POWER LOCK SYSTEMS

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POWER LOCK SYSTEM

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DESCRIPTION AND OPERATION

POWER LOCK SYSTEM

DESCRIPTION

A power operated door and liftgate lock system is standard factory-installed equipment on this model. The power lock system allows all of the doors and the liftgate to be locked or unlocked electrically by operating a switch on either front door trim panel. The power lock system receives non-switched battery current through a fuse in the Power Distribution Center (PDC), so that the power locks remain operational, regardless of the ignition switch position.

The power lock system for this vehicle also has a door lock inhibit feature, which prevents the power lock system from being energized with a power door lock switch if a front door is open with the key in the ignition and/or the exterior lamps are on. However, the locks can still be operated manually, with a key or energized with the RKE transmitter.

This vehicle also offers several customer programmable features, which allows the selection of several optional electronic features to suit individual preferences. Refer to **ELECTRONIC VEHICLE INFORMATION CENTER PROGRAMMING** in the Service Procedures section of Group 8V - Overhead Console Systems for more information on the customer programmable feature options. Customer programmable feature options affecting the power door lock system include:

- **Auto Door Locks** - Automatically locks all of the vehicle doors and the liftgate when the vehicle reaches a speed of about 24 kilometers-per-hour (15 miles-per-hour).
- **Auto Unlock on Exit** - Automatically unlocks all of the vehicle doors and the liftgate when the driver side front door is opened, if the vehicle is stopped and the transmission gear selector is in the Park or Neutral positions. This feature is linked to the Auto Door Locks feature, and will only occur one time following each Auto Door Lock event.

The power lock system for this vehicle can also be operated remotely using the standard equipment Remote Keyless Entry (RKE) system radio frequency transmitters. Refer to **Remote Keyless Entry System** in the Remote Keyless Entry System section of this group for more information on the RKE system.

This group covers the following components of the power lock system:

- Driver Door Module (DDM)
- Passenger Door Module (PDM)
- Power lock motors
- Power lock switches.

DESCRIPTION AND OPERATION (Continued)

Certain functions and features of the power lock system 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 power lock system 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.
- **Electronic Vehicle Information Center (EVIC)** - Refer to **Electronic Vehicle Information Center** in the Description and Operation section of Group 8V - Overhead Console 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 **Power Door Locks** in the Contents of Group 8W - Wiring Diagrams for complete circuit diagrams. Following are general descriptions of the major components in the power lock system.

OPERATION

The Passenger Door Module (PDM) contains the power door lock control logic and a power lock switch. The Driver Door Module (DDM) contains a power lock switch and controls the output to the driver side front door power lock motor, while the PDM controls the output to the power lock motors for the remaining doors and the liftgate.

When the power lock switch on the DDM is used to lock or unlock the doors, the DDM sends a control output to the driver side front door power lock motor and sends lock or unlock request messages to the PDM over the Programmable Communications Interface (PCI) data bus. The PDM responds to these messages by sending control outputs to the power lock motors of the remaining doors and the liftgate. When the power lock switch on the PDM is used to lock or unlock the doors, the PDM sends control outputs to the power lock motors in the passenger side front door, both rear doors and the liftgate, then sends lock or unlock request messages to the DDM over the Programmable Communications Interface (PCI) data bus. The DDM responds to these messages by sending control outputs to the power lock motor of the driver side front door.

In order to support the auto door locks and unlock on exit features, if enabled, the power lock system logic in the PDM needs to know the door ajar switch status, vehicle speed, and transmission gear selector lever position. The passenger side front door ajar switch is the only hard wired input to the PDM. The PDM obtains the remaining information from messages it receives from other electronic modules over the PCI data bus network.

See the owner's manual in the vehicle glove box for more information on the features, use and operation of the power lock system.

POWER LOCK SWITCH

DESCRIPTION

The power lock motors are controlled by a two-way momentary switch mounted on the trim panel of each front door. Each power lock switch is illuminated by a Light-Emitting Diode (LED) that is integral to the switch paddle.

The driver side front door power lock switch is integral to the Driver Door Module (DDM), and the passenger side front door power lock switch is integral to the Passenger Door Module (PDM). The power lock switches and their lamps cannot be adjusted or repaired and, if faulty or damaged, the entire DDM or PDM unit must be replaced.

OPERATION

The front door power lock switches provide a lock and unlock signal to the door module circuitry. The Driver Door Module (DDM) circuitry controls the output to the driver side front door power lock motor, while the Passenger Door Module (PDM) circuitry controls the output to the passenger side front door, both rear door and the liftgate power lock motors.

