

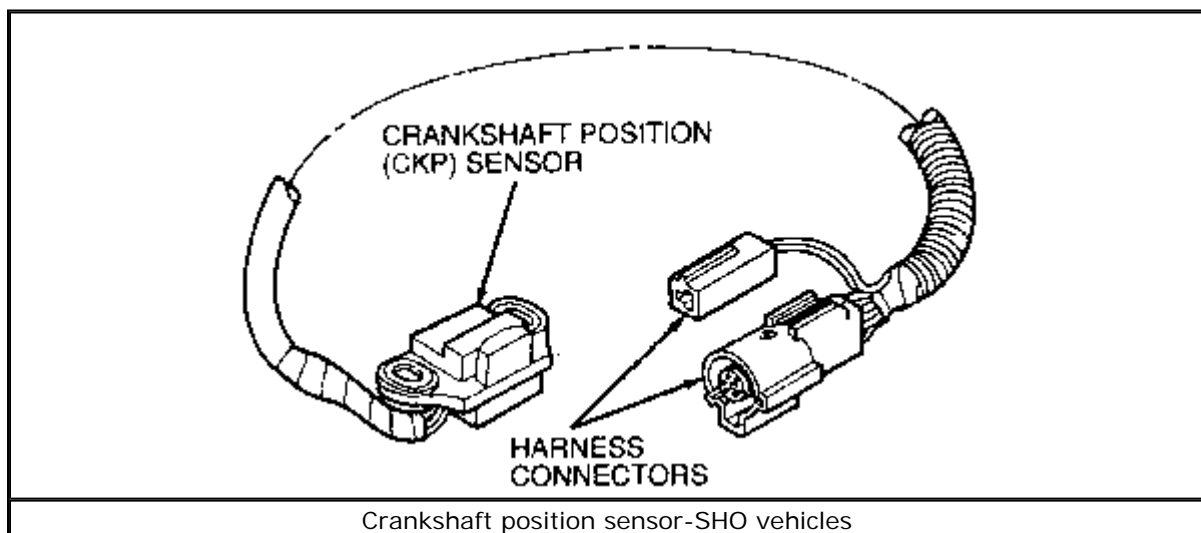
ELECTRONIC IGNITION SYSTEMS

Description & Operation

3.0L/3.2L SHO

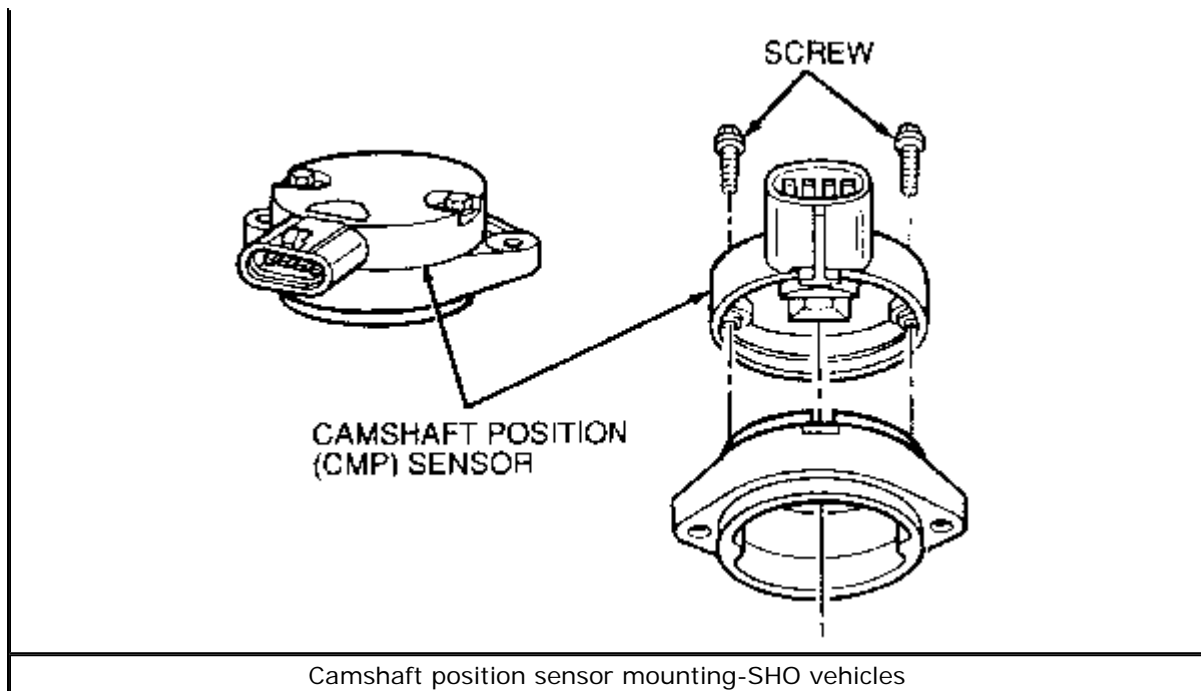
Tauruses with 3.0L and 3.2L SHO engines are equipped with an Electronic Ignition (EI) system previously known as the Distributorless Ignition System (DIS). As the name implies, there is no conventional distributor assembly in the engine. This system consists of:

- A Crankshaft Position sensor (CKP sensor, formerly crankshaft timing sensor) that is a single Hall effect magnetic switch, which is activated by three vanes on the crankshaft timing pulley. The signal generated by this sensor is called Crankshaft Position (CKP). The CKP signal provides base timing and crankshaft speed (rpm) information to the Ignition Control Module (ICM) and the Powertrain Control Module (PCM).



