COOLING

CONTENTS

GENERAL INFORMATION

COOLING SYSTEM

The cooling system consists of an engine cooling module, thermostat, coolant, a water pump to circulate the coolant. The engine cooling module may consist of a radiator, electric fan motor, fan, shroud, coolant reserve system, transmission oil cooler, hoses, clamps, air condition condenser and transmission oil lines.

- When the Engine is cold: The thermostat is closed; the cooling system has no flow through the radiator. The coolant flows through the engine, heater system and bypass.
- When the Engine is warm: Thermostat is open; the cooling system has flow through radiator, engine, heater system and bypass.

GENERAL INFORMATION (Continued)

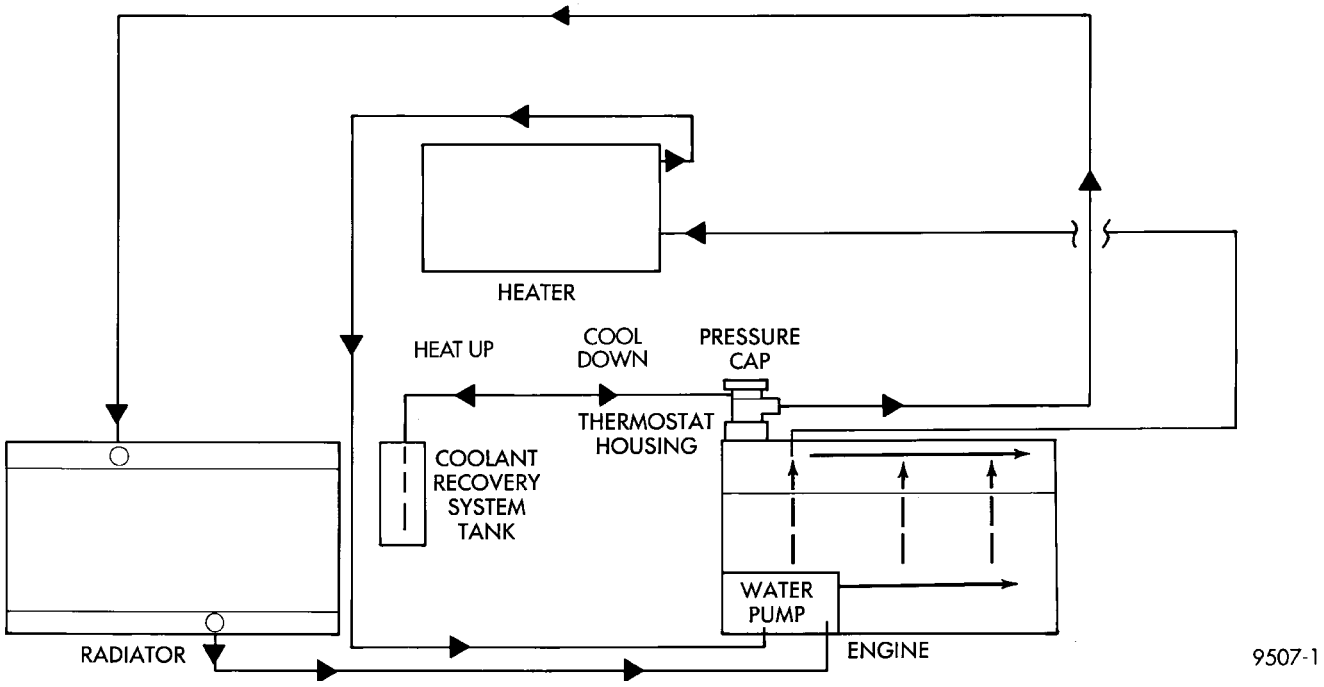


Fig. 1 Cooling System Operation

Coolant flow circuit for the 2.0L engine is shown in (Fig. 1).

During any reassembly procedures all pipe fittings in water jacket, and waterbox require cleaning and application of thread sealant for entire length of threads.

ACCESSORY DRIVE BELTS

If the engine is equipped with power steering or air conditioning, it will have 2 drive belts. One belt drives the generator, the other drives the Power Steering and Air Conditioning. (Fig. 2)

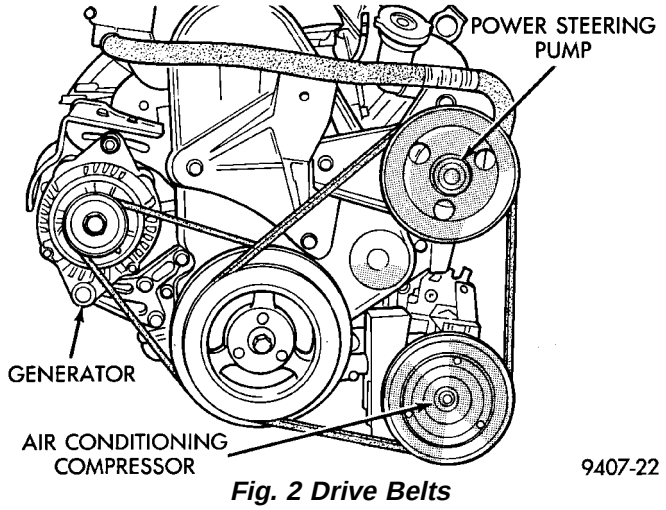


Fig. 2 Drive Belts

COOLANT RECOVERY SYSTEM (CRS)

This system works in conjunction with the radiator pressure cap to utilize thermal expansion and contraction of the coolant to keep the coolant free of trapped air. The system provides space for expansion and contraction, and a convenient safe method for checking and adjusting the coolant level and at atmospheric pressure without removing the pressure cap. It also provides some reserve coolant to compensate for minor leaks and evaporation or boiling losses. All vehicles are equipped with this system (Fig. 3).

See Coolant Level Check, Service Procedures. Deaeration and Pressure Cap sections for operation and service.

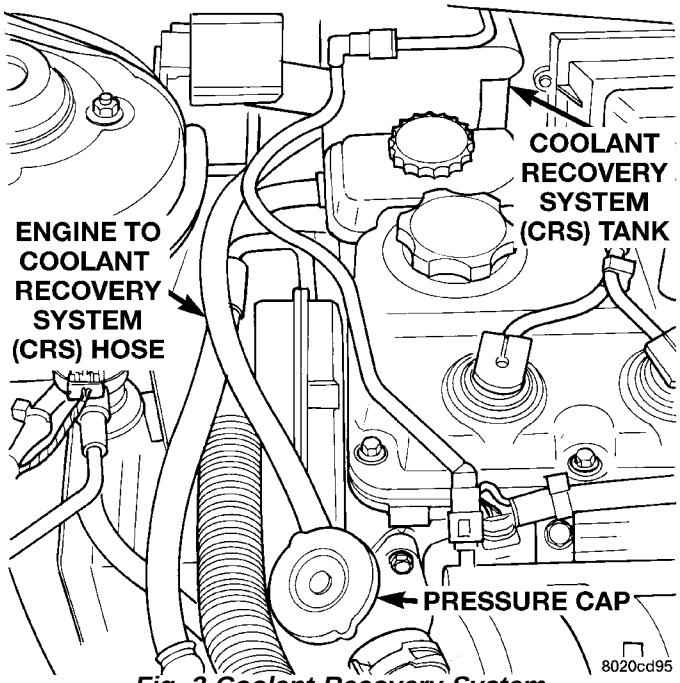


Fig. 3 Coolant Recovery System

GENERAL INFORMATION (Continued)

ENGINE THERMOSTAT

The engine thermostat is located on the front of the engine (radiator side) in the thermostat housing/ engine outlet connector. The thermostat has an air bleed (vent) located in the flange and a O-ring for sealing incorporate on it. There is a relief in the thermostat housing/outlet connector for the O-ring.

WATER PUMP

The water pump has a diecast aluminum body and housing with a stamped steel impeller. The water pump bolts directly to the block (Fig. 4). Cylinder block to water pump sealing is provided by a rubber O-ring. The water pump is driven by the timing belt. Refer to Group 9, Engine section for component removal to access the water pump.

NOTE: The water pump on all models can be replaced without discharging the air conditioning system.

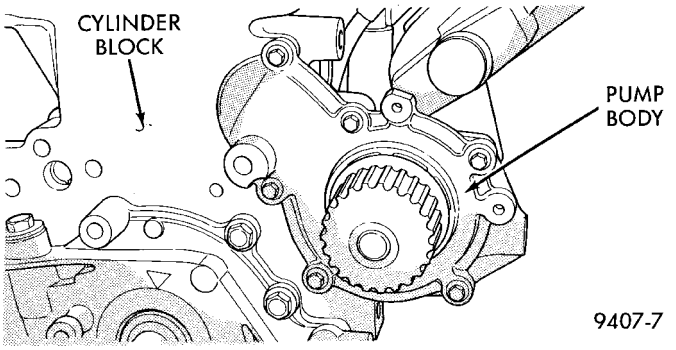


Fig. 4 Water Pump

COOLANT

The cooling system is designed around the coolant. The coolant must accept heat from engine metal, in the cylinder head area near the exhaust valves. Then carry this heat to the radiator where the tube/fin assemblies of these components can give off the heat to the air.

COOLANT REPLACEMENT

Refer to Group 0, Lubrication and Maintenance for schedule.

COOLING SYSTEM PRESSURE CAP

The cooling system is equipped with a pressure cap that releases pressure at some point within a range of 97-124 kPa (14-18 psi) (Fig. 5).

The system will operate at higher than atmospheric pressure, which raises the coolant boiling point, allowing increased radiator cooling capacity.

AUTOMATIC TRANSMISSION OIL COOLER

Oil coolers are internal oil to coolant type, mounted in the radiator lower tank (Fig. 6). Rubber oil lines

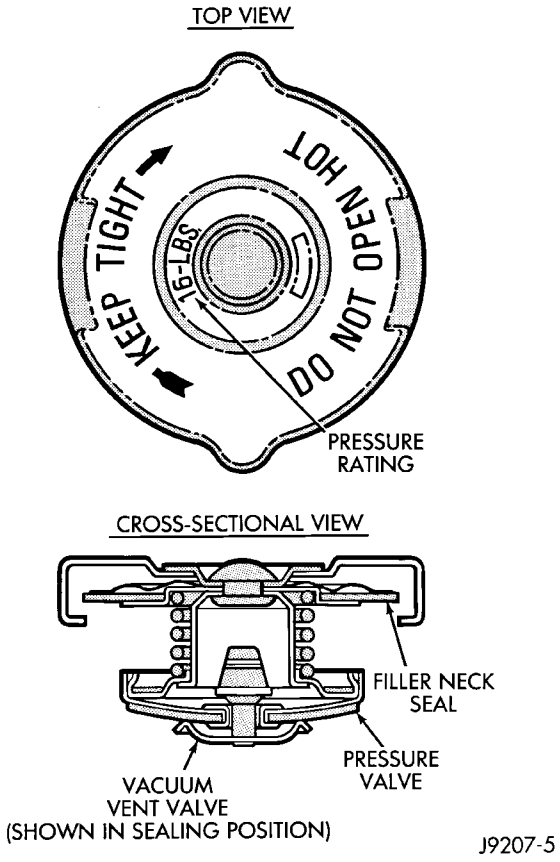


Fig. 5 Cooling System Pressure Cap

feed the oil cooler and the automatic transmission. Use only approved transmission oil cooler hose. Since these are molded to fit space available, molded hoses are recommended. Tighten Oil Cooler Hose Clamps to 2 N·m (18 in. lbs.).

