1.0 INTRODUCTION

The procedures contained in this manual include all the specifications, instructions and graphics needed to diagnose 2004 body system problems. The diagnostics in this manual are based on the failure condition or symptom being present at the time of diagnosis.

Please follow the recommendations below when choosing your diagnostic path.

1. First make sure the DRBIII® is communicating with the appropriate modules; i.e., if the DRBIII® displays a "No Response" or a "Bus ± Signals Open" condition, you must diagnose that first.
2. Read DTC's (diagnostic trouble codes) with the DRBIII®.
3. If no DTC's are present, identify the customer complaint.
4. Once the DTC or customer complaint is identified, locate the matching test in the Table of Contents and begin to diagnose the symptom.

All component location views are in Section 8.0. All connector pinouts are in Section 9.0. All schematics are in Section 10.0. All Charts and Graphs are in Section 11.0.

An * placed before the symptom description indicated a customer complaint.

When repairs are required, refer to the appropriate service information for the proper removal and repair procedure.

Diagnostic procedures change every year. New diagnostic systems may be added: carryover systems may be enhanced. READ THIS MANUAL BEFORE TRYING TO DIAGNOSE A VEHICLE DIAGNOSTIC TROUBLE CODE. It is recommended that you review the entire manual to become familiar with all the new and changed diagnostic procedures.

This book reflects many suggested changes from readers of past issues. After using this book, if you have any comments or suggestions, please fill out the form in the back of this book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic procedures manual covers all 2004 Chrysler Town and Country, Chrysler Voyager and Caravan vehicles. This diagnostic procedures manual also covers both left hand drive (LHD) and right hand drive (RHD) vehicles. There may be some slight differences in the location views of components. If the location views shown are on a LHD vehicle, a RHD vehicle will be symmetrically opposite.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the body system is done in six basic steps:

- verification of complaint
- verification of any related symptoms
- symptom analysis
- problem isolation
- repair of isolated problem
- verification of proper operation

2.0 IDENTIFICATION OF SYSTEM

The vehicle systems that are part of the "body" system are:

- Airbag
- Audio
- Automatic Temperature Control
- Cabin Heater
- Chime
- Communication
- Door Ajar System
- Electrically heated system
- Exterior lighting
- Instrument Cluster
- Interior Lighting
- Manual Temperature Control
- Memory Seat
- Overhead Console
- Power Door Lock/RKE
- Power Folding Mirrors
- Power Sliding Doors
- Power Liftgate
- Power windows
- Tire Pressure Monitor System (TPMS)
- Vehicle Theft Security System (VTSS)
- Windshield Wiper and Washer

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

The body system on the 2004 RS and RG consists of a combination of modules that communicate over the PCI bus (Programmable Communication Interface multiplex system). Through the PCI bus, information about the operation of vehicle components and circuits is relayed quickly to the appropriate modules. All

modules receive all the information transmitted on the bus even though a module may not require all information to perform its function. It will only respond to messages "addressed" to it through binary coding process. This method of data transmission significantly reduces the complexity of the wiring in the vehicle and the size of wiring harnesses. All of the information about the functioning of all the systems is organized, controlled, and communicated by the PCI bus, which is described in the Communication Section of this general information.

3.1 AIRBAG SYSTEM

The Airbag System contains the following components: two types of Occupant Restraint Controller or (ORC), base and premium, Airbag Warning Indicator, Clockspring, Driver and Passenger Dual Squib Airbags, Seat belt Tensioners, Left and Right Side and Front Impact Sensors, and Seat Airbags. The (ORC) is a new type of Airbag Control Module (ACM) that supports staged airbag deployment. The term Airbag Control Module or ACM will be used throughout the airbag diagnostic section and in the Diagnostic Readout Box or DRB III®. The Base ACM can be identified by the present of a single yellow 23 - way connector. This module supports the Driver and Passenger Seat Belt Tensioners and dual squib airbags.

The ACM has four major functions: PCI Bus communications, onboard diagnostics, impact sensing, and component deployment. The ACM sends and/or receives PCI Bus messages with the Instrument Cluster (MIC), Body Control Module (BCM), and Powertrain Control Module (PCM). Diagnostic trouble codes will be set if the communication with these modules is lost or contains invalid information. If the ACM detects a monitored system fault, it sends a message to the instrument cluster via PCI bus to turn on the Airbag Warning Indicator. The ACM can set both active and stored diagnostic trouble codes to aid in the diagnosing system problems. See DIAGNOSTIC TROUBLE CODES in this section.

The ACM has an internal accelerometer that senses the rate of vehicle deceleration, which provides verification of the direction and severity of an impact. A pre-programmed decision algorithm in the ACM microprocessor determines when the deceleration rate is severe enough to require airbag system protection. The ACM also uses the crash severity to determine the level of driver and front passenger deployment, staged deployment low medium or high. Staged deployment is the ability to trigger airbag system squib inflators all at once or individually as needed to provide the appropriate restraint for the severity of the impact. When the programmed conditions are met, the ACM sends an electrical signal to deploy the appropriate airbag system components. The ACM stores enough electrical energy to deploy the airbag components for two seconds following a battery disconnect or failure during an impact.

The Premium ACM can be identified by the present of a two yellow 32 - way connectors and the presents of side seat airbag. In addition to the base system components and DTC's the premium ACM supports the Side and Front Impact Sensors, Side Seat Airbags. In addition to the ACM accelerometer the premium module uses Side Impact Sensors to identify the direction and severity of a side impact and deploy the appropriate side seat airbag. In addition to the base ACM DTCs the premium ACM provides DTC's for the additional circuit and component.

Both modules are secured to the floor panel transmission tunnel under the Instrument Panel. Airbag Control Modules cannot be repaired or adjusted and must be replaced.

WARNING: THE AIRBAG SYSTEM IS A SENSITIVE, COMPLEX ELECTROMECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY AIRBAG SYSTEM OR RELATED STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY OR DEATH.

WARNING: NEVER STRIKE OR KICK THE AIRBAG CONTROL MODULE OR SIDE IMPACT SENSORS, AS IT CAN DAMAGE THE INTERNAL ACCELERATION SENSOR OR AFFECT ITS CALIBRATION. IF AN AIRBAG CONTROL MODULE OR SIDE IMPACT SENSOR IS ACCIDENTALLY DROPPED DURING SERVICE, THE MODULE OR SENSOR MUST BE SCRAPPED AND REPLACED WITH A NEW UNIT. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND PERSONAL INJURY OR DEATH.

The Airbag Warning Indicator is the only point at which the customer can observe symptoms of a

system malfunction. Whenever the ignition key is turned to the run or start position, the MCI performs a lamp check by turning the Airbag Warning Indicator on for 6-8 seconds. After the lamp check, if the indicator turns off, it means that the ACM has checked the system and found it to be free of discernible malfunctions. If the lamp remains on, there could be an active fault in the system or the MIC lamp circuit may be internally shorted to ground. If the lamp comes on and stays on for a period longer than 6-8 seconds, then goes off, there is usually an intermittent problem in the system.

3.1.1 DRIVER AIRBAG

The airbag protective trim cover is the most visible part of the driver side airbag system. The protective trim cover is fitted to the front of the airbag module and forms a decorative cover in the center of the steering wheel. The module is mounted directly to the steering wheel. Located under the trim cover are the horn switch, the airbag cushion, and the airbag cushion supporting components. The airbag module includes a housing to which the cushion and hybrid inflator are attached and sealed. The Minivan is equipped with driver airbag with dual stage inflators that include a small canister of highly compressed argon gas. The ACM uses vehicle crash severity, seat belt switch status (buckled or unbuckled) as inputs to determine the level of airbag deployment. When supplied with the proper electrical signal, the hybrid inflator or inflators discharge the compressed gas it contains directly into the cushion. The airbag cannot be repaired, and must be replaced if deployed or in any way damaged.

WARNING: THE DRIVER AIRBAG MODULE CONTAINS ARGON GAS PRESSURIZED TO OVER 17236.89 Kpa (2500 PSI). DO NOT ATTEMPT TO DISMANTLE AN AIRBAG MODULE OR TAMPER WITH ITS INFLATOR. DO NOT PUNCTURE, INCINERATE, OR BRING INTO CONTACT WITH ELECTRICITY. DO NOT STORE AT TEMPERATURE EXCEEDING 93°C (200°F). REPLACE AIRBAG SYSTEM COMPONENTS ONLY BUT INTERNAL DIFFERENCES MAY RESULT IN INFERIOR OCCUPANT PROTECTION. THE FASTENERS, SCREWS, AND BOLTS ORIGINALLY USED FOR THE AIRBAG SYSTEM COMPONENTS HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANY TIME A NEW FASTENER IS NEEDED, REPLACE IT WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR SPECIFIED IN THE MOPAR PARTS CATALOG. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND PERSONAL INJURY OR DEATH.

3.1.2 CLOCKSPRING

The clockspring is mounted on the steering column behind the steering wheel. This assembly consist of a plastic housing which contains a flat, ribbon-like, electrically conductive tape that winds and unwinds with the steering wheel rotation. The clockspring is used to maintain a continuous electrical circuit between the instrument panel wiring and the driver airbag, the horn, and the vehicle speed control switches if equipped. The clockspring must be properly centered when it is reinstalled on the steering column following any service procedure, or it could be damaged. The clockspring cannot be repaired and it must be replaced.

CAUTION: Deployed Front Air Bags may or may not have live pyrotechnic material within the air bag inflator. Do not dispose of Driver and Passenger Airbags unless you are sure of complete deployment. Please refer to the Hazardous Substance Control System for Proper Disposal. Dispose of deployed air bags in a manner consistent with state, provincial, local, and federal regulations. Use the following table to identify the status of the Airbag Squib.

AIRBAG SQUIB STATUS

(1) Using a DRBIII® read Airbag DTC's **If** the following active codes are present:

ACTIVE DTC	CONDITIONS	SQUIB STATUS
Driver Squib 1 open Driver Squib 2 open	Check the stored DTC's **AND IF** the stored minutes for both are within 15 minutes of each other.	Both Driver Squib 1 and 2 were used.
Driver Squib 1 open Driver Squib 2 open	Check the stored DTC's **AND IF** the stored minutes for Driver Squib 2 open is GREATER than the stored minutes for Driver Squib 1 by 15 minutes or more.	Driver Squib 1 was used; Driver Squib 2 is live.
Driver Squib 1 open Driver Squib 2 open	Check the stored DTC's **AND IF** the stored minutes for Driver Squib 1 open is GREATER than the stored minutes for Driver Squib 2 by 15 minutes or more.	Driver Squib 1 is live; Driver Squib 2 was used.
If Driver Squib 1 open	**AND IF** Driver Squib 2 opens is NOT an active code.	Driver Squib 1 was used; Driver Squib 2 is live.
If Driver Squib 2 open	**AND IF** Driver Squib 1 open is NOT an active code.	Driver Squib 1 is live; Driver Squib 2 was used.

If neither of the following codes is an active code:

ACTIVE DTC	SQUIB STATUS
Driver squib 1 open	Status of Airbag is Unknown
Driver Squib 2 open	

3.1.3 PASSENGER AIRBAG

The airbag insignia in the instrument panel top cover above the glove box is the most visible part of the passenger side airbag system. The airbag door has a living hinge at the top, which is secured to the instrument panel top cover. Located under the airbag door is the airbag cushion and its supporting components. The airbag module includes a housing to which the cushion and hybrid inflators are attached and sealed. The 2003 Minivan is equipped with front passenger airbag with dual stage inflators that include a small canister of highly compressed argon gas. The ACM uses vehicle crash severity, front passenger seat belt switch status (buckled or unbuckled) inputs to determine the level of airbag deployment. When supplied with the proper electrical signal, the hybrid inflator or inflators discharge the compressed gas it contains directly into the cushion. The airbag cannot be repaired, and must be replaced if deployed or in any way damaged.

WARNING: THE PASSENGER AIRBAG MODULE CONTAINS ARGON GAS PRESSURIZED TO 17236.89 Kpa (2500 PSI). DO NOT ATTEMPT TO DISMANTLE AN AIRBAG MODULE OR TAMPER WITH ITS INFLATOR. DO NOT PUNCTURE, INCINERATE, OR BRING INTO CONTACT WITH ELECTRICITY. DO NOT STORE AT TEMPERATURE EXCEEDING 93°C (200°F). REPLACE AIRBAG SYSTEM COMPONENTS ONLY WITH PARTS SPECIFIED IN THE MOPAR PARTS CATALOG. SUBSTITUTE PARTS MAY APPEAR INTERCHANGEABLE, BUT INTERNAL DIFFERENCES MAY RESULT IN INFERIOR OCCUPANT PROTECTION. THE FASTENERS, SCREWS, AND BOLTS ORIGINALLY USED FOR THE AIRBAG SYSTEM COMPONENTS HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANY TIME A NEW FASTENER IS NEEDED, REPLACE IT WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR SPECIFIED IN THE MOPAR PARTS CATALOG. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND PERSONAL INJURY OR DEATH.

CAUTION: Deployed Front Air Bags may or may not have live pyrotechnic material within the air bag inflator. Do not dispose of Driver and Passenger Airbags unless you are sure of complete deployment. Please refer to the Hazardous Substance Control System for Proper Disposal. Dispose of deployed air bags in a manner consistent with state, provincial, local, and federal regulations. Use the following table to identify the status of the Airbag Squib.

AIRBAG SQUIB STATUS

(1) Using a DRBIII® read Airbag DTC's **If** the following active codes are present:

ACTIVE DTC	CONDITIONS	SQUIB STATUS
Passenger Squib 1 open Passenger Squib 2 open	Check the stored DTC's **AND IF** the stored minutes for both are within 15 minutes of each other.	Both Passenger Squib 1 and 2 were used.
Passenger Squib 1 open Passenger Squib 2 open	Check the stored DTC's **AND IF** the stored minutes for Passenger Squib 2 open is GREATER than the stored minutes for Passenger Squib 1 by 15 minutes or more.	Passenger Squib 1 was used; Passenger Squib 2 is live.
Passenger Squib 1 open Passenger Squib 2 open	Check the stored DTC's **AND IF** the stored minutes for Passenger Squib 1 open is GREATER than the stored minutes for Driver Squib 2 by 15 minutes or more.	Passenger Squib 1 is live; Driver Squib 2 was used.
If Passenger Squib 1 open	**AND IF** Passenger Squib 2 open is NOT an active code.	Passenger Squib 1 was used; Passenger Squib 2 is live.
If Passenger Squib 2 open	**AND IF** Passenger Squib 1 open is NOT an active code.	Passenger Squib 1 is live; Passenger Squib 2 was used.

