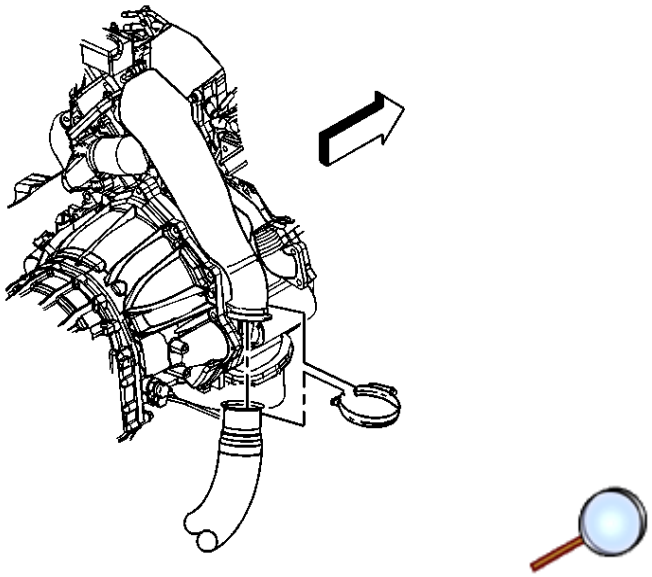
Turbocharger Replacement

Removal Procedure

Notice: If a turbocharger has failed, clean any turbocharger debris or excessive oil from the charge air cooler system before installing the new turbocharger. Failure to clean debris from the charge air cooler system will cause severe turbocharger and engine damage upon startup. Failure to clean excessive oil from the charge air cooler system may cause an engine runaway condition on startup, resulting in severe engine damage.

Important: If a turbocharger failure is thought to be caused due to lack of oil, the camshaft bearing should be checked. The number 4 camshaft bearing bore feeds the turbocharger oil supply (feed) pipe. If this camshaft bearing spins in the bore, the turbocharger will be starved for oil. This will cause a failure of the turbocharger. Failure to diagnosis this condition will result in repeat turbocharger failures.

1. Remove the transmission. Refer to Transmission Replacement.
2. Remove the left and right wheelhouse liners. Refer to Front Wheelhouse Liner Replacement - Right Side and Front Wheelhouse Liner Replacement - Left Side.



3. Loosen the exhaust pipe clamp. Slide the clamp onto the exhaust pipe.
4. Remove the left exhaust pipe. Refer to Exhaust Pipe Replacement - Left Side.
5. Remove the turbocharger exhaust pipe. Refer to Turbocharger Exhaust Pipe Replacement.
6. Remove the right exhaust pipe. Refer to Exhaust Pipe Replacement - Right Side.
7. Remove the exhaust gas recirculation (EGR) valve cooler. Refer to Exhaust Gas Recirculation Valve Cooler Replacement.
8. Remove the air conditioning (A/C) suction hose. Refer to Suction Hose Replacement.
9. Reposition the suction hose aside.

   Important: After removing the charged air cooler duct, cover the turbocharger opening with tape in order to prevent entry of objects.
10. Remove the charge air cooler inlet pipe. Refer to Charge Air Cooler Inlet Pipe Replacement.