RADIATOR

The radiator is a down-flow type (vertical tubes) with design features that provide greater strength, as well as sufficient heat transfer capabilities to keep the engine satisfactorily cooled (Fig. 6).

ENGINE BLOCK HEATER

The engine block heater is available as an optional accessory. The heater, operated by ordinary house current (110 Volt A.C.) through a power cord and connector behind the radiator grille, provides easier engine starting and faster warm-up when vehicle is operated in areas having extremely low temperatures.

DESCRIPTION AND OPERATION

ENGINE THERMOSTAT

The engine cooling thermostats are wax pellet driven, reverse poppet choke type. They are designed

DESCRIPTION AND OPERATION (Continued)

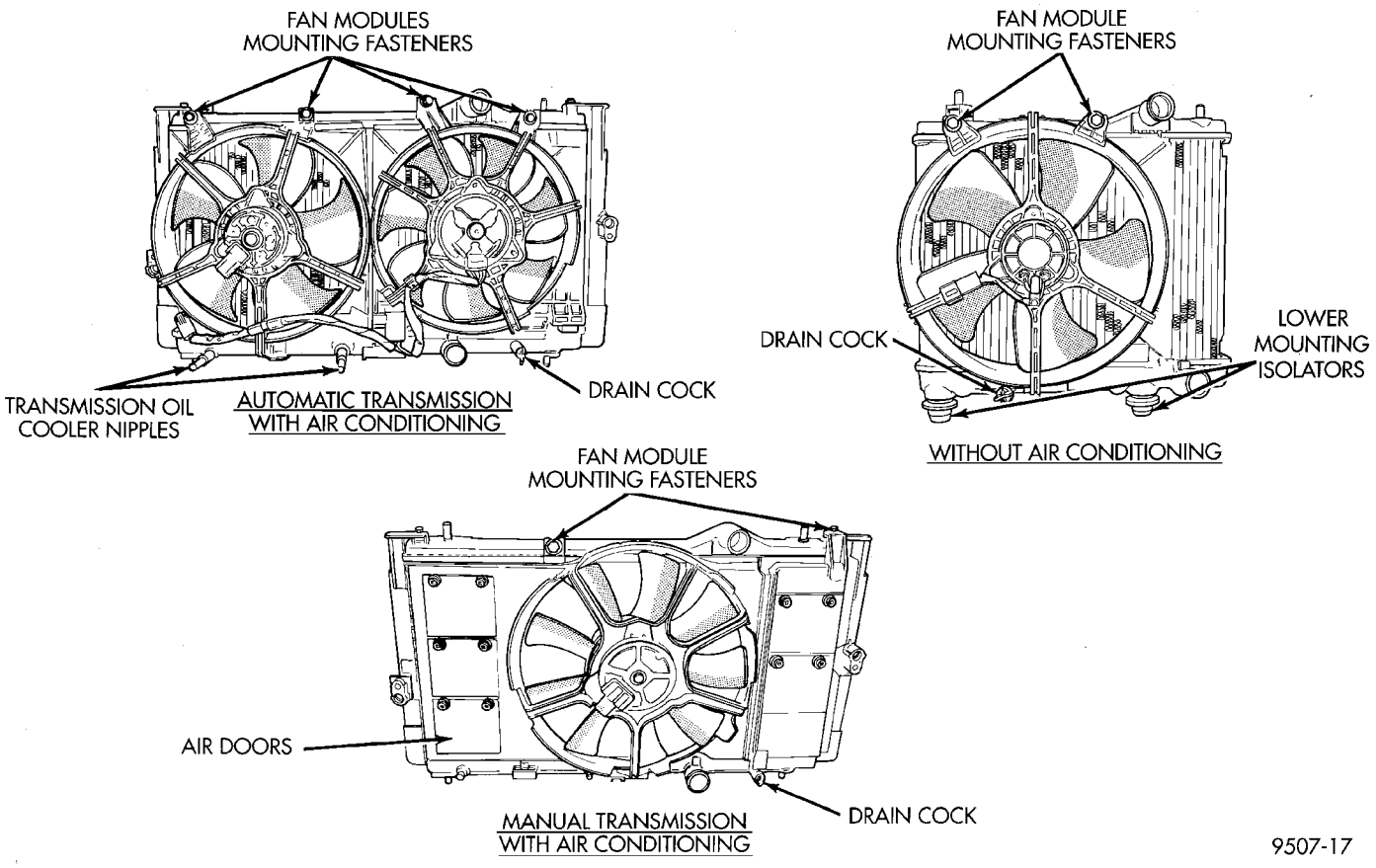


Fig. 6 Cooling Modules

to provide the fastest warm up possible by preventing leakage through them and to guarantee a minimum engine operating temperature of 88 to 93°C (192 to 199°F). They also automatically reach wide open so they do not restrict flow to the radiator as temperature of the coolant rises in hot weather to around 104°C (220°F). Above this temperature the coolant temperature is controlled by the radiator, fan, and ambient temperature, not the thermostat.

Its primary purpose is to maintain engine temperature in a range that will provide satisfactory engine performance and emission levels under all expected driving conditions. It also provides hot water (coolant) for heater performance. It does this by transferring heat from engine metal and automatic transmission oil cooler (if equipped) to coolant, moving this heated coolant to the heater core and radiator, and then transferring this heat to the ambient air.

COOLANT PERFORMANCE

Performance is measurable. For heat transfer pure water excels (Formula = 1 btu per minute for each degree of temperature rise for each pound of water). This formula is altered when necessary additives to control boiling, freezing, and corrosion are added as follows:

- Pure Water (1 btu) boils at 100°C (212°F) and freezes at 0°C (32°F).
- 100 Percent Glycol (.7 btu) can cause a hot engine and detonation and will raise the freeze point to 22°C (-8°F).
- 50/50 Glycol and Water (.82 btu) is the recommended combination that provides a freeze point of -37°C(-35°F). The radiator, water pump, engine water jacket, radiator pressure cap, thermostat, temperature gauge, sending unit and heater are all designed for 50/50 glycol.

Where required, a 56 percent glycol and 44 percent water mixture will provide a freeze point of -59°C (-50°F).

CAUTION: Richer mixtures cannot be measured with field equipment which can lead to problems associated with 100 percent glycol.

SELECTION AND ADDITIVES

The use of aluminum cylinder heads, intake manifolds DOHC, and water pumps requires special corrosion protection. Mopar Antifreeze or their equivalent are recommended for best engine cooling without corrosion. When mixed only to a freeze point of -37°C (-35°F) to -59°C (-50°F). If it looses color or becomes

DESCRIPTION AND OPERATION (Continued)

contaminated, drain, flush, and replace with fresh properly mixed solution.

COOLING SYSTEM PRESSURE CAP

The cooling system is equipped with a pressure cap that releases built up pressure, maintaining a range of 97-124 kPa (14-18 psi).

The cooling system will operate at higher than atmospheric pressure. The higher pressure raises the coolant boiling point thus, allowing increased radiator cooling capacity.

There is a vent valve in the center of the cap that allows a small coolant flow from the coolant reserve system (CRS) tank. This valve is spring loaded in the closed position. However it must be free to open during system cool-down. **If the valve is stuck shut, the radiator hoses will collapse on cool-down. Clean the vent valve (Fig. 7) to ensure proper sealing function.**

There is a gasket in the cap that seals to the top of the filler neck so that vacuum is maintained to draw coolant back into the system from the coolant reserve system (CRS) tank.

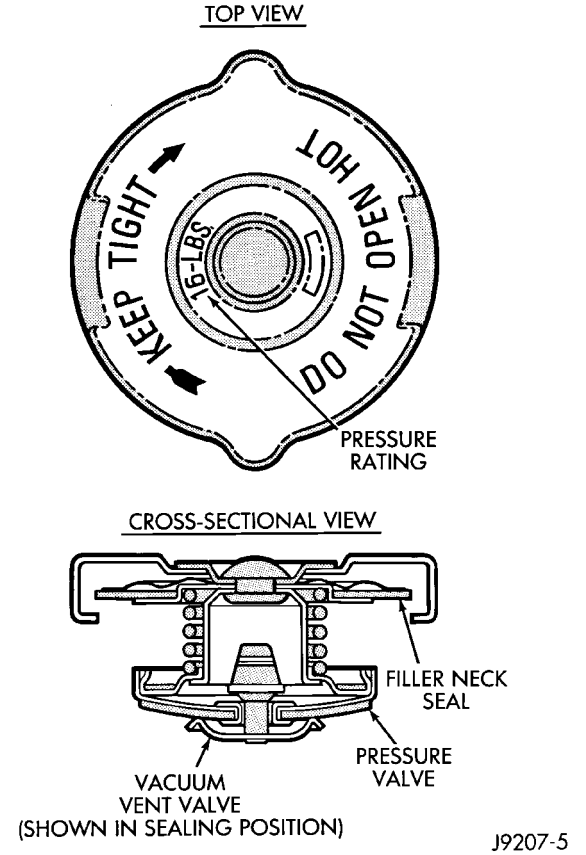


Fig. 7 Cooling System Pressure Cap

RADIATOR HOSES AND CLAMPS

WARNING: IF VEHICLE HAS BEEN RUN RECENTLY, WAIT 15 MINUTES BEFORE WORKING ON VEHICLE. RELIEVE PRESSURE BY PLACING A SHOP TOWEL OVER THE CAP AND WITHOUT PUSHING DOWN ROTATE IT COUNTERCLOCKWISE TO THE FIRST STOP. ALLOW FLUIDS TO ESCAPE THROUGH THE OVERFLOW TUBE AND WHEN THE SYSTEM STOPS PUSHING OUT COOLANT AND STEAM AND THE PRESSURE DROPS CONTINUE SERVICE.

WARNING: CONSTANT TENSION HOSE CLAMPS ARE USED ON MOST COOLING SYSTEM HOSES. WHEN REMOVING OR INSTALLING, USE ONLY TOOLS DESIGNED FOR SERVICING THIS TYPE OF CLAM. ALWAYS WEAR SAFETY GLASSES WHEN SERVICING CONSTANT TENSION CLAMPS.

CAUTION: A number or letter is stamped into the tongue of constant tension clamps. If replacement is necessary, use only a original equipment clamp with matching number or letter.

The hose clamps are removed by using Special Tool 6094 or equivalent constant tension clamp pliers (Fig. 8) to compress hose clamp.

A hardened, cracked, swollen or restricted hose should be replaced. Do not damage radiator inlet and outlet when loosening hoses.

Radiator hoses should be routed without any kinks and indexed as designed. The use of molded hoses is recommended.

Spring type hose clamps are used in all applications. If replacement is necessary replace with the original Mopar equipment spring type clamp.

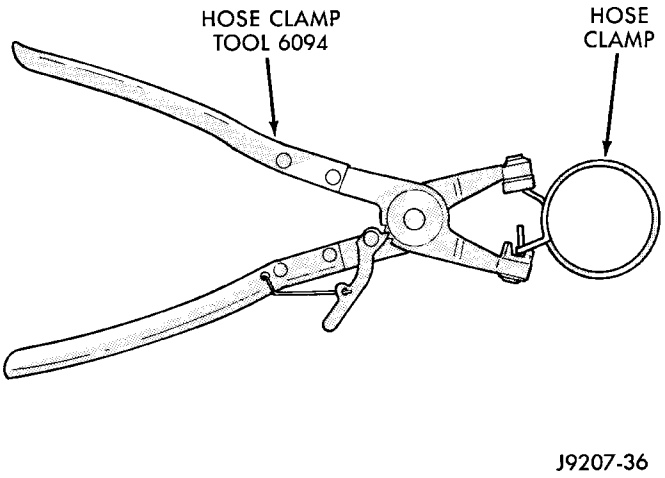


Fig. 8 Hose Clamp Tool

ENGINE BLOCK HEATER

The heater is mounted in a core hole (in place of a core hole plug) in the engine block, with the heating element immersed in coolant. **The power cord**

DESCRIPTION AND OPERATION (Continued)

must be secured in its retainer clips, and not positioned so it could contact linkages or exhaust manifolds and become damaged.