When the DDM-integrated power lock switch is actuated, the DDM circuitry sends control outputs to the driver side front door power lock motor and sends a message to the PDM over the Programmable Communications Interface (PCI) data bus to control the output to the passenger side front door, both rear door and the liftgate power lock motors. When the PDM-integrated power lock switch is actuated, the PDM circuitry sends control outputs to the passenger side front door, both rear door and the liftgate power lock motors and sends a message to the DDM over the Programmable Communications Interface (PCI) data bus to control the output to the driver side front door power lock motor.

Each power lock switch is illuminated by a Light-Emitting Diode (LED) when the ignition switch is

DESCRIPTION AND OPERATION (Continued)

turned to the On position. See the owner's manual in the vehicle glove box for more information on the features, use and operation of the power lock switches.

DOOR MODULE

DESCRIPTION

A Driver Door Module (DDM) and a Passenger Door Module (PDM) are used on this model to control and integrate many of the electronic features and functions of the vehicle. The door modules are mounted to the inside surface of the trim panel on each front door. The only visible parts of the door modules are the switches and the bezel that are located on the outside of each front door trim panel. Each door module houses both the front power lock and power window switches. The DDM also houses individual switches for each passenger door power window, a power window lockout switch and the power mirror switch. The remainder of both door modules is concealed behind the front door trim panels.

The DDM and PDM each contain a central processing unit and interface with each other, as well as 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, reduce internal controller hardware, and reduce component sensor current loads. At the same time, this system provides increased reliability, enhanced diagnostics, and allows the addition of many new feature capabilities.

The circuitry of the door modules controls the following hard wired outputs:

- Door and liftgate power lock motors
- Front and rear door power window motors
- Front door courtesy lamps
- Power mirror control and heating
- Rear door power window switch control and illumination.

The door modules also receive the following hard wired inputs:

- Front door ajar switch
- Front door power window switches
- Memory switch (with the Memory System option only)
- Power lock switches
- Power mirror position potentiometers (with the Memory System option only)
- Power mirror switches
- Power window lockout switch.

In addition, the DDM contains the program logic for the optional Memory System, while the PDM contains the program logic and the receiver for the standard Remote Keyless Entry (RKE) System. Refer to **Memory System** in the Memory System section of Group 8R - Power Seat Systems for more information on the features of the Memory System. Refer to **Remote Keyless Entry System** in the Remote Keyless Entry System section of this group for more information on the features of the RKE system.

For diagnosis of the DDM, PDM, or the PCI data bus network, a DRB scan tool and the proper Diagnostic Procedures manual are recommended. The DDM and the PDM cannot be adjusted or repaired and, if damaged or faulty, they must be replaced.

OPERATION

The functions and features provided by the door modules are possible because of their hard wired inputs and outputs, as well as the resources they share with each other and with the other electronic modules in the vehicle through their communication over the PCI data bus network. The door modules use their internal programming and all of these inputs to decide which functions they should perform and both the standard and optional features they should provide. Refer to **ELECTRONIC VEHICLE INFORMATION CENTER PROGRAMMING** in the Service Procedures section of Group 8V - Overhead Console Systems for more information on the customer programmable feature options.

POWER LOCK MOTOR

DESCRIPTION

Power operated front door, rear door and liftgate locking mechanisms are standard equipment on this model. The lock mechanisms are actuated by a reversible electric motor mounted within each door and the liftgate. The power lock motors for the doors are integral to the door latch units. The liftgate power lock motor is a separate unit secured to the latch brainplate near the center of the liftgate and operates the liftgate latch lock mechanism through a connecting linkage rod.

The power lock motors for the four doors cannot be adjusted or repaired and, if faulty or damaged, the entire door latch unit must be replaced. The liftgate power lock motor cannot be adjusted or repaired and, if faulty or damaged, the entire liftgate latch brainplate unit must be replaced.

OPERATION

The driver side front door power lock motor is controlled by the Driver Door Module (DDM). The remaining power door lock motors and the liftgate power lock motor are controlled by the Passenger Door Module (PDM). A positive and negative battery connection to the two motor terminals will cause the power lock motor plunger to move in one direction.

DESCRIPTION AND OPERATION (Continued)

Reversing the current through these same two connections will cause the power lock motor plunger to move in the opposite direction.