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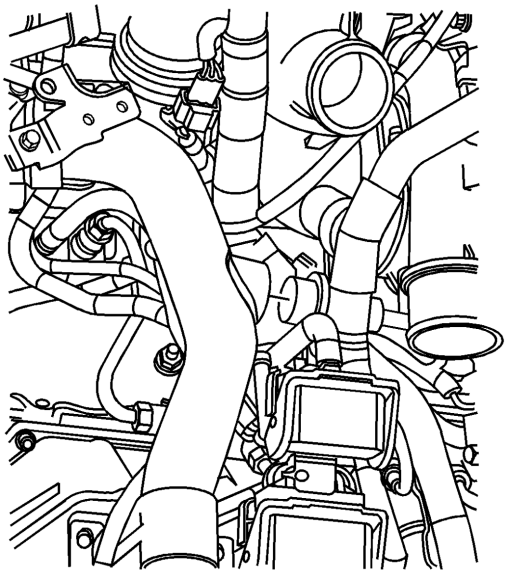
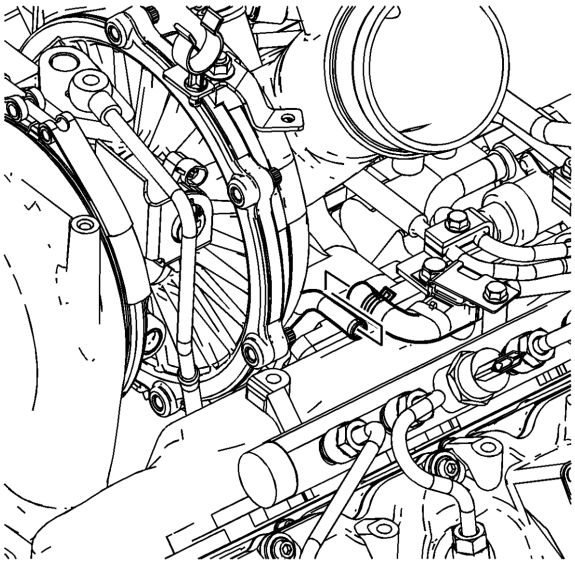
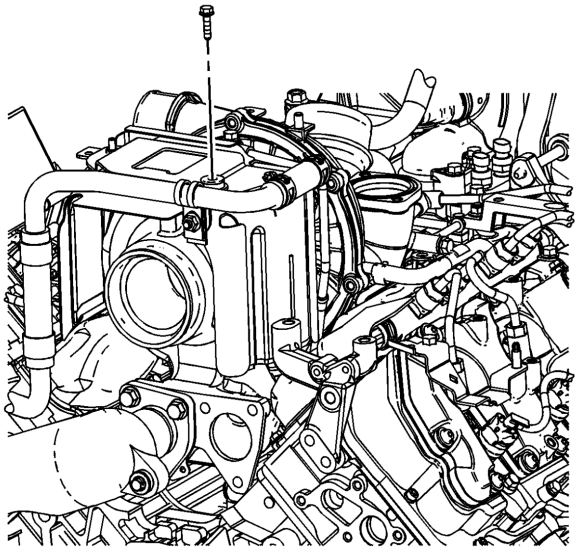


11. Remove the turbocharger inlet coolant hose from the turbocharger coolant bypass valve.

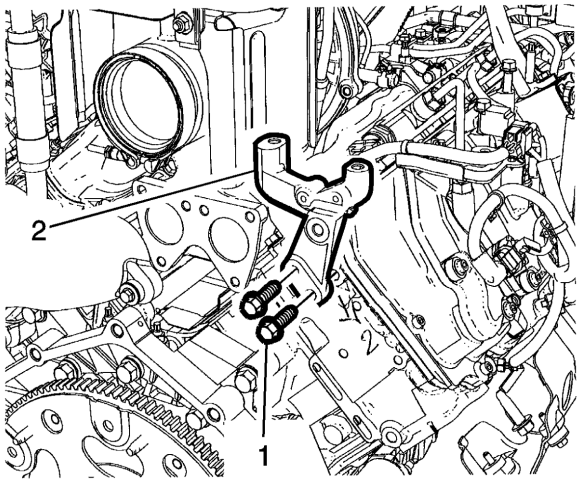


Important: Use care not to damage this hose during the procedure.

