

SECTION VIII - FUEL SYSTEM

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SECTION VIII

FUEL SYSTEM

NOTE: Through a model change all future PA-32-300 aircraft, S/N's 32-7940001 and up, will have incorporated the same fuel system as the PA-32R-300.

8-1. DESCRIPTION. (PA-32-260 and 300 to S/N 7840222).

The fuel system consists of two aluminum tanks contained in the inboard leading edge section of the wings plus two fiberglass tanks, one located in each wing tip. The main tanks have a maximum capacity of 25 U. S. gallons each while the tip tanks hold a maximum capacity of 17 U.S. gallons each.

Fuel is taken from each tank through a screen located in the tank outlet fitting and onto a combination fuel selector valve and strainer located under the floor panel under the middle seats. The fuel selector valve is controlled remotely by a selector lever located on the sloping face of the control tunnel. The strainer portion of the valve is operated by a lever located on the right front side of the spar cover under the forward end of the right middle seat. From the selector valve, fuel is drawn through the electric fuel pump(s) located in the area under the middle seats, through the engine driven pump and onto the carburetor or injector.

Four electric fuel quantity gauges are mounted in the instrument cluster located on the right side of the instrument panel. Each gauge is connected to a sender unit installed in the fuel tanks.

Refer to Figures 8-1 or 8-2 for the layout and relationship of the fuel system and components.

8-2. DESCRIPTION (PA-32R-300). The fuel system consists of two interconnected aluminum tanks in each wing, having a combined capacity of 49 U.S. gallons, for a total capacity of 98 U.S. gallons. These tanks form an integral part of the wing surface when installed. Fuel flow is indicated on the gauge located in the instrument panel. A fuel quantity gauge for each wing system is also located in the instrument panel, and indicates the amount of fuel remaining as transmitted by the electric fuel quantity sending units located in the wing tanks. An exterior sight gauge is installed in the inboard tank of each wing so fuel quantities can be checked on the ground during the preflight of the airplane.

Fuel is drawn through a finger screen located in the inboard fuel tank and routed to a three position fuel selector valve and filter unit which is located aft of the main spar. The valve has "OFF," "LEFT" and "RIGHT" positions which are remotely selected by means of a torque tube operated by a handle located in the pedestal. The handle has a spring loaded detent to prevent accidental selection to the "OFF" position. From the selector valve the fuel goes to the electric fuel pump which is also mounted aft of the main spar and then goes forward to the engine driven fuel pump which forces the fuel through the injector unit into the engine.

Refer to Figure 8-3 for layout and relationship of the fuel system and components.

8-3. TROUBLESHOOTING. Troubles peculiar to the instruments and related areas of the fuel system are listed in Section IX along with their probable causes and suggested remedies. Electrical and mechanical troubles of the system are found in Table VIII-III at the back of this section. When troubleshooting, check from the power supply to the items affected. If no trouble is found by this method, the trouble probably exists inside individual pieces of equipment; they may then be removed from the airplane and an identical unit or units, tested and known to be good, installed in their place.

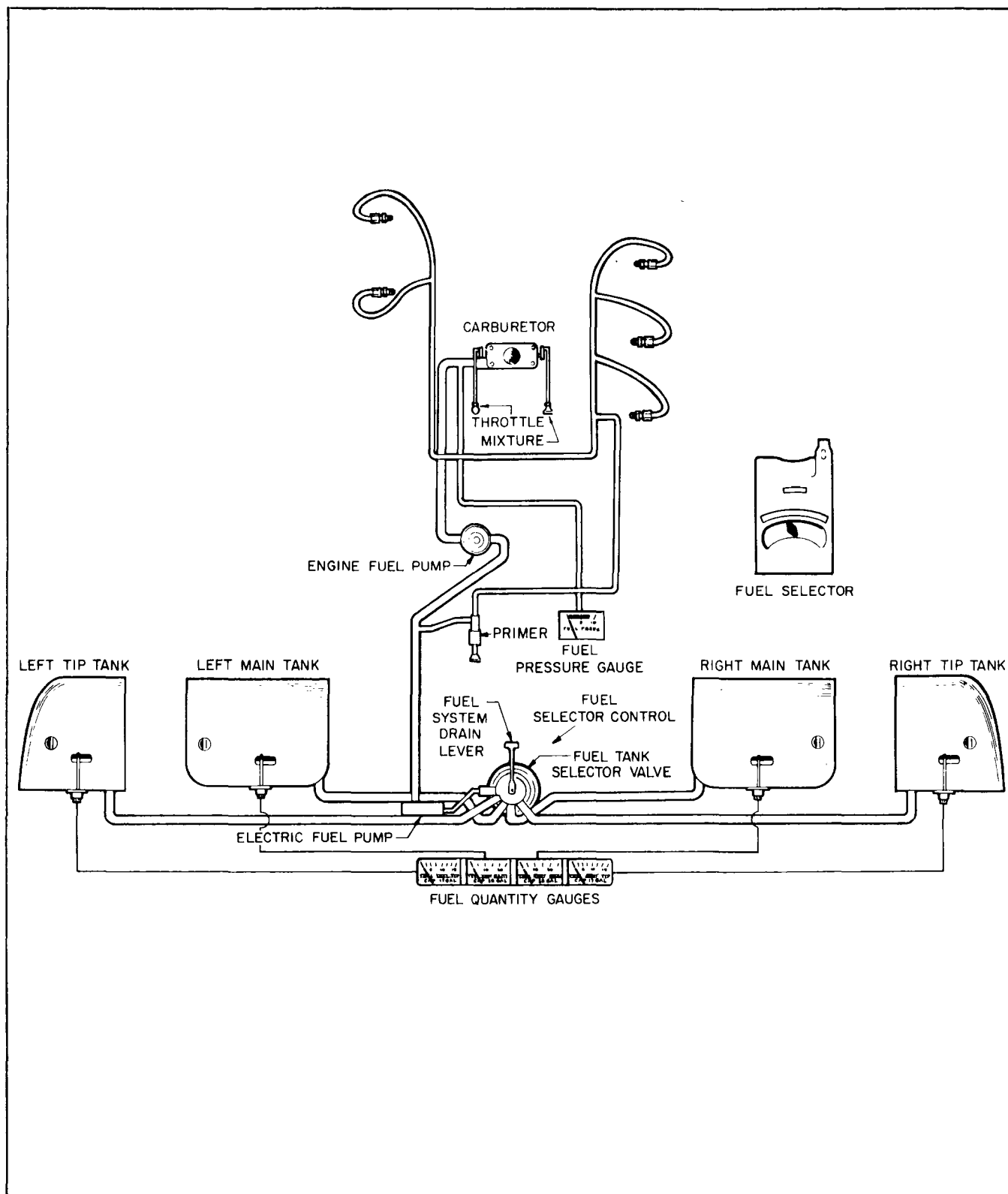


Figure 8-1. Fuel System (PA-32-260)

