2007 ENGINE

Ignition Control - Service Information - Nitro

IGNITION CONTROL - SERVICE INFORMATION

DESCRIPTION

IGNITION SYSTEM-3.7L

The ignition system is controlled by the Powertrain Control Module (PCM) on all engines.

This engine uses a separate ignition coil for each cylinder. The one-piece coil bolts directly to the cylinder head. Rubber boots seal the secondary terminal ends of the coils to the top of all 6 spark plugs. A separate electrical connector is used for each coil.

Because of coil design, spark plug cables (secondary cables) are not used. A distributor is not used with the 3.7L engine.

Two knock sensors (one for each cylinder bank) are used to help control spark knock.

The Auto Shutdown (ASD) relay provides battery voltage to each ignition coil.

The ignition system consists of:

- 6 Spark Plugs
- 6 Separate Ignition Coils
- 2 Knock Sensors
- Powertrain Control Module (PCM)
- Also to be considered part of the ignition system are certain inputs from the Crankshaft Position, Camshaft Position, 2 knock and MAP Sensors

DESCRIPTION

The ignition system is controlled by the Powertrain Control Module (PCM) on all engines.

This engine uses a separate ignition coil for each cylinder. The one-piece coil bolts directly to the cylinder head. Rubber boots seal the secondary terminal ends of the coils to the top of all 6 spark plugs. A separate electrical connector is used for each coil.

Because of coil design, spark plug cables (secondary cables) are not used. A distributor is not used with the 4.0L engine.

One knock sensor is used to help control spark knock.

The Auto Shutdown (ASD) relay provides battery voltage to each ignition coil.

The ignition system consists of:

6 Spark Plugs

6 Separate Ignition Coils

1 Knock Sensor

Powertrain Control Module (PCM)

Also to be considered part of the ignition system are certain inputs from the Crankshaft Position, Camshaft Position, knock and MAP Sensors

SPECIFICATIONS

SPARK PLUGS

ENGINE	PLUG TYPE	ELECTRODE GAP
3.7L V-6	ZFR6F - 11G (NGK)	1.1mm (0.043 in.)
4.0L V-6	NGK R - ZFR5LP 13G	1.2mm - 1.35mm (0.048 - 0.053 in.)

IGNITION TIMING

Ignition timing is not adjustable on any engine.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Camshaft Position Sensor - 3.7L	12	-	106
Camshaft Position Sensor - 4.0L	12	-	106
Crankshaft Position Sensor - 3.7L	28	21	205
Crankshaft Position Sensor - 4.0L	28	21	205
Ignition Coil Mounting - 3.7L	8	-	70
Ignition Coil Mounting - 4.0L	6.7	-	60
* Knock Sensor - 3.7L	20	15 +/- 2	176
* Knock Sensor - 4.0L	10	7	-
Spark Plugs - 3.7L	27	20	-
Spark Plugs - 4.0L	17.5	13	-
Tilt lever bracket	4.5	-	40
Ignition switch mounting screws	3	-	26

* Do not apply any sealant, thread-locker or adhesive to bolts. Poor sensor performance may result.
** Torque critical tapered design. Do not exceed 15 ft. lbs. (20 N.m).

IGNITION COIL RESISTANCE - 3.7L V-6

PRIMARY RESISTANCE 21-27°C (70-80°F)	SECONDARY RESISTANCE 21-27°C (70-80°F)
0.6 - 0.9 Ohms	6,000 - 9,000 Ohms

SPECIFICATIONS - ENGINE FIRING ORDER - 3.7L

1 - 6 - 5 - 4 - 3 - 2

RELAY-AUTO SHUT DOWN

REMOVAL

AUTO SHUTDOWN RELAY

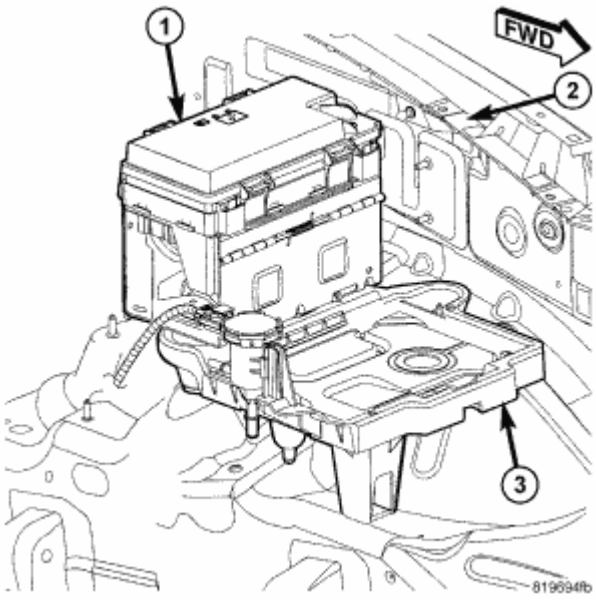

Fig. 1: Identifying ASD, Totally Integrated Power Module (TIPM) & Left Inner Fender
Courtesy of CHRYSLER LLC

The ASD relay is located in the Totally Integrated Power Module (TIPM) (1). The TIPM is located in the engine compartment near the left inner fender (2). Refer to label on TIPM cover for relay location.

1. Remove TIPM cover.
2. Remove relay from TIPM.
3. Check condition of relay terminals and TIPM connector terminals for damage or corrosion. Repair if necessary before installing relay.
4. Check for pin height (pin height should be the same for all terminals within the TIPM connector). Repair

if necessary before installing relay.

INSTALLATION

AUTO SHUTDOWN RELAY

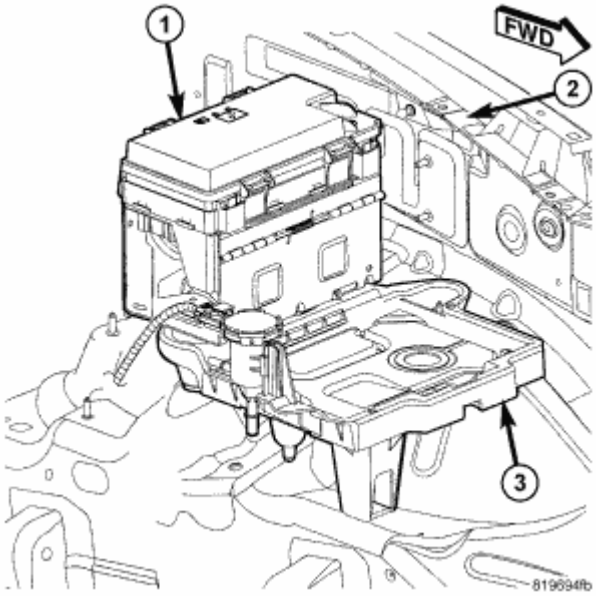

Fig. 2: Identifying ASD, Totally Integrated Power Module (TIPM) & Left Inner Fender
Courtesy of CHRYSLER LLC

1. Refer to TIPM cover for ASD relay location.
2. Install relay to TIPM (1).
3. Install cover to TIPM.

SENSOR-CAMSHAFT POSITION

REMOVAL

CAMSHAFT POSITION SENSOR - 3.7L

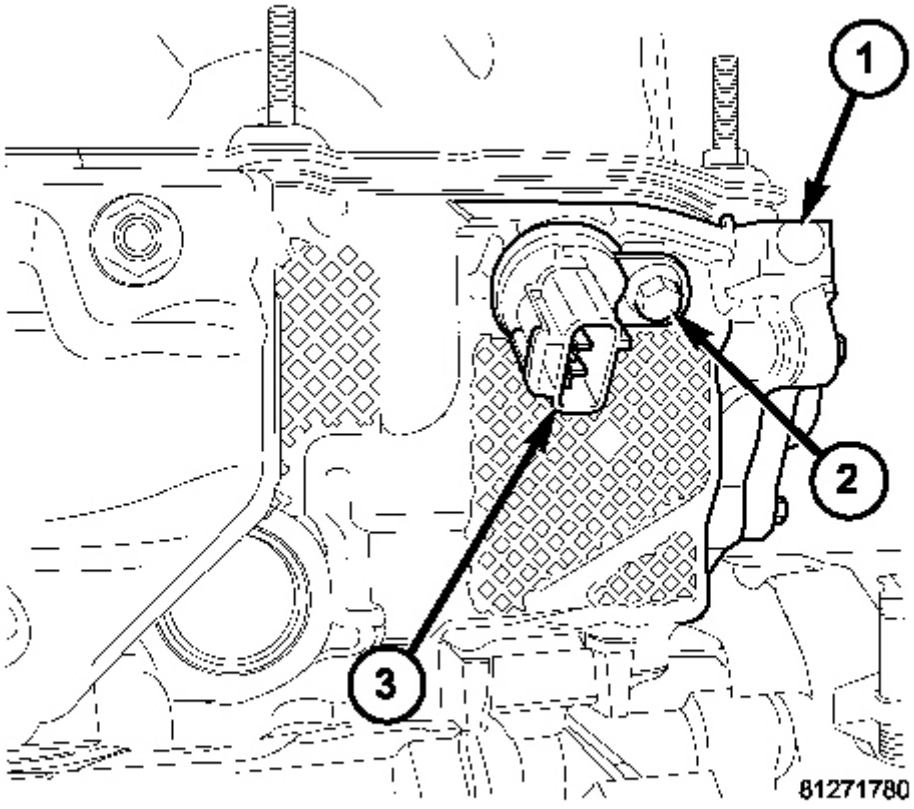

Fig. 3: Identifying Right Cylinder Head, Sensor Mounting Bolt & Camshaft Position Sensor (CMP)
Courtesy of CHRYSLER LLC

The Camshaft Position Sensor (CMP) (3) is bolted to the front/top of the right cylinder head (1).

1. Raise and support vehicle.
2. Disconnect electrical connector at CMP sensor.
3. Remove sensor mounting bolt (2).
4. Carefully twist sensor from cylinder head.
5. Check condition of sensor o-ring.

REMOVAL - 4.0L

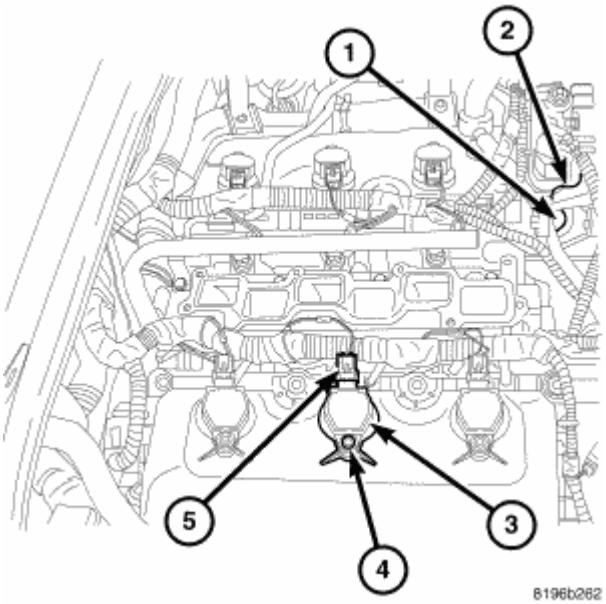

Fig. 4: Identifying Camshaft Position Sensor (CMP) & Generator
Courtesy of CHRYSLER LLC

The Camshaft Position Sensor (CMP) (1) is located at the front/top of the timing gear cover below the generator (2).

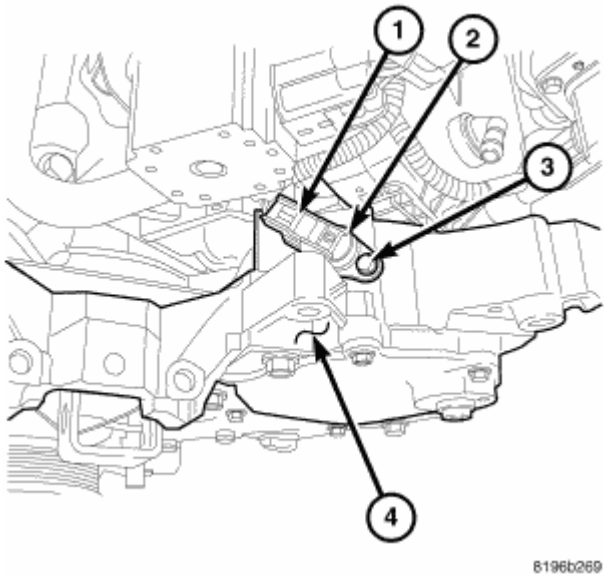

Fig. 5: Identifying CMP Sensor Electrical Connector, Twist Sensor & Sensor Mounting Bolt
Courtesy of CHRYSLER LLC

1. Remove generator. Refer to Generator Removal.
2. Disconnect electrical connector (1) at CMP sensor.
3. Remove sensor mounting bolt (3).

