

Fig. 48—Lincoln Oil Bath Air Cleaner—Cutaway View.

To service the air cleaner, proceed as follows:

1. Remove anchor screw and flat washer located at the top of the air cleaner. Remove cleaner assembly from vehicle.
2. Lift out the filter element.
3. Drain the oil from reservoir and flush with a cleaning solvent. Inspect gasket at base of air

cleaner. Replace if found defective.

4. Flush the filter element with a suitable solvent. Allow solvent to drain from the element.
5. Fill base of air cleaner to the indicated level with engine oil. Use SAE-50 for temperatures above  $+32^{\circ}\text{F}$ . Use SAE 20 oil for season temperatures below  $+32^{\circ}\text{F}$ .

## FUEL PUMP AND VACUUM BOOSTER PUMP

The 1952 Lincoln engine is provided with a combination fuel and vacuum booster pump, operated by means of a pushrod off an eccentric on the engine camshaft. Vacuum from the booster pump supplements engine manifold vacuum to operate the windshield wipers. Figure 49 shows a disassembled view of the combination fuel and vacuum booster pump with basic part numbers.

### OPERATION OF FUEL SECTION OF FUEL AND VACUUM BOOSTER PUMP

The rotation of the camshaft eccentric actuates the rocker arm "A" (figure 50) through an intermediate shaft and pulls link "B" and diaphragm "C" upward against spring pressure "D" which creates a vacuum in pump chamber "E."

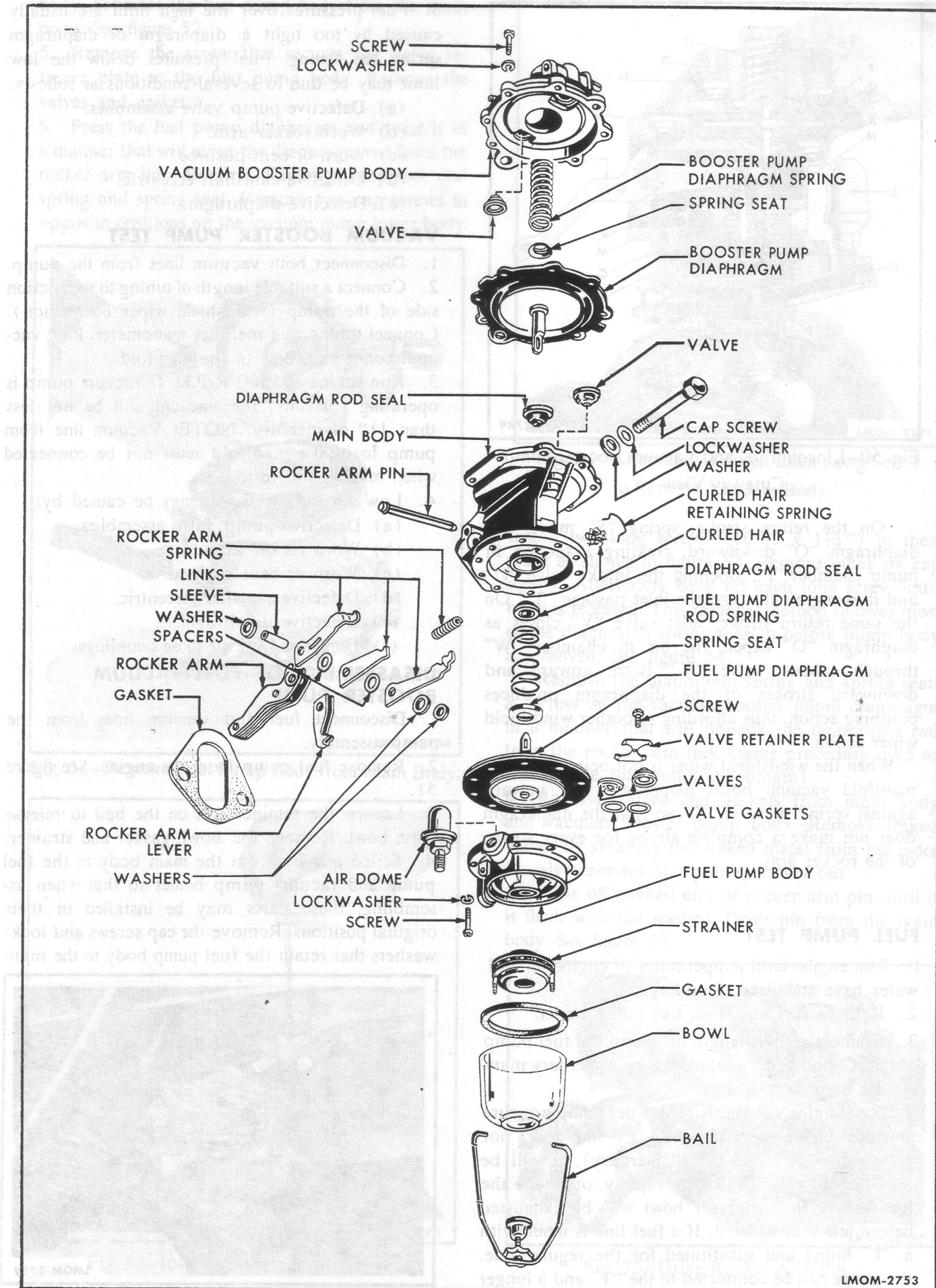
On the suction stroke of the pump, fuel from the gas tank enters through the inlet "F" into the sediment bowl "G" and passes through the strainer "H" and then through inlet valve "I" into the pump chamber "E."