DIAGNOSIS AND TESTING

POWER LOCK SYSTEM

Following are tests that will help to diagnose the hard wired components and circuits of the power lock system. However, these tests may not prove conclusive in the diagnosis of this system. In order to obtain conclusive testing of the power lock system, the Programmable Communications Interface (PCI) data bus network and all of the electronic modules that provide inputs to, or receive outputs from the power lock system components must be checked.

The most reliable, efficient, and accurate means to diagnose the power lock system requires the use of a DRB scan tool and the proper Diagnostic Procedures manual. The DRB scan tool can provide confirmation that the PCI data bus is functional, that all of the electronic modules are sending and receiving the proper messages on the PCI data bus, and that the power lock motors are being sent the proper hard wired outputs by the door modules for them to perform their power lock system functions.

For complete circuit diagrams, refer to **Power Door Locks** in the Contents of Group 8W - Wiring Diagrams.

PRELIMINARY DIAGNOSIS

As a preliminary diagnosis for the power lock system, note the system operation while you actuate both the Lock and Unlock functions with the power lock switches and with the Remote Keyless Entry (RKE) transmitter. Then, proceed as follows:

- If the entire power lock system fails to function with either the power lock switches or the RKE transmitter, check the fused B(+) fuse in the Power Distribution Center. If the fuse is OK, refer to **Door Module** in the Diagnosis and Testing section of this group.
- If the power lock system functions with both power lock switches, but not with the RKE transmitter, refer to **Remote Keyless Entry System** in the Remote Keyless Entry System section of this group.
- If the power lock system functions with the RKE transmitter, but not with one or both power lock switches, refer to **Door Module** in the Diagnosis and Testing section of this group.
- If the driver side power lock switch operates only the driver side front door power lock motor, but all other power lock motors operate with the passenger side power lock switch or the RKE transmitter, use a DRB scan tool and the proper Diagnostic Procedures manual to diagnose the Programmable Communications Interface (PCI) data bus.
- If only one power lock motor to operate with both power lock switches and the RKE transmitter, refer to **Power Lock Motor** in the Diagnosis and Testing section of this group.

DOOR MODULE

NOTE: The following tests may not prove conclusive in the diagnosis of this component. The most reliable, efficient, and accurate means to diagnose this system involves the use of a DRB scan tool and the proper Diagnostic Procedures manual.

Remember, the Driver Door Module (DDM) circuitry controls the output to the driver side front door power lock motor. The Passenger Door Module (PDM) circuitry controls the output to the power lock motors for the remaining doors and the liftgate. For complete circuit diagrams, refer to **Power Door Locks** in the Contents of Group 8W - Wiring Diagrams.

(1) Disconnect and isolate the battery negative cable. Remove the front door trim panel. Go to Step 2.

(2) Check the 15-way door wire harness connector for the door module to see that it is fully seated in the door module connector receptacle. If OK, go to Step 3. If not OK, install the door wire harness connector in the door module connector receptacle properly.

(3) Disconnect the 15-way door wire harness connector for the door module from the door module connector receptacle. Check for continuity between the ground circuit cavity of the 15-way door wire harness connector for the door module and a good ground. There should be continuity. If OK, go to Step 4. If not OK, repair the open ground circuit to ground as required.

(4) Connect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the 15-way door wire harness connector for the door module. If OK, go to Step 5. If not OK, repair the open fused B(+) circuit to the Power Distribution Center (PDC) fuse as required.

(5) Disconnect and isolate the battery negative cable. Check for continuity between the door lock driver circuit cavity of the 15-way door wire harness connector for the door module and a good ground. Repeat the check for the door unlock driver circuit. In each case there should be no continuity. If OK, go to Step 6. If not OK, repair the shorted door lock or unlock driver circuit as required.

(6) Disconnect the door or liftgate wire harness connector from the inoperative power lock motor wire harness connector. Check for continuity between the

DIAGNOSIS AND TESTING (Continued)

door lock driver circuit cavities in the door or liftgate wire harness connector for the inoperative power lock motor and the 15-way door wire harness connector for the door module. Repeat the check for the door unlock driver circuit. In each case, there should be continuity. If OK, go to Step 7. If not OK, repair the open door lock or unlock driver circuit as required.

(7) Reconnect the 15-way door wire harness connector to the door module connector receptacle. Connect the battery negative cable. Go to Step 8.

