

DASH GAUGES

not connected to ignition side of dash unit.

4. Turn ignition on momentarily. If dash unit fails to register, then the dash unit is defective.
5. A defective engine unit or wiring may have damaged the dash unit. After installing a new dash unit, observe its action after turning ignition on momentarily. If the indicator moves beyond the point of normal oil pressure, the engine unit or wiring is defective and must be checked.

AMMETERS

Automotive ammeters indicate direction of current flow (charge or discharge) and the relative amount of current flow. The center point of the dial, Fig. 19, is the point of zero current flow and the two extremes of pointer travel indicate maximum charge and discharge. Therefore, the indicator must not be read for the amount of current charge or discharge but only for charge condition of the generating system.

The typical ammeter consists of a frame to which is attached a permanent magnet. The frame also supports an armature and pointer assembly. When no current flows through the ammeter, the magnet holds the pointer armature so that the pointer stands in the center of the dial. When current passes in either direction through the ammeter, the resulting field attracts the armature away from the affect of the permanent magnet, thus giving a reading proportional to the current strength.

Service

When the ammeter apparently fails to register correctly, there may be trouble in the wiring which connects the ammeter to the generator and battery, or in the generator and battery themselves. There are only a few simple things to check in order to find the cause:

1. Loose connections on the back of the ammeter.
2. Loose connections at the back of the ignition switch, or at the battery. (Ammeters are not grounded to the instrument panel.)
3. Spots on the wiring where the insulation has been chafed, burned or broken.

To check the connections, first tighten the two binding posts on the back of the ammeter. Then, following each wire from the ammeter, tighten all connec-

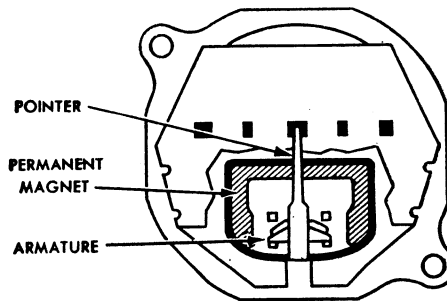


Fig. 19 Drawing of a typical ammeter or battery charge indicator

tions on the ignition switch, battery and generator. Chafed, burned or broken insulation can be found by following each ammeter wire from end to end.

After checking and repairing the wiring, tighten all connections and turn the ignition switch on. The pointer should point to the discharge side of the dial slightly. Start the engine and speed it up to about 30 mph. The pointer should then move to the charge side of the dial and its movement should be smooth.

If the pointer does not behave correctly the ammeter itself is out of order and must be replaced with a new one.

SPEEDOMETERS

The following material covers only that service on speedometers which is feasible to perform by the average service man. Repairs on the units themselves are not included as they require special tools and extreme care when making repairs and adjustments and only an experienced speedometer mechanic should attempt such servicing.

The speedometer has two main parts—the indicating head and the speedometer drive cable. When the speedometer fails to indicate speed or mileage, the cable or cable housing is probably broken.

Speedometer Cable

Most cables are broken due to lack of lubrication, or a sharp bend or kink in the housing.

A cable might break because the speedometer head mechanism binds. If such is the case, the speedometer head should be repaired or replaced before a new cable or housing is installed.

A "jumpy" pointer condition, together

with a sort of scraping noise, is due, in most instances, to a dry or kinked speedometer cable. The kinked cable rubs on the housing and winds up, slowing down the pointer. The cable then unwinds and the pointer "jumps."

To check for kinks, remove the cable, lay it on a flat surface and twist one end with the fingers. If it turns over smoothly the cable is not kinked. But if part of the cable flops over as it is twisted, the cable is kinked and should be replaced.

Lubrication

The speedometer cable should be lubricated with special cable lubricant every 10,000 miles. At the same time, put a few drops of the lubricant on the wick in the speedometer head.

Fill the ferrule on the upper end of the housing with the cable lubricant. Insert the cable in the housing, starting at the upper end. Turn the cable around carefully while feeding it into the housing. Repeat filling the ferrule except for the last six inches of cable. Too much lubricant at this point may cause the lubricant to work into the indicating head.

Installing Cable

During installation, if the cable sticks when inserted in the housing and will not go through, the housing is damaged inside or kinked. Be sure to check the housing from one end to the other. Straighten any sharp bends by relocating clamps or elbows. Replace housing if it is badly kinked or broken. Position the cable and housing so that they lead into the head as straight as possible.

Check the new cable for kinks before installing it. Use wide, sweeping, gradual curves where the cable comes out of the transmission and connects to the head so the cable will not be damaged during its installation.

Arrange the housing so it does not lean against the cylinder head because heat from the engine may dry out the lubricant.

If inspection indicates that the cable and housing are in good condition, yet pointer action is erratic, check the speedometer head for possible binding.

The speedometer drive pinion should also be checked. If the pinion is dry or its teeth are stripped, the speedometer may not register properly.

The transmission mainshaft nut must be tight or the speedometer drive gear may slip on the mainshaft and cause slow speed readings.

FUEL PUMPS

AC FUEL PUMPS

Using Fig. 1 as an example, all AC mechanical fuel pumps operate as follows:

1. The cam on the engine camshaft forces the rocker arm outward,

which, through the linkage and pull rod, moves the diaphragm on its down stroke.

2. The downward movement of the diaphragm creates a vacuum in the fuel chamber of the pump which sucks fuel from the gasoline tank.
3. The diaphragm spring then pushes

the diaphragm upward on a pressure stroke, which forces the contents of the fuel chamber into the carburetor bowl.

4. The flow of fuel from the pump is controlled by the carburetor float. The float opens and closes the float needle valve which builds up or re-

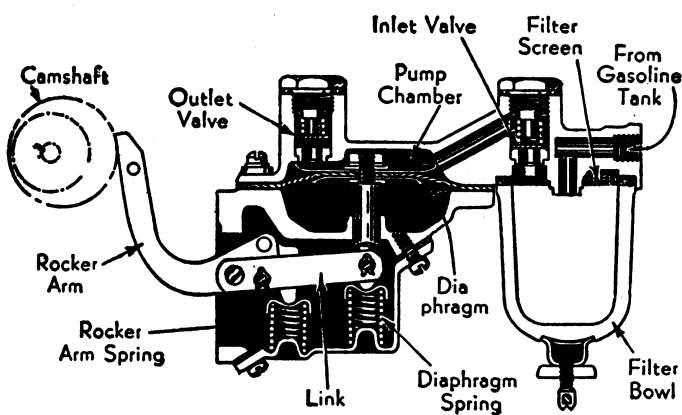


Fig. 1 Series B fuel pump. Design typical of series D

duces pressure in the pump fuel chamber. As pressure is built up in the fuel chamber, it prevents the diaphragm from taking a complete stroke, thus reducing fuel flow. As pressure reduces in the fuel chamber, it allows the diaphragm to take longer strokes, thus increasing fuel flow.

Fig. 2 shows a typical combination fuel and vacuum pump, the vacuum section being used as a booster for windshield wiper operation. The operation of the vacuum pump is as follows:

1. Rotation of the camshaft eccentric actuates the rocker arm. This pushes the vacuum diaphragm downward, expelling the air in the chamber through the discharge valve and into the intake manifold of the engine.
2. On the return stroke of the rocker arm, the diaphragm moves upward, creating a vacuum in the chamber which opens the inlet valve, drawing air from the windshield wiper.
3. When the windshield wiper is not being used, manifold vacuum holds the diaphragm downward against spring pressure so that the diaphragm does not make a complete stroke for every stroke of the rocker arm.
4. When manifold vacuum is greater than the vacuum created by the pump, the air will flow from the windshield wiper through both valves, and the operation of the wiper will be the same as if the vacuum pump were not installed.
5. When manifold vacuum is low, that is, when the engine is accelerating or operating at high speed, the vacuum created by the pump will be greater and will operate the wiper.

Trouble Diagnosis

Fuel pump trouble is of only two kinds. Either the pump is supplying too little fuel, or too much. If the pump is supplying too little fuel, the engine will either not run at all, or it will cough or falter. If the pump is supplying too much fuel, gasoline will drip from the carburetor, or the engine will not run smoothly when idling. Too much fuel will also produce hard starting.