On the return stroke, spring pressure "D" pushes the diaphragm "C" downward, forcing the fuel from chamber "E" through outlet valve "J"

and pump outlet "K" to the carburetor. Air chamber "L" reduces the pulses generated by pump action of diaphragm "C." When the carburetor bowl is filled to the correct level, the float in the carburetor will close the needle valve, thus creating a pressure in pump chamber "E." This pressure will hold diaphragm "C" upward against spring pressure "D" where it will remain inoperative until the carburetor requires additional fuel and the float opens the needle valve. Spring "M" keeps the rocker arm in constant contact with the intermediate shaft and camshaft eccentric.

### OPERATION OF VACUUM SECTION OF FUEL AND VACUUM BOOSTER PUMP

The rocker arm "A" actuated by the intermediate shaft off of the camshaft eccentric, pushes the two links "N" and diaphragm "O" upward, expelling the air in chamber "P" through exhaust valve "Q" and out opening "R" to the intake manifold. On the same stroke, a suction is created in chamber "W" as exhaust valve "X" closes and valve "V" opens, drawing air through the inlet passage "T" from the windshield wiper.



LMOM-2753

Fig. 49—Lincoln Fuel and Vacuum Booster Pump—Disassembled View.



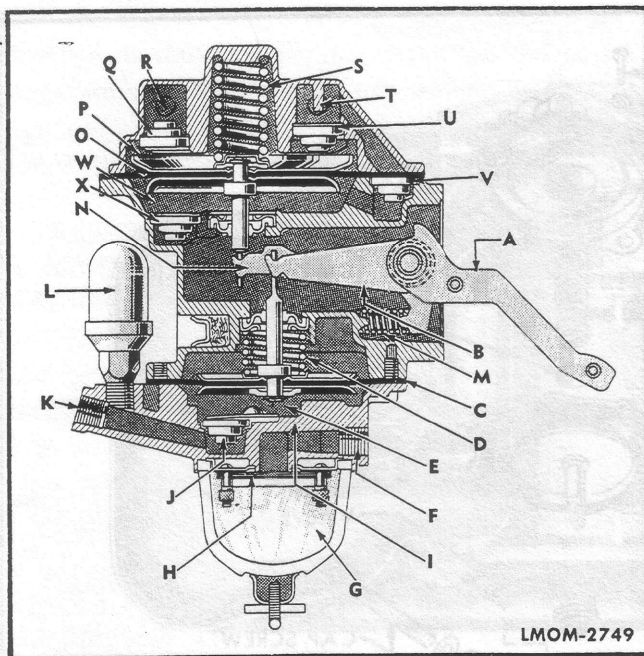


Fig. 50—Lincoln Fuel and Vacuum Booster Pump—  
Cutaway View.

On the return stroke, spring "S" moves the diaphragm "O" downward, creating a suction in pump chamber "P," opening the intake valve "U" and drawing air through the inlet passage "T." On the same return stroke, inlet valve "V" closes as diaphragm "O" expels the air in chamber "W" through exhaust valve "X." Both, upward and downward strokes of the diaphragm produces pumping action, thus affording smoother windshield wiper action.