If unit does not operate, trouble can be in either the power cord or the heater element. Test power cord for continuity with a 110-volt voltmeter or 110-volt test light; test heater element continuity with an ohmmeter or 12-volt test light.

WATER PUMP

The water pump body is made of aluminum with a steel impeller. The water pump is bolted to the front of the block, and driven by the timing belt. The water pump is the heart of the cooling system, pumping the coolant through the engine block, cylinder head, heater core, and radiator.

NOTE: The water pump on all models can be replaced without discharging the air conditioning system.

DIAGNOSIS AND TESTING

COOLING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
TEMPERATURE GAUGE READS LOW	1. Has a Diagnostic Trouble Code (DTC) number 17 been set indicating a stuck open engine thermostat?	1. Refer to On Board Diagnostic in Group 25. Replace thermostat if necessary. if the (DTC) number 17 has not been set, the problem may be with the temperature gauge.
	2. Is the temperature gauge (if equipped) connected to the temperature gauge coolant sensor on the engine?	2. Check the connector at the engine coolant sensor. Refer to Group 8E. Repair as necessary.
	3. Is the temperature gauge (if equipped) operating OK?	3. Check Gauge operation. Refer to Group 8E. Repair as necessary.
	4. Coolant level low during cold ambient temperature, accompanied by poor heater performance.	4. Check coolant level in the coolant overflow/reserve tank and the radiator. Inspect the system for leaks. Repair as necessary. Refer to WARNINGS outlined in this section before removing pressure cap.
TEMPERATURE GAUGE READS HIGH OR ENGINE COOLANT WARNING LAMP ILLUMINATES. COOLANT MAY OR MAY NOT BE LOST FROM SYSTEM.	1. Trailer being towed, a steep hill being climbed, vehicle being operated in slow moving traffic, or engine idling during high ambient (outside) temperatures with air conditioning on. High altitudes Could aggravate these conditions.	1. This may be a temporary condition and repair is not necessary. Turn off the air conditioning and drive the vehicle without any of the previous conditions. Observe the temperature gauge the gauge should return to the normal range. If the gauge does not return to the normal range, determine the cause of the overheating and repair. Refer to POSSIBLE CAUSES in this section.
	2. Is temperature gauge (if equipped) reading correctly?	2. Check gauge. Refer to Group 8E. Repair as necessary.
	3. Is temperature warning lamp (if equipped) illuminating unnecessarily?	3. Check warning lamp operation. Refer to Group 8E. Repair as necessary.
	4. Coolant low in overflow/reserve tank and radiator?	4. Check for coolant leaks and repair as necessary. Refer to checking cooling system for leaks in this group.
	5. Pressure cap not installed tightly. If cap is loose, boiling point of coolant will be lowered. Also refer to the following step 6.	5. Tighten cap.
	6. Poor seals at radiator cap.	6. (a) Check condition of cap and cap seals. Refer to Radiator cap Inspection. Replace cap if necessary. 6. (b) Check condition of filler neck. If neck is bent or damaged, replace neck.

DIAGNOSIS AND TESTING (Continued)

COOLING SYSTEM DIAGNOSIS CONT.

CONDITION	POSSIBLE CAUSES	CORRECTION
TEMPERATURE GAUGE READS HIGH OR ENGINE COOLANT WARNING LAMP ILLUMINATES. COOLANT MAY OR MAY NOT BE LOST FROM SYSTEM.	7. Coolant level low in radiator but not in coolant overflow/reserve tank. This means the radiator is not drawing coolant from the coolant overflow/reserve tank as the engine cools. As the engine cools, a vacuum is formed inside the cooling system. If the radiator cap seals are defective, or the cooling system has a leak, a vacuum can not be formed.	7. (a) Check condition of radiator cap and cap seals. Replace cap if necessary. (b) Check condition of filler neck. If neck is damaged, replace filler neck. (c) Check condition of hoses from filler neck to coolant tank. It should be tight at both ends without any kinks or tears. Replace hose if necessary. (d) Check coolant overflow/reserve tank and tank hoses for blockage. Repair as necessary.
	8. Freeze point of coolant not correct. Mixture may be to rich.	8. Check coolant. Refer to coolant section in this group. Adjust glycol to water ratio as required.
	9. Coolant not flowing through system.	9. Check for coolant flow at filler neck with some coolant removed, engine warm and thermostat open. Coolant should be observed flowing through filler neck. If flow is not observed determine reason for lack of flow and repair as necessary.
	10. Radiator or A/C condenser fins are dirty or clogged.	10. Clean insects or debris.
	11. Radiator core is plugged or corroded.	11. Replace or re-core radiator.
	12. Fuel or ignition system problems.	12. Refer to Fuel and Ignition System group for diagnosis. Also refer to the appropriate Powertrain Diagnosis Procedures manual for operation of the DRB scan tool.
	13. Dragging brakes.	13. Inspect brake system and repair as necessary. Refer to Group 5, Brakes for diagnosis.
	14. Bug screen is being used causing reduced air flow.	14. Remove bug screen.
	15. Thermostat partially or completely shut. This is more prevalent on high mileage vehicles.	15. Check thermostat operation and replace as necessary. Refer to thermostats in this group.
	16. Electric cooling fan not operating properly.	16. Check electric fan operation and repair as necessary.
	17. Cylinder head gasket leaking.	17. Check cylinder head gasket for leaks. Refer to testing cooling system for leaks. For repairs, refer to group 9, Engines.
	18. Heater core leaking.	18. Check heater core for leaks. Refer to Group 24, Heating and Air Conditioning. Repair as necessary.

DIAGNOSIS AND TESTING (Continued)

COOLING SYSTEM DIAGNOSIS CONT.

CONDITION	POSSIBLE CAUSES	CORRECTION
TEMPERAUTRE GAUGE READING IS INCONSISTENT (FLUCTUATES, CYCLES OR IS ERRATIC)	1. The gauge may cycle up and down. This is due to the cycling of the electric radiator fan.	1. A normal condition. No correction is necessary. If gauge cycling is going into the hot zone, check electric fan operation and repair as necessary. Refer to procedure outlined in this section.
	2. During cold weather operation, with the heater blower in the high position, the gauge reading may drop slightly.	2. A normal condition. No correction is necessary.
	3. Temperature gauge or engine mounted gauge sensor defective or shorted. Also, corroded or loose wiring in this circuit.	3. Check operation of gauge and repair if necessary. Refer to Group 8E, Instrument Panel and Gauges
	4. Gauge reading rises when vehicle is brought to a stop after heavy use (engine is still running).	4. A normal condition. No correction is necessary. Gauge reading should return to normal range after vehicle is driven.
	5. Gauge reading high after re-starting a warmed-up (hot) engine.	5. A normal condition. No correction is necessary. The gauge should return to normal range after a few minutes of engine operation.
	6. Coolant level low in radiator (air will build up in the cooling system causing the thermostat to open late).	6. Check and correct coolant leaks. Refer to Testing Cooling System for Leaks in this group.
	7. Cylinder head gasket leaking allowing exhaust gas to enter cooling system causing thermostat to open late.	7. (a) Check for cylinder head gasket leaks with a commercially available Block Leak Tester. Repair as necessary. (b) Check for coolant in the engine oil. Inspect for white steam emitting from exhaust system. Repair as necessary.
	8. Water pump impeller loose on shaft.	8. Check water pump and replace as necessary. Refer to Water Pumps in this group.
	9. Loose accessory drive belt (water pump slipping).	9. Refer to Engine Accessory Drive Belts in this group. Check and correct as necessary.
	10. Air leak on suction side of water pump allows air to build up in cooling system causing thermostat to open late.	10. Locate leak and repair as necessary.
PRESSURE CAP IS BLOWING OFF STEAM AND/OR COOLANT TO COOLANT TANK. TEMPERATURE GAUGE READING MAY BE ABOVE NORMAL BUT NOT HIGH. COOLANT LEVEL MAY BE HIGH IN COOLANT RESERVE/ OVERFLOW TANK	1. Pressure relief valve in radiator cap is defective.	1. Check condition of radiator cap and cap seals. Refer to Radiator Caps in this group. Replace cap as necessary.

DIAGNOSIS AND TESTING (Continued)

COOLING SYSTEM DIAGNOSIS CONT.

CONDITION	POSSIBLE CAUSES	CORRECTION
COOLANT LOSS TO THE GROUND WITHOUT PRESSURE CAP BLOWOFF. GAUGE IS READING HIGH OR HOT	1. Coolant leaks in radiator, cooling system hoses, water pump or engine.	1. Pressure test and repair as necessary. Refer to Testing Cooling System for Leaks in this group.
DETONATION OR PRE-IGNITION (NOT CAUSED BY IGNITION SYSTEM). GAUGE MAY OR MAY NOT BE READING HIGH	1. Engine overheating. 2. Freeze point of coolant not correct. Mixture is too rich or too lean.	1. Check reason for overheating and repair as necessary. 2. Check the freeze point of the coolant. Refer to Coolant in the group for test procedure. Adjust the glycol to water ratio as required.
HOSE OR HOSES COLLAPSE WHEN ENGINE IS COOLING	1. Vacuum created in cooling system on engine cool-down is not being relieved through coolant reserve/overflow system.	1. (a) Radiator cap relief valve stuck. Refer to Radiator Cap in this group. Replace if necessary. (b) Hose between coolant resrve overflow tank and radiator is kinked. Repair as necessary. (c) Vent at coolant reserve/overflow tank is plugged. Clean vent and repair as necessary. (d) Reserve/overflow tank is internally blocked or plugged. Check for blockage and repair as necessary.
ELECTRIC RADIATOR FAN RUNS ALL THE TIME	1. Fan relay, powertrain control module (PCM) or engine coolant temperature sensor defective. 2. Check for low coolant level.	1. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the DRB scan tool. Repair as necessary. 2. Repair as necessary.
ELECTRIC RADIATOR FAN WILL NOT RUN. GAUGE READING HIGH OR HOT	1. Fan motor defective. 2. Fan relay, powertrain control modue (PCM) or engine coolant temperature sensor defective. 3. Blown fuse in power distribution center (PDC).	1. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the DRB scan tool. Repair as necessary. 2. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the DRB scan tool. Repair as necessary. 3. Determine reason for blown fuse and repair as necessary.
NOISY FAN	1. Fan blades loose. 2. Fan blades striking a surrounding object. 3. Air obstructions at radiator or air conditioning condenser. 4. Electric fan motor defective.	1. Replace fan blade assembly. Refer to Cooling System Fans in this group. 2. Locate point of fan blade contact and repair as necessary. 3. Remove obstructions and/or clean debris or insects from radiator or A/C condenser. 4. Refer to procedure outlined in this section.

DIAGNOSIS AND TESTING (Continued)

COOLING SYSTEM DIAGNOSIS CONT.

