

**Fig. 40 Intake manifold and gasket mounting — SOHC engine**

Upper Side

8 4 1 5

7 3 2 6 9

Lower Side

**Fig. 41 SOHC intake manifold torque sequence**

19. Position the manifold support brackets and install the bolts. Tighten the right block bolt to 41 ft. lbs. (55 Nm), then tighten the left block bolt and the support bracket to intake manifold bolts to 22 ft. lbs. (30 Nm).

20. Lubricate the male fuel supply and return connects, then install.

21. Connect the throttle cable to the throttle body and install the support bracket. Tighten the bracket retaining bolts to 19 ft. lbs. (25 Nm). Verify that the cable locking tangs are fully engaged when assembled.

22. Position the wiring harness and connect all electrical connectors and vacuum hoses in their original locations.

23. Install the PCV hose, the air inlet tube and resonator.

24. Connect the negative battery cable, close the radiator drain and install the engine block drain plug. Tighten the block

drain plug to 26 ft. lbs. (35 Nm). Fill the engine cooling system.

25. Prime the fuel system by cycling the ignition switch **ON** for 5 seconds, then **OFF** for 10 seconds and repeating 2 times. Start the engine and check for leaks.

## Exhaust Manifold

### REMOVAL & INSTALLATION

♦ See Figures 45 and 46

1. Disconnect the negative battery cable, then raise and support the vehicle safely using suitable jackstands.

2. Remove the pipe-to-manifold nuts and lower the pipe, then remove the old gasket and discard.

3. Remove the supports and lower the vehicle.

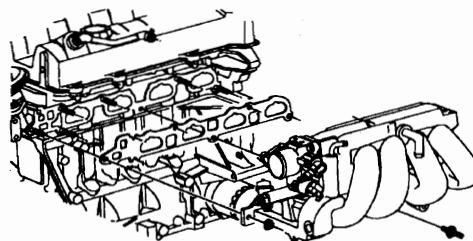
4. If equipped, remove the air conditioning compressor and bracket from the engine, then position aside. Do not disconnect the refrigerant lines.

5. Disconnect the oxygen sensor connector. If necessary, use a 19mm, 6-point, crows foot to remove the oxygen sensor from the manifold.

6. Remove the manifold retaining nuts and remove the manifold from the cylinder head. Remove and discard the old gasket from the mating surfaces.

**To install:**

7. Thoroughly clean the gasket mating surfaces, being careful not to score or damage the aluminum surface.



**Fig. 43 Intake manifold and gasket mounting — DOHC engine**

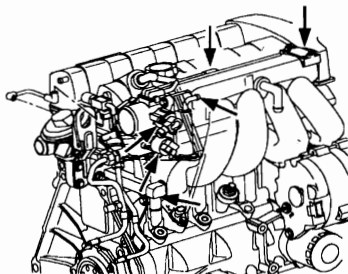
Upper Side

5 2 3

7 4 1 6

Lower Side

**Fig. 44 DOHC intake manifold torque sequence**



**Fig. 42 Disconnect the electrical connections from these locations — DOHC engine**

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8. Install the new gasket with the smooth side facing the manifold, then install the manifold and attaching nuts. Tighten the nuts in sequence to 16 ft. lbs. (22 Nm) for the SOHC engine or to 23 ft. lbs. (31 Nm) for the DOHC engine.

9. If replacing the oxygen sensor, coat the threads with nickel based anti-seize compound and tighten to 18 ft. lbs. (25 Nm). Connect the oxygen sensor electrical connector.

10. Install the air conditioning compressor and brackets. Tighten all fasteners except the front bracket-to-compressor fasteners to 19 ft. lbs. (25 Nm). Tighten the front bracket-to-compressor fasteners to 40 ft. lbs. (54 Nm).

11. Raise and support the vehicle safely using jackstands, then install a new gasket onto the studs between the pipe and manifold.

12. Connect the pipe and manifold, then tighten the fasteners in a crosswise pattern to 23 ft. lbs. (31 Nm), then lower the vehicle.

13. Connect the negative battery cable, start the engine and check for exhaust leaks.

### Radiator

The radiator drain plug is threaded into a removable drain housing. The housing may be replaced at any point after the coolant is drained from the system. To remove the housing, use a pair of pliers to pinch the tabs closed, then pull the housing straight back and out of the radiator. Squeeze the tabs of the replacement to begin inserting it into the bore, then carefully snap it into position.

