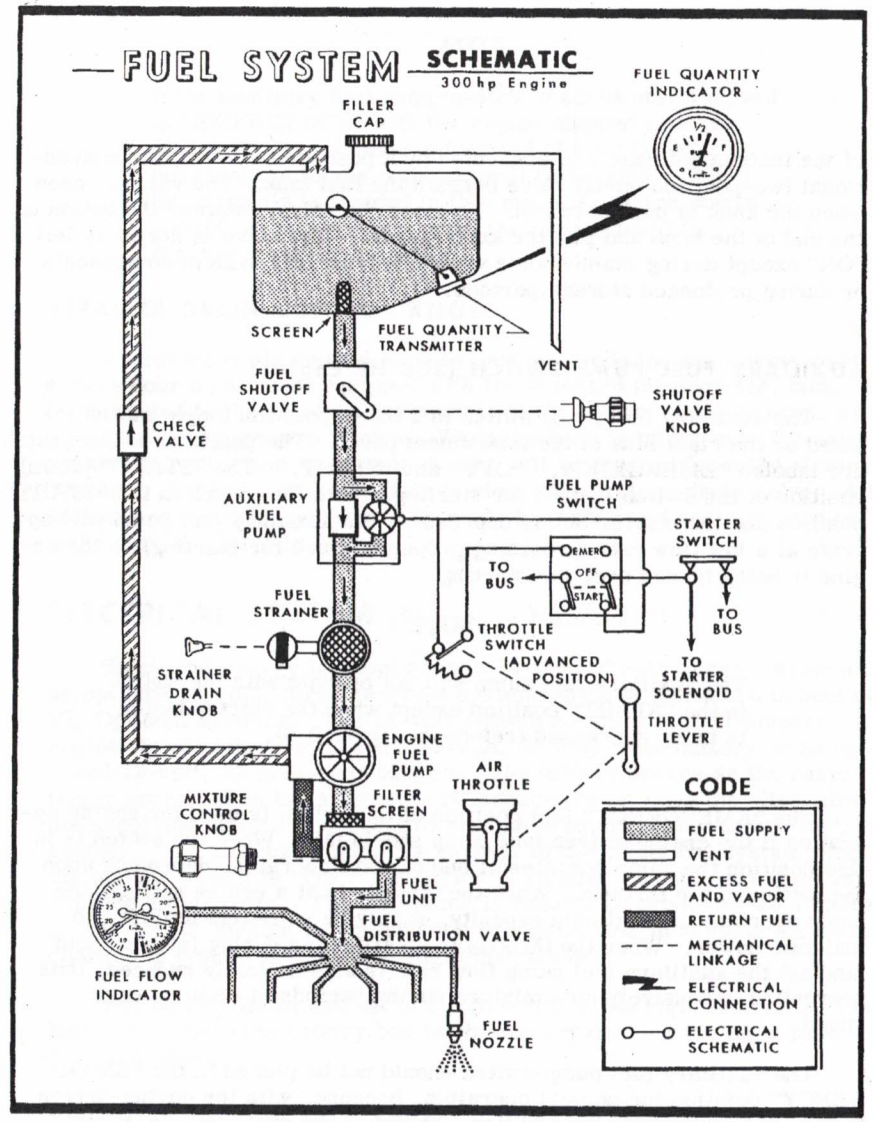


Figure 2-6.

of the instrument panel, is connected by a push-pull control to a conventional two-position on-off valve beneath the fuel tank. The valve is open when the knob is pushed full in. To close the valve, depress the button on the end of the knob and pull the knob full out. The valve is normally left "ON" except during maintenance work involving fuel system components or during prolonged storage periods.

AUXILIARY FUEL PUMP SWITCH (300 HP Engine).

The auxiliary fuel pump switch is a three-position toggle switch located on the right side of the instrument panel. The positions of the switch are labeled "EMERGENCY," "OFF" and "START." The "START" (down) position of the switch is used for starting. With the switch in the "START" position and the starter button depressed, the auxiliary fuel pump will operate at a low flow rate (providing proper mixture for starting) as the engine is being turned over for starting.

NOTE

The auxiliary fuel pump will not operate with the switch in the "START" position except when the starter button is being depressed (reference figure 2-6).

The "EMERGENCY" (up) position of the switch is used for engine operation if the engine-driven fuel pump should fail. When the switch is in this position the pump operates at one of two flow rates, depending upon the setting of the throttle. When the throttle is at a cruise setting, the pump operates at maximum capacity, supplying sufficient fuel flow to maintain power. When the throttle is retarded (as during let-down and landing) the auxiliary fuel pump flow rate is automatically reduced, thus preventing excessively rich mixture during periods of reduced engine speed.

The auxiliary fuel pump switch should not be placed in the "EMERGENCY" position for normal operation, because, with the engine-driven fuel pump functioning, the additional output of the auxiliary fuel pump will provide a fuel/air ratio considerably richer than best power mixture. However, if fuel vapor is affecting engine operation, the vapor may be purged by placing the switch in the "EMERGENCY" position while leaning the mixture as required to prevent excessively rich mixture. Successful vapor purging is evidenced by smooth engine operation and steady and normal fuel flow indications with the auxiliary fuel pump switch "OFF."

NOTE

If the auxiliary fuel pump switch is accidentally moved to "EMERGENCY" with the engine stopped (master switch "ON" and mixture forward of the idle cut-off position) the intake manifold will be flooded. When the manifold is flooded in this manner, engine starts should not be attempted until the excess fuel has drained from the manifold.

STRAINER DRAIN CONTROL KNOB.

A strainer drain control knob is located inside the left engine cowl access door on aircraft equipped with the standard fuselage fuel tank. It is connected to the strainer drain valve at the bottom of the firewall with a conventional push-pull control. When the knob is pulled out, the valve is opened and water and sediment, if any, will be drained from the strainer. The knob should be pushed full-in to close the strainer drain valve. After draining, a visual check should be made for water and sediment and to make sure the valve is closed.

ELECTRICAL SYSTEM (Reference Figure 2-7).

