

# VEHICLE THEFT/SECURITY SYSTEM

## TABLE OF CONTENTS

|  | page |  | page |
|--|------|--|------|
| <b>DESCRIPTION AND OPERATION</b>           |      | <b>SERVICE PROCEDURES</b>  |      |
| INTRODUCTION . . . . .                     | 1    | SENTRY KEY IMMOBILIZER SYSTEM                                    |      |
| VEHICLE THEFT/SECURITY SYSTEM (VTSS) . . . | 1    | INITIALIZATION . . . . .   | 5    |
| SENTRY KEY IMMOBILIZER SYSTEM (SKIS) . . . | 2    | SENTRY KEY IMMOBILIZER SYSTEM                                    |      |
| SENTRY KEY IMMOBILIZER MODULE              |      | TRANSPONDER PROGRAMMING . . . . .                                | 5    |
| (SKIM) . . . . .                           | 2    | SWITCHING OPERATING MODES/<br>CONFIGURING A NEW MODULE . . . . . | 6    |
| SENTRY KEY IMMOBILIZER SYSTEM              |      | <b>REMOVAL AND INSTALLATION</b>                                  |      |
| TRANSPONDER . . . . .                      | 3    | DOOR CYLINDER LOCK SWITCH . . . . .                              | 7    |
| SENTRY KEY IMMOBILIZER SYSTEM              |      | HOOD AJAR SWITCH . . . . .                                       | 7    |
| INDICATOR LAMP . . . . .                   | 4    | SENTRY KEY IMMOBILIZER MODULE                                    |      |
| TRIGGERING THE VTSS . . . . .              | 4    | (SKIM) . . . . .   | 7    |
| <b>DIAGNOSIS AND TESTING</b>               |      | VEHICLE THEFT/SECURITY SYSTEM DECK                               |      |
| SENTRY KEY IMMOBILIZER SYSTEM . . . . .    | 4    | LID SECURITY (KNOCK OUT) SWITCH . . . . .                        | 8    |
| VEHICLE THEFT/SECURITY SYSTEM (VTSS) . . . | 5    |  |      |

## DESCRIPTION AND OPERATION

### INTRODUCTION

The Vehicle Theft/Security System (VTSS) is designed to protect against whole vehicle theft. The system monitors vehicle doors, hood, trunk key cylinder, and ignition for unauthorized operation.

The VTSS activates:

- Sounding of the horn.
- Flashing of the park lamps.
- Flashing of the headlamps.

The RKE Module has three modes of operation including customer usage mode, dealer lot storage mode, and shipping mode. The customer usage mode provides full functionality of the module and is the mode in which the RKE Module should be operating when used by the customer. Dealer lot storage mode and shipping mode are reduced power modes meant to extend vehicle battery life during shipping and storage in the dealer lot. Dealer lot storage mode provides limited VTSS and power door lock functions, and disables the Remote Keyless Entry (RKE) functions. This mode is intended to be used when the vehicle is on the dealer lot to provide VTSS coverage of the vehicle while minimizing battery drain. Shipping mode disables all normal functions of the module with the exception of communications over the vehicle's PCI bus, and is intended to be used when the vehicle is shipped from the assembly plant. The dealer must remove the module from shipping mode

and place it into either the dealer lot storage or customer usage modes of operation.

**NOTE:** The dealer must remove the module from "Ship Mode" and place the RKE Module into either the "Dealer Lot" storage or "Customer Usage" modes of operation after receiving the vehicle from the assembly plant. Refer to Switching Operating Modes/Configuring a New Module under Service Procedures in this section.

### VEHICLE THEFT/SECURITY SYSTEM (VTSS)

In the customer usage mode of operation, the system is armed when the vehicle is locked using the:

- Power door lock switches.
- Remote Keyless Entry (RKE) transmitter.

After the vehicle is locked and the last door is closed, the circular red VTSS indicator in the instrument cluster will flash quickly for 16 seconds, indicating that arming is in progress. If no monitored systems are activated during this period (excluding the hood and trunk key cylinder), the system will arm. After 16 seconds, the LED will continue to flash at a slower rate indicating the system is armed.