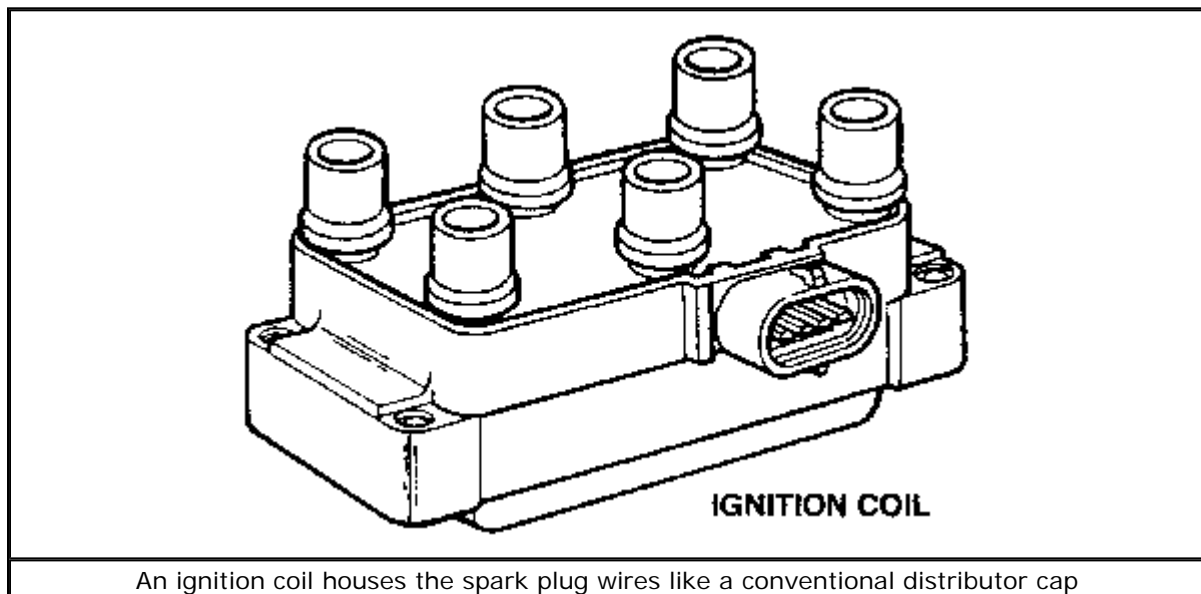
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- A Camshaft Position sensor (CMP sensor) that is a single Hall effect magnetic switch also, but is activated by a single vane driven by the camshaft. This sensor provides camshaft rotational location information to the PCM. The Ignition Control Module (ICM) uses a Camshaft Position (CMP) signal for ignition coil fire sequencing. The PCM also uses the CMP signal for fuel injector synchronization.

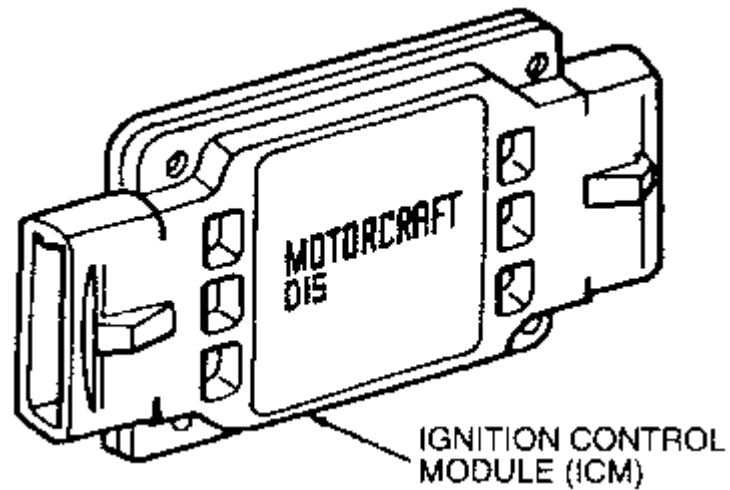


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- An ignition coil that houses the spark plug wires like the conventional distributor cap. The ignition "coil" actually contains three separate ignition coils. Each coil is controlled by the Ignition Control Module (ICM) through three coil leads. Each ignition coil activates two spark plugs simultaneously, one on the compression stroke (this uses the majority of the ignition coil's energy) and one on the exhaust stroke (this uses very little of the ignition coil's stored energy).



- An Ignition Control Module (ICM) which receives the CKP signal from the CKP sensor. During normal operation, the CKP signal is sent to the PCM from the CKP sensor and provides base ignition timing and RPM information. The ICM receives the CMP signal from CMP sensor, providing the ICM with the information required to synchronize the ignition coils in the proper sequence. It also receives the Spark Output (SPOUT) from the PCM. The SPOUT signal contains the optimum spark timing and dwell information.

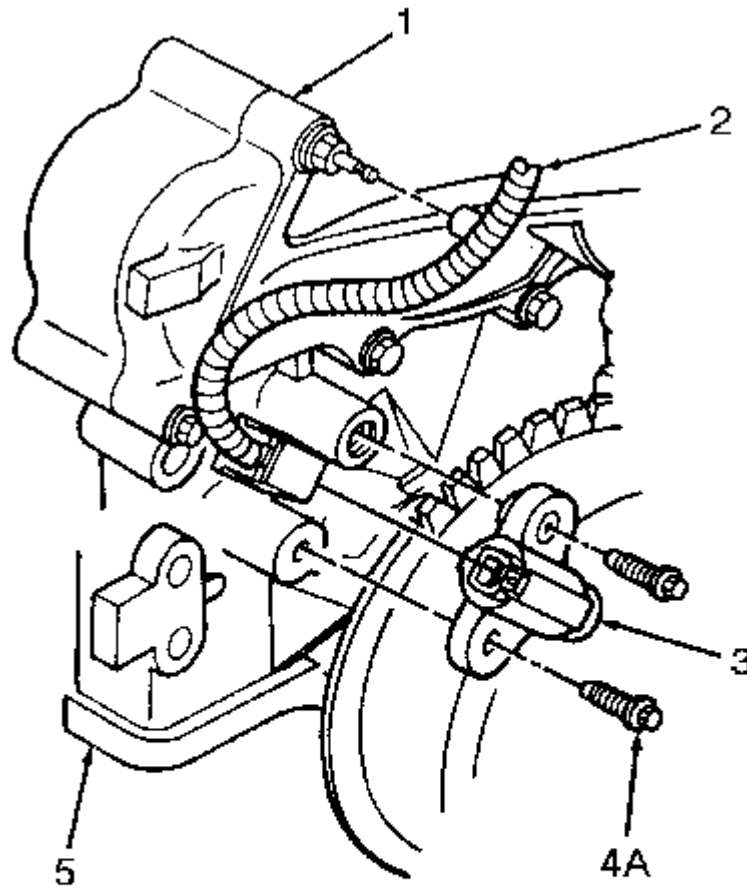


The ignition control module is mounted to the engine air inlet connector

3.0L FLEXIBLE FUEL (FF) VEHICLES

The 3.0L Flexible Fuel Taurus is equipped with an ignition system that is very similar to that of the 3.0/3.2L SHO vehicles. The main difference is the crankshaft position sensor. The system includes:

- A Crankshaft Position sensor (CKP sensor) which is a variable reluctance sensor triggered by a "36-minus-1" tooth trigger wheel located on the crankshaft pulley and damper. The signal generated from the CKP sensor is called the Crankshaft Position signal (CKP signal). This signal provides base timing and crankshaft speed (rpm) information to the Ignition Control Module (ICM). The ICM uses this information with the spark advance information from the PCM to determine ignition coil ON and OFF time.