Electrical energy is supplied by a 14-volt, direct-current system or an optional 28-volt, direct-current system which is discussed in Section VI, Optional Systems. The 14-volt system consists of a 60-ampere engine-driven alternator, and a 12-volt, 25 amp-hour battery or an optional 12-volt, 33 amp-hour battery. The battery serves as the basic power source when the alternator is inoperative or when the alternator is not supplying sufficient current to meet the requirements of the electrical system. The alternator supplies current to the electrical system when the master switch is "ON," the engine is running, and the ammeter is not showing a discharge. The alternator is capable of producing 25 amperes at idle speed, making it far superior to a generator in keeping the battery charged in typical agricultural flight operations.

The battery is located aft of the firewall on the right side of the fuselage. Access to the battery box is obtained by opening the right forward fuselage panel.

CIRCUIT BREAKERS AND FUSES.

Most of the electrical circuits in the airplane are protected by "push-

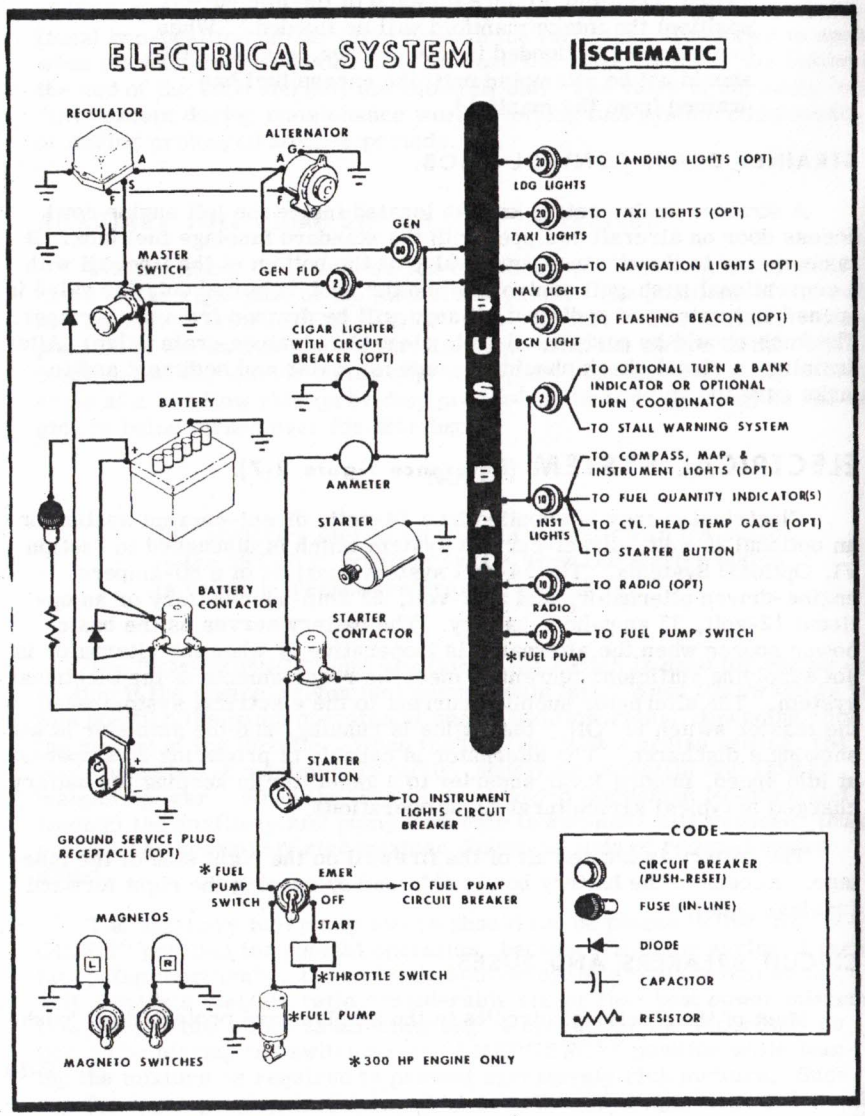


Figure 2-7.

to-reset" circuit breakers mounted on the instrument panel. The optional cigar lighter is protected by a manually reset circuit breaker mounted on the back of the lighter behind the instrument panel. A fuse mounted near the battery protects the battery contactor closing circuit.

AMMETER.

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

LANDING LIGHTS (OPT).

A three position, push-pull switch controls the optional landing lights. To turn the taxi lights on, pull the switch out to the first stop. To turn the landing lights on, pull the switch out to the second stop. To turn both taxi and landing lights off, push the switch full in.

FLIGHT CONTROL SYSTEMS.

The primary flight control surfaces (ailerons, elevator, and rudder) are controlled by a conventional control stick and rudder pedal arrangement. A bobweight is mounted on the control stick to give larger control pressure variation with changes in airspeed and flight load factors.

The elevator trim tab is controlled by a wheel located to the left of the pilot's seat. Rolling the top of the trim wheel aft produces more nose up trim.

WING FLAP SYSTEM.

The wing flaps are manually operated by means of a lever located to the left of the pilot's seat. The lever provides locked positions for 0°, 10° and 20° of flap deflection. The flaps may be set in any one of the three positions by depressing the button on the end of the lever while moving the lever to the desired position.

LANDING GEAR SYSTEM.

The landing gear has been specifically designed for heavy-duty agri-

cultural dispersal service. It consists of extra thick chrome-vanadium steel main landing gear springs and a spring-steel tubular tailwheel spring with a steerable tailwheel. The tailwheel steering arms are connected to the rudder cables with cables and springs. Tailwheel steering of 24° left and right is available. For tighter turns in close quarters, application of toe pressure on either of the rudder pedals will cause the tailwheel to free swivel and enable the airplane to be pivoted around the wheel being braked.

BRAKE SYSTEM.

The hydraulic brakes on the main wheels are conventionally operated by applying toe pressure to the top of the rudder pedals. The rotation of the pedals actuates the brake master cylinders, resulting in braking action on the main wheels. The brakes may also be set by pulling the parking brake "T" handle aft. To release the parking brake, depress the button in the center of the "T" handle, and push it toward the instrument panel.

