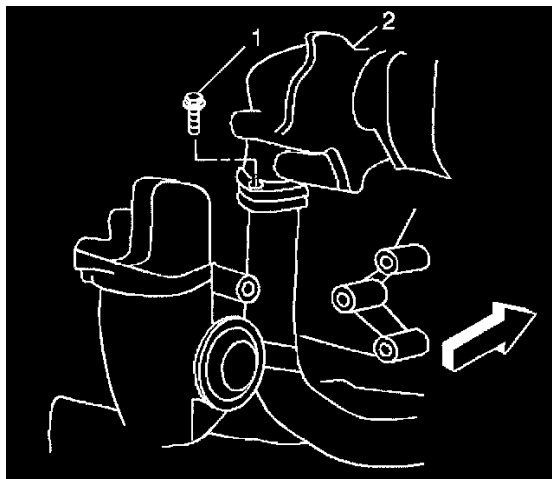


## Water Pump: Service and Repair

### Removal Procedure

**Caution:** Refer to Battery Disconnect Caution in Service Precautions.

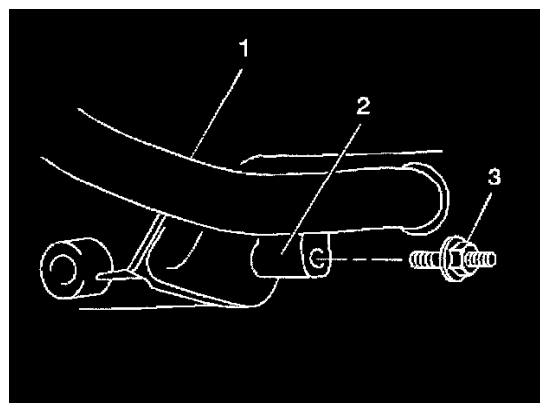
**Notice:** When adding coolant, use DEX-COOL (R) coolant. If silicated coolant is added to the system, premature engine, heater core or radiator corrosion may result. In addition, the engine coolant will require change sooner-at 50,000 km (30,000 mi) or 24 months.



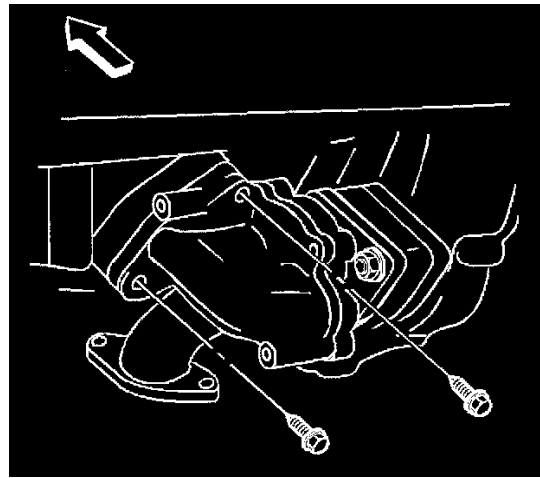
1. Disconnect the negative battery cable.
2. Drain the coolant. Recover the coolant. Refer to Draining and Filling Cooling System.
3. Disconnect the oxygen sensor (O2S) connector.
4. Remove the upper exhaust manifold heat shield. Refer to Exhaust Manifold Replacement.
5. Raise the vehicle. Refer to Vehicle Lifting.
6. Remove the exhaust manifold brace to manifold bolt.
7. Break loose the manifold to exhaust pipe bolts.
8. Remove the radiator outlet pipe assembly to coolant pump cover (2) bolts (1).

**Notice:** Do not rotate the flex coupling more than 4 degrees. Damage to the flex coupling may occur.

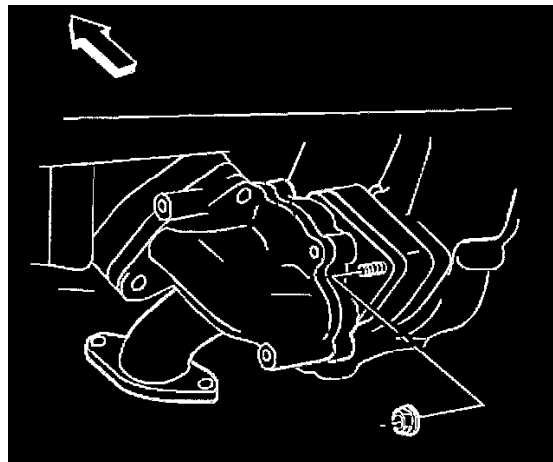
9. Remove the exhaust manifold pipe from the exhaust manifold. Pull down and back on the exhaust manifold pipe in order to disengage the pipe from the exhaust manifold. Refer to Exhaust Manifold Replacement.



