INSTALLATION

1. Install hub assembly on engine crankshaft and retain with bolt and spacer. Tighten bolt to 180 to 200 foot-pounds torque.

2. Install bolt retainer and snap ring.

3. Install fan blade assembly and tighten bolts firmly using new lock washers.

4. Install radiator assembly, referring to "Radiator and Shutter Installation" covered later in this section.

Radiator, Shutters, and Thermostat

Radiator, shutters, and baffles to prevent recirculation of air, comprise an assembly which is mounted on a support at left side of engine compartment. Top of the assembly is held in position by bolt and rubber spacers. Power unit which operates shutters is mounted on top of radiator assembly. Surge tank installed above radiator provides space for expansion of coolant without loss. Cooling system is filled through filler cap at surge tank. Pressure valve (fig. 1) incorporates two valves -- one to relieve excessive pressure and one to admit atmosphere as coolant contracts after engine is stopped.

SHUTTER MAINTENANCE

Maintain radiator shutter unit in free working condition by cleaning vane bearings thoroughly with brush or spray gun, or both. Use gasoline or penetrating oil until all dirt is removed. After shutter is once worn in, lubricating oil may be omitted after cleaning.

Frictional wear is very slight, and excessive lubricant may increase rapid collection of dirt. This attention is recommended every 2000 or 5000 miles, depending upon the nature of operation and the tendency toward dirt collection.

AIR FILTER

Air filter, shown in figure 7, prevents moisture from entering shutter thermostat. As air from air tank enters filter, it strikes against baffle which diverts moisture in air stream to bottom of housing. Air then passes through filtering element. Air is again filtered through felt before entering thermostat air valves. Periodic check should be made for leakage at filter connections. Tighten if necessary.

CAUTION: Valve at filter inlet line must be closed before removing plugs or disconnecting outlet line.

Add fluid to filter through filler plug. Refer to Lubrication Chart in LUBRICATION (SEC. 13), for intervals, quantity, and type of fluid. Larger quantities or more frequent filling may overload system.

Air filter should be drained at regular intervals by opening pet cock at bottom. This operation should be performed with pressure in air lines.

Every 10,000 miles, air filter should be disassembled and the felt cleaned with cleaning solvent or replaced.

RADIATOR SHUTTER THERMOSTAT

Radiator shutter thermostat (fig. 8), mounted in housing between engine head and radiator, functions automatically to open and close air line to power unit, which operates radiator shutter.

CLEANING

Key numbers in text refer to figure 8.

1. Remove end cap (9) and needle valve seat cap (1). Wash needle (2) thoroughly in a cleaning solution.

IMPORTANT: Do not use abrasive or metal tools to remove deposits from needle or seats.

A pointed wooden stick provides a practical method of cleaning tapered seats. All parts must be thoroughly cleaned before reassembling. Felts must be renewed, or thoroughly washed in solvent.

2. Apply a drop or two of engine oil on needle (2) then insert needle (2), blunt end toward push pin (5) and into unit. Install seat cap (1) (without spacing gasket (7)) and tighten firmly against needle. Repeat operation a few times, until new seat has been formed.

