Cessna

MORE PEOPLE BUY AND FLY CESSNA AIRPLANES THAN ANY OTHER MAKE

1979

AG WAGON • AG TRUCK

OWNER'S MANUAL

WORLD'S LARGEST PRODUCER OF GENERAL AVIATION AIRCRAFT SINCE 1956

PERFORMANCE - SPECIFICATIONS

AIRPLANE CONFIGURATION	AG WAGON		AG TRUCK	
	NO DISPERSAL SYSTEM	LIQUID DISPERSAL SYSTEM	NO DISPERSAL SYSTEM	LIQUID DISPERSAL SYSTEM
PERFORMANCE AT 3300 LBS				
SPEED:				
Maximum at Sea Level	151 MPH	121 MPH	151 MPH	121 MPH
Cruise,* 75% Power at 6500 Ft	140 MPH	113 MPH	140 MPH	113 MPH
CRUISE: Recommended lean mixture with fuel allowance for engine start, taxi, takeoff, climb, and 45 minutes reserve at 45% power.				
75% Power at 6500 Ft — Range	370 MILES	295 MILES	370 MILES	295 MILES
52 Gallons Usable Fuel — Time	2.7 HRS	2.6 HRS	2.7 HRS	2.6 HRS
RATE OF CLIMB AT SEA LEVEL	940 FPM	690 FPM	940 FPM	690 FPM
SERVICE CEILING	15,700 FT	11,100 FT	15,700 FT	11,100 FT
TAKEOFF PERFORMANCE:				
Ground Roll	610 FT	680 FT	610 FT	680 FT
Total Distance Over 50-Ft Obstacle	970 FT	1090 FT	970 FT	1090 FT
LANDING PERFORMANCE:				
Ground Roll	420 FT	420 FT	420 FT	420 FT
Total Distance Over 50-Ft Obstacle	1265 FT	1265 FT	1265 FT	1265 FT
STALL SPEED (CAS):				
Flaps Up, Power Off	61 MPH	61 MPH	61 MPH	61 MPH
Flaps Down, Power Off	57 MPH	57 MPH	57 MPH	57 MPH
SPECIFICATIONS				
MAXIMUM WEIGHT:				
Normal Category	3300 LBS	3300 LBS	3300 LBS	3300 LBS
Restricted Category	4000 LBS	4000 LBS	4200 LBS	4200 LBS
STANDARD EMPTY WEIGHT	1986 LBS	2164 LBS	2040 LBS	2222 LBS
HOPPER CAPACITY:				
Gallons	200		280	
Cubic Feet	27		37.4	
WING LOADING: Pounds/Sq Ft				
3300 Lbs	16.3		16.1	
POWER LOADING: Pounds/HP				
3300 Lbs	11.0		11.0	
FUEL CAPACITY: Total	54 GAL.		54 GAL.	
OIL CAPACITY	12 QTS.		12 QTS.	
ENGINE: Teledyne Continental, Fuel Injection	IO-520-D		IO-520-D	
300 BHP at 2850 RPM (5-Minute Takeoff Rating)				
285 BHP at 2700 RPM(Maximum Continuous Rating)				
PROPELLER: Type and Diameter				
Constant Speed, 2-Bladed	82 IN.		82 IN.	
*Constant Speed, 2-Bladed	86 IN.		86 IN.	
*Constant Speed, 3-Bladed	80 IN.		80 IN.	

*The performance data above is based on the 82-inch, two-bladed propeller; however, performance is essentially the same with either the 86-inch, two-bladed propeller, or the 80-inch, three-bladed propeller.

This manual covers operation of the Ag Wagon and Ag Truck which are certified as Model A188B under Type Certificate No. A9CE.

D1145-13—RPC—600—10/78

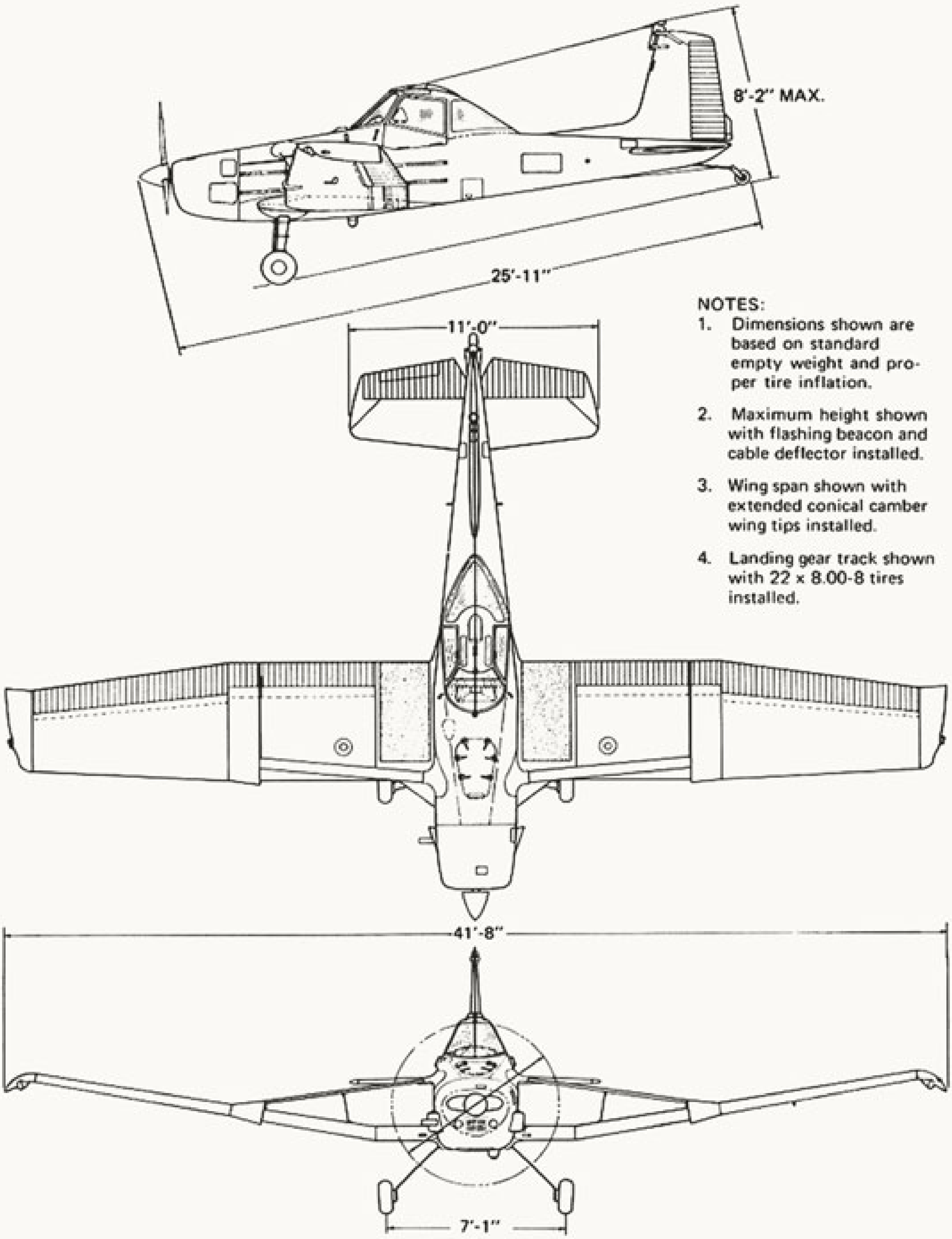
INTRODUCTION

The Cessna Ag Wagon and Ag Truck are designed specifically as safe, efficient, easy-to-fly aerial application airplanes. Their flying characteristics have been carefully developed so that they can be maneuvered near the ground for long periods with maximum safety and minimum effort. In addition, their rugged structure and equipment are simple and easy to maintain, further enhancing their reliability and efficiency.

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, while minimizing operational information that is conventional and well known to agricultural pilot's. Many of the systems are optional, while others are included as standard equipment in some models.

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 6 has been presented for a "clean" airplane without dispersal equipment installed. 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.

CESSNA AIRCRAFT COMPANY
WICHITA, KANSAS, USA



NOTES:

1. Dimensions shown are based on standard empty weight and proper tire inflation.
2. Maximum height shown with flashing beacon and cable deflector installed.
3. Wing span shown with extended conical camber wing tips installed.
4. Landing gear track shown with 22 x 8.00-8 tires installed.

Principal Dimensions (Ag Truck Shown)

TABLE OF CONTENTS

SECTION

SECTION 1
OPERATING CHECKLIST

TABLE OF CONTENTS

INTRODUCTION

Section 1 lists, in Pilot's Checklist 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 2. All airspeeds given in Sections 1, 2, 3, and 4 are indicated airspeeds unless otherwise noted.

PREFLIGHT INSPECTION

(1)
a. Check FAA Approved Airplane Flight Manual available in the airplane.
b. Release control lock.
c. Check magneto switches turned off.
d. Turn on master switch and check fuel quantity indicators; then turn off master switch.

WARNING

When turning on the master switch, using an external power source, or pulling the propeller through by hand, treat the propeller as if the magneto switches were on. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

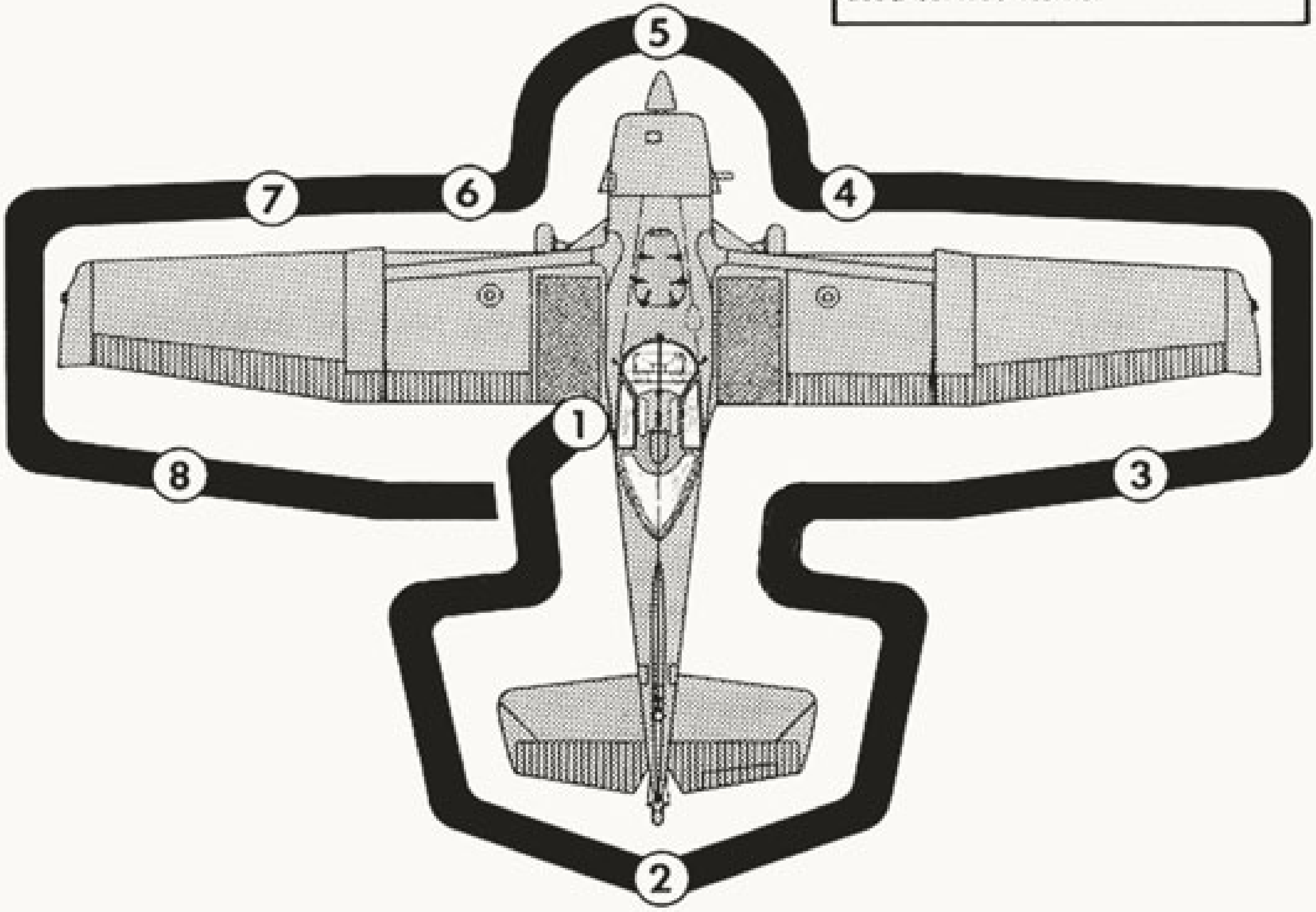
e. Check fuel shutoff valve knob ON (full in).
f. Check all items in cockpit secured, and control cables clear of obstructions.

(2)
a. Inspect flight instrument static source opening on tailcone for stoppage (both sides).
b. Remove rudder gust lock, if installed.
c. Disconnect tail tie-down.
d. Check tail wheel tire for proper inflation.
e. Check control surfaces for freedom of movement and security.

(3)
a. Check aileron for freedom of movement and security.

(4)
a. Disconnect wing tie-down.
b. Check fuel vent for stoppage.
c. Before first flight of day and after each refueling, use sampler cup

Refer to inside back cover of this manual for quantities, materials, and specifications of frequently used service items.



NOTE

Visually check inspection plates, removable panels, hopper door and wing strut fairings for security, and general condition of airplane and agricultural equipment 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.

Figure 1-1. Preflight Inspection

and drain small amount of fuel from tank sump drain valve to check for water, sediment, and proper fuel grade.

d. Visually check fuel quantity; then check fuel filler cap secure.
e. Check main wheel tire for proper inflation.

(5) a. Check propeller for nicks, oil leaks, and security.

NOTE

The propeller hub is filled with a red oil to detect oil leaks as a result of structural damage or seal leakage during preflight inspections. If red oil is evident on the propeller hub or blades, cowling nose cap, or windshield, the source of the leak must be determined before flight is permitted. Propeller manufacturer service information should be consulted for approved detail inspection and maintenance procedures.

b. Check induction air inlet for restrictions.
c. Before first flight of the day and after each refueling, pull out strainer drain knob for about four seconds to clear fuel system of possible water and sediment. After draining, make sure that strainer drain is closed.
d. Check oil level. Do not operate with less than nine quarts. Fill to twelve quarts for extended flight. Check oil filler cap secure.
e. Check hydraulic oil cooler inlets unblocked (both wing root leading edges when hydraulically-operated spray pump system installed).
f. Before first flight of day and after each refueling, use sampler cup and drain small amount of fuel from reservoir tank drain valve to check for water, sediment and proper fuel grade.

(6) a. Check main wheel tire for proper inflation.
b. Visually check fuel quantity; then check fuel filler cap secure.
c. Before first flight of day and after each refueling, use sampler cup and drain small amount of fuel from tank sump drain valve to check for water, sediment, and proper fuel grade.
d. Check fuel vent for stoppage.
e. Disconnect wing tie-down.

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

(8) a. Check aileron for freedom of movement and security.

BEFORE STARTING ENGINE

1. Exterior Inspection -- COMPLETE.
2. Seat and Seat Belts -- ADJUST and LOCK.
3. Shoulder Harness -- ADJUST.
4. Fuel Shutoff Valve -- ON (knob pushed full in).
5. Radio and Electrical Equipment -- OFF.
6. Air Conditioner (if installed) -- OFF.
7. Brakes -- TEST and SET.
8. Tail Wheel Lock -- UNLOCK.

STARTING ENGINE

1. Mixture -- RICH.
2. Throttle -- CLOSED.
3. Propeller -- HIGH RPM.
4. Alternate Air -- OFF.
5. Master Switch -- ON.
6. Propeller Area -- CLEAR.
7. Magneto Switches -- ON.
8. Auxiliary Fuel Pump Switch -- ON.
9. Throttle -- ADVANCE to obtain 8 to 10 gal/hr fuel flow; then RETURN to IDLE.
10. Auxiliary Fuel Pump Switch -- OFF.
11. Starter -- ENGAGE.
12. Throttle -- SLOWLY ADVANCE until engine starts.

NOTE

The engine should start in two to three revolutions. If it does not continue running, start again at step (7) above. If the engine does not start, leave the auxiliary fuel pump switch off, set the mixture to idle cut-off, open the throttle, 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 motor to cool.

13. Oil Pressure -- CHECK.

BEFORE TAKEOFF

1. Flight Controls -- CHECK.
2. Elevator Trim -- SET.

3. Canopy Doors -- CLOSED.
4. Throttle Setting -- 1700 RPM.
5. Engine Instruments -- CHECK.
6. Magnetos -- CHECK (RPM drop should not exceed 150 RPM on either magneto or 50 RPM differential between magnetos).
7. Propeller -- CYCLE from high to low RPM; RETURN to high RPM (full forward).
8. Flight Instruments and Radio -- SET.
9. Quadrant Friction Lock -- ADJUST.
10. Air Conditioner (if installed) -- OFF.

TAKEOFF

NORMAL CATEGORY TAKEOFF

1. Tail Wheel Lock -- LOCK.
2. Wing Flaps -- 0° to 20°.
3. Power -- FULL THROTTLE and 2850 RPM.
4. Elevator Control -- LIFT TAIL WHEEL and assume level flight attitude for best acceleration.
5. Climb Speed -- 70 to 80 MPH.
6. Wing Flaps -- RETRACT.

RESTRICTED CATEGORY TAKEOFF (Dispersal Equipment Installed)

1. Tail Wheel Lock -- AS DESIRED.
2. Wing Flaps -- 5° to 10°.
3. Brakes -- APPLY.
4. Power -- FULL THROTTLE and 2850 RPM.
5. Mixture -- LEAN for field elevation.
6. Brakes -- RELEASE.
7. Elevator Control -- LIFT TAIL WHEEL and assume level flight attitude for best acceleration.
8. Climb Speed -- 80 to 90 MPH until all obstacles are cleared.
9. Wing Flaps -- RETRACT after obstacles are cleared.

CLIMB

NORMAL CLIMB (Without Dispersal Equipment)

1. Airspeed -- 90 to 100 MPH.
2. Power -- 25 INCHES Hg and 2550 RPM.

3. Mixture -- LEAN for altitude.
4. Air Conditioner (if installed) -- AS DESIRED.

MAXIMUM PERFORMANCE CLIMB
(Without Dispersal Equipment)

1. Airspeed -- 91 MPH.
2. Power -- FULL THROTTLE and 2700 RPM.
3. Mixture -- LEAN for altitude.
4. Air Conditioner (if installed) -- OFF.

NOTE

The climb speeds listed above in Normal Climb and Maximum Performance Climb checklists apply to operations at 3300 pounds and will decrease approximately 13 MPH with dispersal equipment installed.

CRUISING

1. Power -- 15-25 INCHES Hg and 2200-2550 RPM.
2. Elevator Trim -- ADJUST.
3. Mixture -- LEAN.
4. Air Conditioner (if installed) -- AS DESIRED.

BEFORE LANDING

1. Mixture -- RICH.
2. Propeller -- HIGH RPM.
3. Quadrant Friction Lock -- ADJUST to prevent creeping.
4. Airspeed -- 80 to 90 MPH (flaps UP).
5. Wing Flaps -- AS DESIRED.
6. Airspeed -- 75 to 85 MPH (flaps DOWN).
7. Air Conditioner (if installed) -- OFF.

NOTE

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

AFTER LANDING

1. Wing Flaps -- UP.

2. Tail Wheel Lock -- UNLOCK.
3. Air Conditioner (if installed) -- AS DESIRED.

SECURING AIRPLANE

1. Parking Brake -- SET.
2. Radio and Electrical Equipment -- OFF.
3. Air Conditioner (if installed) -- OFF.
4. Mixture -- IDLE CUT-OFF (pulled full out).
5. Master Switch and Magneto Switches -- OFF.
6. Control Lock -- INSTALL.
7. Hopper and Dispersal System Plumbing -- EMPTY and CLEAN as described under Hopper and Gate Box paragraphs in Section 7.

SECTION 2 DESCRIPTION & OPERATING DETAILS

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

Page

INTRODUCTION

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

ENGINE CONTROLS

A control quadrant (located on the left side of the cockpit just below the door frame) contains the throttle lever and the propeller lever. Friction on the throttle and propeller controls can be increased by rotating the knurled friction lock on the side of the quadrant clockwise.

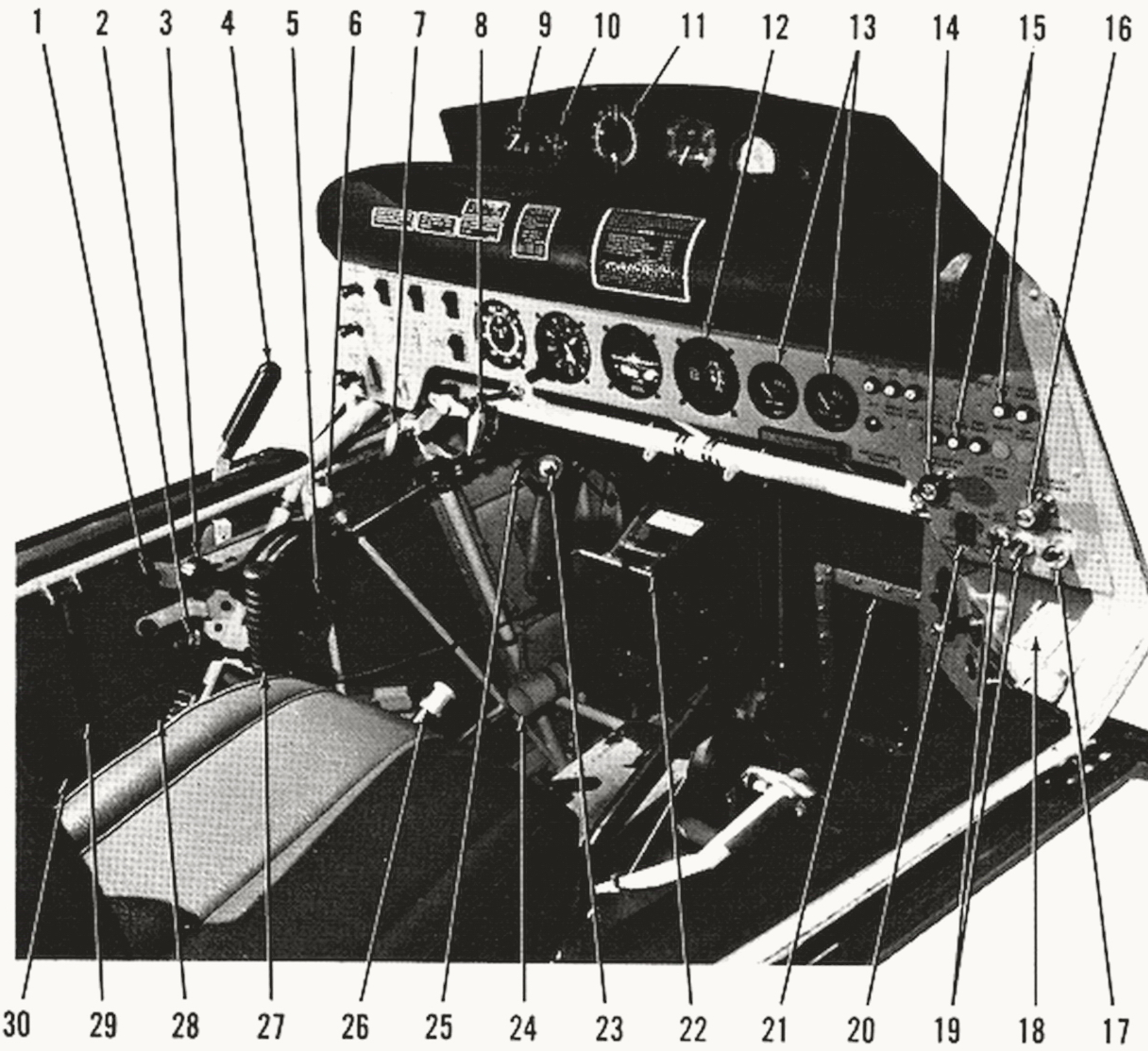
The throttle is the outboard lever on the control quadrant and is opened by moving it forward. A spring is attached to the throttle linkage to automatically advance the throttle in the event of a linkage failure. To prevent inadvertent throttle advancement, tighten the friction lock sufficiently to stop spring tension from moving the throttle. The inboard lever on the control quadrant is the propeller control lever. Forward movement of the lever increases RPM.

A red push-pull mixture control with a vernier feature is located just aft of the control quadrant. For precise mixture adjustments, rotate the control in or out to the desired position. For larger adjustments, depress the button on the end of the knob and push or pull the control as desired. The full-out position of the control is the idle cut-off position.

A double-button push-pull type engine alternate air control is located on the lower right side of the instrument panel. The control actuates an alternate air valve which selects the source of engine induction air (figure 2-2). Depressing the button on the end of the knob and pulling the control to the full-out position causes non-filtered air to be ducted to the throttle body. If the induction air inlet, ducting, or filter becomes blocked, the alternate air control should be pulled full out. This will bypass the blockage and provide the engine with induction air. The alternate air control should be pushed full in for normal operation.