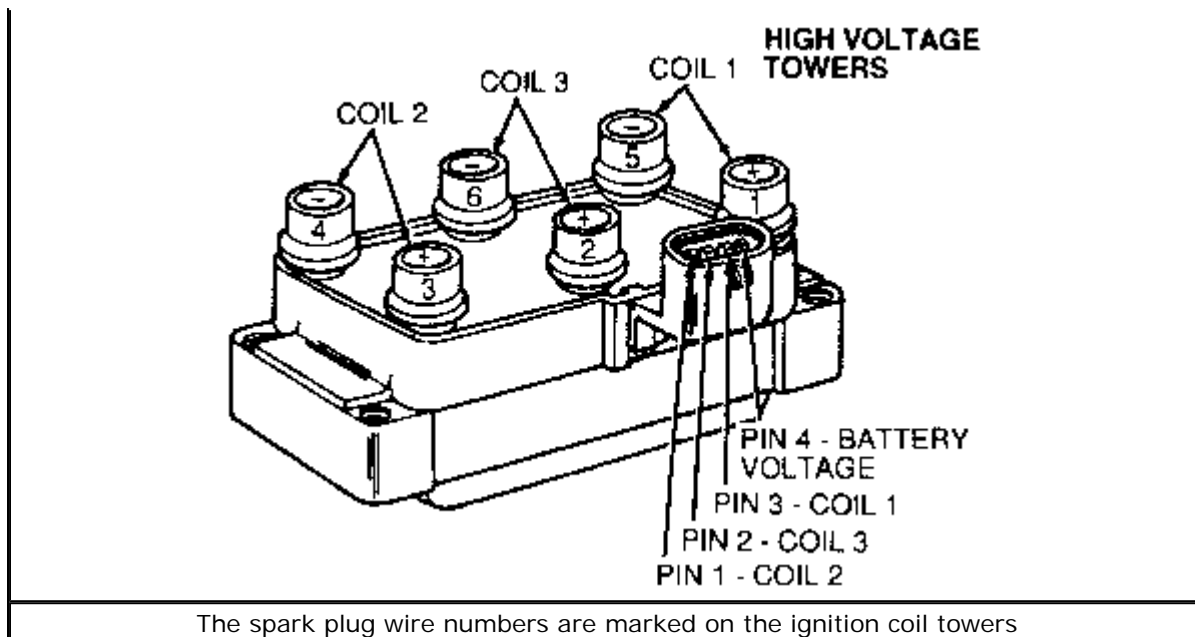


- 1 Water pump
- 2 Fuel charging wiring
- 3 Crankshaft position sensor
- 4 Bolt (2 req'd)
- 5 Engine front cover
- A Tighten to 5-7 Nm (44-61 lb.in.)

Location of the crankshaft position sensor-3.0L FF engine

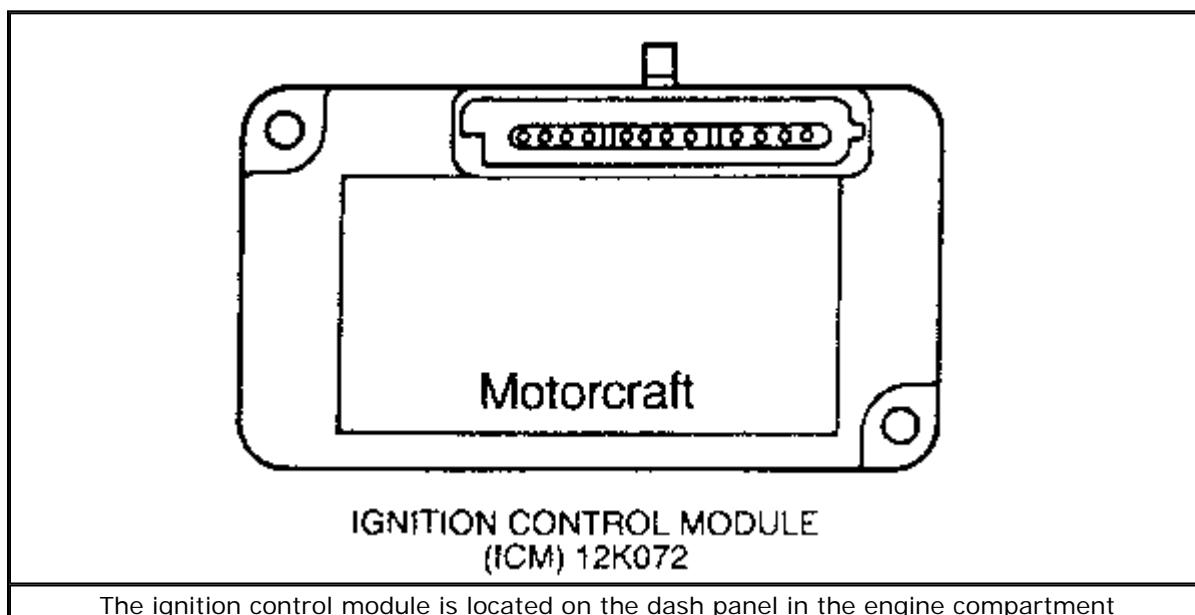
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- An ignition "coil" which is mounted to the rear of the left-hand cylinder head. It actually contains three separate ignition coils. Each ignition coil is controlled by the ignition control module through three coil leads. Each ignition coil activates two spark plugs simultaneously, one on the compression stroke (this plug uses the majority of the ignition coil's energy) and one on the exhaust stroke (this plug uses very little of the ignition coil's stored energy).



[Click to enlarge](#)

- An Ignition Coil Module (ICM) which is located on the dash panel in the engine compartment. It receives engine position and speed information from the CKP sensor, and desired spark advance information from the PCM. The ignition module uses this information to determine which ignition coil to fire, calculating the ON and OFF times of the ignition coils required to achieve the correct dwell and spark advance. It outputs a Profile Ignition Pickup (PIP) signal and an Ignition Diagnostic Monitor (IDM) signal for use by the PCM. It also sends information on system failures through the IDM signal to the PCM, stores information for use during diagnostic test mode, and provides the signal for the tachometer.



