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DESCRIPTION AND OPERATION

VEHICLE THEFT SECURITY SYSTEM

DESCRIPTION

The Vehicle Theft Security System (VTSS) is an available factory-installed option on this model. The VTSS is designed to provide perimeter protection against unauthorized use or tampering by monitoring the vehicle doors, the liftgate, the liftgate flip-up glass and the ignition system. If unauthorized use or tampering is detected, the system responds by sounding the horn and flashing the exterior lamps.

The VTSS also includes the Sentry Key Immobilizer System (SKIS). The SKIS includes a steering column-mounted control module and antenna unit as well as a transponder in each ignition key. If the SKIS module does not recognize the ignition key transponder, it prevents the engine from running. Refer to **Sentry Key Immobilizer System** in the Sentry Key Immobilizer System section of this group for more information on the SKIS.

The VTSS includes the following components:

- Auto headlamp light sensor/VTSS Light Emitting Diode (LED)
- Body Control Module (BCM)
- Combination flasher
- Door ajar switch
- Driver cylinder lock switch
- Horn relay
- Liftgate ajar switch
- Liftgate flip-up glass ajar switch
- Low beam headlamp relay

Certain functions and features of the VTSS rely upon resources shared with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus network. The PCI data bus network allows the sharing of sensor information. This helps to reduce wire harness complexity, internal controller hardware, and component sensor current loads. At the same time, this system provides increased reliability, enhanced diagnostics, and allows the addition of many new feature capabilities. For diagnosis of these electronic modules or of the PCI data bus network, the use of a DRB scan tool and the proper Diagnostic Procedures manual are recommended.

The other electronic modules that may affect VTSS operation are as follows:

- **Body Control Module (BCM)** - Refer to **Body Control Module** in the Description and Operation section of Group 8E - Instrument Panel Systems for more information.

DESCRIPTION AND OPERATION (Continued)

- **Driver Door Module (DDM)** - Refer to **Door Module** in the Power Lock System section of Group 8P - Power Lock Systems for more information.
- **Passenger Door Module (PDM)** - Refer to **Door Module** in the Power Lock System section of Group 8P - Power Lock Systems for more information.

Refer to **Vehicle Theft Security System** in the Contents of Group 8W - Wiring Diagrams for complete circuit diagrams. Following are general descriptions of the features and major components of the VTSS.

COMBINATION FLASHER

The combination flasher is a smart relay that functions as both the turn signal system and the hazard warning system flasher. The combination flasher contains active electronic Integrated Circuitry (IC) elements. This flasher can be energized by the BCM to flash all of the park/turn signal/front side marker lamps as an optical alert for the VTSS alarm function. Refer to **Combination Flasher** in the proper section of Group 8J - Turn Signal and Hazard Warning Systems for diagnosis and service of this component.

HORN RELAY

The horn relay is a electromechanical device that switches battery current to the horn when the horn switch grounds the relay coil. The horn relay is located in the Power Distribution Center (PDC) in the engine compartment. This relay can be energized by the BCM to sound the horns as an audible alert for the VTSS alarm function. Refer to **Horn Relay** in the proper section of Group 8G - Horn Systems for diagnosis and service of this component.

LOW BEAM HEADLAMP RELAY

The low beam headlamp relay is a electromechanical device that switches battery current to the headlamp low beams when the BCM grounds the relay coil. The low beam headlamp relay is located in the junction block in the passenger compartment. This relay can be energized by the BCM to flash the headlamp low beams as an optical alert for the VTSS alarm function. Refer to **Low Beam Headlamp Relay** in the proper section of Group 8L - Lamps for diagnosis and service of this component.

OPERATION

A Body Control Module (BCM) is used on this model to control and integrate many of the electronic functions and features included in the VTSS. In the VTSS, the BCM receives inputs indicating the status of the door ajar switch, the driver cylinder lock switch, the ignition switch, the liftgate ajar switch, and the liftgate flip-up glass ajar switch. The programming in the BCM allows it to process the information from all of these inputs and send control outputs to energize or de-energize the combination flasher, the horn relay, the low beam headlamp relay, and the auto headlamp light sensor/VTSS Light Emitting Diode (LED).

