

Intake Manifold: Service and Repair

Intake Manifold

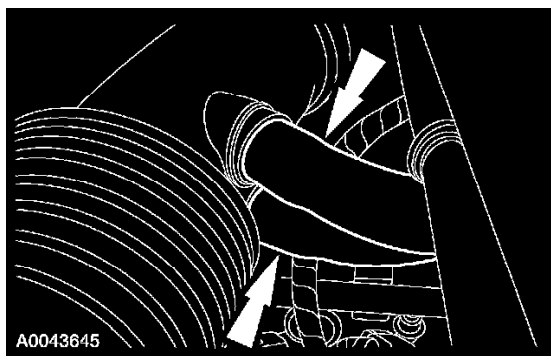
Removal

All vehicles

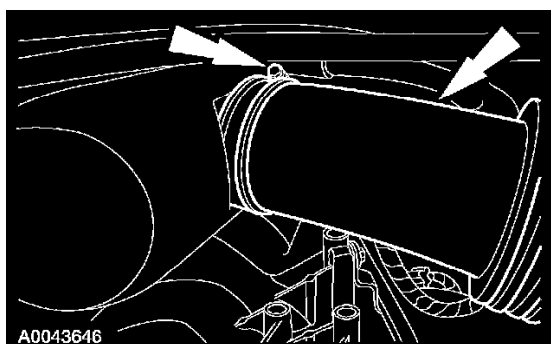
WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related components. Highly flammable mixtures are always present and can be ignited, resulting in possible personal injury.

WARNING: Fuel in the fuel system remains under high pressure even when the engine is not running.

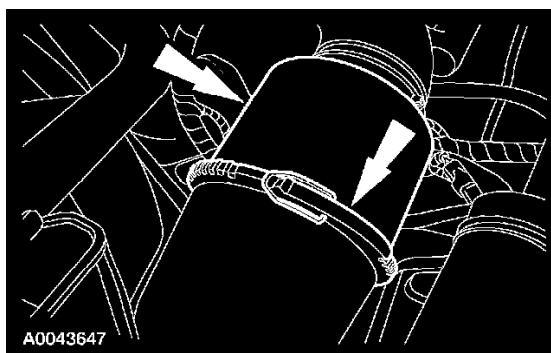
1. Disconnect the battery ground cable.
2. Relieve the fuel system pressure.
3. Drain the cooling system.



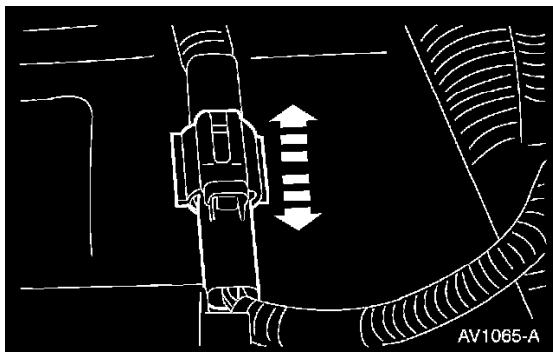
4. Disconnect the Idle Air Control (IAC) fresh air tube and crankcase ventilation tube from the air cleaner outlet pipe.



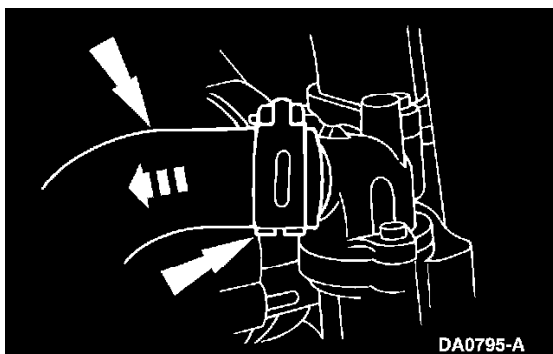
5. Loosen the clamp and disconnect the air cleaner outlet pipe from the throttle body.



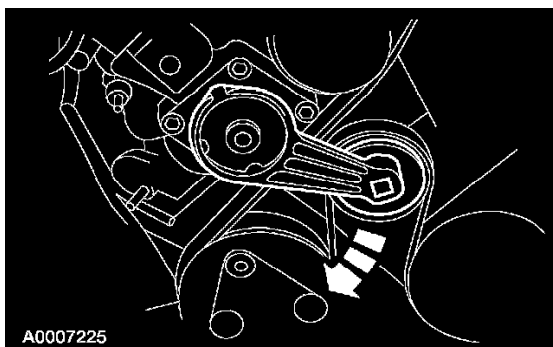
6. Release the clamp and separate the air cleaner outlet housing from the air cleaner inlet housing.



7. Disconnect the Mass Air Flow (MAF) sensor electrical connector and remove the air cleaner, air cleaner outlet housing and the air cleaner outlet pipe from the vehicle.