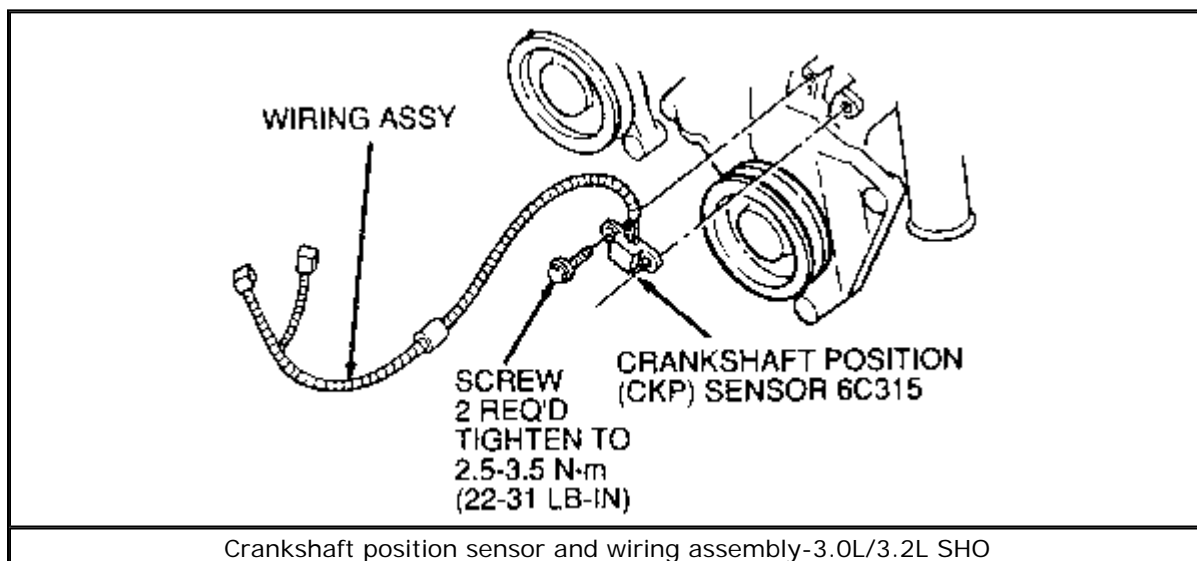
The ignition control module is located on the dash panel in the engine compartment

Component Replacement

3.0L/3.2L SHO VEHICLES

Crankshaft Position (CKP) Sensor

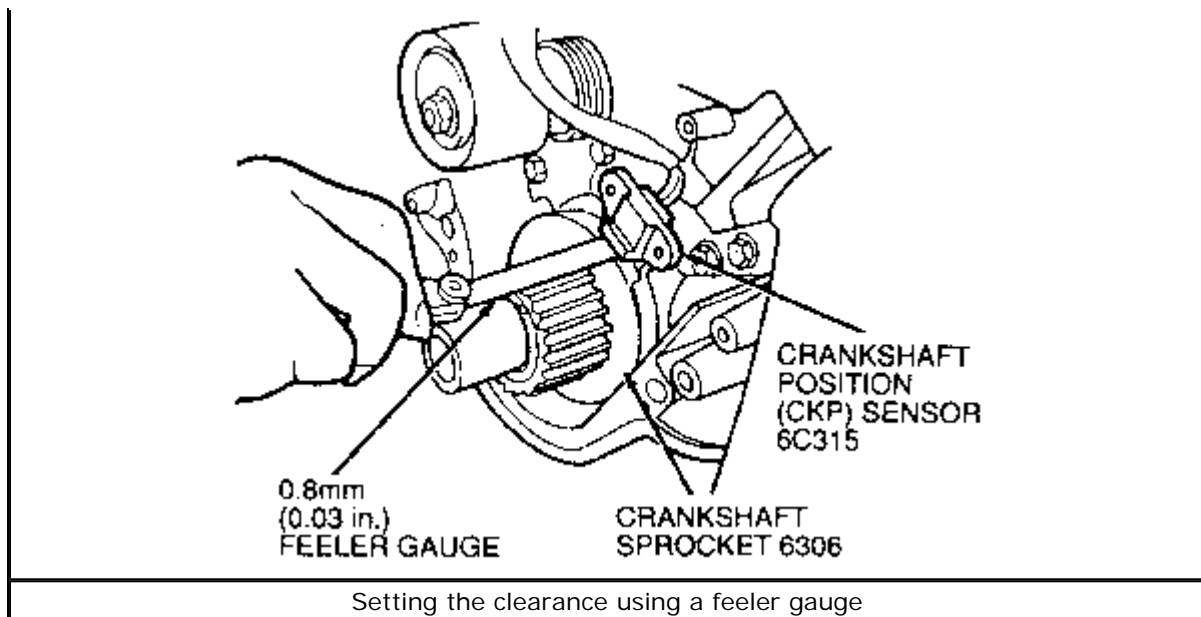
1. Disconnect the negative battery cable.
2. Loosen the drive belt tensioner for the A/C compressor and power steering drive belts.
3. Remove the drive belts from the crankshaft vibration damper and pulley.
4. Disconnect the ignition control module, then remove the engine air inlet connector.
5. Remove the upper outer timing belt cover.
6. Disengage the crankshaft position sensor wiring harness at the connector, then route the crankshaft position sensor harness through the outer timing belt cover.
7. Raise and safely support the vehicle, then remove the right front wheel and tire assembly.
8. Remove the crankshaft vibration damper and pulley using Steering Wheel Puller T67L-3600-A, or equivalent.
9. Remove the center and lower outer timing belt cover.
10. Rotate the crankshaft by hand to position the metal vane of the crankshaft sprocket outside of the crankshaft position sensor air gap.
11. Remove the two CKP sensor retaining screws, then remove the crankshaft position sensor from the engine.



[Click to enlarge](#)

To install:

12. Route the crankshaft position sensor wiring harness through the outer timing belt cover. Position the CKP sensor on the mounting pad and install the retaining screws loosely. Do NOT tighten the screws at this time.
13. Set the clearance between the CKP sensor assembly and one vane on the crankshaft sprocket with a 0.03 in. (0.8mm) feeler gauge, then tighten the retaining screws to 22-31 inch lbs. (2.5-3.5 Nm).



