

## SECTION 2-F COOLING AND OILING SYSTEMS SERVICE

### CONTENTS OF SECTION 2-F

Paragraph	Subject	Page	Paragraph	Subject	Page
2-20	Cooling System Services . . .	2-43	2-22	Radiator Thermostat Inspec-	
2-21	Fan Belt Adjustment or			tion and Test . . . . .	2-45
	Replacement . . . . .	2-44	2-23	Water Pump Repairs . . . . .	2-45
			2-24	Oil Pump Service . . . . .	2-46

### 2-20 COOLING SYSTEM SERVICES

#### a. Checking and Filling Cooling System

The coolant level should be checked only when the engine is cold and only enough coolant added to bring the level approximately half-way between the top of the core and the top of the upper tank.

It is unnecessary and unadvisable to check the coolant level whenever the car is stopped for fuel or oil, as the engine is usually hot at such times.

**CAUTION:** Never remove the radiator cap quickly when the radiator is hot. Sudden release of cooling system pressure may cause the coolant to boil and escape with some force.

If it becomes necessary to remove the radiator cap when the radiator is hot, rotate the cap slowly counterclockwise till a stop is reached. Leave cap in this position until all system pressure is released, then remove cap.

#### b. Draining, Flushing, Conditioning Cooling System

It is advisable to drain and flush the engine cooling system twice a year. This should be done when the anti-freeze solution is added in the fall and again when it is removed in the spring.

To drain the cooling system, remove radiator cap, open the drain cock in the lower radiator tank and remove the drain plugs on both sides of cylinder block. If car is heater equipped, set heater temperature control valve at full heat position.

After the cooling system is drained, plugs reinstalled and cock closed, fill the system with clean water. Run the engine long enough to open

the thermostat for complete circulation through the system, then completely drain the cooling system before sediment has a chance to settle.

#### c. Conditioning the Cooling System

“Rust Inhibitor & Stop Leak,” listed under Parts Dept. Group 8.800 is recommended for use in the cooling system, particularly when preparing for installation of anti-freeze solution. This material stops small seepage leaks, has rust preventive properties and its soluble oil is effective in eliminating a squealing noise which sometimes develops at the water pump seal. Instructions for its applications are printed on the conditioner bottle.

It is very important to make certain that the cooling system is properly prepared before an anti-freeze solution is installed; otherwise, loss of solution through leakage may occur or seepage may result in damage to the engine. The cooling system should be drained and flushed as described above (subpar. b.), all joints should be checked for leakage and corrected, and the conditioner described above should be added with the anti-freeze solution.

Inspect the water pump, radiator core, heater core, drain cocks, water jacket plugs, and edge of cylinder head gaskets for evidence of water leaks. Tighten all hose clamps in the cooling and heating systems and replace any deteriorated hoses.

#### d. Using and Testing Anti-Freeze Solutions

Volatile (alcohol) type anti-freeze solutions up to 50% may be used with the standard 170° radiator thermostat. If a non-volatile (ethylene glycol) type solution is used, the higher limit 180° radiator thermostat may be used to improve car heater performance.

The practice of mixing alcohol type anti-freeze with ethylene glycol type anti-freeze is not recommended. Although anti-freeze protection may be afforded, the level of protection is impossible to check with a specific gravity type of instrument due to the difference in weight of the two types of anti-freeze.

Every anti-freeze solution must be used in accordance with the instructions and in proportions specified by the anti-freeze manufacturer. The proportions must be selected as specified for the lowest temperature at which protection against freezing will be required.

The following solutions have been found to be unsatisfactory for use in automobile cooling systems: Salt solutions such as calcium or magnesium chloride, sodium silicate, etc; honey, glucose, sugar solutions, oils or kerosene, untreated glycerine, untreated ethylene glycol.

It is advisable to test the anti-freeze solution at intervals during the winter to make certain that the solution has not been weakened by evaporation or leakage. Use only hydrometers which are calibrated to read both the specific

gravity and the temperature, and have a table or other means of converting the freezing point at various temperatures of the solution. Disregarding the temperature of the solution when making the test may cause an error as large as 30°F. Care must be exercised to use the correct float or table for the particular type of anti-freeze being tested.