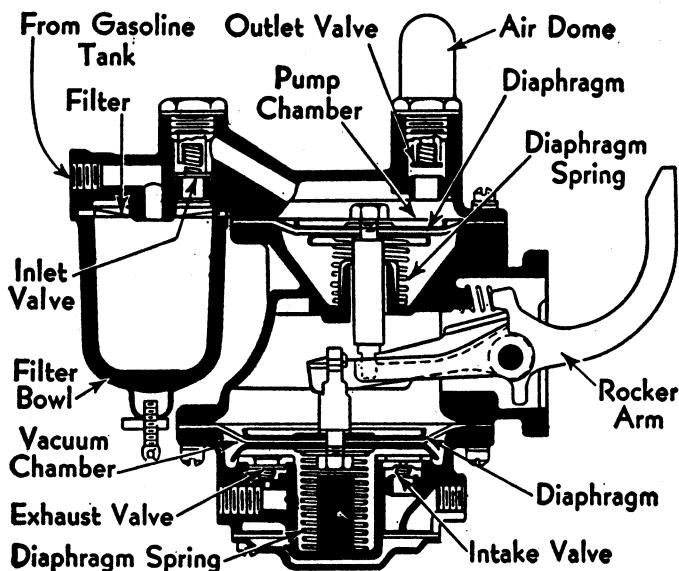


Fig. 2 Series AB fuel and vacuum pump. Design typical of series AD, AL, F, I and J

Fuel pumps may be tested with an analyzer which discloses fuel pump pressure and rate of flow, or it may be tested for pressure by connecting a gauge of the type shown in Fig. 3, the test being made while the engine is running. In the absence of this equipment, do not remove the pump from the engine until the following points have been checked.

If the engine is getting too little fuel, proceed as follows:

Be sure there is gasoline in the tank. Disconnect the fuel line at the carburetor or at the pump, whichever is easier to reach. Then, with the ignition shut off, crank the engine with the starter. If gas spurts from the pump, the trouble is not in the pump, lines or tank.

If no gas flows at all or if only a little gas flows, do the following:

1. Look for leaky bowl gasket. If not sure, replace gasket.

2. Remove and clean the strainer or screen which is inside the bowl.
3. Look for loose fuel line connections. Check all the way back to the tank. Tighten all connections.
4. Blow out all lines to remove any restrictions.
5. Make sure all pump cover screws are tight, and see that external plugs over pump valves are tight.
6. Inspect flexible line (if used) for breaks or porous condition.
7. If pump to engine gasket is too thick, pump pressure will be too low.

If correction of the above items fail to restore the pump to operating condition, it should be removed for replacement or overhaul.

If the engine is getting too much fuel, the trouble is more than likely caused by one of the following: (a) defective automatic choke (b) excessive use of hand choke, (c) punctured carburetor float, (d) defective carburetor needle valve, (e) loosely connected fuel line or loose carburetor assembly screws, (f) improper carburetor adjustment, (g) if pump to engine gasket is too thin, pump pressure will be too high.

If none of the above items is the cause of flooding or poor gasoline mileage, then the pump needs overhauling.

Vacuum Pump Troubles

If the windshield wiper is slow acting at high speed, it indicates an inoperative vacuum pump. Check the lines to the wiper. If the trouble is not in the lines, disassemble the vacuum pump and examine the valves and diaphragm.

If vacuum pump operation is noisy, it generally indicates either a worn or improperly installed oil seal or a worn vacuum pump link and rocker arm pin.

High gasoline pressure and noise indicates that the fuel pump is striking the vacuum pump diaphragm. This can be corrected by replacing the rocker

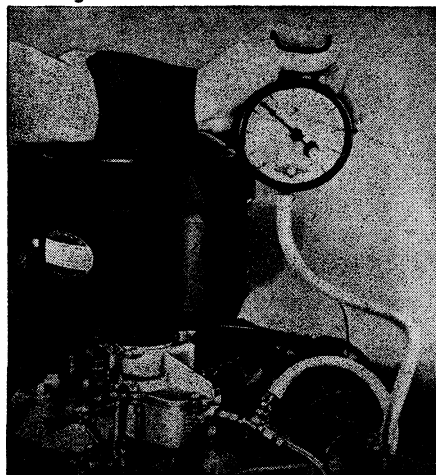


Fig. 3 Testing fuel pump pressure

FUEL PUMPS

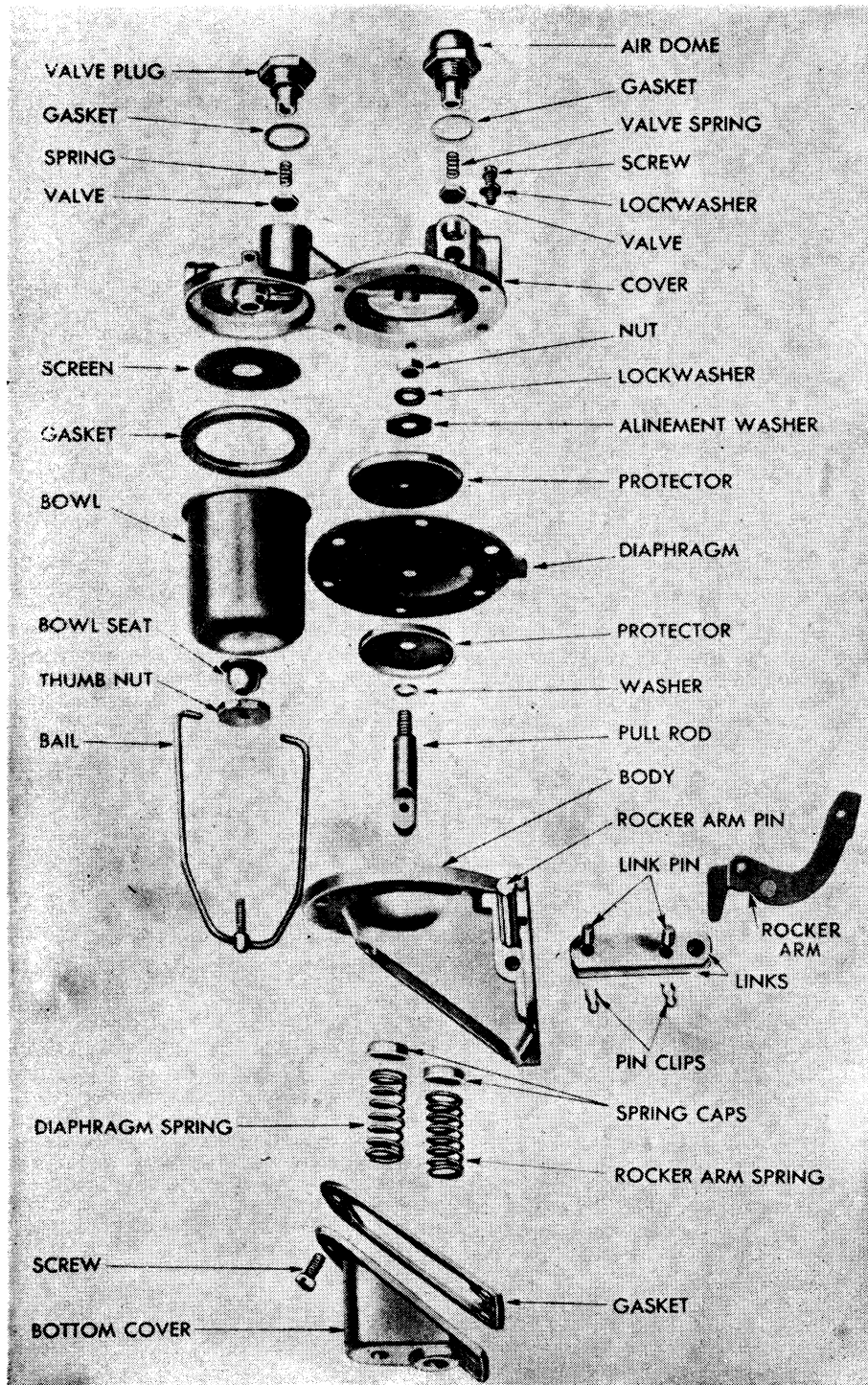


Fig. 4 Fuel pump disassembled. Typical series B construction

arm pin and vacuum pump link.

If the vacuum pump diaphragm is punctured, oil is drawn from the crankcase, causing high oil consumption and ignition miss due to fouled plugs. A small hole in the diaphragm, when first encountered, may be indicated by a partial miss on the two cylinders adjacent to the spot where the vacuum line taps into the manifold. This condition may be checked by the action of the windshield wiper upon acceleration, or by

disconnecting the line on the manifold side of the vacuum pump to inspect for oil leakage.

Noisy operation or failure of the diaphragm may also indicate that it is either too taut, or too slack, which will be evident if the diaphragm is wrinkled.

Service Procedure

A good working knowledge of the three pumps described in the following

paragraphs will furnish a good background for servicing all AC fuel and vacuum pumps.

Models B and R are representative of what is known as "single pumps"—which means that they pump nothing but fuel. The AJ pump, known as a "combination fuel and vacuum pump", not only pumps fuel but it also creates a vacuum which helps keep the windshield wiper operating.

