

VEHICLE THEFT/SECURITY SYSTEM

CONTENTS

	page	page
GENERAL INFORMATION		
INTRODUCTION	1	
SENTRY KEY IMMOBILIZER SYSTEM (SKIS) ..	1	
DESCRIPTION AND OPERATION		
SENTRY KEY IMMOBILIZER MODULE (SKIM) .	2	
SENTRY KEY IMMOBILIZER SYSTEM		
INDICATOR LAMP	3	
SENTRY KEY IMMOBILIZER TRANSPONDER ..	3	
TRIGGERING THE VTSS	4	
DIAGNOSIS AND TESTING		
SENTRY KEY IMMOBILIZER SYSTEM (SKIS) ..	4	
SERVICE PROCEDURES		
SENTRY KEY IMMOBILIZER TRANSPONDER		
PROGRAMMING	4	
REMOVAL AND INSTALLATION		
DECK LID SECURITY SWITCH	5	
SENTRY KEY IMMOBILIZER MODULE (SKIM) .	5	

GENERAL INFORMATION

INTRODUCTION

The Vehicle Theft Security System (VTSS) is designed to protect against whole vehicle theft. The system monitors vehicle doors, deck lid key cylinder, and ignition action for unauthorized operation. The alarm activates:

- Sounding of the horn
- Flashing of the park and tail lamps
- Flashing of the headlamps
- An engine kill feature (without SKIS)

Upon failure of proper VTSS/SKIM communication to the PCM, the PCM will shut off fuel after two seconds of run time. The engine will not re-crank on the key cycle that the failure occurred, a full key down sequence must be performed for the engine to crank again. After six consecutive fuel shut-offs, the engine will no longer crank on subsequent key cycles. The failure must be corrected and a valid communication process between the BCM (VTSS), or SKIM, and the PCM must occur for the engine to crank and start again.

The electronics for the VTSS are part of the Body Control Module (BCM). The system is armed when the vehicle is locked using the:

- Power door lock switches
- Remote Keyless Entry transmitter.

For vehicles equipped with SKIS, there is no arming sequence required.

After the vehicle is locked and the last door is closed, the set LED indicator in the top cover will

flash quickly for 16 seconds, indicating that arming is in progress. If no monitored systems are activated during this period, the system will arm. After 16 seconds the indicator LED will continue to flash at a slower rate.

This indicates that the system is armed. If the deck lid key cylinder switch is not sensed by the system, the indicator LED will remain lit during the arming process, although the system will still arm. If the indicator LED does not illuminate at all upon door closing it indicates that the system is not arming.

Passive disarming occurs upon normal vehicle entry by unlocking either door with the ignition key/remote transmitter. This disarming will also halt the alarm once it has been activated.

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

The VTSS will not arm by pushing down the door lock mechanism. This will manually override the system.

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), Body Control Module (BCM), Sentry Key transponder, VTSS indicator LED, and the Powertrain Control Module (PCM).

GENERAL INFORMATION (Continued)

The SKIM is installed on the steering column near the ignition lock cylinder (Fig. 1). 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 panel top cover.

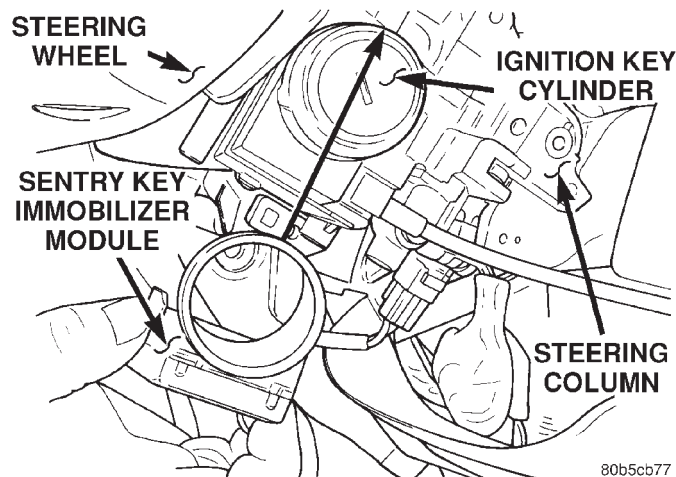


Fig. 1 Sentry Key Immobilizer Module Location

The SKIS includes two valid Sentry Key transponders from the factory. 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 scan tool as described in the proper Body Diagnostic Procedures manual.