If the hood ajar switch and/or trunk key cylinder switch(s) are not sensed by the system, the indicator LED will remain lit during the arming process, although the system will still arm. If the VTSS indicator does not illuminate at all upon door closing it indicates that the system is not arming.

## DESCRIPTION AND OPERATION (Continued)

VTSS disarming occurs upon normal vehicle entry by unlocking either door via the key cylinders or RKE transmitter, or by starting the vehicle with a valid Sentry Key. This disarming will also halt the alarm once it has been activated.

A tamper alert exists to notify the driver that the system had been activated. This alert consists of 3 horn pulses when the vehicle is disarmed.

The VTSS will not arm by mechanically locking the vehicle doors. This will manually override the system.

In the dealer lot storage mode of operation, all of the above descriptions of the VTSS are true with the following exceptions:

- Remote Keyless Entry functions are disabled, and cannot be used for arming/disarming the VTSS.
- The VTSS indicator is non-operational.

### SENTRY KEY IMMOBILIZER SYSTEM (SKIS)

The Sentry Key Immobilizer System (SKIS) is designed to provide passive protection against unauthorized vehicle use by preventing the engine from operating while the system is armed. The primary components of this system are the Sentry Key Immobilizer Module (SKIM), the Sentry Key transponder, the Vehicle Theft/Security System (VTSS) indicator LED, and the Powertrain Control Module (PCM).

The SKIM is installed on the steering column near the ignition lock cylinder. The transponder is located under the molded rubber cap on the head of the ignition key. The VTSS indicator LED is located in the instrument cluster.

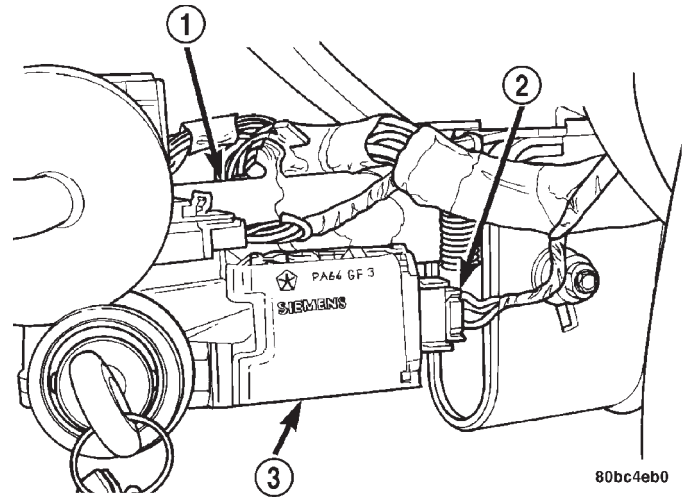
The SKIS includes three valid Sentry Key transponders from the factory, one being a valet key. This is so the customer can self program new keys if one is lost. If the customer wishes, additional non-coded blank Sentry Keys are available. These blank keys can be cut to match a valid ignition key, but the engine will not start unless the key transponder is also programmed to the vehicle. The SKIS will recognize no more than eight valid Sentry Key transponders at any one time.

The SKIS performs a self-test each time the ignition switch is turned to the ON position, and will store Diagnostic Trouble Codes (DTC's) if a system malfunction is detected. The SKIS can be diagnosed, and any stored DTC can be retrieved using a DRB III® scan tool as described in the proper Body Diagnostic Procedures Manual.

### SENTRY KEY IMMOBILIZER MODULE (SKIM)

The Sentry Key Immobilizer Module (SKIM) (Fig. 1) contains a Radio Frequency (RF) transceiver and a central processing unit, which includes the Sentry Key Immobilizer System (SKIS) program logic. The SKIS programming enables the SKIM to program

and retain in memory the codes of at least two, but no more than eight electronically coded Sentry Key transponders. The SKIS programming also enables the SKIM to communicate over the Programmable Communication Interface (PCI) bus network with the Powertrain Control Module (PCM), the instrument cluster and/or the DRB III® scan tool.