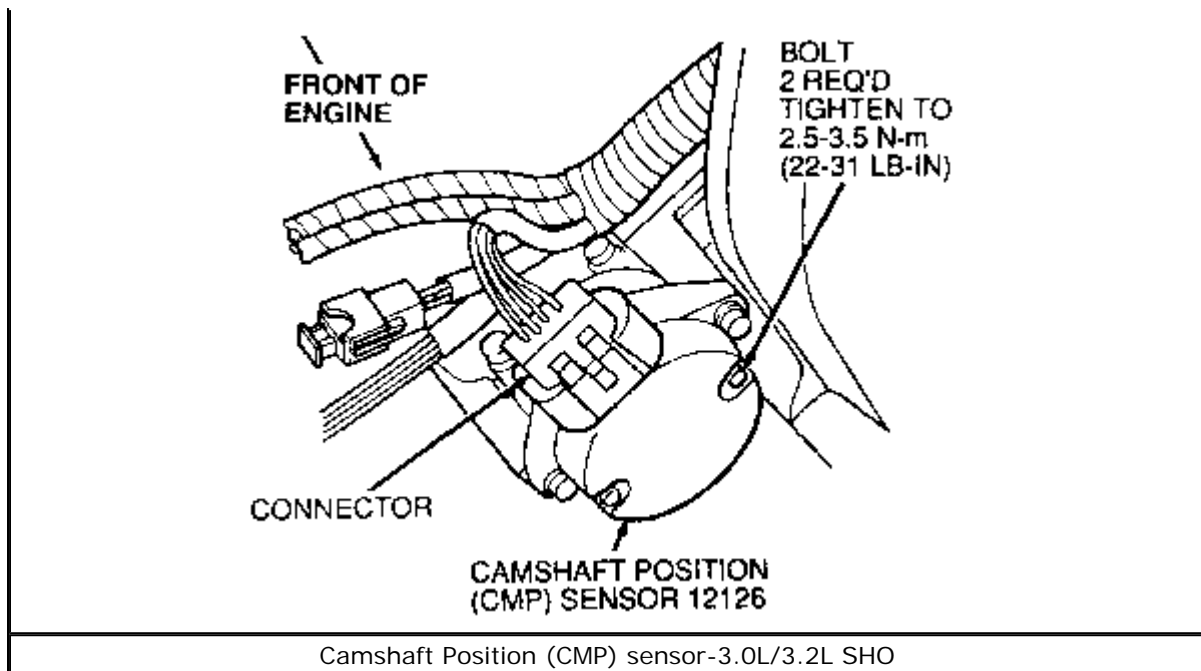
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Do NOT overtighten the CKP retaining screws! Damage to the crankshaft position sensor will result.

14. Install the lower outer timing belt cover. Make sure you don't damage the CKP sensor wiring harness. Install the crankshaft vibration damper and pulley using the Crank Gear and Damper Replacer T83T-6316-B, or equivalent. Tighten the pulley bolt to 112-127 ft. lbs. (152-172 Nm).
15. Install the center outer timing belt cover.
16. Install the wheel and tire assembly. Tighten the lug nuts to 85-105 ft. lbs. (115-142 Nm), then lower the vehicle.
17. Route and connect the crankshaft position sensor wiring harness.
18. Install the upper outer timing belt cover.
19. Install the engine air inlet connector, then engage the ignition control module.
20. Install the A/C compressor and power steering pump drive belts.
21. Connect the negative battery cable.

Camshaft Position (CMP) Sensor

1. Disconnect the negative battery cable.
2. Remove the front engine support damper.
3. Remove the power steering pump drive belt.
4. Remove the power steering pump pulley.
5. Disengage the Camshaft Position (CMP) sensor wiring connector.
6. Remove the CMP sensor retaining bolts, then remove the camshaft position sensor.



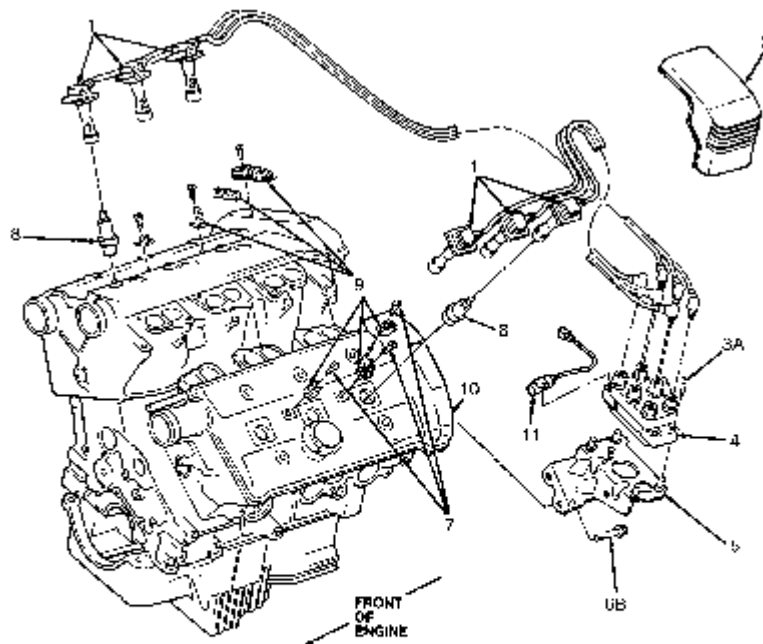
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To install:

7. Install the camshaft position sensor and secure using the retaining bolts. Tighten the bolts to 22-31 inch lbs. (2.5-3.5 Nm).
8. Engage the camshaft position sensor wiring connector.
9. Install the power steering pump pulley, then install the power steering belt.
10. Install the front engine support damper.
11. Connect the negative battery cable.

Ignition Coil

1. Disconnect the negative battery cable.
2. Remove the ignition coil cover, then disengage the engine control sensor wiring connector from the ignition coil and, if equipped, the radio ignition interference capacitor.
3. Remove the ignition coil wires by squeezing the locking tabs together to release the ignition coil boot retainers.
4. Remove the ignition coil retaining screws, then remove the ignition coil and, if applicable, the radio interference capacitor.