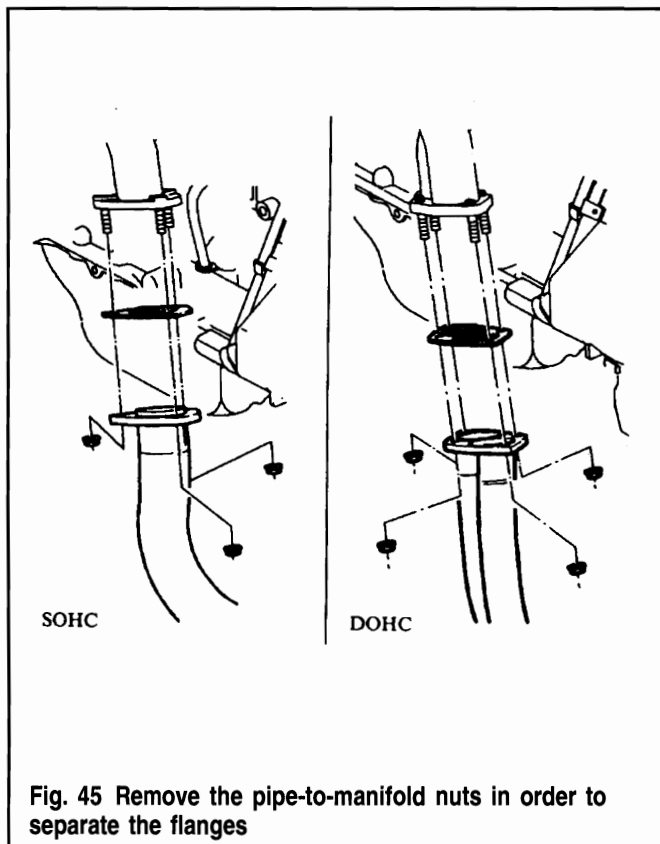


Fig. 45 Remove the pipe-to-manifold nuts in order to separate the flanges

### REMOVAL & INSTALLATION

♦ See Figures 47, 48, 49, 50 and 51

1. Disconnect the negative battery cable. Drain the engine coolant from the radiator and block drains into a suitable clean container.

### \*\*\*CAUTION

When draining the coolant, keep in mind that cats and dogs are attracted by the ethylene glycol antifreeze, and are quite likely to drink any that is left in an uncovered container or in puddles on the ground. This will prove fatal in sufficient quantity. Always drain the coolant into a sealable container. Coolant may be reused unless it is contaminated or several years old.

2. Remove the air intake ducts and disconnect the temperature sensor connector, then for the DOHC engine, remove the air cleaner housing.

3. Loosen the clamp and disconnect the upper hose from the radiator. If equipped with an automatic transaxle, disconnect the upper transaxle fluid cooler line. Plug the openings to prevent transaxle fluid contamination or loss.

4. Remove the electric cooling fan assembly.

5. Loosen the clamp and disconnect lower hose from the radiator.

6. Raise and support the front of the vehicle safely using suitable jackstands.

7. Disconnect the fasteners, then carefully lower the splash shield from the vehicle to gain access below the radiator.

8. If equipped with an automatic transaxle, disconnect and plug the lower transaxle cooler line.

9. Remove the 2 condenser bracket-to-radiator bolts from either side of the radiator. Wire the condenser to the frame assembly to keep it in place, then remove the supports and carefully lower the vehicle.

10. Remove the upper radiator nuts and brackets. On air conditioning equipped vehicles, remove the upper radiator seal.

11. Carefully lift the radiator from the vehicle. If necessary, squeeze the drain housing tabs and withdraw it from the bottom of the radiator.

### To install:

12. If installing a new radiator, make sure the drain housing is in position. If the replacement did not come with a drain housing, insert the old drain housing into radiator and press until it snaps into position. Be careful not to press the housing through the hole and into the radiator tank.

13. Install the radiator into the vehicle. Install the upper seal, if applicable, then install the brackets and retaining nuts. Be sure the L-shaped brackets do not pinch the radiator locating pins and that the radiator moves freely in the grommets.

