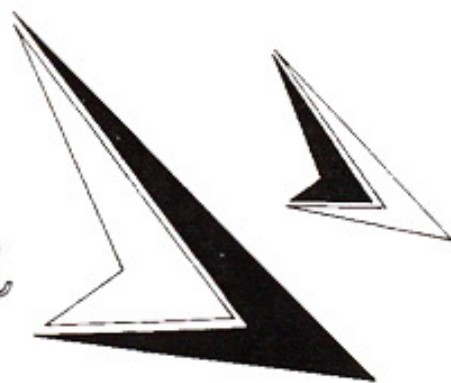


PAWNEE

C

Owner's Handbook

PIPER



**Piper Aircraft Corporation, Lock Haven, Pa.
U. S. A.**

If a non-conformity of information should exist between this manual and the FAA Approved Flight Manual, the Flight Manual shall be considered the authority.

Additional copies of this manual, Part No. 753 749, may be obtained from your Piper Dealer.

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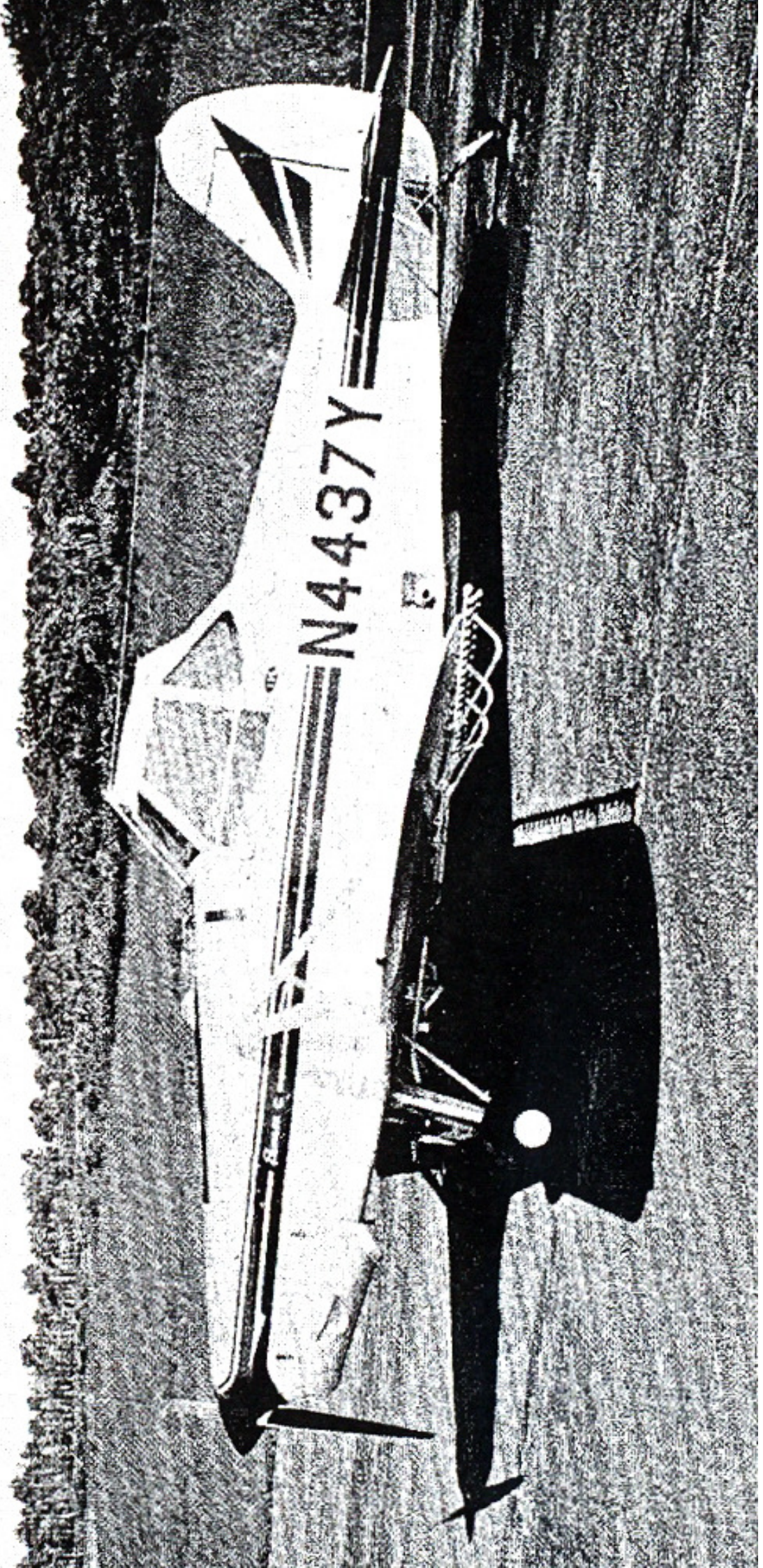
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SECTION I

SPECIFICATIONS

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SPECIFICATION FEATURES:

POWER PLANT	PA-25-235		PA-25-260 (Fixed Pitch)		PA-25-260 (Constant Speed)	
	Lyc. O-540-B2C5		Lyc. O-540-G1A5		Lyc. O-540-G1A5	
Engine	235	260	260	260	260	260
Rated Horsepower	2575	2700	2700	2700	2700	2700
Rated Speed RPM	5.125	5.125	5.125	5.125	5.125	5.125
Bore, inches	3.875	4.375	4.375	4.375	4.375	4.375
Stroke, inches	5.41.5	5.41.5	5.41.5	5.41.5	5.41.5	5.41.5
Displacement (cubic inches)	7.20:1	8.5:1	8.5:1	8.5:1	8.5:1	8.5:1
Compression Ratio	368	384	384	386	386	386
Dry Weight, Pounds	12	12	12	12	12	12
Oil Sump Capacity (quarts)	80/87	100/130	100/130	100/130	100/130	100/130
Fuel Aviation (Min. Octane)	80/87	100/130	100/130	100/130	100/130	100/130
(Specified Octane)	80/87	100/130	100/130	100/130	100/130	100/130

(Refer to Sec. IV, Pg. 22 when using alternate fuels)

PERFORMANCE	Clean	Duster	Sprayer	Clean	Duster	Sprayer	Clean	Duster	Sprayer
Take-off Run (ft.)	785	956	800	730	890	740	660	830	680
Take-off Run over 50 ft. barrier	1350	1470	1370	1250	1420	1270	1200	1370	1220
Best Rate of Climb Speed (MPH)	83	80	83	83	83	83	83	83	83
Best Angle of Climb (MPH)	71	71	73						
Rate of Climb (ft. per min.)	700	500	630	755	555	685	775	575	705
Service Ceiling (ft.)	13,000	9000	13,000						
Top Speed (MPH)	124	110	117	128	113	120	128	113	120
Cruising Speed (75% power) (MPH)	114	100	105	118	103	108	118	103	108
Fuel Consumption (75% power, best power mixture) (gph)	14	14	14	14.1	14.1	14.1	14.1	14.1	14.1
Fuel Consumption (75% power, full rich mixture) (gph)	16	16	16	19.3	19.3	19.3	19.3	19.3	19.3
Cruising Range (75% power, best power mixture) (mi)	290	255	270	300	260	275	300	260	275
Cruising Range (75% power, full rich mixture) (mi)	256	225	236	220	192	201	220	192	201
Stalling Speed at Maximum gross, flap down (MPH)	61	61	61	61	61	61	61	61	61
Stalling Speed as usually landed	46	46	46	46	46	46	46	46	46
Landing Roll at gross	850	850	850	850	850	850	850	850	850
	(at 1700 lbs.)	(at 1700 lbs.)	(at 1700 lbs.)	(at 1700 lbs.)	(at 1700 lbs.)	(at 1700 lbs.)	(at 1700 lbs.)	(at 1700 lbs.)	(at 1700 lbs.)

SPECIFICATION FEATURES: (cont.) PA-25-235 PA-25-260 (Fixed Pitch) PA-25-260 (Constant Speed)

WEIGHTS

	Sprayer	Duster	Sprayer	Duster	Sprayer	Duster
--	---------	--------	---------	--------	---------	--------

Gross Weight (lbs.)	2900	2900	2900	2900	2900	2900
Empty Weight (lbs.)	1523	1514	1540	1531	1556	1556
USEFUL LOAD (lbs.)	1377	1386	1360	1369	1344	1353
Hopper Load (lbs.)	1200	1200	1200	1200	1200	1200

FUEL AND OIL

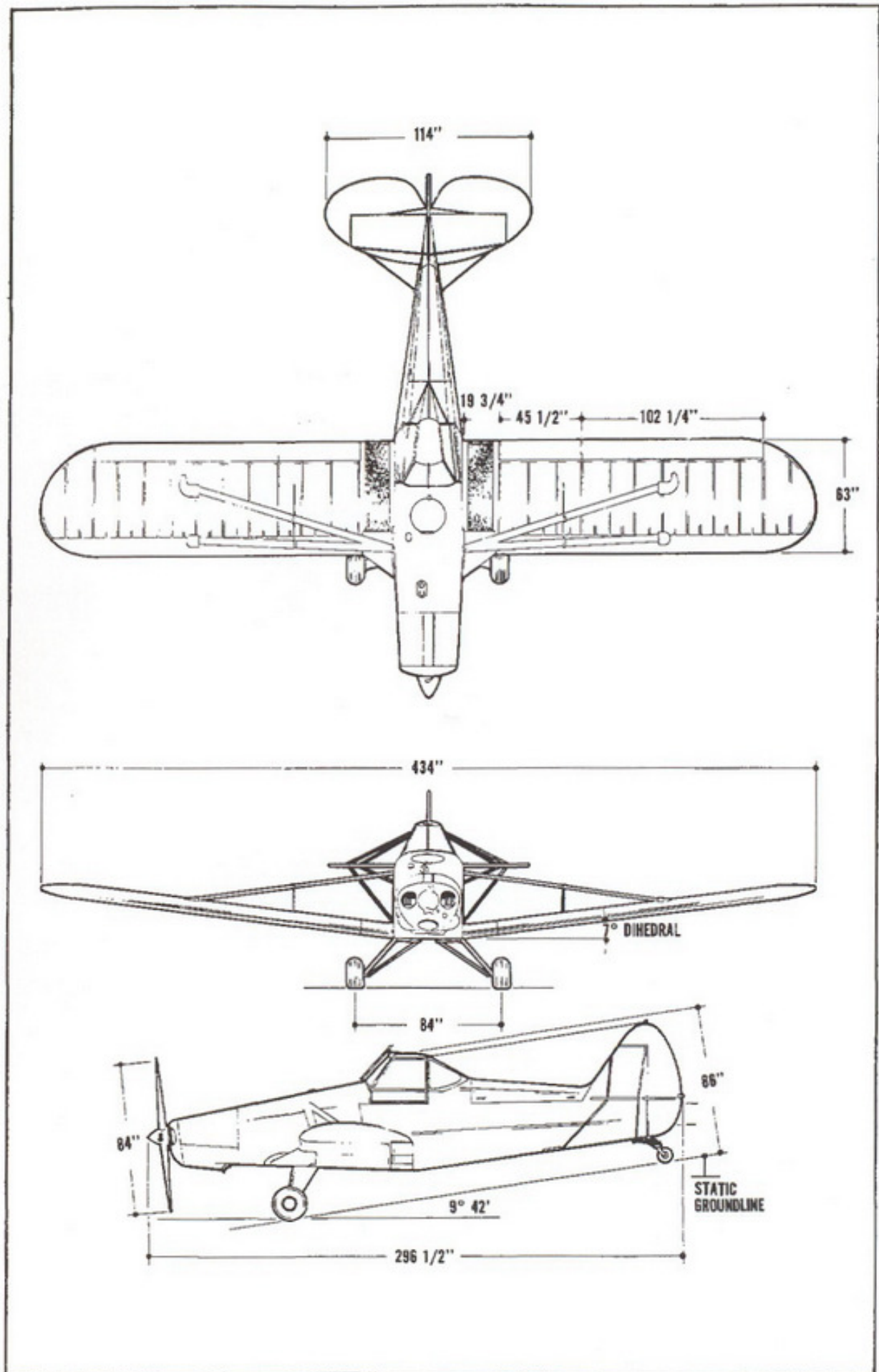
Fuel Capacity (gal)		38		38		38
(Fuel tank with liner, See Figure 2, page 9)						
Oil Capacity (qts.)		12		12		12

DIMENSIONS

Wing Span (ft.)		36.2		36.2		36.2
Wing Area (sq. ft.)		183		183		183
Wing Loading (lbs per sq. ft.)		15.8		15.8		15.8
Length (ft.)		24.7		24.7		24.7
Height (ft.)		7.2		7.2		7.2
Power Loading (lbs per HP)		12.3		11.1		11-1
Propeller Diameter (max. in.)		84		84		84

LANDING GEAR

Tire Pressure (lbs.) Main		25		25		25
Tail		50		50		50
Tire Size Main (four ply)		8:00 x 6		8:00 x 6		8:00 x 6
Tail (four ply)		3:00 x 4		3:00 x 4		3:00 x 4



SECTION II

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SECTION II

DESIGN INFORMATION

ENGINE AND PROPELLER

The PA-25-235 is powered by a Lycoming O-540-B2C5 engine rated at 235 HP at 2575 RPM, with a compression ratio of 7.20:1 and the PA-25-260 by a Lycoming O-540-G1A5 engine rated at 260 HP at 2700 RPM, with a compression ratio of 8.50:1. The six cylinder, direct drive, carburetor equipped 235 HP engine required 80/87 minimum octane aviation fuel while the 260 HP engine requires 100/130 minimum octane aviation fuel.

Exhaust gases are carried through a single muffler system constructed of heavy gauge stainless steel and directed overboard at the right of the cowl. The muffler shroud provides a source of heat for the cabin interior, while carburetor heat is furnished by a separate shroud located on the right exhaust stack.

The carburetor air filter is of the dry pleated-paper type which features very efficient filtering action with negligible restriction to carburetor inlet flow. Also optional is a full flow oil filter, with easily replaceable cartridges.

The standard propeller on the PA-25-235 is a McCauley one-piece metal design. Also available for the PA-25-260 is either a Hartzell HC-C2YK-1/8477-0 or a McCauley B2D34C16/84HF-0 constant speed propeller.

FUSELAGE AND WINGS

The fuselage frame is constructed of steel tubes, welded to form a rigid structure. Highly stressed members are made of 4130 chrome-moly steel, others are of 1025 steel.

Repairs to the fuselage can be made in accordance with

the requirements of F.A.A. Manual 18 or Aviation Circular 43.13-1. Repair facilities for this type of construction are commonly available.

The fuselage structure is treated as follows to eliminate corrosion. The interior of the lower tubing is coated with Lionoil to prevent internal corrosion. The longerons and diagonal tubes are completely sprayed with zinc chromate primer followed by a coating of Rexton Activated Copon paint. A paste mixture composed of Permalite and polyester resin is applied at various points on the structure to eliminate dust pockets. Dope sealer is applied to the frame at points where fabric attaches.

The wing framework consists of riveted aluminum ribs mounted on extruded aluminum spars with tubular drag and compression struts and high strength stainless steel drag wires. Aluminum sheet is used to form the leading edge and the false spars. An ash wing-tip bow provides a light tough member which can withstand considerable wingtip shock without failing.

The wings are attached to the fuselage at fittings on the lower longerons, and by means of compression struts which bolt to upper fuselage members and wing spar fittings. The rear struts may be adjusted by means of a threaded attachment fitting at the outboard end of the struts. This adjustment is used to set the rigging of the wings.