- | | |
|-----------------------------|--|
| 1 Ignition wire (6 req'd) | 8 Spark plug (6 req'd) |
| 2 Ignition coil cover | 9 Ignition wire separator |
| 3 Screw (4 req'd) | 10 Valve cover |
| 4 Ignition coil | 11 Radio ignition interference capacitor |
| 5 Ignition coil bracket | A Tighten to 4.5-7.0 Nm (40-62 lb.in.) |
| 6 Bolt (2 req'd) | B Tighten to 28-42 Nm (21-31 lb.ft.) |
| 7 Screw (8 req'd each side) | |

Ignition coil and related system components-3.0L/3.2L SHO

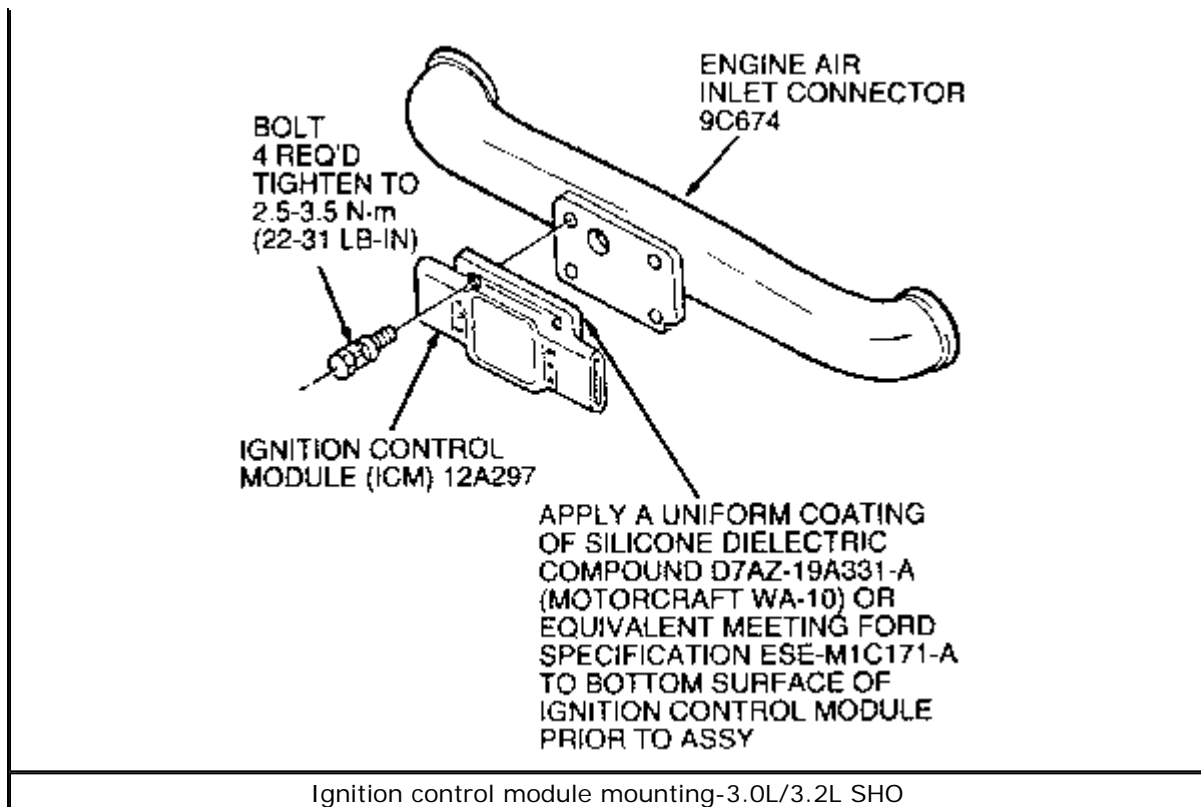
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To install:

5. Install the ignition coil, radio ignition interference capacitor (if equipped) and the retaining screws. Tighten the screws to 40-62 inch lbs. (4.5-7.0 Nm).
6. Connect the ignition wires to the proper ignition coil terminals. Engage the engine control sensor wiring connector to the ignition coil and, if applicable, the radio ignition interference capacitor.
7. Install the ignition coil cover, then connect the negative battery cable.

Ignition Control Module

1. Disconnect the negative battery cable.
2. Disengage both engine control sensor wiring connectors at the Ignition Control Module (ICM), by pressing down on the locking tabs stamped "PUSH", then remove the wiring connector.
3. Unfasten the retaining bolts, then remove the ICM.



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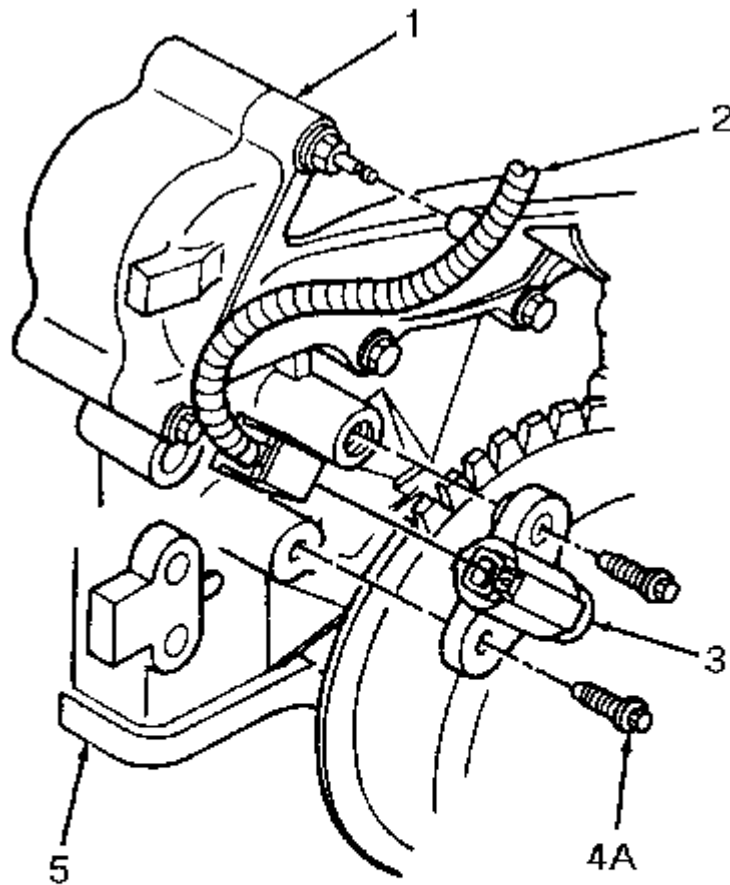
To install:

4. Apply an even coat of about $\frac{1}{32}$ in. (0.8mm) of Silicone Dielectric Compound D7AZ-19A331-A, or equivalent, to the mounting surface of the ignition control module.
5. Install the ICM and secure using the retaining bolts. Tighten the bolts to 22-31 inch lbs. (2.5-3.5 Nm).
6. Engage both engine control sensor wiring connectors to the ignition control module.
7. Connect the negative battery cable.