**Fig. 1 Sentry Key Immobilizer Module (SKIM) Location**

- 1 - STEERING COLUMN
- 2 - SKIM ELECTRICAL CONNECTOR
- 3 - SKIM

The SKIM transmits and receives RF signals through a tuned antenna enclosed within a molded plastic ring formation that is integral to the SKIM housing. When the SKIM is properly installed on the steering column, the antenna ring is oriented around the circumference of the ignition lock cylinder housing (Fig. 1). This antenna ring must be located within eight millimeters (0.31 inches) of the Sentry Key in order to ensure proper RF communication between the SKIM and the Sentry Key transponder.

For added system security, each SKIM is programmed with a unique "Secret Key" code and a security code. The SKIM keeps the "Secret Key" code in memory and sends the code over the CCD data bus to the PCM, which also keeps this code in its memory. The SKIM also sends the "Secret Key" code to each of the programmed Smart Key transponders. The security code is used by the assembly plant to access the SKIS for initialization, or by the dealer technician to access the system for service. The SKIM also stores in its memory the Vehicle Identification Number (VIN), which it learns through a PCI bus message from the PCM during initialization.

The SKIM and the PCM both use software that includes a rolling code algorithm strategy, which helps to reduce the possibility of unauthorized SKIS

DESCRIPTION AND OPERATION (Continued)

disarming. The rolling code algorithm ensures security by preventing an override of the SKIS through the unauthorized substitution of the SKIM or the PCM. However, the use of this strategy also means that replacement of either the SKIM or the PCM units will require a system initialization procedure to restore system operation.

When the ignition switch is turned to the ON or START positions, the SKIM transmits an RF signal to excite the Sentry Key transponder. The SKIM then listens for a return RF signal from the transponder of the Sentry Key that is inserted in the ignition lock cylinder. If the SKIM receives an RF signal with valid "Secret Key" and transponder identification codes, the SKIM then sends a "valid key" message to the PCM over the PCI bus. If the SKIM receives an invalid RF signal or no response, it sends "invalid key" messages to the PCM. The PCM will enable or disable engine operation based upon the status of the SKIM messages.

The SKIM also sends messages to the instrument cluster over the PCI bus network to control the VTSS indicator LED. The SKIM sends messages to the instrument cluster to turn the LED on for about three seconds when the ignition switch is turned to the ON position as a bulb test. After completion of the bulb test, the SKIM sends bus messages to keep the LED off for a duration of about one second. Then the SKIM sends messages to turn the LED on or off based upon the results of the SKIS self-tests. If the VTSS indicator LED comes on and stays on after the bulb test, it indicates that the SKIM has detected a system malfunction and/or that the SKIS has become inoperative.

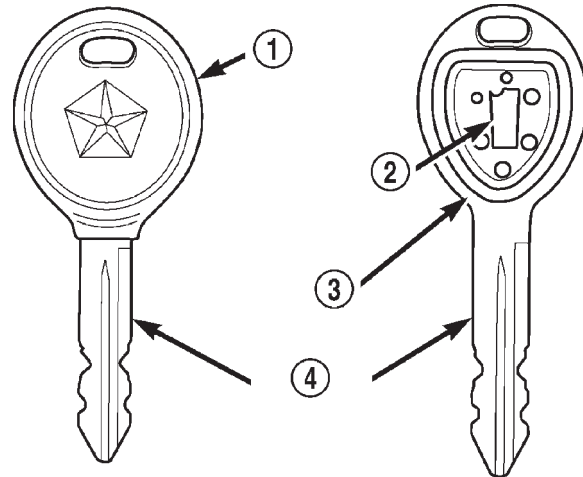
If the SKIM detects an invalid key when the ignition switch is turned to the ON position, it sends messages to the instrument cluster to flash the VTSS indicator LED. The SKIM can also send messages to the instrument cluster to flash the LED and to generate a single audible chime tone. These functions serve as an indication to the customer that the SKIS has been placed in its "Customer Learn" programming mode. See Sentry Key Immobilizer System Transponder Programming in this group for more information on the "Customer Learn" programming mode.