When the windshield wiper is not being used, the manifold vacuum holds diaphragm "O" upward against spring pressure "S," so that the diaphragm does not make a complete stroke for every stroke of the rocker arm.

### FUEL PUMP TEST

1. Run engine until temperatures of engine oil and water have stabilized. Stop engine.
2. Remove fuel line from fuel pump outlet.
3. Connect a short length of line to the fuel pump outlet. Connect this adapter line to a mercury manometer or pressure gauge.
4. Run engine at 1800 R.P.M. Fuel pump pressure must not be less than  $3\frac{1}{2}$  P.S.I. (7" mercury) nor greater than  $4\frac{1}{2}$  P.S.I. (9" mercury). It will be necessary to make this check rapidly, otherwise the fuel supply in carburetor bowl will be exhausted before test is completed. If a fuel line is made with a "T" fitting and substituted for the regular line, the gauge can be connected to the "T" and a longer time allowed to make necessary readings.

5. Fuel pressures over the high limit are usually caused by too tight a diaphragm or diaphragm spring too strong. Fuel pressures below the low limit may be due to several conditions as follows:

- (a) Defective pump valve assemblies.
- (b) Worn rocker arm.
- (c) Worn or bent pushrod.
- (d) Defective camshaft eccentric.
- (e) Defective diaphragm.

### VACUUM BOOSTER PUMP TEST

1. Disconnect both vacuum lines from the pump.
2. Connect a suitable length of tubing to the suction side of the pump (windshield wiper connection). Connect tubing to a mercury manometer. Plug vacuum connection hole in the manifold.
3. Run engine at 1800 R.P.M. If vacuum pump is operating correctly, the vacuum will be not less than 11" of mercury. NOTE: Vacuum line from pump to intake manifold must not be connected when making this test.
4. Low vacuum pressures may be caused by:
  - (a) Defective pump valve assemblies.
  - (b) Worn rocker arm.
  - (c) Worn or bent pushed.
  - (d) Defective camshaft eccentric.
  - (e) Defective diaphragm.
  - (f) Defective hose or loose couplings.

### DISASSEMBLY OF FUEL-VACUUM BOOSTER PUMP

1. Disconnect fuel and vacuum lines from the pump assembly.
2. Remove fuel pump from the engine. See figure 51.
3. Loosen the retainer nut on the bail to release glass bowl. Remove the bowl, gasket and strainer.
4. Scribe a mark from the main body to the fuel pump and vacuum pump bodies so that when assembling, these parts may be installed in their original positions. Remove the cap screws and lock-washers that retain the fuel pump body to the main

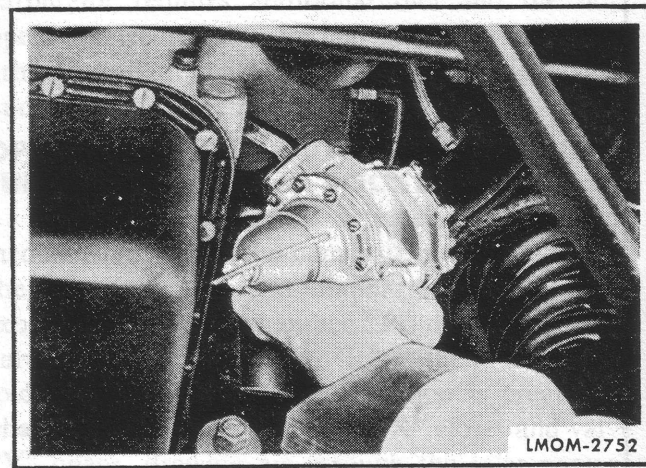


Fig. 51—Remove Fuel Pump from Engine.

body. Separate the fuel pump body from the main body. See figure 52.

5. Remove the screw that secures the valve retainer plate to the fuel pump body. Remove the valves and gasket.

6. Press the fuel pump diaphragm and twist it in a manner that will move the diaphragm rod from the rocker arm link. Remove diaphragm and rod, coil spring and spring seat. Remove two cap screws in opposite positions on the vacuum pump lower body.