Fig. 4 is an exploded view of Model B, while Fig. 5 is that of Model AJ.

Do not attempt to overhaul fuel pumps unless you have a set of special tools designed for the purpose. If your equipment is not adequate, install a new or rebuilt pump, the latter being available on an exchange basis.

Most pumps are identified by stamping the last four digits of the part number on the edge of the mounting flange. To identify the pump, convert these digits to the factory number by referring to the following key:

(152)1000 to (152)3999
 (559)4000 to (559)4999
 (85)5000 to (85)6999
 (153)7000 to (153)9999

Some high production pumps are identified by the complete part number cast in the body, under the diaphragm flange.

Service Note

B series pump repair procedure can also be used as a guide for Series D and O. And insofar as the body section is concerned, it may also be used as a reference in servicing S, AC, AG and AR pumps, while the cover section is typical of series P, W, Y and AK.

R series pump repair procedure may be used as a guide in servicing E, G, T, AF, AH, AT, AU and AW pumps. It may also be used in servicing the body on series P, W, Y and AK, and the cover on S, AC, AG and AR pumps.

Use the AJ instructions as a guide in repairing all combination pumps.

Pump Removal

Disconnect the fuel line between the carburetor and pump, and the line between the pump and gasoline tank. If it is a combination pump, disconnect both vacuum lines. Remove bolts and washers which hold the pump to the engine. On some installations, the pump is mounted on a bracket which, in turn, is bolted to the engine. In these cases, it is easier to remove the pump and bracket as a unit. Lift off the pump and gasket. Clean the pump in gasoline or other suitable solvent.

Pump Disassembly

Fuel pumps can be taken apart in any convenient manner but the following precautions should be observed.

Before taking a pump apart, always file a mark across diaphragm flanges, Figs. 6 and 7. These file marks will serve as a guide when reassembling so that the inlet and outlet holes will match the position of the fuel lines. If a heat shield stud is used, the file mark should

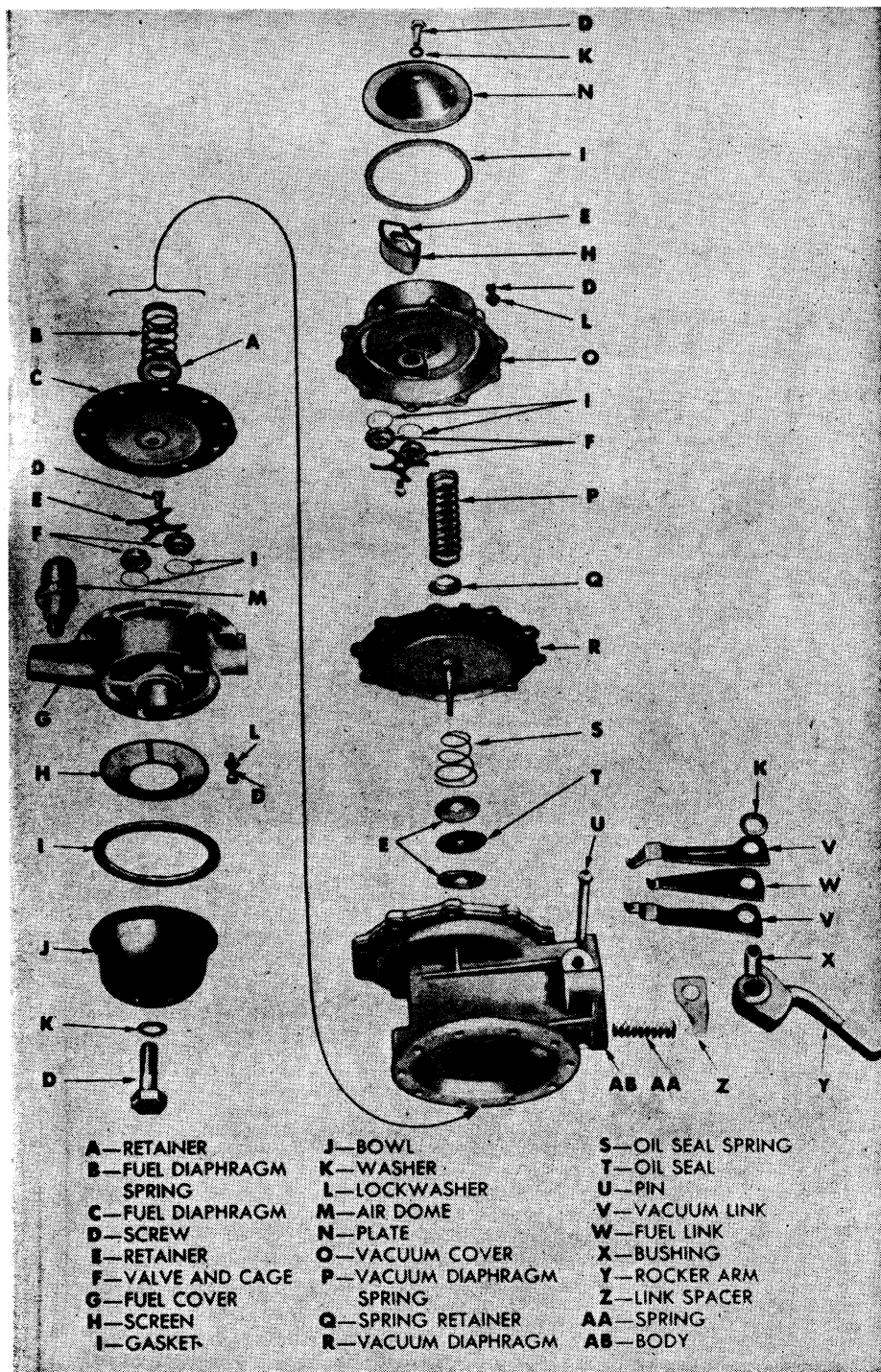


Fig. 5 Fuel and vacuum pump disassembled. Typical series AJ construction

be made at the stud position.

Fuel pumps with riveted diaphragm and pull rod assemblies, and the fuel section of combination pumps, usually have a tight fitting oil seal around the pull rod. The oil seal can be ruined by tipping the diaphragm while unhooking from the link. The safest method to follow is first to remove the rocker arm pin, rocker arm, and link. The diaphragm assembly can then be lifted straight out with no damage to the seal. This applies to pump series AH, AJ, AS, AT, AV and AW.

Service Note

B series pump diaphragm and rocker arm springs look alike but may have different pressures. Be sure to identify these springs for correct assembly. One method is to push a cover screw into the coils of the rocker arm spring.

Vacuum sections of combination pumps have a very strong diaphragm spring. Because of its strength, it is necessary to replace two opposite vacuum section diaphragm flange screws with two longer screws (1½ inches).

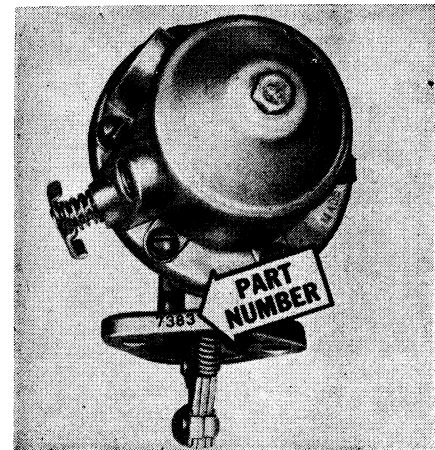


Fig. 6 Location of pump part number

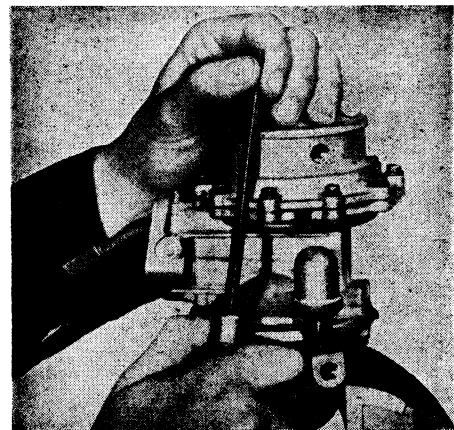


Fig. 7 File mark across flanges before disassembly

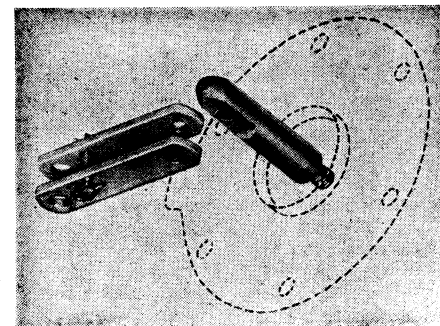


Fig. 8 Series B link and pin assembly

Then remove the standard screws and alternately back off the long screws until spring pressure is no longer effective.