PILOT'S SEAT.

The standard pilot's seat is adjustable in a fore and aft direction and has an adjustable seat back tilt angle. An optional seat is available with standard seat adjustments plus a vertical height adjustment. This seat may be raised or lowered by turning the crank located below the front right corner of the seat bottom.

Both the standard and optional seat are moved fore and aft by pulling up on the seat adjustment lever, located just forward and below the left front corner of the seat bottom, and sliding to the desired position. The lever is then released and the seat is moved fore or aft until the locking pin engages a hole in the seat track. Adjusting the seat back to the desired tilt angle is accomplished by leaning forward to remove pressure from the seat back, pulling up on the lever located on the right aft side of the seat near the hinge line, leaning back to the desired angle, and releasing the lever.

Seat belts and a double-strap shoulder harness are provided. The lower ends of the shoulder harness are attached permanently to the seat belt. The length of the shoulder harness is easily adjusted by means of metal adjusters located at chest height.

COCKPIT PRESSURIZATION.

Cockpit pressurization is provided to help keep dry application materials from contaminating the cockpit. The system consists of adjustable pressure scoops located on each baggage door. The scoops are ground adjustable and can be positioned for varying amounts of pressurization. The full open position will provide maximum pressurization. For dusting operations, tailcone pressurization can be obtained by removing the panel behind the pilot's seat, with the pressure scoops full open. The pressure scoops can be used to give increased cockpit ventilation as well as pressurization by opening the scoops and the optional foul weather windows.

STARTING ENGINE (230 HP Engine).

Ordinarily the engine starts easily after pumping the throttle one or two strokes. In cold weather, it is necessary to use 2-6 strokes of the primer with the throttle open approximately 1/2 inch. In extremely cold temperatures, it may be necessary to continue priming while cranking.

Weak intermittent firing followed by puffs of black smoke from the exhaust stack indicates over-priming or flooding. Excess fuel can be cleared from the combustion chambers by the following procedure: Set the mixture control full lean and the throttle full open; then crank the engine through several revolutions with the starter. Repeat the starting procedure without any additional priming.

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

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

STARTING ENGINE (300 HP Engine).

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

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

NOTE

During cold weather conditions, it may be necessary to place the auxiliary fuel pump switch in the "EMERGENCY" position to prime the engine prior to start. Care should be taken to prevent flooding due to the danger of fire. If a fire should develop, attempt to complete the engine start. Starting the engine will suck the flames back into the engine, and will usually put out the fire.

HOT WEATHER/HOT ENGINE START (300 HP Engine).

(1) Throttle -- Cracked 1 inch.
(2) Magneto Switches -- "ON."
(3) Starter -- Engage.

NOTE

Do not use the auxiliary fuel pump if the engine is hot, unless vapor lock is suspected. If vapor lock is suspected, place switch in "EMERGENCY" position to purge system, then turn switch "OFF" and repeat hot weather starting procedure.

TAXIING.

Since heated intake air is unfiltered, the carburetor air heat control

(230 HP Engine) should be pushed full in (cold) during all ground operations unless heat is absolutely necessary for smooth engine operation.

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

BEFORE TAKE-OFF.

The magneto check should be made at 1700 RPM with the propeller in low pitch (if applicable). The difference between the two magnetos operated separately 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 an ignition 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.

Propeller governor operation should be checked by cycling the propeller from high to low RPM and then back to high RPM. This should be performed at 1700 RPM.

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

TAKE-OFF.

It is important to check full throttle engine operation early in the take-off run. Any indication of rough engine operation or sluggish engine acceleration is good cause for discontinuing the take-off. In this case, more extensive ground checking (including a full throttle runup) is recommended to determine if ignition or fuel metering are in need of adjustment or repair.

With the 300 HP engine, it is important that the auxiliary fuel pump be "OFF" for take-off. Otherwise, the mixture will be excessively rich, causing a serious loss in power. Details of the auxiliary fuel pump sys-

tem are given on page 2-12.

When take-offs must be made over a loose gravel surface, the throttle should be opened slowly. This allows the airplane to start rolling before high RPM is developed, and the gravel will be blown behind the propeller rather than pulled into it.

For maximum engine power (300 HP Engine), the mixture should be adjusted during the initial take-off roll in accordance with the fuel flow vs altitude placard. 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.

Optimum take-off performance at 3300 pounds gross weight is obtained by using 20° wing flaps. The airplane will accelerate more quickly to flying speed in a level attitude. To climb steeply over an obstacle with 20° wing flaps, use an obstacle clearance speed of 70 MPH.

NOTE

Climbs at these low speeds should be of short duration to improve engine cooling. Flaps should be retracted slowly after all obstacles are cleared.

Take-offs into strong crosswinds normally are performed with the minimum flap setting necessary for the field length to give maximum rudder effectiveness and to minimize the drift angle immediately after take-off.

CLIMB.

If optimum climb performance is desired, climb speed will vary from 88 MPH at sea level, decreasing to 85 MPH at 10,000 feet. Refer to figure 5-7 for recommended optimum climb speeds with dispersal equipment installed.

To climb steeply over an obstacle with wing flaps retracted, use an obstacle clearance speed of 75 MPH.

CRUISE.

Normal cruising is done between 65% and 75% power. The power setting required to obtain these powers at various altitudes can be determined

from the OPERATIONAL DATA in Section V.

For a given throttle setting with a constant-speed propeller, select the lowest engine speed in the green arc range that will give smooth engine operation.

The mixture for extended cruising flight should be leaned at any altitude. With a constant-speed propeller and carburetor engine, lean the mixture momentarily to engine roughness, and then enrichen to obtain smooth operation. With a fuel-injection engine, lean to roughness or noticeable power loss, and then enrichen approximately 2 GPH.

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

STALLS.

The stall characteristics are conventional, and aural warning is provided by a stall warning horn which sounds between 5 and 10 MPH above the stall in all configurations. The stall is also preceded by a mild aerodynamic buffet which increases in intensity as the stall is approached. All controls remain effective throughout the stall.