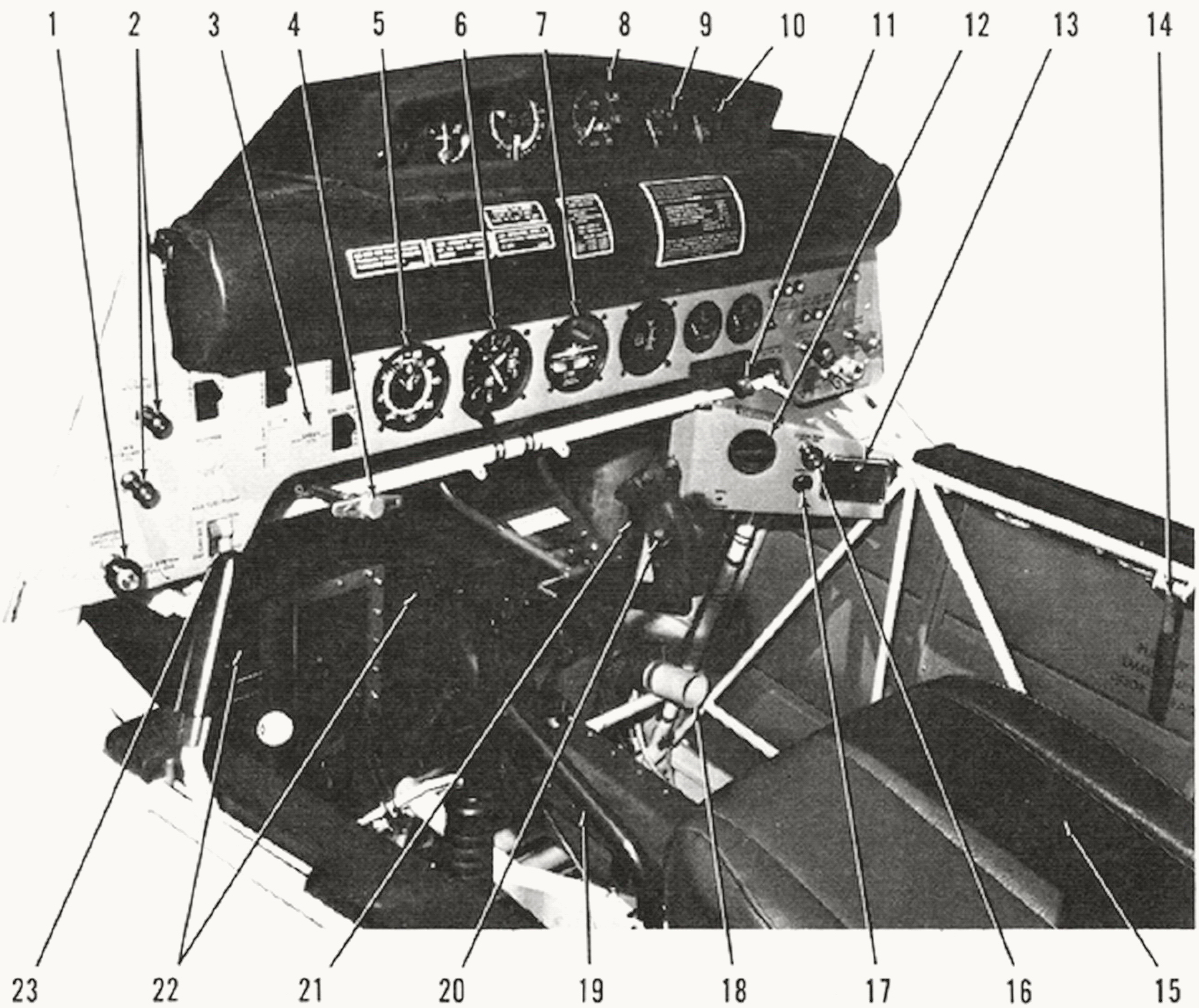
MAGNETO SWITCHES

Two separate magneto ignition toggle switches are located on the lower right side of the instrument panel. Each switch is ON in the up position and OFF in the down position. Operation of the magneto ignition system is conventional. The left magneto 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 magneto switch



1. Spray Valve Metering Stop Control Knob
2. Mixture Control Knob
3. Throttle
4. Manual Spray Valve Control Handle
5. Control Quadrant Friction Lock
6. Propeller Control Lever
7. Hydraulically - Driven Pump System On - Off "T" Handle
8. Boom Pressure Control Knob (Hydraulically - Operated System)
9. Spray Pressure Gage
10. Ammeter
11. Manifold Pressure/Fuel Flow Indicator
12. Cylinder Head Temperature Gage
13. Left and Right Fuel Quantity Indicators
14. Engine Alternate Air Control Knob
15. Circuit Breakers
16. Fuel Shutoff Valve Control Knob
17. Starter Switch
18. Map Light Switch
19. Left and Right Magneto Switches
20. Master Switch
21. Hopper Window
22. Control Stick Lock
23. Spray Valve Off Control Button
24. Left Cockpit Heat Outlet
25. Spray Valve On Control Button
26. Wing Flap Handle
27. Hopper Control and Dump Handle
28. Tail Wheel Lock Control "T" Handle
29. Left Emergency Door Release Lever
30. Elevator Trim Control Wheel

Figure 2-1. Cockpit Controls and Instrument Panel (Sheet 1 of 2)



1. Hopper Shutoff Valve Control Knob
2. Upper and Lower Instrument Light Rheostat Knobs
3. Interior and Exterior Lighting Switches
4. Parking Brake Handle
5. Airspeed Indicator
6. Altimeter
7. Turn Coordinator
8. Tachometer
9. Oil Pressure Gage
10. Oil Temperature Gage
11. Auxiliary Cockpit Air Control Knob
12. Adjustable Auxiliary Cockpit Air Outlet
13. Ashtray
14. Right Emergency Door Release Lever
15. Pilot's Seat
16. Cockpit Heat Control Knob
17. Cigar Lighter
18. Right Cockpit Heat Outlet
19. Control Stick
20. Automatic Flagman Control Button
21. Spray Light/Turn Light Trigger Switch
22. Hopper Quantity Indicator Markings
23. Auxiliary Fuel Pump Switch

Figure 2-1. Cockpit Controls and Instrument Panel (Sheet 2 of 2)

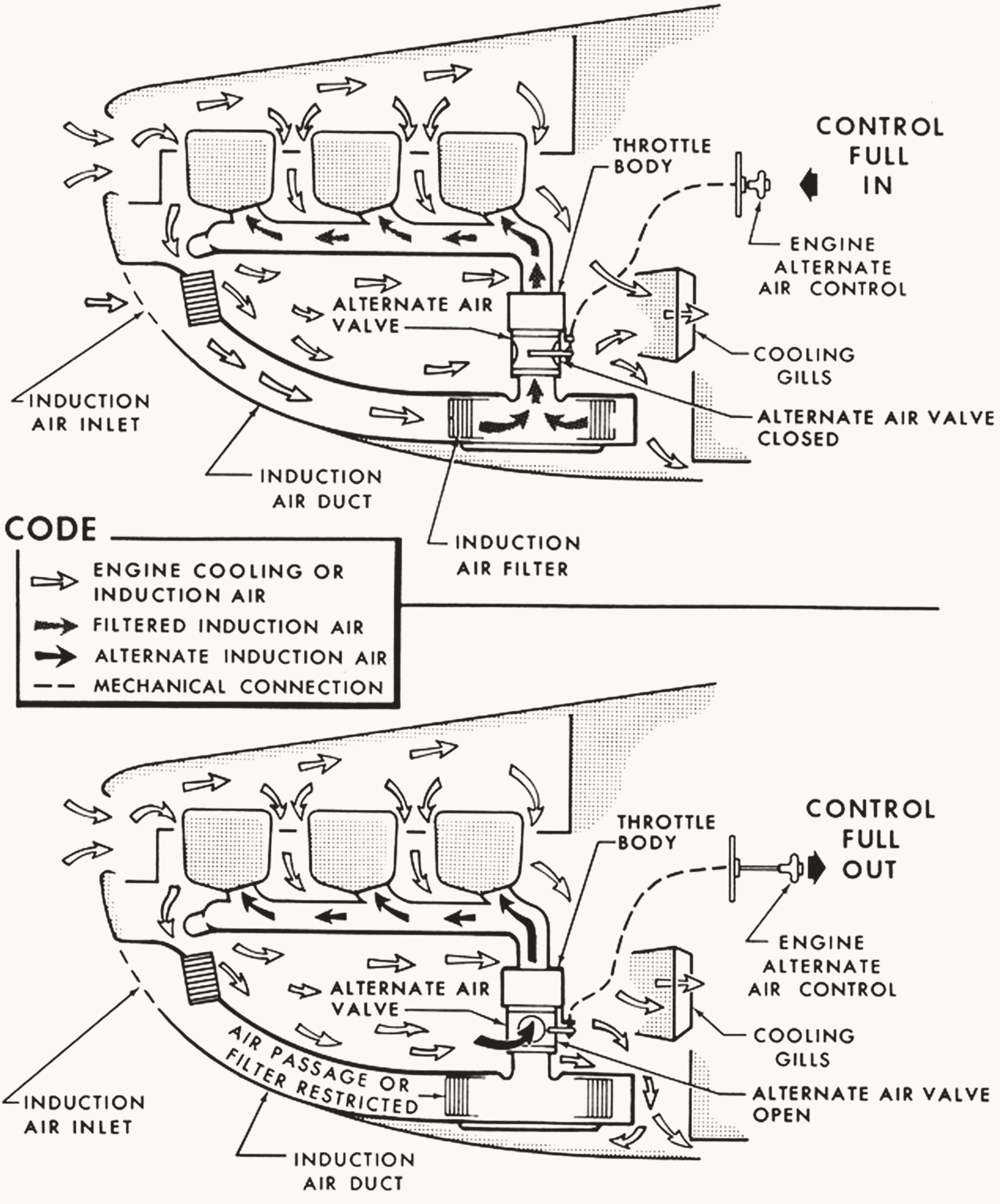


Figure 2-2. Induction Air System

controls the right magneto which fires the top spark plugs on the right bank and the bottom spark plugs on the left bank.

STARTER SWITCH

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 airplane battery or an external power source.

ENGINE INSTRUMENTS

TACHOMETER

A mechanically-driven recording tachometer is located in the instrument console above the crash pad and indicates both engine and propeller speed. An hour meter on the face of the instrument records elapsed engine time in hours and tenths.

For an explanation of the markings shown on the tachometer, refer to Section 4.

MANIFOLD PRESSURE/FUEL FLOW INDICATOR

A combination manifold pressure/fuel flow indicator is located in the console above the crash pad. 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 and is calibrated in gallons per hour. Fuel flows required to give adequate engine cooling in full throttle climbs are shown on a placard located on the instrument panel crash pad.

PROPELLER

The airplane is equipped with an 82-inch, constant-speed, two-bladed propeller as standard equipment. An 86-inch, two-bladed propeller and an 80-inch, three-bladed propeller are also available.

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.

ENGINE OIL SYSTEM

Oil for engine lubrication and propeller governor operation is supplied from a sump located at the bottom of the engine (see figure 2-3). Oil is picked up by the engine-driven pump, and is pumped through the engine oil filter screen (or the oil filter if installed) and then through the right oil gallery to a thermostat. When the oil temperature is low, the thermostat causes the oil to bypass the remotely mounted oil cooler. As the temperature rises, the thermostat closes, causing the oil to circulate 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 an oil filter is installed. However, the oil level should never be higher than the 12-quart mark on the dipstick.

An on-off oil drain valve (spring-loaded in the off position) is installed on the lower left side of the engine to facilitate draining of the engine sump. To drain the sump, turn the valve handle clockwise. Oil should be drained immediately after engine shutdown, while the oil is hot, to expedite oil draining.

FUEL SYSTEM

The fuel system (see figure 2-4) supplies fuel simultaneously from two 27-gallon bladder-type tanks (one in each wing). Total usable fuel for all flight conditions is 52 gallons.

Each wing tank is vented individually through vent lines, incorporating check valves, and terminating in ramp-type external vent plates under the leading edge of the wings. In addition, the tanks are cross vented, utilizing two lines connected to a reservoir tank. The fuel filler caps are also vented.

Fuel flows from both tanks, through the reservoir tank, to the fuel shutoff valve. With the shutoff valve in the open position, the mixture control rich (full in) and the engine running, fuel is drawn through the fuel strainer and through a check valve in the auxiliary fuel pump to the engine-driven fuel pump. Fuel is then directed to the fuel metering unit, where its flow is regulated by throttle and mixture controls. Metered fuel is then pumped through a distribution valve to the injection nozzles. Addi-

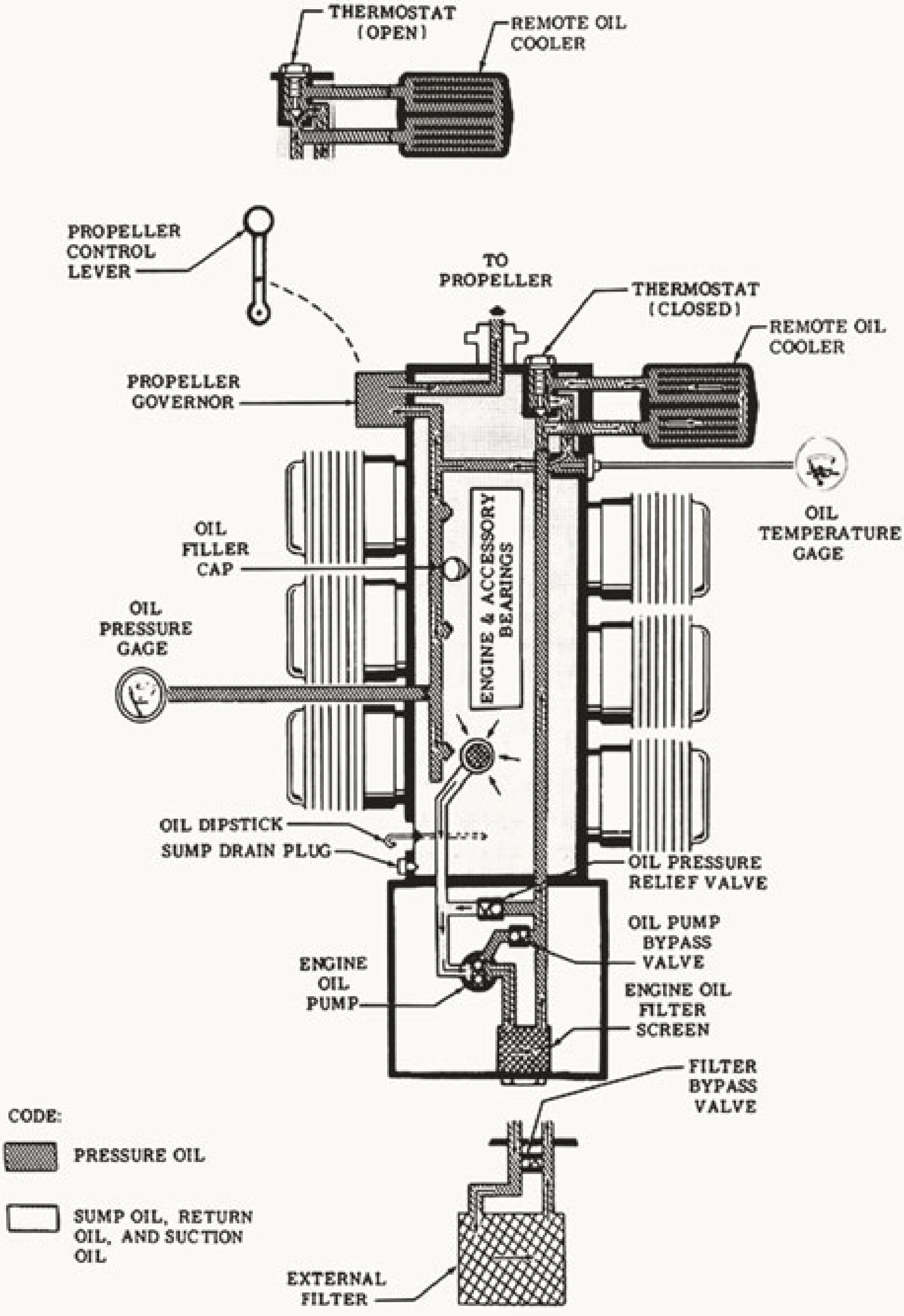


Figure 2-3. Engine Oil System

tional unmetered fuel is returned to the engine-driven fuel pump where excess fuel and vapor is then routed through a return line to the reservoir tank.

FUEL SHUTOFF VALVE KNOB

The red double-button fuel shutoff valve knob, located on the right side of the instrument panel, is connected by a push-pull control to a conventional two-position on-off valve. 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

The auxiliary fuel pump switch is located on the left side of the instrument panel and is a yellow and red split-rocker type switch.

The yellow right half of the switch is labeled START, and its upper ON position is used for normal starting, minor vapor purging and continued engine operation in the event of an engine-driven fuel pump failure. With the right half of the switch in the ON position, the pump operates at one of two flow rates that are dependent upon the setting of the throttle. With the throttle open to a cruise setting, the pump operates at a high enough capacity to supply sufficient fuel flow to maintain flight with an inoperative engine-driven fuel pump. When the throttle is moved toward the closed position (as during letdown, landing, and taxiing), the fuel pump flow rate is automatically reduced, preventing an excessively rich mixture during these periods of reduced engine speed.

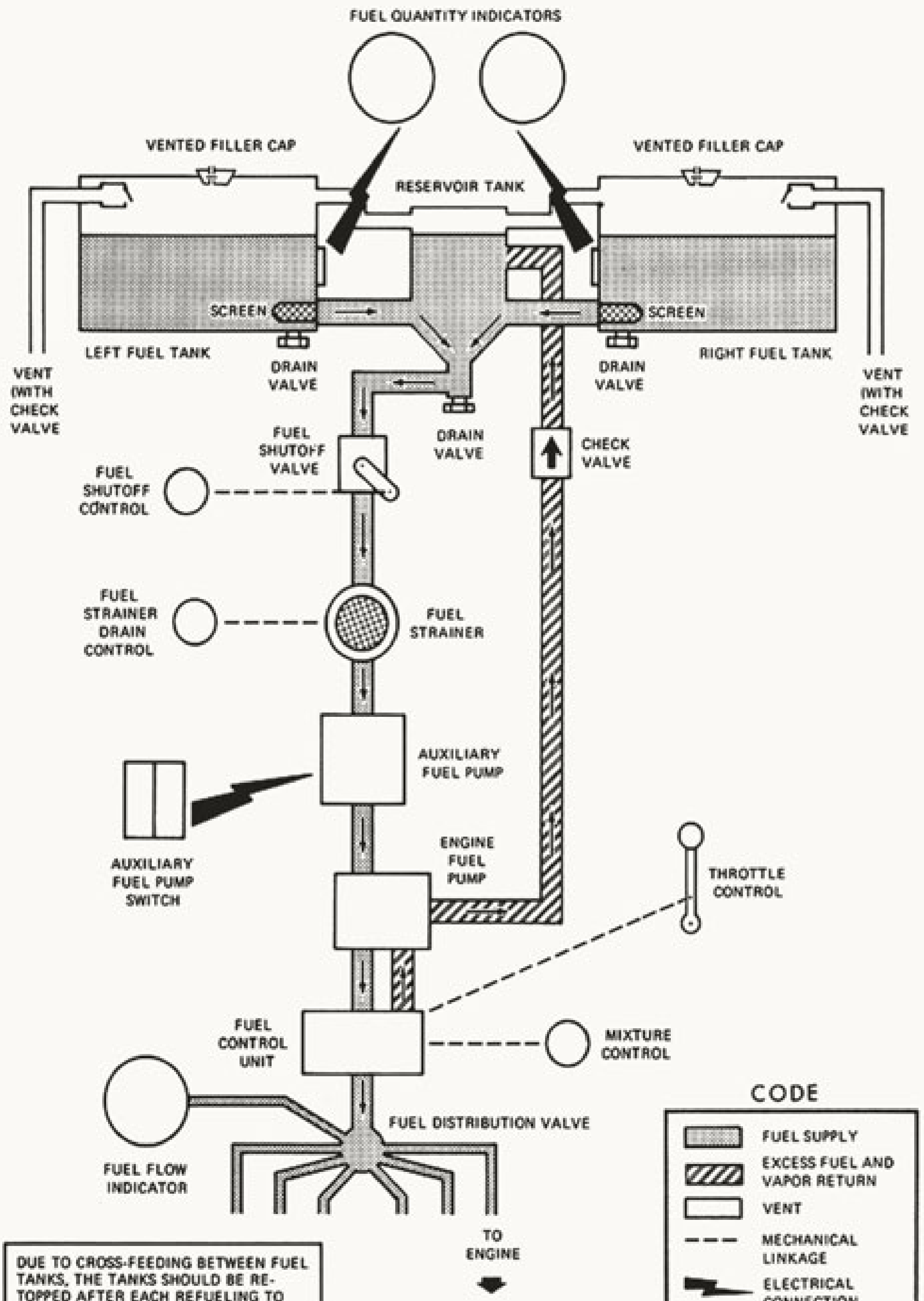
NOTE

If the engine-driven fuel pump is functioning and the auxiliary fuel pump switch is placed in the ON position, an excessively rich fuel/air ratio is produced unless the mixture is leaned. Therefore, this switch should be turned off during takeoff.

NOTE

If the auxiliary fuel pump switch is accidently placed in the ON position with the master switch on and the engine stopped, the intake manifolds will be flooded.

The red left half of the switch is labeled EMERG, and its upper HI position is used in the event of an engine-driven fuel pump failure during



DUE TO CROSS-FEEDING BETWEEN FUEL TANKS, THE TANKS SHOULD BE RE-TOPPED AFTER EACH REFUELING TO ASSURE MAXIMUM CAPACITY.

Figure 2-4. Fuel System

takeoff or high power operation. The HI position may also be used for extreme vapor purging. Maximum fuel flow is produced when the left half of the switch is held in the spring-loaded HI position. In this position, an interlock within the switch automatically trips the right half of the switch to the ON position. When the spring-loaded left half of the switch is released, the right half will remain in the ON position until manually returned to the OFF position.

STRAINER DRAIN CONTROL KNOB

A strainer drain control knob is located inside the left engine cowl access door on the airplane. It is connected to the strainer drain valve 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

The airplane is equipped with a 28-volt direct-current electrical system (see figure 2-5). The system is powered by an engine-driven 60-amp (or 95-amp) alternator and a 24-volt battery (a heavy duty battery is available). The battery serves as the basic power source 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 a higher amperage than a generator, at idle speed, making it far superior 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.

MASTER SWITCH

The split-rocker switch labeled MASTER, located on the lower right side of the instrument panel, is ON in the up position and OFF in the down position. The right half of the switch, labeled BAT, controls all electrical power to the airplane. The left half, labeled ALT, controls the alternator.

Normally, both sides of the master switch should be used simultaneously; however, the BAT side of the switch could be turned on separately to check equipment while on the ground. The ALT side of the switch, when

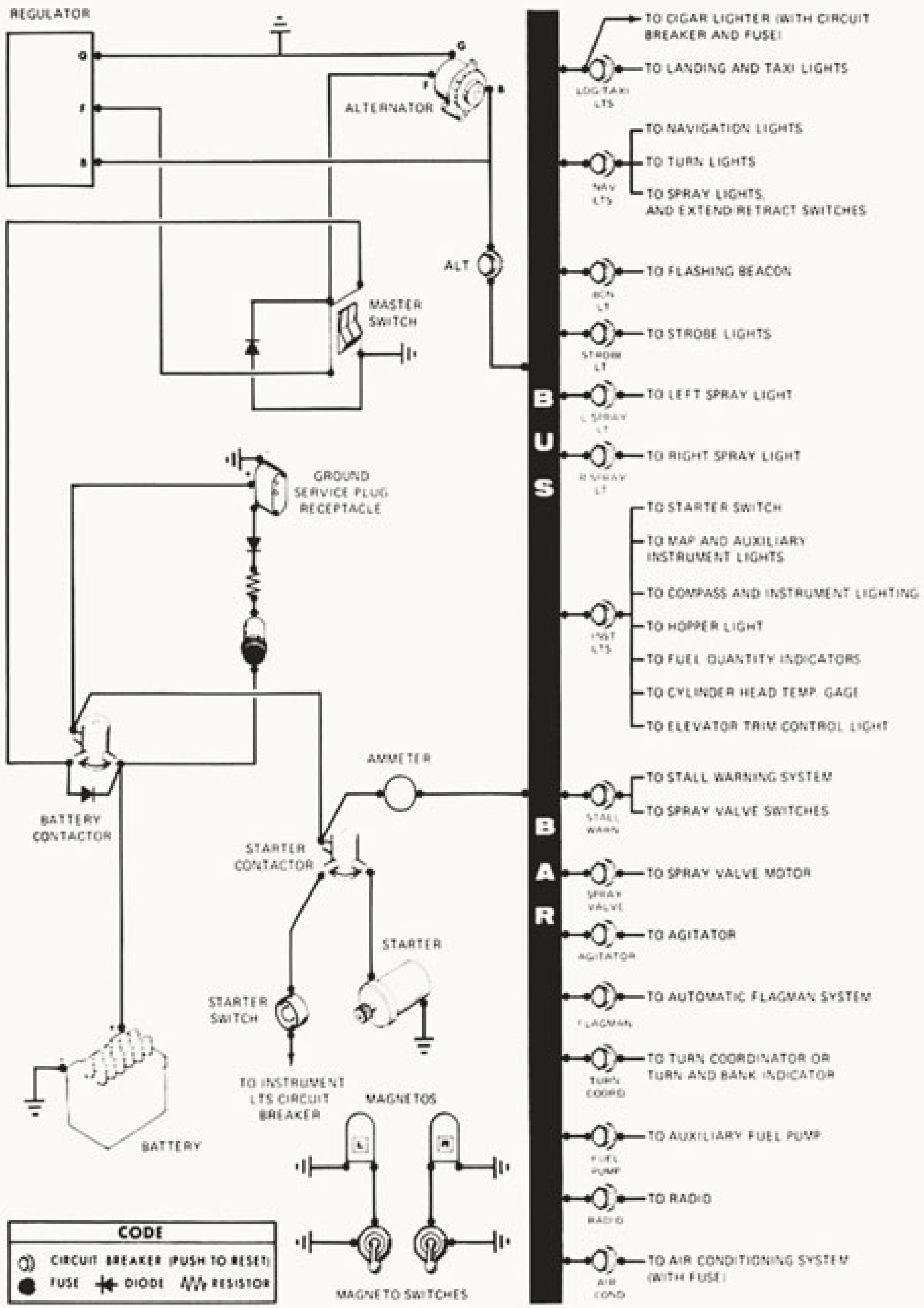


Figure 2-5. Electrical System (60 and 95 Amp)

placed in the OFF position, removes the alternator from the electrical system. With this switch in the OFF position, the entire electrical load is placed on the battery, and all nonessential electrical equipment should be turned off for the remainder of the flight.

AMMETER

The ammeter, located in the instrument console above the crash pad, indicates the amount of current, in amperes, from the alternator to the battery or from the battery to the airplane electrical system. When the engine is operating and the master switch is turned on, the ammeter indicates the charging rate applied to the battery. In the event the alternator is not functioning or the electrical load exceeds the output of the alternator, the ammeter indicates the discharge rate of the battery.

CIRCUIT BREAKERS AND FUSES

Most of the electrical circuits in the airplane are protected by "push-to-reset" circuit breakers mounted on the instrument panel. The cigar lighter is protected by a manually-reset circuit breaker on the back of the lighter, and a fuse behind the instrument panel. The air conditioner (if installed) is protected by a fuse behind the instrument panel, and by the AIR COND circuit breaker. A fuse mounted near the battery protects the battery contactor closing circuit.

GROUND SERVICE PLUG RECEPTACLE

A ground service plug receptacle is installed just aft of the firewall on the right side of the fuselage below the right forward fuselage panel.

Just before connecting an external power source (generator type or battery cart), turn the radio equipment off (if installed), and the master switch on.

WARNING

When turning on the master switch, using an external power source, or pulling the propeller through by hand, treat the propeller as if the magneto switches were on. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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, placing the master switch in the ON position will close the battery contactor.

LIGHTING EQUIPMENT

EXTERIOR LIGHTING

Exterior lighting consists of conventional navigation lights located on the wing tips and stinger, strobe lights on the wing tips, a flashing beacon on top of the vertical fin, landing and taxi lights in the nose cap, retractable spray lights on the lower surface of the wings, and wing tip turn lights.

The navigation lights, strobe lights, flashing beacon and landing and taxi lights are operated by split-rocker switches on the lower left side of the instrument panel. The switches are labeled NAV LTS, STROBE, BCN, LAND LT, and TAXI LT respectively, and are in the ON position when rotated to the upper position, and off in the lower position.

The spray lights and turn lights are controlled by a combination of split-rocker switches located on the lower left side of the instrument panel, and a trigger switch on the leading edge of the control stick grip. The spray lights are turned on and off by the left half of the split-rocker switch labeled SPRAY LTS FLAGMAN. This switch has three functions: When the switch is rotated to the ON (upper) position, the spray lights are turned on, and an electrical circuit is activated to the trigger switch on the control stick grip, allowing it to function as a selector switch between the spray lights and the turn lights. A second electrical circuit is activated to the extend/retract split-rocker switches labeled EXT, OFF, and RET (these switches are spring-loaded to the OFF position). The switch halves labeled L, and R, allow each spray light to be positioned independently for optimum ground illumination by momentarily rotating each switch to the EXT (upper) or RET (lower) position. When the spray run is completed and the turn lights are needed for the turn-around, depressing the trigger switch on the control stick grip will select the turn lights and simultaneously turn off the spray lights. At the end of the turn-around, releasing the trigger switch will select the spray lights and simultaneously turn off the turn lights. The Automatic Flagman may be used in conjunction with the spray lights and turn lights. For additional description and operation of the Automatic Flagman, refer to paragraphs in this Section and Section 7.

NOTE

The spray lights should be used sparingly during ground operations such as taxiing. When operating below 1000 RPM, the load placed on the 95-amp alternator as the lights are turned on could cause slippage or breakage of the alternator belt.

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. It may be desirable to turn off the flashing beacon during spray runs.

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

INTERIOR LIGHTING

Interior lighting consists of instrument panel flood lighting, map lighting, and post lighting.

