



COOLING SYSTEM

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GENERAL INFORMATION

COOLING SYSTEM

The cooling system consists of an engine cooling module, pressure cap, coolant deaeration pressure 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, hoses, clamps, air conditioning condenser, and a receiver drier.

- When Engine is cold: Thermostat is closed, cooling system has no flow through the radiator. The coolant flows through the engine heater core, deaeration pressure bottle and by-pass.
- When Engine is warm: Thermostat is open, coolant flows through the radiator, heater core, deaeration pressure 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 performance and cooling for automatic transmission oil. 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 coolant routings is shown in (Fig. 1).

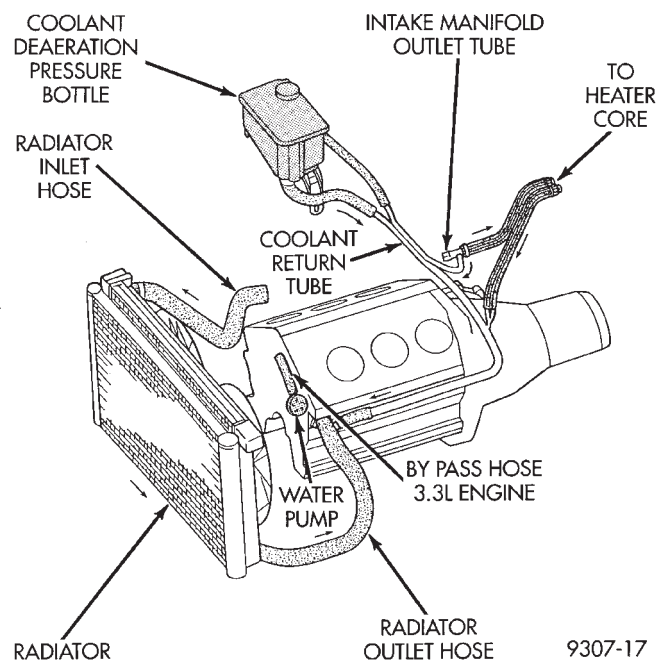


Fig. 1 Cooling System Operation—3.3/3.5L Engine



COOLING SYSTEM DIAGNOSIS

OVERHEATING DRIVING CONDITIONS

Establish what "driving" conditions caused this complaint. Abnormal loads on the cooling system, such as the following may be the problem:

1. Prolonged Idle, Very High Ambient Temperature, Slight Tail Wind at Idle, Slow Traffic, Traffic Jams, High Speed, Steep Grades:

Driving techniques that avoid overheating are:

(a) Idle with A/C off when temperature gauge is at end of normal range.

(b) Do not increase engine speed for more air flow and coolant flow because the electric motor fan systems are not responsive to engine RPM. The added cooling from higher coolant flow rate is more than offset by increased heat rejection (engine heat added to coolant).

2. Trailer Towing:

Consult owner's manual—Trailer Towing. Do not exceed limits.

3. Air Conditioning: Add-on or After Market:

If add-on or after market A/C is involved maximum cooling components should be installed for the model involved per manufacturer's specifications.

Further diagnostic checks should not be required.

4. Recent Service or Accident Repair:

Determine if any recent service has been performed on the vehicle that may affect the cooling system such as engine adjustment (wrong timing), loose or slipping water pump belt, brakes (possibly dragging), changed parts (possibly wrong), recored radiator or cooling system refilling (possibly under-filled or trapped air).

If investigation reveals none of the above as cause for overheating complaint refer to the following symptoms chart.

COOLING SYSTEM DIAGNOSIS**Symptom****Action**

**High Gauge Indication -
Without Coolant Loss**

Normal with temporary operation with heavy load, towing a light trailer, high outdoor temperatures, and/or on a steep grade.

Coolant Loss

Improper refilling procedures can result in trapped air in the system. Subsequent cycles through the deaeration bottle will deaerate the cooling system. A low coolant level will result in the coolant deaeration pressure bottle. Add coolant. If condition persists see System Diagnosis.

Fan Never Runs

Refer to L.H. Body Diagnostic Manual.

Fan Always Runs

Check for low coolant level. For system diagnosis refer to L.H. Body Diagnostic Manual.

**Hot Car (Not Engine) Heat Damage
Hot Carpet, Seat, Trunk
Hot Catalytic Converter
Smoke, Burnt Odor**

Check heat shielding, exhaust system, emission controls, ignition timing—fuel/air ratio, misfiring.

**Hot Engine
Crackling Sounds
Hot Smell
Severe Local Hot Spots**

A moderate amount of sound of heating metal can be expected with any vehicle. However, a crackling sound from the thermostat housing, a hot smell and/or severe local hot spots on an engine can indicate blocked coolant passages. Inspect for plugged water passages, bad casting, core sand and plugging, a cracked block or head, or a blown head gasket. Usually accompanied with coolant loss.

Coolant Color

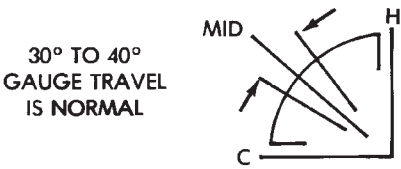
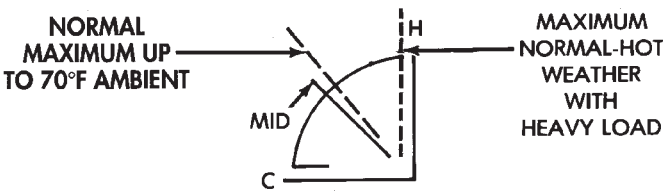
Coolant color is not necessarily an indication of adequate temperature or corrosion protection.

**Coolant Deaeration Pressure
Bottle - Level Changes**

Level changes are to be expected as coolant volume changes with engine temperature. If the level in the bottle is between the Maximum and Minimum marks at normal engine operating temperature, the level should return to within that range after operation at elevated temperatures.



COOLING SYSTEM DIAGNOSIS

CONDITION—AND CHECKS	DIAGNOSIS
Magnetic 90° Gauge Reads Low	
	
	Fig. 1—Normal Gauge Travel
(1) Verify gauge (Fig. 1). Is temperature really low?	(1) See Electrical, Group 8, and check temperature sending unit and gauge. Repair or replace sending unit or gauge.
(2) Is code 17 set in diagnostics?	(2) Yes—Thermostat; No—Other.
(3) Coolant level low in cold ambient (also poor heater performance).	(3) Check radiator and Coolant Deaeration Pressure Bottle for level; inspect for leaks.
(4) Coolant level O.K.	(4) Check heater controls, doors; see Group 24, Heaters and Air Conditioning.
Gauge Reads High Without Pressure Cap Blow off, without Coolant or Steam from Coolant Deaeration Pressure Bottle and to Ground	
	Fig. 2—Gauge Reading—Hot Weather—Heavy Load
(1) Is it really reading high?	(1) See Figure 2.
(2) If at "H" without other signs of boiling.	(2) Look for Grounded gauge, coolant sensor, or wire. See Group 8, Electrical.
(3) Check radiator and Coolant Deaeration Pressure Bottle for level; inspect for leaks.	(3) a—Fill full, remembering to Vent Air. b—Inspect for leaks, repair. c—Assure Pressure Cap was shut tight and that seals at top and bottom of neck are functioning properly. d—Check for correct Pressure Cap.
(4) Coolant level low in Radiator but not in CRS.	