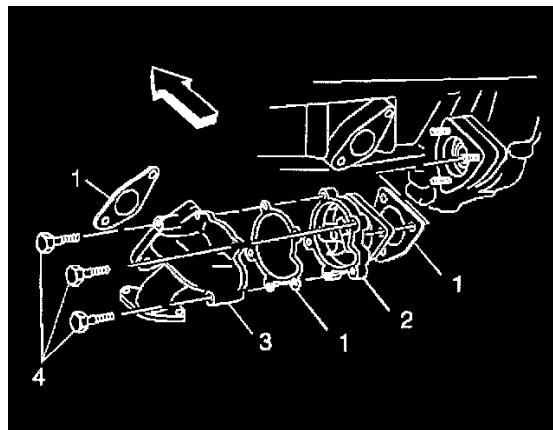
10. Remove the radiator outlet pipe (1) from the oil pan (2).
  - ^ With a manual transaxle, remove the exhaust manifold brace.
  - ^ Keep the radiator inlet hose attached. Pull down on the radiator outlet pipe in order to disengage the pipe from the coolant pump. Leave the radiator outlet pipe hanging.
11. Lower the vehicle.
12. Remove the following parts in order:
  - 12.1. The brake vacuum pipe from the cam housing
  - 12.2. The exhaust manifold to cylinder head retaining nuts
  - 12.3. The exhaust manifold
  - 12.4. The seals and gaskets of the exhaust manifold, refer to Exhaust Manifold Replacement.
13. Remove the front timing chain cover. Refer to Timing Chain Housing Replacement.
14. Remove the timing chain tensioner. Refer to Timing Chain, Sprockets, and Tensioner Replacement.



15. Remove the coolant pump cover to cylinder block bolts.



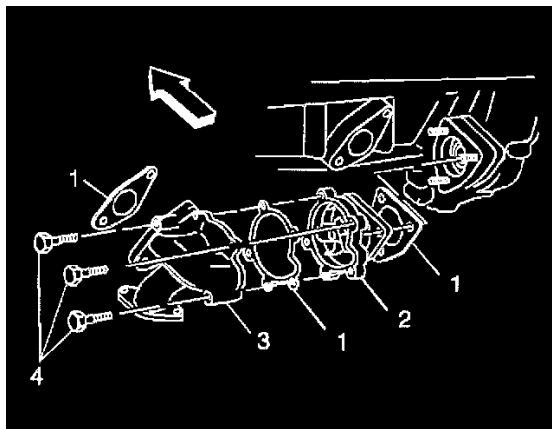
16. Remove the coolant pump to timing chain housing nuts.



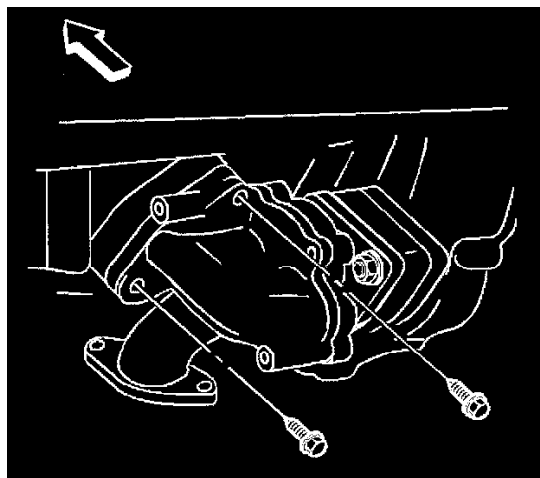
17. Remove the coolant pump cover (3) and the coolant pump (2) and the gaskets (1).  
 18. Remove the coolant pump cover to coolant pump assembly bolts (4).  
 19. Clean all sealing surfaces.

### Installation Procedure

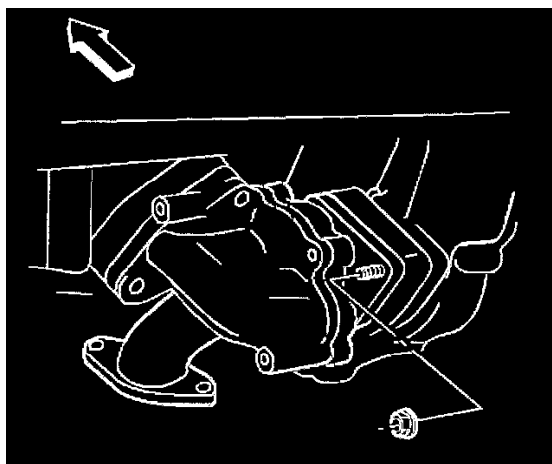
**Important:** Before you install the coolant pump, read the entire procedure. Pay special attention to the tightening sequences in order to avoid part damage and to provide proper sealing.