4. Carefully twist sensor (2) from timing gear cover.
5. Check condition of sensor O-ring.

INSTALLATION

CAMSHAFT POSITION SENSOR - 3.7L

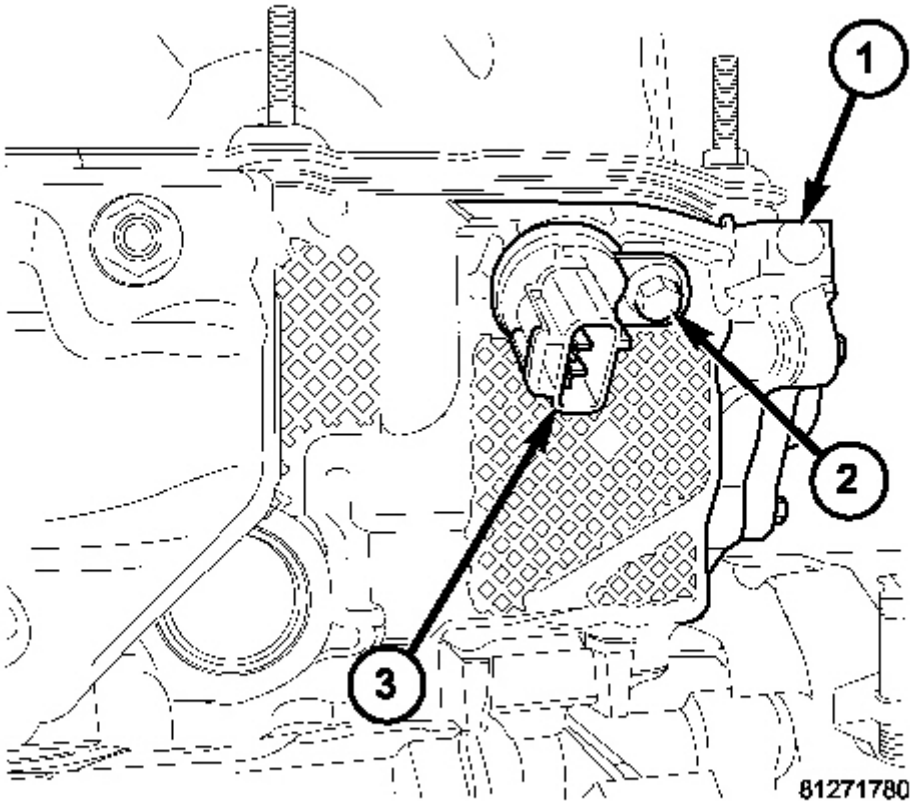

Fig. 6: Identifying Right Cylinder Head, Sensor Mounting Bolt & Camshaft Position Sensor (CMP)
Courtesy of CHRYSLER LLC

1. Clean out machined hole in cylinder head.
2. Apply a small amount of engine oil to sensor o-ring.
3. Install sensor (3) into cylinder head with a slight rocking and twisting action.

CAUTION: Before tightening sensor mounting bolt (2), be sure sensor is

completely flush to cylinder head. If sensor is not flush, damage to sensor mounting tang may result.

4. Install mounting bolt (2) and tighten to 12 N.m (106 in.lbs).
5. Connect electrical connector to sensor.

INSTALLATION - 4.0L

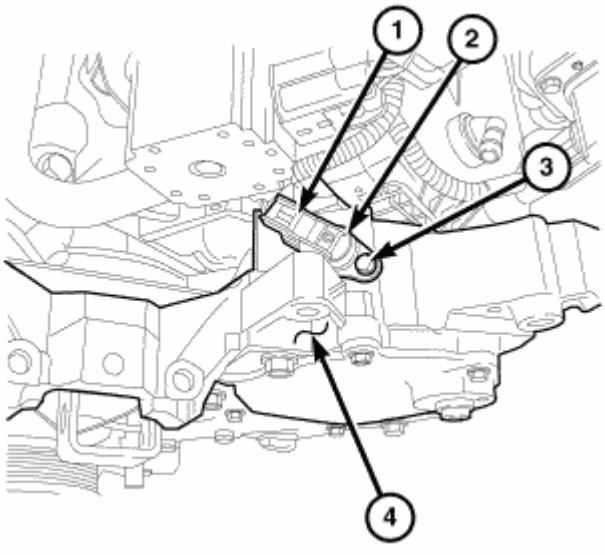

Fig. 7: Identifying CMP Sensor Electrical Connector, Twist Sensor & Sensor Mounting Bolt
Courtesy of CHRYSLER LLC

1. Check condition of sensor O-ring.
2. Carefully twist sensor (2) into timing gear cover (4).
3. Install sensor mounting bolt (3). Refer to **TORQUE SPECIFICATIONS**.
4. Connect electrical connector (1) to CMP sensor.
5. Install generator. Refer to Generator Installation.

COIL-IGNITION

REMOVAL

COIL-IGNITION-3.7L

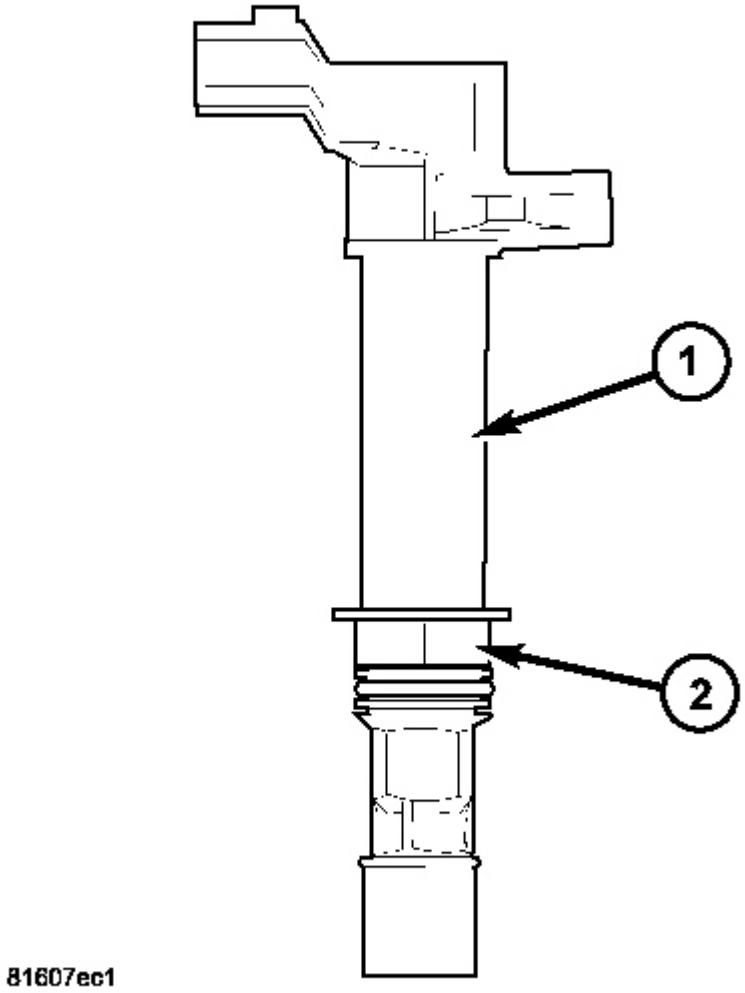

Fig. 8: Ignition Coil Seal & O-Ring
Courtesy of CHRYSLER LLC

An individual ignition coil (1) is used for each spark plug. The coil fits into machined holes in the cylinder head. A mounting stud/nut secures each coil to the top of the intake manifold. The bottom of the coil is equipped with a rubber boot to seal the spark plug to the coil. Inside each rubber boot is a spring. The spring is used for a mechanical contact between the coil and the top of the spark plug. These rubber boots and springs are a permanent part of the coil and are not serviced separately. An o-ring (2) is used to seal the coil at the opening into the cylinder head.

1. Depending on which coil is being removed, the throttle body air intake tube or intake box may need to be

removed to gain access to coil.

2. Disconnect electrical connector from coil by pushing downward on release lock on top of connector and pull connector from coil.
3. Clean area at base of coil with compressed air before removal.

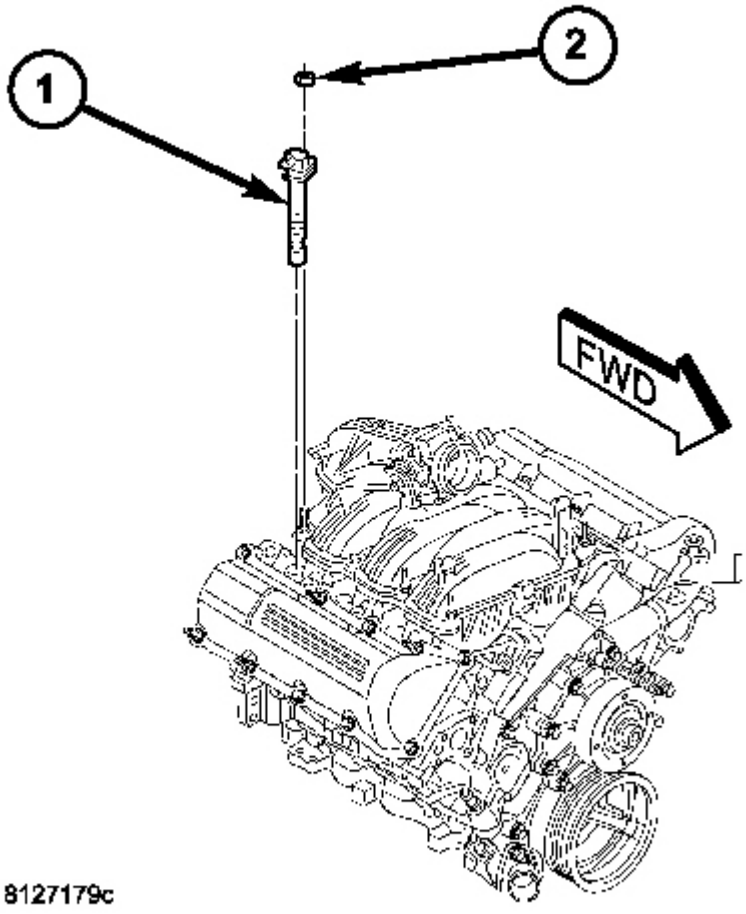

Fig. 9: Locating Ignition Coil - 3.7L
Courtesy of CHRYSLER LLC

4. Remove coil mounting nut (2) from mounting stud.
5. Carefully pull up coil from cylinder head opening with a slight twisting action.
6. Remove coil from vehicle.

COIL-IGNITION - 4.0L

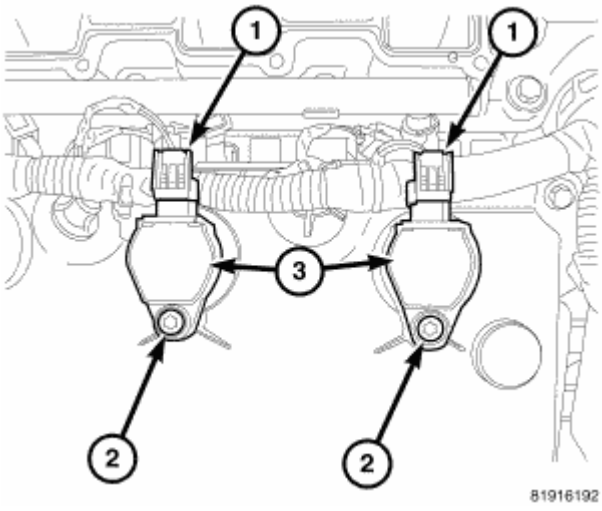

Fig. 10: Identifying Ignition Coil Electrical Connector, Coil Mounting Bolt & Ignition Coils
Courtesy of CHRYSLER LLC

Six individual ignition coils (3) are used for each of the six spark plugs.

1. Remove engine cover.
2. Disconnect negative battery cable.
3. Remove upper half of intake manifold. Refer to **REMOVAL** .
4. Unlock and disconnect electrical connector (1) from ignition coil(s)
5. Clean area at base of coil with compressed air before removal.
6. Remove coil mounting bolt (2).
7. Carefully pull up coil from cylinder head opening with a slight twisting action.
8. Remove coil from engine.