LANDING GEAR

The Pawnee "C" landing gear employs two air-oil shock absorbers designed for minimum maintenance operation. (Consult Section IV for shock absorber maintenance.)

The only maintenance normally required is lubrication of the hinge bolts and each end of the shock struts according to the lubrication chart. The steel hinge bolt bushings should be inspected and replaced if worn.

The Scott 8" steerable, full-swivel tail wheel is standard equipment on the Pawnee. This unit is combined with steel leaf springs which are easily replaced if needed.

The main wheel assemblies are Cleveland Products 40-84A with Cleveland 30-41 Disc Brake Assemblies. The tires are 8:00 x 6 four ply rating. Tires should be inflated to 25 psi to prevent slippage and to produce even wear.

EMPENNAGE

The fin, rudder, stabilizers and elevator are all constructed of tubular steel with steel channel ribs. The control surface hinges have bronze bushing inserts and should be oiled according to lubrication chart. The elevators and the rudder are designed with an aerodynamic balance to increase stability and lighten control forces.

Double stainless steel tie rods and fittings brace the stabilizers to the fin and fuselage. The tail brace wires should not be used for lifting or ground handling of the airplane.

CONTROL SYSTEM

Conventional flight and engine controls are provided in the Pawnee. The flap lever has three positions, full up, half, or full down. The flaps are provided for an increased angle of descent only and should not be used for take-off or climb.

The elevator trim control is located on the left side of the cockpit and consists of a two-spring system with an irreversible geared crank mechanism. This system normally requires very little maintenance except for inspection and lubrication according to lubrication chart.

FUEL SYSTEM

Located in the first fuselage bay aft of the firewall is a 38 gallon, non-corrosive, fiberglass reinforced, plastic fuel tank incorporating a polyurethane and nylon liner. The liner is a safety feature incorporated to prevent fuel spillage in the event of a severe impact. The fuel quantity gauge is a float-type direct indicating unit installed in the top of the tank within easy view of the cockpit. The fuel shut-off valve is controlled by a "T" handle on the right side of the cockpit.

The fuel strainer, on the lower forward side of the firewall in the engine compartment, traps water or sediment that may collect in the system. Additional fuel screens are provided at the tank outlet and in the carburetor. The quick-drain valve on the strainer should be checked daily for water or dirt.

The fuel tank itself has an external vent line, and a non-vented fuel cap is used.

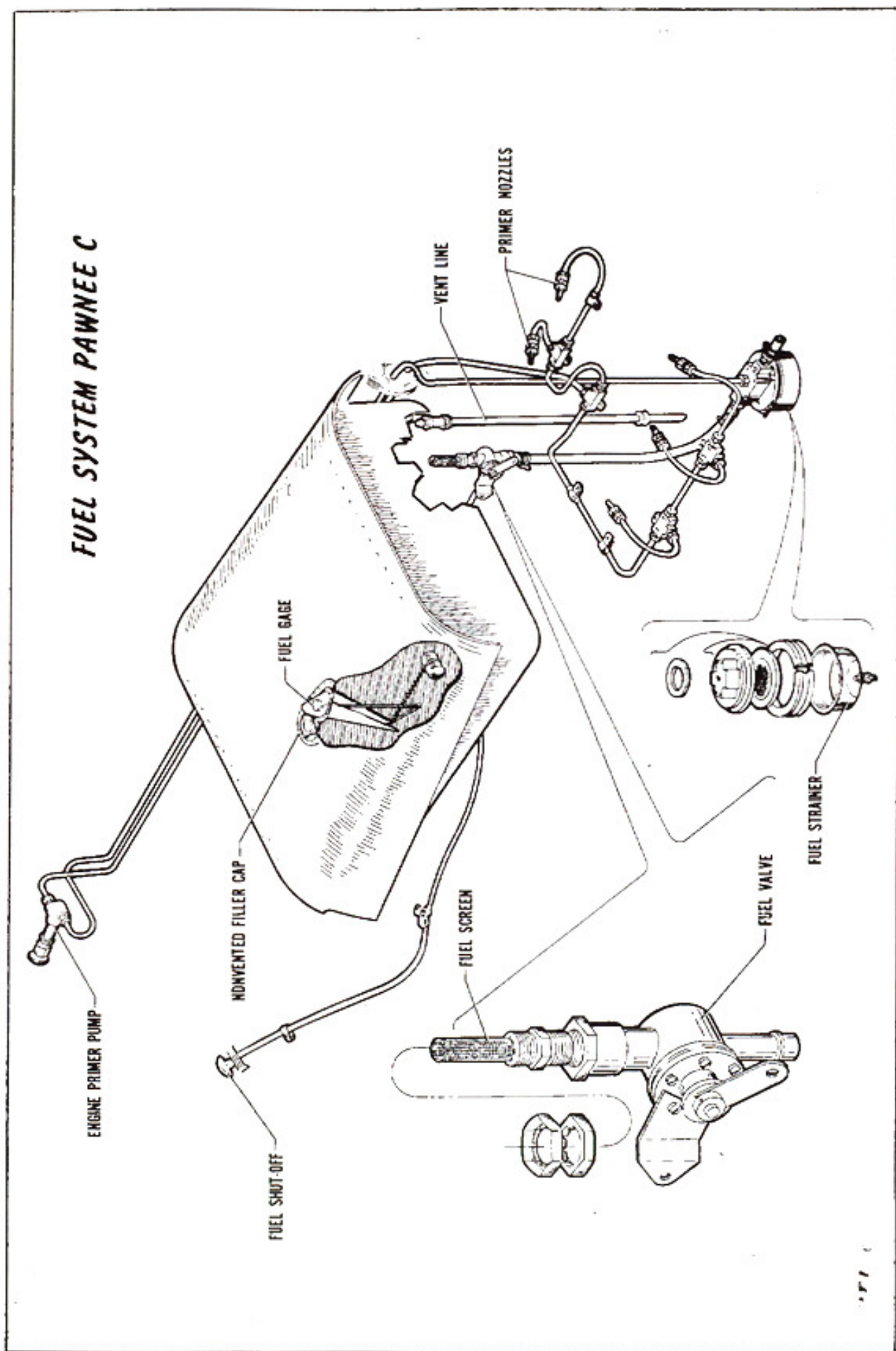
The engine primer pump on the left hand side of the instrument panel takes fuel from the top of the fuel strainer and pumps directly to the cylinders of the engine. The primer should be locked in at all times except when in use, to prevent malfunctioning of the engine.

An idle cut-off is incorporated in the mixture control. The engine should be stopped with the idle cut-off.

ELECTRICAL SYSTEM

A 12-volt 35-ampere hour battery, voltage regulator, ammeter, starter solenoid, alternator, circuit breakers, stall warning light, switches, and related wiring are all included as standard equipment on the Pawnee.

The battery is located in a box in the fuselage just forward of the horizontal stabilizer. It is accessible through the removable turtle deck. The master solenoid and an energizing diode are located on the forward side of the battery box. The diode excites a circuit permitting a completely dead battery to



be charged after the engine is cranked manually. The voltage regulator is attached to the underside of the floorboard.

All switches, ammeter and circuit breakers are grouped on the right side of the instrument panel. The circuit breakers automatically break the electrical circuits if an overload is applied. When resetting an open circuit breaker, allow sufficient time for the breaker to cool before applying power to the circuit again.

Position lights, anti-collision lights, landing lights and instrument lights are available as optional equipment.

FINISH

The finish of the Pawnee consists of fire-resistant butyrate plastic material on the fabric surfaces and Rexton enamel on metal surfaces.

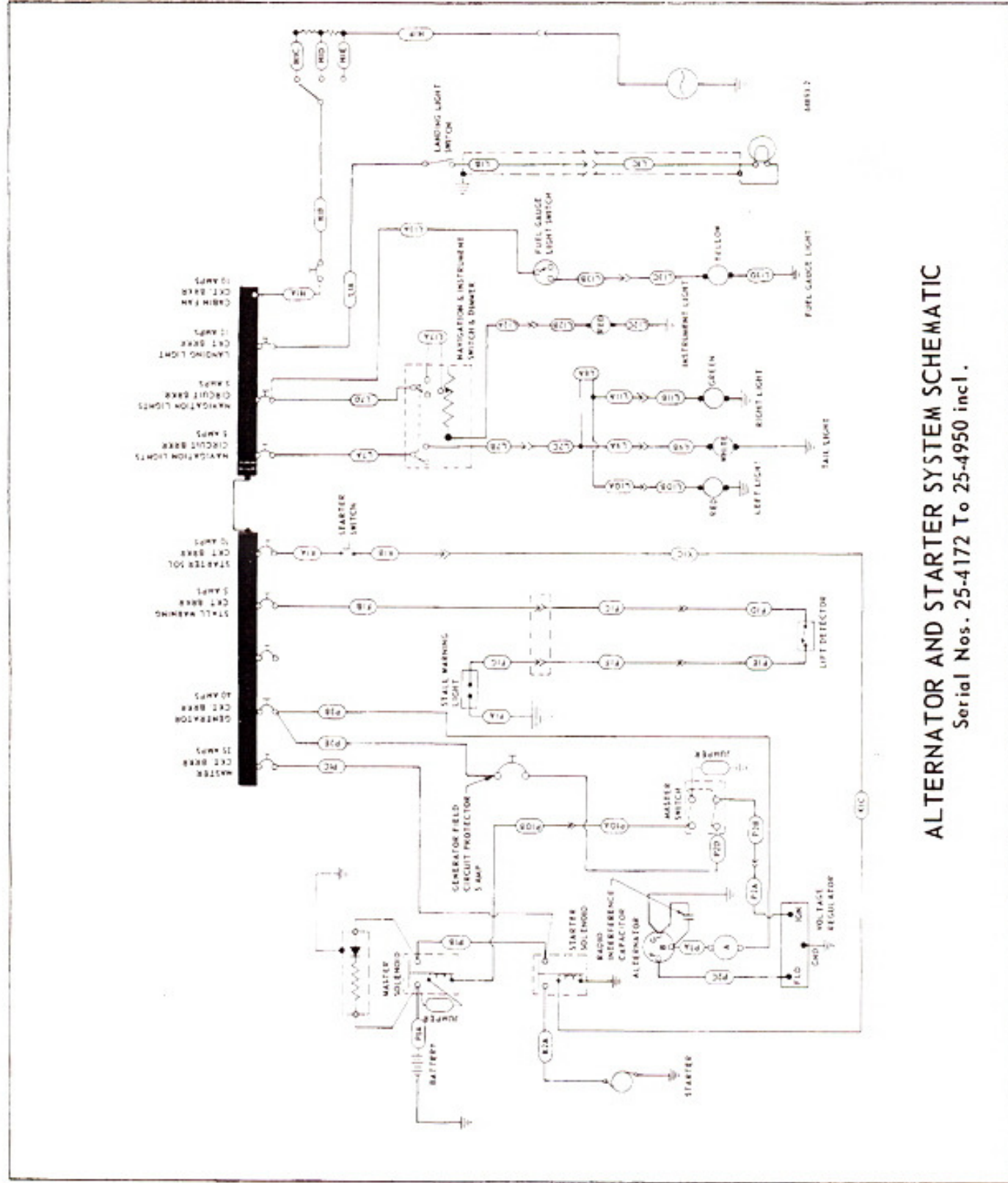
The butyrate finish must not be covered over with any incompatible material. The use of different materials from those originally applied will damage the finish.

CABIN FEATURES

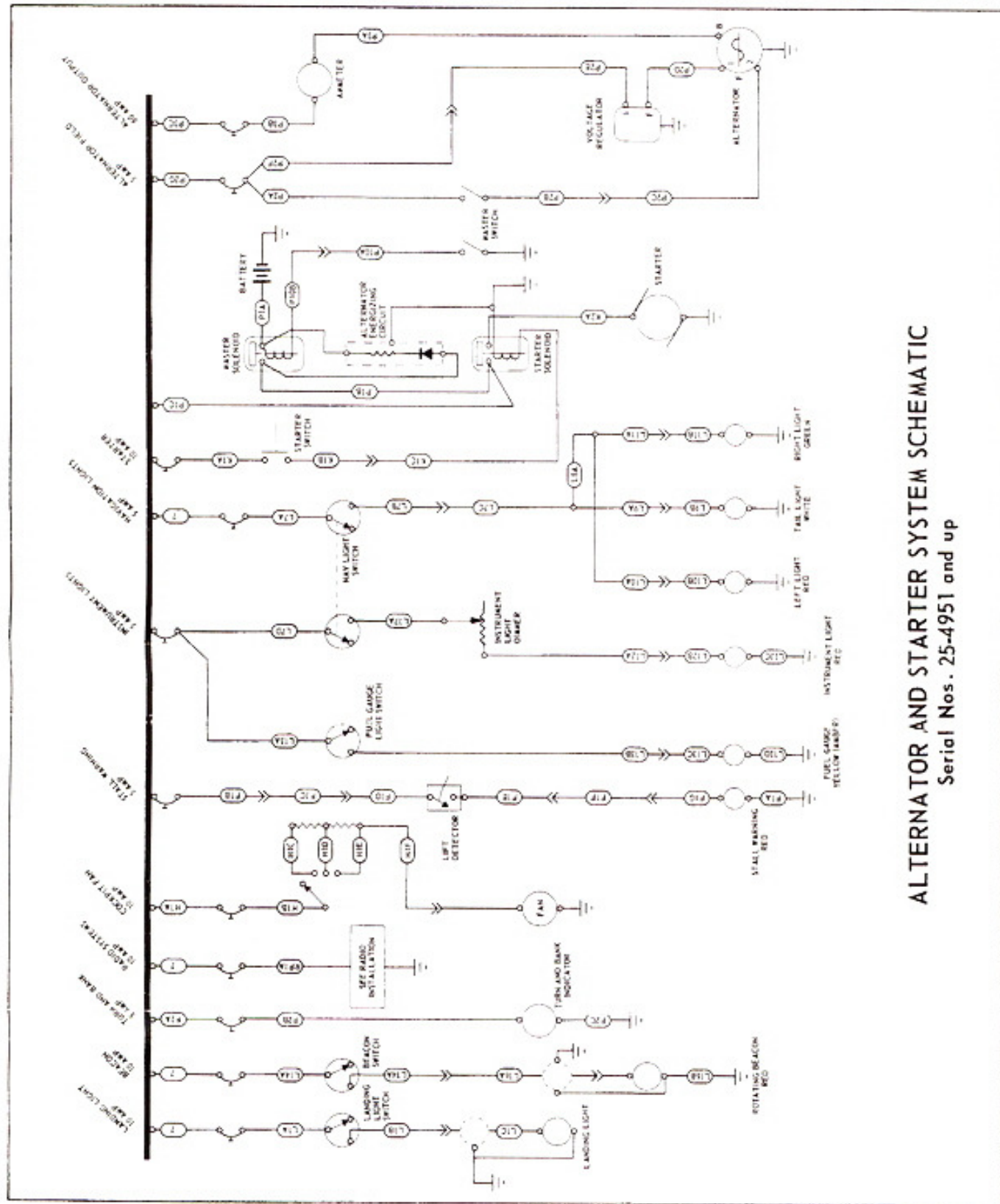
The standard instrument group in the Pawnee includes the following: Altimeter, Airspeed, Compass, Oil Temperature and Pressure Gauge, and Tachometer.

