

**2007 ENGINE****Starting - Service Information - Nitro****STARTING INFORMATION****DESCRIPTION****DESCRIPTION**

The Remote Starting System allows the vehicle to be started up to 300 feet (91 meters) away from the vehicle using the remote keyless entry key fob which is part of your ignition key. In order to remote start your vehicle, the hood, liftgate, and all of the doors must be closed. To remotely start your vehicle, press the "Lock" button on the key fob once, then within three seconds press the "Remote Start" button twice. To indicate that the vehicle is about to start, the parking lights will flash and the horn will sound briefly. Once the vehicle has started, the engine will run for 15 minutes. To cancel remote start, press the "Remote Start" button twice within two seconds. To enter the vehicle while the engine is running during a remote start, you must first unlock the vehicle using the "Unlock" button on the key fob. After the vehicle is unlocked, you have 60 seconds to enter the vehicle, insert the key into the ignition, and move it to the RUN position. Otherwise, the engine will cancel remote start and automatically turn off. Remote start will also cancel if any of the following occur:

If the engine stalls or RPM exceeds 2500.

Any engine warning lamps come on.

The hood is opened.

The hazard switch is pressed.

The transmission is moved out of P (Park).

The vehicle can be started remotely up to a maximum of two times. The vehicle is also allowed a maximum of one failed start, where the remote start sequence was initiated but cancelled before the engine begins to crank. After either of these conditions, or if the Vehicle Theft Alarm is alarming, or if the PANIC button was pressed, the vehicle must be reset by inserting a valid key into the ignition and moving it to the RUN position, then back to LOCK.

**STARTING SYSTEM**

The starting system consists of:

Starter relay

Starter motor (including an integral starter solenoid)

Other components to be considered as part of starting system are:

Battery

Battery cables

Ignition switch and key lock cylinder

- Clutch pedal position switch (manual transmission)
- Park/neutral position switch (automatic transmission)
- Wire harnesses and connections.

The Battery, Starting, and Charging systems operate in conjunction with one another, and must be tested as a complete system. For correct operation of starting/charging systems, all components used in these 3 systems must perform within specifications. When attempting to diagnose any of these systems, it is important that you keep their interdependency in mind.

The diagnostic procedures used in each of these groups include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM). Use of an induction-type milliamperage ammeter, volt/ohmmeter, battery charger, carbon pile rheostat (load tester), and 12-volt test lamp may be required.

Certain starting system components are monitored by the PCM and may produce a Diagnostic Trouble Code (DTC).

## **OPERATION**

### **STARTING SYSTEM**

The starting system components form two separate circuits. A high-amperage feed circuit that feeds the starter motor between 150 and 350 amperes (700 amperes - diesel engine), and a low-amperage control circuit that operates on less than 20 amperes. The high-amperage feed circuit components include the battery, the battery cables, the contact disc portion of the starter solenoid, and the starter motor. The low-amperage control circuit components include the ignition switch, the clutch pedal position switch (manual transmission), the park/neutral position switch (automatic transmission), the starter relay, the electromagnetic windings of the starter solenoid, and the connecting wire harness components.

If the vehicle is equipped with a manual transmission, it has a clutch pedal position switch installed in series between the ignition switch and the coil battery terminal of the starter relay. This normally open switch prevents the starter relay from being energized when the ignition switch is turned to the momentary Start position, unless the clutch pedal is depressed. This feature prevents starter motor operation while the clutch disc and the flywheel are engaged. The starter relay coil ground terminal is always grounded on vehicles with a manual transmission.

If the vehicle is equipped with an automatic transmission, battery voltage is supplied through the low-amperage control circuit to the coil battery terminal of the starter relay when the ignition switch is turned to the momentary Start position. The park/neutral position switch is installed in series between the starter relay coil ground terminal and ground. This normally open switch prevents the starter relay from being energized and the starter motor from operating unless the automatic transmission gear selector is in the Neutral or Park positions.

When the starter relay coil is energized, the normally open relay contacts close. The relay contacts connect the relay common feed terminal to the relay normally open terminal. The closed relay contacts energize the starter solenoid coil windings.

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The energized solenoid pull-in coil pulls in the solenoid plunger. The solenoid plunger pulls the shift lever in the starter motor. This engages the starter overrunning clutch and pinion gear with the starter ring gear on the manual transmission flywheel or on the automatic transmission torque converter or torque converter drive plate.

As the solenoid plunger reaches the end of its travel, the solenoid contact disc completes the high-amperage starter feed circuit and energizes the solenoid plunger hold-in coil. Current now flows between the solenoid battery terminal and the starter motor, energizing the starter.

Once the engine starts, the overrunning clutch protects the starter motor from damage by allowing the starter pinion gear to spin faster than the pinion shaft. When the driver releases the ignition switch to the On position, the starter relay coil is de-energized. This causes the relay contacts to open. When the relay contacts open, the starter solenoid plunger hold-in coil is de-energized.

When the solenoid plunger hold-in coil is de-energized, the solenoid plunger return spring returns the plunger to its relaxed position. This causes the contact disc to open the starter feed circuit, and the shift lever to disengage the overrunning clutch and pinion gear from the starter ring gear.

## OPERATION

### Remote Start Operating Conditions

In order to operate remote start, the following conditions must be met:

- Key fob sequence must be operated within a 100 meter range of the vehicle.
- The vehicle must be in Park.
- Key is not in the ignition.
- The hazard switch off.
- Vehicle Theft Alarm or Panic is not alarming.
- Doors and hood must be closed.
- The battery voltage is normal (11 to 15 volts).

### Remote Start Shut Down/Deactivate Conditions

Engine will NOT start or will shut down/deactivate during any of the following conditions:

- Key in Ignition.
- Doors or hood are opened before remote unlock.
- Hazard Switch depressed.
- Panic or theft alarm active.
- Brake applied.
- A prior remote start cranked the engine , but failed to start the engine.
- Battery voltage NOT in the normal range.
- High (run away) or Low Idle (stall) RPM.
- MIL Active.

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- High Engine Coolant Temperature.
- Low Engine Oil Pressure.

### Initiate Remote Start

To Remote Start the vehicle:

1. Press remote button on the Key Fob twice within 5 seconds.

**NOTE:** Engine will run for 15 minutes after a remote start is initiated. After 15 minutes, the engine will shut off. The system allows for only two sequential remote starts without a key ignition cycle.

2. Unlock vehicle with Key Fob to enter the vehicle.
3. Put key in ignition, turn key to run position to exit remote start and enter a normal start without engine shut off.

### Identification that Remote Start is Activated

To identify that Remote Start has been activated the following will occur:

- Horn will sound and lights will flash to acknowledge a start command was received.
- Park Lamps will turn on to indicate that the engine is running in remote start mode.

### Terminate Remote Start

To terminate Remote Start, press Remote Start button on the Key Fob once.

**NOTE:** In order to avoid inadvertent shut downs, the one-time press to shut down the vehicle will be disabled for two seconds after receipt of a valid remote start request.

## DIAGNOSIS AND TESTING

### STARTING SYSTEM

The battery, starting, and charging systems operate in conjunction with one another, and must be tested as a complete system. For correct starting/charging system operation, all of the components involved in these three systems must perform within specifications.

Starting System Diagnosis		
CONDITION	POSSIBLE CAUSE	CORRECTION
STARTER FAILS TO OPERATE.	1. Battery discharged or faulty.	1. Refer to <b>BATTERY</b> . Charge or replace battery, if required.
	2. Starting circuit wiring	2. Refer to <b>SYSTEM WIRING DIAGRAMS</b> . Test

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	faulty.	and repair starter feed and/or control circuits, if required.
	3. Starter relay faulty.	3. The starter relay is located within the TIPM (Totally Integrated Power Module). Refer to " <b><u>*NO CRANK CONDITION</u></b> " .
	4. Ignition switch faulty.	4. Refer to Ignition Switch and Key Lock Cylinder in <b><u>STEERING SYSTEM</u></b> article. Replace ignition switch if required.
	5. Clutch pedal position switch faulty.	5. Refer to <b><u>SWITCH-CLUTCH PEDAL POSITION</u></b> .
	6. Park/Neutral position switch faulty or misadjusted.	6. Refer to Park/Neutral Position Switch in <b><u>42RLE - SERVICE INFORMATION</u></b> . Replace park/neutral position switch if required.
	7. Starter solenoid faulty.	7. Refer to <b><u>MOTOR - STARTER</u></b> . Replace starter motor assembly if required.
	8. Starter motor faulty.	8. If all other starting system components and circuits test OK, replace starter motor.
STARTER ENGAGES, FAILS TO TURN ENGINE.	1. Battery discharged or faulty.	1. Refer to <b><u>BATTERY</u></b> . Charge or replace battery if required.
	2. Starting circuit wiring faulty.	2. Refer to <b><u>SYSTEM WIRING DIAGRAMS</u></b> . Test and repair starter feed and/or control circuits if required.
	3. Starter motor faulty.	3. If all other starting system components and circuits test OK, replace starter motor assembly.
	4. Engine seized.	4. Refer to Engine Diagnosis in the <b><u>DIAGNOSIS AND TESTING</u></b> for 3.7L - SERVICE INFORMATION or <b><u>DIAGNOSIS AND TESTING</u></b> for 4.0L - SERVICE INFORMATION .
STARTER ENGAGES, SPINS OUT BEFORE ENGINE STARTS.	1. Starter ring gear faulty.	1. Refer to Starter Motor <b><u>REMOVAL</u></b> and <b><u>INSTALLATION</u></b> . Remove starter motor to inspect starter ring gear. Replace starter ring gear if required.
	2. Starter motor faulty.	2. If all other starting system components and circuits test OK, replace starter motor assembly.
STARTER DOES NOT DISENGAGE.	1. Starter motor improperly installed.	1. Refer to Starter Motor <b><u>REMOVAL</u></b> and <b><u>INSTALLATION</u></b> . Tighten starter mounting hardware to correct torque specifications.
	2. Starter relay faulty.	2. The starter relay is located within the TIPM (Totally Integrated Power Module). Refer to " <b><u>*NO CRANK CONDITION</u></b> " .
	3. Ignition switch faulty.	3. Refer to Ignition Switch and Key Lock Cylinder in <b><u>STEERING SYSTEM</u></b> article. Replace ignition switch if required.
	4. Starter motor faulty.	4. If all other starting system components and circuits test OK, replace starter motor.