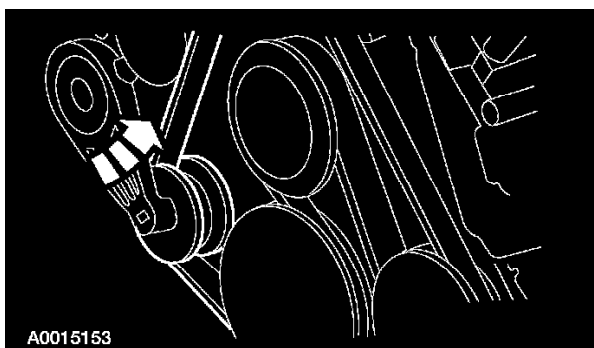


8. Compress and slide the hose clamp and disconnect the upper radiator hose.



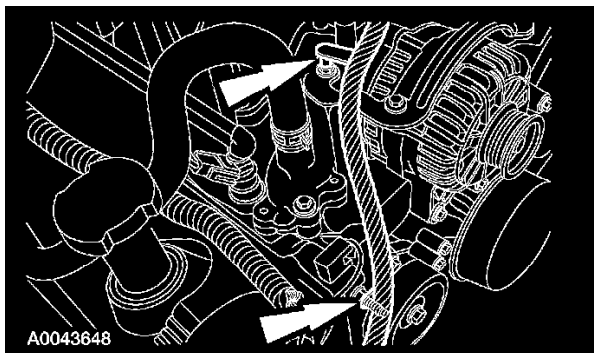
Vehicles with A/C

9. Rotate the belt tensioner clockwise and remove the belt from the generator pulley.

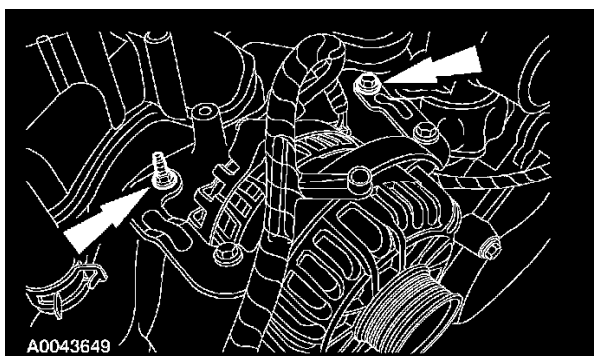


Vehicles without A/C

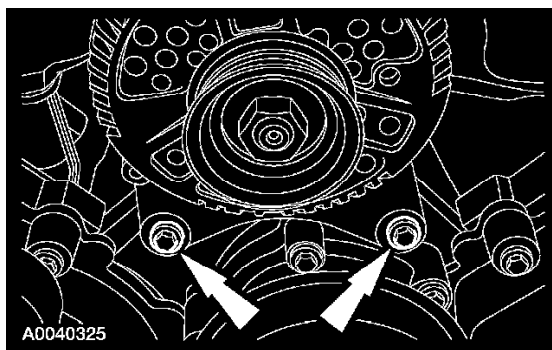
10. Rotate the belt tensioner counterclockwise and remove the belt from the generator pulley.



11. Remove the harness routing clips from the generator stud and the engine front cover.



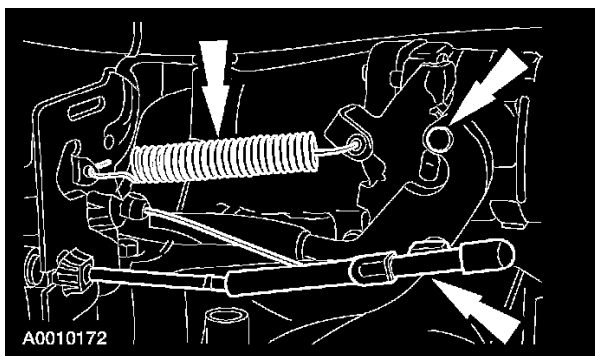
12. Remove the generator upper mounting bracket stud and bolt.



13. Remove the generator lower mounting bolts and position the generator aside.

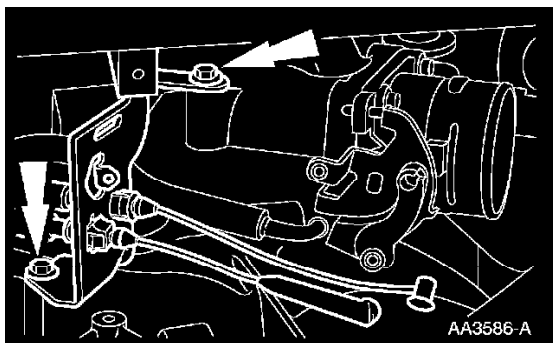


14. Remove the accelerator control splash shield.



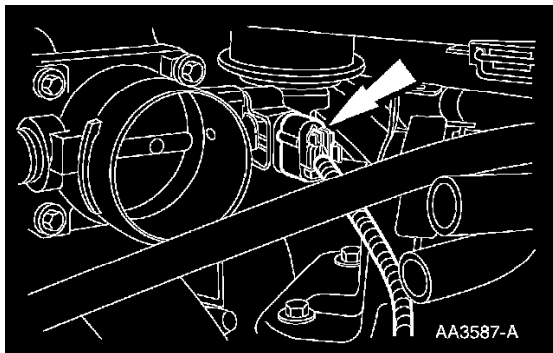
15. Disconnect the throttle body cam.

- ^ Disconnect the accelerator cable.
- ^ If equipped, disconnect the speed control cable.
- ^ Remove the throttle return spring.

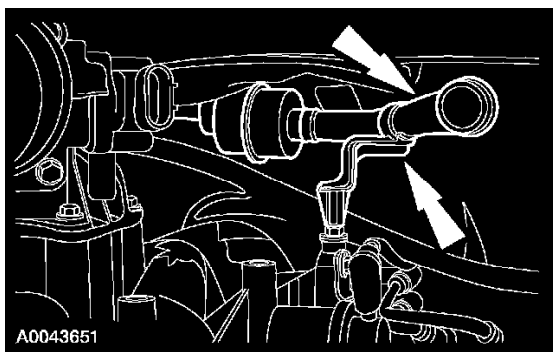


16. Position the accelerator cable bracket aside.

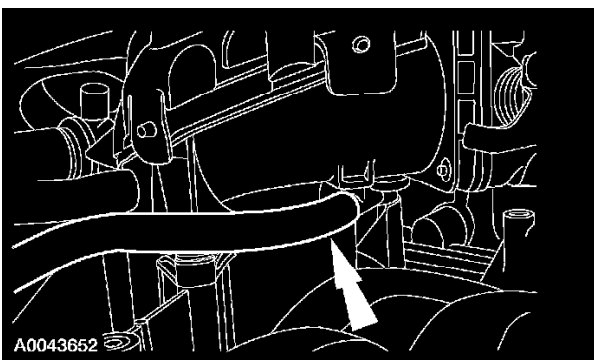
- ^ Remove the bolts.
- ^ Position the accelerator cable bracket aside.



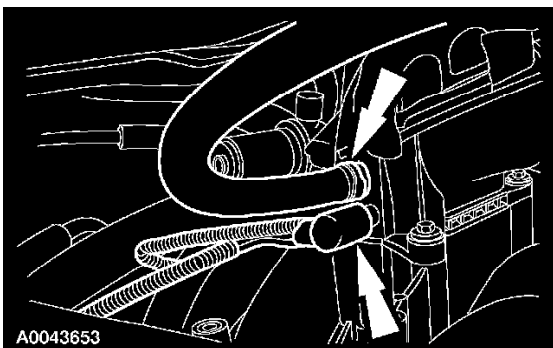
17. Disconnect the Throttle Position (TP) sensor electrical connector.



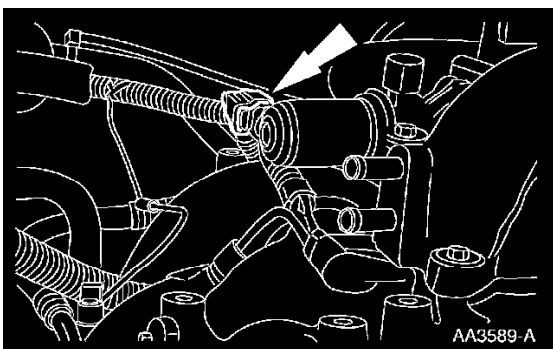
18. Release the IAC fresh air tube from the routing clip and remove it from the vehicle.