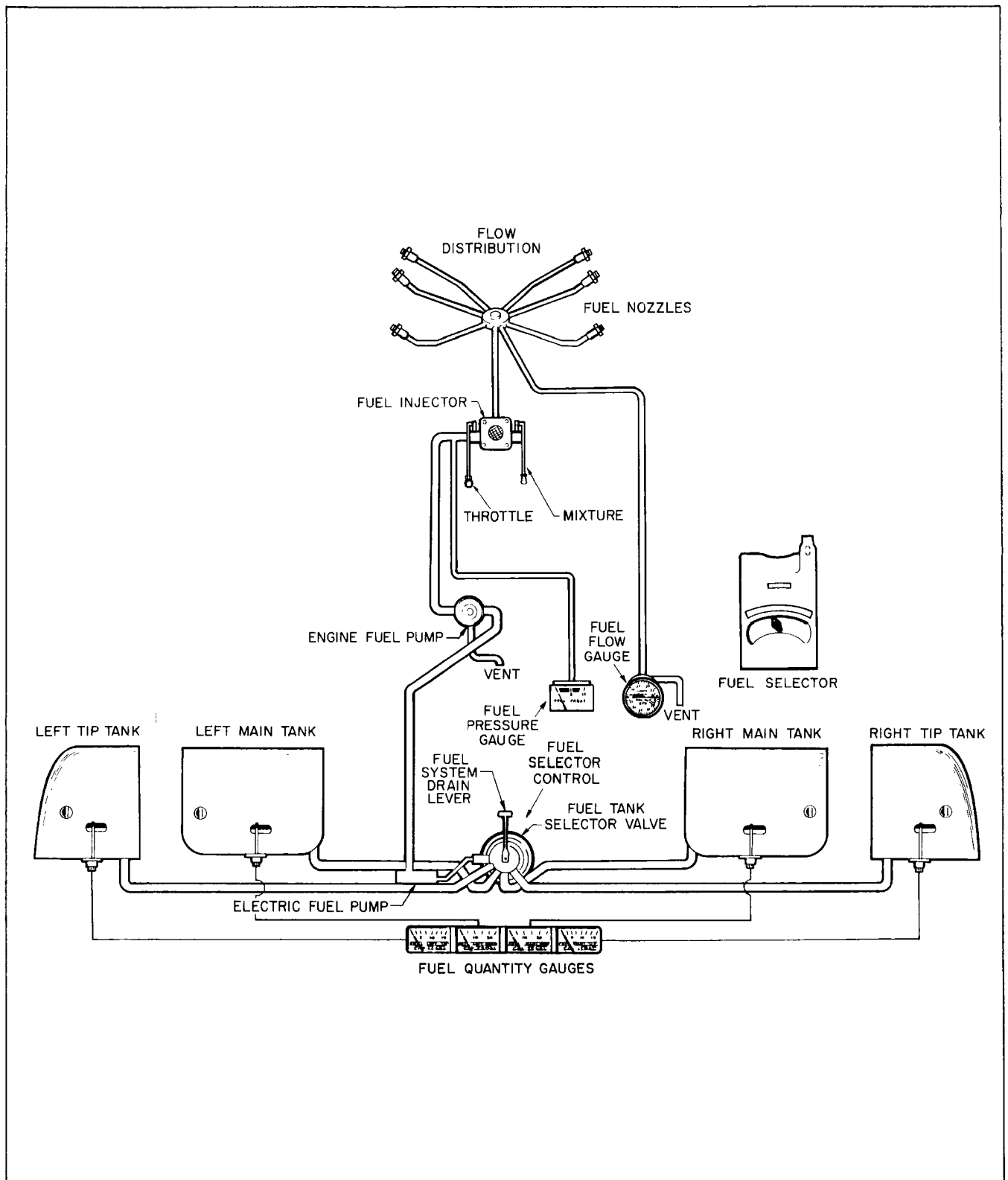


Figure 8-2. Fuel System (PA-32-300)

