

IN-VEHICLE REPAIR

Cylinder Head

Special Tool(s)

 412-108	Remover/Installer, hose clamp 412-108 (T96P-18539-A)
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General Equipment

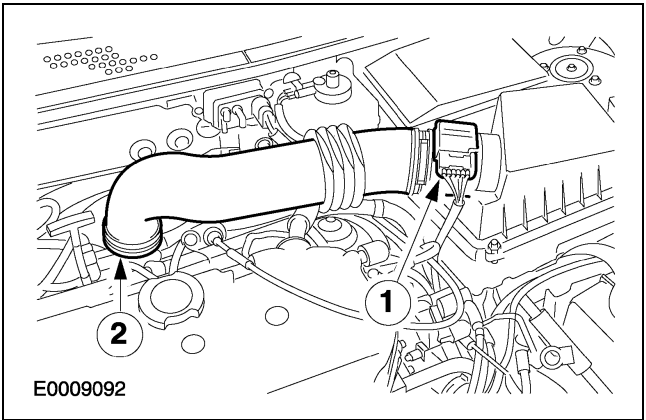
Cable ties

Material

Item	Specification
Engine oil	WSS-M2C153-H

Removal

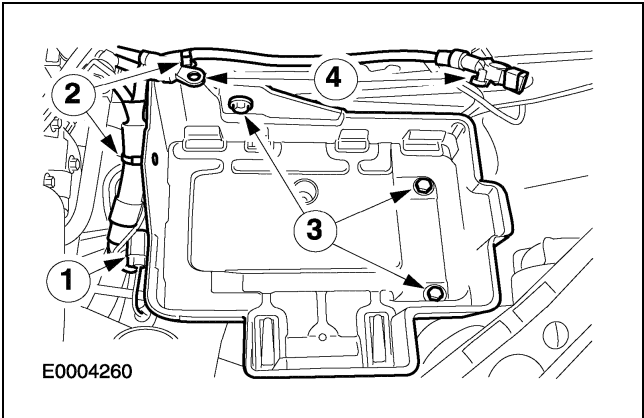
1. Remove the air cleaner housing.
 - 1 Disconnect the mass air flow (MAF) electrical connector.
 - 2 Detach the intake hose.
 - Remove the air cleaner housing from the rubber bushing.



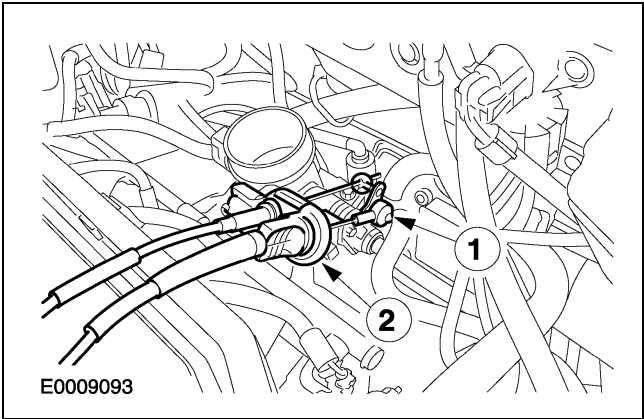
2. **CAUTION:** Disconnect the battery positive and the ground cable. Remove the battery.

Remove the battery tray and detach the ground cable.

- 1 Detach and separate the connector.
- 2 Detach the wiring harness.
- 3 Unscrew the bolts.
- 4 Detach the positive and negative cables.

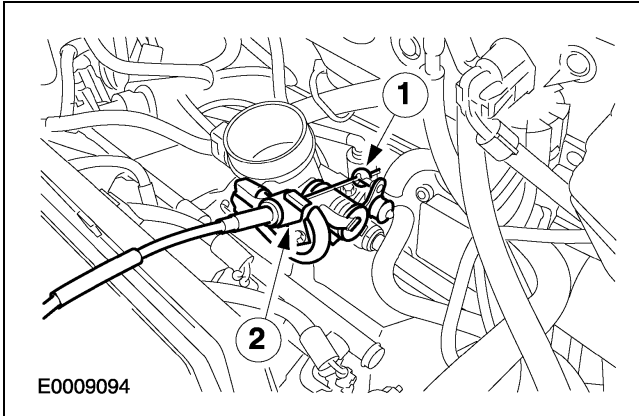


3. Detach the accelerator cable.
 - 1 Unhook the cable.
 - 2 Pull off the plastic clip and lay the accelerator cable to one side.

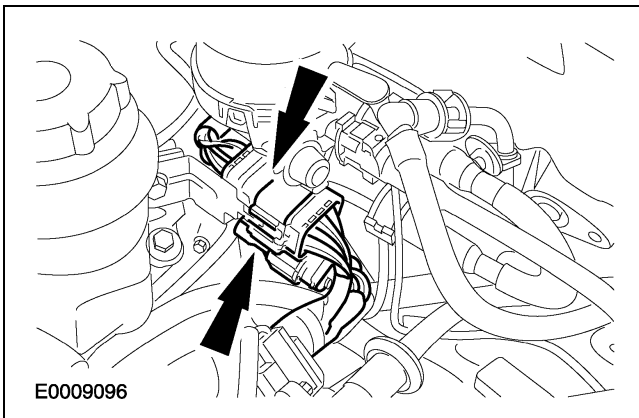


IN-VEHICLE REPAIR (Continued)