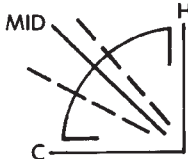
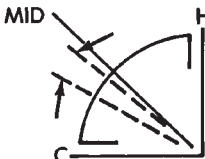
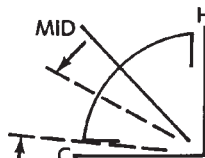


COOLING SYSTEM DIAGNOSIS

CONDITION—AND CHECKS	DIAGNOSIS
(5) Check freeze point.	(5) a—Adjust to 50/50 Glycol and Distilled water. b—If no reading or below -59°C (-50°F), mixture is too rich clean system before refilling.
(6) Assure Coolant Flow.	(6) a—Pinch upper radiator hose and determine if coolant is flowing. Coolant above 90°C (195°F). b—Repair water pump if necessary. See Water Pump Section.
(7) Other possible causes for high gauge reading.	(7) a— —Radiator or Condenser air side plugged. —Radiator core tubes plugged —Add on A/C without proper radiator —Engine out of tune (specifications) —Brakes dragging —Bug screen —Trailer towing or hill climbing b— —Thermostat failed partially shut particularly if ambient temperature is below 21°C (70°F) and vehicle has high mileage. —Condenser or radiator air side plugged. —Add on A/C. c— —Fan not operating. —Check Diagnostics. —Check Fan Motor by wiring to battery, when disconnected from harness. —Check, Group 8, Electrical. —Refer to L.H. Body Diagnostic Manual.
Temperature Gauge Reads Hot with Pressure Cap Blowoff and Steam and coolant to Ground	
(1) Coolant level low in Coolant Deaeration Pressure Bottle.	(1) a—Fill Cooling System Full and Vent Air. b—Inspect for Leaks—repair. c—Assure Pressure cap was shut and seals. d—Assure correct pressure cap is installed.
(2) Check Coolant Freeze point.	(2) Adjust to 50/50 Glycol and distilled water. -37°C (-35°F.)
(3) Assure Coolant Flow.	(3) a—Look for flow through Coolant Deaeration Pressure Bottle with coolant lowered and thermostat open. b—When accompanied with "metal cracking sound"—consider core sand and/or bad head casting. c—Pinch upper radiator hose when coolant is above 90°C (195°F).
(4) Thermostat failed shut.	(4) Especially in cold to medium ambient temperatures.
(5) Head Gasket Leak.	(5) Use block leak checker.



COOLING SYSTEM DIAGNOSIS

CONDITION—AND CHECKS	DIAGNOSIS
Temperature Gauge Is Inconsistent Cycles—Erratic	
	
	Fig. 3—Normal Reaction to Fan Cycle
(1) Is cycle normal?	(1) a—Normal Fan Cycle Due to Temperature. Rises Slowly—Drops Fast (Fig. 3).
	
	Fig. 4—Gauge Reaction to Thermostat
	b—Normal Thermostat Cycle (Fig. 4).
	
	Fig. 5—Gauge Reaction—Winter, Idle, Heater On
	c—Normal Cycle at Idle in Winter With Heater on High. (Heater Heat Transfer Exceeds Engine Heat Rejection) Drops Lower With Time. Sometimes Noticed in Winter Between Drive and Idle (Fig. 5).
	
	Fig. 6—Gauge Reaction—Stop After Heavy Use
	d—Hot Coolant Normally Builds Up at Stop After Heavy Use (Fig. 6).
(2) Is coolant level low in Coolant Deaeration Pressure Bottle (Low level can trap air in system which can put thermostat pellet in air and it opens late).	(2) Fill System, Vent Air and Inspect for Leaks.



COOLING SYSTEM DIAGNOSIS

CONDITION - AND CHECKS	DIAGNOSIS
(3) Is there a head gasket leak that puts exhaust gas in system? (This acts like trapped air with same effect as 2 above.)	(3) a - Test with block leak checker and replace if necessary. b - Coolant in engine oil. c - White steam coming out of exhaust.
(4) Water pump impeller loose on shaft, slips sometimes.	(4) Replace.
(5) Air lead on suction side of water pump entraining air; see 2 above.	(5) Find leak and repair.
Pressure Cap Blow-Off, With Steam to Coolant Deaeration Pressure Bottle and Coolant to Ground Without High Reading. Temperature Gauge Above Normal.	
(1) Check pressure cap relief pressure.	(1) Replace if lower than 14 psi.
Coolant Loss to Ground Without Pressure Cap Blow-Off	
(1) Leaks.	(1) a - Pressure test system while shaking hoses. b - Water pump seal. See "water pump," this Group.
Coolant Loss Past Pressure Cap Top Seal - Glycol Seen on Filler Neck	
(1) With normal gauge reading.	(1) a - Cap not on tight. b - Top seal leaking. c - Cap diaphragm "oil canned." d - Filler neck damaged. e - Rubber seal out of position. f - Wrong pressure cap. g - Damaged cap.
(2) With high gauge reading or low gauge reading on new vehicle.	(2) a - Pressure cap rubber seal out of position. b - Overfilled system.
Detonation or Pre-Ignition When Nothing to Cause It in Engine or Ignition	
(1) Check freeze point of coolant. If tester does not register reading or the reading is below -59°C (-50°F), be aware that 100% glycol makes engine metal run hotter even without a hot gauge reading.	(1) a - Adjust coolant to 50/50 glycol and water -37°C (-35°F). b - If 100% glycol has been found in the system, clean and flush the system before replacing with 50/50 glycol and water.
Hoses Observed Collapsing on Cool-Down	
(1) Check pressure cap vent valve.	(1) a - Must be free to move. Gasket swell can prevent valve from opening. b - Replace cap.
(2) Inside of cap plugged with stop leak pellet, green silica gel, or fiberglass.	(2) Clean cap.
Fan Runs All the Time	
(1) Check for relay.	(1) See Group 8, Electrical.
(2) Check for low coolant level.	(2) Repair as necessary.
Fan Noisy	
(1) Check for loose fan.	(1) Repair as necessary.
(2) Check for fan clearance to adjacent parts.	
(3) Check for loose mount fasteners.	
(4) Check for warped fan blades.	
(5) Check for fan blades spinning on hub.	
(6) Check for air obstructions on radiator or condenser.	



COOLING SYSTEM DIAGNOSIS

CONDITION - AND CHECKS	DIAGNOSIS
Inadequate Air Conditioning Performance – Cooling Systems Suspected	
(1) Check for plugged air side of condenser and radiator – front and rear.	(1) Wash out with low-velocity water.
(2) Assure fan runs correct pressure setting.	(2) Repair as necessary.
(3) Check for missing air seals-recirculating air path.	
(4) Assure correct cooling system parts.	
(5) Check A/C charge level	
Battery Dead – Suspect Fan Current Draw as Cause	
(1) With a good, fully charged battery.	(1) a – Assure fan control is operating properly. Refer to Radiator Fan Control Chart. b – See Charging System in Electrical, Group B.
Hot Smell – Suspect Cooling System	
(1) Was temperature gauge high?	(1) a – Yes, See “Gauge Reads High.” b – No, See 2, 3, 4, and 5.
(2) Heat shields all in place?	(2) a – Yes, See 3, 4, and 5. b – Repair as required.
(3) Fan control operating properly?	(3) a – Yes, See 4 and 5. b – No, See “Fan,” this Group.
(4) Heat exchanger air side plugged?	(4) Clean as required.
(5) Engine missing or running rich?	(5) Repair as required.
Poor Driveability – Suspect Failed Open Thermostat	
(1) Check diagnostics – is code 17 set?	(1) If yes, change thermostat.
Poor Heater Performance – Suspect Failed Open Thermostat	
(1) Does gauge read low?	(1) See 3a.
(2) Check coolant level.	(2) See 3a.
(3) Check diagnostics – is code 17 set?	(3) If yes, change thermostat. If no, check heater bypass valve, which should be closed except in Max A/C or Off mode; if not, see Heater and Air Conditioning, Group 24.
Steaming, Observe Water Vapor Through Grill or Head Gap at Standstill at Idle – In Damp Weather	
(1) This is normal. It is moisture, snow, or water on the outside of the radiator that evaporates when the thermostat opens to put hot water into the radiator. This usually occurs in cool weather with no fan or air flow to blow it away.	(1) Normal condition – no service required.