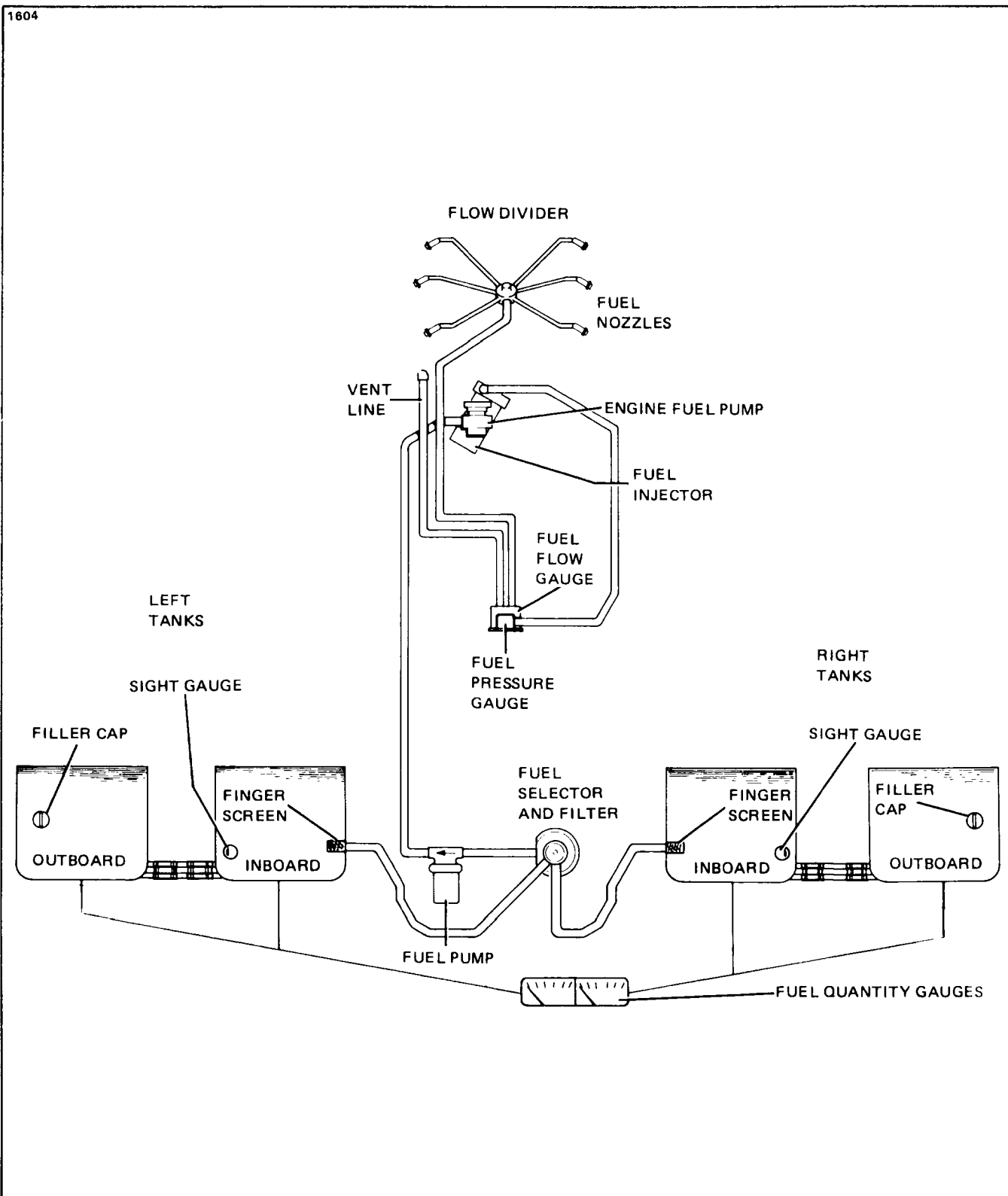


Figure 8-3. Fuel System
(PA32-300, Serial No. 32-7940001 and up; PA-32R-300, All)

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8-4. FUEL TANKS.

NOTE: Through a model change, all future PA-32-300 aircraft, S/N's 32-7940001 and up, will have incorporated the same fuel system as the PA-32R-300.

8-5. INSPECTION AND REPAIR OF METAL FUEL TANKS.

Visually inspect fuel tanks and adjacent areas for signs of leaks. Tell tale stains are frequently the first indication. Fuel tanks found to be seeping or leaking fuel must be removed and repaired, as authorized herein, or replaced.

WARNING: SLOSHING OF FUEL TANKS PROHIBITED.

- a. Remove tank(s) as described above.
- b. Fuel tanks which have previously been sloshed must be replaced if new leaks are detected.
- c. Leaks in fuel tanks which have not been sloshed can be sealed with Products Research Corp. PR-1422A2 sealant.
 - (1) Allow sealant to cure 72 hours.
 - (2) Leak check repair by filling the fuel tanks with 1.5 psi clean dry air and:
 - (a) applying a water and soap solution; or,
 - (b) submerging seams in clean water a minimum of one (1) inch, but no more than six (6) inches.

NOTE: Replace the tank if it cannot be successfully repaired by the method above.

8-5a. SLOSHED FUEL TANK 100 HOUR INSPECTION.

WARNING: SLOSHING OF FUEL TANKS PROHIBITED.

Replacement of fuel tanks which have previously been sloshed is recommended. If the fuel tank must remain in service, each 100 hours inspect as follows:

- (1) The entire interior of the tank should be inspected with the tank drained. Use a mirror and inspection light through the filler neck, or sight gauge hole, if appropriate, and inspect for peeling of the sloshing compound. Small scrapes in the film adjacent to the filler neck may be disregarded provided there is no indication of peeling.
- (2) If peeling has occurred and separated material is found, the tank must be removed and replaced.

8-6. INSPECTION AND REPAIR OF TIP TANKS (PA-32-260 and 300) (FIBERGLASS).

Drain tanks completely before inspection. (Refer to Draining Fuel System, Section II.) Check the tank for signs of leaks. Minor repair of the tank can be accomplished with the use of fiberglass repair kit 756-729. This kit along with instructions is obtained from Piper Dealers or Distributors.

8-7. REMOVAL OF MAIN FUEL TANK (PA-32-260 and 300).

- a. Drain the fuel tank. (Refer to Draining Fuel System, Section II.)
- b. Remove the screws from around the perimeter of the tank assembly.
- c. Disconnect fuel line attached to tank.
- d. Pull the tank away from the wing assembly far enough to gain access for removal of the sender wire.
- e. Remove the tank from the wing assembly.

8-7a. INSTALLATION OF MAIN FUEL TANK (PA-32-260 and 300).

- a. Slide the main tank partly into position and connect the sender wire.
- b. Slide the tank completely into place and secure with screws around its perimeter.
- c. Connect fuel line on inboard side of tank. The flexible hose from the fuel tank must not be twisted during installation on applicable models.
- d. Fill the fuel tank and check for leaks, unrestricted Fuel flow and proper sender indications on the quantity gauge.

8-8. REMOVAL AND INSTALLATION OF TIP TANK (PA-32-260 and 300).

- a. Drain the fuel tank. (Refer to Draining Fuel System, Section II.)
- b. Remove the access plate on the underside of the wing adjacent to the fuel tank.
- c. Remove the two bolts that secure the tank to the end of the main spar by entering through the access hole on the underside of the wing.
- d. Disconnect the fuel line and sender wire through the access hole.
- e. Remove the screws that secure the tank to the wing from around the outside of the tank.
- f. Remove the tank from the wing assembly.
- g. Reinstall the tank in reverse of the removal instructions.

8-9. REMOVAL OF INBOARD FUEL TANK

(PA-32R-300 and 32-300 with S/N's 32-7940001 and up).

- a. Locate and remove cover from access hole located on underside of wing between wing station 88.75 and wing station 115.95.
- b. With fuel completely drained from tank, loosen clamps at hose connections on fuel line and fuel vent line and slide hose connections away from fuel tank.
- c. Disconnect fuel line on inboard side of tank.
- d. Remove screws from around the perimeter of the tank. Carefully pull tank away from the wing far enough to gain access to/and remove sender wire.
- e. The tank is now free to be removed.

8-10. INSTALLATION OF INBOARD FUEL TANK

(PA-32R-300 and 32-300 with S/N's 32-7940001 and up).

- a. Position fuel tank in its recess in the wing. Connect fuel sender wires. Slide tank completely into position and secure with screws around its perimeter.
- b. Using access hole located on underside of wing, slide hose on interconnecting fuel line and fuel vent line into position and tighten clamps.
- c. Connect fuel line on inboard side of tank.
- d. Fill fuel tanks and check for leaks, unrestricted fuel flow, accurate sender indications on fuel quantity gauge, and that ground wire is securely attached to interconnecting fuel line, fuel vent line and wing rib at wing station 88.75.

8-11. REMOVAL OF OUTBOARD FUEL TANK

(PA-32R-300 and 32-300 with S/N's 32-7940001 and up).