Instrument panel flood lighting is provided by 13 red lights; four in the upper edge of the crash pad and nine in the lower edge of the crash pad. All 13 lights, and the magnetic compass light, are turned on or off by the left half of a split-rocker switch, labeled INST LT, located on the left side of the lower instrument panel. Light intensity is controlled by two dimming rheostats; one, labeled UPR INSTRUMENT LTS, controls the upper instrument panel lights and the compass light, and one, labeled LWR INSTRUMENT LTS, controls the lower lights.

Map lighting and additional instrument panel lighting is provided by a light mounted in the top of the cockpit. The light contains both red and white bulbs, and may be positioned to light any area desired by the pilot. A switch on the auxiliary panel, adjacent to the lower right corner of the instrument panel, is labeled RED, OFF, and WHITE. Moving the switch full forward will provide a red light. In the rear position, standard white lighting is provided. The center position is OFF.

The elevator trim wheel and indicator are lighted by a post light mounted on the structure above the trim wheel and indicator. The light is controlled by a split-rocker switch located on the left side of the instrument panel. The switch is labeled INST LT; the upper position is ON, and the lower position is off. The LWR INSTRUMENT LTS dimming rheostat, located on the left side of the instrument panel, controls the light intensity.

A light, mounted high on the aft side of the hopper, illuminates the interior of the hopper, giving the pilot an accurate check of the hopper

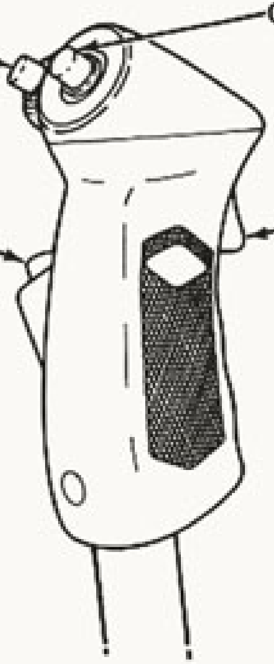


Figure 2-6. Control Stick Grip

quantity. The light is turned on or off with the left half of the split-rocker switch labeled INST LT, and the light intensity is controlled by the dimming rheostat labeled HOPPER LT.

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 better control feel during maneuvering flight.

When an electric spray valve, spray lights and turn lights, or an Automatic Flagman is installed, the control stick has a special grip containing additional controls (see figure 2-6). The top of the grip has two push-button switches labeled SPRAY VALVE. The button on the left side, labeled ON, opens the electric spray valve when pushed down; the button on the right side of the grip, labeled OFF, closes the spray valve when pushed down. A trigger switch, located on the leading edge of the grip, labeled TURN LTS, is used in switching from spray lights to turn lights. A push-button switch, located on the left side of the grip, is labeled FLAG-MAN, and when pushed down, operates the Automatic Flagman.

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°, 5°, 10°, and 20° of flap deflection. The flaps may be set in any one of the four 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 agricultural dispersal service. It consists of extra thick chrome-vanadium steel main landing gear springs and a spring-steel tubular tail wheel spring with a steerable tail wheel. The tail wheel steering arms are connected to the rudder cables with cables and springs. Tail wheel 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 tail wheel to free swivel and enable the airplane to be pivoted around the wheel being braked.

The airplane may also be equipped with bicycle type fenders over the main gear tires. The fenders are designed to help protect the propeller by deflecting mud and gravel being picked up and thrown by the tires. Adequate space is provided between the fender and tire to permit using the tire as a step during preflight inspection. The fenders should never be used as steps; however, the gear support brackets may be used.

The steerable tail wheel incorporates a manual anti-swivel locking system which can be engaged to limit steering to 2.5° left and right. A "T" handle on the fuselage structure to the left of the pilot's seat controls a spring-loaded locking lug on the tail wheel assembly. To lock the tail wheel, pull the handle aft and turn it to the locking detent. To unlock the tail wheel, turn the handle out of the locking detent and return it to the full forward position.

Towing lugs are available for attachment to the axle bolts on the inboard side of the main landing gear springs. With the aid of a suitable tow bar, fashioned to the operator's personal needs, the lugs permit towing and other ground handling with a vehicle.

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.

CONTROL STICK LOCK

The control stick lock protects the ailerons and elevator from buffeting by wind while the airplane is parked. The lock is hinged from the tubular structure just below the instrument panel, and is spring-loaded in the stowed position (rotated under the instrument panel). To lock the control stick, rotate the lock from the stowed position toward the control stick and engage the spring-loaded pin on the end of the control lock into the bracket on the forward side of the control stick.

If the airplane is equipped with an air conditioner, a spring-steel control lock is furnished to lock the controls. To install the control lock, attach the hook on the end of the lock to the tab on the forward side of the control stick, then snap the latch ends of the lock into the two tabs located on the structure above the air conditioner. After unlocking the controls, stow the control lock in the map compartment.

PILOT'S SEAT

The pilot's seat is available in two different designs: four-way and six-way.

The four-way seat is adjustable forward and aft, and up and down. To move the seat forward or aft, lift up on the tubular handle located under the front of the seat bottom and slide the seat to the desired position. After the seat is positioned, release the handle and move the seat until the locking pins engage holes in the seat rails. A crank located below the right front corner of the seat bottom is used to raise or lower the seat to the desired level.

The six-way seat may be moved forward or aft, and infinitely adjusted for height and angle of the seat back. Also, the seat is equipped with a right arm rest and a head rest. To move the seat forward or aft, lift up on the tubular handle located under the front of the seat bottom and slide the seat into the desired position. After the seat is positioned, release the handle and move the seat until the locking pins engage holes in the seat rails. A crank located below the right front corner of the seat bottom is used to raise or lower the seat to the desired level. The seat back may be adjusted to the desired angle by utilizing the crank located below the left front corner of the seat bottom. As the seat back is tilted forward or aft, the seat bottom angle will also change.

Seat belts and a double-strap shoulder harness are provided. The lower ends of the harness are permanently attached to the seat belt. The length of the harness is adjusted by means of metal adjusters located at chest height. A seat belt-shoulder harness system with an inertia reel is available. The reel is an automatic locking type which will permit the pilot to move forward or back freely, but will not permit a sudden forward movement with a load factor of 1.5 g's or more.

TAILCONE PRESSURIZATION

To help prevent contamination of the tailcone, it is pressurized by an air scoop in the vertical fin, which is vented into the tailcone. The amount of pressurization is not controllable, and pressurization will occur any-time the airplane is flown.

COCKPIT HEATING AND VENTILATING SYSTEMS

A cockpit heating system is available and utilizes exhaust manifold heated air routed to outlets near the pilot's feet to supply heat to the cockpit. The system is controlled by a knob, labeled CABIN HEAT, on the auxiliary panel below the right corner of the instrument panel. For cockpit heat, pull the knob out until the desired amount of heated air is obtained. To shut off cockpit heat, push the knob full in.

A windshield defogging system can be added to the heating system. Whenever the heating system is operating, heat is also transmitted to an outlet at the bottom of the windshield for defogging.

Cockpit ventilation is provided by two outlets located inside the top of the canopy, forward and aft of the pilot's head. The system consists of an external air scoop, an internal plenum, outlets with movable guide vanes, and an on-off control lever located slightly to the left of the magnetic compass. The on-off control operates a butterfly plate in the leading edge of the external scoop. When the lever is pushed full forward, the butterfly plate is closed and all air flow is stopped. If ventilation is desired, pull the lever aft until the desired amount is obtained. Maximum ventilation is obtained with the lever pulled full aft. Ventilation air flow direction may be adjusted by rotating the guide vanes up or down as desired.

An auxiliary cockpit ventilating system can be used for additional ventilation. The system consists of an air scoop on the right side of the fuselage, a duct from the scoop to an adjustable outlet below the right corner of the instrument panel, and a double-button control knob. The control knob, labeled AUX CABIN AIR, is located under the edge of the instrument panel on the right side and opens or closes the air scoop. If auxiliary ventilation is desired, depress the button on the end of the control knob and pull the knob full out, or adjust according to the amount of air flow desired. The direction of air flow may be changed by positioning the guide vanes in the outlet.

STARTING ENGINE

Proper fuel management and throttle adjustments are needed to obtain an easy start from the continuous-flow fuel-injection engine. The procedure outlined in Section 1 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, place the right half of the auxiliary fuel pump switch in the ON position and advance the throttle to obtain 8 to 10 gal/hr fuel flow. Then promptly turn off the fuel pump and return the throttle to idle. With both magneto switches on, depress the starter button. 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.

NOTE

During cold weather conditions, it may be necessary to place the auxiliary fuel pump switch in the HI 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

1. Throttle -- ADVANCE 1 INCH.
2. Magneto Switches -- ON.
3. Starter -- ENGAGE.

NOTE

During a restart after a brief shutdown in extremely hot weather, the presence of fuel vapor may require the auxiliary fuel pump to operate in the ON position for up to 1 minute or more before the vapor is cleared sufficiently to obtain 8 to 10 gal/hr for starting. If the above procedure does not obtain sufficient fuel flow, fully depress and hold the left half of the switch in the HI position to obtain additional fuel pump capability.

TAXIING

The tail wheel lock should be unlocked for steering while taxiing.

Since alternate intake air is unfiltered, the alternate air control should be pushed full in (closed) during all ground operations.

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 TAKEOFF

The magneto check should be made at 1700 RPM with the propeller in low pitch. RPM drop should not exceed 150 RPM on either magneto or show greater than 50 RPM differential between magnetos. 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 runup. The ammeter will remain within a needle width of zero if the alternator and voltage regulator are operating properly.

Prior to applying full throttle for takeoff, adjust the quadrant friction lock to prevent the throttle from creeping (throttle is spring-loaded to the full-open position). Similar friction lock adjustments should be made as required in other flight conditions to maintain a fixed throttle setting.

TAKEOFF

Takeoff should be conducted with the tail wheel lock engaged. Tail wheel travel will be limited to 2.5° each side of center, and weather vaning and shimmy tendencies will be minimized.

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

It is important that the auxiliary fuel pump switch be turned off for takeoff. Otherwise, the mixture will be excessively rich, causing a serious loss in power. Details of the auxiliary fuel pump system are given on page 2-10.

When takeoffs 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, the mixture should be adjusted during the initial takeoff 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 takeoff 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.

Takeoffs into strong crosswinds normally are performed with the minimum flap setting necessary for the field length to give maximum rudder effectiveness and to minimize drift angle immediately after takeoff.

ENROUTE CLIMB

If maximum rate-of-climb performance is desired, climb speed will vary from 91 MPH at sea level, decreasing to 88 MPH at 10,000 feet. Refer to figure 6-10 for recommended optimum climb speeds with dispersal equipment installed.

A cruising climb at 25 inches of manifold pressure, 2550 RPM (approximately 75% power) and 90 to 100 MPH is normally recommended. This type of climb provides better engine cooling, less engine wear, and improved visibility ahead. Cruising climbs should be conducted at 18 GPH up to 4000 feet with a fuel flow reduction of one GPH for each 2000 feet above 4000 feet.

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

CRUISING

Normal cruising is performed between 55% and 75% power. The corresponding power setting and fuel consumption for various altitudes can be determined from the Operational Data in Section 6.

NOTE

Cruising should be performed at 65% to 75% power until a total of 50 hours has accumulated or oil consumption has stabilized. This is to ensure proper seating of the rings and is applicable to new engines, and engines in service following cylinder replacement or top overhaul of one or more cylinders.

The mixture for extended cruising flight should be leaned at any altitude. Lean to roughness or noticeable power loss, and then enrichen approximately 2 GPH, or in accordance with the Cruise Performance chart in Section 6. Cruise leaning should be accomplished only during extended level flight periods and not during spray runs because of the serious distraction that could result.

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. All controls remain effective throughout the stall.

Power-off stall speeds at 3300 pounds gross weight and an aft center of gravity loading are presented in figure 6-2 as calibrated airspeeds. Power-on stall speeds are approximately 5 MPH lower than the power-off stall speeds.

NOISE ABATEMENT

Increased emphasis on improving the quality of our environment requires renewed effort on the part of all pilots to minimize the effect of airplane noise on the public.

We, as pilots, can demonstrate our concern for environmental improvement, by application of the following suggested procedures, and thereby tend to build public support for aviation.

1. Pilots operating aircraft under VFR over outdoor assemblies of persons, recreational and park areas, and other noise-sensitive areas should make every effort to fly not less than 2000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.
2. During departure from or approach to an airport, climb after takeoff and descent for landing should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas.

NOTE

The above recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instructions, or where, in the pilot's judgment, an altitude of less than 2000 feet is necessary for him to adequately exercise his duty to see and avoid other aircraft.

SECTION 3
EMERGENCY PROCEDURES

TABLE OF CONTENTS

INTRODUCTION

Emergencies caused by airplane or engine malfunctions are extremely rare if proper pre-flight inspections and maintenanace are practiced. However, should an emergency arise, the basic guidelines described in this section should be considered and applied as necessary to correct the problem.

EMERGENCY HOPPER DUMP

If, in the event of an emergency, it becomes necessary to dump the hopper contents, the following procedure is suggested.

1. Hopper Control Metering Stop -- ROTATE UP out of position.
2. Hopper Dump Handle -- FULL FORWARD to dump hopper load.
3. Control Stick -- APPLY FORWARD PRESSURE to maintain a steady climb attitude.
4. Hopper Dump Handle -- FULL AFT to close hopper dump door when altitude gain is satisfactory or hopper load is exhausted.

It is recommended that the pilot become familiar with pitch trim changes during an emergency dump. A suggested method for this is to dump a partial hopper load of water at altitude at least once at the beginning of the season. This will also permit a system check for proper operation.

When performing liquid dispersal operations, the hopper control metering stop should always be disengaged to permit unrestricted dumping of the hopper load due to an emergency. After an emergency hopper dump, the dump door may be closed in flight.

During dry material application, the hopper control metering stop will probably be in use. If an emergency dump becomes necessary, disengage the metering stop before the dump is attempted.

ENGINE FAILURES

ENGINE FAILURE DURING TAKEOFF RUN

1. Throttle -- IDLE.
2. Control Stick -- FULL AFT.
3. Brakes -- APPLY.
4. Wing Flaps -- RETRACT.

5. Mixture -- IDLE CUT-OFF.
6. Magneto Switches -- OFF.
7. Master Switch -- OFF.

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

1. Airspeed -- 85 MPH-IAS.
2. Hopper Load -- DUMP.
3. Mixture -- IDLE CUT-OFF.
4. Fuel Shutoff Valve -- OFF.
5. Magneto Switches -- OFF.
6. Master Switch -- OFF.
7. Wing Flaps -- AS REQUIRED (20° recommended).

ENGINE FAILURE DURING FLIGHT

If an engine stoppage occurs, establish a flaps-up glide at 85 MPH. If time permits, attempt to restart engine by checking for the following: proper fuel shutoff control position, adequate fuel flow, and improved operation on a single magneto.

1. Airspeed -- 85 MPH-IAS.
2. Fuel Shutoff Valve -- CHECK IN.
3. Mixture -- RICH.
4. Throttle -- CRACKED 1 INCH.
5. Auxiliary Fuel Pump -- ON to obtain 4 - 6 GPH, then OFF.
6. Magneto Switches -- ON.
7. Starter -- ENGAGE (if propeller is stopped).

FORCED LANDINGS

EMERGENCY LANDING WITHOUT ENGINE POWER

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

1. Hopper Load -- DUMP.
2. Seat Belt, Shoulder Harness -- CHECK for snug fit.
3. Mixture -- IDLE CUT-OFF.
4. Fuel Shutoff Valve Control Knob -- OFF.
5. All Switches -- OFF.
6. Airspeed -- MAINTAIN 85 MPH on approach.
7. Wing Flaps -- EXTEND as necessary within gliding distance of field.
8. Touchdown -- 3-POINT ATTITUDE.
9. Brakes -- APPLY HEAVILY.

NOTE

Increase the above listed airspeeds by 5 MPH if landing must be made at maximum restricted category weight.

PRECAUTIONARY LANDING WITH ENGINE POWER

Some advance preparations prior to making a precautionary landing at an unfamiliar "off airport" site should be made as follows:

1. Hopper Load -- DUMP.
2. Seat Belt, Shoulder Harness -- CHECK for snug fit.
3. Wing Flaps -- 10°.
4. Airspeed -- 90 MPH.
5. Selected Field -- FLY OVER, noting preferred area for touchdown, then retract flaps upon reaching a safe altitude and airspeed.
6. All Switches (except magneto switches) -- OFF, on downwind leg.
7. Wing Flaps -- 20°.
8. Airspeed -- MAINTAIN 80 MPH on approach.
9. Touchdown -- 3-POINT ATTITUDE.
10. Brakes -- APPLY HEAVILY.
11. Magneto Switches -- OFF.

EMERGENCY DOOR RELEASE

If an emergency arises which requires rapid evacuation of the airplane during ground operations or after an emergency landing, proceed as follows:

1. Canopy Door Latch -- RELEASE, if possible.
2. Emergency Door Release Lever -- ROTATE UPWARD.
3. Canopy Door -- PUSH AWAY from airplane.
4. Seat Belt -- RELEASE.
5. Airplane -- EVACUATE.

NOTE

Evacuate from the right side, if feasible, on airplanes equipped with a manually-operated spray valve. The spray valve control handle extends above the left door sill, and may interfere with an evacuation from the left side.

Periodic inspection of the emergency door release mechanism on each canopy door is recommended to maintain familiarity with its function and assure its operation if needed.

FIRES

DURING START ON GROUND

1. Magneto Switches -- ON.
2. Starter -- ENGAGE (continue cranking to obtain start).
3. Auxiliary Fuel Pump -- OFF.

If engine starts:

4. Power -- 1700 RPM for a few minutes.
5. Engine -- SHUTDOWN and inspect for damage.

If engine fails to start:

4. Starter -- ENGAGE (continue cranking).
5. Throttle -- FULL OPEN.
6. Mixture -- IDLE CUT-OFF.
7. Fire Extinguisher -- OBTAIN (have ground attendants obtain if not installed).
8. Engine -- SECURE.
   a. Magneto Switches -- OFF.
   b. Master Switch -- OFF.
   c. Fuel Shutoff Valve -- OFF.
9. Fire -- EXTINGUISH using fire extinguisher, wool blanket or dirt.

NOTE

If sufficient ground personnel are available (and fire is on ground and not too dangerous) move airplane away from the fire by pushing rearward on the leading edge of the horizontal tail.

10. Fire Damage -- INSPECT, repair damage or replace damaged components or wiring before conducting another flight.

ENGINE FIRE IN FLIGHT

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

1. Fuel Shutoff Valve Knob -- OFF.
2. Master and Magneto Switches -- OFF.
3. Mixture -- IDLE CUT-OFF.
4. Cabin Heat and Air -- OFF.
5. Airspeed -- 120 MPH (If fire is not extinguished, increase glide

speed to find an airspeed which will provide an incombustible mixture.)

6. Select a field suitable for a forced landing.
7. Forced Landing -- EXECUTE (as described in Emergency Landing Without Engine Power). Do not attempt to restart the engine.

ELECTRICAL FIRE IN FLIGHT

The initial indication of an electrical fire is usually the odor of burning insulation. The following procedure should then be used:

1. Master Switch -- OFF.
2. All Radio/Electrical Switches -- OFF.
3. Vents/Cabin Air/Heat -- CLOSED.
4. Fire Extinguisher -- ACTIVATE (if available).

WARNING

After discharging a fire extinguisher in a closed cockpit, ventilate the cockpit.

If fire appears out and electrical power is necessary for continuance of flight:

5. Master Switch -- ON.
6. Circuit Breakers -- CHECK for faulty circuit, do not reset.
7. Radio/Electrical Switches -- ON one at a time, with delay after each until short circuit is localized.
8. Vents/Cabin Air/Heat -- OPEN when it is ascertained that fire is completely extinguished.

SPINS

Intentional spins are prohibited in this airplane. Should an inadvertent spin occur, the following recovery technique should be used.

1. RETARD THROTTLE TO IDLE POSITION.
2. PLACE AILERONS IN NEUTRAL POSITION.
3. APPLY AND **HOLD** FULL RUDDER OPPOSITE TO THE DIRECTION OF ROTATION.
4. AS THE RUDDER REACHES THE OPPOSITE STOP (APPROXIMATELY 1/4 TURN), MOVE THE CONTROL STICK **BRISKLY** FORWARD.
5. **HOLD** THESE CONTROL INPUTS UNTIL ROTATION STOPS.
6. AS ROTATION STOPS, NEUTRALIZE RUDDER AND MAKE A SMOOTH RECOVERY FROM THE RESULTING DIVE.

ROUGH ENGINE OPERATION OR LOSS OF POWER

SPARK PLUG FOULING

A slight engine roughness in flight may be caused by one or more spark plugs becoming fouled by carbon or lead deposits. This may be verified by switching momentarily from one magneto to the other. An obvious power loss in single magneto 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 both magnetos unless extreme roughness dictates the use of a single magneto.

MAGNETO MALFUNCTION

A sudden engine roughness or misfiring is usually evidence of magneto problems. Switching momentarily from one magneto to the other will identify which magneto is malfunctioning. Select different power settings and enrichen the mixture to determine if continued operation on both magnetos is practical. If not, leave the good magneto in the ON position and proceed to the nearest airport for repairs.

ENGINE-DRIVEN FUEL PUMP FAILURE

Failure of the engine-driven fuel pump will be evidenced by a sudden reduction in the fuel flow indication **prior to a loss of power**, while operating with adequate fuel.

In the event of an engine-driven fuel pump failure during takeoff, immediately hold the left half of the auxiliary fuel pump switch in the HI position until the airplane is well clear of obstacles. Upon reaching a safe altitude, and reducing the power to a cruise setting, release the HI side of the switch. The ON position will then provide sufficient fuel flow to maintain engine operation while maneuvering for a landing.

If an engine-driven fuel pump failure occurs during cruising flight, apply full rich mixture and hold the left half of the auxiliary fuel pump switch in the HI position to re-establish fuel flow. Then, the normal ON position (the right half of the fuel pump switch) may be used to sustain level flight. If necessary, additional fuel flow is obtainable by holding the left half of the pump switch in the HI position.

LOW OIL PRESSURE

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

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

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

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

EXCESSIVE RATE OF CHARGE

After engine starting and heavy electrical usage at low engine speeds (such as extended taxiing) the battery condition will be low enough to accept above normal charging during the initial part of a flight. However, after thirty minutes of cruising flight, the ammeter should be indicating less than two needle widths of charging current. If the charging rate were to remain above this value on a long flight, the battery would overheat and evaporate the electrolyte at an excessive rate. Electronic components in the electrical system could be adversely affected by higher than normal voltage if a faulty voltage regulator is causing the overcharging. To preclude these possibilities, turn off the ALT side of the master switch. The flight should be terminated and/or the current drain on the battery minimized because the battery can supply the electrical system for only a limited period of time. If the emergency occurs at night, power must be conserved for later use of the landing light during landing.

INSUFFICIENT RATE OF CHARGE

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

SECTION 4
OPERATING LIMITATIONS

TABLE OF CONTENTS

Page

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. A188B.

The airplane may be equipped for day or night VFR operation. Your Cessna Dealer will be happy to assist you in selecting equipment best suited to your needs.

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

MANEUVERS - NORMAL CATEGORY

The airplane is certified 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 5° .... +2.5
*Flaps Down 10°- 20° .... +2.0

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

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:

The Ag Wagon and Ag Truck have been demonstrated at weights up to 4000 and 4200 pounds respectively. With the Ag Truck and its 280-gallon (37.4 cu. ft.) hopper, it is possible to exceed the 4200 pound restricted weight by a considerable amount if high density materials are carried in the hopper. The Ag Truck hopper is limited to 1800 pounds maximum, and particular attention is required so that neither the gross weight of the airplane nor the hopper is exceeded. Takeoff performance at these gross weights is limited, and ideal field elevation, runway, and weather conditions are expected to exist in obtaining satisfactory takeoff 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 takeoff 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 121 MPH. The airplane may be operated at this speed with a maximum flap extension of 5°. 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. Operation of the airplane with flap extensions in excess of 5° must be limited to no more than 109 MPH or 2.0 g's.

Although the airplane is capable of working at speeds from 85 MPH to 121 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 airplane's landing gear and 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 takeoffs at increasing gross weights on a trial basis.

4. TAKEOFF, CLIMB, AND CRUISE:

Conditions of high temperature, high altitude, rough takeoff surfaces and terrain clearances at the end of the runway should obviously be considered when determining the specific takeoff gross weight of this airplane. As a guide, a takeoff chart is included in Section 6 to show the normally expected takeoff run for the airplane with optional spray equipment installed. Also included are charts for varying gross weights above 3300 pounds, and notes for operation on grass runways and above standard temperature conditions. When agricultural equipment is installed, the takeoff ground run will not be affected significantly, but the air distance over an obstacle will be increased appreciably.

The optimum flap setting for takeoff at the maximum restricted category gross weight with dispersal equipment installed is 10°. Best acceleration to takeoff 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 78 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.

Takeoffs and landings may be made with the tail wheel locked or unlocked, the use of the lock being left to the individual pilot's preference. However, if there is a strong crosswind, it is advisable to takeoff with the tail wheel unlocked. At high gross weights and low speeds at the start of the takeoff run, a more positive directional control of the airplane can be maintained with the tail wheel unlocked and held on the ground during the takeoff roll. It will be helpful to lock the tail wheel when landing on a rough field, in a strong crosswind, and at a high gross weight. In these conditions, an unlocked tail wheel could be deflected at touchdown, and it could shimmy during the landing roll.

Climb and cruise performance differentials with various Cessna Dispersal equipment options are shown in Section 6.

5. LANDING WEIGHT:

The landing gear is designed for a landing weight of 3300 pounds gross weight. It is normally expected that all landings will be made at or below this gross weight figure. If a landing at a higher gross weight is required, caution should be exercised 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 judgment of the operator coupled with his own experience will provide the most useful guideline for operating the airplane. Good judgment and caution are required at all times.

AIRSPEED LIMITATIONS*

The following is a list of the certificated airspeed limitations for the airplane.

	IAS MPH	CAS MPH
Never Exceed Speed (glide or dive, smooth air)	182	181
Maximum Structural Cruising Speed	146	144
Maximum Speed, Flaps Extended:		
Flaps 5°	121	119
Flaps 10° - 20°	109	107
**Maneuvering Speed:		
3300 Lbs	118	113
2800 Lbs	107	104
2300 Lbs	98	95

*These limitations apply only to airplanes WITHOUT dispersal equipment installed. For airplanes with dispersal equipment installed, see placard adjacent to airspeed indicator: MAX OPERATING SPEED IN AGRICULTURAL OPERATIONS -- 121 MPH IAS (105 KNOTS IAS).

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

AIRSPEED INDICATOR MARKINGS

The following is a list of the certificated indicated airspeed markings for the airplane.

Never Exceed (glide or dive, smooth air)	182 MPH (red line)
Caution Range	146 to 182 MPH (yellow arc)
Normal Operating Range	67 to 146 MPH (green arc)
Flap Operating Range	62 to 109 MPH (white arc)

ENGINE OPERATION LIMITATIONS

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

ENGINE INSTRUMENT MARKINGS

OIL TEMPERATURE GAGE

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

OIL PRESSURE GAGE

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

MANIFOLD PRESSURE GAGE

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

TACHOMETER

Normal Operating Range . . . . 2200-2550 RPM (green arc)
Caution Range . . . . 2700-2850 RPM (yellow arc)
Do Not Exceed (Engine rated speed) . . . . . . 2850 RPM (red line)

FUEL FLOW INDICATOR

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

NOTE

A placard near the fuel flow indicator provides maximum performance takeoff/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

CYLINDER HEAD TEMPERATURE GAGE

Normal Operating Range . . . . 300°-460°F (green arc)
Do Not Exceed . . . . 460°F (red line)

FUEL QUANTITY INDICATORS

Empty . . . . E (red line)
(2.0 gallons total unusable.)