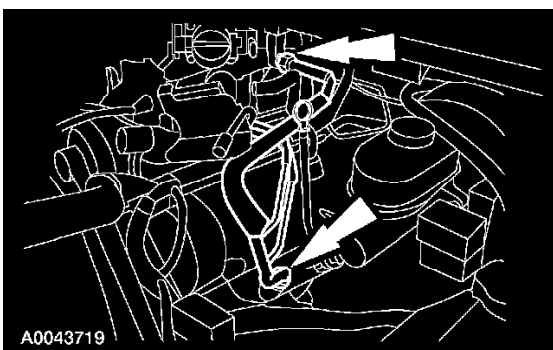
19. Disconnect the Evaporative Emission (EVAP) canister purge valve vacuum hose from the throttle body adapter.



20. Disconnect the brake booster vacuum hose and main vacuum harness from the throttle body adapter.

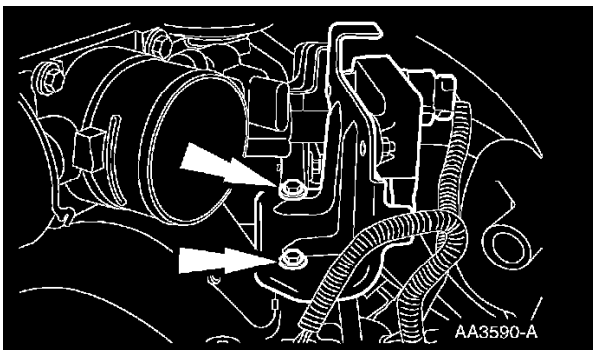


21. Disconnect the IAC electrical connector.

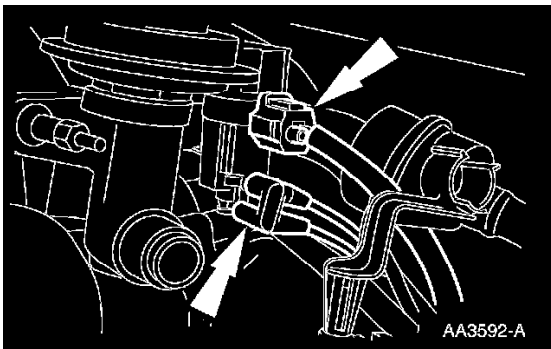


Vehicles with EGR system

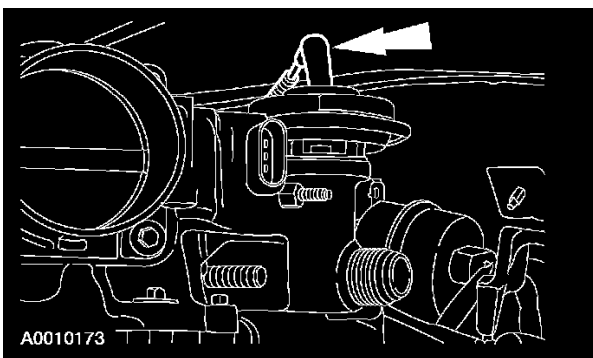
22. Position the exhaust manifold to Exhaust Gas Recirculation (EGR) valve tube aside.
- ^ Disconnect the upper fitting.
 - ^ Loosen the lower fitting.
 - ^ Position the exhaust manifold to EGR valve tube aside.



23. Position the differential pressure feedback EGR system bracket aside.
- ^ Remove the bolts.
 - ^ Position the bracket aside.

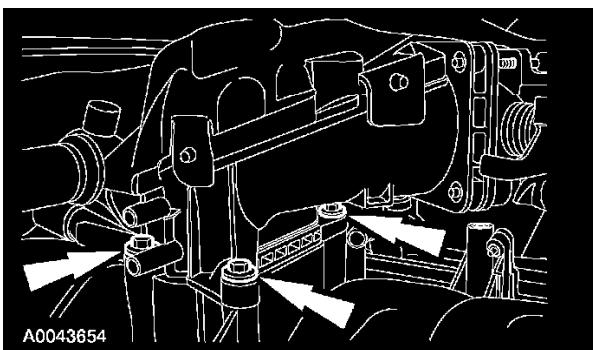


24. Disconnect the EGR vacuum regulator solenoid connections.

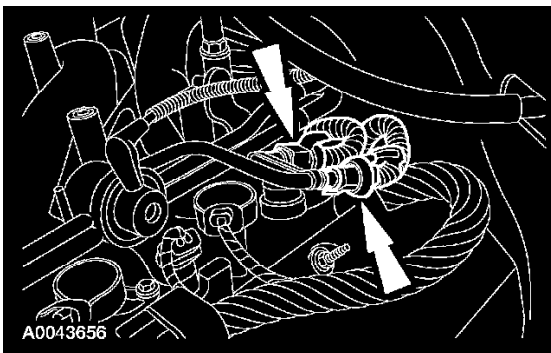


25. Disconnect the EGR valve vacuum hose.

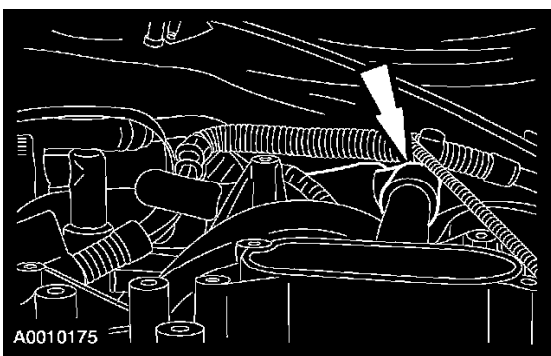
All vehicles



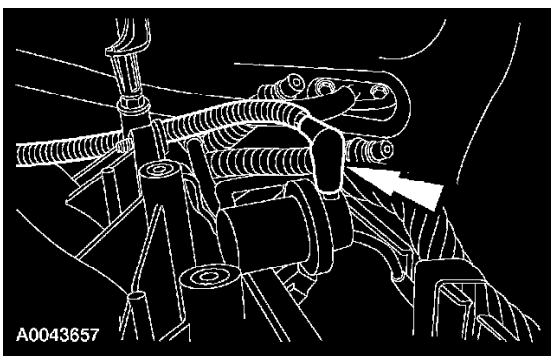
26. Remove the throttle body adapter.
- ^ Remove the four bolts.
 - ^ Remove the throttle body adapter.
 - ^ Remove and discard the throttle body gasket.



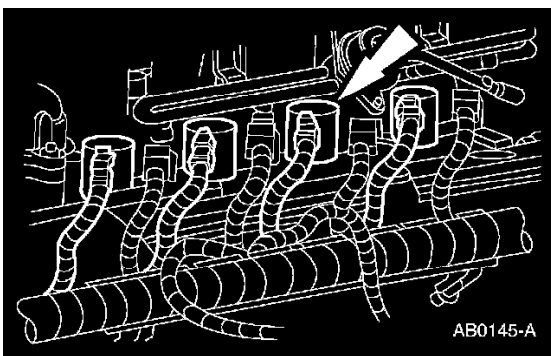
27. Disconnect the fuel tubes.



