

SECTION 303-01D Engine — 6.0L Diesel

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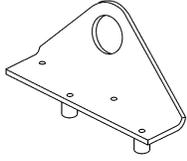
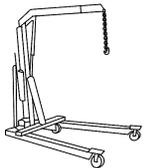
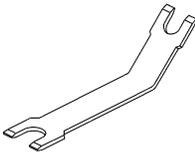
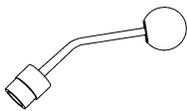
IN-VEHICLE REPAIR

Cylinder Head — RH	303-01D-2
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IN-VEHICLE REPAIR

Cylinder Head — RH

Special Tool(s)

 <p>ST2697-A</p>	<p>Lifting Bracket, Cylinder Head 303-759</p>
 <p>ST1341-A</p>	<p>Heavy Duty Floor Crane 014-00071</p>
 <p>ST2247-A</p>	<p>Quick Disconnect Tool 303-625</p>
 <p>ST2703-A</p>	<p>Disconnect Tool, Quick Release Coupling 303-755</p>
 <p>ST2862-A</p>	<p>Release Tool, Injector Connector 303-1115</p>

Material

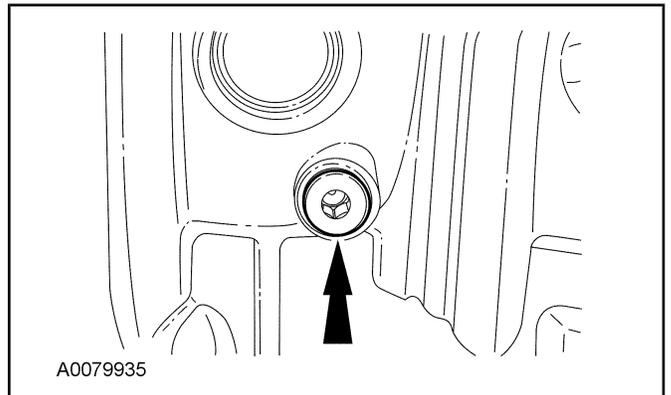
Item	Specification
<p>Super Duty SAE 15W-40 Engine Oil XO-15W40-QSD or equivalent</p>	<p>WSS-M2C171-B</p>

Material(Continued)

Item	Specification
<p>High Temperature Nickel Anti-Sieze Lubricant XL-2 or equivalent</p>	<p>ESE-M12A4-A</p>

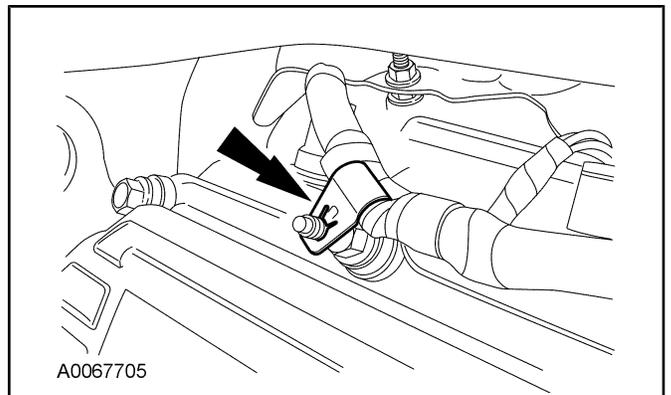
Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.
2. Drain the engine oil.
3. Remove the intake manifold. For additional information, refer to Intake Manifold in this section.
4. Remove the starter. For additional information, refer to Section 303-06B.
5. Remove the cylinder drain block.



6. Remove the evaporator core housing. For additional information, refer to Section 412-02.
7. **NOTE:** Only one retainer shown.

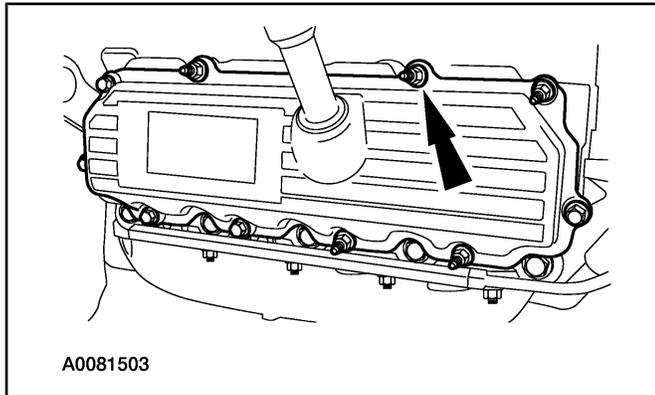
Disconnect the wiring retainers from the stud.



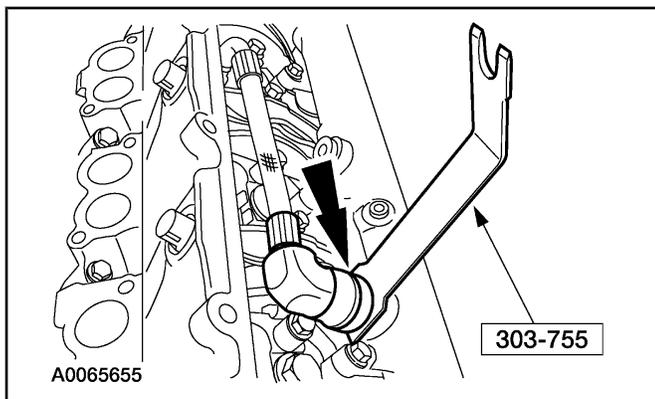
8. **NOTE:** Mark the position of the valve cover bolts for valve cover installation.

Remove the bolts and the valve cover.

