

COOLING SYSTEM

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GENERAL INFORMATION

COOLING SYSTEM

The cooling system consists of an engine cooling module, pressure cap, coolant bottle, thermostat, coolant, and a water pump to circulate the coolant. The engine cooling module consist of a radiator, electric fan motors, shroud, internal transmission oil cooler, air conditioning condenser, receiver drier, and a auxiliary transmission oil cooler (if equipped).

- When Engine is cold: Thermostat is closed, cooling system has no flow through the radiator. The coolant flows through the engine heater core, coolant bottle and by-pass.

- When Engine is warm: Thermostat is open, coolant flows through the radiator, heater core, coolant bottle and by-pass.

The cooling systems 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 coolant for heater, and cooling for automatic

GENERAL INFORMATION (Continued)

transmission fluid. It does this by transferring heat from engine metal to coolant, moving this heated coolant to the radiator, and then transferring this heat to the ambient air.

Coolant flow circuit for the 3.3/3.5L engine is shown in (Fig. 1).

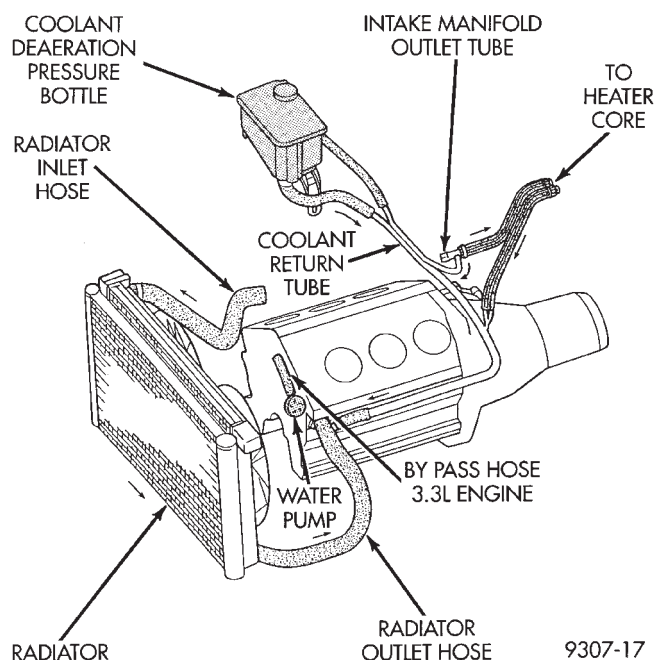


Fig. 1 Cooling System Operation—3.3/3.5L Engine

ACCESSORY DRIVE BELTS

The accessory drive system on 3.3L and 3.5L engines utilizes two different belts. A conventional V-belt drives the air conditioning compressor on 3.3/3.5L engine. On the 3.3L engine a Poly-V belt drives the generator, power steering pump, and water pump. On the 3.5L engine the Poly-V belt drives the generator, and power steering pump.

COOLANT PRESSURE BOTTLE

This bottle keeps the coolant free of trapped air. It provides a volume for expansion and contraction and provides a convenient and safe method for checking coolant level and adjusting level at atmospheric pressure. It also provides some reserve coolant to cover minor leaks and evaporation or boiling losses (Fig. 2).

Refer to Coolant Level Service, Pressure Cap sections for operation and service.

ENGINE THERMOSTAT

The engine thermostat is located in a water box, formed in the front of the lower intake manifold (Fig. 3). This thermostat has an air bleed located in the thermostat flange.

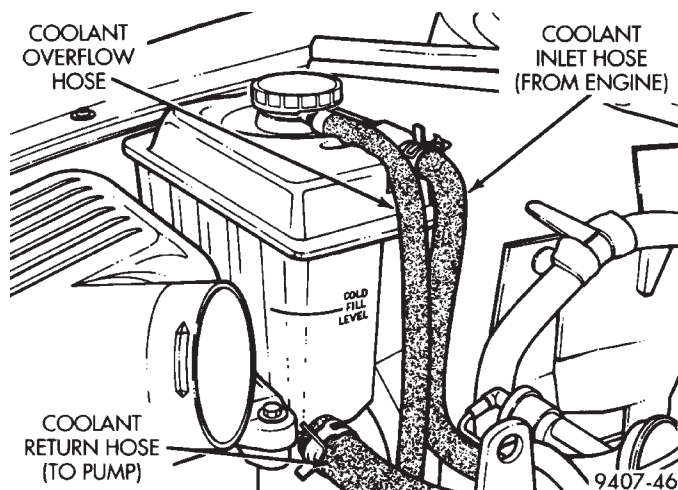


Fig. 2 Coolant Pressure Bottle

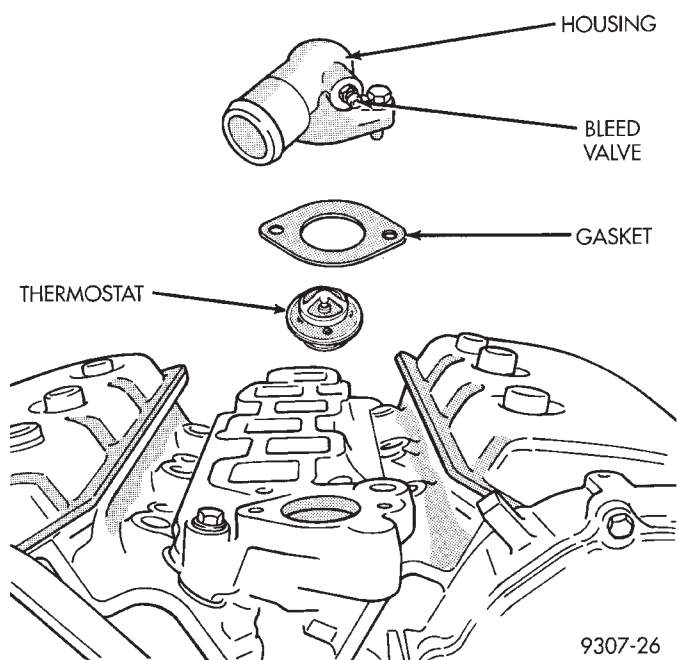


Fig. 3 Thermostat and Housing—3.3/3.5L Engine

WATER PUMP

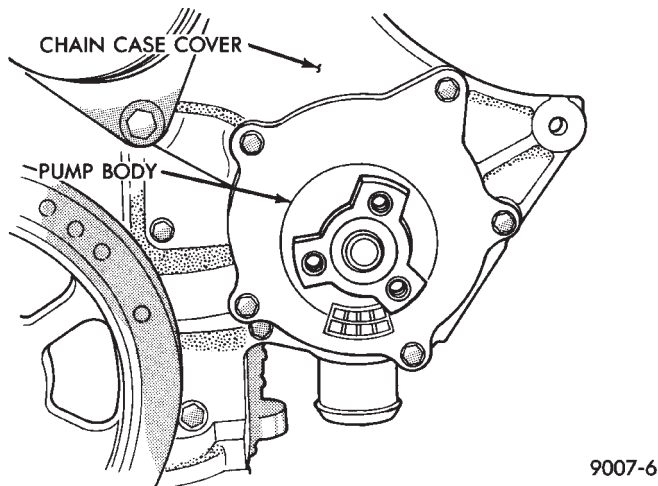
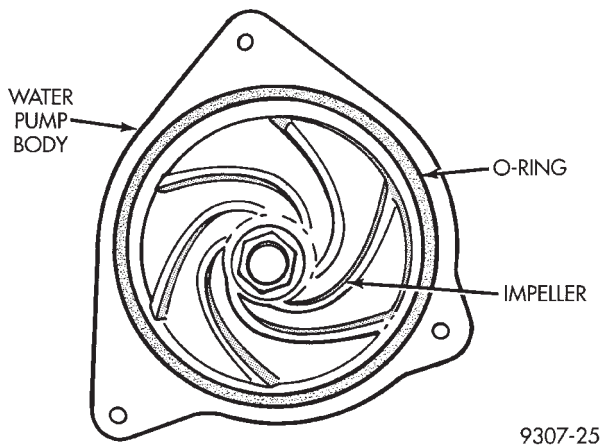
WATER PUMP—3.3L ENGINE

The 3.3L pump has a die cast aluminum body and a stamped steel impeller. It bolts directly to the chain case cover, using an O-ring for sealing. It is driven by the back surface of the Poly-V Drive Belt. (Fig. 4)

WATER PUMP—3.5L ENGINE

The 3.5L pump has a plastic impeller. The housing bolts directly to the right rear timing belt cover, using a O-ring gasket for pump to cover sealing (Fig. 5). The pump is driven by the engine timing belt and serviced as a assembly.

GENERAL INFORMATION (Continued)

**Fig. 4 Water Pump—3.3L Engine****Fig. 5 Water Pump Body—3.5L Engine****COOLANT**

CAUTION: Use of Propylene Glycol based coolants is not recommended as they provide less freeze protection and less corrosion protection.

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 and engine block. Then carry this heat to the radiator where the tube/fin radiator can give it up to the air.

The use of aluminum cylinder heads, intake manifolds, and water pumps requires special corrosion protection. Mopar Antifreeze or the equivalent ethylene glycol base antifreeze with a silicate inhibitor is 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 loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed solution.

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASE COOLANT PROPERLY, CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE, PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED, PERSONAL INJURY CAN RESULT.

RADIATOR

The radiators are cross-flow types (horizontal tubes) with design features that provide greater strength as well as sufficient heat transfer capabilities to keep the engine satisfactorily cooled.

CAUTION: Plastic tanks, while stronger than brass are subject to damage by impact, such as wrenches, or heat from torch.

CAP COOLANT PRESSURE BOTTLE

The Coolant bottle is equipped with a pressure cap which releases pressure at some point within a range of $117\text{ kPa} \pm 7\text{ kPa}$ ($17\text{ psi} \pm 1\text{ psi}$) (Fig. 6).