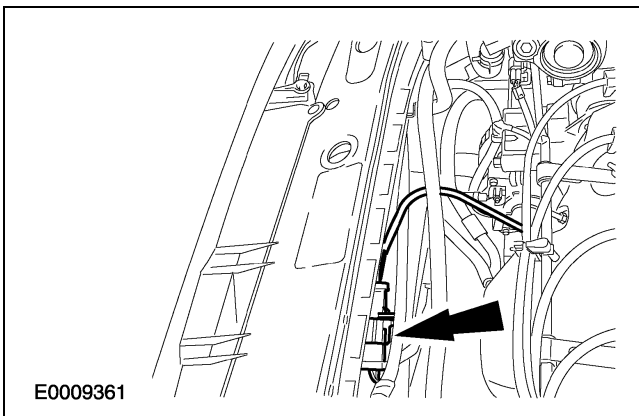
4. Remove the speed control cable.
 - 1 Unhook the cable.
 - 2 Pull off the plastic clip and lay the speed control cable to one side.



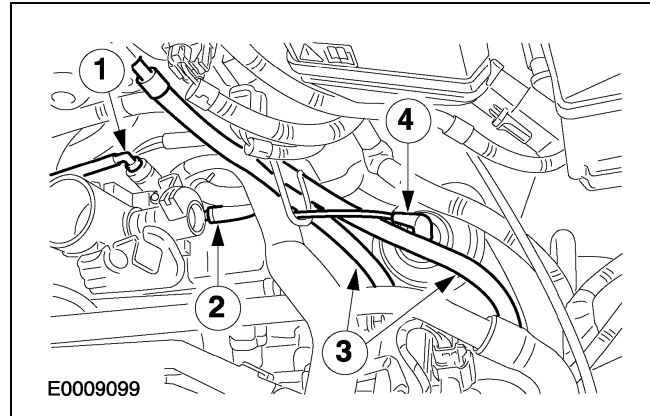
5. Disconnect the both powertrain control module (PCM) connectors.



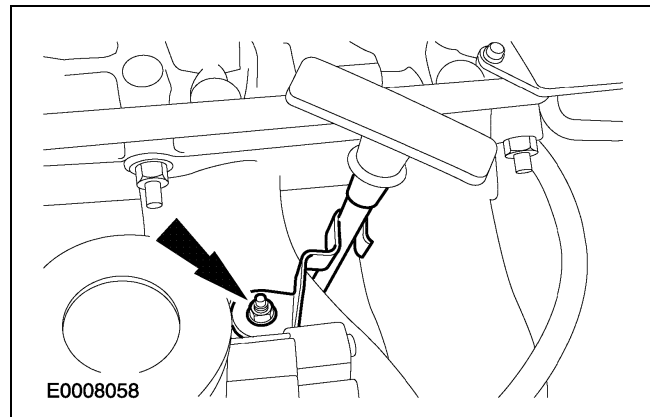
6. Disconnect the heated oxygen sensor (HO2S) electrical connector.



7. Detach the vacuum hoses.
 - 1 EVAP
 - 2 Brake servo
 - 3 Delta Pressure Feedback Electronic System Sensor (DPFE)
 - 4 Exhaust gas recirculation (EGR) valve

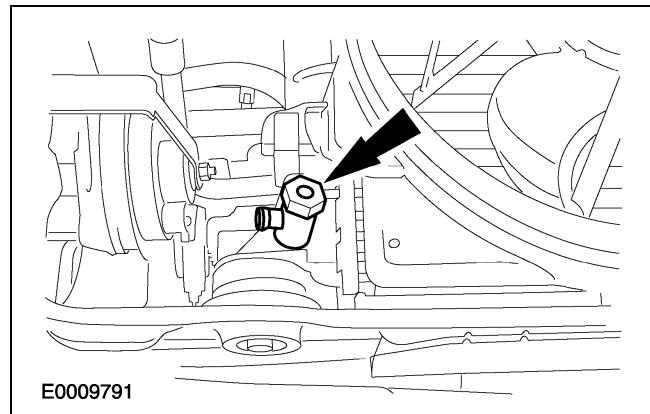


8. Remove the nut and the oil level indicator tube.



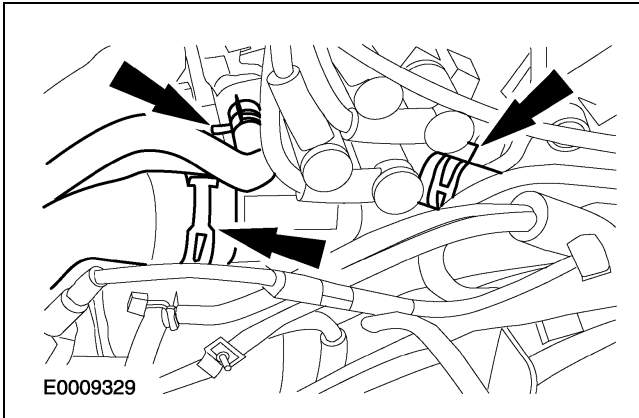
9.  **WARNING: Danger of scalding if the engine is hot.**

Drain the coolant (shown from below).