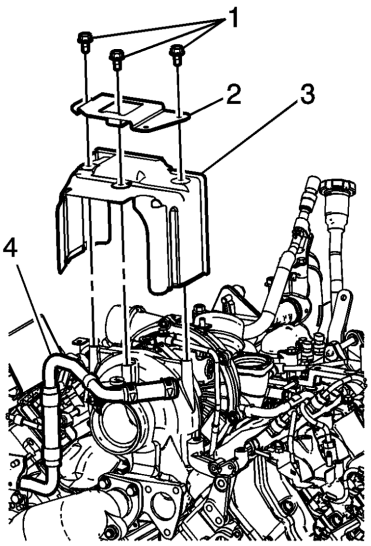
12. Reposition the hose clamp and remove the turbocharger outlet coolant hose from the turbocharger.
13. Remove the positive crankcase ventilation (PCV) hose/pipe. Refer to Positive Crankcase Ventilation Hose/Pipe/Tube Replacement.



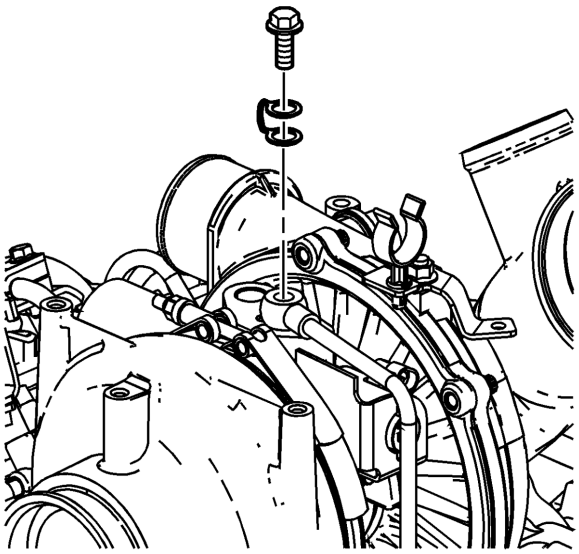
14. Remove the glow plug module and both brackets. Refer to Glow Plug Control Module Replacement.
15. Remove the EGR cooler pipe bolt.



16. Remove the EGR/engine lift hook bracket bolts (1).
17. Remove the EGR/engine lift hook bracket.

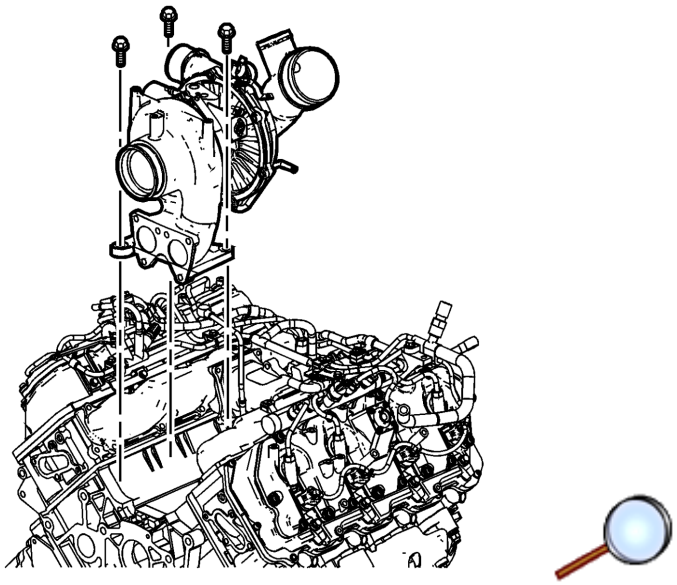


18. Reposition the EGR cooler pipe (4) out of the way.
19. Remove the EGR valve adapter pipe bracket bolts (1).
20. Rotate the turbocharger heat shield and remove from the right side of the engine compartment.