(8) Connect the probes of a reversible DC digital voltmeter to the door lock and unlock driver circuit cavities of the door or liftgate wire harness connector for the inoperative power lock motor. Observe the voltmeter while actuating the power lock switch in the lock and unlock directions. There should be a short 12-volt voltage spike as the switch is moved to both the lock and unlock positions, and no voltage in the neutral position. If OK, refer to **Power Lock Motor** in the Diagnosis and Testing section of this group. If not OK, replace the faulty door module.

POWER LOCK MOTOR

Remember, the Driver Door Module (DDM) circuitry controls the output to the driver side front door power lock motor. The Passenger Door Module (PDM) circuitry controls the output to the power lock motors for the remaining doors and the liftgate. For complete circuit diagrams, refer to **Power Door Locks** in the Contents of Group 8W - Wiring Diagrams.

(1) Check each power lock motor for correct operation while moving the power lock switch to both the Lock and Unlock positions. If all of the power lock motors are inoperative, go to Step 2. If one power lock motor is inoperative, go to Step 3.

(2) If all of the power lock motors except the driver side front door are inoperative, the problem may be caused by one shorted motor. Disconnecting a shorted power lock motor from the power lock circuit will allow the good power lock motors to operate. Disconnect each PDM-controlled power lock motor wire harness connector, one at a time, and recheck both the lock and unlock functions by operating the power lock switch. If all of the PDM-controlled power lock motors are still inoperative after the above test, check for a short or open circuit between the power lock motors and the PDM. If disconnecting one power lock motor causes the other motors to become functional, go to Step 3 to test the power lock motor that was last disconnected.

(3) Once it is determined which power lock motor is inoperative, that motor can be tested as follows. Disconnect the door or liftgate wire harness connector at the inoperative power lock motor. Apply 12 volts to the lock and unlock driver circuit cavities of the power lock motor connector to check its operation in one direction. Reverse the polarity to check the operation in the other direction. If OK, repair the shorted or open circuits to the DDM or PDM as required. If not OK, replace the faulty power lock motor.

REMOVAL AND INSTALLATION

DOOR MODULE

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the trim panel from the front door. Refer to **Front Door Trim Panel** in the Removal and Installation section of Group 23 - Body for the procedures.

(3) Remove the five screws that secure the door module to the back of the front door trim panel (Fig. 1).

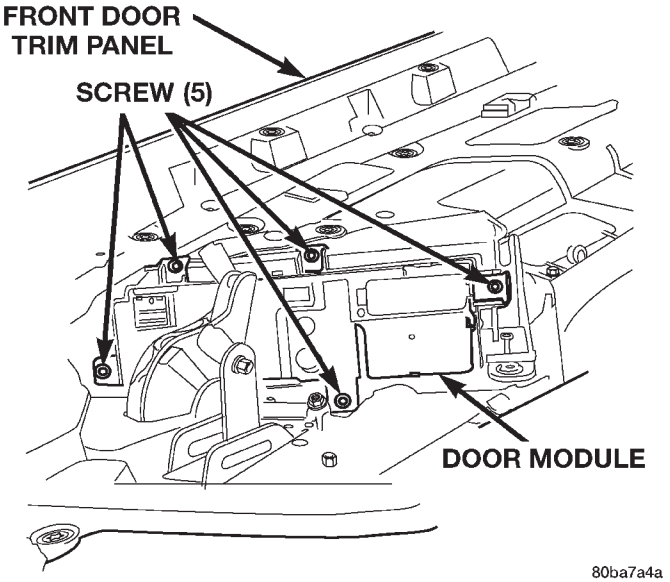

Fig. 1 Door Module Remove/Install

(4) Remove the door module from the front door trim panel.

INSTALLATION

(1) Position the door module to the front door trim panel.

(2) Install and tighten the five screws that secure the door module to the back of the front door trim panel. Tighten the screws to 2.2 N·m (20 in. lbs.).

(3) Install the trim panel onto the front door. Refer to **Front Door Trim Panel** in the Removal and Installation section of Group 23 - Body for the procedures.

(4) Reconnect the battery negative cable.

LIFTGATE FLIP-UP GLASS POWER RELEASE SYSTEM

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DESCRIPTION AND OPERATION

LIFTGATE FLIP-UP GLASS POWER RELEASE SYSTEM

DESCRIPTION

A power operated liftgate flip-up glass release system is standard factory installed equipment on this model. The liftgate flip-up glass power release system allows the flip-up glass latch to be released electrically by depressing a switch located on the bottom of the liftgate license plate lamp housing unit, above the license plate on the outside of the liftgate.

