

**Tightening torques**

Block drain plug to block	25 Nm (18 ft-lb)
Radiator drain plug to radiator	2-3 Nm (18-27 in-lb)

**Coolant, draining and filling (V-8 models)****WARNING —**

*Allow the cooling system to cool before opening or draining the cooling system.*

- Raise front of car and support safely.

**WARNING —**

*Make sure the car is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.*

- Remove splash shield from under engine.
- Loosen radiator bleed screw at top radiator fitting (arrow).
- Remove cap from radiator expansion tank. With ignition switch in ON position, set temperature controls to full warm.
- Place 5-gallon pail underneath radiator.



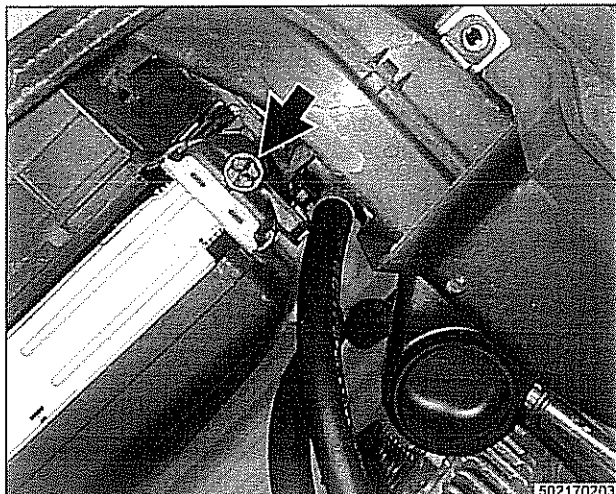
- Remove drain plug (arrow) on bottom of radiator and allow coolant to drain.

**NOTE —**

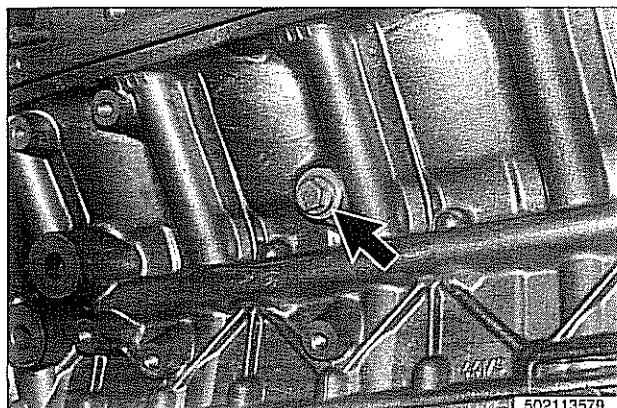
*For radiators without drain plug, remove lower hose to drain radiator.*

**WARNING —**

*Coolant is poisonous. It is especially lethal to pets. Clean up spills immediately and rinse the area with water. If coolant is ingested, immediately seek medical attention.*



## Radiator and Cooling System



◀ V-8 engine block drain plugs (one shown at **arrow**) are located on each side of engine block (exhaust manifold removed for photo).

- Place 5-gallon pail underneath engine block coolant drain plugs.
- Remove engine block coolant drain plugs and drain coolant.
- Reinstall radiator and engine block drain plugs using new sealing washers.
- Before refilling radiator:
  - Switch ignition to **ON**. (Do not start engine).
  - Set temperature controls to full warm.
  - Set blower control to low.
- Using a coolant mixture of 50% antifreeze and 50% distilled water, fill expansion tank slowly. Continue until coolant emerges from bleed screw. Cooling system capacity is listed in **Table d. Cooling system capacity (V-8 models)**.

### NOTE—

- Be sure radiator bleed screw is loose when filling cooling system.
- Tap water may cause corrosion of radiator, engine and coolant hoses.
- Coolant can often be reused provided it is clean and less than two years old. Do not reuse coolant when replacing damaged engine parts.

- Bleed cooling system. See **Cooling system, bleeding**.

