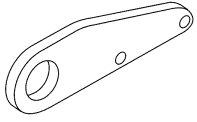
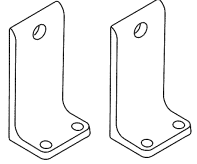
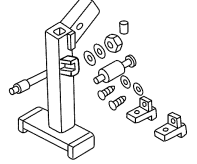
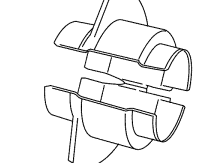
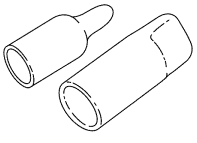
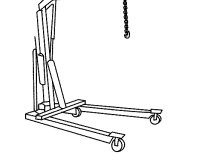


REMOVAL AND INSTALLATION

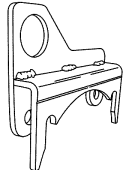
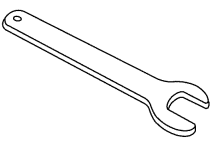
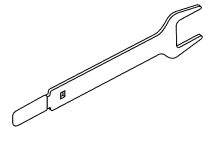
Engine — Body On

Special Tool(s)

 <p>ST2727-A</p>	<p>Adapter For 303-D043 303-D043-02 or equivalent</p>
 <p>ST2728-A</p>	<p>Adapter For 303-D043 303-D043-01 or equivalent</p>
 <p>ST1663-A</p>	<p>Diesel Engine Lifting Bracket 303-D043 (D83T-6000-B) or equivalent</p>
 <p>ST2935A</p>	<p>Disconnect Tool, Transmission Cooler Line 307-459</p>
 <p>ST3023A</p>	<p>Fuel System Caps 310-158</p>
 <p>ST1341-A</p>	<p>Heavy Duty Floor Crane 014-00072 or equivalent</p>

(Continued)

Special Tool(s)

 <p>ST3013-A</p>	<p>Turbocharger Lifting Bracket 303-1266</p>
 <p>ST2175-A</p>	<p>Wrench, Fan Clutch Nut 303-214 (T83T-6312-B)</p>
 <p>ST2736-A</p>	<p>Wrench, Fan Hub Nut 303-774</p>

Removal

All vehicles

NOTE: It is recommended that this component be serviced with the vehicle body removed. If the body can be removed, refer to Engine — Body Off in this section.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.
2. Disconnect the LH and RH battery ground cables. For additional information, refer to Section 414-01.
3. Release the fuel pressure. For additional information, refer to Section 310-00.

Vehicles with manual transmission

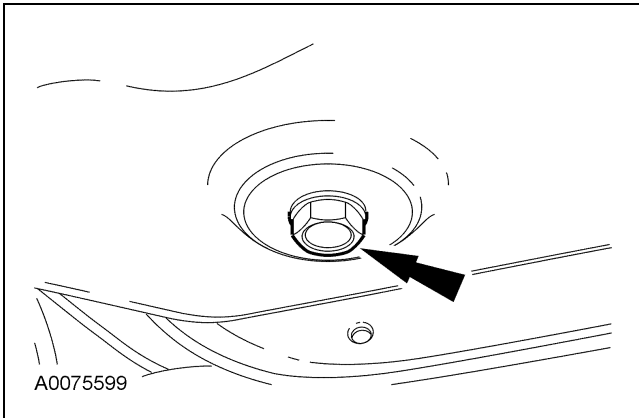
4. **NOTE:** On vehicles equipped with manual transmissions, the transmission must be removed before the engine can be removed. Remove the transmission. For additional information, refer to Section 308-03.

REMOVAL AND INSTALLATION (Continued)

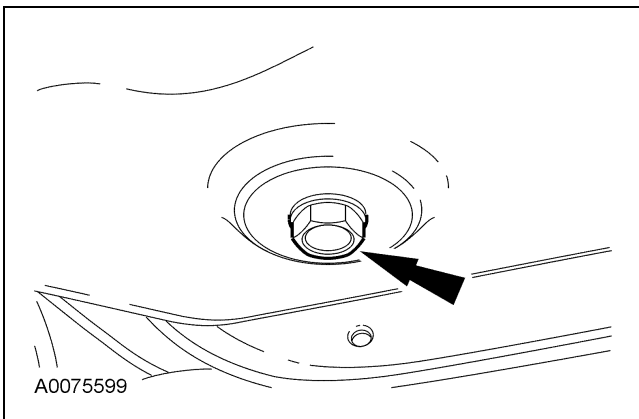
5. Remove the clutch disc and pressure plate. For additional information, refer to Section 308-01.

All vehicles

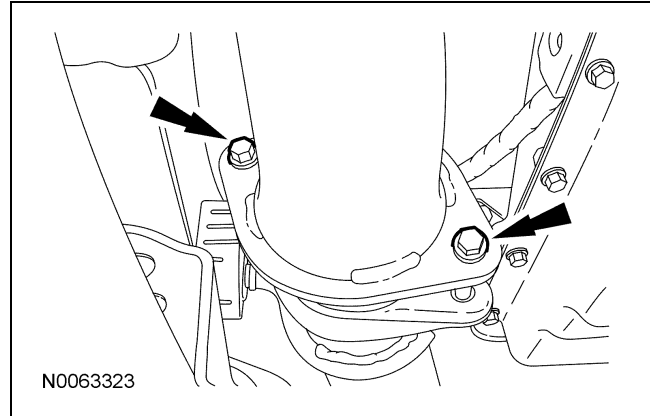
6. Remove the cooling module. For additional information, refer to Section 303-03.
7. Remove the oil pan drain plug and drain the engine oil.



8. Install the oil pan drain plug.
 - Tighten to 44 Nm (32 lb-ft).

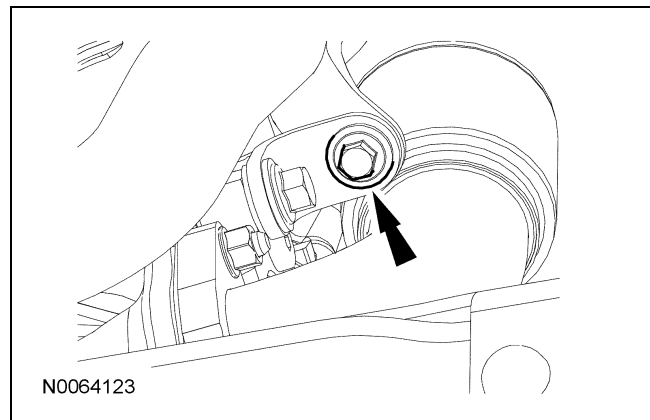


9. Loosen the bolts for the turbocharger downpipe.



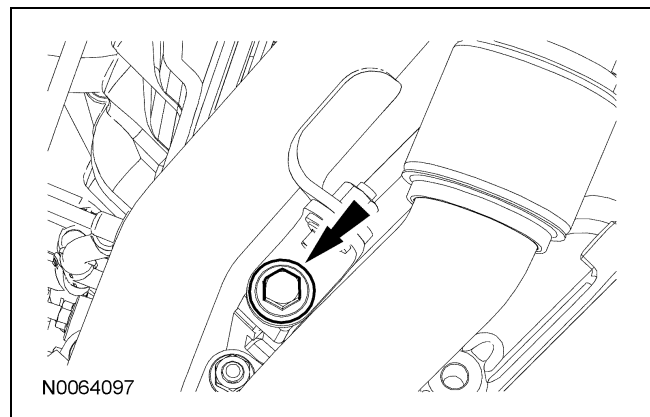
10. Remove the bolt and washer for the EGR-oxidation catalytic converter (OC) pipe bracket.

- Discard the bolt.



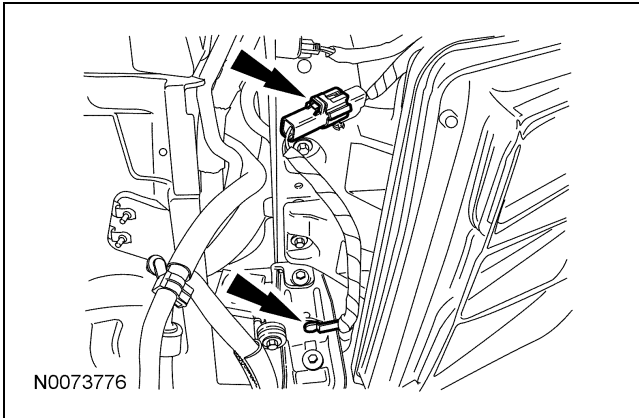
11. Remove the bolt, washers and bracket for the EGR-OC pipe bracket.

- Discard the bolt.



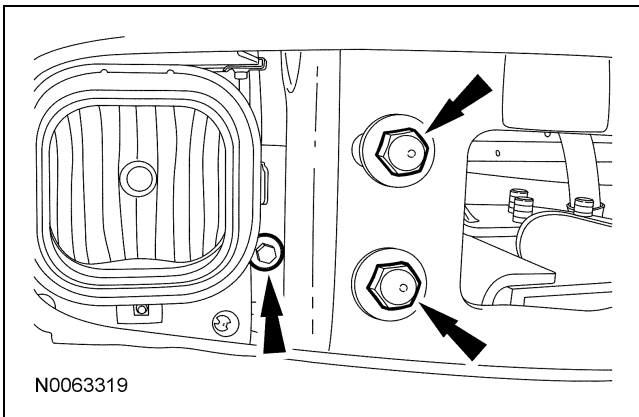
REMOVAL AND INSTALLATION (Continued)

12. Disconnect the fog light electrical connector and pin-type retainer.

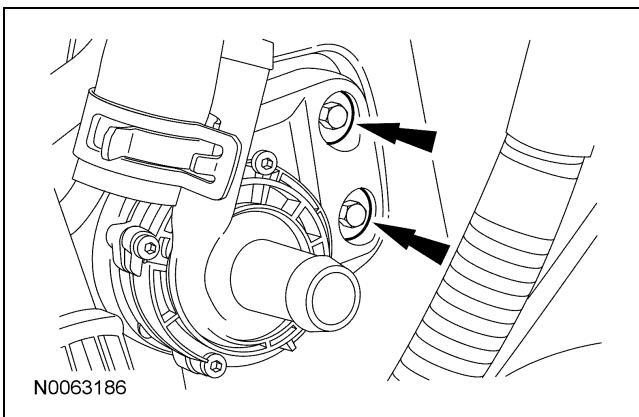


13. **NOTE:** RH side shown, LH side similar.

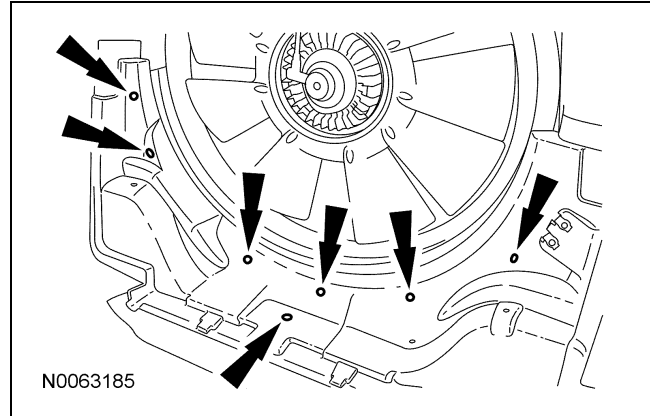
Mark the location of the bumper. Remove the 6 bolts and the front bumper.



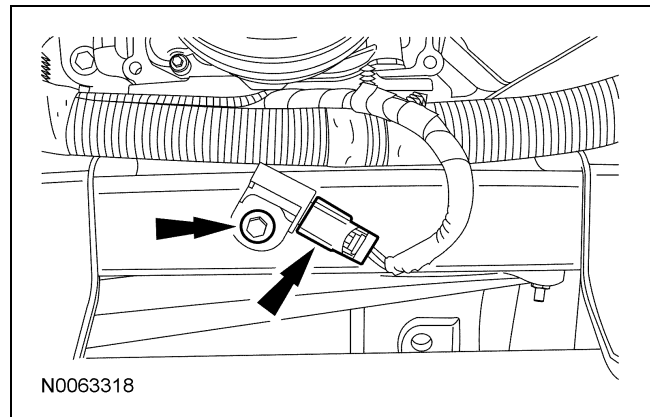
14. Remove the bolts for the fuel cooling pump.



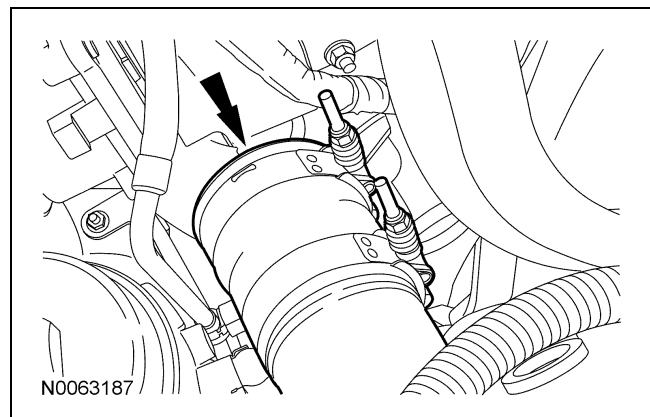
15. Disconnect the retainers and remove the lower cooling fan shroud.



16. Disconnect the front impact severity sensor electrical connector. Remove the bolt and the front impact severity sensor.

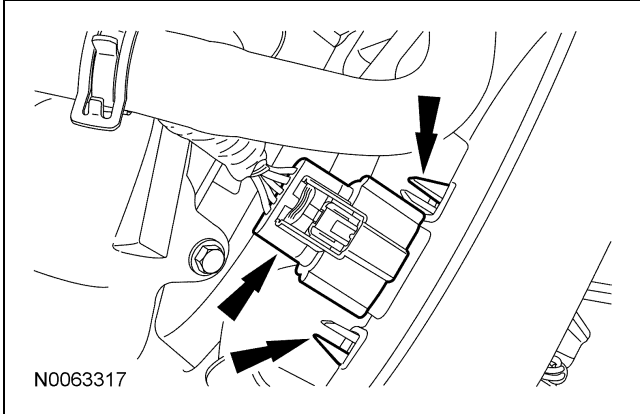


17. Loosen the clamp and remove the LH charge air cooler (CAC) pipe.

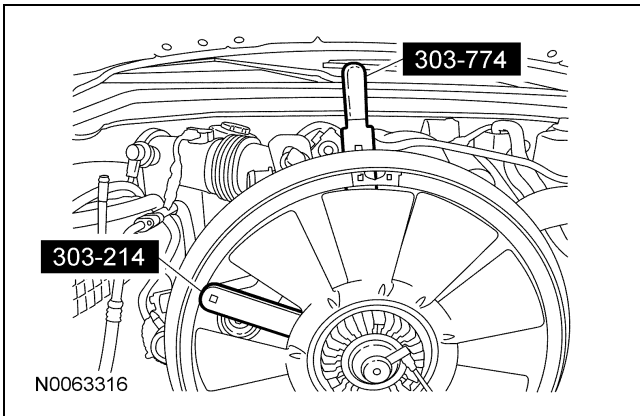


REMOVAL AND INSTALLATION (Continued)

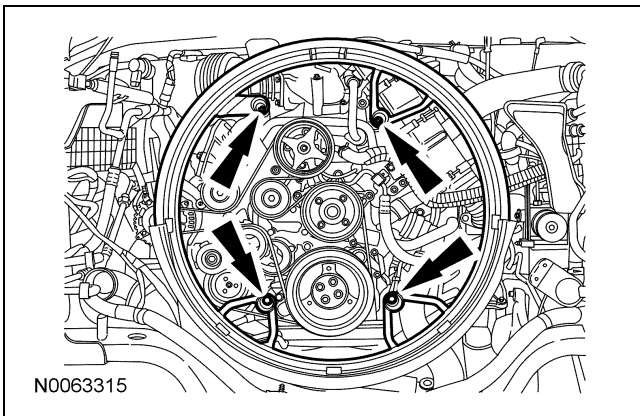
18. Disconnect the cooling fan electrical connector. Carefully squeeze the locking tabs and remove the cooling fan electrical connector from the stator.



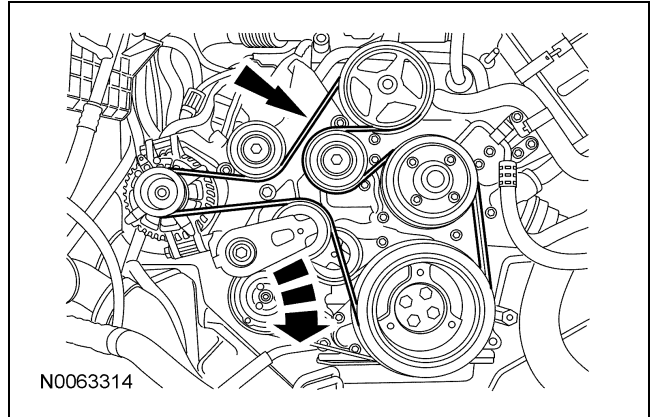
19. **NOTE:** The cooling fan has LH threads. Using the special tools, remove the cooling fan assembly.



20. Remove the nuts, bolts and the cooling fan stator.



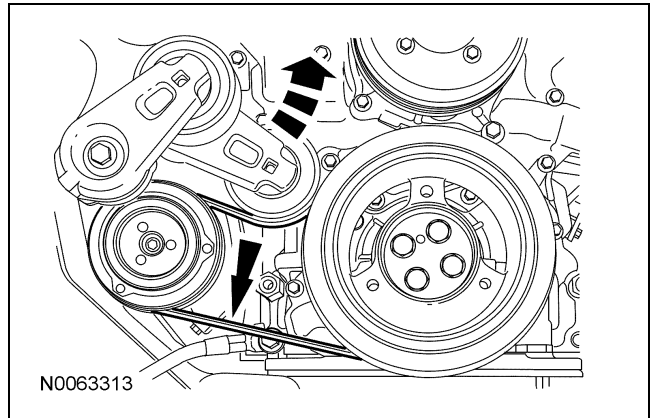
21. **NOTE:** Single generator shown, dual generator similar. Remove the accessory drive belt.