FLIGHT WITH CANOPY DOORS REMOVED

Although there are no adverse flight characteristics with one or both canopy doors removed, a **significant** penalty occurs in 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 with these fairings removed.

WEIGHT AND BALANCE

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

Select the Sample Loading Problem applicable to your airplane. Take the basic empty weight and moment from appropriate weight and balance records carried in your airplane, and write them down in the column titled YOUR AIRPLANE on the Sample Loading Problem.

NOTE

The basic empty weight and moment are recorded on the Weight and Balance and Installed Equipment Data sheet, or on revised weight and balance records, and are included in the airplane file. In addition to the basic empty weight and moment noted on these records, the C.G. arm (fuselage station) is also shown, but need not be used on the Sample Loading Problem. The moment which is shown must be divided by 1000 and this value used as the moment/1000 on the loading problem.

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

NOTE

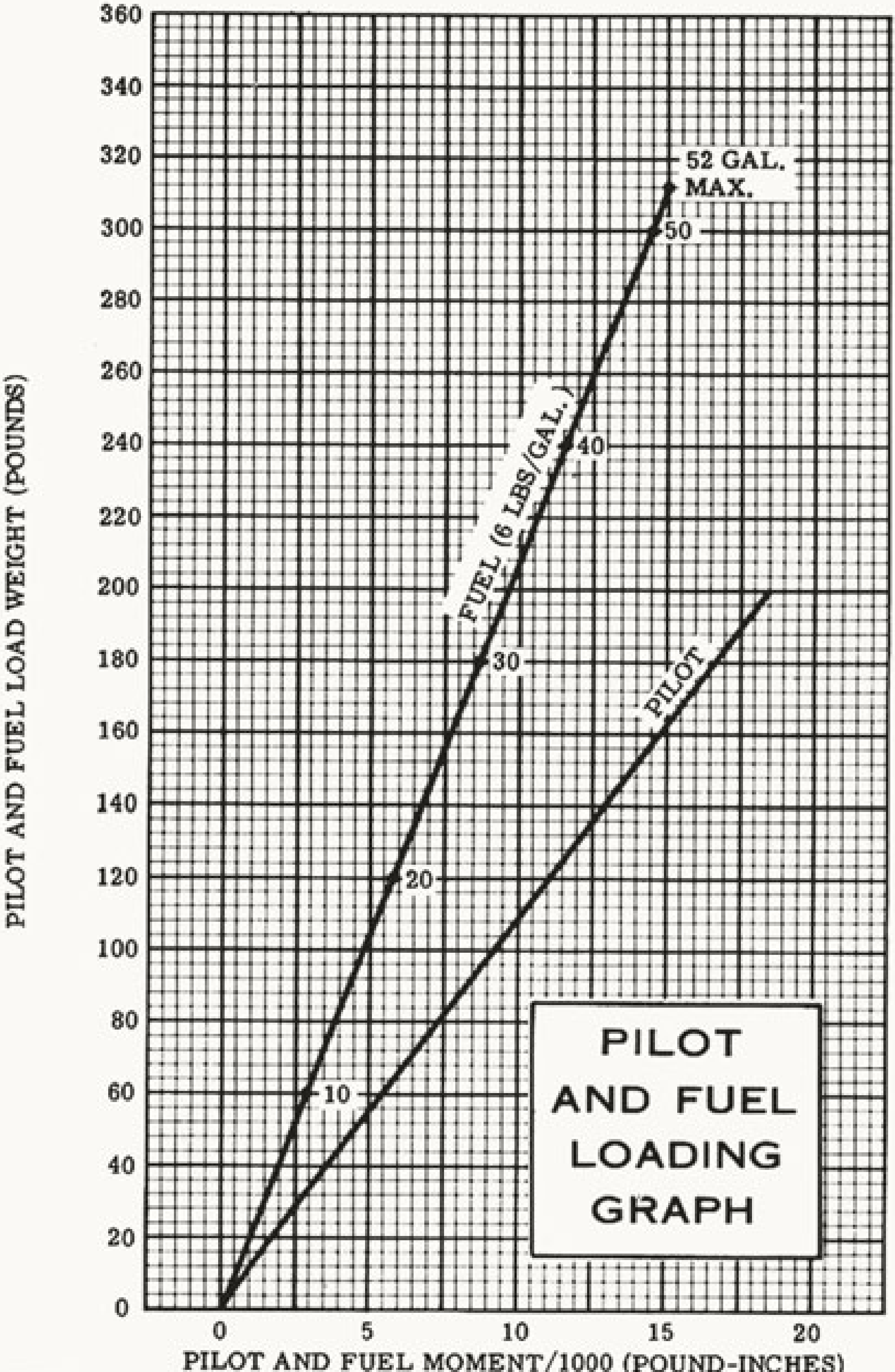
The Sample Loading Problem provides for determination of the airplane's Weight and Moment/1000 in two load configurations; one at the heaviest weight to be expected during the flight, and another at the most aft center of gravity position to be anticipated during the flight. The heaviest condition exists at initial takeoff with fuel and hopper load at its greatest. The maximum aft center of gravity condition exists when the hopper load is least and fuel load is greatest.

SAMPLE LOADING PROBLEM FOR Ag Wagon	SAMPLE AIRPLANE		YOUR AIRPLANE	
	Weight (lbs.)	Moment (lb.-ins. /1000)	Weight (lbs)	Moment (lb.-ins. /1000)
1. Basic Empty Weight (Use data pertaining to your airplane as it is presently equipped. Includes unusable fuel and full oil)	2176	89.2		
2. Usable Fuel (52 Gal. Maximum at 6 Lbs./Gal.)	312	15.0		
3. Pilot (Station 91 to 95)	170	15.8		
4. Miscellaneous				
5. TOTAL WEIGHT AND MOMENT - HOPPER EMPTY	2658	120.0		
6. Locate this point (2658 at 120.0) on the Center of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable for flight with hopper empty.				
7. Hopper Load (1670 Lbs. Maximum)	1342	58.0		
8. TOTAL WEIGHT AND MOMENT - HOPPER LOADED	4000	178.0		
9. Locate this point (4000 at 178.0) on the Center of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable for flight with hopper loaded.				

Figure 4-1. Sample Loading Problem (Ag Wagon)

SAMPLE LOADING PROBLEM FOR Ag Truck	SAMPLE AIRPLANE		YOUR AIRPLANE	
	Weight (lbs.)	Moment (lb.-ins. /1000)	Weight (lbs.)	Moment (lb.-ins. /1000)
1. Basic Empty Weight (Use data pertaining to your airplane as it is presently equipped. Includes unusable fuel and full oil)	2234	90.5		
2. Usable Fuel (52 Gal. Maximum at 6 Lbs./Gal)	312	15.0		
3. Pilot (Station 91 to 95)	170	15.8		
4. Miscellaneous				
5. TOTAL WEIGHT AND MOMENT - HOPPER EMPTY	2716	121.3		
6. Locate this point (2716 at 121.3) on the Center of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable for flight with hopper empty.				
7. Hopper Load (1800 Lbs. Maximum)	1484	51.5		
8. TOTAL WEIGHT AND MOMENT - HOPPER LOADED	4200	172.8		
9. Locate this point (4200 at 172.8) on the Center of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable for flight with hopper loaded.				

Figure 4-2. Sample Loading Problem (Ag Truck)



NOTE: Line representing Pilot shows the pilot center of gravity on adjustable seat positioned for an average occupant. Refer to the Sample Loading Problem for forward and aft limits of occupant C.G. range.

Figure 4-3. Pilot And Fuel Loading Graph

Prior to calculation of hopper loading, it is important to know the density of the dispersal material to be applied. Convenient conversion factors are given so that the density of the material being applied may be converted into lbs/gallons which can be used in conjunction with the Load Density Graph and Hopper Loading Graph. Use of the Load Density Graph will permit calculations of: (1) the weight of a load when the hopper is filled to a particular volume, and (2) the volume of material that can be carried without exceeding the weight limitations of the hopper or airplane. Conversion factors are as follows:

Lbs/U.S. Bushel x .1074 = Lbs/U.S. Gallon
Lbs/Cubic Feet x .1337 = Lbs/U.S. Gallon

1. TO CALCULATE THE WEIGHT OF A HOPPER LOAD, locate the intended volume to be carried at the bottom of the Load Density Graph and read upward until intersecting the material density line (1 thru 10 lbs/gallon) for the material being used; then read across to the left to find the weight of the hopper load. Check to see that this weight does not cause the gross weight of the airplane to be exceeded.

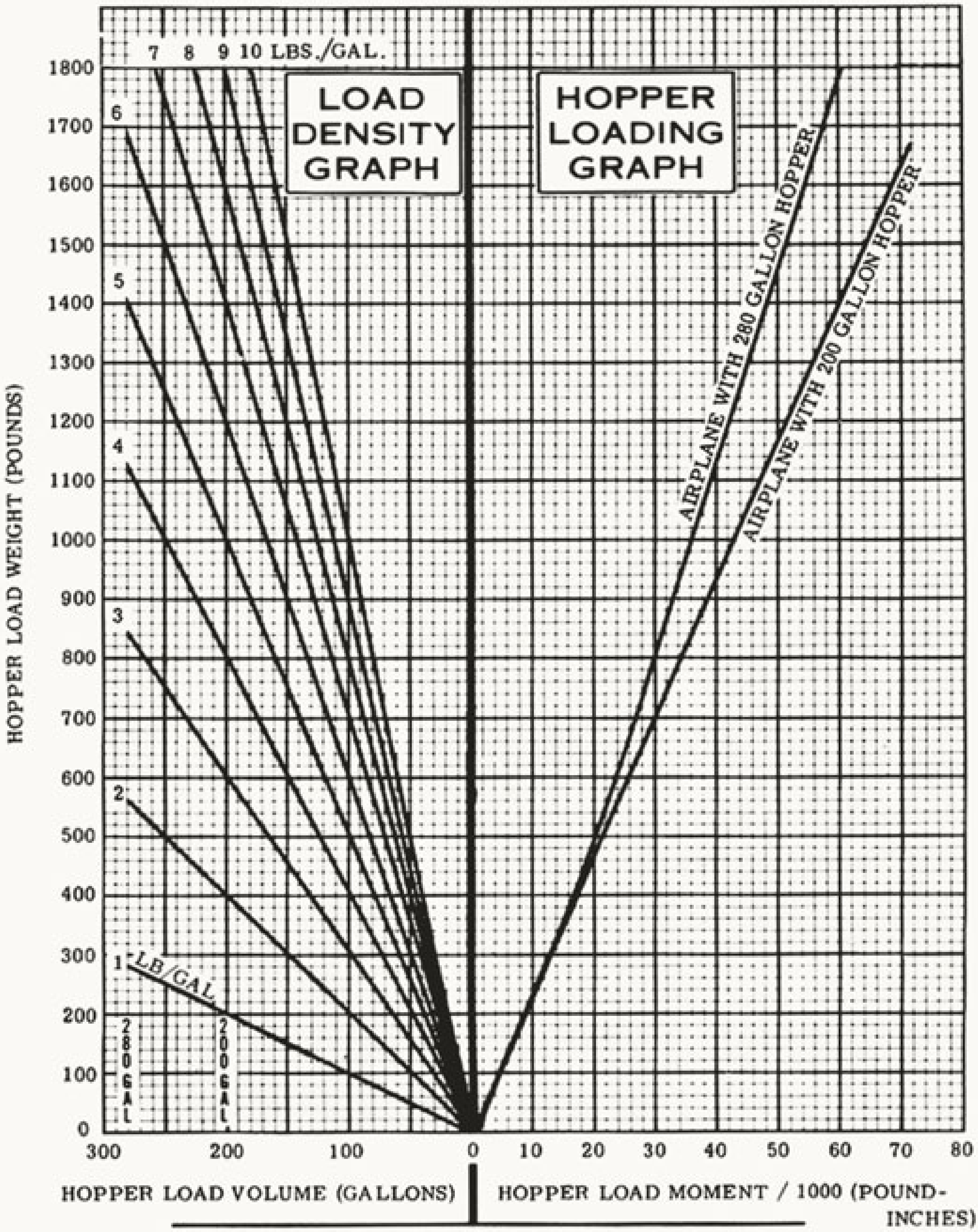
2. TO CALCULATE THE VOLUME OF THE DESIRED HOPPER LOAD, locate the weight of the hopper load on the left side of the Load Density Graph and read across until intersecting the material density line (1 thru 10 lbs/gallon) for the material being used; then read down to the bottom to find the volume of the hopper load in gallons. If the volume exceeds the volume capacity of your hopper, reduce the weight accordingly.

3. TO CALCULATE THE MOMENT/1000 FOR HOPPER LOADS, locate the weight of the hopper load (as determined in steps 1 or 2 above) on the left side of the Hopper Loading Graph and read across to the right until intersecting the line representing the size of the airplane hopper. From this point, drop down vertically and read the moment/1000. Write the weight and moment/1000 in the appropriate Sample Loading Problem.

NOTE

The 280-gallon hopper is restricted to loads of 1800 pounds or less; the 200-gallon hopper can carry loads of 1670 pounds or less (indicated by the line on the Loading Graph).

Figure 4-4. Calculation Of Hopper Load Weight, Volume and Moment/1000



NOTE: (1) Lbs. /U.S. Bushel x .1074 = Lbs. /U.S. Gallon
(2) Lbs. /Cubic Feet x .1337 = Lbs. / U.S. Gallon
(3) The density of water is 8.345 Lbs. /U.S. Gallon

Figure 4-5. Load Density Graph and Hopper Loading Graph

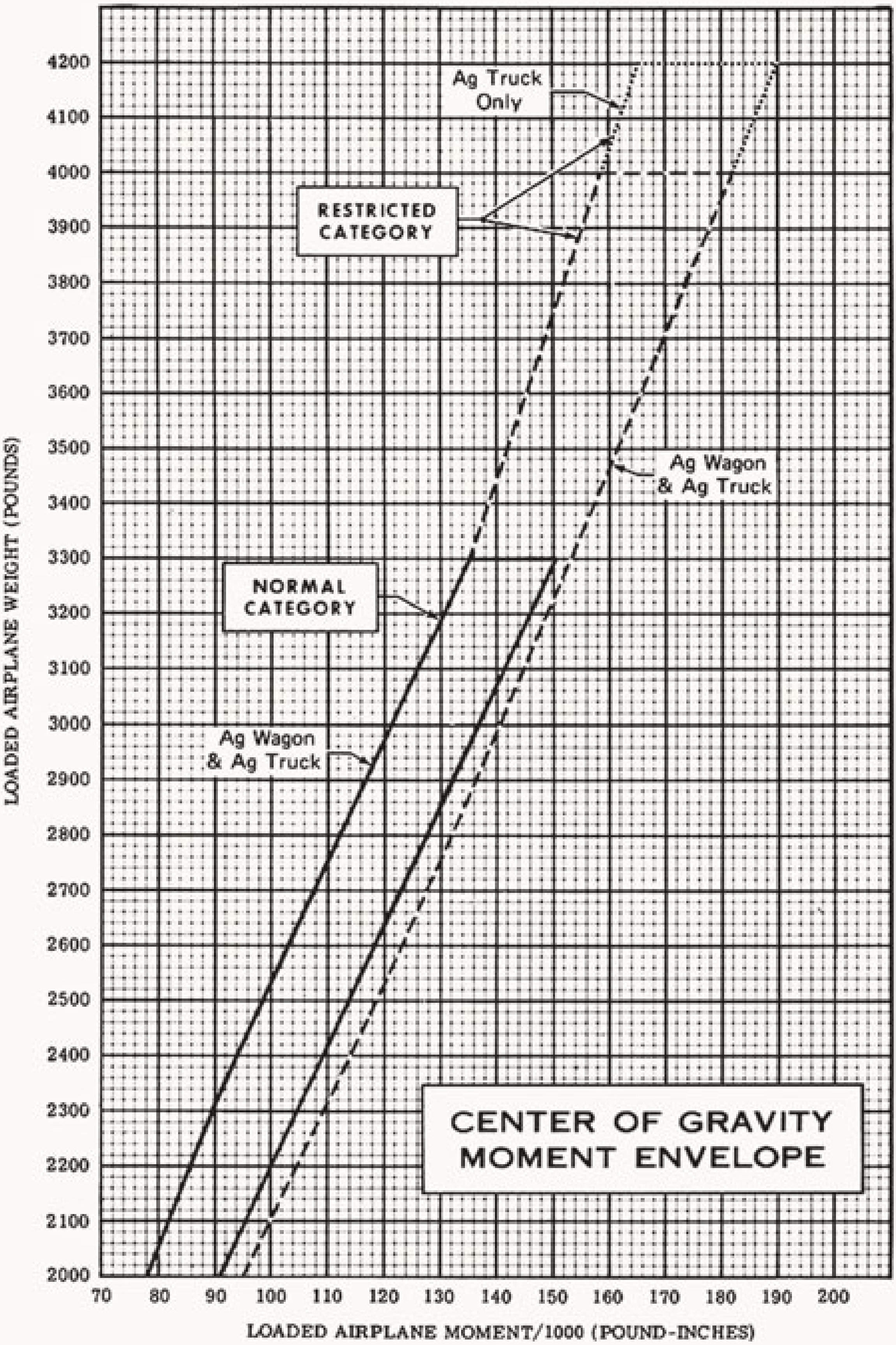


Figure 4-6. Center of Gravity Moment Envelope

SECTION 5
CARE OF THE AIRPLANE

TABLE OF CONTENTS

INTRODUCTION

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 Agricultural 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, leading edge of the stabilizer adjacent to the fuselage, at the root of the vertical fin, or lift the tail with the 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 sideways on the upper portion of the fin.

TIE-DOWN

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

WINDSHIELD - WINDOWS

The plastic windshield and windows should be cleaned with an aircraft windshield cleaner. Apply the cleaner sparingly with soft cloths, and rub with moderate pressure until all dirt, oil scum and bug stains are removed.

Allow the cleaner to dry, then wipe it off with soft flannel cloths.

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, 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 lukewarm) 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, mask off pitot and static system openings to prevent entry of water. 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. 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.

WARNING

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

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 cockpit 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 propeller, 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 Stoddard solvent.

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. A removable tailcone panel on each side of the fuselage above the stabilizer leading edge provides access to the tailgear steering and control system components in this area. 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 fuselage or hopper interior, first hose it down with water, then wash with 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 surfaces. 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.

WARNING

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

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.

IDENTIFICATION PLATE

All correspondence regarding your airplane should include the SERIAL NUMBER. The Serial Number, Model Number, Production Certificate Number (PC) and Type Certificate Number (TC) can be found on the Identification Plate, located on the right side of the panel behind the pilot's seat. Located adjacent to the Identification Plate is a Finish and Trim Plate which contains the paint control code and exterior paint combination of the airplane. The code may be used in conjunction with an applicable Parts Catalog if finish and trim information is needed.

AIRPLANE FILE

There are miscellaneous data, information and licenses that are a part of the airplane file. The following is a checklist 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 airplane at all times:
   1. Aircraft Airworthiness Certificate (FAA Form 8100-2, Normal Category or Form 8130-7, Restricted Category).
   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 airplane at all times:
   1. FAA Approved Airplane Flight Manual.
   2. Weight and Balance, and associated papers (latest copy of the Repair and Alteration Form, FAA Form 337, if applicable).
   3. Aircraft Equipment List.
   4. 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.

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 airplanes should check with their own aviation officials to determine their individual requirements.

Cessna recommends that these items, plus the Owner's Manual; Customer Care Program book and Customer Care Card, be carried in the airplane at all times.

FLYABLE STORAGE

Airplanes placed in non-operational storage for a maximum of 30 days or those which receive only intermittent operational use for the first 25 hours are considered in flyable storage status. Every seventh day during these periods, the propeller should be rotated by hand through five revolutions. This action "limbers" the oil and prevents any accumulation of corrosion on engine cylinder walls.

WARNING

For maximum safety, check that the magneto switches are in the OFF position, the throttle is closed, the mixture control is in the idle cut-off position, and the airplane is secured before rotating the propeller by hand. Do not stand within the arc of the propeller blades while turning the propeller.

After 30 days, the airplane should be flown for 30 minutes or a ground runup should be made just long enough to produce an oil temperature within the lower green arc range. Excessive ground runup should be avoided.

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

INSPECTION REQUIREMENTS

As required by Federal Aviation Regulations, all civil aircraft of U.S. registry must undergo a complete inspection (annual) each twelve calendar months. In addition to the required ANNUAL inspection, aircraft operated commercially (for hire) must have a complete inspection every 100 hours of operation.

In lieu of the above requirements, an airplane may be inspected in accordance with a progressive inspection schedule, which allows the work load to be divided into smaller operations that can be accomplished in shorter time periods.

The CESSNA PROGRESSIVE CARE PROGRAM has been developed to provide a modern progressive inspection schedule that satisfies the complete airplane inspection requirements of both the 100 HOUR and ANNUAL inspections as applicable to Cessna airplanes.

CESSNA PROGRESSIVE CARE

The Cessna Progressive Care Program has been designed to help you realize maximum utilization of your airplane at a minimum cost and down-time. Under this program, your airplane is inspected and maintained in four operations at 50-hour intervals during a 200-hour period. The operations are recycled each 200 hours and are recorded in a specially provided Aircraft Inspection Log as each operation is conducted.

The Cessna Aircraft Company recommends Progressive Care for airplanes that are being flown 200 hours or more per year, and the 100-hour inspection for all other airplanes. The procedures for the Progressive Care Program and the 100-hour inspection have been carefully worked out by the factory and are followed by the Cessna Dealer Organization. The complete familiarity of Cessna Agricultural Dealers with Cessna equipment and factory-approved procedures provides the highest level of service possible at lower cost to Cessna Ag Airplane owners.

CESSNA CUSTOMER CARE PROGRAM

Specific benefits and provisions of the CESSNA WARRANTY plus other important benefits for you are contained in your CUSTOMER CARE PROGRAM book supplied with your airplane. You will want to thoroughly review your Customer Care Program book and keep it in your airplane at all times.

Coupons attached to the Program book entitle you to an initial inspection and either a Progressive Care Operation No. 1 or the first 100-hour inspection within the first 6 months of ownership at no charge to you. If you take delivery from your Dealer, the initial inspection will have been performed before delivery of the airplane to you. If you pick up your airplane at the factory, plan to take it to your Dealer reasonably soon after you take delivery, so the initial inspection may be performed allowing the Dealer to make any minor adjustments which may be necessary.

You will also want to return to your Dealer either at 50 hours for your first Progressive Care Operation, or at 100 hours for your first 100-hour inspection depending on which program you choose to establish for your airplane. While these important inspections will be performed for you by any Cessna Agricultural Dealer, in most cases you will prefer to have the Dealer from whom you purchased the airplane accomplish this work.

SERVICING REQUIREMENTS

For quick and ready reference, quantities, materials, and specifications for frequently used service items (such as fuel, oil, etc.) are shown on the inside back cover of this manual.

In addition to the EXTERIOR INSPECTION covered in Section 1, COMPLETE servicing, inspection and test requirements for your airplane are detailed in the Service Manual. The Service Manual outlines all items which require attention at 50, 100, and 200 hour intervals plus those items which require servicing, inspection, and/or testing at special intervals.

Since Cessna Agricultural Dealers conduct all service, inspection, and test procedures in accordance with applicable Service Manuals, it is recommended that you contact your Dealer concerning these requirements and begin scheduling your airplane for service at the recommended intervals.

Cessna Progressive Care ensures that these requirements are accomplished at the required intervals to comply with the 100-hour or ANNUAL inspection as previously covered.

Depending on various flight operations, your local Government Aviation Agency may require additional service, inspections, or tests. For these regulatory requirements, owners should check with local aviation officials where the airplane is being operated.

OWNER FOLLOW-UP SYSTEM

Your Cessna Agricultural 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, in the form of Service Letters, directly from the Cessna Customer Services Department. A subscription form is supplied in your Customer Care Program book for your use, should you choose to request this service. Your Cessna Agricultural 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 airplane when delivered from the factory. These items are listed below.

- CUSTOMER CARE PROGRAM BOOK
- FAA APPROVED AIRPLANE FLIGHT MANUAL
- OWNER'S MANUALS FOR YOUR
  - AIRPLANE
  - AVIONICS
- 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 airplane, are available from your Cessna Dealer.

- SERVICE MANUALS AND PARTS CATALOGS FOR YOUR
  - AIRPLANE
  - ENGINE AND ACCESSORIES
  - AVIONICS

Your Cessna Agricultural Dealer has a current catalog of all Customer Services Supplies that are available, many of which he keeps on hand. He will be happy to place an order for any item which is not in stock.

NOTE

An FAA Approved Airplane Flight Manual which is lost or destroyed may be replaced by contacting your Cessna Agricultural Dealer or writing directly to the Customer Services Department, Cessna Aircraft Company, Wichita, Kansas. An affidavit containing the owner's name, airplane serial number and registration number must be included in replacement requests since the FAA Approved Airplane Flight Manual is identified for specific airplanes only.

SECTION 6
OPERATIONAL DATA

TABLE OF CONTENTS

INTRODUCTION

The operational data charts in this section are presented so that you may know what kind of performance to expect from your airplane under standard day conditions in both normal and restricted categories.

Performance data in this section is based on the 82-inch, constant speed, two-bladed propeller; however, performance is essentially the same with either the 86-inch, two-bladed propeller, or the 80-inch, three-bladed propeller.

NORMAL CATEGORY PERFORMANCE

All data shown in the following charts is for operation of the airplane under the normal category in a clean configuration.

AIRSPEED CORRECTION TABLE

	IAS	60	70	80	90	100	110	120	130	140	150	160
FLAPS UP	CAS	56	66	77	87	97	108	118	128	138	148	159
FLAPS DOWN	CAS	56	67	77	87	97	107	•	•	•	•	•

Figure 6-1. Airspeed Correction Table

STALL SPEEDS - MPH, CAS

CONFIGURATION		ANGLE OF BANK		
POWER OFF - AFT C.G.		0°	30°	60°
GROSS WEIGHT 3300 LBS.	FLAPS UP	61	66	86
	FLAPS 10°	59	63	83
	FLAPS 20°	57	61	81

Figure 6-2. Stall Speeds

TAKEOFF DISTANCE

TAKEOFF 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

NOTES: 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.

Figure 6-3. Takeoff Distance

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	91	940	90	670	88	400	86	135
2800	88	1205	87	900	85	590	83	290
2300	84	1570	83	1230	81	840	79	485

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

Figure 6-4. Maximum Rate Of Climb

TIME, FUEL AND DISTANCE TO CLIMB

NORMAL CLIMB 95 IAS/MPH

FLAPS UP, 2550 RPM, 25 INCHES MP OR FULL THROTTLE

ALTITUDE FEET	TEMP °F	GROSS WEIGHT POUNDS	RATE OF CLIMB FT/MIN	FROM SEA LEVEL		
				TIME MINUTES	FUEL USED GALLONS	DISTANCE MILES
SEA LEVEL	59	3300	630	0	0	0
		2800	840	0	0	0
		2300	1125	0	0	0
2500	50	3300	630	4	1.2	5
		2800	845	3	0.9	4
		2300	1130	2	0.7	3
5000	41	3300	580	8	2.4	11
		2800	790	6	1.8	8
		2300	1070	4	1.3	6
7500	32	3300	455	13	3.8	18
		2800	645	10	2.8	13
		2300	900	7	2.0	10
10,000	23	3300	330	19	5.5	28
		2800	505	14	3.9	20
		2300	730	10	2.9	15

NOTES:
1. Mixture Setting: S.L. to 4000 FT 18 GPH
   6000 FT 17 GPH
   8000 FT 16 GPH
   10,000 FT 15 GPH
2. Add 2.0 gallons of fuel for engine start, taxi and takeoff allowance.
3. Distances shown are based on zero wind.