**Table d. Cooling system capacity (V-8 models)**

Engine	Capacity
M62, M62 TU	12.0 liters (12.7 US qts)

### Tightening torques

Block drain plug	25 Nm (18 ft-lb)
Radiator drain plug	2 - 3 Nm (18 - 27 in-lb)



## Cooling system, bleeding

Trapped air in the cooling system can prevent proper coolant circulation and overheating. Whenever the coolant is drained and filled, bleed the cooling system to remove trapped air.

- Loosen bleed screw (**arrow**) on radiator expansion tank.
- Set temperature controls in passenger compartment to full warm, set blower to low setting and turn ignition to ON position (do not start engine).

### CAUTION—

*On late model cars with latent heat pump, do not turn ignition to ON position.*

- Slowly add coolant/distilled water mixture to expansion tank until it spills from bleed screw. When coolant spilling from bleed screws is free of air bubbles, tighten screw and replace cap on expansion tank.
  - Run engine until it reaches operating temperature.
  - After engine has cooled, recheck coolant level.
  - Top up so that coolant level indicator is at MAX.
- If trapped air cannot be bled manually, pressure-bleed system using cooling system pressure tester.

### CAUTION—

*Always use genuine BMW coolant or its equivalent to avoid the formation of harmful, clogging deposits in the cooling system.*

### Tightening torque

Radiator bleed screw to radiator	2.5 Nm (22 in-lb)
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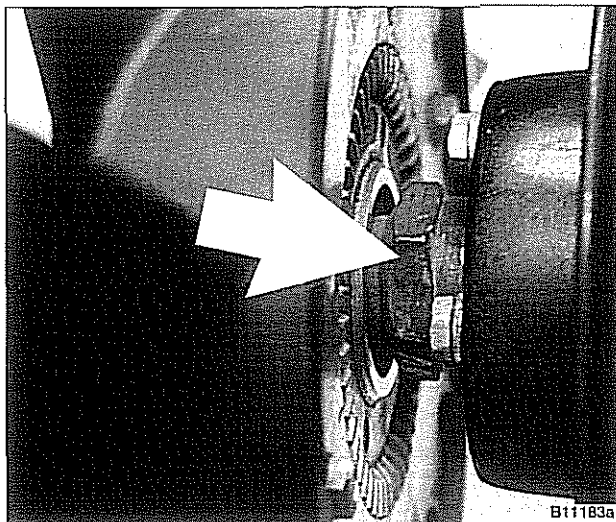
## Mechanical (viscous clutch) cooling fan, removing and installing

The procedure given here describes the removal of the mechanical fan and fan shroud. It is possible to remove the fan without the shroud.



- Working at top of fan shroud:
  - Remove expansion tank bleed screw (**arrow**) and expansion tank locking tabs.
  - Push top of expansion tank toward engine and lift to free from lower mounts.
- Remove two expansion rivets in upper corners of fan shroud. Unclip expansion tank bleed hose located under shroud.

## Radiator and Cooling System



- Remove rubber trim strip between top of shroud and radiator.

- Using 32 mm wrench (BMW special tool 11 5 040) on fan clutch nut (**arrow**), turn wrench in a clockwise direction (working from front of car) while counterholding pulley with BMW special tool 11 5 030. Spin fan off coolant pump.

### NOTE —

The radiator cooling fan nut (32 mm wrench) has left-hand threads.

- Unclip AUC (air quality) sensor from shroud.
- M54 engine: Disconnect auxiliary coolant pump from base of fan shroud.

- Lift fan and shroud together out of engine compartment.

- To replace fan clutch, remove fan mounting bolts and separate viscous clutch from fan.

- Installation is reverse of removal.