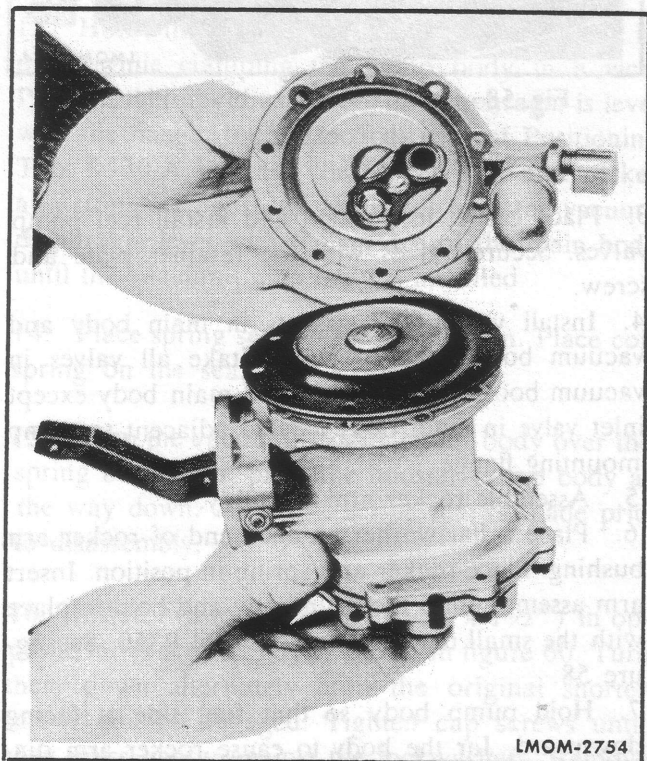


Fig. 52—Remove Fuel Pump Body from Main Body.

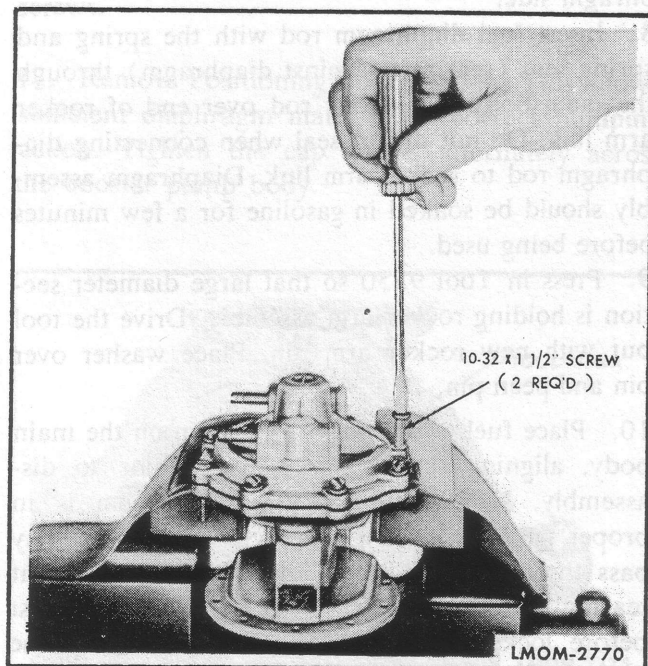


Fig. 53—Install Two Long Screws in Opposite Holes Across Body.

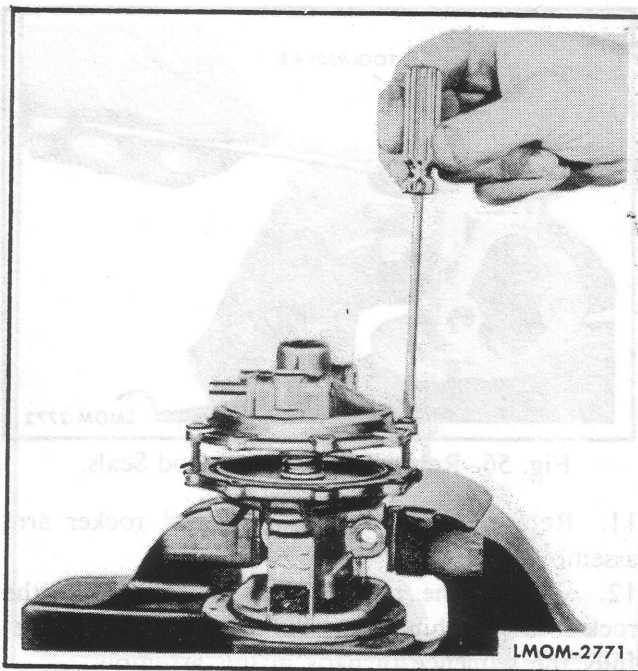


Fig. 54—Alternately Loosen Each Long Screw to Remove Vacuum Body.