- a. Using the same access hole described in Paragraph 8-9 and with fuel completely drained from the tank, loosen clamps at hose connections on fuel line and fuel vent line. Slide hose connections away from fuel tank.
- b. Gain access to outboard fuel vent elbow by removing wing tip. Disconnect or cut hose and remove elbow.
- c. Remove screws from around the perimeter of the tank. Carefully pull tank away from the wing far enough to gain access to remove sender wires.
- d. The tank is now free to be removed.

NOTE: In the event the interconnecting fuel line and fuel vent line are being removed, it will be necessary to first disconnect the ground wire attached to the rib at wing station 88.75.

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8-12. INSTALLATION OF OUTBOARD FUEL TANK

(PA-32R-300 and 32-300 with S/N's 32-7940001 and up).

- Position fuel tank in its recess in the wing. Connect fuel sender wires. Slide tank completely into position and secure with screws around its perimeter.
- Using access hole located on underside of wing, slide hose on interconnecting fuel vent line into position and tighten clamps.
- Slide hose connection on interconnecting fuel line into position and tighten clamps.
- Connect fuel vent line on outboard side of tank.
- Fill the fuel tank and check for leaks and unrestricted fuel flow, accurate sender indications on fuel quantity gauge, and that ground wire is securely attached to interconnecting fuel line, fuel vent line and wing rib at wing station 88.75.

8-13. INSPECTION OF FUEL SYSTEM. Fill tanks with fuel. Inspect tanks and fuel line connections for leaks. If fuel tanks leak, follow instructions given in Paragraph 8-5 or 8-6. If fuel line connections leak, tighten clamps or replace hose connections after first draining tanks.

8-14. FUEL QUANTITY SENDER/GAUGE CHECK (INSTALLED) (PA-32-260 and 300).

- Turn the fuel selector valve off. Completely drain the fuel tank that relates to the gauge to be checked. (Refer to Draining Fuel System, Section II.)
- Level the airplane longitudinally and laterally.

NOTE: The electrical system should supply 12 to 14-volts to the gauge.

- Turn the master switch on and observe the fuel quantity gauge, it should read empty. Refer to Table VIII-I for tolerances that are permitted between the fuel gauge reading and the actual fuel in the tank.
- Add fuel to the tank in the amount of five U.S. gallon increments until the tank is full and observe the gauge readings.

NOTE: It will be permissible to adjust the fuel tank float support wire to obtain the specified tolerances.

TABLE VIII-I. SENDER/FUEL QUANTITY GAUGE TOLERANCES (PA-32-260 & 300)

| MAIN TANK | | TIP TANK | |
|--------------------------------|--------------------------|--------------------------------|--------------------------|
| Actual Fuel in Tank (U.S. Gal) | Gauge Reading (U.S. Gal) | Actual Fuel in Tank (U.S. Gal) | Gauge Reading (U.S. Gal) |
| Full | 22 to 28 | Full | 15 to 17 |
| 20 | 17 to 24 | 10 | 7 to 12 |
| 15 | 12 to 17 | 5 | 3 to 7 |
| 10 | 7 to 12 | 0 | 0 to -2 |
| 5 | 2 to 6 | | |
| 0 | 0 to -2 | | |

8-14a. FUEL QUANTITY SENDING UNIT (P/N 548-671) CALIBRATION.

NOTE: The fuel quantity sending unit, Piper part number 548-671 (Rochester Gauges P/N 7740-309) is NOT compatible with any A.C. Sparkplug or Stewart Warner fuel quantity gauge. The Rochester fuel quantity sending unit MUST be used only with Rochester fuel quantity gauges. Refer to Service Spares Letter Number 406 for appropriate fuel quantity gauge/sender systems.

Instructions:

- a. Perform sending unit/gauge system check per section 8 of the aircraft service manual.
- b. Make appropriate log book entry.

NOTE: If an adjustment of the fuel quantity sending unit, Piper P/N 548-671, is required, refer to instructions below.

1. Fasten unit to a fabricated checking fixture with washers and nuts (Refer to Figure 8-3a for dimensions of fuel quantity sending unit checking fixture).
2. Ascertain that with the float just touching the top of a 0.27 inch spacer block, the resistance of the sending unit is $3 \pm .5$ ohms. Should the resistance of the sending unit not fall into this range, adjust the arm of the float assembly by gently bending it as indicated in Figure 8-3b. The entire float must be horizontal to the base of the fixture.
3. Remove the sending unit from the checking fixture and connect it to an ohmmeter. Allow the float arm to rest on the bottom mechanical stop. A resistance of $0 \pm .5$ ohms should be indicated at this position. Move the float assembly to the upper mechanical stop. A resistance of 45 ± 2 ohms should be indicated at this position.
4. Check for dead spots by slowly moving the float arm from the bottom stop to the upper stop and back. Watch the ohmmeter indicator, it should steadily move up and down the scale with out fluctuation as the float arm is moved.
5. If an incorrect resistance and/or dead spots are found, the sending unit should be replaced.