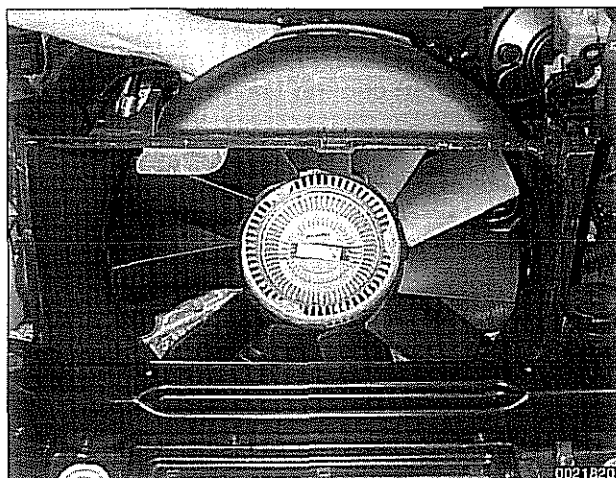
### Tightening torques

#### Clutch nut to pump

- Without BMW tool 11 5 040 40 Nm (29 ft-lb)
- With BMW tool 11 5 040 30 Nm (22 ft-lb)

#### Fan to viscous clutch

10 Nm (89 in-lb)



## Electric cooling fan, removing and installing

The electric cooling fan is mounted behind the front bumper, in front of the A/C condenser.

- Remove front bumper. See **510 Exterior Trim, Bumpers**.
- Remove left and right headlights. See **630 Lights**.
- Where applicable, detach horizontal air ducts behind front bumper and fold to side.
- Disconnect fan electrical connector on right side of radiator shroud and lay aside.
- Detach wire loom from air duct in front of cooling fan.
- Pry out expansion rivets holding air duct. Slide air duct downward to remove.

- Remove fan and fan shroud mounting fasteners. Slide fan and fan shroud downward to remove.
- Reinstallation is reverse of removal.

### Thermostat, removing and installing (M52 engine)

The coolant thermostat is installed in a housing at the front of the engine.

- Drain coolant from radiator and engine block. See **Coolant, draining and filling (6-cylinder models)**.

#### **WARNING—**

*Allow the cooling system to cool before opening or draining the system.*

- Remove mechanical cooling fan and fan shroud. See **Mechanical (viscous clutch) cooling fan, removing and installing**.
- Disconnect coolant hoses from thermostat housing.
- Remove thermostat housing from front of engine.
- Remove thermostat. Note thermostat direction and orientation before removing.
- Installation is reverse of removal, noting the following:
  - Use new O-ring and gasket(s) when installing thermostat and housing.

#### **NOTE—**

*Some thermostats have a direction arrow or vent hole near the edge. Install the thermostat so that either the arrow or hole are at the top.*

- Fill system with coolant as described in **Coolant, draining and filling (6-cylinder models)**.

#### **CAUTION—**

*Be sure to reconnect ground wire(s) at thermostat housing mounting bolt, where applicable.*

**Tightening torques**

Block drain plug to block	25 Nm (18 ft-lb)
Coolant hose clamp (32 — 48 mm hose diameter)	2.5 Nm (22 in-lb)
Radiator drain plug to radiator	2 - 3 Nm (18 - 27 in-lb)
Thermostat housing to cylinder head	10 Nm (89 in-lb)

**Thermostat, removing and installing (M52 TU or M54 engine)**

- The electric map-controlled thermostat is part of the thermostat housing at the front of the cylinder head.

1. Bolts (M6)
2. Bolt (M8)
3. Housing with thermostat
4. Gasket

- If a faulty thermostat is suspected, use appropriate scan tool to interrogate ECM for stored fault codes.
- Drain radiator and engine block. See **Coolant, draining and filling (6-cylinder models)**.