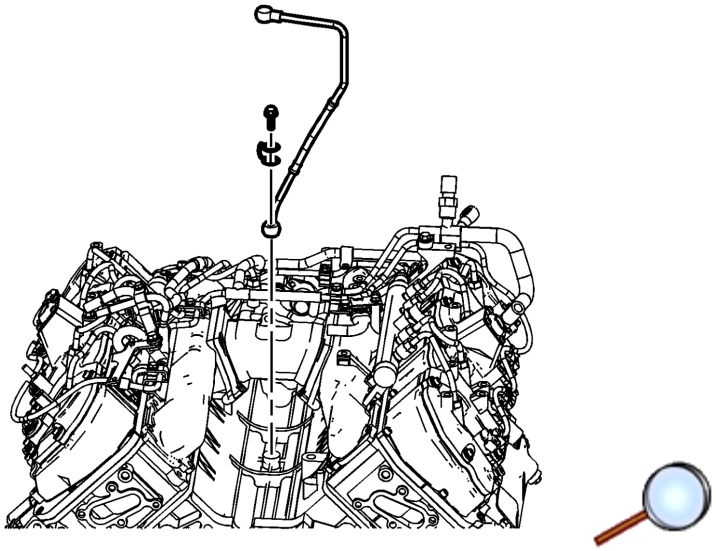


Notice: Do not twist the turbocharger oil feed pipe. Twisting of the feed pipe will result in the collapse and deformation of the plastic pipe, restricting oil flow and causing turbocharger damage. During turbocharger replacement, gently push the oil feed pipe towards the front of the engine to clear the turbocharger. Assistance may be required to keep the pipes clear of the turbocharger during removal or installation.

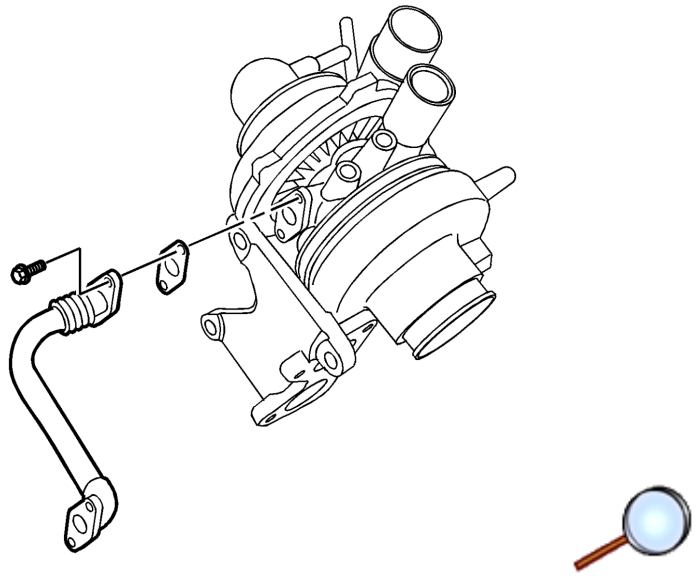
21. Remove the turbocharger oil feed pipe banjo bolt and washer.
22. Reposition the oil feed pipe out of the way.
23. Remove the turbocharger oil return pipe nuts at the top of the flywheel housing.
24. Disconnect the turbocharger vane position sensor electrical connector.



25. Remove the turbocharger bolts.
26. Remove the turbocharger (with the oil return pipe).
27. Remove and discard the turbocharger oil return pipe gasket at the flywheel housing.