3.0L FLEXIBLE FUEL (FF) VEHICLES

Crankshaft Position Sensor

1. Disconnect the negative battery cable.
2. Raise and safely support the vehicle.
3. Disconnect the fuel charging wiring from the crankshaft position sensor.
4. Remove the crankshaft position sensor retaining bolts, then remove the crankshaft position sensor.



- 1 Water pump
- 2 Fuel charging wiring
- 3 Crankshaft position sensor
- 4 Bolt (2 req'd)
- 5 Engine front cover
- A Tighten to 5-7 Nm (44-61 lb.in.)

Crankshaft position sensor-3.0L Flexible Fuel (FF)

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To install:

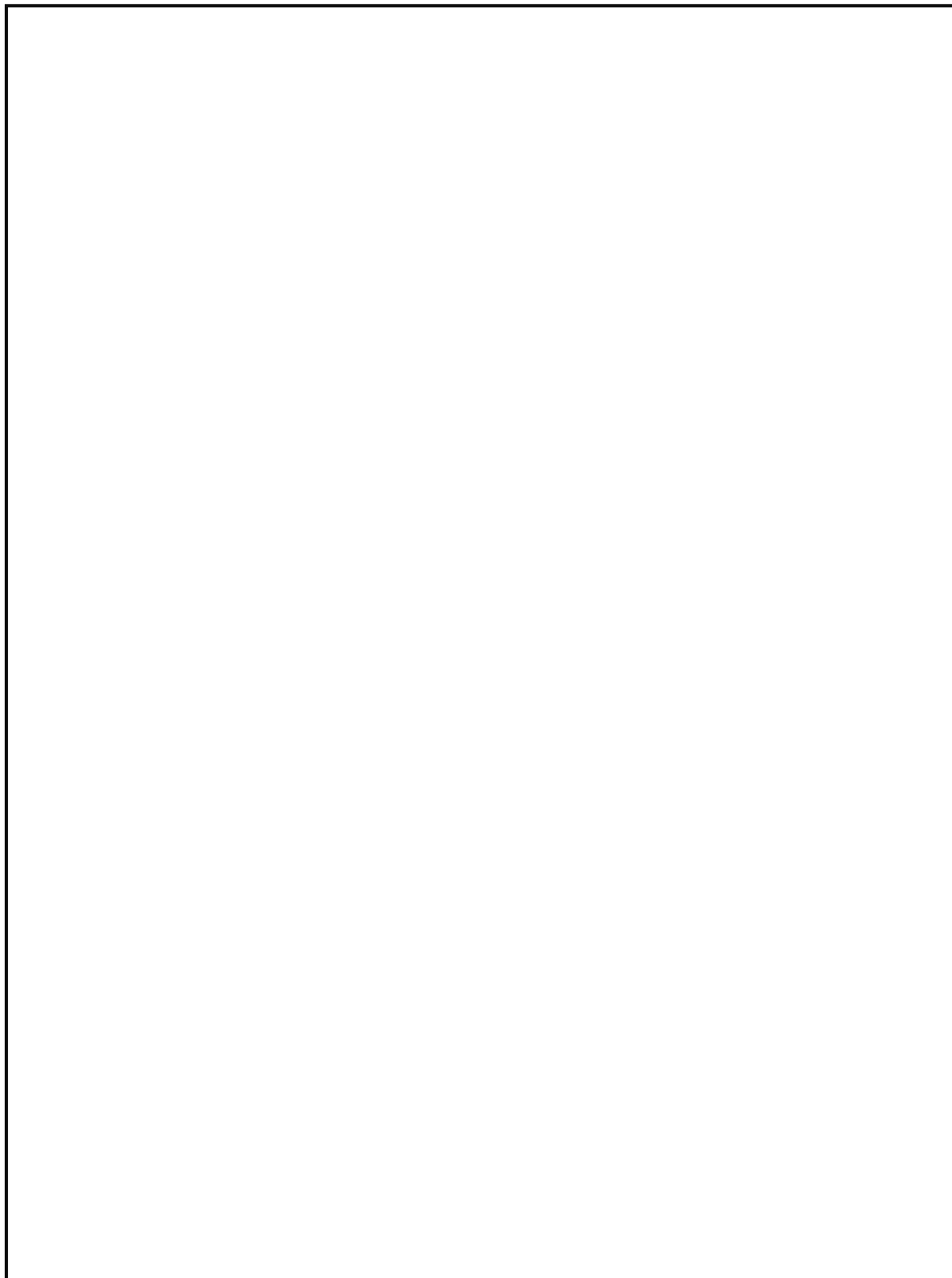
5. Position the crankshaft position sensor and secure using the retaining bolts. Tighten the retaining bolts to 44-61 inch lbs. (5-7 Nm).

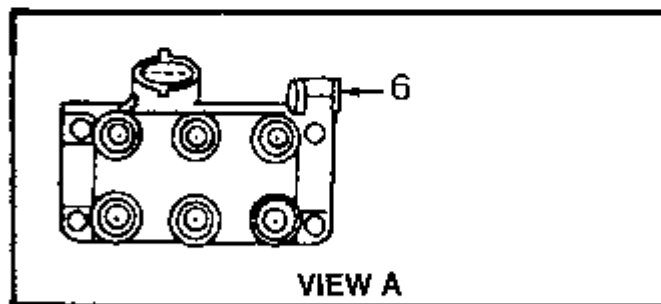
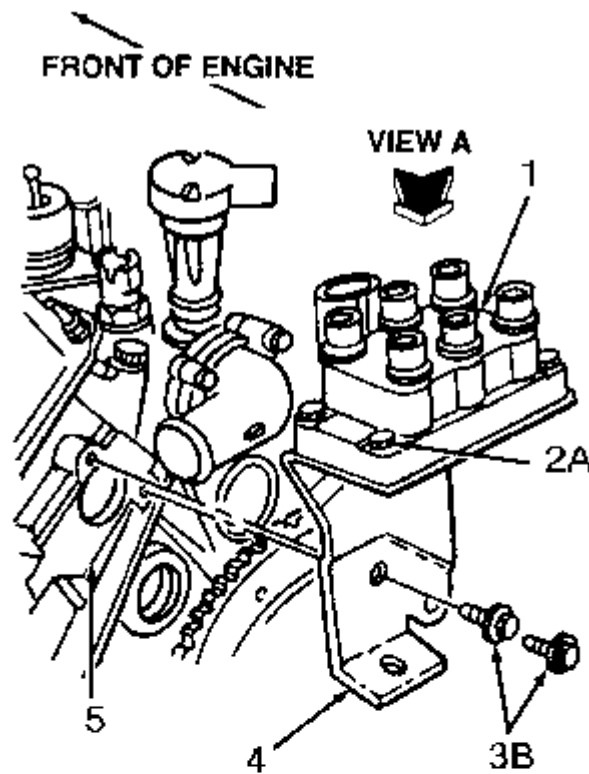
Do NOT overtighten the retaining bolts or damage to the crankshaft position sensor may result!