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

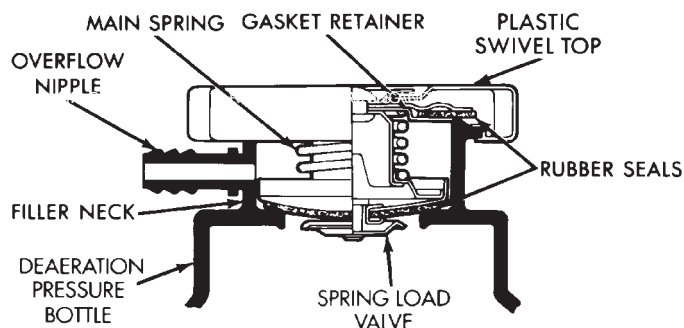
There is a spring-loaded vent valve in the center of the cap that allows the system to pressurize and depressurize without creating a vacuum. If the valve is stuck open, coolant will escape to the overflow hose. There is also a gasket in the cap to seal to the top of the filler neck.

CAUTION: Use only the pressure cap specified for this vehicle. Use of other pressure caps can lead to coolant loss and overheating.

DUAL FAN MODULE

All models use electric motor driven fans. The fan modules include a motor support and shroud. The module is fastened to the radiator by screws with U-nuts and retaining clips (Fig. 7).

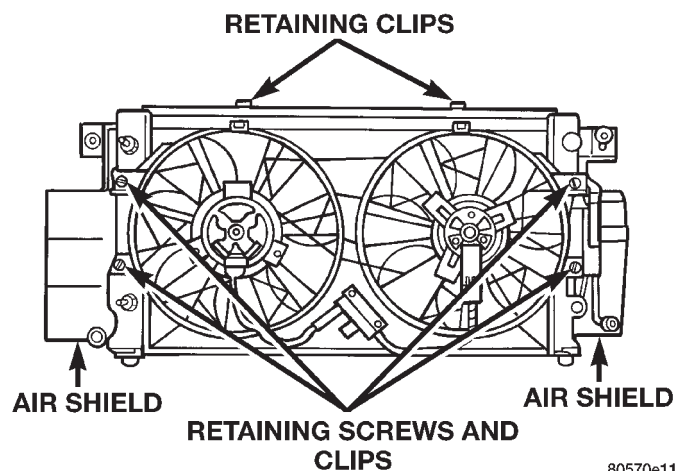
GENERAL INFORMATION (Continued)



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Fig. 6 Pressure Cap and Bottle

The dual fan module is a combination of 2 fans mounted in a one piece shroud which operate at two speeds and are simultaneously activated. The dual fan system improves engine cooling and air conditioning performance in hot weather and severe driving conditions, while reducing fan noise and power consumption. Attempts to reduce high temperature gauge reading by increasing engine speed, at the same vehicle speed, can increase high temperature.



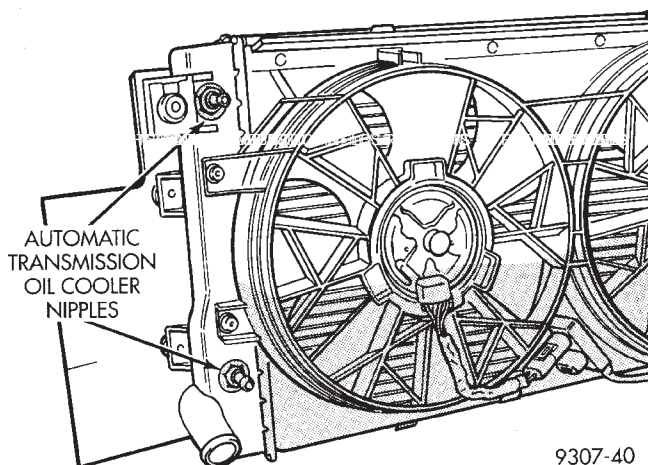
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Fig. 7 Fan Module**FAN SHROUD**

All vehicles have fan shrouds to improve fan air flow efficiency. The shroud supports the electric fan motor and fan.

AUTOMATIC TRANSMISSION OIL COOLER

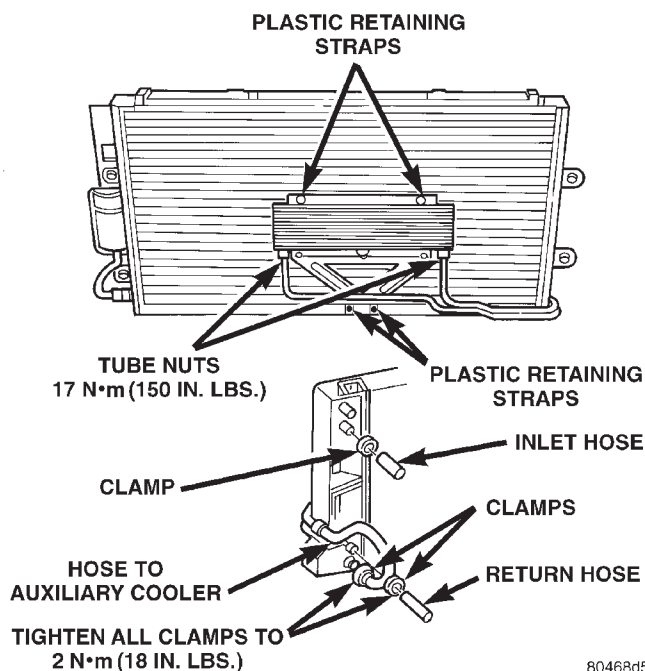
The oil cooler is an internal oil to coolant type mounted in the radiator left tank (Fig. 8). Steel tube and rubber oil lines feed the oil cooler and the automatic transmission. Use only approved transmission oil cooler hose. Since these lines are molded, only molded hoses are recommended. Flare the end of steel tube to ensure sealing of the hose. Torque Oil Cooler Hose Clamps to 2.5 N·m (22 in. lbs.).



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Fig. 8 Transmission Oil Cooler**AUXILIARY TRANSMISSION OIL COOLER**

An external oil-to-air type is mounted ahead of the cooling module (Fig. 9) on some vehicles. This style cooler uses steel tube and rubber oil lines to feed oil from the internal cooler to the external and then to the automatic transmission. Use only approved transmission oil cooler hose. Since these are molded to fit space available, molded hoses are recommended.



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Fig. 9 Auxiliary Transmission Oil Cooler**ENGINE BLOCK HEATER**

On all models an 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 grill. This provides easier engine starting and faster

GENERAL INFORMATION (Continued)

warm-up when the 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 to provide the fastest warm up possible by preventing leakage through them and to guarantee a minimum engine operating temperature of 90°C (195°F). They also automatically reach wide open at a temperature of approximately 102°C (215°F) 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 102°C (215°F) the coolant temperature is controlled by the radiator, fan, and ambient temperature, not the thermostat.

COOLANT PERFORMANCE

Performance is measurable. For heat transfer pure water absorbs 1 btu 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 ethylene glycol (.7 btu) can cause an engine to run hot, cause detonation, and will freeze at -22°C (-8°F).
- 50/50 Ethylene Glycol and Distilled 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, coolant sensor and heater are all designed for 50/50 ethylene glycol.

Where required, a 56 percent glycol and 44 percent water mixture will provide a freeze point of -46°C (-50°F).

NOTE: Richer mixtures cannot be measured with field equipment and can lead to problems associated with 100 percent glycol. If there is doubt that the coolant mixture is too rich for field equipment to measure, put a sample in a clean container. Add exactly the same amount of water and retest. If the coolant in the vehicle is 100% antifreeze, the diluted sample will read 50%. If the coolant in the vehicle was 70% antifreeze and 30% water, the diluted sample will read as 35%, etc.

SELECTION AND ADDITIVES

The use of aluminum cylinder heads, intake manifolds, and water pumps requires special corrosion protection. Mopar Antifreeze or their equivalent are

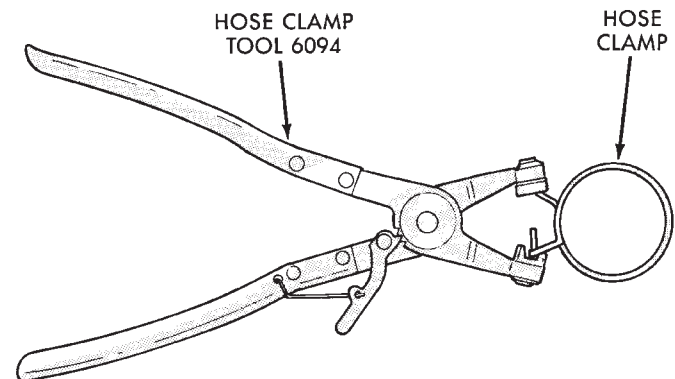
recommended for best engine cooling without corrosion. When mixed only to a freeze point of -37°C (-35°F) to -59°C (-50°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed solution.

CAUTION: Do not use well water, or suspected water supply in cooling system. A 50/50 ethylene glycol and distilled water mix is recommended.

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 PRESSURE DROPS.

The hoses are removed by using constant tension clamp pliers to compress hose clamp (Fig. 10).



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Fig. 10 Hose Clamp Tool

A hardened, cracked, swollen, severely abraded, 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.

CAUTION: Use of general purpose pliers can bend the clamps to a out of round condition, Resulting in a loss of clamping strength.