For diagnosis or initialization of the SKIM and the PCM, a DRB III® scan tool and the proper Body Diagnostic Procedures Manual are required. The SKIM cannot be repaired, and if faulty or damaged, the unit must be replaced.

**SENTRY KEY IMMOBILIZER SYSTEM  
TRANSPONDER**

The Sentry Key Immobilizer System (SKIS) uses a transponder that is integral to each of three ignition

key that are supplied with the vehicle when it is shipped from the factory. The transponder chip is insulated within a nylon mount inserted in the head of the key, and invisible beneath a molded rubber cap (Fig. 2).



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**Fig. 2 Sentry Key Immobilizer Transponder**

- 1 - MOLDED CAP
- 2 - TRANSPONDER
- 3 - MOLDED CAP REMOVED
- 4 - SENTRY KEY

Each Sentry Key transponder has a unique transponder identification code programmed into it by the manufacturer. The Sentry Key Immobilizer Module (SKIM) has a unique "Secret Key" code programmed into it by the manufacturer. When a Sentry Key transponder is programmed into the memory of the SKIM, the SKIM learns the transponder identification code from the transponder, and the transponder learns the "Secret Key" code from the SKIM. Each of these codes is stored within the transponder and in the nonvolatile memory of the SKIM. Therefore, blank keys for the SKIS must be programmed by and into the SKIM, in addition to being cut to match the mechanical coding of the ignition lock cylinder. See Sentry Key Immobilizer System Transponder Programming in this group for more information.

The Sentry Key transponder is within the range of the SKIM transceiver antenna ring when it is inserted in the ignition lock cylinder. When the ignition switch is turned to the START or RUN positions, the SKIM transceiver issues a Radio Frequency (RF) signal that excites the transponder chip. The transponder chip responds by issuing an RF signal containing its transponder identification code and the "Secret Key" code. The SKIM transceiver compares the transponder codes with the codes stored in its

## DESCRIPTION AND OPERATION (Continued)

memory to determine whether a valid key is in the ignition lock cylinder.

The Sentry Key transponder cannot be repaired and, if faulty or damaged, it must be replaced.

### SENTRY KEY IMMOBILIZER SYSTEM INDICATOR LAMP

The Sentry Key Immobilizer System (SKIS) uses the Vehicle Theft Security System (VTSS) indicator LED to give an indication when the SKIS is faulty or when the vehicle has been immobilized due to the use of an invalid ignition key. The LED is controlled by the instrument cluster circuitry based upon messages received from the Sentry Key Immobilizer Module (SKIM) through the Body Control Module (BCM) on the Programmable Communication Interface (PCI) bus.

The SKIM sends messages to the instrument cluster, via the BCM, to turn the LED on for about three seconds when the ignition switch is turned to the ON position as a bulb test. After completion of the bulb test, the SKIM sends PCI bus messages to keep the LED off for a duration of about one second. Then the SKIM sends messages to the instrument cluster circuitry to turn the LED on or off based upon the results of the SKIS self-tests. If the VTSS indicator LED comes on and stays on after the bulb test, it indicates that the SKIM has detected a system malfunction and/or that the SKIS has become inoperative. If the SKIM detects an invalid key when the ignition switch is turned to the ON position, it sends messages to the instrument cluster to flash the VTSS indicator LED.

The SKIM can also send messages to the instrument cluster to flash the LED and to generate a single audible chime tone. These functions serve as an indication to the customer that the SKIS has been placed in its "Customer Learn" programming mode. See Sentry Key Immobilizer System Transponder Programming in this group for more information on the "Customer Learn" programming mode.

The VTSS indicator LED uses a replaceable Light Emitting Diode (LED) on the instrument cluster electronic circuit board. Refer to Group 8E - Instrument Panel Systems for Cluster Lamp Removal and Installation. If the VTSS indicator LED comes on and stays on after the bulb test function, diagnosis of the SKIS should be performed with a DRB III® scan tool and the proper Body Diagnostic Procedures Manual.