DESCRIPTION AND OPERATION

SENTRY KEY IMMOBILIZER MODULE (SKIM)

The Sentry Key Immobilizer Module (SKIM) (Fig. 2) 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), and/or the DRB scan tool.

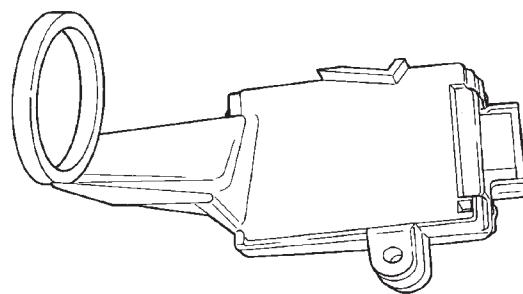


Fig. 2 Sentry Key Immobilizer Module

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 PCI 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 Sentry 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 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 sends a "valid key" message to the PCM over the PCI bus. If the SKIM receives an

DESCRIPTION AND OPERATION (Continued)

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 BCM which controls the VTSS indicator LED. The SKIM sends messages to 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 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 flash the VTSS indicator LED. The SKIM can also send messages 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 section for more information on the “Customer Learn” programming mode.

For diagnosis or initialization of the SKIM and the PCM, a DRB 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 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 BCM based upon messages received from the Sentry Key Immobilizer Module (SKIM). The VTSS/SKIS indicator LED is hardwired directly to the BCM.

The SKIM sends messages to 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 bus messages to the BCM to keep the LED off for a duration of about one second. Then the SKIM sends messages to the BCM 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

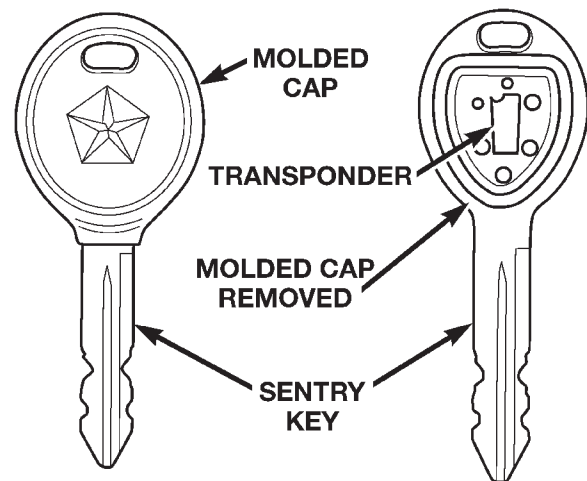
inoperative. If the SKIM detects an invalid key when the ignition switch is turned to the ON position, it sends messages to the BCM to flash the VTSS indicator LED.

The SKIM can also send messages to the BCM 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 section for more information on the “Customer Learn” programming mode.

The VTSS indicator LED is housed in the Automatic Temperature Control (ATC) Sun Sensor located in the instrument panel top cover. Refer to Group 8E - Instrument Panel and Systems for service of ATC Sun Sensor. 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 scan tool and the proper Body Diagnostic Procedures manual.

SENTRY KEY IMMOBILIZER TRANSPONDER

The Sentry Key Immobilizer System (SKIS) uses a transponder that is integral to each of two 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. 3).



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Fig. 3 Sentry Key Immobilizer Transponder

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 identifica-

DESCRIPTION AND OPERATION (Continued)

tion 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 section 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 ON 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 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.

TRIGGERING THE VTSS

Using the power door switch or the keyless transmitter will arm the system. Any of the following actions will trigger the system:

- (1) Opening any door.
- (2) Removing the deck lid lock cylinder.
- (3) Turning the ignition to the ON position.

CAUTION: The VTSS indicator LED will trigger and engine will continue to run if the vehicle is equipped with SKIS and the proper key is used to start the vehicle. This condition will occur if the VTSS has been triggered.

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

DIAGNOSIS AND TESTING

SENTRY KEY IMMOBILIZER SYSTEM (SKIS)

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 involves the use of a DRB scan tool. Refer to the proper Body Diagnostic Procedures manual for the procedures.

