COOLING SYSTEM
DATA AND SPECIFICATIONS

Models		P-30 and LP-1	P-31 and LP-2	LP-2
		230 cu. in.	301-318 cu. in.	350 cu. in.
Cooling System Type		Pressure Vent		
Radiator Relief Pressure		14 P.S.I.		
Radiator Core Type		Fin and Tube		
Water Pump	Type	Centrifugal		
	Bearings	Ball Bearing Assembly		
Bypass Recirculation		Internal		
Radiator Hoses	Lower—Type	Moulded Curved Rubber		
	Lower—Inside Dia.	1.5 in.		
	Upper—Type	Moulded Curved Rubber		
	Upper—Inside Dia.	1.5 in.		
Cooling Capacity—Quarts		13 qts. 14 qts. (with heater)	20 qts. 21 qts. (with heater)	16 qts. 17 qts. (with heater)
Thermostat—Starts to Open		157—162°F.		
Thermostat—Fully Open		185°F.		
Fan	Number of Blades & Spacing	4—76°, 104° (V-8 with air conditioning Six blade, 45°-75°-60°		
	Diameter	17 in. (sq. tip)	18 in. (curved tip)	
	Ratio—Fan To Crankshaft R.P.M.	.95 to 1		
Thermostat Type		Choke, Pellet actuated		

BELT TENSION SPECIFICATIONS

Type of Accessories		New Belt (in.)	Used Belt (in.)	Location
V-8 318 cu. in.	Standard	5/32	¼	between generator and water pump
	Power Steering	1/16	⅛	between crankshaft and power steering pump
	Air Conditioning	3/16 5/64	5/16 3/32	between compressor and generator between idler and water pump
V-8 350 cu. in.	Standard	⅛	¼	between generator and water pump
	Power Steering	⅛	3/16	between crankshaft and power steering pump
	Air Conditioning	¼ 1/16	⅜ ⅛	between generator and compressor between idler and fan
6 cyl. 1957	Standard and Power Steering	3/16	¼	between generator and water pump
6 cyl. 1958	Standard	3/32	5/32	between generator and water pump
	Power Steering	3/32 3/32	5/32 7/32	between power steering pump and water pump between generator and water pump

PART TWO—ENGINE AND ELECTRICAL

SECTION V—COOLING SYSTEM

1. PRESSURE SYSTEM

The radiator is equipped with a 14 lb. pressure vent type radiator cap. See Figure 1. Under severe driving conditions, such as highload hill climbing, heavy traffic conditions, stop and go driving and high altitude driving where temperatures are above 100 degrees Fahrenheit, the gauge will read near the hot mark. The pressure cap is designed to operate only under abnormally high temperatures. Under normal conditions, no pressure is built up within the radiator, thus prolonging the life of the cooling system.

When removing the pressure cap, turn the cap counter-clockwise to stop. This will release built-up pressure through the overflow tube. To remove cap after pressure has been released, press down and continue to turn cap counter-clockwise. The coolant level should be 2 inches from the top of filler neck at normal engine operating temperature.

2. CLEANING THE COOLING SYSTEM

Large deposits of rust, scale and sediment can be prevented from forming in the cooling system by the occasional use of a reputable cooling system cleaner. In areas where the water contains a high percentage of minerals, the cooling system should be cleaned at regular intervals; otherwise, it may be necessary to remove the top or bottom tanks of the radiator to clean the core.

Reverse flushing will loosen and remove deposits of rust, scale and sediment more thoroughly than ordinary flushing. Reverse flushing of the cooling system is accomplished by forcing air and water through the system in the direction opposite that of the normal flow of water in the system.

Keep the radiator core openings clean so that air can pass through the openings unobstructed. Use an air hose on the back side of the core to blow out dead bugs, leaves and other particles of dirt that stick to the outer surface of the core.

USE OF COOLING SYSTEM CLEANER

A high quality cooling system cleaner chemically loosens, dissolves, and removes rust and scale that forms in most cooling systems. The cleaner is harmless to the cooling system provided it is used in accordance with directions on the container.

After the engine has been operated the required length of time with temperature around 200 degrees Fahrenheit, drain the cooling system immediately before the loosened sediment has a chance to settle. Be sure to open the drain cock on the left side of 6 cylinder