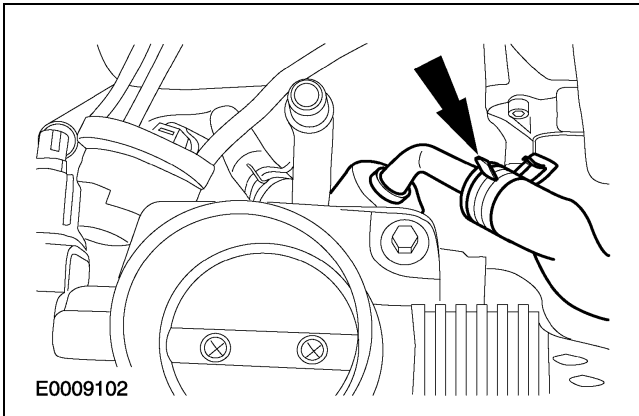



IN-VEHICLE REPAIR (Continued)

10. Remove the coolant hoses from the thermostat housing.



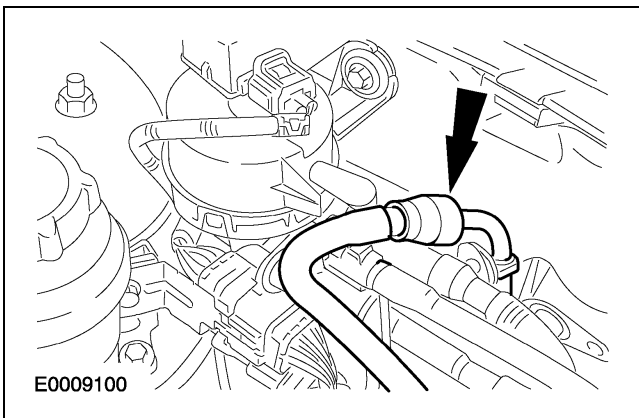
11. Remove the coolant hose.



12.  **WARNING: Escaping fuel. Observe the safety regulations for working with fuel. Failure to follow these instruction may result in personal injury.**

Drain off the fuel. For additional information, refer to Section 310-00.

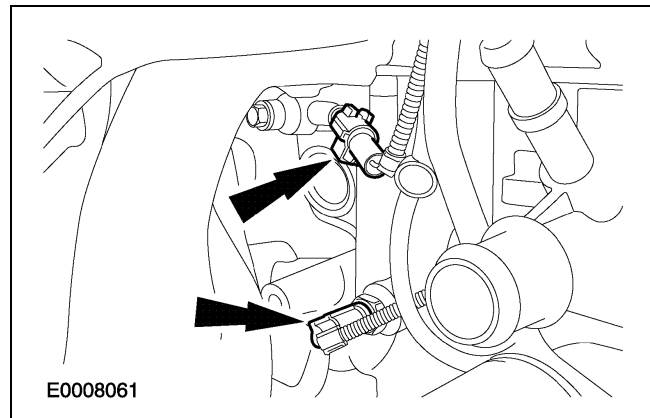
- Detach the fuel hose.



13. Raise and support the vehicle. For additional information, refer to Section 100-02.

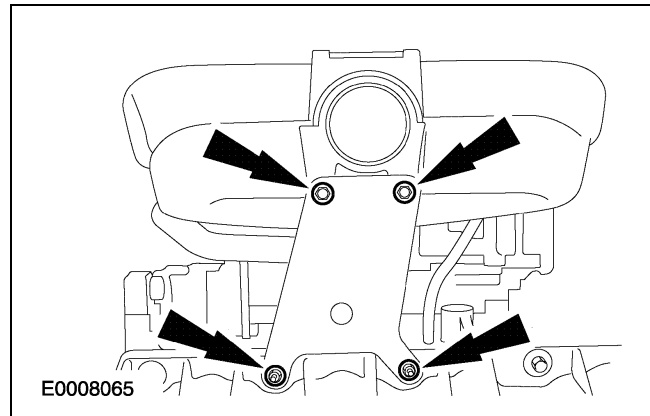
14. Disconnect the knock sensor (KS) and the oil pressure switch electrical connectors (shown from below).

- 1 Oil pressure switch
- 2 Knock sensor



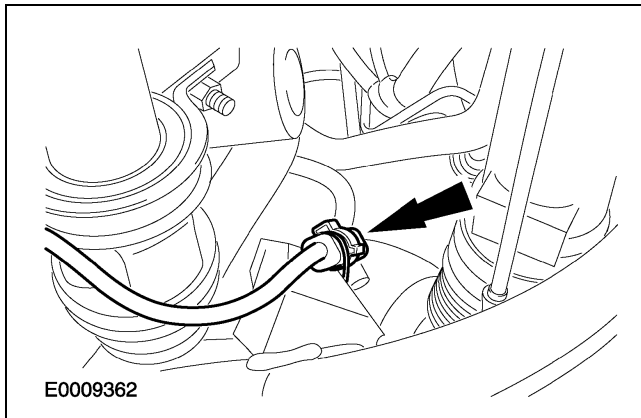
15. Detach the intake manifold bracket.

- Loosen the nuts and remove the bolts.