14. Raise the front of the vehicle and safely support using jackstands.

15. Install the condenser bracket bolts, then if applicable, remove the plugs and install the lower automatic transaxle cooler line.

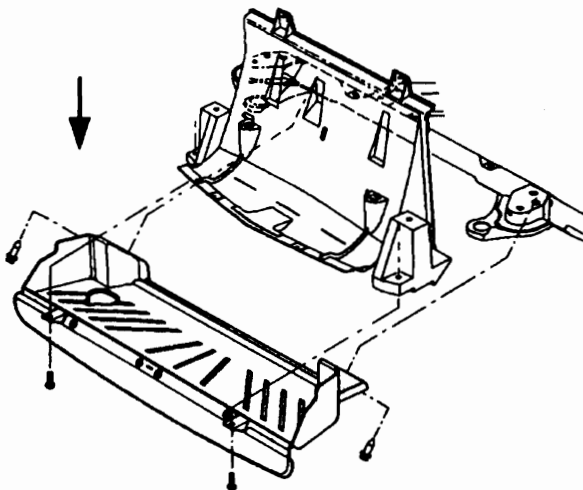
16. Install the splash shield, remove the supports and lower the vehicle.

17. Install the lower radiator hose with the clamp tangs positioned at 1 o'clock.

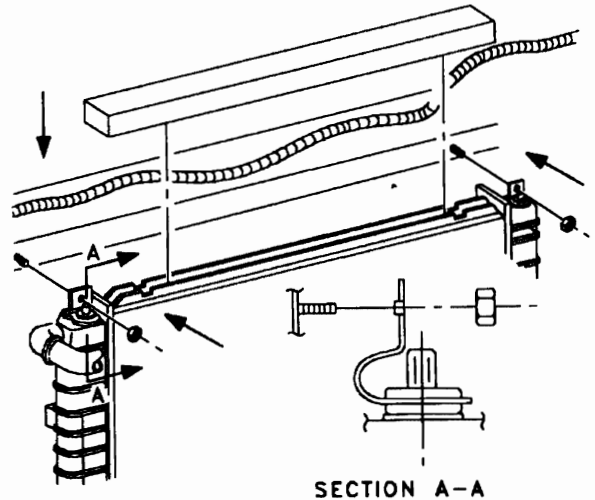
|                    |            |   |   |   |
|--------------------|------------|---|---|---|
| SOHC (LKO) Engine: | Upper Side |   |   |   |
|                    | 8          | 4 | 1 | 5 |
|                    | 7          | 3 | 2 | 6 |
|                    | Lower Side |   |   |   |
| DOHC (LLO) Engine: | Upper Side |   |   |   |
|                    | 2          | 3 |   |   |
|                    | 4          | 1 | 5 |   |
|                    | Lower Side |   |   |   |

**Fig. 46 Exhaust manifold torque sequences**

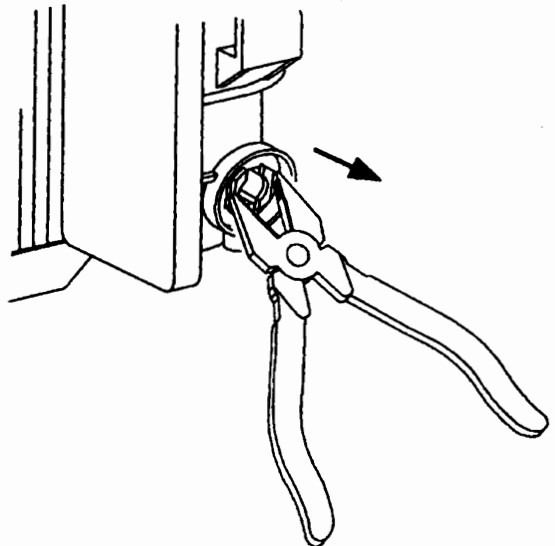
18. Install the cooling fan assembly.
19. For 1991 vehicles with an automatic transaxle, connect the upper transaxle cooler line and tighten. For 1992-93 vehicles with an automatic transaxle, connect the upper transaxle cooler line at a 35 degree angle inward from vertical and hold while tightening.
20. Install the upper radiator hose with the clamp tangs at 12 o'clock.
21. For the DOHC engine, install the air cleaner housing.
22. Install the intake air ducts and connect the air temperature sensor plug.
23. Close the radiator drain plug and install the cylinder block drain plug. Tighten the block plug to 26 ft. lbs. (35 Nm).
24. Connect the negative battery cable and properly fill the engine cooling system.
25. Start and run the engine to check for coolant leaks.