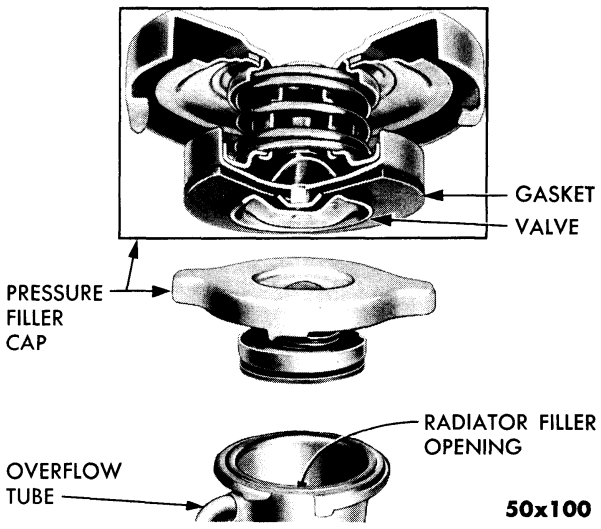

Figure 1—Radiator Pressure Cap

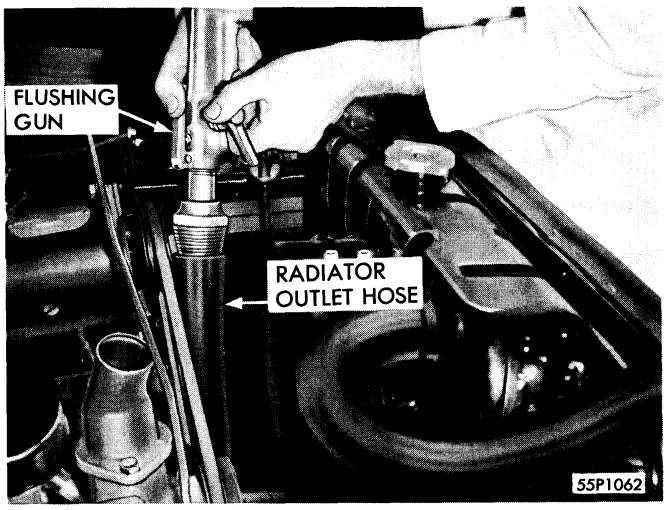

Figure 2—Reverse Flushing Radiator

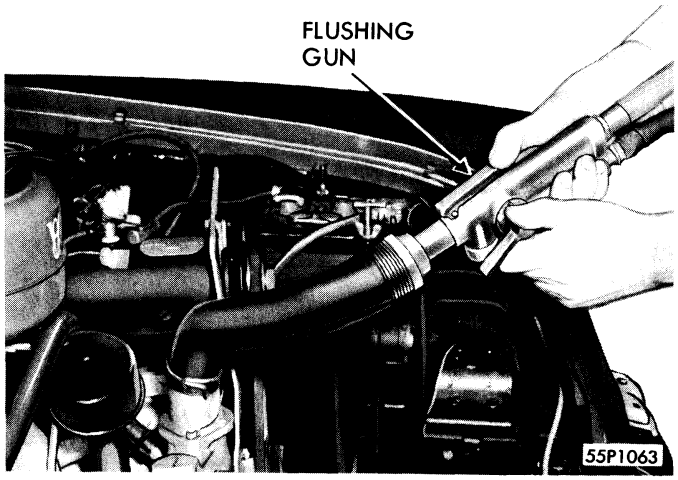

Figure 3—Reverse Flushing Cylinder Block

engines. On 8 cylinder engines open both drain cocks on the left and right side of the cylinder block.

In some instances it may be necessary to repeat the cleaning operation. In unusual cases where systems are badly plugged, it will be necessary to reverse flush the radiator core and cylinder block.

REVERSE FLUSHING RADIATOR

Drain radiator and disconnect hose from radiator inlet. Connect a long section of drain hose to the radiator inlet pipe. See Figure 2. The hose should be long enough to extend outside the engine compartment to allow water and sediment to drain without spilling on the engine or other parts of the car.

Disconnect the radiator outlet hose from water pump and insert flushing gun in hose. First make sure water will flow through radiator, then apply normal water pressure. When it is known water will flow through the core, apply air pressure in short bursts into the water stream to help remove sediment and scale. A pulsating water flow will loosen sediment faster than a steady flow.

CAUTION

Use of excessive water or air pressure may damage the core when using the flushing gun, so be certain that water will flow through core before applying air pressure.

REVERSE FLUSHING CYLINDER BLOCK

If the cylinder block is badly clogged with rust and scale, the water distributor tube (used on PowerFlow 6 engines only) should be removed before reverse flushing the block. If the tube is not removed, the sediment in the block may plug the tube or its slots which direct the flow of water toward the valve ports. On older cars, it may be advisable to remove the core hole plugs to permit thorough cleaning of the block. Core hole plugs are located on left side of PowerFlow 6 engines and on both the left and right side of V-8 engines.

To reverse flush the cylinder block, remove the thermostat and connect a piece of hose, long enough to extend beyond the engine compartment, to the water pump inlet. Connect the radiator inlet hose to the thermostat housing and insert the flushing gun. See Figure 3. Force the water and air pressure through the block until water runs clean. Remove the flushing gun from the radiator inlet hose and insert it in the water pump inlet. Flush the block in the direction coolant normally flows.

USE OF RUST RESISTOR

The use of rust resistor helps prevent the formation of rust and scale in the cooling system. After the cooling system is cleaned, add one pint of a reputable rust resistor to the system, unless an anti-freeze solution containing a rust inhibitor is being used.

It is good practice to feel the inside of the radiator filler neck and inside the radiator top tank for evidence of the formation of scum or rusty particles, and if so, clean the system and fill with fresh water and rust resistor.

3. ANTI-FREEZE SOLUTIONS

During cold weather when atmospheric temperatures fall below freezing (32° F.), the cooling system should be protected with a reputable brand compounded from

denatured alcohol, methanol (synthetic wood alcohol) or ethylene glycol.