ASSEMBLING B TYPE PUMPS

1. Assemble the two links, Fig. 8, with one link pin and clips.
2. Attach the two links to the pull rod with the other link pin and clips.

FUEL PUMPS

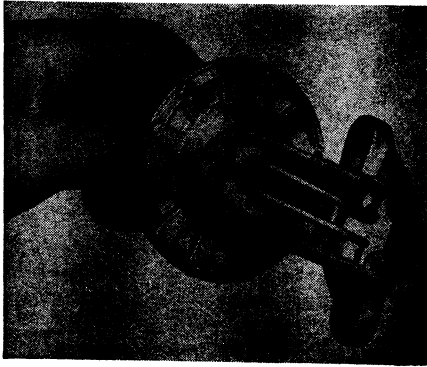


Fig. 9 Series B. Links placed in pump body

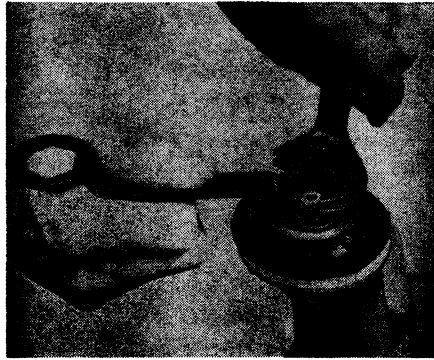


Fig. 12 Series B. Holding alignment washer with special wrench while tightening pull rod nut

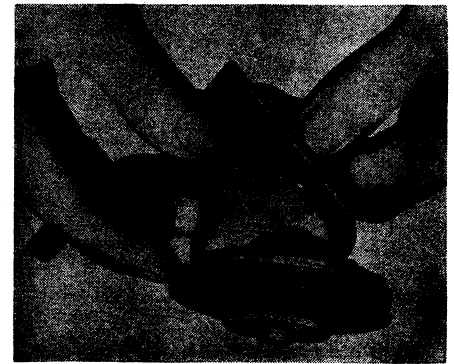


Fig. 14 Series B. Assembling lower cover to pump body

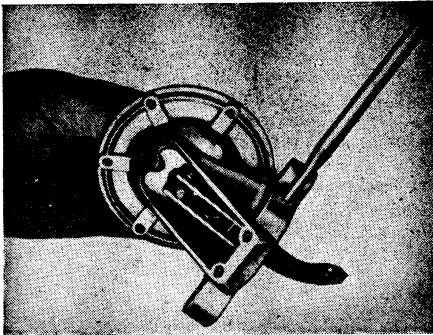


Fig. 10 Series B. Use of assembly pin

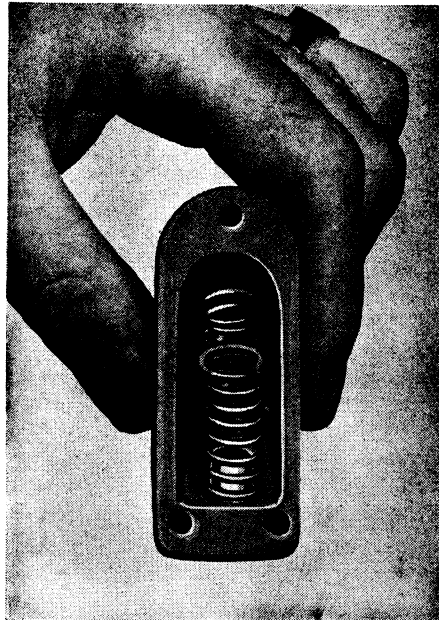


Fig. 13 Series B. Assembling springs in lower cover

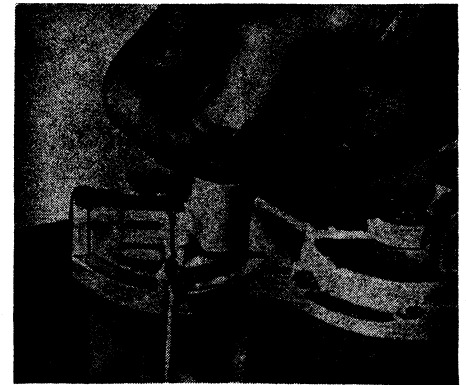


Fig. 15 Series B. Installing inlet valve

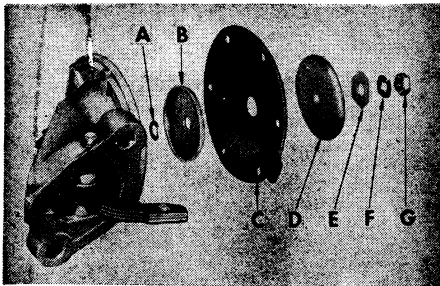


Fig. 11 Series B. Assemble diaphragm parts in following sequence: A. Pull rod gasket. B. Lower diaphragm protector. C. Fabric diaphragm. D. Upper diaphragm protector. E. Diaphragm alignment washer (six-sided). F. Lock washer. G. Diaphragm nut.

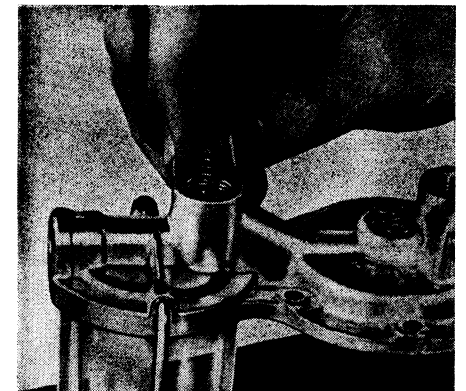


Fig. 16 Series B. Installing spring over inlet valve

- The cut off corner of each link should be nearest the diaphragm when the links are attached to the pull rod.
3. Install the assembly, Fig. 9, in the pump body, pushing the pull rod up through the hole provided for it. Be sure that the two links will swing to one side toward the rocker arm pin hole. This is necessary so that the rocker arm pin will pass through the holes at the ends of the links.
 4. Hold the pull rod in position and slip the rocker arm through the slot.

- Be sure that it slides in between the two links and that the projecting hook on it goes over the link pin.
5. Insert the small end of assembly pin, Fig. 10, through the body, link and rocker arm. Push assembly pin through so that large end is retaining link and arm in position.
 6. Maintain a slight pressure on the assembly pin while driving it out of the body with the permanent rocker arm pin.
 7. Peen the edges of the pin hole over both ends of the pin. If the rocker arm pin is of the kind having rings to hold it, slip the two spring rings into the grooves at each end of the pin. If the pin has a head on one end and a tapered, hollow end on the other, install a washer over the taper and spread the hollow part to retain in position.
 8. Install the parts of the diaphragm assembly over the threaded end of the pull rod in the order indicated in

- Fig. 11. The diaphragm should be dipped in kerosene to soften. It also acts as a lubricant between the layers of the diaphragm cloth. When installing the diaphragm fabric, be sure that the tab is in a position which will not interfere with the bowl.
9. Hold the hexagon alignment washer with the special wrench shown in Fig. 12 while tightening the pull rod nut. The alignment washer must be held stationary to avoid diaphragm distortion.
 10. Holding the lower cover in your



Fig. 17 Series B. Installing inlet valve chamber plug

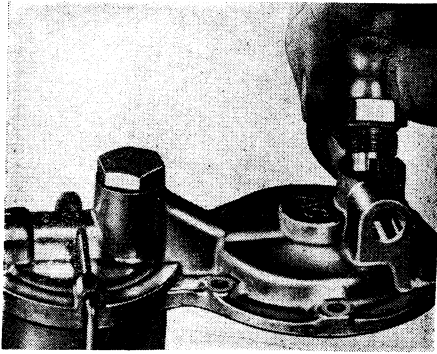


Fig. 18 Series B. Installing outlet valve chamber plug or air dome

hand, place the rocker arm spring and diaphragm spring over the bosses (hollow cones) on the inside of the cover, Fig. 13. Install the two spring caps over the ends of the springs with the rims down. Replace gasket on cover flange.

- Bring the lower cover and pump body together, Fig. 14, being sure that the cup of one cap fits around the end of the pull rod and the cup of the other fits around the end of the rocker arm. Install the cover screws and tighten securely.

Service Note

In assembling the top cover, if the brass valve seats are worn or damaged, new ones can be installed.