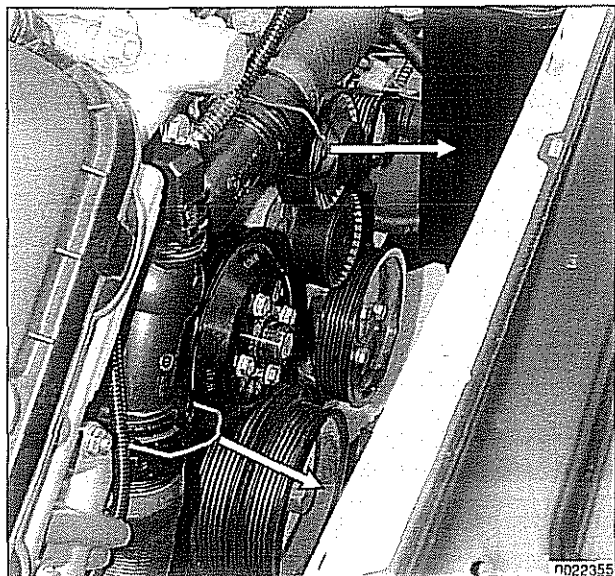
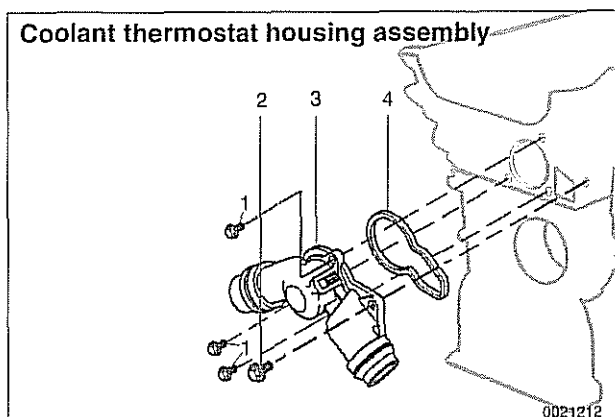
**CAUTION—**

*Allow cooling system to cool before opening or draining the system.*

- Remove cooling fan and fan shroud. See **Mechanical (viscous clutch) cooling fan, removing and installing**.
- Disconnect electrical harness connector from thermostat housing.

- Lever out retaining clips (**arrows**) and pull hose fittings off thermostat housing.

- Unbolt and remove thermostat housing from front of engine. Loosen nut at top of engine lifting eye to facilitate removal.
- Installation is reverse of removal, noting the following:
  - Keep sealing faces free of oil.
  - Use new sealing gasket.
  - When reinstalling hose to thermostat housing, install clip on hose end fitting, then push hose onto housing until it clicks into place.
  - Fill system with coolant. See **Coolant, draining and filling (6-cylinder models)**.

**Coolant thermostat housing assembly**

**Tightening torques**

Block drain plug to block	25 Nm (18 ft-lb)
Radiator drain plug to radiator	2 - 3 Nm (18 - 27 in-lb)
Thermostat housing to cylinder head	10 Nm (89 in-lb)

**Thermostat, removing and installing (V-8 models)**

The electrically-heated thermostat is an integral part of the thermostat housing. The operation of the thermostat is monitored by the engine control module (ECM).

- If a faulty thermostat is suspected, use appropriate scan tool to interrogate ECM for stored fault codes.
- Drain radiator and engine block. See **Coolant, draining and filling (V-8 models)**.