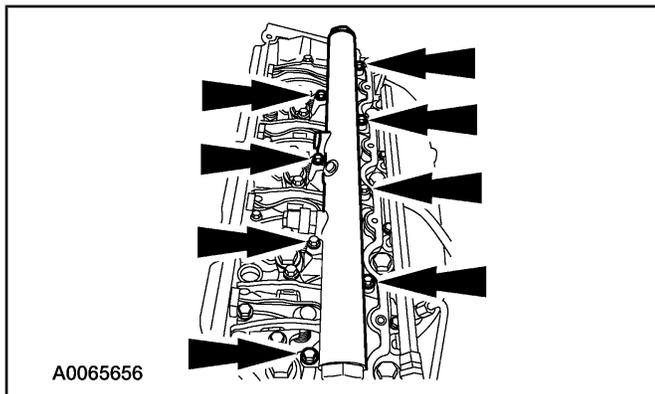
IN-VEHICLE REPAIR(Continued)



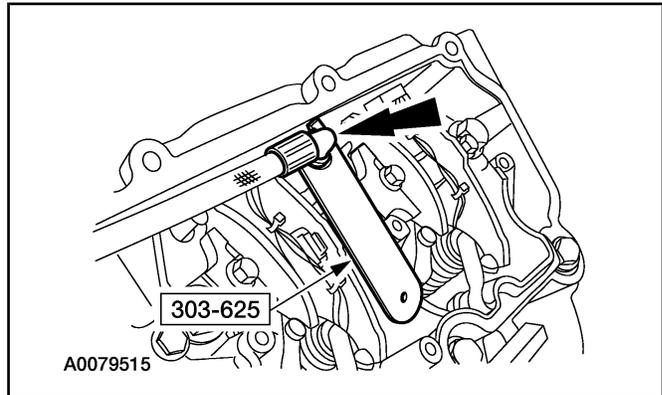
9. Using the special tool, disconnect the high-pressure oil rail supply line at the high-pressure oil rail.



10. Remove the bolts and the high-pressure oil rail.

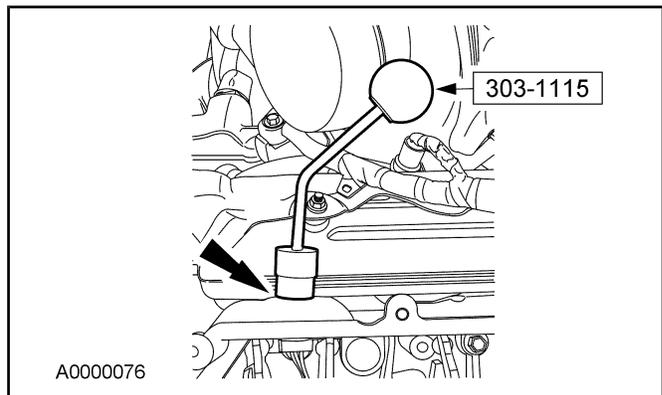


11. Using the special tool, disconnect the high-pressure oil supply line.



12. **NOTICE:** Do not attempt to put battery voltage to the fuel injector or damage to the fuel injector will occur.

Using the special tool, push the fuel injector electrical connector out of the rocker arm carrier.



13. Prior to removing the injector assembly, insert clean shop towels in the oil drain holes adjacent to each glow plug.
14. **NOTICE:** To prevent engine damage, do not use air tools to remove the fuel injectors. The clip that extracts the fuel injector can dislodge and fall into the oil drain hole.

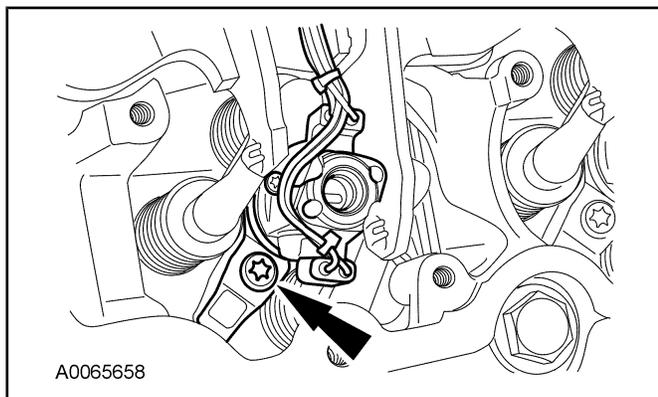
NOTICE: Failure to account for all snap rings or pieces prior to placing the vehicle back in service can cause engine damage. A missing snap ring can be ingested into the lube oil system causing severe engine damage.

NOTE: There is no need to drain the fuel rail.

NOTE: If engine coolant is found in the combustion chambers, it may be necessary to install a new injector sleeve. For additional information, refer to Section 303-04D.

Remove the bolt, fuel injector hold-down and fuel injector.

IN-VEHICLE REPAIR(Continued)

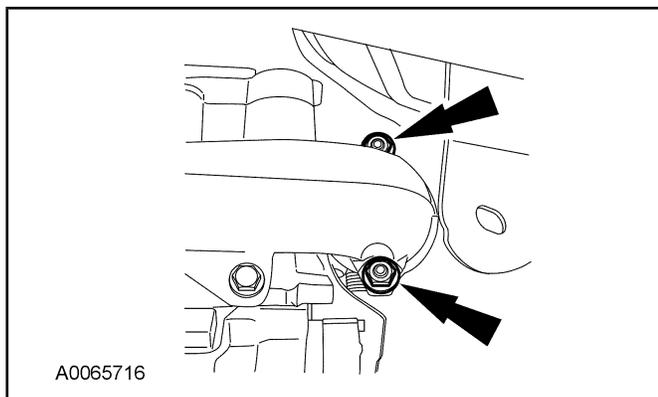


15. **NOTE:** If a snap ring or piece of a snap ring is missing from the injector hold-down assembly, it must be located prior to removing the shop towels.

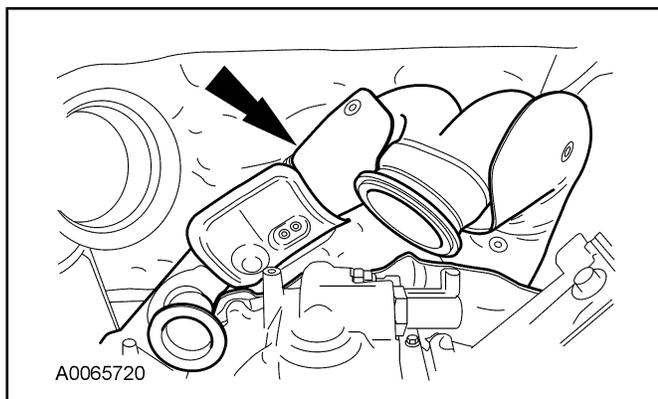
Remove the shop towels.