## 2-21 FAN BELT ADJUSTMENT OR REPLACEMENT

A tight fan belt will cause rapid wear of the generator and water pump bearings. A loose belt will slip and wear excessively and will cause noise, engine overheating, and unsteady generator output. A fan belt which is cracked or frayed, or which is worn so that it bottoms in the pulleys should be replaced.

The fan belt may be replaced by loosening the generator brace at both ends, slightly loosening the generator mounting bolts and moving generator inward to provide maximum slack in the belt.

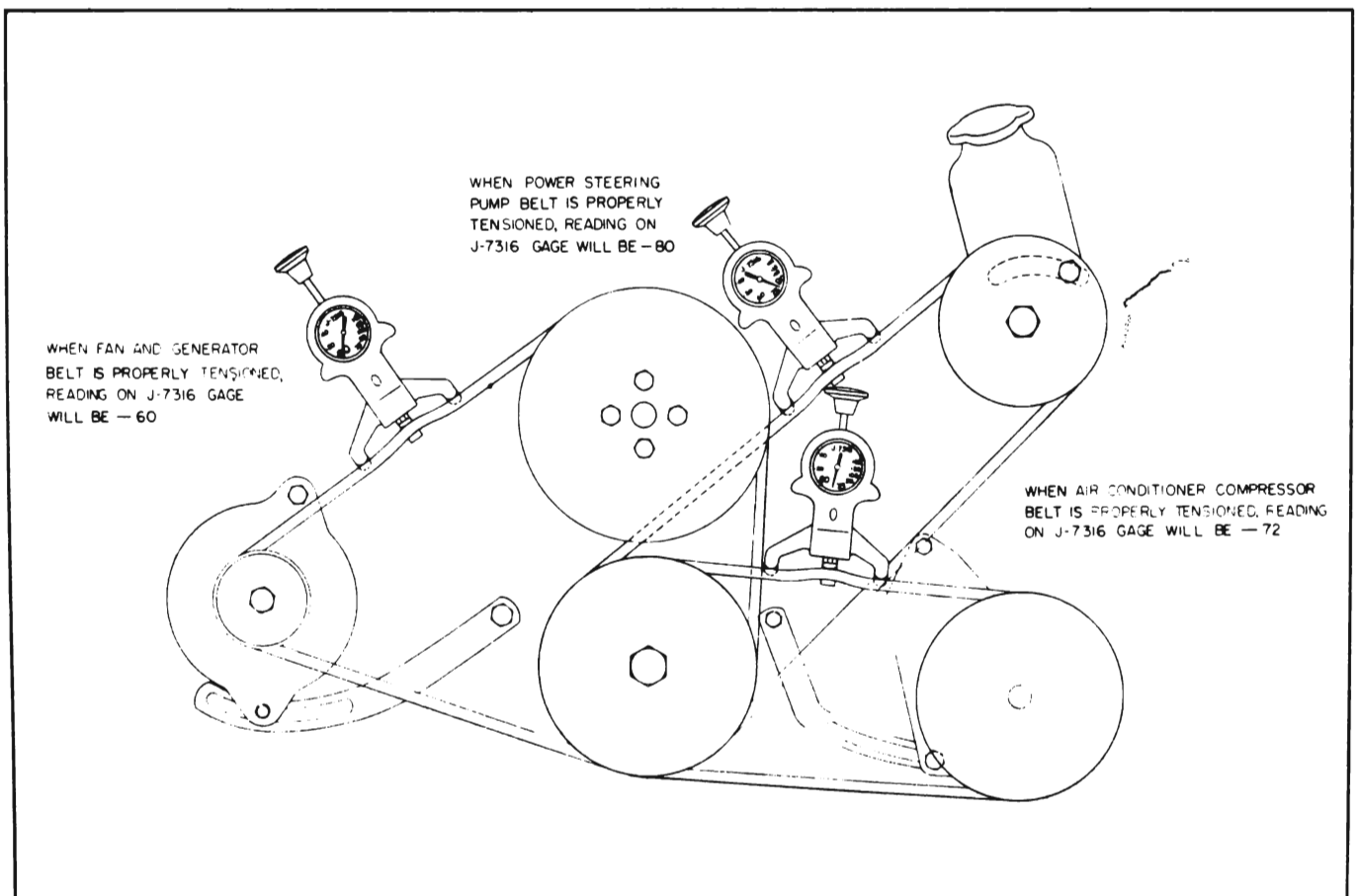


Figure 2-53—Belt Tension Chart

The generator must be moved sidewise to adjust the fan belt. After the generator brace and mounting bolts are securely tightened, the fan belt tension should be checked as shown in Figure 2-53.

If the power steering oil pump belt is removed it should be adjusted to tension specified, in Figure 2-53.

If the Air Conditioner compressor belt is disturbed it should be adjusted as specified, in Figure 2-53.

## 2-22 RADIATOR THERMOSTAT INSPECTION AND TEST

A sticking radiator thermostat will prevent the cooling system from functioning properly. If the thermostat sticks in the open position, the engine will warm up very slowly. If the thermostat sticks in the closed position, overheating will result.

The thermostat may be removed for inspection and test by partially draining the cooling system and disconnecting the water outlet and hose from the intake manifold, in which the thermostat is located.

If the thermostat valve does not fully close when cold, replace the thermostat. If the valve will fully close when cold, test the thermostat for correct opening temperature by immersing the unit and a thermometer in a container of water over a heater. While heating the water do not rest either the thermometer or thermostat on bottom of container as this will cause them to be at higher temperature than the water. Agitate the water to insure uniform temperature of water, thermostat and thermometer.

