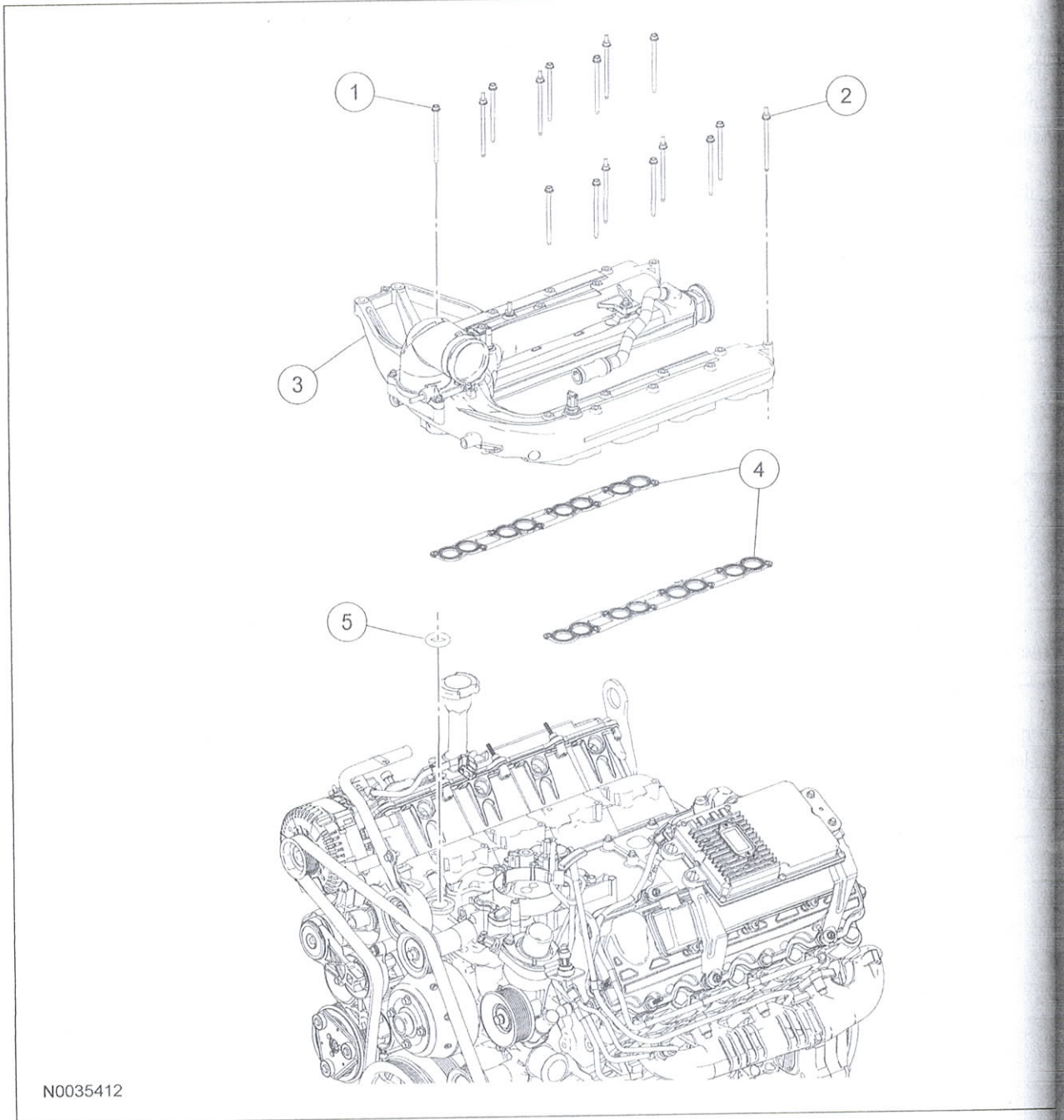


IN-VEHICLE REPAIR

Intake Manifold



N0035412

Item	Part Number	Description
1	W705800	Intake manifold bolt (10 required)
2	9F792	Intake manifold stud bolt (6 required)
3	6K889	Intake manifold
4	9439	Intake manifold gaskets (2 required)
5	—	Front module O-ring seal

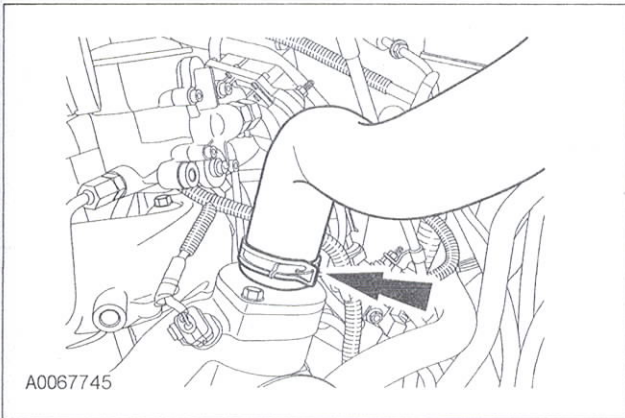
Removal

All vehicles

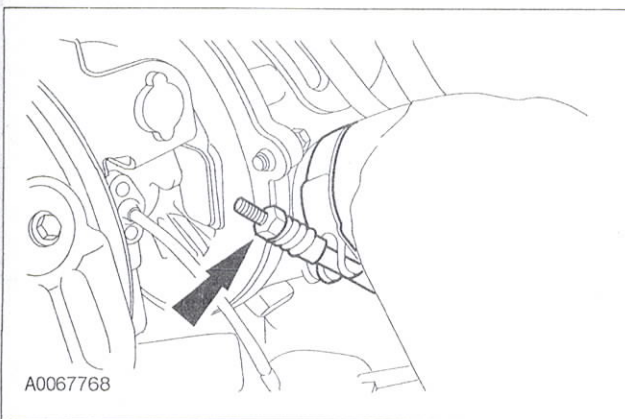
1. Remove the auxiliary battery. For additional information, refer to Section 414-01.
2. Remove the cooling fan stator. For additional information, refer to Section 303-03.

IN-VEHICLE REPAIR (Continued)

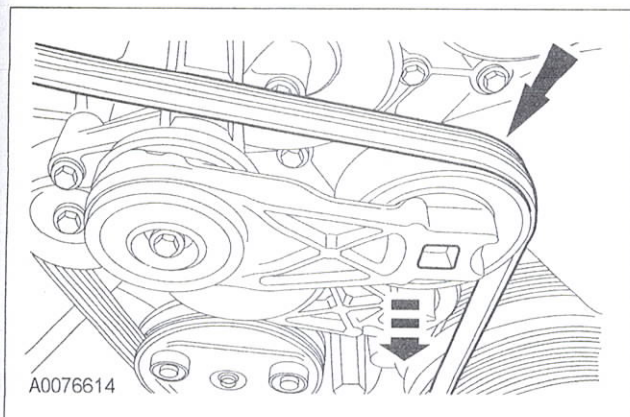
3. Remove the degas bottle. For additional information, refer to Section 303-03.
4. Disconnect the upper radiator hose.



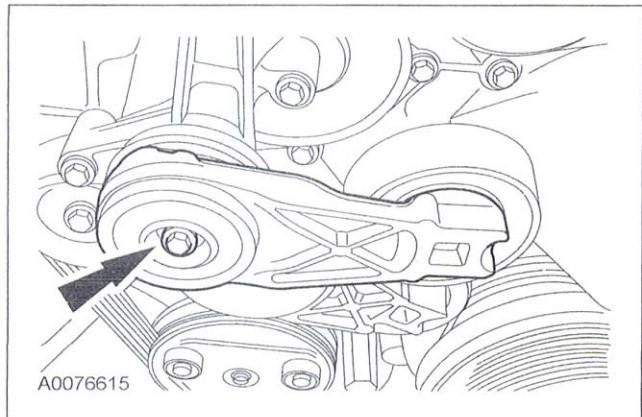
5. **NOTE:** Engine side shown, charge air cooler (CAC) side similar.
Remove the turbocharger-to-CAC duct.

**Vehicles with dual generators**

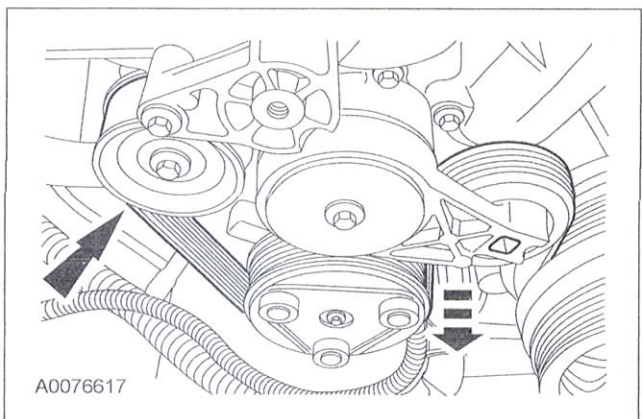
6. Remove the accessory drive belt.



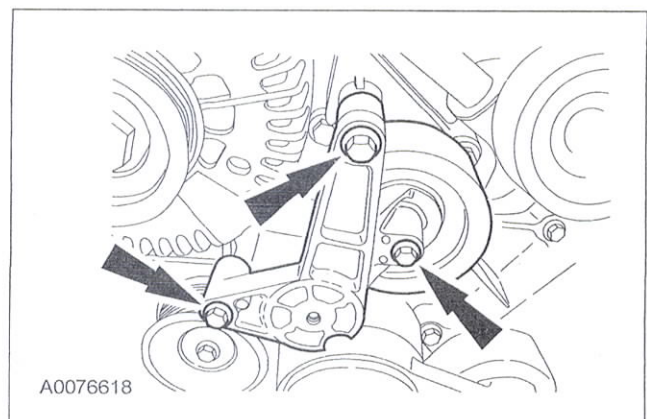
7. Remove the bolt and the accessory drive belt tensioner.