CAUTION

Anti-Freeze solutions containing sodium chloride (common table salt), calcium chloride, magnesium chloride, or any inorganic salt, should never be used as an anti-freeze. Water soluble organic products, such as, sugar, honey, or glucose, or any organic crystalline compounds, are not recommended. Mineral oils, such as kerosene, or engine oil, may damage rubber parts and therefore prove harmful.

Before an anti-freeze solution of any type is added to the cooling system, drain and flush the entire system. Replace deterioriated hose and be sure all hose connections are tight. Inspect for possible leakage of cylinder head gasket, outlet elbow gasket and heater connections. If rust or scale is present, reverse flush the cooling system, using a reputable cooling system cleaner.

An alcohol type anti-freeze solution is subject to evaporation. When used in the cooling system, check the solution periodically. If an alcohol-base liquid is spilled on the finish of the car, the finish may become damaged, unless it is washed off immediately with a generous amount of water. Do not use a high temperature thermostat (180° F.) with an alcohol-base anti-freeze solution.

TESTING ANTI-FREEZE SOLUTIONS

The freezing point of anti-freeze solution in the cooling system can be determined with a hydrometer. Always test the solution at the temperature for which the hydrometer is calibrated, and use a hydrometer of the type that will accurately test the particular type anti-freeze solution used.

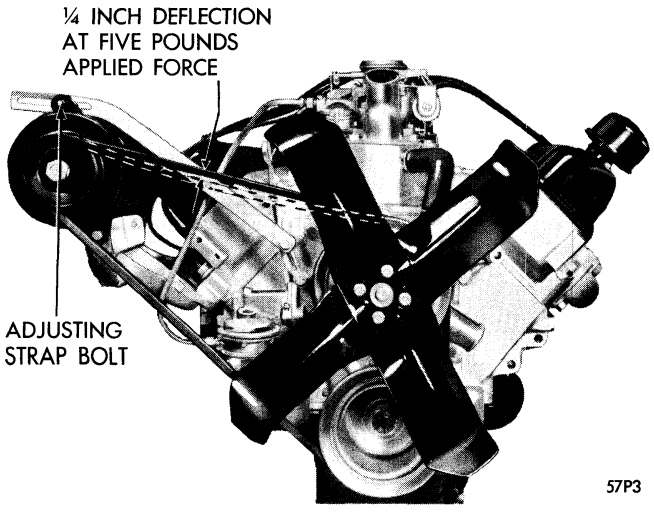

Figure 4—Checking Belt Tension with Straight Edge V-8 Engine (Typical of 6 Cylinder Engine)

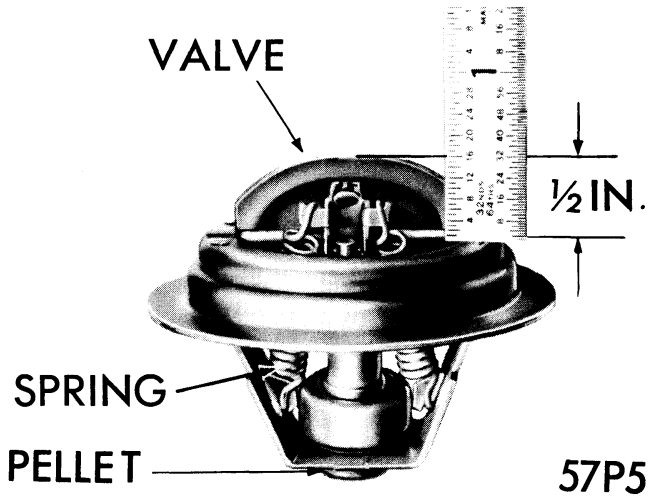

Figure 5—Thermostat

CAUTION

Never add water or anti-freeze solution to an overheated cooling system.

4. FAN BELT

Correct belt tension is important to the proper operation of belt driven units. This is especially true on cars equipped with power steering or air conditioning. A slipping belt due to looseness or grease will cause premature wear of the belt and reduce the efficiency of the driven units. Over-tightening belts will put too great a load on bushings or bearing.

BELT TENSION

To check belt tension, place a straight edge on the belt between the generator pulley and fan pulley. Apply a 5 pound force at the center of the belt and measure the deflection. See Figure 4. Refer to Belt Tightening Specifications Chart for correct deflection.

5. THERMOSTAT

A choke type pellet actuated thermostat is used on all models. Refer to Figure 5.

The pellet contains a paste mixture and as the pellet absorbs heat, the paste liquefies and increases in volume. This expansion moves the piston up which in turn opens the valve against the tension of the springs.

If there is evidence of overheating, carefully inspect the pellet for leakage and test the thermostat for proper operation.