INSTALLATION

COIL-IGNITION - 3.7L

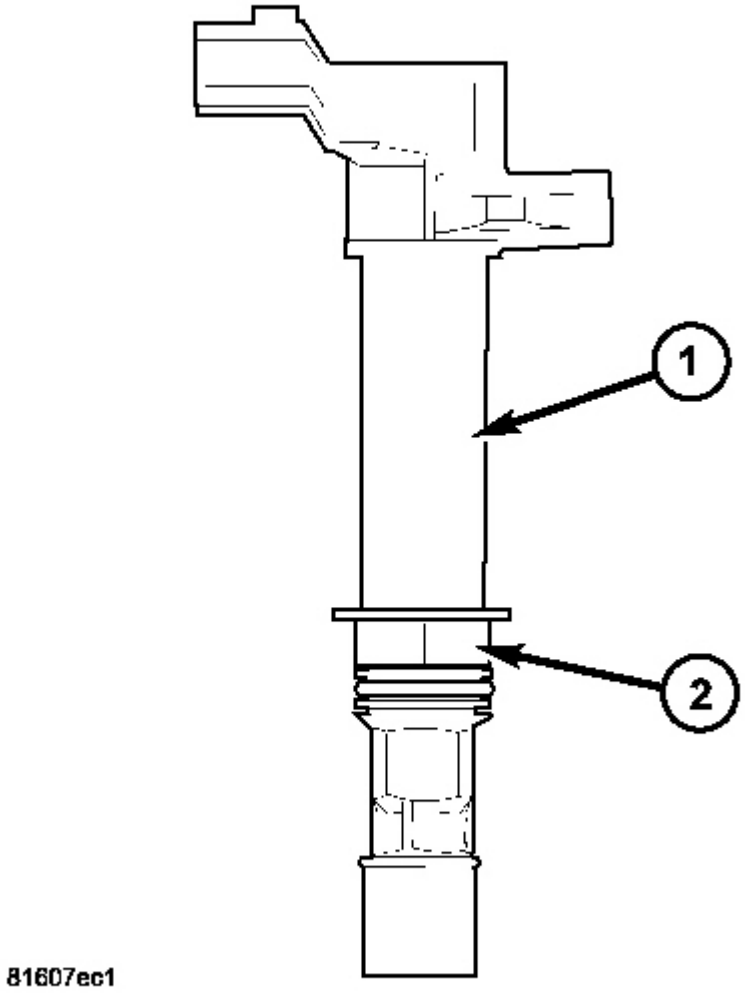

Fig. 11: Ignition Coil Seal & O-Ring
Courtesy of CHRYSLER LLC

1. Using compressed air, blow out any dirt or contaminants from around top of spark plug.
2. Check condition of coil O-ring (2) and replace as necessary. To aid in coil installation, apply silicone to coil o-ring (2).

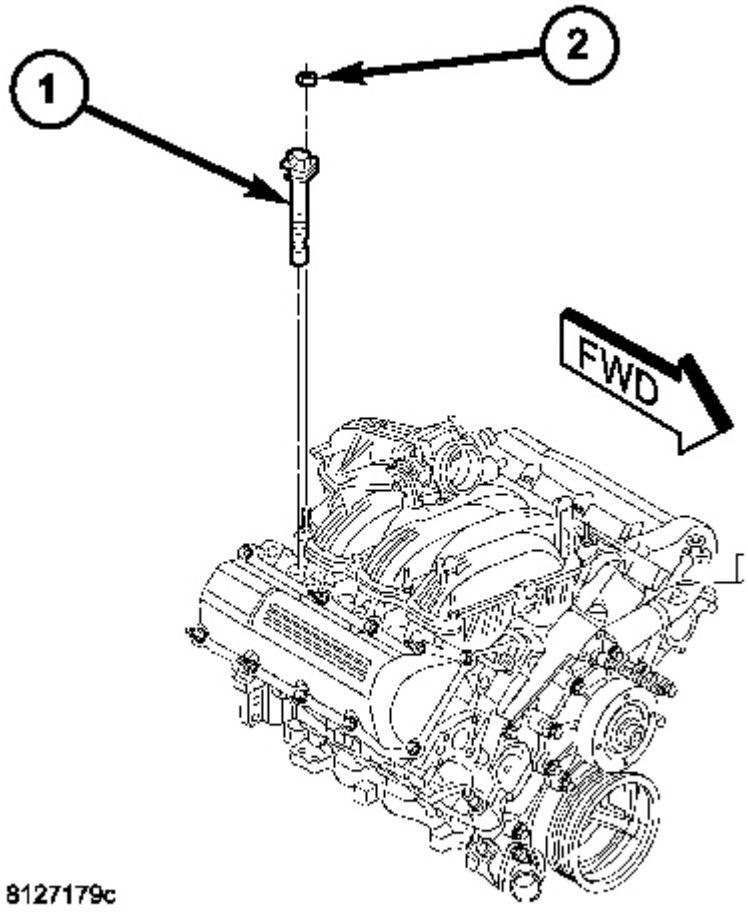

Fig. 12: Locating Ignition Coil - 3.7L
Courtesy of CHRYSLER LLC

3. Position ignition coil (1) into cylinder head opening and push onto spark plug. Do this while guiding coil base over mounting stud.
4. Install coil mounting stud nut (2). Refer to Torque Specifications.
5. Connect electrical connector to coil by snapping into position.
6. If necessary, install throttle body air tube.

COIL-IGNITION - 4.0L

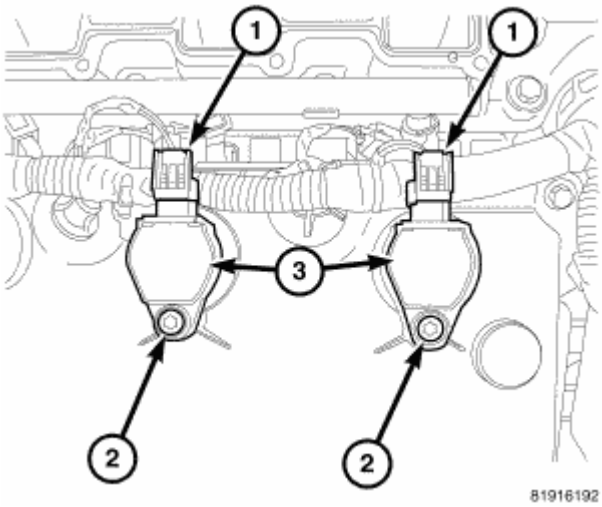

Fig. 13: Identifying Ignition Coil Electrical Connector, Coil Mounting Bolt & Ignition Coils
Courtesy of CHRYSLER LLC

1 - Electrical Connector
2 - Mounting Bolt
3 - Coil

1. Install ignition coil (3) into cylinder head.
2. Install and tighten coil mounting bolt (2). Refer to Torque Specifications.
3. Connect electrical connector (1) and lock.
4. Install upper half of intake manifold. Refer to **INSTALLATION** .
5. Connect negative battery cable.
6. Install engine cover.

SENSOR-KNOCK

OPERATION

OPERATION - 3.7L

Two knock sensors are used; one for each cylinder bank. When the knock sensor detects a knock in one of the cylinders on the corresponding bank, it sends an input signal to the Powertrain Control Module (PCM). In response, the PCM retards ignition timing for all cylinders by a scheduled amount.

Knock sensors contain a piezoelectric material which constantly vibrates and sends an input voltage (signal) to the PCM while the engine operates. As the intensity of the crystal's vibration increases, the knock sensor output voltage also increases.

The voltage signal produced by the knock sensor increases with the amplitude of vibration. The PCM receives the knock sensor voltage signal as an input. If the signal rises above a predetermined level, the PCM will store that value in memory and retard ignition timing to reduce engine knock. If the knock sensor voltage exceeds a

preset value, the PCM retards ignition timing for all cylinders. It is not a selective cylinder retard.

The PCM ignores knock sensor input during engine idle conditions. Once the engine speed exceeds a specified value, knock retard is allowed.

Knock retard uses its own short term and long term memory program.

Long term memory stores previous detonation information in its battery-backed RAM. The maximum authority that long term memory has over timing retard can be calibrated.

Short term memory is allowed to retard timing up to a preset amount under all operating conditions (as long as rpm is above the minimum rpm) except at Wide Open Throttle (WOT). The PCM, using short term memory, can respond quickly to retard timing when engine knock is detected. Short term memory is lost any time the ignition key is turned off.

NOTE: Over or under tightening the sensor mounting bolts will affect knock sensor performance, possibly causing improper spark control. Always use the specified torque when installing the knock sensors.

OPERATION - 4.0L

Only one knock sensor is used. When the knock sensor detects a knock in one of the cylinders, it sends an input signal to the Powertrain Control Module (PCM). In response, the PCM retards ignition timing for all cylinders by a scheduled amount.

Knock sensors contain a piezoelectric material which constantly vibrates and sends an input voltage (signal) to the PCM while the engine operates. As the intensity of the crystal's vibration increases, the knock sensor output voltage also increases.

The voltage signal produced by the knock sensor increases with the amplitude of vibration. The PCM receives the knock sensor voltage signal as an input. If the signal rises above a predetermined level, the PCM will store that value in memory and retard ignition timing to reduce engine knock. If the knock sensor voltage exceeds a preset value, the PCM retards ignition timing for all cylinders. It is not a selective cylinder retard.

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NOTE: Over or under tightening the sensor mounting bolt will affect knock sensor performance, possibly causing improper spark control. Always use the specified torque when installing the knock sensor.

REMOVAL

SENSOR-KNOCK-3.7L

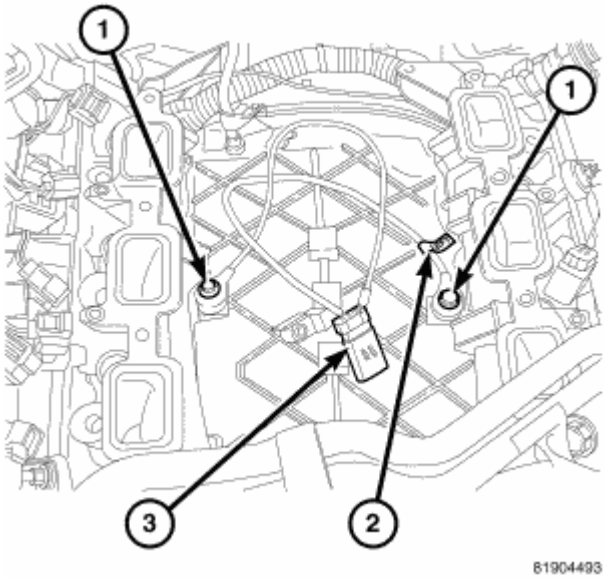

Fig. 14: Identifying Knock Sensors, Identification Tag (LEFT) & Electrical Connector
Courtesy of CHRYSLER LLC

The two knock sensors (1) are bolted into the cylinder block under the intake manifold. The two sensors share a common wiring harness using one electrical connector (3). Because of this, they must be replaced as a pair.

NOTE: The left sensor is identified by an identification tag (LEFT) (2). It is also identified by a larger bolt head. The Powertrain Control Module (PCM) must have and know the correct sensor left/right positions. Do not mix the sensor locations.

1. Remove intake manifold. Refer to **INSTALLATION** .
2. Disconnect knock sensor dual pigtail harness from engine wiring harness. This connection is made near rear of engine.
3. Remove both sensor mounting bolts. Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.
4. Remove sensors from engine.

REMOVAL - 4.0L

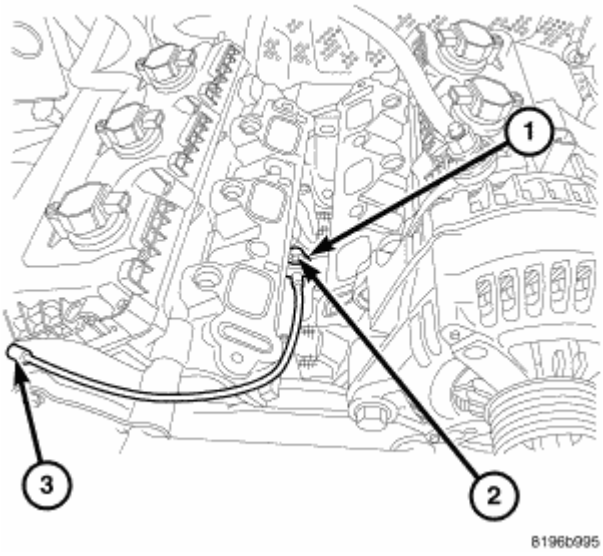

Fig. 15: Identifying Sensor, Sensor Mounting Bolt & Engine
Courtesy of CHRYSLER LLC

Only one sensor (1) is used with the 4.0L engine. It is attached to the top of the cylinder block below the intake manifold.