16. **NOTE:** LH shown, RH similar.

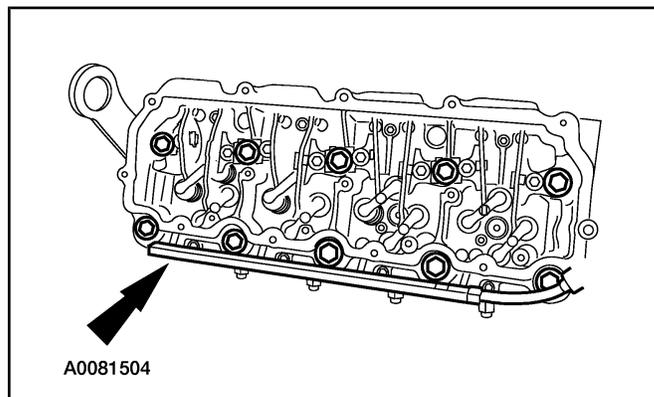
Remove the nuts and bolts from the turbocharger adapter pipe.



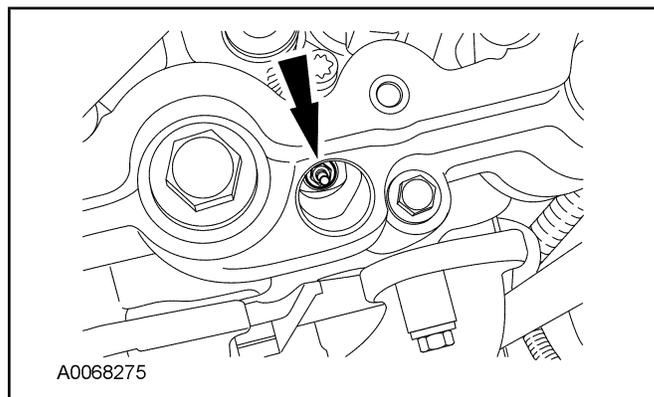
17. Remove the turbocharger adapter pipe.



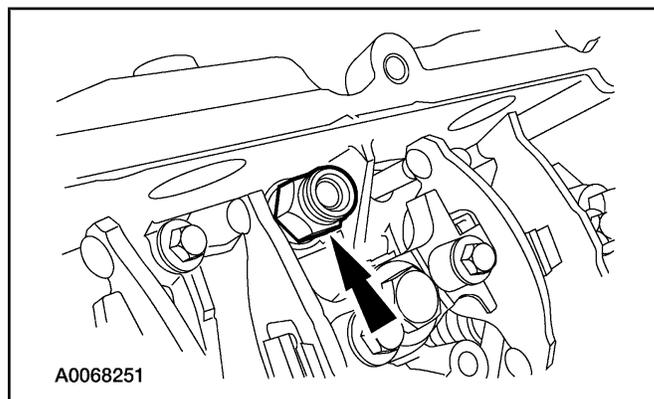
18. Remove the glow plug buss bar.



19. Remove the four glow plugs.

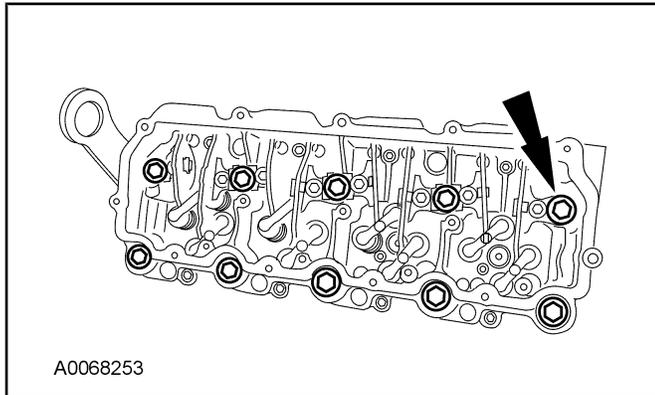


20. Remove and discard the crankcase to head tube assembly.

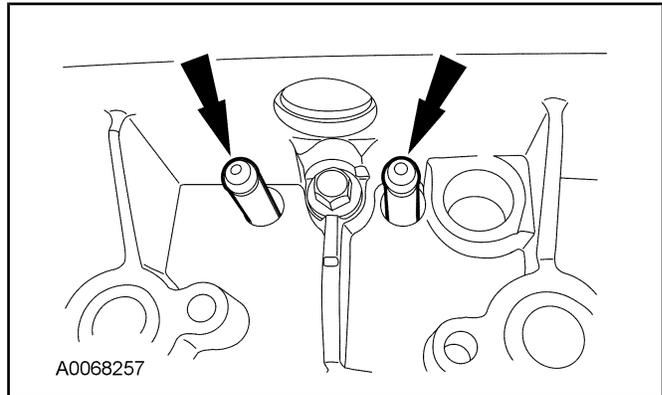


21. Remove and discard the 10 inner cylinder head bolts.

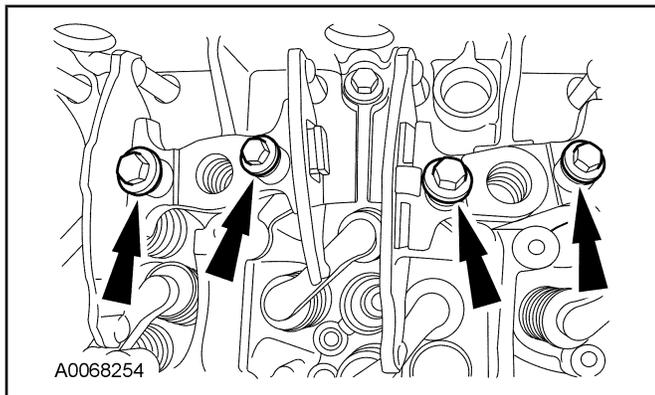
IN-VEHICLE REPAIR(Continued)



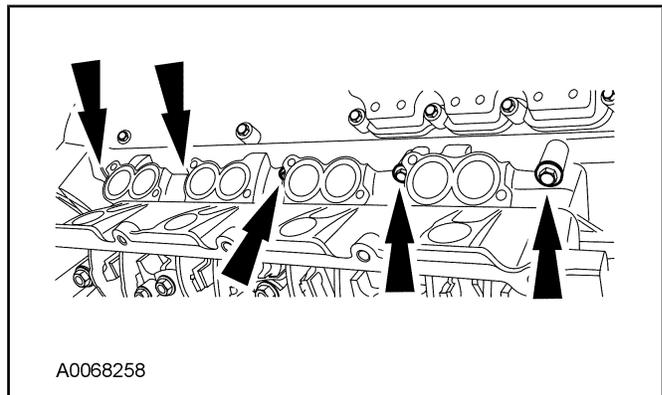
22. Remove the eight bolts and the rocker arm assemblies.