If neither of the following codes is an active code:

ACTIVE DTC	SQUIB STATUS
Passenger squib 1 open	Status of Airbag is Unknown
Passenger squib 2 open	

3.1.4 SEAT BELT TENSIONER (SBT)

The driver and passenger seat belt (buckle) tensioners are mounted to the inboard side of the front seats. The seat belt buckle and seat belt switch are connected directly to the seat belt tensioner cable. At the onset of an impact event the ACM uses the seat belt tensioner to rapidly retract the seat belt buckles. With the slack removed, the occupant's forward motion in an impact will be reduced as will the likelihood of contacting interior components. The seat belt tensioner cannot be removed, the occupant's forward motion in an impact will be reduced as will the likelihood of contacting repaired, if damaged or defective it must be replaced.

The ACM continuously monitors the resistance of the seat belt tensioner circuits an open or shorted conditions.

3.1.5 SEAT BELT SWITCHES (SBS)

The hall-effect driver seat belt switch provide the seat belt status, buckled or unbuckled, via hard-wired inputs to the ACM. If the seat belt switch is damaged or defective the seat belt tensioner must be replaced. The ACM continuously monitors the seat belt switch circuits for an open or shorted conditions.

3.1.6 FRONT IMPACT SENSORS

The front impact sensors are electronic accelerometers that sense the rate of vehicle deceleration. Front impact sensors and the ACM Accelerometer provide verification of the direction and severity of a front impact to the ACM processor.

The front impact sensors receive battery current and ground from he ACM through dedicated sensor signal and ground circuits. The ACM communicate with the front impact sensors by modulating the current in the sensor signal circuit. Each sensor communicates the sensor status as well as sensor fault information to the microprocessor in the Airbag Control Module.

The ACM microprocessor continuously monitors all circuits to determine the system readiness. If the ACM detects a system fault, it sets a Diagnostic Trouble Code and controls the airbag warning indicator operation accordingly. When needed the driver and passenger airbags are deployed by the ACM to provide side impact protection for the occupants.

WARNING: THE AIRBAG SYSTEM IS A SENSITIVE, COMPLEX ELECTROMECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY AIRBAG SYSTEM OR RELATED STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY OR DEATH.

WARNING: NEVER STRIKE OR KICK THE AIRBAG CONTROL MODULE, AS IT CAN DAMAGE THE INTERNAL ACCELERATION SENSOR OR AFFECT ITS CALIBRATION. IF AN AIRBAG CONTROL MODULE OR SIDE IMPACT SENSOR IS ACCIDENTALLY DROPPED DURING SERVICE, THE MODULE OR SENSOR MUST BE SCRAPPED AND REPLACED WITH A NEW UNIT. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND PERSONAL INJURY OR DEATH.

CAUTION: Do not remove or install the impact sensors while the sensor is attached to the vehicle wiring.

3.1.7 SIDE IMPACT SENSORS

The side impact sensors are electronic accelerometers that sense the rate of vehicle deceleration. Side impact sensors and the ACM Accelerometer provides verification of the direction and severity of a side impact to the ACM processor. The left side impact sensor provides impact sensing for impacts on the left side of the vehicle and the right side impact sensor provides sensing for impacts on the right side of the vehicle.

The side impact sensors receive battery current and ground from he ACM through dedicated sensor signal and ground circuits. The ACM communicate with the side impact sensors by modulating the current in the sensor signal circuit. Each sensor communicates the sensor status as well as sensor fault information to the microprocessor in the Airbag Control Module.

The ACM microprocessor continuously monitors all circuits to determine the system readiness. If the ACM detects a system fault, it sets a Diagnostic Trouble Code and controls the airbag warning indicator operation accordingly. When needed the curtain airbags are deployed independently by the ACM to provide side impact protection for the occupants.

WARNING: THE AIRBAG SYSTEM IS A SENSITIVE, COMPLEX ELECTROMECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY AIRBAG SYSTEM OR RELATED STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY OR DEATH.

WARNING: NEVER STRIKE OR KICK THE AIRBAG CONTROL MODULE, AS IT CAN DAMAGE THE INTERNAL ACCELERATION SENSOR OR AFFECT ITS CALIBRATION. IF AN AIRBAG CONTROL MODULE OR SIDE IMPACT SENSOR IS ACCIDENTALLY DROPPED DURING SERVICE, THE MODULE OR SENSOR MUST BE SCRAPPED AND REPLACED WITH A NEW UNIT. FAILURE TO TAKE THE PROPER PRECAUTIONS CAN RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND PERSONAL INJURY OR DEATH.

CAUTION: Do not remove or install the impact sensors while the sensor is attached to the vehicle wiring.

3.1.8 SEAT AIRBAGS (SAB)

The left and right seat airbags are located in the outboard end of the front seat backs. The airbag module contains a bag, an inflator (a small canister of highly compressed argon gas) and a mounting bracket. The seat airbags cannot be repaired and must be replaced if deployed or in any way damaged. When supplied with the proper electrical signal the inflator seals the hole in the airbag cushion so it can discharge the compressed gas it contains directly into the cushion. Upon deployment, the seat back trim cover will tear open and allow the seat airbag to fully deploy between the seat and the door.

WARNING: SEAT AIRBAG CONTAINS ARGON GAS PRESSURIZED TO OVER 17236.89 Kpa (2500 PSI). DO NOT ATTEMPT TO DISMANTLE AN AIRBAG MODULE OR TAMPER WITH ITS INFLATOR. DO NOT PUNCTURE, INCINERATE, OR BRING INTO CONTACT WITH ELECTRICITY. DO NOT STORE AT TEMPERATURE EXCEEDING 93°C (200°F). REPLACE AIRBAG SYSTEM COMPONENTS ONLY WITH PARTS SPECIFIED IN THE CHRYSLER MOPAR PARTS CATALOG. SUBSTITUTE PARTS MAY APPEAR INTERCHANGEABLE, BUT INTERNAL DIFFERENCES MAY RESULT IN INFERIOR OCCUPANT PROTECTION. THE FASTENERS, SCREWS, AND BOLTS ORIGINALLY USED FOR THE AIRBAG SYSTEM COMPONENTS HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANY TIME A NEW FASTENER IS NEEDED, REPLACE IT WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR SPECIFIED IN THE MOPAR PARTS CATALOG. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND PERSONAL INJURY OR DEATH.

3.1.9 DIAGNOSTIC TROUBLE CODES

Airbag diagnostic trouble codes consist of active and stored codes. If more than one code exists, diagnostic priority should be given to the active codes. Each diagnostic trouble code is diagnosed by following a specific testing procedure. The diagnostic test procedures contain step-by-step instructions for determining the cause of the trouble codes. It is not necessary to perform all of the tests in this book to diagnose an individual code. Always begin by reading the diagnostic trouble codes using the DRBIII®. Always begin diagnostic with the Table of Contents section 7.0. This will direct you to the specific test(s) that must be performed. Active diagnostic trouble codes for the airbag system are not permanent and will change the moment the reason for the code is corrected. In certain test procedures within this manual, diagnostic trouble codes are used as a diagnostic tool.

3.1.10 SPECIAL TOOLS

Some airbag diagnostic test use special tools, 8310 and 8443 airbag load tool, for testing squib circuits. The load tools contain fixed resistive loads, jumpers and adapters. The fixed loads are connected to cables and mounted in a storage case. The cables can be directly connected to some airbag system connectors. Jumpers are used to convert the load tool cable connectors to the other airbag system connectors. The adapters are connected to the module harness connector to open shorting clips and protect the connector terminal during testing. When using the load tool follow all of the safety procedures in the service information for disconnecting airbag system components. Inspect the wiring, connector and terminals for damage or misalignment. Substitute the airbag load tool in place of a Driver or Passenger Airbag, seat airbag, clockspring, or seat belt tensioner (use a jumper if needed). Then follow all of the safety procedures in the service information for connecting airbag system components. Read the module active DTC's. If the module reports NO ACTIVE DTC's the defective component has been removed from the system and should be replaced. If the DTC is still active, continue this process until all component in the circuit have been tested. Then disconnect the module connector and connect the matching adapter to the

module connector. With all airbags disconnected and the adapter installed the squib wiring can be tested for open and shorted conditions.

3.1.11 ACTIVE CODES

The code becomes active as soon as the malfunction is detected or key-on, whichever occurs first. An active trouble code indicates an on-going malfunction. This means that the defect is currently there every time the airbag control module checks that circuit or component. It is impossible to erase an active code. Active codes automatically erase by themselves when the reason for the code has been corrected. With the exception of the warning lamp trouble codes or malfunctions, when a malfunction is detected, the airbag lamp remains lit for a minimum of 12 seconds or as long as the malfunction is present.

3.1.12 STORED CODES

Airbag codes are automatically stored in the ACM's memory as soon as the malfunction is detected. The exception is the Loss of Ignition Run Only code which is an active code only. A stored code indicates there was an active code present at some time. However, the code currently may not be present as an active code, although another code could be active. When a trouble code occurs, the airbag warning indicator illuminates for 12 seconds minimum (even if the problem existed for less than 12 seconds). The code is stored, along with the time in minutes it was active, and the number of times the ignition has been cycled since the problem was last detected. The minimum time shown for any code will be one minute, even if the code was actually present for less than one minute. Thus, the time shown for a code will be one minute, even if the code was actually present for less than one minute. Thus, the time shown for a code that was present for two minutes 13 seconds, for example, would be three minutes. If a malfunction is detected a diagnostic trouble code is stored and will remain stored. When and if the malfunction ceases to exist, an ignition cycle count will be initiated for that code. If the ignition cycle count reaches 100 without a reoccurrence of the same malfunction, the diagnostic trouble code is erased and that ignition cycle counter is reset to zero. If the malfunction reoccurs before the count reaches 100, then the ignition cycle counter will be reset and diagnostic trouble code will continue to be a stored code. If a malfunction is not active while performing a diagnostic test procedure, the active code diagnostic test will not locate the source of the problem. In this case, the stored code can indicate an area to inspect. If no obvious problems are found, erase stored codes, and with the ignition on wiggle the wire harness and connectors, rotate the steering wheel from stop to stop. Recheck for codes periodically as you work through the system. This procedure may uncover a malfunction that is difficult to locate.

3.2 AUDIO SYSTEM

Some of the radios are on the PCI Bus system. The PCI Bus inputs into the radio are used for VF dimming, remote steering wheel controls and cabin EQ preference. PCI Bus outputs from the radio are used for the Name Brand Speaker (NBS) relay activation, as well as cabin EQ preference.

The radios have the capability of containing multiple vehicle unique equalization curves (cabin EQ preferences) within the radio. These curves will reside in the radio's flash memory. The radio is capable of storing up to 20 unique equalization curves. The latent curves can be selected via the Front Control Module transmitting a PCI Bus message to the radio in response to a radio request for equalization message. Upon receipt of a valid equalization select message response, the radio will switch to output the corresponding equalization curve.

All the radios are capable of displaying faults and allowing certain actuation tests through the use of the DRBIII®. When attempting to perform PCI Bus diagnostics, the first step is to identify the radio in use in the vehicle.

When trouble shooting output shorts or "output" error messages, the following applies:

On radios without an external amplifier, the term output refers to the path between the radio and the speaker. This type of circuit can be monitored all the way through the speaker connections by the radio assembly. When the radio displays a shorted output DTC with this type of system, the speaker, radio, or wiring could be at fault.

On radios with an external amplifier, the term "output" refers to the circuit between the radio connector and the amplifier. The radio is capable of monitoring only this portion and can tell nothing about the circuit between the amplifier and the speakers. Consequently, a shorted output DTC on this type of system would only refer to this circuit. A faulty speaker could not cause this DTC.

3.2.1 NAVIGATION RADIO

The optional navigation radio system receives GPS signals from up to eight satellites to display the position and direction of the vehicle. Map information is supplied through a DVD-ROM. An electronic gyrosensor and the vehicle's speed sensor enable the system to display the present vehicle position even in locations where GPS signals may be blocked.

When a destination is selected, the navigation system uses information from the map to quickly calculate a route. As the vehicle is driven along the chosen route, the operator is guided with pictorial displays and voice prompts. For complete operating instructions, refer to the manual included with the vehicle.

3.2.2 REMOTE RADIO CONTROLS

These radios can be controlled via remote radio switches (optional). These switches are located on the back side of the steering wheel. They control mode, preset, seek up, seek down, volume up and volume down functions.

These functions are inputs to the Body Control Module and can be read with the DRBIII® under "body computer". The switches are a multiplexed signal to the BCM. The radio control MUX circuit is a 5 volt line that is pulled to ground through different value resistors built into the switches. This causes a voltage drop to be seen by the BCM and it sends a specific message to the radio on the PCI Bus circuit. The radio then responses to the message.

This circuit is fairly simple to troubleshoot. The circuit must be complete from the switches in the steering wheel to the BCM. The ground must be complete so that the switches can cause the voltage drop for the BCM to see. The circuit passes through the clockspring so continuity through this devise must be verified.

3.2.3 CD CHANGER

The new in-dash CD Changer is designed to fit into the existing cubby bin in the center stack. This new cartridge-less CD Changer is controlled by your radio, and allows you to individually load up to four discs at a time. However, due to its compact design, the CD Changer can only carry out one operation at a time. For example, you can not load a new disc while playing another at the same time. Each operation happens sequentially.

The radio unit installed with your system provides control over all features of the CD Changer with the exception of the CD load and eject functions, which are controlled by buttons located on the front of the CD Changer. The radio also supplies the power, ground, PCI Bus, left and right speaker output through a single DIN cable. All features you would expect, such as Disc Up/Down, Track Up/Down, Random and Scan are controlled by the radio, which also displays all relevant CD Changer information on the radio display.