SERVICE PROCEDURES

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WATER PUMPS

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.

WATER PUMP—3.3L ENGINE

The pump has a die cast aluminum body and a stamped steel impeller. It bolts directly to the chain case cover (Fig. 1), using an O-ring for sealing. It is driven by the back surface of the Poly-V Drive Belt.

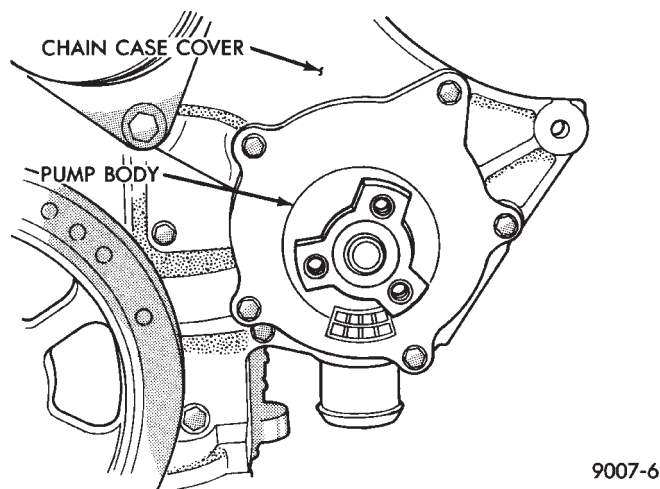


Fig. 1 Water Pump—3.3L Engine

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. Refer to Draining Cooling System in this group.
- (2) Remove Poly V Drive Belt.
- (3) Remove right front lower fender shield.
- (4) Remove pump pulley bolts and remove pulley.
- (5) Remove pump mounting screws (Fig. 1). Remove pump.

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

INSPECTION

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, evident by traces of coolant leaks from vent hole.
- (3) Loose or rough turning bearing.
- (4) Impeller rubs either the pump body or oil pump housing.

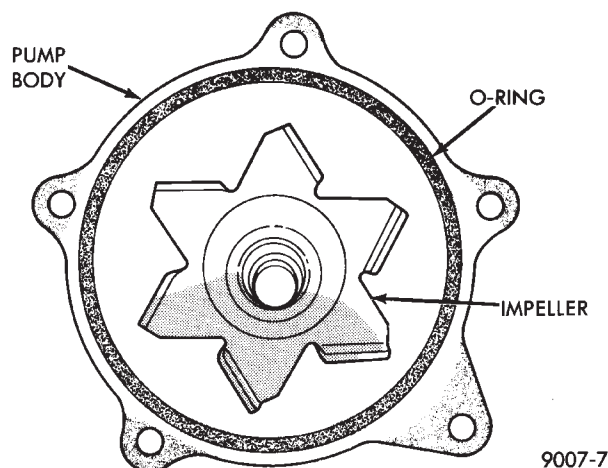


Fig. 2 Water Pump Body

INSTALLATION

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

- (1) Install new O-ring in O-ring groove (Fig. 2).
- (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) Install right front lower fender shield.
- (7) Refill Cooling System. See Refilling Cooling System in this section.

WATER PUMP—3.5L ENGINE

The 3.5L pump bolts directly to the engine block, using a O-ring gasket for pump to block sealing (Fig. 4). The pump is serviced as a unit.

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. Refer to Draining Cooling System in this group.
- (2) The water pump is driven by the timing belt. See Timing System in Group 9, Engine for component removal providing access to water pump.

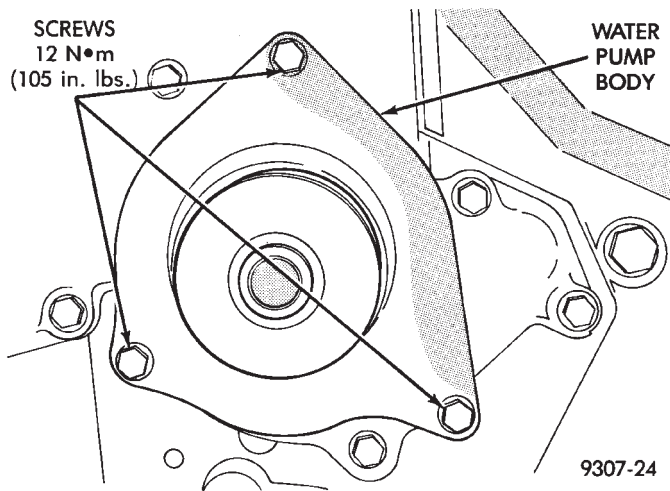


Fig. 3 Water Pump—3.5L Engine

- (3) Remove mounting bolts.
- (4) Remove pump from engine (Fig. 3).

INSPECTION

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 shaft seal is leaking, evident by traces of coolant leaks from behind pulley.
- (3) Impeller rubs inside of pump.
- (4) Excessively loose or rough turning bearing.

INSTALLATION

- (1) Clean all O-ring surfaces on pump and block.
- (2) Install new O-ring on water pump (Fig. 4). Wet the O-ring with water to facilitate assembly.

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

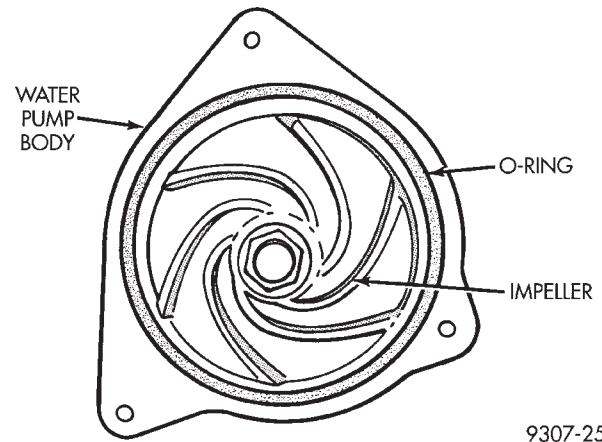


Fig. 4 Water Pump Body—3.5L Engine

- (3) Install pump to block mounting bolts and tighten to 27 N•m (20 ft. lbs.).
- (4) Refer to Timing System in Engine Section, Group 9 and install timing belt. Reassemble engine.
- (5) Fill cooling system. Refer to Refilling Cooling System.

ENGINE THERMOSTATS

The engine thermostat is located in a water box, formed in the front of the intake manifold (Fig. 5). This thermostat has an air bleed located in the thermostat flange.

DESCRIPTION AND OPERATION

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 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 90°C (195°F) the coolant temperature is controlled by the radiator, fan, and ambient temperature, not the thermostat.

OPERATION AND 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 open too soon type failure mode is included in the onboard 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 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.

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. 5).
- (3) Remove thermostat, discard gasket and clean both gasket sealing surfaces.

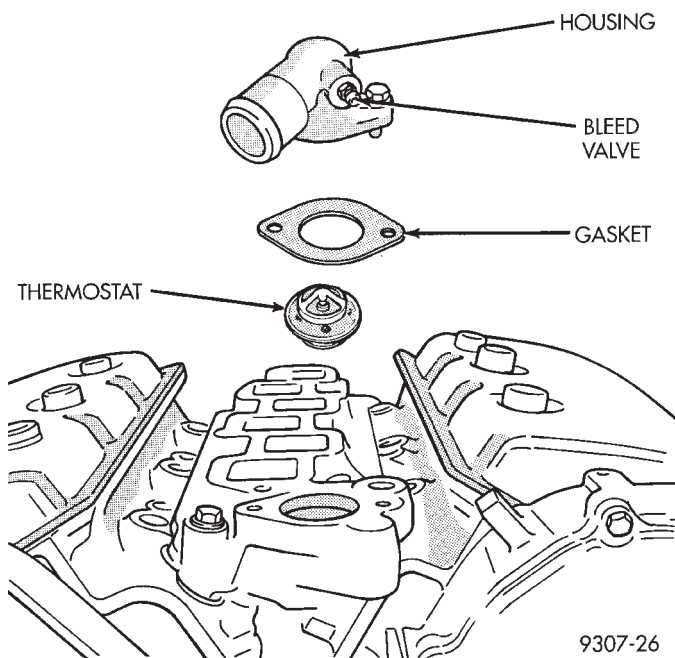


Fig. 5 Thermostat, Housing —3.3/3.5L Engines

INSTALLATION

- (1) Install thermostat into recess provided in the intake manifold (Fig. 5).
- (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 28 N•m (250 in. lbs.) 3.5L engine.
- (4) Refill cooling system (see **Refilling System**).