Power-off stall speeds at 3300 pounds gross weight are presented in figure 5-2 as calibrated airspeeds. Power-on stall speeds are approximately 5 MPH lower than the power-off stall speeds.

SPINS.

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

Section III

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. A9CE, as Cessna Model No. 188/A188.

With standard equipment, the airplane is approved for day operations under VFR. Additional optional equipment is available to increase its utility and to make it authorized for use at night under VFR. 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 and exceeds the requirements for airworthiness of the Federal Aviation Regulations, Part 23, set forth by the United States Government. 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.	3300 lbs	
Flight Load Factor		
*Flaps Up.	+3.8	-1.52
*Flaps Down	+3.0	

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

RESTRICTED CATEGORY.

In addition to the operations authorized under the Part 23 certification at 3300 pounds without special agricultural equipment, the airplane is designed as a specialized agricultural airplane. In this operation, it will be used under a restricted type certificate. The operations under the limitations of this restricted type certificate are spelled out for your information below. It should be noted that in all cases the judgment and skill of the pilot will become a large factor in properly interpreting the most suitable operating limitations of this airplane.

As a general guide, the following five areas should be considered when operating in this restricted category:

(1) GROSS WEIGHT:

This airplane has been satisfactorily demonstrated at gross weights of 3800 pounds for the 230 HP engine, and up to 4000 pounds for the 300 HP engine. Take-off performance at these gross weights is limited, and ideal field elevation, runway, and weather conditions are expected to exist in obtaining satisfactory take-off performance. Operation from fields in excess of 1000 feet above sea level, rough or soft runways, adverse runway gradients, high outside air temperature, turbulence, etc., may prevent a safe take-off at these gross weights. All of these things must be considered by the operator.

(2) SPEED AND LOAD FACTORS:

The speed, while operating in the restricted category, is restricted to not more than 120 MPH. At the same time, it is expected that the airplane will not be maneuvered with load factors in excess of 2.5 g's while carrying heavy loads. It is obvious that the margin of strength is reduced at the higher gross weight, and therefore, the operator must take this into account when conducting pull-ups and turn around maneuvers at the end of the field.

Although the airplane is capable of working at speeds from 85 MPH to 120 MPH, it is suggested that a speed of 95 MPH to 115 MPH be used for very heavy loads. The use of very low airspeeds in combination with heavy loads is not recommended because it reduces the margin of safety.

(3) RUNWAY CONDITIONS:

Where the runway is unusually rough, and therefore, subjects the landing gear and airplane structure to high, sharply accelerated loads, the gross weight should be restricted. Such operation can exceed the limit load factors for the landing gear and fuselage, and seriously reduce the overall life of the airplane. The adverse effect of soft runways and long grass can only be determined by a series of take-offs at increasing gross weights on a trial basis.

(4) TAKE-OFF, CLIMB, AND CRUISE:

Conditions of high temperature, high altitude, rough take-off surfaces and terrain clearances at the end of the runway should obviously be taken into account in judging the proper take-off gross weight of this airplane. As a guide, take-off charts are included in Section V to show the normally expected take-off run for the airplane with optional spray equipment installed. Also included are charts for varying gross weights above 3300 pounds. When agricultural equipment is installed, the take-off ground run will not be affected significantly, but the air distance over an obstacle will be increased appreciably.

The optimum flap setting for take-off at the maximum restricted category gross weight with dispersal equipment installed is 10°. Best acceleration to take-off speed is attained in a level flight attitude. Rotation for lift-off should be initiated when the airplane becomes light on its main wheels. A speed of 75 MPH should be maintained after lift-off until all obstacles are cleared. Flaps should be retracted after obstacles are cleared and before a power reduction.

Climb and cruise performance differentials with various Cessna dispersal equipment options are shown in Section V. The smaller cruise speed differentials for the fixed-pitch propeller version are the result of a need for increased power settings to maintain a given RPM with the higher drag configurations. In contrast, the constant-speed propeller cruise speed differentials are based on a constant power for all configurations.

(5) LANDING WEIGHT:

The airplane landing gear is designed for a landing weight of 3300 pounds gross weight. It is normally expected that all land-

ings will be made at or below this gross weight figure. If a landing at a higher gross weight is required, caution should be exercized to prevent overstressing the landing gear.

When the airplane is operated within the restrictions noted above, it is expected that satisfactory performance can be obtained from the airplane. It must be stressed, however, that the judgement of the operator coupled with his own experience will provide the most useful guideline for operating the airplane. Judgement and caution are required at all times.

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)	181 MPH
Maximum Structural Cruising Speed	144 MPH
Maximum Speed, Flaps Extended	110 MPH
**Maneuvering Speed	127 MPH

*These airspeed limitations are only applicable to airplanes without agricultural dispersal equipment installed. For airplanes with dispersal equipment installed, refer to the placard located adjacent to the airspeed indicator: "MAX OPERATING SPEED IN AGRICULTURAL OPERATIONS 120 MPH (104 KNOTS)."

**The maximum speed at which abrupt control can be used without exceeding the design load factor.

AIRSPEED INDICATOR MARKINGS.

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

Never Exceed (glide or dive, smooth air)	181 MPH (red line)
Caution Range	144 to 181 MPH (yellow arc)
Normal Operating Range	64 to 144 MPH (green arc)
Flap Operating Range	58 to 110 MPH (white arc)

ENGINE OPERATION LIMITATIONS.

Power and Speed (230 HP Engine)	230 BHP at 2600 RPM
(300 HP Engine)	300 BHP at 2850 RPM (5-Minutes Take-Off)
	285 BHP at 2700 RPM (Maximum Continuous)

ENGINE INSTRUMENT MARKINGS.

OIL TEMPERATURE GAGE.

Normal Operating Range	Green Arc
Do Not Exceed (230 HP Engine)	225°F (red line)
(300 HP Engine)	240°F (red line)

OIL PRESSURE GAGE.

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

MANIFOLD PRESSURE GAGE.