CONDITION	POSSIBLE CAUSES	CORRECTION
INADEQUATE AIR CONDITIONER PERFORMANCE (COOLING SYSTEM SUSPECTED)	1. Radiator and/or air conditioning condenser is restricted, obstructed or dirty. 2. Electric radiator fan not operating when a/c is on. 3. Engine is overheating (heat may be transferred from radiator to A/C condenser. High underhood temperature due to engine overheating may also transfer heat to A/C components).	1. Remove restriction and/or clean as necessary. 2. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the DRB scan tool. repair as necessary. 3. Correct overheating condition. Refer to Group 7, Cooling.
INADEQUATE HEATER PERFORMANCE.	1. Has a diagnostic trouble code (DTC) number 17 been set? 2. Coolant level low. 3. Obstructions in heater hose fittings at engine. 4. Heater hose kinked. 5. Water pump is not pumping coolant to heater core. When the engine is fully warmed up, both heater hoses should be hot to the touch. The accessory drive belt may be slipping causing poor water pump operation.	1. Refer to On-Board Diagnostic in Group 25, and replace thermostat if necessary. 2. Refer to testing cooling system for leaks in this section. Repair as necessary. 3. Remove heater hoses at both ends and check for obstructions. Repair as necessary. 4. Locate kinked area and repair as necessary. 5. Refer to water pump in this group. Repair as necessary. If slipping belt is detected, refer to accessory drive belts in this group. Repair as necessary.
HEAT ODOR	6. Various heat shields are used at certain drive line components. One or more of these shields may be missing.	6. Locate missing shields and replace or repair as necessary.

DIAGNOSIS AND TESTING (Continued)

COOLING SYSTEM DIAGNOSIS CONT.

CONDITION	POSSIBLE CAUSES	CORRECTION
HEAT ODOR - CONT.	2. Is temperature gauge reading above the normal range?	2. Refer to the previous Temperature Gauge Reads High in these Diagnosis Charts. Repair as necessary.
	3. Is cooling fan operating correctly?	3. Refer to Cooling System Fan in this group for diagnosis. Repair as necessary.
	4. Has undercoating been applied to any unnecessary component?	4. Clean undercoating as necessary.
	5. Engine may be running rich causing the catalytic converter to overheat.	5. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the DRB scan tool. Repair as necessary.
POOR DIRVEABILITY (THERMOSTAT POSSIBLY STUCK OPEN). GAUGE MAY BE READING LOW	1. For proper driveability, good vehicle emissions and for preventing build-up of engine oil sludge, the thermostat must be operating properly. Has a diagnostic trouble code (DTC) number 17 been set?	1. Refer to On-Board Diagnostics in Group 25. DTC's may also be checked using the DRB scan tool. Refer to the proper Powertrain Diagnostics Procedures manual for checking the thermostat using the DRB scan tool. Replace thermostat if necessary.
STEAM IS COMING FROM FRONT OF VEHICLE NEAR GRILL AREA WHEN WEATHER IS WET, ENGINE IS WARMED UP AND RUNNING, AND VEHICLE IS STATIONARY. TEMPERATURE GAUGE IS IN NORMAL RANGE	1. During wet weather, moisture (snow, ice or rain condensation) on the radiator will evaporate when the thermostat opens. This opening allows heated water into the radiator. When the moisture contacts the hot radiator, steam may be emitted. This ususally occurs in cold weather with no fan or airflow to blow it away.	1. Occasional stem emitting from this area is normal. No repair is necessary.
COOLANT COLOR	1. Coolant color is not necessarily an indication of adequate corrosion or temperature protection. Do not rely on coolant color for determining condition of coolant.	1. Check the freeze point of the coolant. Refer to Coolant in the group for test procedure. Adjust the glycol to water ratio as required.
COOLANT LEVEL CHANGES IN COOLANT RESERVE/OVERFLOW TANK. TEMPERATURE GAUGE IS IN NORMAL RANGE	1. Level changes are to be expected as coolant volume fluctuates with engine temperature. If the level in the tank was between the FULL and ADD marks at normal engine operating temperature, the level should return to within that range after operation at elevated temperatures.	1. A normal condition. No repair is necessary.

DIAGNOSIS AND TESTING (Continued)

ENGINE THERMOSTAT TESTING

The thermostat is operated by a wax filled container (pellet) which is sealed so that when heated to a predetermined temperature. The wax expands enough to overcome the closing spring and water pump pressure, which forces the valve to open. Coolant leakage into the pellet will cause a thermostat to fail open. Do not attempt to free up a thermostat with a screwdriver.

The thermostat that opens too soon type failure mode is included in the on-board diagnosis. The check engine light will not be lit by an open too soon condition. If it has failed open, code 17 will be set. Do not change a thermostat for lack of heater performance or temperature gage position, unless code 17 is present. See diagnosis for other probable causes. Thermostat failing shut is the normal long term mode of failure, and normally, only on high mileage vehicles. The temperature gauge will indicate this, Refer to diagnosis in this section.

ACCESSORY DRIVE BELT DIAGNOSIS

Condition	Possible Cause	Correction
INSUFFICIENT ACCESSORY OUTPUT DUE TO BELT SLIPPAGE	(a) Belt too loose.	(a) Adjust belt tension.
	(b) Belt excessively glazed or worn.	(b) Replace and tighten as specified.
BELT SQUEAL WHEN ACCELERATING ENGINE	(a) Belts too loose.	(a) Adjust belt tension.
	(b) Belts glazed.	(b) Replace belts.
BELT CHIRP AT IDLE	(a) Belts too loose.	(a) Adjust belt tension.
	(b) Dirt and paint imbedded in belt.	(b) Replace belt.
	(c) Non-uniform belt.	(c) Replace belt.
	(d) Misaligned pulleys.	(d) Align accessories
	(e) Non-uniform groove or eccentric pulley.	(e) Replace pulley.
BELT ROLLED OVER IN GROOVE OR BELT JUMPS OFF	(a) Broken cord in belt.	(a) Replace belt.
	(b) Belt too loose, or too tight.	(b) Adjust belt tension.
	(c) Misaligned pulleys.	(c) Align accessories.
	(d) Non-uniform grooves or eccentric pulley.	(d) Replace pulley.

DIAGNOSIS AND TESTING (Continued)

WATER PUMP DIAGNOSIS

A quick flow test to tell whether or not the pump is working is to see if the heater warms properly. A defective pump will not be able to circulate heated coolant through the long heater hose.

Another flow test to help determine pump operation.

WARNING: DO NOT remove radiator cap if the cooling system is hot or under pressure.

(1) Remove radiator cap.

(2) Remove a small amount of coolant from the system, start the engine and warm up until thermostat opens. With the thermostat open and coolant level low you will see if the water pump is pumping coolant through the system.

COOLING SYSTEM FLOW CHECK

To determine whether coolant is flowing through the cooling system, use the following procedures:

(1) If engine is cold, idle engine until normal operating temperature is reached. Then feel the upper radiator hose. If it is hot, coolant is circulating.

WARNING: DO NOT REMOVE THE COOLING SYSTEM PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(2) Remove pressure cap when engine is cold, remove small amount of coolant Idle engine until thermostat opens, you should observe coolant flow while looking down the filler neck. Once flow is detected install the pressure cap.

RADIATOR FAN CONTROL

Fan control is accomplished two ways. The fan always runs when the air conditioning compressor clutch is engaged. In addition to this control, the fan is turned on by the temperature of the coolant which is sensed by the coolant temperature sensor which sends the message to the Powertrain Control Module (PCM). The (PCM) turns on the fan through the Pulse Width Module (PWM). See Wiring Diagrams Manual for circuity and diagnostics provided.

Switching through the (PCM) provides fan control for the following conditions.

- The fan will not run during cranking until the engine starts no matter what the coolant temperature is.
- Fan will run when the air conditioning clutch is engaged and low pressure cutout switch is closed.
- Fan will run at vehicle speeds above about 40 mph only if coolant temperature reaches 110°C (230°F). It will turn off when the temperature drops to 104°C (220°F). At speeds below 40 mph the fan switches on at 102°C (215°F) and off at 93°C (200°F).
- This next fan operation is to help prevent steaming. The fan will run only below 16°C (61°F) ambient. Between 38°C (100°F) to 97°C (207°F) coolant temperature, at idle and then only for three minutes.

Refer to Radiator Fan Control Module Group 14, Fuel Injection for more information.

ELECTRIC FAN MOTOR TEST

Refer to Powertrain Diagnostic Manual for procedure.

TESTING COOLING SYSTEM FOR LEAKS

The system should be full. With the engine not running, wipe the filler neck sealing seat clean.

Attach a radiator pressure tester to the filler neck, as shown in (Fig. 9) and apply 104 kPa (15 psi) pressure. If the pressure drops more than 2 psi in 2 minutes, inspect the system for external leaks.

Move all hoses at the radiator and heater while system is pressurize at 15 psi, since some leaks occur due to engine rock while driving.

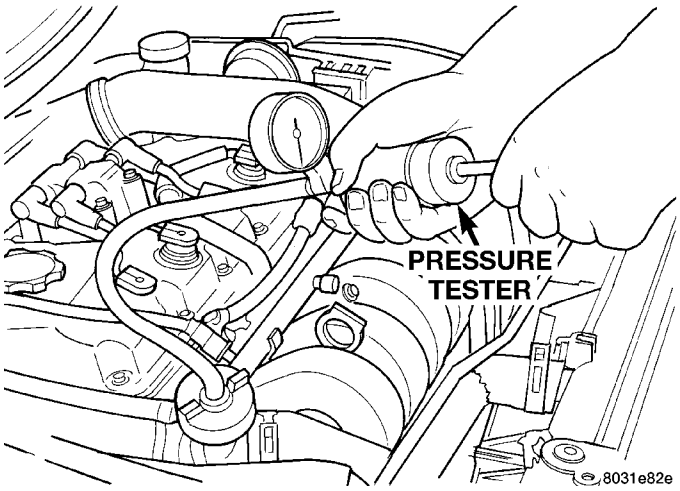


Fig. 9 Pressure Testing Cooling System—Typical

If there are no external leaks after the gauge dial shows a drop in pressure, detach the tester. Start the engine, and run the engine to normal operating temperature in order to open the thermostat and allow the coolant to expand. Reattach the tester. If the needle on the dial fluctuates it indicates a combustion leak, usually a head gasket leak.

WARNING: WITH THE PRESSURE TESTER IN PLACE PRESSURE BUILDS UP QUICKLY. ANY EXCESSIVE PRESSURE BUILD-UP DUE TO CONTINUOUS ENGINE OPERATION MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

DIAGNOSIS AND TESTING (Continued)

If the needle on the dial does not fluctuate, race the engine a few times. If an abnormal amount of coolant or steam is emitted from the tail pipe, it may indicate a faulty head gasket, cracked engine block, or cracked cylinder head.

There may be internal leaks, which can be determined by removing the oil dipstick. If water globules appear intermixed with the oil, it indicates an internal leak in the engine. If there is an internal leak, the engine must be disassembled for repair.

PRESSURE CAP TO FILLER NECK SEAL PRESSURE RELIEF CHECK

The pressure cap upper gasket (seal) pressure relief can be checked by removing the overflow hose at the radiator filler neck nipple (Fig. 10). Attach the radiator pressure tester to the **filler neck nipple,** and pump air into the system. The pressure cap upper gasket should relieve pressure at 69-124 kPa (10-18 psi), and hold pressure at 55 kPa (8 psi) minimum.