- Turn the top cover right side up. Put a drop of light oil on a new inlet valve and place the valve in the well or recess over the bowl, Fig. 15. Be sure the valve lies flat. Install a new outlet valve in its recess in the same manner.
- Place a new inlet valve coil spring, Fig. 16, on top of the inlet valve.
- Install the inlet valve chamber plug and a new gasket, Fig. 17, starting it with your fingers to be sure the

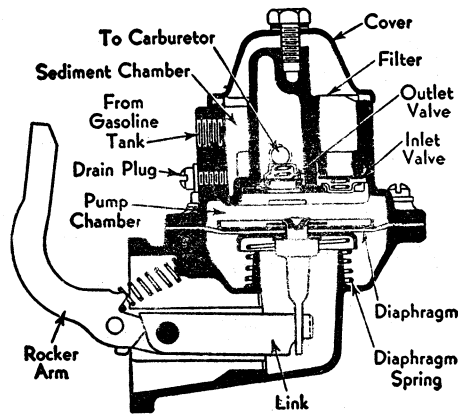


Fig. 19 Series R fuel pump

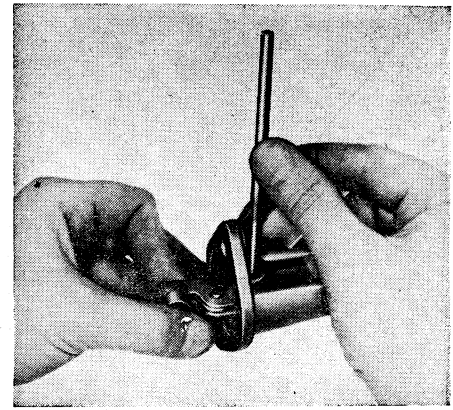


Fig. 22 Series R. Use of assembly pin to hold rocker arm and link in place

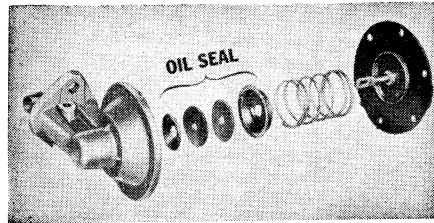


Fig. 20 Series R. Assembly sequence of oil seal when parts are separate

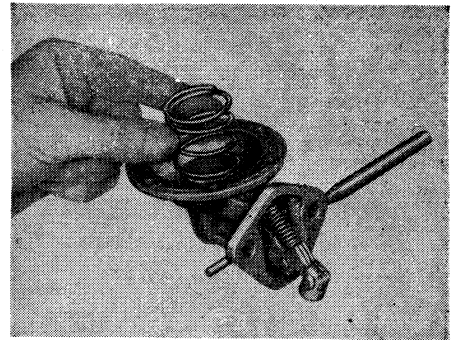


Fig. 23 Series R. Installing diaphragm spring

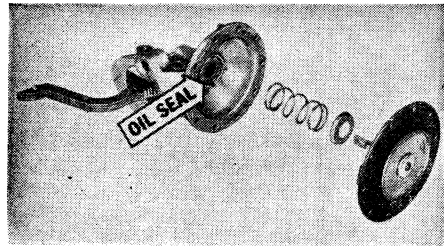


Fig. 21 Series R. Staked-in type oil seal

valve spring fits up into the pocket in the plug.

- Drop a new outlet valve coil spring down on top of the valve. Install the outlet valve chamber plug and a new gasket, in the same way you replaced the other plug. When an air dome is used, Fig. 18, it is always placed over the outlet valve.
- Put the body in a vise and line up the file marks which were made before the pump was dismantled. Level the diaphragm by moving the rocker arm. Hold it while you install all screws and washers finger tight. Be sure they pass through the holes in the diaphragm easily without chewing the fabric. Tighten the screws only enough so that they just touch the lock washers.
- Actuate the rocker arm several strokes, releasing with a snap. Then tighten the cover screws. Do this alternately, first a screw on one side, then a screw on the opposite side, repeating this until all screws are tightened securely.

Service Note

The most important single item in the repair of fuel pumps is to pull sufficient diaphragm cloth inside the pump to prevent stretching of the cloth when pump is placed in operation.

- When assembling the strainer, hold the pump upside down and replace the screen in the bowl recess. The screen must fit tightly around the inlet shoulder and its outside edges must be flat on the screen recess. Spring the bail into position in its retaining holes.
- Place a new bowl gasket in position. Clean the bowl thoroughly. Then put the bowl in place over the gasket and retain it with the bail.

ASSEMBLING R TYPE

Fig. 19 is a sectional view of series R pump. Bodies on fuel pumps of this general construction may be classed according to the type of oil seal around the diaphragm pull rod.

The oil seal shown in Fig. 20 is made up of a compression spring and two leather washers sandwiched between metal discs, the latter being keyed for locking over the pull rod flat. As a variant, you may find a cup-shaped rubber oil seal held in place by the diaphragm spring.

The oil seal in Fig. 21 is an integral part of the body. It has an important

FUEL PUMPS

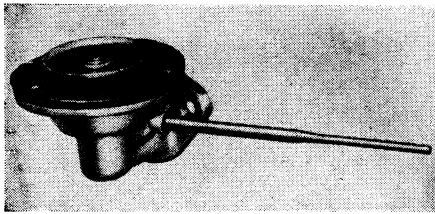


Fig. 24 Series R. Showing thick portion of assembly pin holding rocker arm and link in position

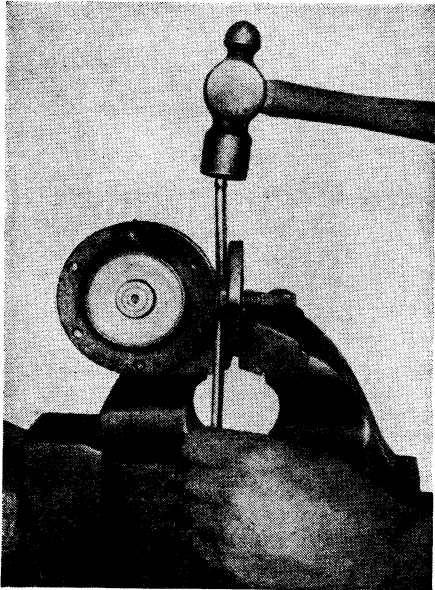


Fig. 25 Series R. Driving assembly pin out of body with permanent rocker arm pin

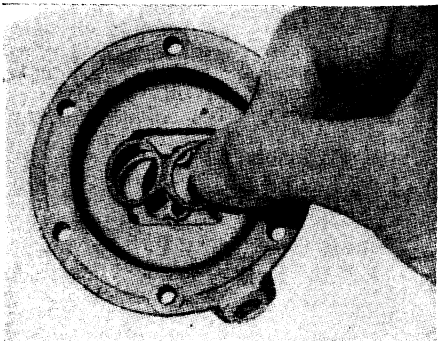


Fig. 26 Series R. Installing valve seat gaskets

function in preventing loss of crankcase oil. The body and oil seal assembly must be replaced if the seal is dried out or the fine leather edge is torn. On these bodies the diaphragm assembly must be installed correctly to avoid oil seal damage.

The following procedure is based on the required procedure for bodies with staked-in oil seals, Fig. 21.

1. Make an assembly of rocker arm and link. Retain with bushing, if one is used.

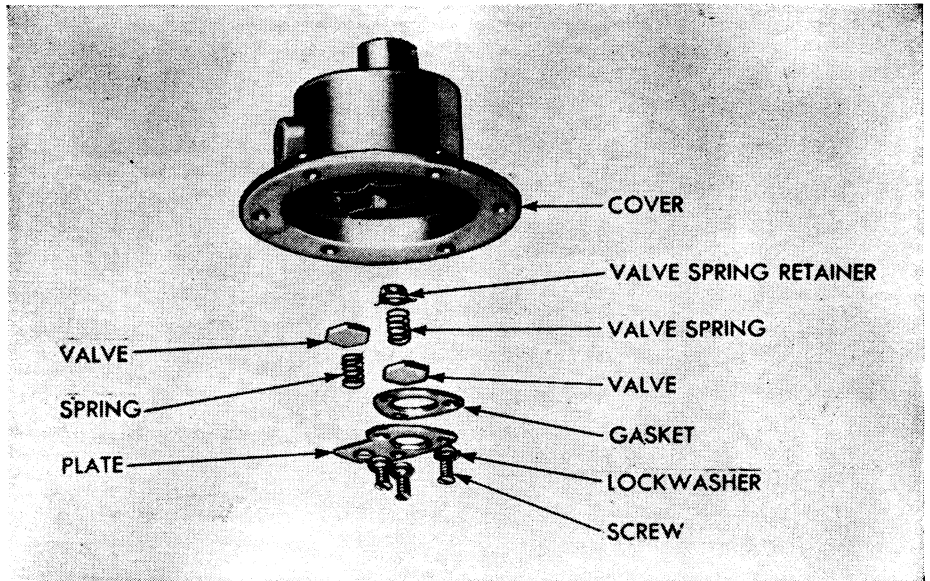


Fig. 27 Series R. If pump being serviced has separate valve parts, assemble in sequence shown