Refer to the owner's manual in the vehicle glove box for more information on the features, use and operation of the vehicle theft security system.

ENABLING

The Vehicle Theft Security System (VTSS) features are provided by the BCM located in the passenger compartment. The BCM must have the VTSS functions electronically enabled in order for the VTSS to perform as designed. The logic in the BCM keeps its VTSS features dormant until it is enabled using a DRB scan tool. The VTSS features of the BCM are enabled on vehicles equipped with the VTSS option at the factory, but a service replacement BCM must be enabled by the dealer with a DRB scan tool anytime the BCM is replaced with a new unit. See the proper Diagnostic Procedures manual for more information on enabling the BCM VTSS feature.

ARMING

Passive arming of the VTSS occurs when the vehicle is exited with the key removed from the ignition switch, the headlamps are turned off, and the doors are locked while they are open using the power lock switch. The power lock switch will not function if the key is in the ignition switch or the headlamps are on with the driver side front door open. The VTSS will not arm if the driver side front door is locked using the key in the lock cylinder or using the mechanical lock button.

Active arming of the VTSS occurs when the Remote Keyless Entry (RKE) transmitter is used to lock the vehicle, even if the doors and/or the liftgate are open when the RKE transmitter Lock button is depressed. However, the VTSS arming will not be complete until all of the doors, the liftgate and the liftgate flip-up glass are closed. Refer to **Remote Keyless Entry System** in the Remote Keyless Entry System section of Group 8P - Power Lock Systems for more information on the RKE system components.

Following successful passive or active VTSS arming, the VTSS LED on the top of the instrument panel will flash rapidly for about fifteen seconds after the illuminated entry system times out. This indicates that VTSS arming is in progress. Once the fifteen second arming function is successfully completed, the set lamp will flash at a slower rate to indicate that the VTSS is armed.

DESCRIPTION AND OPERATION (Continued)

DISARMING

Passive disarming of the VTSS occurs when the vehicle is unlocked using the key to unlock the driver side front door. Active disarming of the VTSS occurs when the vehicle is unlocked by depressing the Unlock button of the Remote Keyless Entry (RKE) transmitter. Refer to **Remote Keyless Entry System** in the Remote Keyless Entry System section of Group 8P - Power Lock Systems for more information on the RKE system components. Once the alarm has been activated (horn sounding and exterior lamps flashing), either disarming method will also deactivate the alarm.

Depressing the Panic button on the RKE transmitter will also disarm the VTSS, but the horn will sound and the exterior lamps will flash for about three minutes as part of the Panic feature function. Refer to **Power Lock System** in the Power Lock System section of Group 8P - Power Lock Systems for more information on the Panic feature.

POWER-UP MODE

When the armed VTSS senses that the battery has been disconnected and reconnected, it enters its power-up mode. In the power-up mode the alarm system remains armed following a battery failure or disconnect. If the VTSS was armed prior to a battery disconnect or failure, the technician or vehicle operator will have to be actively or passively disarm the alarm system after the battery is reconnected.

The power-up mode will also apply if the battery goes dead while the system is armed, and battery jump-starting is then attempted. The VTSS will be armed until the technician or vehicle operator has actively or passively disarmed the alarm system. If the VTSS is in the disarmed mode prior to a battery disconnect or failure, it will remain disarmed after the battery is reconnected, replaced or jump-starting is attempted.

TAMPER ALERT

The VTSS tamper alert will sound the horn three times upon disarming, if the alarm was triggered and has since timed-out (about eighteen minutes). This feature alerts the vehicle operator that the VTSS was activated while the vehicle was unattended.

DOOR AJAR SWITCH

DESCRIPTION

The door ajar switches are concealed within and integral to the door latch units. The front door ajar switches are actuated by the front door latch mechanisms, and are hard wired between a body ground and the Driver Door Module (DDM) or the Passenger Door Module (PDM) through the front door wire harnesses. The rear door ajar switches are actuated by the rear door latch mechanisms, and are hard wired between a body ground and the Body Control Module (BCM) through the rear door and body wire harnesses.