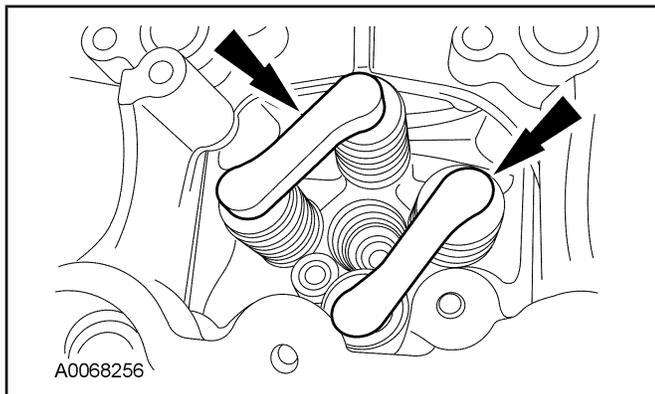
25. Remove the outer cylinder head bolts.



23. Mark the eight valve bridges with a permanent marker and remove.

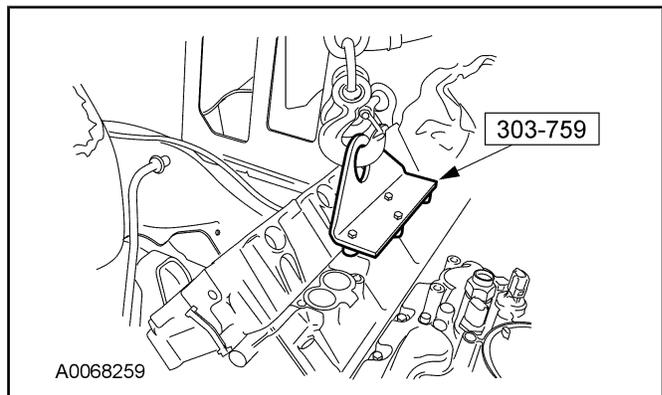


26. Install the special tool and the lifting crane. With the help of an assistant, remove the cylinder head from the vehicle.



24. **NOTICE:** To prevent engine damage, keep the push rods in the order in which they were removed. Install all push rods back in their original positions.

Mark and remove the eight push rods.

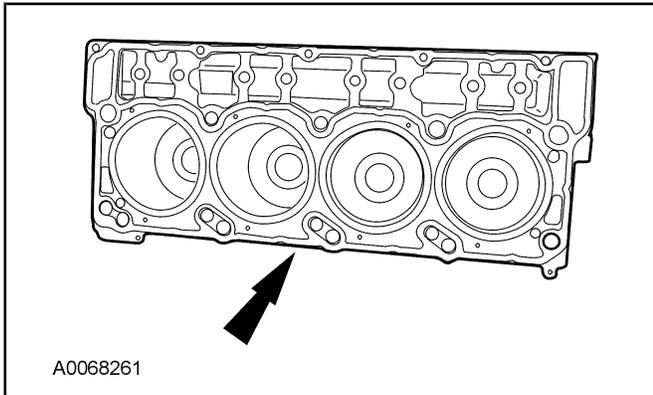


27. Check for cylinder head distortion. For additional information, refer to Cylinder Head Distortion in this section.

28. Remove and discard the cylinder head gasket and dowels.

- Clean and inspect the gasket sealing surfaces.

IN-VEHICLE REPAIR(Continued)

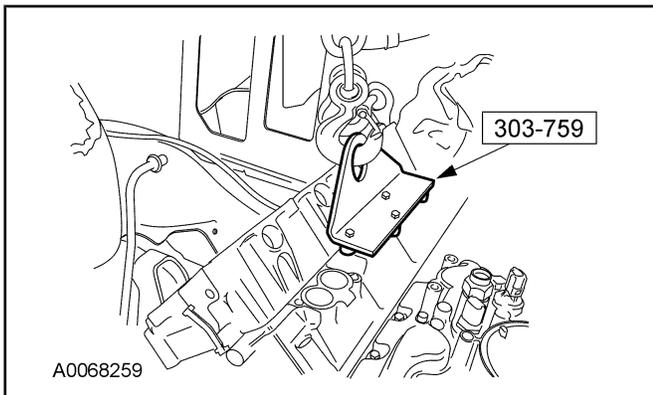


Installation

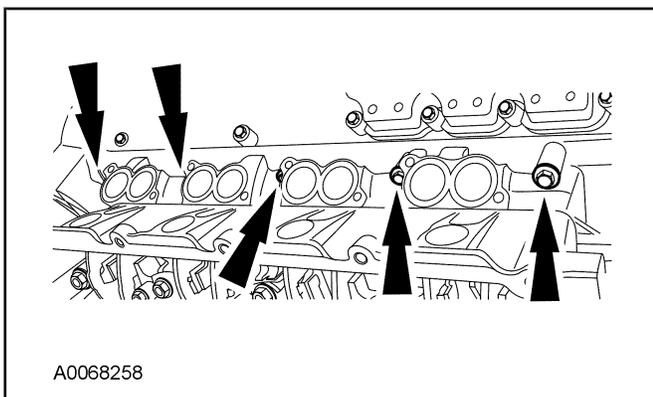
1. **NOTE:** Use care to avoid scratching the blue compound on the cylinder head gasket. Install a new cylinder head gasket with the part number facing up and verify the top five holes and the head gasket push rod holes line up.