Normal Operating Range	
(230 HP Engine, CSP)	15-23 in. Hg (green arc)
(300 HP Engine)	15-25 in. Hg (green arc)

TACHOMETER.

Normal Operating Range	
(230 HP Engine, FPP)	2200-2600 RPM (green arc)
(230 HP Engine, CSP)	2200-2450 RPM (green arc)
(300 HP Engine)	2200-2550 RPM (green arc)
Caution Range (300 HP Engine)	2700-2850 RPM (yellow arc)
Do Not Exceed (Engine rated speed)	
(230 HP Engine)	2600 RPM (red line)
(300 HP Engine)	2850 RPM (red line)

FUEL QUANTITY INDICATOR(S).

Empty	E (red line)

0.5 gallon total unusable (standard fuselage fuel tank system)
7.0 gallons total unusable (optional wing tank fuel system)

FUEL FLOW INDICATOR (300 HP Engine).

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

NOTE

A placard near the fuel flow indicator provides maximum performance take-off/climb fuel flow settings vs. altitude. These settings are as follows:

FUEL FLOW AT FULL THROTTLE

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

WEIGHT AND BALANCE.

Refer to the Weight and Balance Data sheet in the aircraft file for the licensed empty weight and center of gravity limits. Also, a sample problem, loading graph, center of gravity moment envelope and center of gravity limits chart are provided on the sheet titled Loading/Center of Gravity Charts and Weighing Procedures which is provided in the aircraft file.

FLIGHT WITH CANOPY DOORS REMOVED.

Although there are no adverse flight characteristics with one or both canopy doors removed, a significant penalty occurs in airplane performance. Therefore, under heavy load conditions, flight with canopy doors removed is not recommended.

Under no circumstances should a canopy door be opened in flight, since air loads will pull it downward sharply against the fuselage. In addition, at low speed the door buffets sharply against the fuselage, making it undesirable to conduct a landing in this configuration.

WING STRUT FAIRING EFFECT ON STALL CHARACTERISTICS.

Smooth airflow over the ailerons is essential for good stall characteristics in the airplane. Poorly fitted or damaged wing strut fairings can result in wing dropping tendencies and decreased lateral control at the stall. Therefore, preflight inspections should verify the integrity of these fairings. The airplane is not to be flown without these fairings installed.

Section IV

CARE OF THE AIRPLANE

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

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

GROUND HANDLING.

When maneuvering the airplane by hand, push at the wing struts, stub wing, landing gear struts, the leading edge of the stabilizer adjacent to the fuselage, at the root of the vertical fin, or lift the tail with the optional stowable lift handles, which are located on the sides of the tailcone near the horizontal stabilizer. Do not lift the empennage by the tip of the horizontal stabilizer or elevator; likewise, do not shove sidewise on the upper portion of the fin.

MOORING YOUR AIRPLANE.

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

(1) Set the parking brake and install a controls lock (if available).
(2) Install a surface control lock over the fin and rudder.
(3) Tie a rope or chain to the tail gear tie-down fitting and secure the opposite end to a tie-down.
(4) Tie sufficiently strong ropes or chains (700 pounds tensile strength) to the wing tie-down fittings, and secure the opposite ends of the ropes or chains to tie-downs.
(5) Install a pitot tube cover.

WINDSHIELD – WINDOWS.

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

NOTE

Rubber gloves should be worn to prevent hands coming in contact with any toxic spray or dust chemicals on the windows and windshield.

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.

EXTERIOR CARE.

The painted exterior surfaces of your new Cessna require an initial curing period which may be as long as 7 to 10 days after delivery of the airplane. During this curing period, some precautions should be taken to avoid damaging the finish or interfering with the curing process. The finish should be cleaned only by washing with clean water (cold or luke-

warm) and mild soap, followed by a rinse with water and drying with cloths or a chamois. Do not use polish or wax, which would exclude air from the surface, during this curing period.

After the finish has cured completely, keeping the airplane clean and waxed is important. Besides maintaining the trim appearance of the airplane, cleaning reduces the possibility of corrosion and makes inspection and maintenance easier. During agricultural spraying and dusting operations, daily hosing down of the airplane is highly recommended. Prior to cleaning the exterior, install plugs or mask off all openings to prevent entry of water into the engine compartment, or pitot and static systems. Wash the airplane with cold or lukewarm water and mild soap as noted above. Harsh or abrasive soaps or detergents which cause corrosion or scratches should never be used. To remove stubborn oil and grease, use a cloth moistened with Stoddard solvent. A fine grade rubbing compound may be used to remove bugs and gasoline stains.

IMPORTANT

DO NOT steam clean the airplane after it has been used for agricultural spraying or dusting. Steam changes toxic spray and dust chemicals into vapor which can be absorbed or inhaled.

After cleaning, the painted surfaces may be waxed with a good automotive wax. A heavier coating of wax on the leading edges of the wing and tail and on the nose cap 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 then 50% alcohol is harmful and should be avoided. While applying the de-icing solution, keep it away from the windshield and cockpit windows since the alcohol will attack the plastic and may cause it to craze.

INTERIOR CARE.

Care of the interior of your airplane is as important as the care given the exterior. The primary factors to be considered are cleanliness of the cockpit area and freedom from dirt and corrosion throughout the

entire airframe. Some dirt and toxic chemical will find its way into the fuselage through long periods of use; these hazards must be minimized if the pilot is to operate the airplane with safety and if the airplane is to give the long service it was designed to give.

The fuselage has removable panels to facilitate a thorough cleaning and inspection of the interior. Two large panels on each side of the fuselage are completely removable for access to the interior structure, hopper and cockpit area. A large door, hinged at the top, is located just aft of the firewall on each side of the airplane for access to forward fuselage components. Smaller removable panels on the sides of the fuselage tailcone provide access to control system cables and fuselage structure. The engine cowling is completely removable for access to the engine. In general, the entire fuselage structure can be exposed for cleaning and inspection.

It is a good practice, before cleaning, to check the interior for signs of leaking fittings and corrosion. Note any areas where further investigation is needed; however, do not make any repair until the airplane is thoroughly cleaned to prevent contamination from toxic chemicals.