WARNING: THE WARNING WORDS DO NOT OPEN HOT ON THE PRESSURE CAP IS A SAFETY PRECAUTION. WHEN HOT, THE COOLING SYSTEM BUILDS UP PRESSURE. TO PREVENT SCALDING OR OTHER INJURY, THE PRESSURE CAP SHOULD NOT BE REMOVED WHILE THE SYSTEM IS HOT AND/OR UNDER PRESSURE.

There is no need to remove the pressure cap at any time **except** for the following purposes:

- Check and adjust coolant freeze point
- Refill system with new coolant
- Conducting service procedures
- Checking for leaks

WARNING: IF VEHICLE HAS BEEN RUN RECENTLY, WAIT 15 MINUTES BEFORE REMOVING CAP. PLACE A SHOP TOWEL OVER THE CAP, AND WITHOUT PUSHING DOWN, ROTATE IT COUNTERCLOCKWISE TO THE FIRST STOP. ALLOW FLUIDS TO ESCAPE THROUGH THE OVERFLOW TUBE. WHEN THE SYSTEM STOPS PUSHING COOLANT AND STEAM INTO THE CRS TANK AND PRESSURE DROPS, PUSH DOWN ON THE CAP AND REMOVE IT COMPLETELY. SQUEEZING THE RADIATOR INLET HOSE WITH A SHOP TOWEL (TO CHECK PRESSURE) BEFORE AND AFTER TURNING TO THE FIRST STOP IS RECOMMENDED.

PRESSURE TESTING COOLING SYSTEM PRESSURE CAP

Dip the pressure cap in water; clean off any deposits on the vent valve or its seat, and apply the cap to end of radiator pressure tester (Fig. 11). Working the

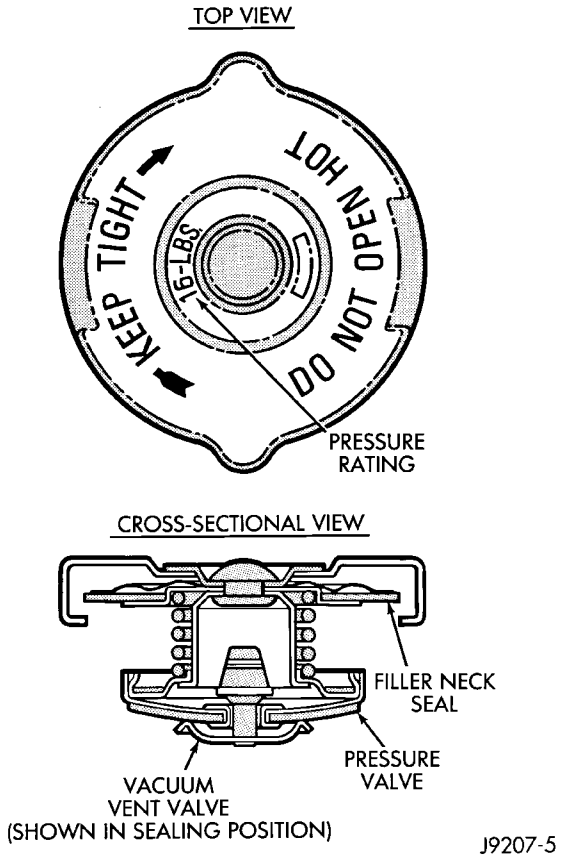


Fig. 10 Cooling System Pressure Cap

plunger, increase the pressure to 104 kPa (15 psi) on the gauge. If the pressure cap fails to hold pressure of at least 97 kPa (14 psi), replace the cap.

CAUTION: The radiator pressure tester is very sensitive to small air leaks that will not cause cooling system problems. A pressure cap that does not have a history of coolant loss should not be replaced just because it leaks slowly when tested with this tool. Add water to the tool. Turn the tool upside down, and recheck the pressure cap to confirm that the cap is faulty.

If the pressure cap tests properly while positioned the on radiator pressure tester, but will not hold pressure or vacuum when positioned on the filler neck, inspect the filler neck and cap top gasket for irregularities that may prevent the cap from sealing properly.

LOW COOLANT LEVEL AERATION

- Will cause corrosion in the system.
- High reading shown on the temperature gauge.
- Air in the coolant will also cause loss of flow through the heater.
- Exhaust gas leaks into the coolant can also cause the above problems.

DIAGNOSIS AND TESTING (Continued)

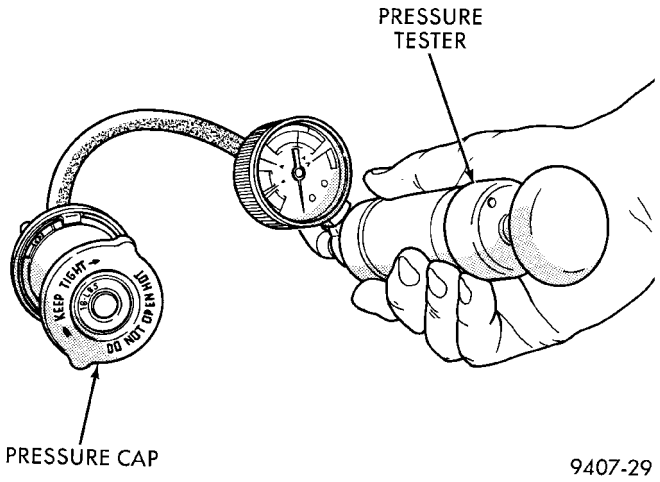


Fig. 11 Pressure Testing Radiator Cap

DEAERATION

Air can only be removed from the system by gathering under the pressure cap. On the next heat up it will be pushed past the pressure cap into the CRS tank by thermal expansion of the coolant. It then escapes to the atmosphere in the CRS tank and is replaced with solid coolant on cool down.

TEMPERATURE GAUGE INDICATION

At idle the temperature gauge could rise slowly to about 1/2 gauge travel. The fan will come on and the gauge could drop to about 1/3 gauge travel, this is normal.

SERVICE PROCEDURES

ROUTINE COOLANT LEVEL CHECK

NOTE: Do not remove radiator cap for routine coolant level inspections.

The coolant reserve system provides a quick visual method for determining the coolant level without removing the radiator cap. Simply observe, with the engine idling and warmed up to normal operating temperature, that the level of the coolant in the reserve tank (Fig. 12) is between the add and full marks.

ADDING ADDITIONAL COOLANT

NOTE: The radiator cap should not be removed.

When additional coolant is needed, it should be added to the coolant reserve tank. Use only 50/50 concentration of ethylene glycol type antifreeze and water

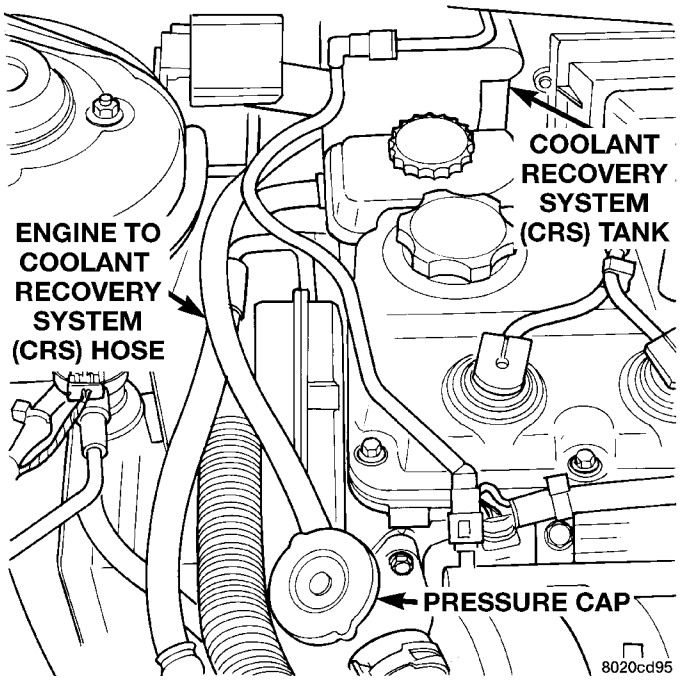


Fig. 12 Coolant Recovery System

SERVICING COOLANT LEVEL

NOTE: The cooling system is closed and designed to maintain coolant level to the top of the radiator.

When servicing requires a coolant level check in the radiator, the engine must be **off** and **not** under pressure. Drain several ounces of coolant from the radiator drain cock while observing the Coolant Recovery System (CRS) Tank. Coolant level in the CRS tank should drop slightly. Then remove the radiator cap. The radiator should be full to the top. If not, and the coolant level in the CRS tank is at the ADD mark there is a air leak in the CRS system. Check hose or hose connections to the CRS tank, radiator filler neck or the pressure cap seal to the radiator filler neck for leaks.

DRAINING COOLANT

NOTE: Drain, flush, and fill the cooling system at the mileage or time intervals specified in the Maintenance Schedule in this Group. If the solution is dirty or rusty or contains a considerable amount of sediment, clean and flush with a reliable cooling system cleaner. Care should be taken in disposing of the used engine coolant from your vehicle. Check governmental regulations for disposal of used engine coolant.

Without removing radiator pressure cap and with system not under pressure,

SERVICE PROCEDURES (Continued)

(1) Shut engine off and turn draincock counterclockwise to open (Fig. 13).

(2) The coolant reserve tank should empty first, then remove the pressure cap. (if not, Refer to Testing Cooling System for leaks).

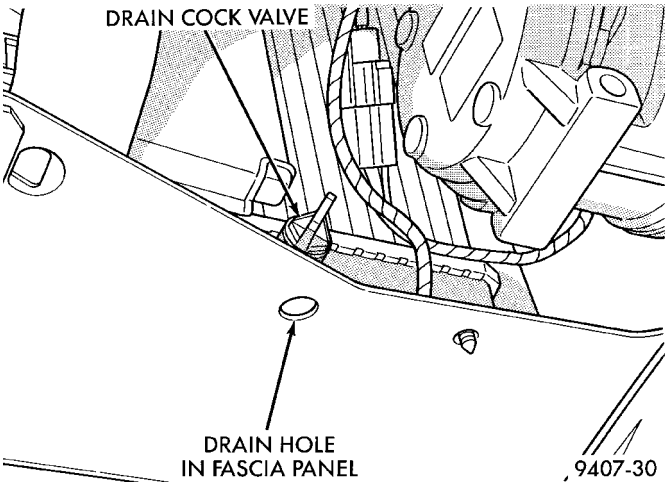


Fig. 13 Draining Cooling System

REFILLING COOLING SYSTEM

First clean system to remove old glycol, see Cooling System Cleaning.

Fill system using antifreeze described in Coolant section. Fill 50 percent of capacity with 100 percent glycol. Then complete filling system with water.

Continue filling system until full, this provides better heater performance. **Be careful not to spill coolant on drive belts or the generator.**

Fill coolant reserve system to at least the FULL mark with 50/50 solution. It may be necessary to add coolant to the reserve tank to maintain coolant level between the FULL and ADD mark after three or four warm-up, cool down cycles and trapped air has been removed.

REMOVAL AND INSTALLATION

WATER PUMP

REMOVAL

(1) Raise vehicle on a hoist. Remove right inner splash shield.

(2) Remove accessory drive belts and power steering pump. Refer to Accessory Drive Belt service of this section.

(3) Drain cooling system. Refer to Draining Cooling System in this group.

(4) Support engine from the bottom and remove right engine mount.

(5) Remove power steering pump bracket bolts and set pump and bracket assembly aside. Power steering lines do not need to be disconnected.