The CD Changer contains a Load/Eject button and an indicator light for each of the four disc positions. The individual light indicates whether a CD is currently loaded in that particular chamber of the CD Changer. Pressing the individual Load/Eject button for a particular chamber will eject a disc currently present in that chamber. If the chamber is currently empty, actuating the Load/Eject button will position that chamber to receive and load a new disc in that chamber.

3.2.4 DVD/CD CHANGER

The DVD/CD Changer (if equipped) is located in the instrument panel below the radio. The DVD/CD Changer can hold one DVD at a time. Three RCA jacks on the front of the unit will allow the use of MP3 players, video systems or camcorders.

3.3 BODY CONTROL MODULE

The body control module (BCM) supplies vehicle occupants with visual and audible information and controls various vehicle functions. To provide and receive information, the module is interfaced to the vehicle's serial bus communications network (PCI). This network consists of the powertrain control module (PCM), the engine control module (ECM) diesel, the mechanical instrument cluster (MIC), the front control module (FCM), the airbag control module (ACM), the compass/mini-trip (CMTC), the electronic vehicle information center (EVIC), the controller antilock brake (CAB), the HVAC control module (ATC & MTC), the power sliding door (Left & Right) modules (PSD), the power liftgate module (PLG), the Audio system, the Adjustable Pedals Assembly, the memory seat/mirror module (MSMM), the RKE/thatcham alarm module (export) and the sentry key remote entry module (SKREEM). The BCM is operational when battery power is supplied to the module.

The body control module provides the following features:

- Power Door Locks
- Automatic Door Lock
- Door Lock Inhibit
- Central Locking (with VTSS Only)
- Battery Protection
- The BCM will automatically turn off all exterior lamps after 3 minutes and all interior lamps after 15 minutes after the ignition is turned off, if they are not turned off by the driver.
- Chime Driver
- Compass/Minitrip Support
- Interior Lighting (Courtesy/Reading Lamps)
- BCM Diagnostic Reporting
- Electronic Liftgate Release (with Power Door Locks)
- Exterior Lighting

- Headlamp Time Delay (with/without Autoheadlamps)
- Automatic Headlamps (with electrochromatic mirror)
- Illuminated Entry
- Fade to Off

This feature dims the interior lighting (courtesy lamps) gradually if the BCM does not receive any new inputs that would cause the interior lamps to remain on.

- PWM Instrument Panel Dimming
- Door Lock Inhibit

This feature disables the door lock functions if the key is in the ignition and either front door is ajar. Pressing the RKE lock/unlock button under these conditions, result in normal lock/unlock activation.

- Power Sliding Door Switch Inputs

The BCM has 4 switch inputs for the power sliding door feature: Located in the overhead console are the Left and Right side sliding door switches to activate either or both sliding doors under the proper conditions. Also there are B-Pillar switches located on the Left and Right B-pillar posts.

- Power Liftgate Switch Input

The BCM has 1 Liftgate switch input located in the overhead console

- Power Lockout Switch Input

The BCM has 1 Lockout switch that when enabled will disable the B-Pillar sliding door switches from activating either sliding door when depressed. When replacing a body control module there are 2 modules available, a Base and a Midline. The Midline controller is used on vehicles that have Power Door Locks. If a vehicle is equipped with the Vehicle Theft Security System, the midline controller becomes a premium when the theft feature is enabled.

NOTE: Do not swap the body control module between vehicles or body control modules off the shelf.

Engineering does not recommend that service, dealers or the plant swap Body Control Modules (BCM) between vehicles or off the shelf. The BCM has internal diagnostic capability that assists in diagnosing the system. When an “Open” or a “Short” circuit exists, the diagnostic tool can be used to read the BCM codes. The codes are very descriptive in identifying the appropriate feature that has faulted. The BCM also learns what features are on the vehicle and if modules are swapped the BCM could set false DTCs based on what it learned.

3.4 CHIME WARNING SYSTEM

The BCM monitors the door/liftgate ajar switches, multifunction switches, headlight switch, ignition switch, PCI bus, and the diagnostic tool to perform various chime operations. The BCM uses a low-side driver to control the chime located in the cluster.

The chime system provides the Driver with warning chimes for:

- Seat belt
- Exterior lights on
- Key-in Ignition
- Key-in Accessory
- Engine temperature critical
- Low washer fluid
- Turn signals on
- Dome light on
- Low oil pressure
- Any warning lamp announcement
- *High-speed warning Gulf Coast Countries (GCC) only*

The output sound intensity of the chime is approximately 72 decibels.

3.4.1 CHIME PRIORITY

The following list indicates the priority of the chime when more than one chime is active at the same time:

- Seat belt warning
- *High-speed warning Gulf Coast Countries (GCC) only*
- Turn signal on
- Chime request
- Warning lamp announcement

The cluster is responsible to set priority on all warning lamp announcement chimes.

3.4.2 CHIME ON CONDITIONS

The following is a list of the chime warnings and when they will sound.

Driver’s Seat belt Unbuckled: Sounds for approximately 6±2 seconds when the igntion is turned on and driver’s seat belt is not buckled, as a reminder to the driver to buckle the seat belt.

Exterior Lights On:	Ignition is in the lock position, the driver door is ajar, and the headlight switch is left in any position, other than auto or off. The chime will sound as a warning to the driver until one of the above conditions is removed or until the battery protection time of 3 minutes has expired.
Key-In Ignition:	Ignition is in the lock position, driver door is ajar and the key is in the ignition. The chime will sound until one of the above conditions is removed or until the battery protection time of 15 minutes has expired.
Turn Signal On:	When the BCM detects a turn signal input continuously for 1.0mile/0.6km and the vehicle speed is greater than 15 mph/24kph, the chime will sound until the specific turn signal is cancelled.
Dome Lights On:	Ignition is in the lock position, driver door ajar, and the dome light switch is left in the on position. The chime will sound until one of the above conditions is removed or until the battery protection time of 15 minutes has expired.
Low Oil Pressure:	The chime will sound when the engine is operating and the oil pressure drops below 4psi/27.5kPa.
Engine Temperature Critical:	The chime will sound when the engine is operating and the coolant temperature exceeds 252°F/122C *or 234°/112C(diesel)*. The chime is continuous at 257°F/125C and will chime for 4 minutes and stop if the temperature drops below 255°F/123C.
Low Washer Fluid	The chime will sound when the washer fluid drops below a specific level.
Warning Lamp Announcement:	A chime will sound to alert the driver to scan the instrument panel and overhead console to see which warning lamp is illuminated. The door/liftgate ajar warning lamp will appear without a chime if the vehicle is running and a door or the liftgate is opened. A chime will sound if the door or liftgate is still open and the vehicle speed is greater than 4mph/6kph.
High-speed warning Gulf Coast Countries (GCC) only	*The chime will sound, acting as a warning to the driver that the vehicle speed has exceed 75mph±2/120kph±3.*

3.4.3 WARNING LAMP ANNOUNCEMENT

Low Fuel Lamp:	The cluster will request a single chime after the indicator is illuminated.
Volt Lamp:	The cluster will request a single chime after the indicator is illuminated.
Oil Pressure Lamp:	The cluster will request a single chime after illuminating the indicator above 450rpm vehicle operation.
Liftgate Ajar Lamp:	The BCM determines when to chime for liftgate ajar.
Fasten Seat Belt Lamp:	The MIC will request a single chime from the BCM when the ignition is turned to the unlock/run/start positions if the driver seat belt is not buckled and 2 seconds after seatbelt warning chime ends.
Check Engine Lamp:	The cluster will request a single chime after the indicator is illuminated.
Low Washer Fluid Lamp:	The cluster will request a single chime after the indicator is illuminated.
Engine Temperature Lamp:	The cluster will request a single chime when the indicator is first illuminated at 252°F/122C.

3.4.4 OTHER CHIME ON CONDITIONS

Programming of an Additional Key Fob:	A single cluster chime will sound, which signals that the program mode has been initiated.
Programming for Rolling Door Locks:	When the programming has been completed, a single tone from the chime system, will occur.

3.5 COMMUNICATION

The Programmable Communication Interface or PCI Bus is a single wire multiplexed network capable of supporting binary encoded messages shared between multiple modules. The PCI bus circuit is identified as D25 and is white with a violet tracer. Additional tracer colors may be added to the violet in order to distinguish between different module connections. The modules are wired in parallel. Connections are made in the harness using splices. The following modules are used on the RS/RG:

- Adjustable Pedals Module
- Body Control Module

- Front Control Module
- Airbag Control Module
- Controller Antilock Brake
- Powertrain Control Module (Gas)
- Engine Control Module (Diesel)
- Radio
- CD Changer
- DVD/CD Changer
- Automatic Temperature Control Module
- A/C Heater Control Module (MTC)
- Sentry Key Remote Entry Module (SKREEM)
- Memory Seat/Mirror Module
- Overhead Console
- Mechanical Instrument Cluster
- Left Sliding Door Control Module
- Right Sliding Door Control Module
- Thatcham Alarm Module (Export)
- Power Liftgate Module

Each module provides its own bias and termination in order to transmit and receive messages. The bus voltage is at zero volts when no modules are transmitting and is pulled up to about seven and a half volts when modules are transmitting.

The bus messages are transmitted at a rate averaging 10800 bits per second. Since there is only voltage present when the modules transmit and the message length is only about 500 milliseconds, it is ineffective to try and measure the bus activity with a conventional voltmeter. The preferred method is to use the DRBIII® lab scope. The 12v square wave selection on the 20-volt scale provides a good view of the bus activity. Voltage on the bus should pulse between zero and about seven and a half volts. Refer to the following figure for some typical displays.

The PCI Bus failure modes are broken down into two categories. Complete PCI Bus Communication Failure and individual module no response. Causes of a complete PCI Bus Communication Failure include a short to ground or battery on the PCI circuit. Individual module no response can be caused by an open PCI circuit at the module, or an open battery or ground circuit to the affected module.

Symptoms of a complete PCI Bus Communication Failure would include but are not limited to:

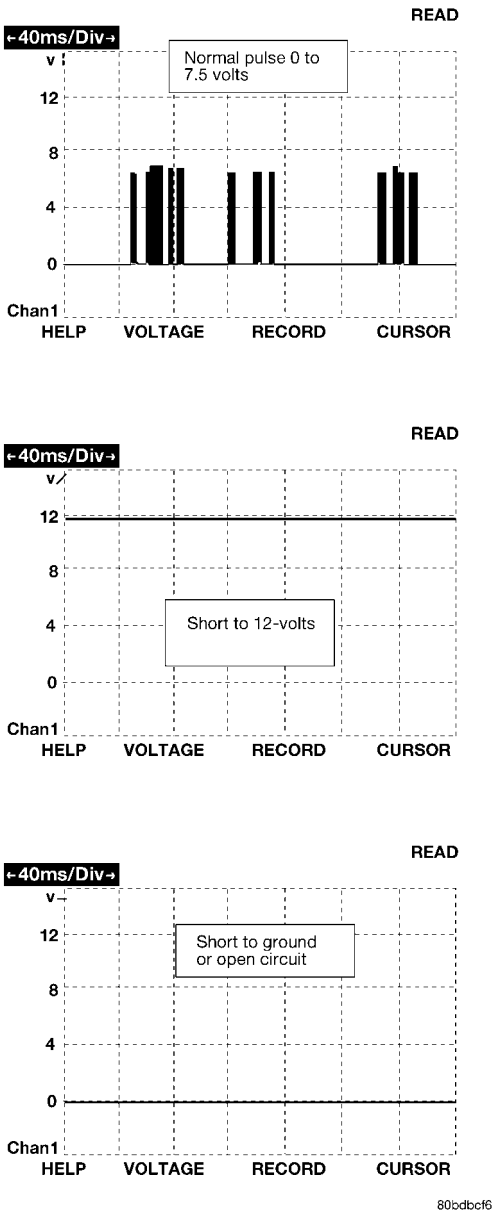
- All gauges on the MIC stay at zero
- All telltales on MIC illuminate
- MIC backlighting at full intensity
- Dashed lines in the overhead console ambient temperature display
- No response received from any module on the PCI bus (except the PCM/ECM)
- No start (if equipped with Sentry Key Immobilizer)

Symptoms of Individual module failure could include any one or more of the above. The difference would be that at least one or more modules would respond to the DRBIII®.

Diagnosis starts with symptom identification. If a complete PCI Bus Communication Failure is suspected, begin by identifying which modules the vehicle is equipped with and then attempt to get a response from the modules with the DRBIII®. If any modules are responding, the failure is not related to the total bus, but can be caused by one or more modules PCI circuit or power supply and ground circuits. The DRBIII® may display “BUS +/- SIGNAL OPEN” or “NO RESPONSE” to indicate a communication problem. These same messages will be displayed if the vehicle is not equipped with that particular module. The CCD error message is a default message used by the DRBIII® and in no way indicates whether or not the PCI bus is operational. The message is only an indication that a module is either not responding or the vehicle is not equipped.

NOTE: For 2004 model year, some vehicles will integrate the Transmission Control Module and Powertrain Control Module into a single control module. This new module is the Next Generation Controller for DaimlerChrysler and will be referred to as the Powertrain Control Module (PCM). The Transmission Control Module is part of the Powertrain Control Module.

Diagnostic procedures and DTC numbers are some of the changes you will see which reflect the new combined module technology. The PCM will have four color coded connectors C1 through C4, (C1-BLK, C2-ORANGE, C3-WHITE, C4-GREEN), each PCM connector will have 38 pins each. Two new tools are used for probing and repairing the New PCM connectors. A New tool to release the pins from the PCM connectors Miller #3638 is introduced, you must use the Miller tool #3638 to release the connector pins or harness and connector damage will occur. Also a New tool for probing connectors Miller #8815 is introduced, you must use the Miller tool #8815 to probe the PCM pins or harness and connector damage will occur. There is also a new Verification test and module replacment procedure for the PCM.