A special high temperature thermostat that starts to open at about 180 degrees Fahrenheit is available from

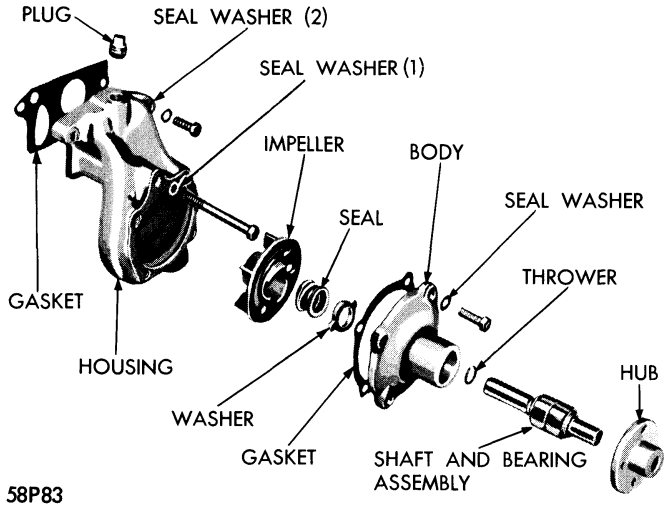

Figure 6—Water Pump—Disassembled 6 Cylinder Engine

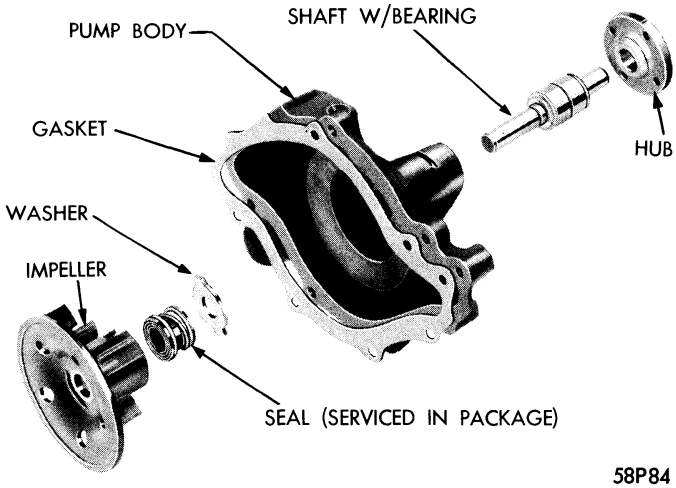

Figure 7—Water Pump—Disassembled Typical of 277, 301 and 318 Cubic Inch V-8 Engine

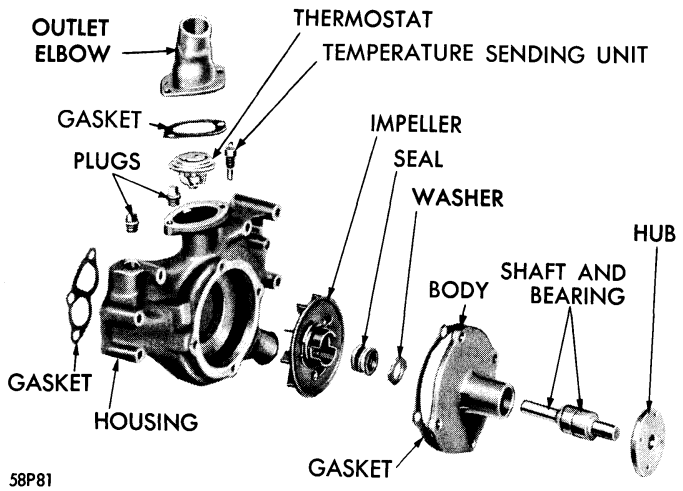

Figure 8—Water Pump—Disassembled Typical of 350 Cubic Inch V-8 Engine

the Chrysler Corporation Parts Division for use in extremely cold climates where more heat is desirable for operation of water type heaters. The high temperature thermostat should not be used with alcohol type anti-freeze solutions. When installing a thermostat always use a new water outlet elbow gasket.

TESTING THERMOSTAT

To test the thermostat, suspend the unit and a reliable thermometer in a pail of water so that they do not contact the bottom of the pail. Heat the water and record the temperature at which the thermostat begins to open. Continue heating and record temperature at which thermostat is fully open. See Cooling System Data and Specifications. The pellet actuated thermostat is fully open when the valve is open approximately $\frac{1}{2}$ inch. See Figure 5.

6. WATER DISTRIBUTION TUBE

The water distribution tube, used only on 6 cylinder engines, should be replaced whenever the engine is completely overhauled. If the tube becomes rusted or corroded, overheating of the engine may occur due to failure of the water to circulate properly through the cylinder block.

To replace the tube, remove the radiator core and water pump. Pull the tube out of the cylinder block with a stiff hooked rod. See Figure 9. Install tube with slots up and be sure the tube is inserted far enough into block so that water pump will seat properly against the block.

7. WATER PUMP

Ball bearing type water pumps are used on both 6 cylinder and V-8 engines.