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 heater core and plate/fin radiator can give it up to the air.

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.

PERFORMANCE

Performance is measurable. For heat transfer pure water absorbs 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 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 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 and can lead to problems associated with 100 percent glycol.

SELECTION AND ADDITIVES

The use of aluminum cylinder heads, intake manifolds, and water pumps requires special corrosion protection. Mopar Antifreeze or antifreeze containing Alugard 340-2, or their equivalent are recommended



for best engine cooling without corrosion. To obtain the maximum life of components in the engine cooling system, mixing distilled water with ethylene-glycol type coolant is recommended. Use (50 percent distilled water and 50 percent coolant for freezing protection to -35°C (-30°F) or 40 percent distilled water and 60 percent coolant where freezing protection to -50°C (-60 °F) is required. If the coolant loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed solution.

SERVICE

Coolant should be changed the first time at 80,000 km (52,000 miles) or three years, whichever occurs first. Subsequent coolant changes should be every two years or 45,000 km (30,000 miles) whichever comes first.

ROUTINE LEVEL CHECK

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

The coolant deaeration pressure bottle provides a quick visual method for determining the coolant level without removing the radiator cap. With the engine idling and at normal operating temperature, the level of the coolant in the coolant deaeration pressure bottle (Fig. 6) should be between the minimum and maximum marks.

ADDING ADDITIONAL COOLANT

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. If you are able to squeeze the hose easily, then continue, otherwise wait for the system to cool.

(2) With a shop towel over the pressure cap on the coolant deaeration pressure bottle 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 fully counter-clockwise.

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 1219 mm (48 in.) long, to the bleed valve in the thermostat. 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.

(4) Open bleed valve.

(5) Slowly fill coolant pressure bottle (Fig. 2) 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 1/2 inch below base of filler neck of the coolant deaeration pressure bottle. This will be a level above both the min and max marks on the bottle.

(8) Install cap on coolant pressure bottle.

(9) Remove hose from bleed valve.

Cooling system will remove trapped air from itself during normal driving. It is recommended that lower engine speeds be used to allow the cooling system to purge itself of any trapped air for about 20 to 30 minutes before extended operation at high engine speeds (above 4000 RPM).

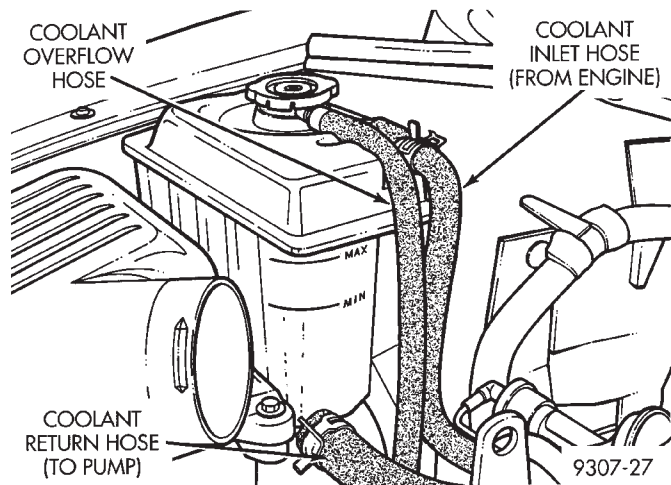


Fig. 6 Coolant Deaeration Pressure Bottle

LOW COOLANT LEVEL

Low coolant level in a cross flow radiator will equalize in both tanks with engine off. With engine at running 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 sucked 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.
- Exhaust gas leaks into the coolant can also cause the same problems.

DEAERATION

Air is removed from the system by gathering in the coolant deaeration pressure bottle and is released into the atmosphere through the pressure valve located in the pressure cap when pressure reaches 97-



124 kPa (14-18 psi.). The air is replaced with coolant from the coolant deaeration bottle.

COOLING SYSTEM DRAIN, CLEAN, FLUSH AND FILLING

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 clean water. Care should be taken in disposing of the used engine coolant from your vehicle. Check governmental regulations for disposal of used engine coolant.

DRAINING

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

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

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

(2) Remove coolant pressure bottle cap and thermostat bleed valve this will allow radiator drain.

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

CAUTION: The cooling system normally operates at 97-140 kPa (14-20 psi) pressure. Exceeding this pressure may damage the radiator or hoses.

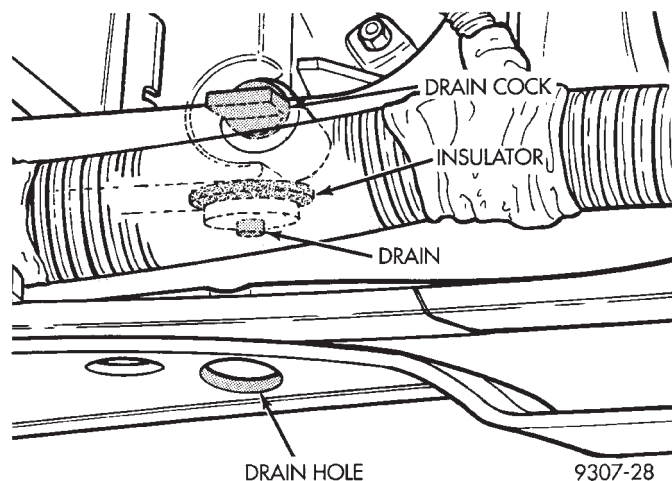


Fig. 1 Radiator Draincock Location

CLEANING

Drain cooling system (see: **Draining Cooling System**) and refill with clean distilled water (see: **Refilling Cooling System**). 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

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.

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.

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 (see: **Draining Cooling System**) and 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 (See **Refilling Cooling System**).

FILLING

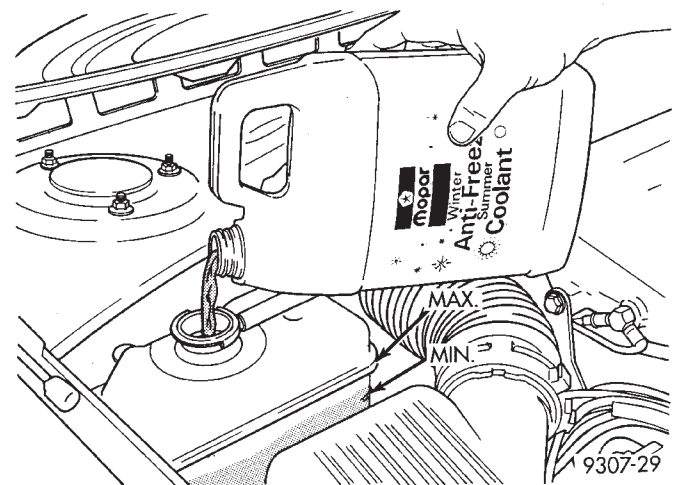


Fig. 2 Filling Cooling System

Use Mopar All Season Coolant, or an equivalent coolant containing ALUGARD 340-2 or it's equivalent.



lent is necessary for best engine cooling without corrosion. Refer to Selection and Additives in this section for appropriate coolant mixture to use.

- (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 1219 mm (48 in.) long, to the bleed valve in the thermostat (Fig. 3). 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.