1. Remove intake manifold. Refer to **INSTALLATION** .
2. Disconnect knock sensor pigtail harness from engine wiring harness. This connection is made near front of engine (3).
3. Remove sensor mounting bolt (2). Note foam strip on bolt threads. This foam is used only to retain the bolt to sensor for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to this bolt.
4. Remove sensor from engine.

INSTALLATION

INSTALLATION - 3.7L

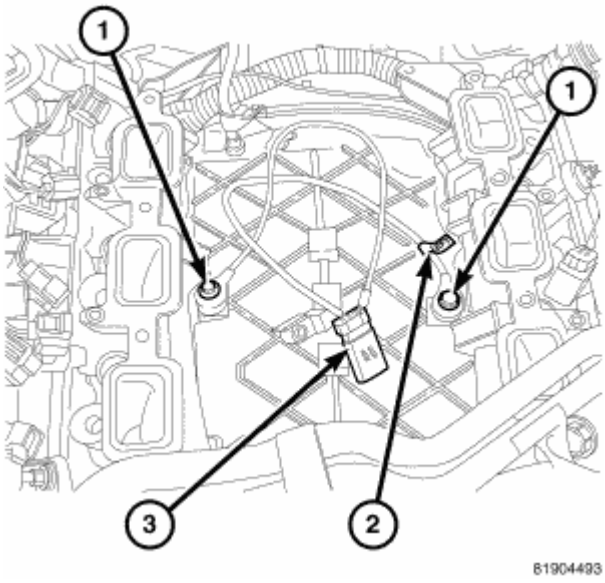

Fig. 16: Identifying Knock Sensors, Identification Tag (LEFT) & Electrical Connector
Courtesy of CHRYSLER LLC

NOTE: The left sensor is identified by an identification tag (LEFT) (2). It is also identified by a larger bolt head. The Powertrain Control Module (PCM) must have and know the correct sensor left/right positions. Do not mix the sensor locations.

1. Thoroughly clean knock sensor mounting holes.
2. Install sensors (1) into cylinder block.

NOTE: Over or under tightening the sensor mounting bolts will affect knock sensor performance, possibly causing improper spark control. Always use the specified torque when installing the knock sensors. The torque for the knock sensor bolt is relatively light for an 8 mm bolt.

NOTE: Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.

3. Install and tighten mounting bolts. Tighten to 15 +/- 2 ft. lbs. (20 N.m) (176 in.lbs).
4. Connect knock sensor wiring harness to engine harness at rear of intake manifold.
5. Install intake manifold. Refer to **INSTALLATION** .

INSTALLATION - 4.0L

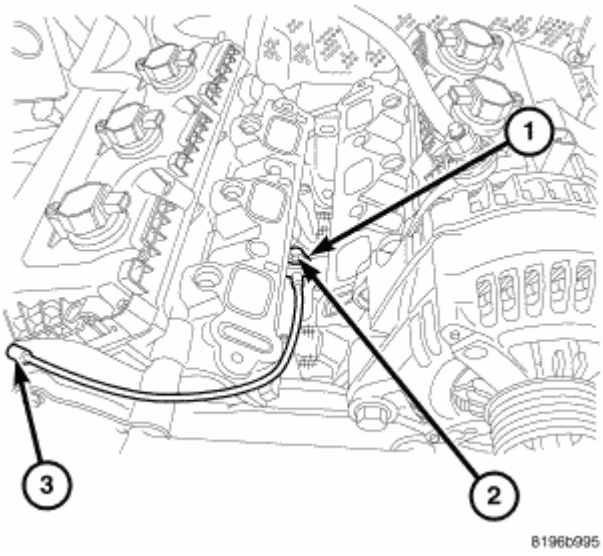

Fig. 17: Identifying Sensor, Sensor Mounting Bolt & Engine
Courtesy of CHRYSLER LLC

Only one sensor (1) is used with the 4.0L engine. It is attached to the top of the cylinder block below the intake manifold.

1. Position sensor (1) to engine. Install and tighten mounting bolt (2). Refer to Torque Specifications. Note foam strip on bolt threads. This foam is used only to retain the bolt to sensor for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to this bolt.
2. Connect knock sensor pigtail harness to engine wiring harness. This connection is made near front of engine (3).
3. Install intake manifold. Refer to **INSTALLATION** .

SPARK PLUG

REMOVAL

SPARK PLUGS

Each individual spark plug is located under each ignition coil. Each individual ignition coil must be removed to gain access to each spark plug. See **REMOVAL**.

1. Remove necessary air filter tubing at throttle body.
2. Prior to removing ignition coil, spray compressed air around coil base at cylinder head.
3. Prior to removing spark plug, spray compressed air into cylinder head opening. This will help prevent foreign material from entering combustion chamber.
4. Remove spark plug from cylinder head using a quality socket with a rubber or foam insert. Also check condition of ignition coil O-ring and replace as necessary.
5. Inspect spark plug condition.

INSTALLATION

INSTALLATION

Special care should be taken when installing spark plugs into the cylinder head spark plug wells. Be sure the plugs do not drop into the plug wells as electrodes can be damaged.

Always tighten spark plugs to the specified torque. Over tightening can cause distortion resulting in a change in the spark plug gap or a cracked porcelain insulator.

1. Start the spark plug into the cylinder head by hand to avoid cross threading.
2. Tighten spark plugs. Refer to Spark Plug Torque Specifications.
3. Before installing ignition coil(s), check condition of coil O-ring and replace as necessary. To aid in coil installation, apply silicone to coil O-ring.
4. Install ignition coil(s). See **INSTALLATION**.

SPARK PLUG CABLE

DESCRIPTION

DESCRIPTION

Spark plugs cables are not used with either the 3.7L or 4.0L V-6 engines.

SWITCH-IGNITION

DESCRIPTION

IGNITION SWITCH

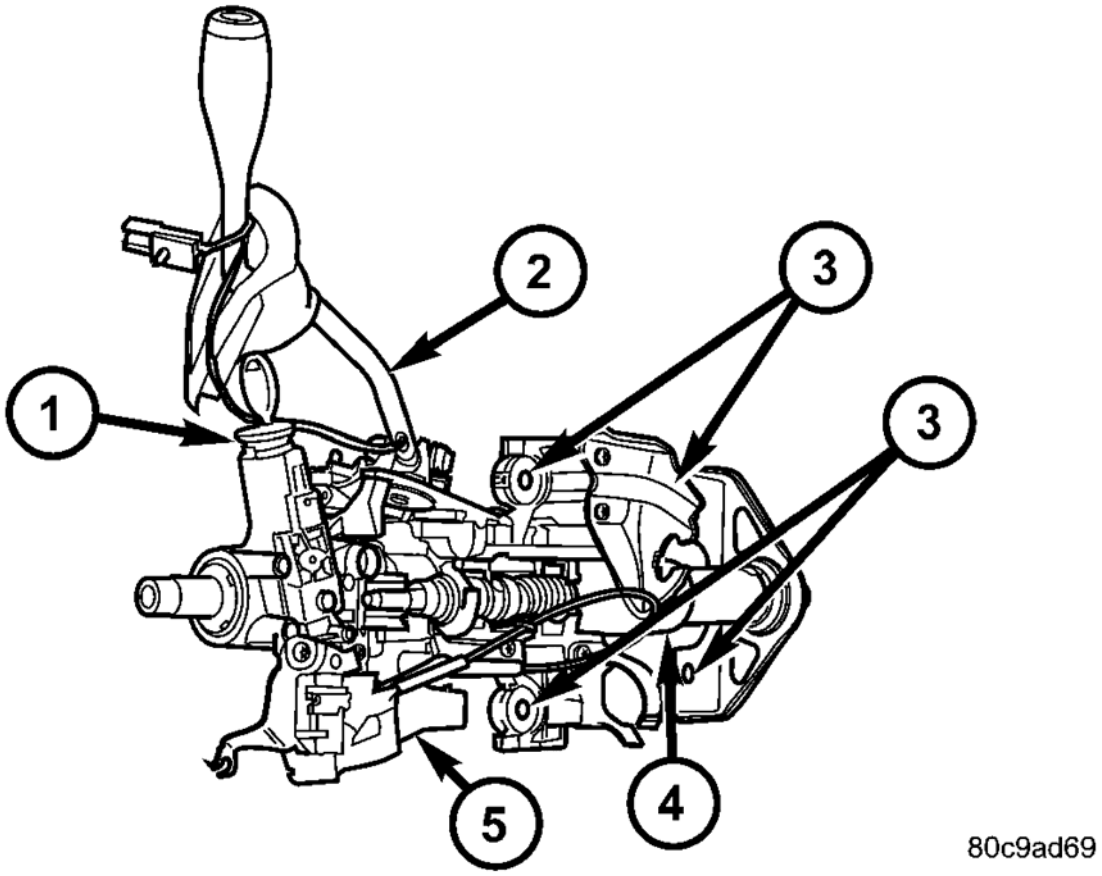

Fig. 18: Identifying Key Cylinder, Gear Shift Lever, Mounting Holes, Steering Column & Ignition Switch
Courtesy of CHRYSLER LLC

1 - KEY CYLINDER
2 - GEAR SHIFT LEVER
3 - MOUNTING HOLES
4 - STEERING COLUMN
5 - IGNITION SWITCH

The ignition switch (5) is located on the steering column (4). It is used as the main on/off switching device for most electrical components. The mechanical key cylinder is used to engage/disengage the electrical ignition switch.

OPERATION

IGNITION SWITCH

Vehicles equipped with an automatic transmission and a steering column mounted shifter: an interlock device is located within the shift cable. This interlock device is used to lock the transmission shifter in the PARK position when the key cylinder is in any position and the brake pedal is not depressed.

DIAGNOSIS AND TESTING

IGNITION SWITCH

TEST AND REPAIR

If the key removal effort is excessive on a vehicle with an automatic transmission first adjust the shift linkage, refer to **ADJUSTMENTS** .

If the ignition switch effort is excessive, remove the ignition key cylinder from the steering column. Check the turning effort of the key cylinder. If the ignition key cylinder effort is excessive, replace the key cylinder. Refer to **REMOVAL** .