Install the dowels and the cylinder head gasket.

2. Using the special tools and with the help of an assistant, install the cylinder head on the engine. Remove the special tools.



3. Install the outer cylinder head bolts finger-tight.

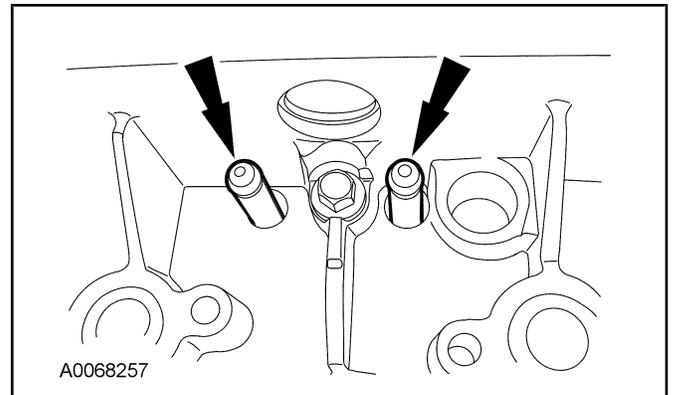


4. **NOTICE:** To prevent engine damage, keep the push rods in the order in which they were removed. Install all push rods back in their original positions.

NOTE: Higher mileage engines require push rods to be cleaned so the copper-colored end of the push rod can be identified.

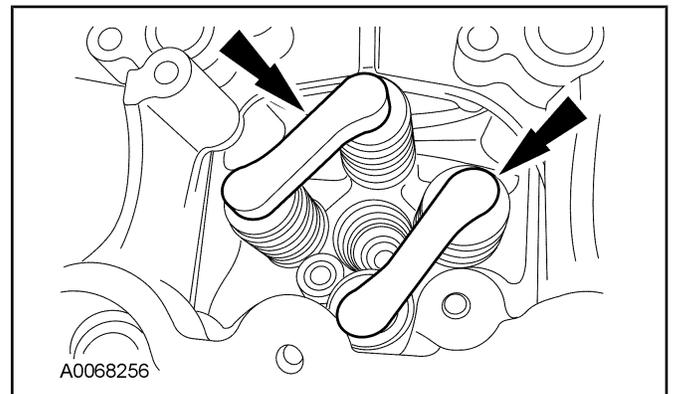
NOTE: If a push rod has been replaced, it may not have a copper-colored end and can be installed with either end up.

Apply clean engine oil to each end of the push rods. Insert them into their respective positions with the copper-colored end up.



5. **NOTE:** Coat the end of each valve stem with clean engine oil.

Install the eight valve bridges.

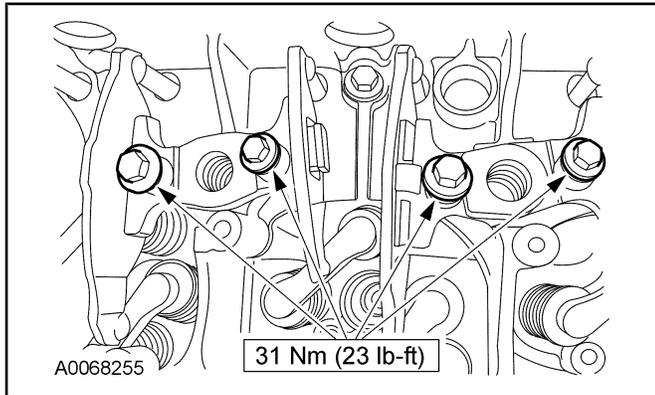


6. **NOTICE:** Rotate the crankshaft until the damper locating dowel notch is in the six o'clock position or engine damage can occur.

NOTE: Apply clean engine oil to the top center of each valve bridge.

Install the rocker arm assemblies and eight bolts.

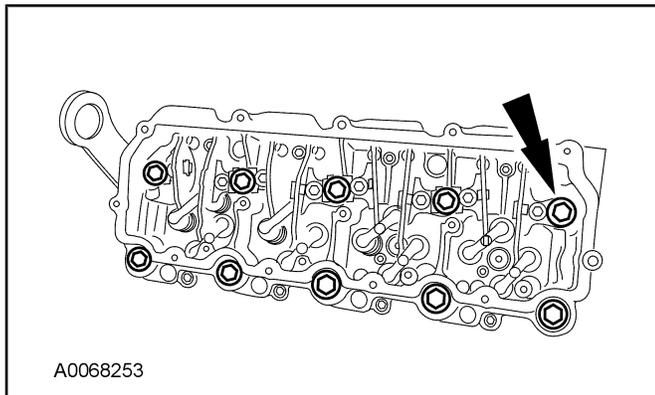
IN-VEHICLE REPAIR(Continued)



7. **NOTICE:** Using too much engine oil on the threads of the cylinder head bolts can cause damage to the threads and poor sealing. Using anti-seize compounds, grease or any other lubricants other than engine oil on the cylinder head bolt threads can affect the true torque value of the bolts.