3.6 DOOR AJAR SYSTEM

The door ajar and liftgate ajar states are used as inputs for the Body Control Module (BCM). The BCM uses these inputs to determine exactly what position the doors and liftgate are in. The DRBIII® will display the state of the door ajar and the liftgate ajar switches in Inputs/Outputs. It's important to note, that when any door, or the liftgate is closed, the switch state on the DRBIII® will show OPEN. When any door, or the liftgate is open the switch state on the DRBIII® will show CLOSED. During diagnosis, if a door or the liftgate is closed and the DRBIII® displays the switch state as CLOSED, it indicates a shorted ajar circuit. If the door or the liftgate is open and the DRBIII® displays the switch state as OPEN, it indicates an open ajar circuit.

3.7 EXTERIOR LIGHTING SYSTEM

3.7.1 HEADLAMP POWER

The Headlamp Switch is a direct input to the BCM. The BCM sends a BUS message to the FCM informing it of a headlamp switch status change. The FCM then turns on power to the headlamps through four "fuseless" circuits. These circuits are electronically controlled and continuously monitored for malfunctions. Power is supplied to each filament in a separate circuit. For vehicles equipped with daytime running Lamps (DRL), the FCM electronically steps down the headlamp voltage to provide the desired illumination.

3.7.2 HEADLAMP SWITCH

The Headlamp Switch uses a multiplexed (MUX) circuit to the Body Control Module (BCM). The Headlamp Switch controls the Fog lamp relay, Park lamps and the Low and High headlamps. The BCM then sends a signal through the PCI Bus line to the FCM as to what state the switch has selected. The FCM energizes the high side output drivers to turn ON the desired lamps.

3.7.3 PARK LAMP RELAY

The Park Lamp Switch is a direct input to the BCM. The BCM sends a BUS message to the FCM informing it to turn on the park lamp relay. The park lamp relay is then powered through low side control of the FCM. This circuit is electronically controlled and continuously monitored for malfunctions.

3.7.4 FOG LAMP RELAY

The Fog Lamp switch is a direct input to the BCM. The BCM sends a BUS message to the FCM informing it to turn on the fog lamp relay. The fog lamp relay is then powered through low side control of the FCM. This circuit is electronically controlled and continuously monitored for malfunctions. Fog lamp functionality is not equipped on all vehicles. The FCM "learns" that the vehicle is equipped with fog lamps by reading the BCM BUS message.

3.7.5 FOG LAMPS

The BCM controls the operation of the fog lamp relay that turns the fog lamps ON and OFF. The Fog lamps can only be ON when the park and low beams are ON. If the high beams are switched ON then the Fog lamps will be automatically turned OFF.

3.7.6 EXTERIOR LIGHTING BATTERY SAVER

The BCM monitors the status of, and controls, the Park Lamps, Headlamps and Fog Lamp relays. If any exterior lamps are left ON after the ignition is turned OFF, the BCM will turn them OFF after 3 minutes.

3.7.7 AUTO HEADLAMPS

This feature is available on vehicles equipped with both the Electrocromatic Mirror (ECM) and the Compass/Mini-Trip Computer (CMTC). When the BCM detects a day/night signal from the CMTC, an ECM is present and Auto Headlamp mode is selected.

3.8 FRONT CONTROL MODULE

The Front Control Module (FCM) is an electrical control and interface center located in the engine compartment. When it is mated to the Power Distribution Center (PDC), it is referred to as the Integrated Power Module (IPM). The IPM, with its fuses and relays provides power and signal distribution throughout most of the vehicle. The FCM receives both hard wire and digital electronic inputs from the vehicle electrical system through the PDC. Based on these inputs and the ignition switch position, it provides direct power feeds and relay control to some of the vehicles' most critical electrical systems.

The Front Control Module provides the following features:

Controlled power feeds:

- Front airbag system
- Headlamp power
- EATX module power (4 speed only)
- Front washer motor
- Rear washer motor
- Cabin Heater
- Brake shift interlock system

Relay controls:

- Fog lamp relay (when equipped)
- Park lamp relay
- Front wiper on relay
- Front wiper high/low relay
- Accessory relay
- Horn relay
- Front & rear blower relay
- Name brand speakers (NBS) relay
- Adjustable pedals relay (non-memory)
- Electronic back light (EBL) run only relay

Electrical inputs:

- Headlamp battery supplies 1 & 2
- Module battery supply
- Power ground
- Ignition switch RUN or START position status
- Ignition switch START only status
- PCI Bus
- Stop lamp switch
- Horn switch
- Back-up switch
- Wiper park switch
- Washer fluid level switch
- Brake fluid level switch
- Ambient temperature sensor
- Right park lamp outage
- Left park lamp outage
- Battery IOD
- Battery (+) connection detection
- Flash reprogramming voltage

3.8.1 CONTROLLED POWER FEEDS

Front airbag system

The FCM provides power to the Occupant Restraint Control (ORC) system through two "fuseless" circuits (ORC RUN/START, and ORC RUN only). These circuits are electronically controlled and continuously monitored for malfunctions. Power is supplied while the ignition switch is in the RUN and START positions on pin 48 of the FCM connector, and in the RUN only position on pin 29.

Headlamp power

The headlamp switch is a direct input to the BCM. The BCM sends a PCI Bus message to the FCM informing it of a headlamp switch status change. The FCM then turns on power to the headlamps through four "fuseless" circuits. These circuits are electronically controlled and continuously monitored for malfunctions. Power is supplied to each filament in a separate circuit. For vehicles equipped with Daytime Running Lamps (DRL), the FCM electronically steps down the headlamp voltage to provide the desired illumination.

EATX power

The electronic automatic 4 speed transmission module is powered when the ignition switch is in the UNLOCK, RUN or START positions. This circuit is electronically controlled and continuously monitored for malfunctions. Power is supplied through pin 27 of the FCM connector.

Front washer motor

The front washer switch is a direct input to the BCM. The BCM sends a PCI Bus message to the

FCM informing it of a request to wash. The front washer motor is then powered through low side control inside the FCM. This circuit is electronically controlled and continuously monitored for malfunctions. In addition, the FCM electronically protects the washer motor from system voltages higher than 16 volts by automatically switching off the low side circuit.

Rear washer motor

The rear washer switch is a direct input to the BCM. The BCM sends a PCI Bus message to the FCM informing it of a request to wash. The rear washer motor is then powered through low side control inside the FCM. This circuit is electronically controlled and continuously monitored for malfunctions. In addition, the FCM electronically protects the washer motor from system voltages higher than 16 volts by automatically switching off the low side circuit.

Cabin Heater

When the ignition is in Run, the FCM monitors the PCI bus for the Cabin Heater Activation request. The Automatic or Manual Temperature Control initiates this request only when all conditions for the Cabin Heater activation are favorable. The request carries the status bit that the FCM requires to activate its Cabin Heater Assist Control output. This output is a low side driver (coming from FCM pin 15) which supplies a ground signal to the Cabin Heater (pin 5). When the Cabin Heater receives this ground signal input, it interprets this as an activation signal. The FCM low side driver is also capable of diagnostic sensing. The driver will sense an open circuit when the driver is off, and will sense a short to voltage when the driver is on. The FCM will set DTCs for both of these types of faults. For additional information, refer to Cabin Heater under General Information and Diagnostic Procedures in the manual.

Brake shift interlock system

The brake shift interlock solenoid receives power from both high side and low side controls inside the FCM. The high side control is on the same circuit as the EATX module power, and the low side control comes through pin 47 of the FCM connector. The solenoid is controlled by the low side driver when the brake pedal is pressed. Both circuits are continuously monitored for malfunctions.

3.8.2 RELAY CONTROLS

Fog lamp relay

The fog lamp switch is a direct input to the BCM. The BCM sends a PCI Bus message to the FCM informing it to turn on the fog lamp relay. The fog lamp relay is then powered through low side control of the FCM. This circuit is electronically controlled and continuously monitored for malfunctions. Fog lamp functionality is not equipped on all vehicles. The FCM “learns” that the vehicle is equipped with fog lamps by reading the BCM PCI Bus message.

Park lamp relay

The park lamp switch is a direct input to the BCM. The BCM sends a PCI Bus message to the FCM informing it to turn on the park lamp relay. The park lamp relay is then powered through low side control of the FCM. This circuit is electronically controlled and continuously monitored for malfunctions.

Front wiper on relay

The front wiper switch is a direct input to the BCM. The BCM sends a PCI Bus message to the FCM informing it to turn on the front wiper on relay. The front wiper on relay is then powered through low side control of the FCM. This circuit is electronically controlled and continuously monitored for malfunctions.

Front wiper high/low relay

The front wiper switch is a direct input to the BCM. The BCM sends a PCI Bus message to the FCM informing it to turn on the front wiper high/low relay. The relay switches power between the low speed and high speed windings of the wiper motor. The front wiper high/low relay is powered through low side control of the FCM. This circuit is electronically controlled and continuously monitored for malfunctions.

Accessory relay

The accessory relay works in conjunction with the FCM’s power accessory delay feature to control the operation of the radio, power windows, washer motors, wiper motors and power outlet. The accessory relay is turned on through low side control on pin 35 of the FCM. This circuit is electronically controlled and continuously monitored for malfunctions. Depending on the ignition switch position, the accessory relay will remain on or will time-out and turn off. The accessory relay remains on in the RUN and ACCY positions of the ignition switch. In the UNLK and OFF positions, the relay will remain energized for 45 seconds then turn off. During this time-out period, if the driver or passenger doors are opened, the relay will turn off immediately. While the ignition switch is in the START position, the relay will also drop-out, then resume operation. Accessory relay operation is most noticeable by observing the operation of the radio or blower functions.

Horn relay

The horn relay operates through a direct wire input to the FCM from the horn switch (FCM pin 17) , or a PCI Bus message from the BCM. The relay

responds to the horn switch, remote door lock and VTA alarm functions. The horn relay is powered through low side control on pin 10 of the FCM. Under normal operating conditions, if the horn is pressed for longer than 30 seconds, the FCM will automatically deactivate the horn to prevent damage to it. The FCM will re-activate control of the relay after a 25 second cool-down period. This circuit is electronically controlled and continuously monitored for malfunctions.

Front and rear blower relay

RS with MTC

Upon ignition on, the A/C-Heater Control Module sends a blower relay on request to the FCM over the PCI Bus. The front blower relay and the rear blower relay, if equipped, are then powered through low side control through FCM pin 30. The relay provides the high side to the blower motor, and the blower speed is governed through low side control in the A/C-Heater Control Module. This circuit is electronically controlled and continuously monitored for malfunctions.

RG with MTC

Upon power up (Power switch on), the A/C-Heater Control Module sends a blower relay on request to the FCM over the PCI Bus. The front blower relay is then powered through low side control through FCM pin 30. The relay provides the high side to the blower motor, and the blower speed is governed through low side control in the A/C-Heater Control Module. This circuit is electronically controlled and continuously monitored for malfunctions.

RS & RG with ATC

Upon power up (Power switch on), the Automatic Temperature Control (ATC) Module sends a blower relay on request to the FCM over the PCI Bus. The front blower relay and the rear blower relay, if equipped, are then powered through low side control through FCM pin 30. The relay provides the high side to the Blower Motor Power Module, and the blower speed is governed through control in the ATC Module. This circuit is electronically controlled and continuously monitored for malfunctions.

Name Brand Speakers (NBS) relay

The NBS relay operates through the vehicle bus interface between the radio and the FCM. When the radio is turned on, the radio sends a PCI Bus message to the FCM. The NBS relay is then powered on through low side control on pin 11 of the FCM. The relay supplies power to the amplified speaker, and ground is supplied through the radio. This circuit is electronically controlled and continuously monitored for malfunctions.

Electronic Back Light (EBL) relay

The rear defrost switch is part of the Automatic Temperature Control or A/C-Heater Control Module (Manual Temp). When the ignition switch is in the RUN position and the rear defrost switch is turned on, the ATC or A/C-Heater Control Module sends a PCI Bus message to the FCM. The EBL run only relay is then powered through low side control on pin 31 of the FCM. The relay provides the high side to the rear window defrost grid, and ground is attached to the vehicle body. The FCM will only allow the rear defrost to operate in the RUN position. This circuit is electronically controlled and continuously monitored for malfunctions.

Adjustable Pedals Relay (Non-Memory)

The Adjustable Pedals Relay is only on non-memory Adjustable Pedals System equipped vehicles. The relay is supplied battery voltage from the IPM and is electronically controlled with a low side driver within the FCM. The relay is energized when the transmission is in reverse and when cruise control operation is engaged. This action disables the Adjustable Pedals System from movement. This circuit is continuously monitored for proper function.

3.8.3 ELECTRICAL INPUTS

Headlamp battery supplies 1 & 2 — 12 volt input on pins 1 and 2. Battery supply voltage for switching headlamp circuits only.

Module battery supply — 12 volt input on pin 9. Battery supply voltage for all other FCM operations.

Power ground — Ground source on pin 8 for all FCM operations.

Ignition switch RUN or START position status — 12 volt input on pin 37. Allows the FCM to determine the ignition switch status for related FCM operations.

Ignition switch START only status — 12 volt input on pin 19. Allows the FCM to discriminate between RUN/START input and START for related FCM operations.

PCI Bus — Approximately 7.5 volt input on pin 22. Allows the FCM to communicate with other modules on the vehicle bus.

Stop lamp Switch status — 12 volt input on pin 44. Provides for brake shift interlock function.

Horn Switch — Ground input on pin 17. Primary means for engaging the horn.

Back-up switch — Ground input on pin 39. Input is converted to a PCI Bus status message for use by other modules.

Wiper park switch — Ground input on pin 16. Used to determine park placement of wipers. Also

used as feedback to FCM to determine correct operating mode of wipers.

Washer fluid level switch — Ground input to pull-up on pin 18. Ground is switched into the circuit when washer bottle fluid level is low.

Brake fluid level switch — Ground input to pull-up on pin 36. Ground is switched into the circuit when brake fluid level is low.

Ambient temperature sensor — Resistive input to pull-up on pin 25. Corresponding voltage level is converted to a PCI Bus message for use by other modules on the bus.

Right park lamp outage — 12 volt input on pin 21. Used to determine if right park lamp circuit is operating properly.

Left park lamp outage — 12 volt input on pin 41. Used to determine if left park lamp circuit is operating properly.