The standard thermostat (170°) valve should start to open at a temperature of 167°F. to 172°F., and should be fully open at a temperature not in excess of 192°F. The high temperature (180°) thermostat valve should start to open at a temperature of 177°F. to 182°F., and should be fully open at a temperature not in excess of 202°F. If thermostat does not operate at specified temperatures it should be replaced as it cannot be adjusted.

## 2-23 WATER PUMP REPAIRS

The water pump cover is die cast aluminum into which the water pump bearing outer race is shrunk fit. For this reason the cover, shaft

bearing and hub are not replaceable. The shaft seal and impeller are the only replaceable parts of the water pump.

### a. Removal

1. Drain cooling system being sure to drain into a clean container if anti-freeze solution is to be saved.

2. Loosen belt or belts, then remove fan blade, and pulley or pulleys from hub on water pump shaft. Remove belt or belts.

3. Disconnect hose from water pump inlet and heater hose from nipple. Remove bolts then remove pump assembly and gasket from timing chain cover.

4. Check pump shaft bearings for end play or roughness in operation. If bearings are not in serviceable condition, the assembly must be replaced.

### b. Disassembly for Seal Replacement

1. Pull impeller from pump shaft using care to avoid any end thrust on bearings. See Figure 2-54.

2. Remove carbon washer, rubber bellows and spring from the brass sleeve that is pressed into the pump housing. It is not necessary to