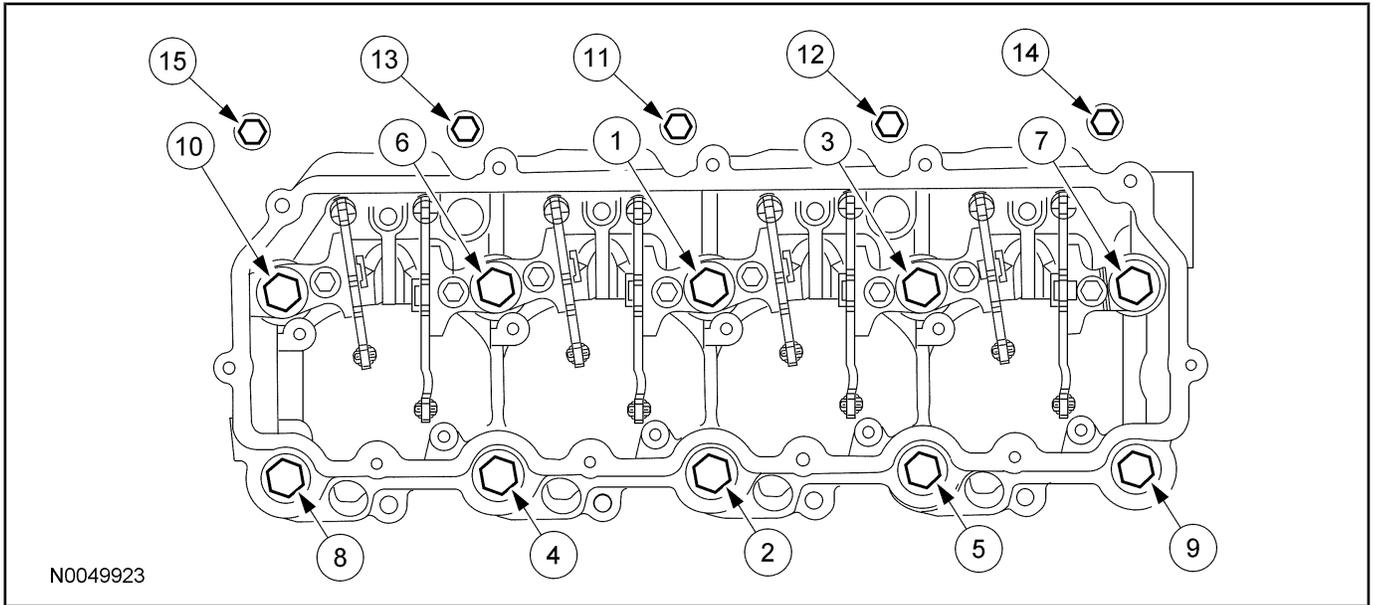
NOTE: Lightly lubricate the new cylinder head bolt threads and flanges with clean engine oil.

Install the 10 new inner cylinder head retaining bolts finger-tight.



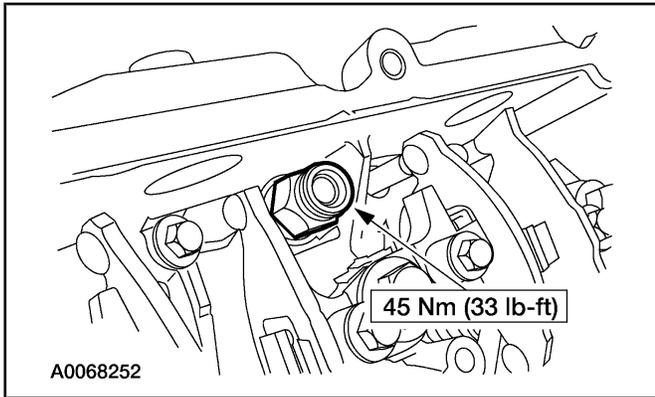
8. Tighten the head bolts in the following sequence.
- 1 Tighten bolts 1 through 10 to 88 Nm (65 lb-ft).
 - 2 Tighten bolts 1 through 10 to 115 Nm (85 lb-ft).
 - 3 Tighten bolts in sequence 1 through 10, clockwise 90 degrees.
 - 4 Tighten bolts in sequence 1 through 10, a second time, clockwise 90 degrees.
 - 5 Tighten bolts in sequence 1 through 10, a third time, clockwise 90 degrees.
 - 6 Tighten bolts 11 through 15 to 24 Nm (18 lb-ft).
 - 7 Tighten bolts 11 through 15 to 31 Nm (23 lb-ft).

IN-VEHICLE REPAIR(Continued)

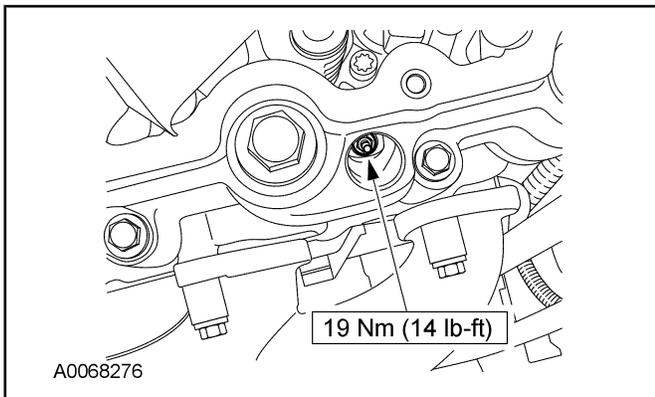


9. **NOTE:** Install a new lower O-ring.

Install a new crankcase to head tube assembly.

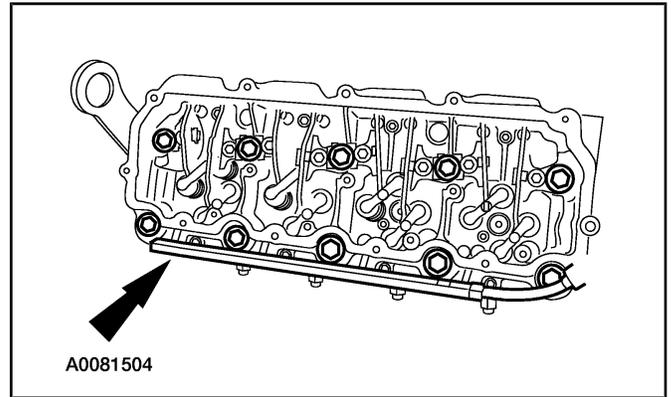


10. Install the four glow plugs.

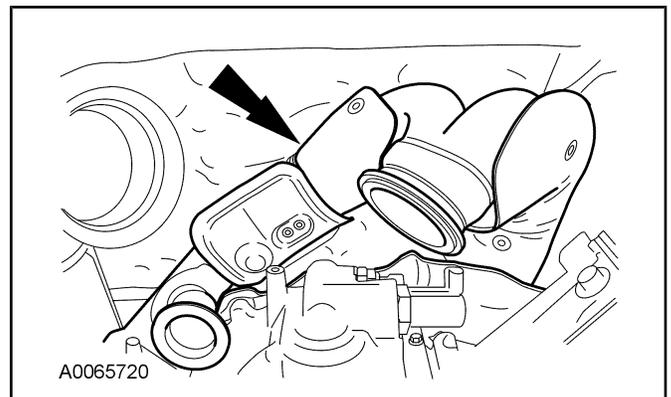


11. **NOTE:** Clean and apply clean engine oil to the O-rings before installing.