Vehicles with A/C

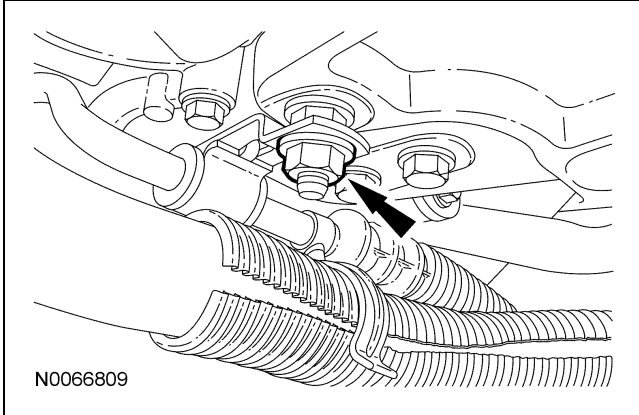
22. Remove the A/C drive belt.

- Remove the belt from the bottom of the A/C pulley then remove the belt from the crankshaft pulley.



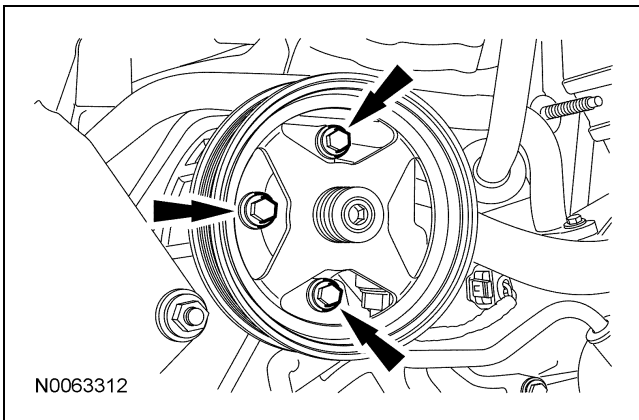
REMOVAL AND INSTALLATION (Continued)**All vehicles**

23. Remove the retaining nut for the power steering hose and tube.

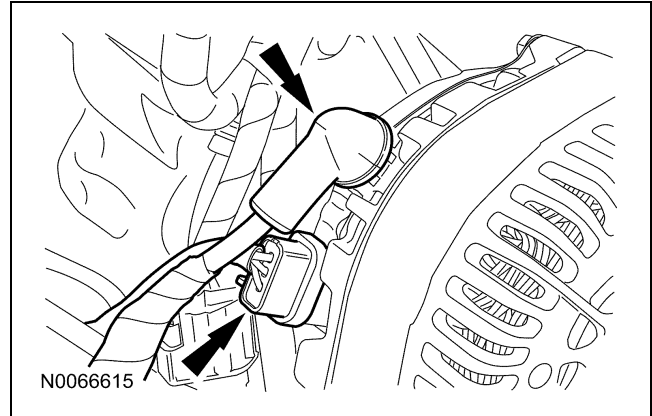


24. **NOTE:** When positioning the pump aside, raise the supply tube up to clear the engine coolant temperature (ECT) sensor connector.

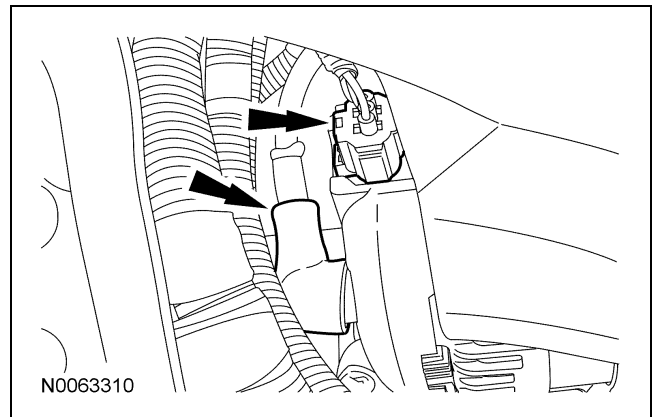
Remove the bolts for the power steering pump. Position the power steering pump aside.



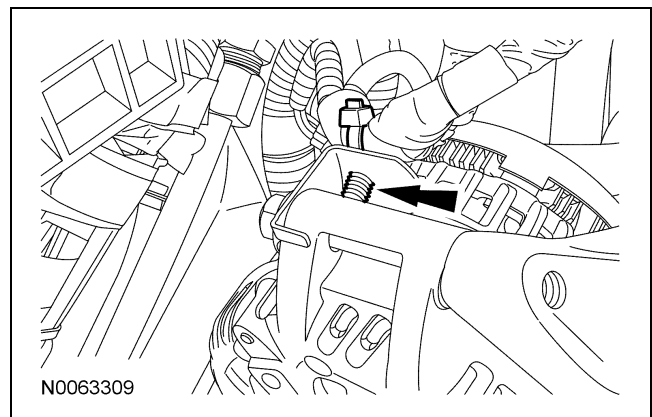
25. If equipped with dual generators, position the wiring boot and remove the nut from the generator wiring. Disconnect the generator electrical connector.



26. Position the wiring boot and remove the nut from the generator wiring. Disconnect the generator electrical connector.

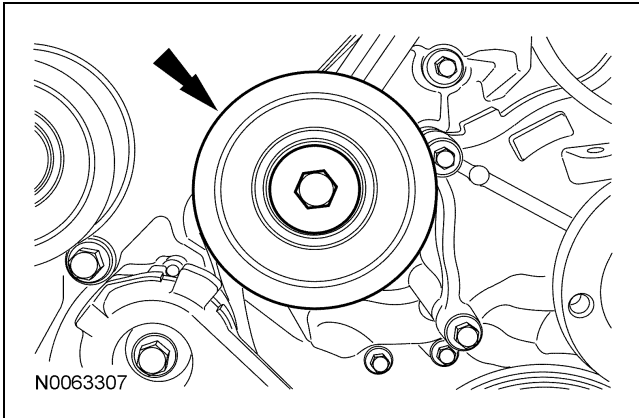


27. Disconnect the pushpin and position the generator wiring aside.

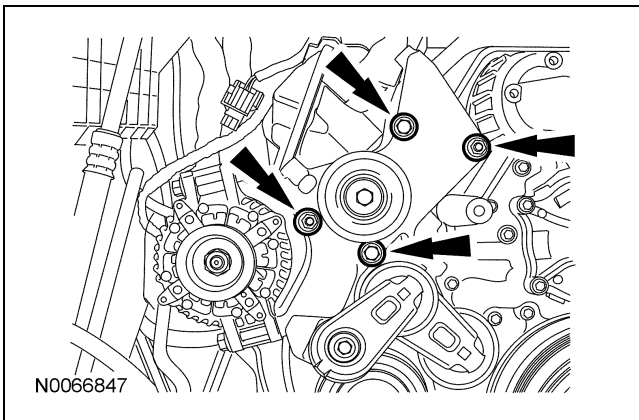


REMOVAL AND INSTALLATION (Continued)

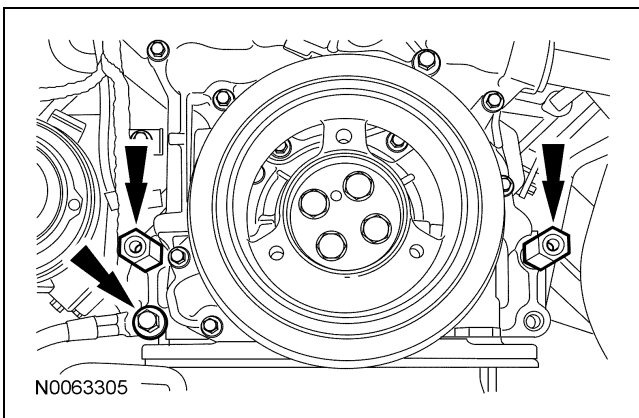
28. Remove the bolt and the accessory drive belt idler pulley.



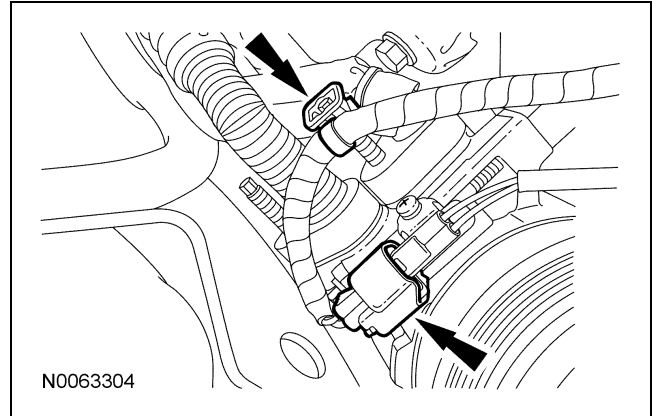
29. Remove the nuts, bolts and the front end accessory drive (FEAD) assembly.



30. Remove the bolt for the RH ground cable. Remove the stator stand offs.

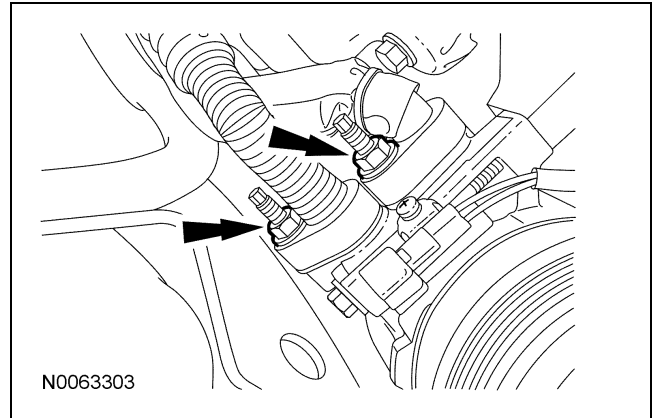
**Vehicles with A/C**

31. Disconnect the A/C clutch electrical connector and wire retainer.

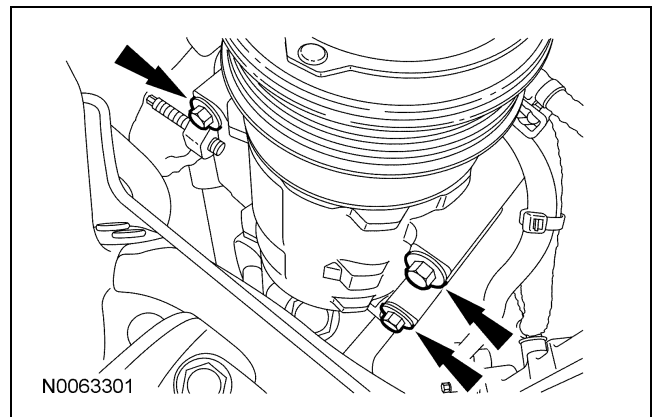


32. Remove the retaining nuts and the A/C hoses.

- Remove and discard the O-ring seals and gaskets.
- Plug or cap the opening as needed.

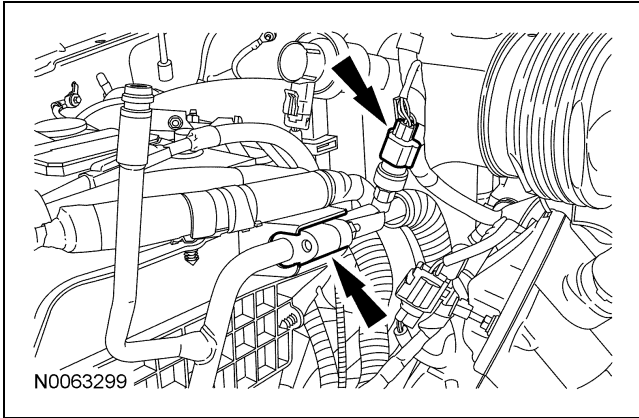


33. Remove the bolts and the A/C compressor.

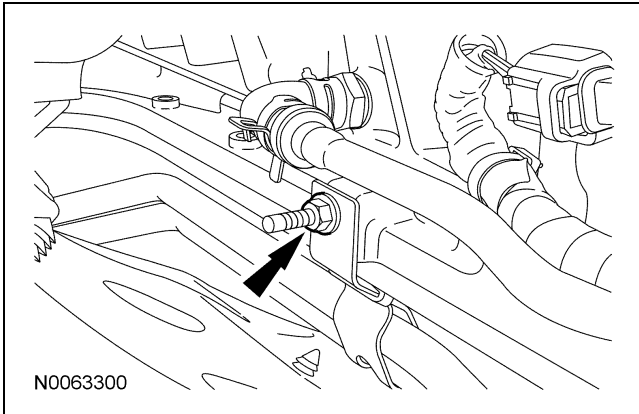


REMOVAL AND INSTALLATION (Continued)

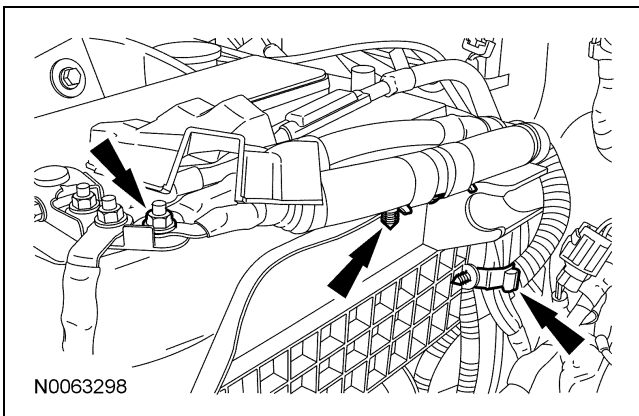
34. Disconnect the A/C pressure switch electrical connector. Disconnect the A/C line from the clip and remove.

**All vehicles**

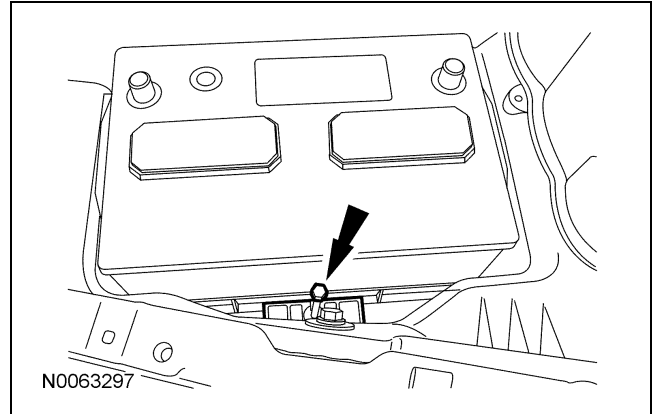
35. Remove the retaining nut and disconnect the transmission cooler tubes from the engine.



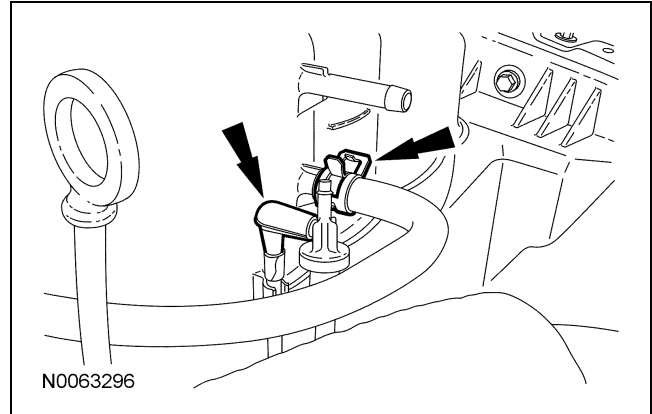
36. **NOTE:** Cover positioned aside for clarity. Remove the retaining nut and disconnect the pushpin retainer for the power supply cable. Position the cable on the engine.



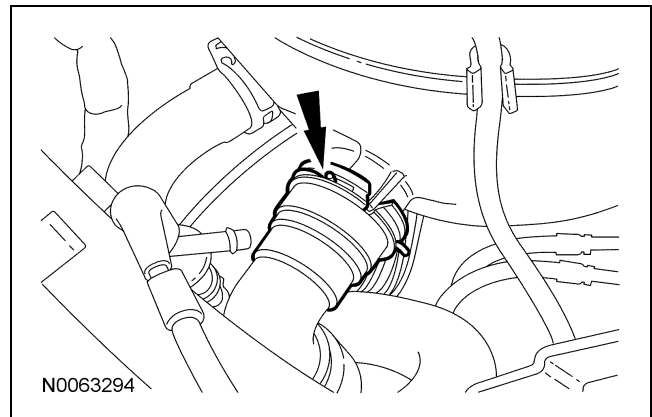
37. Remove the hold-down bolt and the LH battery.



38. Disconnect the EGR cooler-to-degas bottle hose. If equipped, disconnect the vacuum hose.

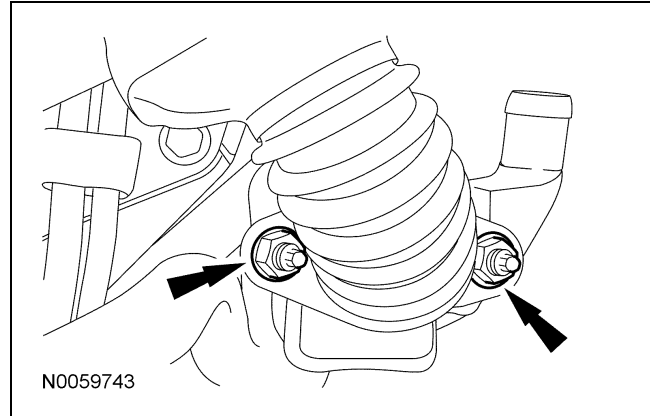
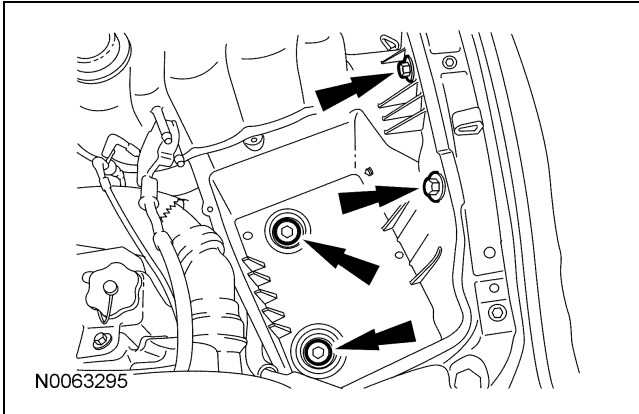


39. Disconnect the engine fill hose from the degas bottle.



REMOVAL AND INSTALLATION (Continued)

40. Remove the bolts and the degas bottle module.



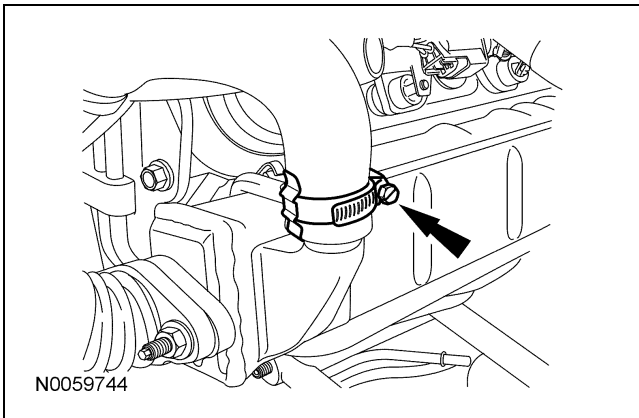
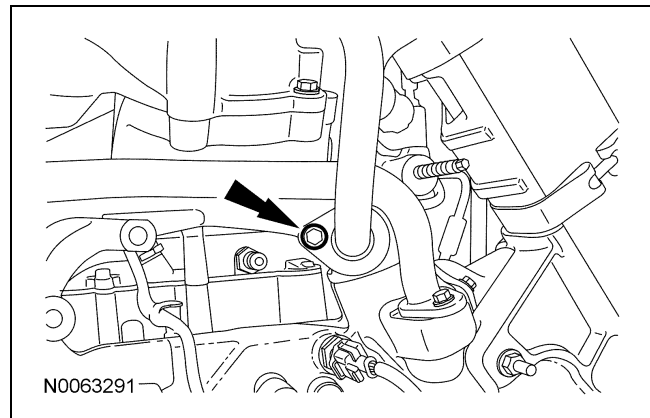
43. Remove the bolt and the EGR cooler coolant tube.