The door ajar switches cannot be adjusted or repaired and, if faulty or damaged, the door latch unit must be replaced. Refer to **Front Door Latch** or **Rear Door Latch** in the Removal and Installation section of Group 23 - Body for the service procedures. For complete circuit diagrams, refer to **Vehicle Theft Security System** in the Contents of Group 8W - Wiring Diagrams.

OPERATION

The front door ajar switches close a path to ground for the DDM or the PDM when a front door is opened, and opens the ground path when a front door is closed. The rear door ajar switches close a path to ground for the BCM when a rear door is opened, and opens the ground path when a rear door is closed. The DDM, PDM, or BCM reads the switch status through an internal pull-up, then sends the proper switch status messages to other electronic modules over the Programmable Communications Interface (PCI) data bus network. The door ajar switch status message is used by the BCM as an input for Vehicle Theft Security System (VTSS) operation.

DRIVER CYLINDER LOCK SWITCH

DESCRIPTION

The driver cylinder lock switch is integral to the key lock cylinder inside the driver side front door. The driver cylinder lock switch is a normally-open momentary switch that is hard wired between a body ground and the Driver Door Module (DDM) through the front door wire harness, and closes a path to ground through an internal resistor when the lock cylinder is rotated to the unlock position.

The driver cylinder lock switch cannot be adjusted or repaired and, if faulty or damaged, the driver side front door lock cylinder must be replaced. Refer to **Front Door Lock Cylinder** in the Removal and Installation section of Group 23 - Body for the service procedures. For complete circuit diagrams, refer to **Vehicle Theft Security System** in the Contents of Group 8W - Wiring Diagrams.

OPERATION

The driver cylinder lock switch is actuated by the key lock cylinder when the key is inserted in the lock cylinder and turned to the unlock position. The driver cylinder lock switch closes a path to ground through an internal resistor for the DDM when the driver door key lock cylinder is in the lock or unlock

DESCRIPTION AND OPERATION (Continued)

position, and opens the ground path when the lock cylinder is in the neutral position. The DDM reads the switch status through an internal pull-up, then sends the proper switch status messages to other electronic modules over the Programmable Communications Interface (PCI) data bus network. The driver cylinder lock switch unlock status message is used by the BCM as an input for Vehicle Theft Security System (VTSS) operation.

LIFTGATE AJAR SWITCH

DESCRIPTION

The two liftgate ajar switches are concealed within and integral to the two liftgate latch units in the liftgate. The two liftgate ajar switches are actuated by the liftgate latch mechanisms, and are hard wired in parallel with each other between a body ground and the Body Control Module (BCM) through the liftgate and body wire harnesses.

The liftgate ajar switches cannot be adjusted or repaired and, if faulty or damaged, the liftgate latch unit must be replaced. Refer to **Liftgate Latch** in the Removal and Installation section of Group 23 - Body for the service procedures. For complete circuit diagrams, refer to **Vehicle Theft Security System** in the Contents of Group 8W - Wiring Diagrams.

OPERATION

Each of the liftgate ajar switches can close a path to ground for the BCM when the liftgate is opened, and opens the ground path when the liftgate is closed. The BCM reads the switch status through an internal pull-up, then sends the proper switch status messages to other electronic modules over the Programmable Communications Interface (PCI) data bus network. The liftgate ajar switch status message is used by the BCM as an input for Vehicle Theft Security System (VTSS) operation.

LIFTGATE FLIP-UP GLASS AJAR SWITCH

DESCRIPTION

The liftgate flip-up glass ajar switch is concealed within and integral to the liftgate flip-up glass latch unit in the liftgate. The liftgate flip-up glass ajar switch is actuated by the liftgate flip-up glass latch mechanism, and is hard wired in series between a body ground, the Body Control Module (BCM) and the rear wiper motor module through the liftgate and body wire harnesses.

The liftgate flip-up glass ajar switch cannot be adjusted or repaired and, if faulty or damaged, the liftgate flip-up glass latch unit must be replaced. Refer to **Liftgate Flip-Up Glass Latch** in the Removal and Installation section of Group 23 - Body for the service procedures. For complete circuit diagrams, refer to **Vehicle Theft Security System** in the Contents of Group 8W - Wiring Diagrams.