Figure 6-5. Time, Fuel and Distance To Climb

CRUISE PERFORMANCE

RECOMMENDED LEAN MIXTURE

STANDARD CONDITIONS, ZERO WIND, GROSS WEIGHT - 3300 POUNDS

ALTITUDE	RPM	MP	%BHP	TAS MPH	GAL./HOUR	52 GAL. (45 MIN. RESERVE)	
						ENDR. HOURS	RANGE MILES
2500	2550	25	79	140	16.4	2.6	355
		24	74	136	15.6	2.7	370
		23	70	133	14.7	2.9	380
	2400	25	71	134	14.9	2.8	375
		24	68	130	14.2	3.0	385
		23	64	127	13.4	3.2	400
	2300	24	63	128	13.3	3.2	400
		23	60	123	12.6	3.4	410
		22	56	119	11.9	3.5	420
	2200	22	52	114	11.1	3.8	430
		21	48	110	10.5	4.0	440
		20	45	105	9.8	4.3	445
5000	2550	24	77	141	16.1	2.6	365
		23	73	138	15.2	2.8	375
		22	69	134	14.4	2.9	390
	2400	25	73	138	15.3	2.8	375
		24	70	135	14.5	2.9	385
		23	66	131	13.8	3.0	395
	2300	24	65	131	13.7	3.1	395
		23	62	127	13.0	3.2	405
		22	58	123	12.3	3.4	415
	2200	22	54	118	11.5	3.6	430
		21	50	114	10.8	3.8	435
		20	47	109	10.2	4.1	445
7500	2550	22	71	139	14.9	2.8	385
		21	67	135	14.0	3.0	395
		20	63	131	13.2	3.2	405
	2400	22	64	132	13.5	3.1	400
		21	61	128	12.8	3.3	410
		20	57	124	12.0	3.4	420
	2300	21	57	124	12.0	3.4	420
		20	53	119	11.3	3.6	430
		19	49	114	10.6	3.9	435
	2200	20	49	114	10.6	3.9	435
		19	46	108	10.0	4.1	445
		18	42	102	9.3	4.4	450

NOTES: 1. Range and endurance values include time and distance required during a normal climb at 95 MPH IAS and 2.0 gallons of fuel for engine start, taxi, and takeoff allowance.
2. Reserve fuel is based on 45 minutes at 45% BHP and is 7.4 gallons.

Figure 6-6. Cruise Performance

LANDING DISTANCE

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 headwind.
3. For operation on a dry, grass runway, increase distances (both "ground roll" and "total to clear 50 ft. obstacle") by 20% of the "total to clear 50 ft. obstacle" figure.

Figure 6-7. Landing Distance

RESTRICTED CATEGORY PERFORMANCE

The following charts provide performance data for the airplane when operating in the restricted category. Refer to Section 4 for additional operating details for this category.

The Performance Differential Table, figure 6-10, shows the decrease in the rate of climb and cruise speeds due to various dispersal systems and due to gross weight. These figures should be subtracted from the data in the normal category clean configuration shown in figures 6-3, 6-4, 6-5, and 6-6. The Landing Distance Chart, figure 6-7, may be used for the restricted category also.

STALL SPEEDS - MPH, CAS

CONFIGURATION		ANGLE OF BANK		
POWER OFF - AFT C.G.		0°	30°	60°
GROSS WEIGHT 4200 LBS.	FLAPS UP	69	74	98
	FLAPS 10°	67	72	95
	FLAPS 20°	65	70	92
GROSS WEIGHT 4000 LBS.	FLAPS UP	67	72	95
	FLAPS 10°	65	70	92
	FLAPS 20°	63	68	89

Figure 6-8. Stall Speeds

TAKEOFF DISTANCE WITH DISPERSAL EQUIPMENT

SEA LEVEL, STANDARD CONDITIONS, ZERO WIND

HARD SURFACE RUNWAY, FLAPS 10°

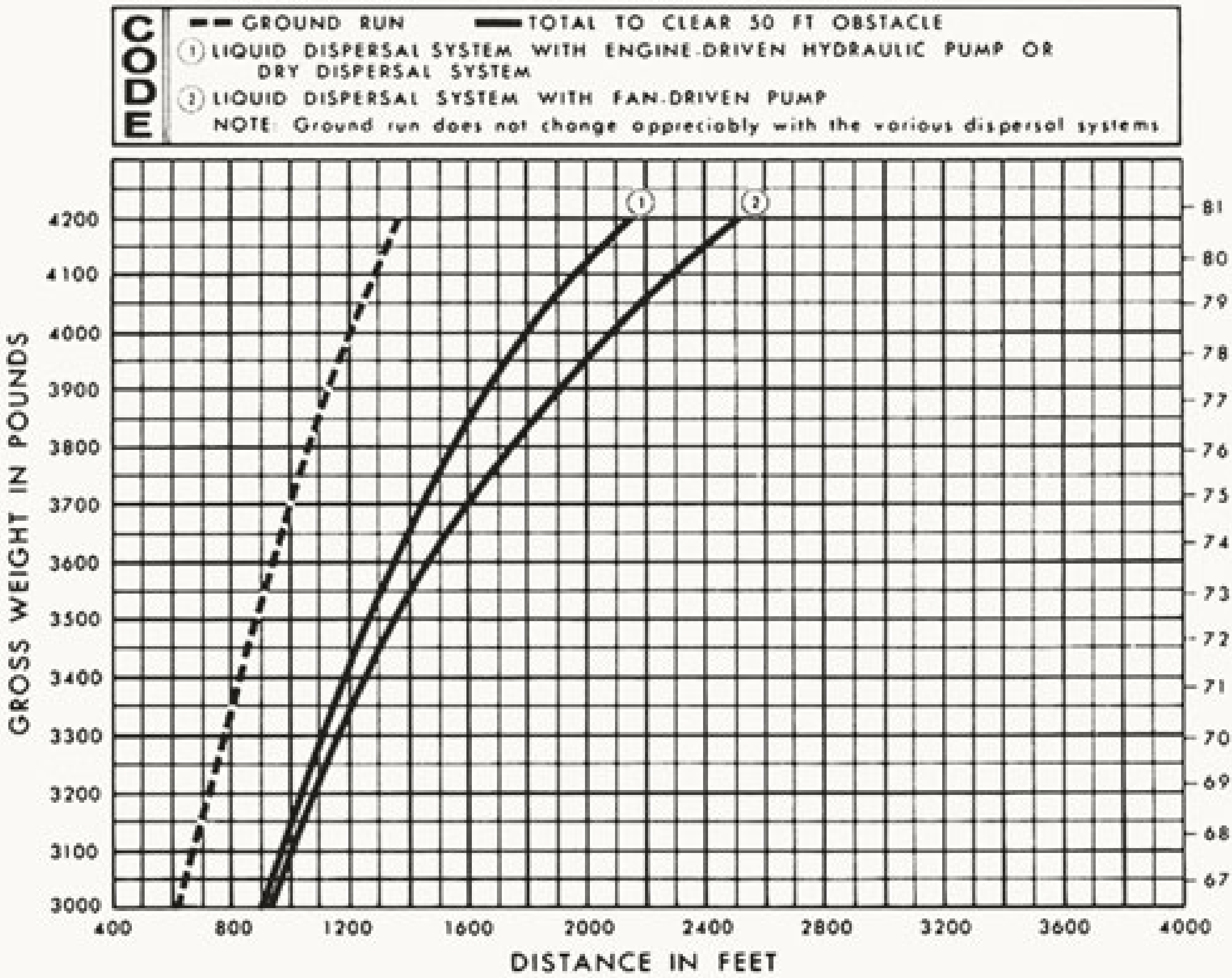


Figure 6-9. Takeoff Distance With Dispersal Equipment

PERFORMANCE DIFFERENTIAL TABLE

EFFECT OF OPTIONAL DISPERSAL EQUIPMENT

GROSS WEIGHT 3300 POUNDS

DISPERSAL EQUIPMENT		CLIMB DIFFERENTIAL FPM	CRUISE SPEED DIFFERENTIAL MPH
SYSTEM	TYPE		
LIQUID DISPERSAL	ENGINE-DRIVEN HYDRAULIC PUMP	-250	-27
	FAN-DRIVEN PUMP	-310	-33
DRY DISPERSAL	HIGH VOLUME	-270	-27

EFFECT OF INCREASED GROSS WEIGHT

WEIGHT INCREASE	CLIMB DIFFERENTIAL - FPM	CRUISE SPEED DIFFERENTIAL - MPH
FOR EACH 100 LBS ABOVE 3300 LBS	-45	-1.5

NOTE: For optimum climb performance with dispersal equipment installed, reduce speeds on "MAXIMUM RATE OF CLIMB" charts by 13 MPH.

Figure 6-10. Performance Differential Table

SECTION 7
DISPERSAL & AIR CONDITIONING SYSTEMS

TABLE OF CONTENTS

Page

INTRODUCTION

This section contains descriptions, operating procedures, and performance data (when applicable) for some of the dispersal equipment and the air conditioning system which may be installed in the airplane. Supplements are provided to cover operation of other systems when installed in your airplane. Contact your Cessna Agricultural Dealer for a complete list of available equipment.

Three factory installed dispersal systems (two liquid and one dry) are available. The two liquid dispersal systems are equipped with gate boxes and are either fan driven or hydraulically driven. Each system may be equipped with either a manual or electrically-operated spray valve. The dry dispersal system also requires a gate box and is available without an agitator or can be equipped with either a fan-driven agitator or electrically-driven agitator.

The two liquid dispersal systems (regardless of power source) can be converted to the dry dispersal configuration by removing and adding certain components. Conversely, the dry system can be converted to a liquid system.

The information on the following pages covers all three dispersal systems and their usage. Individual dispersal components and controls are described first to aid the user in familiarizing himself with this equipment. Some components are used in both liquid and dry dispersal system installations, while other items are used in only one type of system. Later discussions of the various systems describe what components are used in each system and how the system operates. Spray system performance is also provided in this section as a guide when calculating dispersal requirements. Special system options which supplement dispersal operations are described near the end of this section.

A complete discussion of the air conditioning system is provided at the end of this section.

DISPERSAL SYSTEM COMPONENTS AND CONTROLS

HOPPER AND GATEBOX

Two hoppers of different capacity are available depending on the airplane. The Ag Wagon has a 200-gallon (27 cubic foot) hopper, and the Ag

Truck has a 280-gallon (37.4 cubic foot) hopper. Both hoppers have large doors in the top (to facilitate filling with dry materials), hopper windows, and a quick-loader valve on the left side of the fuselage for loading the hopper with liquid materials. A series of marks and numbers on the aft side of both hoppers indicates, in gallons, the material level in the hopper. The markings in red are used during flight and the markings in black are used on the ground. The hopper window, located in the center of the hopper between the ground and flight markings, provides a clear view of the contents as well as the bottom of the hopper.

Cleaning of the hopper and dispersal system plumbing is beneficial in maintaining good system operation. Rinse out the hopper when changing from one chemical to another. After daily use, rinse with water, wash with warm soapy water, and hose rinse to flush away soapy water. After cleaning, leave the hopper door open overnight to air out the hopper. When used, flush dispersal system plumbing daily with water to remove all chemical residue and prevent clogging of system components.

CAUTION

It is important that the hopper be cleaned as described above because mixing of certain agricultural chemicals can cause premature hopper deterioration. Washing and airing the hopper will allow the hopper material resin to recure after being exposed to harsh chemicals. DO NOT LEAVE CHEMICALS IN THE HOPPER OVERNIGHT.

A gate box is mounted on the bottom of the hopper and has several functions. A hopper shutoff valve can be mounted inside the gate box on the front face. The supply hose from the spray pump is connected to the front face of the gate box by means of a quick-disconnect fitting. The spray valve is mounted on the left hand side to enable recirculation of liquids when spray is not being dispersed. A door is located on the front lower surface which is used as a recloseable dump for liquids. It is also used as a metering device for dry materials. Once the gate box is installed for liquid application, it is not necessary for this unit to be removed when changing to dry material.

HOPPER SHUTOFF VALVE AND CONTROL KNOB

A hopper shutoff valve is available for installation when a liquid dispersal system is used. The valve is mounted inside the front face of the gate box and is controllable from the cockpit. It can be shut to prevent loss of spray material from the hopper in case of line breakage anywhere between the gate box outlet and the spray valve, or if maintenance is to be performed on the system in this area.

The hopper shutoff valve knob, labeled HOPPER SHUTOFF, is a double-button control on the lower left side of the instrument panel. When the knob is pulled full out, the shutoff valve in the gate box closes, preventing any flow of liquid from the outlet of the hopper. Anytime the shutoff valve is utilized, whether for maintenance of system plumbing or due to line breakage being suspected because of loss of boom pressure in flight, the pilot should remember that the spray valve should also be opened. With the spray valve open, the spray valve port which normally allows excess liquid through the valve to recirculate back into the hopper will be closed and back-flow from the hopper will be stopped.

HOPPER DUMP DOOR/METERING GATE AND CONTROLS

A door in the bottom of the gate box functions as a recloseable dump for liquids and as a metering gate and dump for dry materials. The door is actuated by forward motion of the hopper control and dump handle located on the left side of the cockpit. For emergency dumping, the hopper control metering stop (used in dry material dispersal operations) is rotated up out of position to allow forward actuation of the dump handle. A 200-gallon liquid load can be dumped in approximately 5 seconds. An over-center device on the gate box restrains the dump handle from inadvertent dumping operations.

When used in dispersal of dry materials, the hopper dump door/metering gate is located upstream and ahead of the spreader air intake, and meters the material into the spreader. The gate is opened and closed by the hopper control and dump handle. The amount of opening is varied by rotation of a hopper control crank which moves a metering stop and limits the open setting. In this manner, an accurate setting can be achieved each time for the desired flow rate. To utilize the dump feature, the metering stop can be disengaged by rotating it upward, thus permitting full forward movement of the hopper control and dump handle for full-open gate actuation.

The dump door/metering gate can be conveniently checked for proper operation when rinsing out chemicals from the hopper or dumping surplus chemicals after a flight.

AGITATORS

Two types of agitator systems are available for use with dry dispersal systems: a fan-driven agitator or an electrically-driven agitator system.

The fan-driven agitator is mounted on the right side of the gate box and drives agitator blades within the gate box to prevent clogging of dry materials. The agitator operates continuously in flight unless secured to prevent rotation. Extended ferry flights should not be made without securing the agitator fan. This procedure will give maximum agitator service life.

An electrically-driven agitator system is available and consists of a motor and agitator, a micro switch, and a 10-amp circuit breaker, labeled AGITATOR, on the right side of the instrument panel. This system is automatic and will begin operating anytime the hopper control and dump handle is moved forward, opening the metering gate. To check operation of the system prior to loading the hopper, turn on the master switch, open the metering gate, and observe the agitator turning slowly. This system needs no special attention for ferry flights since it does not operate until the metering gate is opened for dispersal of material.

SPRAY PUMP STRAINER

A strainer may be mounted between the gate box outlet and the spray pump of liquid dispersal systems to strain out undissolved liquid dispersal materials and to catch foreign objects before they reach the spray pump. Removal of the strainer screen for cleaning or daily inspection is accomplished by cutting the safety wire and turning the handle at the bottom of the strainer in a counterclockwise direction. If necessary, a screwdriver or suitable tool positioned through the handle will give added leverage for loosening the strainer cap and screen.

FAN-DRIVEN SPRAY PUMP AND FAN BRAKE CONTROL

A strut-mounted, fan-driven spray pump can be used to drive the liquid dispersal system. The remote mounting of the spray pump allows easy replacement with a great variety of wind-driven pumps. Removal of the pump is simple and is achieved by slipping the fan brake cable out of the slot in the attachment plate and operating the quick-disconnect latches on the pump mounting strut and hoses.

Adequate pump output for medium volume work can be obtained with a two-bladed fan; however, a four-bladed fan is more desirable for high volume work. Two separate wooden propellers can be "laminated" together at right angles to obtain a four-bladed fan, provided longer mounting bolts are used.

Continuous mixing of the hopper contents can be obtained by letting the spray pump run during the ferry portion of the flight since material will leave the hopper, pass through the pump, and return to the hopper. This procedure may be desirable with certain wettable powders to avoid plugging the Y-strainer screen and/or the spray nozzles.

Care should be taken not to let the pump run when the system is dry since this will destroy the pump bearings. To stop the spray pump, a fan brake control on the right side of the cockpit is used. The vertical position of the control handle allows the fan to run freely. With the handle pulled aft to the horizontal position, the fan is locked.

Adjustment of the brake cable tension can be made in flight if it is noted that the fan brake is slipping. Increasing cable tension is accomplished by turning the knurled knob at the end of the handle in the clockwise direction.

HYDRAULIC MOTOR-DRIVEN SPRAY PUMP

A hydraulic motor-driven spray pump is available for liquid dispersal operation. The hydraulic motor is coupled to the spray pump and receives hydraulic flow from an engine-driven hydraulic pump. A manually operated boom pressure valve controls the hydraulic flow between the hydraulic pump and the hydraulic motor, enabling the motor to vary the spray pump output. For more details, refer to the paragraphs in this section labeled Liquid Dispersal System (Engine-Driven Hydraulic Pump).

HYDRAULIC SYSTEM ON-OFF VALVE AND CONTROL

The hydraulic system which powers the hydraulically-driven spray pump is controlled by an on-off control mounted just below the left side of the instrument panel. When the on-off "T" handle is pulled full aft, a valve in the hydraulic system reservoir is closed off and fluid under pressure from the engine-driven hydraulic pump is directed to the motor. When the hydraulic motor becomes operational, it drives the spray pump. Pushing the on-off "T" handle full forward opens the valve in the hydraulic reservoir, allowing fluid to by-pass the hydraulic motor which in turn stops the motor and the spray pump.

BOOM PRESSURE VALVE AND CONTROL KNOB

A boom pressure valve in the hydraulic system is used to regulate dispersal system boom pressure to a prescribed setting. When the hydraulic system is operating and the boom pressure valve is closed, all pressure being developed in the system is directed to the hydraulic motor and the motor drives the spray pump at maximum output. This condition is obtained by rotating the boom pressure control knob, located below the left side of the instrument panel, to an index setting of 9. If less boom pressure is required, the boom pressure control knob can be rotated back to any index from 9 to 0. The index numbers do not indicate a specific pressure but are for index purposes only, and are useful in establishing similar pressures on successive spray runs. Although boom pressure may be varied with the spray valve metering stop control knob, it is recommended that boom pressure be regulated with the boom pressure control knob.

SPRAY VALVE (Manually/Electrically Operated)

Manually-operated butterfly-type, or electrically-operated butterfly or ball-type spray valves may be attached to the left side of the gate box. When a fan-driven system is installed, the spray valve is used to meter liquid flow rate and control spray boom pressure. If a hydraulically-driven system is installed, the spray valve is used primarily to either permit or stop liquid flow. Spray boom pressure is controlled by the boom pressure valve and control knob. Do not operate the electric spray valve with a dry system.

If it becomes necessary to check spray nozzle output and shutoff capability, or to rinse the spray boom during ground operations, the following recommendation may save valuable time. Simply disconnect the spray pump outlet from the valve and connect the loading hose to the spray valve. This can be easily accomplished if the side loader and spray valve fittings are identical.

MANUALLY-OPERATED SPRAY VALVE CONTROLS

The controls for the manually-operated spray valve, when associated with either the fan or hydraulically-driven spray systems, are located on the left side of the cockpit on the canopy door sill and just below it. The spray valve control handle, in a slot on the door sill, opens the spray valve when moved forward and closes it when moved aft. The slot in the door sill is labeled OPEN at the forward end and CLOSED at the aft end, and is marked with a scale in increments from 0 to 20.

A spray valve metering stop control knob, below the left canopy door sill, moves a metal stop which limits the forward travel of the spray valve control handle, thus controlling the spray boom pressure and liquid flow rate. The control knob is used primarily with the fan-driven spray system. Since the hydraulically-driven spray system flow rate and boom pressure is primarily controlled by hydraulic pump pressure, the spray valve metering stop is only used to provide liquid recirculation for mixing purposes during material application.

ELECTRICALLY-OPERATED SPRAY VALVE CONTROLS

Two push-button switches located on top of the control stick grip labeled SPRAY VALVE, control the electrically-operated spray valve. The left push-button, labeled ON, opens the spray valve; the right push-button, labeled OFF, closes the valve. Both switches are wired to an electric motor drive unit which actuates the valve. Approximately one-fourth second is required to complete valve actuation. Any intermediate setting of the adjustable limit switch introduced by use of the metering stop control knob will prevent the valve from completely opening. The spray valve should not be operated unless the spray system is in operation.

The spray valve metering stop control knob, just below the left canopy door sill, should only be used when a recirculating or agitating action is desired during material application. This is accomplished by limiting the amount the spray valve opens with the metering stop control knob. By limiting the amount the spray valve opens, part of the spray liquid is returned to the hopper creating the desired agitating action, thus continually mixing the hopper contents. This is desirable when wettable powders are being used. Limiting the amount the spray valve opens will decrease boom pressure, which may be reestablished by increasing the hydraulic system boom pressure control knob setting, unless the setting is already at maximum.

Y-STRAINER

A Y-strainer is located below the centerline of the fuselage approximately in line with the trailing edge of the wing. The Y-strainer contains a screen to prevent the spray nozzles from getting clogged. Removal of the screen for cleaning or daily inspection is accomplished by removing a cap and seal on the aft end of the Y-strainer.

SPRAY PRESSURE GAGE

A pressure gage has been installed to measure spray pressure within the booms downstream of the Y-strainer screen. The pressure gage is located in the instrument console above the crash pad. When the Y-strainer screen is obstructed, a loss of spray pressure can be detected and indicates reduced spray system output.

SPRAY BOOMS

The spray booms have been carefully located to minimize aerodynamic drag. Removal of the spray booms requires a minimum of tools since quick-disconnect fittings are incorporated at all boom attachment points. The outboard ends of the booms are equipped with quick-disconnect boom caps. To remove a boom cap, remove the safety wire from the pull arms, rotate the arms outward until the locking cams disengage and pull the cap from the boom end. To replace a cap, push it firmly on the boom end, rotate the pull arms inward until the locking cams are fully engaged, and safety wire the arms to the cap.

To equip the airplane with the 64-nozzle system, all boom positions must be utilized. If the 44-nozzle system is desired, start at each wing tip and work inboard by removing and plugging every third nozzle position. To convert to the 22-nozzle system, start at each wing tip and work inboard by removing and plugging the first nozzle position, leaving the second nozzle, and then leaving every third nozzle. Plug the two vacant positions between each remaining nozzle.

Adjustment of nozzle alignment should be made according to the droplet size desired. For the largest droplet sizes (common with herbicides), the nozzles should be pointed directly aft. To decrease the droplet size, rotate the nozzles downward and forward. The smallest droplet sizes (common with insecticides) can be obtained by directing the nozzles downward and forward at a 45° angle. Whenever possible, the nozzles should be mounted on top of the boom to reduce the susceptibility to nozzle outlet clogging.

The airplane may also be equipped with six rotary atomizers in place of the conventional spray nozzles. Rotary atomizers generally produce a much narrower droplet spectrum than nozzles. An instruction manual is furnished with the rotary atomizers, and contains operational instructions, spray tables, service instructions and a parts list along with instructions for field installation of the system.

SPREADER

A high-volume, dry dispersal, stainless steel spreader is available in two sizes. If the airplane was previously equipped with a liquid dispersal system, the existing gate box and controls can be utilized for spreader mounting and operation.

The spreader can be installed or removed with a screwdriver. It is attached with eight quick-release fasteners located below the metering gate, and two quick-release fasteners located at each side of the gate box. The aft end of the spreader is attached to one support on each side by a pin and a lock pin.

Adjustable doors in the center vanes of the spreader allow the operator to make minor changes to the distribution pattern. Different distribution characteristics of various dry materials will necessitate some adjustment of these doors.

LIQUID DISPERSAL SYSTEM (Strut-Mounted Pump)

The liquid dispersal system with a strut-mounted pump is suitable for both medium and high-volume liquid application. As shown in figure 7-1, the system consists of a gate box with a recloseable dump door, a remotely-mounted wind-driven spray pump, a manually or electrically-operated spray valve, and a set of trailing edge booms. A hopper shutoff valve and a spray pump strainer may also be added to the system.

Controls for the system consist of a hopper control and dump handle, hopper control crank and metering stop (not used for liquid dispersal), spray pump fan brake control, manual or electric spray valve controls, and a hopper shutoff control (if installed). A spray pressure gage in the instrument console indicates spray boom pressure. Refer to Dispersal System Components And Controls at the beginning of this section for additional description of these components and controls.

In this system, liquid leaves the hopper through an opening above the dump door in the gate box and enters the remotely-mounted centrifugal spray pump. After leaving the pump, the liquid enters a spray valve. If the spray valve is closed, the liquid is returned to the hopper to provide agitation of the hopper contents. Some hopper agitation will occur any time the spray valve is partially closed. When the spray valve is opened, liquid enters the spray booms after passing through a Y-strainer screen.

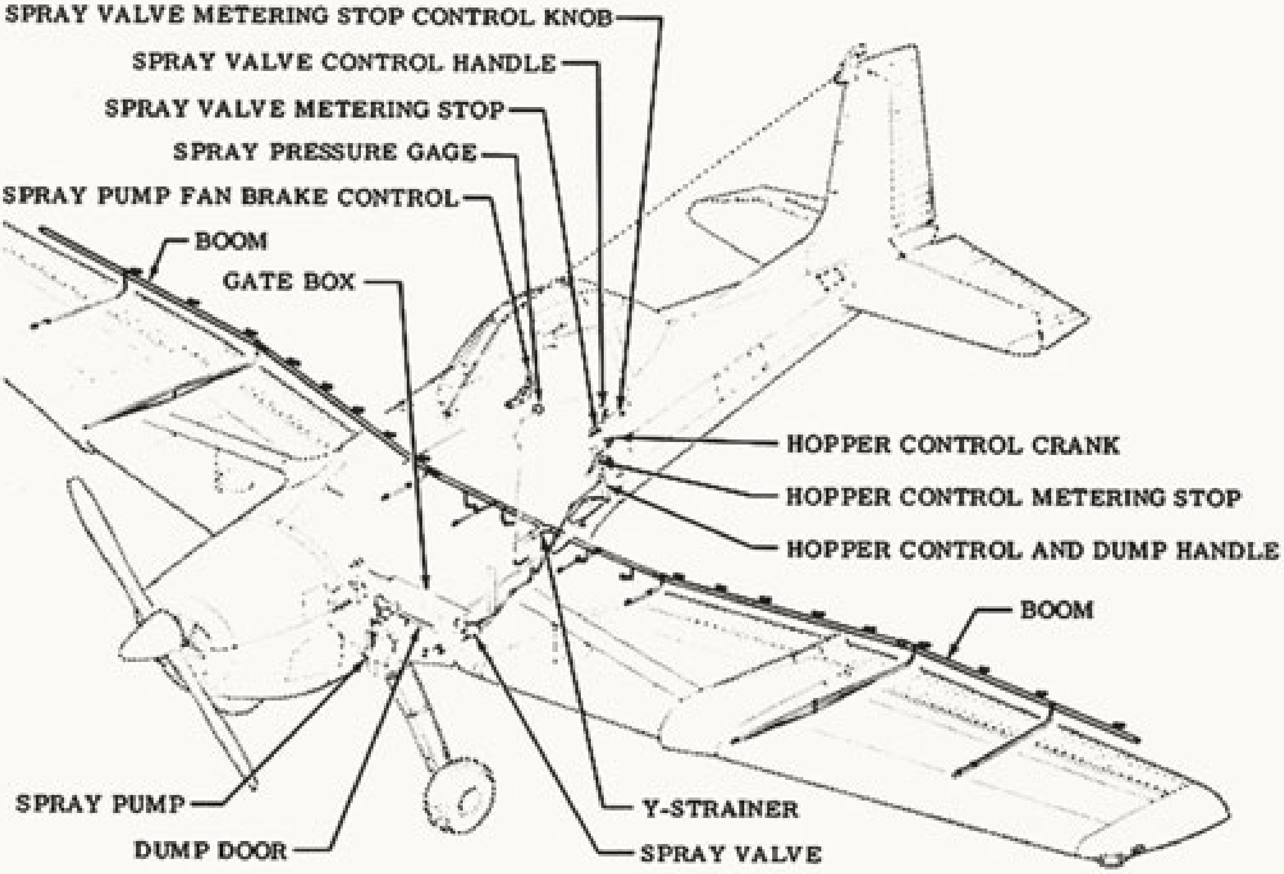


Figure 7-1. Liquid Dispersal System (Strut Mounted Pump)

For performance data for the strut-mounted fan-driven pump system, refer to Spray System Performance (figure 7-6) in this section.