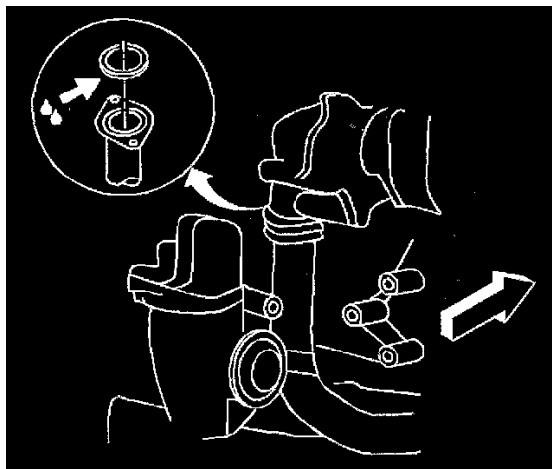
1. Install the coolant pump cover (3) and the gasket (1) to the coolant pump (2).
  - 1.1. Lubricate the splines of the coolant pump drive with Chassis Grease GM P/N 1051344, or equivalent.
  - 1.2. Install the coolant pump cover to coolant pump bolts (4), then hand tighten the bolts.
2. Install the coolant pump and the coolant pump cover assembly in position on the engine block.



3. Install the coolant pump cover to block bolts. Hand tighten the bolts.

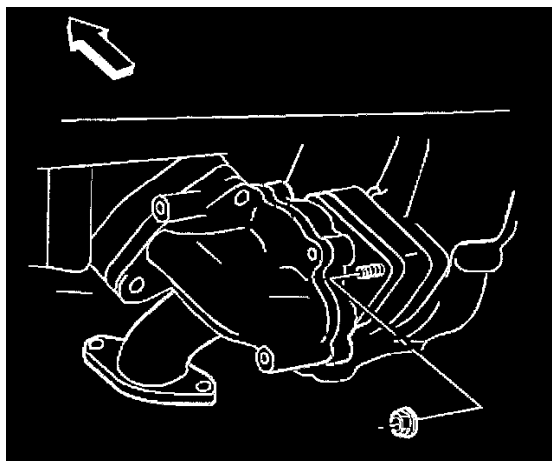


4. Install the coolant pump to timing chain housing nuts. Hand tighten the nuts.

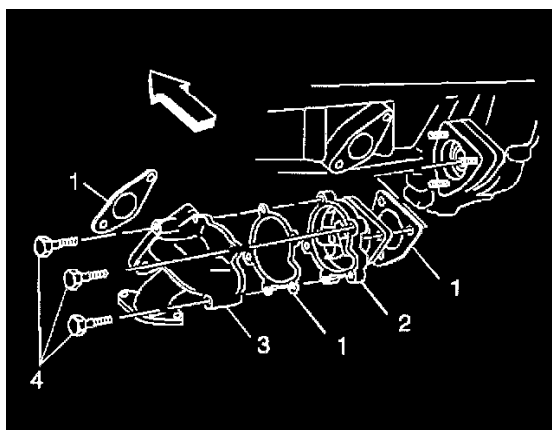


5. Lubricate the O-ring on the radiator outlet pipe with an antifreeze solution.
  - 5.1. Slide the outlet pipe into the coolant pump cover.
  - 5.2. Install the bolts. Hand tighten the bolts.

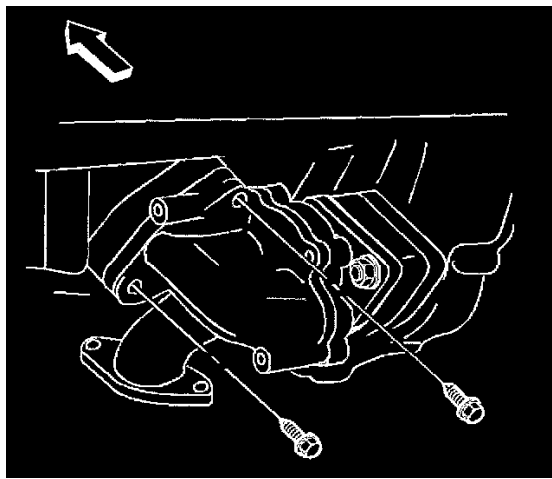
**Notice:** Refer to Fastener Notice in Service Precautions.