Battery IOD — 12 volt input on pin 20. The FCM enters a low power consumption mode when the ignition is turned OFF. This low current draw battery supply keeps the microprocessor functioning in the low power mode.

Battery (+) connection detection — 12 volt input on pin 38. The battery connection on the PDC incorporates the use of an internal switch to determine if the connector is properly mated and the Connector Positive Assurance (CPA) is engaged. If the CPA is not properly engaged, a voltage on pin 38 will be interpreted as an unseated connector and a fault will set.

Flash programming voltage — 20 volt input on pin 42. When a DRBIII® is connected and the proper flash reprogramming sequence is selected, the 20 volt signal will be applied through pin 42.

3.9 HEATING & A/C SYSTEM

3.9.1 AUTOMATIC TEMPERATURE CONTROL (ATC)

CAUTION: Automatic Temperature Control (ATC) Modules in 2003 RS/RG vehicles use version 13 and 0F software. ATC Modules in 2004 RS/RG vehicles use version 0313 and 0428 software. Do NOT install an ATC Module with version 13 or 0F software in a 2004 RS/RG vehicle. Do NOT install an ATC Module with version 0313 or 0428 software in a 2003 RS/RG vehicle. Use the DRBIII® to verify which version software the ATC Module is using by selecting Body Systems, Automatic Temperature Control, and then selecting Module Display. Failure to follow these instructions can result in either improper or failed HVAC system operation.

3.9.1.1 SYSTEM AVAILABILITY

EXCEPT EXPORT

- The ATC system is a Three-Zone Air Conditioning System.

EXPORT

- Two different types of systems are currently available for these vehicles.
  - ► Dual-Zone Air Conditioning System for all except LWB vehicles.
  - ► Three-Zone Air Conditioning System for all LWB vehicles.

CABIN HEATER, EXPORT WITH DIESEL ENGINE

- A Cabin Heater is used in conjunction with the ATC system. The Cabin Heater is designed to supply the vehicle's occupants with heat prior to the engine reaching operating temperature. For additional information on this system, refer to Cabin Heater under General Information and Diagnostic Procedures in this manual.

3.9.1.2 SYSTEM CONTROLS

The ATC Module:

- is fully addressable with the DRBIII®.
- communicates over the Programmable Communication Interface Multiplex System (PCI) Bus.
- provides an A/C request over the PCI Bus to the Powertrain Control Module (PCM) when compressor operation is desired.
- for exports with diesel engines, provides a Cabin Heater activation request over the PCI Bus to the Front Control Module (FCM) when conditions are favorable for Cabin Heater operation.
- uses input from the evaporator temperature sensor to prevent evaporator freeze up while maintaining optimum cooling performance.
- uses input from infrared (I/R) sensors, which measure surface temperature, to maintain occupant comfort levels.
  - ► The I/R sensors are mounted in the instrument panel center bezel.
- can be operated in a manual mode.
- provides a blower relay on request over the PCI Bus to the Front Control Module (FCM) when blower operation is desired.

- controls front blower operating speed, providing 10 speeds in manual mode and infinite speeds in automatic mode.
- provides a cold engine blower lockout function.
  - ► A Blower Speed Clamping feature minimizes occupant discomfort by controlling the amount of warm air coming out of the HVAC system should the Powertrain Control Module (PCM) disable A/C Compressor operation while the Automatic Temperature Control (ATC) is set in an automatic mode. The PCM disables the A/C compressor if the A/C pressure is too low, if the A/C pressure is too high, if engine overheating is immanent, or if an engine overheating condition exists. The ATC clamps the blower speed if the outside air temperature is greater than 50°F (10°C) and the PCM has disabled the A/C compressor. This means that the ATC wil not adjust blower speed automaticaly when the clamping feature is enabled, e.g. if the clamping feature is enabled while in Auto Lo the blower will continue to run in low speed; if the clamping feature is enabled while in Auto Lo and the operator selects Auto Hi the blower will continue to run in low speed; if the clamping feature is enabled while in Auto Hi the blower will continue to run at the highest speed. In any case the operator can manually change the blower speed as desired. When diagnosing blower related symptoms verify that none of the above conditions for disabling the A/C compressor exist before diagnosing the blower circuits and components.
- controls rear blower operating speed, providing 10 speeds in manual mode and infinite speeds in automatic mode.
  - ► The separate front and rear Blower Motor Controllers operate as follows: When blower operation is desired, the Blower Motor Controller provides a 10.0 volt signal to the ATC Module over a control circuit. The ATC Module provides a variable duty cycle ground to the 10.0 volt signal based on input from the blower switch. When the blower switch is set to LO speed, the ATC Module provides a short duty cycle (less time grounding the signal voltage). As higher blower speeds are requested, the ATC Module increases the duty cycle (more time grounding the signal voltage). When the blower switch reaches HI speed, the duty cycle increases to where the signal pattern is almost a flat line (with brief voltage spikes).
- controls the front and rear electric door actuators' operation.
  - ► A simplified control system for operation of the mode, recirculation, and temperature control actuators provides positive positioning without the complexity of feedback from position sensors. The ATC Module knows the number of operating actuator revolutions required for full door travel as well as the number of actuator commutator pulses per revolution. Using these parameters, the ATC Module runs the actuator for the number of commutator pulses that correspond to the desired door position. To maintain accuracy, the system recalibrates itself periodically at known zero and full travel conditions.
- activates and deactivates the Rear ATC Switch.

The Rear ATC Switch (Three-Zone Only):

- provides desired rear blower speed input to the ATC Module.
- provides desired rear blend and mode door position input to the ATC Module.

The Dual-Zone ATC system uses:

- two front, two-wire electric blend door actuators.
- one front, two-wire electric mode door actuator.
- one, two-wire electric recirculation door actuator.

The Three-Zone ATC system uses:

- two front, two-wire electric blend door actuators.
- one front, two-wire electric mode door actuator.
- one, two-wire electric recirculation door actuator.
- one rear, two-wire electric blend door actuator.
- one rear, two-wire electric mode door actuator.

System Relays

- The Integrated Power Module (IPM) houses and provides power to the A/C Clutch Relay, Front Blower Motor Relay, and Rear Blower Motor Relay.

3.9.1.3 SYSTEM REVISIONS

The 2004 ATC system remains carryover from 2003.

3.9.1.4 SYSTEM DIAGNOSTICS

Fault detection is through active and stored Diagnostic Trouble Codes (DTCs)

- DTCs are displayed by the DRBIII®.
- Active DTCs are those which currently exist in the system. The condition causing the fault must be repaired in order to clear this type of DTC.
- Stored DTCs are those which occurred in the system since the ATC Module received the last ″clear diagnostic info″ message.

The AC Cooldown Test:

- is actuated with the DRBIII®.
- checks A/C system performance based on evaporator temperature sensor input.
- forces the ATC to initiate the Cabin Heater Activation request when the vehicle is equipped with a Diesel Cabin Heater Assist.

WARNING: DO NOT OPERATE THE DCHA IN AN ENCLOSED AREA SUCH AS A GARAGE THAT DOES NOT HAVE EXHAUST VENTILATION FACILITIES. ALWAYS VENT THE DCHA's EXHAUST WHEN OPERATING THE DCHA. REFER TO VENTING THE DCHA's EXHAUST UNDER CABIN HEATER IN THE GENERAL INFORMATION PORTION OF THIS SECTION FOR PROPER EXHAUST VENTING INSTRUCTIONS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PERSONAL INJURY OR DEATH.

CAUTION: Do not activate the A/C Cooldown Test with the engine off. Failure to follow these instructions can result in internal damage to the DCHA Heater Module.

  - ► The FCM monitors the PCI bus for the Cabin Heater Activation request. The request carries the status bit that the FCM requires to activate its' Cabin Heater Assist Control output. This output is a low side driver (coming from FCM pin 15) which supplies a ground signal to the Cabin Heater (pin 5). When the Cabin Heater receives this ground signal input, it interprets this as an activation signal.
  - ► The FCM low side driver is also capable of diagnostic sensing. The driver will sense an open circuit when the driver is off, and will sense a short to voltage when the driver is on. The FCM will set DTCs for both of these types of faults. For additional information, refer to Cabin Heater under General Information and Diagnostic Procedures in the manual.
- will not run the air conditioning portion of this test if ambient temperature is below 12°C (53°F).
  - ► The forced Cabin Heater activation will occur even if the air conditioning portion of this test fails to initiate because AC Cooldown test criteria was not met. When activated, the DCHA will operate for approximately seven minutes. Three minutes to run and four minutes to purge.
- will pass the air conditioning portion of this test if the evaporator temperature drops 6.7°C (20°F) within two minutes of starting this test.
- messages (air conditioning related only) display on the DRBIII® after running this test.
  - ► These messages will clear after paging back out of this test. Therefore, it is important to note all of the AC Cooldown test messages before doing so.
  - ► All Cabin Heater-related DTCs display under Cabin Heater, Read DTCs.
- will cause the DELAY and Snowflake VF segments on the ATC to flash for 162 seconds (RG with DCHA only). If the air conditioning portion of this test fails, the DELAY and Snowflake VF segments will continue to flash until the vehicle is driven more than three miles.

3.9.2 MANUAL TEMPERATURE CONTROL (MTC)

CAUTION: Manual Temperature Control (MTC) Modules in 2001 and 2002 RS/RG vehicles use 0614 and 0700 version software. MTC Modules in 2003 RS/RG and 2004 RG vehicles use 0802 version software. MTC Modules in 2004 RS vehicles use 0900 version software and have new control features. Do NOT install a MTC Module with 0614 or 0700 version software in a 2003 or 2004 RS/RG vehicle. Do NOT install a MTC Module with 0802 version software in a 2004 RS vehicle. Do not install a MTC Module with 0900 version software in a 2001, 2002, or 2003 model year RS/RG vehicle or in a 2004 RG vehicle. Use the DRBIII® to verify which version software the MTC Module is using by selecting Body Systems, HVAC, and then selecting Module Display. Failure to follow these instructions can result in either improper or failed HVAC system operation.

3.9.2.1 SYSTEM AVAILABILITY

EXCEPT EXPORT

- Three different types of systems are currently available for these vehicles.
  - ► Single-Zone Air Conditioning System
  - ► Dual-Zone Air Conditioning System
  - ► Three-Zone Air Conditioning System

EXPORT

- Two different types of systems are currently available for these vehicles.
  - ► Single-Zone Air Conditioning System
  - ► Dual-Zone Air Conditioning System

CABIN HEATER, EXPORT WITH DIESEL ENGINE

- A Cabin Heater is used in conjunction with the HVAC system. The Cabin Heater is designed to supply the vehicle's occupants with heat prior to the engine reaching operating temperature. For additional information on this system, refer to Cabin Heater under General Information and Diagnostic Procedures in this manual.

3.9.2.2 SYSTEM CONTROLS

The A/C-Heater Control Module:

- is fully addressable with the DRBIII®.
- communicates over the Programmable Communication Interface Multiplex System (PCI) Bus.
- provides an A/C request to the Powertrain Control Module (PCM) over the PCI Bus when compressor operation is desired.
- uses input from the evaporator temperature sensor to prevent evaporator freeze up while maintaining optimum cooling performance.
- for exports with diesel engines, provides a Cabin Heater activation request to the Front Control Module (FCM) over the PCI Bus when conditions are favorable for Cabin Heater operation.
- for RS vehicles, provides a blower relay on request to the FCM over the PCI Bus upon ignition on.
- for RG vehicles, provides a blower relay on request to the FCM over the PCI Bus when the Power switch on the A/C-Heater Control Module is turned on.
- controls front blower operating speed. For RS vehicles, the four speed settings are Low, M1, M2, and High. For RG vehicles the five speed settings are Low, M1, M2, M3, and High.
- for RS vehicles uses the blower switch to control system on/off and blower speed.
- for RG vehicles uses the power switch to control system on/off and the blower switch to control blower speed.
- for RS vehicles uses the rear wiper/washer switch to control rear wiper/washer operation.
- for RS vehicles, provides a rear wiper on request to the Body Control Module (BCM) when rear wiper operation is desired.
- for RS vehicles, provides a rear washer on request to the Body Control Module (BCM) when rear washer operation is desired.
- controls EBL operation.
- on three-zone systems, activates and deactivates the Rear A/C-Heater Control.
- on three-zone systems, controls rear blower operating speed. The three speed settings are Low, Med, and High.
- controls the front and the three-zone system rear electric door actuators' operation.
  - ► A simplified control system for operation of the mode, recirculation, and temperature control actuators provides positive positioning without the complexity of feedback from position sensors. The A/C - Heater Control Module knows the number of operating actuator revolutions required for full door travel as well as the number of actuator commutator pulses per revolution. Using these parameters, the A/C - Heater Control Module runs the actuator for the number of commutator pulses that correspond to the desired door position. To maintain accuracy, the system recalibrates itself periodically at known zero and full travel conditions.

On Three-Zone systems, the Rear A/C-Heater Control:

- controls rear blower motor operating speed. The three blower speeds are Low, Med, and High.
- provides desired rear blend and mode door position input to the A/C-Heater Control Module.

The Single-Zone HVAC system uses:

- one, two-wire electric blend door actuator.
- one, two-wire electric mode door actuator.
- one, two-wire electric recirculation door actuator.

The Dual-Zone HVAC system uses:

- two, two-wire electric blend door actuators.
- one, two-wire electric mode door actuator.
- one, two-wire electric recirculation door actuator.

The Three-Zone HVAC system uses:

- two front, two-wire electric blend door actuators.
- one front, two-wire electric mode door actuator.
- one, two-wire electric recirculation door actuator.
- one rear, two-wire electric blend door actuator.
- one rear, two-wire electric mode door actuator.

System Relays

- The Integrated Power Module (IPM) houses and provides power to the A/C Clutch Relay, Front Blower Motor Relay, and Rear Blower Motor Relay.

3.9.2.3 SYSTEM REVISIONS

The 2004 RG MTC system remains carryover from 2003. Revisions to the 2004 RS MTC system include:

- all new 0900 version software.