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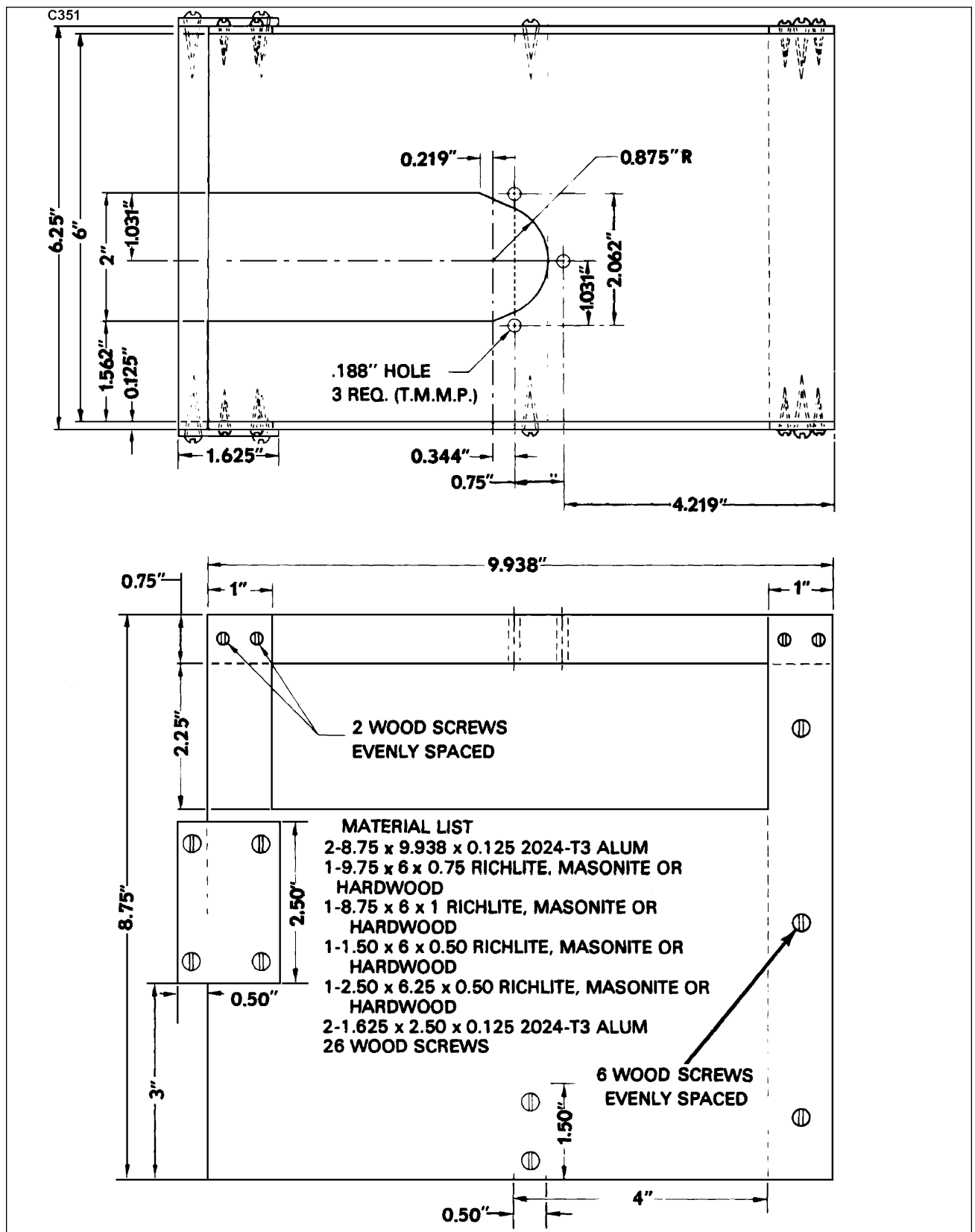


Figure 8-3a. Fuel Quantity Sender Checking Fixture

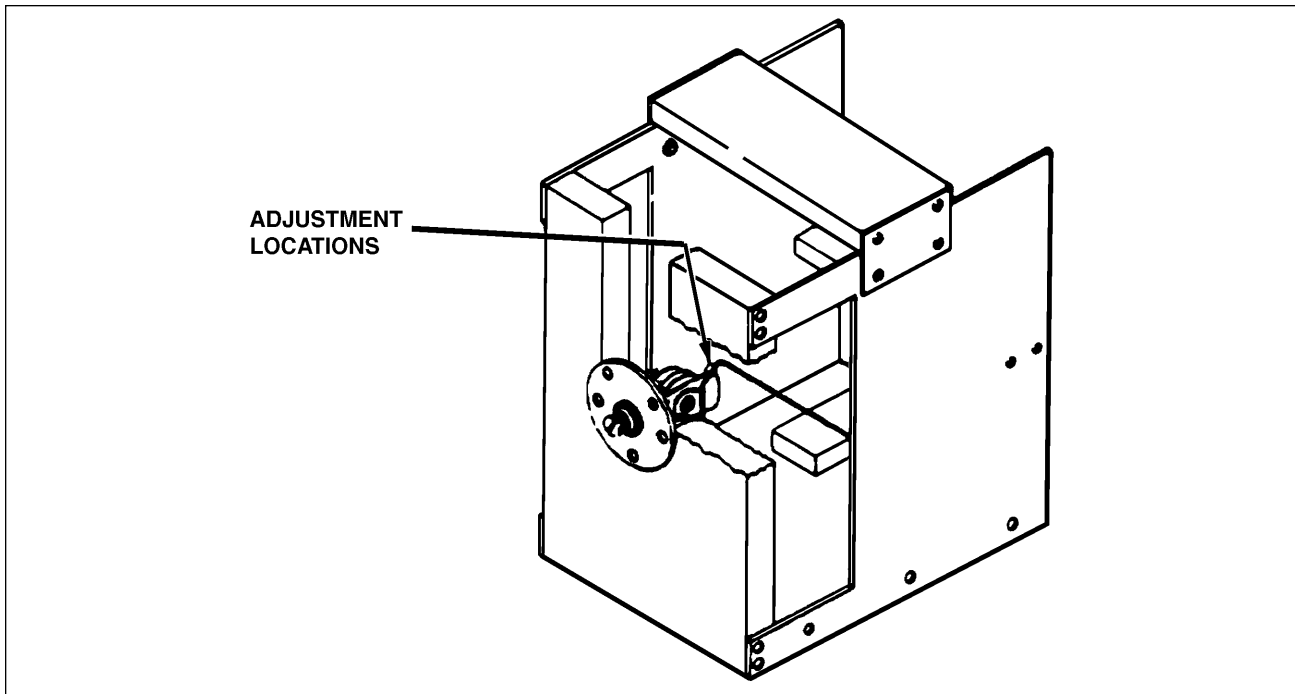


Figure 8-3b. Fuel Quantity Sender Unit (P/N 548-671) Adjustment

8-15. FUEL QUANTITY SENDER UNIT (PA-32R-300 and 32-300 with S/N's 32-7940001 and up).

NOTE: Inboard and outboard fuel tanks in each wing are interconnected and have a total capacity of 49 gallons. Fuel quantity sender units mounted in each fuel tank transmit electrically the cumulative quantity of fuel in each set of tanks, to fuel quantity gauges mounted in the instrument panel.

8-16. FUEL QUANTITY SENDER/GAUGE CHECK (INSTALLED) (PA-32R-300 and those 32-300's above S/N's 32-7940001). Fuel quantity sender units and fuel quantity gauges can be checked while mounted in the airplane by using the following procedure:

- a. Put the fuel selector levers in the "OFF" position. Completely drain fuel tanks that relate to the fuel quantity senders and gauge to be checked. (Refer to Draining Fuel System, Section II.)
- b. Level airplane laterally (refer to Leveling, Section II) and position the aircraft with a 1 degree nose up attitude.

NOTE: The electrical system should supply 12 to 14volts to the gauge.

- c. With the master switch in the "OFF" position, the gauge needle should be centered on the white dot to the left of the "O" radial mark, with a maximum deviation of 1/4 needle width. If not within this tolerance, the gauge should be replaced.
- d. With the master switch in the "ON" position and no fuel in the tanks, the gauge needle should be centered on the white dot to the left of the "O" radial mark with a maximum deviation of 1/4 needle width. If not within this tolerance, the gauge should be replaced.