**INSPECTION**

For complete starter wiring circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** . Before removing any unit from starting system for repair or diagnosis, perform the following inspections:

**WARNING:** On vehicles equipped with airbags, refer to **RESTRAINTS - SERVICE INFORMATION** , before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury.

**Battery** - Visually inspect battery for indications of physical damage and loose or corroded cable connections. Determine state-of-charge and cranking capacity of battery. Charge or replace battery if required. Refer to **BATTERY** . **Note: If equipped with diesel engine, a dual battery system may be used, and both batteries must be inspected.**

**Ignition Switch** - Visually inspect ignition switch for indications of physical damage and loose or corroded wire harness connections. Refer to **STEERING SYSTEM** article.

**Clutch Pedal Position Switch** - If equipped with manual transmission, visually inspect clutch pedal position switch for indications of physical damage and loose or corroded wire harness connections. Refer to **SWITCH-CLUTCH PEDAL POSITION** .

**Park/Neutral Position Switch** - If equipped with automatic transmission, visually inspect park/neutral position switch for indications of physical damage and loose or corroded wire harness connections. Refer to **42RLE - SERVICE INFORMATION** .

**Starter Relay** - The starter relay is located within the TIPM (Totally Integrated Power Module). Refer to **"\*NO CRANK CONDITION"** .

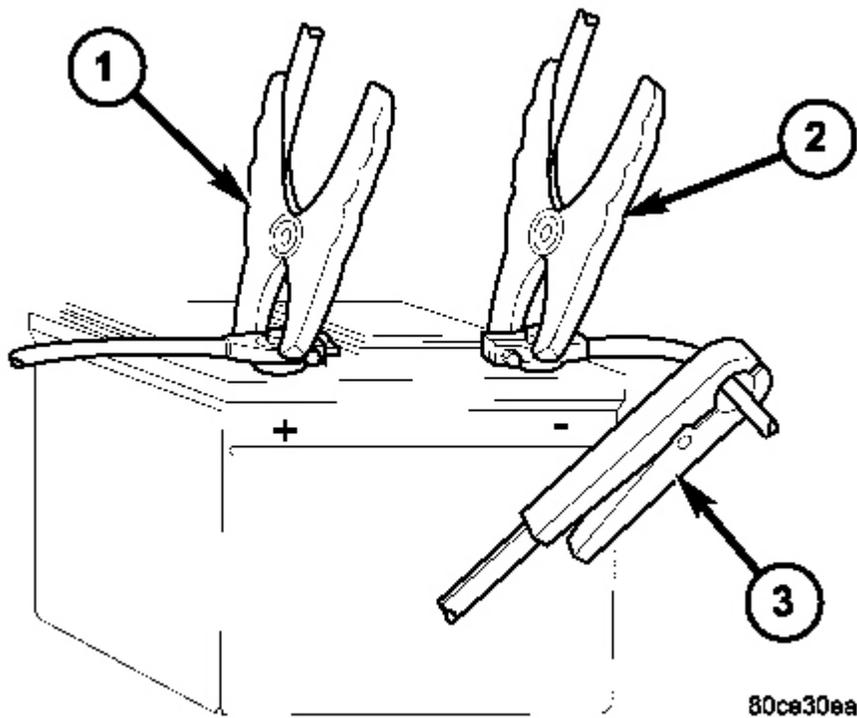
**Starter Motor** - Visually inspect starter motor for indications of physical damage and loose or corroded wire harness connections.

**Starter Solenoid** - Visually inspect starter solenoid for indications of physical damage and loose or corroded wire harness connections.

**Wiring** - Visually inspect wire harnesses for damage. Repair or replace any faulty wiring, as required. Refer to **SYSTEM WIRING DIAGRAMS** article .

**TESTING****COLD CRANKING TEST**

**NOTE:** For complete starter wiring circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** . The battery must be fully-charged and load-tested before proceeding. Refer to **BATTERY** .



**Fig. 1: Identifying Positive Clamp, Negative Clamp & Induction Ammeter Clamp**  
Courtesy of CHRYSLER LLC

- 1 - POSITIVE CLAMP
- 2 - NEGATIVE CLAMP
- 3 - INDUCTION AMMETER CLAMP

1. Connect volt-ampere tester (1) and (2) to battery terminals. See **Fig. 1**. See instructions provided by manufacturer of volt-ampere tester being used. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, tester should be connected to battery on left side of vehicle only. Also, tester current reading must be taken from positive battery cable lead that connects to starter motor.**
2. Fully engage parking brake.
3. If equipped with manual transmission, place gearshift selector lever in Neutral position and block clutch pedal in fully depressed position. If equipped with automatic transmission, place gearshift selector lever in Park position.
4. Verify that all lamps and accessories are turned off.

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5. To prevent a gasoline engine from starting, remove either the ignition run fuse, or the fuel pump control fuse. To prevent a diesel engine from starting, disconnect the electrical connectors at both the camshaft and crankshaft position sensors.

**WARNING:** Attempt to start engine a few times before proceeding with following step.

**NOTE:** A cold engine will increase starter current (amperage) draw reading, and reduce battery voltage reading.

6. Rotate and hold ignition switch in Start position. Note cranking voltage and current (amperage) draw readings shown on volt-ampere tester.
  - If voltage reads below 9.6 volts, refer to **STARTER MOTOR** in Diagnosis and Testing. If starter motor is OK, refer to **DIAGNOSIS AND TESTING** for 3.7L - SERVICE INFORMATION or **DIAGNOSIS AND TESTING** for 4.0L - SERVICE INFORMATION for further testing of engine. If starter motor is not OK, replace faulty starter motor.
  - If voltage reads above 9.6 volts and current (amperage) draw reads below specifications, refer to **FEED CIRCUIT TEST** .
  - If voltage reads 12.5 volts or greater and starter motor does not turn, refer to **CONTROL CIRCUIT TESTING** .
  - If voltage reads 12.5 volts or greater and starter motor turns very slowly, refer to **FEED CIRCUIT TEST** .

### FEED CIRCUIT TEST

The starter feed circuit test (voltage drop method) will determine if there is excessive resistance in high-amperage feed circuit. For complete starter wiring circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** .

When performing these tests, it is important to remember that voltage drop is giving an indication of resistance between two points at which voltmeter probes are attached.

**Example:** When testing resistance of positive battery cable, touch voltmeter leads to positive battery cable clamp and cable connector at starter solenoid. If you probe positive battery terminal post and cable connector at starter solenoid, you are reading combined voltage drop in positive battery cable clamp-to-terminal post connection and positive battery cable.

The following operation will require a voltmeter accurate to 1/10 (0.10) volt. Before performing tests, be certain that following procedures are accomplished:

Battery is fully-charged and load-tested. Refer to **BATTERY** .

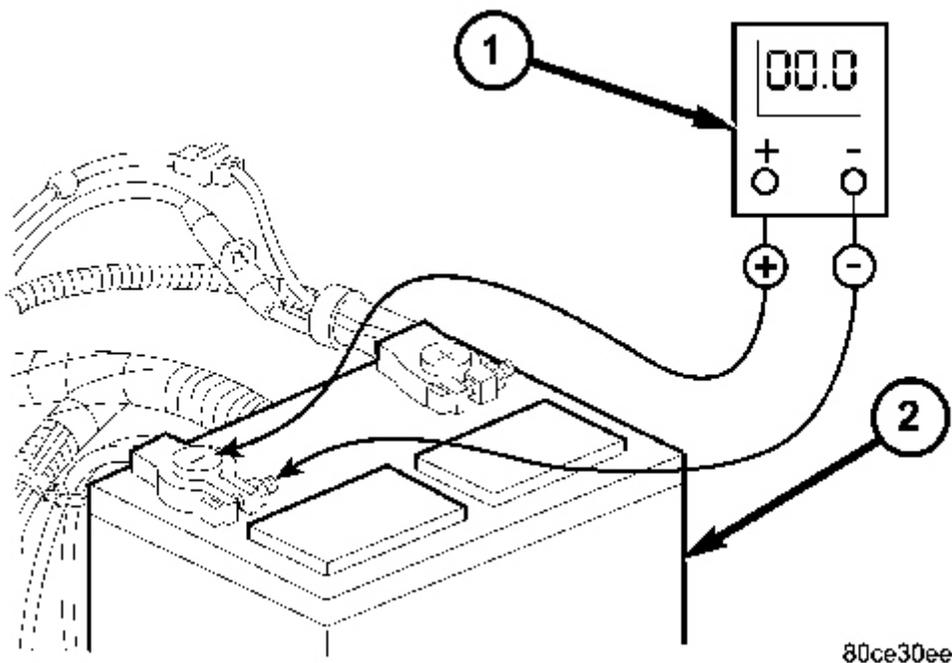
Fully engage parking brake.