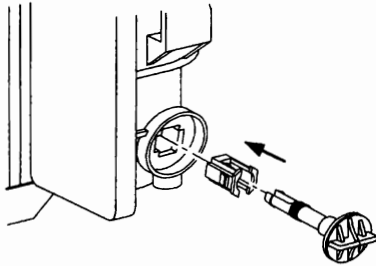
**Fig. 47 Disconnect the fasteners and carefully lower the splash shield from the vehicle**



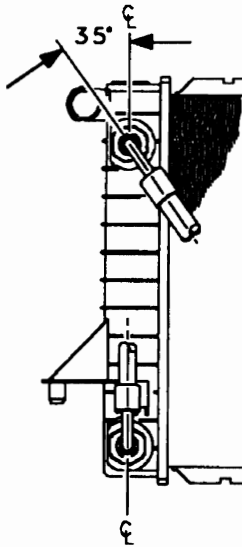
**Fig. 48 Make sure the L-shaped brackets do not pinch the radiator locating pins**



**Fig. 49 Pinch the drain housing tabs closed and remove by pulling straight out**



**Fig. 50 Exploded view of the drain plug and housing**



**Fig. 51 For 1992-1993 vehicles equipped with automatic transaxles, install the upper transaxle fluid cooler line as shown**

## Electric Cooling Fan

### TESTING

#### See Figure 52

When conducting tests on the electric cooling fan and circuit, use of a high impedance Digital Volt Ohm Meter (DVOM) is necessary.

#### Cooling Fan Inoperative Test

1. Check the 30 amp cooling fan maxifuse (maxifuse No. 6, labeled COOL FAN) in the underhood junction block.

2. If the fuse is OK, disconnect the cooling fan motor connector and connect a DVOM from terminal B (BLK/RED) wire to ground.

3. Start the engine and turn the air conditioning **ON**:

- a. If there is voltage at the B wire, check for open at terminal A (BLK) wire to ground which would prevent circuit completion and keep an otherwise good motor from operating. If there is no open and voltage is present, the motor must be faulty. Repair the open wire or replace the faulty motor, as applicable.

- b. If there is no voltage at the B wire, turn the engine **OFF** and with the DVOM still connected to terminal B, unplug the PCM connector. Install a jumper wire between the PCM connector terminal 12A03 (DRK GRN/WHT) wire and ground. If there is no voltage at the connector, the fan relay is faulty. If there is voltage, the PCM is bad.

4. The fan motor may also be checked by jumping 12 volts to the 2 wires (A = negative, B = positive). The motor should run while voltage is applied.

#### Cooling Fan Constantly On Test

1. Disconnect the negative battery cable and remove the cooling fan relay from the underhood junction block. Connect the negative battery cable and inspect the motor to see if it still operates.

2. If the motor operates with the relay removed, a short to power exists in the BLK/RED wire from the underhood junction block to the fan motor.

3. If the fan does not operate with the relay removed, substitute a new relay and watch for operation. If the fan operates with a new relay, check the DRK GRN/WHT wire for a short to ground and repair, if found. If a short does not exist, yet the fan operates, the PCM is likely at fault.

### REMOVAL & INSTALLATION

#### See Figures 53, 54 and 55

1. Disconnect the negative battery cable.
2. For vehicles equipped with the DOHC engine, remove the air intake ducts and unplug temperature sensor connector.
3. Unplug the wiring harness from the motor electrical connector.
4. Remove the top fan motor assembly bolts.
5. If equipped with air conditioning and an automatic transmission, it may be necessary to loosen the top automatic transaxle cooler line and position it aside for clearance.
6. Lift the fan assembly off the lower mounting brackets. Move the assembly to the left and rotate counterclockwise lifting the right side up past the radiator hose, then remove the assembly from the vehicle.
7. If necessary, remove the fan blade and motor from the shroud:
  - a. Hold the fan and remove the left-hand threaded nut, then pull the fan from the motor shaft.
  - b. Remove the motor mounting screws.
  - c. Separate the motor from the shroud.