- Remove and discard the O-ring seal.

41. **⚠ CAUTION:** The coolant hose clamps used on this engine are constant tension worm gear clamps. Standard worm gear clamps cannot be used. Failure to use correct coolant hose clamps can result in hose joint failure.

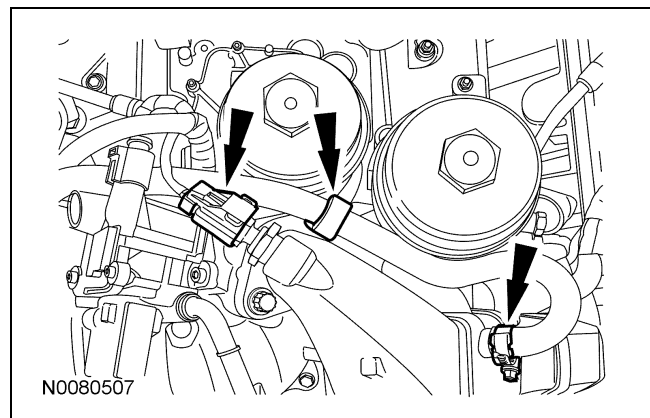
Loosen the clamp and disconnect the EGR cooler hose.

- Discard the EGR cooler hose clamp.



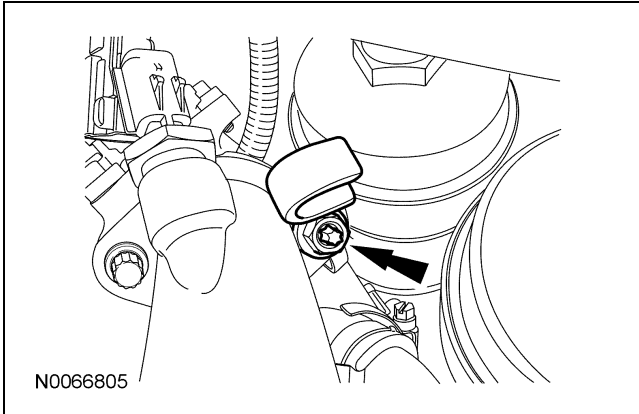
42. Remove the retaining nuts for the vertical EGR cooler.

44. Disconnect the EGR temperature (EGRT) sensor electrical connector. Disconnect the hose and retaining clip at the EGR cooler and EGR valve and position the hose aside.

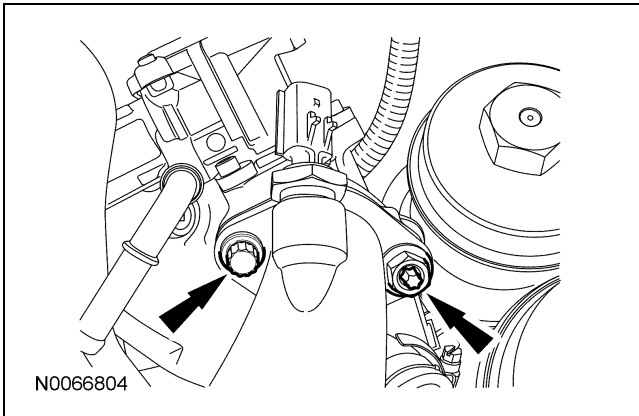


REMOVAL AND INSTALLATION (Continued)

45. Remove the retaining nut and retaining clip.

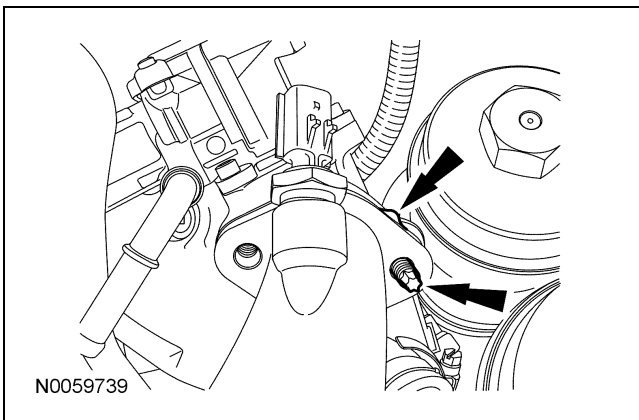


46. Remove the nut and bolt for the vertical EGR cooler.



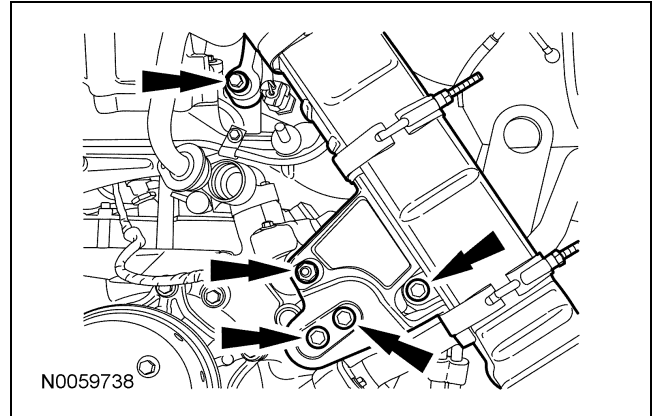
47. Remove the vertical EGR cooler stud.

- Remove and discard the gasket.

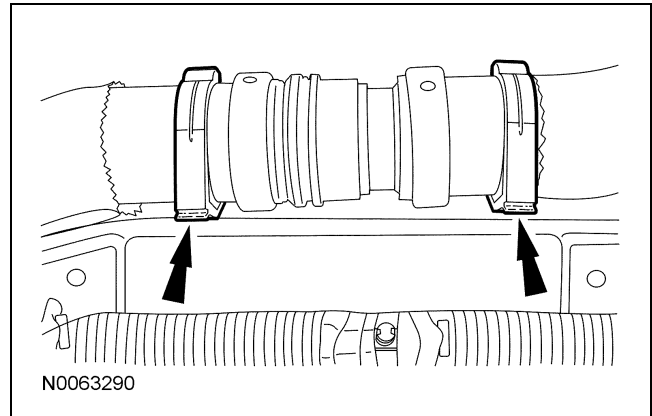


48. Remove the bolts and the vertical EGR cooler assembly.

- Remove and discard the gasket.

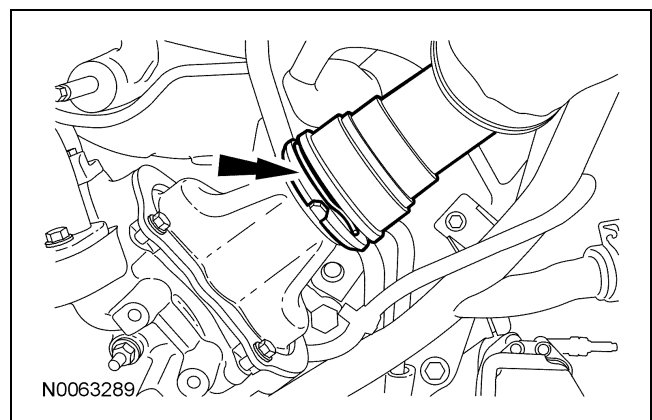


49. Disconnect the retainers for the lower radiator hose.



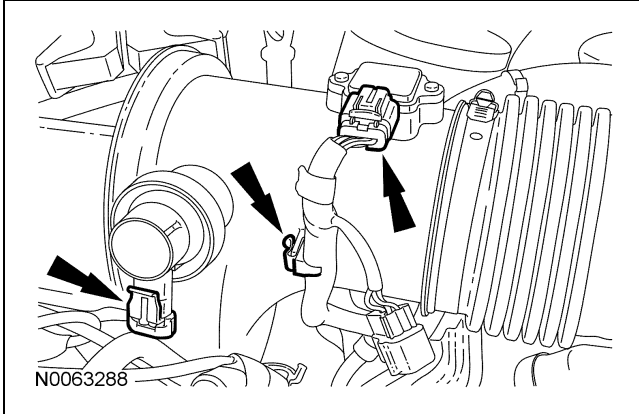
50. **NOTE:** Upper radiator hose shown, lower radiator hose similar.

Remove the clips. Remove the upper and lower radiator hoses.

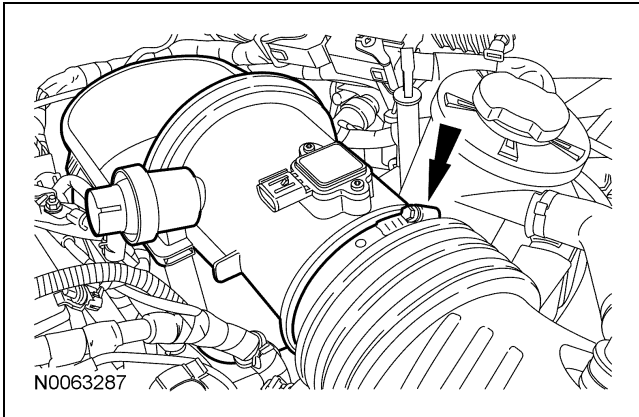


REMOVAL AND INSTALLATION (Continued)

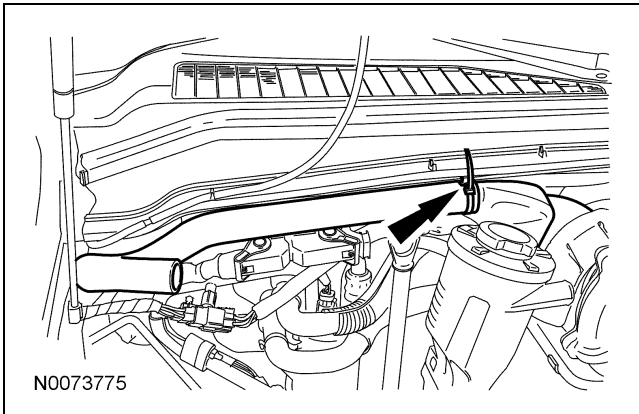
51. Disconnect the filter minder and the mass air flow (MAF) sensor electrical connectors. Disconnect the wire retainer and position aside the wire.



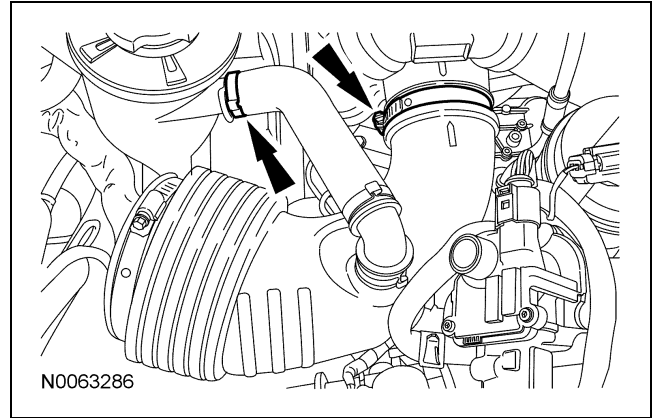
52. **NOTE:** The air cleaner is most easily removed by lifting under the air cleaner outlet pipe end to tilt it upward and separate it from the air cleaner outlet pipe, then pulling the air cleaner up and away from the air cleaner intake pipe. Loosen the clamp and remove the air cleaner assembly.



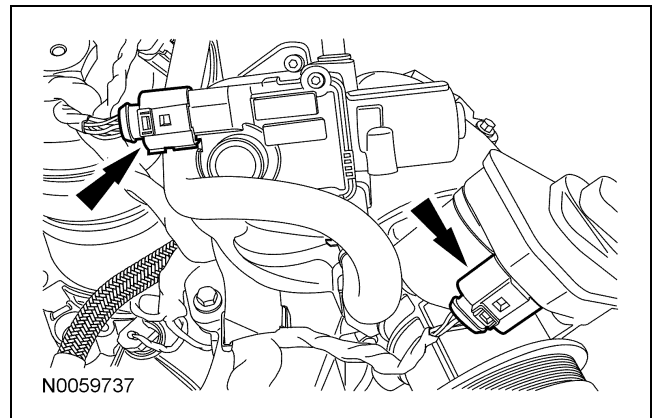
53. Remove the auxiliary air intake from the cowl.



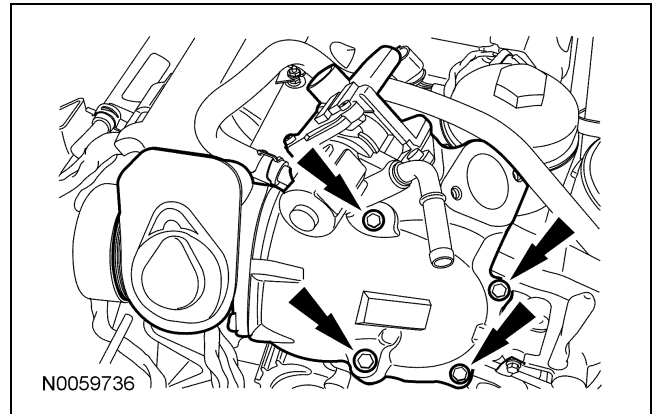
54. Remove the clamp at the crankcase vent oil separator. Loosen the clamp and remove the air cleaner outlet pipe.



55. Disconnect the EGR valve and throttle body (TB) electrical connectors.

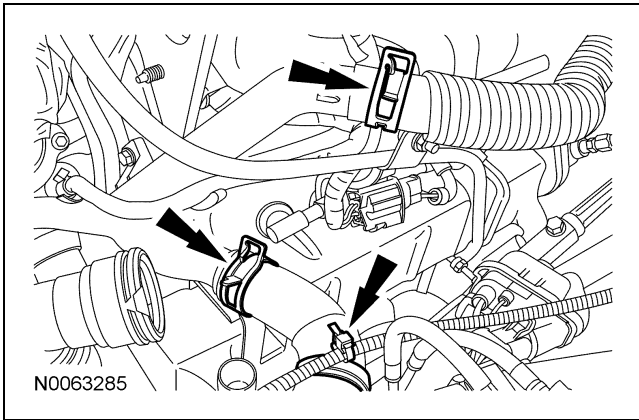


56. Remove the bolts and the intake throttle adapter.
- Remove and discard the press-in-place gasket.



REMOVAL AND INSTALLATION (Continued)

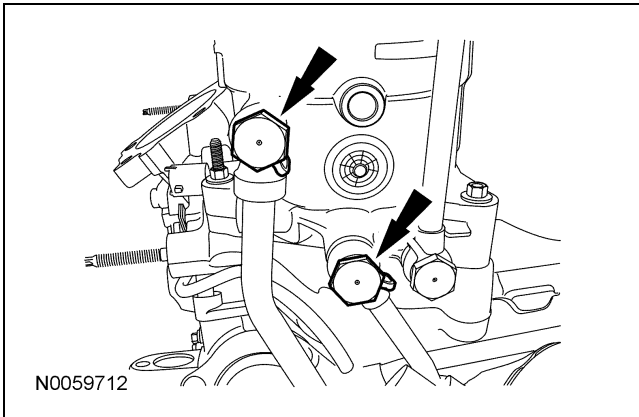
57. Disconnect the vacuum tube from the engine fill hose and remove the engine fill hose. Disconnect the heater hose and position aside.



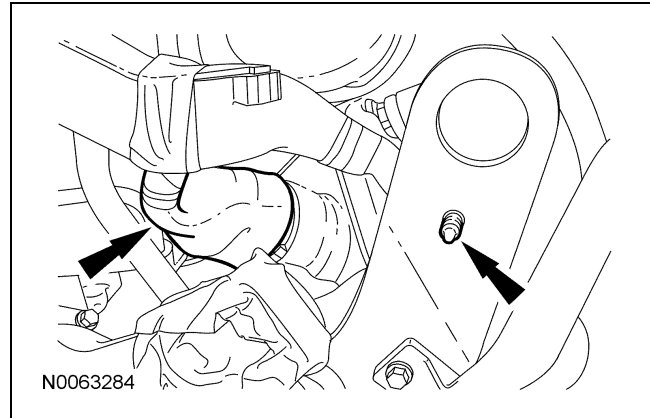
58. **⚠ CAUTION: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. To prevent fuel system damage it is essential that absolute cleanliness is observed when working with these components. Always install Fuel System Caps to any open orifices or tubes.**

Remove the banjo fittings and copper sealing washers at the fuel filter module.

