

DESCRIPTION

FUEL AND VACUUM PUMP

All models are equipped with a combination fuel and double acting vacuum pump operated by an eccentric bolted to the front end of the engine camshaft.

FUEL SECTION (FIG. 6B-105)

The fuel pump draws gasoline from the tank and supplies it to the carburetor in sufficient quantity to meet engine requirements at any speed or load.

The rocker arm spring keeps the rocker arm in constant engagement with the eccentric on the engine camshaft so that the rocker arm moves downward and upward as the camshaft rotates. As the rocker arm is moved downward it bears against the link which is also pivoted on the rocker arm pin. The long end of the link is hooked to the diaphragm pull rod so diaphragm is moved away from fuel chamber and the diaphragm spring is compressed. The enlarging fuel chamber moves gasoline from the tank through the tubing, inlet valve and into the space below the diaphragm.

As the rotating eccentric permits the rocker arm to move away from contact with the link, the compressed diaphragm spring is free to move the diaphragm downward to expel the fuel through the outlet valve to the carburetor bowl.

Because the diaphragm is moved downward only by the diaphragm spring, the pump delivers fuel to the carburetor only when the pressure in the outlet line is less than the pressure maintained by the diaphragm spring. Fuel is delivered to the carburetor only when the needle valve is open. When the needle valve is closed by pressure of fuel on the float, the pump builds up pressure in the space below the diaphragm and in the outlet tube until the diaphragm spring is compressed. The diaphragm remains in a stationary condition until more fuel is required. Normal diaphragm stroke is about $\frac{1}{16}$ ".

VACUUM SECTION

The vacuum section acts as a booster when engine manifold vacuum is insufficient to operate the windshield wipers at adequate speed. This section is a double acting pump since air is displaced on both upward and downward movement of the diaphragm.

As the rocker arm is moved downward by pressure from the high point of the eccentric, it bears against the double links which are also pivoted on the rocker arm pin bushing. The long end of the channel link is hooked to the diaphragm so the rocker arm movement results in upward motion of the vacuum diaphragm. The diaphragm movement compresses the diaphragm spring and exhausts air from the upper chamber to the intake manifold. With this same stroke the lower diaphragm chamber is enlarged thus drawing air from the windshield wiper.

As the rotating eccentric permits the rocker arm to move away from contact with the links, the compressed diaphragm spring is free to move the diaphragm downward. This diaphragm stroke exhausts air from the lower chamber, through the valve that opens into the pump body, into the engine crankcase. This same stroke draws air from the windshield wiper into the expanded area above the diaphragm.

When the windshield wiper control valve is closed, or engine vacuum is sufficient to operate the wiper, vacuum holds the diaphragm near the center of its stroke so that very little movement occurs.

FUEL AND VACUUM PUMP— REMOVE AND REPLACE

REMOVE

1. Disconnect battery cables and remove battery.
2. Disconnect fuel lines from fittings at pump.
3. Remove pump body attaching screws.
4. Lower pump and remove vacuum lines from pipes on pump. Lift out pump and gasket.

REPLACE

1. If new pump is being installed remove fittings from old pump and install on new.
2. Using a new gasket install pump with two attaching screws. NOTE: To insure that rocker arm is in its proper position beneath the camshaft eccentric, tip top of pump in as it is being positioned. Pump is installed more easily with engine rotated to number six cylinder on ignition.
3. Replace vacuum lines on vacuum pipes.
4. Connect fuel lines to fittings on pump.
5. Install battery and connect cables.

FUEL PUMP—OVERHAUL

FUEL PUMP—DISASSEMBLY (FIG. 6B-105)

1. Scratch locating marks on fuel cover and pump body so that inlets and outlets will be properly located when pump is reassembled.
2. Remove screws and washers holding fuel cover to pump body and remove cover.
3. Place pump rocker arm in soft jawed vise so that vacuum side is up and remove all vacuum

cover screws except any two that are diametrically opposite.

4. Press down firmly on the vacuum cover to hold the heavy vacuum diaphragm spring compressed and remove the remaining two screws. Release the vacuum cover slowly and remove cover assembly, diaphragm spring and spring retainer. NOTE: If desired, two 10-32NF x 1½" screws may be screwed diametrically opposite into the cover to aid in relieving the diaphragm spring pressure when removing the cover.