8. Remove the accessory drive belt.

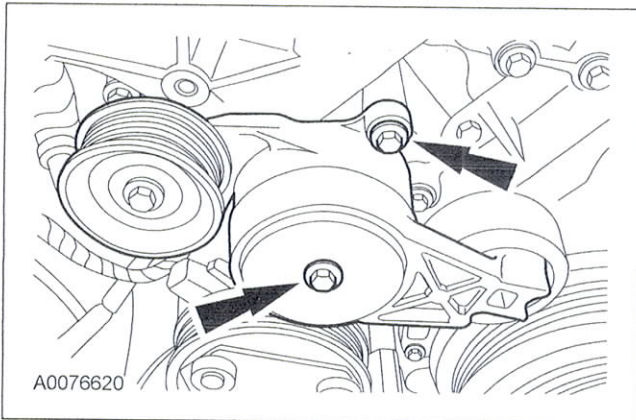


9. Remove the bolts, bracket and accessory drive belt idler pulley.

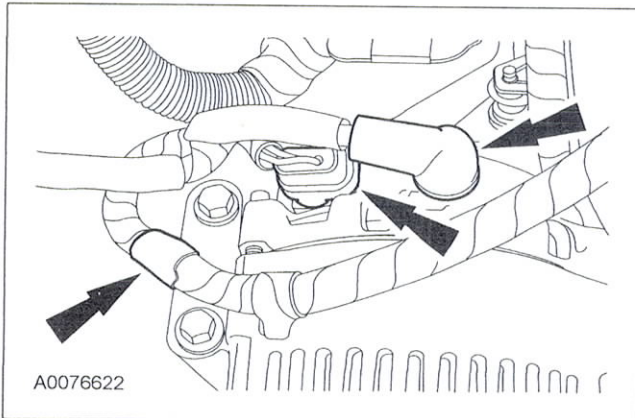


IN-VEHICLE REPAIR (Continued)

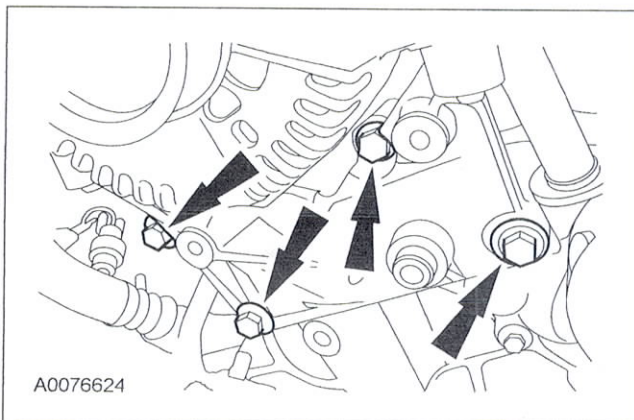
10. Remove the bolts and the accessory drive belt tensioner.



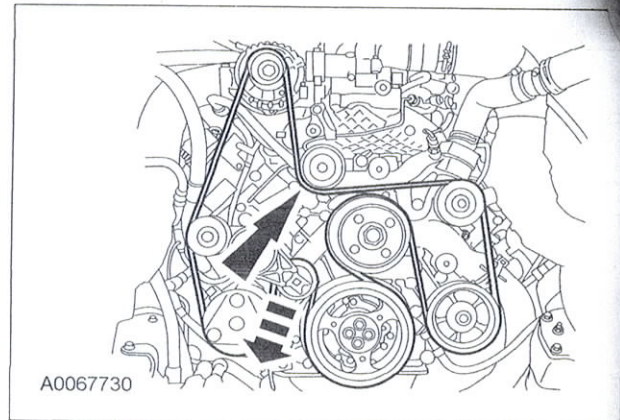
11. Disconnect the wiring harness retainer, generator electrical connector and B+ wire.



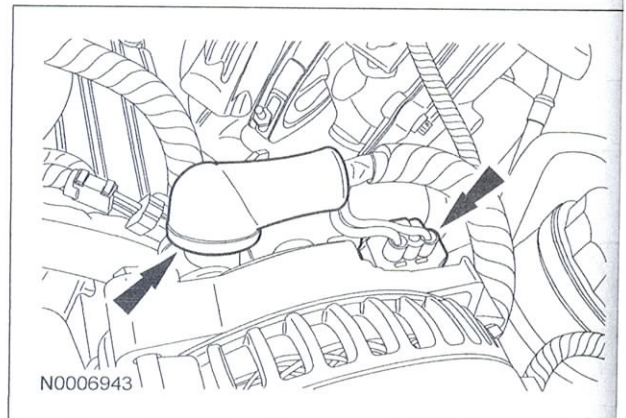
12. Remove the bolts and the generator with mounting bracket.

**Vehicles with single generator**

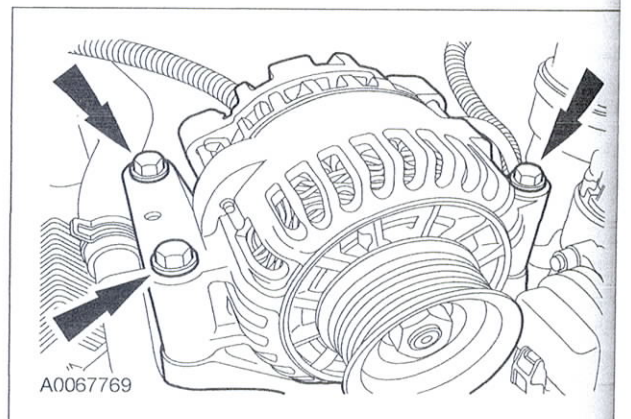
13. Remove the accessory drive belt.

**All vehicles**

14. Position the boot back and disconnect the generator B+ wire and electrical connector.



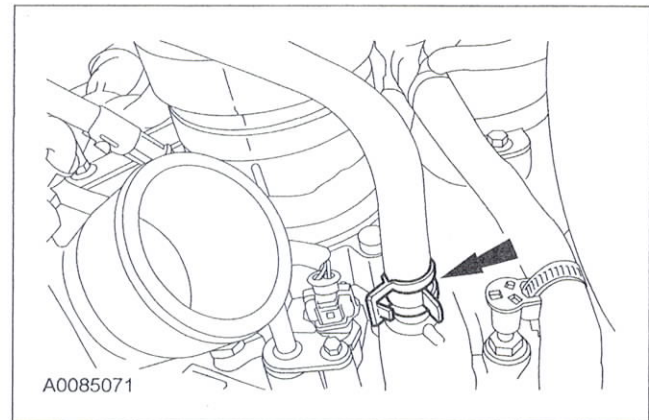
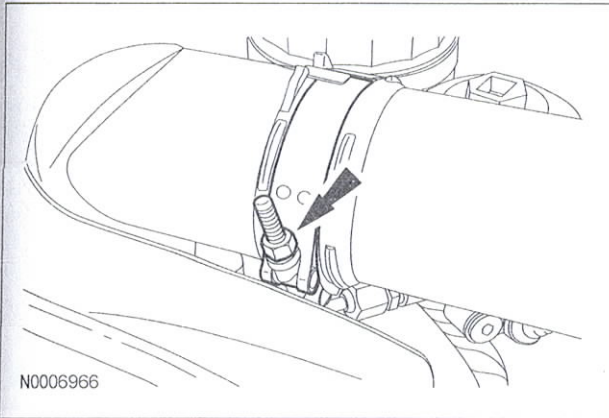
15. Remove the 3 bolts and the generator.



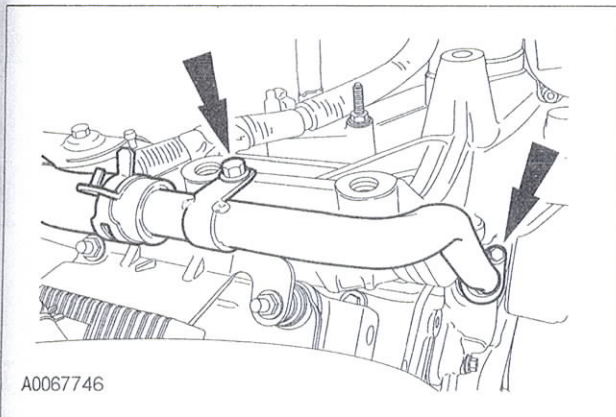
16. Remove the turbocharger and the turbocharger pedestal. For additional information, refer to Section 303-04D.

IN-VEHICLE REPAIR (Continued)

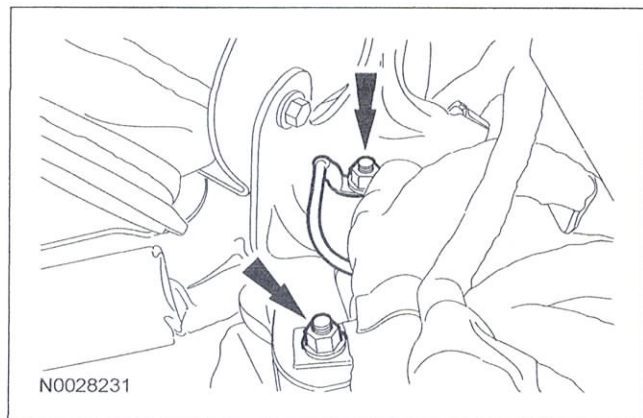
17. **NOTE:** Engine side shown, CAC side similar.
Loosen the clamps and remove the CAC duct.



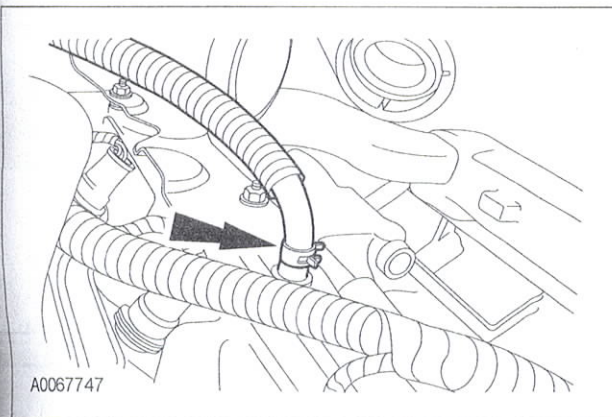
18. Remove the bolts and position the heater hose tube aside.
- Remove and discard the O-ring.



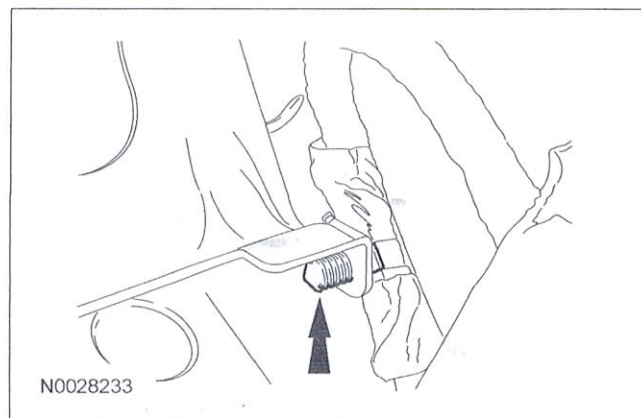
21. Remove the fuel injector control module. For additional information, refer to Section 303-14B.
22. Remove the nuts from the heat shield bracket and disconnect the ground wire from the stud.



19. Disconnect the manifold absolute pressure (MAP) sensor hose.



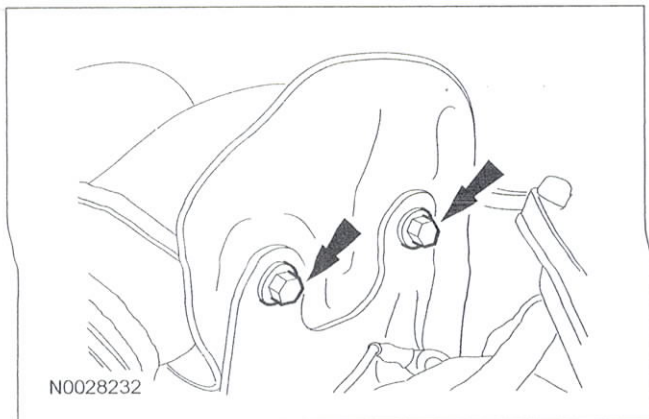
23. Disconnect the wiring retainer from the heat shield bracket.