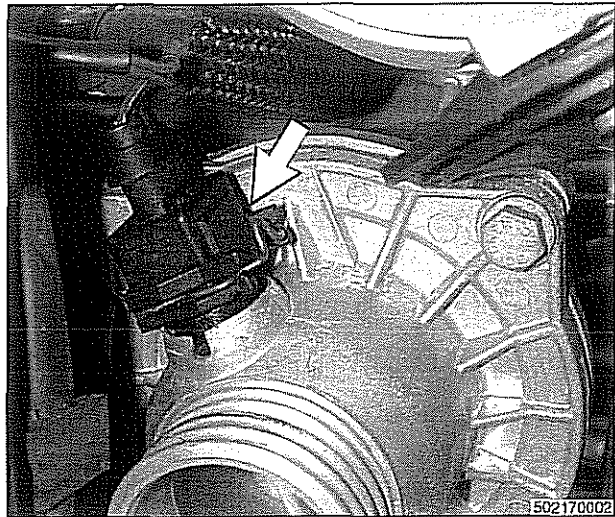
**WARNING —**

*Allow cooling system to cool before opening or draining the system.*

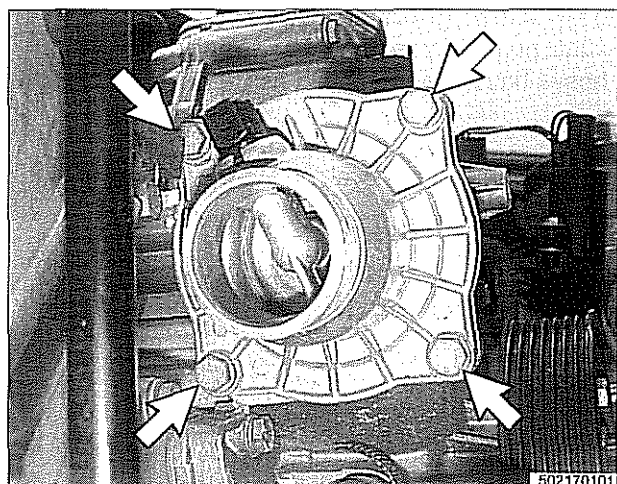
- Disconnect mass air flow (MAF) sensor electrical harness connector. Remove air intake duct together with MAF sensor.
- Remove mechanical cooling fan and fan shroud. See **Mechanical (viscous clutch) cooling fan, removing and installing**.
- Disconnect electrical harness connector (arrow) from thermostat housing.
- Remove coolant hose from thermostat housing.

**NOTE —**

- M62 engine: Hose is clamped on.
- M62 TU engine: Hose is attached with quick-disconnect fitting. Remove clip to disconnect hose.



## Radiator and Cooling System



➤ Remove thermostat housing fasteners (**arrows**) and remove thermostat housing.

- Installation is reverse of removal, noting the following:
  - Keep sealing faces clean and free of oil.
  - Use new sealing gasket.
  - Fill system with coolant. See **Coolant, draining and filling (V-8 models)**.

### Tightening torques

Block drain plug to block	25 Nm (18 ft-lb)
Coolant hose clamp (32 — 48 mm hose diameter)	2.5 Nm (22 in-lb)
Radiator drain plug to radiator	2 - 3 Nm (18 - 27 in-lb)
Thermostat cover to coolant pump	10 Nm (89 in-lb)

## Coolant pump, replacing (6-cylinder models)

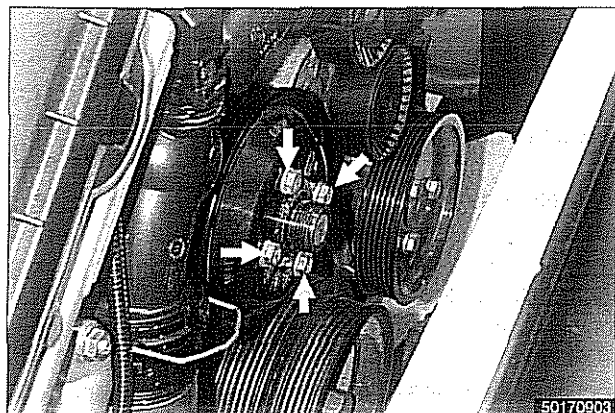
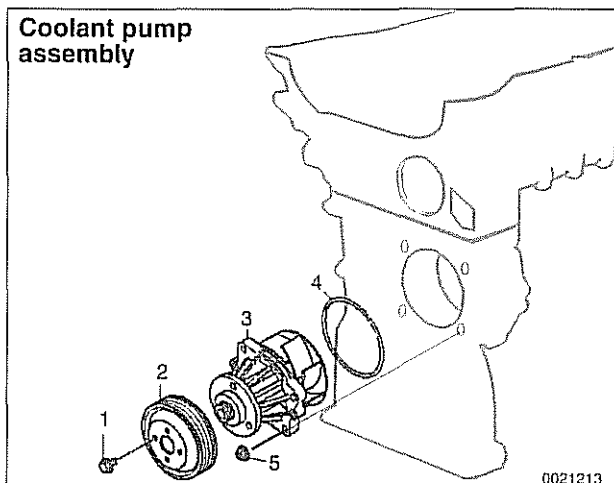
➤ The engine coolant pump is mounted in the front of the engine in the timing chain cover.