IN-VEHICLE REPAIR (Continued)

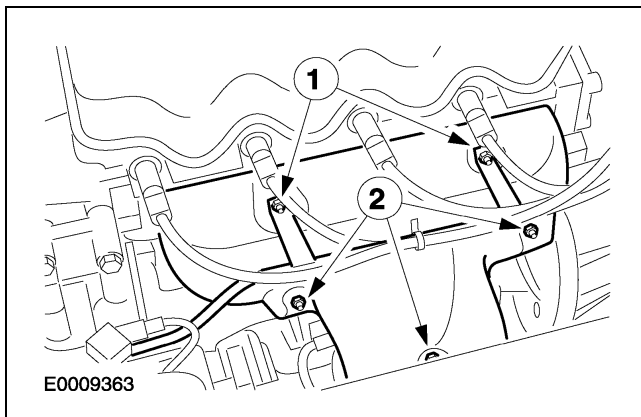
16. Disconnect and remove the catalyst monitor sensor electrical connector.



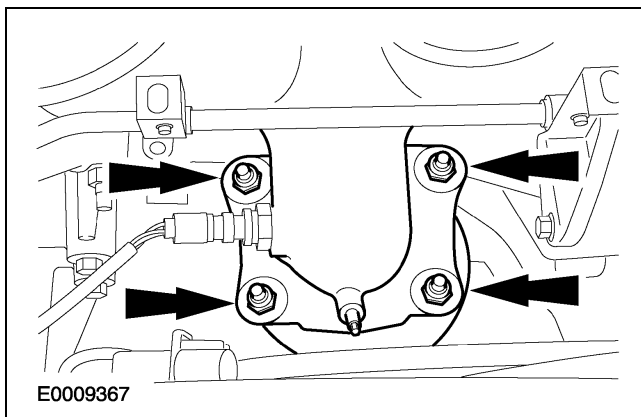
17. Lower the vehicle.

18. Remove the heat shield.

- 1 Power steering pipe
- 2 Heat shield

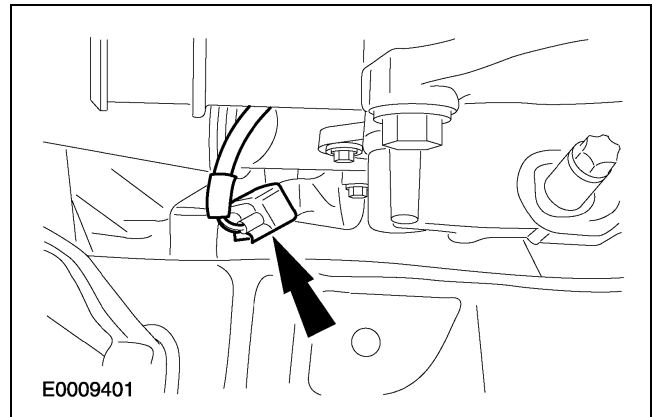


19. Remove the catalytic converter from the exhaust manifold.

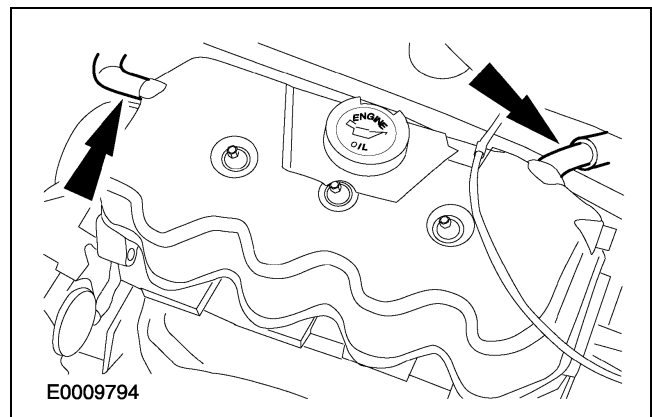


20. Remove the timing belt. For additional information, refer to Timing Belt.

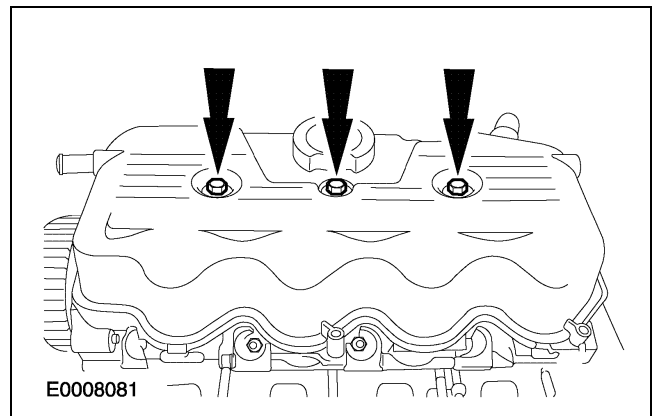
21. Disconnect the crankshaft position sensor (CKP) electrical connector.




22. Disconnect the PCV and the fresh air hoses.



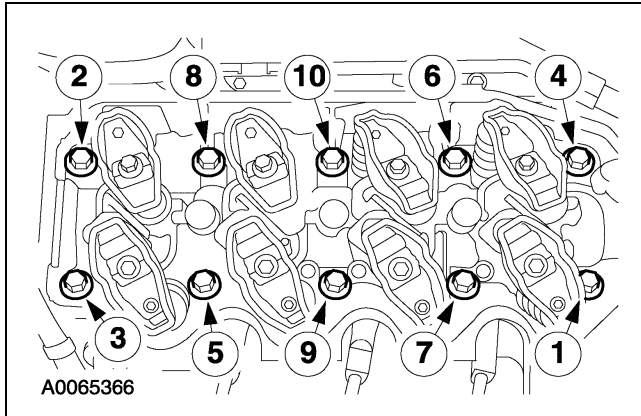
23. Remove the valve cover.