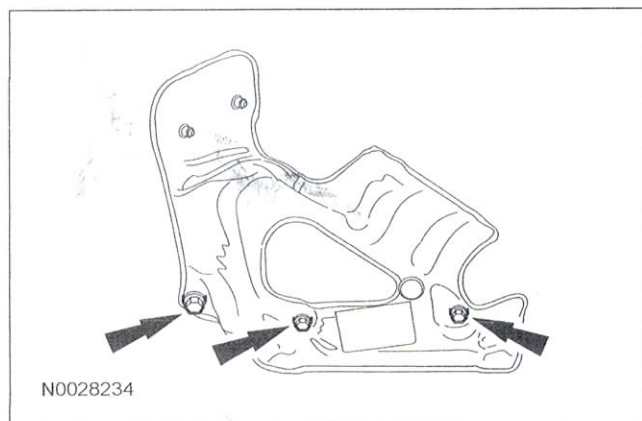
20. Disconnect the engine coolant vent hose.

IN-VEHICLE REPAIR (Continued)

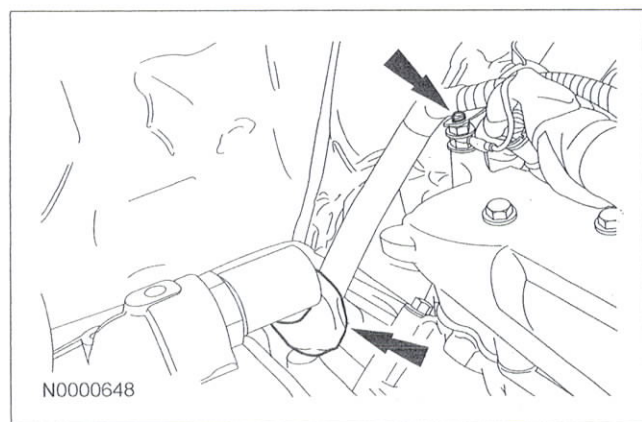
24. Remove the bolts and heat shield bracket.



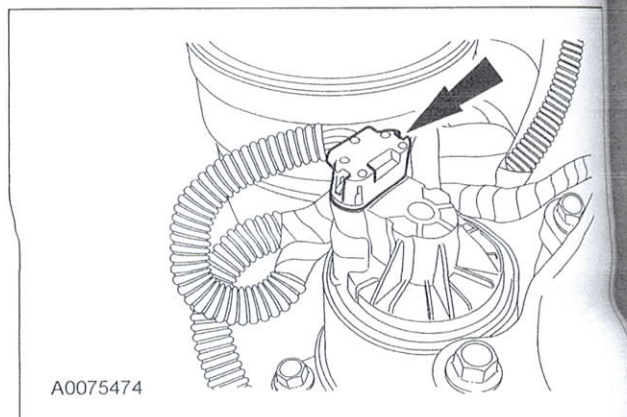
25. Remove the 3 bolts and the turbocharger heat shield.



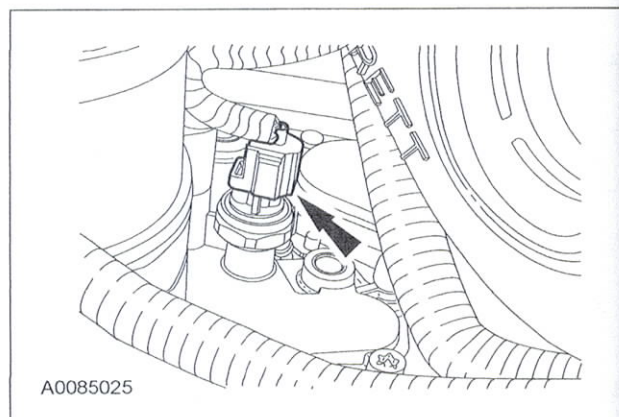
26. Position back the heat insulating wrap and disconnect the wiring retainer and injection pressure regulator (IPR) valve electrical connectors.



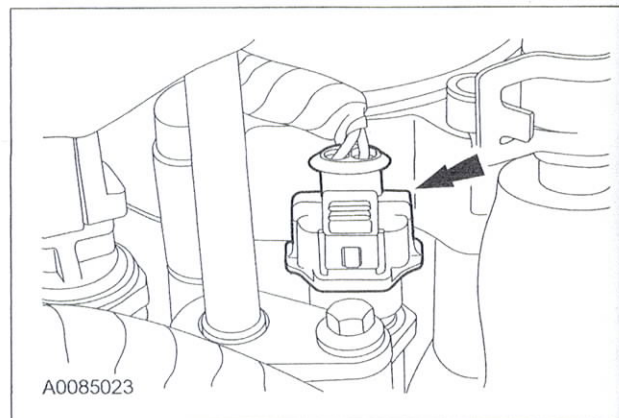
27. Disconnect the exhaust gas recirculation (EGR) valve electrical connector.



28. Disconnect the engine oil pressure (EOP) sensor electrical connector.

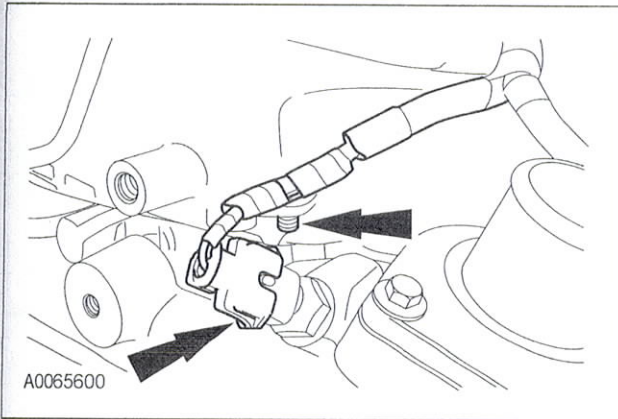


29. Disconnect the engine oil temperature (EOT) sensor electrical connector.

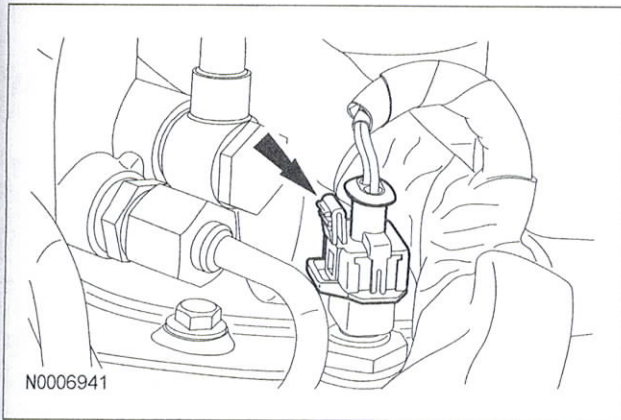


IN-VEHICLE REPAIR (Continued)

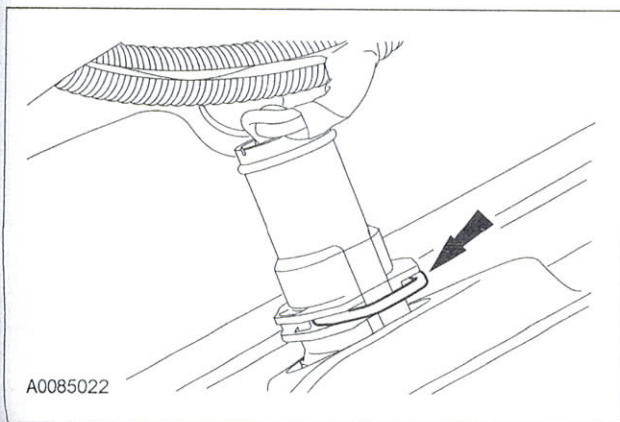
30. Disconnect the pin-type retainer and engine coolant temperature (ECT) sensor.



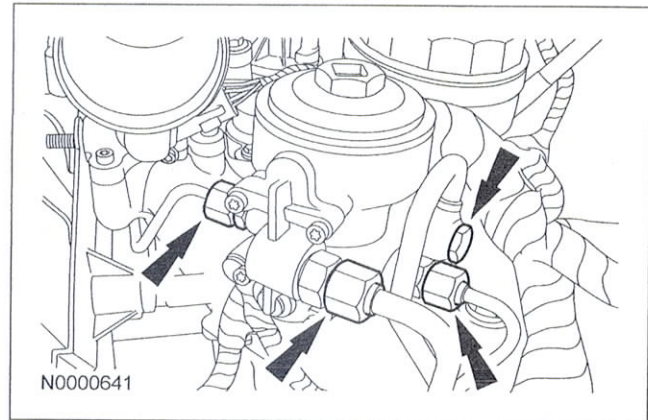
31. Disconnect the intake air temperature (IAT2) sensor electrical connector.



32. Disconnect the 8 fuel injectors electrical connectors.



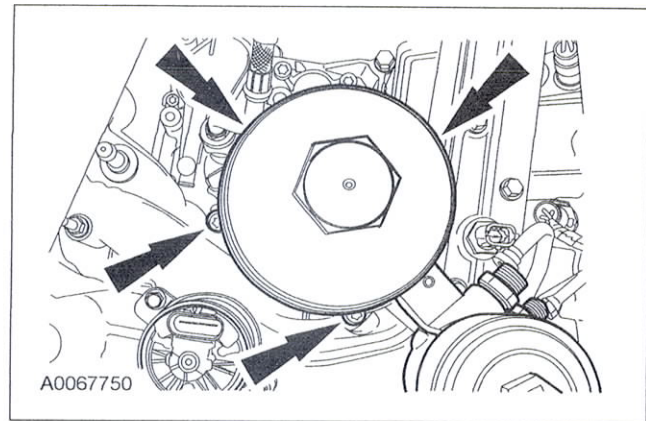
33. **NOTE:** It is necessary to remove the fuel filter and drain the housing.
Disconnect the fuel tube fittings.
- Remove and discard the sealing washers.



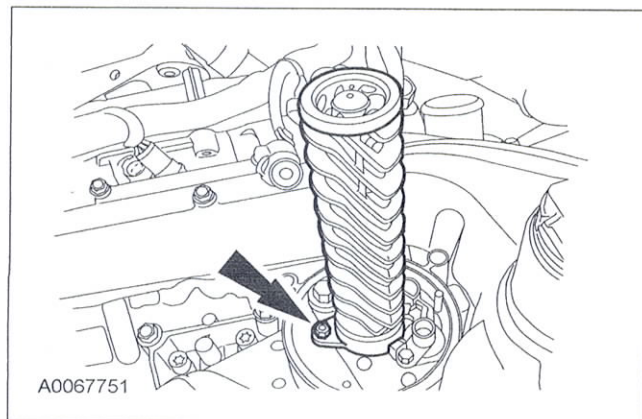
34. **NOTE:** It is necessary to remove the oil filter and drain the housing.