CAUTION: Manual Temperature Control (MTC) Modules in 2001 and 2002 RS/RG vehicles use 0614 and 0700 version software. MTC Modules in 2003 RS/RG and 2004 RG vehicles use 0802 version software. MTC Modules in 2004 RS vehicles use 0900 version software and have new control features. Do NOT install a MTC Module with 0614 or 0700 version software in a 2003 or 2004 RS/RG vehicle. Do NOT install a MTC Module with 0802 version software in a 2004 RS vehicle. Do not install a MTC Module with 0900 version software in a 2001, 2002, or 2003 model year RS/RG vehicle or in a 2004 RG vehicle. Use the DRBIII® to verify which version software the MTC Module is using by selecting Body Systems, HVAC, and then selecting Module Display. Failure to follow these instructions can result in either improper or failed HVAC system operation.

- changing the system on/off switch function to an intermittent rear wiper and rear washer control function.
- adding the system on/off function to the blower control switch.
- changing the number of blower speed settings from five to four.
- eliminating the odor control programming which allowed a small amount of fresh air to enter the cabin while in recirculation mode.
- moving the evaporator temperature sensor from the expansion valve to the top of the HVAC housing near the evaporator.

3.9.2.4 SYSTEM DIAGNOSTICS

Fault detection is through active and stored Diagnostic Trouble Codes (DTCs)

- DTCs are displayed by the DRBIII®.
- Active DTCs are those which currently exist in the system. The condition causing the fault must be repaired in order to clear this type of DTC.
- Stored DTCs are those which occurred in the system since the A/C-Heater Control Module received the last ″clear diagnostic info″ message.

The A/C Cooldown Test:

- is actuated with the DRBIII®.
- checks A/C system performance based on evaporator temperature sensor input.
- will not run if ambient temperature is below 12.7°C (55°F).
- will pass if the evaporator temperature drops 6.7°C (20°F) within two minutes of starting the test.
- faults display on the DRBIII® as test messages only after running the test.
- faults will not display on the DRBIII® as Diagnostic Trouble Codes.
- for RS vehicles will cause the Rear Wipe/Wash and A/C status indicators on the A/C-Heater Control Module to flash alternately while the test is running.
- for RG vehicles will cause the PWR and A/C status indicators on the A/C - Heater Control Module to flash alternately while the test is running.
  - ► The A/C status indicator will flash twice per second to indicate that the A/C Cooldown Test needs to be run. The A/C status indicator will stop flashing twice per second if either the A/C Cooldown Test returns passed, or if any button on the control is pressed, or if the ignition is cycled and the odometer shows greater than eight miles.

The HVAC Door Recalibration function:

- is actuated with the DRBIII®.
  - ► After completing HVAC Door Recalibration, the DRBIII® will the store the total span and the status of each door actuator. Selecting HVAC Door Cal Monitor in the System Tests will display this information.
- homes and repositions door actuators.
- monitors for door span faults on the actuator circuits.
- faults display on the DRBIII® as test messages only after running the test.
- faults will not display on the DRBIII® as Diagnostic Trouble Codes.
- for RS vehicles will cause the Rear Wipe/Wash and RECIRC status indicators on the A/C-Heater Control Module to flash alternately while the test is running.
- for RG vehicles will cause the PWR and RECIRC status indicators on the A/C - Heater Control Module to flash alternately while the test is running.
  - ► The RECIRC status indicator will flash twice per second to indicate that the HVAC Door Recalibration Test needs to be run. The RECIRC status indicator will stop flashing twice per second if either the HVAC Door Recalibration Test returns passed, or if any button on the control is pressed, or if the ignition is cycled and the odometer shows greater than eight miles.

The Actuator Circuit Test:

- is actuated with the DRBIII®.
- monitors for shorted actuator circuits.
- allows service to easily diagnose and troubleshoot up to three simultaneous shorts.
- supplements the continuous diagnostics on the actuator drive system.
- faults display on the DRBIII® as test messages only after running the test.
- faults will not display on the DRBIII® as Diagnostic Trouble Codes.

When Performing the Actuator Circuit Test

CAUTION: Shorted rear door driver circuits can cause additional Actuator Circuit Test messages to set for circuits where no condition exists to cause a fault.

CAUTION: To ensure a proper diagnosis, repair all Short Too Complex messages first, all rear door driver circuit related messages second, all common door driver circuit related messages third, and all front door driver circuit related messages last.

CAUTION: The DRBIII® can display up to three Actuator Circuit Test messages at a time. After repairing each Actuator Circuit Test message, cycle the ignition switch, then rerun the Actuator Circuit Test to ensure no new messages exist.

- The Short Too Complex message:
  - ► indicates that a specific determination of which lines are shorted could not be made.
  - ► is caused by more than three drivers being shorted in the same direction. For example, four drivers all shorted to ground, or two or more drivers shorted with at least one driver shorted to ignition/battery and one driver shorted to ground.
- Messages displaying:
  - ► XXX Driver/Circuit Shorted to Ignition/ Battery will set on a per-driver basis.
  - ► XXX Driver/Circuit Shorted to Ground will set on a per-driver basis.
  - ► the same two drivers/circuits shorted to ignition/battery as-well-as shorted to ground indicates that two actuator driver circuits are shorted together.
- When the test returns passed, then troubleshooting should proceed to clearing faults and running the HVAC Door Recalibration system test as a final check of system health.

3.10 CABIN HEATER

NOTE: The Cabin Heater, also known as the Diesel Cabin Heater Assist (DCHA), will be referred to as the DCHA throughout most of the General Information and the Diagnostic Procedures in this manual.

3.10.1 GENERAL SAFETY INFORMATION

WARNING: DO NOT OPERATE THE DCHA IN AN ENCLOSED AREA SUCH AS A GARAGE THAT DOES NOT HAVE EXHAUST VENTILATION FACILITIES. ALWAYS VENT THE DCHA's EXHAUST WHEN OPERATING THE DCHA. REFER TO 3.10.3.1 VENTING THE DCHA'S EXHAUST FOR PROPER EXHAUST VENTING INSTRUCTIONS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PERSONAL INJURY OR DEATH.

WARNING: ALLOW THE DCHA ASSEMBLY TO COOL BEFORE PERFORMING A COMPONENT INSPECTION/REPAIR/REPLACEMENT. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PERSONAL INJURY OR DEATH.

WARNING: ALWAYS DISCONNECT THE VEHICLE'S BATTERY PRIOR TO PERFORMING ANY TYPE OF WORK ON THE DCHA. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PERSONAL INJURY OR DEATH.

WARNING: NEVER ATTEMPT TO REPAIR THE DCHA HEATER MODULE OR ANY OF ITS INTERNAL COMPONENTS. ALWAYS PERFORM DCHA COMPONENT REPLACEMENT IN ACCORDANCE WITH THE SERVICE INFORMATION. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PERSONAL INJURY OR DEATH.

CAUTION: Do not actuate the DCHA Field Mode Test with the engine off. Failure to follow these instructions can result in internal damage to the DCHA Heater Module.

CAUTION: Always Perform The Cabin Heater Pre-Test Prior To Performing Any Other Cabin Heater Test For The Test Result To Be Valid.

NOTE: Do not disconnect the vehicle's battery or the DCHA's main power-supply while the DCHA is in operation or in run-down mode. Failure to follow these instructions can result in excess emissions from the DCHA Heater Module.

NOTE: Failure to prime the Dosing Pump after draining the DCHA fuel line will prevent DCHA heater activation during the first attempt to start the heater. This will also set a Diagnostic Trouble Code (DTC) in the DCHA Control's memory. Do not perform the Dosing Pump Priming Procedure if an attempt was made to start the DCHA without priming the Dosing Pump first. This will put excess fuel in the DCHA Heater Module and cause smoke to emit from the DCHA exhaust pipe when heater activation occurs.

NOTE: Waxed fuel can obstruct the fuel line and reduce flow. Check for the appropriate winter grade fuel and replace as necessary.

3.10.2 COMPONENT DESCRIPTION AND OPERATION

3.10.2.1 DCHA ASSEMBLY

The DCHA is a supplemental heater designed to pre-heat the engine's coolant in order to supply the vehicle's occupants with heat prior to the engine reaching operating temperature. The DCHA assembly mounts underneath the vehicle on the left side floor pan near the front door opening. The DCHA assembly connects to the vehicle's heater hoses and has a fuel supply line that connects to the vehicle's fuel tank.

The DCHA assembly consists of a:

- combustion air fan assembly
- burner housing
- burner insert
- control unit/heat exchanger
- combustion chamber
- dosing pump

3.10.2.2 COMBUSTION AIR FAN

The combustion air fan assembly includes the:

- combustion air fan
- combustion air fan inlet
- fuel supply inlet

The combustion air fan delivers the air required for combustion from the combustion air inlet to the burner insert.

3.10.2.3 BURNER HOUSING

The burner housing includes the:

- coolant inlet
- coolant outlet
- exhaust outlet

The burner housing accommodates the burner insert and is combined with the control unit/heat exchanger as an assembly.

3.10.2.4 BURNER INSERT

The burner insert includes the:

- combustion pipe fuel cross section
- glow plug/flame sensor

Inside the burner insert, fuel is distributed across the combustion-pipe fuel cross section. Combustion of the fuel/air mixture takes place within the combustion pipe to heat the exchanger. The glow plug/flame sensor, located in the burner insert, ignites the fuel/air mixture during heater start up. After heater start up, the glow plug/flame sensor operates in the flame sensor function. The glow plug/flame sensor is an electrical resistor by design, and is located in the burner insert opposite the flame side.

3.10.2.5 CONTROL UNIT/HEAT EXCHANGER

The control unit/heat exchanger includes the:

- control unit
- temperature sensor
- overheat protection
- heat exchanger
- connector terminal

The control unit controls and monitors combustion operation. The control unit is ventilated by means of a ventilation hose routed from the combustion air collector compartment of the burner. The heat exchanger transfers the heat generated by combustion to the coolant circuit. The control unit/heat exchanger and the burner housing are an assembly and must not be disassembled.

The temperature sensor senses the coolant temperature in the heat exchanger as an electrical resistance. This signal is sent to the control unit for processing.

The overheat protection, controlled by the temperature resistor, protects the heater against undue

operating temperatures. The overheat protection will switch the heater off if the water temperature exceeds 105°C (221°F).

3.10.2.6 DOSING PUMP

The dosing pump is a combined delivery, dosing, and shut-off system for the fuel supply of the heater. The dosing pump receives its supply of fuel from the vehicle's fuel tank.

3.10.3 OPERATION

3.10.3.1 VENTING THE DCHA'S EXHAUST

WARNING: DO NOT OPERATE THE DCHA IN AN ENCLOSED AREA SUCH AS A GARAGE THAT DOES NOT HAVE EXHAUST VENTILATION FACILITIES. ALWAYS VENT THE DCHA's EXHAUST WHEN OPERATING THE DCHA. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PERSONAL INJURY OR DEATH.

WARNING: ALLOW THE DCHA ASSEMBLY TO COOL BEFORE PERFORMING A COMPONENT INSPECTION/REPAIR/REPLACEMENT. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PERSONAL INJURY OR DEATH.

CAUTION: When using a powered exhaust ventilation system, do not attach the exhaust ventilation hose directly to the DCHA exhaust pipe. Too much suction can prevent DCHA operation.

- When using a powered exhaust ventilation system, affix the ventilation hose to the DCHA exhaust pipe or to the vehicle in such a manor that the end of the ventilation hose remains approximately three inches away from the end of the DCHA exhaust pipe.
- When using a non-powered exhaust ventilation system, affix the ventilation hose directly to the DCHA exhaust pipe.

3.10.3.2 ACTIVATION

When the ignition is in Run, the FCM monitors the PCI bus for the Cabin Heater Activation request. The Automatic or Manual Temperature Control initiates this request only when all conditions for Cabin Heater activation are favorable (see below). The request carries the status bit that the FCM requires to activate its Cabin Heater Assist Control Output. This output is a low side driver (coming from FCM pin 15) which supplies a ground signal to the Cabin Heater (pin 5). When the Cabin Heater receives this ground signal input, it interprets this as an activation signal. The FCM low side driver is also capable of diagnostic sensing. The driver will sense an open circuit when the driver is off, and will sense a short to voltage when the driver is on. The FCM will set DTCs for both of these types of faults.

For vehicle's with a Manual Temperature Control system, the DCHA will activate only:

- when the engine is running.
- when the coolant temperature is below 66°C (151°F).
- when the fuel tank has greater than 1/8 of a tank of fuel.
- when the Power switch on the A/C - Heater Control Module is on.
- when the Blend control on the A/C - Heater Control Module is set above 90% reheat (within 2 detents of the full heat position).
- once per ignition cycle, when the ambient temperature is below 9°C (49°F), and the vehicle speed is above 25 km/h (15.5 mph) for two minutes, and the Blend control on the A/C - Heater Control Module is set anywhere from 80% to 90% reheat (3 to 4 detents from the full heat position). Under this circumstance, the DCHA will remain active for five minutes unless additional input is supplied to the DCHA.
- when the Front Control Module (FCM) sees the Cabin Heater Activation request that is bussed from the A/C - Heater Control Module.

For vehicle's with a Automatic Temperature Control system, the DCHA will activate only when the:

- VIN indicates that the vehicle has a diesel engine
- vehicle's odometer reads more than 5 miles.
- engine speed is above 500 rpm.
- coolant temperature is below 66°C (151°F).
- fuel tank has greater than 1/8 of a tank of fuel.
- Power switch on the Automatic Temperature Control is on.
- Driver Temperature Control on the Automatic Temperature Control is set above 22°C (72°F).
- Front Control Module (FCM) sees the Cabin Heater Activation request that is bussed from the Automatic Temperature Control.

When the DCHA starting sequence begins, the glow plug and the combustion air fan are activated. After 30 seconds, the fuel dosing pump begins operating and the combustion air fan operation is suspended for 3 seconds. Subsequently, the combustion air fan speed is increased in two ramps within 56 seconds to nearly full load operation. After a stabilization phase of 15 seconds, the combustion

air fan speed is again increased in a ramp within 50 seconds to nearly full load. After reaching full load fuel delivery, the glow plug is deactivated and the combustion air fan operation is increased to full load. During the subsequent 45 seconds, as well as in normal operation, the glow plug functions as a flame sensor to monitor the flame condition. After all these events, the automatically controlled heating operation starts.