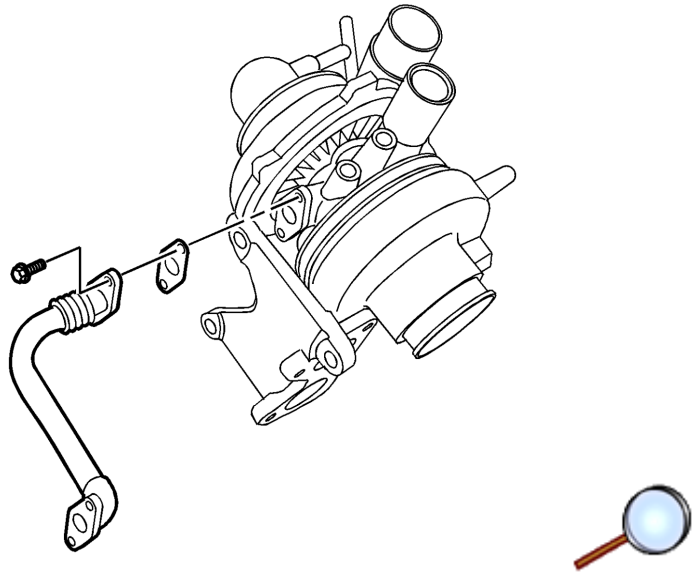


28. Remove the turbocharger lower heat shield, if necessary.
29. Remove the oil feed pipe bolt, washer, and pipe, if necessary.
30. If the turbocharger has failed, perform the following steps the verify the condition of the number 4 camshaft bearing before installing a new turbocharger:
    30.1. Visually inspect for correct alignment of the number 4 camshaft bearing oil hole through the turbocharger oil supply hole in the block.
    30.2. Turn the engine over by hand 1/2 turn and inspect for camshaft bearing movement, indicating a spun camshaft bearing.
    30.3. If the bearing is spun the engine MUST be replaced.



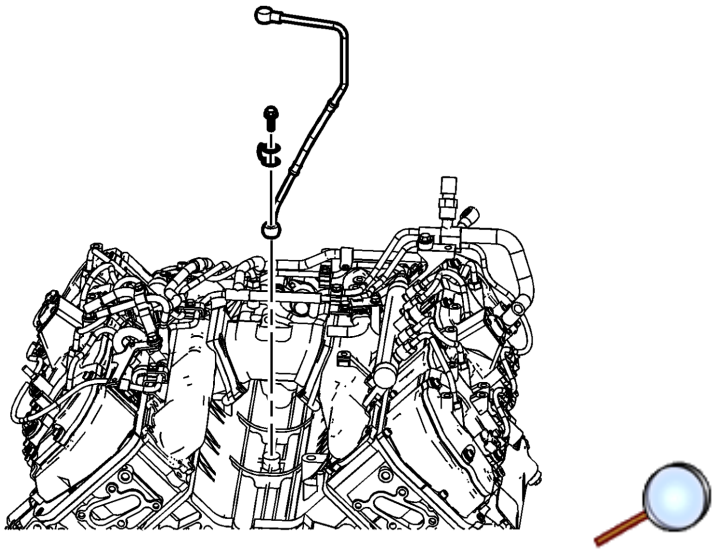
31. Remove the turbocharger outlet coolant pipe banjo bolt and washers.
32. If replacing the turbocharger, remove the oil return pipe bolts, pipe and gasket. Discard the gasket.
33. Clean all turbocharger to engine gasket mating surfaces.
34. If required, clean and inspect the turbocharger. Refer to Turbocharger Cleaning and Inspection

Installation Procedure



Notice: Refer to Fastener Notice.

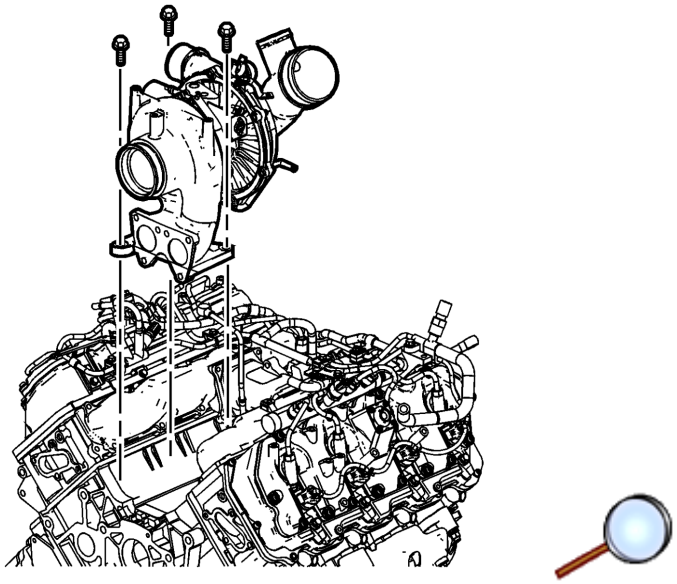
1. If the turbocharger was replaced, install the oil return pipe, bolts, and a NEW gasket.
   Tighten
   Tighten the bolts to 21 N•m (15 lb ft).
2. Install the turbocharger outlet coolant pipe banjo bolt and washers.
   Tighten
   Tighten the bolt to 26 N•m (19 lb ft).