Install two long screws (10-32 x 1½") in their place as shown in figure 53. Remove other six cap screws. Alternately back off each long screw until body is released. This removal method relieves most of the diaphragm spring tension before pump body is removed. See figure 54.

7. Remove the diaphragm spring and spring seat.  
8. Press on the vacuum booster pump diaphragm in a manner that will unhook the diaphragm rod from the rocker arm link (same procedure used to remove the fuel pump diaphragm).

9. Remove valves and gaskets from main body and vacuum booster pump body. Remove staked valves by scraping the staked metal from the sides of valve recesses and pulling valves out.

10. File off peened end of rocker arm pin until it is flush with the washer. Drive pin from the main body. See figure 55.

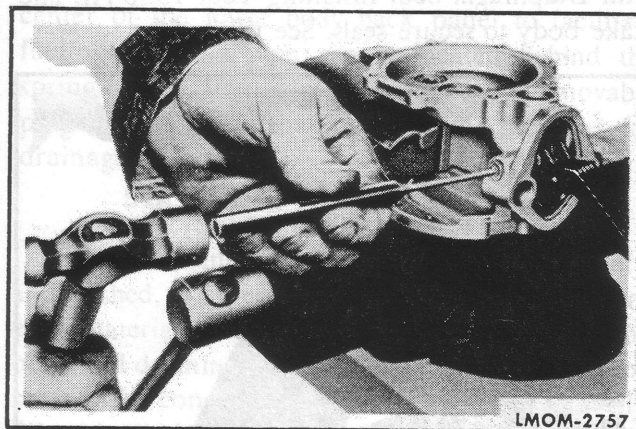


Fig. 55—Drive Rocker Arm Pin from the Main Body.



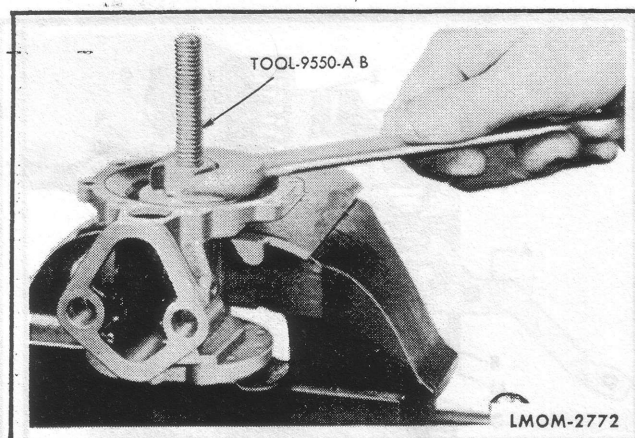


Fig. 56—Remove Diaphragm Rod Seals.

11. Remove rocker arm spring and rocker arm assembly.
12. Remove the two flat washers and push the rocker arm bushing from the assembly. Note carefully the sequence of parts in this assembly.
13. Use Diaphragm Seal Remover Tool to remove the vacuum and fuel diaphragm rod seals from the main body. See figure 56.
14. Smooth both seal counterbores in the main body with a scraper. This will remove metal projections caused when seals were staked in position.
15. Remove curled hair retainer spring from main body. Remove curled hair.
16. Clean all parts in a suitable solvent. Examine individual parts for excessive wear or damage.
17. Replace parts from a service repair kit. The repair kit contains service parts for the units most likely in need of replacement such as diaphragms, valves, gaskets and seals. Other parts requiring replacement are available as separate items.

#### ASSEMBLY OF FUEL-VACUUM BOOSTER PUMP

1. Install curled hair in pump body and insert spring retainer.
2. Install fuel and vacuum diaphragm rod seals with Diaphragm Seal Installing Tool 9550-AB and stake body to secure seals. See figure 57.