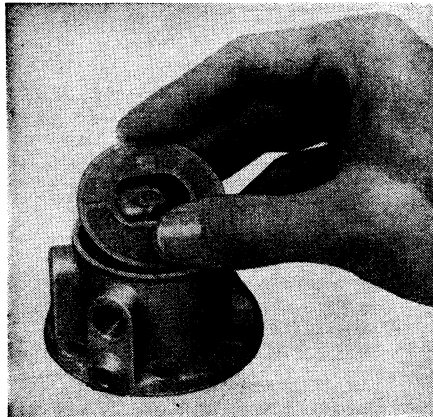


Fig. 28 Series R. Install screen with two metal projections facing you

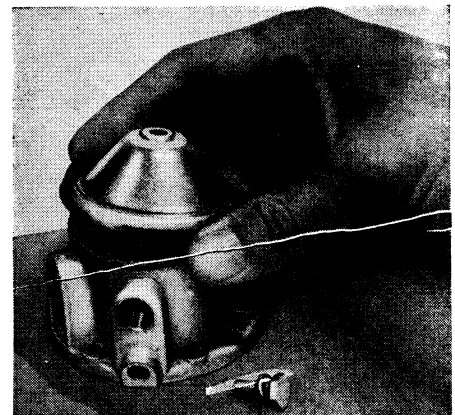


Fig. 29 Series R. Installing bowl cover

2. Slide the rocker arm and link assembly into the body and retain in position with the thin end of the assembly pin shown in Fig. 22.
3. Replace the rocker arm spring, and large coil (diaphragm) spring, Fig. 23, on the staked-in oil seal (or the body ledge around the pull rod hole). Lay diaphragm spring retainer on spring.
4. Push the diaphragm pull rod straight through oil seal, against spring pressure. Press on diaphragm to tilt rod slightly away from link. Raise pump body until it is upside down so link will fall into engagement with pull rod. Bring diaphragm back to level position to hook pull rod on link.
5. Push the assembly pin through, Fig. 24, so that thick portion is holding arm and link assembly in position.
6. Maintain a slight pressure on assembly pin, Fig. 25, and drive it out of body with permanent rocker arm pin.

7. For bullet type pins, stake the edge of the pin hole over the end of the pin. Do this at both ends of the pin. If the pin has a head on one end and a tapered hollow end on the other, install a washer over the taper and spread the hollow part to retain in position.
8. Stand the cover casting on the bench with the flange up. Drop the fibre valve seat gaskets, Fig. 26, down into the two valve pockets. Drop the valves down into valve holes on top of paper gaskets. Three legs up for inlet valve and legs down for outlet valve.
9. Place valve cage retainer down on valves so that two pairs of arms rest on edges of valve assemblies and so the two small holes in the retainer line up with screw holes in casting. The retainer is slightly curved and should be installed so the hump of the curve is toward you. This will give the retainer some spring pressure when the screws are

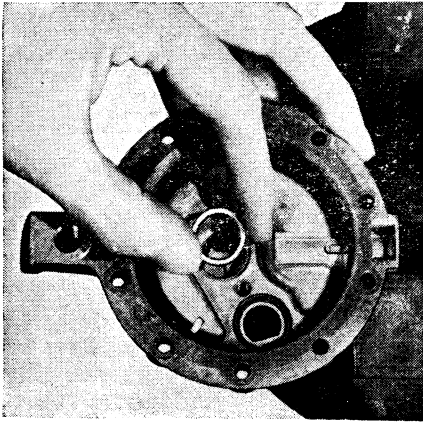


Fig. 30 Series AJ. Installing fibre valve gaskets



Fig. 31 Series AJ. Install valve with three legged side down in valve seat nearest outlet hole



Fig. 32 Series AJ. Install other valve with legs up

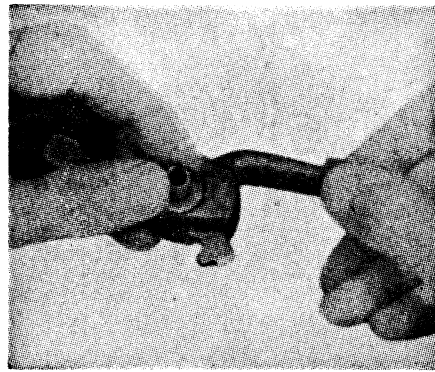


Fig. 33 Series AJ. Assembling bushing in rocker arm and link parts

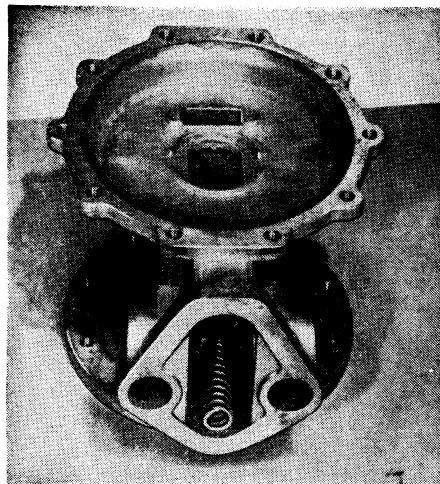


Fig. 34 Series AJ. Installing rocker arm spring in slot

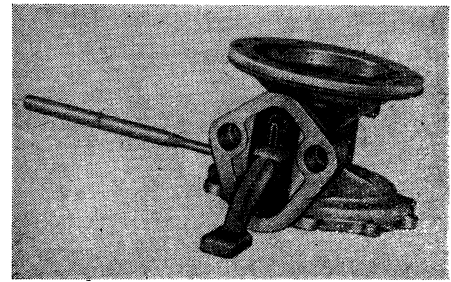


Fig. 35 Series AJ. Retain rocker arm and link in body with assembly pin shown

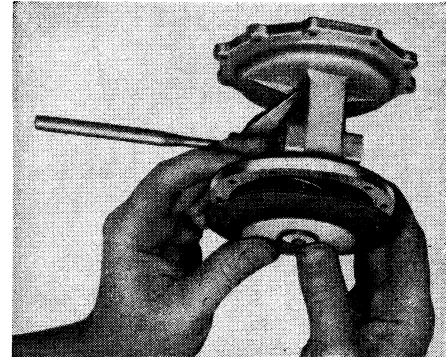


Fig. 36 Series AJ. Assembling diaphragm in body

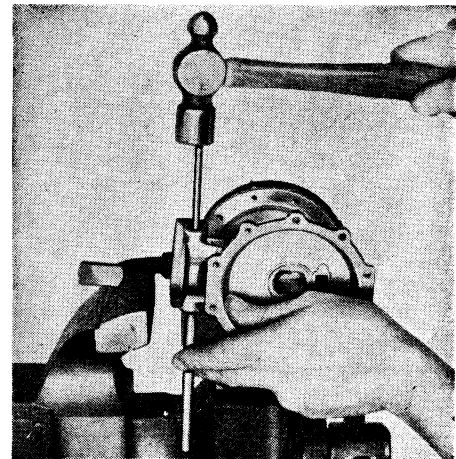


Fig. 37 Series AJ. Driving out pin assembly by installing permanent rocker arm pin

- tightened down.
10. If the pump being serviced is one in which the valves are not a unit, install the separate parts in the order shown in Fig. 27.
 11. Replace bowl cover gasket on edge of body casting. Place screen, Fig. 28, over gasket in such a way that rim of screen lies close against it. The two small metal projections near the center of the screen should be on your side of the screen.
 12. Install bowl cover, Fig. 29. Lay the cover over the casting and screen and install the cap screw through the hole in the center of the cover. fibre gasket is in place under a screw head.
 13. Clamp the body in a vise and line up the file marks which were made before the pump was dismantled. Level the diaphragm by moving the rocker arm. Hold it while installing all screws and lock washers. Be sure screws pass through holes in diaphragm easily without chewing the fabric. Tighten screws just Tighten this screw securely. Be sure enough so the heads touch lock washers.
 14. Push rocker arm back and forth several strokes, releasing with a

15. If a drain cock and spring is used install these parts.

ASSEMBLING AJ COMBINATION PUMP

The following repair procedure is generally applicable to all combination pumps.