Notice: Do not twist the turbocharger oil feed pipe. Twisting of the feed pipe will result in the collapse and deformation of the plastic pipe, restricting oil flow and causing turbocharger damage. During turbocharger replacement, gently push the oil feed pipe towards the front of the engine to clear the turbocharger. Assistance may be required to keep the pipes clear of the turbocharger during removal or installation.

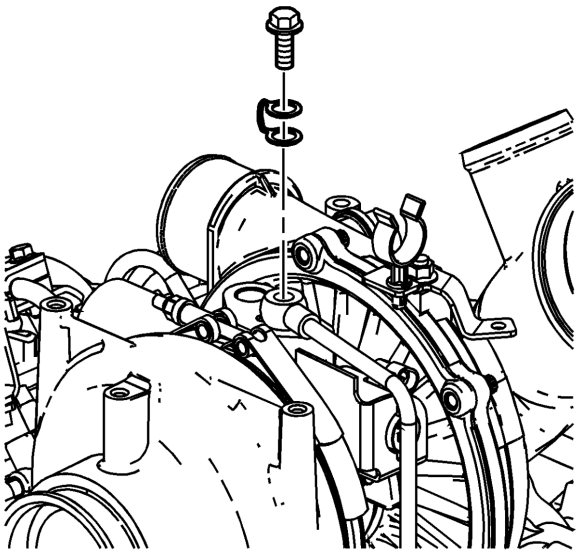
Important: Lubricate the washer with diesel fuel prior to installing.

3. Install the oil feed pipe, washer, and bolt, if necessary.
   Tighten
   Tighten the bolt to 34 N•m (25 lb ft).
4. Install the turbocharger lower heat shield, if necessary.

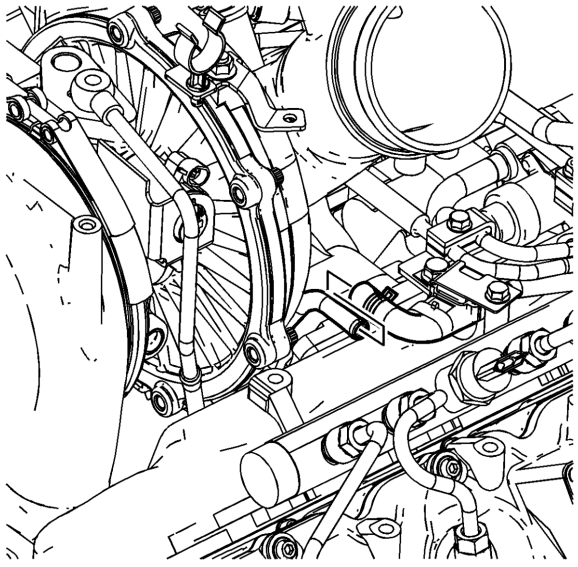


5. Install a NEW turbocharger oil return pipe gasket at the flywheel housing.
6. Install the turbocharger (with the oil return pipe).
7. Install the turbocharger bolts.
   Tighten
   Tighten the bolts to 108 N•m (80 lb ft).
8. Install the turbocharger oil return pipe nuts at the top of the flywheel housing.
   Tighten
   Tighten the nuts to 25 N•m (18 lb ft).