#### To install:

8. If removed, install the motor and fan blade. Tighten the left-hand threaded fan nut to 27-44 inch lbs. (3-5 Nm).

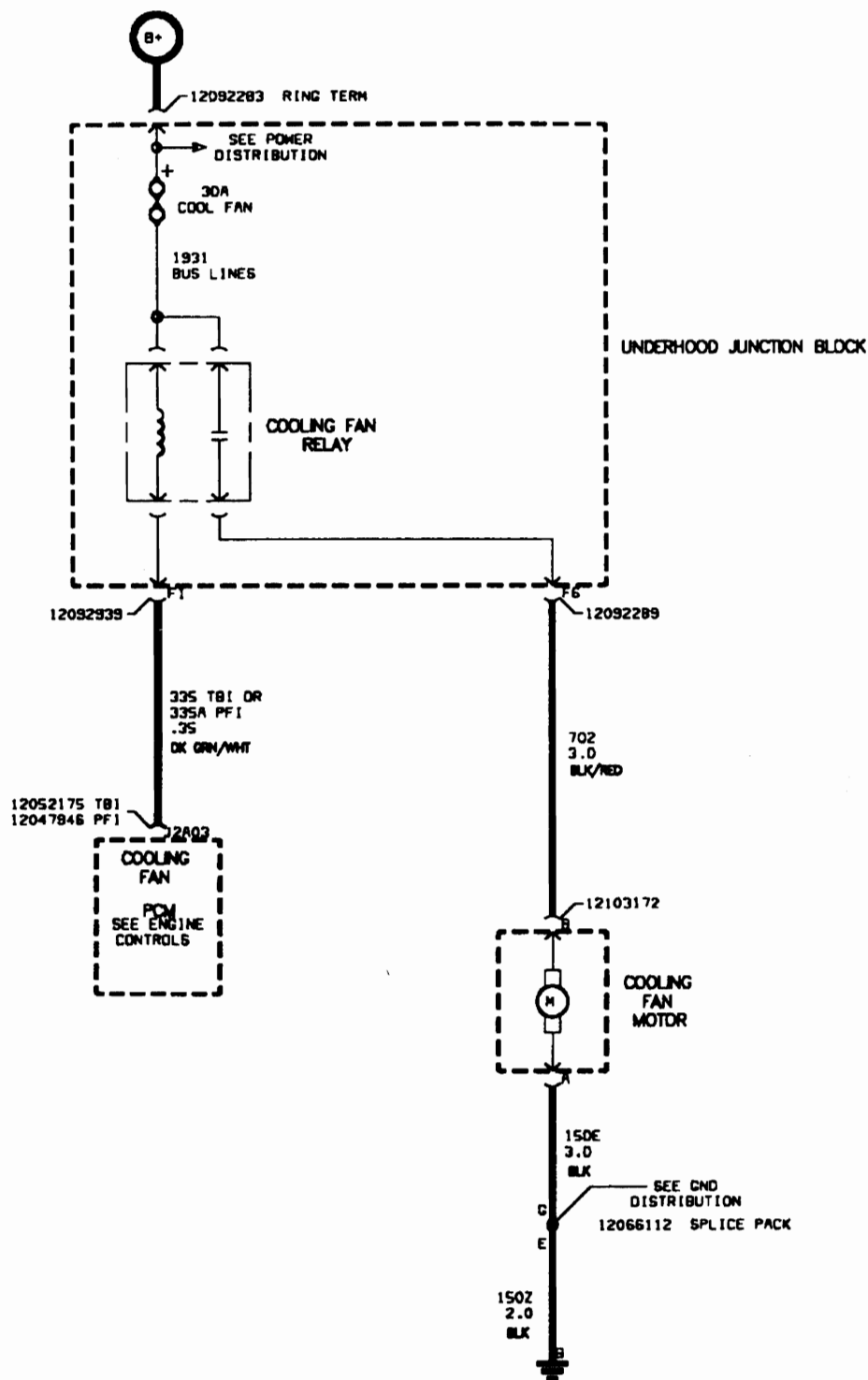


Fig. 52 Cooling fan electrical schematic

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9. Install the assembly with the lower left corner 1st. Rotate the assembly clockwise to place the lower left mount under the lower radiator hose and position the assembly onto the mounting brackets.