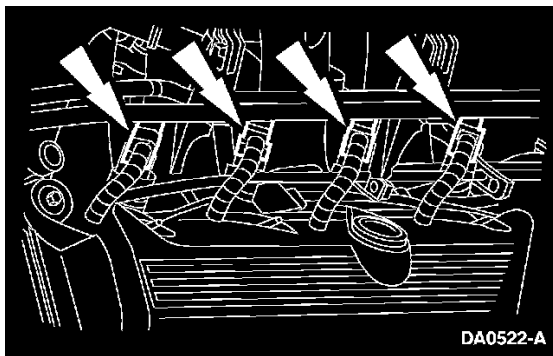
28. Disconnect the Positive Crankcase Ventilation (PCV) valve tube from the intake manifold.



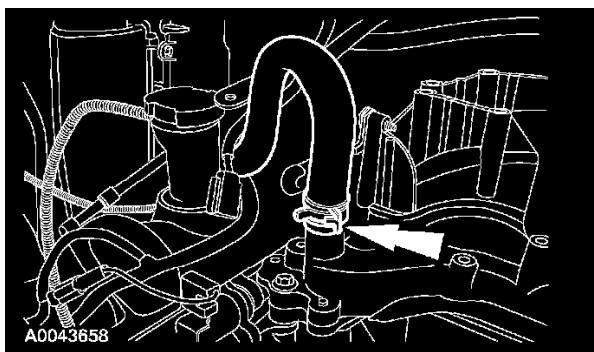
29. Disconnect the fuel pressure regulator vacuum hose.



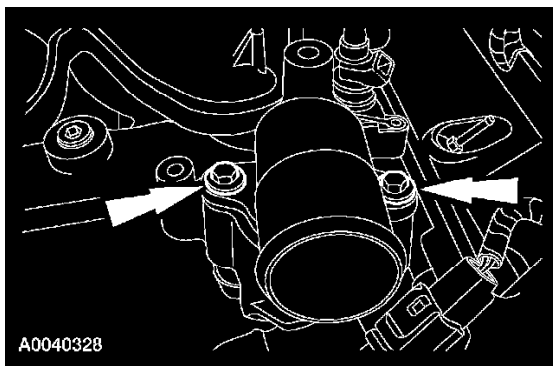
30. Disconnect the eight ignition coil electrical connectors and remove the coils.



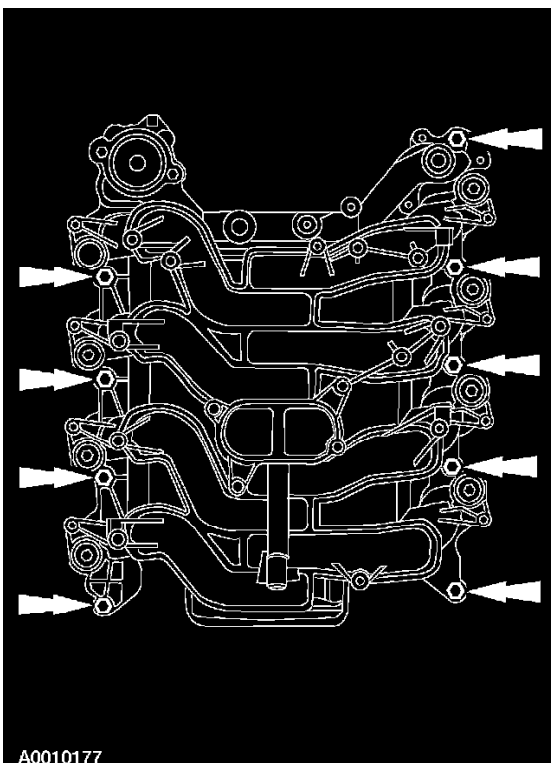
31. Disconnect the eight fuel injector electrical connectors.



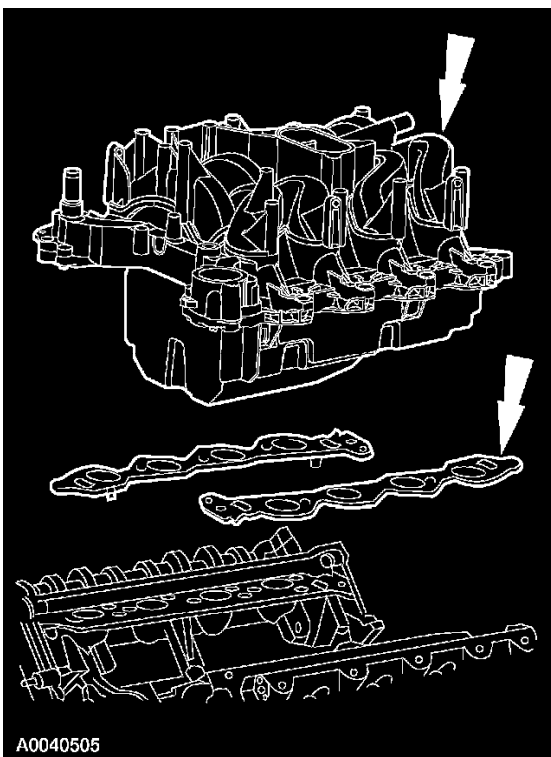
32. Disconnect the hose clamp and remove the heater water hose.



33. Remove the bolts, water thermostat housing, O-ring seal and the water thermostat.
^ Discard the O-ring seal.



34. Remove the bolts.



35. Remove the intake manifold.

^ Lift the intake manifold.

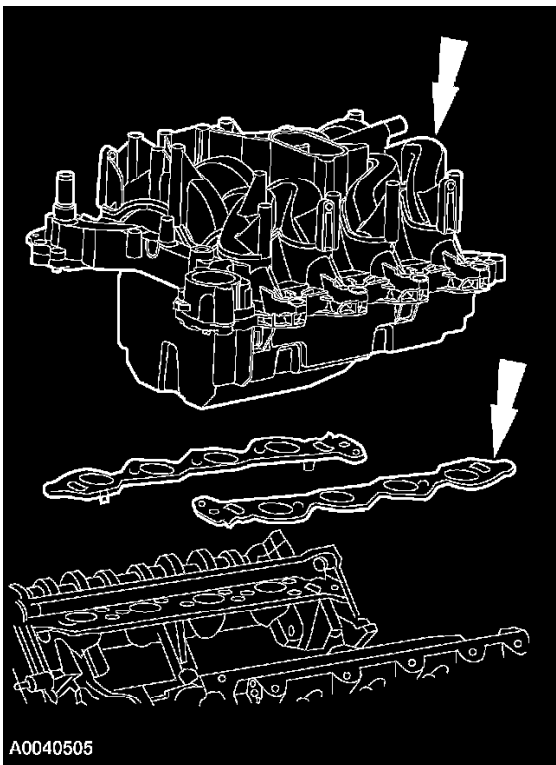
^ Remove and discard the intake manifold gaskets.