### TRIGGERING THE VTSS

After the VTSS is armed, any of the following will trigger the system:

- Opening any door.
- Opening the hood.
- Removing the trunk lock cylinder.

- Turning the ignition to the RUN/START position with an invalid Sentry Key.

**NOTE:** The ignition switch can be turned to the accessory position without triggering the alarm system.

## DIAGNOSIS AND TESTING

### SENTRY KEY IMMOBILIZER SYSTEM

**WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO GROUP 8M - PASSIVE RESTRAINT SYSTEMS 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.**

**NOTE:** The following tests may not prove conclusive in the diagnosis of this system. The most reliable, efficient, and accurate means to diagnose the Sentry Key Immobilizer System (SKIS) involves the use of a DRB III® scan tool and the proper Body Diagnostic Procedures Manual.

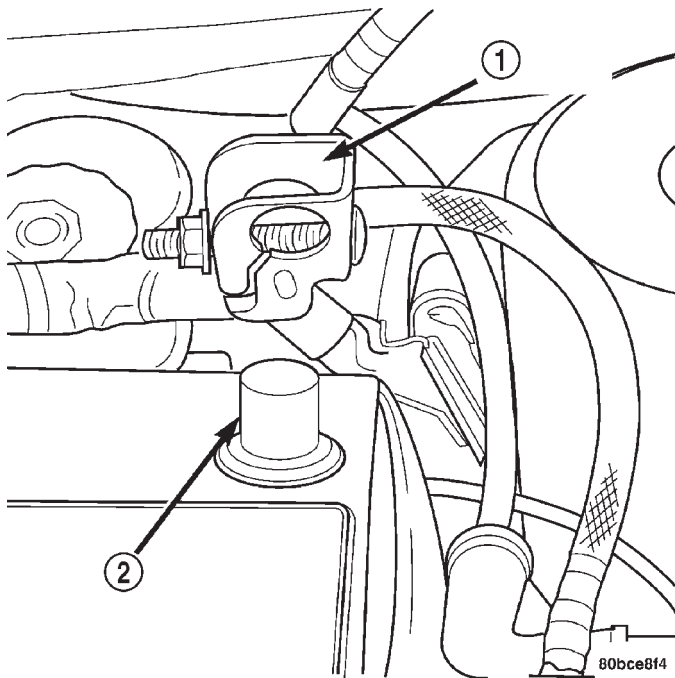
The Sentry Key Immobilizer System (SKIS) and the Programmable Communication Interface (PCI) bus network should be diagnosed using a DRB III® scan tool. The DRB III® will allow confirmation that the PCI bus is functional, that the Sentry Key Immobilizer Module (SKIM) is placing the proper messages on the PCI bus, and that the Powertrain Control Module (PCM) and the instrument cluster are receiving the PCI bus messages. Refer to the proper Body Diagnostic Procedures Manual. Refer to Group 8W-Wiring Diagrams for complete circuit descriptions and diagrams.

(1) Check the fuses in the fuse block. If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Disconnect and isolate the battery negative cable (Fig. 3). Unplug the wire harness connector at the SKIM. Check for continuity between the ground circuit cavity of the SKIM wire harness connector and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open circuit to ground as required.

(3) Connect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the SKIM wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit to the fuse in the fuse block as required.

## DIAGNOSIS AND TESTING (Continued)



**Fig. 3 Battery Negative Cable Remove/Install**

- 1 - NEGATIVE CABLE  
2 - NEGATIVE BATTERY POST

(4) Turn the ignition switch to the ON position. Check for battery voltage at the fused ignition switch output (run/start) circuit cavity of the SKIM wire harness connector. If OK, use a DRB III® scan tool and the proper Body Diagnostic Procedures Manual to complete the diagnosis of the SKIS. If not OK, repair the open circuit to the fuse in the fuse block as required.

## VEHICLE THEFT/SECURITY SYSTEM (VTSS)

To diagnose the Vehicle Theft/Security System (VTSS), use a DRB III® scan tool and the proper Body Diagnostic Procedures Manual.