In case of a no flame or a flame out condition, a restart is automatically initiated. If the no flame condition persists, fuel delivery is stopped and the heater enters an error lockout mode with a run-down of the combustion air fan. This will set one or more DTCs in the DCHA Control's memory. If six continuous attempts to start the heater fail due to one or more faults in the DCHA system, the heater enters a heater lockout mode. This will set DTC B1813 along with any other fault(s) that the DCHA Control identified.

3.10.3.3 HEATING

During the automatically controlled heating operation, when the coolant temperature reaches 76°C (169°F), the heater will switch to a part load operation. When the coolant temperature reaches 83°C (181°F) or if the heater runs for longer than 76 minutes the heater will switch to a control idle period. If the coolant temperature drops to 73°C (163°F) during a control idle period, the heater will perform a regular starting sequence into full load operation. A drop in coolant temperature to 66°C (151°F) during part load operation will cause the heater to switch to a full load operation.

3.10.3.4 DEACTIVATION

For vehicles with a Manual Temperature Control system, the DCHA will deactivate if the:

- engine is turned off.
- coolant temperature reaches 83°C (181°F).
- heater runs longer than 76 minutes (for normal automatic controlled heating operation).
- heater reaches 5-minute timeout period (for once per ignition cycle operation).
- fuel tank has less than 1/8 of a tank of fuel.
- Power switch on the A/C - Heater Control Module is off.
- Blend Control on the A/C - Heater Control Module is set below 75% reheat. 5 detents

For vehicle's with a Automatic Temperature Control system, the DCHA will deactivate if the:

- engine speed drops below 500 rpm.
- engine is turned off.
- coolant temperature reaches 83°C (181°F).
- heater runs longer than 76 minutes.
- fuel tank has less than 1/8 of a tank of fuel.
- Power switch on the Automatic Temperature Control is off.
- Comfort level is attained as determined by the temperature setting on the Automatic Temperature Control.

When the heater is deactivated, the combustion stops and a run-down sequence begins. During the run-down sequence, the combustion air fan continues operation to cool down the heater. The fan is automatically switched off after the run-down sequence is complete. The run-down time and the combustion air fan speed depend on the heater operating condition at the time of deactivation. Run-down time is approximately 175 seconds when deactivated in full load operation and approximately 100 seconds when deactivated in part load operation.

3.10.4 DIAGNOSTICS

The DCHA is fully addressable with the DRBIII®. System tests include a Field Mode Test to activate the DCHA for diagnostic testing purposes. The DCHA Control will store up to three DTCs in its memory. If the Controller detects a new fault in the DCHA system, one that is not already stored in its memory, it will clear the oldest of the three stored DTCs, and it will store the new fault's DTC. If the Controller detects a reoccurrence of a stored fault, it will overwrite that fault's DTC with the most recent occurrence.

For vehicles equipped with Automatic Temperature Control (ATC), the AC Cooldown Test will also activate the DCHA for diagnostic testing purposes. The AC Cooldown Test is actuated with the DRBIII. The test checks A/C system performance based on evaporator temperature sensor input. It also forces the ATC to initiate a Cabin Heater Activation request when the vehicle is equipped with a Diesel Cabin Heater Assist (DCHA). The air conditioning related portion of this test will not run if ambient temperature is below 12°C (53°F). However, the forced Cabin Heater activation will occur even if the air conditioning portion of this test fails to initiate because test criteria was not met. The air conditioning related portion of this test will pass if the evaporator temperature drops 6.7°C (20°F) within two minutes of starting this test. Only air conditioning related messages display on the DRBIII® after running this test. These messages will clear after paging back out of this test. Therefore, it is important to note all of the AC Cooldown test messages before doing so. Running the AC Cooldown test will cause the DELAY and Snowflake VF segments on the ATC to flash for 162 seconds. If the air condi-

tioning portion of this test fails, the DELAY and Snowflake VF segments will continue to flash until the vehicle is driven more than three miles.

3.11 INSTRUMENT CLUSTER

The Instrument Cluster receives and sends messages to other modules via the PCI bus circuit. The indicator lamps will illuminate briefly for a bulb check when the ignition is turned from off to run. All of the gauges receive their information via the PCI bus from the powertrain control module and body control module.

The gauges and the LEDs are not individually replaceable thereby requiring complete replacement of the Instrument Cluster if a repair is necessary. In the event that the Instrument Cluster loses communication with other modules on the PCI bus, the cluster will display “no bus” in the VF display.

The Trip/Reset button is used to switch the display from trip to total mileage. Holding the button when the display is in the trip mode will reset the trip mileage. This button is also used to put the cluster into self-diagnostic mode. The odometer display uses blue-green vacuum fluorescent digital characters.

On base models, the Instrument Cluster has three gauges: Speedometer, fuel and temperature. A red dot moves transversely appears through openings in the Instrument Cluster face (P-R-N-D-2-1) to indicate the gear selected.

With other models, the Instrument Cluster may also include a tachometer and use a vacuum-fluorescent shift indicator.

The high-line Instrument Cluster features Electroluminescent Illumination of the gauge faces (EL Panel). This feature eliminates the use of bulbs for gauge/panel lighting. In a manner similar to fluorescent lights, a/c voltage from an inverter integrated circuit chip is applied to the phosphorescent material, causing it to glow. The phosphorescent material is screen-printed onto flexible Mylar sheets that form the gauge faces.

The odometer display and door/liftgate ajar indicators turn on when a door is opened to assist both the customer and service technician to view the odometer without turning the ignition on.

On models with AutoStick, the display includes an O/D OFF indicator that is illuminated when the driver presses the Overdrive Off button on the transaxle shifter.

For complete details of the Instrument Cluster, refer to the RS/RG Service Manual.

3.11.1 INSTRUMENT CLUSTER SELF TEST

1. Depress and hold the Odometer Reset button.
2. Turn the ignition switch to on.
3. Release the Odometer reset button.

The Instrument Cluster will illuminate all indicators and step the gauges through several calibration points. Also, the odometer will display any stored codes that may have set.

3.11.2 MESSAGE CENTER

The Message Center is above the brow of the Instrument Cluster. It houses the following warning indicators: Check Engine/Service Engine Soon, High Beam, Left and Right turn signals, Security Alarm Set, and Low Oil Pressure. On base models equipped with the three-speed transaxle, these indicators appear in the face of the cluster. The Security Alarm set indicator is now a large red circle symbol.

Activation of Instrument Cluster indicators is coordinated with indicators in the message center and EVIC where used to avoid redundancy. A revised safety standard now requires that the seat belt warning lamp in the Instrument Cluster remain lit if the driver seat belt is not buckled. A headlamp out indicator is used to alert the driver when a headlamp is not functioning.

3.12 INTERIOR LIGHTING

3.12.1 COURTESY LAMP CONTROL

The body controller has direct control over all of the vehicle's courtesy lamps. The body computer will illuminate the courtesy lamps under any of the following conditions:

1. Any door ajar and courtesy lamp switch on the headlamp switch is not in the dome off position.
2. The courtesy lamp switch on the headlamp switch is in the dome on position.
3. A Remote Keyless Entry unlock message is received.
4. Driver door unlocked with key (with VTSS only).

3.12.2 ILLUMINATED ENTRY

Illuminated entry will be initiated when the customer enters the vehicle by unlocking the doors with the key fob, or with the key if the vehicle is equipped with vehicle theft alarm. Upon exiting the vehicle, if the lock button is pressed with a door open, illuminated entry will cancel when the door closes. If the doors are closed and the ignition switch is turned on, the illuminated entry also cancels. The illuminated entry feature will not operate if the courtesy lamp switch is in the dome off position.

3.12.3 INTERIOR LIGHTING BATTERY SAVER

If any of the interior lamps are left on after the ignition is turned off, the BCM will turn them off after 8 minutes. To return to normal operation, the courtesy lamps will operate after the dome lamp switch or door ajar switch changes state. The glove box and switched reading lamps require that the ignition be turned to the on/acc position.

3.13 MEMORY SYSTEM

The memory system consists of power driver's seat, power mirror and radio presets. The Memory Seat/Mirror Module (MSMM) is located under the driver's seat. It receives input from the following: driver's manual 8-way seat switch, driver's seat position sensors, PCI bus circuits, and the power mirror sensors. The module uses these inputs to perform the following functions: position the driver's memory seat, both exterior mirrors (during recalls), and send/receive the memory system information over the PCI bus.

The Memory Set Switch is wired to the Body Control Module (BCM). A button (either #1 or #2) pressed on the set switch causes the BCM to send a message to the MSMM which in turn will send a motion status message back to the BCM. If the message from the MSMM indicates no current motion, the BCM will send a recal message to the module. The MSMM will set the seat, exterior mirror and radio to the presets for the indicated driver.

If any one of the memory controlled systems is inoperative from its manual switch, use the schematics and diagnostic information to correct the concern. This manual addresses the memory problems only and it is assumed there is not a basic component failure.

3.13.1 POWER SEAT

The memory power seat provides the driver with 2 position settings for the driver's seat. Each power seat motor is connected to the MSMM with two motor drive circuits. Each circuit is switched between battery and ground. By being able to bi-directionally drive the circuits, the MSMM controls the movement of the motors based on input from the power seat switch or from the position sensors when performing a memory recall. Each motor contains a potentiometer to monitor the seat position. To monitor the position of the motor, the MSMM sends out a 5-volt reference on the sensor supply circuit. The sensor is grounded back to the module on a common ground circuit. Based on the position of the sensor, the MSMM monitors the voltage change through the sensor on a separate signal circuit.

The MSMM stores the input value of each of the four seat potentiometers in memory when the system requests a set. The driver can initiate a memory recall, using either the door mounted memory switch or the RKE transmitter (if the remote linked to memory feature is enabled via the EVIC). When initiated, the MSMM adjusts the four seat sensors (by using the motors) to match the memorized seat position data.

For safety, the memory seat recall is disabled by the MSMM when the vehicle is out of park position or if the speed is not zero. Any obstruction to seat movement over a 2-second delay will cause the seat to stop moving in which case a stalled motor would be detected by the MSMM and the corresponding seat output would be deactivated. However, if the object obstructing the seat is removed, the seat will function normally again.

3.13.2 MEMORY MIRRORS

The driver sideview mirror contains vertical and horizontal bi-directional drive positioning motors and position sensors. The MSMM provides a 5-volt reference on the signal circuit to each position sensor. The sensors share a common ground circuit. The MSMM monitors the position of the mirror motors by measuring the voltage on each signal circuit. When a memory position is set, the MSMM monitors and stores the position of the outside mirror. The MSMM adjusts the mirror to the appropriate positions when a memory recall message is received from the RKE or is requested from the memory set switch.

The power mirror switch during non-memory operation operates the mirror independently of the MSMM.

3.14 OVERHEAD CONSOLE

COMPASS/TEMPERATURE MODULE, COMPASS/MINI-TRIP COMPUTER or ELECTRONIC VEHICLE INFORMATION CENTER

The Compass/Temperature Module (CT), Compass/Mini-Trip Computer (CMTC) or Electronic Vehicle Information Center (EVIC) is located in the overhead console. The CT provides the vehicle operator with only outdoor temperature and the compass heading. The CMTC or EVIC supplements the standard vehicle instrumentation. The CMTC and EVIC use a vacuum fluorescent (VF) display to supply the vehicle operator with a compass heading, outdoor temperature, average fuel economy, distance to empty, instantaneous fuel economy, trip

odometer, elapsed ignition on time, distance to service, warning messages, and service messages.

The difference between a CMTC and an EVIC is that only the EVIC provides additional memory, feature programming, and warning messages. The EVIC is capable of displaying warning messages and memory system messages when the vehicle is equipped with memory systems. The EVIC also provides the interface to enable and disable vehicle programmable features when the vehicle is equipped with certain features.

If equipped, the EVIC is also available with an integrated Universal Garage Door Opener (UGDO) known as HomeLink®. The EVIC may also be equipped with up to 4 power door switches: ON/OFF, Left Sliding Door, Right Sliding Door, and Liftgate.

The CT function buttons are labeled C/T and US/M. The CMTC function buttons are labeled US/M, C/T, RESET, and STEP. The EVIC function buttons are labeled C/T, RESET, STEP, and MENU. The three UGDO buttons are labeled with dots to indicate the channel number.

The BCM supplies most of the information displayed by the CMTC/EVIC. Display information, except for the internal compass function, is received over the PCI bus. The FCM supplies the ambient temperature sensor information via the PCI bus. The CMTC/EVIC sends and receives data over the PCI bus, communicating with the BCM, PCM, FCM, and the Instrument Cluster. Tire Pressure Monitoring System information is received from the SKREEM via PCI bus information. The tire pressure sensors are mounted to the vehicle wheels. For complete information, refer to the Tire Pressure Monitoring System section in this publication.

3.14.1 VEHICLE INFORMATION DISPLAY

The CMTC/EVIC provides the following functions:

- Compass direction
- Outside temperature
- Elapsed ignition on time
- Distance to empty
- Average fuel economy
- Instantaneous fuel economy
- Trip odometer
- Distance to service

The EVIC will also display the following driver alert messages:

- TURN SIGNAL ON (with vehicle graphic)
- PERFORM SERVICE
- DOOR OPEN (individual or multiple doors, with graphic)
- LOW or HIGH TIRE(S) PRESSURE (when equipped)
- ADJUSTABLE PEDAL DISABLED CRUISE ENGAGED (when equipped)
- ADJUSTABLE PEDAL DISABLED VEHICLE IN REVERSE (when equipped)

An audible chime or chimes will accompany any displayed warning messages. Chime requests with an OPEN message are dependent upon vehicle speed.

The CT/CMTC/EVIC will not display information for any of the screens for which it did not receive the proper PCI bus data. Refer to the symptom list in the Overhead Console section for problems related to the CT/CMTC/EVIC.