Remove the 4 bolts and the oil filter housing.

- Remove and discard the O-ring seal.



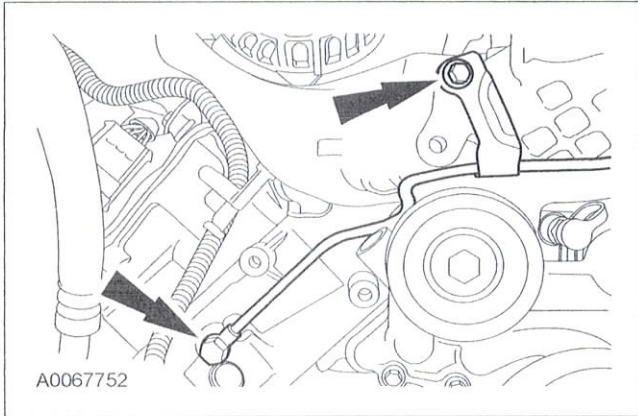
35. Remove the bolt and the oil filter return tube.



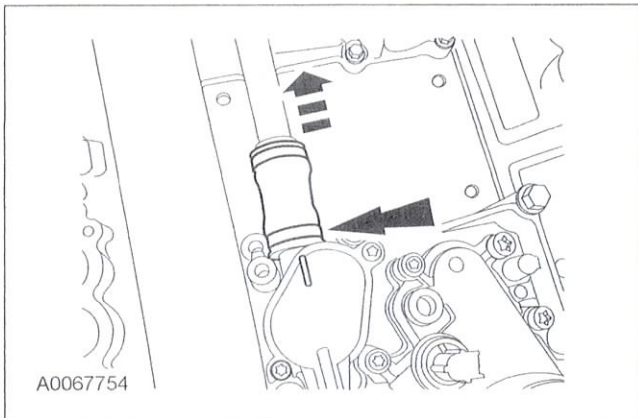
IN-VEHICLE REPAIR (Continued)

36. Remove the fuel tube.

- Remove the bolt and the banjo fitting from the fuel tube.
- Discard the sealing washers and remove the fuel tube.

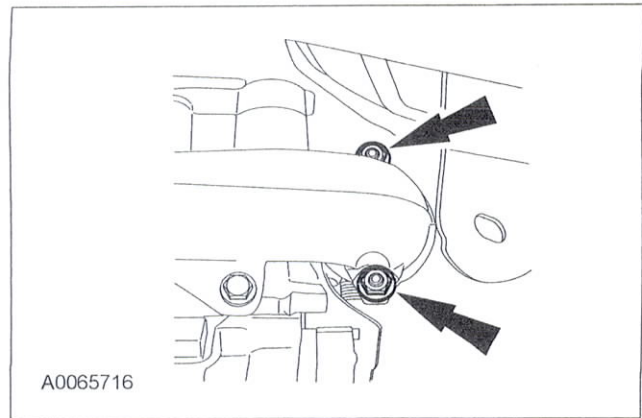


37. **NOTE:** Align the flat edge with the index feature located on the coolant supply port.
Pull the EGR cooler clamp forward, twist and then slide the EGR cooler hose rearward to remove.

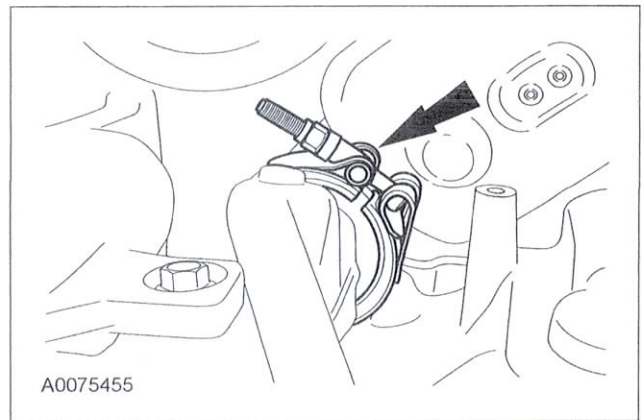


38. **NOTE:** LH shown, RH similar.

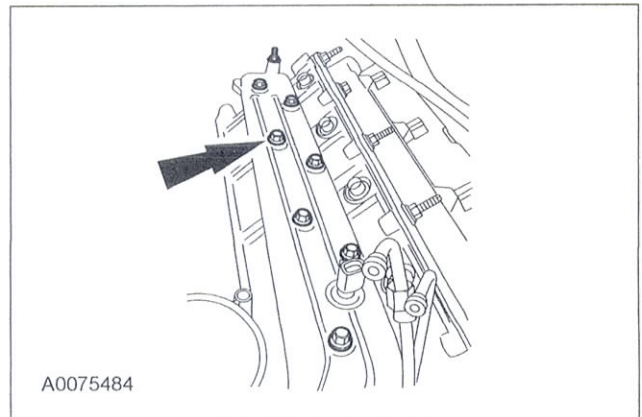
Loosen the nuts and bolts from the turbocharger adapter pipe.



39. Loosen the EGR cooler V-clamp.



40. **NOTE:** Keep the EGR cooler V-clamp with the turbo adapter pipe.
Remove the bolts and the intake manifold.



IN-VEHICLE REPAIR (Continued)

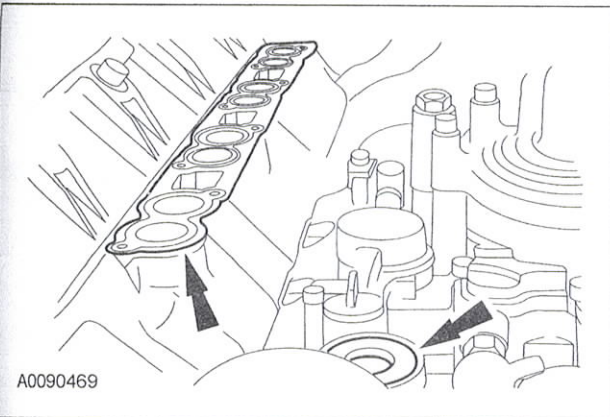
4l. Remove the intake manifold gaskets.

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

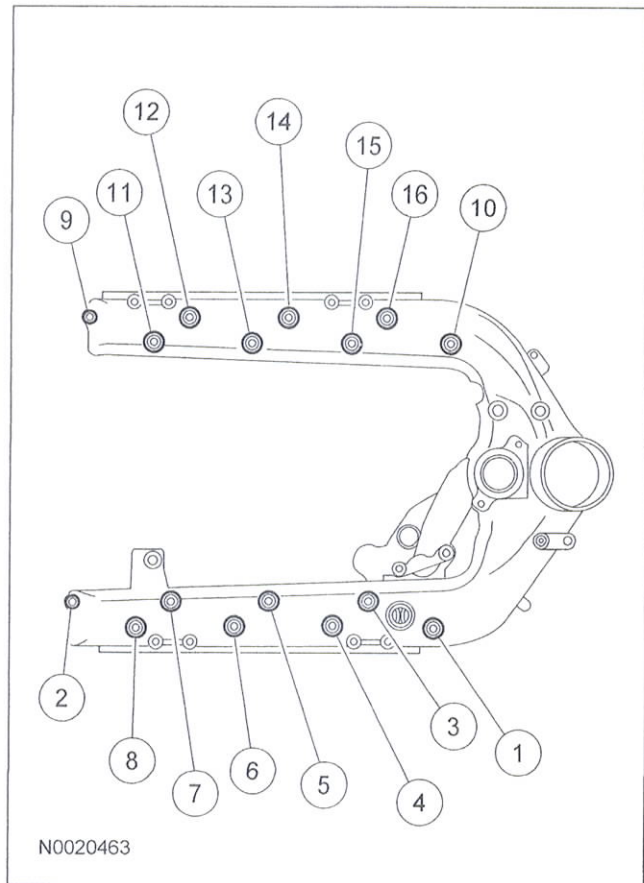
**Installation****All vehicles**

1. **NOTE:** The locating tabs on the gaskets must be up and positioned toward the center of the engine or a leak will occur.

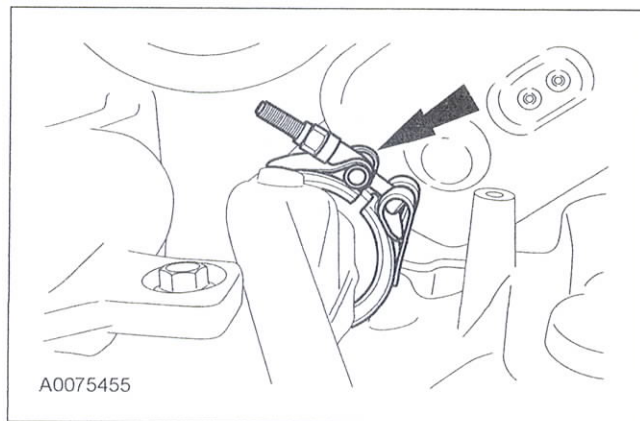
Install the intake manifold gaskets and front module O-ring seal.



2. Install the intake manifold and bolts and tighten in 3 stages, in the sequence shown.
 - Stage 1: Loosely install bolts 1-8.
 - Stage 2: Tighten bolts 9-16 to 11 Nm (8 lb-ft).
 - Stage 3: Tighten all bolts to 11 Nm (8 lb-ft).

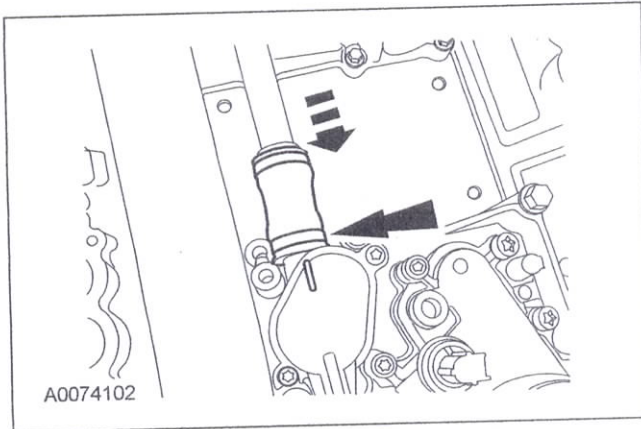


3. Position the EGR cooler V-clamp over the EGR tube.
4. Install the gasket and the EGR cooler V-clamp.
 - Tighten to 6 Nm (53 lb-in).