The seat is adjustable fore and aft and up and down. The angle of the seat back is not adjustable.

The inertia reel for the shoulder harness installed in the Pawnee has a manual control to lock or unlock the harness in any position as well as an automatic locking device which will



ALTERNATOR AND STARTER SYSTEM SCHEMATIC
 Serial Nos. 25-4172 To 25-4950 incl.



ALTERNATOR AND STARTER SYSTEM SCHEMATIC
Serial Nos. 25-4951 and up

lock the reel automatically in any position upon application of more than $2-1/2 \pm 1/2$ G inertia load on the reel.

When the lock is set automatically and the manual control is in the unlocked position, or when the lock is unlocked manually with a shoulder harness cable load, the cable drum will remain locked after both the inertia and the shoulder harness cable loads are released. Upon removal of these loads and operation of the manual control from the unlocked to the locked position and return to unlocked position, the reel shall automatically retract the shoulder harness cable.

The cabin ventilation system serves two purposes:

1. It provides cabin and fuselage pressurization to prevent the entrance of dust and toxic fumes into the airplane.
2. It provides ventilating air to the pilot.

The pressurization is controlled by the most forward door in the canopy. When the door is opened, pressurizing air flows through the chamber in the top of the canopy and is ejected into the fuselage at the rear of the canopy. The pressurizing system should be in use during all spraying and dusting operations.

Cabin ventilation is obtained by bleeding air from the pressurizing air chamber. The flow of air can be controlled by the circular ventilator located forward and above the pilot's head, and the "Y" shaped ventilator located at the rear of the cabin. The most forward door must be opened in order to obtain any cabin ventilation.

The control to regulate the flow of hot air to the cabin is by means of the cabin-heat control located just below the right corner of the instrument panel. To better distribute the heated air within the cabin, the circulation fan may be turned on to the low position.

Emergency door releases are located on each side of the instrument panel. To operate, pull red tee handle hard enough to break safety wire then push out door.

PIPER AUTOMATIC LOCATOR (OPTIONAL)

The Piper Automatic Locator, when installed, is located under the canopy and forward of the removable top deck assembly and is

provided as an emergency locator signal transmitter which meets the requirements of FAR 91.52. It is automatically activated by a longitudinal force of 5 to 7 g's and transmits a distress signal on both 121.5 MHz and 243.0 MHz for a period of 48 hours in low temperature areas to 100 hours in high temperature areas. The unit operates on a self contained battery.

The battery has a useful life of four years. However, to comply with FAA regulations, it must be replaced after two years of shelf life or service life. The battery should also be replaced if the transmitter has been used in an emergency situation or if the accumulated test time exceeds one hour. The replacement date is marked on the transmitter label.

The unit has a three position selector switch placarded "OFF," "ARM" and "ON." The "ARM" position is provided to set the unit to the automatic position so that it will transmit only after impact and continue to transmit until the battery power is drained to depletion or the switch is manually moved to the "OFF" position. The "ARM" position is selected when the locator is installed at the factory and should remain in that position whenever the unit is installed in the aircraft. The "ON" position is provided so the unit can be used as a portable transmitter or in the event the automatic feature was not triggered by impact or to check the function of the transmitter periodically.

The "OFF" position is provided for the purpose of changing the battery or to prolong the service life of the battery if used as a portable transmitter or rearming the unit if it should be activated for any reason.

NOTE

If the switch has been placed in the "ON" position for any reason, the "OFF" position has to be selected before selecting "ARM." If "ARM" is selected directly from the "ON" position the transmitter will continue to transmit in the "ARM" position.

Attached to the unit is a portable antenna, provided so that the locator may be removed from the aircraft, in case of an emergency, and used as a portable signal transmitter.

The locator should be checked during the Ground Check to make certain the unit has not been accidentally activated. Check by tuning a radio receiver to 121.5 MHz. If you hear an oscillating audio sound the locator may have been activated and should be turned off immediately. Reset to "ARM" position and check again to insure against outside interference.

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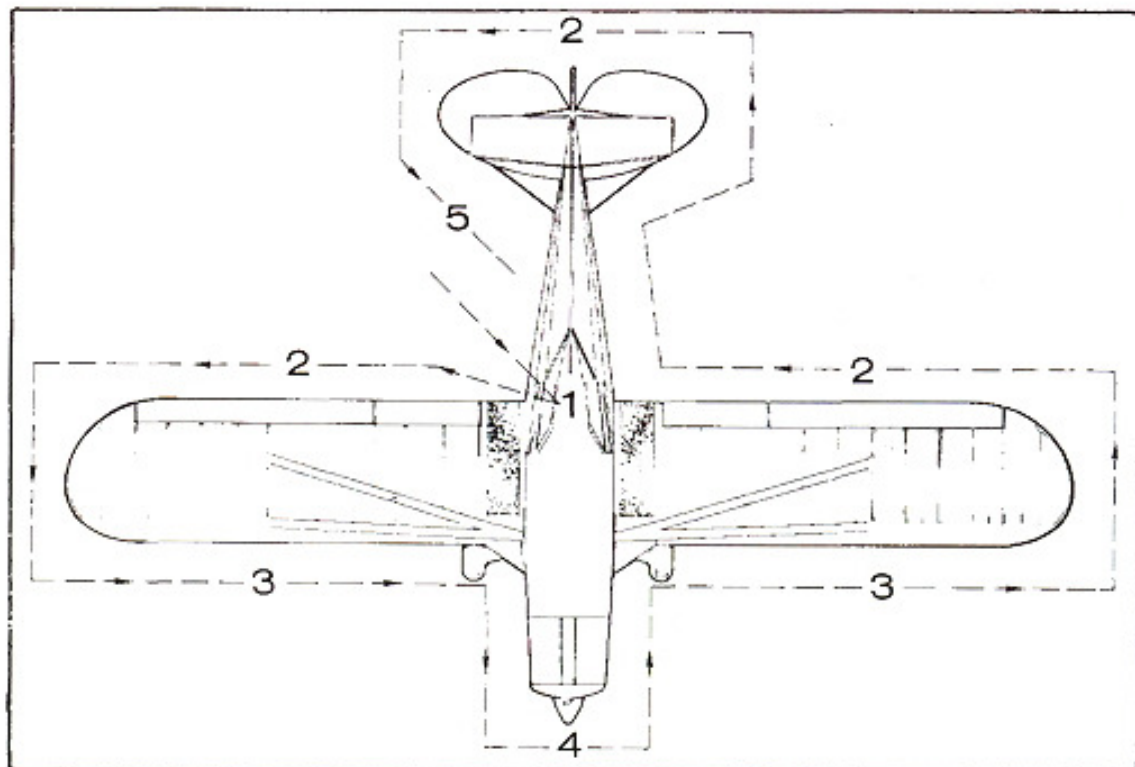
SECTION III

OPERATING INSTRUCTIONS

PREFLIGHT

The preflight should be a careful visual inspection made prior to flight. The following is an outline for preflighting the Pawnee.

1. a. As the aircraft is approached check the general appearance.
- b. Check cockpit for general appearance. Check the master and magneto switches in off position.
- c. Check windshield and condition of cockpit enclosure.
2. a. Check top side of wings, strut security, flap and aileron security and wing tip light.



- b. Check tail surfaces, tail brace wires and fittings for condition and security.
3. a. Check leading edge of wing for dents and condition.
b. Check landing gear for security, check tires for proper inflations, cuts and flat spots.
4. a. Check propeller and spinner for condition and security.
b. Open engine cowling and check for oil capacity. Check engine and accessories for security.
c. Drain fuel strainer. Allow sufficient fuel to drain so that the system is free of sediment.
d. Check fuel tank for leaks and quantity.
e. Check air filter for security.
5. a. If agricultural equipment is installed, check for security and general condition.
b. Check turtle deck for condition and security.

BEFORE OPERATION

1. Fasten safety belt.
2. Operate the flight controls and check for freedom of movement and proper operation.
3. Set parking brake.

STARTING ENGINE

When the engine is cold, prime three to five strokes. Push mixture control to full rich, prop pitch to full increase RPM (if so equipped), carburetor heat off, and open throttle about one-eighth inch.

Next place left magneto switch in the on position, turn on master switch, and with brakes set, push starter button. If the engine does not start in the first few revolutions open the throttle an additional one-half inch, while the engine is still turning over on the starter. If the engine appears to be loading up, open

throttle completely; when engine starts retard throttle to desired idle position and turn on right magneto switch.

When the engine is warm, do not prime before starting.

WARM-UP AND GROUND CHECK

As soon as the engine starts, the oil pressure should be checked. If no pressure is indicated within thirty seconds, stop the engine and determine the trouble.

Warm up the engine at 800 to 1000 RPM for not more than two minutes in warm weather, four minutes in cold weather. The magnetos should be checked at 1800 RPM, the drop not to exceed 125 RPM. The engine is warm enough for take-off when the throttle can be opened without the engine faltering.

If installed, the constant speed prop control should be moved through its complete range to check for proper operation and then placed to increase RPM for take-off.

Carburetor heat should be checked during the warm up to insure the correct operation of the control and the availability of heat if needed.

TAKE-OFF, CLIMB AND LEVEL FLIGHT

The fuselage, forward of the cockpit, was designed to give better visibility. During take-off and in flight the nose appears to have a nose-down attitude. If the nose-down appearance is kept in mind during the operator's first few take-offs, no difficulty should be encountered in obtaining the correct attitude.

If desired, a level flight may be simulated by raising the tail on a tail stand to a level position. With the airplane in this position, the nose attitude as seen from the cockpit is correct for take-off. Because of the nose down appearance, propeller clearance is sometimes questioned and should be observed while the aircraft is in this position to eliminate any doubts of adequate

clearance.

The elevator trim should be set three-quarters of its travel nose up for takeoff. The carburetor heat should be off and mixture should be full rich, except a minimum amount of leaning is permitted for smooth engine operation when taking off at high elevation. The electric fuel pumps should be on for all takeoffs. The flaps should be retracted for takeoff. The best rate of climb speed for the Pawnee sprayer is 83 MPH, while 80 MPH is recommended for the duster.

After takeoff, hold the best rate of climb speed. In this attitude (normal climb) the nose attitude will appear a little low. Check the airspeed with the nose attitude until the attitude of the airplane has been determined. This is the best climb attitude and raising the nose higher will only decrease the rate of climb.

STALLS

Normal maneuvers in the Pawnee are permitted. A slip, skid, or high rate of roll will cause a slight buffet, however, this should not be interpreted as a stall warning but an indication of unbalanced flight. A slight buffet may also be felt in a steep, abrupt, pull-up but this is similar to the buffet felt in a high rate-of-roll maneuver and should not cause concern.

In any attitude or under any loading condition the stall is preceded by a moderate aerodynamic buffet and a proportional decrease in stick forces. All controls are effective up to and completely through the stall and there is no noticeable tendency to enter a spin after the stall.

With agricultural equipment installed the flaps down stall speed is 61 MPH, flaps up 62 MPH.

CRUISING

The cruising speed with agricultural equipment at gross load under standard sea level conditions at 75% power for the PA-25-235 is 105 MPH with the sprayer installations and 100 MPH with the duster installation. For the PA-25-260 the speeds are 108 MPH and 103 MPH for the fixed pitch and 108 MPH and 103 MPH for the controllable pitch. At 75% power, and full rich, fuel consumption will be approximately 16 gallons per hour for the PA-25-235 and 19.3 for the PA-25-260. Leaned to best power, the fuel consumption is approximately 14 gallons per hour for the PA-25-235 and 14.1 for the

PA-25-260. Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes, and reduces lead deposits when the alternate fuels are used. The mixture should be leaned when 75% power or less is being used. If any doubt exists as to the amount of power being used, the mixture should be in the FULL RICH position for all operations. Always enrich the mixture before increasing power settings. See fuel consumption charts for additional information.

Pilots should use care in flying cross-country in a Pawnee because range is a function of so many variables such as configuration, weight, throttle position, leaning technique and wind. It is recommended that distances between stops be short, especially until the pilot gets a feel for actual rate of fuel consumption, airspeed and wind.

APPROACH AND LANDING

During the approach, trim elevator to maintain a glide speed of 75 MPH. Flaps should not be extended if the airspeed exceeds 109 MPH. The mixture should be full rich, propeller set to full increase RPM (constant speed propeller), electric fuel pump on, and carburetor heat off unless icing conditions prevail. The engine should be cleared occasionally by opening the throttle.

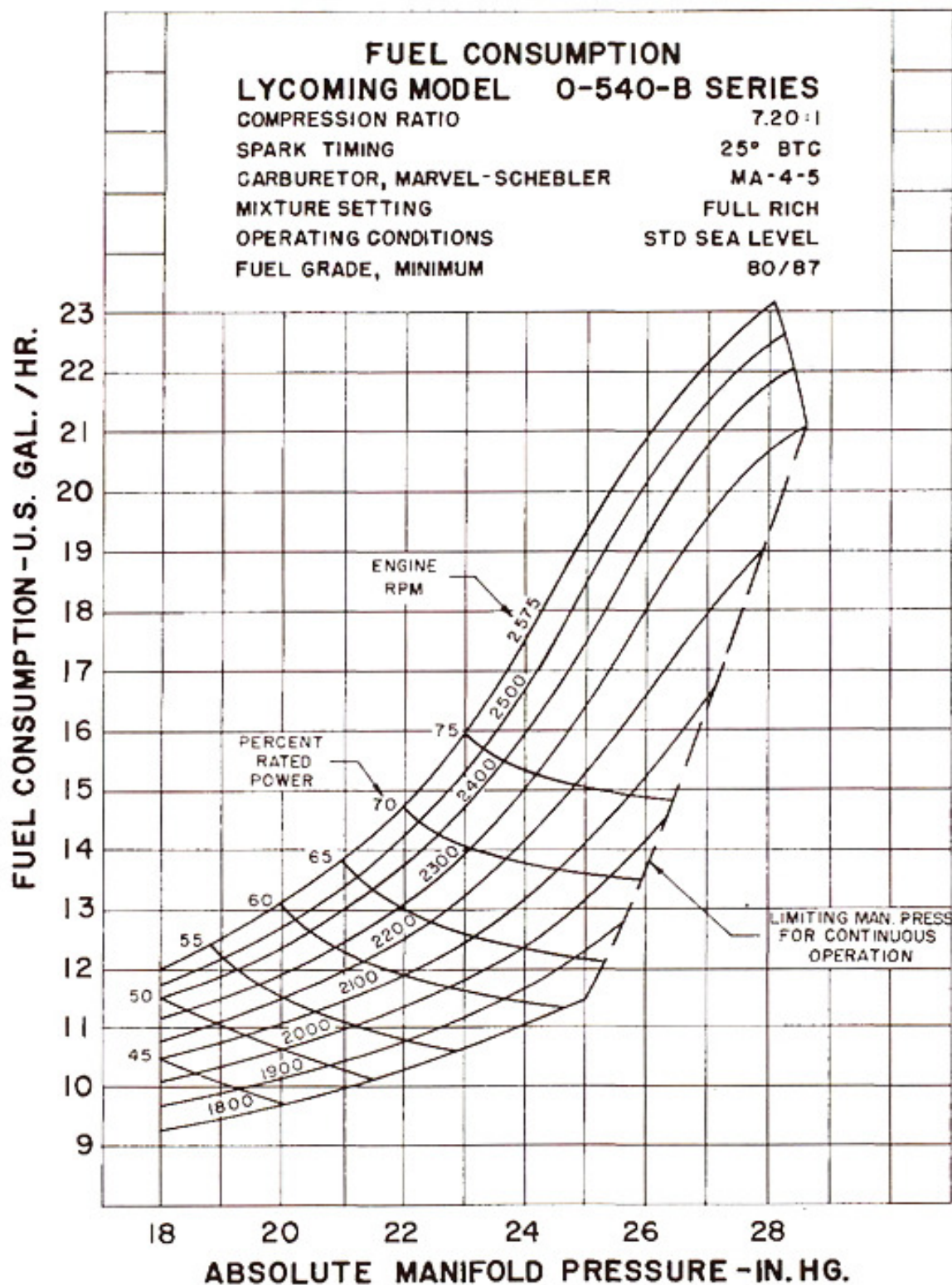
During the landing roll, steer the airplane with the rudder pedals, using brakes as little as possible to avoid excessive brake and tire wear.