IN-VEHICLE REPAIR (Continued)

24.  **CAUTION:** Do not work on aluminium engine components until the engine is cold.


Loosen the cylinder head bolts in the indicated sequence.



25. Remove the cylinder head.

- Discard the gasket.

Installation

1.  **CAUTION:** Do not use abrasive grinding disk to remove gasket material; use only plastic scrapers. Do not scratch or gouge aluminum sealing surfaces.

Clean all gasket material from the mating surfaces on the cylinder head and cylinder block. Clean out the bolt holes in the cylinder block. Inspect the cylinder head for distortion. For additional information, refer to Section 303-00.

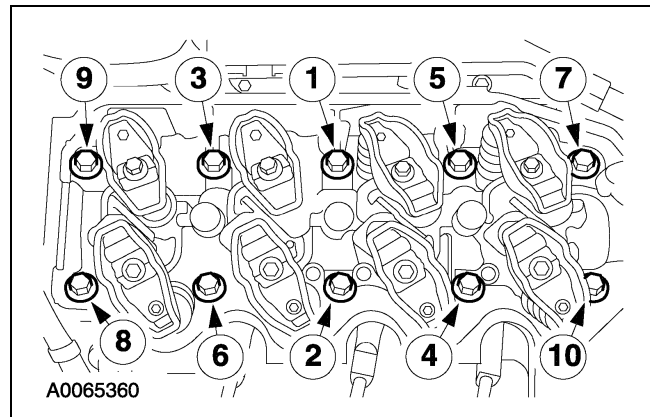
2. Install a new head gasket on the cylinder block.

3.  **CAUTION:** Always install new cylinder head bolts.

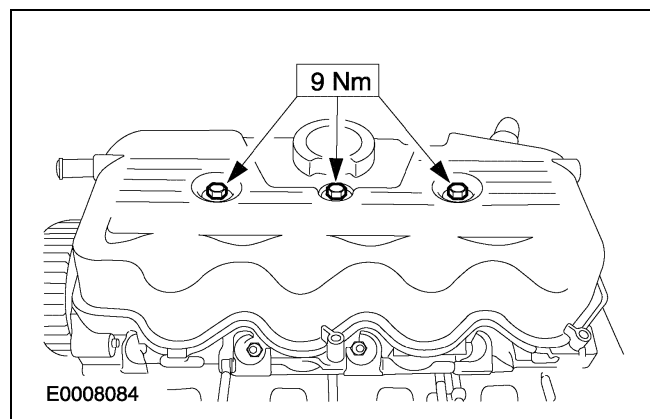
NOTE: Lubricate the cylinder head bolts with engine oil prior to installation.

Install the cylinder head assembly and tighten the cylinder head bolts in the following sequence.

- 1 Tighten all bolts in a single sequence to 50 Nm .
- 2 Back the bolts off 1/2 turn.
- 3 Tighten the bolts in sequence shown to 50 Nm.
- 4 Rotate all the bolts in a single sequence an additional 180 degrees in two steps of 90 degrees each.

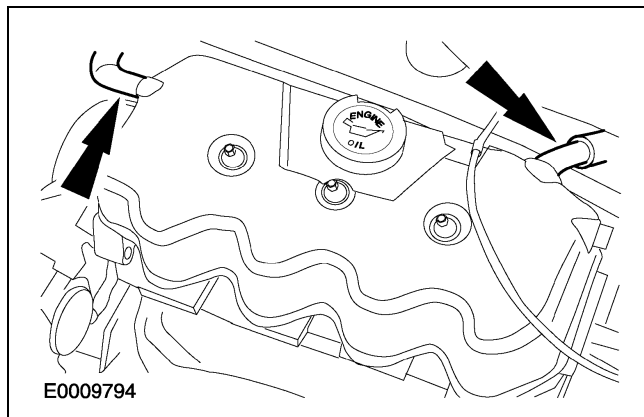


4. Install the valve cover.

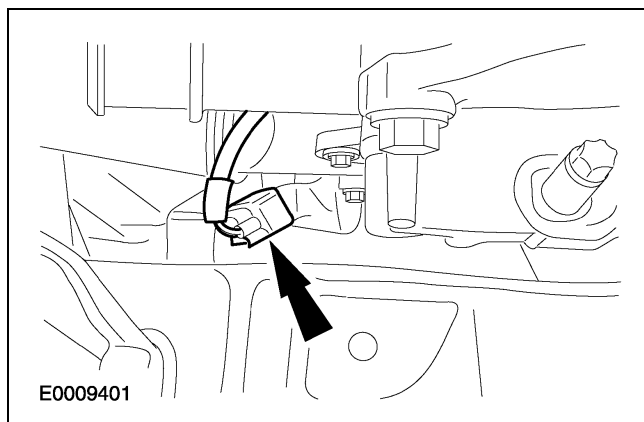


IN-VEHICLE REPAIR (Continued)