- Drain cooling system as described earlier. See **Coolant, draining and filling (6-cylinder models)**.

### WARNING —

*Allow cooling system to cool before opening or draining system.*

- Remove cooling fan and fan shroud. See **Mechanical (viscous clutch) cooling fan, removing and installing**.
- Remove coolant pump drive belt. See **020 Maintenance**.



➤ Remove coolant pump pulley bolts (**arrows**) and remove pulley from pump.

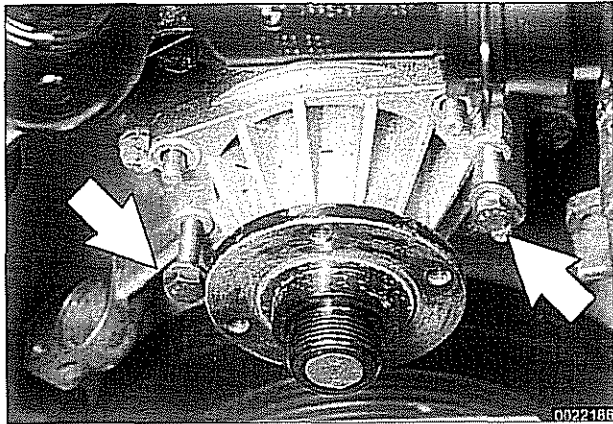
- Remove nuts retaining pump to engine block.

### NOTE —

*The coolant pump is mounted on studs and retained by nuts.*



## Radiator and Cooling System



➤ Insert two M6 screws (**arrows**) in tapped bores and tighten uniformly until pump is free from timing chain cover (thermostat and hoses have been removed for purposes of visual clarity).

- Installation is reverse of removal, noting the following:
  - Be sure to replace sealing O-ring and gaskets.
  - Coat O-ring with water-based lubricant during installation.
  - Refill with coolant. See **Coolant, draining and filling (6-cylinder models)**.

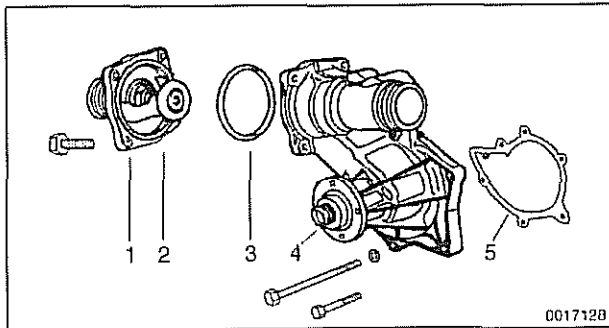
### Tightening torques

Coolant pump to timing chain cover	10 Nm (89 in-lb)
Coolant pump pulley to coolant pump	10 Nm (89 in-lb)
Engine block drain plug to block	25 Nm (18 ft-lb)
Radiator drain plug to radiator	2 - 3 Nm (18 - 27 in-lb)

### Coolant pump, replacing (V-8 models)

➤ The engine coolant pump is mounted in the front of the engine in the timing chain cover.