If equipped with manual transmission, place gearshift selector lever in Neutral position and block clutch pedal in fully depressed position. If equipped with automatic transmission, place gearshift selector lever

in Park position.

Verify that all lamps and accessories are turned off.

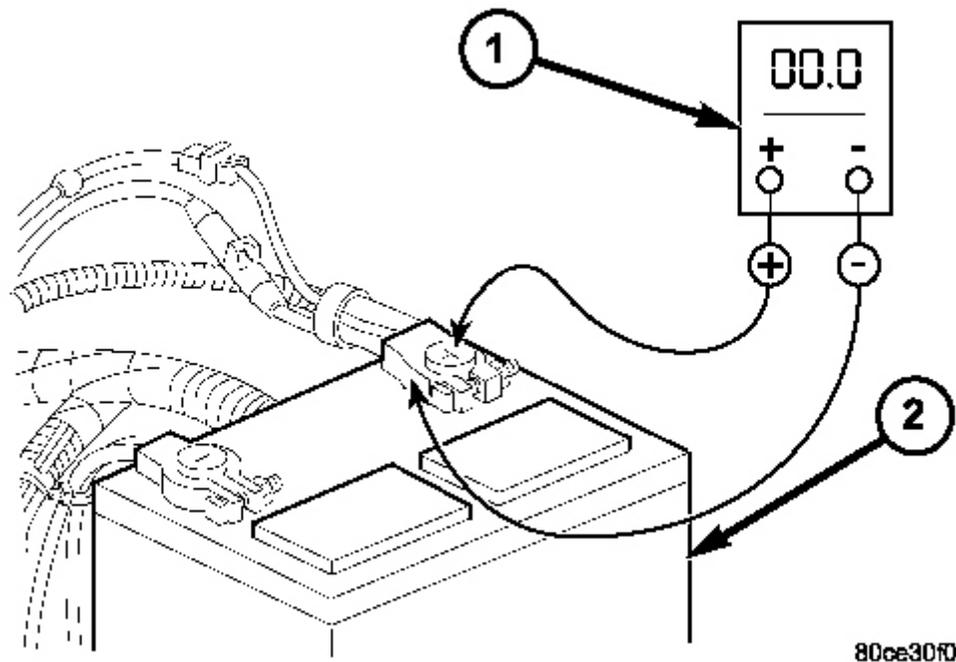
To prevent a gasoline engine from starting, remove Automatic Shut Down (ASD) relay. To prevent a diesel engine from starting, remove Fuel Pump Relay. These relays are located in Power Distribution Center (PDC). Refer to label on PDC cover for relay location.



**Fig. 2: Testing Battery Negative Connection Resistance**  
Courtesy of CHRYSLER LLC

1 - VOLTMETER  
2 - BATTERY

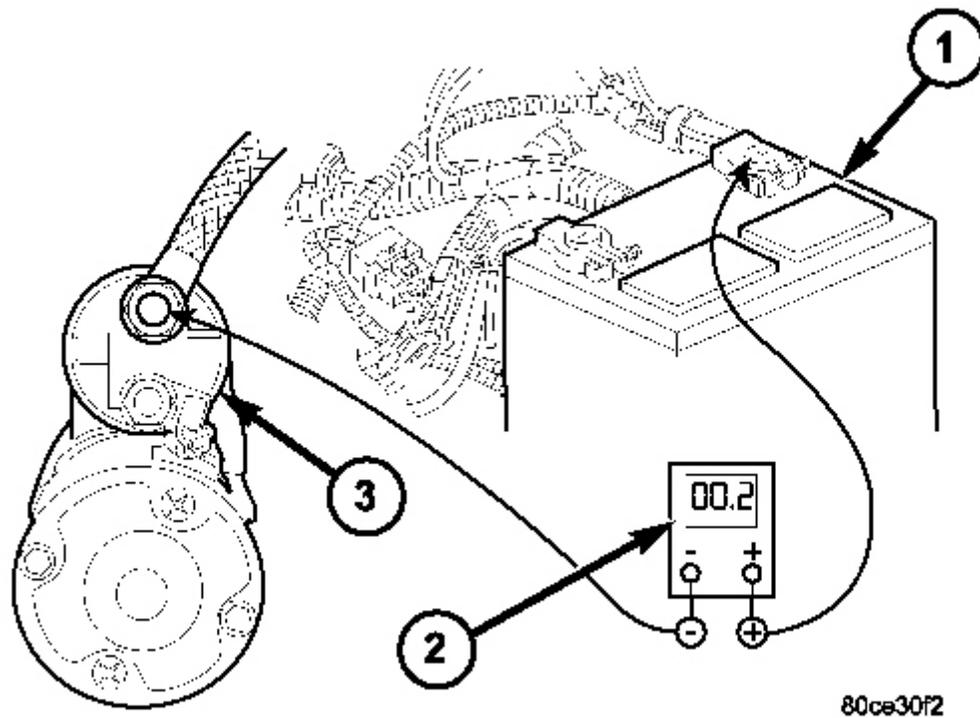
1. Connect positive lead of voltmeter (1) to negative battery cable terminal post. Connect negative lead of voltmeter to negative battery cable clamp. See [Fig. 2](#). Rotate and hold ignition switch in Start position. Observe voltmeter. If voltage is detected, correct poor contact between cable clamp and terminal post. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, procedure must be performed twice, once for each battery.**



**Fig. 3: Testing Battery Positive Connection Resistance**  
Courtesy of CHRYSLER LLC

1 - VOLTMETER  
2 - BATTERY

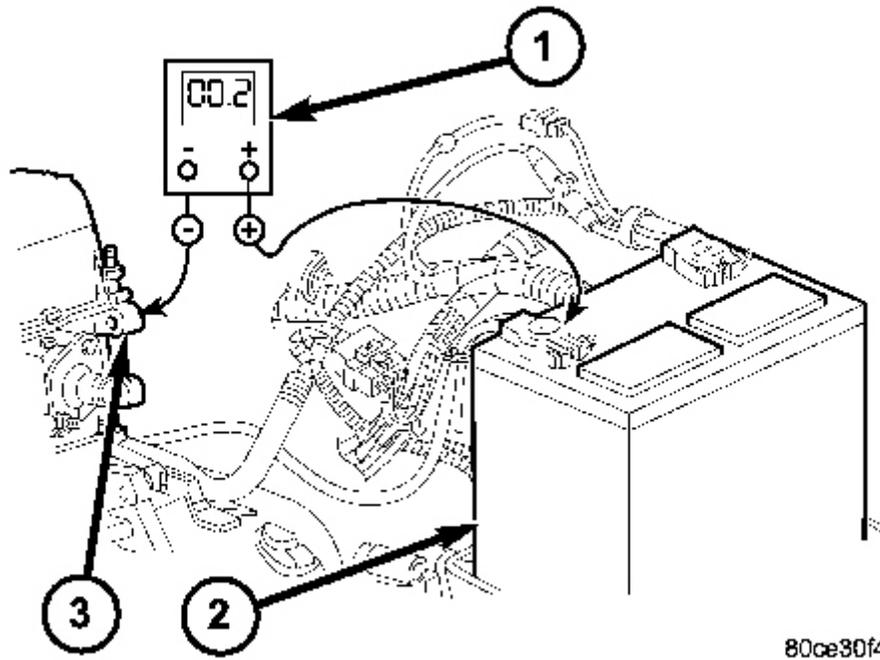
2. Connect positive lead of voltmeter to positive battery terminal post. Connect negative lead of voltmeter to battery positive cable clamp. See **Fig. 3**. Rotate and hold ignition switch in Start position. Observe voltmeter. If voltage is detected, correct poor contact between cable clamp and terminal post. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed twice, once for each battery.**