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- e. Place 2 gallons of fuel in the wing fuel tank that relates to the gauge and sender unit being checked.
- f. With 12 to 14-volts DC supplied to the electrical system and the master switch in the “ON” position, the needle should be centered on the “O” radial mark; plus 0, minus 1 needle width.
- g. If the needle does not read within the above tolerance, remove the sender wire from the rear of the gauge and check the resistance to ground through the sender circuit. If the resistance is not within 5 ± 1 ohms, replace the inboard sender. Then, recheck as specified above.
- h. Add fuel to the tanks in accordance with the information given in Table VIII-II until tanks are full. Observe the gauge reading at each 10 gallon increment.
- i. With the tanks full and master switch “ON,” the needle should be centered on the “F” radial mark within ± 1 needle width. If not within this tolerance, adjust the electrical adjustment (refer to Figure 8-4) just sufficiently to bring it within tolerance; do not center the needle.

TABLE VIII-II. SENDER/FUEL QUANTITY GAUGE TOLERANCES
(PA-32R-300 and those 32-300's above S/N 32-7940001)

| Actual Fuel in Tank (U.S. Gallons) | Gauge Reading (U.S. Gallons) |
|------------------------------------|------------------------------|
| 49 Full | F |
| 42 | 40 |
| 32 | 30 Pointer |
| 22 | 20 \pm Width |
| 12 | 10 |
| 2 | Not More Than Zero |
| 0 EMPTY | White Dot |

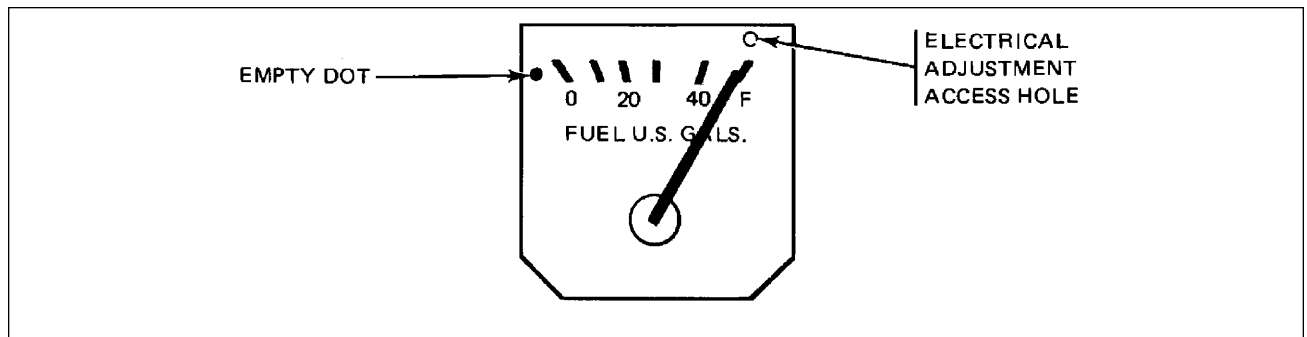


Figure 8-4. Fuel Gauge (PA-32R-300)

8-17. FUEL SELECTOR VALVE AND FILTER.

8-18. FUEL SELECTOR VALVE OPERATION. When the fuel selector handle is not in a positive selector detent position, more than one fuel port will be open at the same time. It should be ascertained that the fuel selector is positioned in a detent, which can be easily felt when moving the handle through its various positions.

8-19. REMOVAL OF FUEL SELECTOR VALVE AND FILTER.

CAUTION: NO FIELD DISASSEMBLY OR REPAIR OF FUEL SELECTOR VALVES IS AUTHORIZED. MAINTENANCE IS LIMITED TO REMOVAL AND REPLACEMENT OF THE WHOLE UNIT.

- a. Drain fuel from tanks. (Refer to Draining Fuel System, Section II.)
- b. Remove center seats, seat belt attachments and floor panel just aft of the main spar by removing the floor attachment screws. Lift the panel and remove.
- c. Remove plate from bottom of the fuselage which covers fuel selector.
- d. Disconnect the fuel lines and selector linkage from valve assembly.
- e. Remove the four mounting screws which hold the fuel selector in place and remove the selector assembly.

8-20. CLEANING FILTER ASSEMBLY.

- a. Remove the access panel to the filter bowl on the bottom of the fuselage.