The liftgate flip-up glass release system operates on non-switched battery current supplied through a fuse in the junction block so that the system remains functional, regardless of the ignition switch position. However, a limit switch that is integral to the liftgate latch actuator unit opens to prevent the flip-up glass latch from being actuated when the liftgate latch is locked.

The liftgate flip-up glass power release system includes the following components:

- Liftgate flip-up glass limit switch
- Liftgate flip-up glass release motor
- Liftgate flip-up glass release switch.

Refer to **Power Door Locks** in the Contents of Group 8W - Wiring Diagrams for complete circuit diagrams.

OPERATION

When the liftgate mounted flip-up glass release switch is depressed, battery current is directed to the electric release motor that is integral to the flip-up glass latch located inside the liftgate. When the release motor is energized the latch releases and the flip-up glass can be opened. A liftgate flip-up glass limit switch is integral to the liftgate latch actuator mechanism. The limit switch automatically enables or disables the liftgate flip-up glass power release circuitry, depending upon the position of the liftgate latch lock mechanism. When the liftgate latch is unlocked, the limit switch closes and battery current is available at the release switch. When the liftgate latch is locked, the limit switch opens, and the release switch is disabled.

See the owner's manual in the vehicle glove box for more information on the features, use and operation of the liftgate flip-up glass power release system.

DIAGNOSIS AND TESTING

LIFTGATE FLIP-UP GLASS POWER RELEASE SYSTEM

For complete circuit diagrams, refer to **Power Door Locks** in Group 8W - Wiring Diagrams.

(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) as required.

(3) Disconnect the liftgate wire harness connector from the liftgate flip-up glass limit switch. Check for battery voltage at the fused B(+) circuit cavity of the liftgate wire harness connector for the flip-up glass limit switch. If OK, go to Step 4. If not OK, repair the open fused B(+) circuit to the junction block fuse as required.

(4) Check for continuity between the two terminals of the liftgate flip-up glass limit switch. There should be continuity with the liftgate latch unlocked, and no continuity with the latch locked. If OK, go to Step 5. If not OK, replace the faulty liftgate flip-up glass limit switch (liftgate latch actuator unit).

(5) Disconnect the liftgate wire harness connector from the liftgate flip-up glass release switch. With the liftgate latch unlocked, check for battery voltage at the liftgate flip-up glass limit switch output circuit cavity of the liftgate wire harness connector for the

DIAGNOSIS AND TESTING (Continued)

release switch. If OK, go to Step 6. If not OK, repair the open liftgate flip-up glass limit switch output circuit to the limit switch as required.

(6) Check for continuity between the two terminals of the liftgate flip-up glass release switch. There should be no continuity. Depress the switch, there should now be continuity. If OK, go to Step 7. If not OK, replace the faulty liftgate flip-up glass release switch.

(7) Disconnect the liftgate wire harness connector from the liftgate flip-up glass latch motor. Check for continuity between the ground circuit cavity of the liftgate wire harness connector for the latch motor and a good ground. There should be continuity. If OK, go to Step 8. If not OK, repair the open ground circuit to ground as required.

(8) With the liftgate latch unlocked and the flip-up glass release switch depressed, check for battery voltage at the liftgate flip-up glass release switch output circuit cavity of the liftgate wire harness connector for the latch motor. If OK, replace the faulty liftgate flip-up glass latch. If not OK, repair the open liftgate flip-up glass release switch output circuit to the release switch as required.

REMOVAL AND INSTALLATION

LIFTGATE FLIP-UP GLASS POWER RELEASE SYSTEM COMPONENTS

Service procedures for the various components used in the liftgate flip-up glass power release system can be found in the proper group as follows:

- **Liftgate flip-up glass limit switch** - Refer to **Liftgate Latch** in the Removal and Installation section of Group 23 - Body for the service procedures.
- **Liftgate flip-up glass release motor** - Refer to **Flip-Up Glass Latch** in the Removal and Installation section of Group 23 - Body for the service procedures.
- **Liftgate flip-up glass release switch** - Refer to **License Plate Lamp Housing** in the Removal and Installation section of Group 23 - Body for the service procedures.

REMOTE KEYLESS ENTRY SYSTEM

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DESCRIPTION AND OPERATION

REMOTE KEYLESS ENTRY SYSTEM

DESCRIPTION

A Radio Frequency (RF) type Remote Keyless Entry (RKE) system is standard factory-installed equipment on this model. The RKE system allows the use of a remote battery-powered radio transmitter to control the power lock system. The RKE receiver operates on non-switched battery current through a fuse in the Power Distribution Center (PDC), so that the system remains operational, regardless of the ignition switch position.