**Fig. 4: Testing Battery Positive Cable Resistance**  
Courtesy of CHRYSLER LLC

1 - BATTERY  
2 - VOLTMETER  
3 - STARTER MOTOR

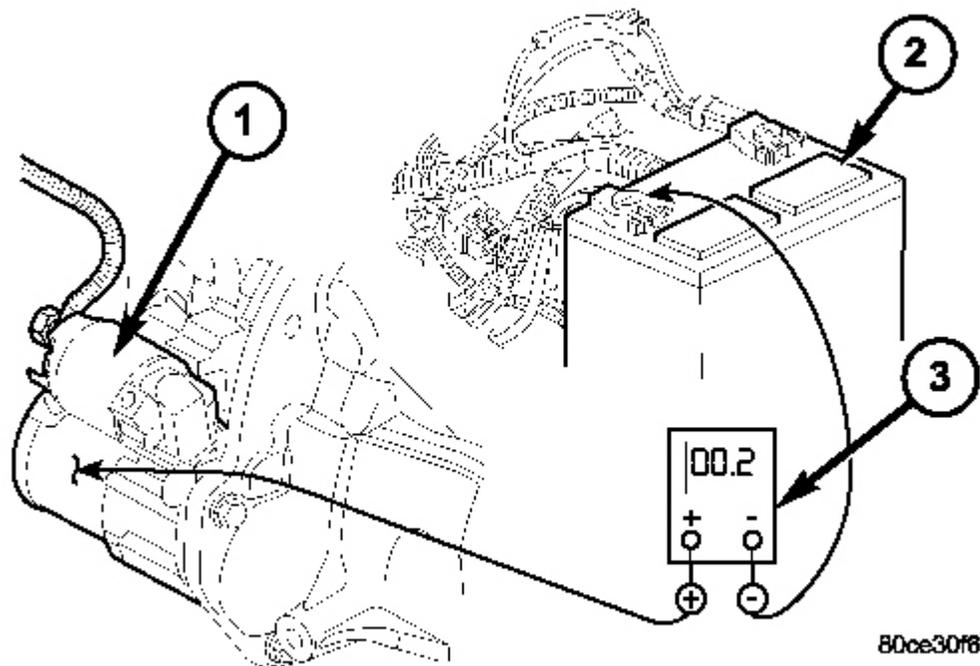
3. Connect voltmeter to measure between battery positive terminal post and starter solenoid battery terminal stud. See **Fig. 4**. Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten battery cable connection at solenoid. Repeat test. If reading is still above 0.2 volt, replace faulty positive battery cable. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed on driver side battery only.**



**Fig. 5: Testing Ground Circuit Resistance**  
Courtesy of CHRYSLER LLC

1 - VOLTMETER
2 - BATTERY
3 - ENGINE GROUND

4. Connect voltmeter to measure between negative battery terminal post and a good clean ground on engine block. See **Fig. 5**. Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten negative battery cable attachment on engine block. Repeat test. If reading is still above 0.2 volt, replace faulty negative battery cable. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed twice, once for each battery.**



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**Fig. 6: Testing Starter Ground**  
 Courtesy of CHRYSLER LLC

1 - STARTER MOTOR 2 - BATTERY 3 - VOLTMETER
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- Connect positive lead of voltmeter to starter housing. Connect negative lead of voltmeter to negative battery terminal post. See **Fig. 6**. Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, correct poor starter to engine block ground contact. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed on driver side battery only.**
- If equipped with dual battery system (certain diesel equipped models), connect positive lead of voltmeter to positive battery cable clamp on battery located on left side of vehicle. Connect negative lead of voltmeter to positive battery terminal post on battery located on right side of vehicle. Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten battery cables at both batteries. Repeat test. If reading is still above 0.2 volt, replace faulty positive battery cable.

If resistance tests detect no feed circuit problems, refer to **STARTER MOTOR** in the Diagnosis and Testing.

**CONTROL CIRCUIT TESTING**

The starter control circuit components should be tested in the order in which they are listed, as follows:

**Starter Relay** - Refer to **RELAY - STARTER MOTOR**. The starter relay is located within the TIPM (Totally Integrated Power Module). Refer to "**\*NO CRANK CONDITION**".

**Starter Solenoid** - Refer to **STARTER MOTOR**.

**Ignition Switch** - Refer to Ignition Switch and Key Lock Cylinder in **STEERING SYSTEM**

**Clutch Pedal Position Switch** - If equipped with manual transmission, refer to **SWITCH-CLUTCH PEDAL POSITION**.

**Park/Neutral Position Switch** - If equipped with automatic transmission, refer to **42RLE - SERVICE INFORMATION** article.

**Wire harnesses and connections** - Refer to **SYSTEM WIRING DIAGRAMS**.

**REMOTE STARTING SYSTEM**

Before attempting to diagnose a problem with the remote starting system, first be sure the starter motor and starter solenoid are working properly. The starter should operate with the use of the standard ignition key in the ignition switch. Any starter or solenoid problems must be repaired first.

Also be sure the engine will easily start and run with the use of the standard ignition key in the ignition switch. Any engine running, idling or driveability problems must be repaired first.

**Also note that the remote start system will automatically be cancelled if any of the following occur:**

- IF THE ENGINE STALLS OR RPM EXCEEDS 2500
- NORMAL TIME OUT RUN MODE (15 MINUTES)
- CUSTOMER MOVES IGNITION INTO RUN/START
- ANY VEHICLE DOOR AJAR
- TRUNK/LIFTGATE AJAR
- HOOD AJAR
- START COUNTER REACHED
- LOW RPM SHUTDOWN
- KEY IN IGNITION
- BRAKE PRESSED
- THE HAZARD SWITCH IS PRESSED
- NOT IN PARK OR NEUTRAL
- VEHICLE SPEED HIGH
- VTA ALARM TRIGGERED
- PANIC MODE ACTIVATED
- BATTERY VOLTAGE HIGH
- BATTERY VOLTAGE LOW

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- LOSS OF BATTERY VOLTAGE
- MIL ON
- LOW OIL PRESSURE
- COOLANT TEMPERATURE HIGH
- CRANK NO START
- RKE OFF MESSAGE
- VEHICLE NOT CONFIGURED
- HOOD SWITCH NOT INSTALLED OR INOPERATIVE
- NO AUTOMATIC TRANSMISSION
- INVALID KEY
- IGNITION SNA
- IGNITION NOT IN LOCK
- EXCESSIVE GLOW PLUG TIME (DIESEL ONLY)
- VEHICLE IN SHIPPING MODE
- VEHICLE NOT PROGRAMMED

If all of the previous items checked OK, and the remote starting system will not operate, refer to **STARTING - ELECTRICAL DIAGNOSTICS** for further information.

### SPECIFICATIONS

#### TORQUE SPECIFICATION

#### TORQUE SPECIFICATION

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Starter Solenoid Battery Cable Nut	11	-	100
Starter Mounting Bolts - 3.7L/4.0L	54	40	-
Starter Mounting Bolts - 2.8L Diesel	41	30	-
Starter Heat Shield Mounting Bolts	6	-	55

#### STARTER MOTOR SPECIFICATIONS

STARTER MOTOR			
Engine Application	3.7L	4.0L	2.8L Diesel
Power Rating	1.2 Kilowatt	1.4 Kilowatt/1.9 Horsepower	2.2 Kilowatt
* Cranking Amperage Draw Test	100 - 200 Amperes	125 - 250 Amperes	500 Amperes

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\* Test at operating temperature. Cold engine, tight (new) engine, or heavy oil will increase starter amperage draw.

\*\*The starter is equipped with permanent magnets. Never strike the starter case to attempt to loosen a sticking/stuck armature as permanent magnets may crack or break.

### MOTOR - STARTER

#### DIAGNOSIS AND TESTING

##### STARTER MOTOR

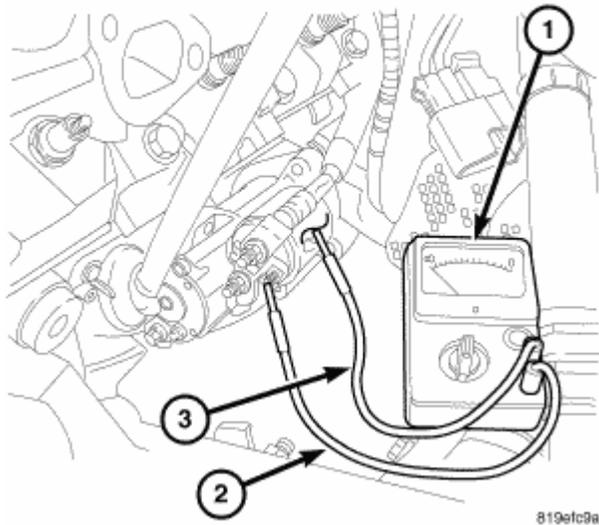
Correct starter motor operation can be confirmed by performing the following free running bench test. This test can only be performed with starter motor removed from vehicle. Refer to **STARTER MOTOR SPECIFICATIONS** for starter motor specifications.

1. Remove starter motor from vehicle. Refer to **MOTOR - STARTER** Removal and Installation.
2. Mount starter motor securely in a soft-jawed bench vise. The vise jaws should be clamped on the mounting flange of starter motor. Never clamp on starter motor by field frame.
3. Connect a suitable volt-ampere tester and a 12-volt battery to starter motor in series, and set ammeter to 100 ampere scale. See instructions provided by manufacturer of volt-ampere tester being used.
4. Install jumper wire from solenoid terminal to solenoid battery terminal. The starter motor should operate. If starter motor fails to operate, replace faulty starter motor assembly.
5. Adjust carbon pile load of tester to obtain free running test voltage. Refer to **STARTER MOTOR SPECIFICATIONS** for starter motor free running test voltage specifications.
6. Note reading on ammeter and compare reading to free running test maximum amperage draw. Refer to **STARTER MOTOR SPECIFICATIONS** for starter motor free running test maximum amperage draw specifications.
7. If ammeter reading exceeds maximum amperage draw specification, replace faulty starter motor assembly.