(4) Open bleed valve.

(5) Slowly fill coolant pressure bottle (Fig. 2) 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 deaeration pressure bottle (Fig. 3).

(8) Install cap on coolant pressure bottle.

(9) Remove hose from bleed valve.

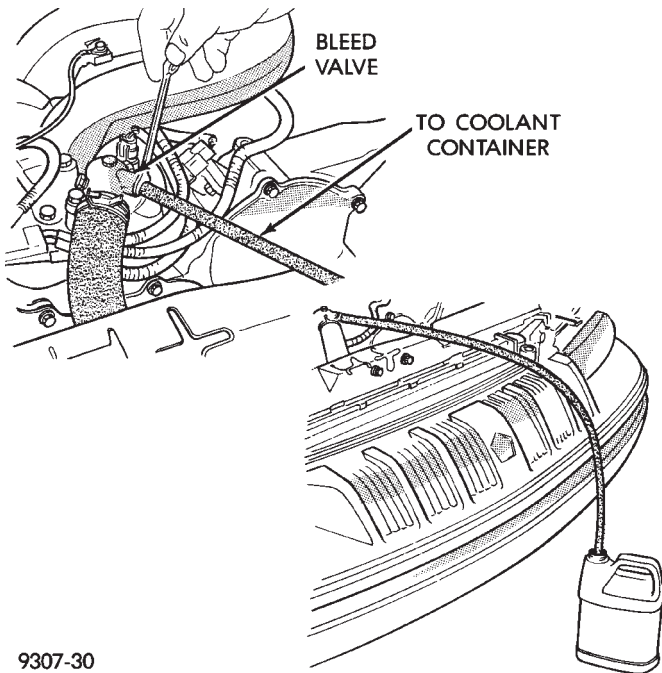


Fig. 3 Bleeding Cooling System While Filling With Coolant

TESTING SYSTEM FOR LEAKS

With engine not running, wipe the deaeration filler neck sealing seat clean.

Attach a radiator pressure tester to the coolant deaeration bottle, as shown in (Fig. 4) and apply 104 kPa (15 psi) pressure. If the pressure drops more than 2 psi in 2 minutes inspect all points for external leaks.

All hoses, radiator and heater, should be moved while at 15 psi since some leaks occur while driving due to engine rock, etc.

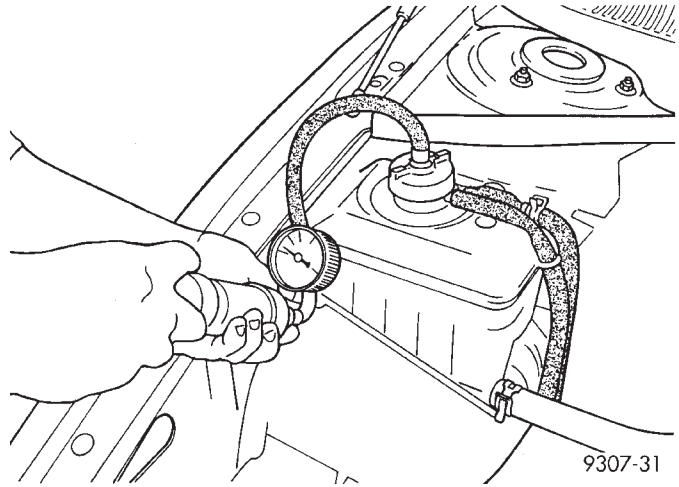


Fig. 4 Pressure Testing Cooling System

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 an internal leak in the engine. If there is an internal leak, the engine must be disassembled for repair.

COOLANT DEAERATION PRESSURE BOTTLE

This system works in conjunction with the coolant deaeration pressure bottle pressure cap to keep the coolant free of trapped air. It provides a volume for expansion and contraction. Provides a convenient and safe method for checking coolant level and ad-



justing level at atmospheric pressure without removing the radiator pressure cap. It also provides some reserve coolant to cover minor leaks and evaporation or boiling losses (Fig. 5).

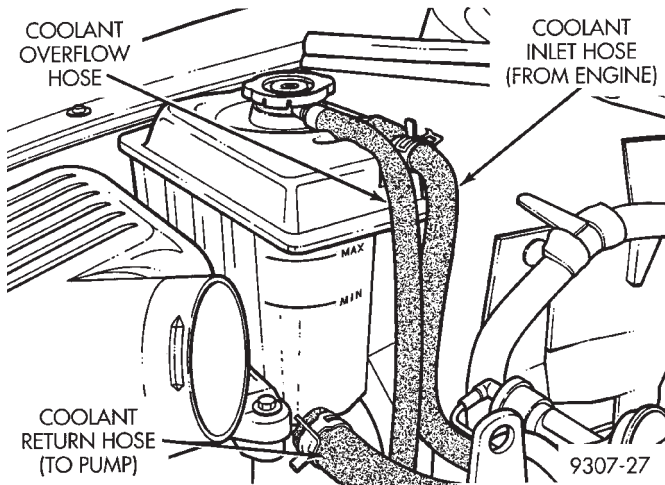


Fig. 5 Coolant Deaeration Pressure Bottle

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

DEAERATION PRESSURE BOTTLE PRESSURE CAP

Deaeration bottle is equipped with a pressure cap which release pressure at some point within a range of 110 kPa $\pm$ 14 kPa (16 psi $\pm$ 2 psi) (Fig. 6).

The system will operate at higher than atmospheric pressure which raises the coolant boiling point 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 allows it to deaerate the coolant. If 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.

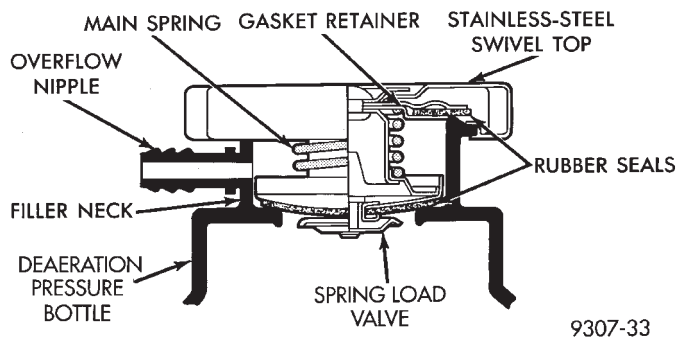


Fig. 6 Deaeration Pressure Cap Filler Neck

DEAERATION PRESSURE BOTTLE CAP TO SEAL CHECK

The pressure cap upper gasket (seal) pressure relief can be checked by removing cap (Fig. 7). 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 55 kPa (8 psi) minimum.

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

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

- (1) Check and adjust antifreeze freeze point.
- (2) Refill system with new coolant.
- (3) Conducting service procedures.
- (4) 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 COUNTER-CLOCKWISE 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.

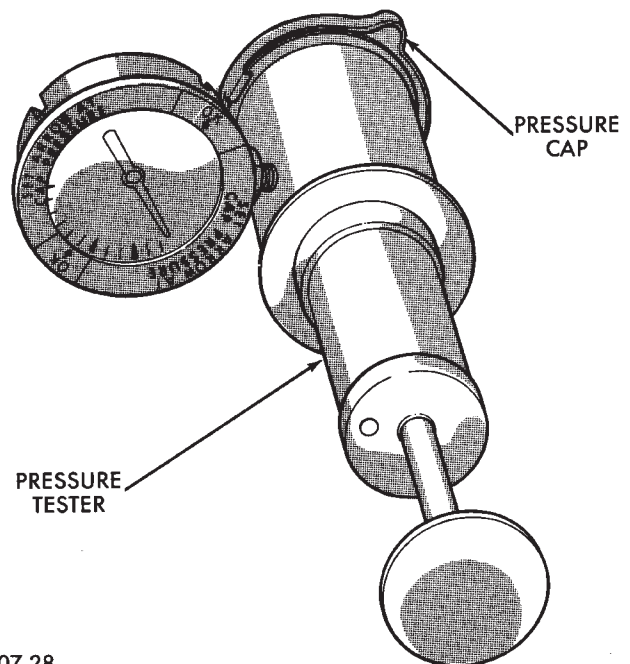


Fig. 7 Pressure Testing Radiator Cap



PRESSURE TESTING DEAERATION PRESSURE BOTTLE CAP

Dip the pressure cap in water, clean any deposits off the vent valve or its seat and apply cap to end of Radiator Pressure Tool. Working the plunger, bring 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 cap. See **CAUTION**

If the pressure cap tests properly while positioned on Radiator Pressure Tool (Fig. 7), but will not hold pressure or vacuum when positioned on the deaeration bottle. Inspect the deaeration bottle neck and cap top gasket for irregularities that may prevent the cap from sealing properly.