OPERATING PROCEDURES

Operating procedures for the liquid dispersal system with a strut-mounted pump are as follows:

1. Set spray valve metering stop control knob for desired boom pressure by rotating clockwise to increase pressure, or counter-clockwise to decrease it.

2. Release spray pump fan brake control by pushing up and forward.

NOTE

For hopper agitation on ferry flights to the field, check that the spray valve is closed and release the fan brake.

3. When ready to spray, release fan brake control (if previously in the FAN STOP position) and open the spray valve. (With a manually-operated spray valve, move spray valve control handle forward against the metering stop. With an electrically-operated spray valve, momentarily push down on the left push-button switch on top of the control stick grip. Total valve travel requires one-fourth of a second.) If the boom pressure is too high or too low, readjust the spray valve metering stop and reposition the spray valve either manually or electrically, as applicable, to the new stop setting.

4. To stop spraying, close the spray valve either manually or electrically, as applicable. (To close the electric spray valve, momentarily push down on the right push-button switch on top of the control stick grip. Total travel requires one-fourth of a second.)

5. On subsequent spray passes, utilize the spray valve to start and stop spray dispersal. Once the spray valve metering stop is adjusted, boom pressure will remain the same each time the spray valve is opened unless the airspeed is changed.

6. After emptying the hopper, engage the fan brake control by pulling it full aft to prevent running the spray pump when it is dry.

LIQUID DISPERSAL SYSTEM
(Engine-Driven Hydraulic Pump)

The liquid dispersal system powered by an engine-driven hydraulic pump is suitable for both medium and high-volume liquid application. As shown in figures 7-2 and 7-3, the system consists of a gate box with a reclosable dump door, a hydraulic system which drives a spray pump, a manually or electrically-operated spray valve, and a set of trailing edge booms. A hopper shutoff valve and a spray pump strainer may also be added to the system.

Excluding the hydraulic system, dispersal system controls include a hopper control and dump handle, hopper control crank and metering stop (not used for liquid dispersal), manual or electric spray valve controls, and a hopper shutoff control (if installed). A spray pressure gage on the instrument panel indicates spray boom pressure.

The hydraulic motor-driven spray pump system consists of a hydraulic reservoir (with an integral pressure relief valve, system on-off valve and an externally-mounted hydraulic fluid filter), an engine-driven hydraulic pump, a boom pressure valve, hydraulic motor and hydraulic fluid cooler. The fluid level in the hydraulic reservoir is maintained through a filler plug opening on top of the reservoir. The filler plug also contains a dipstick. The reservoir is pressurized with air to 15-20 PSI through an air filler valve near the filler plug. The on-off valve in the reservoir is mechanically operated by a system on-off "T" handle. The boom pressure valve is mechanically operated by a rotary boom pressure control knob. The entire hydraulic system, with the exception of the engine-driven pump, system on-off "T" handle, and the boom pressure valve and control knob is located between the firewall and the forward end of the hopper, with the hydraulic fluid cooler positioned on the bottom of the fuselage just aft of the firewall.

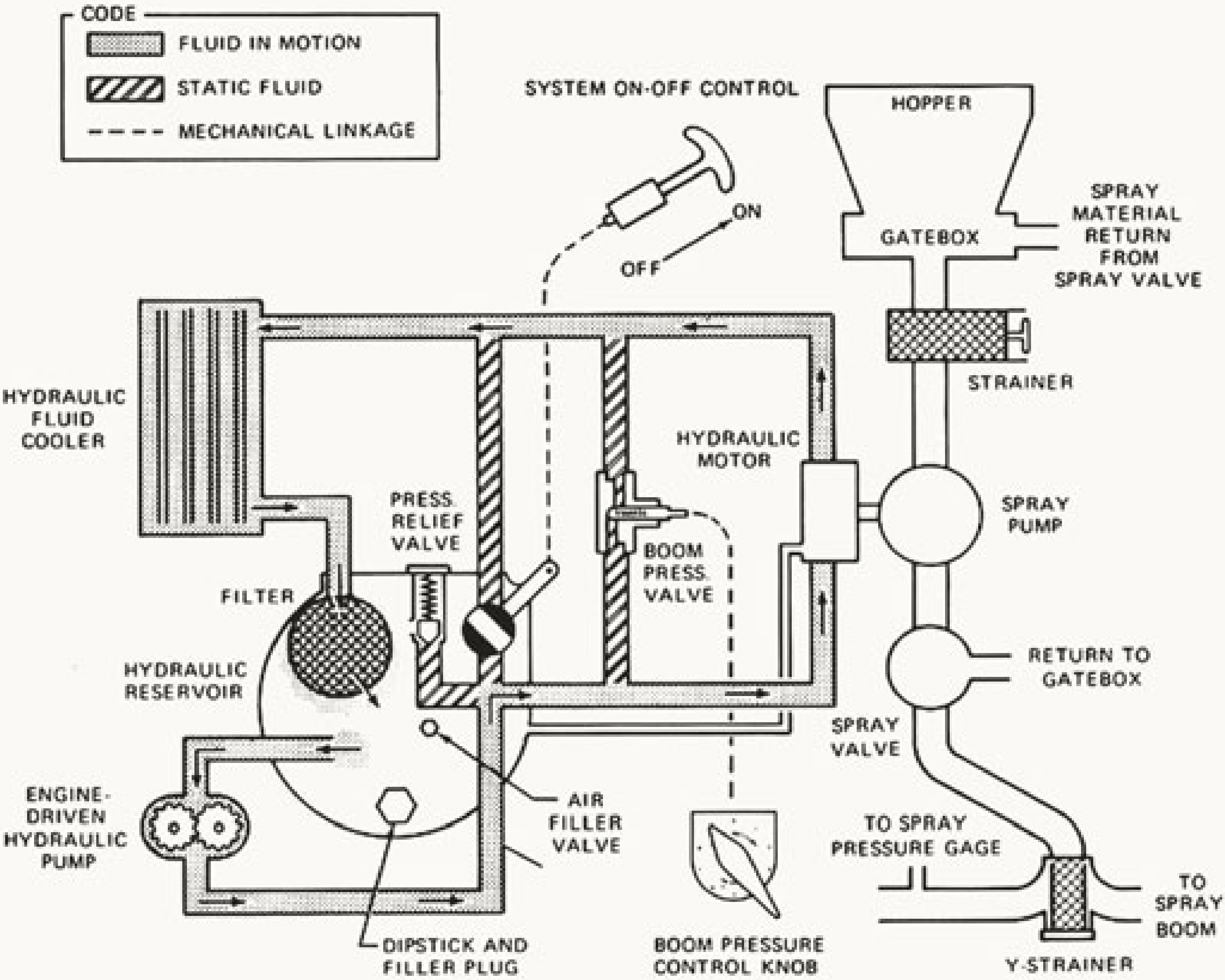
Refer to Dispersal System Components And Controls at the beginning of this section for additional description of both dispersal system and hydraulic system conponents and controls.

In this system, hydraulic pressure is continuously provided by the engine-driven hydraulic pump. When the hydraulic system on-off "T" handle is pulled full aft, the on-off valve in the reservoir is closed and fluid under pressure from the engine-driven hydraulic pump drives the hydraulic motor which in turn drives the spray pump. Return fluid from the hydraulic motor circulates through a cooler and returns to the reservoir.

Control of spray pump output is the preferred method used to regulate dispersal system boom pressure and flow rate in this system. Rotation of the boom pressure control knob opens or closes a boom pressure valve in the hydraulic system to by-pass hydraulic flow applied to the hydraulic motor. When the boom pressure control knob is turned to a low index number (placarded behind the control), some hydraulic flow to the motor is by-passed through the boom pressure valve, and the reduced flow causes a low spray pump output. As the knob is rotated to a higher index, less hydraulic flow is by-passed and the motor drives the spray pump at an increased rate for higher boom pressure.

With the spray pump operating, spray material is drawn from the hopper through an opening above the dump door in the gate box and enters the spray pump. From the pump, the liquid enters the spray valve. If the spray valve is closed, the liquid is returned to the hopper to provide agitation of the hopper contents.

When the spray valve is opened, liquid enters the spray booms after passing through a Y-strainer screen.



SCHEMATIC SHOWS SYSTEM DURING HYDRAULIC MOTOR OPERATION AT MAXIMUM OUTPUT

OPERATING CONDITIONS:

(1) When the hydraulic system on-off "T" handle is pulled full aft (on-off valve closed), fluid under pressure from the engine-driven hydraulic pump drives the hydraulic motor which in turn drives the spray pump.

NOTE

If the hydraulic motor or spray pump malfunctions, increased pressure created by the engine-driven hydraulic pump is relieved through the pressure relief valve.

(2) When the hydraulic system on-off "T" handle is pushed full forward (on-off valve open), fluid from the engine-driven pump by-passes the hydraulic motor through the open on-off valve and returns via the cooler to the hydraulic reservoir.

(3) The boom pressure control knob regulates dispersal system boom pressure to a prescribed setting. When the knob is turned to a low index number, some hydraulic flow to the motor is by-passed through the boom pressure valve, and the reduced flow causes a low spray pump output. As the knob is rotated to a higher index, less hydraulic flow is by-passed and the motor drives the spray pump at an increased rate for higher pressure.

Figure 7-2. Hydraulically-Driven Pump System

Agitation of the hopper contents during the spray run (spray valve open) can be obtained by adjusting the spray valve metering stop to prevent the spray valve from completely opening. The partially open valve will cause some of the liquid to be returned to the hopper, thus causing agitation of the hopper contents. During flights to the field, or during spray run turn-arounds, agitation of the hopper contents can be obtained by turning on the hydraulic system with the spray valve closed. The rate of agitation can then be controlled with the boom pressure control knob.

Operation of the system may be stopped at any time by pushing the system on-off "T" handle full forward. This rotates the on-off valve in the reservoir to the open position, permitting the hydraulic fluid to by-pass the motor and return via the cooler to the hydraulic reservoir.

If for any reason the hydraulic motor or spray pump should malfunction, system pressure will start increasing due to the operation of the engine-driven hydraulic pump. When system pressure reaches approximately 1000 psi, the pressure relief valve will open and permit hydraulic fluid to by-pass the inoperative motor and return to the reservoir.

For performance data for the engine-driven hydraulic pump system, refer to Spray System Performance (figure 7-5) in this section.

OPERATING PROCEDURES

Operating procedures for the liquid dispersal system with an engine-driven hydraulic pump are as follows:

1. Pull the hydraulic system on-off "T" handle full aft to turn on hydraulic system.

2. Set boom pressure control knob for desired boom pressure.

NOTE

For hopper agitation before flight and during ferry flights to the field, check that the spray valve is closed and turn on the hydraulic system. For maximum agitation, rotate the boom pressure control knob clockwise. Readjust the boom pressure control to the desired setting before turning on the spray valve.

NOTE

The hydraulic system is to be turned off for takeoff and landing.

3. When ready to spray, turn on the hydraulic system, if off, and open the spray valve. (With a manually-operated spray valve, move the

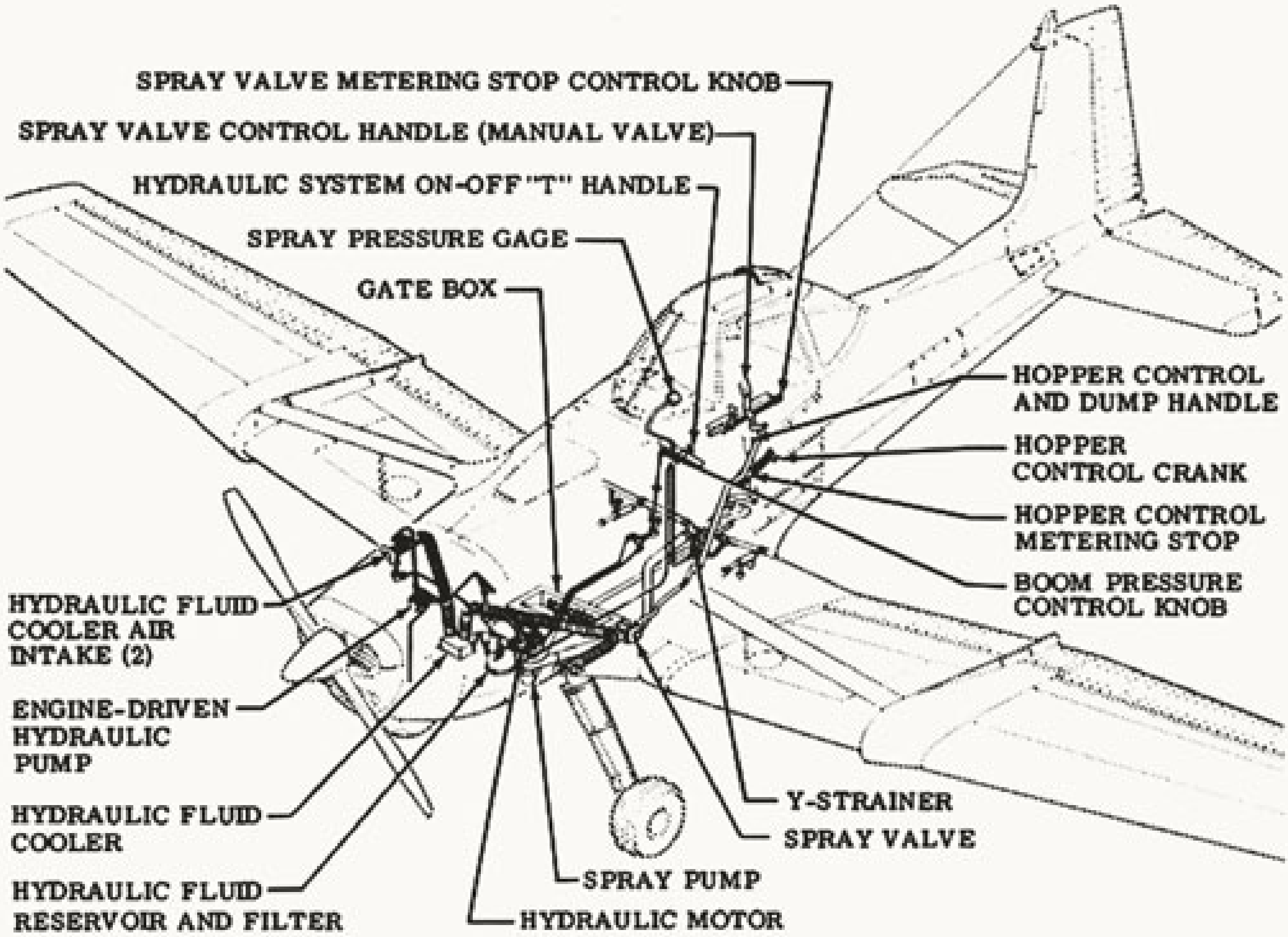


Figure 7-3. Liquid Dispersal System (Engine-Driven Hydraulic Pump)

spray valve control handle forward. With an electrically-operated spray valve, momentarily push down on the left push-button switch on top of the control stick grip; one-fourth of a second is required for full valve travel.) If the boom pressure requires readjustment, rotate the boom pressure control knob clockwise to increase pressure or counterclockwise to decrease pressure.

4. To stop spraying, close the spray valve either manually or electrically, as applicable. (To close the electric spray valve, momentarily push down on the right push-button switch on top of the control stick grip; one-fourth of a second is required for full valve travel.)

5. On subsequent spray passes, utilize the spray valve to start and stop spray dispersal. Once the boom pressure control knob is adjusted, boom pressure will remain the same each time the spray valve is opened unless the engine RPM is changed.

6. After emptying the hopper, turn off the hydraulic system by

pushing forward on the hydraulic system on-off "T" handle to prevent running the spray pump when it is dry. If an electric spray valve is installed, it should not be operated when the hopper is dry.

DRY DISPERSAL SYSTEM

The dry dispersal system is suitable for dry material application. As shown in figure 7-4, the system consists of a gate box with a reclosable dump door/metering gate and a spreader. The spreader is available in two different throat sizes and may be installed with either a fan-driven or electrically-driven agitator. Controls for the system consist of a hopper control and dump handle, hopper control crank, and a hopper control metering stop. If the airplane was previously equipped with a liquid dispersal system, the existing gate box and controls can be utilized. Refer to Dispersal System Components And Controls at the beginning of this section for additional description of these components and controls.

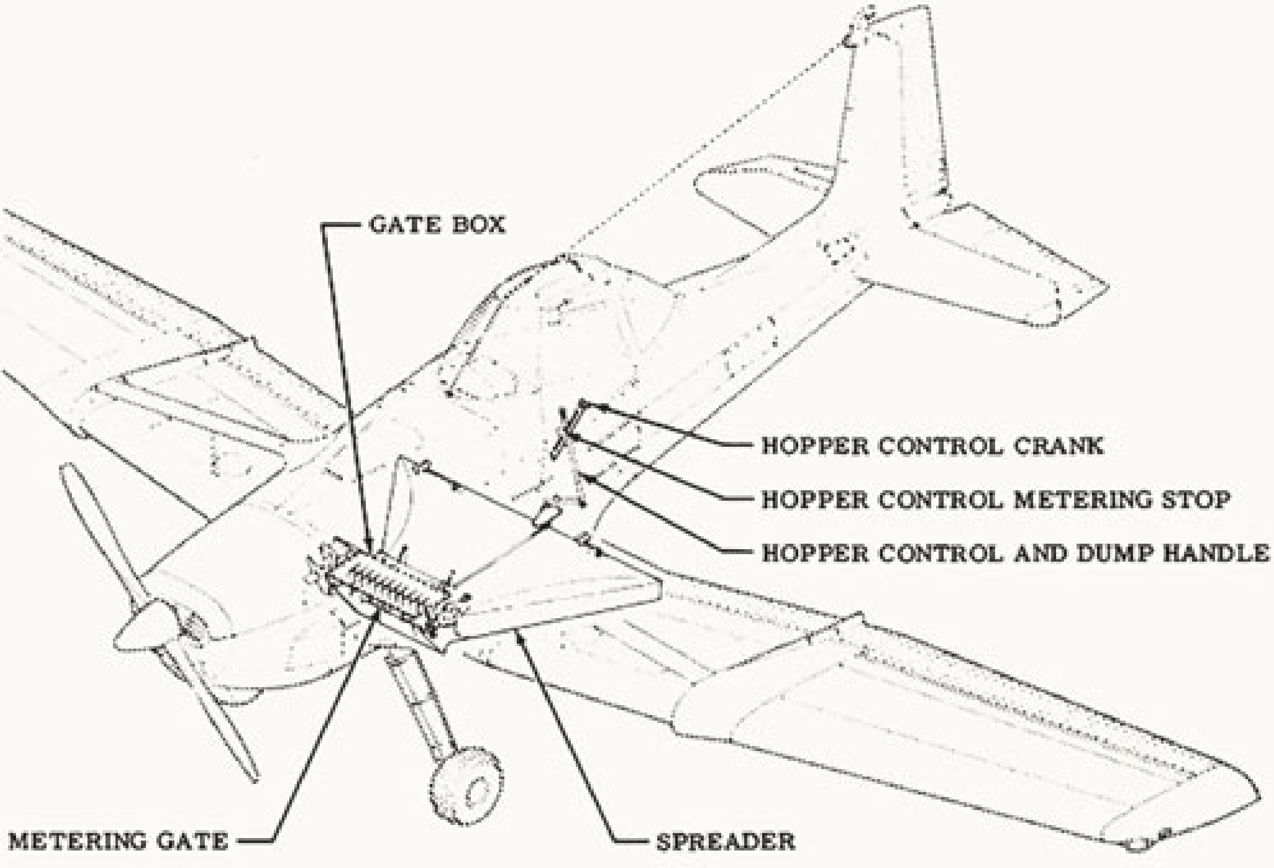


Figure 7-4. Dry Dispersal System

In this system, dry material leaves the hopper and is metered into the spreader by a metering gate (in the gate box) located upstream and ahead of the spreader air intake. The gate position is controlled by the hopper control and dump handle. Rotation of the hopper control crank positions a control metering stop and permits an accurate setting of the desired flow rate. To utilize the dump feature, the metering stop can be disengaged by rotating it upward, thus permitting full forward movement of the hopper control and dump handle for full-open gate actuation.

OPERATING PROCEDURES

Operating procedures for the dry dispersal system are as follows:

1. Set the hopper control metering stop by turning the hopper control crank to the desired stop setting.

NOTE

Before opening the metering gate on the first pass, check to see that the metering stop is rotated clockwise to its horizontal position so that it will catch the hopper control as it is moved forward. It may be desirable to have the metering stop rotated counterclockwise for takeoff in case of an emergency dump requirement.

2. When ready to apply material, move the hopper control forward to the metering stop.

3. To stop application, pull the hopper control full aft until it reaches the overcenter, closed position.

SPRAY SYSTEM PERFORMANCE

The maximum boom pressure available with the engine-driven hydraulic spray pump and D4, D6, D8, D10 and D12-45 nozzles is shown in figure 7-5; the pressure available with the fan-driven pump and these nozzles is shown in figure 7-6. Operators desiring to use D8, D10 and D12-46 nozzles may want to fly trail spray runs at various engine RPM settings or airspeeds to determine maximum boom pressures with the -46 nozzles. Spray tables (figure 7-7) are provided for several installations using both the -45 and -46 nozzles, and are applicable to both the engine-driven hydraulic spray pump and the two-bladed fan-driven spray pump. The tables are designed to cover the maximum range of boom pressures and flow rates available with either pump.

ENGINE RPM	APPROXIMATE MAXIMUM BOOM PRESSURE - PSI										
	22 NOZZLES				44 NOZZLES				64 NOZZLES		
	NOZZLE NUMBER										
	D4-45	D6-45	D8-45	D10-45	D6-45	D8-45	D10-45	D12-45	D8-45	D10-45	D12-45
2700	95	90	84	78	77	68	60	55	57	50	46
2600	91	86	81	76	75	67	60	55	57	50	46
2500	86	82	78	73	76	65	59	54	56	50	46
2400	81	78	74	70	69	62	56	52	54	58	46
2300	76	73	69	66	65	59	54	50	52	46	43
2200	72	69	66	63	62	57	52	48	50	44	39

Figure 7-5. Engine-Driven Hydraulic Spray Pump Boom Pressure

AIRSPEED MPH	APPROXIMATE MAXIMUM BOOM PRESSURE - PSI										
	22 NOZZLES				44 NOZZLES				64 NOZZLES		
	NOZZLE NUMBER										
	D4-45	D6-45	D8-45	D10-45	D6-45	D8-45	D10-45	D12-45	D8-45	D10-45	D12-45
80	36	35	34	33	32	31	29	26	28	25	23
90	46	45	44	43	41	38	36	33	34	31	29
100	55	54	53	52	50	46	44	40	42	37	35
110	64	63	62	61	59	55	52	48	50	46	42
120	73	72	71	70	69	65	60	56	57	52	49

Figure 7-6. Fan-Driven Spray Pump Boom Pressure

22 D4-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA				
			SWATH WIDTH - FT				
			40	50	60	70	80
80	10	4.0	.62	.49	.41	.35	.31
	20	5.5	.85	.68	.57	.49	.43
	30	6.8	1.05	.84	.70	.60	.53
	40	7.9	1.22	.98	.81	.70	.61
	50	8.7	1.35	1.08	.90	.77	.67
	60	9.5	1.47	1.18	.98	.84	.73
	70	10.2	1.58	1.26	1.05	.90	.79
	80	11.0	1.70	1.36	1.13	.97	.85
	90	11.7	1.81	1.45	1.21	1.03	.90
	100	12.3	1.90	1.52	1.27	1.09	.95
90	10	4.0	.55	.44	.37	.31	.27
	20	5.5	.76	.60	.50	.43	.38
	30	6.8	.93	.75	.62	.53	.47
	40	7.9	1.09	.87	.72	.62	.54
	50	8.7	1.20	.96	.80	.68	.60
	60	9.5	1.31	1.04	.87	.75	.65
	70	10.2	1.40	1.12	.93	.80	.70
	80	11.0	1.51	1.21	1.01	.86	.76
	90	11.7	1.61	1.29	1.07	.92	.80
	100	12.3	1.69	1.35	1.13	.97	.85
100	10	4.0	.49	.40	.33	.28	.25
	20	5.5	.68	.54	.45	.39	.34
	30	6.8	.84	.67	.56	.48	.42
	40	7.9	.98	.78	.65	.56	.49
	50	8.7	1.08	.86	.72	.62	.54
	60	9.5	1.18	.94	.78	.67	.59
	70	10.2	1.26	1.01	.84	.72	.63
	80	11.0	1.36	1.09	.91	.78	.68
	90	11.7	1.45	1.16	.97	.83	.72
	100	12.3	1.52	1.22	1.01	.87	.76
110	10	4.0	.45	.36	.30	.26	.22
	20	5.5	.62	.49	.41	.35	.31
	30	6.8	.76	.61	.51	.44	.38
	40	7.9	.89	.71	.59	.51	.44
	50	8.7	.98	.78	.65	.56	.49
	60	9.5	1.07	.85	.71	.61	.53
	70	10.2	1.15	.92	.76	.66	.57
	80	11.0	1.24	.99	.82	.71	.62
	90	11.7	1.32	1.05	.88	.75	.66
	100	12.3	1.38	1.11	.92	.79	.69
120	10	4.0	.41	.33	.27	.24	.21
	20	5.5	.57	.45	.38	.32	.28
	30	6.8	.70	.56	.47	.40	.35
	40	7.9	.81	.65	.54	.47	.41
	50	8.7	.90	.72	.60	.51	.45
	60	9.5	.98	.78	.65	.56	.49
	70	10.2	1.05	.84	.70	.60	.53
	80	11.0	1.13	.91	.76	.65	.57
	90	11.7	1.21	.97	.80	.69	.60
	100	12.3	1.27	1.01	.85	.72	.63

Figure 7-7. Spray Table (Sheet 1 of 14)