The bearing and shaft assembly are combined in a single replaceable unit which is press fit into the pump

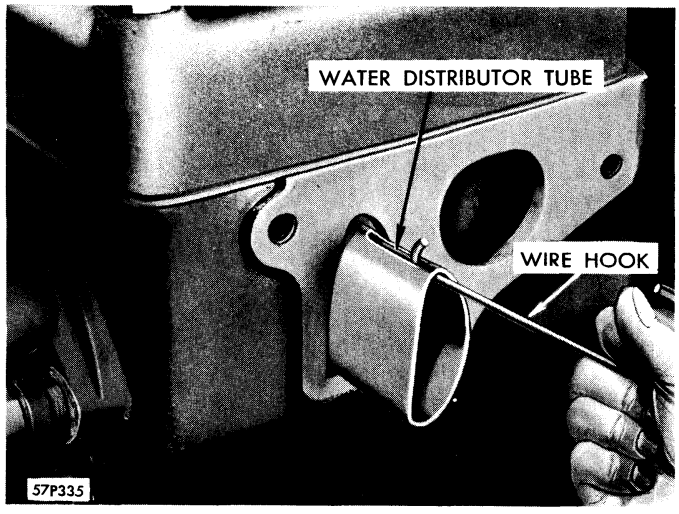

Figure 9—Removing Water Distribution Tube 6 Cylinder Engine

body. The shaft and bearing assembly is prelubricated and sealed at both ends of the bearing race by seal retainers. No lubrication of this type pump is required. The assembly is serviced as a unit. See Figures 6, 7, and 8.

DISASSEMBLY

The hub and plastic impeller on both 6 cylinder and V-8 engines is press fit on the shaft and can be removed by using Tool C-412 as shown in Figure 10. Whenever the seal or shaft assembly is to be serviced the impeller must be removed. To do this, break the plastic impeller away from the steel insert and remove the neoprene seal assembly from the shaft. Install Tool C-3476 and remove the steel insert from the shaft as shown in Figure 11.

INSPECTION

Clean the pump housing in a suitable solvent and inspect for porosity. Check mating surface of pump body for parallelism. Surface should be free of nicks or burrs.

REFACING SEAL SEAT

Use tool C-551 to reface the seal seat. Turn the tool in an even clockwise direction until a smooth, full cut has been taken. Do not remove any more metal from the seat than is necessary to provide a smooth surface. Continue to turn tool clockwise as it's removed. This will prevent leaving a ridge on the front seat. See Figure 12.

After seat is refaced, lap the seat with emery cloth discs SP-1527 to obtain a smooth seal seat. Place the discs under the teeth of the refacing tool and perform the final lapping operation by rotating tool until all cutter marks are removed.

INSTALLING BEARING ASSEMBLY

The bearing and shaft assembly is held in the pump body by a press fit. Use installing sleeve C-3468 for this operation. See Figure 13. Start the bearing assembly straight in the pump body and install the sleeve over the shaft on to the lower surface of the seal retainer. Press the bearing into the body. Do not press the bearing to the shoulder of the sleeve. The bearing assembly should be pressed into the body $\frac{3}{32}$ inch as measured from the end of the pump to the outer surface of the seal retainer. See Figures 14, 15, and 16.

NOTE

Do not install bearing assembly by driving on the sleeve or by driving on the shaft as this will damage the seal retainer and also the bearings and races.

INSTALLING SEALS AND IMPELLER

Place thrust washer and seal on impeller end of shaft. Support pump on hub end of the shaft. Position impeller