The Sentry Key Immobilizer System (SKIS) and the Programmable Communication Interface (PCI) bus network should be diagnosed using a DRB scan tool. The DRB 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) is receiving the PCI bus messages. Refer to the proper Body Diagnostic Procedures manual for the procedures, and Group 8W, Wiring Diagrams for complete circuit descriptions and diagrams.

(1) Check the fuses in the junction 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 remote cable from the remote terminal. 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 remote 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 junction block as required.

(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 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 junction block as required.

SERVICE PROCEDURES

SENTRY KEY IMMOBILIZER TRANSPONDER PROGRAMMING

Two 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 six 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, Sen-

SERVICE PROCEDURES (Continued)

try Key programming will require the use of a DRB scan tool and the proper Diagnostic Procedures manual.

CUSTOMER LEARN

(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.

(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.

REMOVAL AND INSTALLATION

DECK LID SECURITY SWITCH

REMOVAL

(1) Refer to Group 23, Body for deck lid lock cylinder removal.

(2) Disconnect connector (Fig. 4) and remove deck lid lock cylinder from bracket.

INSTALLATION

For installation, reverse the above procedures.

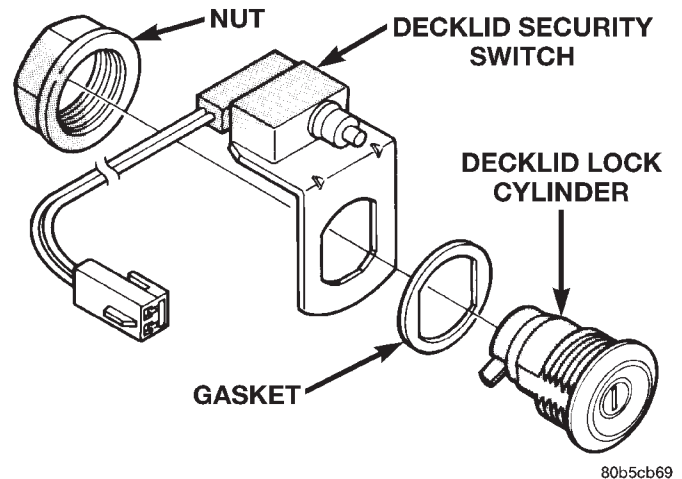


Fig. 4 Deck Lid Security Switch

SENTRY KEY IMMOBILIZER MODULE (SKIM)

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.

REMOVAL AND INSTALLATION (Continued)

REMOVAL

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 5).

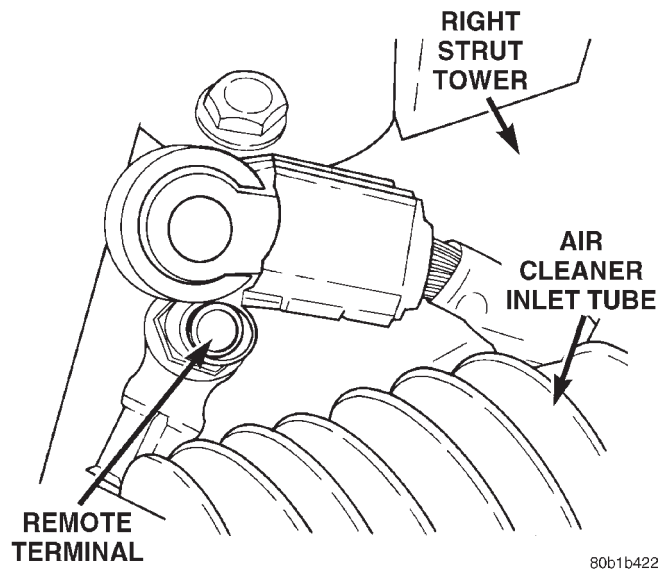


Fig. 5 Negative Battery Cable Remote Terminal

(2) Remove knee bolster. Refer to Group 8E, Instrument Panel and Systems for Removal and Installation.

(3) Remove the steering column upper and lower shrouds. Refer to Group 19, Steering for Removal and Installation.

(4) Disengage the steering column wire harness from the Sentry Key Immobilizer Module (SKIM).

(5) Remove the one screw securing the SKIM to the bottom of the steering column.

(6) Slide the SKIM away from the steering column to clear the SKIM antenna ring from around the ignition switch lock cylinder housing (Fig. 1).

(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 scan tool and the proper Body Diagnostic Procedures Manual MUST be used to initialize the new SKIM and to program at least two Sentry Key transponders.