22 D6-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA				
			SWATH WIDTH - FT				
			40	50	60	70	80
80	10	6.4	.99	.79	.66	.57	.49
	20	9.0	1.39	1.11	.93	.80	.70
	30	11.0	1.70	1.36	1.13	.97	.85
	40	12.8	1.98	1.58	1.32	1.13	.99
	50	13.8	2.13	1.71	1.42	1.22	1.07
	60	15.8	2.44	1.96	1.63	1.40	1.22
	70	17.5	2.71	2.17	1.80	1.55	1.35
	80	18.3	2.83	2.26	1.89	1.62	1.42
	90	19.4	3.00	2.40	2.00	1.71	1.50
	100	20.5	3.17	2.54	2.11	1.81	1.59
90	10	6.4	.88	.70	.59	.50	.44
	20	9.0	1.24	.99	.82	.71	.62
	30	11.0	1.51	1.21	1.01	.86	.76
	40	12.8	1.76	1.41	1.17	1.01	.88
	50	13.8	1.90	1.52	1.26	1.08	.95
	60	15.8	2.17	1.74	1.45	1.24	1.09
	70	17.5	2.41	1.92	1.60	1.38	1.20
	80	18.3	2.52	2.01	1.68	1.44	1.26
	90	19.4	2.67	2.13	1.78	1.52	1.33
	100	20.5	2.82	2.25	1.88	1.61	1.41
100	10	6.4	.79	.63	.53	.45	.40
	20	9.0	1.11	.89	.74	.64	.56
	30	11.0	1.36	1.09	.91	.78	.68
	40	12.8	1.58	1.27	1.06	.91	.79
	50	13.8	1.71	1.37	1.14	.98	.85
	60	15.8	1.96	1.56	1.30	1.12	.98
	70	17.5	2.17	1.73	1.44	1.24	1.08
	80	18.3	2.26	1.81	1.51	1.29	1.13
	90	19.4	2.40	1.92	1.60	1.37	1.20
	100	20.5	2.54	2.03	1.69	1.45	1.27
110	10	6.4	.72	.58	.48	.41	.36
	20	9.0	1.01	.81	.67	.58	.51
	30	11.0	1.24	.99	.82	.71	.62
	40	12.8	1.44	1.15	.96	.82	.72
	50	13.8	1.55	1.24	1.03	.89	.78
	60	15.8	1.78	1.42	1.18	1.02	.89
	70	17.5	1.97	1.57	1.31	1.13	.98
	80	18.3	2.06	1.65	1.37	1.18	1.03
	90	19.4	2.18	1.75	1.45	1.25	1.09
	100	20.5	2.31	1.84	1.54	1.32	1.15
120	10	6.4	.66	.53	.44	.38	.33
	20	9.0	.93	.74	.62	.53	.46
	30	11.0	1.13	.91	.76	.65	.57
	40	12.8	1.32	1.06	.88	.75	.66
	50	13.8	1.42	1.14	.95	.81	.71
	60	15.8	1.63	1.30	1.09	.93	.81
	70	17.5	1.80	1.44	1.20	1.03	.90
	80	18.3	1.89	1.51	1.26	1.08	.94
	90	19.4	2.00	1.60	1.33	1.14	1.00
	100	20.5	2.11	1.69	1.41	1.21	1.06

Figure 7-7. Spray Table (Sheet 2 of 14)

22 D8-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA — SWATH WIDTH - FT				
			40	50	60	70	80
80	10	9.0	1.39	1.11	.93	.80	.70
	20	13.0	2.01	1.61	1.34	1.15	1.01
	30	15.8	2.44	1.96	1.63	1.40	1.22
	40	18.5	2.86	2.29	1.91	1.64	1.43
	50	20.7	3.20	2.56	2.13	1.83	1.60
	60	22.9	3.54	2.83	2.36	2.02	1.77
	70	24.7	3.82	3.06	2.55	2.18	1.91
	80	26.6	4.11	3.29	2.74	2.35	2.06
	90	28.2	4.36	3.49	2.91	2.49	2.18
	100	29.7	4.59	3.68	3.06	2.63	2.30
90	10	9.0	1.24	.99	.82	.71	.62
	20	13.0	1.79	1.43	1.19	1.02	.89
	30	15.8	2.17	1.74	1.45	1.24	1.09
	40	18.5	2.54	2.03	1.70	1.45	1.27
	50	20.7	2.85	2.28	1.90	1.63	1.42
	60	22.9	3.15	2.52	2.10	1.80	1.57
	70	24.7	3.40	2.72	2.26	1.94	1.70
	80	26.6	3.66	2.93	2.44	2.09	1.83
	90	28.2	3.88	3.10	2.58	2.22	1.94
	100	29.7	4.08	3.27	2.72	2.33	2.04
100	10	9.0	1.11	.89	.74	.64	.56
	20	13.0	1.61	1.29	1.07	.92	.80
	30	15.8	1.96	1.56	1.30	1.12	.98
	40	18.5	2.29	1.83	1.53	1.31	1.14
	50	20.7	2.56	2.05	1.71	1.46	1.28
	60	22.9	2.83	2.27	1.89	1.62	1.42
	70	24.7	3.06	2.45	2.04	1.75	1.53
	80	26.6	3.29	2.63	2.19	1.88	1.65
	90	28.2	3.49	2.79	2.33	1.99	1.74
	100	29.7	3.68	2.94	2.45	2.10	1.84
110	10	9.0	1.01	.81	.67	.58	.51
	20	13.0	1.46	1.17	.97	.84	.73
	30	15.8	1.78	1.42	1.18	1.02	.89
	40	18.5	2.08	1.66	1.39	1.19	1.04
	50	20.7	2.33	1.86	1.55	1.33	1.16
	60	22.9	2.58	2.06	1.72	1.47	1.29
	70	24.7	2.78	2.22	1.85	1.59	1.39
	80	26.6	2.99	2.39	1.99	1.71	1.50
	90	28.2	3.17	2.54	2.11	1.81	1.59
	100	29.7	3.34	2.67	2.23	1.91	1.67
120	10	9.0	.93	.74	.62	.53	.46
	20	13.0	1.34	1.07	.89	.77	.67
	30	15.8	1.63	1.30	1.09	.93	.81
	40	18.5	1.91	1.53	1.27	1.09	.95
	50	20.7	2.13	1.71	1.42	1.22	1.07
	60	22.9	2.36	1.89	1.57	1.35	1.18
	70	24.7	2.55	2.04	1.70	1.46	1.27
	80	26.6	2.74	2.19	1.83	1.57	1.37
	90	28.2	2.91	2.33	1.94	1.66	1.45
	100	29.7	3.06	2.45	2.04	1.75	1.53

Figure 7-7. Spray Table (Sheet 3 of 14)

22 D10-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA				
			SWATH WIDTH - FT				
			40	50	60	70	80
80	10	11.9	1.84	1.47	1.23	1.05	.92
	20	16.9	2.61	2.09	1.74	1.49	1.31
	30	20.7	3.20	2.56	2.13	1.83	1.60
	40	24.2	3.74	2.99	2.50	2.14	1.87
	50	26.3	4.07	3.25	2.71	2.32	2.03
	60	29.7	4.59	3.68	3.06	2.63	2.30
	70	32.1	4.97	3.97	3.31	2.84	2.48
	80	34.6	5.35	4.28	3.57	3.06	2.68
	90	36.8	5.69	4.55	3.79	3.25	2.85
	100	38.9	6.02	4.81	4.01	3.44	3.01
90	10	11.9	1.64	1.31	1.09	.93	.82
	20	16.9	2.32	1.86	1.55	1.33	1.16
	30	20.7	2.85	2.28	1.90	1.63	1.42
	40	24.2	3.33	2.66	2.22	1.90	1.66
	50	26.3	3.62	2.89	2.41	2.07	1.81
	60	29.7	4.08	3.27	2.72	2.33	2.04
	70	32.1	4.41	3.53	2.94	2.52	2.21
	80	34.6	4.76	3.81	3.17	2.72	2.38
	90	36.8	5.06	4.05	3.37	2.89	2.53
	100	38.9	5.35	4.28	3.57	3.06	2.67
100	10	11.9	1.47	1.18	.98	.84	.74
	20	16.9	2.09	1.67	1.39	1.20	1.05
	30	20.7	2.56	2.05	1.71	1.46	1.28
	40	24.2	2.99	2.40	2.00	1.71	1.50
	50	26.3	3.25	2.60	2.17	1.86	1.63
	60	29.7	3.68	2.94	2.45	2.10	1.84
	70	32.1	3.97	3.18	2.65	2.27	1.99
	80	34.6	4.28	3.43	2.85	2.45	2.14
	90	36.8	4.55	3.64	3.04	2.60	2.28
	100	38.9	4.81	3.85	3.21	2.75	2.41
110	10	11.9	1.34	1.07	.89	.76	.67
	20	16.9	1.90	1.52	1.27	1.09	.95
	30	20.7	2.33	1.86	1.55	1.33	1.16
	40	24.2	2.72	2.18	1.81	1.56	1.36
	50	26.3	2.96	2.37	1.97	1.69	1.48
	60	29.7	3.34	2.67	2.23	1.91	1.67
	70	32.1	3.61	2.89	2.41	2.06	1.81
	80	34.6	3.89	3.11	2.59	2.22	1.95
	90	36.8	4.14	3.31	2.76	2.37	2.07
	100	38.9	4.38	3.50	2.92	2.50	2.19
120	10	11.9	1.23	.98	.82	.70	.61
	20	16.9	1.74	1.39	1.16	1.00	.87
	30	20.7	2.13	1.71	1.42	1.22	1.07
	40	24.2	2.50	2.00	1.66	1.43	1.25
	50	26.3	2.71	2.17	1.81	1.55	1.36
	60	29.7	3.06	2.45	2.04	1.75	1.53
	70	32.1	3.31	2.65	2.21	1.89	1.66
	80	34.6	3.57	2.85	2.38	2.04	1.78
	90	36.8	3.79	3.04	2.53	2.17	1.90
	100	38.9	4.01	3.21	2.67	2.29	2.01

Figure 7-7. Spray Table (Sheet 4 of 14)

44 D6-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA				
			SWATH WIDTH - FT				
			40	50	60	70	80
80	10	12.8	1.98	1.58	1.32	1.13	.99
	20	18.0	2.78	2.23	1.86	1.59	1.39
	30	22.0	3.40	2.72	2.27	1.94	1.70
	40	25.5	3.94	3.16	2.63	2.25	1.97
	50	27.6	4.27	3.42	2.85	2.44	2.13
	60	31.7	4.90	3.92	3.27	2.80	2.45
	70	35.1	5.43	4.34	3.62	3.10	2.71
	80	36.5	5.65	4.52	3.76	3.23	2.82
	90	38.7	5.99	4.79	3.99	3.42	2.99
	100	40.9	6.33	5.06	4.22	3.62	3.16
90	10	12.8	1.76	1.41	1.17	1.01	.88
	20	18.0	2.47	1.98	1.65	1.41	1.24
	30	22.0	3.02	2.42	2.02	1.73	1.51
	40	25.5	3.51	2.80	2.34	2.00	1.75
	50	27.6	3.79	3.04	2.53	2.17	1.90
	60	31.7	4.36	3.49	2.91	2.49	2.18
	70	35.1	4.83	3.86	3.22	2.76	2.41
	80	36.5	5.02	4.01	3.35	2.87	2.51
	90	38.7	5.32	4.26	3.55	3.04	2.66
	100	40.9	5.62	4.50	3.75	3.21	2.81
100	10	12.8	1.58	1.27	1.06	.91	.79
	20	18.0	2.23	1.78	1.48	1.27	1.11
	30	22.0	2.72	2.18	1.81	1.56	1.36
	40	25.5	3.16	2.52	2.10	1.80	1.58
	50	27.6	3.42	2.73	2.28	1.95	1.71
	60	31.7	3.92	3.14	2.62	2.24	1.96
	70	35.1	4.34	3.47	2.90	2.48	2.17
	80	36.5	4.52	3.61	3.01	2.58	2.26
	90	38.7	4.79	3.83	3.19	2.74	2.39
	100	40.9	5.06	4.05	3.37	2.89	2.53
110	10	12.8	1.44	1.15	.96	.82	.72
	20	18.0	2.02	1.62	1.35	1.16	1.01
	30	22.0	2.47	1.98	1.65	1.41	1.24
	40	25.5	2.87	2.29	1.91	1.64	1.43
	50	27.6	3.10	2.48	2.07	1.77	1.55
	60	31.7	3.57	2.85	2.38	2.04	1.78
	70	35.1	3.95	3.16	2.63	2.26	1.97
	80	36.5	4.11	3.28	2.74	2.35	2.05
	90	38.7	4.35	3.48	2.90	2.49	2.18
	100	40.9	4.60	3.68	3.07	2.63	2.30
120	10	12.8	1.32	1.06	.88	.75	.66
	20	18.0	1.86	1.48	1.24	1.06	.93
	30	22.0	2.27	1.81	1.51	1.30	1.13
	40	25.5	2.63	2.10	1.75	1.50	1.31
	50	27.6	2.85	2.28	1.90	1.63	1.42
	60	31.7	3.27	2.62	2.18	1.87	1.63
	70	35.1	3.62	2.90	2.41	2.07	1.81
	80	36.5	3.76	3.01	2.51	2.15	1.88
	90	38.7	3.99	3.19	2.66	2.28	2.00
	100	40.9	4.22	3.37	2.81	2.41	2.11

Figure 7-7. Spray Table (Sheet 5 of 14)

44 D8-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA				
			SWATH WIDTH - FT				
			40	50	60	70	80
80	10	18.0	2.78	2.23	1.86	1.59	1.39
	20	26.0	4.02	3.22	2.68	2.30	2.01
	30	31.7	4.90	3.92	3.27	2.80	2.45
	40	37.0	5.72	4.58	3.82	3.27	2.86
	50	41.4	6.40	5.12	4.27	3.66	3.20
	60	45.8	7.08	5.67	4.72	4.05	3.54
	70	49.5	7.66	6.13	5.10	4.38	3.83
	80	53.2	8.23	6.58	5.49	4.70	4.11
	90	56.3	8.71	6.97	5.81	4.98	4.35
	100	59.4	9.19	7.35	6.13	5.25	4.59
90	10	18.0	2.47	1.98	1.65	1.41	1.24
	20	26.0	3.57	2.86	2.38	2.04	1.79
	30	31.7	4.36	3.49	2.91	2.49	2.18
	40	37.0	5.09	4.07	3.39	2.91	2.54
	50	41.4	5.69	4.55	3.79	3.25	2.85
	60	45.8	6.30	5.04	4.20	3.60	3.15
	70	49.5	6.81	5.44	4.54	3.89	3.40
	80	53.2	7.31	5.85	4.88	4.18	3.66
	90	56.3	7.74	6.19	5.16	4.42	3.87
	100	59.4	8.17	6.53	5.44	4.67	4.08
100	10	18.0	2.23	1.78	1.48	1.27	1.11
	20	26.0	3.22	2.57	2.14	1.84	1.61
	30	31.7	3.92	3.14	2.62	2.24	1.96
	40	37.0	4.58	3.66	3.05	2.62	2.29
	50	41.4	5.12	4.10	3.42	2.93	2.56
	60	45.8	5.67	4.53	3.78	3.24	2.83
	70	49.5	6.13	4.90	4.08	3.50	3.06
	80	53.2	6.58	5.27	4.39	3.76	3.29
	90	56.3	6.97	5.57	4.64	3.98	3.48
	100	59.4	7.35	5.88	4.90	4.20	3.68
110	10	18.0	2.02	1.62	1.35	1.16	1.01
	20	26.0	2.92	2.34	1.95	1.67	1.46
	30	31.7	3.57	2.85	2.38	2.04	1.78
	40	37.0	4.16	3.33	2.77	2.38	2.08
	50	41.4	4.66	3.73	3.10	2.66	2.33
	60	45.8	5.15	4.12	3.43	2.94	2.58
	70	49.5	5.57	4.45	3.71	3.18	2.78
	80	53.2	5.98	4.79	3.99	3.42	2.99
	90	56.3	6.33	5.07	4.22	3.62	3.17
	100	59.4	6.68	5.35	4.45	3.82	3.34
120	10	18.0	1.86	1.48	1.24	1.06	.93
	20	26.0	2.68	2.14	1.79	1.53	1.34
	30	31.7	3.27	2.62	2.18	1.87	1.63
	40	37.0	3.82	3.05	2.54	2.18	1.91
	50	41.4	4.27	3.42	2.85	2.44	2.13
	60	45.8	4.72	3.78	3.15	2.70	2.36
	70	49.5	5.10	4.08	3.40	2.92	2.55
	80	53.2	5.49	4.39	3.66	3.13	2.74
	90	56.3	5.81	4.64	3.87	3.32	2.90
	100	59.4	6.13	4.90	4.08	3.50	3.06

Figure 7-7. Spray Table (Sheet 6 of 14)

44 D10-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA				
			SWATH WIDTH - FT				
			40	50	60	70	80
80	10	23.8	3.68	2.95	2.45	2.10	1.84
	20	33.7	5.21	4.17	3.48	2.98	2.61
	30	41.4	6.40	5.12	4.27	3.66	3.20
	40	48.4	7.49	5.99	4.99	4.28	3.74
	50	52.6	8.14	6.51	5.42	4.65	4.07
	60	59.4	9.19	7.35	6.13	5.25	4.59
	70	64.3	9.95	7.96	6.63	5.68	4.97
	8C	69.2	10.70	8.56	7.14	6.12	5.35
	90	73.5	11.37	9.10	7.58	6.50	5.68
	100	77.9	12.05	9.64	8.03	6.89	6.03
90	10	23.8	3.27	2.62	2.18	1.87	1.64
	20	33.7	4.63	3.71	3.09	2.65	2.32
	30	41.4	5.69	4.55	3.79	3.25	2.85
	40	48.4	6.65	5.32	4.44	3.80	3.33
	50	52.6	7.23	5.79	4.82	4.13	3.62
	60	59.4	8.17	6.53	5.44	4.67	4.08
	70	64.3	8.84	7.07	5.89	5.05	4.42
	80	69.2	9.51	7.61	6.34	5.44	4.76
	90	73.5	10.11	8.08	6.74	5.77	5.05
	100	77.9	10.71	8.57	7.14	6.12	5.36
100	10	23.8	2.95	2.36	1.96	1.68	1.47
	20	33.7	4.17	3.34	2.78	2.38	2.09
	30	41.4	5.12	4.10	3.42	2.93	2.56
	40	48.4	5.99	4.79	3.99	3.42	2.99
	50	52.6	6.51	5.21	4.34	3.72	3.25
	60	59.4	7.35	5.88	4.90	4.20	3.68
	70	64.3	7.96	6.37	5.30	4.55	3.98
	80	69.2	8.56	6.85	5.71	4.89	4.28
	90	73.5	9.10	7.28	6.06	5.20	4.55
	100	77.9	9.64	7.71	6.43	5.51	4.82
110	10	23.8	2.68	2.14	1.78	1.53	1.34
	20	33.7	3.79	3.03	2.53	2.17	1.90
	30	41.4	4.66	3.73	3.10	2.66	2.33
	40	48.4	5.44	4.36	3.63	3.11	2.72
	50	52.6	5.92	4.73	3.94	3.38	2.96
	60	59.4	6.68	5.35	4.45	3.82	3.34
	70	64.3	7.23	5.79	4.82	4.13	3.62
	80	69.2	7.78	6.23	5.19	4.45	3.89
	90	73.5	8.27	6.61	5.51	4.72	4.13
	100	77.9	8.76	7.01	5.84	5.01	4.38
120	10	23.8	2.45	1.96	1.64	1.40	1.23
	20	33.7	3.48	2.78	2.32	1.99	1.74
	30	41.4	4.27	3.42	2.85	2.44	2.13
	40	48.4	4.99	3.99	3.33	2.85	2.50
	50	52.6	5.42	4.34	3.62	3.10	2.71
	60	59.4	6.13	4.90	4.08	3.50	3.06
	70	64.3	6.63	5.30	4.42	3.79	3.32
	80	69.2	7.14	5.71	4.76	4.08	3.57
	90	73.5	7.58	6.06	5.05	4.33	3.79
	100	77.9	8.03	6.43	5.36	4.59	4.02

Figure 7-7. Spray Table (Sheet 7 of 14)

44 D12-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA				
			SWATH WIDTH - FT				
			40	50	60	70	80
80	10	29.5	4.56	3.65	3.04	2.61	2.28
	20	41.8	6.47	5.17	4.31	3.69	3.23
	30	51.5	7.97	6.37	5.31	4.55	3.98
	40	59.8	9.25	7.40	6.17	5.29	4.63
	50	66.7	10.32	8.25	6.88	5.90	5.16
	60	73.9	11.43	9.15	7.62	6.53	5.72
	70	79.8	12.34	9.88	8.23	7.05	6.17
	80	85.8	13.27	10.62	8.85	7.58	6.64
	90	91.3	14.12	11.30	9.42	8.07	7.06
	100	96.8	14.97	11.98	9.98	8.56	7.49
90	10	29.5	4.06	3.24	2.70	2.32	2.03
	20	41.8	5.75	4.60	3.83	3.28	2.87
	30	51.5	7.08	5.66	4.72	4.05	3.54
	40	59.8	8.22	6.58	5.48	4.70	4.11
	50	66.7	9.17	7.34	6.11	5.24	4.59
	60	73.9	10.16	8.13	6.77	5.81	5.08
	70	79.8	10.97	8.78	7.31	6.27	5.49
	80	85.8	11.80	9.44	7.86	6.74	5.90
	90	91.3	12.55	10.04	8.37	7.17	6.28
	100	96.8	13.31	10.65	8.87	7.61	6.65
100	10	29.5	3.65	2.92	2.43	2.09	1.83
	20	41.8	5.17	4.14	3.45	2.96	2.59
	30	51.5	6.37	5.10	4.25	3.64	3.19
	40	59.8	7.40	5.92	4.93	4.23	3.70
	50	66.7	8.25	6.60	5.50	4.72	4.13
	60	73.9	9.15	7.32	6.10	5.23	4.57
	70	79.8	9.88	7.90	6.58	5.64	4.94
	80	85.8	10.62	8.49	7.08	6.07	5.31
	90	91.3	11.30	9.04	7.53	6.46	5.65
	100	96.8	11.98	9.58	7.99	6.85	5.99
110	10	29.5	3.32	2.65	2.21	1.90	1.66
	20	41.8	4.70	3.76	3.13	2.69	2.35
	30	51.5	5.79	4.63	3.86	3.31	2.90
	40	59.8	6.73	5.38	4.48	3.84	3.36
	50	66.7	7.50	6.00	5.00	4.29	3.75
	60	73.9	8.31	6.65	5.54	4.75	4.16
	70	79.8	8.98	7.18	5.98	5.13	4.49
	80	85.8	9.65	7.72	6.43	5.52	4.83
	90	91.3	10.27	8.22	6.85	5.87	5.14
	100	96.8	10.89	8.71	7.26	6.22	5.44
120	10	29.5	3.04	2.43	2.03	1.74	1.52
	20	41.8	4.31	3.45	2.87	2.46	2.16
	30	51.5	5.31	4.25	3.54	3.03	2.66
	40	59.8	6.17	4.93	4.11	3.52	3.08
	50	66.7	6.88	5.50	4.59	3.93	3.44
	60	73.9	7.62	6.10	5.08	4.35	3.81
	70	79.8	8.23	6.58	5.49	4.70	4.11
	80	85.8	8.85	7.08	5.90	5.06	4.42
	90	91.3	9.42	7.53	6.28	5.38	4.71
	100	96.8	9.98	7.99	6.65	5.70	4.99

Figure 7-7. Spray Table (Sheet 8 of 14)

64 D8-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA — SWATH WIDTH - FT 40	50	60	70	80
80	10	26.2	4.05	3.24	2.70	2.32	2.03
	20	37.8	5.85	4.68	3.90	3.34	2.92
	30	46.0	7.12	5.69	4.74	4.07	3.56
	40	53.8	8.32	6.66	5.55	4.76	4.16
	50	60.2	9.31	7.45	6.21	5.32	4.66
	60	66.6	10.30	8.24	6.87	5.89	5.15
	70	73.0	11.29	9.03	7.53	6.45	5.65
	80	77.4	11.97	9.58	7.98	6.84	5.99
	90	81.9	12.67	10.14	8.45	7.24	6.33
	100	86.4	13.36	10.69	8.91	7.64	6.68
90	10	26.2	3.60	2.88	2.40	2.06	1.80
	20	37.8	5.20	4.16	3.46	2.97	2.60
	30	46.0	6.32	5.06	4.22	3.61	3.16
	40	53.8	7.40	5.92	4.93	4.23	3.70
	50	60.2	8.28	6.62	5.52	4.73	4.14
	60	66.6	9.16	7.33	6.10	5.23	4.58
	70	73.0	10.04	8.03	6.69	5.74	5.02
	80	77.4	10.64	8.51	7.09	6.08	5.32
	90	81.9	11.26	9.01	7.51	6.43	5.63
	100	86.4	11.88	9.50	7.92	6.79	5.94
100	10	26.2	3.24	2.59	2.16	1.85	1.62
	20	37.8	4.68	3.74	3.12	2.67	2.34
	30	46.0	5.69	4.55	3.79	3.25	2.85
	40	53.8	6.66	5.33	4.44	3.80	3.33
	50	60.2	7.45	5.96	4.97	4.26	3.72
	60	66.6	8.24	6.59	5.49	4.71	4.12
	70	73.0	9.03	7.23	6.02	5.16	4.52
	80	77.4	9.58	7.66	6.39	5.47	4.79
	90	81.9	10.14	8.11	6.76	5.79	5.07
	100	86.4	10.69	8.55	7.13	6.11	5.35
110	10	26.2	2.95	2.36	1.96	1.68	1.47
	20	37.8	4.25	3.40	2.83	2.43	2.13
	30	46.0	5.17	4.14	3.45	2.96	2.59
	40	53.8	6.05	4.84	4.03	3.46	3.03
	50	60.2	6.77	5.42	4.51	3.87	3.39
	60	66.6	7.49	5.99	4.99	4.28	3.75
	70	73.0	8.21	6.57	5.47	4.69	4.11
	80	77.4	8.71	6.97	5.80	4.98	4.35
	90	81.9	9.21	7.37	6.14	5.26	4.61
	100	86.4	9.72	7.78	6.48	5.55	4.86
120	10	26.2	2.70	2.16	1.80	1.54	1.35
	20	37.8	3.90	3.12	2.60	2.23	1.95
	30	46.0	4.74	3.79	3.16	2.71	2.37
	40	53.8	5.55	4.44	3.70	3.17	2.77
	50	60.2	6.21	4.97	4.14	3.55	3.10
	60	66.6	6.87	5.49	4.58	3.92	3.43
	70	73.0	7.53	6.02	5.02	4.30	3.76
	80	77.4	7.98	6.39	5.32	4.56	3.99
	90	81.9	8.45	6.76	5.63	4.83	4.22
	100	86.4	8.91	7.13	5.94	5.09	4.45

Figure 7-7. Spray Table (Sheet 9 of 14)