To stop the engine after landing, pull the mixture control full back to idle cut-off. When alternate fuels are used, the engine should be run up to 1200 RPM for one minute prior to shutdown to clean out any unburned fuel. After the engine stops turn magneto and master switches off.

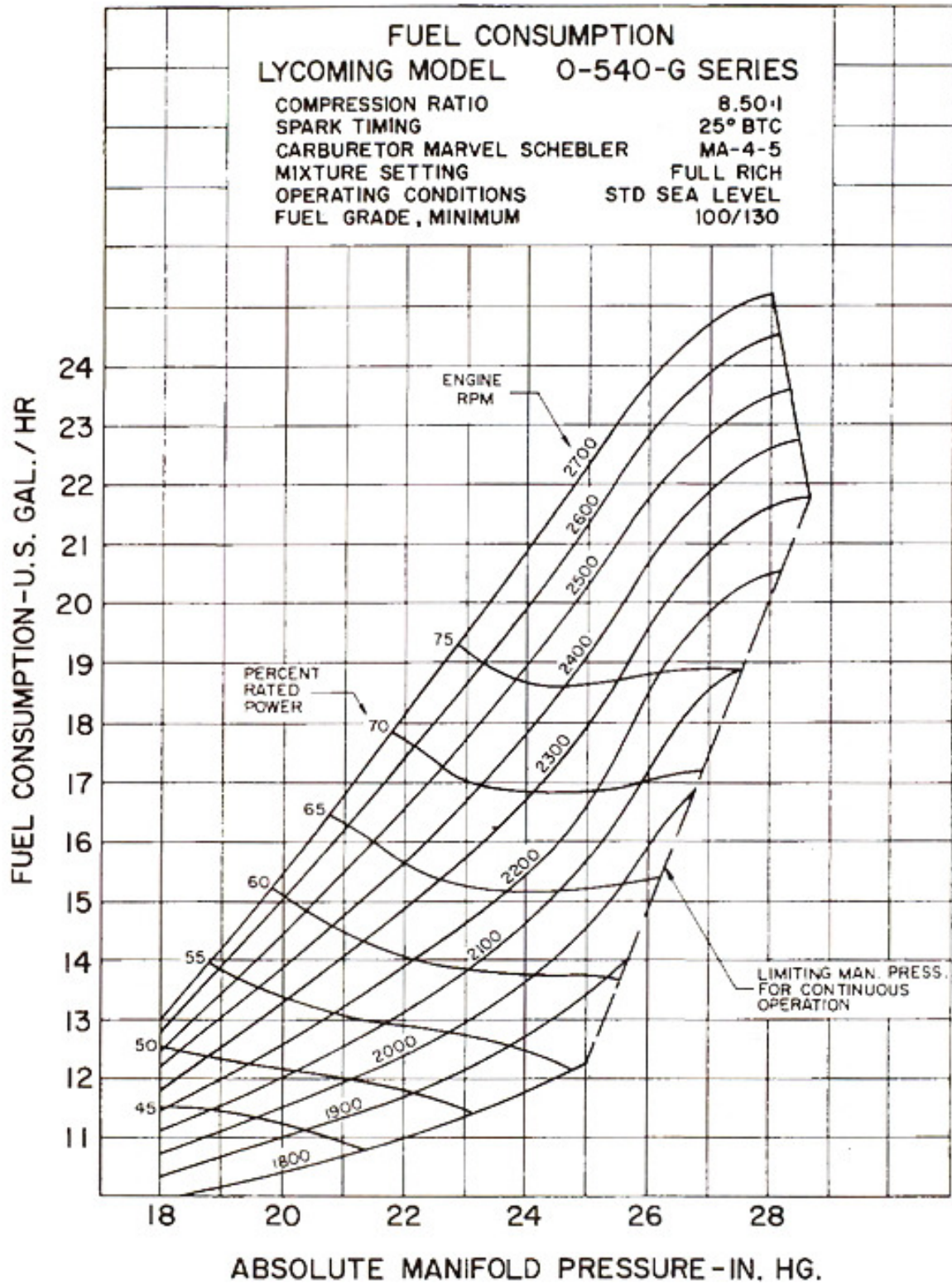
WEIGHT AND BALANCE

It is the responsibility of the owner and pilot to determine that the airplane remains within the allowable weight vs. center of gravity envelope while in flight. For weight and balance data see the Weight and Balance form supplied with each airplane. Operators are cautioned not to exceed the allowable gross weight.

PIPER PAWNEE PA-25-235



PIPER PAWNEE PA-25-260



Power Setting Table - Lycoming Model O-540-E,-G, 260 HP Engine

Press. Alt Feet	Std. Alt Temp °F	143 HP - 55% Rated RPM AND MAN. PRESS.			169 HP - 65% Rated RPM AND MAN. PRESS.			195 HP - 75% Rated RPM AND MAN. PRESS.			Press. Alt Feet			
		2100	2200	2300	2400	2100	2200	2300	2400	2100		2200	2300	2400
SL	59	21.7	20.8	20.2	19.5	24.6	23.6	22.7	21.9	26.3	25.3	24.4	23.8	SL
1,000	55	21.5	20.6	20.0	19.3	24.4	23.3	22.5	21.7	26.0	25.0	24.1	23.5	1,000
2,000	52	21.3	20.4	19.8	19.1	24.1	23.1	22.2	21.5	25.7	24.8	23.9	23.3	2,000
3,000	48	21.0	20.1	19.6	18.9	23.8	22.9	22.0	21.2	25.4	24.5	23.6	23.0	3,000
4,000	45	20.8	19.9	19.4	18.7	23.6	22.6	21.8	21.0	25.1	24.2	23.3	22.7	4,000
5,000	41	20.6	19.7	19.2	18.4	23.3	22.4	21.5	20.8	24.8	23.9	23.0	22.5	5,000
6,000	38	20.4	19.5	18.9	18.2	23.1	22.2	21.3	20.6	--	23.7	22.8	22.2	6,000
7,000	34	20.2	19.3	18.7	18.0	22.8	22.0	21.1	20.4	--	--	22.5	22.0	7,000
8,000	31	20.0	19.1	18.5	17.8	22.6	21.8	20.8	20.1	--	--	22.3	21.7	8,000
9,000	27	19.8	18.8	18.3	17.6	--	21.6	20.6	19.9	--	--	--	--	9,000
10,000	23	19.6	18.6	18.1	17.4	--	--	20.3	19.7	--	--	--	--	10,000
11,000	19	19.4	18.4	17.9	17.2	--	--	--	19.5	--	--	--	--	11,000
12,000	16	19.2	18.2	17.7	17.0	--	--	--	19.3	--	--	--	--	12,000
13,000	12	--	17.9	17.4	16.8	--	--	--	--	--	--	--	--	13,000
14,000	9	--	17.7	17.2	16.6	--	--	--	--	--	--	--	--	14,000
15,000	5	--	--	17.0	16.4	--	--	--	--	--	--	--	--	15,000

To maintain constant power, correct manifold pressure approximately 0.17" Hg for each 10° F variation in carburetor air temperature from standard altitude temperature. Add manifold pressure for air temperature above standard; subtract for temperatures below standard.

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SECTION IV

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SECTION IV GENERAL MAINTENANCE

FUEL REQUIREMENTS

The minimum aviation grade fuel for the PA-25-260 is 100/130 octane. The minimum aviation grade fuel for the PA-25-235 is 80/87. Since the use of lower grades can cause serious engine damage in a short period of time, the engine warranty is invalidated by the use of lower octanes.

Whenever 80/87 is not available for the PA-25-235, the lowest lead 100 grade should be used. (See Fuel Grade Comparison Chart, below)

The continuous use, more than 25% of the operating time, of the higher leaded fuels can result in increased engine deposits, both in the combustion chamber and in the engine oil. It may require increased spark plug maintenance and more frequent oil changes. The frequency of spark plug maintenance and oil drain periods will be governed by the amount of lead per gallon and the type of operation. Operation at full rich mixture requires more frequent maintenance periods; therefore it is important to use proper approved mixture leaning procedures.

Reference Avco Lycoming Service Letter No. L185A attached to the Engine Operators Manual for care, operation and maintenance of the airplane when using the higher leaded fuel.

A summary of the current grades as well as the previous fuel designations are shown in the following chart:

FUEL GRADE COMPARISON CHART

Previous Commercial Fuel Grades (ASTM-D910)			Current Commercial Fuel Grades (ASTM-D910-75)			Current Military Fuel Grades (MIL-G-5572E) Amendment No. 3		
Grade	Color	Max. TEL ml/U.S. gal.	Grade	Color	Max. TEL ml/U.S. gal.	Grade	Color	Max. TEL ml/U.S. gal.
80/87	red	0.5	80	red	0.5	80/87	red	0.5
91/98	blue	2.0	*100LL	blue	2.0	none	none	none
100/130	green	3.0	100	green	**3.0	100/130	green	**3.0
115/145	purple	4.6	none	none	none	115/145	purple	4.6

* - Grade 100LL fuel in some over seas countries is currently colored green and designated as "100L."

** - Commercial fuel grade 100 and grade 100/130 (both of which are colored green) having TEL content of up to 4 ml/U.S. gallon are approved for use in all engines certificated for use with grade 100/130 fuel.

OIL REQUIREMENTS

The oil capacity of both the O-540 engines is 12 quarts. It is recommended that the engine oil be changed every 50 flying hours or sooner under adverse conditions. It is recommended the oil filter be changed every 50 hours. The minimum safe quantity of oil required is 3 quarts. The following grades are recommended for the specified temperatures.

Recommended oil for the O-540 engines:

Temperature above 60° F	S.A.E. 50
Temperature 30° F to 90° F	S.A.E. 40
Temperature 0° F to 70 °F	S.A.E. 30
Temperature below 10° F	S.A.E. 20

BATTERY SERVICE

A 12 volt 35 ampere hour battery is installed with the standard electrical equipment. The battery should be checked frequently for proper fluid level. Do not fill the battery above the baffle plates. Always use water - do not use acid. At least every 30 days terminals, connections and battery area should be checked for corrosion. Corrosion effects may be neutralized by applying a solution of baking soda and water.

Repeat application until bubbling action has ceased. Wash battery with clean water, and dry. Wash and flush battery box with clean water before reinstalling battery.

CAUTION

When removing battery, care should be used to prevent terminals from contacting control cables. Do not allow soda solution to enter battery.

If the battery is not up to charge, recharge, starting with a maximum charge rate of four amps and finishing with two amps. The master switch should be off and the battery removed from the airplane while charging.

CARE OF WINDSHIELD AND WINDOWS

The windshield and windows are made of Plexiglas and a certain amount of care is required to keep them clear and clean. The following procedure is recommended:

1. Flush with clean water and dislodge excess dirt, mud, etc. with your hand.
2. Wash with mild soap and warm water. Use a soft cloth or sponge. Do not rub.
3. Remove oil, grease, or dust and spray residue with a cloth soaked in kerosene. Do not use gasoline, alcohol, benzene, carbon tetrachloride, lacquer thinner or window cleaning sprays.
4. After cleaning apply a thin coat of hard polishing wax. Rub lightly with a soft dry cloth.
5. A severe scratch or mar can be removed by using jeweler's rouge to rub out scratch. Smooth area and apply wax.

FIRE EXTINGUISHER SYSTEM

Semi-annually or if discharged, this system should be checked and serviced as follows:

1. Remove left hand forward fuselage side panel.
2. Remove safety wire and unfasten clamp, unscrew fire bottle and remove from aircraft.
3. The indicator located at the bottom of the cylinder should not indicate a discharged condition. The cylinder can be weighed and should not weigh less than the amount indicated on the cylinder.
4. Check the discharge nozzle located on the forward face of the firewall to assure that the red plastic closure is in place. If missing, this is one indication that the system has been discharged.
5. Check the automatic fuse link located on the engine mount just aft of the carburetor for security. If necessary, replace fuse link with P/N 472 772, Link 280°.
6. Lubricate the fuse link cable with light oil over its entire length.
7. Have one mechanic hold the fire extinguisher control head while another pulls the mechanical actuator located at the left side of the cockpit. This will remove the pull pin and allow the discharge pin to extend. Check discharge pin for freedom of movement and spring tension.
8. Place a small amount of light oil on the mechanical actuating cable at the forward and aft end and check freedom of movement.
9. Compress the discharge pin into the control head and replace the pull pin connecting the mechanical release cable to the control head.
10. Place a small amount of Lubri-plate on the threads of the fire extinguisher cylinder and install it into the control head, reclamp the cylinder into the bracket and safety wire the clamp. NOTE: If the system is discharged, remove the control head and the remaining extinguishing agent. Use line air pressure to clear the discharge line, then place the 7/16 cap-plug on the discharge nozzle. Wash the engine and replace the cylinder with a #13967 Ansul Spare. Complete the installation as per preceding instruction.

BRAKE AND TIRE SERVICE

The brake system is filled with a Petroleum Base hydraulic brake fluid. This should be checked at every 100 hour inspection, and replenished if necessary. Do not refill with vegetable base fluid. When it is necessary to refill the system, or when the brakes seem spongy, probably due to the air in the lines, the following procedures will apply:

Cleveland Brake #30-41

To fill the brake system with this type brake assembly installed, proceed as follows:

1. Remove the rubber cap from the bleeder assembly and slide the hose from the pressure cap over the bleeder screw. Loosen the bleeder screw and fill the system until the master cylinder is full. Repeat this procedure for the left brake. If a pressure can is not available an open can with a hose attached may be used, provided the can is held higher than the master cylinder.

2. Air in the brake lines causes faulty operation which can be corrected by bleeding the individual brake systems as follows:

- a. Check the entire system for breaks or leaks.
- b. Remove rubber cap from bleeder assembly, and slide a hose over the bleeder screw.
- c. Remove filler screw from master cylinder of the particular brake which is being bled.
- d. Fill the master cylinder with Univis No. 40 MIL-H-5606 hydraulic fluid and keep the cylinder full during the bleeding process.
- e. Loosen the bleeder screw and work the brake pedal rapidly to force fluid through the bleeder hose into the receptacle. Tighten bleeder screw during return of pedal to the off position. Continue this process until no air bubbles are observed coming through the bleeder hose. The system is then properly bled.
- f. Tighten the bleeder screw, remove hose, and replace the rubber cap. Insure the master cylinders are full of

fluid and that the brakes operate properly.

No adjustment of the brake clearances is necessary on the Pawnee. If after extended service the brakes become less effective, new segments may be installed by taking off the dust covers and axle nuts, and removing four bolts from the brake assembly after which the wheel, the brake body, and the inner segments may be disassembled. The outer segments may be removed from the brake body by removing an 8-32 steel lock nut which is located centrally on the face of the brake body. Also the pistons, "O" rings and cylinders may be inspected after the outer segments are removed.