To thoroughly clean the interior, first hose it down with water, then wash by hand with a sponge or cloth in warm soapy water. A hose rinse should follow the soap and water washing process to flush away soapy water. Rubber gloves should be worn during the washing process to protect the hands from chemicals on the interior surface.

IMPORTANT

DO NOT steam clean the interior of the fuselage. Steam changes toxic spray and dust chemicals into vapor which can be absorbed or inhaled.

Removable rubber drain plugs are located along the bottom of the fuselage for draining the water. Although the pilot's seat is of a durable vinyl material, it would be best to remove it before hosing down the interior. (The pilot's seat is readily removable by removing the aft seat stop of the right hand seat rail and sliding the seat back and off the rail.) When cleaning the interior, precaution should be taken to keep water away from the instrument panel, radio, heater outlets, and map compartment. A protective waterproof covering for these items is recommended.

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

The pilot's seat can be cleaned by wiping with a cloth moistened in clean water. Mild soap suds, used sparingly, will remove grease. The soap should be removed with a clean damp cloth.

PROPELLER CARE.

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

INSPECTION SERVICE — INSPECTION PERIODS.

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

Federal Aviation Regulations require that all airplanes have a periodic (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 famil-

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

AIRCRAFT FILE.

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

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

(1) Aircraft Airworthiness Certificate (Form FAA-1362B).
(2) Aircraft Registration Certificate (Form FAA-500A).
(3) Aircraft Radio Station License (Form FCC-404, if transmitter installed).

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

(1) Weight and Balance, and associated papers (latest copy of the Repair and Alteration Form, Form FAA-337, if applicable).
(2) Aircraft Equipment List.
(3) When the aircraft is operated as an agricultural dispersal aircraft, a copy of the Agricultural Aircraft Operator's Certificate (as prescribed under FAR 137) must be carried.

C. To be made available upon request:

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

NOTE

Cessna recommends that these items, plus the Owner's Manual, Agwagon Spray 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, owner's of exported aircraft should check with their own aviation officials to determine their individual requirements.

LUBRICATION AND SERVICING PROCEDURES

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

DAILY

FUEL TANK FILLER:

Service after each flight with 80/87 (230 HP Engine), 100/130 (300 HP Engine) minimum grade fuel. The fuel tank capacity is 37 gallons for aircraft equipped with the standard fuselage fuel tank, and 56 gallons total (28 gallons each tank) for aircraft equipped with the optional wing tank fuel system.

FUEL STRAINER:

Drain for approximately four seconds before initial flight and after refueling to remove water and sediment. Make sure drain valve is closed after draining.

OIL DIPSTICK:

Check oil level before each flight. Do not operate on less than 9 quarts. To minimize loss of oil through breather, fill to 10 quart level for normal flights of less than 3 hours. For extended flight, fill to 12 quarts.

NOTE

The dipstick is marked with four lines representing the six, eight, ten and twelve quart levels. The bottom line is the six quart level and the top line is the twelve quart (full) level. The opposite side of the dipstick has two "X" marks; these should be disregarded on this aircraft.

If an optional oil filter is installed, one additional quart is required when the filter element is changed.

LUBRICATION AND SERVICING PROCEDURES

DAILY (Continued)

OIL FILLER:

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

NOTE

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

SERVICING INTERVALS CHECK LIST

EACH 50 HOURS

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

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

NOTE

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

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

EACH 100 HOURS

SPARK PLUGS -- Clean, test and regap.

FUEL STRAINER -- Disassemble and clean.

FUEL/AIR CONTROL UNIT SCREEN (300 HP Engine) -- Clean.

FUEL TANK AND RESERVOIR TANK DRAIN VALVES (Opt. Wing Fuel System)-- Drain water and sediment.

BRAKE MASTER CYLINDERS -- Check and fill.

TAIL WHEEL PIVOT-- Lubricate. Lubricate more often if an excessive amount of dust, water or mud is encountered.

TAIL WHEEL BEARINGS -- Lubricate. Lubricate more often if an excessive amount of dust, water or mud is encountered.

MAIN WHEEL BEARINGS -- Lubricate.

OWNER FOLLOW-UP SYSTEM

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

PUBLICATIONS

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

- OWNER'S MANUALS FOR YOUR
  AIRCRAFT
  ELECTRONICS
- CESSNA SPRAY 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

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 V

OPERATIONAL DATA

The operational data charts on the following pages are presented so that you may know what kind of performance to expect from your airplane under standard day conditions.

Data in figures 5-1 through 5-6 is provided for airplanes in the normal category in a clean configuration; figures 5-7 and 5-8 show restricted category data for various gross weights and dispersal equipment installations.

AIRSPEED CORRECTION TABLE

	IAS	60	70	80	90	100	110	120	130	140	150	160
FLAPS UP	CAS	59	69	79	89	100	110	120	130	140	150	160
FLAPS DOWN	CAS	58	68	79	89	100	110	•	•	•	•	•

Figure 5-1.

STALL SPEEDS, POWER OFF

Gross Weight 3300 LBS. / CONFIGURATION	ANGLE OF BANK 0°	30°	60°
FLAPS UP	64	69	91
FLAPS 10°	60	65	85
FLAPS 20°	58	62	82

SPEEDS ARE MPH, CAS

Figure 5-2.

230 HP ENGINE ..... FIXED-PITCH PROPELLER

Normal Category - Clean Configuration

TAKE-OFF DATA

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

GROSS WEIGHT POUNDS	IAS @ 50 FT. MPH	HEAD WIND KNOTS	@ SEA LEVEL & 59° F		@ 2500 FT. & 50° F		@ 5000 FT. & 41° F	
			GROUND RUN	TOTAL TO CLEAR 50 FT. OBS.	GROUND RUN	TOTAL TO CLEAR 50 FT. OBS.	GROUND RUN	TOTAL TO CLEAR 50 FT. OBS.
3300	70	0	845	1365	1015	1605	1235	1945
		10	590	1020	720	1210	885	1480
		20	380	715	470	860	595	1070
2800	64	0	580	1005	695	1160	840	1360
		10	390	735	475	855	585	1010
		20	240	500	295	585	375	705
2300	58	0	375	740	445	830	535	950
		10	240	530	295	600	360	690
		20	135	345	170	395	215	460

NOTE: 1. Increase distance 10% for each 25° F above standard temperature.
2. For operation on a dry, grass runway, increase distances (both "ground run" and "total to clear 50 ft. obstacle") by 6% of the "total to clear 50 ft. obstacle" figure.