## SERVICE PROCEDURES

### SENTRY KEY IMMOBILIZER SYSTEM INITIALIZATION

The Sentry Key Immobilizer System (SKIS) initialization should be performed following a Sentry Key Immobilizer Module (SKIM) replacement.

It can be summarized by the following:

(1) Obtain the vehicle's unique PIN number assigned to its original SKIM from the vehicle owner, the vehicle's invoice or from Daimler-Chrysler's Customer Center.

(2) With the DRB III® scan tool, select "Theft Alarm," "SKIM," Miscellaneous." Select "SKIM Mod-

ule Replaced" function and the DRB III® will prompt you through the following steps.

(3) Enter secured access mode using the unique four digit PIN number.

(4) Program the vehicle's VIN number into the SKIM's memory.

(5) Program the country code into the SKIM's memory (U. S.).

(6) Transfer the vehicle's unique Secret Key data from the PCM. This process will require the SKIM to be in **secured access mode**. The PIN number must be entered into the DRB III® before the SKIM will enter **secured access mode**. Once **secured access mode** is active, the SKIM will remain in that mode for 60 seconds.

(7) Program all customer keys into the SKIM's memory. This required that the SKIM be in **secured access mode** The SKIM will immediately exit **secured access mode** after each key is programmed.

**NOTE: SECURED ACCESS MODE is not required to query the programmed status of the key.**

**NOTE: If a PCM is replaced, the unique "Secret Key" data must be transferred from the SKIM to the PCM. This procedure requires the SKIM to be placed in SECURED ACCESS MODE using the four digit PIN code.**

## SENTRY KEY IMMOBILIZER SYSTEM TRANSPONDER PROGRAMMING

Three programmed Sentry Key transponders are included with the Sentry Key Immobilizer System (SKIS) when it is shipped from the factory. The Sentry Key Immobilizer Module (SKIM) can be programmed to recognize up to five additional transponders, for a total of eight Sentry Keys. The following "Customer Learn" programming procedure for the programming of additional transponders requires access to at least two of the valid Sentry Keys. If two valid Sentry Keys are not available, Sentry Key programming will require the use of a DRB III® scan tool.

### CUSTOMER LEARN PROGRAMMING

(1) Obtain the additional Sentry Key transponder blank(s) that are to be programmed for the vehicle. Cut the additional Sentry Key transponder blanks to match the ignition lock cylinder mechanical key codes.

(2) Insert one of the two valid Sentry Key transponders into the ignition switch and turn the ignition switch to the ON position.

## SERVICE PROCEDURES (Continued)

(3) After the ignition switch has been in the ON position for about three seconds, but no more than fifteen seconds, cycle the ignition switch back to the OFF position. Replace the first valid Sentry Key in the ignition lock cylinder with the second valid Sentry Key and turn the ignition switch back to the ON position. Both operations must be performed within 15 seconds.

(4) About ten seconds after the completion of Step 3, the VTSS indicator LED will start to flash and a single audible chime tone will sound to indicate that the system has entered the "Customer Learn" programming mode.

(5) Within about fifty seconds of entering the "Customer Learn" programming mode, turn the ignition switch to the OFF position, replace the valid Sentry Key with a blank Sentry Key transponder, and turn the ignition switch back to the ON position.

(6) About ten seconds after the completion of Step 5, a single audible chime tone will sound and the VTSS indicator LED will stop flashing and stay on solid for about three seconds to indicate that the blank Sentry Key transponder has been successfully programmed. The SKIS will immediately return to normal system operation following exit from the "Customer Learn" programming mode.

(7) Go back to Step 2 and repeat this process for each additional Sentry Key transponder blank to be programmed.

If any of the above steps is not completed in the proper sequence, or within the allotted time, the SKIS will automatically exit the "Customer Learn" programming mode. The SKIS will also automatically exit the "Customer Learn" programming mode if it sees a non-blank Sentry Key transponder when it should see a blank, if it has already programmed eight valid Sentry Keys, or if the ignition switch is turned to the OFF position for more than about fifty seconds.