For maximum service, keep the tires inflated to the proper pressure. 25 lbs. is the minimum for satisfactory service. When carrying heavier loads, increased pressure may be desired. This may be gauged visually to meet the existing load conditions. The main gear tires may be rotated to produce even wear if necessary.

The tires may be demounted from the wheels by deflating the tubes, then removing the wheel through-bolts, allowing the wheel halves to be separated.

CARBURETOR AIR FILTER

1. Visual Inspection:

A visual inspection of the paper cartridge should be made at intervals not exceeding eight (8) hours of operation or at any time after the filter has been subjected to severe dust conditions. This inspection should be made to determine if there has been a rupture of the paper cartridge, damage to the outer screen or end seals, or blockage of the air flow due to leaves, paper, etc.

2. Cleaning:

Remove cartridge and clean by tapping against a hard surface to remove grit, sand and dirt. Do not blow out with an air hose or wash.

3. Replacement:

If the present cartridge is found to be in good condition and is not obstructed after being properly cleaned (see paragraphs 1 and 2), the following check should be made:

- a. Operate engine to static RPM at full throttle and note RPM.
- b. Remove filter cartridge and repeat operation in paragraph 3a.

If an increase of 50 RPM or greater is noted, a new cartridge should be installed.

LANDING GEAR SERVICE

With the airplane empty and sitting in the normal three point position, the strut extension (dimension "B" as shown on the sketch) will be approximately 1/4 to 3/8 inch when the oleo strut is in good condition and the air pressure and oil level are correct. Rocking the airplane side to side should cause very little change in strut extension.

If strut extension is excessive, inspection and servicing per the following will be necessary:

1. Inspection:

a. Visually check the exterior of the strut for signs of excessive hydraulic fluid leakage.

b. Check for external air leakage at the air filler valve by the use of a solution of soapy water.

c. Check for internal air leakage by the following:

1. Raise or support the aircraft so that the landing gear is clear of the ground. This can be accomplished by attaching a sling (cable or nylon web type) around the upper engine-to-mount attachment point cluster both left and right sides and hoist aircraft. Another method is to place a suitable jack or stand under the point where the jury strut fitting extends through the lower surface of the wing at the main spar. The latter method can be used when it is desirable to service one side only or a hoist is not available.

NOTE

Aircraft hopper should be empty for all lifting or jacking operations.

2. Inflate strut to 575 ± 15 PSI.
3. Slowly and cautiously loosen the oil filler plug and note whether air and/or hydraulic fluid issues from the filler plug port.

CAUTION

If an internal leak is present air and oil may issue from the port with considerable force.

2. Service Required

- a. If the above inspection shows that external fluid leakage or internal air leakage are present, the strut will require overhaul.
- b. If the inspection indicates only that external air leaks are present at the air filler valve, replace the valve.

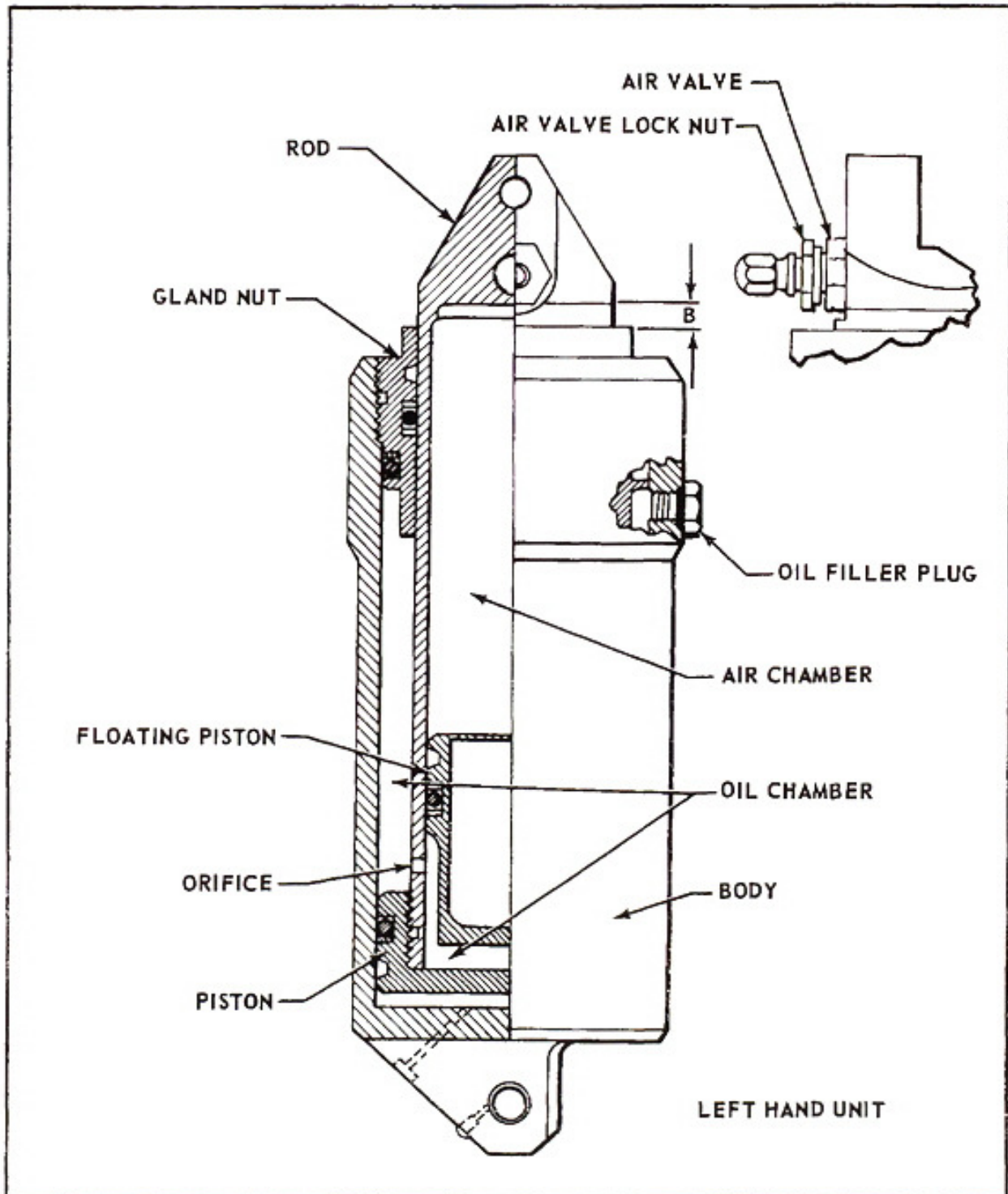
CAUTION

Release strut air pressure before removing the air filler valve.

- c. If the inspections indicate no appreciable leakage is present, recharge the strut as follows and return to service:
 1. Release air pressure.
 2. Remove the oil filler plug in the side of the shock strut body and hand fill to overflowing with MIL-H-5606 hydraulic fluid when strut is fully retracted.
 3. Install the plug with bleeder hole exposed.
 4. Remove valve cap and attach air line to air valve.

5. Loosen air lock nut and inflate strut to 575 ± 15 PSI using either a strut pump or a portable charging bottle. Any excess oil will be discharged from the bleeder vent at this time.
6. Tighten air lock nut and remove air line.
7. Torque oil filler plug 35 to 45 inch pounds.
8. Replace valve cap.

A portable charging bottle is available through our Service Department.



INSPECTIONS

ENGINE SECTION

1. Operation:

- a. Run engine to minimum 120^o oil temperature - check full throttle static RPM both magnetos.
- b. Check magnetos 125 RPM drop at 1800.
- c. Check carburetor heat. 150 RPM drop at 1800.
- d. Check ignition switch for operation.
- e. Check idle RPM 550-600 carburetor heat off.
- f. Oil pressure - Minimum idle 25 lbs. Normal 60-90 lbs.
- g. Master switch on, check alternator and voltage regulator for operation.
- h. Battery fully charged will show very slight indication on ammeter at full throttle.
- i. Check idle cut-off at 800 RPM; engine should cut off clean.
- j. Static RPM PA-25-235, 2250-2350. PA-25-260 fixed pitch prop, 2325-2425; constant speed prop, 2700.

2. Engine Mount:

- a. Check engine mount for damage and cracks at gussets or in corners.
- b. Inspect protective finish on mount, sand and touch up bare areas.
- c. Inspect rubber shock mounts for deterioration and tension.
- d. Check mount bolts for safety.

3. Cowling:

- a. Clean and inspect engine cowling for dents and cracks at hinges and reinforcement.

- b. Check for tension adjustment on cowl doors at latch.
- c. Tension prevents vibration and cowl cracking.
- d. Check baffles for cracks and felt installation to prevent chafing.

4. Magnetos:

- a. Check magnetos for secure attachment.
- b. Check breaker point housing for excessive oil.
- c. Check points for gap and pitting. Gap setting .015 to .018.
- d. Check plug wiring connections at magneto and wire insulation for deterioration and chafing.
- e. Check grommets at baffles.

5. Oil Drain:

- a. Drain oil and check for metal particles.
- b. Remove, clean and check oil screen drain plug and inlet oil temperature housing for metal particles.
- c. Reinstall and safety oil drain plug.
- d. Check oil cover for leaks and flexible lines for deterioration.

6. Spark Plugs:

- a. Remove plugs, bomb blast and clean.
- b. Plugs with badly burned electrodes should be replaced.
- c. Reset gap to .018 to .022".
- d. Reinstall using thread lubricant to prevent seizing and torque to 300 to 360 inch pounds or 30 foot pounds.

7. Starter:

- a. Check starter motor for mounting security.
- b. Check commutator for excessive wear and bridging.
- c. Inspect wiring insulation for deterioration and

connections.

d. Check ring gear for damaged teeth and nose cowl clearance.

e. Check starter shaft bushings for play.

f. Check brush retention and tension springs.

8. Alternator:

a. Check alternator mounting for security.

b. Check alternator drive belt for 3/4" hand deflection.

c. The amount of current shown on the ammeter is the load in amperes demanded by the electrical system from the alternator. To check, take for example a condition where the battery is demanding 10 amperes charging current. Switch on the rotating beacon. Note the value in amperes placarded for the beacon fuse (15 amps) and multiply by 80 percent. You get an actual current of 12 amperes. There will then be an increase of current from 10 to 22 amperes displayed on the ammeter. As each unit of electrical equipment is switched on, the currents will add up and the total, including the battery, will appear on the ammeter. Maximum continuous load is 60 amperes.

9. Carburetor and Heater:

a. Check carburetor for mounting security.

b. Inspect carburetor bowl for cracks, particularly at inlet.

c. Drain carburetor float chamber and check inlet finger screen. Resafety.

d. Operate throttle in cockpit to be sure that throttle arm hits stops in open and closed positions without binding or sticking.

e. Check operation of mixture control for binding or sticking and full rich position.

f. Inspect carburetor air box for security and cracks and heater valve for full travel.

g. Check rubber intake hose connections for deterioration and clamp security.

h. Check intake system for leaks and cracks.

i. Clean air filter by tapping against a hard surface to remove grit and dirt. Do not blow out with air hose or wash.

10. Fuel Lines:

- a. Check fuel lines for leaks and hose deterioration.
- b. Check hose supports for security and
- c. Drain and clean fuel strainer and resafety.
- d. Check for stains around fuel system indicating leaks.
- e. Check all connections for tightness.
- f. Check fuel valve travel at the valve.

11. Exhaust Stacks:

- a. Check stack flanges for security, cracks and leaks.
- b. Remove all heater and muffler shrouds and inspect for corrosion, cracks and leaks that might transfer gas to the cockpit, particularly through the cabin heater system.
- c. Check tailpipe, muffler and stacks for security at all clamps and slip joints.
- d. Check cabin heater box and control valve for operation.
- e. Check cabin and carburetor heat flexible tubing for security and general condition.

12. Firewall:

- a. Check firewall for open holes and gas leaks from engine compartment.
- b. Check all controls for grommets and sealing.

PROPELLER SECTION**1. Alignment:**

- a. Remove spinner and check for cracks or dents in spinner and back plate. Propeller blades are to track within 1/16".
- b. Metal propeller hub bolts are torqued 55-65 ft. lbs.
- c. Check for oil leaks on controllable pitch prop hub.

COCKPIT

1. Seats:

- a. Check seat cushions for wear or deterioration.
- b. Check seat fore and aft adjustment and lubricate track.
- c. Check condition of safety harness and operation of buckle.

2. Windshield:

- a. Check weatherstripping for security in channels and for weather leaks.
- b. Visually check for cracks, crazing, distortion and discoloration.

3. Power Instruments:

- a. Check power plant instruments for mounting security.
- b. Check connections and plugs.
- c. Check placards and limitation markings.

Tachometer	PA-25-235	PA-25-260
Red Line . . .	2575 RPM	2700 RPM
Green Arc. . .	500-2575 RPM	500-2700 RPM

Oil Pressure	min	max	min	max
Red Line . . .	60 lbs	90 lbs	60 lbs	90 lbs
Yellow Arc . . .	25 lbs	60 lbs	25 lbs	60 lbs
Green Arc. . .	60 lbs	90 lbs	60 lbs	90 lbs

Oil Temperature

Red Line	245°	245°
Yellow Arc . . .	40° - 120°	40° - 120°
Green Arc. . . .	120° - 245°	120° - 245°

4. Flight Instruments:

- a. Check flight instruments for mounting security.
- b. Check connections and plugs.
- c. Check placards and limitation markings.

Airspeed

Red Line	156 M.P.H.
Yellow Arc	124 - 156 M.P.H.
Green Arc.	61 - 124 M.P.H.
White Arc (Flap Operation)	60 - 109 M.P.H.

5. Switches, Lights, Fuses:

- a. Check battery cable connections for security.
- b. Check circuit breaker wire connector for security and insulating sleeves.
- c. Check position and landing light switches for placards and operation.

6. Door Latch and Hinges:

- a. Check door hinges for looseness.
- b. Check door latches for security.
- c. Check doors for proper fit to prevent air leaks to cockpit.

7. Engine Controls:

- a. Check mixture control for quadrant placard and smoothness of operation.
- b. Check carburetor heat for quadrant placard and smoothness of operation.
- c. Check throttle for quadrant placard and smoothness of operation.
- d. Check propeller for panel placard and smoothness of operation.
- e. Check primer for operation and leaks.
- f. Check cabin heat for panel placard and full travel of heater butterfly valve.

g. Check ignition switches for panel and terminal security, and placard for "OFF", "LEFT", "RIGHT".

8. Controls:

- a. Check aileron and elevator control torque tube for excessive play.
- b. Check pulleys and cable attachments.
- c. Check aileron arm attachment on torque tube.
- d. Check control stick bolts.

9. Rudder Pedals and Linkage:

- a. Check rudder pedal assembly for play and travel.
- b. Lubricate hinges and torque tube bearings and check for safety.
- c. Check rudder pedal return springs for attachment.

10. Flap Controls:

- a. Check flap handle for placard and condition of ratchet for flap positions.
- b. Check flap torque tube for excessive play.
- c. Check flap cable attachments.
- d. Check flap pulleys at bottom of fuselage.
- e. Remove inspection covers and check cable fairleads within wingwalk.
- f. Through wing inspection openings check the attachment of flap return springs.

11. Cables and Pulleys:

- a. Check all cables for broken strands.
- b. Check aileron pulleys and fairleads.