(6) Remove right engine mount bracket.

(7) Remove timing belt. Refer to Group 9, Engine for procedure.

(8) Remove inner timing belt cover.

(9) Remove water pump attaching screws to engine (Fig. 14).

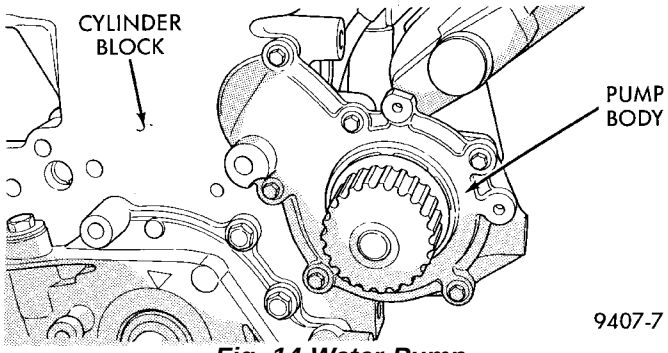


Fig. 14 Water Pump

INSTALLATION

(1) Install new O-ring gasket in water pump body O-ring groove (Fig. 15). Use small dabs of Mopar Silicone Rubber Adhesive Sealant around the water pump body to secure O-ring in place during installation.

CAUTION: Make sure O-ring gasket is properly seated in water pump groove before tightening screws. An improperly located O-ring may cause damage to the O-ring and cause a coolant leak.

(2) Assemble pump body to block and tighten screws to 12 N·m (105 in. lbs.). Pressurize cooling system to 15 psi with pressure tester and check water pump shaft seal and O-ring for leaks.

(3) Rotate pump by hand to check for freedom of movement.

(4) Install inner timing belt cover.

(5) Install timing belt. Refer to Group 9, Engine, and Reassemble engine.

(6) Install right engine mount bracket and engine mount. Refer to Group 9, Engine for procedure.

(7) Fill cooling system. See **Filling Cooling System.**

(8) Install power steering pump and accessory drive belts, Refer to Accessory Drive Belts, in this Group.

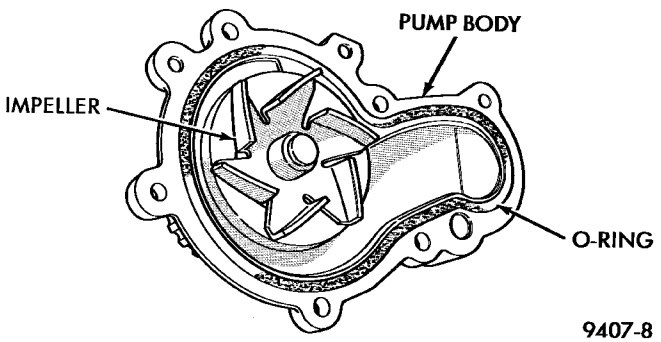


Fig. 15 Water Pump Body

REMOVAL AND INSTALLATION (Continued)

WATER PUMP INLET TUBE

The inlet tube connects the water pump to the radiator and heater core. This tube is sealed by a O-ring and held in place by fasteners to the block.

REMOVAL

CAUTION: Do not use any sharp tools to remove hoses from inlet tube. This may cause the tube to leak.

(1) Drain cooling system. Refer to procedure outlined in this section.
(2) Remove upper radiator hose to access the hose connections at the inlet tube.
(3) Remove lower radiator hose and heater hose from the inlet tube (Fig. 16).
(4) Remove the two fasteners that hold the inlet tube to the block and one fastener that holds the intake manifold to inlet tube.
(5) Rotate tube while removing the tube from the engine block (Fig. 17).

INSTALLATION

(1) Inspect the O-ring for damage before installing the tube into the cylinder block (Fig. 17).
(2) Lube O-ring with coolant and install into the cylinder block opening.
(3) Install two fasteners to the engine block and the one fastener to the intake manifold. Tighten fasteners to 12 N·m (105 in. lbs.).
(4) Connect lower radiator hose and heater hose to inlet tube.
(5) Install upper radiator hose.
(6) Fill cooling system. Refer to procedure outlined in this section.
(7) Pressure system to 104 kPa (15 psi) to check for leaks.

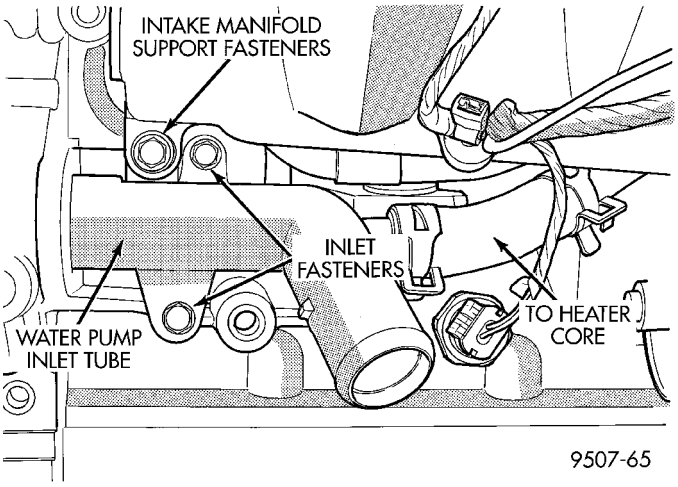


Fig. 16 Water Pump Inlet Tube Hose Connections

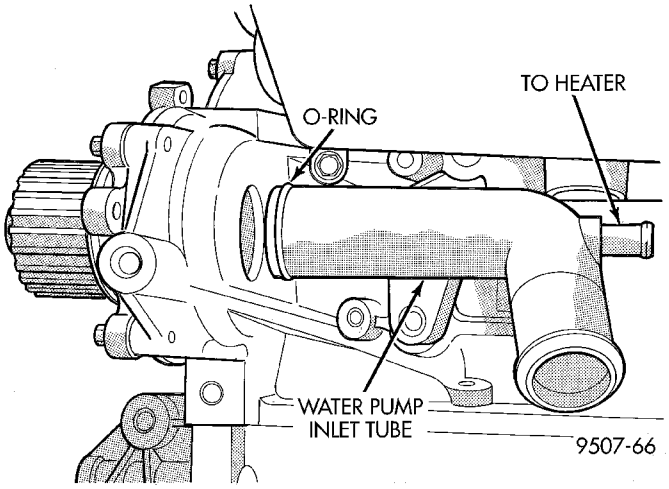


Fig. 17 Water Pump Inlet Tube

ENGINE THERMOSTAT

REMOVAL

(1) Drain cooling system to the thermostat level or below.
(2) Remove coolant recovery system (CRS) hose and thermostat/engine outlet connector bolts (Fig. 18) or (Fig. 19).
(3) Remove thermostat an O-ring assembly, and clean sealing surfaces.

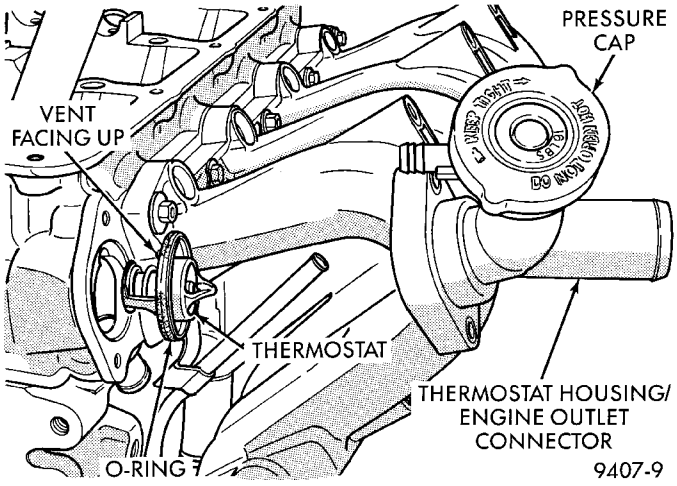


Fig. 18 Thermostat/Engine Outlet Connector—SOHC

INSTALLATION

(1) Place the new thermostat assembly into the thermostat housing/outlet connector. Align vent with notch in cylinder head.
(2) Install thermostat housing/outlet connector onto cylinder head and tighten bolts to 12.5 N·m (110 in. lbs.). Connect the coolant recovery system (CRS) hose.
(3) Refill cooling system (see **Refilling System**).

REMOVAL AND INSTALLATION (Continued)

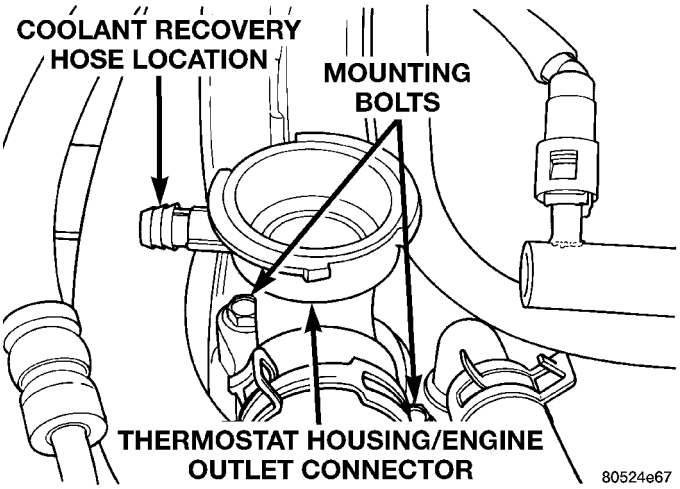


Fig. 19 Thermostat/Engine Outlet Connector—DOHC

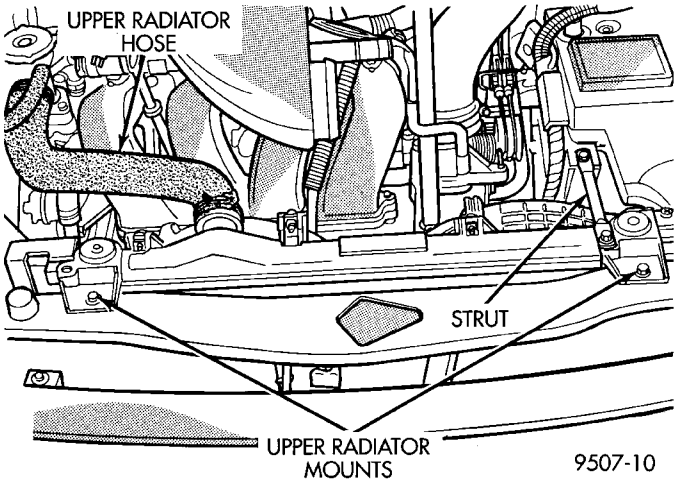


Fig. 20 Radiator Mounting

RADIATOR

REMOVAL

WARNING: DO NOT REMOVE THE CYLINDER BLOCK PLUG OR THE RADIATOR DRAINCOCK WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(1) Disconnect negative battery cable from battery.
(2) Drain cooling system. Refer to Draining Cooling System of this section.
(3) Remove hose clamps and hoses from the radiator.
(4) Disconnect automatic transmission hoses and plug off, if equipped.
(5) Remove radiator to battery strut (Fig. 20). Remove fan module assembly by disconnecting fan motor electrical connector. Remove fan shroud retaining screws, located on the top of the shroud (Fig. 21). Lift shroud up and out of bottom shroud attachment clips separating shroud from radiator. For dual fan applications the left fan module may be removed first, then the right side module last. Fan damage should always be avoided.
(6) Remove upper radiator isolator bracket mounting screws. Disconnect the engine block heater wire if equipped.
(7) Remove the air conditioning condenser attaching screws located at the front of the radiator, if equipped (Fig. 22). Lean condenser forward, it is not necessary to discharge the air conditioning system to remove radiator.
(8) Radiator can now be lifted free from engine compartment. **Care should be taken not to damage radiator cooling fins or water tubes during removal.**