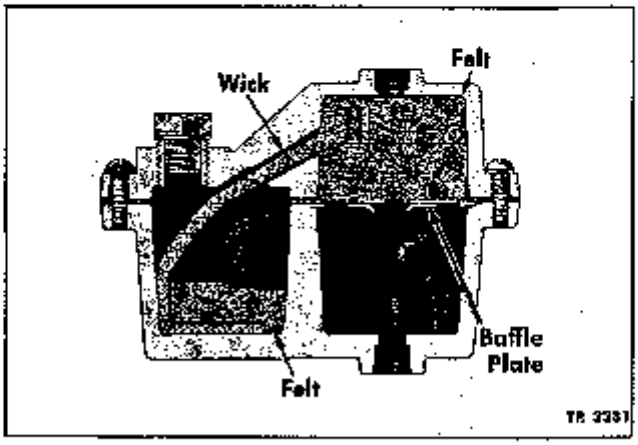

Figure 7—Shutter Air Filter

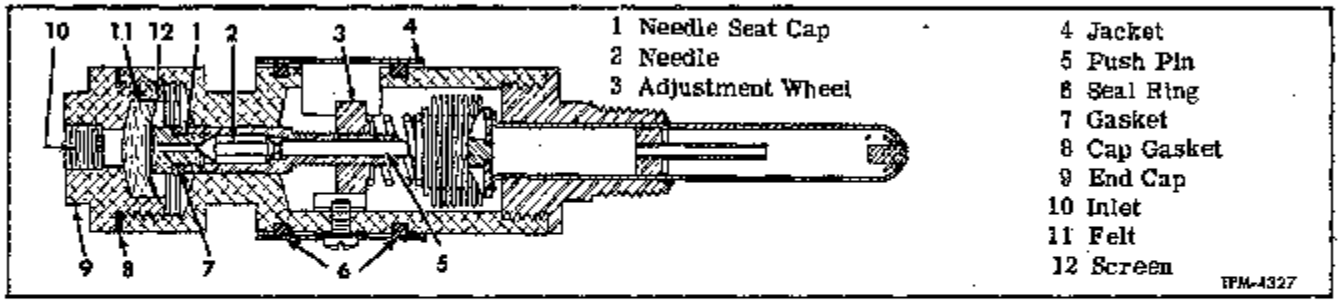

Figure 8—Radiator Shutter Thermostat

3. Remove seat cap (1) and needle (2) and clean. Reinstall needle and seat cap, using new gasket (7) under seat cap.

4. Install screen (12), felt (11), end cap gasket (8), and end cap (9). Tighten end cap firmly.

TESTING

Shutter thermostat should be tested for proper operation, before installation in vehicle. Test in water bath, as follows:

Connect air line to inlet port and an air pressure gauge to outlet port. Suspend thermostat in water, up to mounting threads. Use an accurate thermometer, but make sure neither thermostat nor thermometer contacts bottom of container.

Raise water temperature gradually to closing temperature of thermostat, keeping water thoroughly agitated. Hold water temperature constant for two or three minutes, since thermostat operation may lag on initial cycle.

Note thermometer reading at which gauge shows pressure drop - this indicates closing of thermostat.

If thermostat fails to close at temperatures listed in "Specifications," adjust to proper operating point.

Adjust by turning adjustment wheel (3). Turning wheel one full turn against will change operating range approximately 10°F.

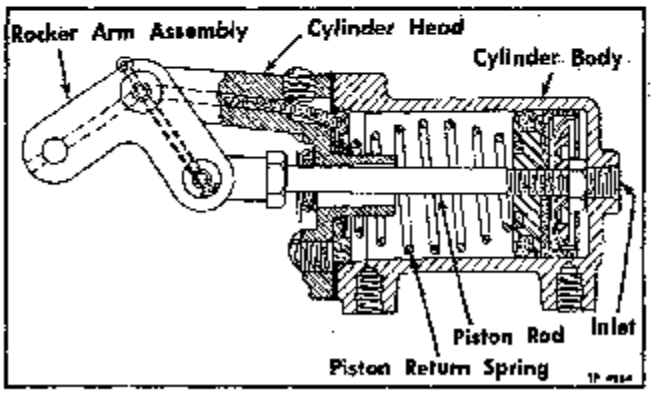

Figure 9—Radiator Shutter Air Cylinder

SHUTTER POWER UNITS

AIR CYLINDER TYPE UNIT

An air cylinder is used as regular equipment to operate radiator shutters. Sectional view of two types used are shown in figures 9 and 10. Shutter thermostat previously described, controls air supply to cylinder. When air is admitted at inlet, the piston moves to opposite end of cylinder and piston rod is pushed outward, causing rocker arm to pull on rod attached to shutter vanes. Rod clevis should be adjusted so that shutters are closed completely while air is applied to piston. Shutters must move to fully open position when air supply is cut off. Cylinder should operate with minimum pressure of 35 psi.

Maintenance

Cylinder should be removed and disassembled for cleaning and inspection at intervals of 20,000 miles. Lubricate when reassembling.

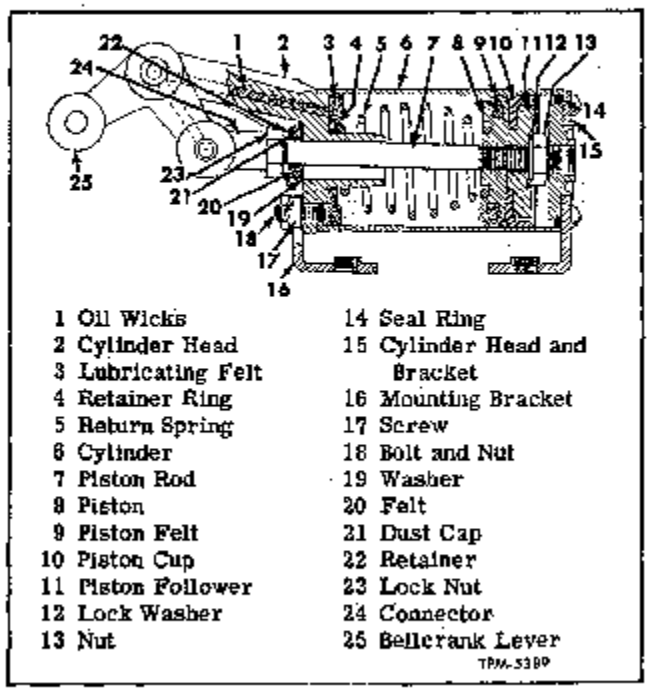

Figure 10—Radiator Shutter Air Cylinder

RADIATOR, SHUTTERS, AND THERMOSTAT

After reassembling, start engine and warm to normal operating temperature. Check shutter position, making sure shutters are fully open. Check for air leaks with soapy water.