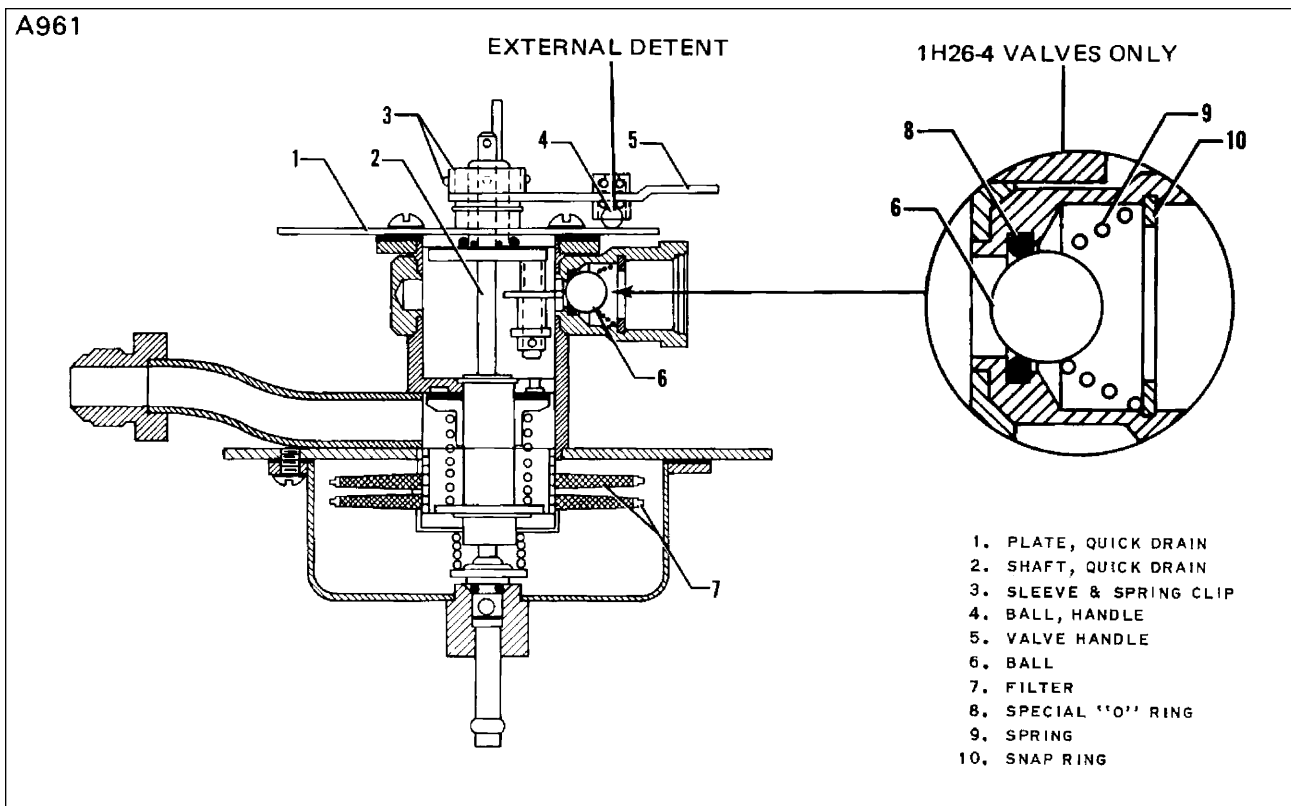


Figure 8-5. Fuel Selector and Filter

- b. Remove fuel strainer bowl.
 - c. Remove filter disc assembly from center stem by compressing filter retainer spring and removing filter retainer washer. (Refer to Figure 8-6.)
 - d. Inspect bowl gasket and replace if necessary.
 - e. Filter discs may be cleaned as follows:
 1. Plug open ends of filter disc center with stoppers to prevent dirt from entering.
 2. Wash metallic filter disc in acetone, gasoline, carbon tetrachloride, trichlorethylene (permachlor) or Bendix cleaner. Wash nylon filter disc with soap and water.
- CAUTION: DO NOT USE ACETONE, METHYLETHYLKETONE, ETC., TO CLEAN NYLON FILTER DISCS.**
3. Remove stubborn deposits from filter disc with a soft bristle brush.
 4. Rinse all traces of soap solution. Drain or blow dry and remove stoppers.
- f. Replace the filter disc if damage is evident.
 - g. Reinstall filter disc assembly and strainer bowl.

8-21. RESERVED

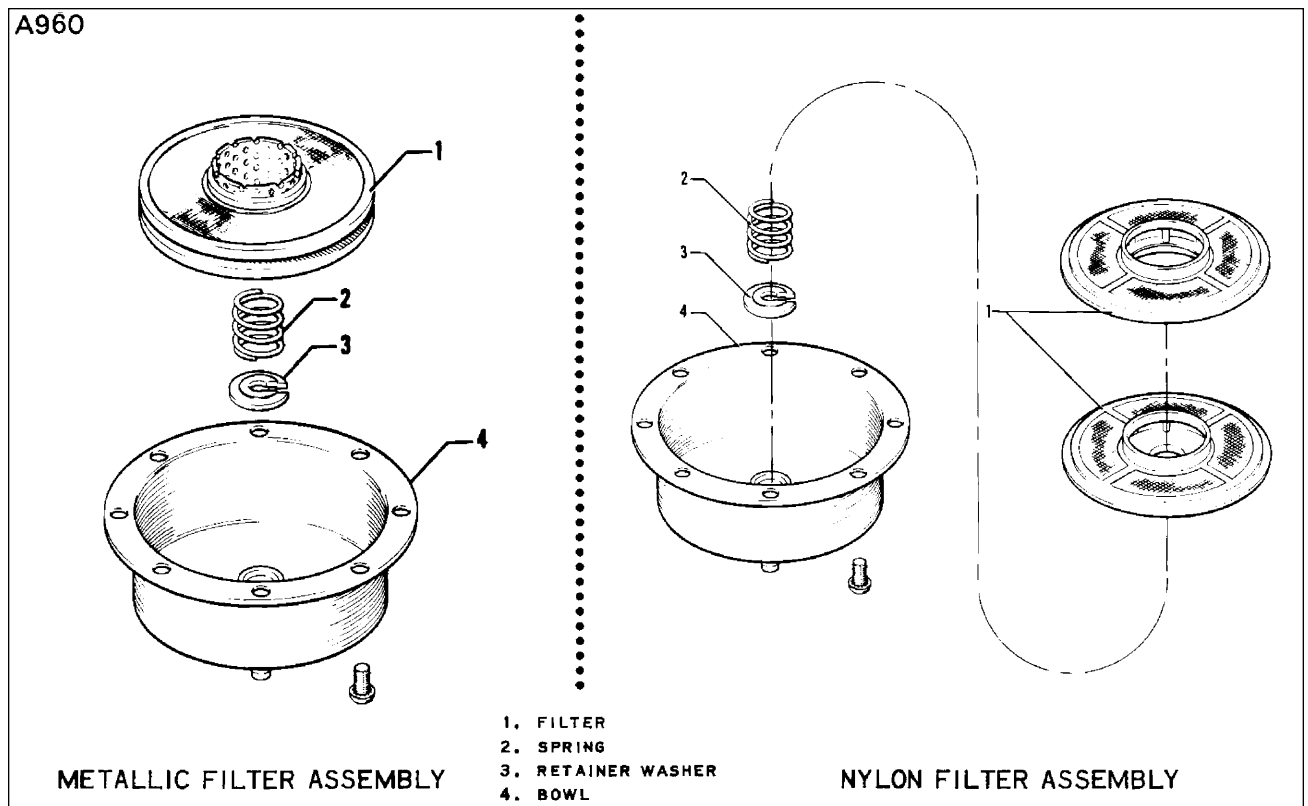


Figure 8-6. Fuel Filter

8-22. INSTALLATION OF FUEL SELECTOR AND FILTER VALVE.

- a. Position the valve inside the airplane just aft of the main spar.
- b. Secure the valve with machine screws, washers and self-locking nuts.
- c. Connect the fuel lines.
- d. Connect fuel selector valve linkage to insure that selector handle engages the left indent position when it is against the safety stop on the console cover.
- e. Fill the fuel tanks and check all connections for leaks.
- f. Install the rear seat and fuel drain placard cover.
- g. Install the access plate to the bottom of the fuselage with attaching screws.

NOTE: When installing the fuel selector valve, it is recommended the complete fuel system and tanks be drained and flushed to ascertain no contamination is present. (Refer to Paragraph 8-23.)

8-23. CLEANING FUEL SYSTEM.

- a. Remove all fuel from tanks. The fuel should be drained through a chamois or other straining equipment to inspect for the presence of foreign matter.
- b. Each tank should be flushed by opening the tank drain and adding two-three gallons of clean fuel. While the fuel is draining, the aircraft wing should be raised and lowered to allow the fuel to rinse any contamination still remaining in the tank out the drain.
- c. After the valve is installed and the aircraft refueled, the fuel inlet line to the injector or carburetor should be disconnected and with boost pump on, lines should be flushed while selector is moved from one tank to another.
- d. Make proper logbook entry.

8-24. ELECTRIC FUEL PUMP.