OPERATION

The liftgate flip-up glass ajar switch can close a path to ground for the BCM and the rear wiper motor module when the liftgate flip-up glass is opened, and opens the ground path when the liftgate flip-up glass is closed. The rear wiper motor module uses the liftgate flip-up glass ajar switch input to control the rear wiper operation, and will park the rear wiper blade if this input indicates that the liftgate flip-up glass is ajar. The BCM reads the switch status through an internal pull-up, then sends the proper switch status messages to other electronic modules over the Programmable Communications Interface (PCI) data bus network. The liftgate flip-up glass ajar switch status message is used by the BCM as an input for Vehicle Theft Security System (VTSS) operation.

VEHICLE THEFT SECURITY SYSTEM LIGHT EMITTING DIODE

DESCRIPTION

The Vehicle Theft Security System (VTSS) Light Emitting Diode (LED) is a red light-emitting diode that is integral to the auto headlamp light sensor, which is mounted on top of the instrument panel near the driver side defroster outlet. The LED is connected to fused battery current at all times and is hard wired to the Body Control Module (BCM) through the instrument panel wire harness.

The VTSS LED cannot be adjusted or repaired and, if faulty or damaged, auto headlamp light sensor/VTSS LED unit must be replaced. Refer to **Auto Headlamp Sensor** in the Removal and Installation section of Group 8L - Lamps for the service procedures. For complete circuit diagrams, refer to **Vehicle Theft Security System** in the Contents of Group 8W - Wiring Diagrams.

OPERATION

The VTSS LED gives a visible indication of the VTSS arming status. One side of the LED is connected to battery current at all times. The other side of the LED is hard wired to the BCM, which controls the operation of the LED by switching this side of the circuit to ground. When the VTSS arming is in progress, the BCM will flash the LED rapidly on and off for about fifteen seconds. When the VTSS has been successfully armed, the BCM will flash the LED on and off continually at a much slower rate until the VTSS is disarmed.

DIAGNOSIS AND TESTING

VEHICLE THEFT SECURITY SYSTEM

In order to obtain conclusive testing of the Vehicle Theft Security System (VTSS), the Body Control Module (BCM) and all of the electronic modules that provide inputs to, or receive outputs from the VTSS components must be checked. The most reliable, efficient, and accurate means to diagnose the VTSS requires the use of a DRB scan tool and the proper Diagnostic Procedures manual. The DRB scan tool can provide confirmation that the Programmable Communications Interface (PCI) data bus network is functional, that all of the electronic modules are sending and receiving the proper messages on the PCI data bus, and that the BCM is receiving the proper hard wired inputs and relaying the proper hard wired outputs to perform its VTSS functions.

See the proper Diagnostic Procedures manual and the Vehicle Theft Security System menu item on the DRB scan tool for the procedures. Refer to **Vehicle Theft Security System** in the Contents of Group 8W - Wiring Diagrams for complete circuit diagrams.

REMOVAL AND INSTALLATION

VEHICLE THEFT SECURITY SYSTEM COMPONENTS

Service procedures for the various components used in the Vehicle Theft Security System (VTSS) can be found in the proper group as follows:

- **Auto headlamp light sensor/VTSS Light Emitting Diode (LED)** - Refer to **Auto Headlamp Sensor** in the Removal and Installation section of Group 8L - Lamps for the service procedures.
- **Body Control Module (BCM)** - Refer to **Body Control Module** in the Removal and Installation section of Group 8E - Instrument Panel Systems for the service procedures.
- **Combination flasher** - Refer to **Combination Flasher** in the Removal and Installation section of Group 8J - Turn Signal and Hazard Warning Systems for the service procedures.
- **Door ajar switch** - Refer to **Front Door Latch** or **Rear Door Latch** in the Removal and Installation section of Group 23 - Body for the service procedures.
- **Driver cylinder lock switch** - Refer to **Front Door Lock Cylinder** in the Removal and Installation section of Group 23 - Body for the service procedures.
- **Horn relay** - Refer to **Horn Relay** in the Removal and Installation section of Group 8G - Horn Systems for the service procedures.
- **Liftgate ajar switch** - Refer to **Liftgate Latch** in the Removal and Installation section of Group 23 - Body for the service procedures.
- **Liftgate flip-up glass ajar switch** - Refer to **Liftgate Flip-Up Glass Latch** in the Removal and Installation section of Group 23 - Body for the service procedures.
- **Low beam headlamp relay** - Refer to **Low Beam Headlamp Relay** in the Removal and Installation section of Group 8L - Lamps for the service procedures.