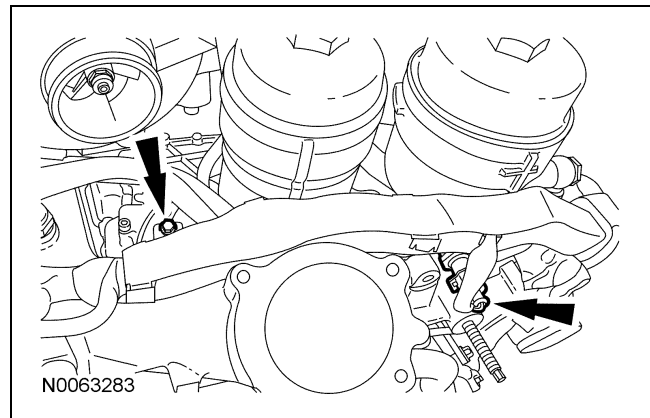
- Discard the copper sealing washers.




59. Disconnect the pushpin retainer and the LH fuel charging harness electrical connector.



60. Disconnect the fuel temperature sensor electrical connector. Remove the bolt and disconnect the engine wiring harness.

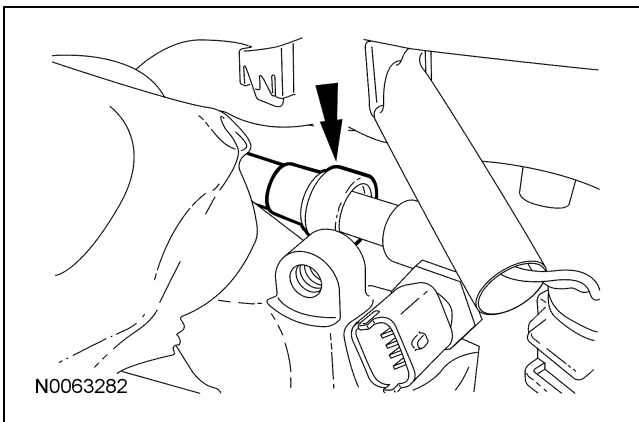



REMOVAL AND INSTALLATION (Continued)

61.  **CAUTION:** Fuel injection equipment is manufactured to very precise tolerances and fine clearances. To prevent fuel system damage it is essential that absolute cleanliness is observed when working with these components. Always install Fuel System Caps to any open orifices or tubes.

NOTE: The hose will not be completely disconnected until the fuel filter module is removed.

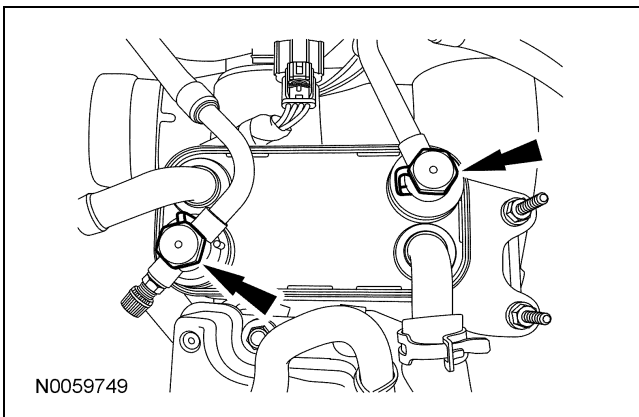
Using a commercially available tool, release the fuel supply hose connector.



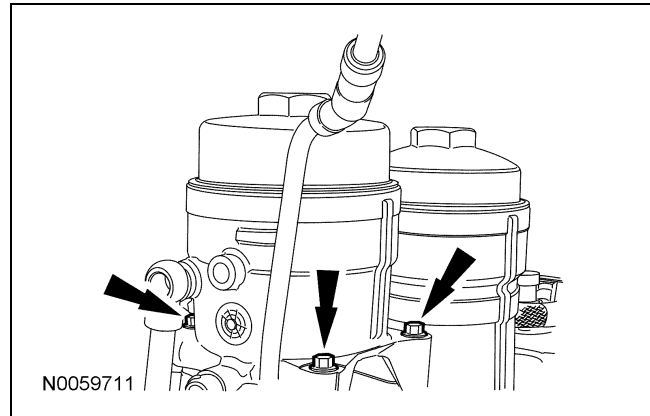
62.  **CAUTION:** Fuel injection equipment is manufactured to very precise tolerances and fine clearances. To prevent fuel system damage it is essential that absolute cleanliness is observed when working with these components. Always install Fuel System Caps to any open orifices or tubes.


Remove the banjo fittings and sealing washers on the fuel cooler.

- Discard the sealing washers.



63. Remove the bolts and the fuel filter module.

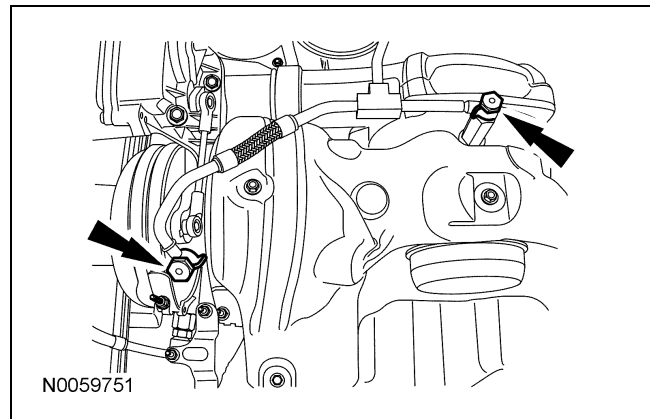


64.  **CAUTION:** Do not lean on, pull on or use the turbocharger oil supply tube as a handle or damage to the turbocharger oil supply tube may occur.

NOTE: Use a back-up wrench to prevent the fittings from turning.

Remove the turbocharger oil supply tube banjo fitting bolts and copper sealing washers.

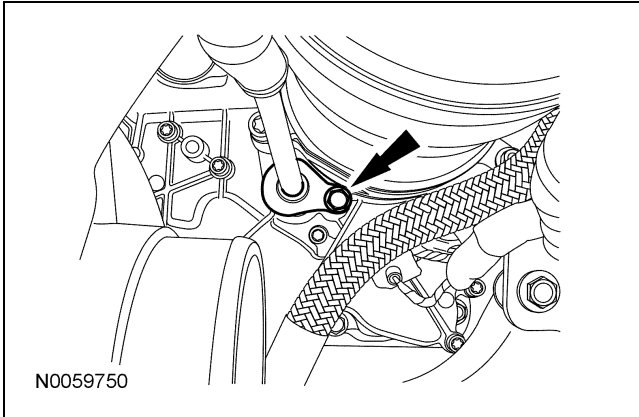
- Discard the copper sealing washers.



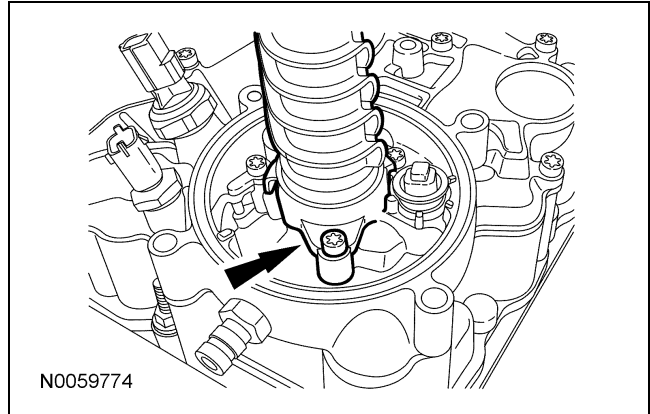
REMOVAL AND INSTALLATION (Continued)

65. Remove the bolt and the turbocharger oil supply tube.

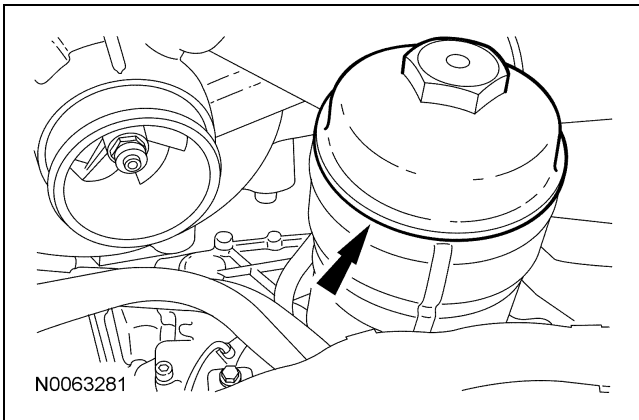
- Remove and discard the O-ring seal.



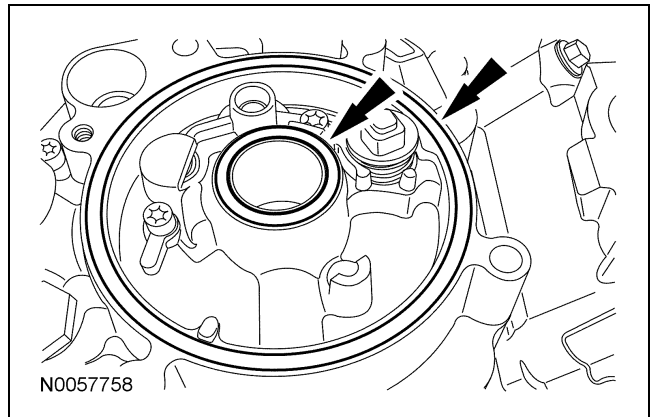
68. Remove the screw and the oil filter return tube.



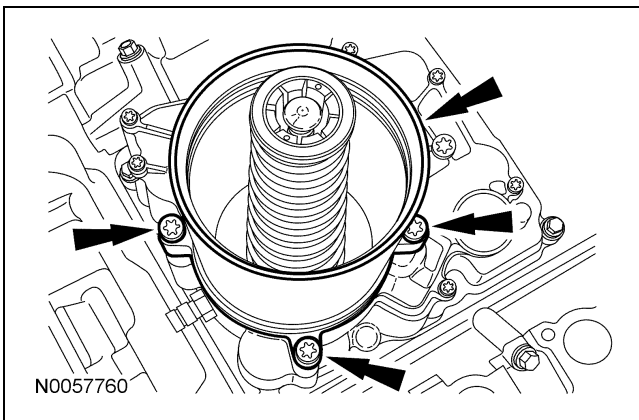
66. Remove the oil filter cap and oil filter element.



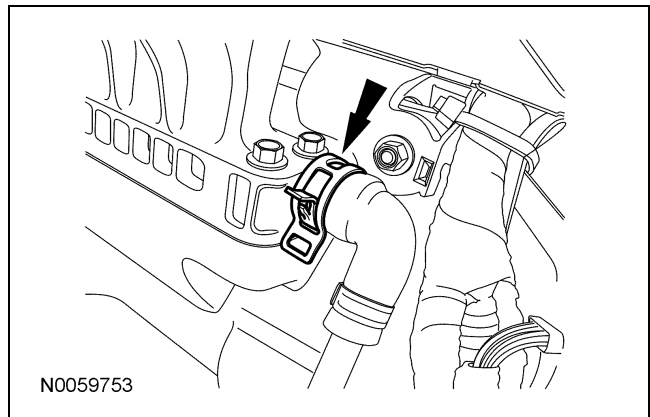
69. Remove and discard the O-ring seal and gasket.



67. Remove the 4 bolts and the oil filter housing.



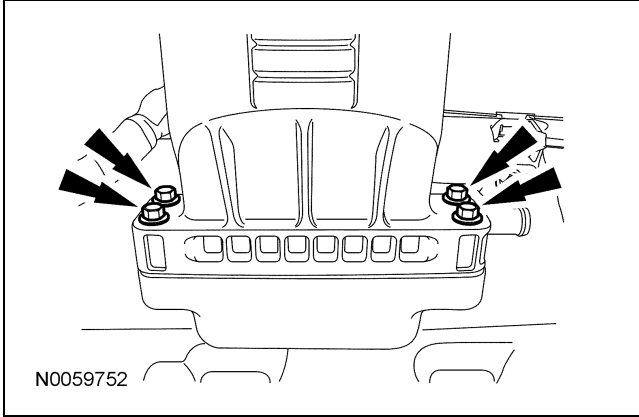
70. Disconnect the crankcase vent oil separator drain tube.



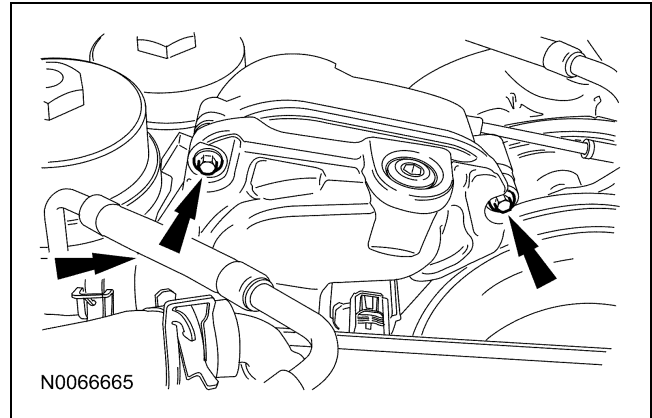
REMOVAL AND INSTALLATION (Continued)

71. Remove the bolts and the crankcase vent oil separator.

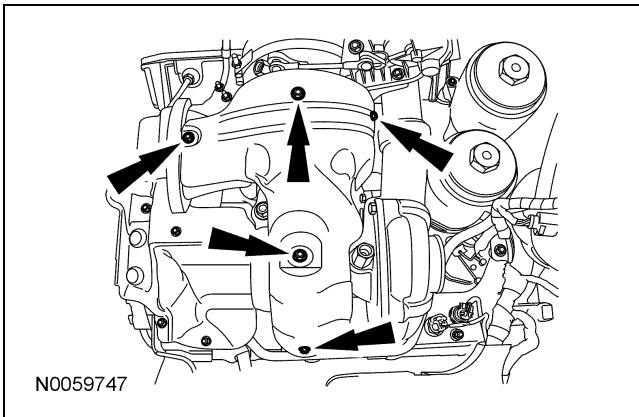
- Remove and discard the press-in-place gasket.



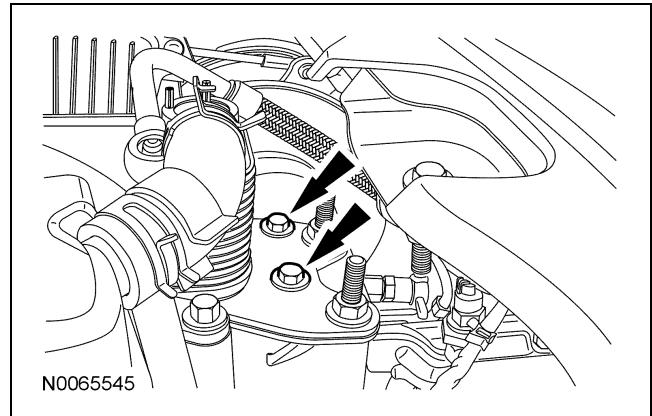
74. Remove the 3 bolts for the turbocharger actuator cooler.



72. Remove the 5 bolts and the turbocharger heat shield.

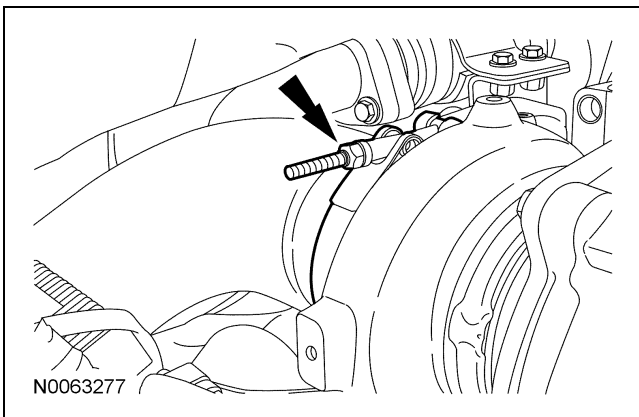


75. Remove the bolts for the fuel cooler.

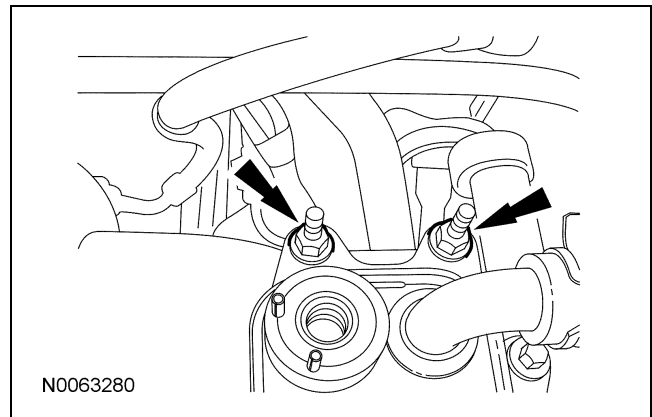


73. Remove the clamp for the turbocharger exhaust downpipe.

- Disconnect the exhaust downpipe from the turbocharger.
- Discard the clamp and gasket.

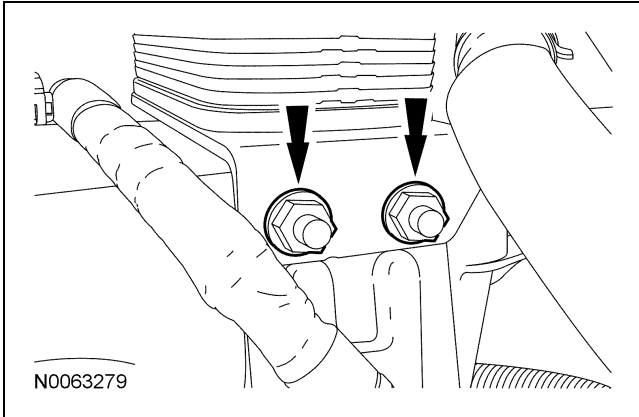


76. Remove the stud bolts for the fuel cooler.

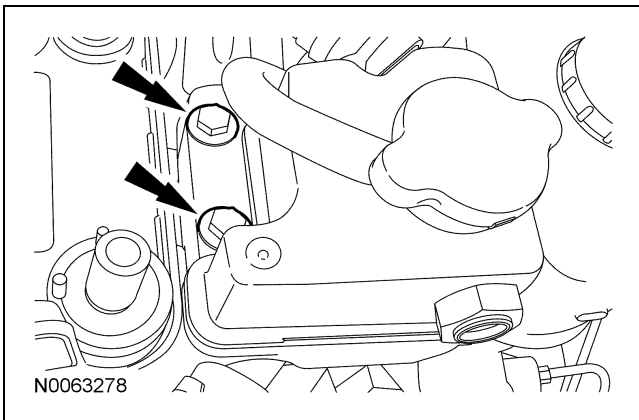


REMOVAL AND INSTALLATION (Continued)

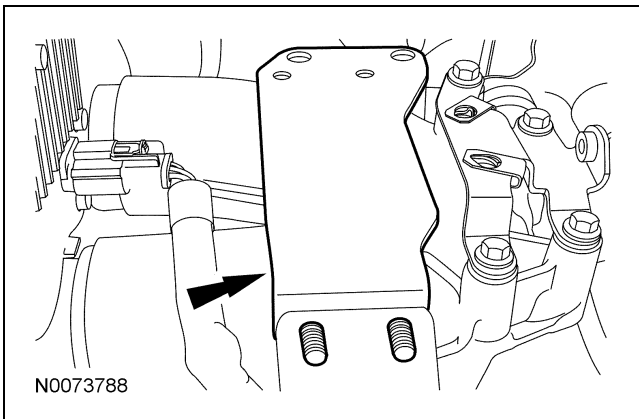
77. Remove the retaining nuts for the fuel cooler.