5. Lift vacuum diaphragm and remove vacuum valve from body under diaphragm at rocker arm side.

6. Remove pump from vise.

7. Remove vacuum pump diaphragm by unhooking diaphragm pull rod from link. This can best be done by extending vacuum diaphragm and tilting towards rocker arm while rolling the pull rod off the link.

8. Disengage fuel diaphragm pull rod from link and remove fuel pump diaphragm, spring and retainer.

9. If pump requires replacement of rocker arm bushing, pin, fuel or vacuum links, disassemble as follows:

- a. Use a ⅜" or slightly larger drill or a file to remove the portion of the rocker arm pin which is upset over pin washer.
- b. Drive out pin using a long tapered drift.
- c. Remove rocker arm, rocker arm spring and links from pump body.
- d. To disassemble rocker arm assembly, remove bushing from rocker arm and slide out vacuum links, fuel link, link spacer and washers. NOTE: There may be one or two link washers.

10. If diaphragm pull rod seals are torn or exhibit signs of wear they must be replaced. Use a small chisel, round file, or small grinding wheel to remove metal displaced by staking operation and pull seals out of body with hook shaped tool. Use care not to damage seal seats.

11. Inspect valves in fuel and vacuum covers. If worn or damaged remove metal displaced by staking operation and pry valves and cages out with screw driver blade. Lift out gaskets.