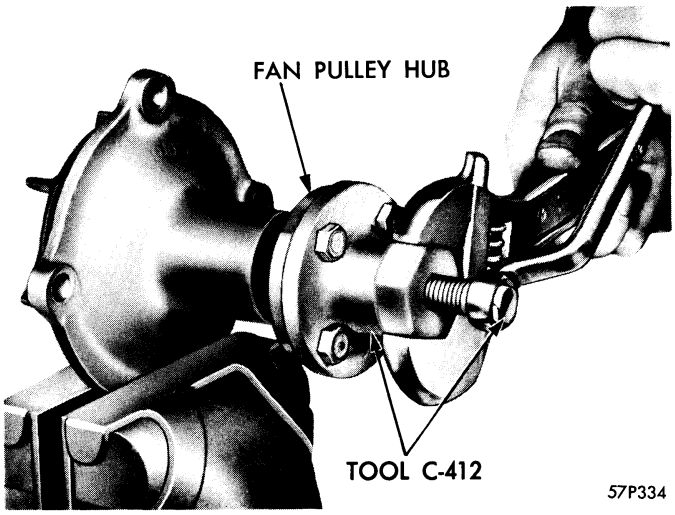

Figure 10—Removing Fan Pulley Hub—6 Cylinder Engine Typical of V-8 Engine

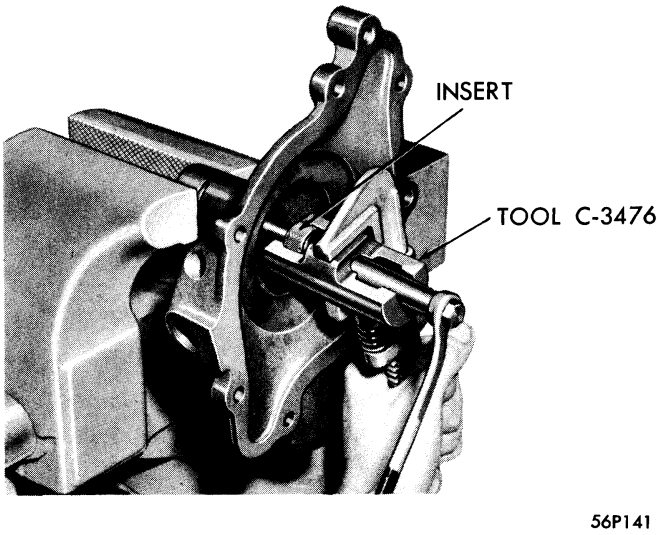

Figure 11—Removing Impeller Insert with Tool C-3476 Typical of All Pumps

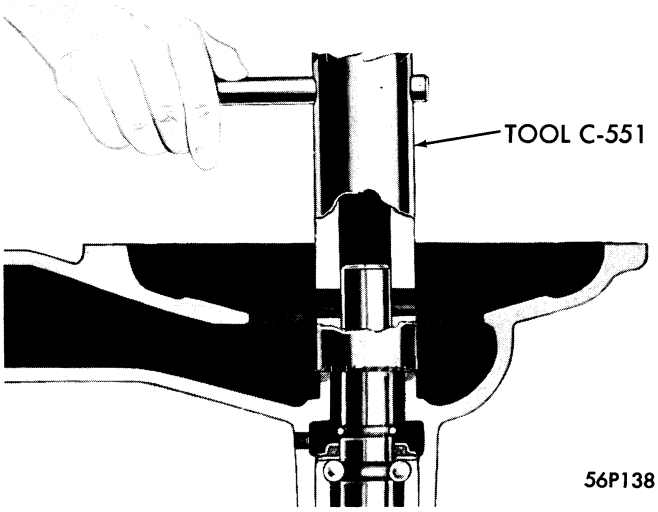

Figure 12—Refacing Seal Seat Using Tool C-551 Typical of All Pumps

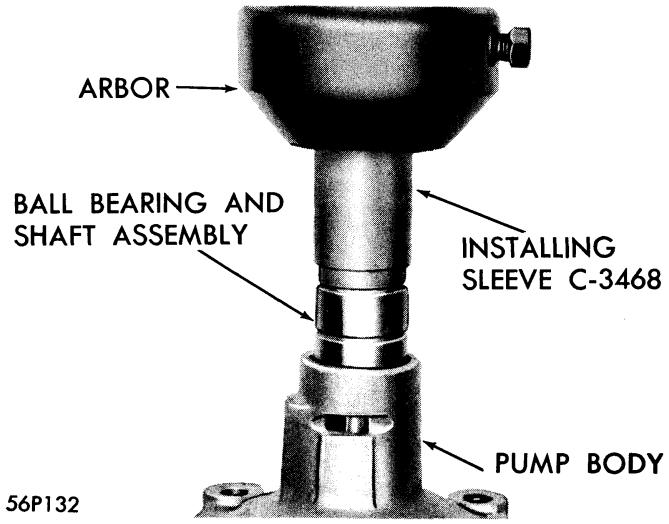

Figure 13—Installing Shaft and Bearing Assembly Using Sleeve C-3468—Typical of All Pumps

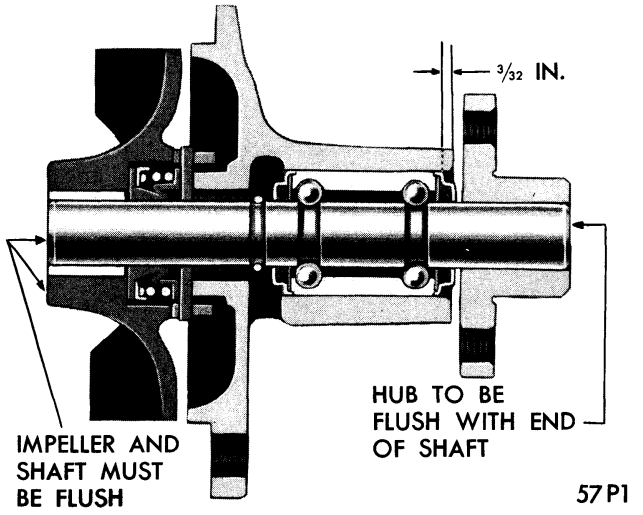

Figure 14—Cross-Sectional View of 6 Cylinder Engine Water Pump

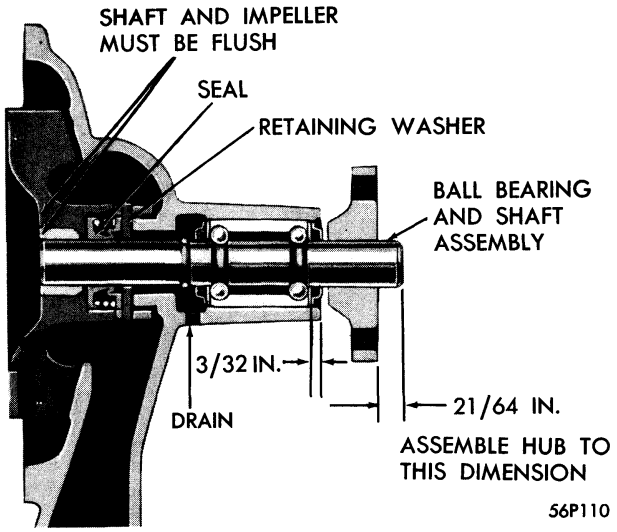

Figure 15—Cross-Sectional View of Water Pump Typical of 277, 301 and 318 Cubic Inch V-8 Engine

on shaft making sure that the notches in the impeller will index exactly with the engaging ears of the thrust washer. Then press on impeller, applying pressure only to the insert of the impeller. Insert should be flush with end of shaft. See Figures 14, 15 and 16.