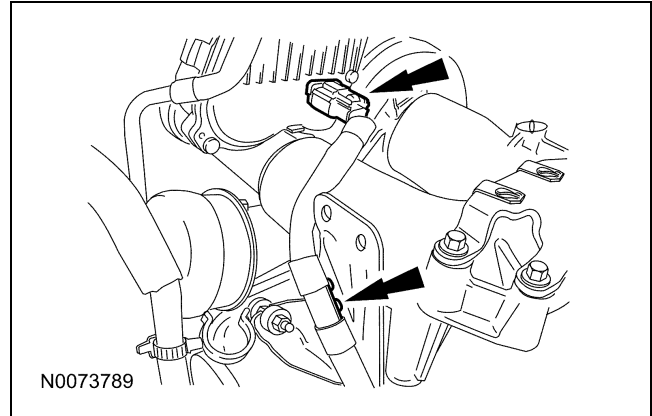
78. Remove the 3 bolts for the coolant expansion tank. Position aside the turbocharger actuator cooler, fuel cooler and coolant expansion tank.



79. Remove the fuel cooler bracket.

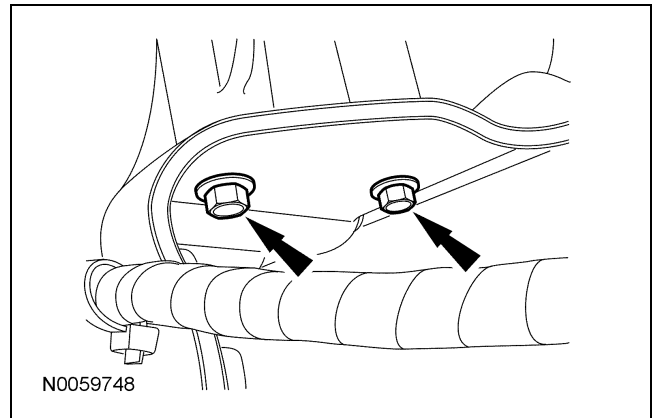


80. Disconnect the turbocharger actuator electrical connector and pushpin retainer.

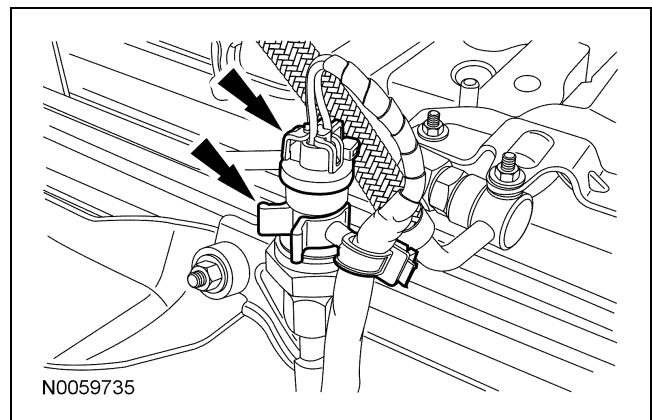


81. **NOTE:** Rear bolts shown, front bolts similar.

Remove the 4 bolts for the turbocharger crossover tube. Remove the front fuel cooler bracket.

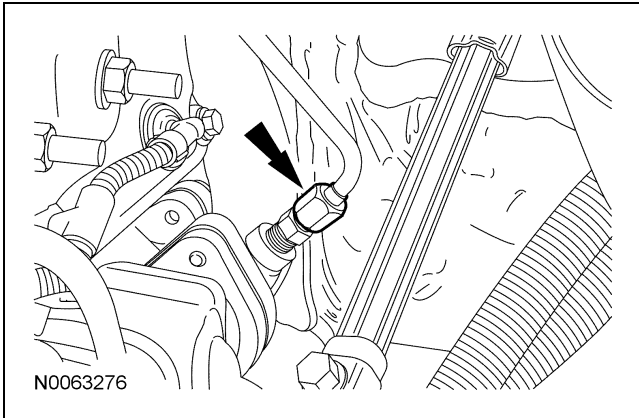


82. Disconnect the exhaust pressure (EP) sensor electrical connector and retaining clip.

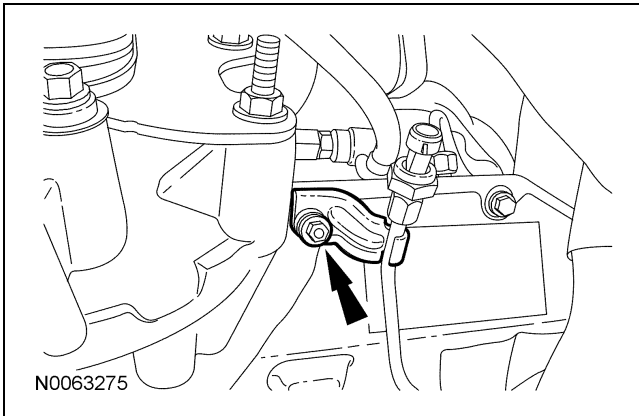


REMOVAL AND INSTALLATION (Continued)

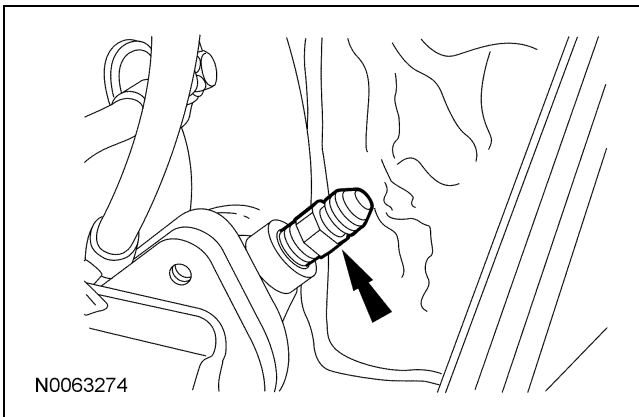
83. Disconnect the EP sensor tube from the EGR-OC pipe.



84. Remove the nut and the EP tube assembly.

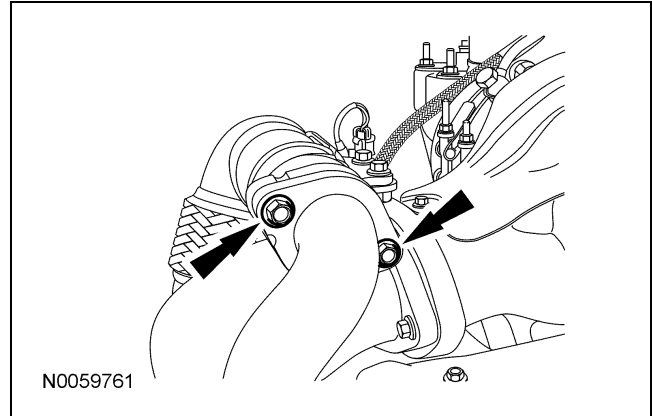


85. Remove the fitting for the EP tube assembly.



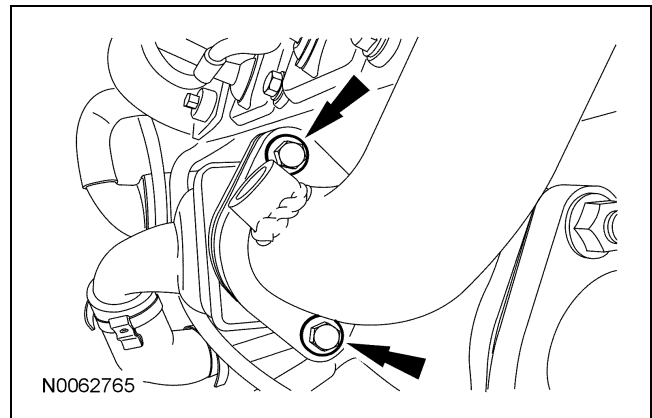
86. Remove and discard the upper bolts for the EGR-OC pipe.

- Remove and discard the gasket.



87. Remove and discard the lower bolts for the EGR-OC pipe.

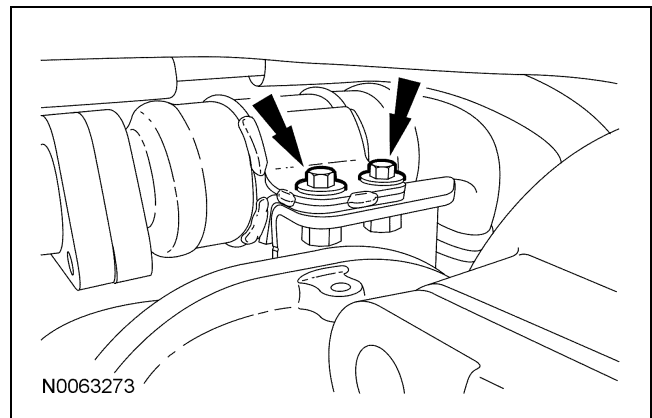
- Remove and discard the gasket.



88. **NOTE:** Mark the bolts so that they are installed back in their original positions.

Remove the mounting bolts for the EGR-OC pipe.

- Position the EGR-OC pipe as needed to access the bolts for the turbocharger inlet pipes.

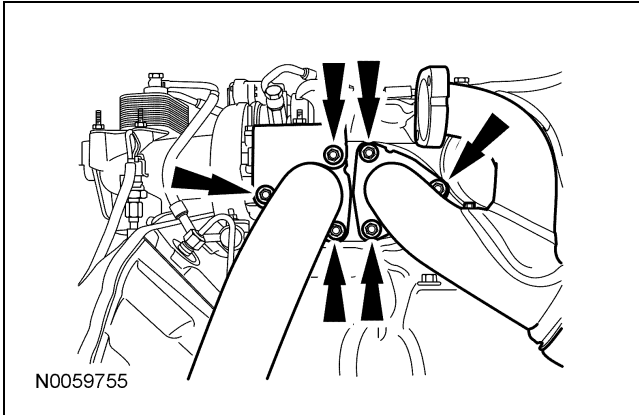


REMOVAL AND INSTALLATION (Continued)

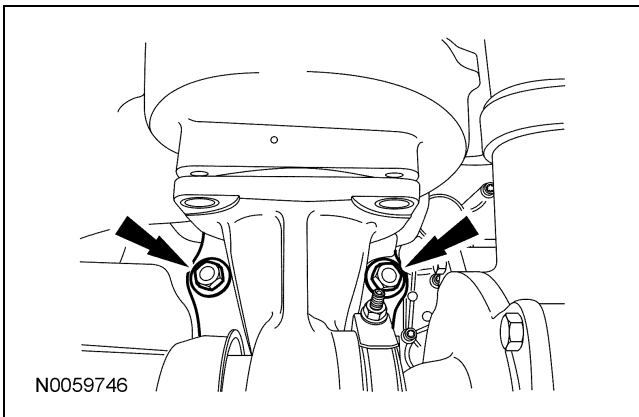
89. **NOTE:** It will be necessary to position the EGR-OC pipe to access the bolts as needed.

Remove the bolts and bracket for the turbocharger inlet pipes.

- Discard the bolts and gaskets.

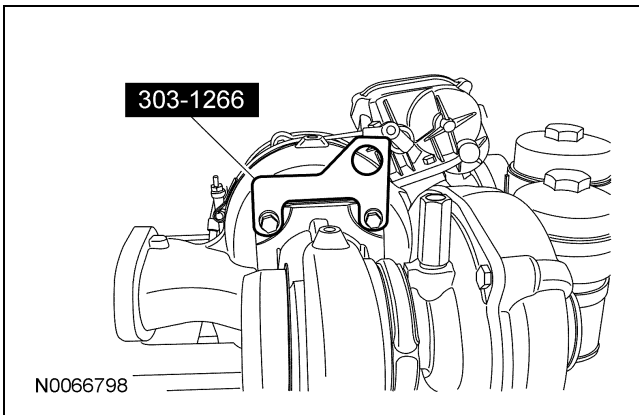


90. Remove the bolts and hold downs for the turbocharger.



91. Install the special tool.

- Tighten to 20 Nm (117 lb-in).



92. **CAUTION:** Failure to use the turbocharger lifting bracket during removal, handling or installation of the turbocharger could result in damage to the low pressure-to-high pressure turbocharger seal.

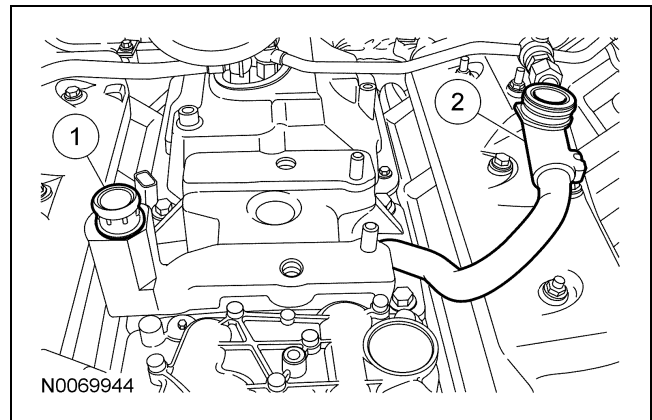
CAUTION: Make sure the turbocharger assembly is kept level with the engine during removal or installation. Failure to follow this instruction may result in damage to the high-pressure oil drain tube.

NOTE: Use care when removing the turbocharger. The crossover tube should not be removed, it has one-time-use seals.

Using the special tool, remove the turbocharger assembly.

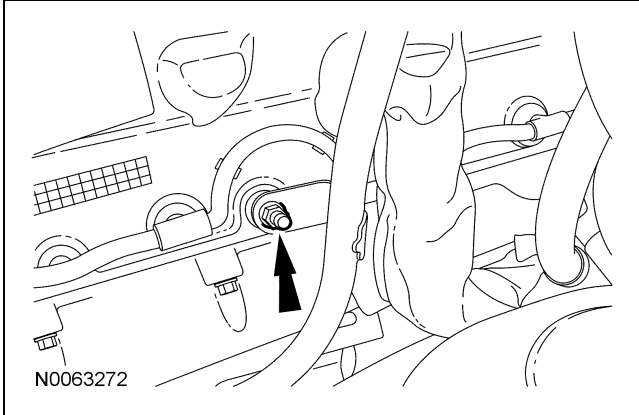
93. Remove the turbocharger drain tubes.

- 1 Remove and discard the low-pressure drain tube.
 - 2 Remove the high-pressure drain tube.
- Remove and discard the O-ring seals.

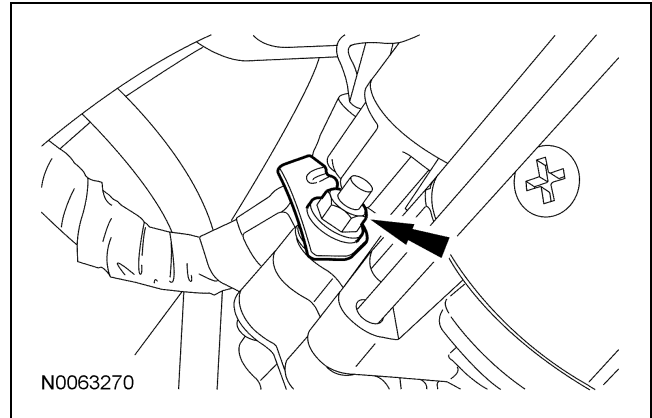


REMOVAL AND INSTALLATION (Continued)**Vehicles with automatic transmission**

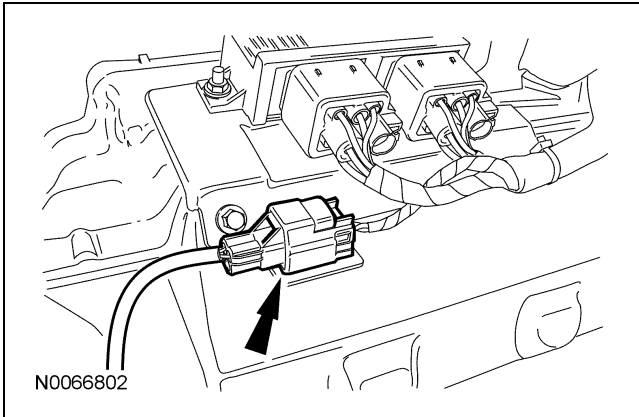
94. Remove the retaining nut and the transmission indicator and tube.



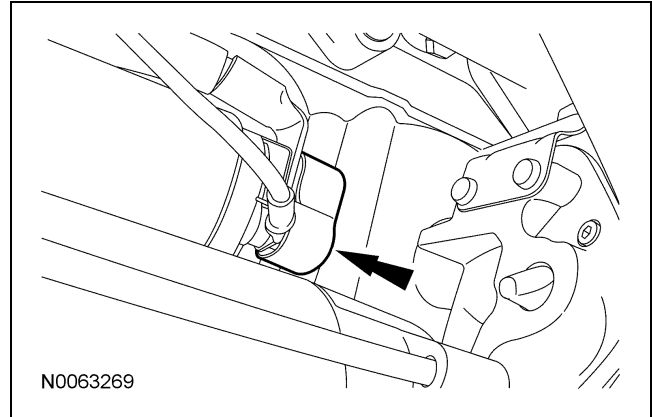
98. Remove the nut and position the battery cable bracket aside.