Install the glow plug buss bar.



12. Position the turbocharger adapter pipe.

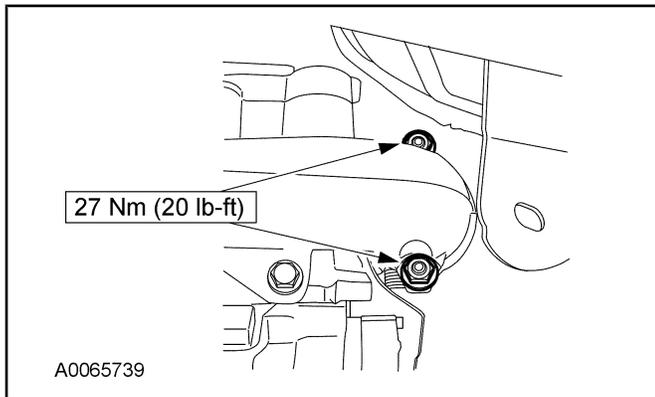


13. **NOTE:** Apply anti-seize lubricants to the bolt threads prior to installing the bolts.

NOTE: Do not tighten until after the turbocharger is installed.

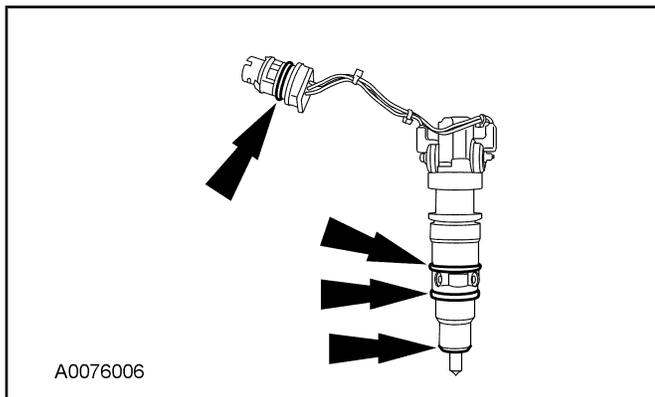
Install the nuts and bolts in the adapter pipe.

IN-VEHICLE REPAIR(Continued)



14. **NOTICE:** If the fuel injector oil inlet D-ring is damaged, a new fuel injector must be installed.

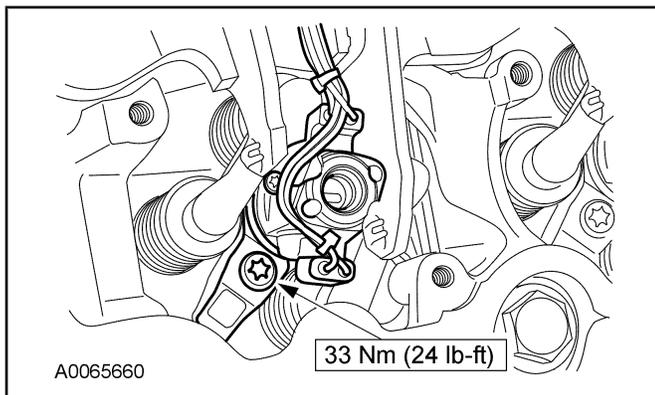
Install new O-rings and copper washer on the fuel injector. Lubricate the fuel injector and O-rings liberally with clean engine oil.



15. **NOTICE:** Failure to tighten the injector properly can lead to engine failure.

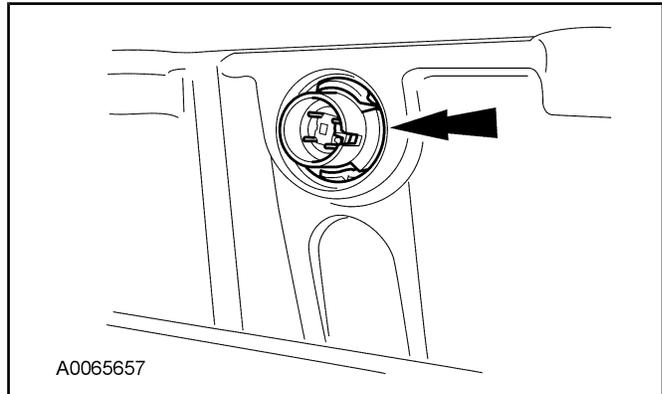
NOTICE: To prevent engine damage, do not use air tools to install the fuel injectors. The clip that extracts the injector can dislodge and fall into the oil drain hole.

Install the fuel injector, fuel injector hold-down and bolt.

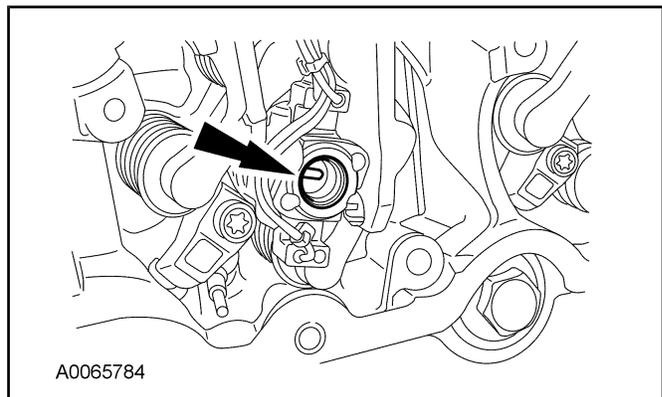


16. **NOTICE:** Make sure the injector wiring is clear of all moving parts or engine damage can occur.

Install the fuel injector electrical connector into the rocker carrier.