MAXIMUM RATE-OF-CLIMB

GROSS WEIGHT POUNDS	@ SEA LEVEL & 59° F		@ 5000 FT. & 41°F		@ 10,000 FT. & 23° F		@ 15,000 FT. & 5° 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.
3300	88	710	87	475	86	240	85	5
2800	85	935	84	670	83	400	82	135
2300	81	1240	80	925	79	610	78	300

NOTE: 1. Full throttle, flaps up, and mixture leaned for smooth operation above 5000 feet.
2. For hot weather, decrease rate of climb 30 ft./min. for each 10° F above standard day temperature for particular altitude.

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions • Zero Wind • Gross Weight-3300 Pounds

RPM	%BHP	TAS MPH	GAL./HOUR	36.5 GAL. (NO RESERVE)	
				ENDR. HOURS	RANGE MILES
2500 FEET					
2600	74	118	13.9	2.6	310
2500	67	111	12.6	2.9	320
2400	60	104	11.4	3.2	335
2300	55	98	10.4	3.5	345
2200	49	91	9.5	3.8	350
2100	45	83	8.6	4.2	350
5000 FEET					
2600	70	116	13.1	2.8	325
2500	63	109	11.9	3.1	335
2400	57	102	10.8	3.4	345
2300	52	95	10.1	3.6	345
2200	47	88	9.1	4.0	350
2100	43	80	8.3	4.4	350

Figure 5-3.

230 HP ENGINE ..... CONSTANT-SPEED PROPELLER

Normal Category - Clean Configuration

TAKE-OFF DATA

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

GROSS WEIGHT POUNDS	IAS @ 50 FT. MPH	HEAD WIND KNOTS	@ SEA LEVEL & 59° F		@ 2500 FT. & 50° F.		@ 5000 FT. & 41° F	
			GROUND RUN	TOTAL TO CLEAR 50 FT. OBS.	GROUND RUN	TOTAL TO CLEAR 50 FT. OBS.	GROUND RUN	TOTAL TO CLEAR 50 FT. OBS.
3300	70	0	805	1320	965	1565	1165	1890
		10	555	975	675	1170	825	1430
		20	345	670	430	820	540	1020
2800	64	0	555	965	660	1115	795	1305
		10	365	695	445	815	545	960
		20	215	465	270	550	340	660
2300	58	0	355	705	425	795	505	905
		10	225	495	275	565	330	650
		20	125	315	155	365	190	425

NOTE: 1. Increase distance 10% for each 25° F above standard temperature.
2. For operation on a dry, grass runway, increase distances (both "ground run" and "total to clear 50 ft. obstacle") by 6% of the "total to clear 50 ft. obstacle" figure.

MAXIMUM RATE-OF-CLIMB

GROSS WEIGHT POUNDS	@ SEA LEVEL & 59° F		@ 5000 FT. & 41° F		@ 10,000 FT. & 23° F		@ 15,000 FT. & 5° 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.
3300	88	755	87	515	86	275	85	40
2800	85	990	84	715	83	445	82	180
2300	81	1305	80	980	79	660	78	350

NOTE: 1. Full throttle, flaps up, and mixture leaned for smooth operation above 5000 feet.
2. For hot weather, decrease rate of climb 30 ft./min. for each 10° F above standard day temperature for particular altitude.

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions • Zero Wind • Gross Weight-3300 Pounds

RPM	MP	%BHP	TAS MPH	GAL./HOUR	36.5 GAL. (NO RESERVE)	
					ENDR. HOURS	RANGE MILES
2500 FEET						
2450	23	76	125	14.2	2.6	320
	22	72	121	13.4	2.7	330
2300	23	71	120	13.0	2.8	335
	22	67	116	12.3	3.0	345
2200	22	62	112	11.3	3.2	360
	20	55	103	10.2	3.6	370
5000 FEET						
2450	23	77	128	14.3	2.6	325
	22	73	124	13.6	2.7	335
2300	23	72	123	13.2	2.8	340
	22	68	120	12.5	2.9	350
2200	22	64	115	11.6	3.1	365
	20	56	107	10.4	3.5	375

Figure 5-4.

300 HP ENGINE ..... CONSTANT-SPEED PROPELLER

Normal Category - Clean Configuration

TAKE-OFF DATA

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

GROSS WEIGHT POUNDS	IAS @ 50 FT. MPH	HEAD WIND KNOTS	@ SEA LEVEL & 59° F		@ 2500 FT. & 50° F		@ 5000 FT. & 41° F	
			GROUND RUN	TOTAL TO CLEAR 50 FT. OBS.	GROUND RUN	TOTAL TO CLEAR 50 FT. OBS.	GROUND RUN	TOTAL TO CLEAR 50 FT. OBS.
3300	70	0	610	970	730	1125	880	1325
		10	425	720	515	845	630	1005
		20	270	505	335	600	420	720
2800	64	0	420	735	500	835	600	960
		10	285	535	345	615	420	715
		20	170	365	210	425	265	495
2300	58	0	270	550	325	615	385	690
		10	175	395	210	445	255	500
		20	95	260	120	295	150	340

NOTE: 1. Increase distance 10% for each 25° F above standard temperature.
2. For operation on a dry, grass runway, increase distances (both "ground run" and "total to clear 50 ft. obstacle") by 6% of the "total to clear 50 ft. obstacle" figure.