##### STARTER SOLENOID

Certain vehicles with certain engines may require starter motor removal for the following test.

1. If necessary, remove starter motor from vehicle. Refer to **MOTOR - STARTER** Removal and Installation.
2. Disconnect solenoid connector wiring from starter motor.

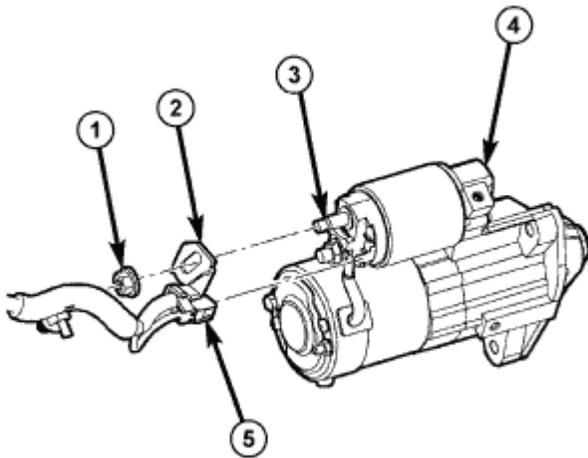


**Fig. 7: Solenoid Continuity Test**  
Courtesy of CHRYSLER LLC

3. Check for continuity between solenoid terminal (2) and solenoid case (3). There should be continuity. If not OK, replace faulty starter motor assembly.

## REMOVAL

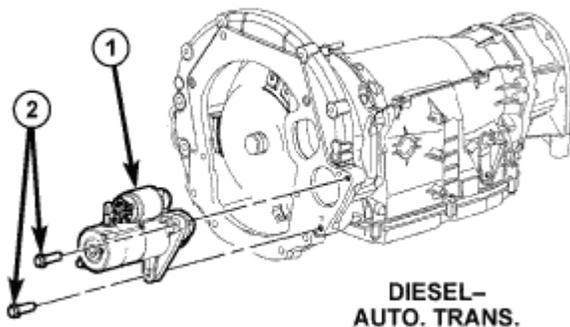
### REMOVAL - 2.8L DIESEL



**Fig. 8: Identifying Solenoid Nut, Mounting Stud, Electrical Connector & Battery Cable Assembly**  
Courtesy of CHRYSLER LLC

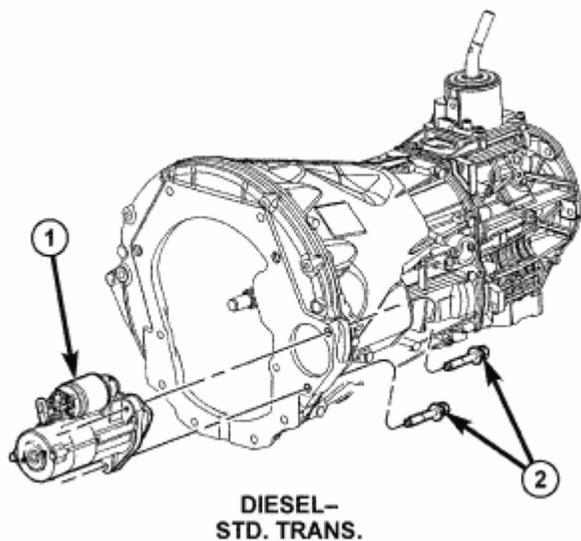
1. Disconnect and isolate negative battery cable

2. Raise and support vehicle.
3. **Four Wheel Drive Equipped:** Remove front propeller shaft.
4. Remove solenoid nut (1) from mounting stud (3).
5. After nut (1) has been removed, pull battery cable from mounting stud (3) while removing electrical connector (5) from solenoid terminal.



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**Fig. 9: Starter Motor - 2.8L Diesel Auto. Trans.**  
Courtesy of CHRYSLER LLC



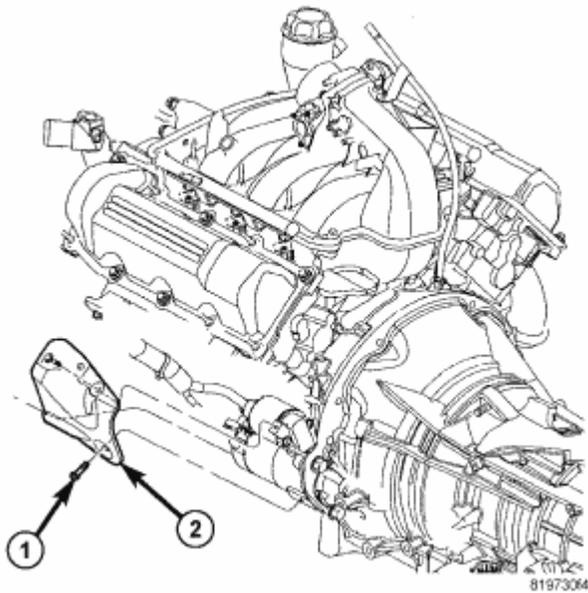
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**Fig. 10: Starter Motor - 2.8L Diesel STD. Trans.**  
Courtesy of CHRYSLER LLC

6. Remove two starter mounting bolts (2).
7. Remove starter assembly (1) from transmission.
8. Rotate starter assembly (1) to allow removal from vehicle.

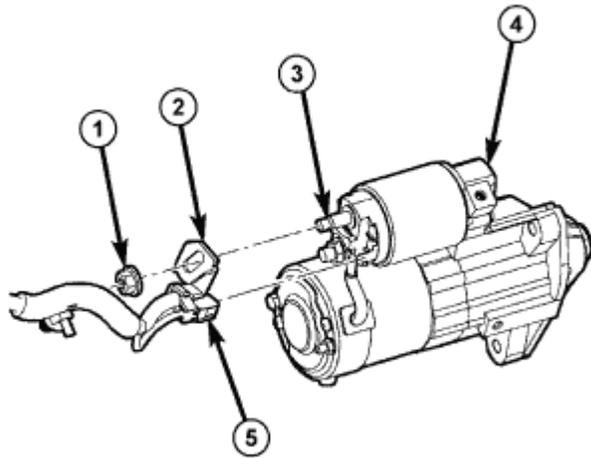
**REMOVAL - 3.7L**

1. Disconnect and isolate negative battery cable.
2. Raise and support vehicle.
3. **Four Wheel Drive Equipped:** Remove front propeller shaft.



**Fig. 11: Starter Heat Shield - 3.7L**  
Courtesy of CHRYSLER LLC

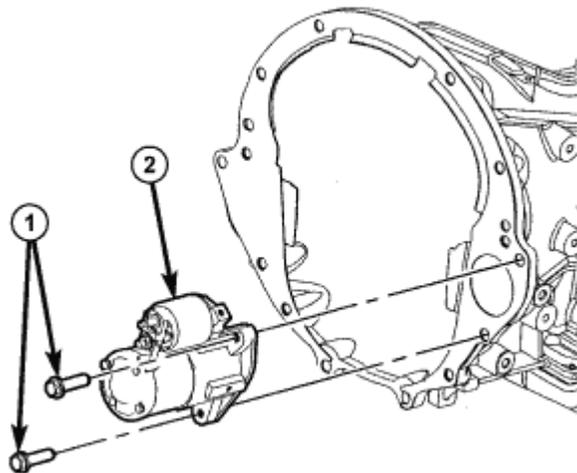
4. Remove two heat shield bolts (1) and remove starter heat shield (2).



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**Fig. 12: Identifying Solenoid Nut, Mounting Stud, Electrical Connector & Battery Cable Assembly**  
Courtesy of CHRYSLER LLC

5. Remove solenoid nut (1) from mounting stud (3).
6. After nut (1) has been removed, pull battery cable from mounting stud (3) while removing electrical connector (5) from solenoid terminal.

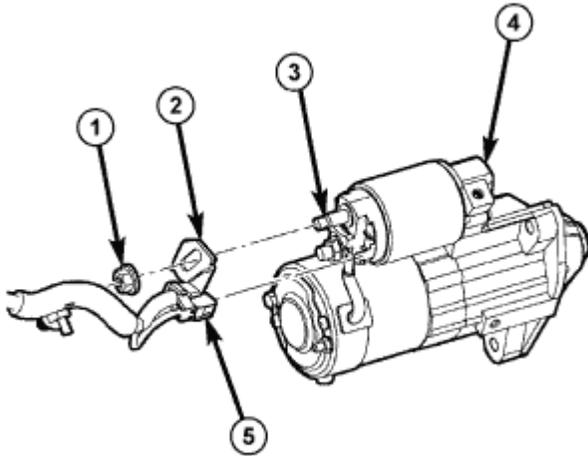


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**Fig. 13: Starter Motor - 3.7L**  
Courtesy of CHRYSLER LLC

7. Remove two starter mounting bolts (1).
8. Remove starter assembly (2) from transmission.
9. Rotate starter assembly to allow removal from vehicle.