6. Properly route the fuel charging wiring, then connect it to the crankshaft position sensor.
7. Lower the vehicle, then connect the negative battery cable.

Ignition Coil

1. **Disconnect the negative battery cable.**
2. **Disengage the fuel charging wiring connectors from the ignition coil and the radio ignition interference capacitor.**
3. **Disconnect the ignition wires by squeezing the locking tabs together and twisting while pulling upward.**
4. **Remove the four ignition coil retaining screws, then remove the ignition coil and radio interference capacitor from the ignition coil bracket. Save the capacitor for installation with the ignition coil.**





- 1 Ignition coil
- 2 Screw (4 req'd)
- 3 Bolt (2 req'd)
- 4 Ignition coil mounting bracket
- 5 Cylinder head (LH)
- 6 Radio ignition interference capacitor
- A Tighten to 4.5-7.0 Nm (44-61 lb.in.)
- B Tighten to 40-55 Nm (30-41 lb.ft.)

Ignition coil-3.0L FF vehicles

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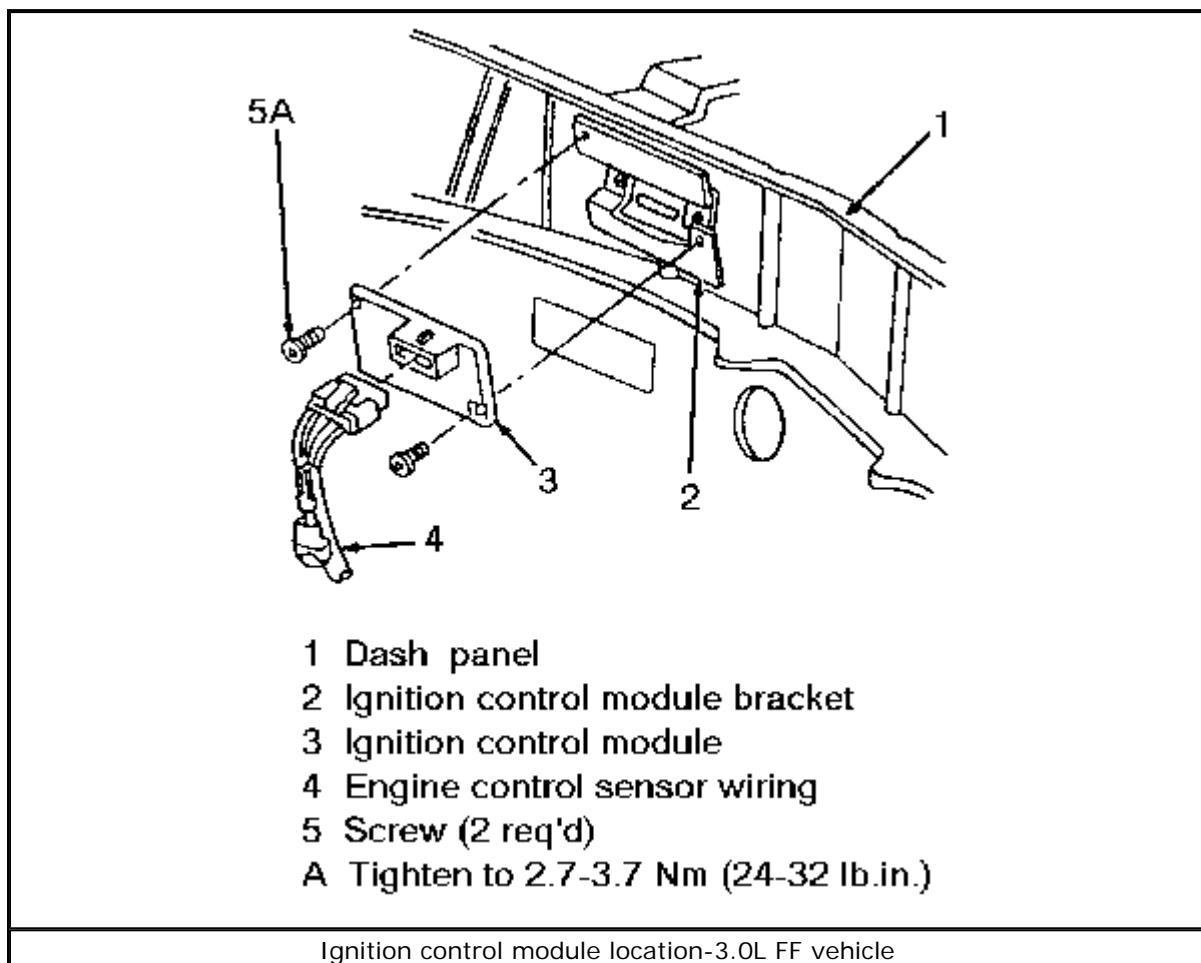
To install:

5. Position the ignition coil and radio ignition interference capacitor to the ignition coil bracket and secure with the retaining screws. Tighten the retaining screws to 44-61 inch lbs. (5-7 Nm).

6. Apply Silicone Dielectric Compound D7AZ-19A331-A, or equivalent, to all ignition wire boots.
7. Install each ignition wire connector to the proper terminal on the ignition coil, making sure all of the boots are fully seated.
8. Connect the fuel charging wiring to the ignition coil and radio ignition interference capacitor, then connect the negative battery cable.

Ignition Control Module

1. Disconnect the negative battery cable.
2. Disengage the engine control sensor wiring connector from the ignition control module by carefully lifting upwards on the locking tabs while grasping the connector body and pulling away from the ignition control module.
3. Remove the two ignition control module retaining screws, then remove the ignition control module.



[Click to enlarge](#)

4. Position the ignition control module to the ignition control bracket and secure using the retaining screws. Tighten the screws to 24-32 inch lbs. (2.7-3.6 Nm).
5. Engage the ignition control module connector by pushing until the connector fingers are positioned over the locking wedge feature on the ICM.

Locking the connector is important to ensure sealing of the connector and ignition control module interface.

6. Connect the negative battery cable.

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