SENTRY KEY IMMOBILIZER SYSTEM

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DESCRIPTION AND OPERATION

SENTRY KEY IMMOBILIZER SYSTEM

DESCRIPTION

The Sentry Key Immobilizer System (SKIS) is standard factory-installed equipment for this model. The SKIS is designed to provide passive protection against unauthorized vehicle use by preventing the engine from operating without a valid key. Following are some general descriptions of the features and components of the SKIS.

The SKIS includes the following components:

- Sentry Key Immobilizer Module (SKIM)
- Sentry Key Immobilizer System indicator lamp
- Sentry Key transponder

Certain functions and features of the SKIS rely upon resources shared with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus network. The PCI data bus network allows the sharing of sensor information. This helps to reduce wire harness complexity, internal controller hardware, and component sensor current loads. At the same time, this system provides increased reliability, enhanced diagnostics, and allows the addition of many new feature capabilities. For diagnosis of these electronic modules or of the PCI data bus network, the use of a DRBIII® scan tool and the proper Diagnostic Procedures manual are recommended.

The other electronic modules that may affect SKIS operation are as follows:

- **Body Control Module (BCM)** - Refer to **Body Control Module** in the Description and Operation section of Group 8E - Instrument Panel Systems for more information.
- **Electro-Mechanical Instrument Cluster (EMIC)** - Refer to **Instrument Cluster** in the Description and Operation section of Group 8E - Instrument Panel Systems for more information.
- **Powertrain Control Module (PCM)** - Refer to **Powertrain Control Module** in the Description and Operation section of Group 14 - Fuel System for more information.

Refer to **Fuel/Ignition System** in the Contents of Group 8W - Wiring Diagrams for complete circuit diagrams. Following are general descriptions of the features and major components of the SKIS.

OPERATION

The SKIS uses a Radio Frequency (RF) transceiver and electronically coded Sentry Key transponders to verify that a valid key is inserted in the ignition switch lock cylinder. If the SKIS recognizes the key as valid, it sends messages to the PCM that will allow the engine to run. If the SKIS does not recognize a valid key, the engine will not run. While the engine starting system will operate and the engine may initially start and run up to about 800 revolutions-per-minute on residual fuel pressure, the vehicle cannot be driven without a valid Sentry Key transponder.

The SKIS includes two valid Sentry Key transponders from the factory. 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 run 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 (DTCs) if a system malfunction is detected. The SKIS can be diagnosed, and any stored DTC can be retrieved using a DRBIII® scan tool as described in the proper Diagnostic Procedures manual.

DESCRIPTION AND OPERATION (Continued)

See the owner's manual in the vehicle glove box for more information on the use and operation of the SKIS.

SENTRY KEY IMMOBILIZER MODULE

DESCRIPTION

The Sentry Key Immobilizer Module (SKIM) 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 Communications Interface (PCI) data bus network with the Powertrain Control Module (PCM), the Electro-Mechanical Instrument Cluster (EMIC), the Body Control Module (BCM) and/or the DRB scan tool.

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.

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 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 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 data 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.

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

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 data 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 EMIC over the PCI data bus network to control the SKIS indicator lamp. The SKIM sends messages to the EMIC to turn the lamp 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 lamp off for a duration of about one second. Then the SKIM sends messages to turn the lamp on or off based upon the results of the SKIS self-tests. If the SKIS indicator lamp 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 EMIC to flash the SKIS indicator lamp. The SKIM can also send messages to the EMIC to flash the lamp and to the BCM 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.

DESCRIPTION AND OPERATION (Continued)

SENTRY KEY IMMOBILIZER TRANSPONDER

DESCRIPTION

The Sentry Key Immobilizer System (SKIS) uses a transponder that is integral to each of the two ignition keys 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. 1). For ease of identification, the molded rubber cap of ignition keys with a transponder are gray in color, while ignition keys without a transponder have a black cap.