INSTALLING WATER PUMP HUB

The hub is held to the shaft by a friction fit on both V-8 and 6 cylinder engine water pumps.

Press hub on to dimension shown in Figures 14, 15 and 16. Use drill fixture C-783 on pinned hubs to insure a straight hole through the shaft and hub. Drive new pin in until it is below surface of hub.

8. TEMPERATURE GAUGE

The temperature gauge is an electro-magnetic type and consists of an engine sending unit and a panel unit connected by a single wire. For complete servicing and testing data, refer to Part 3, Section 4, Instruments and Gauges.

9. DIAGNOSIS PROCEDURES

LEAKAGE

1. RADIATOR HEATER AND CONNECTIONS—Inspect all hose connections for radiator and heater. Inspect radiator and heater cores for seepage of water. Inspect seams and soldered connections in top and bottom tanks of radiator. Inspect water outlet elbow for leakage at gasket.

Leakage of water or anti-freeze will usually leave some trace of rust or dye from the anti-freeze solution.

2. CYLINDER HEAD AND GASKET—A slight amount of seepage of the dye in certain types of anti-freeze solutions will cause some discoloration at the cylinder head

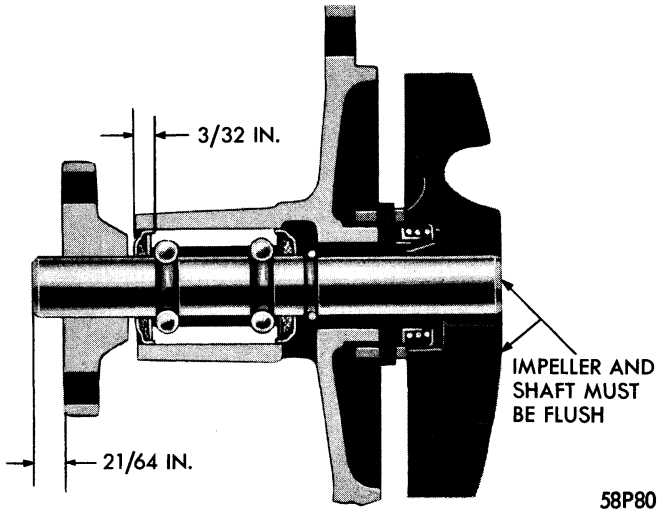

Figure 16—Cross-Sectional View of 350 Cubic Inch V-8 Engine Water Pump

gasket. This does not always indicate that the gasket is leaking excessively. If there is an actual loss of coolant, indicated by frequent necessity of adding water to the radiator, and no other source of leakage can be found, the gasket should be replaced, using sealing compound on both sides of the gasket and on the cylinder head cap screws. Do not use sealing compound on the three screws that lead into the intake manifold ports on 6 cylinder engines.

When tightening a cylinder head, always use a torque wrench. Draw the cap screws down uniformly tight and in the proper sequence, to avoid distortion of the cylinder head and block. Always re-tighten the cylinder head after the engine has been allowed to warm up.

Following are other possible points of leakage at the cylinder head:

(a) 6 Cylinder Engines—Core hole plug at left rear end of cylinder head; accelerator bell crank stud which extends into the cylinder head water passage. Be sure copper washer is used under the stud.

(b) V-8 Engines—Cover plates at rear of right and left cylinder head. Center bolts on each side of manifold exhaust cross over branch. The left and right water passage branch of the water pump housing leading to the left and right cylinder heads.

3. CYLINDER BLOCK — There are several points where coolant can leak from the cylinder block:

(a) 6 Cylinder Engine—Five core hole plugs are used on the left side of the block, as well as the cylinder block drain plug screwed into the water passage. A core hole plug is also used at the rear of the block above the rear main bearing under the clutch bell housing. Another core hole plug is used at the front of the block under the chain case cover plate. The water pump attaching screws extend into the water passage. The two long cap screws for the intake and exhaust manifold assembly (adjacent to the riser section) extend into the water passages.

(b) V-8 Engines—Three core hole plugs and a drain pipe plug are used on the left and right sides of the cylinder block. Two pipe plugs are used at the rear of the engine block. Gaskets are used between the left and right water passage branch of the water pump housing and the front of the engine block.

4. WATER PUMP—Leakage of water due to worn parts in the water pump is usually evident between the thrust face of the front bushing and the fan pulley hub. If the pump is leaking, it should be removed and reconditioned.

LOSS OF WATER (WITHOUT APPARENT LEAKAGE)

1. RADIATOR—Restriction of the passages in the radiator core due to sediment or rust will cause the coolant level to rise when the engine is running and coolant will be lost through the overflow tube.