DIAPHRAGM TYPE UNIT

As special equipment, some vehicles are equipped with a diaphragm type power unit as shown in figure 11. Diaphragm type unit is similar to air brake chamber, consisting essentially of a pressure plate, diaphragm, push rod, non-pressure plate, and spring. Assembly is mounted on bracket at top of radiator assembly. Air supply is controlled by shutter thermostat in same manner as for cylinder type unit previously described under "Air Cylinder Type Unit." As air pressure enters chamber behind diaphragm, the diaphragm forces push rod outward, thereby applying force to bell crank which in turn pulls upward on shutter rod which operates shutter vanes. Diaphragm stop limits movement of push rod assembly. When air supply is cut off by thermostat, spring moves push rod and air is exhausted from chamber behind diaphragm.

Maintenance

The only maintenance normally required is periodic inspection of diaphragm unit for air leakage, and lubrication of clevis pins in linkage.

Test for air leaks as follows:

1. With air pressure applied, coat with soap suds the bolting flanges holding diaphragm. No leakage is permissible. In case leaks exist, tighten flange bolts. Bolts must be tightened evenly and only sufficiently to prevent leakage.

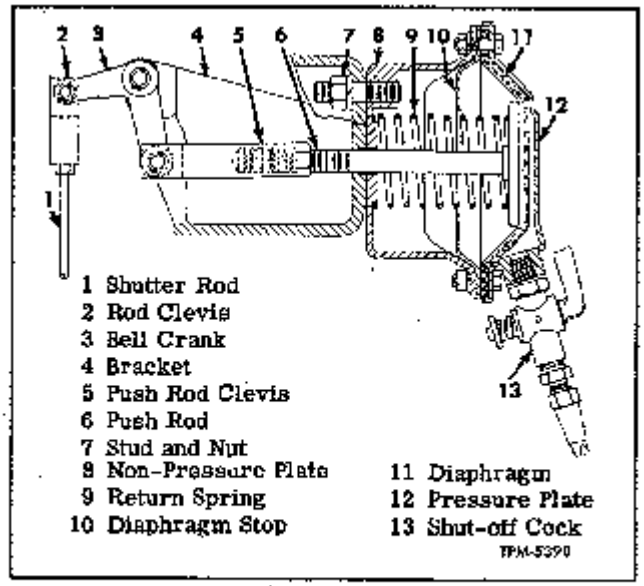

Figure 11—Diaphragm Type Shutter Power Cylinder

2. With air pressure applied to diaphragm unit, check leakage through diaphragm by tapping all openings, then applying soap suds around push rod at bracket. If there is any evidence of air leakage, replace the diaphragm.

RADIATOR AND SHUTTER REPLACEMENT

REMOVAL

1. Close valves in heater lines and drain cooling system as previously described in this section under heading "Draining Cooling System."

2. Remove four screws holding radiator grille door, then remove door and left bumper extension assembly.

3. Shut off air supply to shutter thermostat by closing valve at side of air filter. Disconnect air line from shutter power unit at top of radiator. Detach clips holding overflow pipe.

4. Remove inlet and outlet castings from radiator top and bottom tanks.

5. Disconnect lines at heater booster pump at top of radiator.

6. Remove bolt and insulators which attach top of radiator assembly to support bracket.

7. Place support under radiator assembly. Remove bolts at each end of radiator support channel, then carefully tilt radiator assembly and remove from vehicle.

8. Fan shroud, support channel, and shutter mechanism, as well as top and bottom tanks can be disassembled as necessary to make repairs or replacements.

INSTALLATION

1. Assemble shutter mechanism and fan shroud to radiator assembly, and install support channel at bottom of the assembly.

2. Move the radiator assembly into position in vehicle then install mounting bolts at each end of support channel.

3. Install support bolt and rubber insulators at top of radiator. Clip overflow pipe in place, and connect air line to shutter power unit.

4. Bolt inlet and outlet casting to radiator assembly using new gaskets.

5. Connect water lines at heater booster pump at top of radiator.

6. Install bumper extension and radiator grille door assembly.

7. Open heater line valves and open air valve at shutter air filter.

8. Fill cooling system as previously directed in this section under heading "Filling Cooling System."

9. Start engine and inspect all units and connections for leaks. Recheck coolant level after running engine.