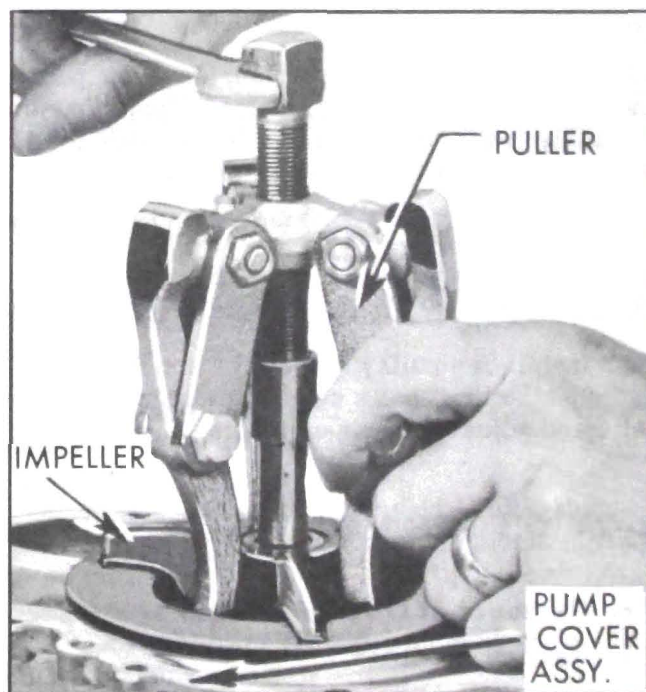


Figure 2-54—Pulling Water Pump Impeller

remove the brass sleeve if it is in good condition. If necessary to remove brass sleeve, drive out with punch inserted through vent hole in pump body.

3. Clean pump cover to remove scale, old gasket, etc. Do not use cleaning solvent as solvent may leak into bearings and destroy the lubricant.

4. If the old brass seal sleeve was removed from pump body, carefully press new seal assembly into body, using thick walled tube of suitable diameter.

4a. If old sleeve was not removed, separate the new seal sleeve from seal bellows by soaking in hot water to soften cement used to hold seal parts together for ease of handling. Install the carbon washer bellows and spring in the old sleeve being careful to engage notches of washer with driving dents of brass sleeve.

5. Coat face of carbon washer and impeller hub with rust preventative or Seco Oil; then press impeller on shaft until rear face of impeller hub is flush with end of shaft.

**CAUTION:** Avoid any pressing technique that is likely to impose thrust loads on water pump bearings. Pump must be supported on forward end of shaft only while pressing on impeller. See Figure 2-14.

### c. Installation

1. Make sure the gasket surfaces on pump and timing chain covers are clean. Install pump assembly with new gasket. Bolts with lock-washers must be tightened uniformly.

2. Connect radiator hose to pump inlet and heater hose to nipple, then fill cooling system and check for leaks at pump and hose joints.

3. Install fan pulley or pulleys and fan blade, tighten attaching bolts securely. Install belt or belts and adjust for proper tension.

## 2-24 OIL PUMP SERVICE

### a. Removal of Oil Pump Cover and Gears

1. Remove oil filter.

2. Disconnect wire from oil pressure indicator switch in filter by-pass valve cap.

3. Remove screws attaching oil pump cover assembly to timing chain cover. Remove cover assembly and slide out oil pump gears.

### b. Inspection

1. Wash off gears and inspect for wear, scoring, etc. Replace any gears not found serviceable.

2. Remove the oil pressure relief valve cap, spring and valve. See Figure 2-55. Remove the oil filter by-pass valve cap, spring, and valve.

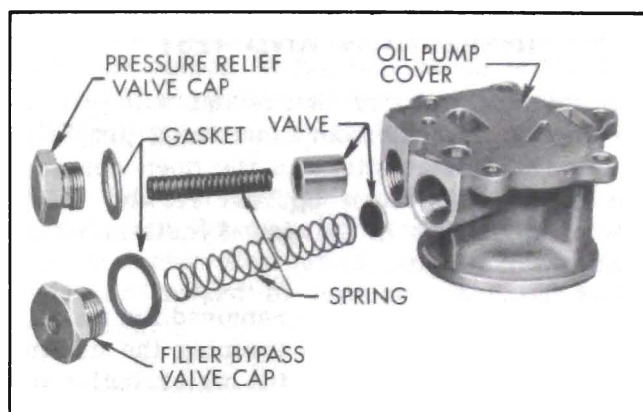


Figure 2-55—Oil Pump Cover Exploded View

3. Wash the parts thoroughly and inspect the relief valve for wear or scoring. Check the relief valve spring to see that it is not worn on its side or collapsed. Replace any relief valve spring that is questionable. Thoroughly clean the screen staked in the relief valve bore of the cover.

4. Check the valve in its bore in the cover. The valve should have no more clearance than an easy slip fit. If any perceptible side shake can be felt the valve and/or the cover should be replaced.