5. Connect the fresh air and PCV hoses.
- Make sure that the twist-on PCV is secure.

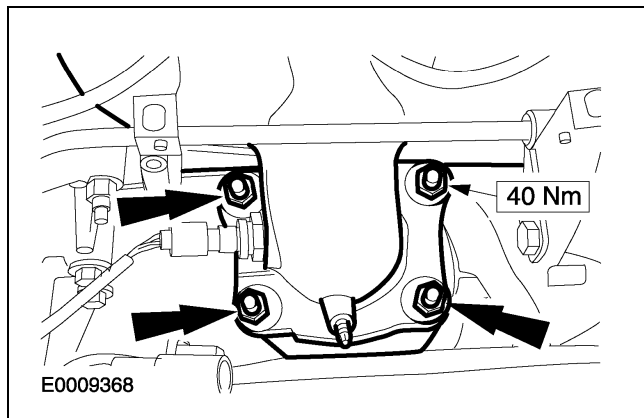


6. Connect the crankshaft position sensor (CKP) electrical connector.

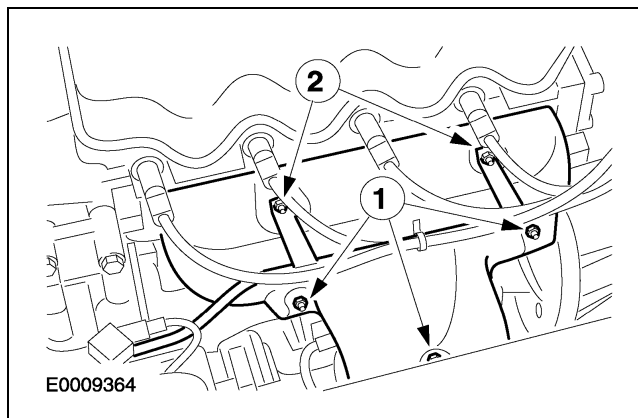


7. Install and tension the timing belt. For additional information, refer to Timing Belt.

8. Install the catalytic converter to the exhaust manifold.

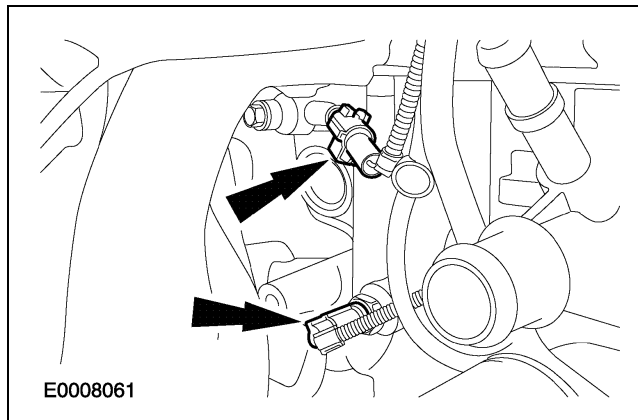


9. Install the heat shield.
- 1 Heat shield
 - 2 Power steering tube

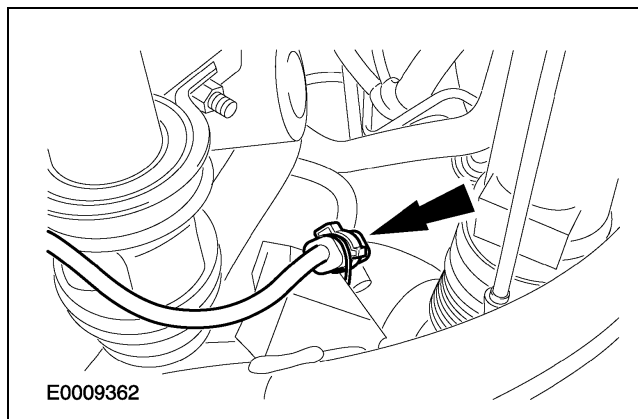


10. Raise and support the vehicle. For additional information, refer to Section 100-02.

11. Connect the knock sensor (KS) and the oil pressure switch electrical connector.



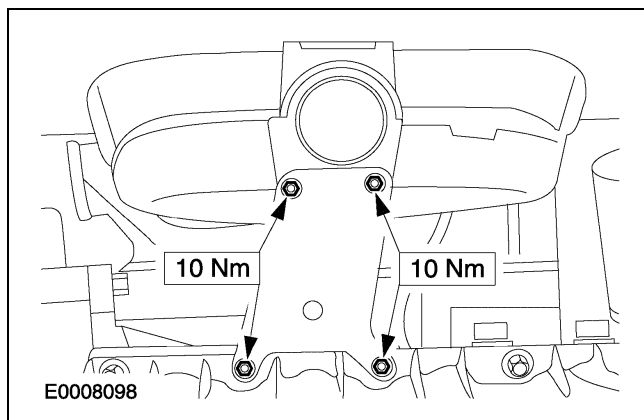
12. Connect the CMS sensor electrical connector.