10. Install and tighten the upper retaining bolts.

11. If disconnected, install and tighten the automatic transaxle fluid cooler line. For 1992-93 vehicles position the transaxle cooler line 35 degrees inward from vertical and hold while tightening.

12. Install the wiring harness plug to the fan motor electrical connector.

13. If removed, install the intake air ducts and the temperature sensor connector.

14. Connect the negative battery cable.

### Water Pump

#### REMOVAL & INSTALLATION

♦ See Figures 56 and 57

1. Disconnect the negative battery cable and drain the engine coolant from the radiator and block drains into a suitable clean container.

#### \*\*\*CAUTION

When draining the coolant, keep in mind that cats and dogs are attracted by the ethylene glycol antifreeze, and are quite likely to drink any that is left in an uncovered

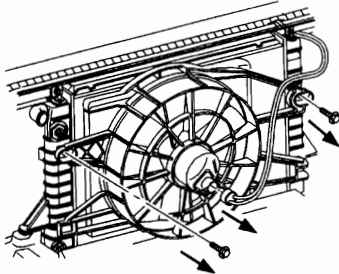


Fig. 53 Remove the top retaining bolts from the fan/motor assembly

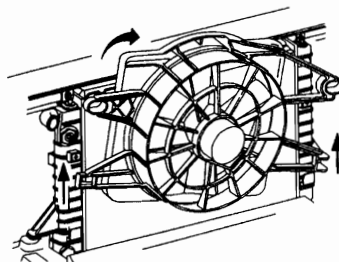
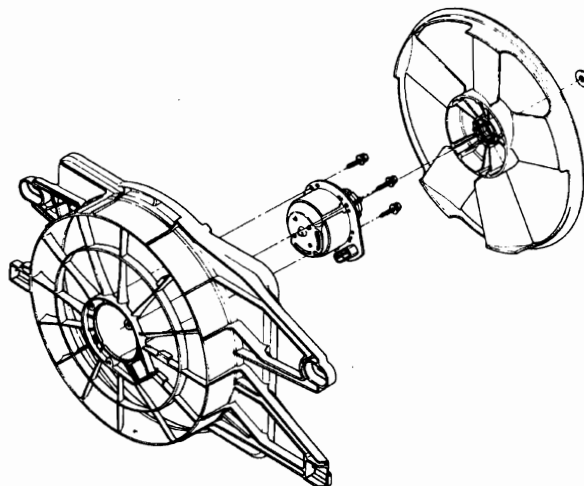


Fig. 54 Rotate the fan/motor assembly counterclockwise lifting the right side up past the radiator hose



WITH A/C

Fig. 55 Exploded view of the fan/motor assembly for A/C equipped vehicles — Non-A/C vehicles similar, but with a different fan and shroud

container or in puddles on the ground. This will prove fatal in sufficient quantity. Always drain the coolant into a sealable container. Coolant may be reused unless it is contaminated or several years old.

2. Remove the serpentine drive belt.
3. Raise the front of the vehicle and support safely using suitable jackstands. Remove the right front tire and inner wheel well splash shield.
4. If access to the water pump is desired from underhood, remove the air conditioning compressor bolts and position the compressor aside with the refrigerant lines intact.
5. Spray the water pump hub with penetrating oil to loosen any rust or corrosion that might bind the pulley and damage it during removal.
6. Remove the water pump pulley bolts and allow the pulley to hang freely on the hub. A 1 inch (25.4mm) block of wood or a hammer handle may be wedged between the pump and crankshaft pulleys to hold the assembly while loosening the retaining bolts.
7. Move the pulley outward or remove as necessary for access and remove the 6 water pump flange bolts. Carefully pull the pump and pulley assembly away from the engine and remove the assembly from the vehicle. If necessary, a gasket scraper may be inserted under the flange, but be careful not to damage the machined aluminum block sealing surface.

#### To install:

8. Thoroughly clean the gasket mating surfaces of all old gasket material. Apply a small amount of gasket sealant at the outer edges of the bolt holes to hold the gasket in place, then install the gasket onto the water pump assembly.

9. Install the pump assembly with the small bump located next to 1 of the attaching bolts in the 11 o'clock position. Install and tighten the bolts in a criss-cross sequence as shown to 22 ft. lbs. (30 Nm).