12. Remove plug over inlet valve in fuel cover and remove gasket and screen.

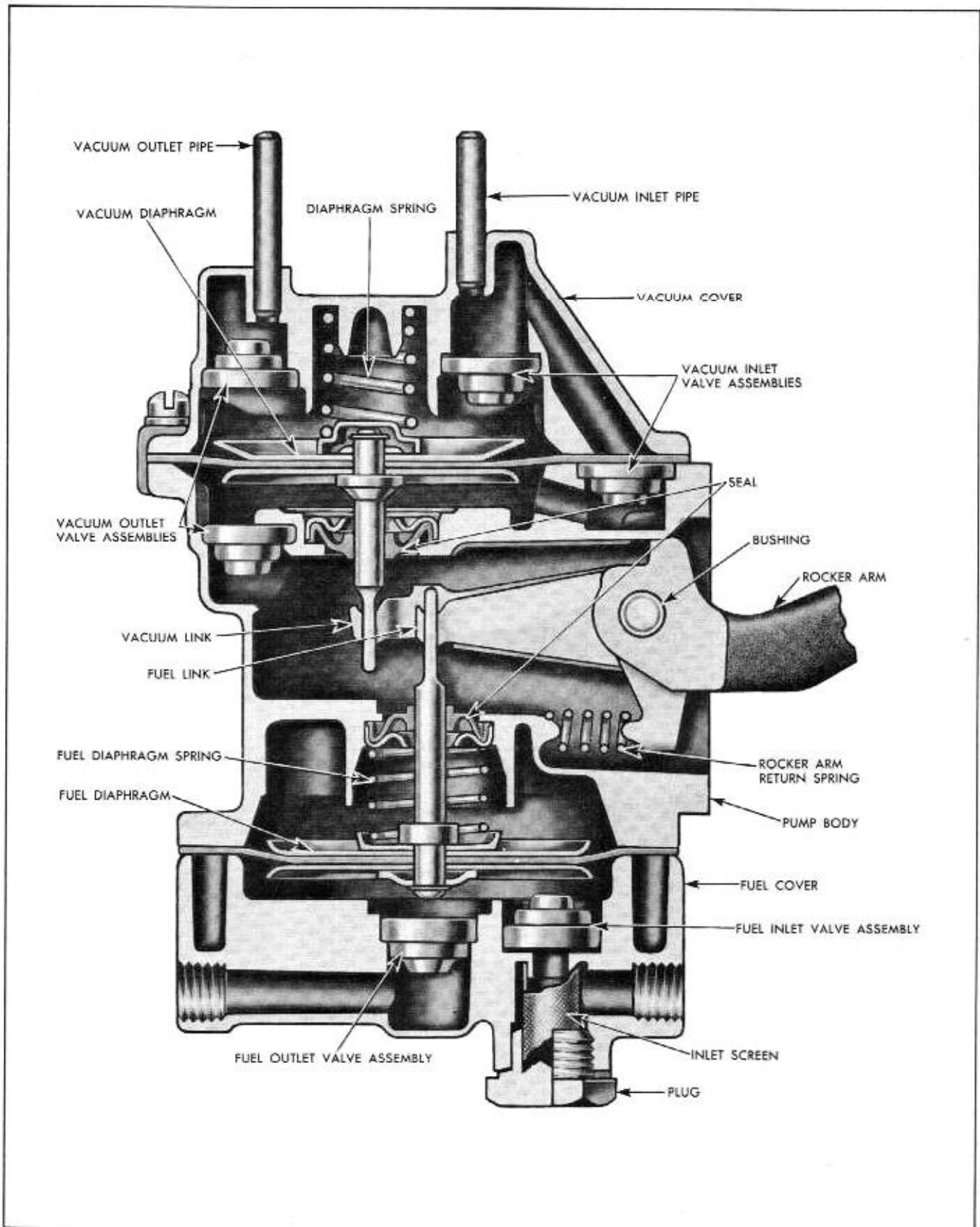


Fig. 6B-105 Schematic View of Combination Fuel and Vacuum Pump

FUEL PUMP—CLEAN AND INSPECT

1. Clean and rinse all metal parts in solvent. Blow out all passages with air hose.
2. Inspect pump body, fuel cover, and vacuum cover for cracks, breakage and distorted flanges. Examine all screw holes for stripped or crossed threads. If any of these three parts are damaged or if pressed in vacuum pipes in vacuum cover are bent or loose the pump should be replaced.
3. Inspect rocker arm for wear or scoring at camshaft pad, at point of contact with links, and at pivot hole. Inspect bushing for wear.
4. Inspect fuel and vacuum diaphragm for signs of wear. Inspect all valves and cage assemblies.
5. Inspect rocker arm and diaphragm spring for distortion, weakness or corrosion.
6. Clean and inspect intake screen.

FUEL PUMP—ASSEMBLE

1. Install seals by placing seal and retainer in pull rod recess of pump body with rubber end down toward links and press down firmly with flat end of $\frac{1}{8}$ " diameter round bar.
2. Stake die cast lip in four places to retain seals.
3. If rocker arm was removed from pump body proceed as follows:
 - a. Assemble link spacer over fuel link.
 - b. Place one vacuum link on each side of the fuel link. The hook ends of the vacuum link should come together so that they surround the fuel link. All link hooks should point in the same direction.
 - c. Place assembly of links and spacer between lobes of rocker arm with one spacer washer on the outer side of each vacuum link.
 - d. Slide rocker arm bushing through hole in rocker arm, spacer washer, and links.
 - e. Position the pump body with the fuel flange down; set rocker arm spring in position with one end over cone cast into the body.
 - f. Slide rocker arm and link assembly into body. Outer end of rocker arm spring clips over projection on link spacer, and the open end of all hooks must point toward vacuum flange.
 - g. Slide pin through bushing and install flat washer on small end. Peen over end of pin to retain in position.

4. Install gaskets and vacuum valves in vacuum cover. After pressing down to accomplish seal against gasket, stake valves in position. **NOTE:** Do not install inlet valve in pump body until diaphragm is installed.

5. Install gaskets and fuel valves in fuel cover.

6. Soak fuel diaphragm in clean kerosene. Fuel oil may be used, but do not use shellac or sealing compound.

7. Place pump body on bench with fuel flange up. Set the diaphragm spring on the staked-in seal and the retainer on top of the spring. Push diaphragm pull rod through retainer, spring, and oil seal. Flat of pull rod must be at right angle to fuel link. Hook diaphragm pull rod to short center fuel link. **CAUTION:** Extreme care must be used when inserting diaphragm push rod through seal to prevent damage to seal.

8. Install fuel cover on body making sure that scratch marks on cover and body line up. Push on rocker arm until diaphragm is flat across body flange. Install cover screws and lockwashers loosely until screws just engage lockwashers. Push rocker arm through its full stroke and hold in that position while tightening cover screws securely. **NOTE:** Diaphragm must be flexed before tightening cover screws or pump will deliver too much pressure.