REMOVAL

IGNITION SWITCH

SERVICE PRECAUTIONS

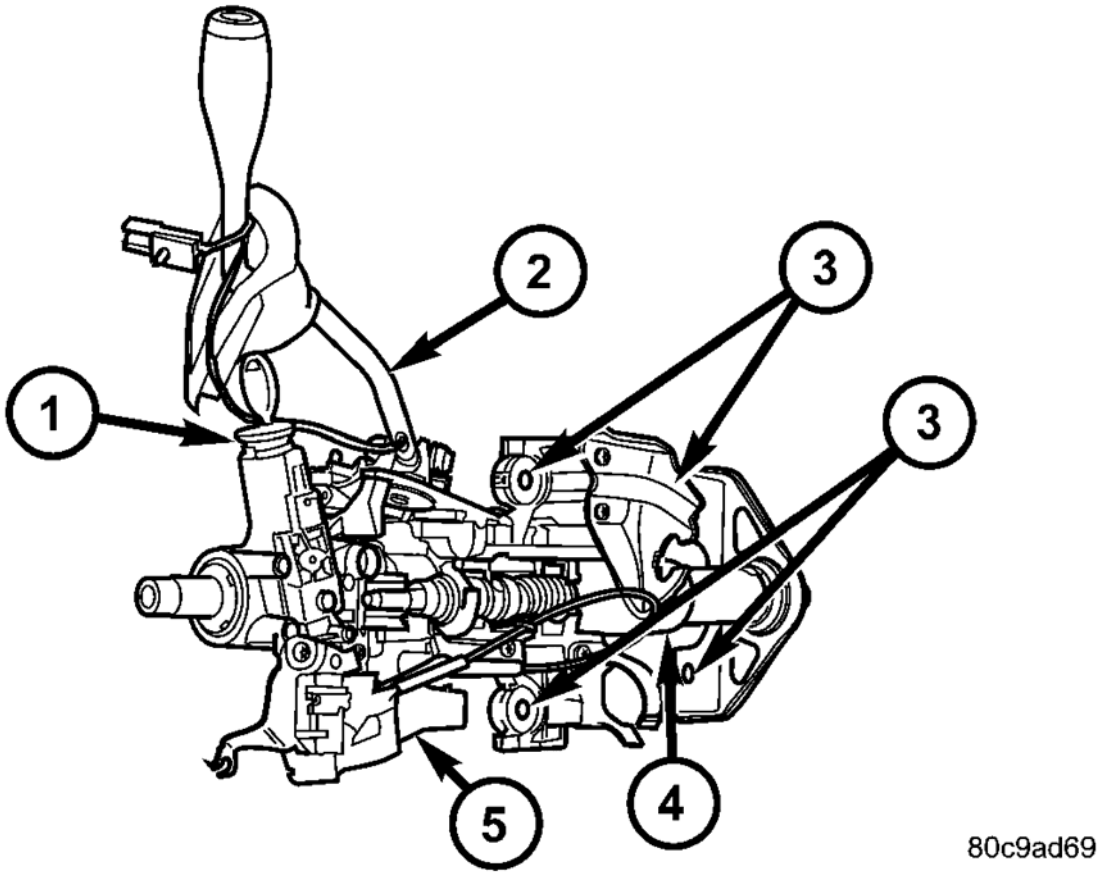

Fig. 19: Identifying Key Cylinder, Gear Shift Lever, Mounting Holes, Steering Column & Ignition Switch
Courtesy of CHRYSLER LLC

1 - KEY CYLINDER
2 - GEAR SHIFT LEVER
3 - MOUNTING HOLES
4 - STEERING COLUMN
5 - IGNITION SWITCH

NOTE: The steering column on vehicles equipped with an automatic transmission is not equipped with an internal locking shaft with the ignition cylinder. Alternative methods of locking the steering wheel for service will have to be used.

The tilt and standard column (4) have been designed to be serviced as an assembly; without wiring, switches, shrouds, steering wheel, etc. Most steering column components can be serviced without removing the steering column from the vehicle. See **Fig. 19**.

Safety goggles should be worn at all times when working on steering columns.

To service the steering wheel, switches or airbag, Refer to Electrical Restraints and follow all WARNINGS and CAUTIONS.

WARNING: The airbag system is a sensitive, complex electro-mechanical unit. Before attempting to diagnose, remove or install the airbag system components you must first disconnect and isolate the battery negative (ground) cable. Then wait two minutes for the system capacitor to discharge. Failure to do so could result in accidental deployment of the air bag and possible personal injury. The fasteners, screws and bolts, originally used for the airbag components, have special coatings and are specifically designed for the airbag system. They must never be replaced with any substitutes. Anytime a new fastener is needed, replace with the correct fasteners provided in the service package or fasteners listed in the parts books.

CAUTION: Do not hammer on steering column shaft. This may cause damage to the shaft or bearing.

CAUTION: Do not attempt to remove the pivot bolts to disassemble the tilting mechanism.

The ignition key must be in the key cylinder for cylinder removal. The key cylinder must be removed first before removing ignition switch.

1. Remove the negative (ground) cable from the battery.
2. Disable the airbag, refer to **REMOVAL** .
3. Remove the lower and upper shrouds.
4. Remove key cylinder. Refer to **REMOVAL** .

5. Disconnect the lower clockspring connectors.
6. Remove the wire retainer from the tilt lever bracket.

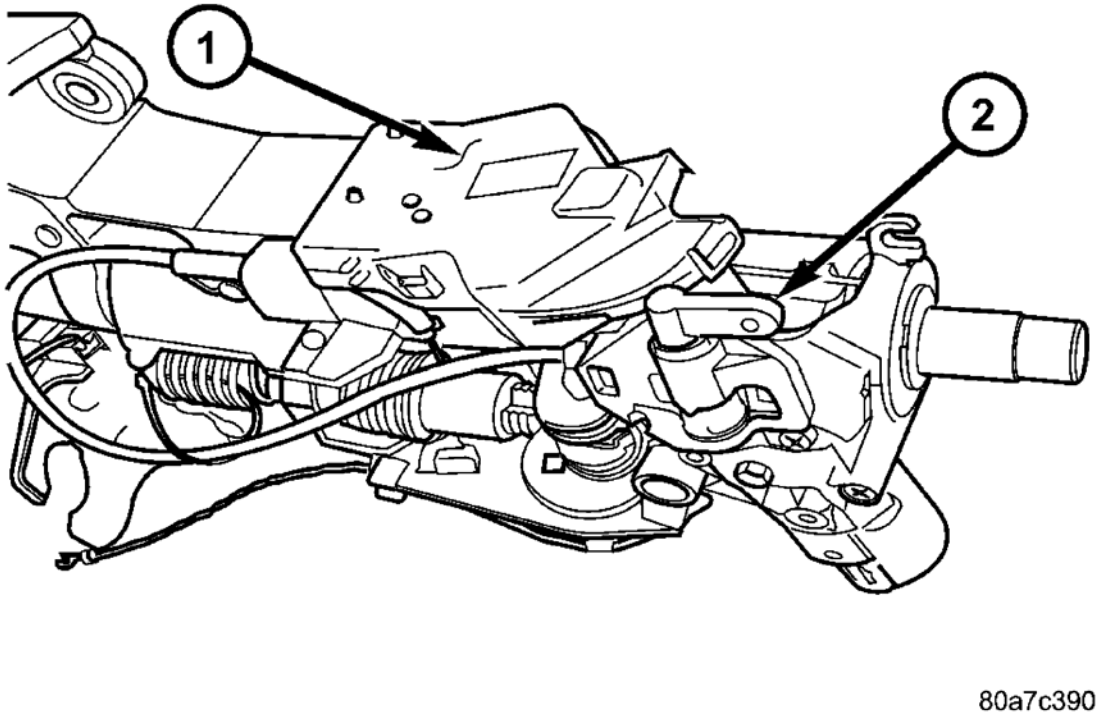

Fig. 20: Ignition Switch & Tilt Lever Mechanism
Courtesy of CHRYSLER LLC

1 - IGNITION SWITCH
2 - TILT LEVER MECHANISM

7. Remove the tilt lever mounting screws to gain access to the ignition switch (1) mounting screws. See **Fig. 20**

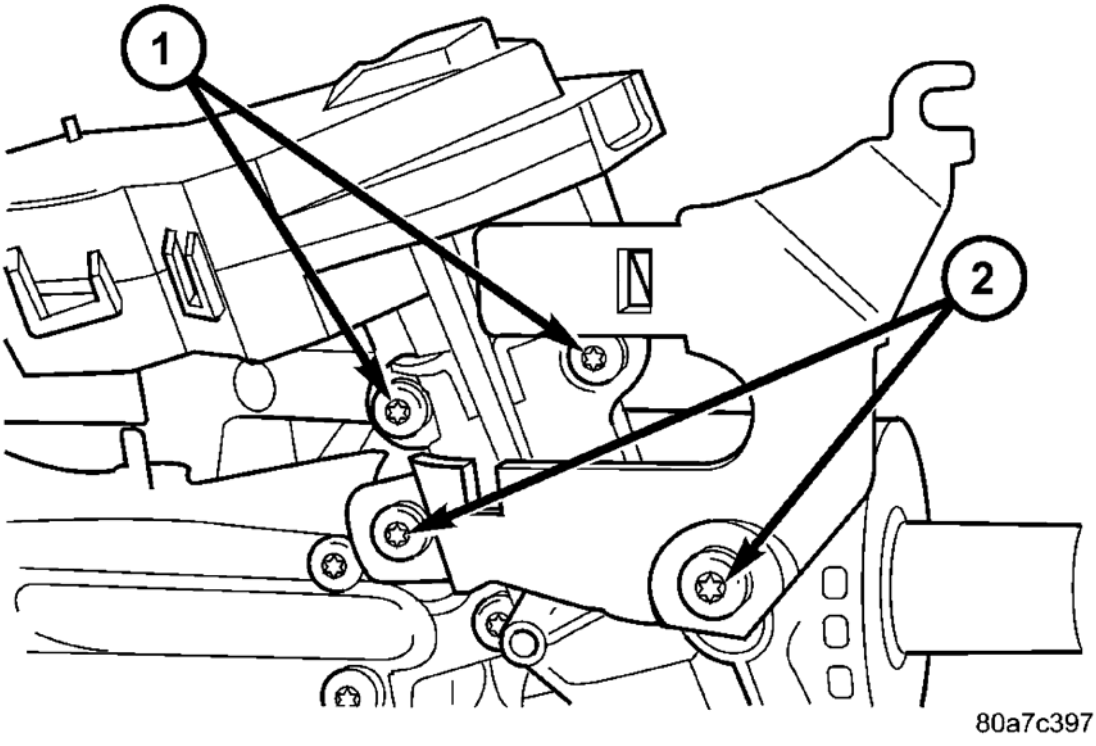

Fig. 21: Ignition Switch Mounting Screws & Non-Tilt Mounting Bracket Screws
Courtesy of CHRYSLER LLC

1 - Ignition Switch Mounting Screws
2 - Non-Tilt Mounting Bracket Screws

8. For columns without tilt remove the bracket (2) to gain access to the ignition switch mounting screws (1). See **Fig. 21**

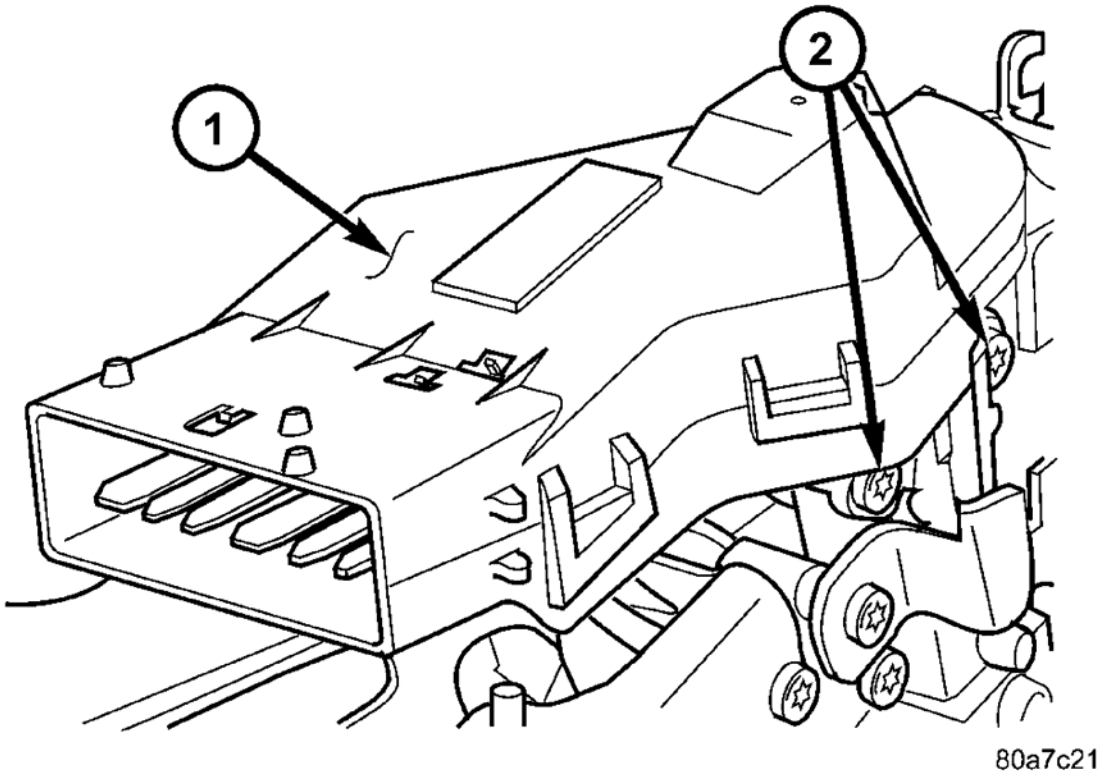

Fig. 22: Ignition Switch & Ignition Switch Mounting Screws
Courtesy of CHRYSLER LLC

1 - Ignition Switch 2 - Ignition Switch Mounting Screws

9. Disconnect the electrical connector at rear of ignition switch (1). See **Fig. 22**.
10. Remove ignition switch mounting screws (2).
11. Using a small screwdriver, push on locking tab and remove switch from steering column.