DESCRIPTION AND OPERATION (Continued)

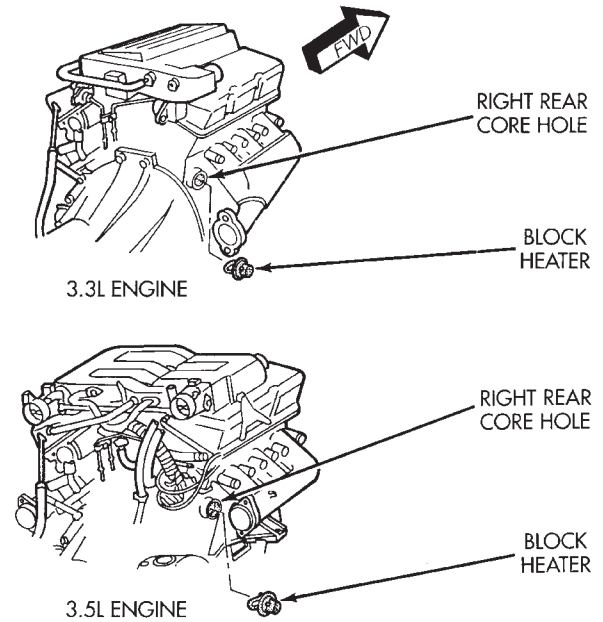
ENGINE BLOCK HEATER

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 (Fig. 11). **The power cord must be secured in its retainer clips, and not positioned so it could contact linkages or exhaust manifolds and become damaged.**

WATER PUMP

The water pump body is made of aluminum with a steel impeller. The water pump is bolted to the front of the timing cover, and driven by the timing belt on the 3.5L engine and the accessory drive belt on the 3.3L. 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.



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Fig. 11 Engine Block Heater

DIAGNOSIS AND TESTING COOLING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
TEMPERATURE GAUGE READING IS INCONSISTENT (FLUCTUATES, CYCLES OR IS ERRATIC)	1. During cold weather operation, with the heater blower in the high position, the gauge reading may drop slightly. Fluctuation is also influenced by loads, outside temperature and cycling of the air conditioning system. 2. Temperature gauge or engine sending unit sensor defective or shorted. Also, corroded or loose wiring in this circuit. 3. Gauge reading rise when vehicle is brought to a stop after heavy use (engine still running). 4. Gauge reading high after restarting a warmed-up (hot) engine. 5. Coolant level low (air will build up in the cooling system causing the thermostat to open late). 6. Cylinder head gasket leaking allowing exhaust gas to enter cooling system causing thermostat to open late. 7. Water pump impeller loose on shaft. 8. Loose accessory drive belt (water pump slipping). 9. Air leak on the suction side of water pump allows air to build up in cooling system causing thermostat to open late.	1. A normal condition. No correction is necessary. 2. Check operation of gauge and repair if necessary. Refer to Group 8E, Instrument Panel and Gauges. 3. A normal condition. No correction is necessary. Gauge reading should return to normal range after vehicle is driven. 4. A normal condition. No correction is necessary. The gauge should return to normal range after a few minutes of engine operation. 5. Check and correct coolant leaks. Refer to Testing Cooling System for Leaks in this group. 6. (a) Check for cylinder head gasket leaks with a commercially available block leak tester. Repair as necessary. (b) Check for coolant in engine oil. Inspect for white steam emitting from exhaust system. Repair as necessary. 7. Check water pump and replace as necessary. Refer to Water Pump Removal in this group. 8. Refer to Engine Accessory Drive Belts in this group. Check and correct as necessary. 9. Locate leak and repair as necessary.
PRESSURE CAP IS BLOWING OFF STEAM AND/OR COOLANT. 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, or the incorrect cap was installed.	1. Check condition of radiator cap and cap seal. Refer to Pressure Cap in this Group. Replace cap as necessary.
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.

DIAGNOSIS AND TESTING (Continued)

COOLING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
COOLANT LOSS TO THE GROUND WITHOUT PRESSURE CAP BLOWOFF. GAUGE IS READING HIGH OR HOT.	1. Coolant leak 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 NOT BE READING HIGH.	1. Engine overheating. 2. Freeze point of coolant not correct. Mixture too rich or too lean. 3. Wrong cooling system pressure cap.	1. Check reason for overheating and repair as necessary. 2. Check freeze point of the coolant. Refer to Coolant General Info. in this group for test procedure. Adjust the ethylene glycol to water ratio as required. 3. Install correct cap.
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) Pressure cap relief valve stuck. Refer to Pressure cap in this group. Replace as necessary. (b) Hose between coolant reserve/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 and repair as necessary.
HOSE OR HOSES COLLAPSE WHEN ENGINE IS RUNNING	1. Obstruction in cooling system hose	1. Check hose for obstruction, 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. 3. A/C pressure transducer defective.	1. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the DRB scan tool. Repair as necessary. 2. Repair as necessary. 3. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the DRB scan tool. Repair as necessary.
NOISY FAN	1. Fan blade loose. 2. Fan blade striking a surrounding object. 3. Air obstructions at radiator or air conditioning condenser. 4. Electric fan motor defective.	1. Replace fan module 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. 4. Refer to procedure outlined in this section

DIAGNOSIS AND TESTING (Continued)

COOLING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
INADEQUATE AIR CONDITIONER PERFORMANCE (COOLING SYSTEM SUSPECTED)	1. Radiator and/or A/C condenser is restricted, obstructed or dirty (insects, leaves etc.). 2. Electric radiator fan not operating when A/C is operated. 3. Engine is overheating (heat may be transferred from radiator to A/C condenser. High underhood temperatures due to engine overheating may also transfer heat to A/C components). 4. Some models with certain engines are equipped with air seals at the radiator and/or A/C condenser. If these seals are missing or damaged, not enough air flow will be pulled through the radiator and A/C condenser.	1. Remove restriction and/or clean as necessary. Refer to Radiator Cleaning in this group. 2. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the DRB scan tool. Repair as necessary. 3. Correct overheating condition. Refer to text in Group 7, Cooling. 4. Check for missing or damaged air seals and repair as necessary.
INADEQUATE HEATER PERFORMANCE. THERMOSTAT FAILED IN OPEN POSITION.	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. Some models with certain engines are equipped with a water control valve located on one of the heater hoses. This valve may be defective. 6. Water pump is not pumping water to heater core. When the engine is fully warmed up, both heater hoses should be hot to the touch. If only one of the hoses is hot, the water pump may not be operating correctly. The accessory drive belt may also be slipping causing poor water pump operation.	1. Refer to On-Board Diagnostics in Group 25 and replace thermostat is 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 Group 24, Heating and Air Conditioning for diagnosis. Repair as necessary. 6. Refer to Water Pumps in this group. Repair as necessary. If a slipping belt is detected, refer to Engine Accessory Drive Belts in this group. Repair as necessary.
HEAT ODOR	1. Various heat shields are used at certain drive line components. One or more of these shields may be missing.	1. Locate missing shields and replace or repair as necessary.

DIAGNOSIS AND TESTING (Continued)

COOLING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
HEAT ODOR-CONT.	2. Is temperature gauge reading above the normal range? 3. Is cooling fan operating correctly? 4. Has undercoating been applied to any unnecessary component? 5. Engine may be running rich causing the catalytic converter to over heat.	2. Refer to the previous Temperature Gauge Reads High in these Diagnosis Charts. Repair as Necessary. 3. Refer to Cooling System Fan in this group for diagnosis. Repair as necessary. 4. Clean undercoating as necessary. 5. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the DRB scan tool. Repair as necessary.
POOR DRIVEABILITY (THERMOSTAT POSSIBLE STUCK OPEN). GAUGE MAY BE READING LOW.	1. For proper driveability, good vehicle emissions and for preventing buildup 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 Diagnostic in Group 25. DTC's may also be checked using the DRB scan tool. Refer to the proper Powertrain Diagnostic Procedure 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, OR VEHICLE HAS JUST BEEN SHUT OFF. TEMPERATURE GAUGE IS IN THE NORMAL RANGE.	1. During wet weather, moisture (snow, ice, rain or condensation) on the radiator will evaporate when the thermostat opens. The thermostat opening allows heated coolant into the radiator. When the moisture contacts the hot radiator, steam may be emitted. This usually occurs in cold weather with no fan or airflow to blow it away.	1. Occasional steam 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 ethylene glycol to water ratio as necessary.
COOLANT LEVEL CHANGES IN COOLANT BOTTLE. TEMPERATURE GAUGE IS IN NORMAL RANGE.	1. Level changes are to be expected as coolant volume fluctuates with engine temperature. The coolant level will also drop as the system removes air from a fresh filling.	1. A normal condition. No repair is necessary.

DIAGNOSIS AND TESTING (Continued)

ENGINE THERMOSTAT

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 open 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, a DTC diagnostic trouble code 17 will be set. Do not change a thermostat for lack of heat by gauge or heater performance, unless code 17 is present, see diagnosis for other probable causes. 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.

WATER PUMP DIAGNOSIS

A quick 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. **The water pump on all models can be replaced without discharging the air conditioning system.**

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain on water pump body). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of green/brown engine coolant is evident on water pump body from the weep hole (shaft seal failure). Be sure to perform a thorough analysis before replacing water pump.

RADIATOR FAN CONTROL

Fan control is accomplished two ways. A pressure transducer on the air conditioning compressor discharge line sends a signal to the Powertrain Control Module (PCM) which will activate both fans if necessary. In addition to this control, the fan is turned on based on coolant temperature sensor output to the (PCM). The PCM switches the fans on through the fan relays. Refer to Wiring Diagrams Manual for circuit and diagnostics.

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

- Regardless of coolant temperature the fan will not run during cranking until the engine starts.
- Fans will run in accordance with following operation charts.