IN-VEHICLE REPAIR (Continued)

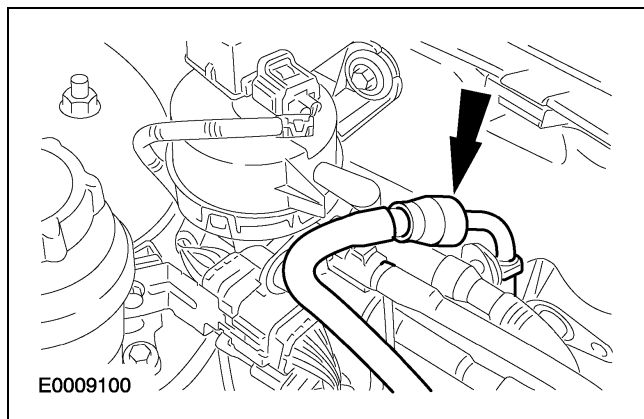
13. Install the intake manifold bracket (shown with engine removed).

1 Install the bolts and tighten the nuts.

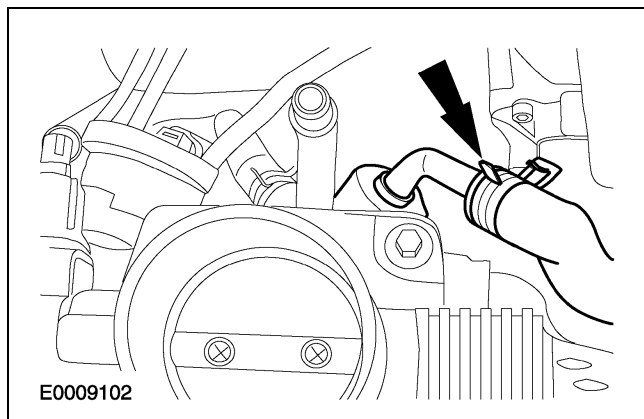


14. Lower the vehicle.

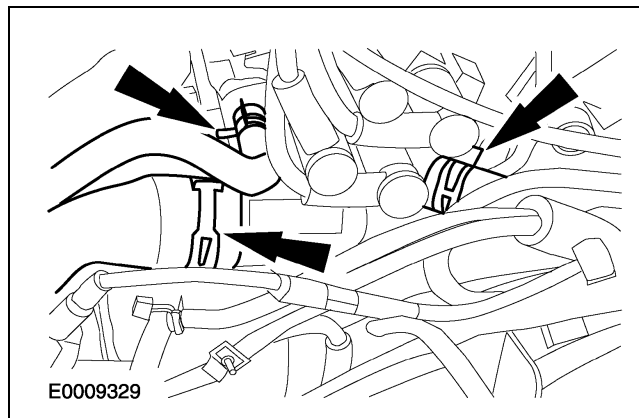
15. Install the fuel hose.



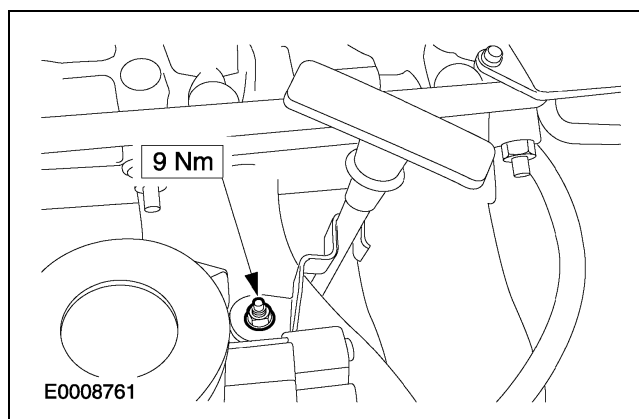
16. Install the coolant hose.



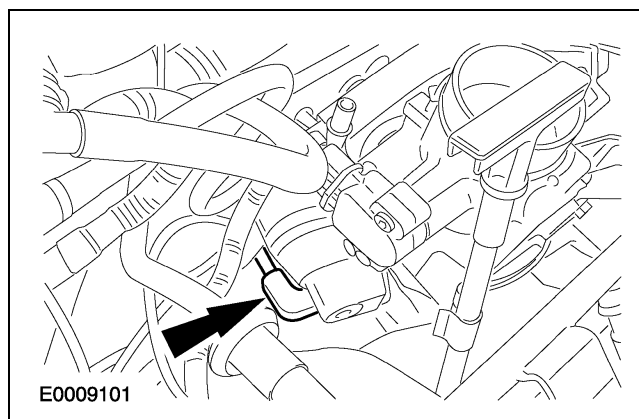
17. Install the coolant hoses to the thermostat housing.



18. Install the oil level indicator tube.



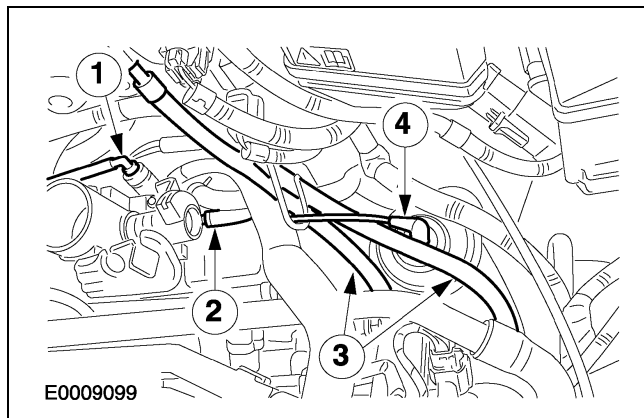
19. Install the vacuum hose.