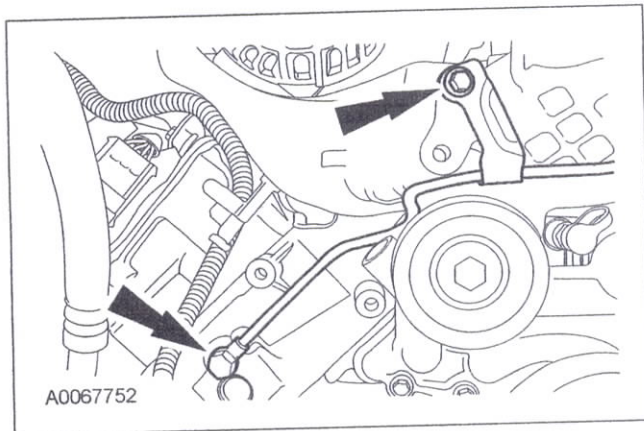


IN-VEHICLE REPAIR (Continued)

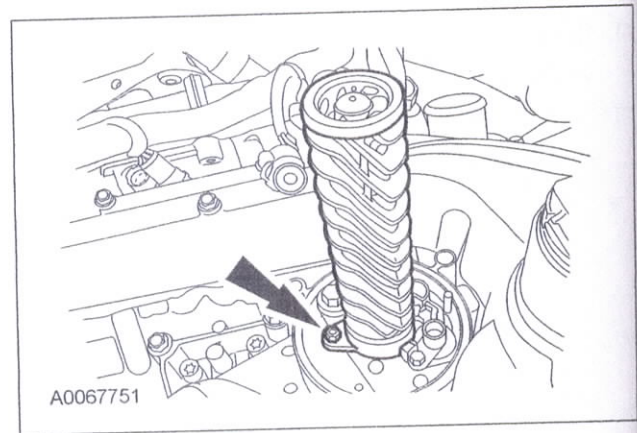
5. Slide the EGR cooler hose forward and rotate flat to lock.



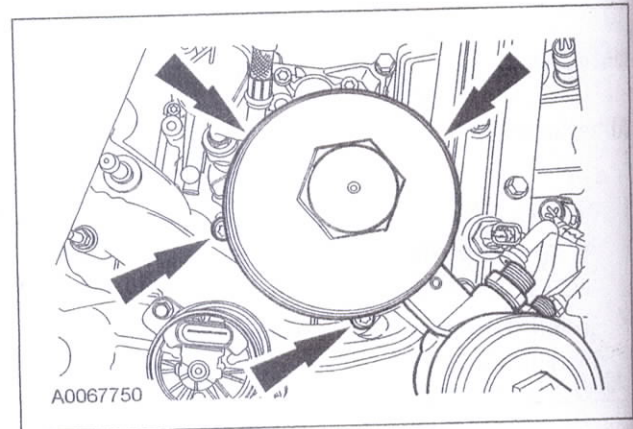
6. Using new sealing washers, install the fuel tube banjo fitting bolt and the support bracket bolt.
- Tighten the fuel tube banjo fitting bolt to 13 Nm (10 lb-ft).
 - Tighten the bolt to 38 Nm (28 lb-ft).



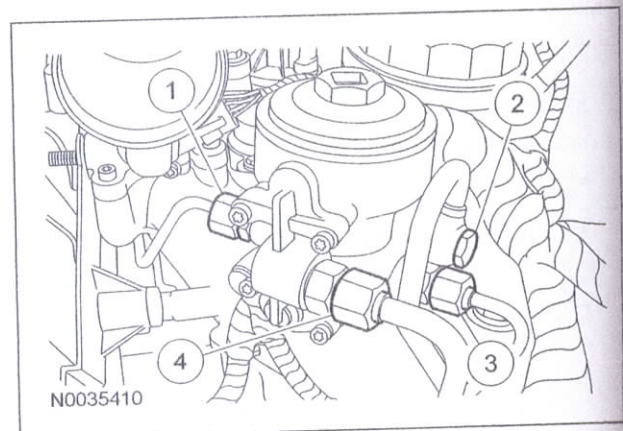
7. Install the oil filter return tube and bolt.
- On new oil filter return tubes, tighten to 6 Nm (53 lb-in).
 - On used oil filter return tubes, tighten to 3 Nm (27 lb-in).



8. **NOTE:** Install a new O-ring seal.
Install the oil filter housing and the 4 bolts.
- Tighten to 15 Nm (11 lb-ft).

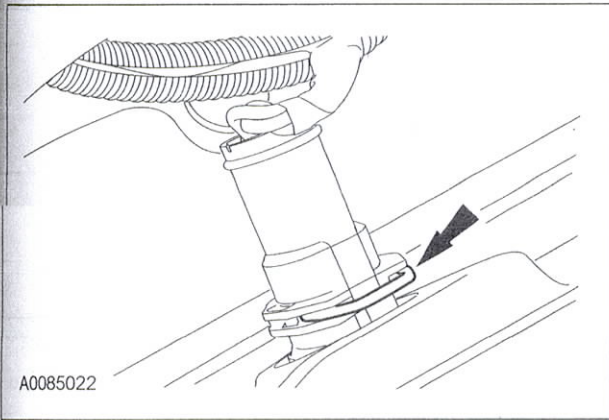


9. **NOTE:** Install new sealing washers on the banjo fitting.
Connect the fuel tube fittings.
- 1 Tighten to 26 Nm (19 lb-ft).
 - 2 Tighten to 35 Nm (26 lb-ft).
 - 3 Tighten to 26 Nm (19 lb-ft).
 - 4 Tighten to 43 Nm (32 lb-ft).

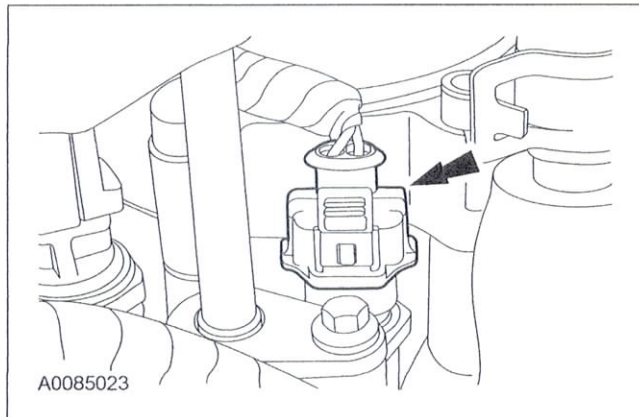


IN-VEHICLE REPAIR (Continued)

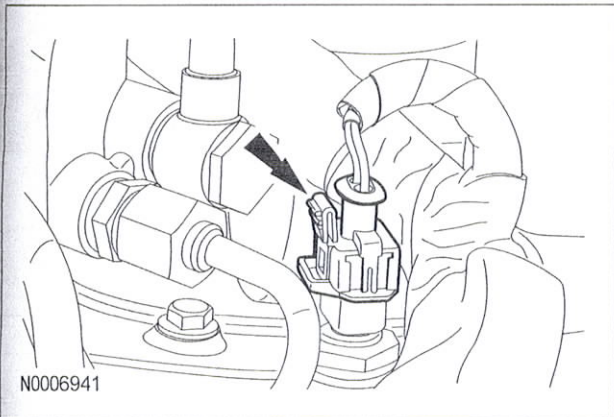
10. Connect the 8 fuel injectors electrical connectors.



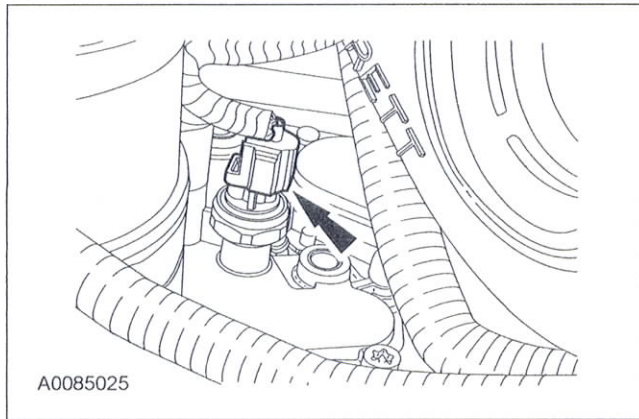
13. Connect the EOT sensor electrical connector.



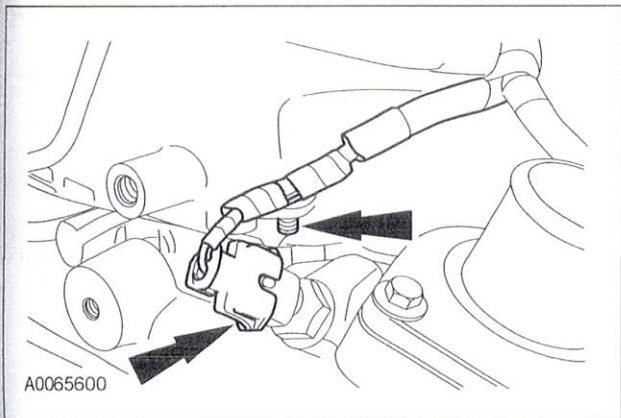
11. Connect the IAT2 sensor electrical connector.



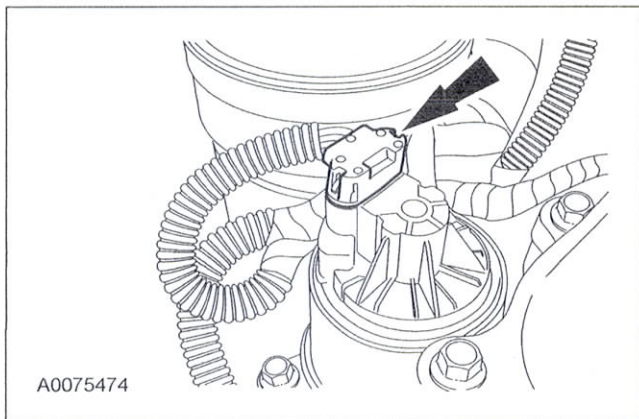
14. Connect the EOP sensor electrical connector.