In addition to Lock and Unlock buttons, the RKE transmitters are also equipped with a Panic button. If the Panic button on the RKE transmitter is depressed, the horn will sound and the exterior lights will flash on the vehicle for about three minutes, or until the Panic button is depressed a second time. A vehicle speed of about 24 kilometers-per-hour (15 miles-per-hour) will also cancel the panic event.

The RKE system can also perform other functions on this vehicle. If the vehicle is equipped with the optional Vehicle Theft Security System (VTSS), the RKE transmitter will arm the VTSS when the Lock button is depressed, and disarm the VTSS when the Unlock button is depressed. If the vehicle is equipped with the optional Memory System, each of the two numbered and color-coded RKE transmitters can be used to recall the stored driver side front seat position, both outside power rear view mirror positions, and the radio station presets for the two assigned drivers. Refer to **Vehicle Theft Security System** in the Vehicle Theft Security System section of Group 8Q - Vehicle Theft Security Systems for more information on the VTSS features. Refer to **Memory System** in the Memory System section of Group 8R - Power Seat Systems for more information on the Memory System features.

The RKE system includes two transmitters when the vehicle is shipped from the factory, but the system can retain the vehicle access codes of up to four transmitters. The transmitter codes are retained in the RKE receiver memory, even if the battery is disconnected. If an RKE transmitter is faulty or lost, new transmitter vehicle access codes can be programmed into the system using a DRB scan tool and the proper Diagnostic Procedures manual.

This vehicle also offers several customer programmable features, which allows the selection of several optional electronic features to suit individual preferences. Refer to **ELECTRONIC VEHICLE INFORMATION CENTER PROGRAMMING** in the Service Procedures section of Group 8V - Overhead Console Systems for more information on the customer programmable feature options. Customer programmable feature options affecting the RKE system include:

- **Remote Unlock** - Allows the option of having only the driver side front door unlock when the RKE transmitter Unlock button is depressed the first time and the remaining doors and the liftgate unlock when the button is depressed a second time, or having all doors and the liftgate unlock upon the first depression of the RKE transmitter Unlock button.
- **Remote Linked to Memory** - If the vehicle is equipped with the Memory System, this feature allows the option of having the RKE transmitter Unlock button activate the recall of the stored settings, or having the recall function assigned solely to the memory switch on the driver side front door trim panel.
- **Sound Horn on Lock** - Allows the option of having the horn sound a short chirp as an audible verification that the RKE system received a valid Lock request from the RKE transmitter, or having no audible verification.
- **Flash Lights with Lock** - Allows the option of having the lights flash as an optical verification that the RKE system received a valid Lock request or

DESCRIPTION AND OPERATION (Continued)

Unlock request from the RKE transmitter, or having no optical verification.

This group covers the following components of the RKE system:

- RKE receiver
- RKE transmitter.

Certain functions and features of the RKE system 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 RKE system 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.
- **Driver Door Module (DDM)** - Refer to **Door Module** in the Power Lock System section of this group for more information.
- **Electronic Vehicle Information Center (EVIC)** - Refer to **Electronic Vehicle Information Center** in the Description and Operation section of Group 8V - Overhead Console Systems for more information.
- **Passenger Door Module (PDM)** - Refer to **Door Module** in the Power Lock System section of this group 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 **Power Door Locks** in the Contents of Group 8W - Wiring Diagrams for complete circuit diagrams. Following are general descriptions of the major components in the RKE system.

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 RKE panic function and, if the Flash Lights with Lock programmable feature is enabled, as an optical verification for the RKE lock event. 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 RKE panic function and, if the Sound Horn on Lock programmable feature is enabled, as an audible verification for the RKE lock event. 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 RKE panic function. Refer to **Low Beam Headlamp Relay** in the proper section of Group 8L - Lamps for diagnosis and service of this component.

OPERATION

The Passenger Door Module (PDM) contains the RKE system control logic and the RKE receiver. When the RKE receiver recognizes a Lock, Unlock or Panic message from a valid RKE transmitter, the RKE receiver provides that input to the PDM. The PDM circuitry and programming responds by sending the proper messages to the other electronic modules over the Programmable Communications Interface (PCI) data bus.