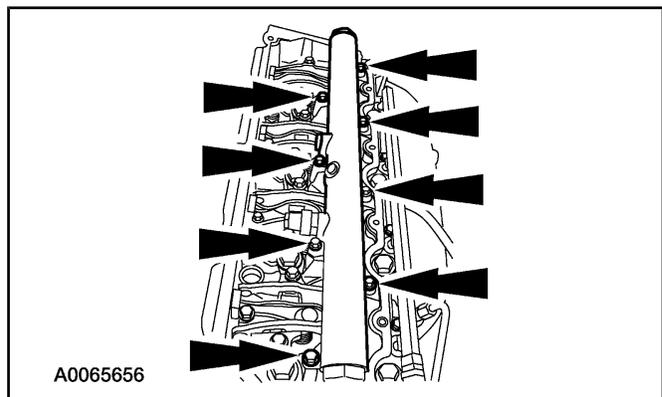


17. Apply clean engine oil to the top fuel injector O-rings.



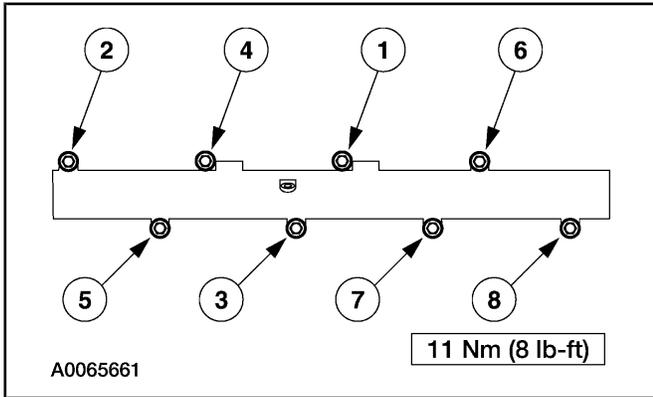
18. Install the high-pressure oil rail and bolts.

- Install the high-pressure oil rail.
- Install the bolts finger tight.

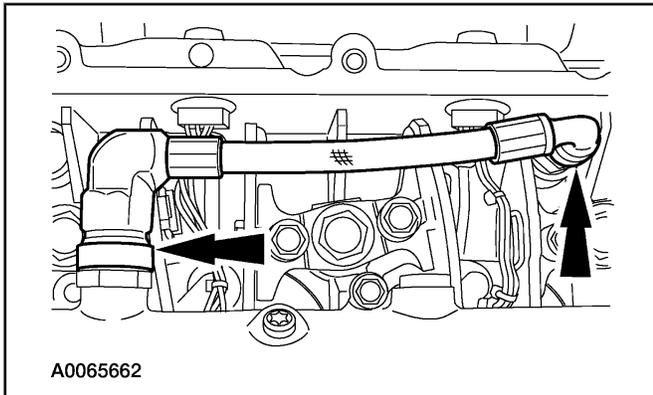


19. Tighten the bolts in the sequence shown.

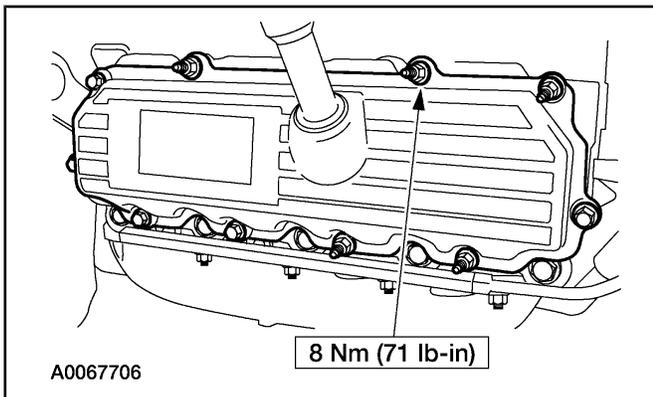
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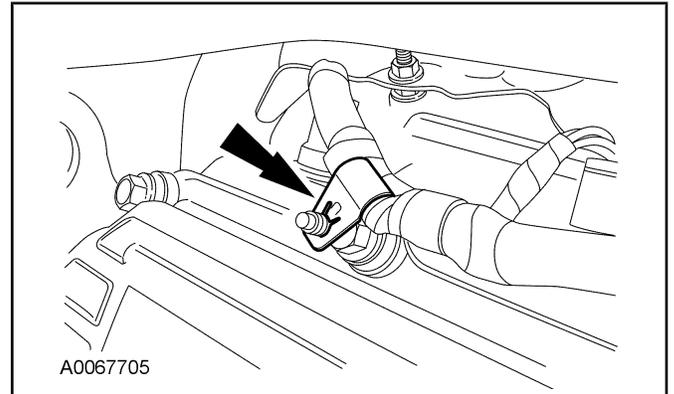
20. Install the high-pressure oil line.



21. Install the valve cover and eleven bolts.

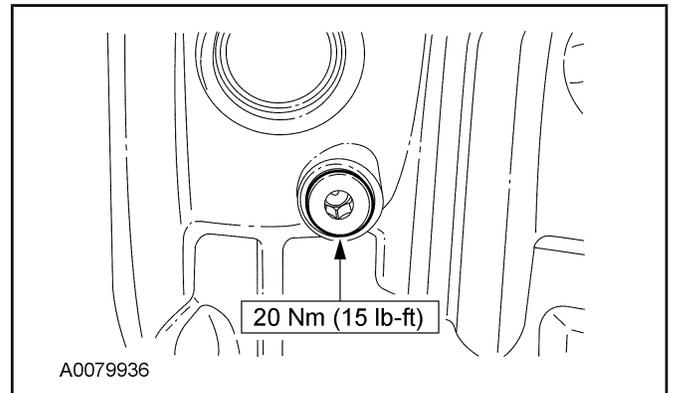


22. Install the evaporator core housing. For additional information, refer to Section 412-02.
23. Connect the wiring retainers to the studs.



24. Fill the crankcase with clean engine oil.
25. **NOTE:** Apply clean engine oil to the O-ring prior to installing.

Install the cylinder block drain plug.



26. Install the starter. For additional information, refer to Section 303-06B.
27. **NOTE:** Install a new oil filter.

Install the intake manifold. For additional information, refer to Intake Manifold in this section.