RADIATOR FAN OPERATION —3.3L OR 3.3L TLEV

Radiator Fan Control			A/C Pressure	
A/C off	Low	High		
Fan On:	99°C (210°F)	110°C (230°F)		
Fan Off:	93°C (199°F)	140°C (219°F)		
A/C On	Low	High	Low	High
Fan On:	99°C (210°F)	110°C (230°F)	1,446 Kpa (209 psi)	1,723 Kpa (249 psi)
Fan Off:	93°C (199°F)	140°C (219°F)	862 Kpa (125 psi)	1,585 Kpa (229 psi)

RADIATOR FAN OPERATION —3.5L ENGINE

Radiator Fan Control			A/C Pressure	
A/C off	Low	High		
Fan On:	110°C (230°F)	113°C (235°F)		
Fan Off:	109°C (228°F)	111°C (231°F)		
A/C On	Low	High	Low	High
Fan On:	104°C (220°F)	110°C (230°F)	1,441 Kpa (209 psi)	1,717 Kpa (249 psi)
Fan Off:	102°C (215°F)	105°C (221°F)	862 Kpa (125 psi)	1,579 Kpa (229 psi)

RADIATOR COOLANT FLOW

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

- If engine is cold, idle engine until normal operating temperature is reached. If the upper radiator hose is hot, coolant is circulating.

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

ELECTRIC FAN MOTOR

Refer to Power Train Diagnostic Manual for procedure.

TESTING SYSTEM FOR LEAKS

With engine not running, wipe the coolant bottle neck sealing seat clean.

Attach a radiator pressure tester to the coolant bottle, as shown in (Fig. 12) and apply 104 kPa (15 psi) pressure. If the pressure drops more than 2 psi in 2 minutes inspect all points for external leaks.

DIAGNOSIS AND TESTING (Continued)

All hoses, radiator and heater, should be moved while at 15 psi since some leaks occur while driving due to engine rock, etc. If the cooling system will not pressurize easily and there is no coolant leaks, the cooling system is only partially filled. Refer to filling procedure in this section.

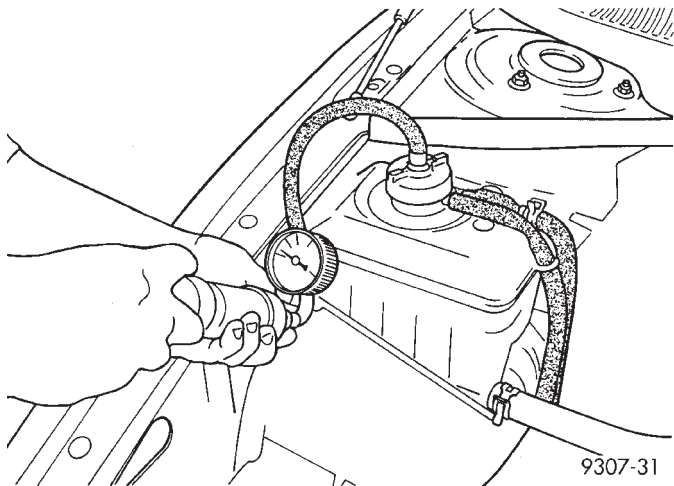


Fig. 12 Pressure Testing Cooling System

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

WARNING: WITH TOOL IN PLACE PRESSURE BUILDS UP FAST. ANY EXCESSIVE AMOUNT OF PRESSURE BUILT UP BY CONTINUOUS ENGINE OPERATION MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

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 cylinder head.

There may be internal leaks which can be determined by removing the oil dip-stick. If water globules appear intermixed with the oil it will indicate a internal leak in the engine. If there is an internal leak, the engine must be disassembled for repair.

LOW COOLANT LEVEL

Low coolant level in a cross flow radiator will equalize in both tanks with engine off. With engine at running and at operating temperature, the high pressure inlet tank runs full and the low pressure outlet tank drops. If this level drops below the top of the transmission oil cooler, air will be drawn into the water pump:

- Transmission oil will become hotter.
- High reading shown on the temperature gauge.
- Air in the coolant will also cause loss of flow through the heater core.
- Water pump seal may run dry, increasing the risk of premature seal failure.
- Exhaust gas leaks into the coolant can also cause the same problems.

DEAERATION

Air is removed from the system as it gathers in the coolant deaeration pressure bottle and is released into the atmosphere through the pressure valve located in the pressure cap when pressure reaches 110-124 kPa (16-18 psi.). The air is replaced with coolant from the coolant deaeration bottle.

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.

DIAGNOSIS AND TESTING (Continued)

ACCESSORY DRIVE BELT DIAGNOSIS

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

ENGINE BLOCK HEATER

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.

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

SERVICE PROCEDURES

COOLANT SERVICE

Coolant should be changed the first time at 72,500 km (45,000 miles) or three years, whichever occurs first. Subsequent coolant changes should occur every two years or 45,000 km (30,000 miles) whichever comes first.

COOLANT LEVEL CHECK

Do not remove coolant bottle pressure cap for routine coolant level inspections.

The coolant bottle provides a quick visual method for determining the coolant level without removing the pressure cap. With the engine cold the level of the coolant in the coolant bottle (Fig. 13) should be within 12 mm (1/2 in.) of cold fill level mark.

ADDING ADDITIONAL COOLANT

When additional coolant is needed, it should be added to the coolant pressure bottle. Use only 50/50

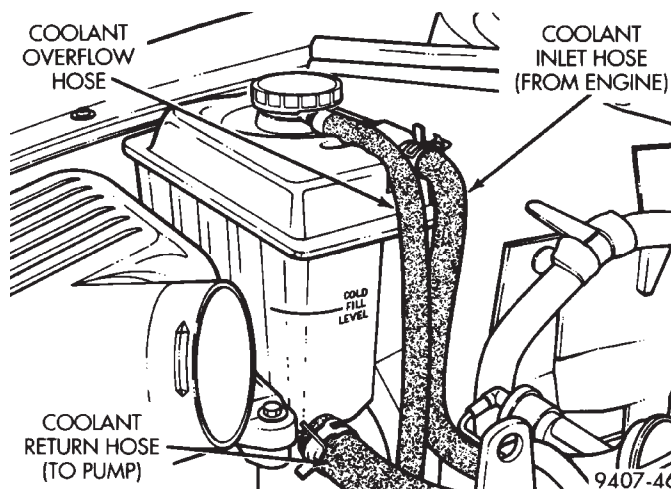


Fig. 13 Coolant Pressure Bottle

concentration of ethylene glycol type antifreeze and water

WARNING: DO NOT OPEN COOLING SYSTEM WHEN HOT AND UNDER PRESSURE BECAUSE PERSONAL INJURY AND SERIOUS BURNS FROM COOLANT CAN OCCUR. ALLOW ENGINE TO COOL BEFORE SERVICING COOLING SYSTEM.

(1) Try squeezing the upper radiator hose to determine if the system is still pressurized.

(2) Place a shop towel over the pressure cap and turn to the first stop. Wait to see if any pressure is released. When no pressure is released, press down on the cap and turn to the second stop. Remove cap.

SERVICE PROCEDURES (Continued)

NOTE: If the coolant pressure is bottle completely empty, refer to Filling Cooling System in this section.

(3) If there is some coolant in coolant pressure bottle, slowly fill coolant pressure bottle.

CAUTION: Do not use well water, or suspected water supply in cooling system. A 50/50 ethylene glycol and distilled water mix is recommended.

DRAINING COOLING SYSTEM

When servicing the cooling system, it is essential that coolant does not drip onto the accessory drive belt and/or pulleys. Shield the belt with shop towels before working on the cooling system. If coolant contacts the belt or pulley, flush both with clean water.

WARNING: DO NOT REMOVE HOSE CLAMPS OR HOSES, CYLINDER BLOCK DRAIN PLUGS, COOLANT BOTTLE CAP, OR OPEN THE RADIATOR DRAINCOCK, WHEN THE SYSTEM IS HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM THE COOLANT CAN OCCUR.

(1) Open radiator drain located at the lower right side of radiator (Fig. 14). Drain takes place through the lower isolator. **Do Not Use pliers to open draincock.**

(2) Remove coolant pressure bottle cap and open the thermostat bleed valve.

(3) Remove the cylinder block drain plug(s) located behind each exhaust manifold.

CAUTION: The cooling system normally operates at 97-124 kPa (14-18 psi) pressure. Exceeding this pressure may damage the radiator or hoses.

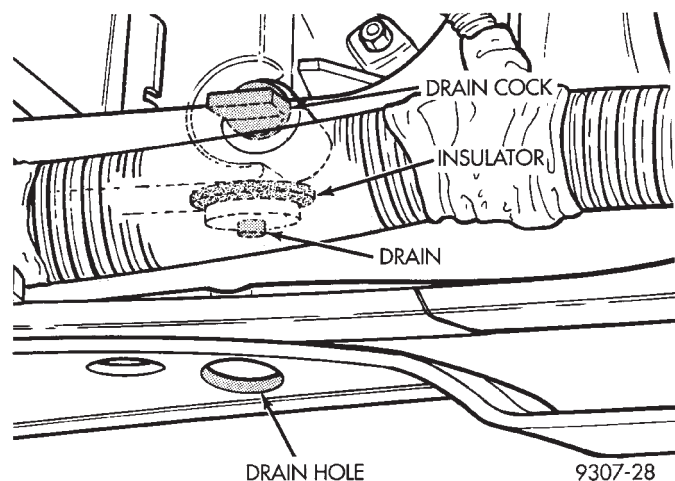


Fig. 14 Radiator Draincock Location

FILLING COOLING SYSTEM

CAUTION: Do not use well water, or suspected water supply in cooling system. A 50/50 ethylene glycol and distilled water mix is recommended.

- (1) Close radiator drain. Hand tighten only.
- (2) Install the cylinder block drain plugs.

WARNING: WHEN INSTALLING DRAIN HOSE TO AIR BLEED VALVE ON THERMOSTAT HOUSING, ROUTE HOSE AWAY FROM ACCESSORY DRIVE BELT, ACCESSORY DRIVE PULLEYS, AND ELECTRIC COOLING FAN MOTORS.

(3) Attach one end of a 6.35 mm (.250 in.) ID clear hose that is approximately 1200 mm (48 in.) long, to the bleed valve in the thermostat (Fig. 15). Route the hose away from the accessory drive belt, drive pulleys and electric cooling fan. Place the other end of hose into a clean container. The hose will prevent coolant from contacting the accessory drive belt when bleeding the system during the refilling operation.