12. Flight Control Operation:

- a. Check aileron, rudder and elevator controls from

cockpit for smooth operation.

b. Check stick for neutral position with control surfaces streamlined.

13. Trim Controls:

a. Check elevator trim control for smooth operation.

b. Check indicator against elevator for proper position.

14. Fuel Valves:

a. Check fuel valve for smooth operation.

b. Check placard for "ON" and "OFF" positions.

c. Check fuel valve for full travel at valve.

LANDING GEAR

1. Shock Struts:

a. Check shock absorbers for proper extension.

b. Check shock struts and hinge bolts for wear and lubrication.

2. Wheels and Axles:

a. Remove wheels, wash, check and relubricate.

b. Check brake disc and segments for wear and scoring.

c. Check brake system for leaks.

d. Install wheel and axle nut only tight enough to remove end play.

e. Check torque on wheel thru bolts.

3. Tires:

a. Check tires for 25 pounds of air pressure.

b. Tail wheel tire pressure is 50 lbs.

c. Replace tires as necessary.

4. Brakes:

- a. Check brake reservoirs for fluid and assembly for leaks.
- b. Check operation and holding ability of brake and parking brake.

5. Landing Gear Vees:

- a. Hoist aircraft and check gear bushings; vee bushings are replaceable if worn.
- b. Check for skin wrinkles which may indicate interior damage.

6. Tail Wheel:

- a. Check tail wheel and spring assembly for looseness.
- b. Check condition of tail spring pad.
- c. Remove wheel, wash and repack bearing.

FUSELAGE**1. Fabric:**

- a. Check condition of fabric particularly on top surfaces. (Use strip test method.)
- b. Check the finish for cracks or checks. Sand out and repaint all checks or cracks to preserve the fabric.

2. Wing Fittings:

- a. With fuselage bottom panel removed, inspect wing fittings with a flashlight and magnifying glass for minute cracks in the ears. Check bolts to be sure that there are no threads in bearing and that bolts are properly safetied.
- b. Check wing fitting holes for elongation by having

someone pull up and down on the wing tips.

3. Landing Gear Fittings:

a. Inspect all fittings with flashlight and magnifying glass for signs of cracks or hole elongation.

4. Fuselage Structure:

a. Through inspection openings and through cockpit, check the condition of all tubing behind seat for rust, damage and protective coating.

b. Check all stringers for damage and security.

5. Debris-In Fuselage:

a. Check the bottom of the fuselage and under floorboards for bolts, nuts and other objects that might jam controls or pulleys.

b. If considerable dirt or oil exist on the fuselage bottom, wash out with a non-caustic soap.

6. Control Cables:

a. Check for broken control cable strands by sliding a cloth over the cable in vicinity of fairleads and pulleys.

b. Check upper and lower elevator turnbuckles for safety and maximum of three threads showing outside of barrel.

c. Check bungee spring attachment at upper and lower elevator horn, and check trim cable for wear at fairleads.

d. Check rudder cable fairleads and cables for wear.

7. Fairings:

a. Check tail assembly fairings for cracks and missing metal screws.

WINGS,AILERONS AND FLAPS

1. Wing Fabric:

a. Check left and right wing fabric for holes, cracks or checks in the finish and open drain grommets at each rib bay trailing edge. (Fabric usually deteriorates first on the upper surface of the wing and along the trailing edge.)

b. Install inspection grommets at drag wire fittings to inspect drag wires for tension and wing ribs and compression members for damage.

2. Struts:

a. Check right and left wing strut fittings for elongation by lifting up and down on the wing.

b. Check bolts for fitting attachment to the spar.

c. Check struts for dents or cracks. Sight down strut trailing edge to ascertain that struts are straight.

d. Check strut ends and lock nut.

3. Bolts:

a. Check strut attachment bolts to be sure that there are no threads in bearing and bolts are properly safetied.

4. Ailerons:

a. Check both ailerons for wrinkles which are possible signs of structural damage.

b. Check each rib bay for an open drain grommet.

c. Check condition of fabric and finish, refinishing any dope cracks, checks or ringworm.

5. Aileron Hinges:

a. Check aileron hinge legs for security at rear spar and false spar.

b. Check clevis bolts for wear and safety. Worn or loose bolts must be replaced.

6. Aileron Control:

a. Remove inspection covers and check the cables in each wing for interference and chafing.

b. Check the pulleys in each wing for condition, wear and safety and lubricate pulley bearings.

c. Check wear and safety of the fairleads in each wing.

d. Aileron travel - 23° up 23° down $\pm 2^{\circ}$.

e. Stop at aileron should engage first to allow for full travel of ailerons.

f. Check the four aileron horn bolts for wear, threads in bearing and safety.

g. Check the turnbuckle to see that it is safetied and not more than three threads are showing outside the barrel.

h. To locate broken strands at fairleads or pulleys slide a cloth over the cable, all cables with broken strands to be replaced.

7. Flap Covering:

a. Check fabric condition of both flaps for deterioration.

b. Check condition of finish for cracks, checks, or ringworm and refinish any that exist.

c. Any internal structural damage will cause wrinkles on the fabric surface.

8. Flap Attachments:

a. Each flap has two hinges and two hinge legs that are riveted to the wing false spar and attached with a single bolt to the wing rear spar. Lowering the flaps at excessive speed can cause possible damage to these hinge legs so a careful inspection is recommended.

b. Check stop in up position for streamline of flap.

c. Check the clevis bolts for wear and installation of washers and safety.

9. Flap Mechanism:

a. Check rod-end bearings and push-pull tube for clearance through hole drilled in the bearing. Check minimum distance the push-pull tube is screwed into the rod. Be sure lock nut is tight.

b. Ascertain through inspection that both flap return springs are secure and in good condition. Operate flaps and check springs to be sure they do not chafe, bind or interfere with other controls or adjacent structure.

c. Check travel: Full Flap $57^{\circ} \pm 2^{\circ}$.

d. Check bellcrank casting for cracks, particularly at the ears and for safety and security of the bracket.

10. Wing Root Fairings:

a. Check all screws for security and the fairing for cracks.

EMPENNAGE

1. Stabilizer:

a. Check stabilizer fabric condition and drain grommet for restrictions.

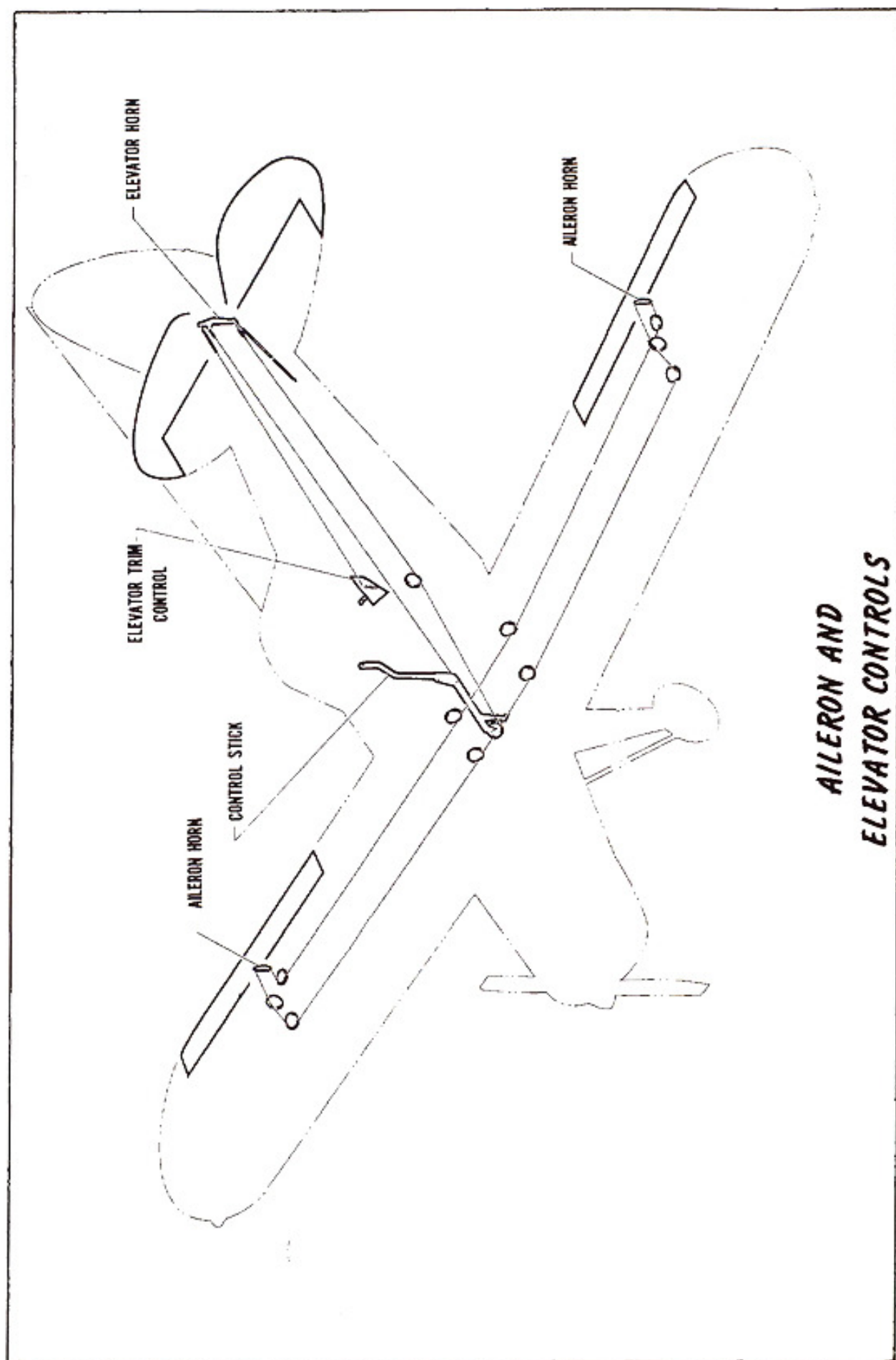
b. Check stabilizer front and rear hanger tube.

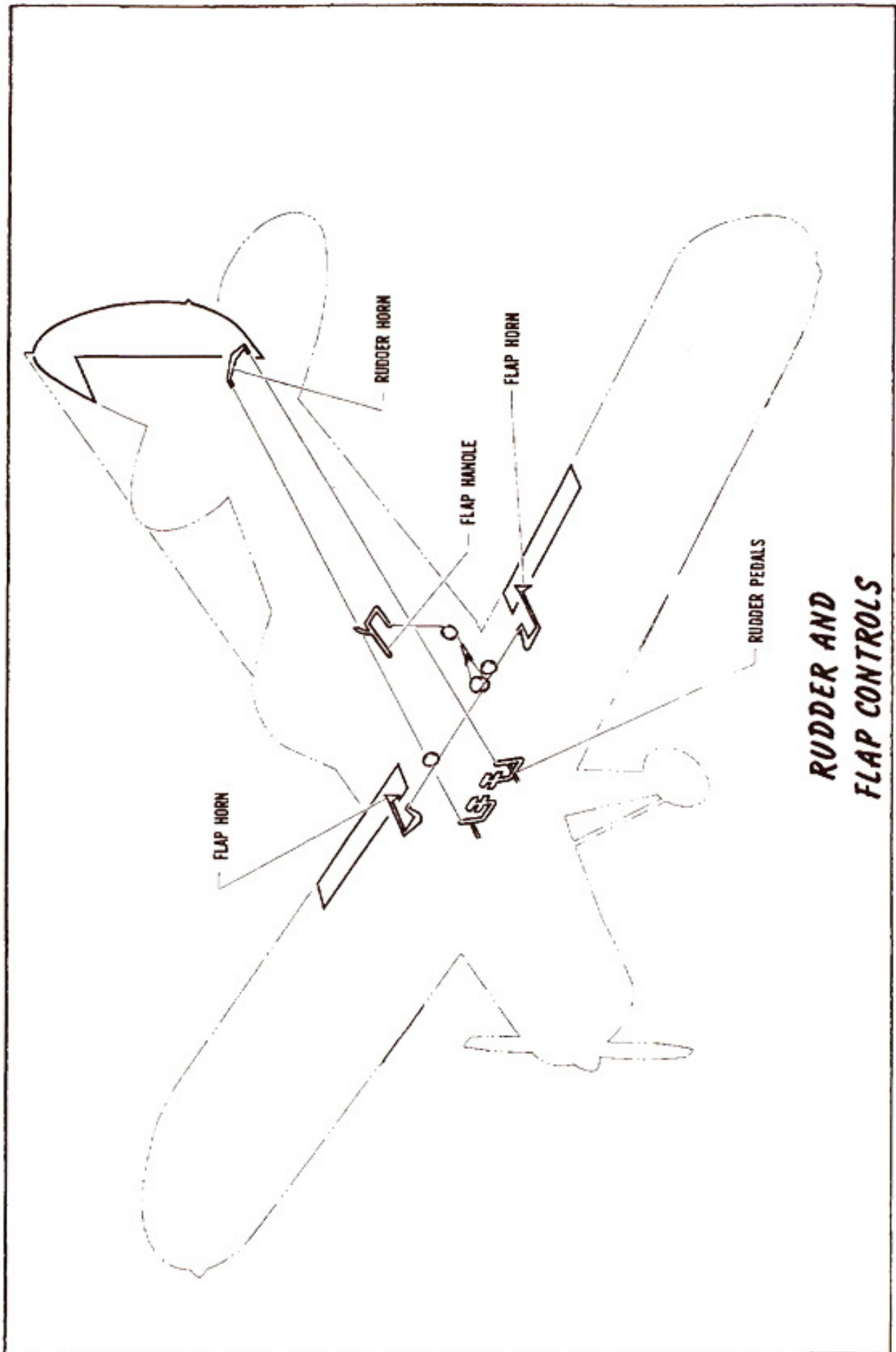
c. Lift up and down on the stabilizer, checking for excessive play.

2. Fin:

a. Inspect vertical fin for fabric condition and finish.

b. Check for wrinkles, dents and signs of internal





damage.

3. Rudder:

- a. Inspect fabric cover on the rudder for fabric and dope condition.
- b. Check bottom of rudder for an open drain grommet.
- c. Check rudder for alignment and possible internal damage usually indicated by a wrinkle in the fabric.
- d. Inspect rudder hinge bolts for wear and safety.
- e. Check hinge bushings for play; these bushings are pressed in and should be replaced when worn.
- f. Check rudder stops to ascertain full travel:
 25° Right and 25° Left, $\pm 2^{\circ}$.

4. Elevators:

- a. Check fabric condition and finish on the elevators.
- b. Check for open drain grommets along the elevator trailing edge.
- c. Sight check elevators for alignment.
- d. Check hinge bolts and bushings for wear and replace any worn pins or bushings.
- e. Check elevator cable horns for safety, worn bolts and clearance in travel.
- f. Check elevator stops to ascertain full travel:
 28° up and 15° down, $\pm 2^{\circ}$.

5. Tail Brace Wires:

- a. Check empennage brace wires for corrosion and cracks or nicks that might result in failure.
- b. Check fittings for alignment with the wire and bolts for safety.
- c. Brace wires should be taut with little hand deflection.
- d. Check each wire to be sure there are no loose fork lock nuts.

6. Empennage Controls:

- a. Check rudder and elevator horns for worn bolts and safety with no threads in bearing.
- b. Check horns for alignment with the cable and freedom of travel.
- c. Check top and bottom cable turnbuckles for safety and a maximum of three threads showing outside of the barrel.
- d. Check cables through the fuselage for interference and chafing.