INSTALLATION

IGNITION SWITCH

The ignition key must be in the key cylinder for cylinder removal. The key cylinder must be removed first before installing ignition switch.

1. Before installing ignition switch, rotate the slot in the switch to the ON position.

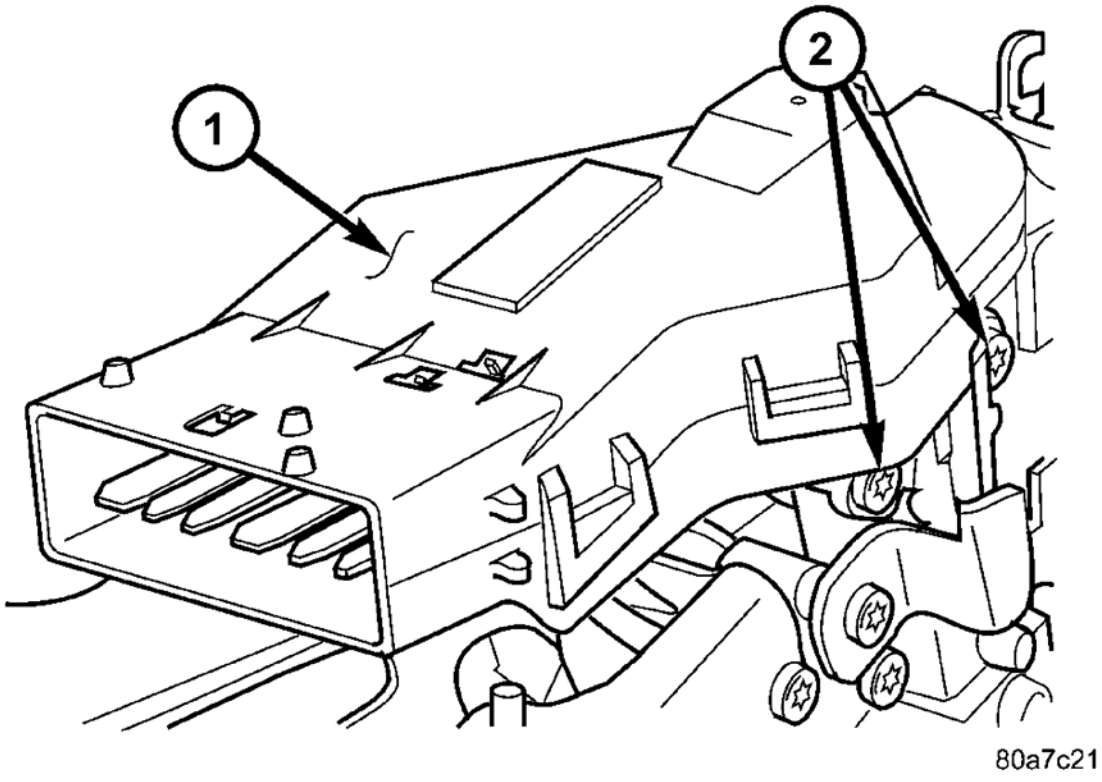

Fig. 23: Ignition Switch & Ignition Switch Mounting Screws
Courtesy of CHRYSLER LLC

1 - Ignition Switch 2 - Ignition Switch Mounting Screws

2. Connect the electrical connector to rear of the ignition switch. Make sure that locking tabs are fully seated into wiring connector.
3. Position switch (1) to column and install the mounting screws (2). Tighten screw to 3 N.m (26 in. lbs.).

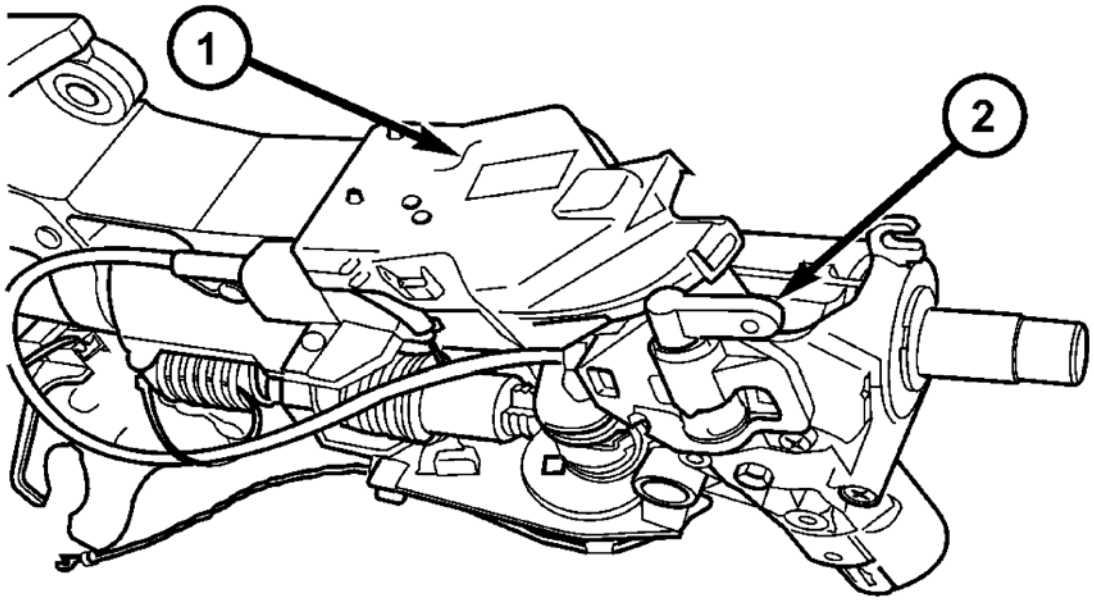

Fig. 24: Ignition Switch & Tilt Lever Mechanism
Courtesy of CHRYSLER LLC

1 - IGNITION SWITCH
2 - TILT LEVER MECHANISM

4. Install the tilt lever bracket (2) mounting screws. Tighten screws to 4.5 N.m (40 in. lbs.).

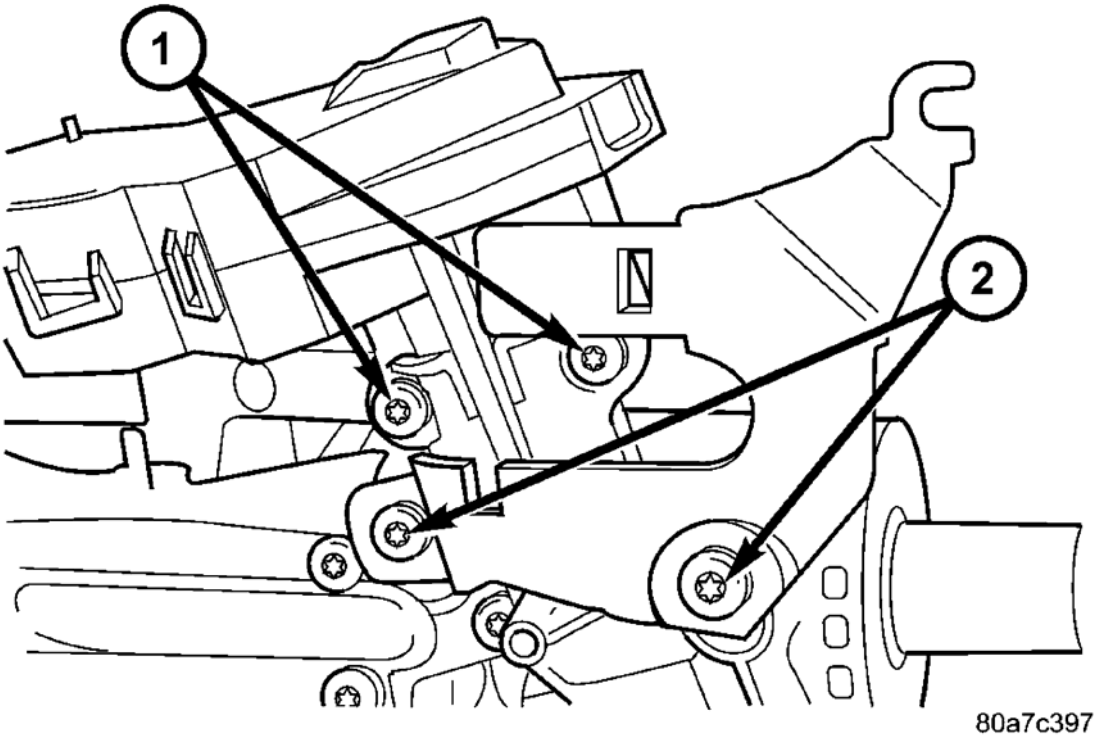

Fig. 25: Ignition Switch Mounting Screws & Non-Tilt Mounting Bracket Screws
Courtesy of CHRYSLER LLC

1 - Ignition Switch Mounting Screws
2 - Non-Tilt Mounting Bracket Screws

5. If the column is non-tilt install the bracket. Tighten screws (2) to 4.5 N.m (40 in. lbs.). See **Fig. 25**

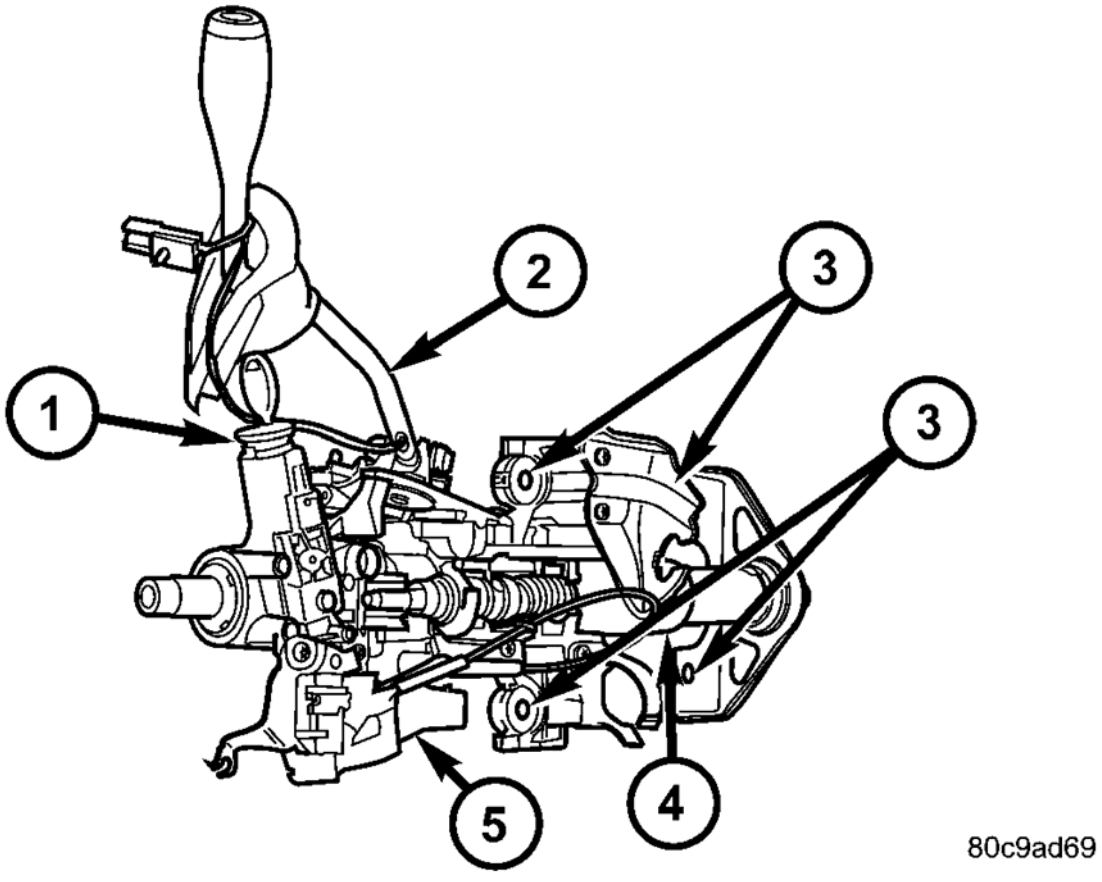

Fig. 26: Identifying Key Cylinder, Gear Shift Lever, Mounting holes, Steering Column & Ignition
Courtesy of CHRYSLER LLC

1 - KEY CYLINDER
2 - GEAR SHIFT LEVER
3 - MOUNTING HOLES
4 - STEERING COLUMN
5 - IGNITION SWITCH

6. Position the wire retainer into the tilt lever bracket.
7. Reconnect the lower clockspring connectors.
8. Install the key cylinder (1)
9. Install steering column upper and lower shrouds.
10. Enable the airbag system. Refer to **INSTALLATION** .