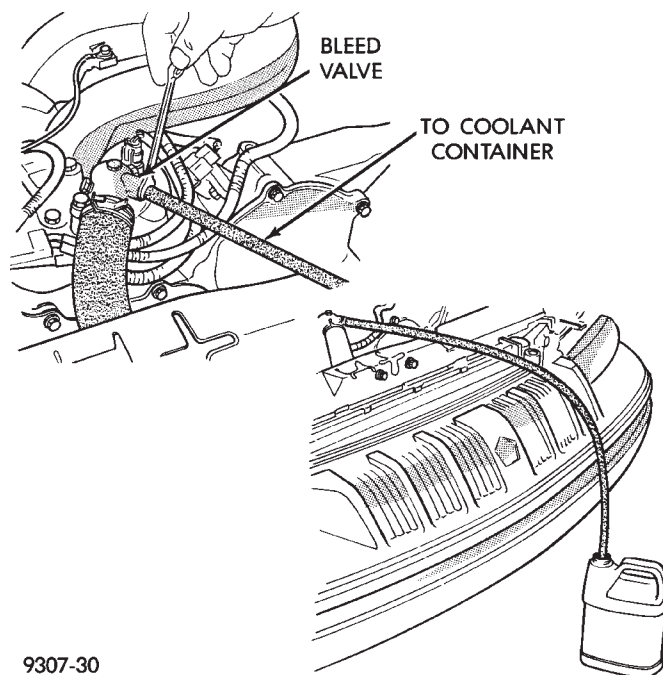
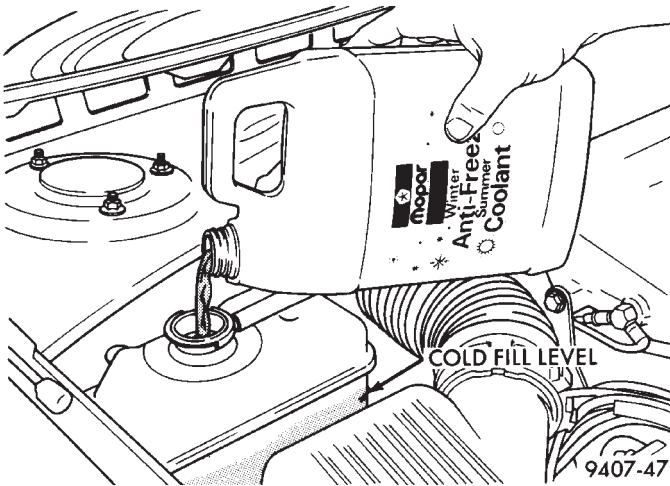


Fig. 15 Bleeding Cooling System While Filling With Coolant

- (4) Open bleed valve.
- (5) Slowly fill coolant pressure bottle (Fig. 16) until a steady stream of coolant flows from hose attached to the bleed valve.
- (6) Gently squeeze upper radiator hose until all air is removed from system.
- (7) Close bleed valve and continue filling to the top of the coolant bottle (Fig. 16).
- (8) Install cap on coolant pressure bottle.

SERVICE PROCEDURES (Continued)

**Fig. 16 Filling Cooling System**

- (9) Remove hose from bleed valve.

NOTE: Mopar Antifreeze or a ethylene glycol base antifreeze with a silicate inhibitor or their equivalent are recommended for best engine cooling without corrosion. Refer to Coolant Performance in this section for appropriate coolant mixture to use.

REMOVAL AND INSTALLATION

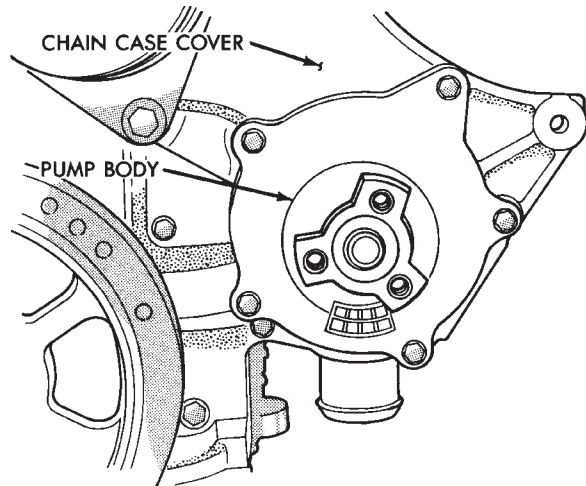
WATER PUMP—3.3L ENGINE**REMOVAL**

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

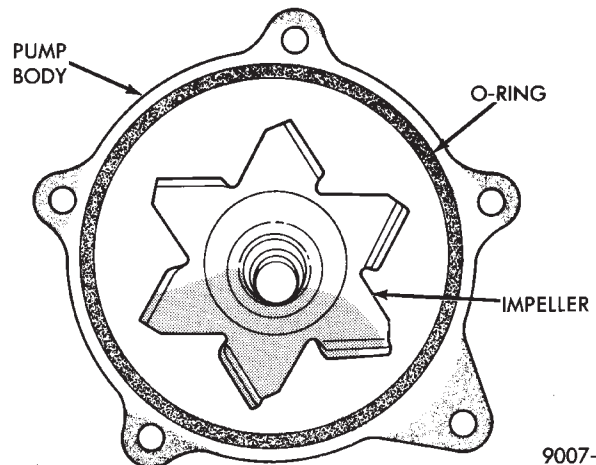
WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND PRESSURIZED. SERIOUS BURNS FROM COOLANT CAN RESULT.

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain on water pump body). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of green/brown engine coolant is evident on the water pump body from the weep hole (shaft seal failure). Be sure to perform a thorough analysis before replacing water pump.

- (1) Drain Cooling System. Refer to Draining Cooling System in this group.
- (2) Remove Poly V Drive Belt.
- (3) Remove pump pulley bolts and remove pulley.
- (4) Remove pump mounting screws (Fig. 17). Remove pump.
- (5) Remove and discard O-ring seal.

**Fig. 17 Water Pump—3.3L Engine**

- (6) Clean O-ring groove and O-ring surfaces on pump and chain case cover. Take care not to scratch or gouge sealing surface.

INSTALLATION**Fig. 18 Water Pump Body—3.3L Engine**

CAUTION: Keep the O-ring free of oil or grease.

- (1) Install new O-ring in pump body groove (Fig. 18).
- (2) Install pump to chain case cover. Torque screws to 12 N·m (105 in. lbs.).
- (3) Rotate pump by hand to check for freedom of movement.
- (4) Position pulley on pump. Install screws and torque to 30 N·m (250 in. lbs.).
- (5) Install drive belt. See Accessory Drive Belts this group.
- (6) Refill Cooling System. See Refilling Cooling System in this section.

REMOVAL AND INSTALLATION (Continued)

WATER PUMP—3.5L ENGINE**REMOVAL**

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

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

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain on water pump body). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of green/brown engine coolant is evident on water pump body from the weep hole (shaft seal failure). Be sure to perform a thorough analysis before replacing water pump.

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

(2) The water pump is driven by the timing belt. Refer to Timing Belt Removal in Group 9, Engine for component removal to provide access to water pump.

(3) Remove mounting bolts.

(4) Remove pump body from engine (Fig. 19).

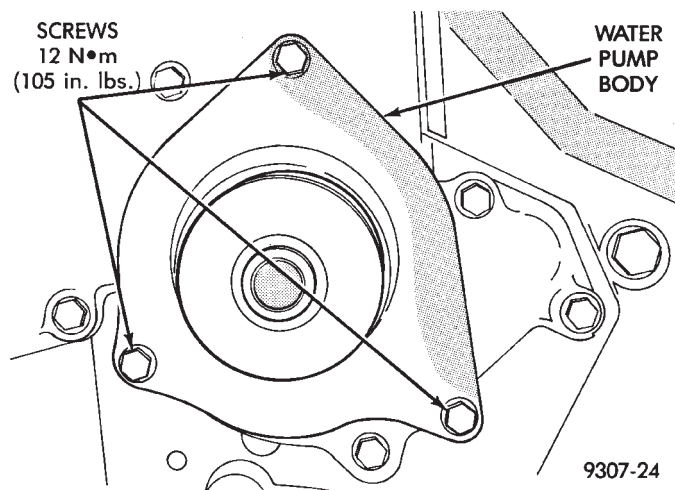


Fig. 19 Water Pump—3.5L Engine

INSTALLATION

(1) Clean all O-ring surfaces on pump and cover.

(2) Install new O-ring on water pump (Fig. 20). Wet the O-ring with water to facilitate assembly.

CAUTION: Keep the O-ring free of oil or grease.

(3) Install pump to housing mounting bolts and tighten to 12 N•m (105 in. lbs.).

(4) Refer to Timing System in Engine Section, Group 9 for timing belt installation procedure and reassemble engine.

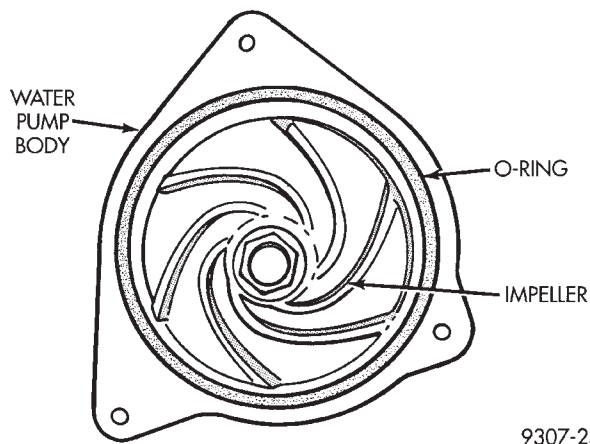


Fig. 20 Water Pump Body—3.5L Engine

(5) Fill cooling system. Refer to Refilling Cooling System.