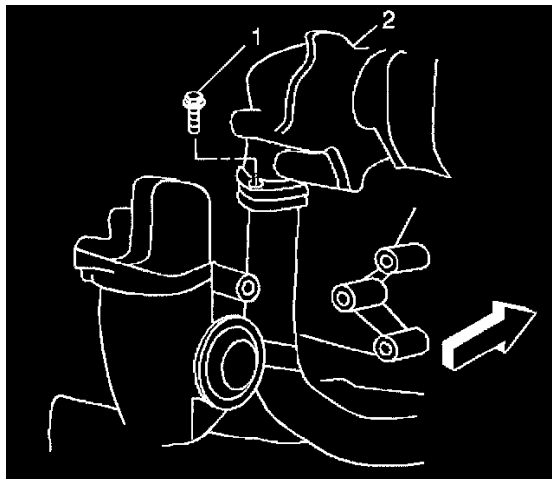
6. Tighten the coolant pump assembly to timing chain housing nuts.
  - ^ Tighten the nuts to **26 Nm (19 ft. lbs.)**.



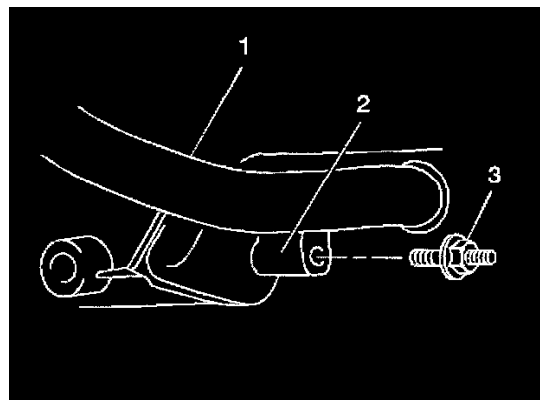
7. Tighten the coolant pump cover to water pump bolts (4).
  - ^ Tighten the bolts to **14 Nm (124 inch lbs.)**.



8. Tighten the coolant pump cover to engine block bolts.  
 ^ Tighten the bottom bolt first. Tighten the bolts to **26 Nm (19 ft. lbs.)**.



9. Tighten the radiator outlet pipe to coolant pump cover (2) bolts (1).  
 ^ Tighten the bolts to **14 Nm (124 inch lbs.)**.
10. Using new gaskets, install the exhaust manifold. Refer to Exhaust Manifold Replacement.
11. install the exhaust manifold to cylinder head retaining nuts. Follow the tightening sequence and tighten to specification. Refer to Exhaust Manifold Replacement.
12. Connect the brake vacuum pipe to the cam housing.
13. Raise the vehicle. Refer to Vehicle Lifting.
14. Index the exhaust manifold bolts into the exhaust pipe flange.
15. Install the exhaust pipe to the exhaust manifold and the bolts. Turn both bolts in evenly in order to avoid cocking the exhaust pipe and binding the bolts. Turn in the bolts until the bolts are fully seated. Refer to Exhaust Manifold Replacement.
16. Install the heater outlet pipe bracket to the transmission.



17. Install the radiator outlet pipe to the oil pan. Install the bolts. With a manual transaxle, install the exhaust manifold brace.  
 ^ Tighten the outlet pipe to oil pan bolt to **25 Nm (18 ft. lbs.)**.
18. Install the timing chain tensioner. Refer to Timing Chain, Sprockets, and Tensioner Replacement.

19. Install the timing chain cover. Refer to Timing Chain Housing Replacement.
20. Lower the vehicle.
21. Install the exhaust manifold brace to manifold bolt.
22. Tighten the manifold to exhaust pipe nuts to specification.
23. Install the exhaust manifold upper heat shield.
24. Connect the oxygen sensor (O2S) connector.
25. Fill the radiator with coolant until the coolant level reaches the heater hose coolant outlet. Then install the hose (this action assists in a complete cylinder block fill). Continue the filling procedure. Refer to Draining and Filling Cooling System.
26. Connect the negative battery cable.
  - ^ Tighten the negative battery cable bolt to **15 Nm (11 ft. lbs.)**.
27. Start the engine. After the engine reaches normal operating temperature, check for coolant leaks.