CAUTION: Radiator Pressure Tool is very sensitive to small air leaks which 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 tool upside down and recheck pressure cap to confirm that cap is bad.

INSPECTION

Hold the cap in hand, **right side up** (Fig. 6). 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.

RADIATORS

The radiators are crossflow 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.

RADIATOR DRAINCOCK SERVICE

REMOVAL

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

(1) Turn the draincock stem counterclockwise to unscrew the stem. When the stem is unscrewed to the end of the threads turn back 1/8 turn and, pull the stem (Fig. 9) from the radiator tank.

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.

RADIATOR COOLANT FLOW CHECK

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. Then feel the upper radiator hose. If it is hot, coolant is circulating.

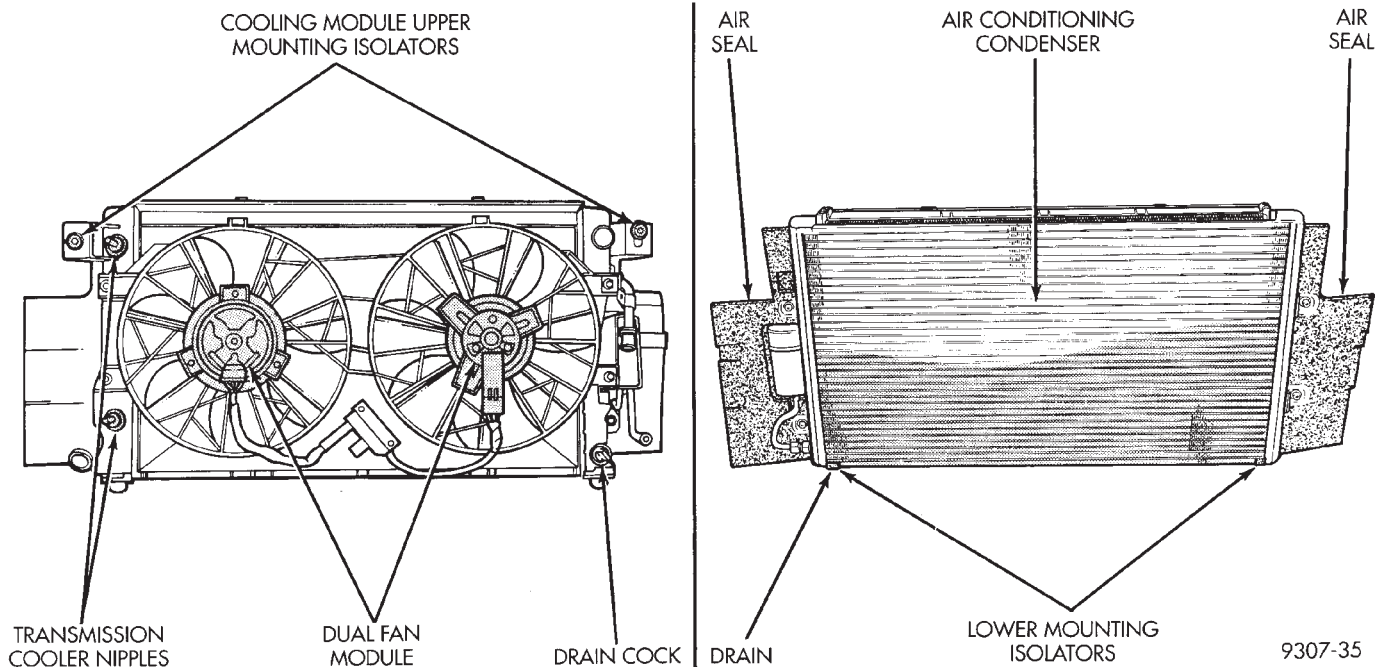


Fig. 8 Cooling Module

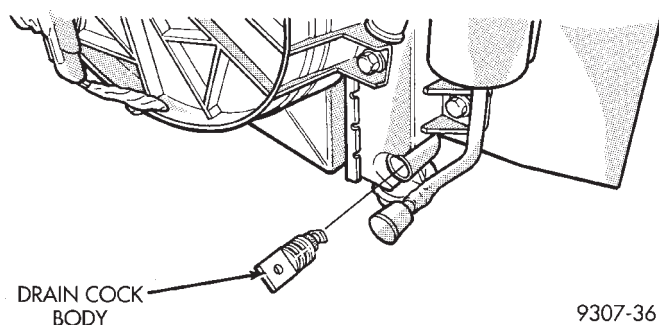


Fig. 9 Draincock Assembly

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

- Remove coolant deaeration pressure cap when engine is cold, Idle engine, you should observe coolant flow while looking into the filler neck. Once flow is detected install pressure cap.

RADIATOR

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.
- (3) Remove upper radiator crossmember (Fig. 10).
- (4) Remove hose clamps and hoses from the radiator.