12. Connect the ECT sensor and the pin-type retainer.

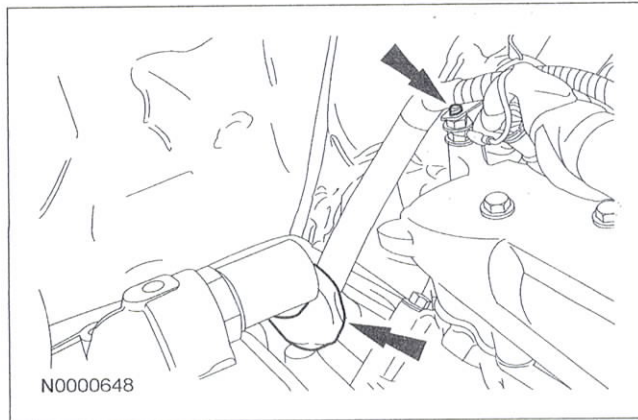


15. Connect the EGR valve electrical connector.



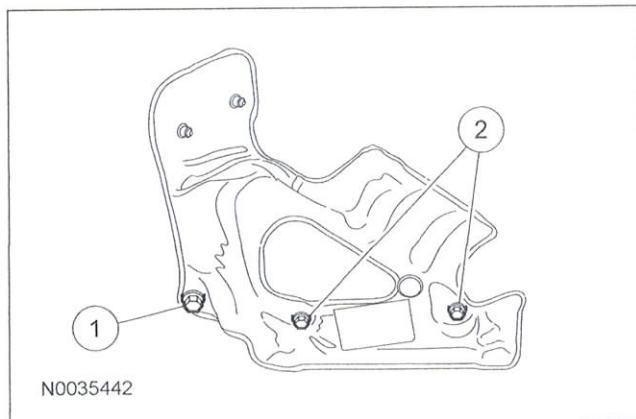
IN-VEHICLE REPAIR (Continued)

16. Connect the wiring retainer and injector pressure regulator electrical connector. Position back the heat insulating wrap.

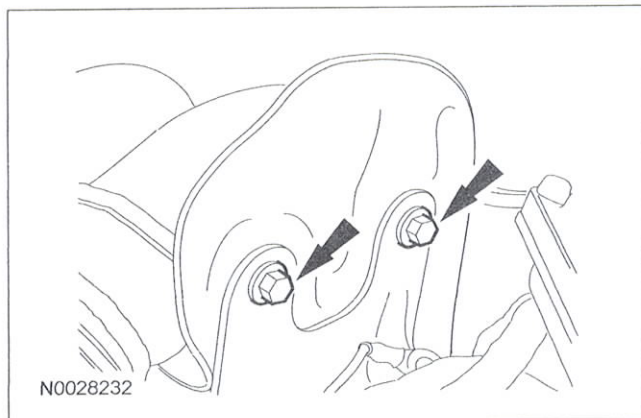


17. Position the turbocharger heat shield and install the 3 bolts.

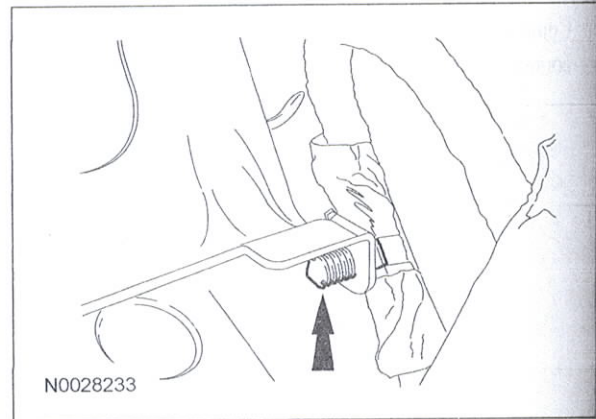
- 1 Tighten to 49 Nm (36 lb-ft).
- 2 Tighten to 11 Nm (8 lb-ft).



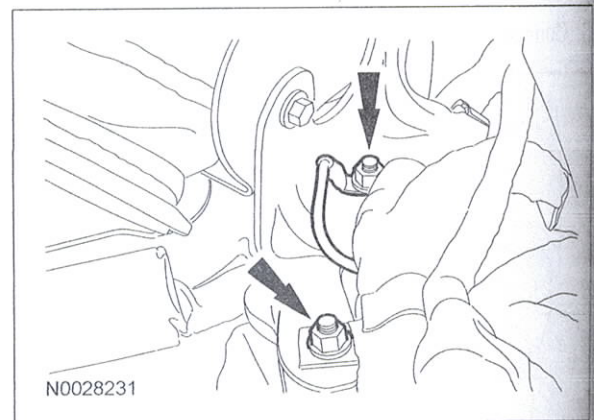
18. Install the heat shield bracket and bolts.



19. Connect the wiring retainer to the back of the heat shield bracket.

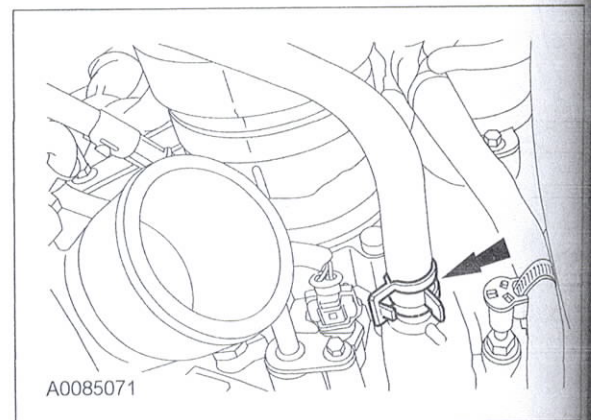


20. Position back the ground wire and install the retaining nuts.



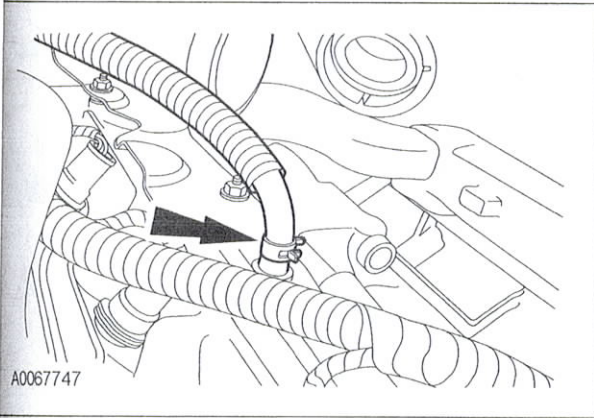
21. Install the fuel injector control module. For additional information, refer to Section 303-14B.

22. Connect the engine coolant vent hose and clamp.



IN-VEHICLE REPAIR (Continued)

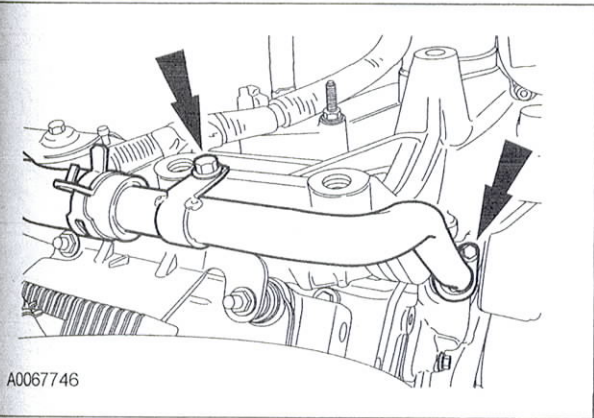
3. Connect the MAP sensor hose.



4. **NOTE:** Install a new O-ring seal on the heater hose tube.

Install the heater hose tube and the 2 bolts.

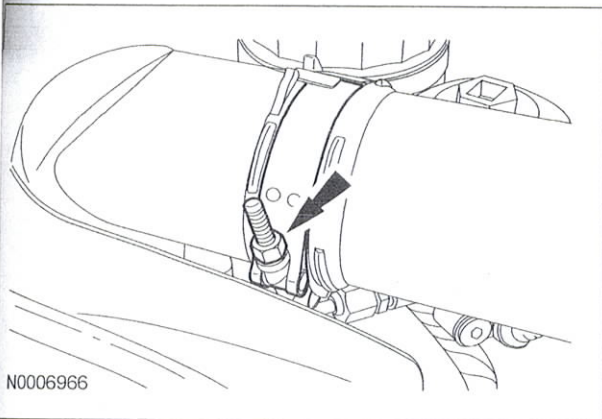
- Tighten to 13 Nm (10 lb-ft).



5. **NOTE:** Engine side shown, CAC side similar.

Install the CAC duct and tighten the clamps.

- Tighten to 12 Nm (9 lb-ft).

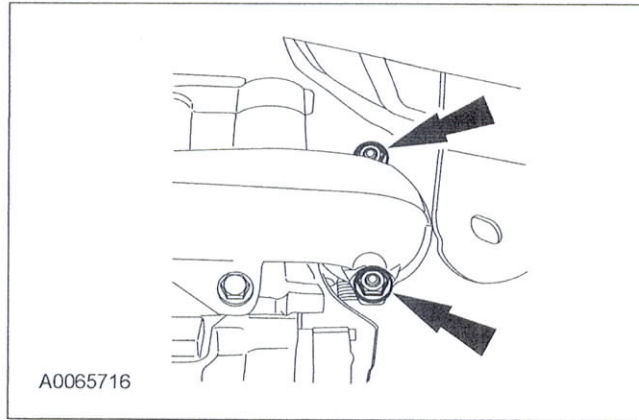


26. Install the turbocharger pedestal and turbocharger. For additional information, refer to Section 303-04D.

27. **NOTE:** Alternately tighten the bolts to specification.

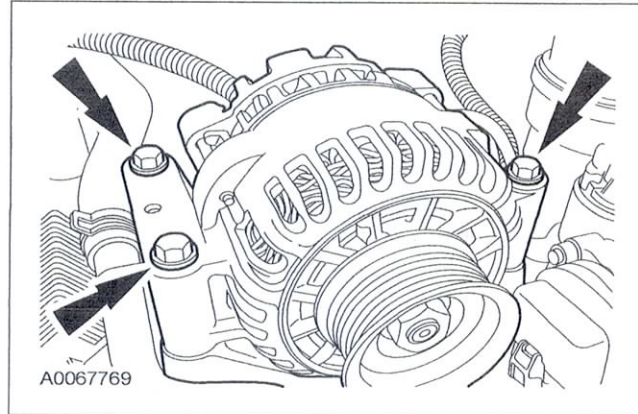
Tighten the nuts and bolts in the adapter pipe.

- Tighten to 27 Nm (20 lb-ft).



28. Install the generator and the 3 bolts.

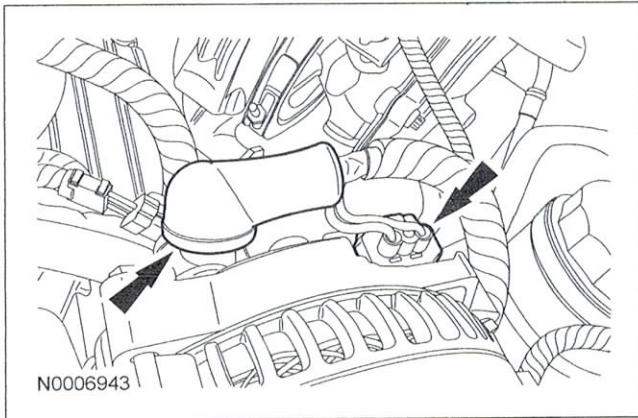
- Tighten to 47 Nm (35 lb-ft).