64 D10-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA — SWATH WIDTH - FT 40	50	60	70	80
80	10	34.6	5.35	4.28	3.57	3.06	2.68
	20	49.3	7.63	6.10	5.08	4.36	3.81
	30	60.2	9.31	7.45	6.21	5.32	4.66
	40	70.4	10.89	8.71	7.26	6.22	5.44
	50	78.4	12.13	9.70	8.08	6.93	6.06
	60	86.4	13.36	10.69	8.91	7.64	6.68
	70	93.4	14.45	11.56	9.63	8.26	7.22
	80	100.5	15.55	12.44	10.36	8.88	7.77
	90	106.9	16.54	13.23	11.02	9.45	8.27
	100	113.3	17.53	14.02	11.68	10.01	8.76
90	10	34.6	4.76	3.81	3.17	2.72	2.38
	20	49.3	6.78	5.42	4.52	3.87	3.39
	30	60.2	8.28	6.62	5.52	4.73	4.14
	40	70.4	9.68	7.74	6.45	5.53	4.84
	50	78.4	10.78	8.62	7.19	6.16	5.39
	60	86.4	11.88	9.50	7.92	6.79	5.94
	70	93.4	12.84	10.27	8.56	7.34	6.42
	80	100.5	13.82	11.05	9.21	7.90	6.91
	90	106.9	14.70	11.76	9.80	8.40	7.35
	100	113.3	15.58	12.46	10.39	8.90	7.79
100	10	34.6	4.28	3.43	2.85	2.45	2.14
	20	49.3	6.10	4.88	4.07	3.49	3.05
	30	60.2	7.45	5.96	4.97	4.26	3.72
	40	70.4	8.71	6.97	5.81	4.98	4.36
	50	78.4	9.70	7.76	6.47	5.54	4.85
	60	86.4	10.69	8.55	7.13	6.11	5.35
	70	93.4	11.56	9.25	7.71	6.60	5.78
	80	100.5	12.44	9.95	8.29	7.11	6.22
	90	106.9	13.23	10.58	8.82	7.56	6.61
	100	113.3	14.02	11.22	9.35	8.01	7.01
110	10	34.6	3.89	3.11	2.59	2.22	1.95
	20	49.3	5.55	4.44	3.70	3.17	2.77
	30	60.2	6.77	5.42	4.51	3.87	3.39
	40	70.4	7.92	6.34	5.28	4.53	3.96
	50	78.4	8.82	7.06	5.88	5.04	4.41
	60	86.4	9.72	7.78	6.48	5.55	4.86
	70	93.4	10.51	8.41	7.00	6.00	5.25
	80	100.5	11.31	9.04	7.54	6.46	5.65
	90	106.9	12.03	9.62	8.02	6.87	6.01
	100	113.3	12.75	10.20	8.50	7.28	6.37
120	10	34.6	3.57	2.85	2.38	2.04	1.78
	20	49.3	5.08	4.07	3.39	2.91	2.54
	30	60.2	6.21	4.97	4.14	3.55	3.10
	40	70.4	7.26	5.81	4.84	4.15	3.63
	50	78.4	8.08	6.47	5.39	4.62	4.04
	60	86.4	8.91	7.13	5.94	5.09	4.45
	70	93.4	9.63	7.71	6.42	5.50	4.82
	80	100.5	10.36	8.29	6.91	5.92	5.18
	90	106.9	11.02	8.82	7.35	6.30	5.51
	100	113.3	11.68	9.35	7.79	6.68	5.84

Figure 7-7. Spray Table (Sheet 10 of 14)

64 D12-45 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA				
			SWATH WIDTH - FT				
			40	50	60	70	80
80	10	42.9	6.64	5.31	4.42	3.79	3.32
	20	60.8	9.40	7.52	6.27	5.37	4.70
	30	74.9	11.59	9.27	7.72	6.62	5.79
	40	87.0	13.46	10.77	8.97	7.69	6.73
	50	97.3	15.05	12.04	10.03	8.60	7.53
	60	107.5	16.63	13.30	11.09	9.50	8.31
	70	115.2	17.82	14.26	11.88	10.18	8.91
	80	124.8	19.30	15.44	12.87	11.03	9.65
	90	132.8	20.54	16.43	13.69	11.74	10.27
	100	140.8	21.78	17.42	14.52	12.45	10.89
90	10	42.9	5.90	4.72	3.93	3.37	2.95
	20	60.8	8.36	6.69	5.57	4.78	4.18
	30	74.9	10.30	8.24	6.87	5.88	5.15
	40	87.0	11.96	9.57	7.97	6.84	5.98
	50	97.3	13.38	10.70	8.92	7.64	6.69
	60	107.5	14.78	11.82	9.85	8.45	7.39
	70	115.2	15.84	12.67	10.56	9.05	7.92
	80	124.8	17.16	13.73	11.44	9.81	8.58
	90	132.8	18.26	14.61	12.17	10.43	9.13
	100	140.8	19.36	15.49	12.91	11.06	9.68
100	10	42.9	5.31	4.25	3.54	3.03	2.65
	20	60.8	7.52	6.02	5.02	4.30	3.76
	30	74.9	9.27	7.42	6.18	5.30	4.63
	40	87.0	10.77	8.61	7.18	6.15	5.38
	50	97.3	12.04	9.63	8.03	6.88	6.02
	60	107.5	13.30	10.64	8.87	7.60	6.65
	70	115.2	14.26	11.40	9.50	8.15	7.13
	80	124.8	15.44	12.36	10.30	8.83	7.72
	90	132.8	16.43	13.15	10.96	9.39	8.22
	100	140.8	17.42	13.94	11.62	9.96	8.71
110	10	42.9	4.83	3.86	3.22	2.76	2.41
	20	60.8	6.84	5.47	4.56	3.91	3.42
	30	74.9	8.43	6.74	5.62	4.81	4.21
	40	87.0	9.79	7.83	6.52	5.59	4.89
	50	97.3	10.95	8.76	7.30	6.25	5.47
	60	107.5	12.09	9.67	8.06	6.91	6.05
	70	115.2	12.96	10.37	8.64	7.41	6.48
	80	124.8	14.04	11.23	9.36	8.02	7.02
	90	132.8	14.94	11.95	9.96	8.54	7.47
	100	140.8	15.84	12.67	10.56	9.05	7.92
120	10	42.9	4.42	3.54	2.95	2.53	2.21
	20	60.8	6.27	5.02	4.18	3.58	3.13
	30	74.9	7.72	6.18	5.15	4.41	3.86
	40	87.0	8.97	7.18	5.98	5.13	4.49
	50	97.3	10.03	8.03	6.69	5.73	5.02
	60	107.5	11.09	8.87	7.39	6.33	5.54
	70	115.2	11.88	9.50	7.92	6.79	5.94
	80	124.8	12.87	10.30	8.58	7.35	6.43
	90	132.8	13.69	10.96	9.13	7.83	6.85
	100	140.8	14.52	11.62	9.68	8.30	7.26

Figure 7-7. Spray Table (Sheet 11 of 14)

64 D8-46 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA				
			SWATH WIDTH - FT				
			40	50	60	70	80
80	10	43.0	6.65	5.32	4.43	3.80	3.33
	20	69.0	10.67	8.54	7.12	6.10	5.34
	30	84.0	12.99	10.39	8.66	7.42	6.50
	40	95.0	14.70	11.76	9.80	8.40	7.35
	50	103.0	15.93	12.75	10.62	9.10	7.97
90	10	43.0	5.91	4.73	3.94	3.38	2.96
	20	69.0	9.49	7.59	6.32	5.42	4.74
	30	84.0	11.55	9.24	7.70	6.60	5.77
	40	95.0	13.06	10.45	8.71	7.46	6.53
	50	103.0	14.16	11.33	9.44	8.09	7.08
100	10	43.0	5.32	4.26	3.55	3.04	2.66
	20	69.0	8.54	6.83	5.69	4.88	4.27
	30	84.0	10.39	8.32	6.93	5.94	5.20
	40	95.0	11.76	9.40	7.84	6.72	5.88
	50	103.0	12.75	10.20	8.50	7.28	6.37
110	10	43.0	4.84	3.87	3.22	2.76	2.42
	20	69.0	7.76	6.21	5.17	4.44	3.88
	30	84.0	9.45	7.56	6.30	5.40	4.72
	40	95.0	10.69	8.55	7.13	6.11	5.34
	50	103.0	11.59	9.27	7.72	6.62	5.79
120	10	43.0	4.43	3.55	2.96	2.53	2.22
	20	69.0	7.12	5.69	4.74	4.07	3.56
	30	84.0	8.66	6.93	5.77	4.95	4.33
	40	95.0	9.80	7.84	6.53	5.60	4.90
	50	103.0	10.62	8.50	7.08	6.07	5.31

Figure 7-7. Spray Table (Sheet 12 of 14)

64 D10-46 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA — SWATH WIDTH - FT: 40	50	60	70	80
80	10	53.0	8.20	6.56	5.47	4.68	4.10
	20	93.0	14.39	11.51	9.59	8.22	7.19
	30	111.0	17.17	13.74	11.45	9.81	8.59
	40	125.0	19.34	15.47	12.89	11.05	9.67
	50	136.0	21.04	16.83	14.02	12.02	10.52
90	10	53.0	7.29	5.83	4.86	4.16	3.64
	20	93.0	12.79	10.23	8.52	7.31	6.39
	30	111.0	15.26	12.21	10.17	8.72	7.63
	40	125.0	17.19	13.75	11.46	9.82	8.59
	50	136.0	18.70	14.96	12.47	10.69	9.35
100	10	53.0	6.56	5.25	4.37	3.75	3.28
	20	93.0	11.51	9.21	7.67	6.58	5.75
	30	111.0	13.74	10.99	9.16	7.85	6.87
	40	125.0	15.47	12.37	10.31	8.84	7.73
	50	136.0	16.83	13.46	11.22	9.62	8.41
110	10	53.0	5.96	4.77	3.97	3.41	2.98
	20	93.0	10.46	8.37	6.97	5.98	5.23
	30	111.0	12.49	9.99	8.32	7.14	6.24
	40	125.0	14.06	11.25	9.38	8.04	7.03
	50	136.0	15.30	12.24	10.20	8.74	7.65
120	10	53.0	5.47	4.37	3.64	3.12	2.73
	20	93.0	9.59	7.67	6.39	5.48	4.80
	30	111.0	11.45	9.16	7.63	6.54	5.72
	40	125.0	12.89	10.31	8.59	7.37	6.45
	50	136.0	14.02	11.22	9.35	8.01	7.01

Figure 7-7. Spray Table (Sheet 13 of 14)

64 D12-46 NOZZLES

AIRSPEED MPH	BOOM PRESSURE PSI	TOTAL FLOW GPM	COVERAGE, GPA — SWATH WIDTH - FT				
			40	50	60	70	80
80	10	54.0	8.35	6.68	5.57	4.77	4.18
	20	97.0	15.00	12.00	10.00	8.57	7.50
	30	120.0	18.56	14.85	12.37	10.61	9.28
	40	138.0	21.35	17.08	14.23	12.20	10.67
	50	151.0	23.36	18.69	15.57	13.35	11.68
90	10	54.0	7.42	5.94	4.95	4.24	3.71
	20	97.0	13.34	10.67	8.89	7.62	6.67
	30	120.0	16.50	13.20	11.00	9.43	8.25
	40	138.0	18.97	15.18	12.65	10.84	9.49
	50	151.0	20.76	16.61	13.84	11.86	10.38
100	10	54.0	6.68	5.35	4.45	3.82	3.34
	20	97.0	12.00	9.60	8.00	6.86	6.00
	30	120.0	14.85	11.88	9.90	8.49	7.42
	40	138.0	17.08	13.66	11.38	9.76	8.54
	50	151.0	18.69	14.95	12.46	10.68	9.34
110	10	54.0	6.07	4.86	4.05	3.47	3.04
	20	97.0	10.91	8.73	7.27	6.24	5.46
	30	120.0	13.50	10.80	9.00	7.71	6.75
	40	138.0	15.52	12.42	10.35	8.87	7.76
	50	151.0	16.99	13.59	11.32	9.71	8.49
120	10	54.0	5.57	4.45	3.71	3.18	2.78
	20	97.0	10.00	8.00	6.67	5.72	5.00
	30	120.0	12.37	9.90	8.25	7.07	6.19
	40	138.0	14.23	11.38	9.49	8.13	7.12
	50	151.0	15.57	12.46	10.38	8.90	7.79

Figure 7-7. Spray Table (Sheet 14 of 14)

QUICK-LOADER VALVE SYSTEMS

A quick-loader valve (see figure 7-8) is installed on the left side of the fuselage to provide a means of quickly filling the airplane hopper to expedite spray operations. A hopper overflow is designed to handle the full flow rate from the bottom loader, if the hopper should be inadvertently overfilled using a high speed pump. A quick loader valve is also available for the right side of the airplane.

Both valves are located behind removable access cover panels just below and slightly aft of the cockpit doors. Quick-release fasteners permit complete removal of the cover panels, exposing the quick-loader valves. The valves are fitted with an inlet filler having 2-inch pipe threads. Adapters are readily available, if necessary, to convert the inlet fitting to the size on the hose of the supply tank. A manually-operated valve handle controls the flow of material into the hopper. With the valve handle aligned with the direction of flow, the valve is full open. After filling, turn the valve handle one-fourth turn (full off) and disconnect the filler hose. This system should be drained before changing spray material, before changing to dust, and in freezing temperatures.

A spring-loaded flapper type check valve is mounted on the inside of the hopper at the quick-loader system outlet. The check valve is designed to prevent either dry material or spray liquid from entering the quick-loader system from the hopper.

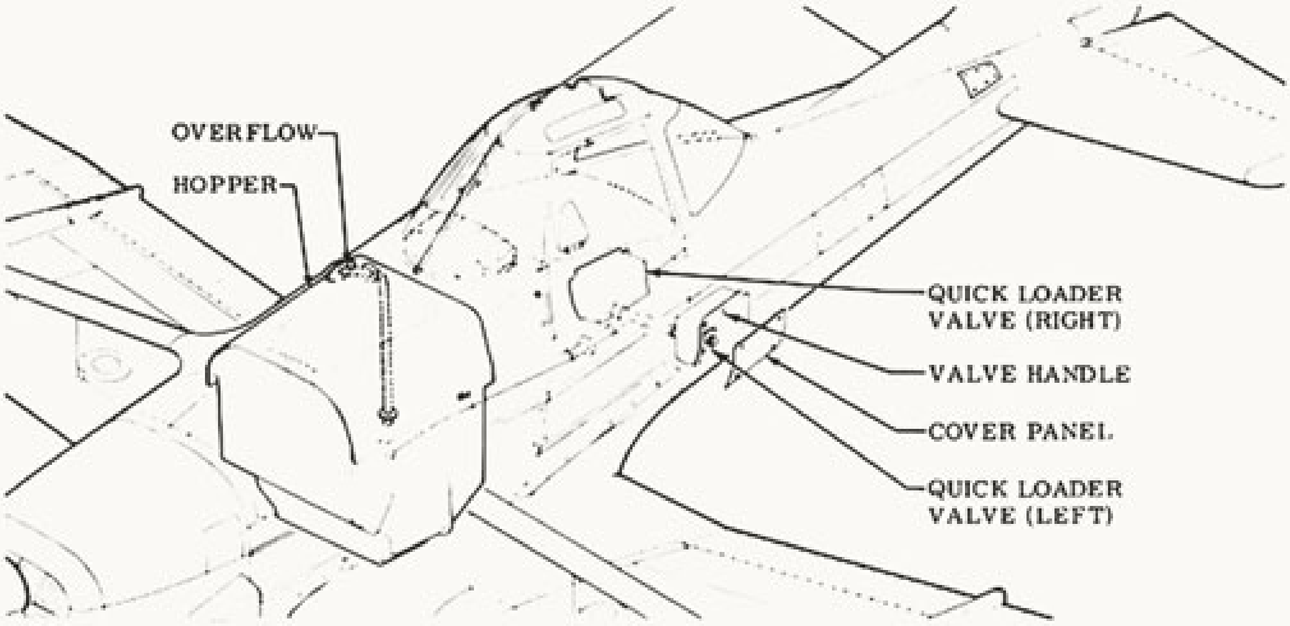


Figure 7-8. Quick-Loader Valve Systems

AUTOMATIC FLAGMAN

An Automatic Flagman is available for installation on top of the right stub wing. The flag dispenser will permit the single operator to mark his own spray run passes when ground personnel are not available. The dispenser ejects a weighted disposable paper streamer (flag) which lands in the center of the swath being sprayed.

In this system, ram air pressure enters an opening in the nose of the dispenser and pushes against a sliding block. Flags stacked in the dispenser behind the block are pressed against stops on the outlet (aft) end of the dispenser. An electric solenoid is mounted below the outlet, and when actuated, causes a plunger to push upward and release a single flag from its secured position.

The right half of a split-rocker switch on the lower left side of the instrument panel, labeled SPRAY LTS FLAGMAN, and a push-button switch on the left side of the control stick grip, labeled FLAGMAN, control the electric solenoid which operates the dispenser. To eject a flag, rotate the rocker switch to the ON (upper) position and push down the push-

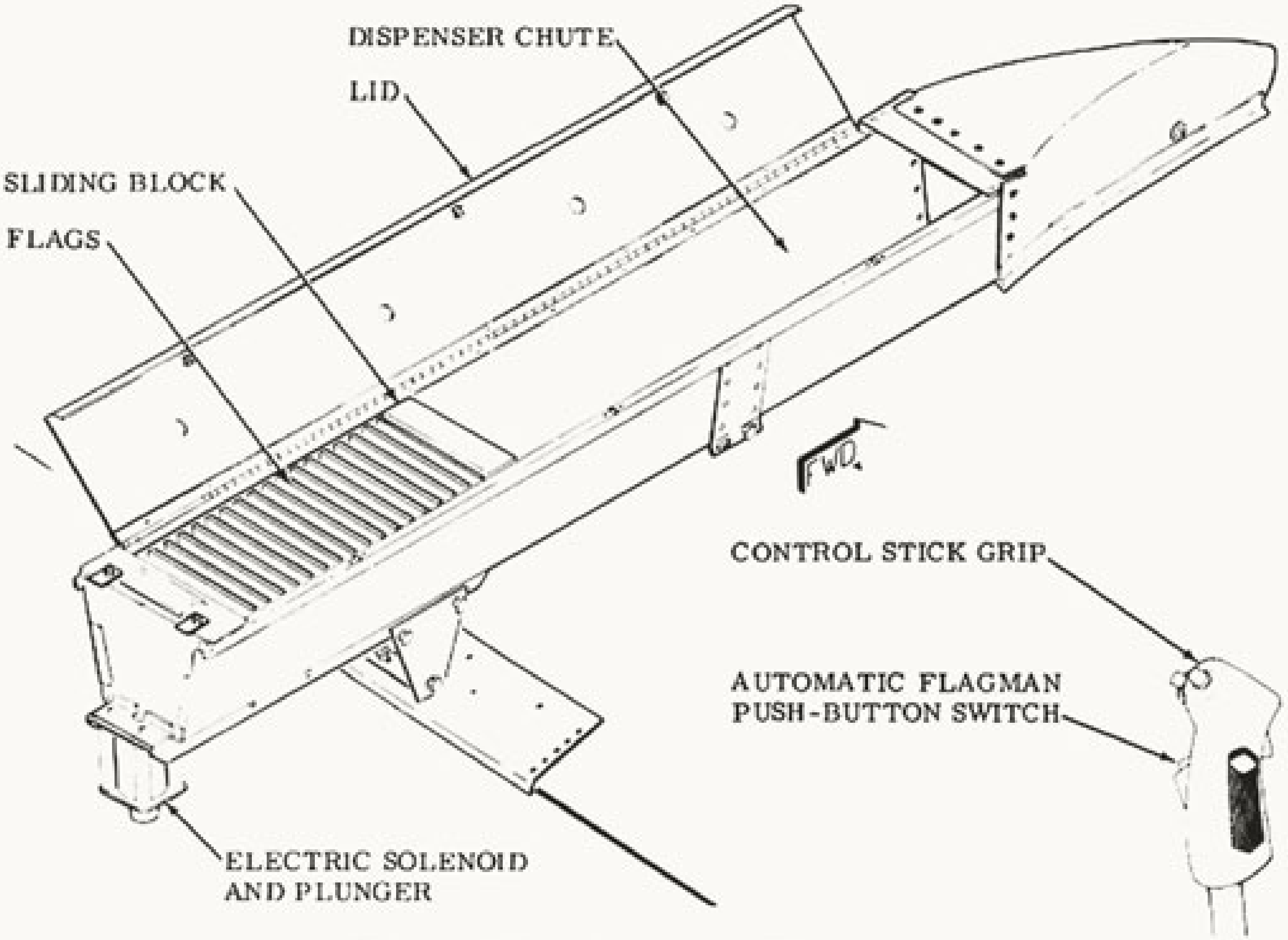


Figure 7-9. Automatic Flagman

button switch on the control stick grip. If desired, the Automatic Flagman may be used in sequence with the spray lights and turn lights for night operations.

WARNING

> Because of the close proximity of the dispenser electric solenoid to dispensed material, do not use the Automatic Flagman when dispensing flammable materials.

A hinged lid with quick-release fasteners is opened to load the dispenser. Loading is most easily accomplished by sliding the transmittal block forward and placing the packages of flags (cardboard weight to the rear) in the dispenser with the packaging bands still on. After loading the packages in the dispenser, slide the block back against the stack, and then break the packaging bands and take the band off of each package. Care should be taken to prevent any of the flag paper from slipping under one edge or bottom of the card, as this may jam the dispenser. The dispenser holds 160 flags weighing 1 1/3 ounces each.

The most important thing in the care of the Automatic Flagman is to keep water out of the electric solenoid and the dispenser chute (if loaded). If the airplane is not to be used for extended periods, or when washing or in rain, place tape over the solenoid plunger hole and dispenser openings to keep out moisture.

When the Automatic Flagman is installed, the airplane must be licensed in the Restricted Category.

AIR CONDITIONING SYSTEM

An air conditioning system, capable of maintaining a comfortable cockpit temperature on the ground as well as in flight (including spray operations), is available for the airplane. As placarded on the instrument panel, the only restriction to use of the air conditioner is during takeoff and landing. The complete installation adds approximately 60 pounds to the basic empty weight, and uses about 4.25 HP.

System components include a belt-driven compressor mounted on the left side of the engine accessory section, a condenser housed within a scoop on the left side of the fuselage, a receiver/dryer (with sight glass) behind the firewall, a thermostatic expansion valve and evaporator unit in front of the pilot below the instrument panel, and the necessary connecting hoses. An electric motor and dual squirrel-cage type blowers mounted on the forward side of the evaporator unit provide airflow through the evaporator. Two vane-type air outlets on the face of the evaporator unit furnish most of the airflow to the pilot; these move vertically and horizontally to direct the air as desired. A smaller rotating outlet on each side of the unit provides additional airflow. Controls for the system are mounted on the evaporator unit to the left of the main air outlets. Servicing of the system is accomplished using Schrader valves located within the hoses at a point just aft of the firewall on the left side of the fuselage. Electrical power is supplied to the evaporator blower motor and compressor clutch through a circuit breaker on the right side of the instrument panel.

A different control lock is required when the air conditioner is installed. The lock is a spring type device designed to be locked into a tab on the forward side of the control stick and then snapped into two tabs on the structural member just above the air conditioner to hold the ailerons and elevator in neutral during tiedown.

The air conditioning system is the mechanical refrigeration type using 2.0 pounds of Refrigerant 12 (R 12) as the heat conducting medium. System operation is conventional. Refrigerant under high pressure is stored in a liquid state in the receiver/dryer until required by the system. When the system is turned on, a magnetic clutch on the compressor is energized and liquid refrigerant in the receiver/dryer is forced through a hose to the thermostatic expansion valve at the inlet side of the evaporator. A restriction in the valve allows only a small amount of the liquid refrigerant through it. After the liquid passes through the restriction, its pressure drops and the liquid picks up heat and begins to boil (evaporate), changing to a gas. By this time, the refrigerant has entered the evaporator coils. Since the evaporator is located within the cockpit and ambient temperature is warm, the cooling fins and coils within the evaporator are warm. Heat always flows to anything that has less heat, and therefore, the heat in the evaporator coils is transferred to the low-pressure gaseous refrigerant, leaving the coils and fins of the evaporator cool. Airflow from the evaporator blower passes through the cooled evaporator coils and fins, and is expelled as "cool air". Recovery of the warm gas in the evaporator is done by the compressor. Suction is created by the compressor causing the warm gas to flow into the compressor where it is compressed to a high pressure. Compression of the gas also raises its temperature to well above outside air temperature. The compressor forces the hot high pressure gas into the condenser where outside air blown across the condenser fins and coils removes heat from the gas. This heat exchange causes the refrigerant to condense back to a liquid. It then flows back into the receiver/dryer for short term storage. In the receiver/dryer, any moisture is collected by a desiccant (drying agent). At this point, the entire cycle starts again with the desired outcome of removing heat from the cockpit and carrying it overboard to outside air.

Control of the air conditioner is accomplished by operation of two rotary type control knobs. Temperature is controlled by the upper knob, labeled TEMP. Turning the knob clockwise from OFF through index settings 1 through 3 will control the air conditioner through progressively colder operation by varying the operating time of the compressor magnetic clutch. Blower speed is controlled by the lower knob, labeled AIR. As the control is rotated clockwise from OFF to the H, M, or L positions, the blower will operate at high, medium, or low speed.

OPERATING PROCEDURES

Operating procedures for the air conditioning system are much like the techniques used in today's automobiles. As stated previously, the air conditioner may be used on the ground or in flight. Operation is not permitted during takeoff and landing.

FAST COOLDOWN AFTER ENGINE START

Use of the air conditioner after engine start and while taxiing can be beneficial in removing superheated air from inside the cockpit before takeoff.

NOTE

A high pressure switch in the air conditioning system disengages the compressor clutch and stops system operation in the event the system becomes overheated during periods of idling at low RPM. The system will cycle on and off under these circumstances and is not malfunctioning. If this occurs, head the airplane into the wind and increase engine RPM, if practical.

Removal of superheated air is accomplished as follows:

1. Canopy Doors/Vents/Cabin Air/Heat -- CLOSED.
2. Foul Weather Windows (if installed) -- OPEN as a vent for superheated air.
3. Air Control Knob -- HIGH (H) position for maximum airflow.
4. Temperature Control Knob -- SETTING 3 for maximum cooling.
5. Foul Weather Windows -- CLOSED after cockpit heat is expelled.
6. Air and Temperature Control Knobs -- OFF, BEFORE TAKEOFF.

INFLIGHT COOLING

Initially, it may be desirable to operate the system at its coldest setting and highest blower speed for fast cooldown. Later, adjustment of the

SERVICING REQUIREMENTS*

ENGINE OIL:

GRADE -- Aviation Grade SAE 50 Above 40°F.
Aviation Grade 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. Ashless dispersant oil, conforming to Continental Motors Specification MHS-24 (and all revisions thereto), **must be used.**

NOTE

Your Cessna was delivered from the factory with a corrosion preventive aircraft engine oil. If oil must be added during the first 25 hours, use only aviation grade straight mineral oil conforming to Specification No. MIL-L-6082.

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. These quantities refer to oil dipstick level readings. During oil and oil filter changes, one additional quart is required when the filter is changed.

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 airplane.

OIL AND OIL FILTER CHANGE --

After the first 25 hours of operation, drain engine oil sump and clean the oil pressure screen. If an oil filter is installed, change filter at this time. Refill sump with straight mineral oil and use until a total of 50 hours has accumulated or oil consumption has stabilized; then change to dispersant oil. On airplanes **not** equipped with an oil filter, drain the engine oil sump and clean the oil pressure screen each 50 hours thereafter. On airplanes **which have** an oil filter, the oil change interval may be extended to 100-hour intervals, providing the oil filter is changed at 50-hour intervals. Change engine oil at least every 6 months even though less than the recommended hours have accumulated. Reduce intervals for prolonged operation in dusty areas, cold climates, or when short flights and long idle periods result in sludging conditions.

SERVICING REQUIREMENTS*

FUEL:

APPROVED FUEL GRADES (AND COLORS) --
 100LL Grade Aviation Fuel (Blue).
 100 (Formerly 100/130) Grade Aviation Fuel (Green).
CAPACITY OF FUEL TANKS (TOTAL) -- 54 Gallons.

NOTE

Due to cross-feeding between fuel tanks, the tanks should be re-topped after each refueling to assure maximum capacity.

LANDING GEAR:

MAIN WHEEL TIRE PRESSURE -- 35 PSI on 22x8.00-8, 6-Ply Rated Tires.
 25 PSI on 8.50-10, 6-Ply Rated Tires.
TAIL WHEEL TIRE PRESSURE -- 50-60 PSI on 3.50-10, 4-Ply Rated Tire.
BRAKE SYSTEM -- MIL-H-5606 Hydraulic Fluid

ENGINE-DRIVEN HYDRAULIC PUMP SPRAY SYSTEM:

HYDRAULIC FLUID RESERVOIR --
 Fill to marking on dipstick with Dexron or Type "A" Automatic Transmission Fluid. Pressurize with air to 15-20 PSI.

* For complete servicing requirements, refer to the aircraft Service Manual.

Cessna.

CUSTOMER CARE

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

CESSNA AIRCRAFT COMPANY

WICHITA, KANSAS

edited by RCH 05/2009