1. Thermostat housing
2. Thermostat
3. Thermostat sealing O-ring
4. Water pump
5. Water pump gasket



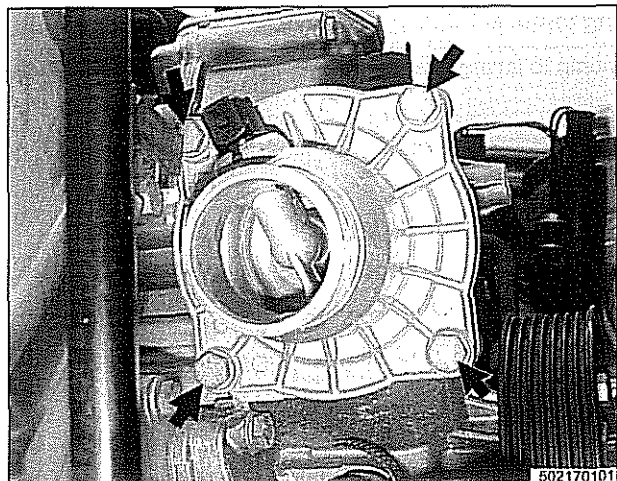
- Drain cooling system. See **Coolant, draining and filling (V-8 models)**.
- Remove cooling fan and fan shroud. See **Mechanical (viscous clutch) cooling fan, removing and installing**.
- Remove engine drive belts: See **020 Maintenance**.

### NOTE—

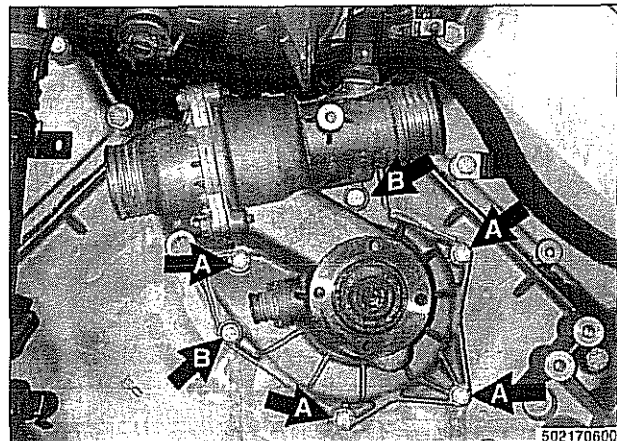
Mark direction of drive belt rotation if reusing belt.

- Remove vibration dampener. See **117 Camshaft and Timing Chain**.
- Disconnect mass air flow (MAF) sensor electrical harness connector. Remove air intake duct together with MAF sensor.
- Disconnect coolant hoses from thermostat housing and coolant pump housing.

## Radiator and Cooling System



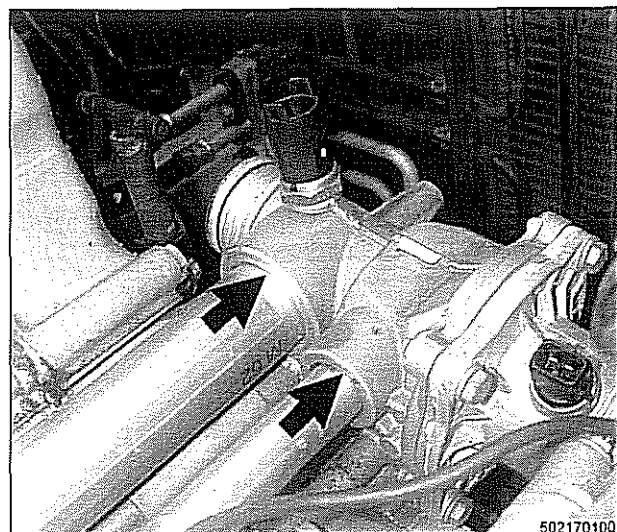
- Disconnect thermostat and cooling system temperature sensor plug connectors.
- Remove thermostat housing fasteners and remove housing.
- Remove coolant pump pulley bolts and remove pulley from pump.



- Remove fasteners A and B (arrows).

### NOTE —

- The coolant pump is retained to the block using different length bolts.
- Bolts A: M6 X 105 mm
- Bolts B: M6 X 35 mm



- Slide coolant pump away from coolant pipes (arrows) while being careful not to dislodge pipes from fittings at rear of engine.
- Installation is reverse of removal, noting the following:
  - Replace all sealing O-rings and washers.
  - Coat O-rings with water-based lubricant during installation.
  - Fill system with coolant. See **Coolant, draining and filling (6-cylinder models)** or **Coolant, draining and filling (V-8 models)**.