**All vehicles**

95. Disconnect the EGRT sensor electrical connector.

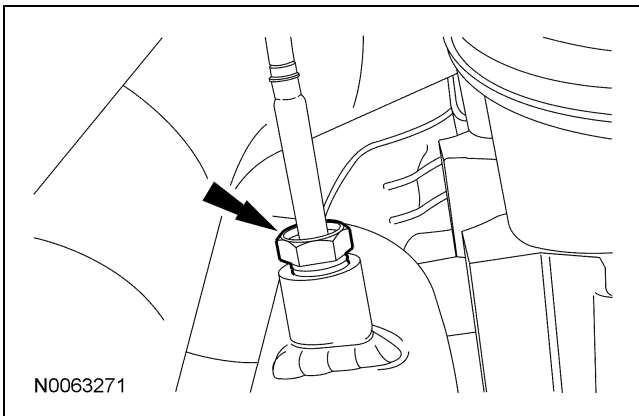


99. Remove the cover for the starter terminals.

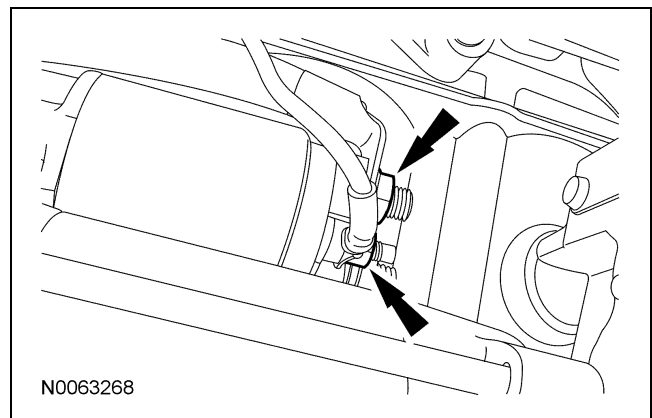


96. Remove the RH splash shield. For additional information, refer to Section 501-02.

97. Remove the EGRT sensor.

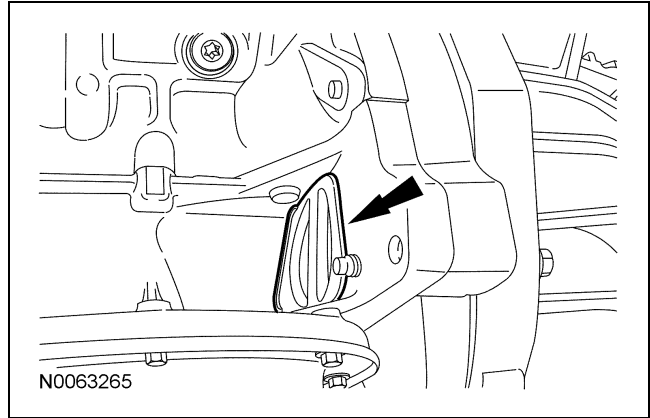
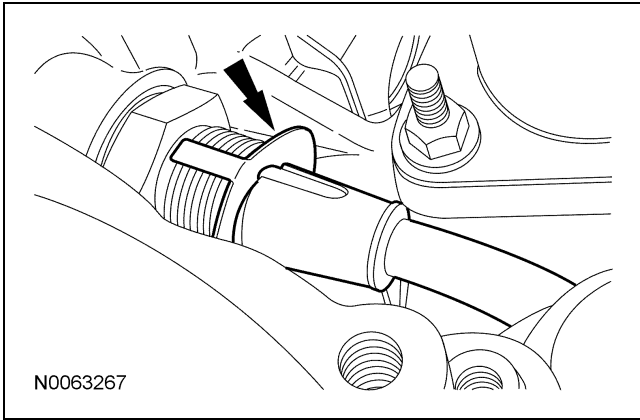


100. Remove the retaining nuts for the starter solenoid wiring. Position the starter wiring aside.



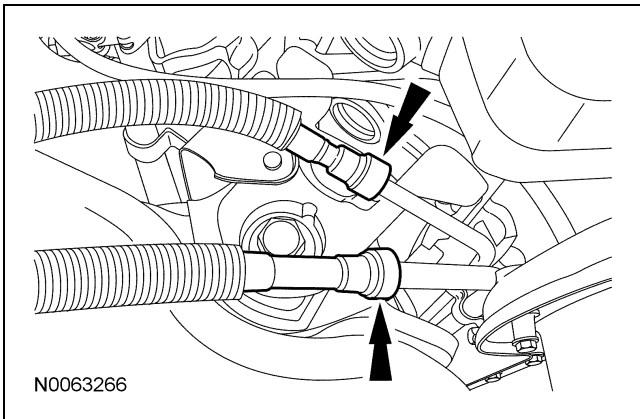
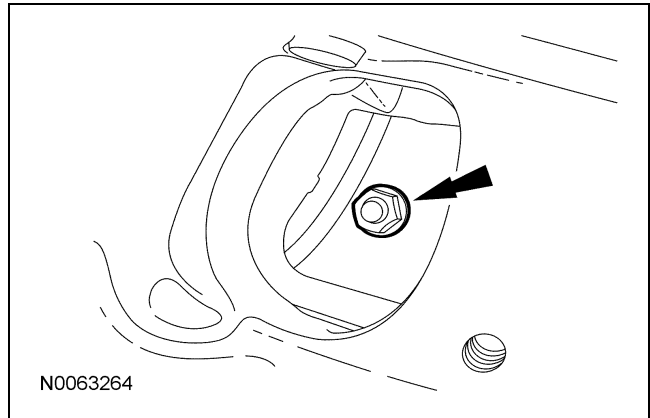
REMOVAL AND INSTALLATION (Continued)

101. If equipped, disconnect the block heater electrical connector.



104. Remove and discard the 8 torque converter nuts.

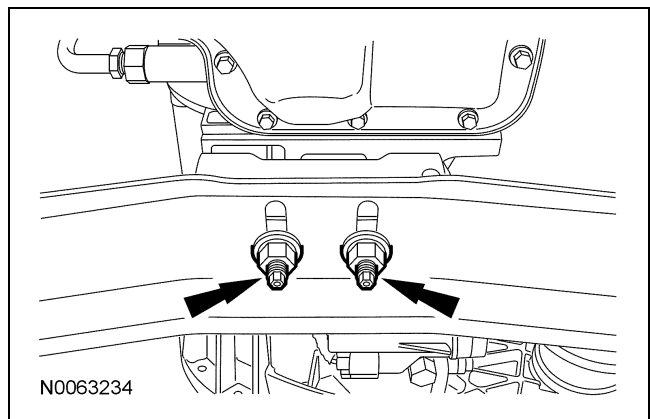
102. **⚠ CAUTION: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. To prevent fuel system damage it is essential that absolute cleanliness is observed when working with these components. Always install Fuel System Caps to any open orifices or tubes. Disconnect the fuel hoses.**



105. Loosen the retaining nuts for the transmission mount.

Vehicles with automatic transmission

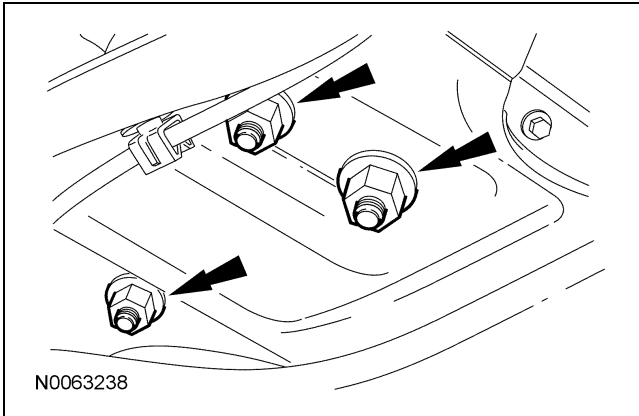
103. Remove the flexplate access cover.



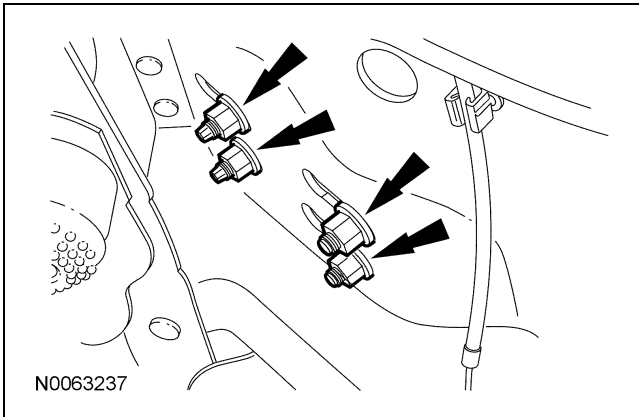
REMOVAL AND INSTALLATION (Continued)**All vehicles**

106. **NOTE:** Do not remove the LH engine mount retaining nuts, they are used to keep the engine stable for the remainder of the procedure.

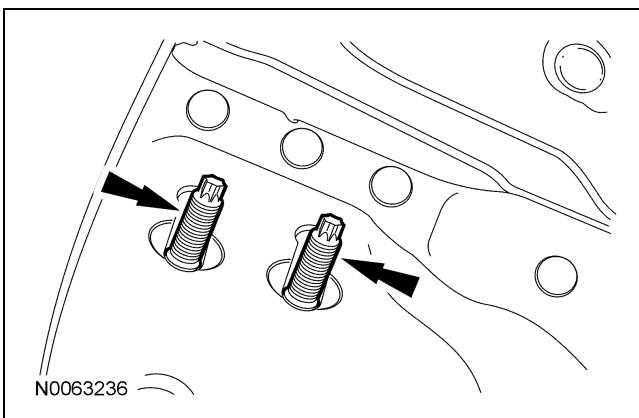
Loosen the retaining nuts for the LH engine mount.



107. Remove and discard the retaining nuts for the RH engine mount.



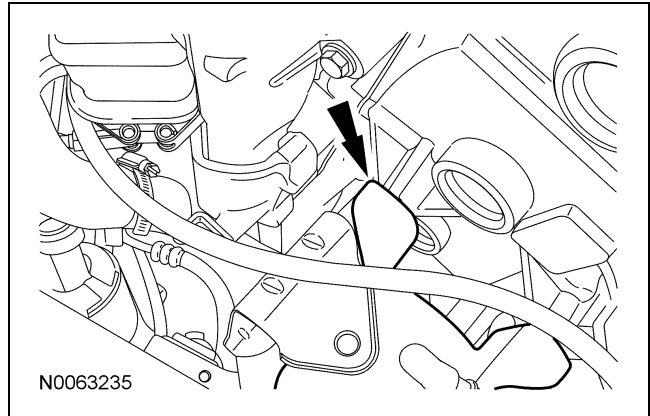
108. Remove the studs for the RH engine mount.



109. **⚠ CAUTION:** The engine mount bracket bolts must be discarded and new bolts installed, or damage to the vehicle may occur. The bolts are a torque-to-yield design and cannot be reused.

NOTE: The bolt is hidden at the approximate location shown.

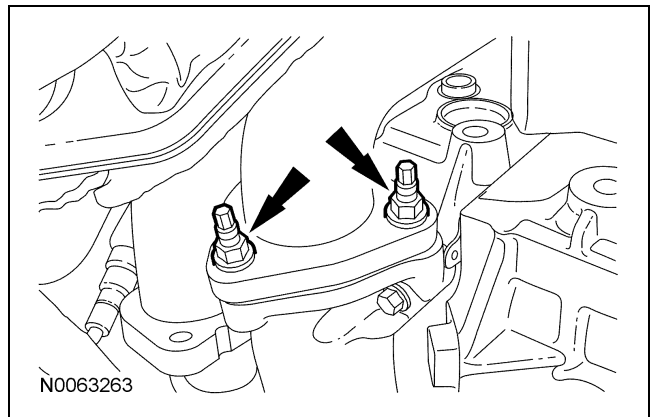
Remove the LH upper engine bracket bolt.



110. **NOTE:** LH side shown, RH side similar.

Remove the 6 lower turbocharger inlet pipe nuts.

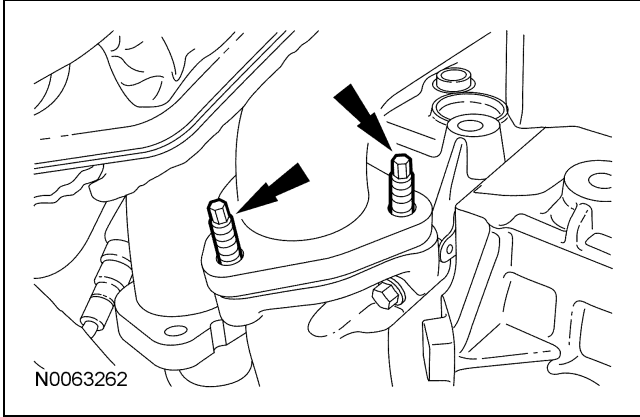
- Discard the nuts.



REMOVAL AND INSTALLATION (Continued)

111. Remove the 3 studs for the LH turbocharger inlet pipe.

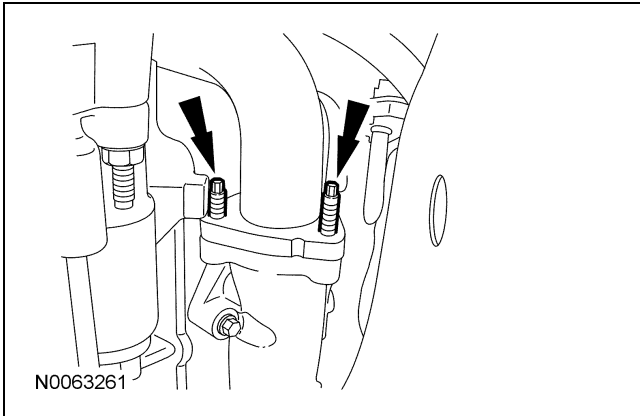
- Remove the LH turbocharger inlet pipe.
- Discard the gasket and studs.



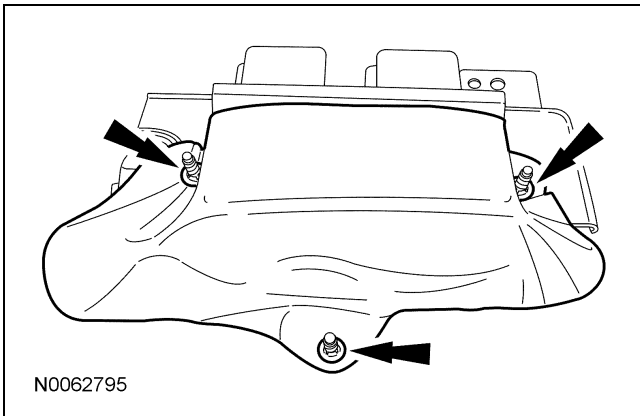
112. **NOTE:** The RH turbocharger up pipe is removed from the top of the engine.

Remove the 3 studs for the RH turbocharger inlet pipe.

- Discard the gasket and studs.

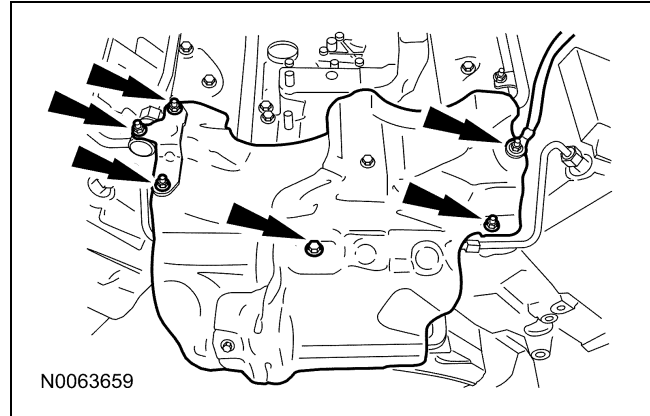


113. Remove the pushnuts and the glow plug module heat shield.

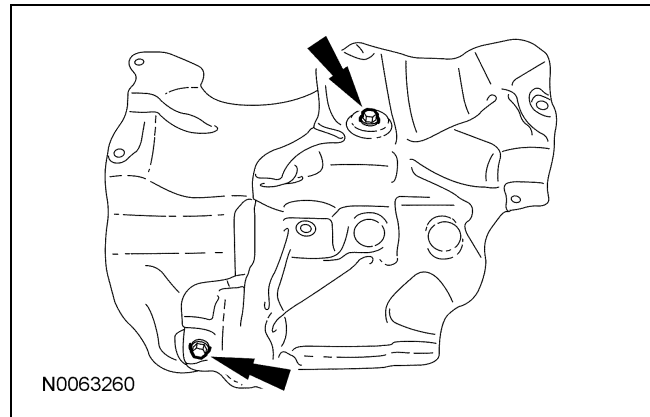


114. **NOTE:** Engine removed from the vehicle for clarity.

Remove the bolt and retaining nuts for the fuel pump heat shield. Remove the fuel tube bracket and ground strap from the fuel pump heat shield.



115. Remove the remaining 2 bolts and the fuel pump heat shield.

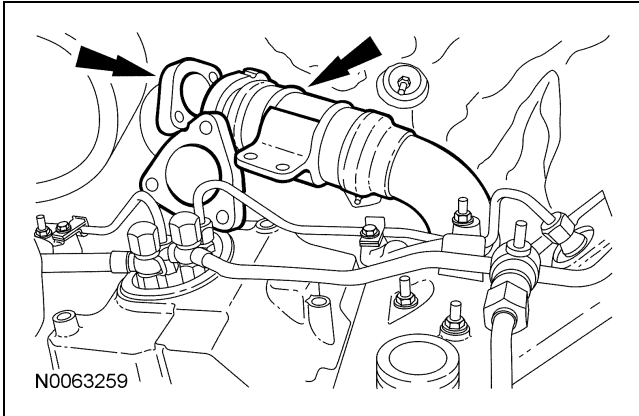


116. Position back and secure the turbocharger exhaust downpipe.

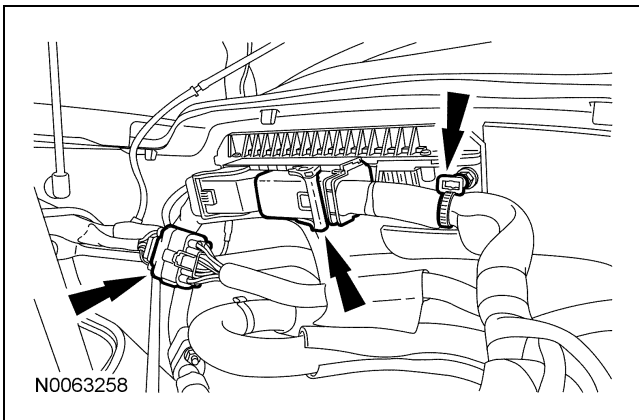
REMOVAL AND INSTALLATION (Continued)

117. Remove the EGR-OC pipe and the RH turbocharger inlet pipe.

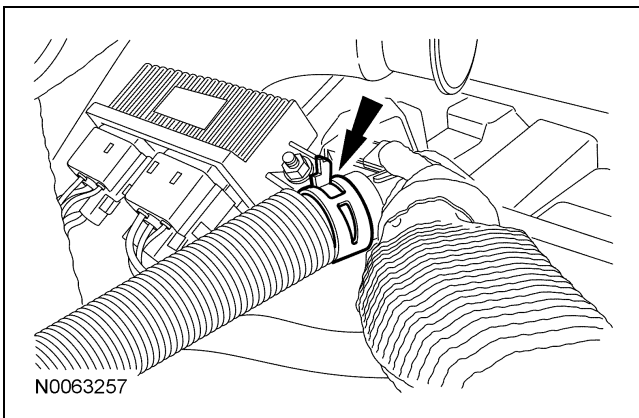
- In order to remove the RH turbocharger inlet pipe, roll it to the left side of the vehicle and then remove the turbocharger inlet pipe.