1. Install the small fibre valve gaskets in the two valve seats, Fig. 30.
2. Place one valve assembly, Fig. 31, in the valve seat nearest the outlet hole in the center. Three legged side should go down into chamber.
3. Install the other valve assembly, Fig. 32, in the other seat, but keep the three legs up. If the pump being serviced is the type in which the

FUEL PUMPS



Fig. 38. Series AJ. Installing washer over small end of rocker arm pin. Turn washer until it lies flat

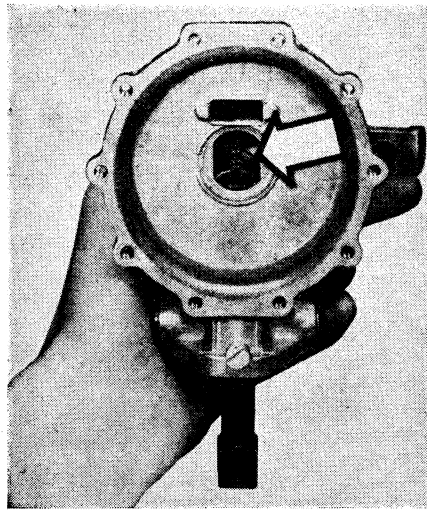


Fig. 40 Series AJ. Sighting through holes in body for pull rod installation (left). Assembling pull rod and diaphragm (right)

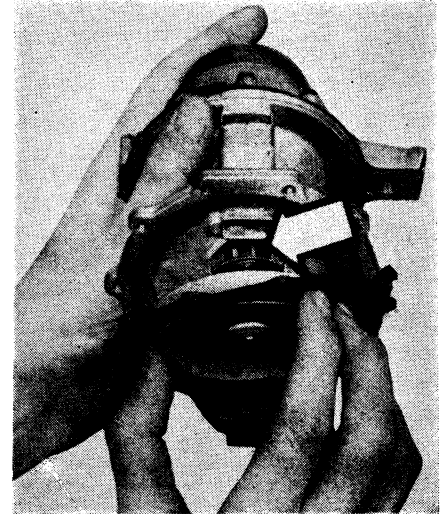


Fig. 39 Series AJ. Assembling body to cover, matching marks previously made

valves are not a unit, replace the separate parts in the order shown in Fig. 27.

4. Set valve retainer in place over the valve cage assemblies. Hump in retainer should be up. Retain with one screw.
5. Thoroughly clean the screen and place in cover. Position in a new bowl gasket. Clean the fuel bowl, install it, and retain with cap screw and gasket.
6. In assembling the pump body, the first step is to assemble the parts which combine to form the rocker arm and link assembly. Slide the spacer over the end of the short link so that the holes line up. The spacer should hang down from the link so it points in the opposite direction to the link hook. The projection on the spacer should point toward the hook end of the link.
7. Place one long link on each side of the spacer. Line up the holes. Be sure that the hook ends of the long links come together so that the long links surround the short link. Also

be sure that the hooks on the two long links point in the same direction as the hook on the short link.

8. Place spacer washer (if required) on the outside of each long link, lining up all holes. Slide the whole assembly between the jaws of the rocker arm. The flat surface of the rocker arm pad should face the same way as the link hooks.
9. Slide the pin bushing, Fig. 33, through the holes in the rocker arm, spacer washers, long links, spacer, and short link.
10. Stand the pump body on the bench, fuel flange down. Then place the rocker arm coil spring, Fig. 34, in the rocker arm slot and set the end of the spring over the cone (or stud) cast in the body. Slide the link and rocker arm assembly into this slot. The outer end of the rocker arm spring slips over the projection on the link spacer.
11. Push the link and arm assembly in until the pin bushing lines up with the pin holes in the pump body. With the assembly pin shown in Fig. 35, retain the rocker arm and link assembly in the body.
12. Place the diaphragm spring on the metal casing of the oil seal. Install the retainer (dish down) on top of spring.
13. Push diaphragm pull rod straight through oil seal, against spring pressure, Fig. 36. Push down on the diaphragm to tilt pull rod slightly away from the link. Raise pump body until it is upside down so link will fall into engagement with pull rod. Bring diaphragm back to level position to hook pull rod on link.
14. Push assembly pin, Fig. 37, through body so that large diameter is holding rocker arm. Drive assembly pin out with permanent rocker arm pin.
15. Turn the pump body on its side, large end of rocker arm pin down. Then slip the washer over the small end of the pin, Fig. 38. Turn the washer until it lies flat. Spread the end of the pin with a ball peen hammer

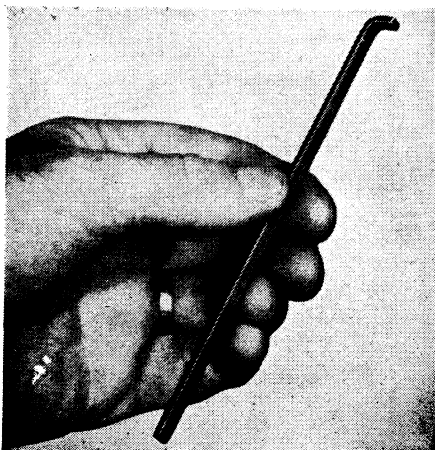


Fig. 41 Series AJ. Diaphragm leveling tool

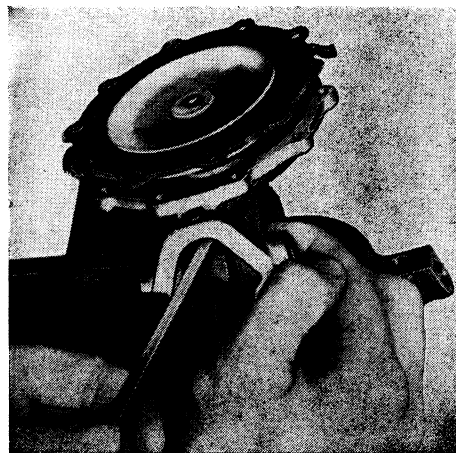


Fig. 42 Series AJ. Leveling tool in operation



Fig. 43 Series AJ. Assembling vacuum cover over diaphragm spring

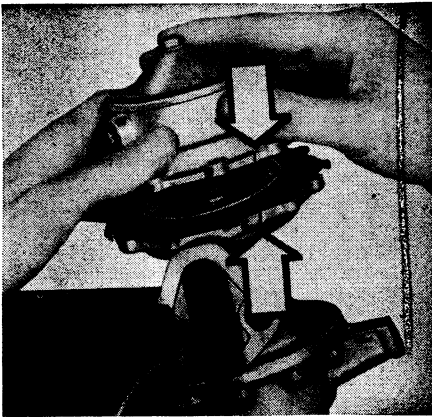


Fig. 44 Series AJ. Lining up cover with body according to marks made previously

mer or roundnosed punch.

16. Line up the file marks, Fig. 39, which were made before the pump was dismantled. Maintain pressure on the rocker arm so that diaphragm is level with flange. Install all screws and lock washers in the holes around the rim of the top cover. Be sure that they pass through the fabric diaphragm without chewing. Tighten the screws only enough so that they just touch the lock washers.
17. Pump the rocker arm two or three full strokes. This assures that the diaphragm will not be stretched too tightly. Then tighten all cover screws. Do this alternately, a screw on one side, then the screw on the opposite side, repeating procedure until all are tightened securely.
18. In assembling the vacuum cover, rinse the fine mesh wire screen thoroughly in gasoline or other solvent. Then dry it thoroughly, being careful not to bend it.
19. Lay the cover casting on the bench with the diaphragm flange down and place screen over valve hole.