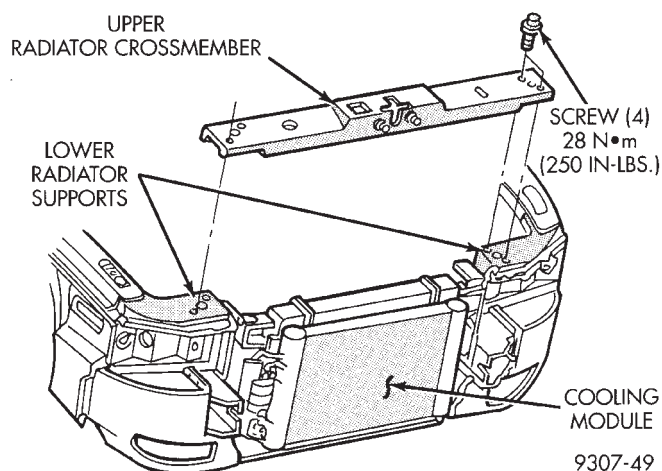


Fig. 10 Upper Radiator Crossmember

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

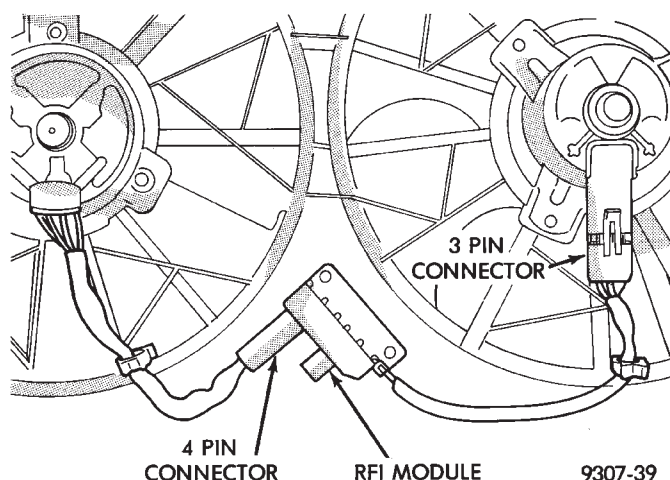


Fig. 11 Electric Fan Motor RFI Module

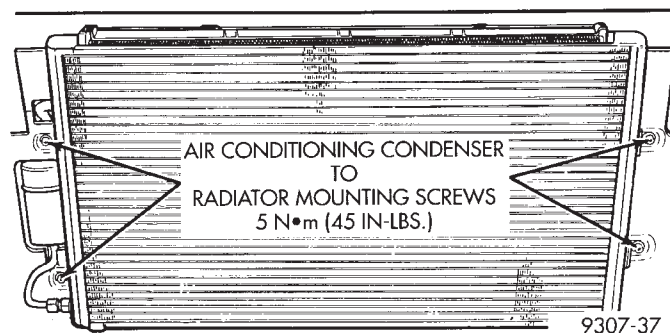
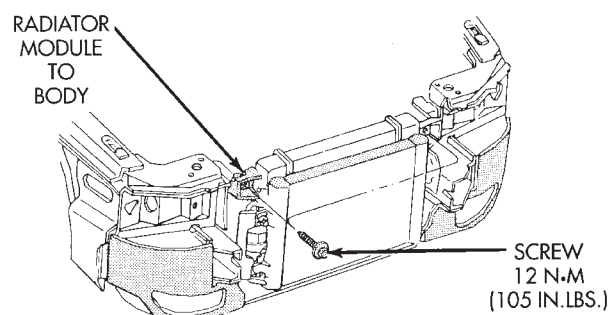


Fig. 12 Radiator Module—All Models

- (6) Disconnect the fan wiring connector from the RFI module (Fig. 11).

- (7) Remove upper radiator mounting screws (Fig. 12). Disconnect the engine block heater wire if equipped.

- (8) Remove the air conditioning condenser attaching screws located at the front of the radiator, if equipped. 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 down into position, seat the radiator assembly lower rubber isolators in the mount holes provided.

(2) Attach air conditioning condenser to radiator, if equipped.

Torque mounting screws to 5 N•m (45 in. lbs.).

(3) Torque radiator mounting screws to 14 N•m (123 in. lbs.).

(4) Connect lower radiator hose and clamp, then automatic transmission hoses. Torque hose clamps to 2.5 N•m (22 in. lbs.).

(5) Install upper radiator hose align hose so it will not interfere with the accessory drive belt or engine. Position hose clamp so it will not interfere with the hood.

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

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

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

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 COUNTER-CLOCKWISE 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.

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.

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. 13).

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.

FAN SHROUD

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

REMOVAL

(1) Disconnect electric lead to the RFI module.

(2) Remove fan module to radiator fasteners and retaining clips (Fig. 13).

(3) Remove assembly from radiator.

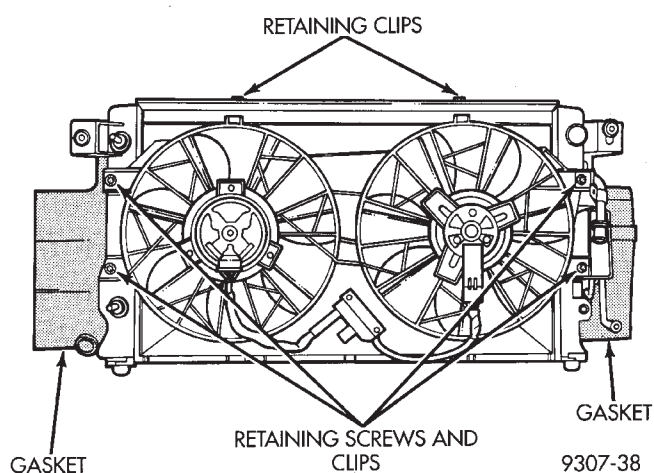


Fig. 13 Servicing Fan Module

FAN SERVICE

(1) To remove fan from motor shaft, bench support the motor and motor shaft, while removing the fan retaining clip 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.** (Fig. 14). 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 or retaining nut.

FAN MOTOR SERVICE

(1) Remove the motor fasteners from support (Fig. 13). 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

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



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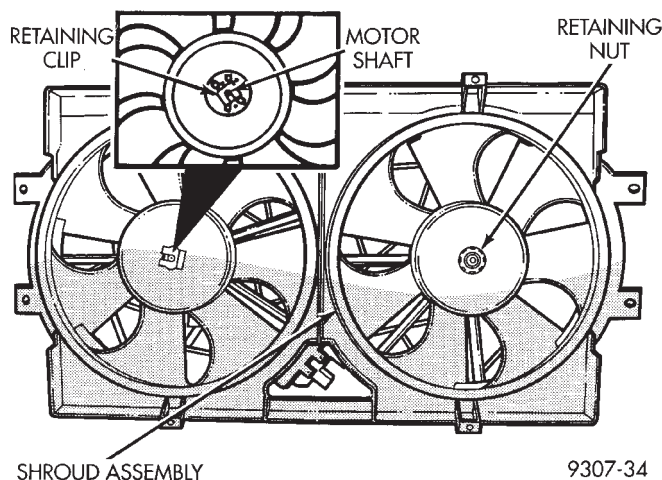


Fig. 14 Servicing Radiator Fans

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

RADIATOR FAN CONTROL

Fan control is accomplished two ways. A pressure transducer on the compressor discharge line sends a signal to the powertrain control module (PCM) which will activate both fans. 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 Engine Controller. The Engine Controller turns on the fan through the fan relay. See Wiring Diagrams Manual for circuitry and diagnostics provided.

Switching through the Engine Controller 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 accordingly the chart in (Fig. 15)

TEMPERATURE GAUGE INDICATION

At idle the temperature gauge will rise slowly to about 5/8 gauge travel. The fan will come on and the gauge will drop to about 1/2 gauge travel, this is normal.

ELECTRIC FAN MOTOR

Refer to L.H. Body Diagnostic Manual for procedure

RADIATOR COOLING FAN OPERATION

ENGINE COOLANT TEMPERATURE AND A/C COMPRESSOR PRESSURES

	A/C OFF	A/C ON	A/C Compressor Pressure
Low Speed Fan ON	99°C (210°F)	99°C (210°F)	1,446.57 Kpa (209.8 psi)
Low Speed Fan OFF	93°C (199°F)	93°C (199°F)	861.87 Kpa (125 psi)
High Speed Fan ON	110°C (230°F)	110°C (230°F)	1,723.75 Kpa (250 psi)
High Speed Fan OFF	140°C (219°F)	140°C (219°F)	1,585.85 Kpa (230 psi)

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Fig. 15 Radiator Fan Control Chart — 3.3/3.5L Engines

ELECTRIC FAN MOTOR TEST

Refer to L.H. Body Diagnostic Manual for procedure

AUTOMATIC TRANSMISSION OIL COOLER

Oil cooler is an internal oil to coolant type, mounted in the radiator left tank (Fig. 16). Steel tube and rubber oil lines 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. 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.).

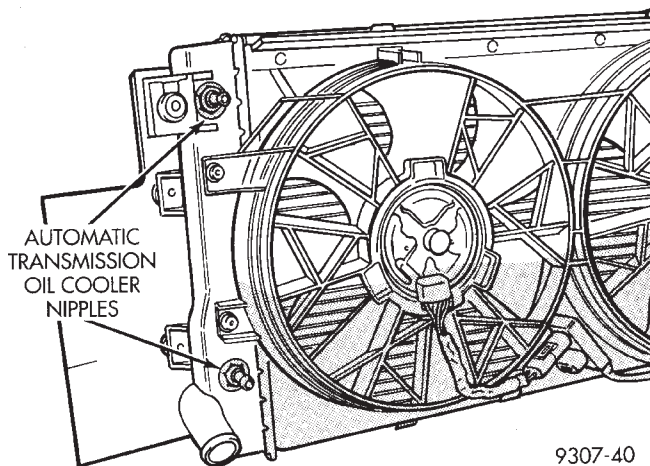


Fig. 16 Transmission Oil Cooler



ACCESSORY DRIVE BELTS

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3.3/3.5L Engine Accessory Drive Belt Service . . .	19	General Information	19

GENERAL INFORMATION

PROPER BELT TENSION

Satisfactory performance of the belt driven accessories depends on belt condition (Fig. 1) and proper belt tension.