7. Electrical System:

- a. Check wiring for chafing and clamping.
- b. Check that all terminals are tight.
- c. Check bonding straps for security.
- d. Check mounting and operation of landing lights.
- e. Battery installation and terminals should be secure. Check that battery is charged and that there is no acid spillage.
- f. Check circuit breakers for security.

AGRICULTURAL EQUIPMENT

1. Spray Equipment

- a. Check spray lines for leaks and hose deterioration.
- b. Check line supports and clamps for security and corrosion.
- c. Drain and clean spray strainer.
- d. Check pump, fan, and brake assemblies, for security and proper operation.
- e. Check pump lubrication.
- f. Check on-off control and valve for security and correct operation.
- g. Check pressure control valve for security and correct operation.
- h. Inspect booms and boom supports for security and

corrosion.

- i. Inspect nozzle diaphragms for deterioration.
- j. Check hopper outlets and seals for leaks.
- k. Check fan blades for cracks.

2. Cleaning of Spray Equipment

Adherence to the following listed procedures will extend the useful life of the fiberglass hopper, gate seal, pump seal, hoses and nozzle diaphragms. Time expended in cleaning and flushing the hopper tank and spray system will be repaid through extended trouble free operation of the spraying system components.

a. Never allow any spray material to remain in the hopper or spray system when the aircraft is not to be used within the next several hours.

b. Clean hopper and flush spray system at least once daily (suggested at end of spray period, or before parking overnight) using following or similar procedure:

1. Fill hopper at least half (preferably completely) full with clean water and add one full cup of strong laundry type detergent.

2. In suitable area, run up engine and operate spray pump, circulating material through the bypass (agitating) system to mix detergent and water. Spray out part of the solution through the nozzles. Note and clean any dripping nozzles. Back flush some of the cleaning solution through side loader system. Pull out boom end plugs and spray out part of cleaning solution through the boom ends. Dump the remaining solution to flush off gate and seal.

3. Open side loader valve, pull "T" strainer and rinse with clean water. Rinse out entire internal surface of hopper, hopper lid and lid seal with clean water. Allow hopper lid and gate to remain open when not in use, insuring that the aircraft is located where debris cannot enter the hopper and spraying system. Leave "T" and boom plugs out until ready to work again.

4. When the aircraft is ready to work again, replace strainer and boom end plugs, close side loader, hopper lid and gate. Care must be exercised to prevent any foreign matter from entering the aircraft spray system.

3. Duster Equipment:

- a. Check gear box oil level.
- b. Check fan, gear box, drive shaft, agitator, and couplings for security and proper operation.
- c. Check fan for cracks and nicks.
- d. Check security of drive shaft hole doubler in lower right wingwalk.
- e. Check agitator shaft seal at hopper for security and leaks.
- f. Check distributor for cracks, loose rivets, and security.
- g. Check all seals for tightness.
- h. Check canvas bottom seal for deterioration.

LEVELING AND RIGGING

The airplane may be leveled as follows:

Support the tail on an adjustable jack or stand so that the airplane is in approximately level flight position. Place a level on either top longeron in the cockpit area and raise or lower the tail until the bubble is centered; next place the level across the cockpit from longeron to longeron and level the airplane laterally by letting air out of the tire on the high side.

Rigging of the aircraft is done as follows:

1. Dihedral angle: This is fixed and cannot be adjusted without structural alteration.
2. Washout: Place a 1/4" spacer block on top of a 30 inch level at one end. With the aircraft level, hold the level fore and aft against the bottom of the rib outboard of aileron, with the spacer block at front spar. The correct washout will exist when the bubble is centered. Adjust the rear struts until this condition exists.

3. Tail assembly: With the airplane in level position, the stabilizers should be leveled at their rear spars by adjusting the rear set of tail brace wires while leaving the front set loose. The elevator hinge line should be straight and level from tip to tip. The fin should be vertical at the rudder post. After the rear set of wires are rigged, tighten up on the front set, being careful not to twist the fin or stabilizer. After the wires are tightened check for proper tension by using the following procedure:

Hold a straight edge of 37.5 inches in length on the tail wire. Hook a spring scale onto the center of the tail wire. A pull of 10 pounds \pm one pound on the scale perpendicular to the straight edge will cause a deflection of $.437 \pm .06$ inches on a tail wire under proper tension.

SERIAL NUMBER PLATE

The Serial Number Plate is located on the after deck behind the pilot's seat. The serial number of the plane should be used in referring to service or warranty matters.

SECTION V

AGRICULTURAL DATA

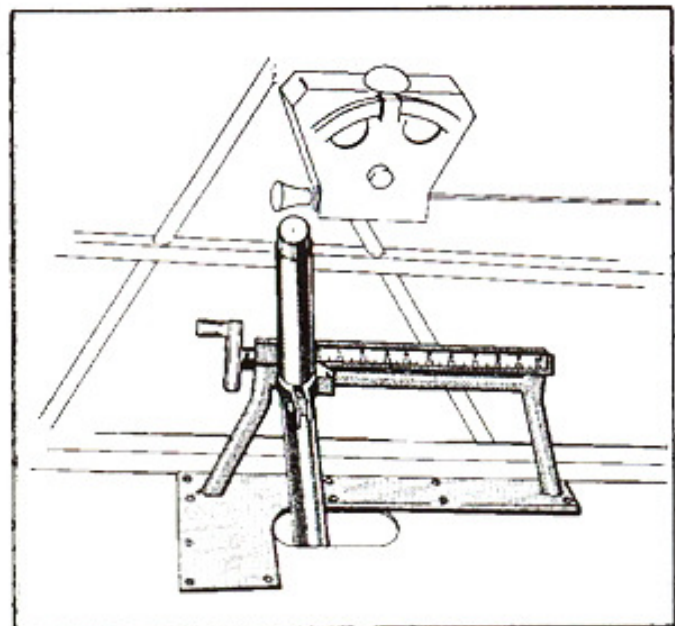
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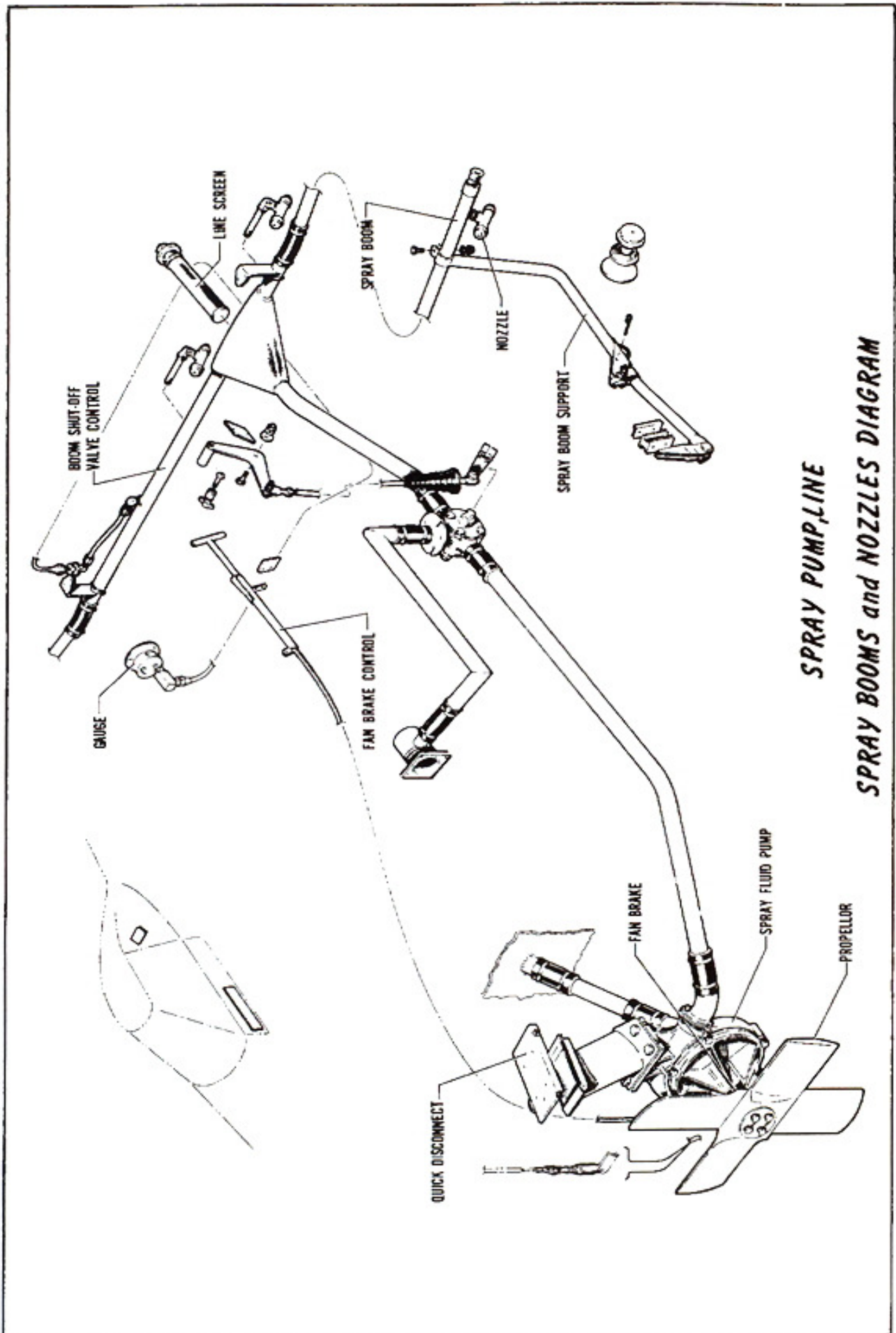
A 21 cubic foot Fiberglas reinforced plastic tank is the principal part of both the dust and spray units. This tank has a liquid capacity of 150 gallons, and a solid capacity of from 550 to 1200 pounds depending on the density of the material used. The tank top forms the cowling between the cockpit and the fuel tank.

The tank gate is designed to be liquid tight as well as dust tight. It is used as a dump valve when the airplane is dispersing liquids. One hundred and fifty gallons of liquid may be dumped in less than 5 seconds.

There is a fore and aft baffle at the bottom of the tank. Above the baffle is a lateral baffle which is attached to the hopper sides by twelve bolts, and to the lower baffle by one bolt. The lateral baffle may be removed for dust work if desired, but must be installed for liquid work as it is an essential part of the tank structure during spray operations. The lower baffle must never be removed.

The gate-dump valve handle is located at the left of the pilot's seat. It has a vernier stop adjustment to control the gate opening and also may be opened to its full extent by depressing a button on top of the handle, thus giving the widest possible gate opening for emer-





**SPRAY PUMP, LINE
SPRAY BOOMS and NOZZLES DIAGRAM**

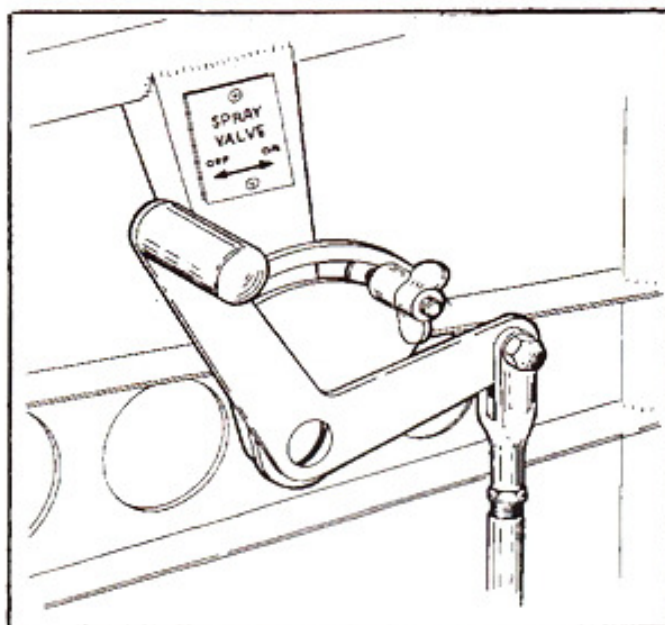
gency dump use.

SPRAY DISPERSAL OPERATION

The spray unit on the Pawnee has a liquid capacity of 150 gallons with a maximum spray output of 106 gallons per minute. The pressure range is from 10 to 60 pounds per square inch depending on the nozzle arrangement and the orifice diameter. The booms are fitted with spraying system diaphragm type nozzles and normally will use 24 nozzles for low volume output and 44 nozzles for high volume output. The booms are extruded aluminum alloy with a continuous internal boss so that it is merely necessary to drill and tap for the placement of nozzles. There are large end openings through which the booms can be flushed if desired.

The spray pressure and flow is controlled by a three way spray valve located at the left, underside of the fuselage. The valve is actuated by an arm located just ahead of the throttle quadrant. To obtain any pressure less than maximum, loosen the adjustable stop wing nut and move the control arm and stop back until it is in the off position. With the spray system operating, move the arm forward until the desired pressure is obtained, then tighten the wing nut. Spray pressure may be observed by the pressure gauge located at the top of the instrument panel.

The three way spray valve has an adjustable suck-back device which induces a negative pressure in the spray booms the instant the spray valve is shut off. This feature prevents nozzles from dripping in flight in the



event that the check diaphragm in the spray nozzle happens to be faulty.

The suck-back adjustment screw is located just below the valve mounting flange on the rearward side. For adjustment first screw it all the way in, then to obtain a minimum amount of suck-back unscrew the adjustment two full turns, for maximum adjustment approximately five full turns are required.

Liquid agitation is accomplished through the spray valve by-pass. Maximum agitation occurs when the spray is in the off position.

The windmill brake is actuated or released by means of a "T" handle on the right of the cockpit.

Fluid quantity in the hopper tank can easily be determined by comparing the liquid level which is visible through the hopper wall, with the calibrations in gallons printed in the hopper itself.

The spray pump is located under the fuselage forward of the landing gear and is attached by means of a quick release bracket. This feature is an aid in expediting installation or removal of the pump.

The spray system strainer is located at the center boom junction and may be cleaned by removing the cap and flushing out the strainer element.

The 44 nozzles, used on the high-volume unit are fitted with D-12 orifices and No. 56 cores. The 24 nozzles, used on the low-volume unit are fitted with D-8 orifices and No. 45 cores.

The output of the spray unit per acre varies with several factors: (1) Pressure; (2) Size of orifices and cores; (3) Speed of plane; (4) Width of swath used. For purpose of standardization, a normal pressure of 40 pounds, a speed of 80 MPH and a swath width of 50 feet are recommended for average use. Any of these variables can be changed to give more satisfactory results under special circumstances.

The speed of the plane can advantageously be increased to 90 MPH for use in large acreages, or slowed to 70 MPH on small plots or for heavier application. At a given pressure, the rate of application per acre will increase as the speed is reduced. A simple formula for determining the output per acre is given

below.

$$\frac{\text{Swath width (feet) x speed (mph)}}{500} = \text{acres per min. covered}$$

$$\text{Example: } \frac{50 \text{ ft. swath x } 100 \text{ mph speed}}{500} = 10 \text{ acres min. covered}$$

For calibration purposes, the best way to determine the output of the spray unit is to put a small quantity of liquid in the tank, spray the liquid out in flight leaving an unusable quantity in the tank. Then put in 20 gallons and spray out this quantity, measuring the time required to put out 20 gallons, and converting to one minute of operation. Next apply the formula given above, dividing the output in one minute by acres covered per minute to get application per acre.