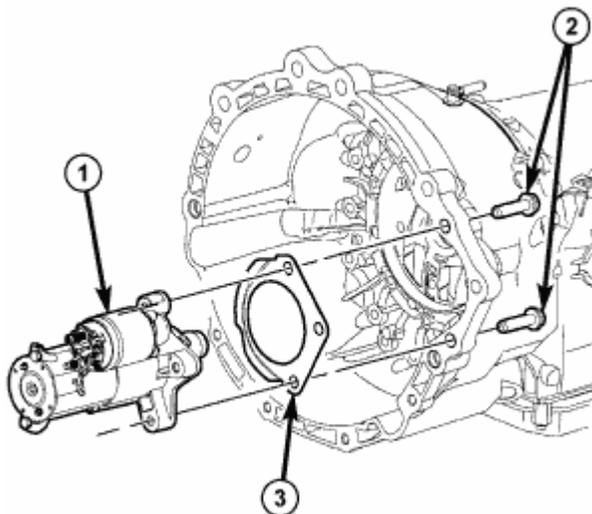
## REMOVAL - 4.0L



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**Fig. 14: Identifying Solenoid Nut, Mounting Stud, Electrical Connector & Battery Cable Assembly**  
 Courtesy of CHRYSLER LLC

1. Disconnect and isolate negative battery cable.
2. Raise and support vehicle.
3. **Four Wheel Drive Equipped:** Remove front propeller shaft.
4. Remove solenoid nut (1) from mounting stud (3).
5. After nut (1) has been removed, pull battery cable from mounting stud (3) while removing electrical connector (5) from solenoid terminal.



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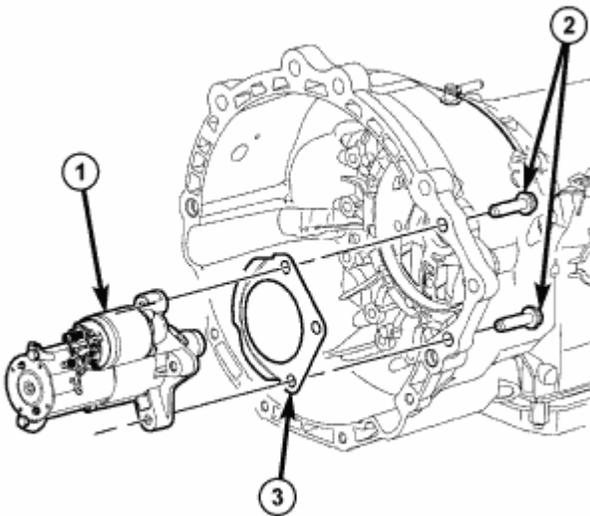
**Fig. 15: Starter Motor - 4.0L**

Courtesy of CHRYSLER LLC

6. Remove two starter mounting bolts (2).
7. Remove starter assembly (1) from transmission.
8. Remove plate (3) from transmission.
9. Rotate starter assembly (1) to allow removal from vehicle.

INSTALLATION

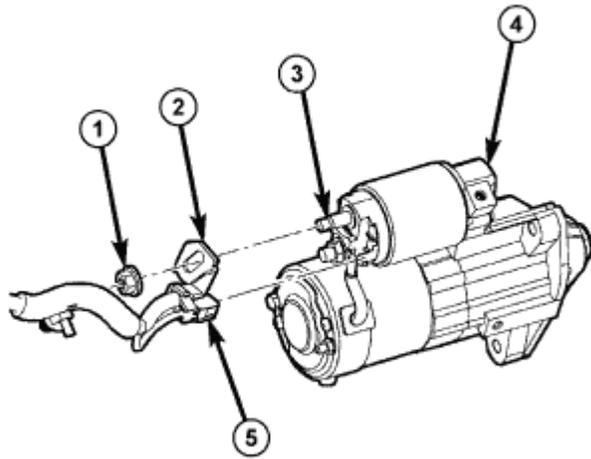
INSTALLATION - 4.0L



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**Fig. 16: Starter Motor - 4.0L**  
Courtesy of CHRYSLER LLC

1. Rotate starter assembly (1) to allow positioning into transmission.
2. Install two starter mounting bolts (2) and tighten. Refer to Torque Specifications.

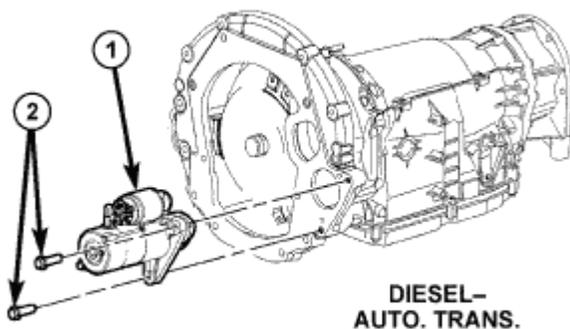


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**Fig. 17: Identifying Solenoid Nut, Mounting Stud, Electrical Connector & Battery Cable Assembly**  
 Courtesy of CHRYSLER LLC

3. Position battery cable assembly (2) onto stud (3) while pushing solenoid connector (5) onto solenoid terminal.
4. Install nut (1) and tighten. Refer to Torque Specifications.
5. **Four Wheel Drive Equipped:** Install front propeller shaft.
6. Lower vehicle.
7. Connect negative battery cable.

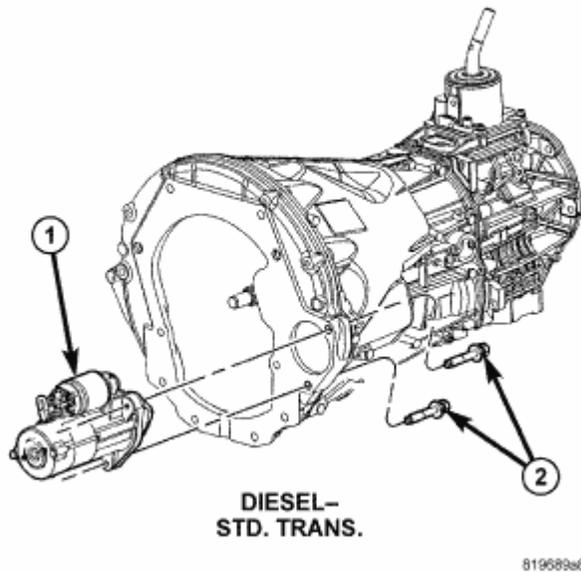
**INSTALLATION - 2.8L DIESEL**



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**Fig. 18: Starter Motor - 2.8L Diesel Auto. Trans.**

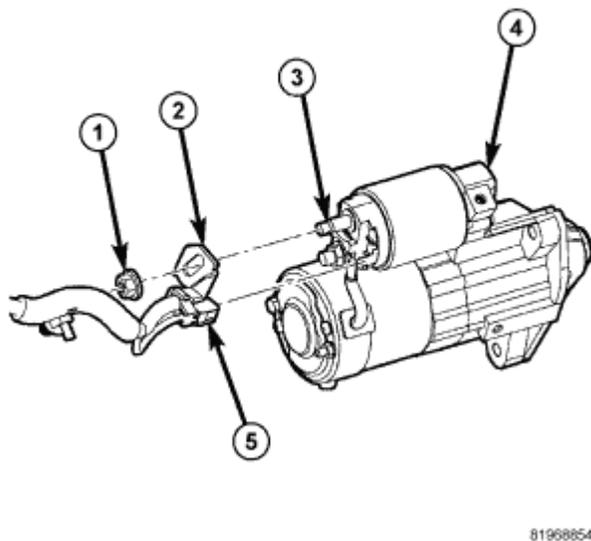
Courtesy of CHRYSLER LLC



**Fig. 19: Starter Motor - 2.8L Diesel STD. Trans.**

Courtesy of CHRYSLER LLC

1. Rotate starter assembly (1) to allow positioning into transmission.
2. Install two starter mounting bolts (2) and tighten. Refer to **TORQUE SPECIFICATION.**

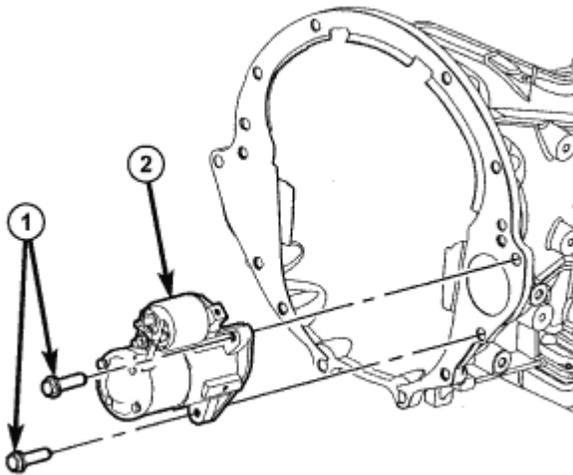


**Fig. 20: Identifying Solenoid Nut, Mounting Stud, Electrical Connector & Battery Cable Assembly**  
Courtesy of CHRYSLER LLC

3. Position battery cable assembly (2) onto stud (3) while pushing solenoid connector (5) onto solenoid terminal.

4. Install nut (1) and tighten. Refer to Torque Specifications.
5. **Four Wheel Drive Equipped:** Install front propeller shaft.
6. Lower vehicle.
7. Connect negative battery cable.