36. **CAUTION:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces.

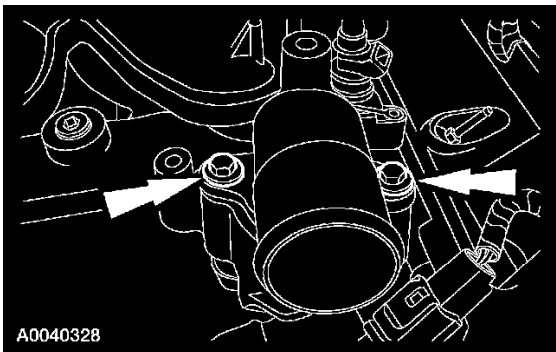
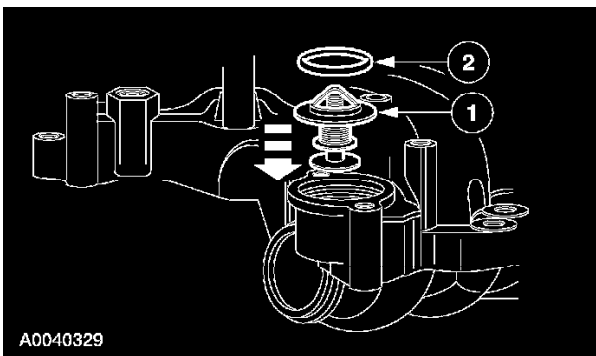
These tools cause scratches and gouges that make leak paths. Clean all mating surfaces.

Installation

All vehicles

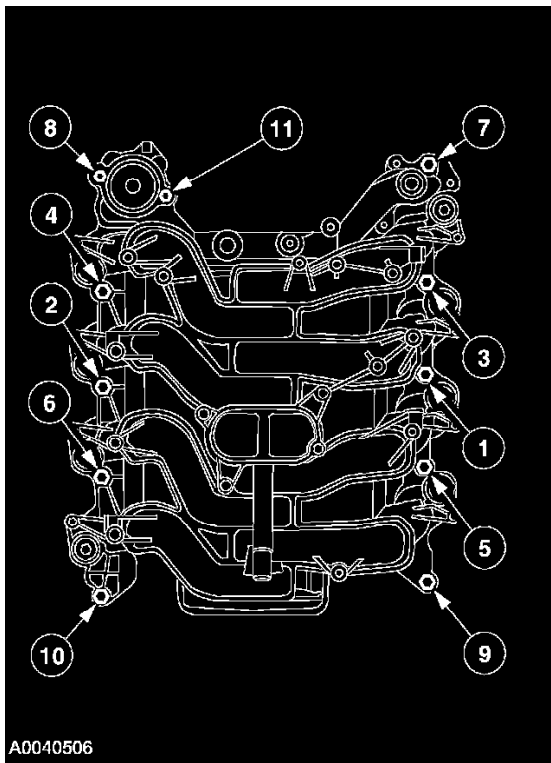


1. Install the intake manifold.
 - ^ Position the intake manifold gaskets.
 - ^ Position the intake manifold.
 - ^ Loosely install the nine bolts.



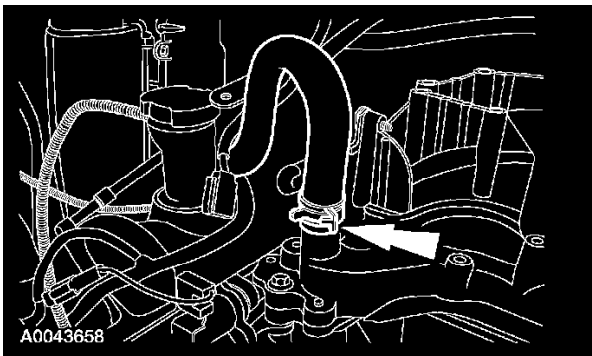
2. Install the water thermostat.
 - ^ Install the thermostat.
 - ^ Install a new O-ring seal.
3. **NOTE:** The thermostat housing bolts are tightened in sequence with the intake manifold bolts. Do not tighten the thermostat housing bolts during thermostat installation.

Install the water thermostat housing and loosely install the bolts.

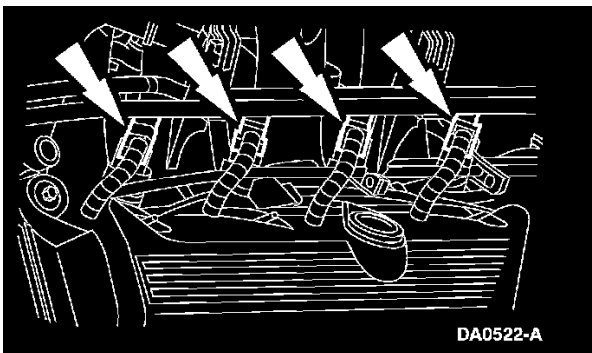


4. Tighten the bolts in two stages, in the sequence shown.

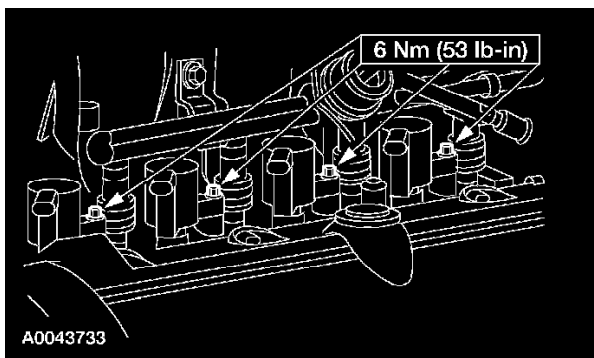
- 1 Stage 1: Tighten to **2 Nm (18 inch lbs.)**.
- 2 Stage 2: Tighten to **25 Nm (18 ft. lbs.)**.



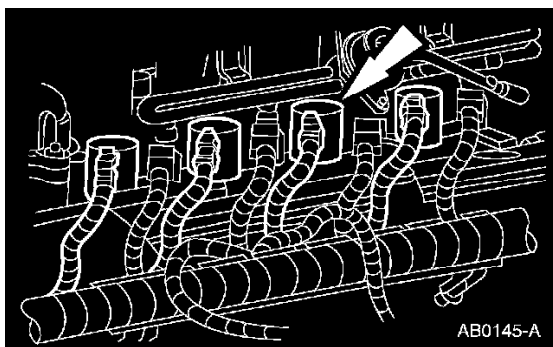
5. Install the heater water hose and position the clamp.