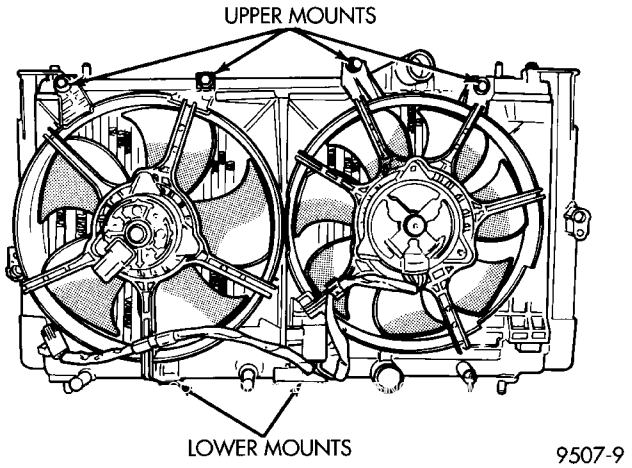


Fig. 21 Servicing Fan Module

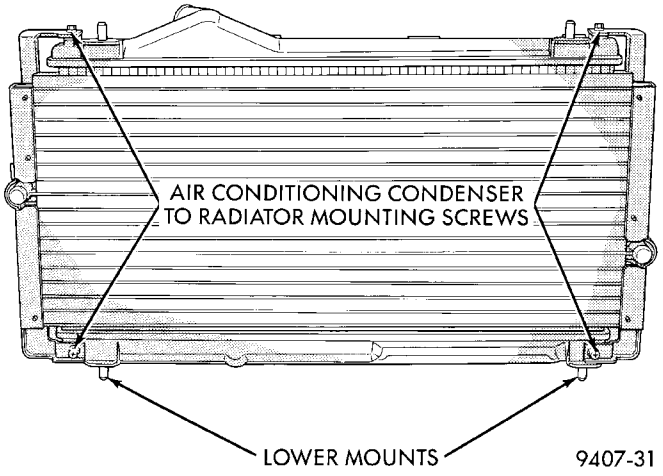


Fig. 22 A/C Condenser to Radiator Mounting Screws

INSTALLATION

(1) Slide radiator down into position behind radiator support (yoke).
(2) Attach air conditioning condenser to radiator if equipped (Fig. 22), with four mounting screws and

REMOVAL AND INSTALLATION (Continued)

tighten to 5.4 N·m (50 in. lbs.). Then seat the assembly lower rubber isolators into the mounting holes provided in the lower crossmember.

(3) Tighten radiator isolator mounting bracket screws to 7.4 N·m (65 in. lbs.). The radiator should have clearance to move up approximately 5 to 8 mm (0.25 in.) after assembled.

(4) Connect automatic transmission hoses, if equipped. Tighten hose clamps to 4 N·m (35 in. lbs.).

(5) Slide fan module down into clip(s) on lower radiator flange (Fig. 21). For dual fan application install the right fan module first and then the left fan module. Install retaining screws and tighten to 5.4 N·m (50 in. lbs.).

(6) Install radiator hoses and coolant reserve hose align hoses and position hose clamps so they will not interfere with the engine or hood.

(7) Connect fan motor electrical connection and connect negative battery cable.

(8) Fill cooling system with coolant. Refer to **Refilling Cooling Systems.** in this group.

(9) Operate engine until it reaches normal operating temperature. Check cooling system and automatic transmission for correct fluid levels.

RADIATOR DRAINCOCK

REMOVAL

(1) Turn the drain cock stem counterclockwise to unscrew the stem. When the stem is unscrewed to the end of the threads, pull the stem (Fig. 23) from the radiator tank.

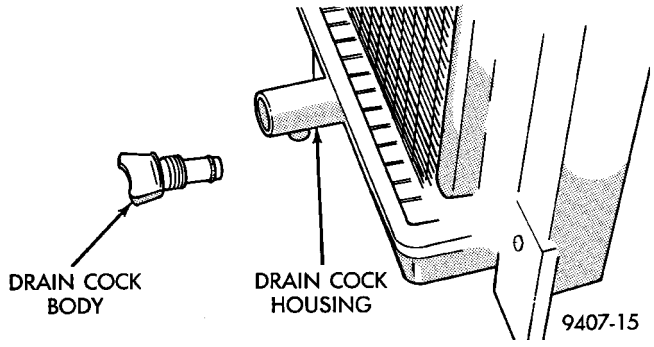


Fig. 23 Draincock

INSTALLATION

(1) Push the draincock assembly body into the tank opening.

(2) Tighten the draincock stem by turning clockwise to 2.0-2.7 N·m (18-25 in. lbs.).

RADIATOR FANS AND MOTOR

All models use a single speed electric motor driven cooling system fans. The fan modules includes a motor, fan blade, and support shroud. The module is fastened to the radiator by screws.

REMOVAL FAN MODULE

(1) Disconnect fan motor leads from module.

(2) Remove fan module fasteners from radiator (Fig. 24).

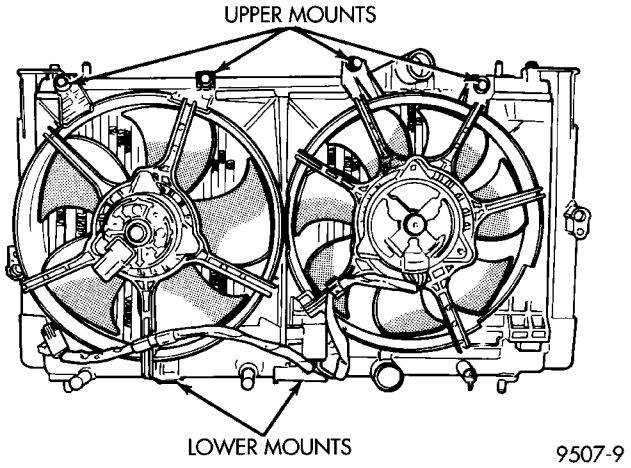


Fig. 24 Servicing Fan Module

FAN BLADE

There are no repairs to be made to the fan. If the fan is warped, cracked, or otherwise damaged, it must be replaced with **only** the recommended part for adequate strength, performance and safety.

(1) To remove fan from motor shaft, bench support the motor and motor shaft, while removing the fan retaining clip, so that the shaft and motor will not be damaged by excessive force. **Surface burr removal may be required to remove fan from motor shaft (Fig. 25).** Do not permit the fan blades to touch the bench.

(2) To install fan on motor shaft, slide the fan over shaft. Support motor and shaft as above while installing fan retaining clip.

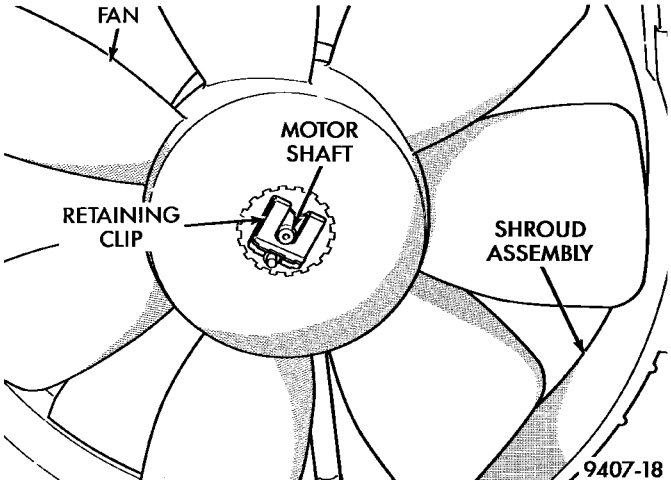


Fig. 25 Servicing Radiator Fan

REMOVAL AND INSTALLATION (Continued)

INSTALLATION FAN MODULE

(1) Install module to radiator. Torque shroud to radiator fasteners to 7.5 N·m (65 in. lbs.).

(2) Connect fan motor lead. **For wiring diagrams of fan motor systems Refer to 8W Wiring Diagrams** .

ELECTRIC FAN MOTOR—SERVICE

WARNING: Do not disassemble the fan motor from the support bracket.

Electric fan motor is serviced as an assembly with the fan module.

FAN SHROUD

Some fan shrouds are equipped with flapped doors to prevent the shroud from restricting air flow at high speeds.

All vehicles have fan shrouds to improve fan air flow efficiency.

The shroud supports the electric fan motor and fan. For removal and installation procedures, refer to radiator removal in this Section.

ENGINE BLOCK HEATER

REMOVAL

(1) Drain coolant from radiator and cylinder block. Refer to Cooling System Drain, Clean, Flush and Refill of this section for procedure.

(2) Detach power cord plug from heater.

(3) Loosen screw in center of heater. Remove heater assembly.

INSTALLATION

(1) Thoroughly clean core hole and heater seat.

(2) Insert heater assembly with element loop positioned **upward.**

(3) With heater seated, tighten center screw securely to assure a positive seal.

(4) Fill cooling system with coolant to the proper level, vent air, and inspect for leaks. Pressurize system with Radiator Pressure Tool before looking for leaks.

ACCESSORY DRIVE BELTS

AIR CONDITIONING COMPRESSOR AND POWER STEERING PUMP

(1) Loosen the power steering pump locking bolts A and B and pivot bolt C (Fig. 26) to remove and install belt and/or adjust belt tension.

(2) Using a 1/2” breaker bar, adjust belt tension by applying torque to the square D hole on the power steering pivot bracket. Adjust tension to specification given in Belt Tension Chart.

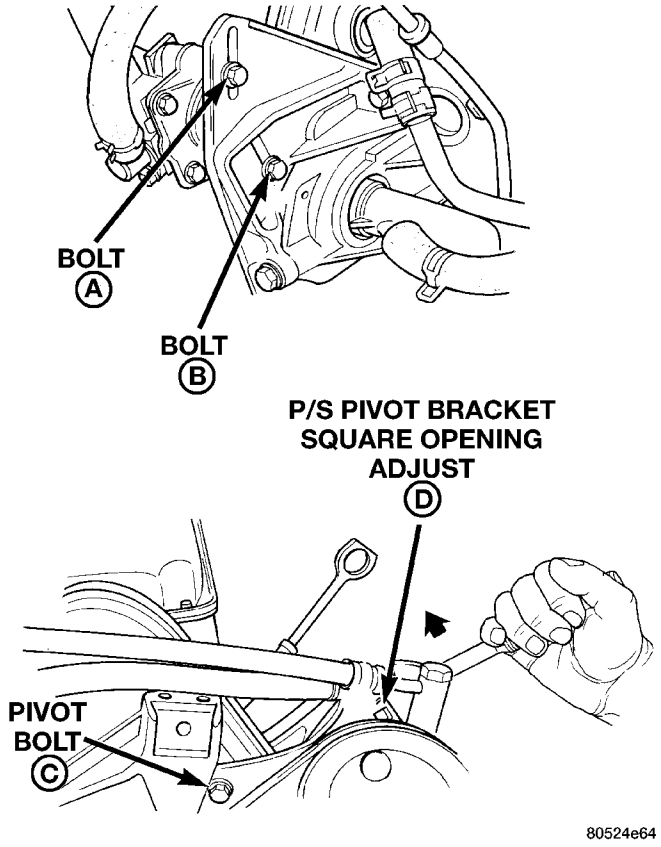


Fig. 26 Power Steering Pump Adjustment

(3) Tighten in order, first tighten locking bolt A to 27 N·m (20 ft. lbs.) then, bolt B to 27 N·m (20 ft. lbs.) Then pivot bolt C to 54 N·m (40 ft. lbs.).