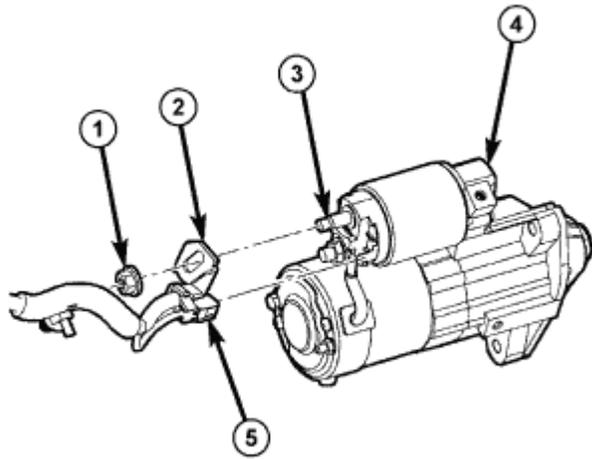
**INSTALLATION - 3.7L**



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**Fig. 21: Starter Motor - 3.7L**  
Courtesy of CHRYSLER LLC

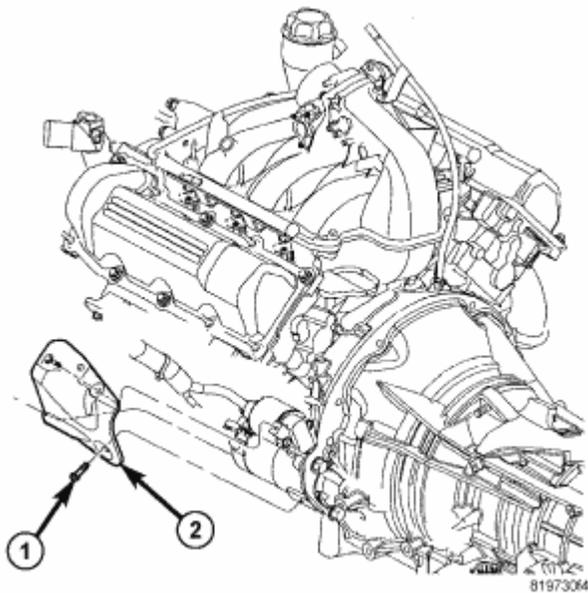
1. Rotate starter assembly (2) to allow positioning into transmission.
2. Install two starter mounting bolts (1) and tighten. Refer to Torque Specifications.



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**Fig. 22: Identifying Solenoid Nut, Mounting Stud, Electrical Connector & Battery Cable Assembly**  
Courtesy of CHRYSLER LLC

3. Position battery cable assembly (2) onto stud (3) while pushing solenoid connector (5) onto solenoid terminal.
4. Install nut (1) and tighten. Refer to Torque Specifications.



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**Fig. 23: Starter Heat Shield - 3.7L**  
Courtesy of CHRYSLER LLC

5. Position starter heat shield (2) and install two bolts (1).
6. **Four Wheel Drive Equipped:** Install front propeller shaft.
7. Lower vehicle.

8. Connect negative battery cable.

## **RELAY - STARTER MOTOR**

### **DESCRIPTION**

#### **STARTER RELAY**

The starter relay is an electromechanical device that switches battery current to the pull-in coil of the starter solenoid when ignition switch is turned to Start position. The starter relay is located in the Power Distribution Center (PDC) in the engine compartment. See PDC cover for relay identification and location.

The starter relay is an International Standards Organization (ISO) relay. Relays conforming to ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions.

The starter relay cannot be repaired or adjusted and, if faulty or damaged, it must be replaced.

### **OPERATION**

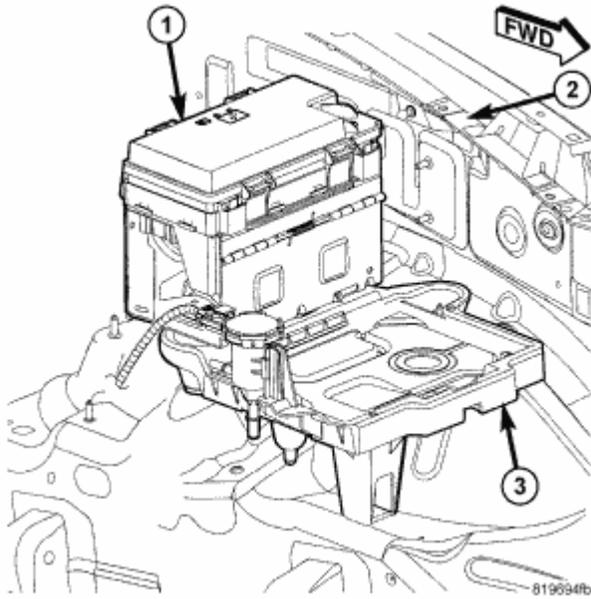
#### **STARTER RELAY**

The ISO relay consists of an electromagnetic coil, a resistor or diode, and three (two fixed and one movable) electrical contacts. The movable (common feed) relay contact is held against one of the fixed contacts (normally closed) by spring pressure. When electromagnetic coil is energized, it draws the movable contact away from normally closed fixed contact, and holds it against the other (normally open) fixed contact.

When electromagnetic coil is de-energized, spring pressure returns movable contact to normally closed position. The resistor or diode is connected in parallel with electromagnetic coil within relay, and helps to dissipate voltage spikes produced when coil is de-energized.

### **REMOVAL**

#### **STARTER RELAY**



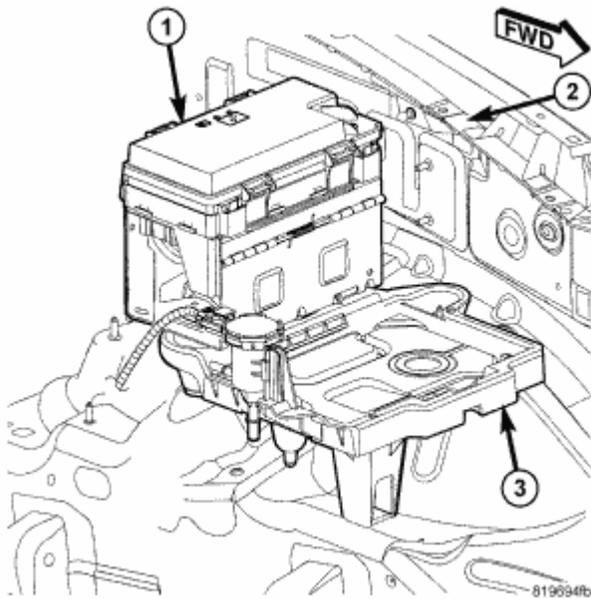
**Fig. 24: Identifying Power Distribution Center (PDC) & Left Inner Fender**  
Courtesy of CHRYSLER LLC

The fuel pump relay is located in the Power Distribution Center (PDC) (1). The PDC is located in the engine compartment near the left inner fender (2). Refer to label on PDC cover for relay location.

1. Remove PDC cover.
2. Remove relay from PDC.
3. Check condition of relay terminals and PDC 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 PDC connector). Repair if necessary before installing relay.

#### INSTALLATION

#### STARTER RELAY



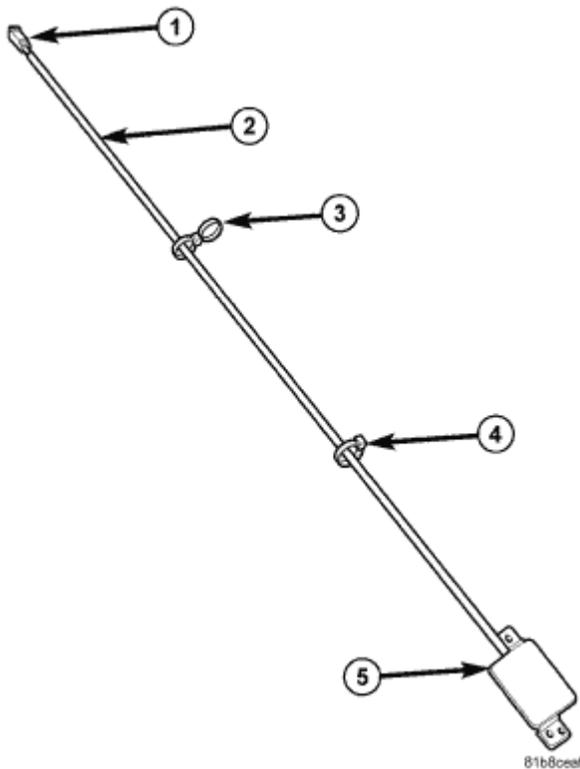
**Fig. 25: Identifying Power Distribution Center (PDC) & Left Inner Fender**  
Courtesy of CHRYSLER LLC

1. Refer to Power Distribution Center (PDC) cover for starter relay location.
2. Install relay to PDC (1).
3. Install cover to PDC.