THERMOSTAT—3.3/3.5L ENGINE**REMOVAL**

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

(1) Drain cooling system down to thermostat level or below.

(2) Remove thermostat housing bolts and housing (Fig. 21).

(3) Remove thermostat, discard gasket and clean both gasket sealing surfaces.

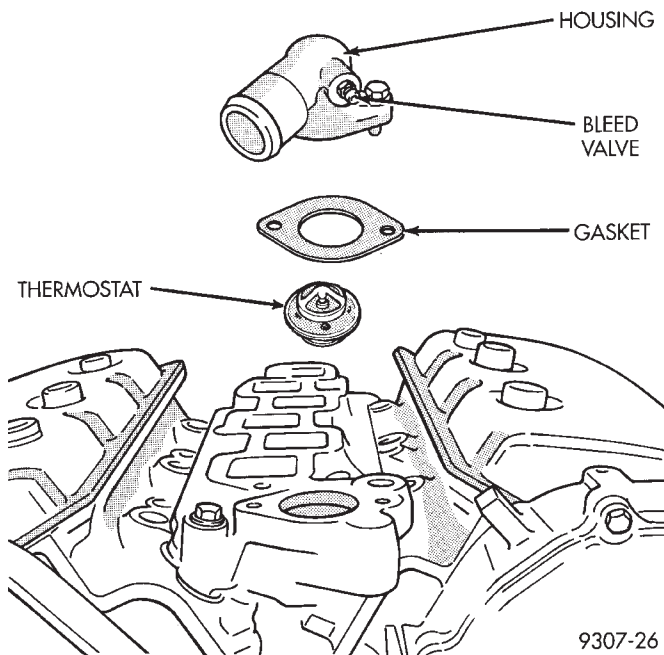


Fig. 21 Thermostat and Housing—3.3/3.5L Engine

REMOVAL AND INSTALLATION (Continued)

INSTALLATION

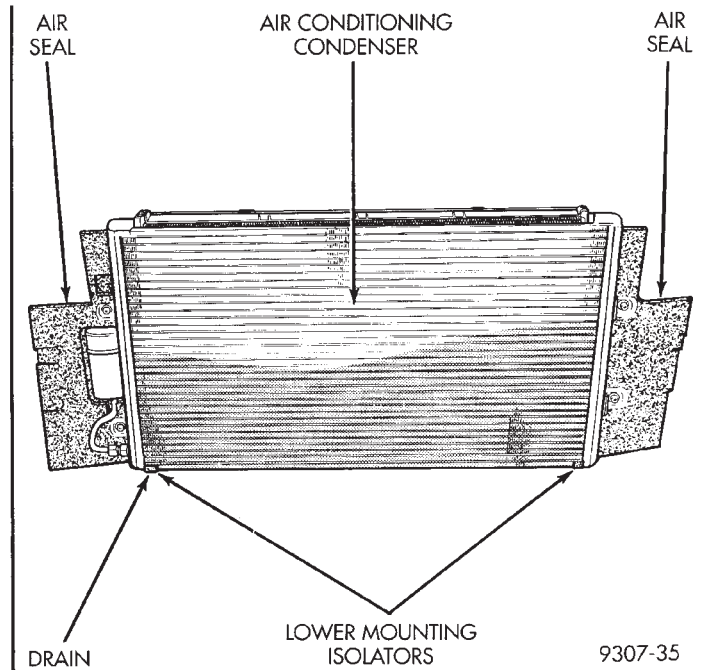
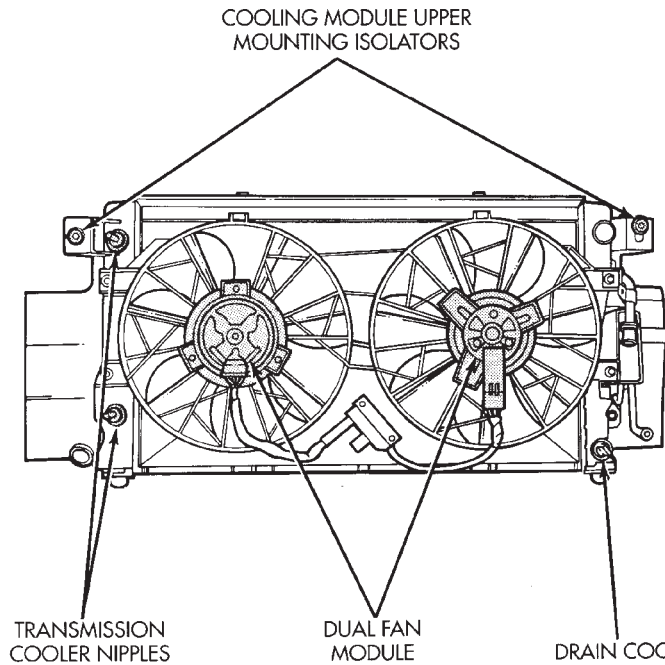
(1) Install thermostat into recess provided in the intake manifold.

(2) Place a new gasket (dipped in water) on the water box surface, center thermostat into opening in the intake manifold.

(3) Place housing over gasket and thermostat, Bolt housing to intake manifold, torque bolts to 28 N·m (250 in. lbs.) 3.3L engine and 12 N·m (105 in. lbs.) 3.5L engine.

(4) Refill cooling system (see **Refilling System**).

RADIATOR



Cooling Module

REMOVAL

(1) Disconnect negative battery cable from battery.

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.

(2) Drain cooling system. Refer to Draining Cooling System of this section. For New Yorker and New Yorker LHS models it will be necessary to remove the sight shield and the right and left headlamp modules. Refer to Group 8L Lamps for procedure.

(3) Remove upper radiator crossmember (Fig. 22).

(4) Remove hose clamps and hoses from the radiator.

(5) Disconnect automatic transmission hoses from cooler and plug off.

(6) Disconnect the fan wiring connector from the RFI module (Fig. 23).

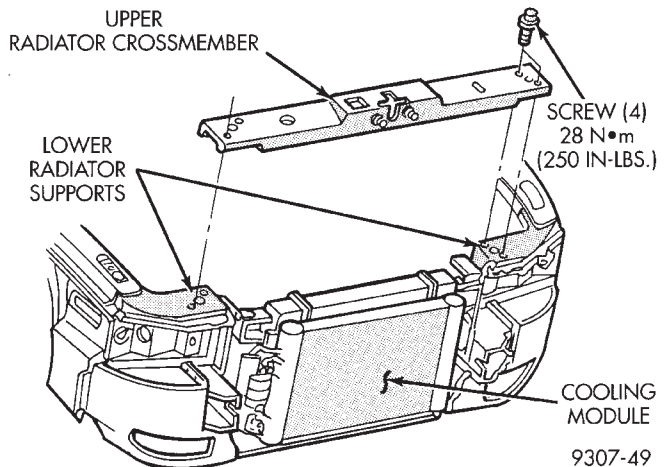
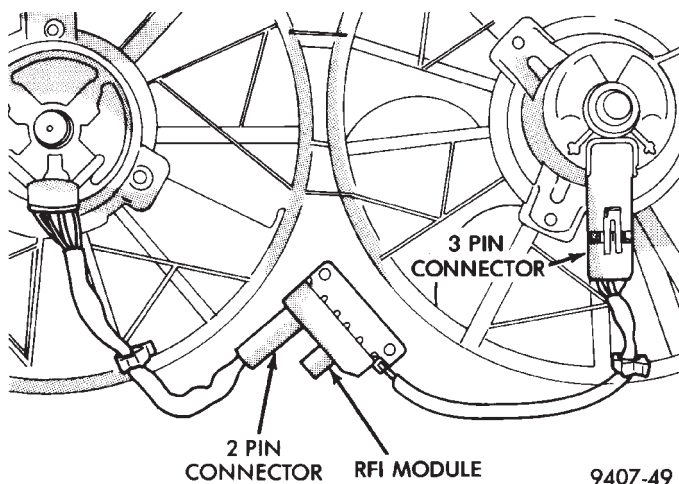


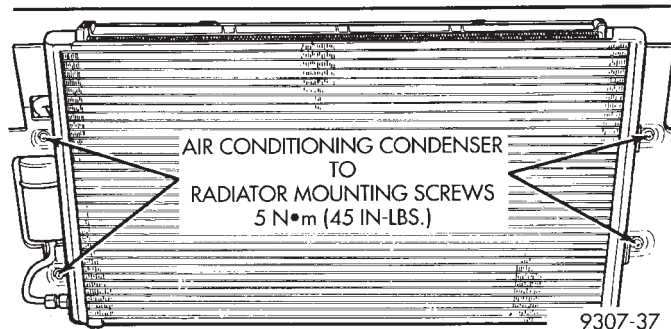
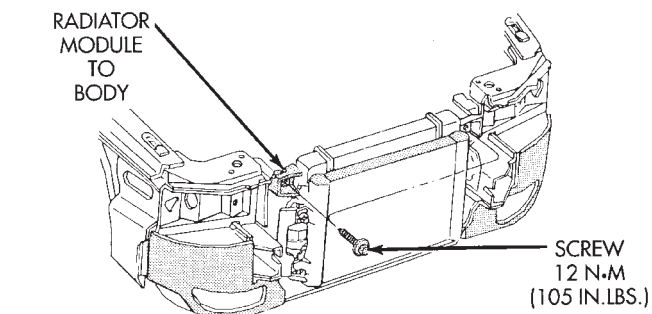
Fig. 22 Upper Radiator Crossmember

(7) Remove upper radiator mounting screws (Fig. 24). Disconnect the engine block heater wire if equipped.

REMOVAL AND INSTALLATION (Continued)

**Fig. 23 Electric Fan Motor RFI Module**

CAUTION: Avoid bending the condenser inlet tube. Care should be taken not to damage radiator or condenser cooling fins or water tubes during removal.