BELT TENSION GAUGE METHOD

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

3.3/3.5L ENGINE ACCESSORY DRIVE BELT SERVICE

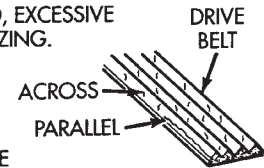
GENERATOR, POWER STEERING PUMP, AIR CONDITIONING COMPRESSOR AND WATER PUMP DRIVE BELT SERVICE

GENERATOR/POWER STEERING PUMP AND WATER PUMP BELT— 3.3L ENGINE

The Poly-V generator/power steering and water pump belt is provided by an adjusting screw on the

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. 1 Drive Belt Inspection

generator mounting bracket (Fig. 3) to maintain proper belt tension. To remove or install this belt, Release tension by loosening the generator mounting bolt A and adjusting bolt locknut B then loosen adjusting bolt (Fig. 3). Reverse procedure to install and tighten belt to specified tension.

GENERATOR/POWER STEERING PUMP BELT— 3.5L ENGINE

The Poly-V generator/power steering belt is provided by adjustable tensioner pulley located on the timing belt cover (Fig. 4) to maintain proper belt tension. To remove or install this belt, Release tension

ACCESSORY DRIVE BELTS 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 SQUEAK 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 groove or eccentric pulley.	(a) Replace belt. (b) Adjust belt tension. (c) Align accessories. (d) Replace pulley.

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by loosening the tensioner pulley nut and adjustment bolt (Fig. 4). Reverse procedure to install and tighten belt to specified tension.

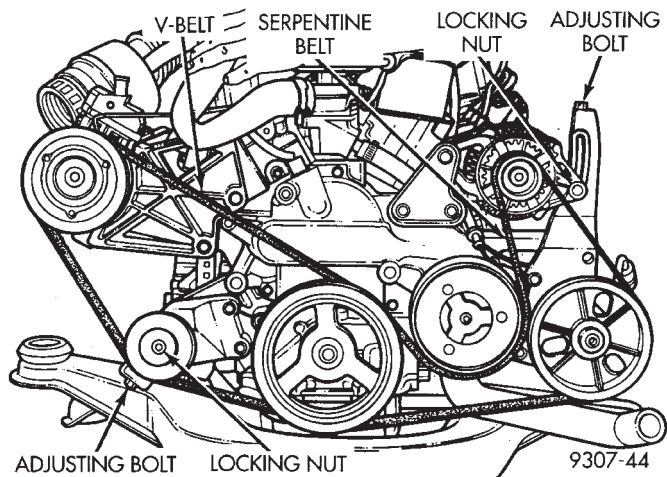


Fig. 2 Accessory Drive— 3.3L Engine

AIR CONDITIONING BELT— 3.3/3.5L ENGINES

(1) Remove the generator/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. 2 and 4).

To adjust the air conditioning drive belt, loosen the tensioner pulley nut (Fig. 4) and adjust belt tension by tightening adjusting screw (Figs. 2 and 4). Torque pulley nut to 54 N•m (40 ft. lbs.) after adjustment.

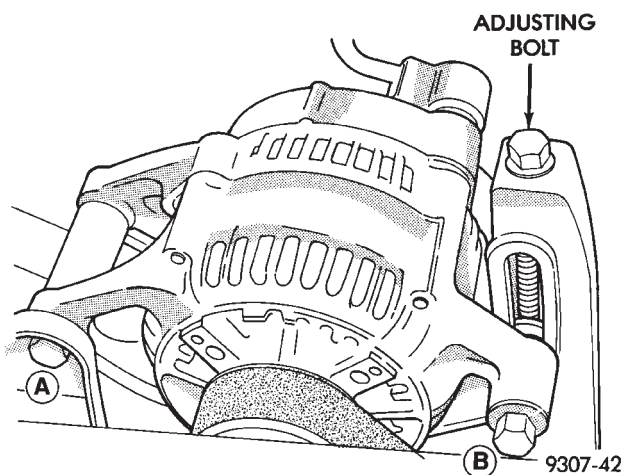


Fig. 3 Generator/Power Steering and Water Pump Drive Belt Adjustment —3.3L Engine

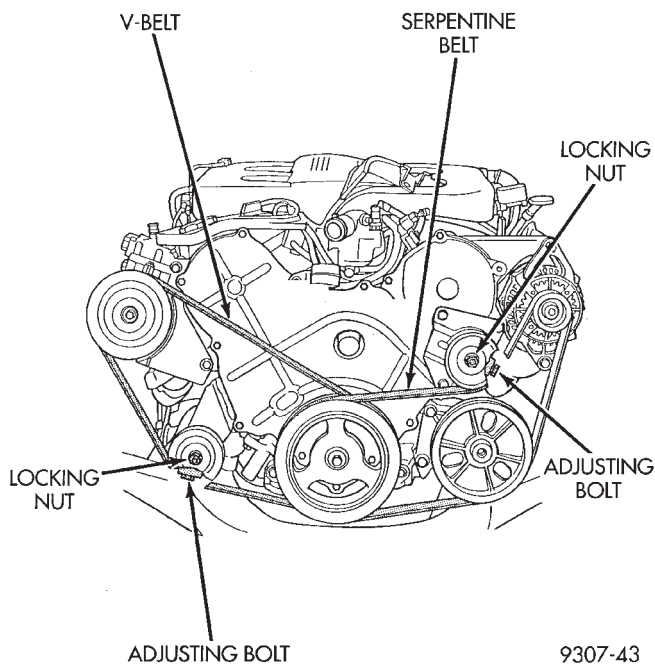


Fig. 4 Accessory Drive—3.5L Engine



ENGINE BLOCK HEATER

DESCRIPTION AND OPERATION

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 warm-up when vehicle is operated in areas having extremely low temperatures. 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. 10).

The power cord 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.

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.

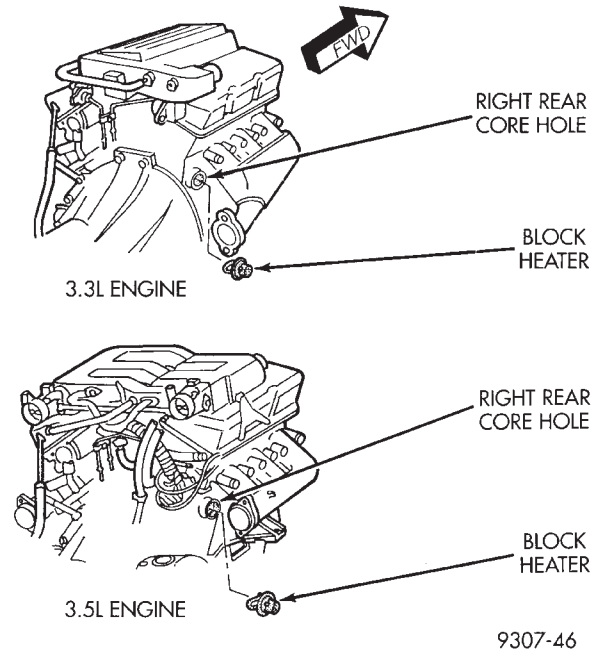


Fig. 5 Engine Block Heater



SPECIFICATIONS

TORQUE

COOLING SYSTEM CAPACITY

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

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3.3L	10.74 LITERS	10.17 QTS.
3.5L	12.46 LITERS	11.80 QTS.

CAPACITY: Includes Heater and
Coolant Deaeration Pressure Bottle

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