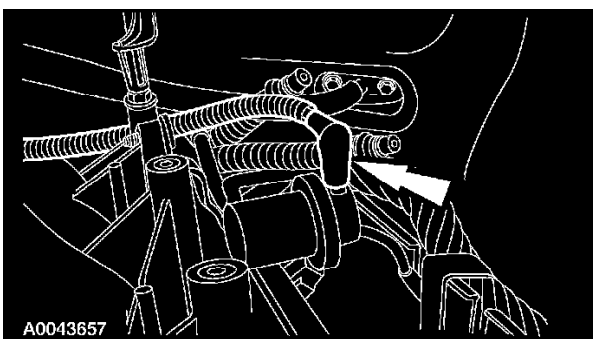
6. Connect the eight fuel injector electrical connectors.



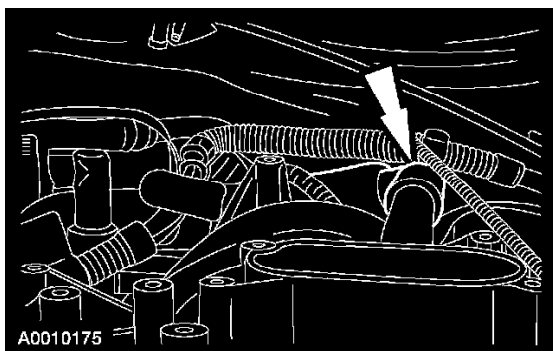
7. Install the eight ignition coils.



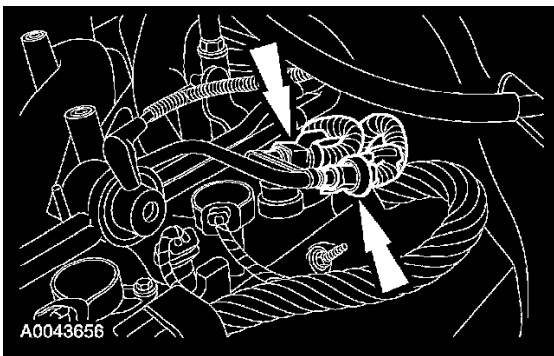
8. Connect the eight ignition coil electrical connectors.



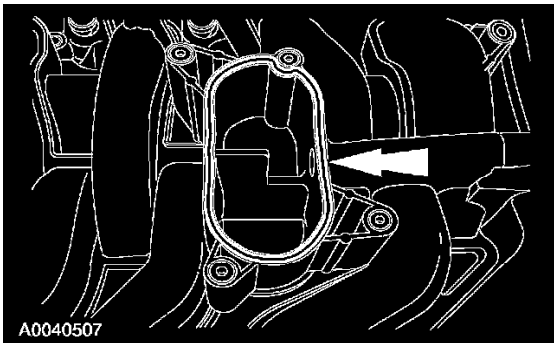
9. Position the vacuum harness and connect the fuel pressure regulator vacuum hose.



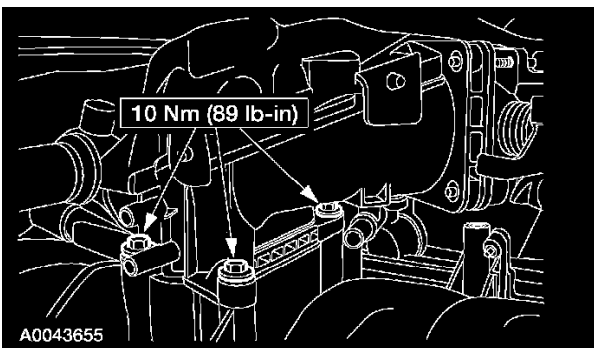
10. Connect the PCV valve tube to the intake manifold.



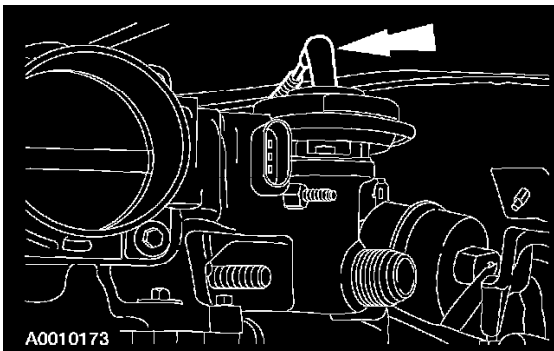
11. Connect the fuel tubes and install the safety clips.



12. Install a new throttle body adapter gasket.

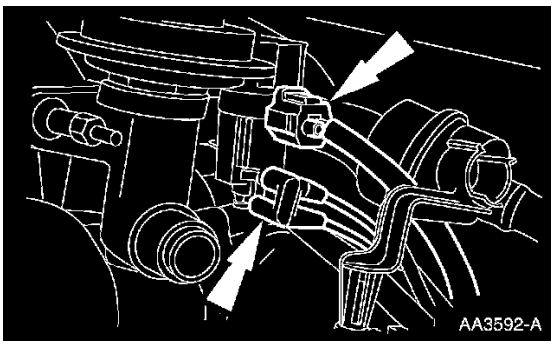


13. Install the throttle body adapter.
 - ^ Position the throttle body adapter.
 - ^ Install the four bolts.

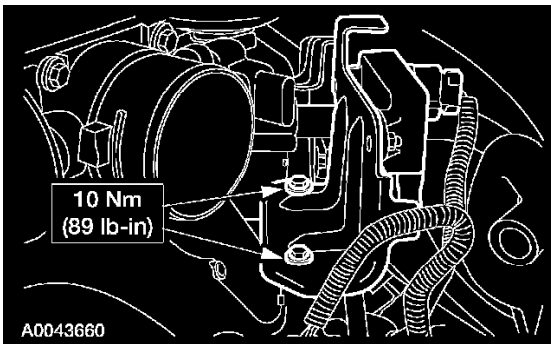


Vehicles with EGR system

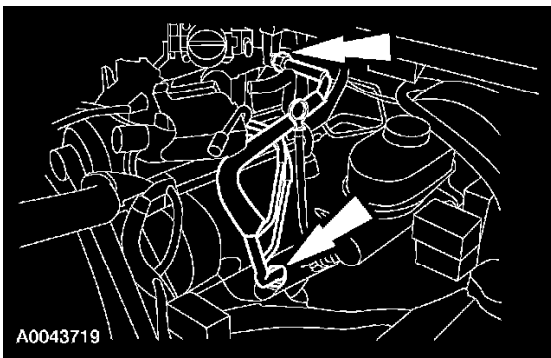
14. Connect the EGR valve vacuum hose.