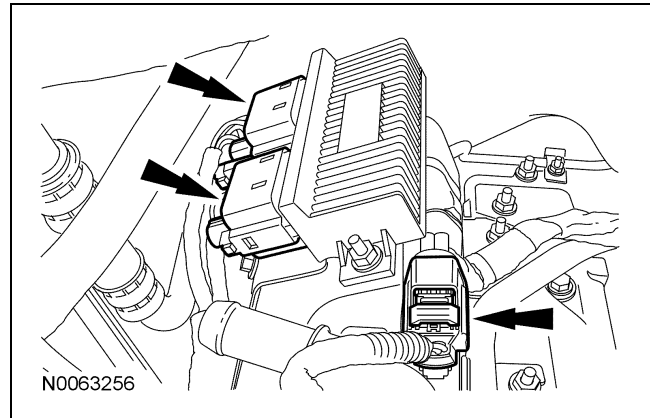
118. Disconnect the PCM and wiring retainer. Disconnect the engine harness electrical connector.



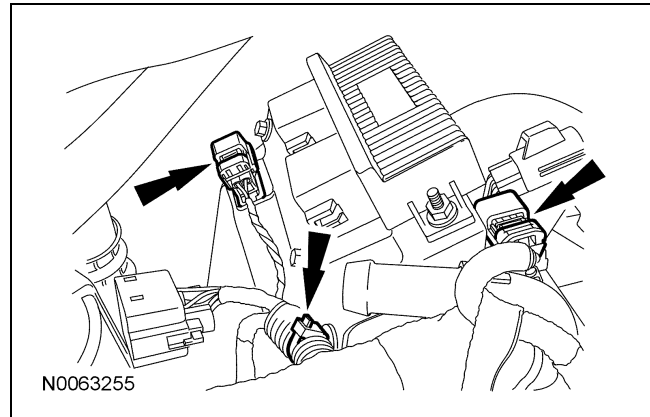
119. Disconnect the heater hose and position aside.



120. Disconnect the glow plug module electrical connectors and high-pressure fuel pump electrical connector.

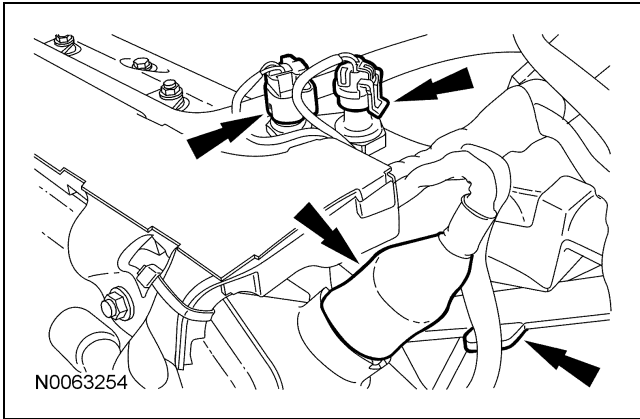


121. Disconnect the retainers for the EGRT sensor electrical connector and high-pressure fuel pump electrical connector from the glow plug module mounting bracket. Disconnect the pushpin retainer.

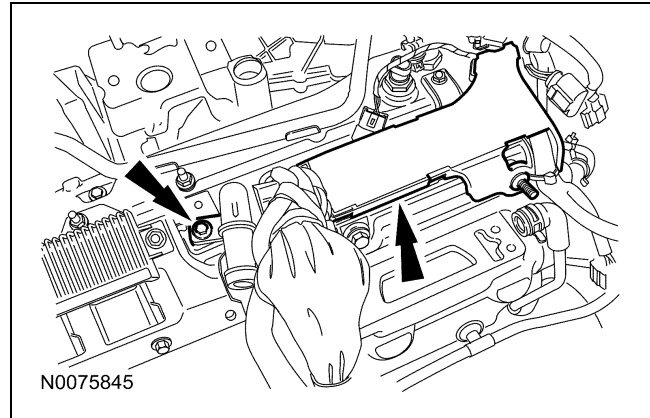


REMOVAL AND INSTALLATION (Continued)

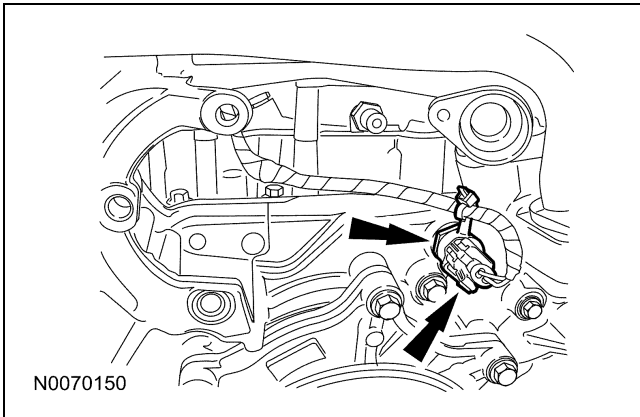
122. Disconnect the intake air temperature 2 (IAT2) and the manifold absolute pressure (MAP) sensor electrical connectors. Disconnect the RH fuel charging wiring harness electrical connector and wire retainer.



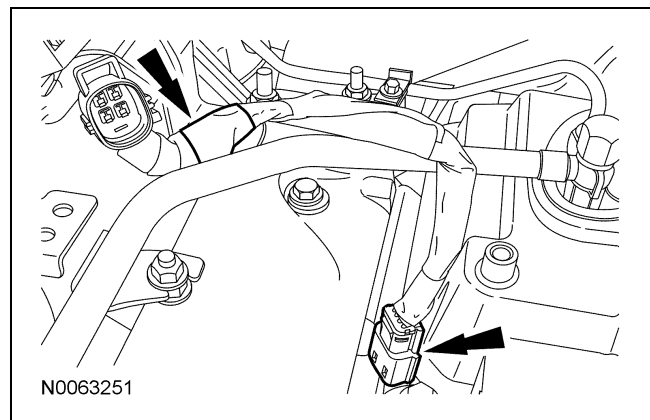
125. Remove the bolt and position the engine wiring harness aside.



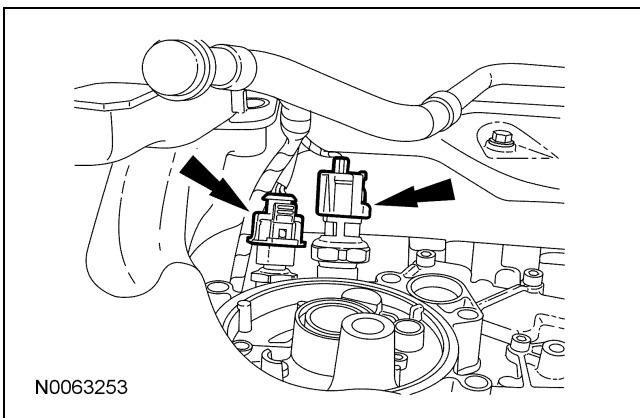
123. Disconnect the engine coolant temperature (ECT) sensor electrical connector and wiring retainer.



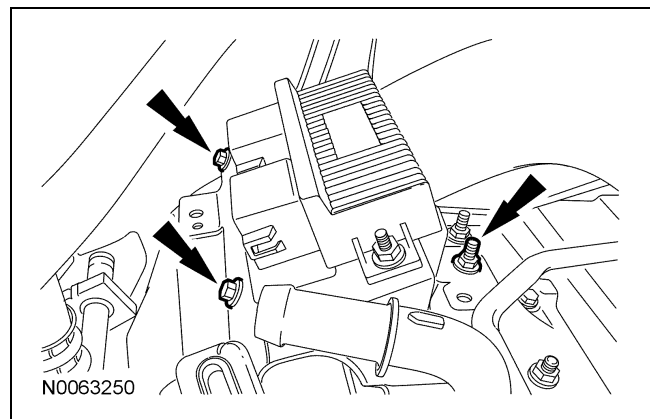
126. Disconnect the high-pressure fuel injection pump electrical connector and the push pin retainer, and remove the harness.




124. Disconnect the engine oil temperature (EOT) sensor and the engine oil pressure (EOP) switch electrical connectors.



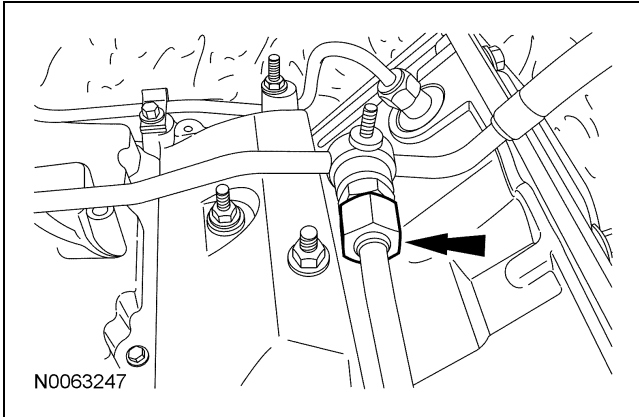
127. Remove the bolts, stud bolt and the glow plug module bracket.



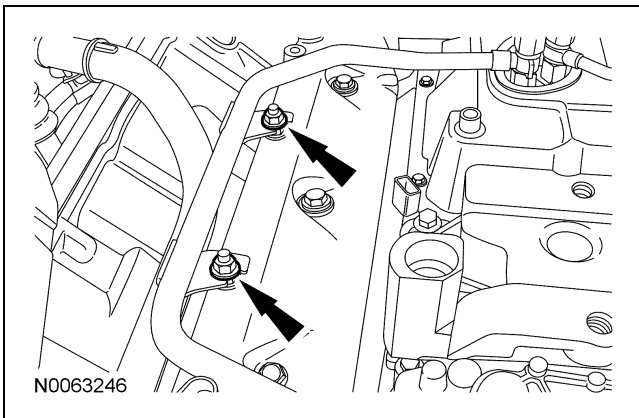
REMOVAL AND INSTALLATION (Continued)


128.  **CAUTION:** Fuel injection equipment is manufactured to very precise tolerances and fine clearances. To prevent fuel system damage it is essential that absolute cleanliness is observed when working with these components. Always install Fuel System Caps to any open orifices or tubes.

Disconnect the fuel injector return tube at the check valve.



129. Remove the retaining nuts for the fuel injection pump supply tube.

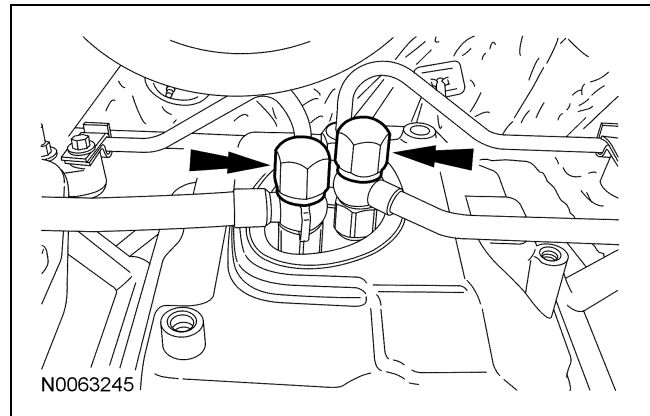


130.  **CAUTION:** Fuel injection equipment is manufactured to very precise tolerances and fine clearances. To prevent fuel system damage it is essential that absolute cleanliness is observed when working with these components. Always install Fuel System Caps to any open orifices or tubes.

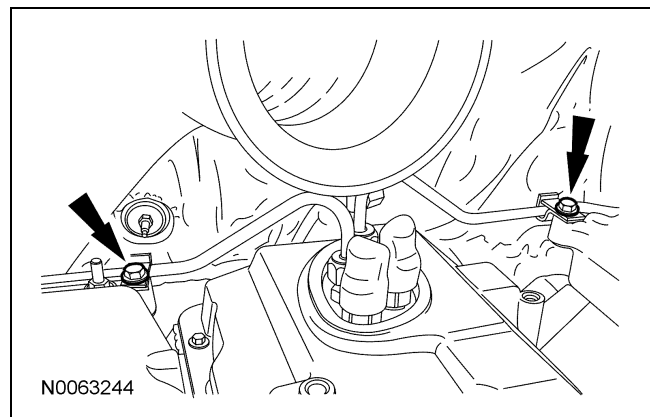
NOTE: Use a back-up wrench to prevent the fittings in the high-pressure fuel injection pump from turning.

Remove the nuts and the copper sealing washers for the high-pressure fuel injection pump. Remove the fuel return tube and the fuel supply tube.


- Discard the copper sealing washers.



131. Remove the bolts from the retainers for the 2 fuel rail supply tubes.

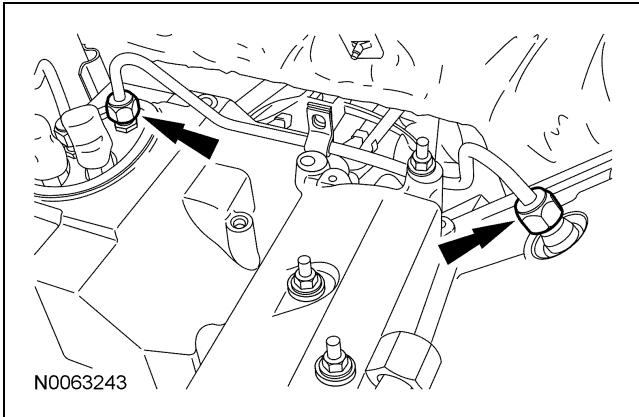



REMOVAL AND INSTALLATION (Continued)

132.  **CAUTION:** Fuel injection equipment is manufactured to very precise tolerances and fine clearances. To prevent fuel system damage it is essential that absolute cleanliness is observed when working with these components. Always install Fuel System Caps to any open orifices or tubes.

NOTE: LH shown, RH similar.

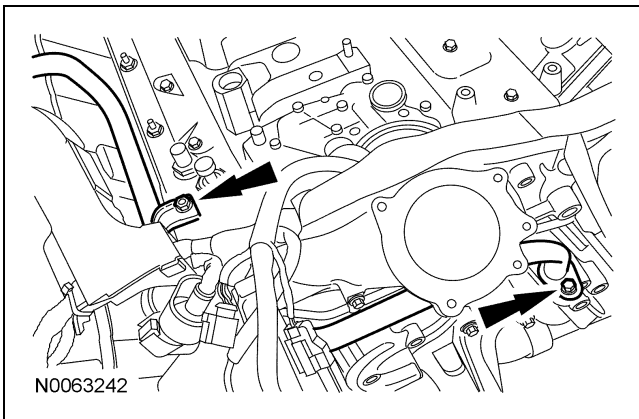
Remove and discard the 2 fuel rail supply tubes.



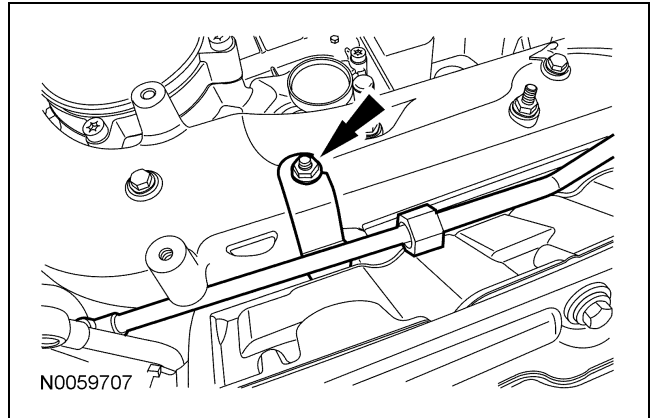
133.  **CAUTION:** Do not bend or flex the heater supply tube or damage to the tube may occur.

Remove the nut, bolt and heater supply tube.

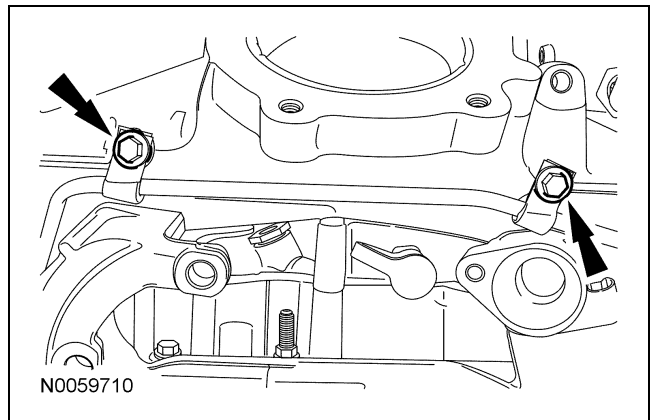
- Remove and discard the O-ring seal.