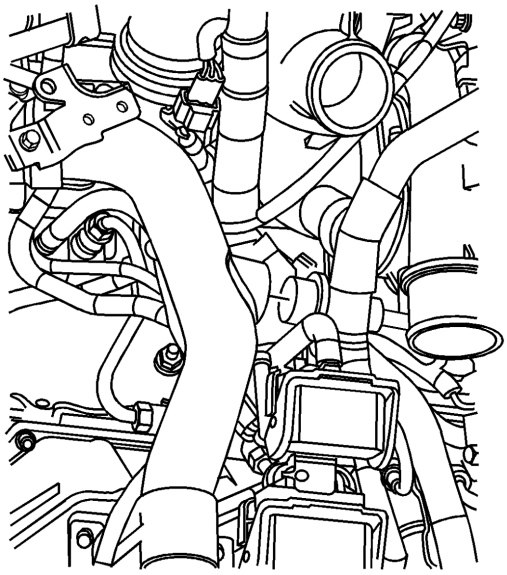
9. Connect the turbocharger vane position sensor electrical connector.



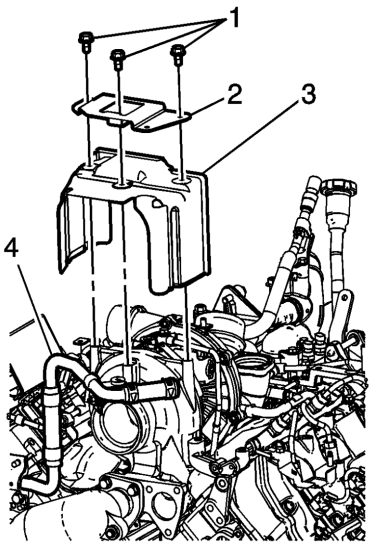
10. If installing a NEW turbocharger, add about 120–150 cc (4–5 oz) of clean engine oil in the turbocharger oil feed pipe opening while rotating the impeller.
11. Position the oil feed pipe to the turbocharger.
12. Install a NEW turbocharger oil feed pipe washer and the banjo bolt.
    Tighten
    Tighten the bolt to 34 N•m (25 lb ft).
13. Install the PCV hose/pipe. Refer to Positive Crankcase Ventilation Hose/Pipe/Tube Replacement.
14. If the cooling outlet hose eye bolts were removed, install cooling outlet hose eye bolts



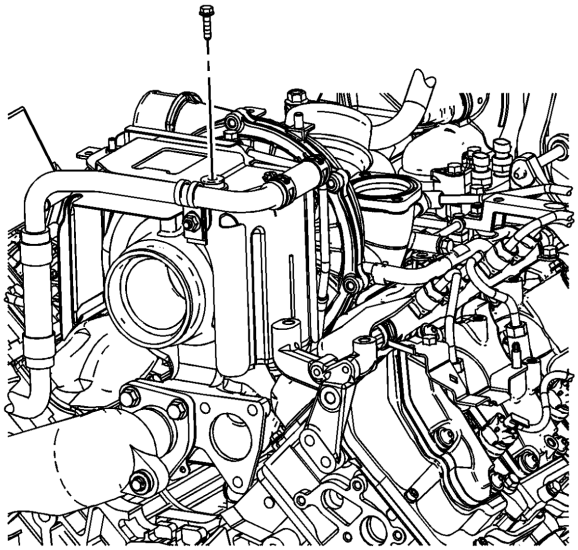
15. Install the turbocharger outlet coolant hose to the turbocharger and position the hose clamp.



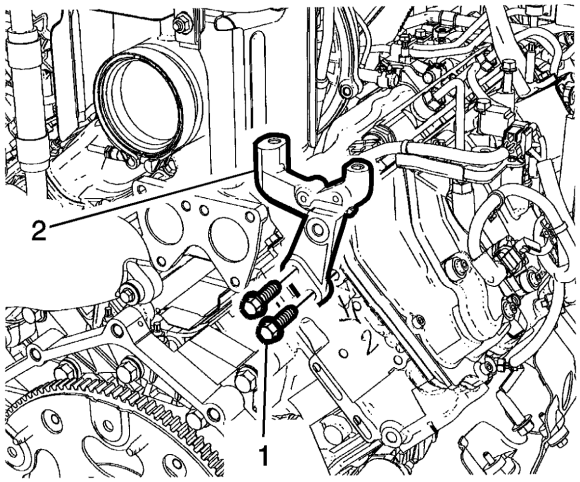
16. Install the turbocharger inlet coolant hose to the turbocharger coolant bypass valve.