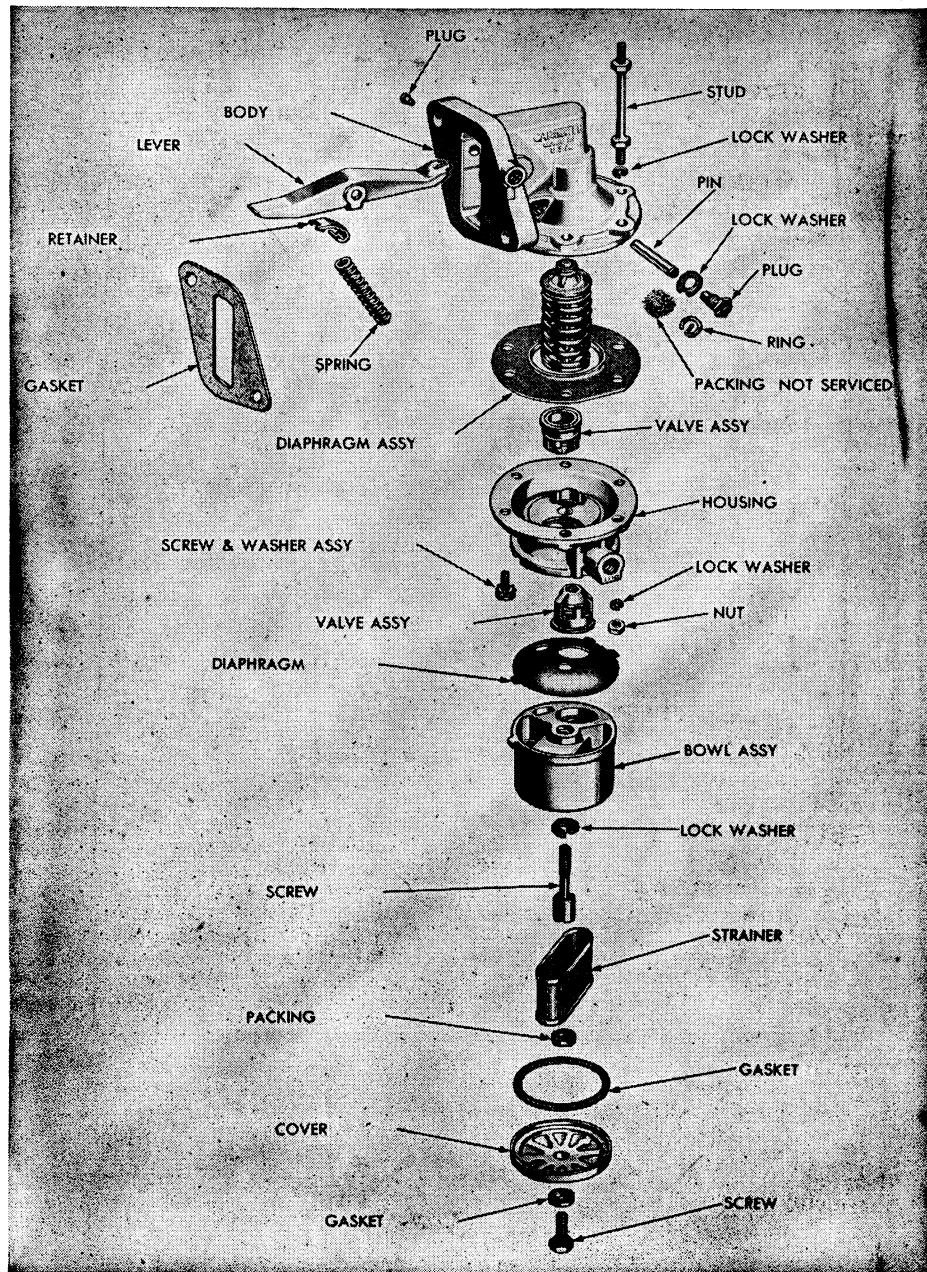


Fig. 45 Carter mechanical fuel pump

20. Place cover gasket in cover, set the cover on the casting and install the cap screw and washer, tightening securely.
21. Turn the cover over and place the inlet and outlet gaskets in the valve recesses. Install one valve assembly in the valve seat nearest the outlet hole, with three legs facing down. Place the other valve in the other chamber with the legs up. If the pump being serviced is one in which the valves are not a unit, install the separate parts in the order shown in Fig. 27.
22. Install the valve cage plate with the hump upward. Install valve retainer screw.
23. Lift pump body above eye level, Fig. 40, so you can see up inside through the center hole from the vacuum (lower) side. Put the pull rod up through the hole and slip the pull rod slot over the hooks on the two long links. Do not force vacuum links down by operating rocker arm. The vacuum links should be left free so they rise naturally when the pull rod is engaged. Applying force to the links will distort the pull rod.
24. Hold the vacuum diaphragm assembly in place while you fasten the pump body in a vise, with the vacuum diaphragm up. It is necessary to have the diaphragm held level with the body flange while attach-

FUEL PUMPS

ing the cover. Do this with the flexing tool shown in Fig. 41.

25. Push on the rocker arm until the diaphragm is level with the flange on which it rests. Hold the rocker arm at this point. Slip the hook of the flexing tool in between the rocker arm and the body casting. Release the rocker arm against leveling tool and the diaphragm will remain level, Fig. 42.
26. Install circular spring seat on center of diaphragm retainer (over pull rod end).
27. Place the diaphragm spring on the seat. Then, Fig. 43, drop the vacuum cover over the spring. Do not try to press cover all the way down. Be sure spring seat stays down in place against diaphragm protector.
28. Line up the file marks, Fig. 44, which were made before the pump was taken apart. Insert two long (1½") screws in two opposite holes in the cover flange. Turn down these two screws as far as they will go without forcing. This will draw the lower cover toward the body far enough to allow the short screws to take hold.
29. Install screws with lock washers. Tighten screws only enough so that they press lightly against lock washers. Remove the two long screws and install short ones.
30. Remove the diaphragm leveling tool. The diaphragm will then flex the correct amount because of the pressure of the heavy spring. Tighten all cover screws. Do this alternately, first a screw on one side, then a screw on the opposite side, repeating the procedure until all screws are tightened securely.

Installing Pump, All Series

1. Insert the rocker arm through the opening in the engine. Make sure that the "pad", which is always the flat surface, rests against the cam on the engine camshaft.
2. Holding the pump in position against the engine, gasket in place, insert the bolts with lock washers in the mounting holes. Start the bolts with your fingers to prevent damage to the threads.
3. Tighten all bolts securely with a suitable wrench.
4. First check the fuel line to be sure it is properly aligned with the opening on the pump. Then start the nuts of both lines with the fingers before tightening them securely with a wrench.
5. On combination pumps, connect both vacuum lines.

CARTER FUEL PUMP

This pump, Fig. 45, operates in the same manner described for AC mechanical fuel pumps.

Referring to Fig. 45, the service procedure for this pump is as follows:

1. Mark pump body and valve housing to assure correct reassembly.
2. Remove cam lever return spring.
3. Remove rivet plug, and cam lever pin plug and washer.
4. Remove cam lever pin, and take out cam lever and spring retainer.
5. Remove vent retainer ring and packing, and take off bowl cover, gasket and strainer.
6. Remove bowl retaining screw, bowl and outlet air dome diaphragm.
7. Remove pump valve housing by inserting a screw driver at opposite

sides between the valve housing and body at flats of diaphragm. By twisting the screw drivers in opposite directions, the valve housing will come off.

8. Lift out the diaphragm assembly, and remove both valve cages.

Clean all parts in gasoline or solvent and dry with compressed air. Replace all worn or damaged parts. To reassemble, proceed as follows:

1. Install new intake valve cage assembly, using tool T-109-191. With the same tool, install new discharge valve cage assembly.
2. Install diaphragm with flats toward ports. Then install pump valve housing, starting all screws but do not tighten. Be sure marks previously made on body and valve housing are aligned.
3. Install cam lever and spring retainer, cam lever pin, cam lever pin plug and washer, and a new rivet plug, using tool T109-43 for the plug.
4. Flex the diaphragm to full downward position and hold in place while tightening valve housing attaching screws. Tool T109-192 may be used to flex diaphragm and hold in position.
5. Install outlet air dome diaphragm, bowl, and bowl retaining screw and washer.
6. Insert cap screw through gasket and bowl cover and install felt packing on screw. Then install strainer, bowl cover and ring gasket.
7. Install vent packing and retainer, and complete the assembly by installing the cam lever return spring.

NOTE—When installing pump on engine, be sure slot and stud holes in gasket are aligned with those in face of pump body.

STOCK TRANSMISSIONS

CLARK

Model	Speeds	Oil, Pts.	Page
185F	4	4	71
202V, VO	5	12	72
204V, VO	5	12	72
205V, VO	5	12	72
207V, VO	5	12	72
230F	4	10	72
231F	4	10	72
265V, VO	5	12	74
267V, VO	5	12	74
270V, VO	5	20	76
276V, VO	5	20	76
290V, VO	5	18	76
291V, VO	5	18	76
292V, VO	5	18	76
300V	5	12	74

FULLER

Model	Speeds	Oil, Pts.	Page
2-A-45	2 Aux.	10	90
5-A-33, 330	5	11	86
5-B-33, 330	5	11	86
5-F-33	5	11	86
5-A-43, 430	5	16	86
5-A-62, 620	5	18	86
5-A-65, 650	5	24	86
5-C-65, 650	5	24	86
5-C-72, 720	5	24	86
10-B-1120	10	35	88
R-45 ①	8	19	78
R-46 ①	8	17	78
R-95-C ①	10	32	78
R-950-C ①	10	32	78
R-96 ①	10	36	78

①—Road Ranger transmission.

NEW PROCESS

Model	Speeds	Oil, Pts.	Page
245	5	12	91
275	5	12	91
420	4	5½	92
540	5	9½	93
541G	5	10	93
875	5	8	97
895	5	8	97
5401	5	10	93
5402	5	10	93
5403	5	10	93
5404	5	10	93
90845	5	12	95
90930	5	12	95