Example: If 20 gallons are sprayed out in one minute, divide 20 by 10 acres per min. (as covered in above example) to get 2 gal. per acre application.

USING SPRAY TABLES

The spray tables are designed to give clear, accurate and complete information regarding spray output by the Pawnee.

If for example you wish to spray 5 gallons per acre with 44 D8-45 nozzles using a 40 ft. swath. By looking in the tables it is seen that 30 pounds per square inch is required at 90 MPH. Thus by combining airspeed, spray pressure and swath width a large number of coverage rates are available.

DROPLET SIZE

The following information on droplet size should be used as a guide.

Using the Spraying Systems Tee-jet nozzles furnished with the Pawnee, the median droplet diameter is likely to be approximately 200 microns with fuel oil and approximately 300 microns with water. (A micron is one thousandth of a millimeter or .00004 inch.) The droplets are not of uniform size, but vary from extremely small size to about twice the median diameter.

The above mentioned droplet sizes are obtained with a spray pressure of 35 psi and an airspeed of 90 MPH. Increasing either the spray pressure or the airspeed will decrease the droplet sizes slightly, and vice versa. Any nozzle from D4-45 to D12-45 (1/16" orifice to 3/16" orifice) will give approximately the same median droplet size at airspeeds of 70 MPH or above because of the influence of the airspeed.

Larger droplets and greater flow can be obtained by removing the No. 45 core which rotates the flow and produces a hollow cone spray. With the cores removed these nozzles will produce fuel oil sprays having median diameters of about 700 microns.

Additional information regarding droplet formation and sizes can be found in the "Handbook on Aerial Application in Agriculture" which is available from the Short Course Office, A & M College of Texas, College Station, Texas. (\$2.50 post-paid)

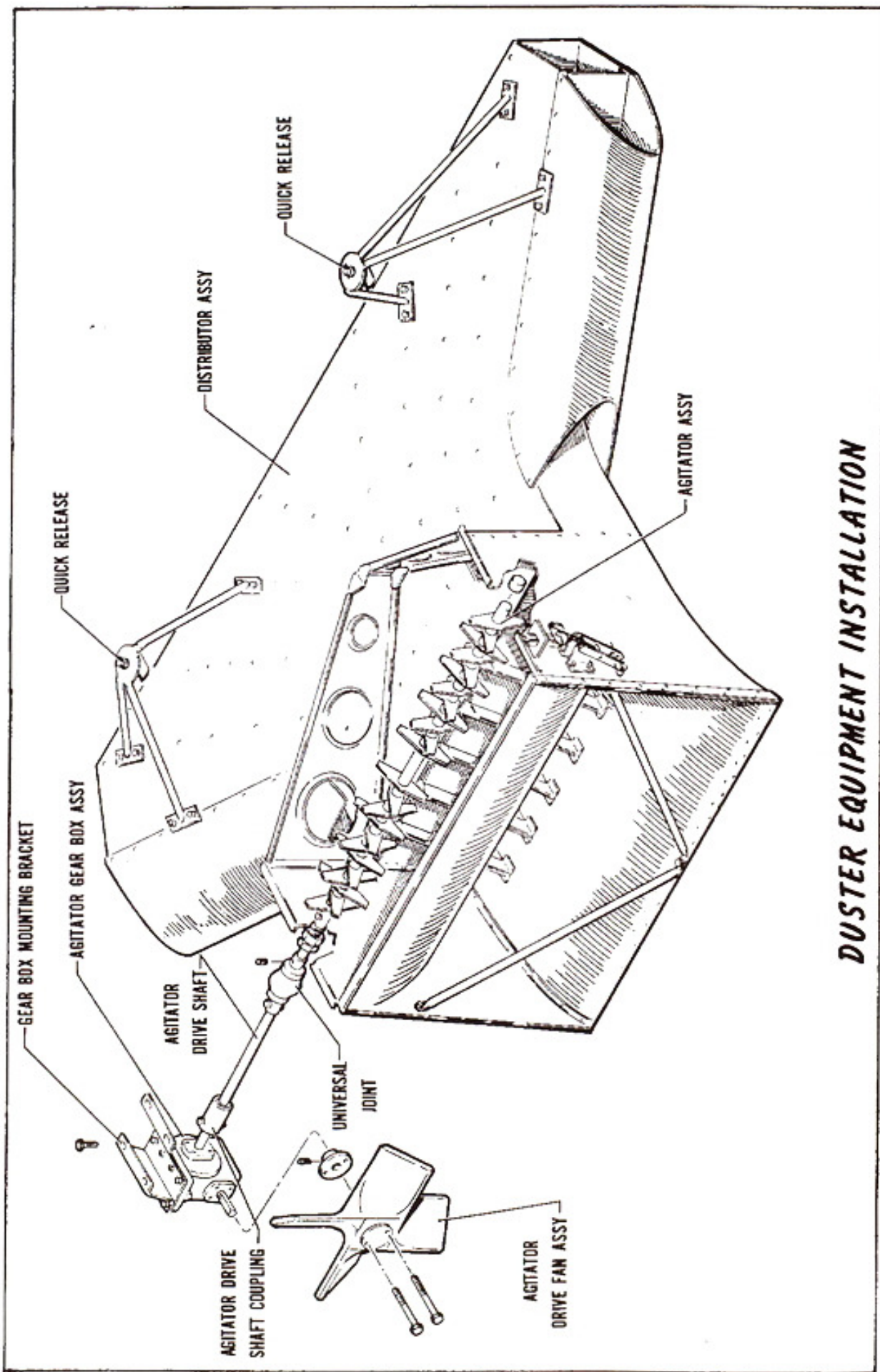
DUST DISPERSAL OPERATION

Because of the wide variety of dusts, seeds, pellets, and granular materials which can be dispersed by the dust unit, and the large variation in desired output quantities and operating requirements, it is not practicable to issue dispersal inform-

ation to cover the entire field.

The pattern of density of dispersal across a single swath is influenced by many factors such as the height of flight above the ground, the type of material dispersed and the position of the doors located in the inner vanes of the distributor. Some flights at very low height will tend to give a heavier deposit in the center of the swath and will result in greater streaking. For the dispersal of dust the inner vane doors should be fully closed to drive the dust away from the center of the swath. When seeds and pellets are dispersed their momentum takes them farther away from the center and the doors should be adjusted to an opening which gives sufficient deposit at the center to provide a satisfactory overall pattern. No definite recommended working swath width can be given but it is suggested to start with a swath spacing of 40 ft. and vary it according to conditions. A wide dust pattern is ordinarily obtained by flying slowly rather than flying fast. Eighty MPH is ordinarily an average airspeed for most operations.

The Pawnee gate has a fine adjustment, through operation of the vernier control of the gate control handle, which gives excellent results at low application.



DUSTER EQUIPMENT INSTALLATION

SPRAY OUTPUT TABLE PA-25-235, -260 LOW VOLUME UNIT 1" Simplex Pump 24 Spraying System Nozzles 2 Bladed Windmill (1 each, part #61742) (Wood)						
Nozzle No.	Airspeed mph	Liquid Press. psig	Total Flow gpm	Coverage (Gal. per acre)		
				30 Ft. Swath	40 Ft. Swath	50 Ft. Swath
D4-45	70	10	6.00	1.43	1.07	.86
		20 max.	7.00	1.67	1.25	1.00
	80	10	6.00	1.25	.94	.75
		20	7.00	1.45	1.09	.88
		28 max.	7.80	1.62	1.22	.98
	90	10	6.00	1.11	.83	.60
		20	7.00	1.29	.97	.78
		30	7.90	1.46	1.09	.88
		32 max.	8.00	1.48	1.01	.89
	100	10	6.00	1.00	.75	.60
		20	7.00	1.16	.88	.70
		30	7.90	1.31	.99	.79
		40	9.00	1.50	1.02	.90
		42 max.	9.20	1.53	1.15	.92
	D8-45	70	10	15.00	3.57	2.67
19 max.			17.00	4.05	3.03	2.41
80		10	15.00	3.12	2.34	1.88
		20	17.20	3.58	2.68	2.15
		27 max.	19.00	3.95	2.96	2.38
90		10	15.00	2.78	2.07	1.67
		20	17.20	3.18	2.38	1.91
		30	19.60	3.62	2.70	2.18
		32 max.	20.00	3.70	2.76	2.22
100		10	15.00	2.49	2.03	1.50
		20	17.20	2.86	2.15	1.72
		30	19.60	3.26	2.45	1.96
		38 max.	21.60	3.59	2.70	2.16

SPRAY OUTPUT TABLE (Cont.)**PA-25-235 , - 260**

LOW VOLUME UNIT

1-1/2" Agavenco Pump

24 Spraying System Nozzles

4 Bladed Windmill (2 each, part #64154) (Wood)

Nozzle No.	Airspeed mph	Liquid Press. psig	Total Flow gpm	Coverage (Gal. per acre)		
				30 Ft. Swath	40 Ft. Swath	50 Ft. Swath
D4-45	70	10	6.00	1.43	1.07	.86
		20	7.00	1.67	1.25	1.00
		30	7.90	1.88	1.41	1.12
		35 max.	8.50	2.05	1.51	1.21
	80	10	6.00	1.25	.94	.75
		20	7.00	1.45	1.09	.88
		30	7.90	1.64	1.23	.99
		40 max.	9.00	1.87	1.40	1.13
	90	10	6.00	1.11	.83	.60
		20	7.00	1.29	.97	.78
		30	7.90	1.46	1.09	.88
		40	9.00	1.67	1.24	1.00
		51 max.	10.10	1.87	1.39	1.12
	100	10	6.00	1.00	.75	.60
		20	7.00	1.16	.88	.70
30		7.90	1.31	.99	.79	
40		9.00	1.50	1.02	.90	
50		10.00	1.66	1.25	1.00	
62 max.		11.00	1.83	1.38	1.10	
D8-45	70	10	15.00	3.57	2.67	2.13
		20	17.20	4.10	3.06	2.44
		30 max.	19.60	4.66	3.50	2.78
	80	10	15.00	3.12	2.34	1.88
		20	17.20	3.58	2.68	2.15
		30	19.60	4.08	3.06	2.45
		38 max.	21.70	4.52	3.39	2.72
	90	10	15.00	2.78	2.07	1.67

SPRAY OUTPUT TABLE (Cont.) PA-25-235, -260 LOW VOLUME UNIT 1-1/2" Agavenco Pump 24 Spraying System Nozzles 4 Bladed Windmill (2 each, part #64154) (Wood)						
Nozzle No.	Airspeed mph	Liquid Press. psig	Total Flow gpm	Coverage (Gal. per acre)		
				30 Ft. Swath	40 Ft. Swath	50 Ft. Swath
D8-45 (cont)	90	20	17.20	3.18	2.38	1.91
		30	19.60	3.62	2.70	2.18
		40	22.00	4.07	3.04	2.44
		48 max.	24.00	4.45	3.32	2.66
	100	10	15.00	2.49	2.03	1.50
		20	17.20	2.86	2.15	1.72
		30	19.60	3.26	2.48	1.96
		40	22.00	3.65	2.75	2.20
		50	24.50	4.06	3.06	2.45
		57 max.	26.00	4.31	3.25	2.60

SPRAY OUTPUT TABLE (Cont.) PA-25-235 , -260 HIGH VOLUME UNIT 1-1/2" Agavenco Pump 44 Spraying System Nozzles 4 Bladed Windmill (2 each, part #64154) (Wood)						
Nozzle No.	Airspeed mph	Liquid Press. psig	Total Flow gpm	Coverage (Gal. per acre)		
				30 Ft. Swath	40 Ft. Swath	50 Ft. Swath
D4-45	70	10	10.00	2.38	1.78	1.42
		20	12.00	2.86	2.14	1.71
		30 max.	14.00	3.34	2.50	2.00
	80	10	10.00	2.08	1.56	1.25
		20	12.00	2.50	1.88	1.50
		30	14.00	2.92	2.19	1.75
		38 max.	16.00	3.34	2.50	1.97
	90	10	10.00	1.85	1.39	1.11
		20	12.00	2.22	1.67	1.33
		30	14.00	2.59	1.95	1.56
		40	16.50	3.06	2.30	1.83
		46 max.	17.70	3.28	2.46	1.97
	100	10	10.00	1.67	1.25	1.00
		20	12.00	2.00	1.50	1.20
		30	14.00	2.34	1.75	1.40
40		16.50	2.75	2.06	1.65	
50		18.50	3.08	2.32	1.85	
56 max.		19.70	3.28	2.46	1.97	
D8-45	70	10	22.50	5.35	4.02	3.22
		20	30.00	7.15	5.35	4.29
		25 max.	33.00	7.85	5.90	4.71
	80	10	22.50	4.58	3.52	2.81
		20	30.00	6.26	4.70	3.75
		31 max.	36.50	5.70	4.56	3.80
	90	10	22.50	4.17	3.13	2.51
		20	30.00	5.56	4.17	3.34
		30	36.00	6.66	5.00	4.00

SPRAY OUTPUT TABLE (Cont.) PA-25-235, -260 HIGH VOLUME UNIT 1-1/2" Agavenco Pump 44 Spraying System Nozzles 4 Bladed Windmill (2 each, part #64154) (Wood)						
Nozzle No.	Airspeed mph	Liquid Press. psig	Total Flow gpm	Coverage (Gal. per acre)		
				30 Ft. Swath	40 Ft. Swath	50 Ft. Swath
D8-45 (cont)	90	38 max.	40.60	7.51	5.64	4.51
		10	22.50	3.75	2.82	2.25
	20	30.00	5.00	3.76	3.00	
	30	36.00	6.00	4.50	3.60	
	40	41.80	6.96	5.23	4.18	
	43 max.	43.00	7.16	5.38	4.30	
D12-45	70	10	39.00	9.30	6.96	5.57
		20	46.00	10.95	8.20	6.56
		23 max.	49.00	11.67	8.75	7.00
	80	10	39.00	8.15	6.12	4.90
		20	46.00	9.60	7.20	5.75
		27 max.	52.00	10.85	8.13	6.50
	90	10	39.00	7.22	5.42	4.34
		20	46.00	8.51	6.40	5.10
		30	54.00	10.00	7.50	6.00
		35 max.	58.00	10.72	8.05	6.45
	100	10	39.00	6.50	4.87	3.90
		20	46.00	7.67	5.75	4.60
		30	54.00	9.00	6.75	5.40
		40	61.50	10.25	7.70	6.15
		43 max.	63.60	10.60	7.95	6.38
D12-56	70	10	72.00	17.15	12.87	10.30
		15 max.	85.00	20.22	15.20	12.15
	80	10	72.00	15.00	11.25	9.00
		18 max.	91.00	19.00	14.20	11.40
	90	10	72.00	13.35	10.00	8.00
		20	95.00	17.60	13.20	10.55

SPRAY OUTPUT TABLE (Cont.) PA-25-235, -260 HIGH VOLUME UNIT 1-1/2" Agavenco Pump 44 Spraying System Nozzles 4 Bladed Windmill (2 each, part #64154) (Wood)						
Nozzle No.	Airspeed mph	Liquid Press. psig	Total Flow gpm	Coverage (Gal. per acre)		
				30 Ft. Swath	40 Ft. Swath	50 Ft. Swath
D12-56 (cont)	90	21 max.	97.00	18.00	13.50	10.80
	100	10	72.00	12.00	9.00	7.20
		20	95.00	15.83	11.87	9.50
		26 max.	106.00	17.70	13.28	10.60

NOTES