2. COMPRESSION LEAK AT CYLINDER HEAD GASKET OR AIR LEAK AT SUCTION SIDE OF WATER PUMP—Displacement of the coolant in the radiator core and loss through the overflow tube can be caused by a compression leak at the cylinder head gasket or by air entering the coolant at the suction side of the water pump.

To determine whether either condition exists, first remove the cap and apply masking tape over the filler neck making sure that there is no air leak. Attach a hose to the overflow pipe and put the end into a pail of water. Run the engine long enough to obtain operating temperature.

If bubbles appear in the water when the engine is accelerated, loosen the fan belt so that it will not drive the water pump and again accelerate the engine for a short period of time. If air bubbles still appear in the water, air is leaking past the cylinder head gasket, into the cooling system. Tighten cylinder head cap screws to specified torque. If leakage is still evident, replace the gasket and inspect the surfaces of the cylinder head and block for small cracks.

If bubbles do not appear in the water when the engine is accelerated with water pump inoperative, air may be leaking into the system at the water pump. It is possible for the connection to be tight enough to stop a water leak, but not an air leak.

OVERHEATING

The common causes of overheating, which are directly traceable to the cooling system, are clogging, improper circulation of coolant, or running engine when coolant level is low. Overheating may also be due to incorrect ignition or valve timing, or dragging brakes.

Another cause of a rise in engine temperature above normal is unusual operating conditions, such as: Overloading of the car; driving in heavy mud or sand; operation (or excessive engine idling) under extreme conditions of heat or altitude. A special radiator, having additional cooling capacity should be used for continued operation under such unusual conditions.

IMPORTANT

The thermostat is seldom responsible for overheating. If damaged, the bellows expands and the valve stays in the wide-open position.

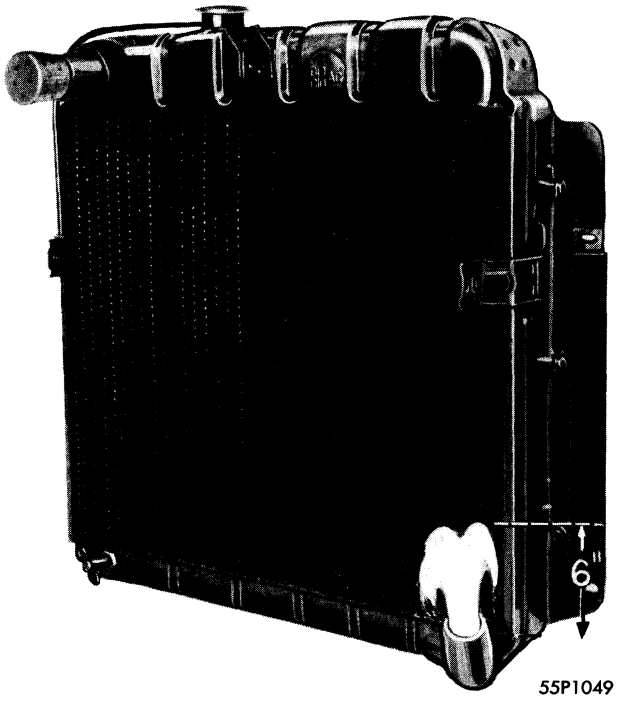

Figure 17—Testing for Clogged Radiator Core

1. FAN BELT—If the fan belt is loose, or slipping, the water pump will not circulate coolant at the proper rate to cool the engine. To test fan belt for tightness, place a straight-edge across fan belt from generator pulley to fan belt pulley. Belt is properly adjusted if it can be pushed downward with finger ¼ inch from straight-edge (between the pulleys.) See Belt Tension Specifications Chart.

Make sure the fan belt is in good condition. If worn, it may be stretched and slipping.

2. HOSE CONNECTIONS—Check for collapsed or plugged radiator hose, causing restriction to circulation of coolant.

3. RADIATOR—To test for clogged radiator core, remove the top and bottom radiator hose and insert plugs in the inlet and outlet connections. See Figure 17. Fill the radiator with water. Then remove the plug from the bottom connection. If the passageways in the core are not clogged, the column of escaping water should extend 5 to 6 inches above the lower connection.

Use an air hose on the back of the radiator core to blow out dead bugs, leaves, and other particles of dirt that would restrict the flow of air through the core.

4. CYLINDER BLOCK—A restricted distributor tube in PowerFlow 6 engines or passageways clogged with rust and scale will cause poor circulation of the coolant. Remove distributor tube and reverse flush the cylinder block.

ENGINE WARMUP—SLOW

If the cooling system is dirty, sediment may collect in the folds of the thermostat bellows and prevent the valve from seating fully. Cover the radiator and bring the engine temperature up to about 180 degrees to be sure the thermostat is open. Then continue to run the engine at a fast speed to increase water circulation and wash out sediment in thermostat. Drain the cooling system immediately and refill with clean water.

If the engine does not warm-up as quickly as it should considering the atmospheric temperature, the thermostat may be permanently stuck in the open position.