5. Check filter by-pass valve for cracks, nicks, or warping. The valve should be flat and free of nicks or scratches.

### c. Assembly and Installation

1. Lubricate and install pressure relief valve and spring in bore of oil pump cover. See Figure 2-55. Install cap and gasket torque cap to 30-35 pounds with a reliable torque wrench. Do not over-tighten.

**NOTE:** Pressure relief valve cap has no hole tapped for installation of oil pressure switch.

2. Install filter by-pass valve flat in its seat in cover. Install spring, cap and gasket. Torque cap to 30-35 ft. lbs. using a reliable torque wrench.

3. Install oil pump gears and shaft in oil pump body section of timing chain cover to check gear end clearance.

4. Place a straight edge over the gears and measure the clearance between the straight edge and the gasket surface. Clearance should be between .0018" and .0058". If clearance is less than .0018" check timing chain cover gear pocket for evidence of wear.

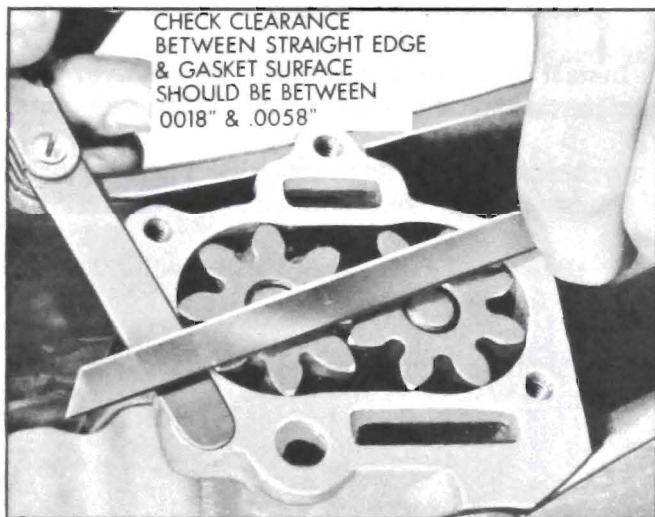


Figure 2-56—Checking Oil Pump Gear End Clearance

5. If gear end clearance is satisfactory, remove gears and pack gear pocket full of petroleum jelly. Do not use chassis lube!!!

6. Reinstall gears so petroleum jelly is forced into every cavity of the gear pocket and between the teeth of the gears. Place new gasket in position. See Figure 2-55.

**NOTE:** This step is very important. Unless the pump is packed with petroleum jelly, it may not prime itself when the engine is started.