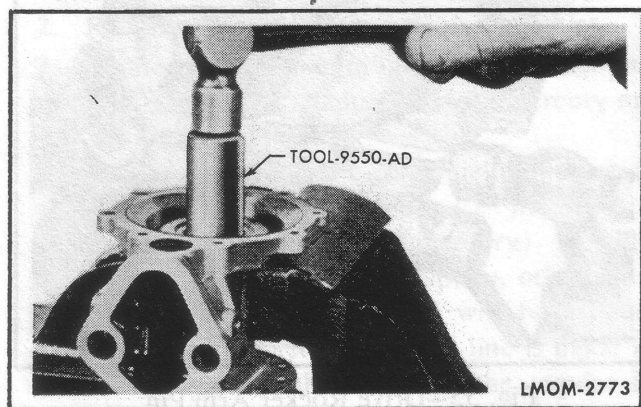


Fig. 57—Install Diaphragm Rod Seals.

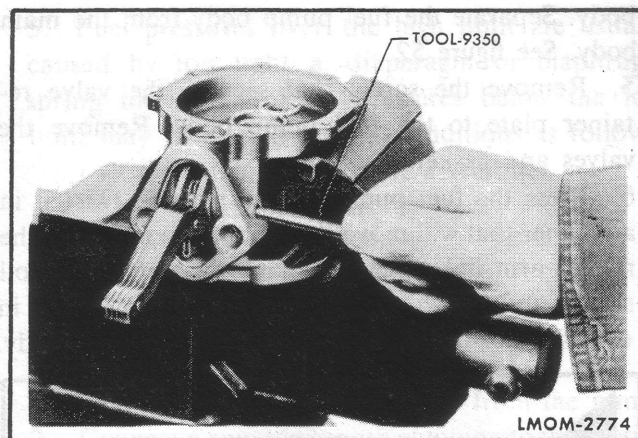


Fig. 58—Hold Arm Assembly in Place with Tool 9350.

3. Place gasket in position and install fuel pump valves. Secure valves with the retainer plate and screw.
4. Install valves and gaskets in main body and vacuum booster pump body. Stake all valves in vacuum booster pump body and main body except inlet valve in main body located adjacent to pump mounting flange.
5. Assemble rocker arm assembly.
6. Place a flat washer on each end of rocker arm bushing. Place rocker arm spring in position. Insert arm assembly into the main body and hold in place with the small diameter end of Tool 9350. See figure 58.
7. Hold pump body so that fuel side is facing downward. Jar the body to cause rocker arm diaphragm operating link to fall toward the fuel diaphragm side.
8. Insert fuel diaphragm rod with the spring and spring seat (seat rests against diaphragm) through the main body seal. Hook rod over end of rocker arm link. Do not distort seal when connecting diaphragm rod to rocker arm link. Diaphragm assembly should be soaked in gasoline for a few minutes before being used.
9. Press in Tool 9350 so that large diameter section is holding rocker arm assembly. Drive the tool out with new rocker arm pin. Place washer over pin and peen pin.
10. Place fuel pump body in position on the main body, aligning scribe marks made prior to disassembly. Make sure that the diaphragm is in proper position. Start all cap screws. Be sure they pass through the holes in the diaphragm without tearing the fabric. Turn screws in evenly, and just before lockwashers start to compress, pump the rocker arm two or three full strokes. This will flex the diaphragm. If diaphragm is not flexed, the pump may develop excessive pressure.

11. Hold main body so that vacuum side faces downward. Jar the body to cause the rocker arm diaphragm operating links (2) to fall towards the vacuum diaphragm side.

12. Insert vacuum diaphragm rod through the main body seal, tilting rod slightly away from rocker arm links. Hook rod over end of links. Make sure rod slides over both link arms. Do not distort seal when connecting rod to link arms.

13. Hold the vacuum diaphragm assembly in place while clamping the pump body in a vice. Push on the rocker arm until the diaphragm is level with the flange. Insert the hook end of Positioning Tool 9530-A between the rocker arm and rocker arm stop. See figure 59. This will hold the vacuum diaphragm level with the surface of the main body until the vacuum pump body is installed.