134. Remove the nut for the fuel return tube retainer.



135. Remove the bolts for the fuel return tube retainers.



REMOVAL AND INSTALLATION (Continued)

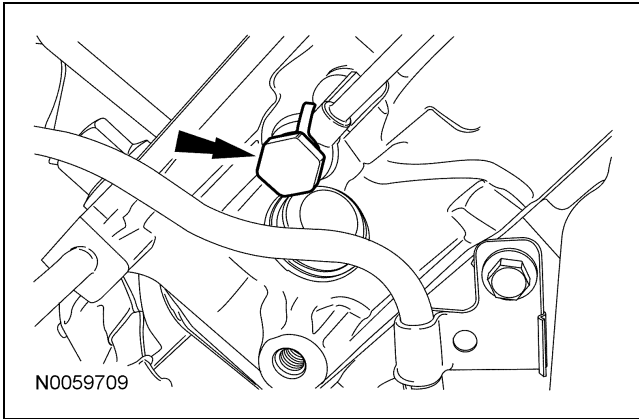
136.  **CAUTION:** Fuel injection equipment is manufactured to very precise tolerances and fine clearances. To prevent fuel system damage it is essential that absolute cleanliness is observed when working with these components. Always install Fuel System Caps to any open orifices or tubes.


NOTE: RH side shown, LH side similar.

NOTE: The fuel return tube will be removed with the intake manifold.

Remove the fuel return tube LH and RH banjo fittings and copper sealing washers.

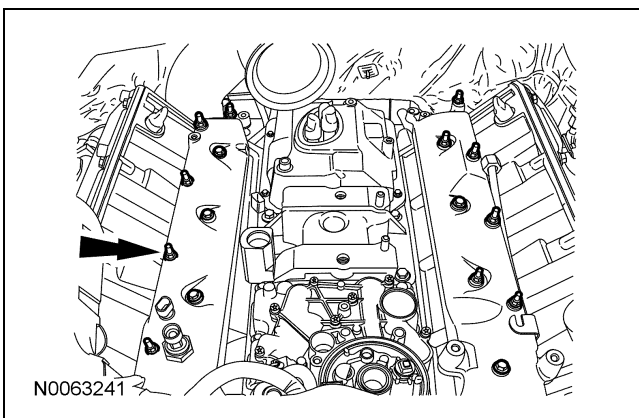
- Discard the copper sealing washers.



137.  **CAUTION:** Clean the area between the engine block and the intake manifold thoroughly before removing the intake manifold. The slope of the block will cause any foreign material not removed to fall into the engine.

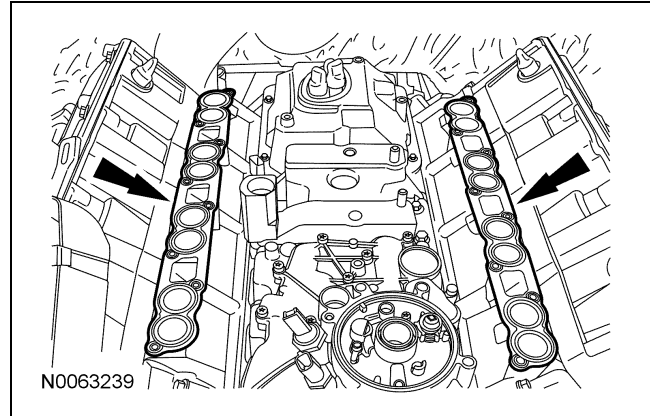
NOTE: Mark the location of the fasteners prior to removing.

Remove the 16 bolts. Remove the intake manifold and the fuel return tube.



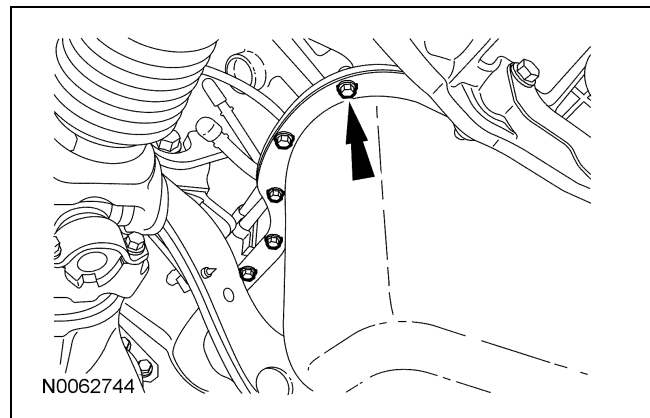
138. Remove the intake manifold gaskets.

- Clean and inspect the gaskets. Install new gaskets if necessary.
- Clean and inspect the sealing surfaces.



139. **NOTE:** Mark the location of the 5 longer bolts.

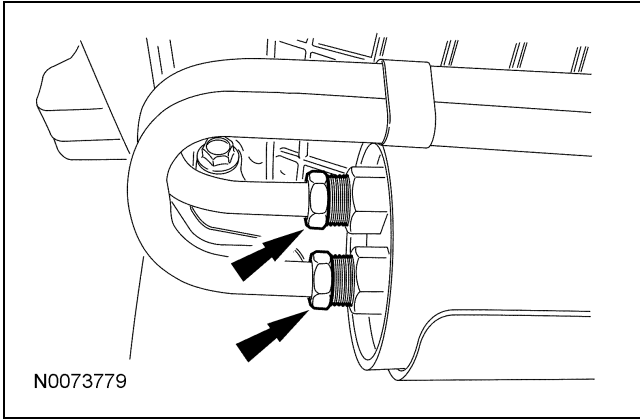
Remove as many of the oil pan bolts as possible.



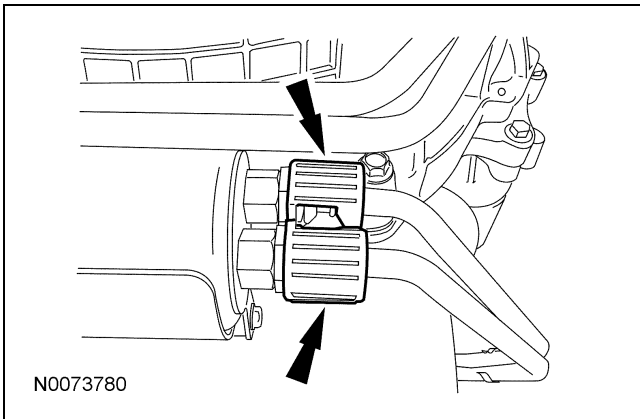
REMOVAL AND INSTALLATION (Continued)

Vehicles with automatic transmission

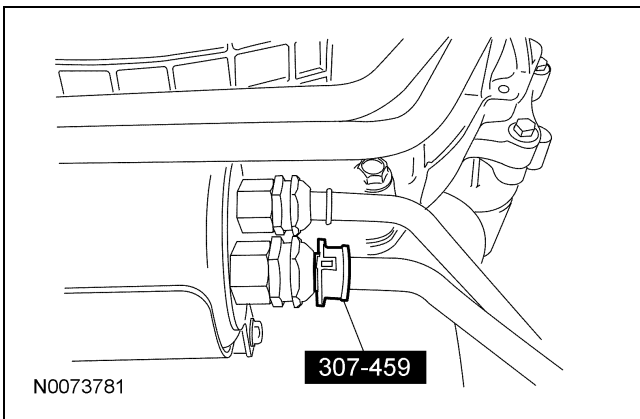
140. If equipped, disconnect the transmission filter tubes.



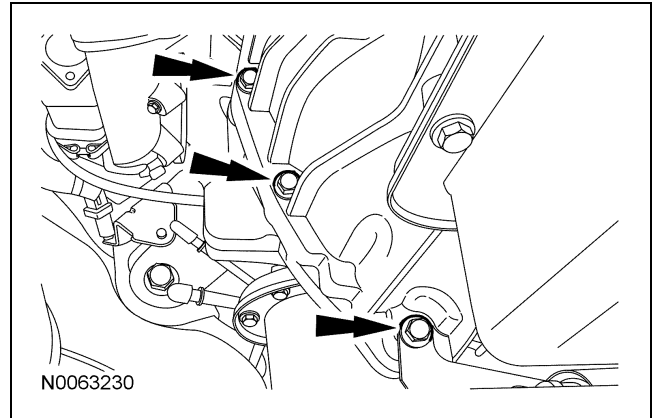
141. Remove the clips from the transmission filter tubes.



142. If equipped, using the special tool, disconnect the transmission filter tubes.

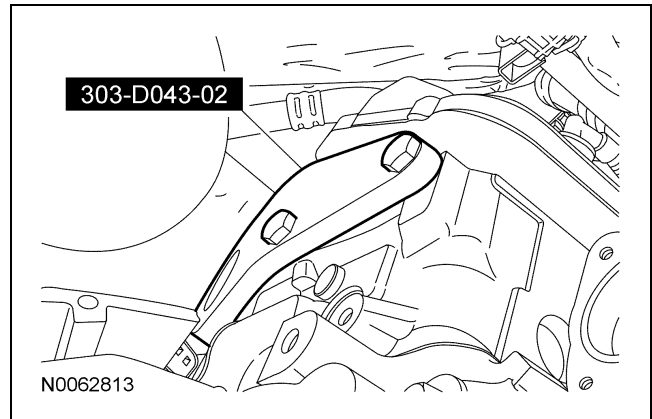


143. Remove the 5 lower engine-to-transmission bolts and if equipped, the transmission filter.

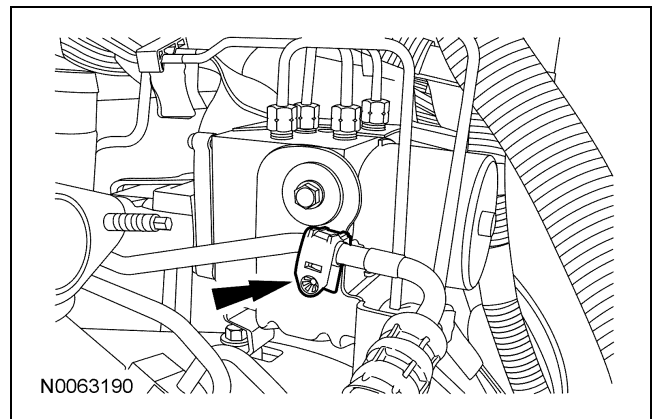


All vehicles

144. Install the special tool on the back of the cylinder head.

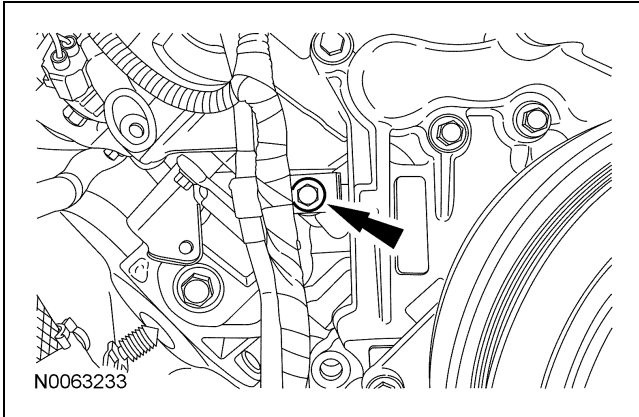


145. Disconnect the retainer for the power steering tube.

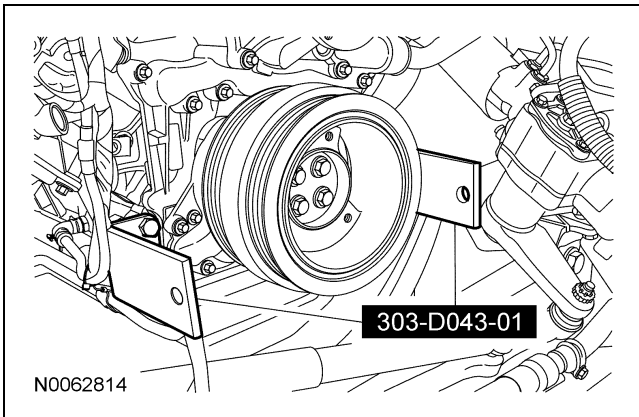


REMOVAL AND INSTALLATION (Continued)

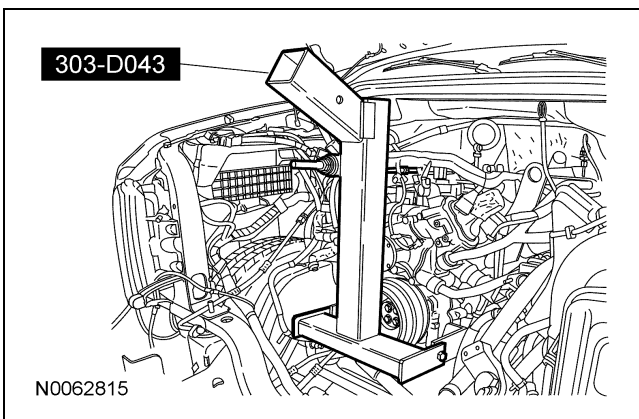
146. Remove the bolt for the oil drain tube.



147. Install the special tools.



148. Install the special tool.



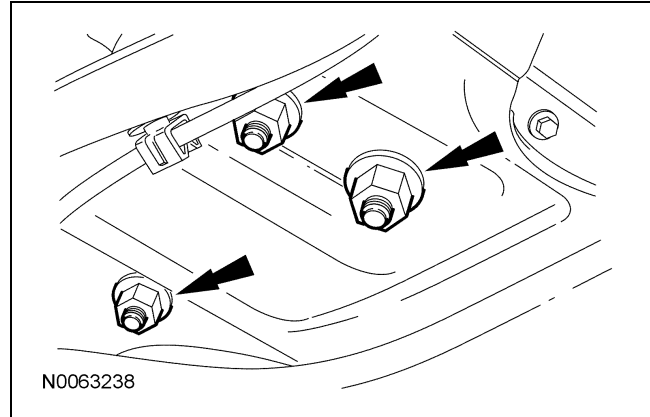
149. Install the engine lifting crane.

Vehicles with automatic transmission

150. Position a suitable jack under the transmission.

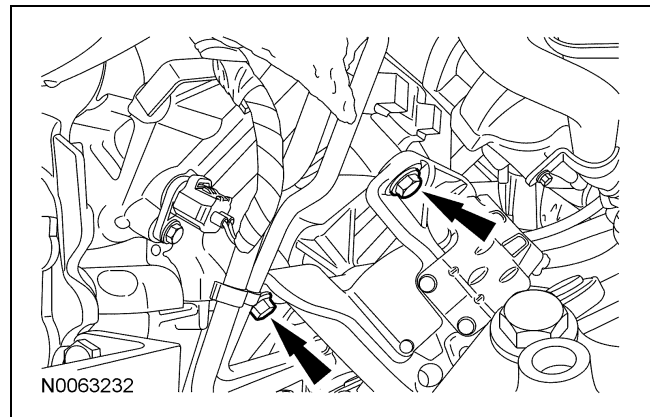
All vehicles

151. Remove and discard the retaining nuts for the LH engine mount.



152. **⚠ CAUTION: The engine mount bracket bolts must be discarded and new bolts installed, or damage to the vehicle may occur. The bolts are a torque-to-yield design and cannot be reused.**

Remove the 3 LH engine mount bracket bolts.

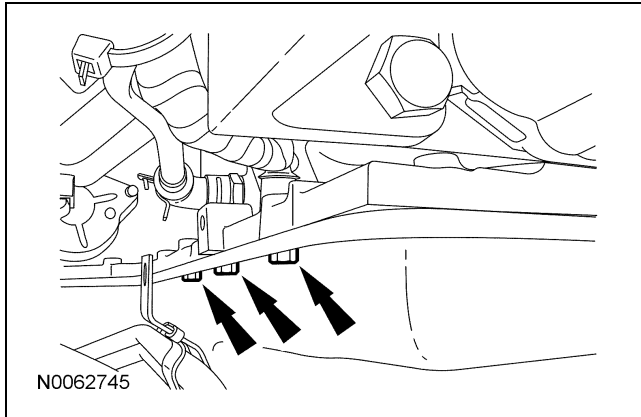


153. With the help of an assistant, raise the engine lifting crane and the transmission jack (automatic transmission vehicles only) as needed to gain enough clearance to remove the oil pan.

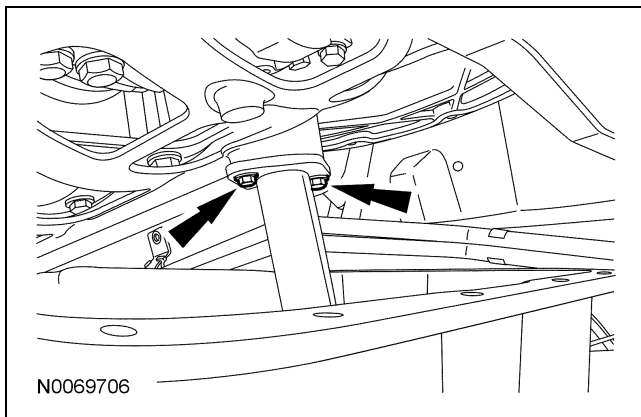
REMOVAL AND INSTALLATION (Continued)

154. **NOTE:** The oil pan will not come out until the oil pick-up tube is removed.

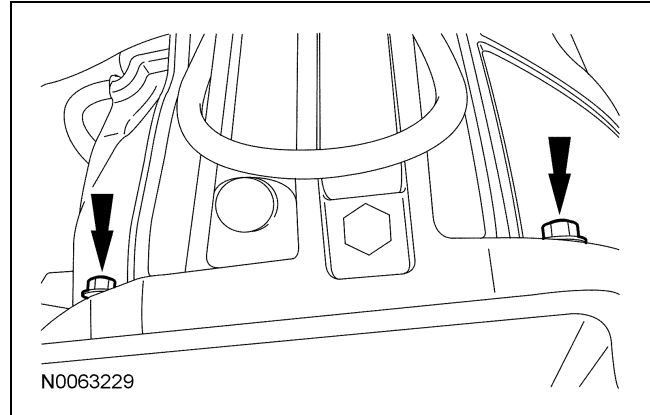
Remove the remaining bolts for the oil pan and position it as needed for oil pick-up tube access.



155. Remove the bolts for the oil pick-up tube and allow it to drop into the oil pan. Remove the oil pan from the vehicle.

**Vehicles with automatic transmission**

156. Remove the 4 upper engine-to-transmission bolts.



REMOVAL AND INSTALLATION (Continued)**All vehicles**

157. ⚠ **CAUTION:** During removal the engine will pass very close to brake lines and other body mounted components. Remove the engine slowly and continually check that engine parts do not snag on body mounted parts, or component damage may occur.

⚠ **CAUTION:** After the engine is removed, position the engine close to the floor in case of lifting crane failure. Failure to lower the engine may result in engine damage.

With the help of an assistant, remove the engine from the vehicle. During the removal of the engine it will be necessary to remove the LH engine mount.