## **MODULE-REMOTE START ANTENNA**

### **DESCRIPTION**

**MODULE - REMOTE START ANTENNA**



**Fig. 26: Remote Start Antenna Module Assembly**  
 Courtesy of CHRYSLER LLC

The Remote Start Antenna Module Assembly consists of an electrical connection to the WCM/WIN (1), a length of coaxial cable (2), two mounting clips (3) and (4), and a control module/antenna (5).

#### OPERATION

#### OPERATION

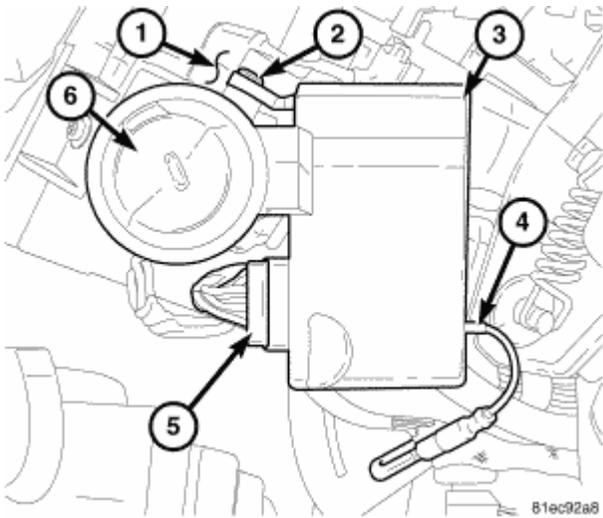
The remote start antenna is located behind the instrument cluster. The antenna interfaces with the Wireless Control Module (WCM) through a coaxial electrical cable and electrical connector. The antenna helps to amplify the signal for the Remote Keyless Entry (RKE) key fob.

#### REMOVAL

#### REMOVAL

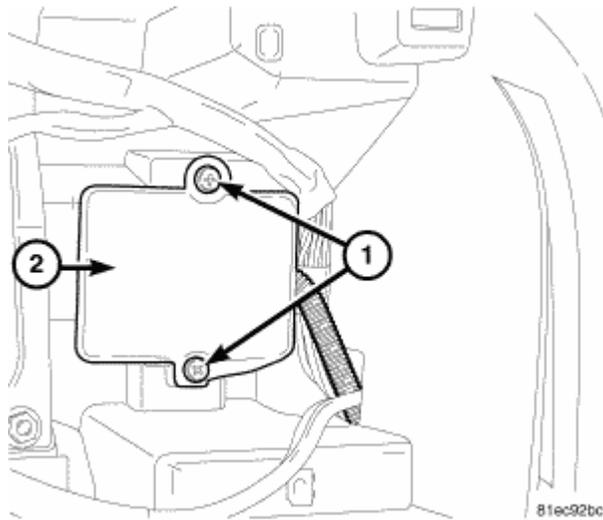
**WARNING:** To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in

accidental airbag deployment.



**Fig. 27: Identifying Integral Mounting Bracket, Screw, Sentry Key Remote Entry Module (SKREEM), Start Antenna Coaxial Cable Connector, Instrument Panel Wire Harness Connector & Lock Cylinder**  
Courtesy of CHRYSLER LLC

1. Disconnect and isolate the battery negative cable.
2. Remove but do not disconnect the right multi-function switch from the integral mounting bracket (1) on the right side of the clockspring and position it so that the Sentry Key REMote Entry Module (SKREEM) (also known as the Sentry Key Immobilizer Module/SKIM or the Wireless Control Module/WCM) mounting screw (2) may be accessed. Refer to **REMOVAL** .
3. Disconnect the instrument panel wire harness connector (5) from the SKREEM (3) connector receptacle.
4. Remove the screw (2) that secures the SKREEM to the boss on the top of the ignition lock cylinder housing (6).
5. Disengage the SKREEM antenna ring from around the ignition lock housing and remove the SKREEM from the steering column.
6. Remove the coaxial electrical cable connector (4) from the SKREEM (3).



**Fig. 28: Antenna Module**  
Courtesy of CHRYSLER LLC

7. Remove the instrument cluster, Refer to **REMOVAL** .

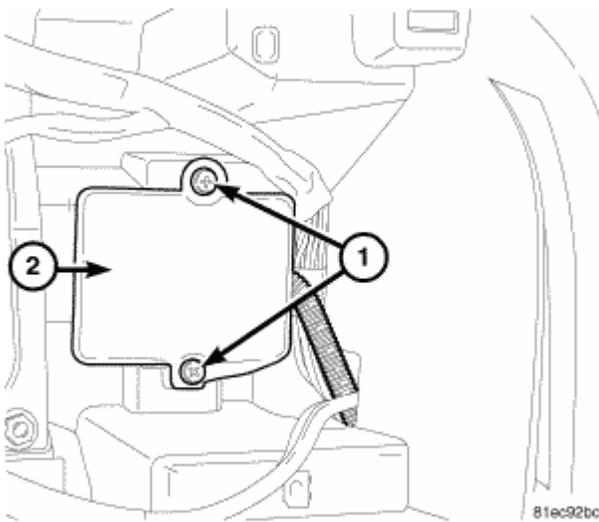
**NOTE:** During removal of the remote start antenna note the routing location of the coaxial cable.

8. Remove the remote start antenna coaxial cable from mounting clips, if equipped.
9. Remove the screws (1) from remote start antenna module (2) and remove from instrument panel assembly.

## INSTALLATION

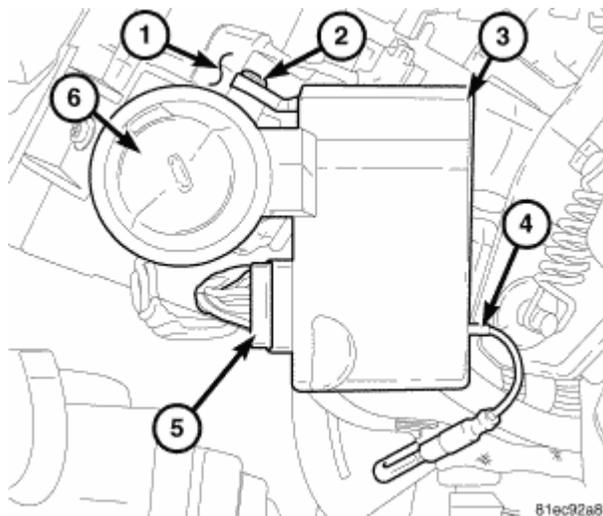
## INSTALLATION

**WARNING:** To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.



**Fig. 29: Antenna Module**  
 Courtesy of CHRYSLER LLC

1. Install the remote start antenna module (2), and screws (1) to instrument panel assembly. Tighten screws to 2.5 N.m (22 in. lbs.).
2. Install the instrument cluster. Refer to **INSTALLATION** .
3. Route the remote start coaxial cable in the position noted during the removal procedure.
4. Install the remote start antenna coaxial cable to mounting clips, if equipped.



**Fig. 30: Identifying Mounting Bracket, Screw, Sentry Key Remote Entry Module (SKREEM), Start Antenna Coaxial Cable Connector, Instrument Panel Wire Harness Connector & Lock Cylinder**  
 Courtesy of CHRYSLER LLC

5. Connect remote start antenna coaxial cable connector (4) to the Sentry Key Remote Entry Module (SKREEM) (3) (also known as the Sentry Key Immobilizer Module/SKIM or the Wireless Control Module/WCM).
6. Position the SKREEM onto the steering column ignition lock housing with the antenna ring oriented

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around the lock cylinder (6).

7. Install and tighten the screw (2) that secures the SKREEM mounting bracket to the boss on the top of the ignition lock housing. Tighten the screw to 2 N.m (20 in. lbs.).
8. Reconnect the instrument panel wire harness connector (5) to the SKREEM connector receptacle.
9. Reinstall the right multi-function switch onto the integral mounting bracket (1) on the right side of the clockspring. Refer to **INSTALLATION** .
10. Reconnect the battery negative cable.

**NOTE:** On vehicles equipped with the Sentry Key Immobilizer System (SKIS), when the SKREEM is replaced with a new unit, a diagnostic scan tool **MUST** be used to initialize the new SKREEM and to program at least two Sentry Key transponders before the vehicle can be operated. Refer to **STANDARD PROCEDURE** .

**NOTE:** On vehicles equipped with a Tire Pressure Monitoring (TPM) system and a full-sized matching spare tire and wheel assembly, when the SKREEM or the spare tire pressure sensor is replaced with a new unit, a diagnostic scan tool **MUST** be used to run a routine that allows the SKREEM to be programmed with the ID number and location of the spare tire pressure sensor mounted in the wheel of the spare tire. This may be done using a TPM-RKE Analyzer special tool by following the programming steps outlined in the diagnostic scan tool for Program Tire Sensor ID w/TPM Tool under Miscellaneous Functions for the WCM/Wireless Control Module menu item. If a TPM-RKE Analyzer special tool is not available, the spare tire must be dismounted from its wheel to access and note the ID number on the spare tire pressure sensor so that the ID code for that sensor can be programmed into the new SKREEM. Follow the programming steps outlined in the diagnostic scan tool for Learn Spare Tire Sensor ID also found under Miscellaneous Functions for the WCM/Wireless Control Module menu item. Refer to **INSTALLATION** .