IN-VEHICLE REPAIR (Continued)

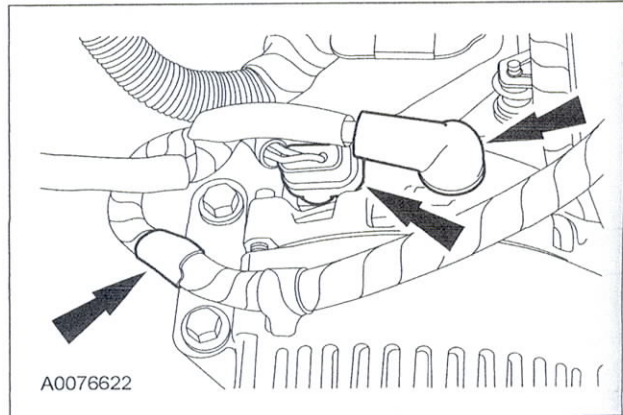
29. Connect the generator B+ wire, the electrical connector and position the boot back.

- Tighten to 8 Nm (71 lb-in).

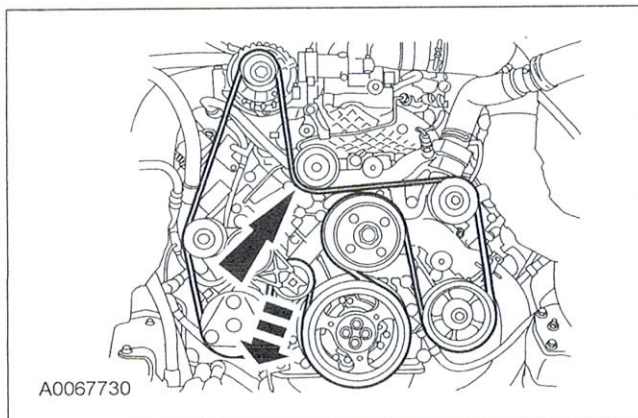


32. Connect the B+ wire, generator electrical connector and wiring harness retainer.

- Tighten to 8 Nm (71 lb-in).

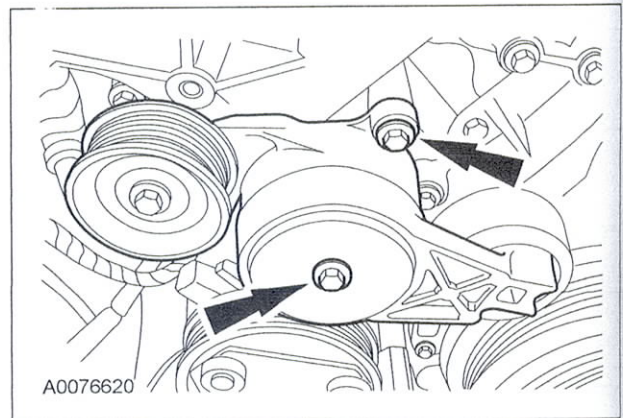
**Vehicles with single generator**

30. Install the accessory drive belt.



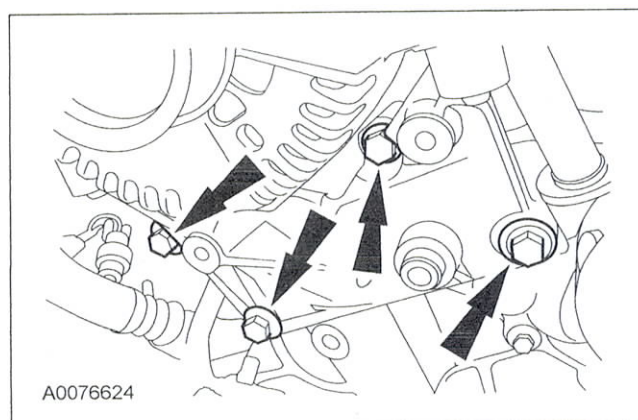
33. Install the accessory drive belt tensioner and bolts.

- Tighten to 25 Nm (18 lb-ft).

**Vehicles with dual generators**

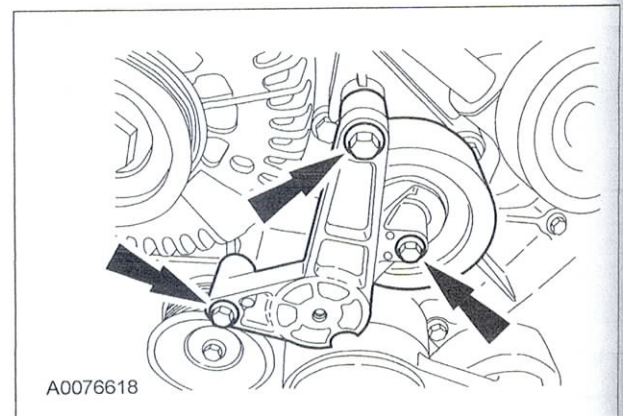
31. Install the generator with mounting bracket and the 4 bolts.

- Tighten to 47 Nm (35 lb-ft).



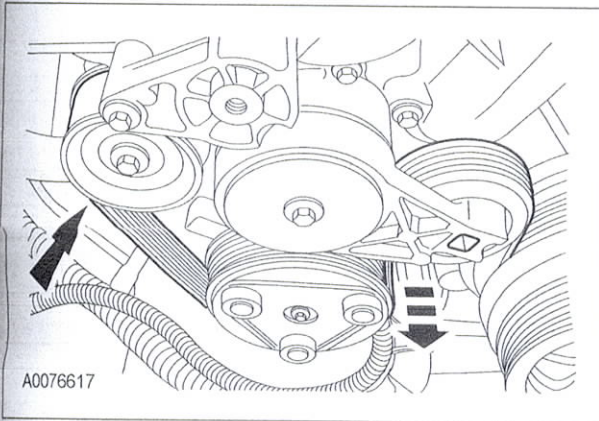
34. Position the accessory drive belt idler pulley. Install the bracket and bolts.

- Tighten to 25 Nm (18 lb-ft).



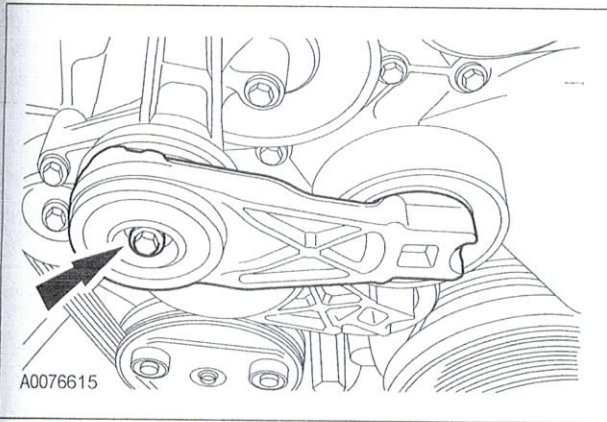
IN-VEHICLE REPAIR (Continued)

35. Install the accessory drive belt.

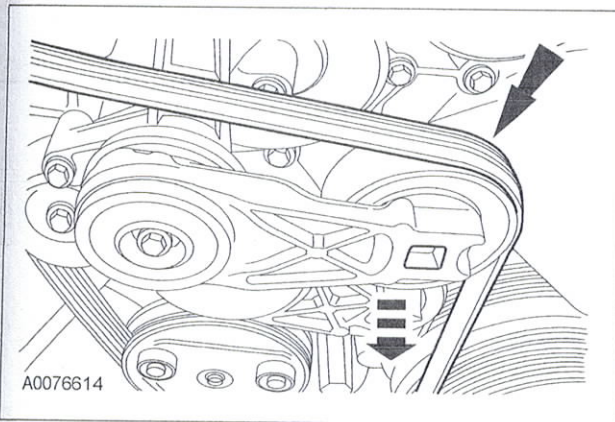


36. Install the accessory drive belt tensioner and bolt.

- Tighten to 25 Nm (18 lb-ft).



37. Install the accessory drive belt.



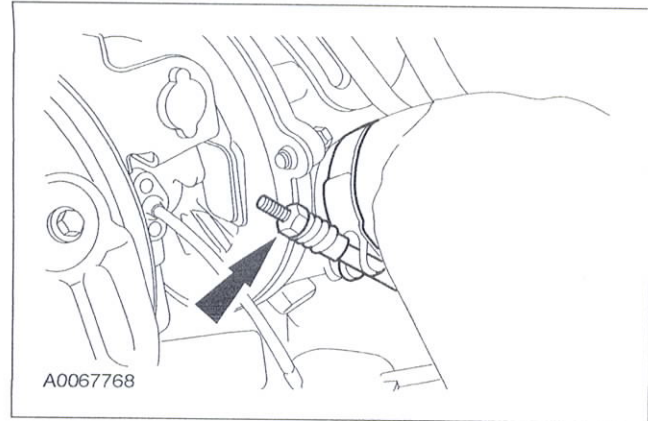
All vehicles

38. **NOTE:** Engine side shown, CAC side similar.

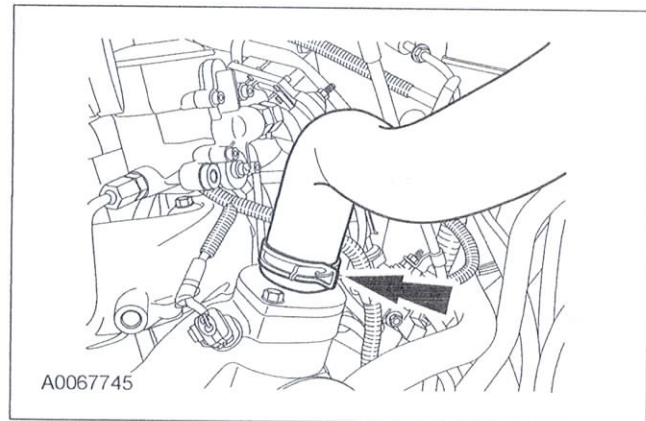
NOTE: If there is any oil residue, clean both connecting ports and the inside surface of the charge air cooler duct to prevent the duct from blowing off.

Install the turbocharger-to-CAC duct.

- Tighten to 12 Nm (9 lb-ft).



39. Connect the upper radiator hose.



40. Install the degas bottle. For additional information, refer to Section 303-03.
41. Install the auxiliary battery. For additional information, refer to Section 414-01.
42. Install the cooling fan stator. For additional information, refer to Section 303-03.

IN-VEHICLE REPAIR (Continued)

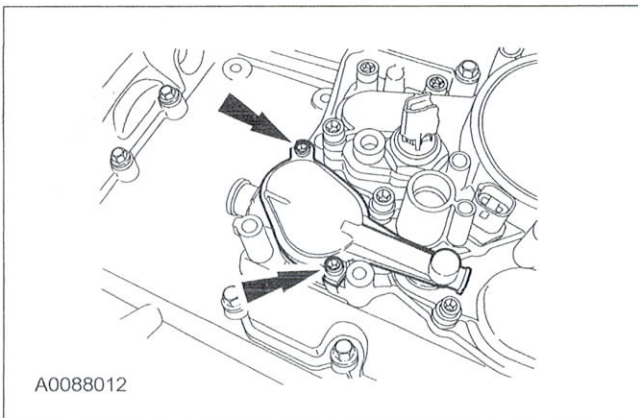
3. Install the crankshaft front seal. For additional information, refer to Crankshaft Front Seal in this section.