**Fig. 24 Radiator Module—All Models**

(8) Remove the air conditioning condenser attaching screws located at the front of the radiator. Lean condenser forward against bumper. It is not necessary to discharge the air conditioning system to remove radiator.

(9) Radiator can now be lifted free from engine compartment. **Care should be taken not to damage radiator cooling fins or water tubes during removal.**

INSTALLATION

(1) Slide radiator and fan module or cooling module down into position, seat the radiator assembly lower rubber isolators in the mount holes provided.

(2) Attach air conditioning condenser to radiator. Torque mounting screws to 5 N·m (45 in. lbs.). On New Yorker and New Yorker LHS models connect A/C lines to condenser. Refer to Group 24 Heating and Air Conditioning for procedures.

(3) Torque radiator mounting screws to 14 N·m (123 in. lbs.). Connect engine block heater wire if equipped.

(4) Connect lower radiator hose and clamp. Connect automatic transmission hoses; torque hose clamps to 2.5 N·m (22 in. lbs.).

(5) Connect fan motor electrical connection.

(6) Install upper radiator hose. Align hose so it does not interfere with the accessory drive belt or engine. Position hose clamp so it will not interfere with the hood liner.

(7) Connect negative battery cable.

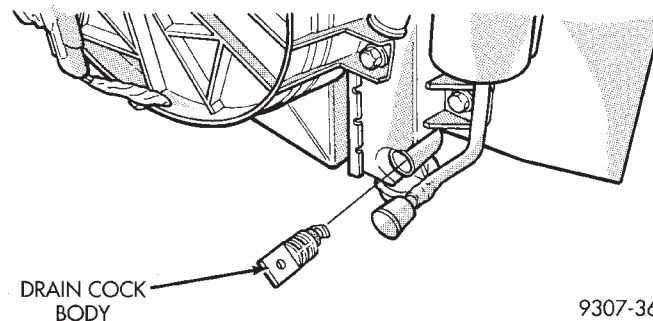
(8) Fill cooling system with coolant. Refer to Refilling Cooling Systems in this section.

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

(10) On New Yorker and New Yorker LHS models, Install right and left headlamp modules and the sight shield to the radiator crossmember. Refer to Group 8L Lamps for procedure.

RADIATOR DRAINCOCK**REMOVAL**

CAUTION: Use of pliers on draincock is not recommended. Damage may occur to part. Draincock should not be removed unless leakage observed.

**Fig. 25 Draincock**

(1) Turn the draincock stem counterclockwise to unscrew the stem. When the stem is unscrewed to the end of its threads, turn back 1/8 turn and pull the stem (Fig. 25) from the radiator tank.

REMOVAL AND INSTALLATION (Continued)

INSTALLATION

(1) Push the draincock assembly body into the tank opening until it snaps into place.

(2) Tighten the draincock stem by turning clockwise until it stops.

FAN MODULE—BLADE AND MOTOR

REMOVAL—ASSEMBLY

(1) Disconnect electric lead to the RFI module.

(2) Remove fan module to radiator fasteners and retaining clips (Fig. 26).

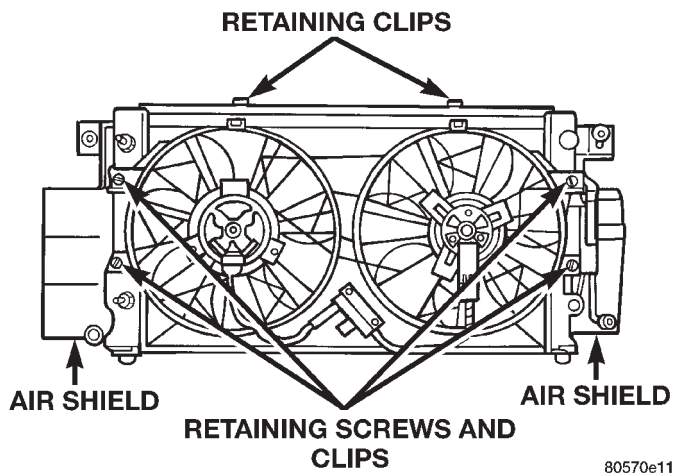


Fig. 26 Fan Module

(3) Remove assembly from radiator.

BLADE—REMOVE AND INSTALL

(1) To remove fan from motor shaft, bench support the motor and motor shaft, while removing the fan retaining clip (Fig. 27) or nut, so that the shaft and motor will not be damaged by excessive force. **Surface or burr removal may be required to remove fan from motor shaft.** Do not permit the fan blades to touch the bench.

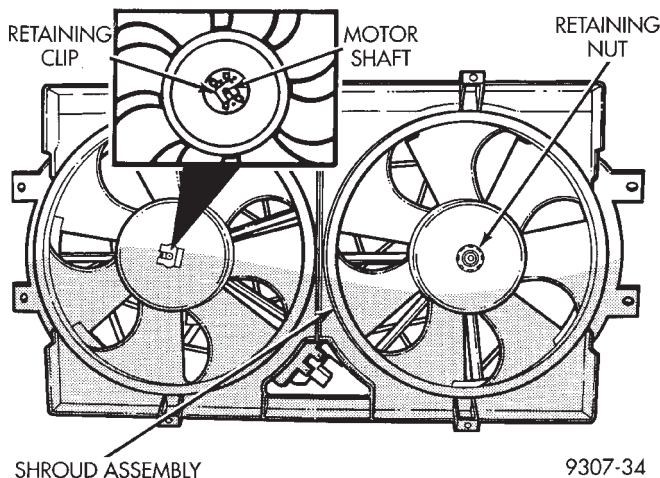


Fig. 27 Radiator Fans

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

FAN MOTOR—REMOVE

(1) Remove the motor fasteners from support. Remove motor from support.

(2) Reverse the above procedure for Installation. Torque the fan motor fasteners to 3 N·m (25 in. lbs.) right fan and 5 N·m (45 in. lbs.) left fan.

INSTALLATION—ASSEMBLY

(1) Install assembly to radiator. Attach retaining clips and torque shroud to radiator fasteners to 5 N·m (45 in. lbs.).

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

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 (Fig. 28).

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

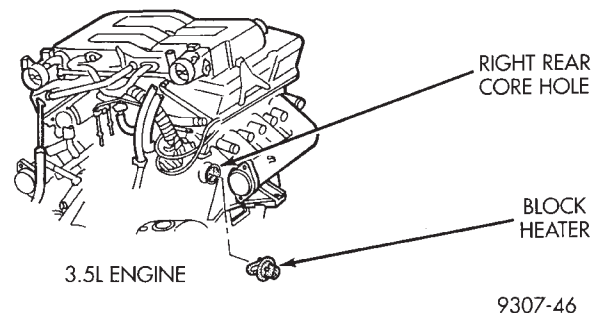
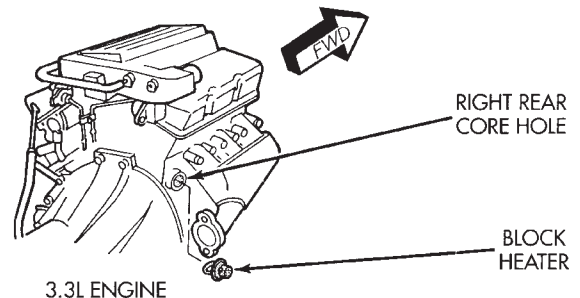


Fig. 28 Engine Block Heater

INSTALLATION

(1) Thoroughly clean core hole and heater seat.

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

REMOVAL AND INSTALLATION (Continued)

(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 BELT— 3.3L ENGINE

The Poly-V serpentine generator/power steering and water pump belt has an adjusting screw on the alternator mounting bracket (Fig. 29) to maintain proper belt tension. To remove or install this belt, Release tension by loosening the alternator mounting bolt A and adjusting bolt locknut B then loosen adjusting bolt (Fig. 30). Reverse procedure to install and tighten belt to specified tension.

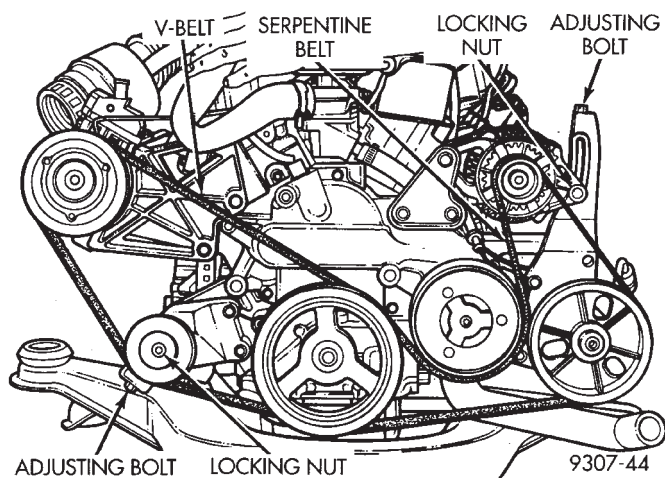


Fig. 29 Accessory Drive—3.3L Engine

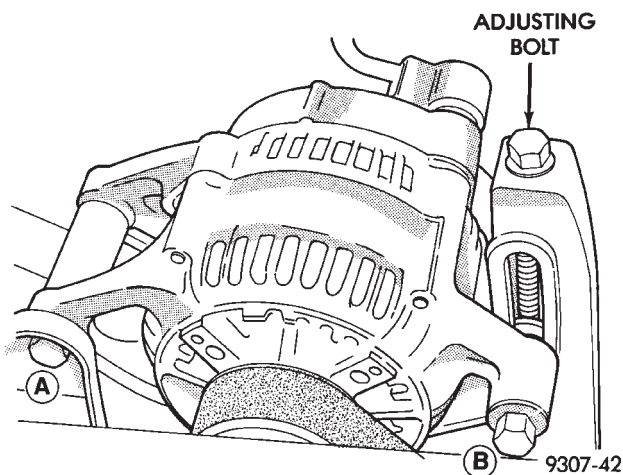


Fig. 30 Accessory Drive Belt Adjustment—3.3L Engine

ACCESSORY DRIVE BELT— 3.5L ENGINE

The Poly-V generator/power steering belt has an adjustable tensioner pulley located on the timing belt cover (Fig. 31) to maintain proper belt tension. To

remove or install this belt, Release tension by loosening the tensioner pulley nut and adjustment bolt (Fig. 31). Reverse procedure to install and tighten belt to specified tension.