14. Place spring seat on the diaphragm. Place coil spring on the seat.

15. Drop the vacuum booster pump body over the spring but do not press the booster pump body all the way down. Align the scribe marks made prior to disassembly.

16. Install two long screws (10-32 x 1½") in opposite holes across body as shown in figure 60. Turn them down alternately until the original shorter screws can be engaged. Tighten cap screws until they press lightly against the lockwashers. Remove the two long screws and install the remaining short screws.

17. Remove Positioning Tool 9350-A. This allows sufficient diaphragm material for correct pumping action. Tighten the cap screws alternately across the booster pump body.

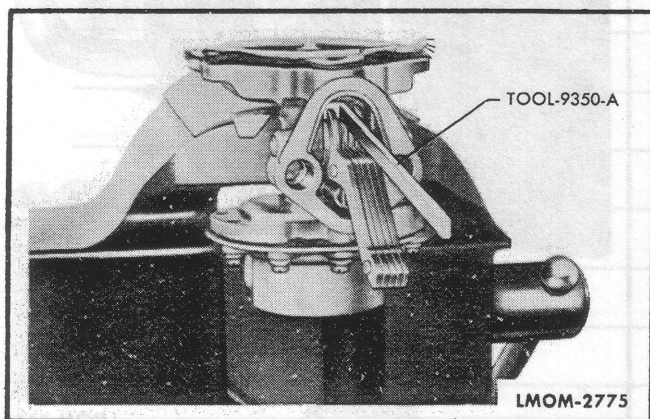


Fig. 59—Hold Vacuum Diaphragm in Position with Tool 9350-A.

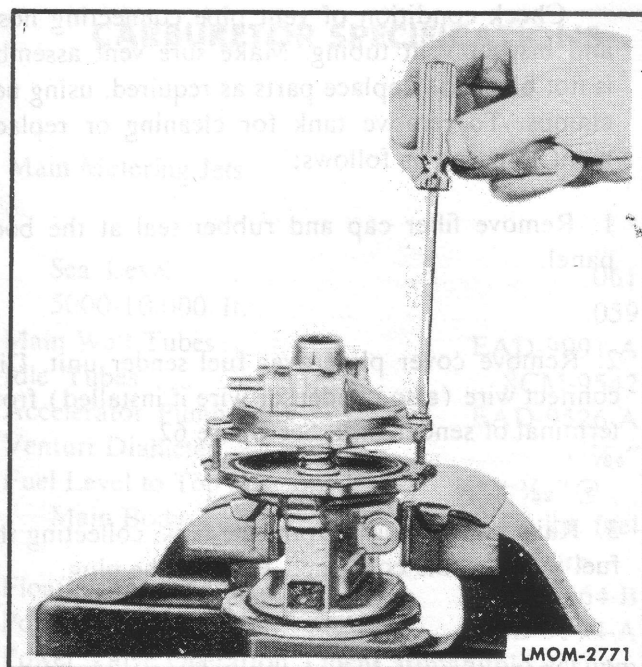


Fig. 60—Install Two Long Screws in Opposite Holes Across Body.

18. Install fuel strainer. Place new bowl gasket in position and install bowl. Install bowl seat and tighten bail nut finger tight.

19. Crank engine until pump push rod is at its highest position. Install pump to the engine. Use a new gasket when making the installation. Tighten bolts holding pump to the engine securely. Connect fuel and vacuum lines to the pump.

20. Test fuel and vacuum booster pump.

### FUEL TANK

The fuel tank for the 1952 Lincoln Cosmopolitan is a flat type tank of 20 gallon capacity, located at the rear of the vehicle and secured to the frame with two steel straps, each hooked at the forward end to the frame crossmember and secured to studs at the rear frame member with wire-locked nuts. Figure 61 shows the fuel tank venting system. The filler tube extends from the rear of the tank to the center of the lower body back panel to facilitate fueling. The fill pipe cap is located behind the spring-loaded license plate bracket. A removable plug is provided in the bottom of the fuel tank for drainage purposes.

### SERVICING THE FUEL TANK

The fuel tank should be drained occasionally and flushed. If an unusual amount of scale and foreign material collects in the fuel pump sediment bowl and draining and flushing of the tank does not remedy the condition, remove the tank and partially fill with a solvent. Agitate the tank and drain. Repeat until all scale or other foreign material has been removed.