17. Install the turbocharger heat shield (3).
18. Install the EGR valve adapter pipe bracket bolts (1).
    Tighten
    Tighten the bolts to 9 N•m (80 lb in).
19. Install the EGR cooler. Refer to Exhaust Gas Recirculation Valve Cooler Replacement.
20. Install the glow plug module and both brackets. Refer to Glow Plug Control Module Replacement.



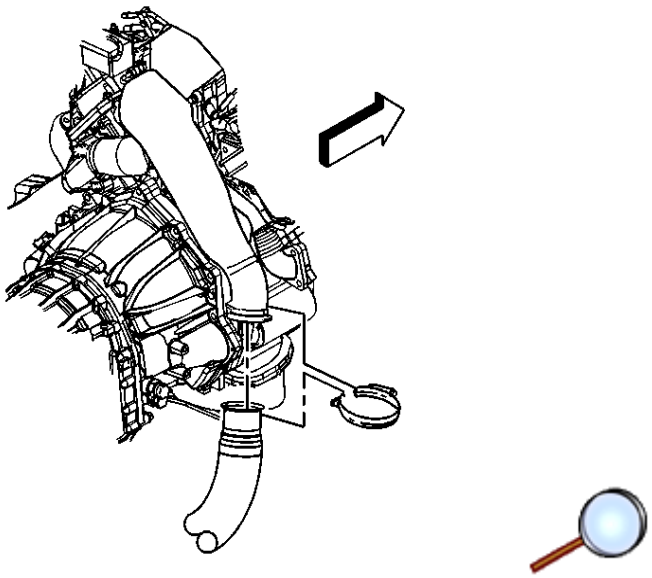
21. Install the EGR cooler pipe bolt.
    Tighten
    Tighten the bolt to 9 N•m (80 lb in).



22. Install the EGR/engine lift hook bracket bolts (1).
    Tighten
    Tighten the bolts to 16 N•m (11 lb ft).
23. Remove the tape from the turbocharger openings.

    Important: Lubricate the end of the duct prior to installation.

    Install the charge air cooler inlet pipe. Refer to Charge Air Cooler Inlet Pipe Replacement.
24. Install the A/C suction hose. Refer to Suction Hose Replacement.
25. Install the air intake pipe. Refer to Air Intake Pipe Replacement.
26. Fill the cooling system. Refer to Cooling System Draining and Filling.



27. Install the right exhaust pipe. Refer to Exhaust Pipe Replacement - Right Side.
28. Install the turbocharger exhaust pipe. Refer to Turbocharger Exhaust Pipe Replacement.
29. Install the left exhaust pipe. Refer to Exhaust Pipe Replacement - Left Side.
30. Slide the clamp onto the exhaust pipe. Tighten the exhaust pipe clamp.
    Tighten
    Tighten the clamp to 40 N•m (30 lb ft).
31. Install the left and right wheelhouse liners. Refer to Front Wheelhouse Liner Replacement - Right Side and Front Wheelhouse Liner Replacement - Left Side.
32. Install the transmission. Refer to Transmission Replacement.
33. Install NEW engine oil and a NEW oil filter. Refer to Engine Oil and Oil Filter Replacement.
34. If a NEW turbocharger was installed, perform the turbocharger learn procedure. Refer to Turbocharger Learn.
35. Road test the vehicle for normal operation.
36. Inspect for coolant, oil, or exhaust leaks. Correct as necessary.