8-25. REMOVAL AND INSTALLATION OF ELECTRIC FUEL PUMP. The PA-32-260 is equipped with two electric pulsate type fuel pumps in models bearing S/N's 32-1 to 32-375 and one pulsate pump in models bearing S/N's 32-376 and up. These pumps are alike in construction as shown in Figure 8-7. The PA-32-300 and PA-32R-300 are equipped with one rotary vane type pump. All pumps may be removed by the following procedure:

- a. Turn the fuel selector to the off position.
- b. Remove the floor panel that is located directly aft of the main spar by removing the center seats, seat belt attachments and the screws that secure the panel. Lift the panel and remove it from the airplane.
- c. On PA-32-260 remove the pump cover located in the left side of the floor opening.
- d. Disconnect the electrical lead from the pump.
- e. Disconnect the inlet and outlet lines from the pump.
- f. Remove the pump by removing the pump attachment bolts.
- g. Reinstall the fuel pump in reverse of removal instructions.

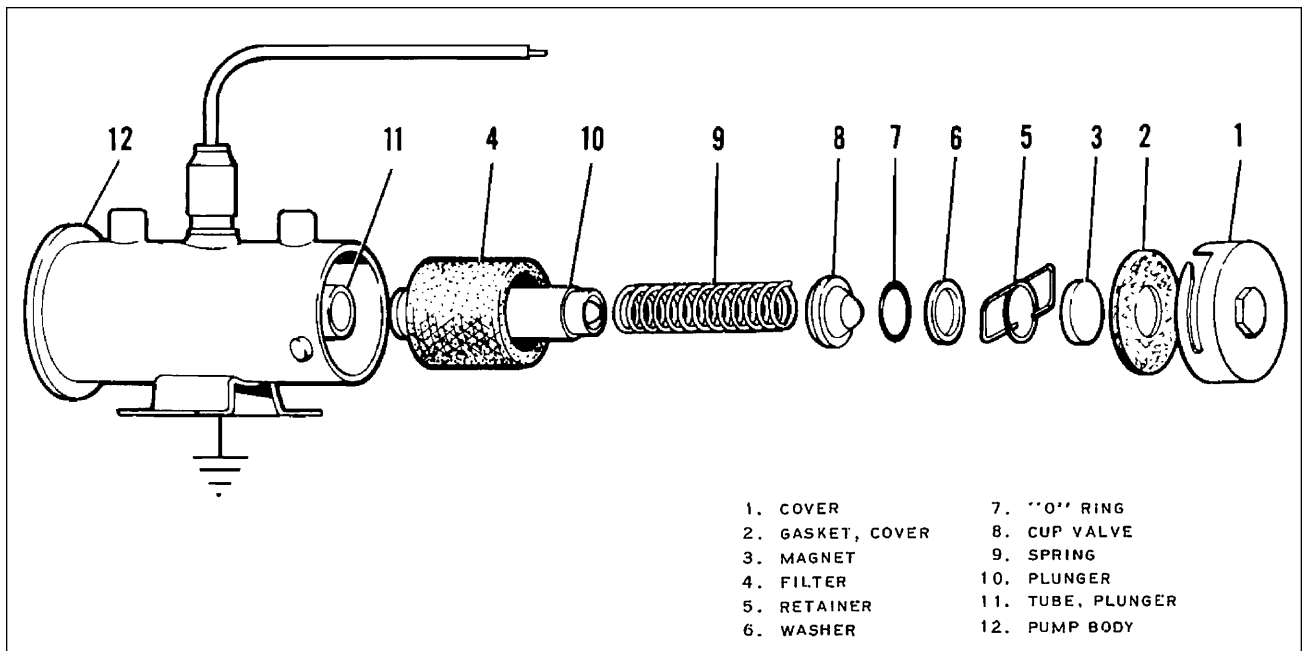


Figure 8-7. Pulsate (Plunger) Fuel Pump

8-26. CLEANING ELECTRIC FUEL PUMP SCREEN ([PA-32-260](#)). (Refer to Figure 8-7.)

- a. Turn the fuel selector to the off position.
- b. Remove the floor panel that is located directly aft of the main spar by removing the center seats, seat belt attachments and screws that secure the panel. Lift the panel and remove it from the airplane.
- c. Remove the cover of the fuel pump box located in the left side of the opening.
- d. Remove the safety wire that secures the cover (1) on the pump.
- e. Turn the cover on the pump in a counterclockwise direction and remove.
- f. Usually the fuel pump filter (4) comes off with the fuel pump cover, although it may stick inside the fuel pump. Carefully remove the filter and rinse it in acetone, gasoline or kerosene to thoroughly clean it. If the gasket (2) is badly compressed or damaged, replace it.
- g. Clean the fuel pump cover and magnet (3) in the same manner as the screen.
- h. Replace the fuel pump filter, gasket and cover. Secure the cover with safety wire.

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TABLE VIII-III. TROUBLESHOOTING - FUEL SYSTEM

| Trouble | Cause | Remedy |
|---------------------------------------|---|---|
| Failure of fuel to flow. | Fuel line blocked. | Flush fuel system. |
| | Fuel vent cap blocked. | Check and clean vent hole in cap. |
| | Mechanical or electrical fuel pump failure. | Check and replace if necessary. |
| | Fuel selector valve in improper position. | Reposition as required. |
| | Damaged fuel selector valve. | Check for obstructions in the fuel selector leverage mechanism. Replace fuel selector valve. |
| Fuel quantity gauge fails to operate. | Broken wire. | Check and repair. |
| | Gauge inoperative. | Replace gauge. |
| | Fuel sender float partially or completely filled with fuel. | Replace sender. |
| | Circuit breaker open. | Check and reset. |
| | Float and arm assembly of fuel sender sticking. | Check. |
| | Bad ground. | Check for good contact at ground lip or rear of gauge. |
| No fuel pressure indication. | Fuel selector valve stuck. | Check fuel selector valve. |
| | Fuel tanks empty. | Check fuel tanks and fill. |
| | Defective gauge. | Replace gauge. |
| | Fuel selector valve in improper position. | Reposition fuel selector valve lever. |
| Low pressure or pressure surges. | Obstruction in inlet side of pump. | Trace lines and |
| | Air in line to pressure gauge. | Bleed line. |

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TABLE VIII-III. TROUBLESHOOTING - FUEL SYSTEM (cont.)

| Trouble | Cause | Remedy |
|---|------------------|---------------------|
| CAUTION: DO NOT TIGHTEN SENDER UNIT TERMINAL SCREW IN AN ATTEMPT TO STOP LEAK. | | |
| Fuel sender leaks through the sender unit terminal screw in PA-32-260/300 airplanes. | Bad sender unit. | Replace sender unit |