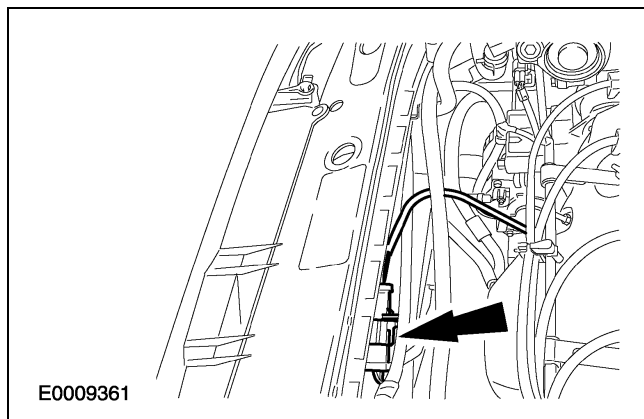
IN-VEHICLE REPAIR (Continued)

20. Install the vacuum hoses.

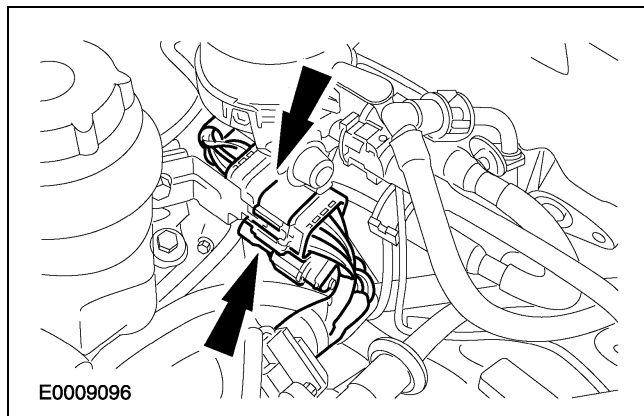
- 1 EVAP
- 2 Brake servo
- 3 Delta Pressure Feedback Electronic System Sensor (DPFE)
- 4 EGR-valve



21. Connect the HO2S electrical connector.

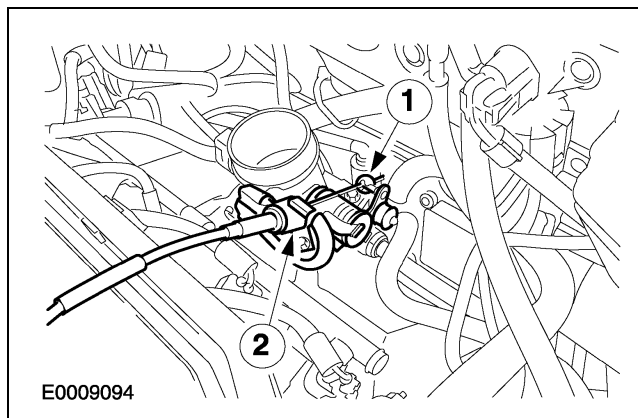


22. Connect both PCM connectors.



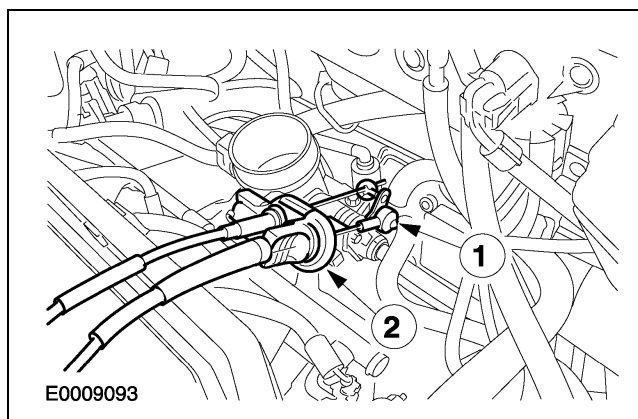
23. Install the speed control cable.

- 1 Install the cable.
- 2 Install the plastic clip.



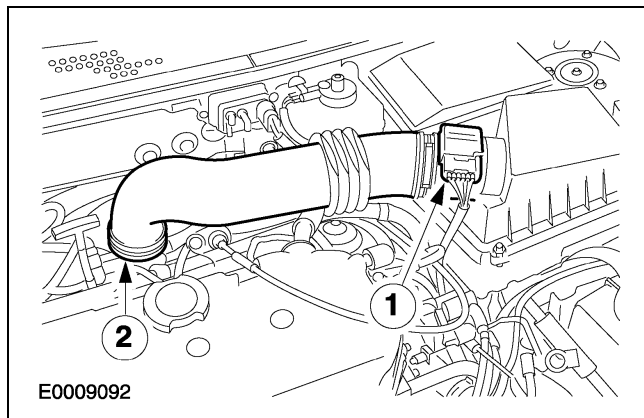
24. Install the accelerator cable.

- 1 Install the cable.
- 2 Install the plastic clip.



IN-VEHICLE REPAIR (Continued)

25. Install the air cleaner housing.
- 1 Connect the MAF electrical connector.
 - 2 Attach the intake hose.
- Install the air cleaner housing to the rubber bushing.



26. Change the engine oil (and the oil filter).
27. Fill the cooling system. For additional information, refer to Section 303-00.
28. Connect the battery ground cable.
29. **NOTE:** When the battery has been disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 miles) or more to relearn the strategy.
- Install the battery. For additional information, refer to Section 414-01.
30. Start the engine and check for leaks.