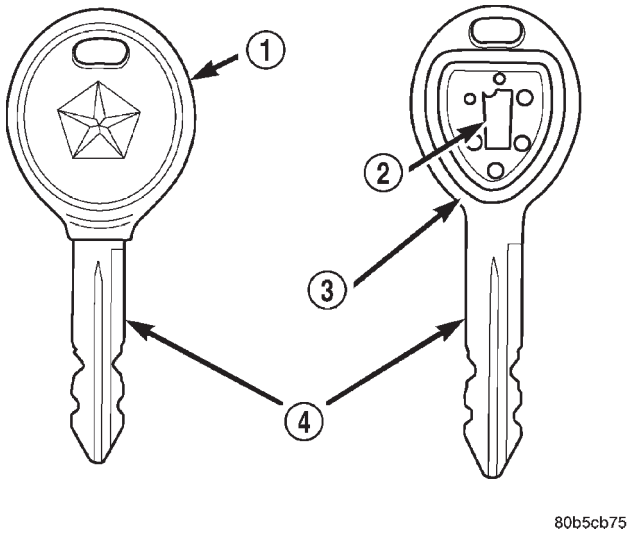


Fig. 1 Sentry Key Immobilizer Transponder

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

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

OPERATION

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. Refer to **Sentry Key Immobilizer System Transponder Programming** in the Service Procedures section of 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 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.

SENTRY KEY IMMOBILIZER SYSTEM INDICATOR LAMP

DESCRIPTION

The Sentry Key Immobilizer System (SKIS) indicator lamp gives an indication when the SKIS is faulty or when the vehicle has been immobilized due to the use of an invalid ignition key. The lamp is controlled by the Electro-Mechanical Instrument Cluster (EMIC) circuitry based upon messages received from the Sentry Key Immobilizer Module (SKIM) over the Programmable Communications Interface (PCI) data bus network.

The SKIS indicator lamp uses a replaceable incandescent bulb and bulb holder on the EMIC electronic circuit board. If the SKIS indicator lamp comes on and stays on after the bulb test function, diagnosis of the SKIS and the PCI data bus should be performed with a DRB scan tool and the proper Diagnostic Procedures manual.

OPERATION

The SKIM sends messages to the EMIC over the PCI data bus to turn the lamp 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 data bus messages to keep the lamp off for a duration of about one second. Then the SKIM sends messages to the instrument cluster circuitry to turn the lamp on or off based upon the results of the SKIS self-tests. If the SKIS indicator lamp 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 SKIS indicator lamp. The SKIM can also send messages to the instrument cluster to flash the lamp and to the Body Control Module (BCM) to generate a single

DESCRIPTION AND OPERATION (Continued)

audible chime tone. These functions serve as an indication to the customer that the SKIS has been placed in its "Customer Learn" programming mode. Refer to **Sentry Key Immobilizer System Transponder Programming** in the Service Procedures section of this group for more information on the "Customer Learn" programming mode.

DIAGNOSIS AND TESTING

SENTRY KEY IMMOBILIZER SYSTEM

In order to obtain conclusive testing of the Sentry Key Immobilizer System (SKIS), the Sentry Key Immobilizer Module (SKIM) and all of the electronic modules that provide inputs to, or receive outputs from the SKIM must be checked. The most reliable, efficient, and accurate means to diagnose the SKIS requires the use of a DRB scan tool and the proper Diagnostic Procedures manual. The DRB scan tool can provide confirmation that the Programmable Communications Interface (PCI) data bus network is functional and that all of the electronic modules are sending and receiving the proper messages on the PCI data bus for the SKIM to perform its SKIS functions.

See the proper Diagnostic Procedures manual and the Vehicle Theft Security System menu item on the DRB scan tool for the procedures. Refer to **Fuel/Ignition System** in the Contents of Group 8W - Wiring Diagrams for complete circuit diagrams.

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.

(1) Check the fused B(+) fuse 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) Check for battery voltage at the fused B(+) fuse in the junction block. If OK, go to Step 3. If not OK, repair the open fused B(+) circuit to the Power Distribution Center (PDC) fuse as required.

(3) Check the fused ignition switch output (run/start) fuse in the junction block. If OK, go to Step 4. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(4) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run/start) fuse in the junction block. If OK, go to Step 5. If not OK, repair the open fused ignition switch output (run/start) circuit to the ignition switch as required.