15. Connect the EGR vacuum regulator solenoid connections.

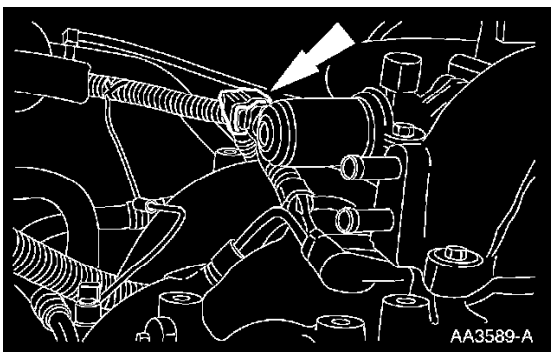


16. Install the differential pressure feedback EGR system bracket.

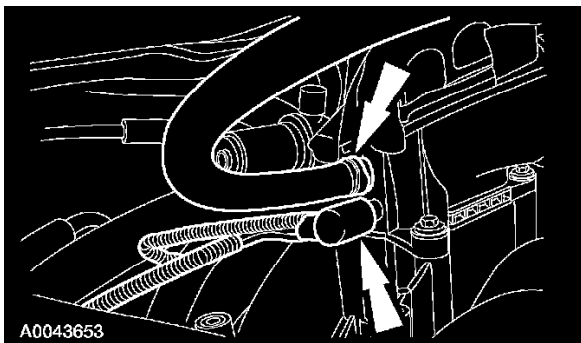


17. Connect the exhaust manifold to EGR valve tube upper fitting.
- ^ Tighten both fittings starting at the top in three steps.
 - ^ Hand-tighten.
 - ^ Tighten the upper fitting to **40 - 60 Nm (30 - 44 ft. lbs.)**.
 - ^ Tighten the lower fitting to **40 - 60 Nm (30 - 44 ft. lbs.)**.

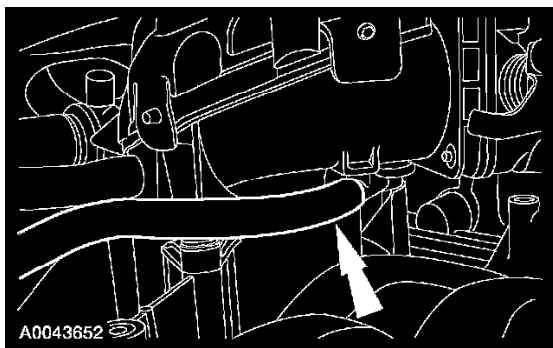
All vehicles



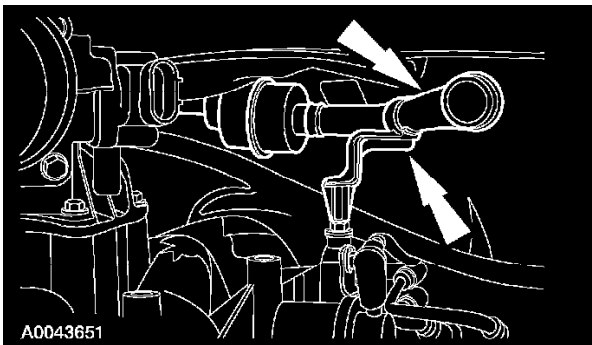
18. Connect the IAC electrical connector.



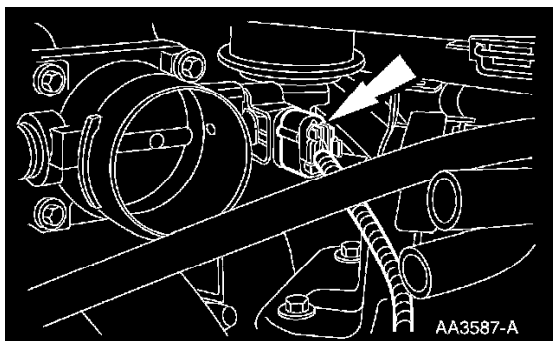
19. Connect the brake booster vacuum hose and main vacuum harness to the throttle body adapter.



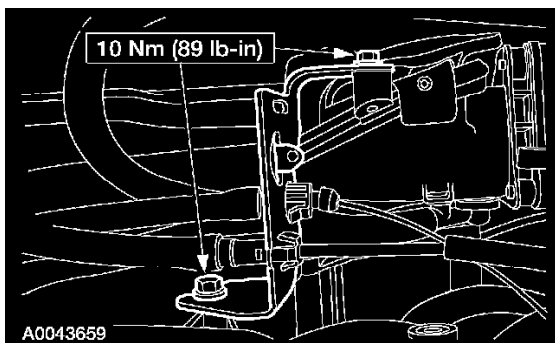
20. Connect the evaporative emission canister purge valve vacuum hose to the throttle body adapter.



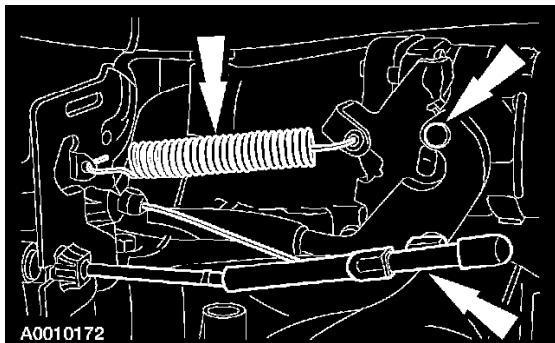
21. Install the IAC fresh air tube and insert it in the routing clip.



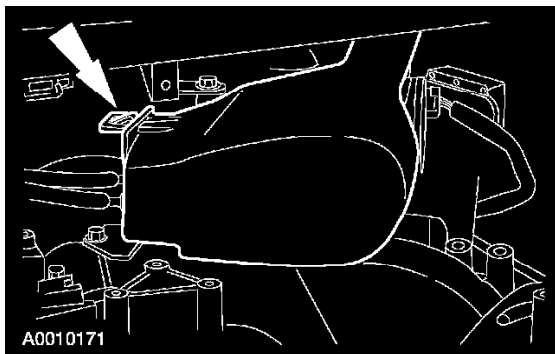
22. Connect the TP sensor electrical connector.



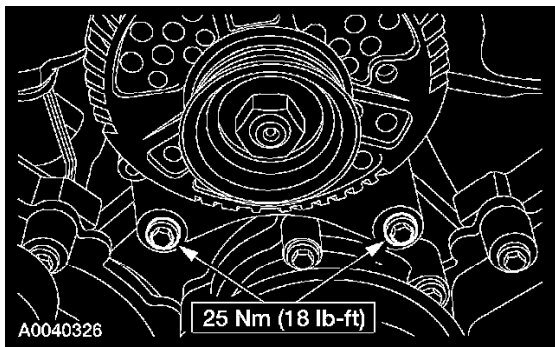
23. Install the accelerator cable bracket.
- ^ Position the accelerator cable bracket.
 - ^ Install the bolts.