9. Soak vacuum diaphragm in clean kerosene. Fuel oil may be used but do not use shellac or sealing compound.

10. Raise vacuum link by pushing in on rocker arm. Push vacuum diaphragm pull rod through oil seal and hook to links. **CAUTION:** Be extremely careful when inserting diaphragm push rod through seal to avoid damaging seal.

11. Lift diaphragm cloth and position valve and cage in recess close to mounting flange. No gasket is required because the diaphragm seals the valve cage.

12. Before installing vacuum cover, rocker arm must be positioned so that vacuum diaphragm will be held level with the body flange while the vacuum cover is installed. This can be done by inserting a $\frac{3}{32}$ inch piece of metal between rocker arm stop and body. This tool can be made from a piece of steel $\frac{3}{16}$ " x $\frac{3}{32}$ " x 6". Bend one end to form a right angle $\frac{3}{8}$ " from bend to end.

13. Place spring retainer on riveted end of diaphragm pull rod and place the diaphragm spring on the retainer. Place vacuum cover over spring and align holes.

14. Press vacuum cover firmly down against diaphragm and body flange and install two screws diametrically opposite. (Two 10-32NF x 1½" screws may be installed to pull vacuum cover down.) Install remaining vacuum cover screws and tighten until screws just engage lockwasher.

15. Release rocker arm to allow heavy vacuum spring to push diaphragm to flexing stop in body. Tighten all cover screws securely.

TROUBLE DIAGNOSIS AND TESTING

FUEL PUMP INSPECTION AND TEST

Always check pump while it is mounted on the engine and be sure there is gasoline in the tank.

The line from the tank to the pump is the suction side of the system and the line from the pump to the carburetor is the pressure side of the system. A leak on the pressure side, therefore, would be made apparent by dripping fuel, but a leak on the suction would not be apparent except for its effect of reducing volume of fuel on the pressure side.

1. Tighten any loose line connections and look for bends or kinks in lines which would reduce fuel flow.

2. Tighten diaphragm flange screws.

3. Disconnect fuel pipe at carburetor. Disconnect distributor to coil primary wire so that engine can be cranked without firing. Place suitable container at end of pipe and crank engine a few revolutions. If little or no gasoline flows from open end of pipe then fuel pipe is clogged or pump is inoperative. Before removing pump disconnect fuel pipe at inlet of pump and at gas tank and outlet pipe and blow through them with an air hose to make sure they are clear. Reconnect pipes to pump and retest while cranking engine.

4. If fuel flows from pump in good volume from pipe at carburetor, check fuel delivery pressure to be certain that pump is operating within specified limits as follows:

- a. Attach a fuel pump pressure test gauge to disconnected end of pump to carburetor pipe.

- b. Run engine at approximately 450 and 1,000 R.P.M. on gasoline in carburetor bowl and note reading on pressure gauge.

- c. If pump is operating properly the pressure will be 4 to 5 pounds and will remain constant at speeds between 450 and 1,000 R.P.M. If pressure is too low or too high, or varies materially at different speeds, the pump should be removed for replacement.

VACUUM SECTION INSPECTION AND TEST

Test the vacuum section of the pump by fully opening the windshield wiper valve and observe wiper blade speed while alternately idling and accelerating the engine. Wiper blade speed should be fairly constant regardless of engine speed or throttle opening. **NOTE THAT A DRY WINDSHIELD WILL SLOW WIPER SPEED.** If windshield wiper does not operate properly make the following inspection and test.

1. Make certain that wiper hoses are properly connected at pump, wiper motor and control at instrument panel and that connections are air tight. Replace cracked or deteriorated hose.

2. If windshield wiper does not operate properly after all points of leakage have been corrected, detach both pipes at vacuum pump and join them with a piece of tubing. *Slowly* operate engine from idle to about 1000 RPM; the wiper should run at full speed operating on engine vacuum only. If it does not, it can be assumed that the wiper motor or tubing is defective. The pump vacuum section is inoperative if the windshield wiper operated properly on engine vacuum, but not on pump vacuum.

3. A further test of vacuum pump may be made by attaching a vacuum gauge to the inlet port (port connected to wiper motor) with outlet pipe disconnected. **CAUTION:** Always make this test of vacuum pump with outlet open.

4. With engine operating at 750 RPM the gauge should show 7 to 12 inches of vacuum. Less than 7 inches of vacuum indicates an inoperative vacuum pump.