7. Install cover assembly screws. Tighten alternately and evenly. The torque specification is 10-15 ft. lbs.

8. Install filter on nipple.

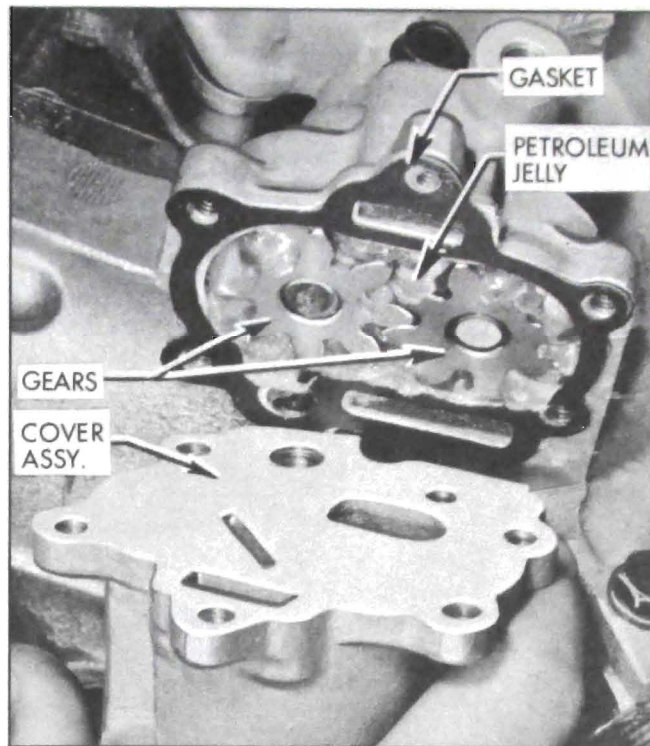


Figure 2-57—Oil Pump Packed With Petroleum Jelly

#### d. Removal and Inspection of Oil Pump Pipe and Screen Assembly

1. Raise car and support on stands.
2. Drain oil.
3. Disconnect exhaust pipe at crossover.
4. If Synchromesh equipped, loosen clutch equalizer to frame attaching bolts.
5. Remove steering idler arm bracket to suspension crossmember attaching bolts.
6. Support engine either with a jack under the oil pan, or with chains around the exhaust manifold.
7. Remove bolts and nuts attaching engine mounts to mount brackets.
8. Raise engine and insert bolts through bracket bolt holes, then lower engine so mounts rest on bolts.
9. Remove lower flywheel housing bolts. Remove housing.
10. Remove oil pan bolts and lower oil pan

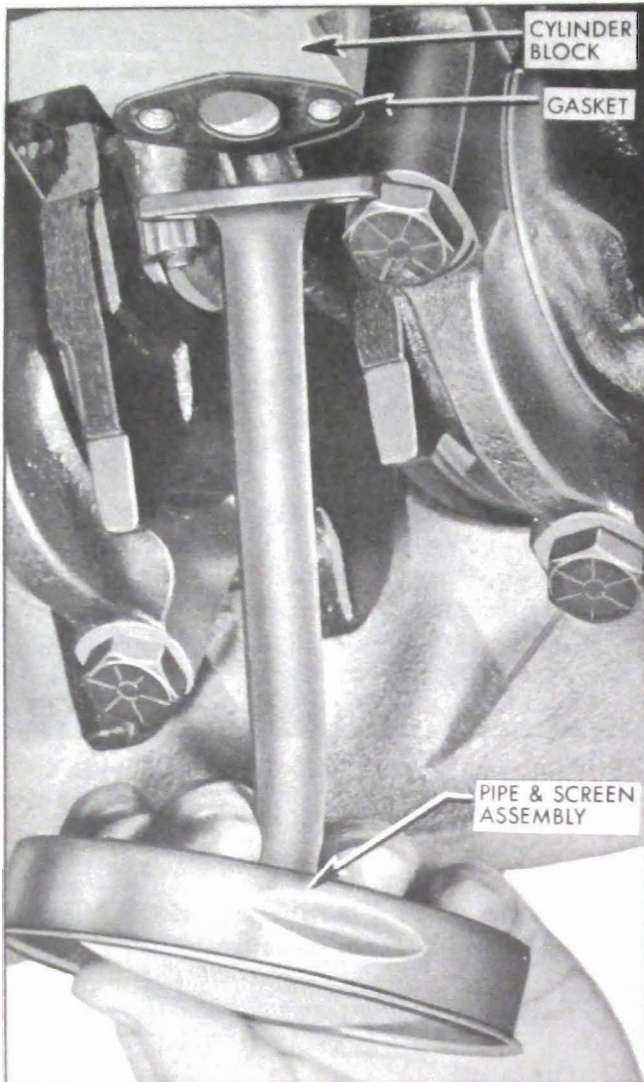


Figure 2-58—Installation of Oil Pump Pipe and Screen Assembly

enough to remove oil pump pipe and screen to cylinder block bolts. See Figure 2-58.

11. Rotate crankshaft to provide maximum clearance at forward end of oil pan. Move front of pan to the right and lower pan through opening between crossmember and steering linkage intermediate shaft.

12. Clean oil pan. Pry screen out of housing and examine for evidence of clogging due to deposit of sludge or other foreign material.

13. Clean the screen and housing thoroughly in solvent and blow dry with air stream.

14. Snap screen into housing.

#### **e. Installation of Oil Pan, Oil Pump Pipe and Screen Assembly**

Install by reversing removal procedure, paying particular attention to the following points.

1. Make sure oil pump pipe flange gasket surface of block is smooth and free of dirt.

2. Use a new gasket and tighten bolts to 10-15 ft. lbs. torque.

3. Tighten pan bolts evenly. Do not over tighten.