Accessory Drive Belt	Gauge	Torque
Power Steering Pump and Air Conditioning Compressor	New 135 lb.	121 N·m (90 ft. lbs.)
	Used 100 lb.	81 N·m (60 ft. lbs.)
Generator	New 135 lb.	121 N·m (90 ft. lbs.)
	Used 100 lb.	81 N·m (60 ft. lbs.)

GENERATOR BELT

(1) Loosen pivot bolt E then locking nut F and adjusting bolt G (Fig. 27) to remove and install belt and/or adjust belt tension.

(2) Tighten adjusting bolt G, adjust belt tension to specification shown in Belt Tension Chart.

(3) Tighten pivot bolt E to 54 N·m (40 ft. lbs.). Locking nut F to 54 N·m (40 ft. lbs.).

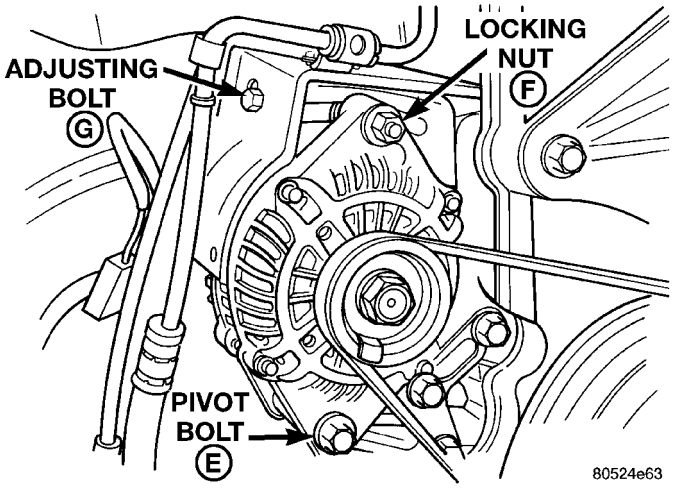


Fig. 27 Generator Adjustment

CLEANING AND INSPECTION

WATER PUMP

Replace water pump body assembly if it has any of these defects:

(1) Cracks or damage on the body.

(2) Coolant leaks from the shaft seal, evident by coolant traces on the pump body.

(3) Loose or rough turning bearing.

(4) Impeller rubs either the pump body or the engine block.

(5) Impeller loose or damaged.

(6) Sprocket or sprocket flange loose or damaged.

ACCESSORY DRIVE BELT INSPECTION

Belt replacement under any or all of the following conditions is required, excessive wear, frayed cords or severe glazing.

Poly-V-Belt system with back drive pulley may develop minor cracks across the ribbed side (due to reverse bending). These minor cracks are considered normal and acceptable. Cracks parallel are not (Fig. 28).

NOTE: Do not use any type of belt dressing or restorer on Poly-V-Belt and V-Belt

COOLING SYSTEM CAP

Hold the cap in your hand, **right side up** (Fig. 29). The vent valve at the bottom of the cap should open with a slight pull. If the rubber gasket has swollen, preventing the valve from opening, replace the cap.

If any light can be seen between vent valve and the rubber gasket, replace the cap. **Use only a replacement cap that has a spring to hold the vent shut.**

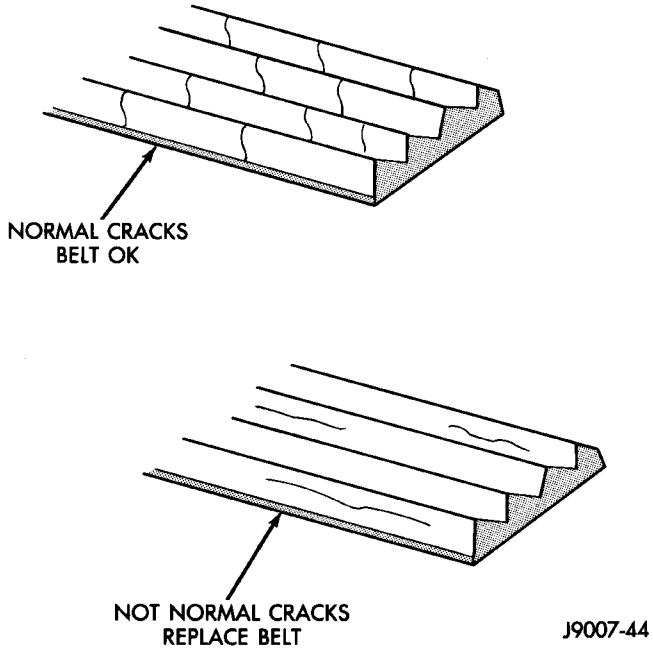


Fig. 28 Drive Belt Wear Pattern

A replacement cap must be of the type designed for coolant reserve systems. This design ensures system pressurization.

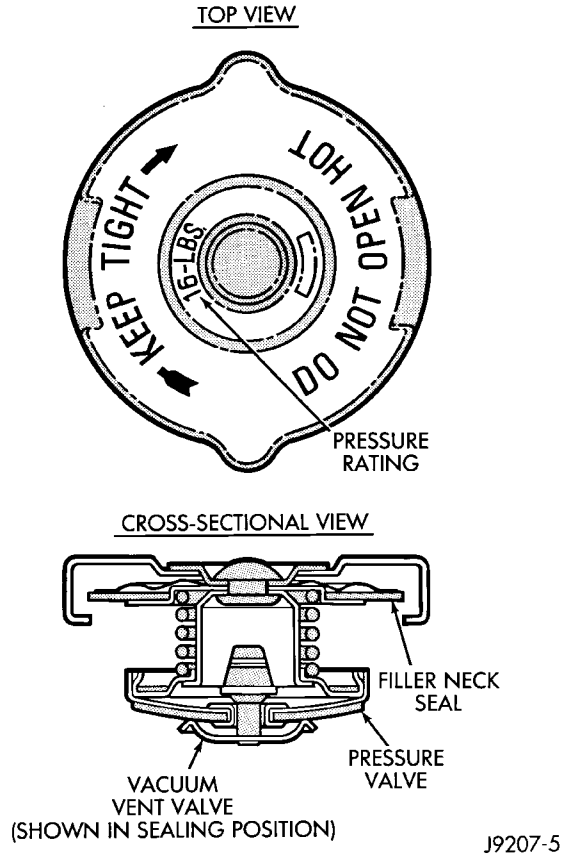


Fig. 29 Cooling System Pressure Cap

CLEANING AND INSPECTION (Continued)

CLEANING COOLING SYSTEM

Drain cooling system (see: **Draining Cooling System**) and refill with clean water (see: **Refilling Cooling System**). Run engine with radiator cap installed until upper radiator hose is hot. Stop engine and drain water from system. If water is dirty, fill, run and drain system again until water runs clear.

RADIATOR FLUSHING

Drain cooling system and remove radiator hoses from engine. Install suitable flushing gun in radiator lower hose. Fill radiator with clean water and turn on air in short blasts.

CAUTION: Internal radiator pressure must not exceed 138 kPa (20 psi) as damage to radiator may result. Continue this procedure until water runs clear.

ENGINE FLUSHING

Drain radiator (see: **Draining Cooling System**) and remove hoses from radiator. Remove engine thermostat and reinstall thermostat housing. A gasket may be needed to seal the housing to cylinder head because the seal is part of thermostat. Install suitable flushing gun to thermostat housing hose. Turn on water, and when engine is filled, turn on air, but no higher than 138 kPa (20 psi) in short blasts. Allow engine to fill between blasts of air. Continue this procedure until water runs clean. Install thermostat and fill cooling system. Refer to **Refilling Cooling System**) for procedure.

REVERSE FLUSHING

Reverse flushing of the cooling system is the forcing of water through the cooling system, using air pressure in a direction opposite to that of the normal flow of water. This is only necessary with dirty systems and evidence of partial plugging.

CHEMICAL CLEANING

One type of corrosion encountered with aluminum cylinder heads is aluminum hydroxide deposits. Corrosion products are carried to the radiator and deposited when cooled off. They appear as dark grey when wet and white when dry. This corrosion can be removed with a two part cleaner (oxalic acid and neutralizer) available in auto parts outlets. Follow manufacturers directions for use.

ADJUSTMENTS

PROPER BELT TENSION

Satisfactory performance of the belt driven accessories depends on belt condition and proper belt tension. Refer to Accessory Drive Belt Inspection in this section. There are two belt tensioning methods given in order of preference:

- Belt tension gauge method.
- Torque equivalent method.

The belt tension gauge method usually requires the vehicle to be raised on a hoist and the splash shield removed.

TORQUE EQUIVALENT METHOD

Adjustable accessory brackets provided with a 13 mm (1/2 in.) square hole for a torque wrench can use an equivalent torque value for belt adjustment.

Equivalent torque values for adjusting these accessory drive belts are specified in the Belt Tension Chart.

BELT TENSION CHART

ACCESSORY DRIVE BELT	GAUGE	TORQUE
Power Steering Pump and A/C Compressor	New 135 lb. Used 100 lb.	121 N·m (90 ft. lbs.) 81 N·m 60 ft. lbs.)
Generator	New 135 lb. Used 100 lb.	121 N·m (90 ft. lbs.) 81 N·m 60 ft. lbs.)

BELT TENSION GAUGE METHOD

NOTE: Use belt tensioning Special Tool Kit C-4162 for:

- For conventional belts and Poly-V-belts.

Adjust the belt tension for a **New** or **Used** belt as prescribed in the Belt Tension Chart Gauge.

BELT TENSION CHART GAUGE

ACCESSORY DRIVE BELT	GAUGE
Power Steering Pump and A/C Compressor	New 135 lb.
	Used 100 lb.
Generator	New 135 lb. Used 100 lb.

SPECIFICATIONS

COOLING SYSTEM CAPACITY

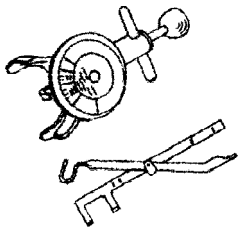
7.00 LITERS	7.40 QTS.
CAPACITY, Includes Heater and Coolant Reserve System	

TORQUE

DESCRIPTION	TORQUE
A/C Condenser to Radiator	7.2 N·m (65 in. lbs.)
Fan Module to Radiator	7.2 N·m (65 in. lbs.)
Fan Motor to Shroud Retaining Screws (A/C equipped)	3.8 N·m (34 in. lbs.)
Fan Motor to Shroud Retaining Screws (Non A/C equipped)	2.3 N·m (20 in. lbs.)
Radiator (Cooling Module) to Body Screws	7.2 N·m (65 in. lbs.)
Thermostat Housing/Engine Outlet Connector Screws	12 N·m (105 in. lbs.)
Upper Radiator Crossmember Bolts	28 N·m (250 in. lbs.)
Water Pump to Engine Block Mounting Bolts	12 N·m (105 in. lbs.)
Water Pump Inlet Tube to Engine Block Mounting Screws	12 N·m (105 in. lbs.)

SPECIAL TOOLS

COOLING



Accessory Drive Belt Tension Gauge C-4162