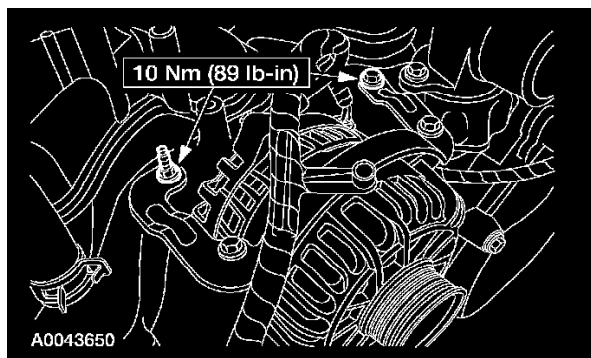
24. Connect the throttle body cam.
- ^ Connect the accelerator cable.
 - ^ If equipped, connect speed control cable.
 - ^ Install the return spring.



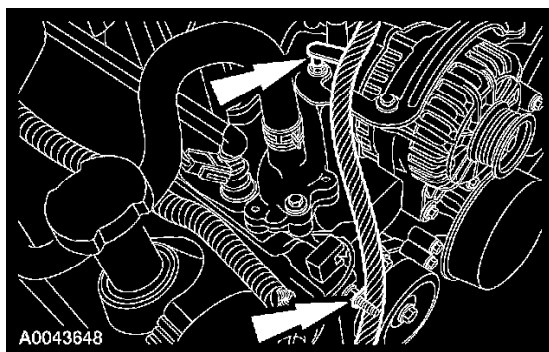
25. Install the accelerator control splash shield.



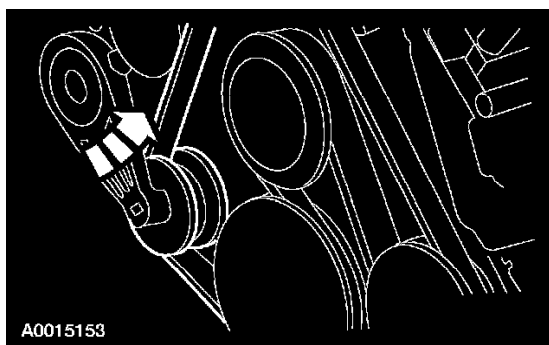
26. Position the generator and install the lower mounting bolts.



27. Install the generator upper mounting bracket stud and bolt.

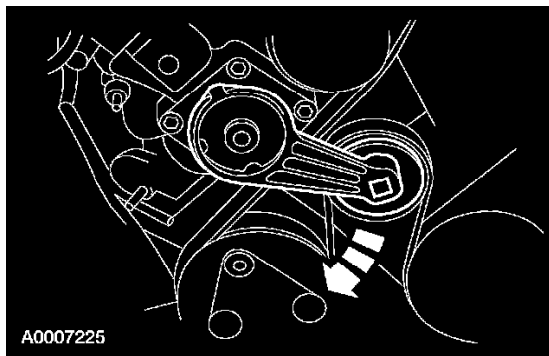


28. Install the harness routing clips on the generator stud and the engine front cover.



Vehicles without A/C

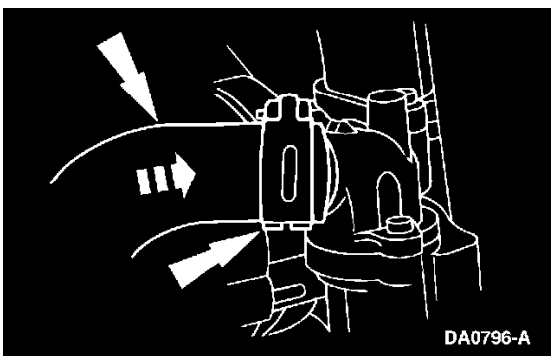
29. Rotate the belt tensioner counterclockwise and install the belt on the generator pulley.



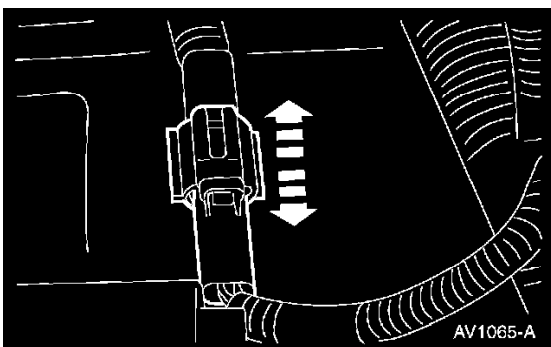
Vehicles with A/C

30. Rotate the belt tensioner clockwise and install the belt on the generator pulley.

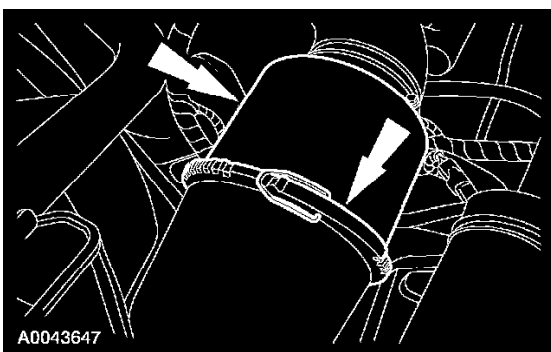
All vehicles



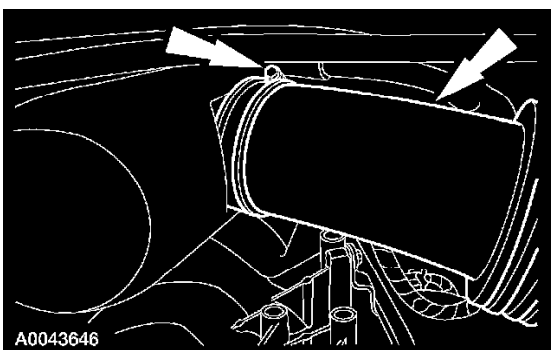
31. Install the upper radiator hose and reposition the clamp.



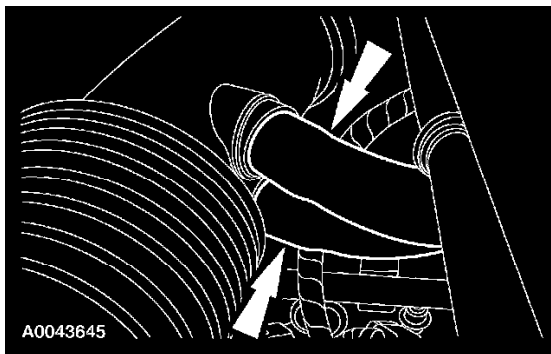
32. Position the air cleaner, air cleaner outlet housing and the air cleaner outlet pipe in the vehicle and connect the MAF sensor electrical connector.



33. Join the air cleaner outlet housing to the air cleaner inlet housing and secure the clamp.



34. Connect the air cleaner outlet pipe to the throttle body and tighten the clamp.



35. Connect the IAC fresh air tube and crankcase ventilation tube to the air cleaner outlet pipe.
36. Fill the cooling system.
37. Connect the battery ground cable.