SWITCH-KEY-IN IGNITION

DESCRIPTION

KEY-IN IGNITION SWITCH

The key-in ignition switch is integral to the ignition switch, which is mounted on the left side of the steering column. It closes a path to ground for the Central Timer Module (CTM) when the ignition key is inserted in the ignition key cylinder and the driver door ajar switch is closed (driver door is open). The key-in ignition switch opens the ground path when the key is removed from the ignition key cylinder. The ground path is also opened when the driver door ajar switch is open (driver door is closed).

The key-in ignition switch cannot be repaired and, if faulty or damaged, the entire ignition switch must be replaced, refer to **REMOVAL** .

DIAGNOSIS AND TESTING

IGNITION SWITCH AND KEY LOCK CYLINDER

ELECTRICAL DIAGNOSIS

For ignition switch electrical schematics, refer to Ignition Switch in the appropriate Electrical Wiring Diagrams article.

MECHANICAL DIAGNOSIS (KEY DIFFICULT TO ROTATE)

Refer to **DIAGNOSIS AND TESTING** .

CYLINDER-KEY/LOCK

REMOVAL

LOCK CYLINDER HOUSING

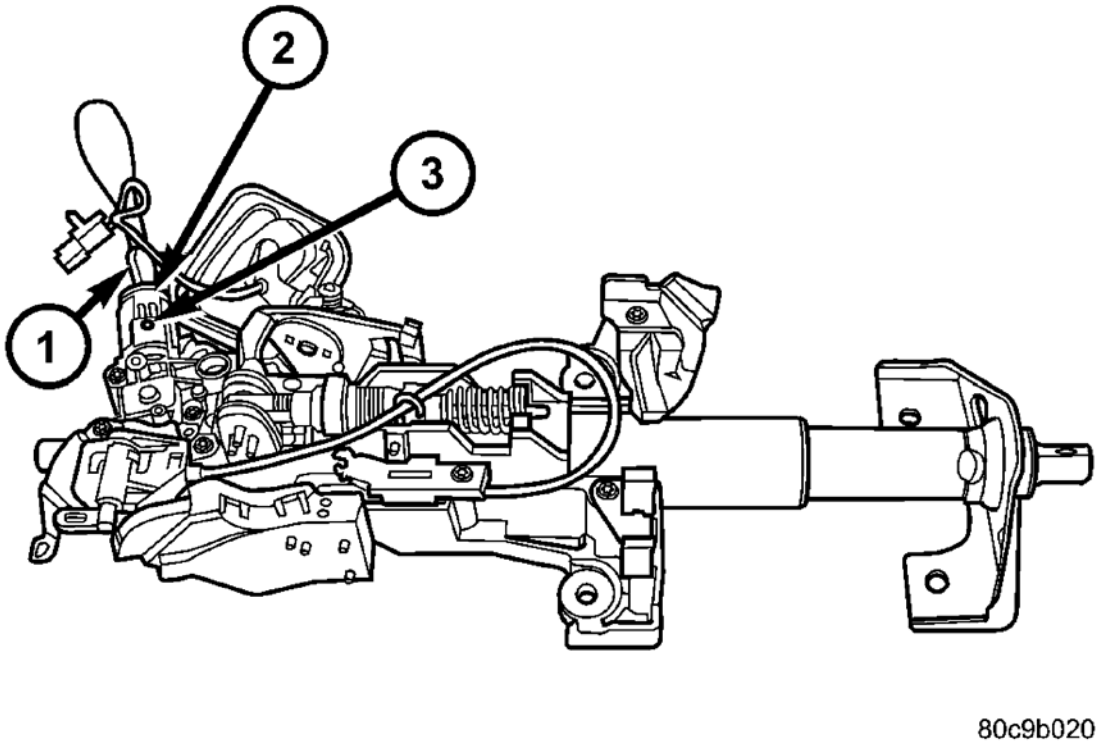

Fig. 27: Key, Key Cylinder & Retaining Pin Holes
Courtesy of CHRYSLER LLC

1 - KEY
2 - KEY CYLINDER
3 - RETAINING PIN HOLE

The ignition key (1) must be in the key cylinder (2) for cylinder removal.

1. Disconnect negative cable from battery.
2. Remove upper and lower covers (shrouds) from steering column.
3. Place shifter in PARK position.
4. A retaining pin is located at side of key cylinder assembly (2). See **Fig. 27**.

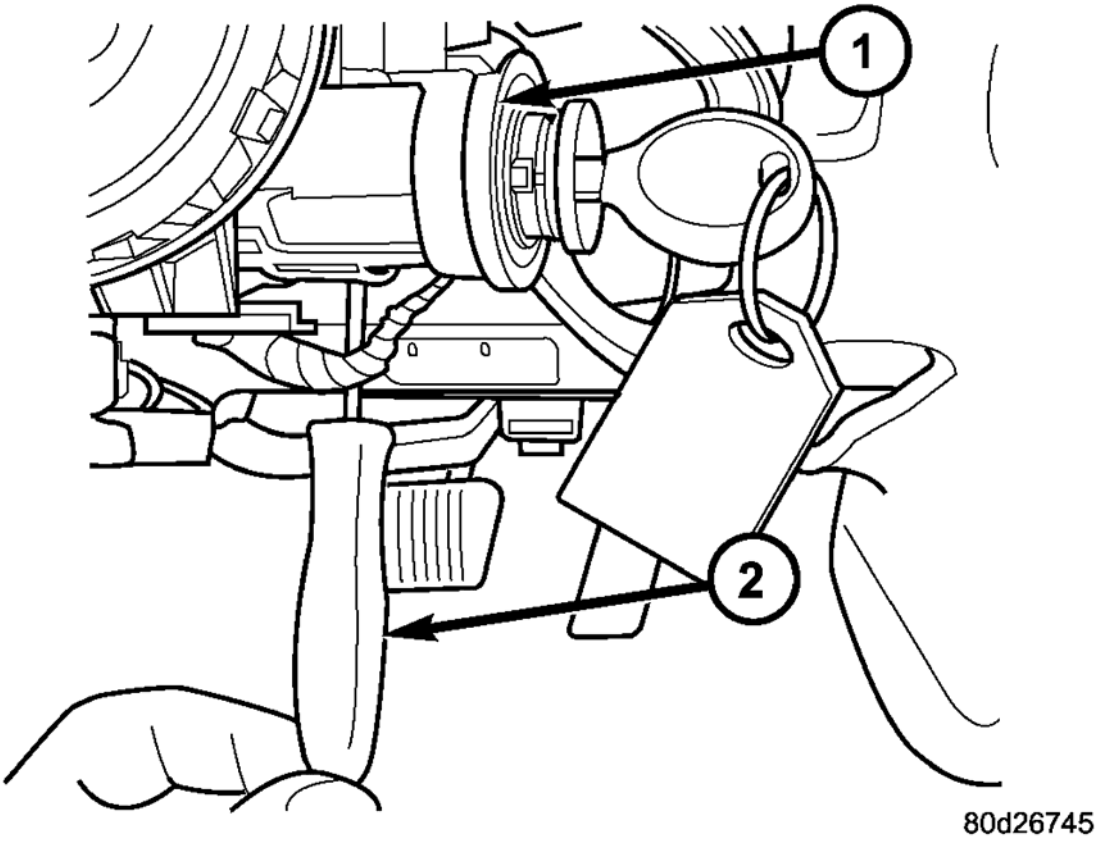

Fig. 28: Key Cylinder & Punch
Courtesy of CHRYSLER LLC

1 - KEY CYLINDER 2 - PUNCH

- Rotate key to RUN position.
- Press in on retaining pin while pulling key cylinder (1) from ignition switch. See **Fig. 28**.

INSTALLATION

LOCK CYLINDER HOUSING

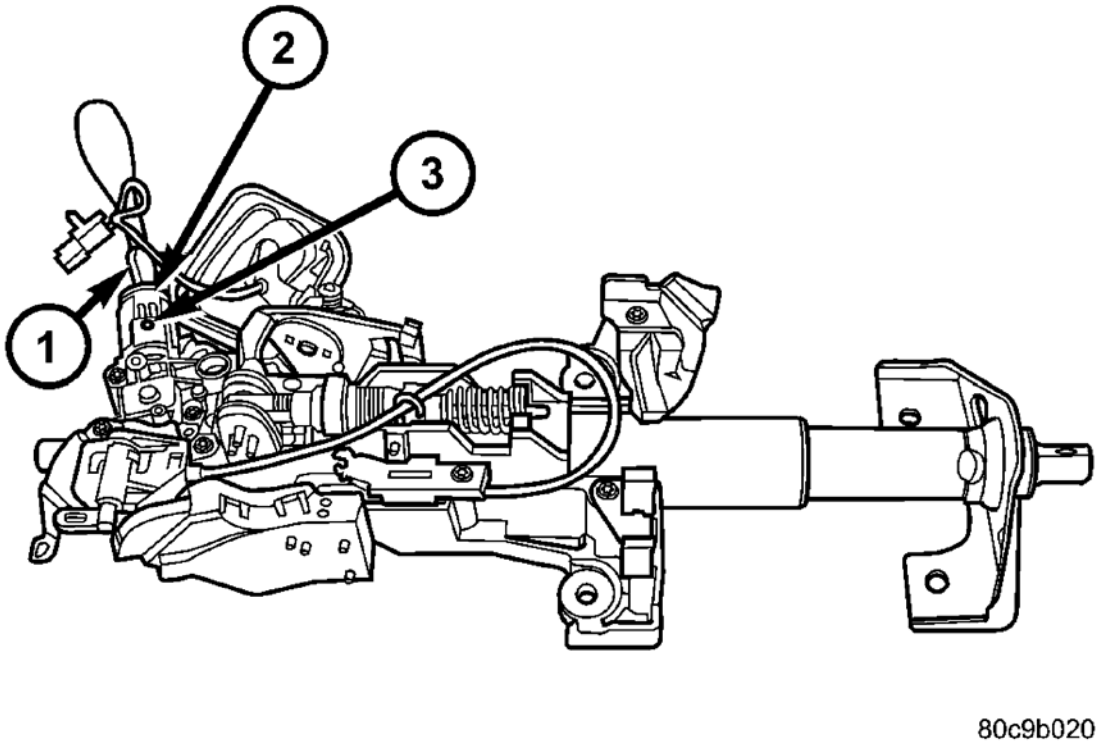

Fig. 29: Key, Key Cylinder & Retaining Pin Holes
Courtesy of CHRYSLER LLC

1 - KEY
2 - KEY CYLINDER
3 - RETAINING PIN HOLE

The ignition key (1) must be in the key cylinder (2) for cylinder installation.

1. Install the key cylinder into the housing using care to align the end of the key cylinder (2) with the ignition switch.
2. Push the key cylinder (2) in until it clicks.
3. Replace the upper and lower shrouds.
4. Reconnect the battery.

PLUG-GLOW 2.8L DIESEL

DESCRIPTION

GLOW PLUG

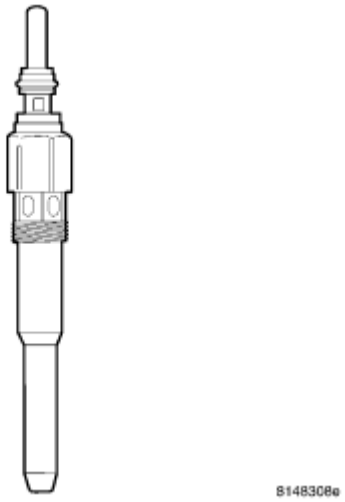

Fig. 30: Glow Plug
Courtesy of CHRYSLER LLC

CAUTION: The glow plugs operate on a 4.4-volt system. The glow plugs DO NOT tolerate any over voltage. Full battery voltage will destroy the glow plug immediately. DO NOT test the glow plugs with a 12V source as damage will occur to the glow plug.