10. Install or reposition the pump pulley, as applicable and tighten the bolts to 19 ft. lbs. (25 Nm). If the pump hub exposed through the pulley is rusty, clean it with a wire brush and apply a thin coat of primer to prevent the pulley from rusting onto the hub.

11. Install the serpentine drive belt, the right splash shield and right tire assembly.

12. If repositioned, install the air conditioning compressor.

13. Close the radiator drain plug and install the cylinder block drain plug. Tighten the block plug to 26 ft. lbs. (35 Nm).

14. Connect the negative battery cable and properly fill the engine cooling system.

15. Operate the engine and check for coolant leaks.

## Cylinder Head

### REMOVAL & INSTALLATION

♦ See Figures 58, 59, 60 and 61

### \*\*\*WARNING

Only remove the cylinder head when the engine is cold. Warpage may result if the cylinder head is removed while the engine is hot.

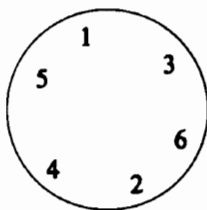


Fig. 56 Water pump bolt torque sequence

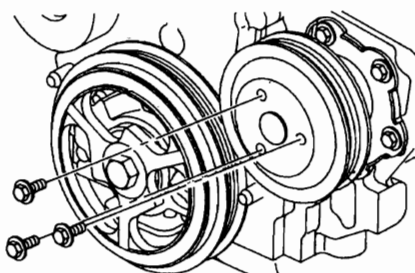


Fig. 57 Water pump pulley mounting bolts

1. Disconnect the negative battery cable and drain the engine coolant from the radiator and block drains into a suitable clean container.

### \*\*\*CAUTION

**When draining the coolant, keep in mind that cats and dogs are attracted by the ethylene glycol antifreeze, and are quite likely to drink any that is left in an uncovered container or in puddles on the ground. This will prove fatal in sufficient quantity. Always drain the coolant into a sealable container. Coolant may be reused unless it is contaminated or several years old.**

2. Remove the air cleaner assembly and air inlet duct; for the DOHC engine lift the resonator upward to disengage the button from the engine service support bracket. Disconnect the PCV valve and fresh air hose from the valve/camshaft cover.

3. Disconnect the accelerator cable from the throttle body and the bracket from the intake manifold.

4. Properly relieve the fuel system pressure.

5. Label and disconnect the following electrical connectors from the cylinder head assembly and components, as applicable. Long nose pliers are necessary to disconnect the coolant temperature connectors. When disconnected, position the electrical harness over the underhood junction block.

a. Coolant temperature and PCM connectors. These connectors are located on the rear side of the cylinder head for DOHC engines.

b. The single injector connector (SOHC Engine) or the 4 injector connectors (DOHC Engine).

c. Idle Air Control (IAC) valve.

d. Manifold Air Pressure (MAP) sensor.

e. Throttle Position Sensor (TPS).

f. Exhaust Gas Recirculation (EGR) solenoid.

g. Spark plug wires from the plugs.

h. Oxygen sensor.

i. Air conditioning compressor.

6. Label and disconnect the following vacuum hoses, as applicable, from the area around the cylinder head assembly.

a. Canister purge valve.

b. EGR valve.

c. MAP sensor, for the SOHC engine only.

d. Brake booster vacuum hose at the intake manifold or the brake booster.

e. Throttle Body Injection (TBI) unit assembly on SOHC Engines or the throttle body for DOHC engines.

f. Fuel regulator, for the DOHC engine only.

7. Disconnect the upper radiator hose at the cylinder head outlet, the heater hose at the intake manifold and the de-aeration hose at the connection next to the TBI assembly (SOHC Engines) or at the intake manifold (DOHC Engines).

8. Remove the bolt which retains the fuel lines to the intake manifold assembly. Disconnect the fuel feed and return lines from the fuel rail or throttle body, as applicable. For SOHC engines, remove the lower intake manifold support bracket stud. For DOHC engines, disconnect the fuel return line from the regulator, then remove the upper intake manifold support bracket bolt.

9. For 1992-93 vehicles with a torque axis mount system, unclip the lower splash shield for access. Place a 1 inch x 1 inch x 2 inch long block of wood between the torque strut and