### PROGRAMMING BLANK SENTRY KEY TRANSPONDERS WITH A DRB III® SCAN TOOL

When programming a blank Sentry Key transponder, the key blank must first be cut to match the ignition lock cylinder. It will also be necessary to enter the vehicle's four digit PIN code into the DRB III® scan tool to enter the Sentry Key Immobilizer Module's (SKIM's) secured access mode.

**NOTE:** Once a Sentry Key is programmed to a particular vehicle, it cannot be transferred to another vehicle.

Insert the blank key into the ignition and turn it to the RUN position. Using the DRB III® scan tool, select "Theft Alarm," then "SKIM," then "Miscellaneous." Select "Program New Key." Enter the four

digit PIN code using the DRB III®. When programming is completed, the SKIM will exit secured access mode and display the status of the key. One of five different status messages may be displayed as follows:

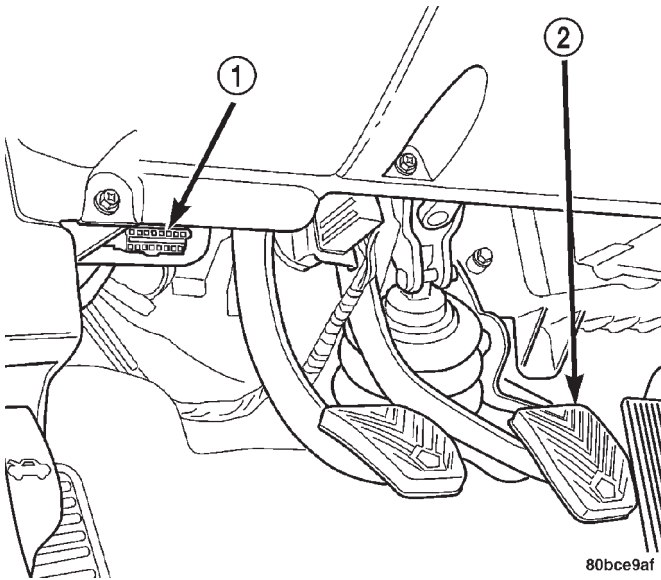
- "Programming Successful" is displayed if SKIM Sentry Key programming succeeds.
- "Learned Key in Ignition" is displayed if the key in the ignition has already been programmed into that vehicle's SKIM.
- "8 Keys Already Learned (At The Maximum) Programming Not Done" is displayed if eight keys have already been programmed into the SKIM. In this case, if a new key needs to be added due to a lost or defective key, the "Erase All Keys" function (requires entering secured access mode) has to be performed. Then the customer is seven keys plus the new key MUST be reprogrammed into the SKIM.
- "Programming Not Attempted" is displayed after an "Erase All Keys" function is executed.
- "Programming Key Failed" is displayed if further diagnosis is required.
- To learn additional keys, turn the ignition OFF, remove the learned key, and insert the next new blank key. Turn ignition to the RUN position and re-enter the secured access mode function and repeat the "Program New Key" procedure outlined above.

### SWITCHING OPERATING MODES/ CONFIGURING A NEW MODULE

To switch operating modes or to configure a new module, a DRB III® scan tool must be used.

- (1) Hook up the DRB III® scan tool to the Data Link Connector (DLC) (Fig. 4).
- (2) With the key in the ignition, turn the key to the RUN position.
- (3) After the DRB III® scan tool initialization, perform the following:
  - (a) Select "Theft Alarm."
  - (b) Select "VTSS."
  - (c) Select "Miscellaneous."
- (4) Once in the "Miscellaneous" screen:
  - (a) If you wish to configure a new module, select "Configure Module."
  - (b) If you wish to put the module into customer usage mode, select "Enable VTSS."
  - (c) If you wish to put the module into dealer lot mode, select "Dealer Lot."

SERVICE PROCEDURES (Continued)



**Fig. 4 Data Link Connector (DLC) Location**

- 1 - DATA LINK CONNECTOR (DLC)
- 2 - BRAKE PEDAL

REMOVAL AND INSTALLATION

DOOR CYLINDER LOCK SWITCH

REMOVAL

- (1) Refer to Group 23, Body for door trim and water shield Removal and Installation.
- (2) Remove illuminated entry switch wiring clip and disconnect connector.
- (3) Remove door cylinder lock switch from door handle.