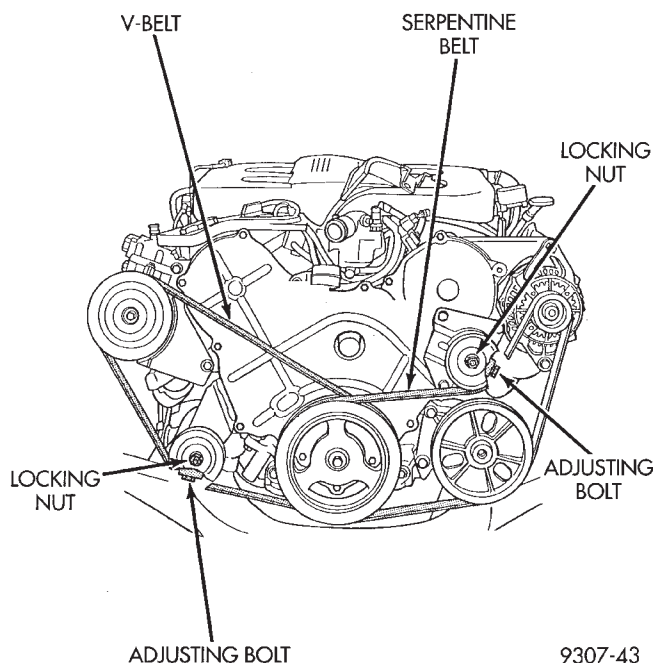


Fig. 31 Accessory Drive—3.5L Engine

AIR CONDITIONING BELT— 3.3/3.5L ENGINE

(1) Remove the alternator/power steering pump and water pump drive belt to gain access to the air conditioning drive belt.

(2) To remove and install the air conditioning compressor drive belt, first loosen the tensioner pulley lock nut, then turn the adjusting screw to raise or lower the tensioner pulley assembly (Fig. 29) or (Fig. 31). **To adjust the air conditioning drive belt,** loosen the tensioner pulley nut and adjust belt tension by tightening adjusting screw. Torque pulley nut to 54 N·m (40 ft. lbs.) after adjustment.

CLEANING AND INSPECTION**WATER PUMP**

Replace the water pump if it has any of the following defects.

- (1) Damage or cracks on the pump body.
- (2) Coolant leaks; if the seal is leaking, this will be evident by traces of thick deposits of greenish-brown dried glycol running down the pump body and components below. A thin black stain below pump weep hole is considered normal operation.
- (3) Impeller rubs inside of chain case cover 3.3L or timing belt cover 3.5L engines.
- (4) Excessively loose or rough turning bearing.

CLEANING AND INSPECTION (Continued)

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain on water pump body). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of green/brown engine coolant is evident on water pump body from the weep hole (shaft seal failure). Be sure to perform a thorough analysis before replacing water pump.

ACCESSORY DRIVE BELT INSPECTION

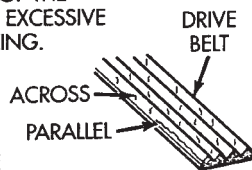
Satisfactory performance of the belt driven accessories depends on belt condition (Fig. 32) and proper belt tension.

COOLANT BOTTLE PRESSURE CAP

BELT REPLACEMENT UNDER ANY OR ALL OF THE FOLLOWING CONDITIONS IS REQUIRED, EXCESSIVE WEAR, FRAYED CORDS OR SEVERE GLAZING.

V-RIBBED 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.

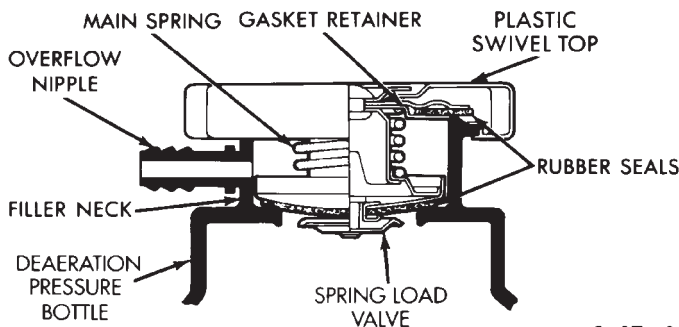
DO NOT USE ANY TYPE OF BELT DRESSING OR RESTORER ON V-RIBBED BELTS.



9207-16

Fig. 32 Drive Belt Inspection

The pressure cap upper gasket (seal) pressure relief can be checked by removing cap. Attach the Radiator Pressure Tool to the cap and pump air into the cap. Pressure cap upper gasket should relieve at 124 kPa (18 psi) and hold pressure at 110 kPa (16 psi) minimum.



9407-48

Fig. 33 Pressure Cap

Remove the pressure tester hold the cap in hand, **right side up** (Fig. 33). The vent valve at the bottom of the cap should not open. If the rubber gasket has swollen and prevents the valve from closing, replace the cap.

Hold the cleaned cap in hand **upside down**. If any light can be seen between vent valve and rubber gasket, replace cap.

WARNING: THE WARNING WORDS DO NOT OPEN HOT ON THE COOLANT BOTTLE PRESSURE CAP IS A SAFETY PRECAUTION. WHEN HOT, PRESSURE BUILDS UP IN COOLING SYSTEM. TO PREVENT SCALDING OR INJURY, THE COOLANT BOTTLE 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:

- Checking and adjust antifreeze freeze point.
- Refilling system with new coolant.
- Conducting service procedures.
- Checking for vacuum leaks.

WARNING: IF VEHICLE HAS BEEN RUN RECENTLY, WAIT 15 MINUTES BEFORE REMOVING CAP. THEN 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 AND WHEN THE SYSTEM STOPS PUSHING OUT COOLANT AND STEAM AND PRESSURE DROPS, REMOVE THE CAP COMPLETELY. SQUEEZING THE RADIATOR INLET HOSE WITH A SHOP TOWEL (TO CHECK PRESSURE) BEFORE AND AFTER TURNING TO THE FIRST STOP IS RECOMMENDED.

CLEANING COOLING SYSTEM

Drain cooling system. Refer to Draining Cooling System in this section. Refill with clean distilled water. Refer to Refilling Cooling System in this section. Run engine with radiator cap installed until upper radiator hose is warm. Stop engine and drain water from system. If water is dirty, fill, run and drain system again until water runs clear.

REVERSE FLUSHING COOLING SYSTEM

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 or in case of partially plugged systems.

RADIATOR

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.

CLEANING AND INSPECTION (Continued)

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

Drain radiator. Refer to Draining Cooling System in this section. Remove hoses from radiator. Remove engine thermostat and reinstall thermostat housing. 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 using a new housing gasket. Fill cooling system. Refer to Refilling Cooling System in this section.

ADJUSTMENTS

BELT TENSION GAUGE METHOD

Use belt tension gauge Special Tool Kit C-4162 for conventional belts and Poly-V belts.

Adjust the belt tension for a **NEW** or **USED** belt tension applications:

- Used Belt — 534 N (120 lbs.)
- New Belt — 667 ± 44 N (150 ± 10 lbs.)

SPECIFICATIONS

COOLING SYSTEM CAPACITY

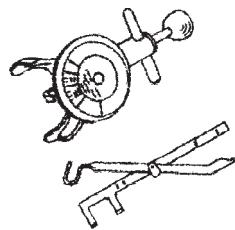
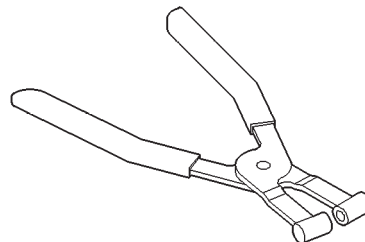
ENGINE	CAPACITIES	
3.3L	10.5 LITERS	11.09 QTS.
3.5L	11.5 LITERS	12.15 QTS.
CAPACITY: Includes Heater and Coolant Pressure Bottle.		

TORQUE

DESCRIPTION	TORQUE
Radiator To Body (Cooling Module)	
Screws	12 N·m (105 in. lbs.)
Fan Module To Radiator	
Screws	5 N·m (45 in. lbs.)
Fan Blade Left Side (Short Motor)	
Nut	5 N·m (45 in. lbs.)

DESCRIPTION	TORQUE
Condenser Inlet Tube Bracket	
Screw	5 N·m (45 in. lbs.)
A/C Condenser to Radiator	
Bolt	5 N·m (45 in. lbs.)
Screws, Fan Motor To Shroud	
Right Side (Long Motor)	3 N·m (25 in. lbs.)
Left Side (Short Motor)	5 N·m (45 in. lbs.)
Receiver / Drier Swivel	
Nut	5 N·m (45 in. lbs.)
RFI Harness To Shroud	
Screw	3 N·m (25 in. lbs.)
Bolts, Thermostat Housing	
3.3L	28 N·m (250 in. lbs.)
3.5L	12 N·m (105 in. lbs.)
Water Pump Pulley	
Bolts	28 N·m (250 in. lbs.)
Bolts, Water Pump Mounting	
3.3L	12 N·m (105 in. lbs.)
3.5L	12 N·m (105 in. lbs.)
Thermostat Bleed	
Screw	8 N·m (70 in. lbs.)
Upper Radiator Crossmember	
Bolts	28 N·m (250 in. lbs.)

SPECIAL TOOLS

COOLING*Belt Tension Gauge C-4162**Hose Clamp Pliers 6094*