Oil Cooler**Material**

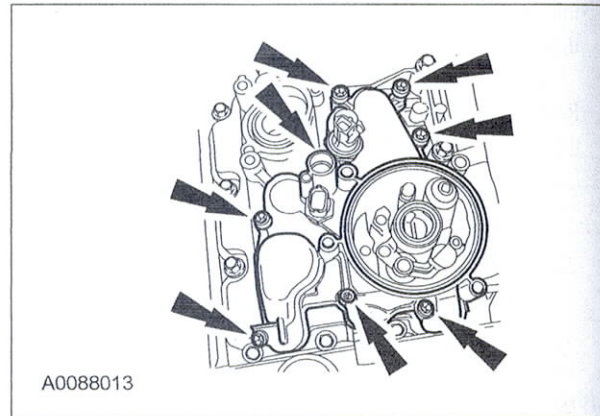
Item	Specification
SAE 15W-40 Super Duty Motor Oil XO-15W40-QSD or equivalent	WSS-M2C171-D

Removal

1. Remove the intake manifold. For additional information, refer to Intake Manifold in this section.
2. Remove the bolts and the exhaust gas recirculation (EGR) cooler supply port cover.
 - Remove and discard the press-in-place gasket.
 - Clean and inspect the sealing surfaces.



3. Remove the bolts and the oil filter base.
 - Remove and discard the press-in-place gasket.
 - Clean and inspect the sealing surfaces.

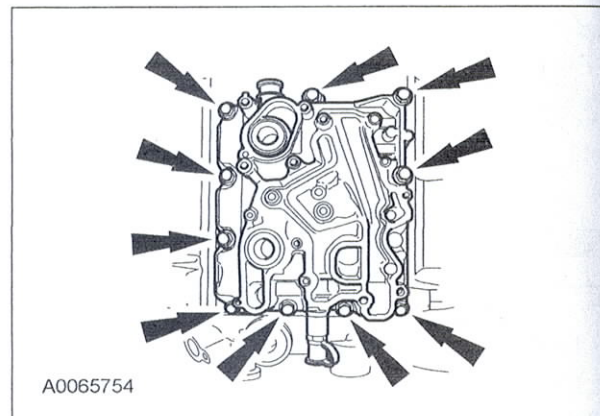


4. **CAUTION:** In the event of a catastrophic engine failure, always install a new oil cooler cover assembly (with oil cooler). Foreign material cannot be removed from the oil cooler.

NOTE: The oil cooler is replaced as an assembly.

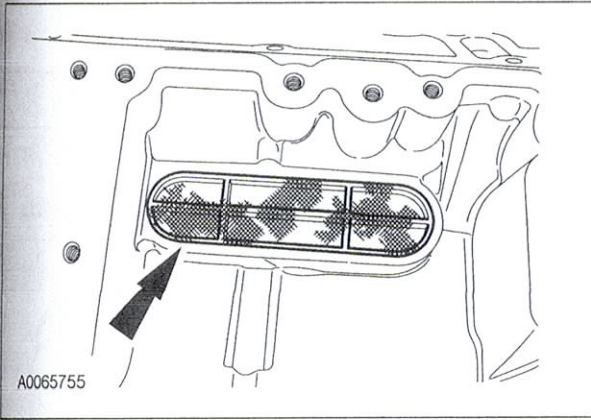
Remove the bolts and the oil cooler assembly.

- Remove and discard the press-in-place gasket.
- Clean and inspect the sealing surfaces.



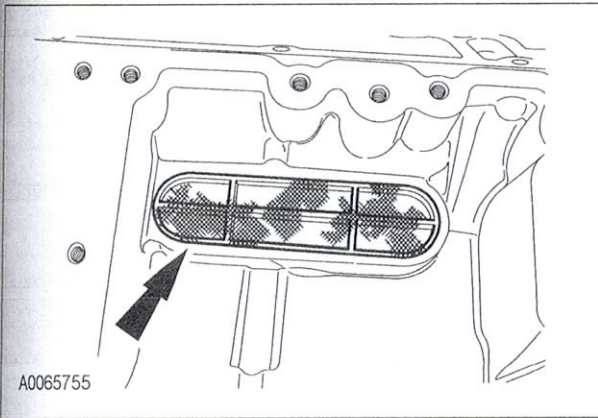
IN-VEHICLE REPAIR (Continued)

5. Remove the oil pump inlet strainer.
 - Clean and inspect the strainer for tears or other signs of damage.

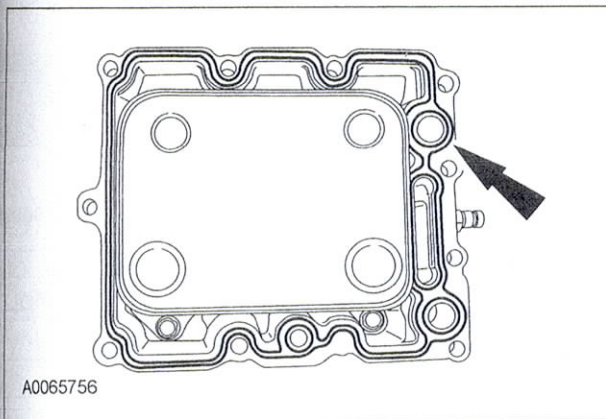


Installation

1. Install the oil pump inlet strainer.



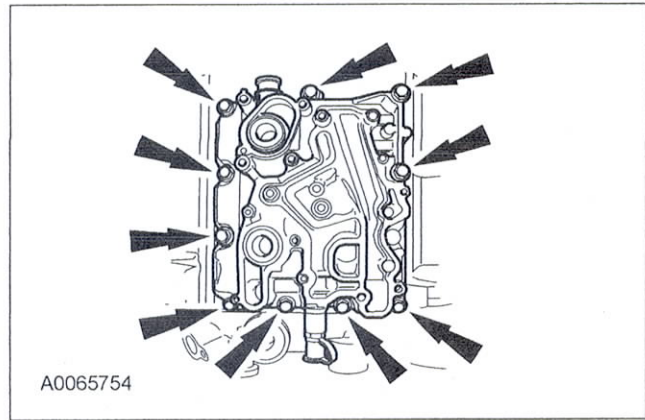
2. Install the gasket in the oil cooler assembly cover.



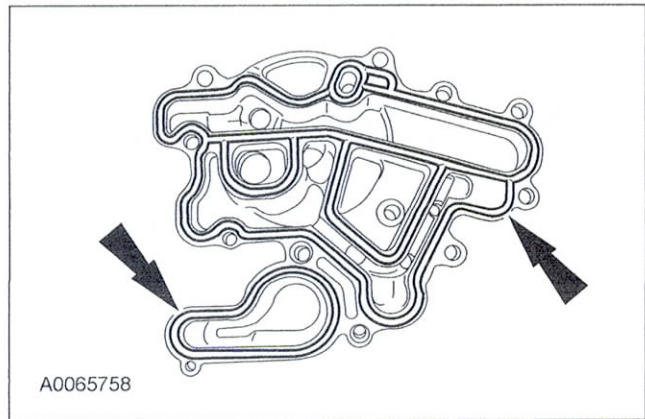
3. **⚠ CAUTION: In the event of a catastrophic engine failure, always install a new oil cooler cover assembly (with oil cooler). Foreign material cannot be removed from the oil cooler.**

Install the oil cooler assembly and the bolts.

- Tighten to 22 Nm (16 lb-ft).

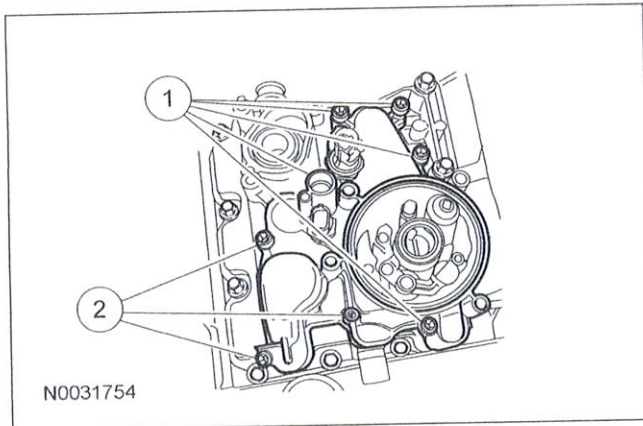


4. Install the gasket in the oil filter base.

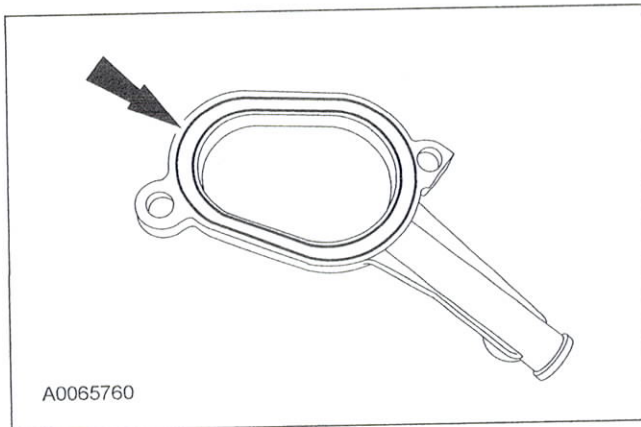


IN-VEHICLE REPAIR (Continued)

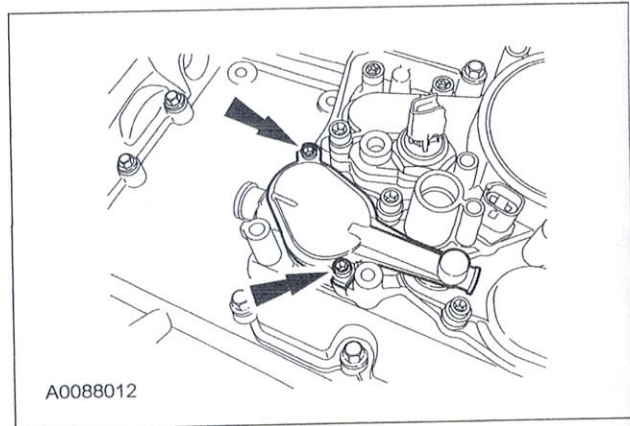
5. Install the press-in-place gasket, the oil filter base and the bolts.
 - 1 Tighten to 22 Nm (16 lb-ft).
 - 2 Tighten to 10 Nm (89 lb-in).



6. Install the seal on the EGR cooler coolant supply port cover.



7. Install a new press-in-place gasket, the EGR cooler coolant supply port cover and the bolts.
 - Tighten to 10 Nm (89 lb-in).



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