INSTALLATION

For installation reverse the above procedures.

HOOD AJAR SWITCH

REMOVAL

- (1) Open hood.
- (2) Disconnect and isolate the battery negative remote cable (Fig. 3).
- (3) Using a trim stick (special tool #C-4755) or equivalent, gently pry switch up and out of mounting bracket.
- (4) Disconnect wire harness connector from hood ajar switch.
- (5) Remove switch from vehicle.

INSTALLATION

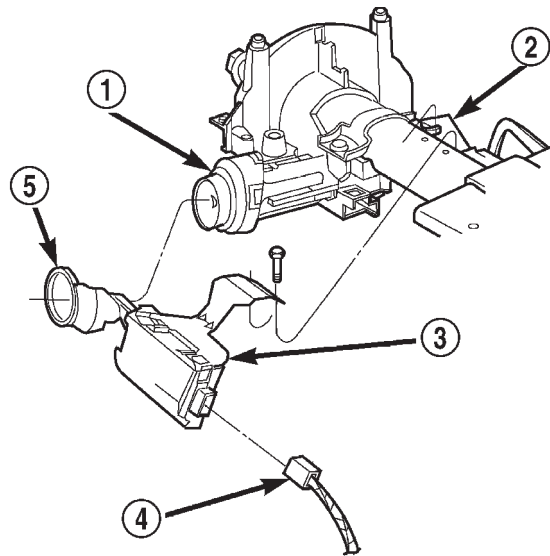
For installation reverse above procedures.

SENTRY KEY IMMOBILIZER MODULE (SKIM)

**WARNING: ON VEHICLES EQUIPPED WITH AIR-BAGS, REFER TO GROUP 8M - PASSIVE RESTRAINT SYSTEMS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIR-BAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.**

REMOVAL

- (1) Disconnect and isolate the battery negative remote cable (Fig. 3).
- (2) Remove Lower Instrument Panel Cover. Refer to Group 8E-Instrument Panel and Systems, Lower Instrument Panel Cover Removal and Installation.
- (3) Remove the steering column upper and lower shrouds. Refer to Group 8E-Instrument Panel and Systems, Steering Column Shroud Removal and Installation.
- (4) Disengage the steering column wire harness from the Sentry Key Immobilizer Module (SKIM).



**Fig. 5 Sentry Key Immobilizer Module (SKIM) Remove/Install**

- 1 - IGNITION KEY CYLINDER
- 2 - STEERING COLUMN
- 3 - SENTRY KEY IMMOBILIZER MODULE (SKIM)
- 4 - SKIM CONNECTOR
- 5 - SKIM ANTENNA

- (5) Remove the two screws securing the SKIM module to the top of the steering column.
- (6) Rotate the SKIM and its mounting bracket upwards and then to the side away from the steering

## REMOVAL AND INSTALLATION (Continued)

column to slide the SKIM antenna ring from around the ignition switch lock cylinder housing.

- (7) Remove the SKIM from the vehicle.

**INSTALLATION**

- (1) For installation, reverse the above procedures.

- (2) If the SKIM is replaced with a new unit, a DRB III® scan tool MUST be used to initialize the new SKIM and to program at least two Sentry Key transponders. Refer to Sentry Key Immobilizer Module Initialization in this section.

**VEHICLE THEFT/SECURITY SYSTEM DECK LID SECURITY (KNOCK OUT) SWITCH**

The Vehicle Theft Security System (VTSS) Deck Lid Security (Knock Out) Switch is mounted to the back of the deck lid lock cylinder.

**REMOVAL**

- (1) Open deck lid.
- (2) Disconnect wire connector to switch.
- (3) Remove the spring clip retainer.
- (4) Pull switch off of deck lid lock cylinder and remove from vehicle.

**INSTALLATION**

For installation, reverse the above procedures.