CAUTION:
Never bend, bump or knock the fast metallic glow plugs.
Fast metallic glow plugs must not be handled loose in a container. Store, handle, and transport them only in original boxes.
If there is any doubt about the proper condition of a glow plug, do not reuse it.
Do not clean the glow plugs with abrasive or aggressive media.
Avoid dipping the glow plug into fluids.
Read Diagnostic Trouble Codes (DTCs). If a glow plug problem is indicated, do not start the engine.

CAUTION: Disregarding these instructions may cause severe engine damage.

Glow plugs are used to help start a cold or cool engine. The glow plugs will heat up and glow to heat the combustion chamber of each cylinder. An individual glow plug is used for each cylinder.

OPERATION

GLOW PLUG

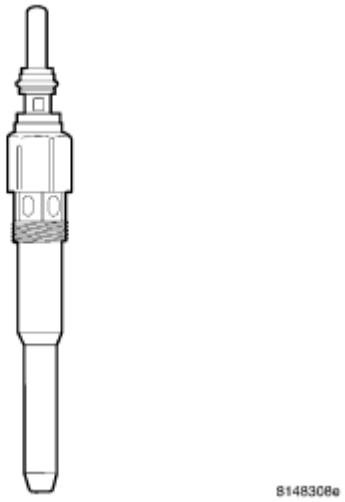

Fig. 31: Glow Plug
Courtesy of CHRYSLER LLC

CAUTION: The glow plugs operate on a 4.4-volt system. DO NOT test the glow plugs with a 12 V source as damage will occur to the glow plug(s).

The Engine Control Module (ECM) monitors various engine sensors. When the ignition key is turned to the ON position, the ECM sends a signal to the glow plug module (relay) to turn on, and cycle, the glow plugs for a pre-determined amount of time, plus illuminate the glow plug light in the instrument panel. Once activated, the element inside of the core of the glow plug begins to glow. Each glow plug draws approximately 8 amps, for a total system amperage of 32 amps at 22°C (72°F) ambient temperature. If there is a fault with the glow plug system, the ECM will store a fault code.

DIAGNOSIS AND TESTING

GLOW PLUG SYSTEM

CAUTION: DO NOT attempt to start the engine until the glow plug system tests correctly.

1. Measure the electrical resistance of each glow plug while it is still installed in the cylinder head. Resistance should be less than 0.8 ohm between the electrical connector point on the glow plug and the cylinder head. The ground contact on the DVOM must be as close as possible to the point where the glow plug contacts the cylinder head to avoid erratic resistance measurements.
2. If the resistance is out of tolerance, remove the glow plug from the cylinder head and check the resistance again.
3. Use the actuator test function of the scan tool to test the glow plug module and glow plug lamp. The glow plug module's on-board diagnostic tests will automatically check the electrical condition of the entire glow plug system.
4. After the scan tool glow plug actuator test function is complete, if MIL is OFF and no glow plug DTCs are present, testing is complete and the engine can be started.

5. If MIL is still ON, check the harness connectors of glow plugs, repair any loose or damaged connections, and run the glow plug actuator test again.
6. If MIL is still ON and glow plug DTCs are present, refer to 9 - Engine Electrical Diagnostics - Diesel, and follow the diagnostic test(s) related to the active or stored DTCs.

REMOVAL

REMOVAL

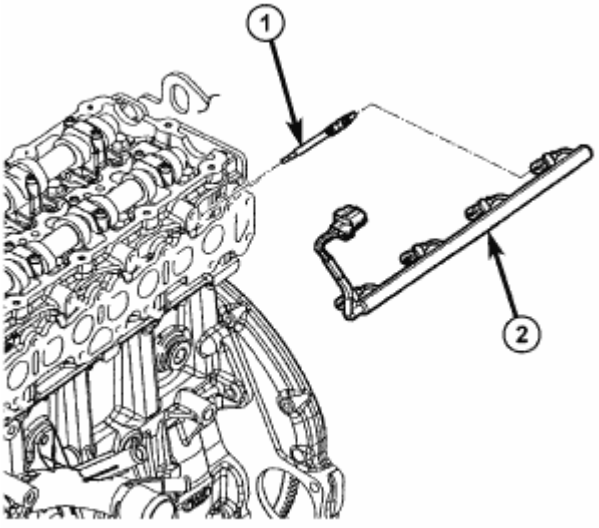

Fig. 32: Glow Plugs & Wiring Harness
Courtesy of CHRYSLER LLC

The four glow plugs (1) are attached to cylinder head below fuel rail.

1. Disconnect negative battery cable.
2. Remove fuel rail and high-pressure fuel lines.
3. Disconnect glow plug wiring harness (2) at all four glow plugs (1).

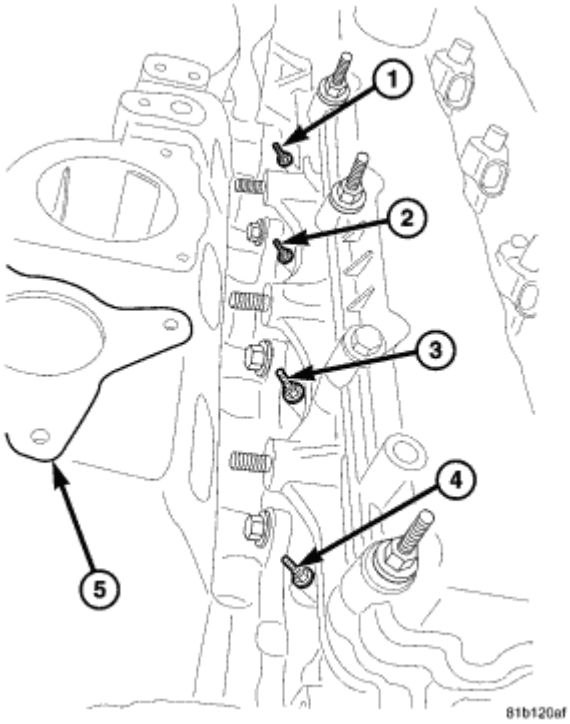

Fig. 33: Glow Plugs - 2.8L Diesel
Courtesy of CHRYSLER LLC

4. Use a socket to loosen glow plug(s) (1), (2), (3) or (4). After loosening, attach a flexible tool such as a rubber hose to remove glow plug from cylinder head.

CAUTION: After plug removal, do not bend, knock, or drop the glow plugs while handling (any mechanical impact may damage the glow plug).

INSTALLATION

INSTALLATION

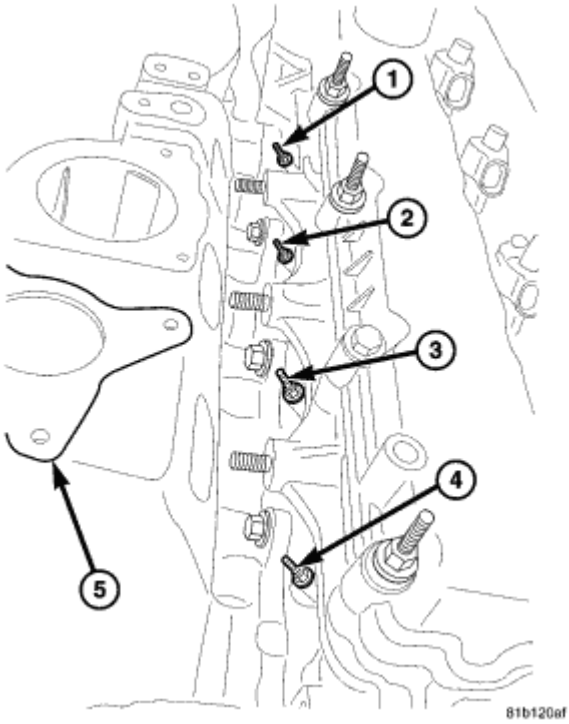

Fig. 34: Glow Plugs - 2.8L Diesel
Courtesy of CHRYSLER LLC

1. Apply a small amount of clean diesel oil or motor oil to glow plug threads.
2. Attach a flexible tool such as a rubber hose to install glow plug into cylinder head. Tighten each plug to 14 N.m (10 ft. lbs.) (124 in. lbs.) torque.

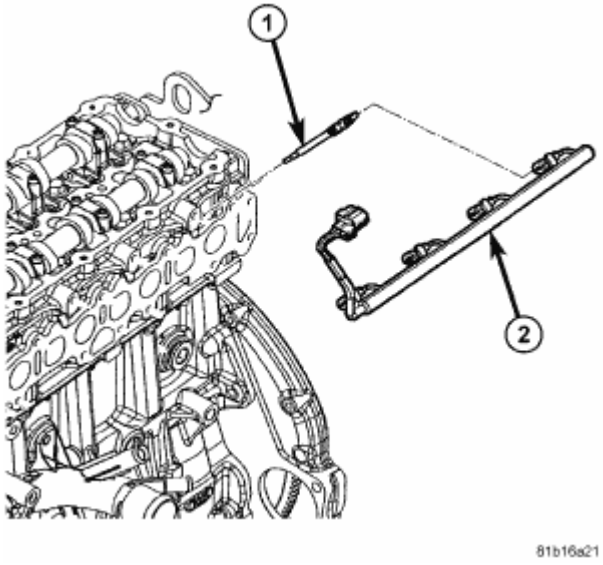

Fig. 35: Glow Plugs & Glow Plug Wiring Harness

Courtesy of CHRYSLER LLC

3. Connect glow plug wiring harness (2) to all four glow plugs (1).
4. Install fuel rail and high-pressure fuel lines.
5. Connect negative battery cable.

RELAY-GLOW PLUG 2.8L DIESEL

REMOVAL

REMOVAL

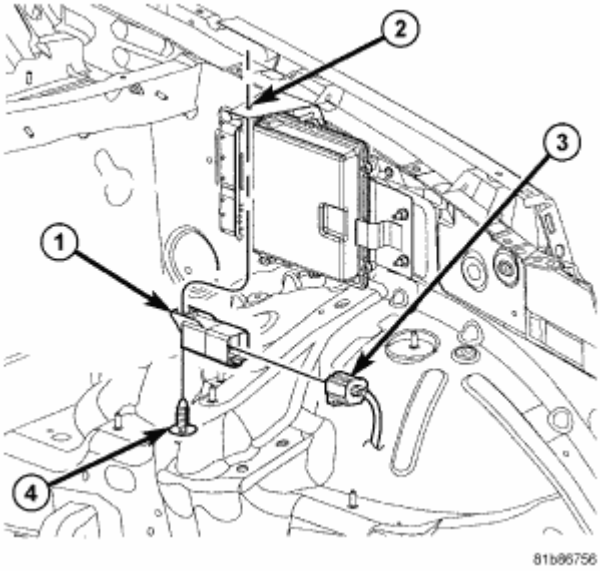

Fig. 36: Identifying Glow Plug Relay (Module), ECM Mounting Bracket, Electrical Connector & Pin
Courtesy of CHRYSLER LLC

The glow plug relay (module) (1) is located in the engine compartment. It is attached to the ECM mounting bracket (2).

1. Remove pin (4).
2. Disconnect electrical connector (3) and remove relay.

INSTALLATION

INSTALLATION

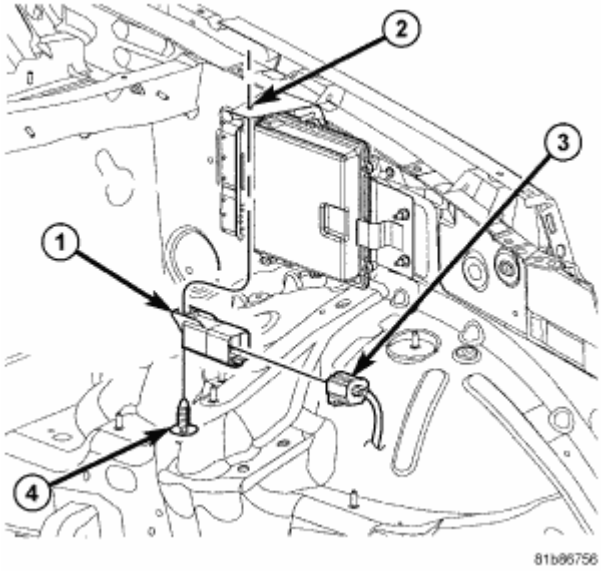

Fig. 37: Identifying Glow Plug Relay (Module), ECM Mounting Bracket, Electrical Connector & Pin
Courtesy of CHRYSLER LLC

The glow plug relay (module) (1) is located in the engine compartment. It is attached to the ECM mounting bracket (2).

1. Connect electrical connector (3) to relay (1).
2. Position relay to mounting bracket (2) and install pin (4).