(5) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector from the Sentry Key Immobilizer Module (SKIM) connector receptacle. Check for continuity between the ground circuit cavity of the instrument panel wire harness connector for the SKIM and a good ground. There should be continuity. If OK, go to Step 6. If not OK, repair the open ground circuit to ground as required.

(6) Connect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the instrument panel wire harness connector for the SKIM. If OK, go to Step 7. If not OK, repair the open fused B(+) circuit to the junction block fuse as required.

(7) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run/start) circuit cavity of the instrument panel wire harness connector for the SKIM. If OK, use a DRB scan tool and the proper Diagnostic Procedures manual to complete the diagnosis of the SKIS. If not OK, repair the open fused ignition switch output (run/start) circuit to the junction block fuse as required.

SERVICE PROCEDURES

SENTRY KEY IMMOBILIZER SYSTEM 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, Sentry 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.

SERVICE PROCEDURES (Continued)

(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 later, 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.

(4) About ten seconds after the completion of Step 3, the SKIS indicator lamp 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 SKIS indicator lamp 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

SENTRY KEY IMMOBILIZER MODULE

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

(1) Disconnect and isolate the battery negative cable.

(2) Remove the steering column opening cover from the instrument panel. Refer to **Steering Column Opening Cover** in the Removal and Installation section of Group 8E - Instrument Panel Systems for the procedures.

(3) Disconnect the instrument panel wire harness connector from the Sentry Key Immobilizer Module (SKIM) connector receptacle.

(4) Remove the one screw that secures the SKIM to the bottom of the steering column housing between the ignition switch and the ignition lock cylinder (Fig. 2).

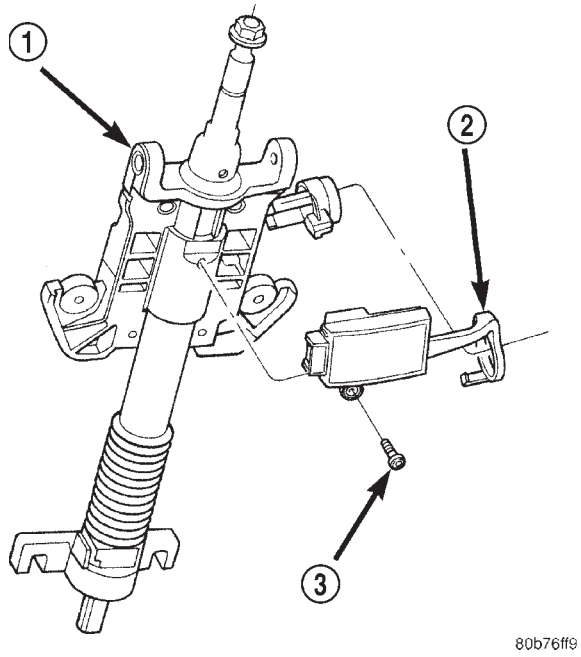


Fig. 2 Sentry Key Immobilizer Module Remove/ Install

1 – STEERING COLUMN
2 – SKIM
3 – MOUNTING SCREW

(5) Pull the lower right side of the fixed column shroud away from the ignition lock cylinder far enough to disengage the antenna ring of the SKIM from around the ignition lock cylinder housing.

(6) Remove the SKIM from the steering column.

INSTALLATION

(1) Position the SKIM under the steering column.

(2) Pull the lower right side of the fixed column shroud away from the ignition lock cylinder far enough to engage the antenna ring of the SKIM around the ignition lock cylinder housing.

REMOVAL AND INSTALLATION (Continued)

(3) Install and tighten the one screw that secures the SKIM to the bottom of the steering column housing between the ignition switch and the ignition lock cylinder. Tighten the screw to 3.4 N·m (30 in lbs.).

(4) Reconnect the instrument panel wire harness connector to the SKIM connector receptacle.

(5) Install the steering column opening cover onto the instrument panel. Refer to **Steering Column Opening Cover** in the Removal and Installation section of Group 8E - Instrument Panel Systems for the procedures.

(6) Reconnect the battery negative cable.