When an RKE lock message is received, the doors and the liftgate lock, the interior lighting is turned off, the horn chirps (if this feature is enabled), the exterior lamps flash (if this feature is enabled) and, if the vehicle is so equipped, the Vehicle Theft Security System (VTSS) is armed. When an RKE unlock message is received, the driver side front door (or all doors and the liftgate if this feature is enabled) unlock, the interior lighting is turned on and, if the vehicle is so equipped, the VTSS is disarmed. If the vehicle is equipped with the Memory System and the RKE Linked to Memory feature is enabled, the RKE unlock message also recalls the driver seat, outside mirror and radio settings assigned to the RKE transmitter that sent the unlock signal.

DESCRIPTION AND OPERATION (Continued)

When an RKE panic message is received, the driver side front door (or all doors and the liftgate if this feature is enabled) unlock, the interior lighting is turned on and, if the vehicle is so equipped, the VTSS is disarmed. The panic message will also cause the exterior lamps (including the headlights) to flash, and the horn to pulse for about three minutes, or until a second panic message is received. A vehicle speed of about 24 kilometers-per-hour (15 miles-per-hour) will also cancel the panic event.

See the owner's manual in the vehicle glove box for more information on the features, use and operation of the RKE system.

REMOTE KEYLESS ENTRY TRANSMITTER

DESCRIPTION

The Remote Keyless Entry (RKE) system Radio Frequency (RF) transmitter is equipped with three buttons, labeled Lock, Unlock, and Panic. It is also equipped with a key ring and is designed to serve as a key fob. The operating range of the transmitter radio signal is up to 10 meters (30 feet) from the RKE receiver.

Each RKE transmitter has a different vehicle access code, which must be programmed into the memory of the RKE receiver in the vehicle in order to operate the RKE system. Two transmitters are provided with the vehicle, but the RKE receiver can retain the access codes of up to four transmitters in its memory. Refer to **Remote Keyless Entry Transmitter Programming** in the Service Procedures section of this group for more information on programming additional transmitters for the RKE system.

In addition, the RKE transmitters for vehicles equipped with the optional Memory System are color-coded and have a number “1” or “2” molded into the transmitter case to coincide with the “Driver 1 (Black)” and “Driver 2 (Gray)” buttons of the memory switch on the driver side front door trim panel. These transmitters must also have their access codes programmed into the RKE receiver so that they coincide with the “Driver 1” and “Driver 2” buttons of the memory switch. Refer to **Memory System** in the Memory System section of Group 8R - Power Seat Systems for more information on the Memory System features.

The transmitter operates on two Panasonic CR2016 (or equivalent) batteries. Typical battery life is from one to two years. The transmitter cannot be repaired and, if faulty or damaged, it must be replaced.

OPERATION

See the owner's manual in the vehicle glove box for more information on the features, use and operation of the RKE transmitters.

REMOTE KEYLESS ENTRY RECEIVER

DESCRIPTION

The Remote Keyless Entry (RKE) receiver is a radio frequency unit contained in the Passenger Door Module (PDM). The PDM also contains the program logic circuitry for the RKE system. The PDM is secured with screws to the back of the trim panel inside the passenger side front door. The RKE receiver has a memory function to retain the vehicle access codes of up to four RKE transmitters. The receiver is designed to retain the transmitter codes in memory, even if the battery is disconnected.

For diagnosis of the RKE receiver, the PDM, the DDM, or the Programmable Communications Interface (PCI) data bus a DRB scan tool and the proper Diagnostic Procedures manual are recommended. The RKE receiver is only serviced as a unit with the PDM and, if faulty or damaged, the entire PDM unit must be replaced.

OPERATION

The RKE receiver is energized by one of three messages from the RKE transmitter; Unlock, Lock, or Panic. The PDM circuitry responds to these messages to lock or unlock the power lock motors that it controls. The PDM circuitry also puts Lock, Unlock, and Panic messages on the PCI data bus. These messages will result in the Driver Door Module (DDM) locking or unlocking the driver side front door, and the other electronic modules in the vehicle responding as their programming dictates.

DIAGNOSIS AND TESTING

REMOTE KEYLESS ENTRY SYSTEM

Following are tests that will help to diagnose the Remote Keyless Entry (RKE) system. However, these tests may not prove conclusive in the diagnosis of this system. In order to obtain conclusive testing of the RKE system, the Programmable Communications Interface (PCI) data bus network and all of the electronic modules that provide inputs to, or receive outputs from the RKE system components must be checked.