MAXIMUM RATE-OF-CLIMB

GROSS WEIGHT POUNDS	@ SEA LEVEL & 59° F		@ 5000 FT. & 41° F		@ 10,000 FT. & 23° F		@ 15,000 FT. & 5° 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.
3300	88	940	87	670	86	400	85	135
2800	85	1205	84	900	83	590	82	290
2300	81	1570	80	1230	79	840	78	485

NOTE: 1. Full throttle, flaps up, and mixture leaned for smooth operation above 5000 feet.
2. For hot weather, decrease rate of climb 30 ft./min. for each 10° F above standard day temperature for particular altitude.

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions • Zero Wind • Gross Weight-3300 Pounds

RPM	MP	%BHP	TAS MPH	GAL. / HOUR	36.5 GAL. (NO RESERVE)		49 GAL. (NO RESERVE)	
					ENDR. HOURS	RANGE MILES	ENDR. HOURS	RANGE MILES
2500 FEET								
2550	25	78	139	16.4	2.2	310	3.0	415
	23	70	133	14.6	2.5	330	3.4	445
2400	24	67	130	14.1	2.6	335	3.5	450
2300	23	59	123	12.5	2.9	355	3.9	480
2200	22	52	114	11.1	3.3	375	4.4	505
	20	45	104	9.8	3.7	390	5.0	520
5000 FEET								
2550	25	81	144	16.9	2.2	310	2.9	420
	23	72	137	15.1	2.4	330	3.2	445
2400	24	69	135	14.5	2.5	340	3.4	455
2300	23	61	127	12.9	2.8	360	3.8	485
2200	22	54	118	11.4	3.2	380	4.3	505
	20	47	109	10.2	3.6	390	4.8	525

Figure 5-5.

LANDING DISTANCE TABLE

LANDING DISTANCE WITH 20° FLAPS ON HARD SURFACE RUNWAY

GROSS WEIGHT POUNDS	APPROACH IAS MPH	@ SEA LEVEL & 59° F		@ 2500 FEET & 50° F		@ 5000 FEET & 41° 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.
3300	76	420	1265	445	1340	470	1420
2300	63	315	940	330	995	350	1045

NOTES: (1) Distances shown are based on zero wind, power off, and heavy braking.
(2) Reduce landing distances 10% for each 5 knots head wind.

Figure 5-6.

PERFORMANCE - SPECIFICATIONS

WITH ANGLE-DRIVE PUMP LIQUID DISPERSAL SYSTEM INSTALLED

AGWAGON "A"

	ENGINE AND PROPELLER CONFIGURATIONS		
	230 HP FIXED PITCH	230 HP CONSTANT SPEED	300 HP CONSTANT SPEED
GROSS WEIGHT	3300 lbs	3300 lbs	3300 lbs
SPEED, BEST POWER MIXTURE:			
Top Speed at Sea Level	110 mph at rated 2600 rpm	119 mph at rated power	128 mph at max. cont. power
Cruise Speed	70% power at 5000 ft 101 mph	75% power at 6500 ft 108 mph	75% power at 6500 ft 121 mph
RANGE, NORMAL LEAN MIXTURE:			
Cruise. 36.5 Gallons, No Reserve	70% power at 5000 ft 260 mi 2.6 hrs 101 mph	75% power at 6500 ft 280 mi 2.6 hrs 108 mph	75% power at 6500 ft 275 mi 2.3 hrs 120 mph
Cruise. 49 Gallons, No Reserve	--- --- ---	--- --- ---	370 mi 3.1 hrs 120 mph
RATE OF CLIMB AT SEA LEVEL	530 fpm	575 fpm	760 fpm
SERVICE CEILING	10,100 ft	10,800 ft	14,000 ft
TAKE-OFF:			
Ground Run	1000 ft	910 ft	660 ft
Total Distance Over 50-Foot Obstacle.	1600 ft	1500 ft	1040 ft
LANDING:			
Ground Roll	420 ft	420 ft	420 ft
Total Distance Over 50-Foot Obstacle.	1265 ft	1265 ft	1265 ft
EMPTY WEIGHT (Approximate)	1860 lbs	1880 lbs	1910 lbs
MAXIMUM GROSS WEIGHT, RESTRICTED CATEGORY	3800 lbs	3800 lbs	4000 lbs

SERVICING REQUIREMENTS

FUEL:

AVIATION GRADE -- 80/87 MINIMUM GRADE (230 HP ENGINE)
100/130 MINIMUM GRADE (300 HP ENGINE)
STANDARD FUSELAGE TANK CAPACITY -- 37 GALLONS.
OPTIONAL WING TANK CAPACITY (TOTAL) -- 56 GALLONS.

ENGINE OIL:

AVIATION GRADE -- SAE 50 ABOVE 40°F.
SAE 10W30 OR SAE 30 BELOW 40°F.
(MULTI-VISCOSITY OIL WITH A RANGE OF SAE 10W30 IS RECOMMENDED FOR IMPROVED STARTING IN COLD WEATHER. DETERGENT OR DISPERSANT OIL, CONFORMING TO CONTINENTAL MOTORS SPECIFICATION MHS-24A, MUST BE USED.)
CAPACITY OF ENGINE SUMP -- 12 QUARTS.
(DO NOT OPERATE ON LESS THAN 9 QUARTS. TO MINIMIZE LOSS OF OIL THROUGH BREATHER, FILL TO 10 QUART LEVEL FOR NORMAL FLIGHTS OF LESS THAN 3 HOURS. FOR EXTENDED FLIGHT, FILL TO 12 QUARTS. IF OPTIONAL OIL FILTER IS INSTALLED, ONE ADDITIONAL QUART IS REQUIRED WHEN FILTER ELEMENT IS CHANGED.)

HYDRAULIC FLUID:

MIL-H-5606 HYDRAULIC FLUID

TIRE PRESSURE:

MAIN WHEELS -- 35 PSI ON 8.00 x 6 TIRES
25 PSI ON 8.50 x 10 TIRES (OPTIONAL)
TAIL WHEEL -- 60-70 PSI ON 2.80 x 8 TIRE
50-60 PSI ON 3.50 x 10 TIRE (OPTIONAL)