The most reliable, efficient, and accurate means to diagnose the RKE system requires the use of a DRB scan tool and the proper Diagnostic Procedures manual. The DRB scan tool can provide confirmation that the PCI data bus is functional, that all of the elec-

DIAGNOSIS AND TESTING (Continued)

tronic modules are sending and receiving the proper messages on the PCI data bus, and that the RKE receiver is being sent the proper radio frequency signals by the RKE transmitters to perform its RKE system functions.

For complete circuit diagrams, refer to **Power Door Locks** in the Contents of Group 8W - Wiring Diagrams.

PRELIMINARY DIAGNOSIS

As a preliminary diagnosis for the RKE system, note the system operation while you actuate both the Lock and Unlock functions with the power lock switches and with the Remote Keyless Entry (RKE) transmitter. Then, proceed as follows:

- If the entire power lock system fails to function with either the power lock switches or the RKE transmitter, check the fused B(+) fuse in the Power Distribution Center. If the fuse is OK, refer to **Door Module** in the Power Lock System section of this group.
- If the power lock system functions with both power lock switches, but not with the RKE transmitter, refer to **Remote Keyless Entry Transmitter** in the Diagnosis and Testing section of this group.
- If the driver side power lock switch operates only the driver side front door power lock motor, but all other power lock motors operate with the passenger side power lock switch or the RKE transmitter, use a DRB scan tool and the proper Diagnostic Procedures manual to diagnose the Programmable Communications Interface (PCI) data bus.

If the problem being diagnosed involves only the Sound Horn on Lock or the Flash Lights with Locks features, be certain that these programmable features are enabled. If the features are enabled and the service horn and turn signals still operate, the Body Control Module (BCM) and the PCI data bus must be tested. For diagnosis of the BCM or the PCI data bus, the use of a DRB scan tool and the proper Diagnostic Procedures manual are recommended.

REMOTE KEYLESS ENTRY TRANSMITTER

(1) Replace the Remote Keyless Entry (RKE) transmitter batteries. Refer to **Remote Keyless Entry Transmitter Battery Replacement** in the Service Procedures section of this group. Test each of the transmitter functions. If OK, discard the faulty batteries. If not OK, go to Step 2.

(2) Program the suspect RKE transmitter and another known good transmitter into the RKE receiver. Use a DRB scan tool, as described in the proper Diagnostic Procedures manual. Refer to **Remote Keyless Entry Transmitter Programming** in the Service Procedures section of this group.

(3) Test the RKE system operation with both transmitters. If both transmitters fail to operate the power lock system, use a DRB scan tool and the proper Diagnostic Procedures manual for further diagnosis of the RKE system. If the known good transmitter operates the power locks and the suspect transmitter does not, replace the faulty transmitter.

NOTE: Be certain to perform the Remote Keyless Entry Transmitter Programming procedure again following this test. This procedure will erase the access code of the test transmitter from the RKE receiver.

SERVICE PROCEDURES

REMOTE KEYLESS ENTRY TRANSMITTER BATTERY REPLACEMENT

The Remote Keyless Entry (RKE) transmitter case snaps open and shut for battery access. To replace the RKE transmitter batteries:

(1) Using a trim stick or a thin coin, gently pry at the notch in the center seam of the RKE transmitter case halves near the key ring until the two halves unsnap.

(2) Lift the back half of the transmitter case off of the RKE transmitter.

(3) Remove the two batteries from the RKE transmitter.

(4) Replace the two batteries with new Panasonic CR2016, or their equivalent. Be certain that the batteries are installed with their polarity correctly oriented.

(5) Align the two RKE transmitter case halves with each other, and squeeze them firmly and evenly together until they snap back into place.

NOTE: The RKE system for this model uses a rolling code security strategy. This strategy requires that synchronization be maintained between the RKE transmitter and the RKE receiver. RKE transmitter battery removal or replacement can cause a loss of synchronization. If the RKE receiver fails to respond to the RKE transmitter following battery removal or replacement, depress and release the RKE transmitter Unlock button repeatedly while listening carefully for the power door locks in the vehicle to cycle. After between five and eight presses of the Unlock button, the power door locks should cycle, indicating that re-synchronization has occurred.

SERVICE PROCEDURES (Continued)

REMOTE KEYLESS ENTRY TRANSMITTER PROGRAMMING

To program the Remote Keyless Entry (RKE) transmitter access codes into the RKE receiver in the Passenger Door Module (PDM) requires the use of a DRB scan tool. Refer to the proper Diagnostic Procedures manual for more information.