The CMTC/EVIC receives the following messages from the Body Control Module (BCM):

- Verification of US/Metric status
- VF display dimming brightness and exterior lamp status
- Elapsed Ignition On Time data
- Fuel Economy (Average and Instantaneous)
- Distance to Empty
- Distance to service
- Driver warning messages

The CT/CMTC/EVIC receives the following messages from the Front Control Module (FCM):

- Outside Temperature

The CMTC/EVIC receives the following messages from the Powertrain Control Module (PCM):

- Trip Odometer data
- Vehicle Speed

The EVIC receives the following messages from the Adjustable Pedal System Module (APS):

- APS status warnings

The CT/CMTC/EVIC receives the following messages from the Sentry Key Remote Electronic Entry Module (SKREEM):

- Tire Pressure information

The CMTC/EVIC transmits the following messages to the BCM:

- Status Request: Beep, Reset, US/M Toggle
- Current Display

STEP BUTTON

The STEP Button can be used in one of the following three ways:

1. To sequentially select one of seven displays or blank display in the following order:

- Average Fuel Economy
- Distance to Empty
- Trip Odometer
- Time Elapsed
- Distance to Service Message
- Off (Blank)

2. To set the magnetic variance zone when VARIANCE = X (X = 1 - 15) is indicated in the VF Display.
3. To select the displayed programmable feature setting. (When equipped.)

MENU BUTTON (EVIC only)

For complete information of the programmable features and memory messages, refer to the RS/RG Service Manual.

Use the MENU button to sequentially step the EVIC through the programmable features.

RESET BUTTON

The RESET Button has two different functions:

1. To clear the trip functions that may be reset
2. To enter and exit the diagnostic mode

Pressing the RESET button once will clear the trip function that is currently being displayed (except Distance to Service) and the CMTC/EVIC will send a PCI bus beep request to the BCM. If the RESET button is pressed again within 3 seconds, the CMTC/EVIC will reset ALL of the trip functions and an additional beep request is sent to the BCM. The trip functions that may be reset are:

- Average Fuel Economy
- Trip Odometer
- Elapsed Time

A reset will only occur if one of the trip functions that may be reset is currently being displayed. Pressing the RESET button for more than three (3) seconds resets the Distance to Service function while the Distance to Service message is being displayed. The CMTC/EVIC module will send a beep request to the BCM.

Simultaneously pressing the RESET button and the STEP button while turning the ignition from Off to On will enter the CMTC/EVIC into the self-diagnostic mode.

COMPASS/TEMPERATURE (C/T) BUTTON

Actuating the Compass/Temperature Button (C/T) will cause the CMTC/EVIC to display the compass and temperature information. This function will operate from another traveler display or from the programmable feature mode.

3.14.2 TRAVELER DISPLAY FUNCTIONS

Using the STEP button will change the CMTC/EVIC between modes of operation and display the appropriate information according to data received from the PCI Bus.

COMPASS/TEMPERATURE

The CMTC/EVIC simultaneously displays the compass reading and the outside temperature. Outside temperature information is received via the PCI bus from the FCM.

The CMTC/EVIC module internally senses and calculates the compass direction.

COMPASS OPERATION - ALL

Upon ignition on, if the calibration information stored in the CMTC memory is within the normal range, the CMTC will perform in slow Auto-Cal mode. In slow Auto-Cal mode, the CMTC continuously compensates for the slowly changing magnetic field of the vehicle. The compass module detects changes in the vehicle magnetism and makes appropriate internal corrections to ensure proper displayed direction.

However, if the calibration information stored in the CMTC memory is not within the normal range at ignition on, the CMTC will enter fast Auto-Cal. CAL is displayed along with the temperature.

Auto activation of the fast Auto-Cal mode will also occur when the CMTC is subjected to high magnetic field strength levels, which cause all compass readings to be erroneous for a continuous period of five (5) minutes. During fast Auto-Cal, CAL will be displayed along with the temperature.

Fast Auto-Cal can also be performed manually, by pressing and holding the RESET button for 10 seconds during the Compass/Temperature display mode.

3.14.3 SETTING MAGNETIC ZONE VARIANCE

Variance is the difference between magnetic North and geographic North. For proper compass function, the correct variance zone must be set. Refer to the Zone Variance map for the correct zone. Follow these steps to check or change the variance zone:

CMTC/EVIC:

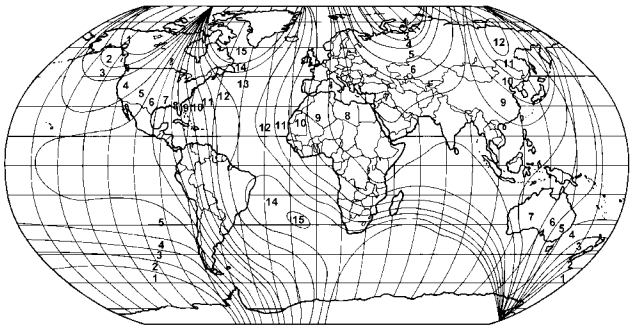
- The ignition switch must be in the On position and the CMTC/EVIC display must not be blank.
- If the compass/temperature data is not currently being displayed, momentarily press and release the C/T button to display compass/temp information.
- Press and hold the RESET button (approximately 5 seconds) until VARIANCE = XX is displayed.

The CMTC/EVIC will display the variance zone stored in memory and the word VARIANCE.

- Use the RESET button to select the proper variance zone number, 1 through 15.
- After selecting the proper zone number, momentarily press and release the RESET button. The variance zone is then stored in the memory and the CMTC/EVIC returns to normal operation.

CT:

- The ignition switch must be in the On position and the C/T display must not be blank.
- Press and hold the C/T and US/M buttons (approximately 5 seconds) until VARIANCE = XX is displayed. The C/T will display the variance zone stored in memory and the word VARIANCE.
- Use the US/M button to select the proper variance zone number, 1 through 15.
- After selecting the proper zone number, momentarily press and release the C/T button. The variance zone is then stored in the memory and the C/T returns to normal operation..



3.14.4 COMPASS CALIBRATION

The compass module has 2 types of auto-calibration; slow-cal and fast-cal. Slow-cal ensures that during normal vehicle operation the compass performs auto-calibration functions to keep the compass sensors in their proper operating range. Whenever the ignition is On and the CT/CMTC/EVIC receives PCI bus data indicating that engine RPM is greater than zero, auto-calibration is performed continuously.

If the calibration information stored in the compass module memory is not within the normal range after a power-up cycle, the compass will display CAL. The CT/CMTC/EVIC will enter into the fast-cal mode until calibration is complete.

To enter the compass into Manual Calibration mode, perform the following steps:

- Drive the vehicle to an area away from any large metal objects or overhead power lines.
- Ensure that the proper variance zone is selected. See ″Setting Magnetic Zone Variance.″
- The ignition switch must be in the On position and the CMTC/EVIC display must not be blank.
- Press the C/T button to view the Compass/ Temperature display.
- Press and hold the RESET button (approximately 10 seconds) until CAL is displayed, then release the button.
- Drive slowly, less than 5 MPH (8KPH) in at least 1 complete 360-degree circle.
- CAL will remain illuminated to alert the driver that the compass is in the calibration mode.
- After calibration is complete, CAL will turn off.

NOTE: For C/T Manual Calibration, perform the same procedure as above, but press and hold the C/T and US/M buttons until CAL is displayed.

If the compass appears blank, unable to be calibrated, or the compass displays false indications, the vehicle must be demagnetized. Refer to Compass Demagnetizing Procedure in the Service Manual.

3.14.5 SELF-CHECK DIAGNOSTICS

The CT/CMTC/EVIC is capable of performing a diagnostic self check on its internal functions. Diagnostics may be performed using a DRBIII® or by using the following procedure:

1. For CMTC/EVIC: With the ignition switch in the OFF position, depress and hold the RESET and the STEP buttons.
   For CT: With the ignition switch in the OFF position, depress and hold the C/T and the US/M buttons.
2. Turn the ignition switch to the ON position.
3. Continue to hold both buttons until the software versions are displayed, then release the buttons.
4. All of the VFD segments will illuminate for 2-4 seconds. Check for segments that do not illuminate or illuminate all the time.
5. When the self-check is complete the EVIC will display one of the following messages:

- PASS SELF TEST
- FAILED SELF TEST
- NOT RECEIVING J1850 MESSAGE
  When the self-check is complete the CT/CMTC will display one of the following messages:
- PASS
- FAIL
- BUS

1. To exit the self-check mode:

For the CMTC/EVIC: Depress the STEP or RESET button, or cycle the ignition switch and the CMTC/EVIC will return to normal operation.

For the C/T: Depress the C/T or US/M button, or cycle the ignition switch and the CT will return to normal operation.

If a Communication fault is displayed, refer to the symptom list. If a FAIL or FAILED is displayed, the CT/CMTC/EVIC must be replaced.

3.14.6 AMBIENT TEMPERATURE SENSOR

The ambient air temperature is monitored by the FCM and displayed by the CT/CMTC/EVIC. The FCM receives a hardwire input from the ambient temperature sensor (ATS).

The ATS is a variable resistor that operates on a 5-volt reference signal circuit hardwired from the FCM. The resistance in the ATS changes as the outside temperature rises or falls. The FCM senses the change in reference voltage through the ATS resistor. Based on the resistance of the ATS, the FCM is programmed to correspond to a specific temperature. The FCM stores and filters the ambient temperature data and transmits this data to the CMTC/EVIC via the PCI Bus. The ATS cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

3.14.7 AMBIENT TEMPERATURE SENSOR FAULT CODES

The outside temperature function is supported by the ambient temperature sensor (ATS), a signal and ground circuit hardwired to the FCM, and the CMTC/EVIC display.

If the ATS sense circuit is shorted to ground, the temp display will be 54°C (130°F) to indicate a SHORT circuit condition.

If the ATS sense circuit is open, the temp display will be -40°C (-40°F) to indicate an OPEN circuit condition.

If there is an OPEN or SHORT circuit condition, it must be repaired before the CMTC/EVIC VFD can be tested.

The ATS is supported by the FCM. Ambient Temperature Sensor DTCs will be recorded in the FCM. The ATS can be diagnosed using the following Sensor Test. Test the ATS circuits using the diagnostics in the Body Diagnostic Procedures Manual. If the CMTC/EVIC passes the self-test, and the ATS, the circuits, and PCI bus communications are confirmed to be OK, but the CMTC/EVIC temperature display is inoperative or incorrect, replace the FCM.

AMBIENT TEMPERATURE SENSOR TEST

1. Turn the ignition OFF.
2. Disconnect the ATS harness connector.
3. Measure the resistance of the ATS using the following min/max values:

- 0° C (32° F) Sensor Resistance = 29.33 - 35.99 Kilohms
- 10° C (50° F) Sensor Resistance = 17.99 - 21.81 Kilohms
- 20° C (68° F) Sensor Resistance = 11.37 - 13.61 Kilohms
- 25° C (77° F) Sensor Resistance = 9.12 - 10.86 Kilohms
- 30° C (86° F) Sensor Resistance = 7.37 - 8.75 Kilohms
- 40° C (104° F) Sensor Resistance = 4.90 - 5.75 Kilohms

The sensor resistance should read between these min/max values. If the resistance values are not OK, replace the Sensor.

3.14.8 HOMELINK® UNIVERSAL TRANSMITTER

If equipped, the HomeLink® Universal Transmitter is integrated into the overhead console. For added security it will operate home security systems that use coded signals known generically as *Rolling Codes*. The overhead console display provides visual feedback to the driver, indicating which HomeLink® transmitter channel button is being pressed. The HomeLink® can learn and store up to three separate transmitter radio frequency codes to operate garage door openers, security gates, and security lighting. The HomeLink® buttons are marked with one, two, or three dots. For complete information, refer to Universal Transmitter in the Service Manual or the Owner's Manual.

3.14.9 TIRE PRESSURE MONITORING SYSTEM (TPMS)

If equipped with the Tire Pressure Monitoring System (TPMS), each of the vehicles four wheels will have a valve stem with a pressure sensor and radio transmitter built in. Signals from the tire pressure Sensor/Transmitter are received and interpreted by the Sentry Key Remote Entry Module (SKREEM). Using the DRBIII®, go to ANTI-THEFT for the SKREEM data.

A Sensor/Transmitter in a mounted wheel will broadcast an RF frequency indicating its pressure once per minute when the vehicle is in drive mode. To activate the Sensor/Transmitter operation, the required SKREEM speed is 13 mph (20 km/h). Each

Sensor/Transmitters broadcast is uniquely coded so that the SKREEM can monitor the states of each Sensor/Transmitter on the vehicle. The SKREEM TPMS does not use a magnet to relearn, it automatically learns while driving after a SKREEM or a Sensor/Transmitter has been replaced.

3.14.9.1 TRAINING THE SKREEM

If a Sensor/Transmitter is replaced, the vehicle has to be parked for at least 15 minutes for the system to be ready to learn the new Sensor/Transmitter ID code. The vehicle then must be driven for a minimum of five minutes with a minimum continuous speed above 13 mph (20 km/h). The system will learn the new Sensor/Transmitter and clear the DTC's automatically. The Sensor/Transmitters are programmed at the assembly plant in this clockwise orientation:

Sensor/Transmitter 1 = Left Front
Sensor/Transmitter 2 = Right Front
Sensor/Transmitter 3 = Right Rear
Sensor/Transmitter 4 = Left Rear

NOTE:

1. **If one or all Sensor/Transmitters cannot be trained, check for and avoid RF interference.**
2. **If one Sensor/Transmitter still cannot be trained, replace it and retry.**
3. **If all Sensor/Transmitters still fail to train, replace the SKREEM.**

3.14.9.2 PRESSURE THRESHOLDS

The SKREEM will monitor the tire pressure signals from the Sensor/Transmitters and determine if any tire has gone below the low-pressure or exceeded the high-pressure thresholds. Refer to the tables below:

LOW TIRE PRESSURE THRESHOLDS	
SYSTEM STATUS INDICATOR	TIRE PRESSURE
ON	193 kPa (28 PSI)
OFF	227 kPa (33 PSI)
HIGH TIRE PRESSURE THRESHOLDS	
SYSTEM STATUS INDICATOR	TIRE PRESSURE
ON	331 kPa (48 PSI)
OFF	296 kPa (43 PSI)

3.14.9.3 ACTIVE FAULT AND SYSTEM ALERTS

An active fault will be triggered when a system failure has been detected. When this occurs, the Instrument Cluster will illuminate the TPMS indicator and the SKREEM will store the fault code. An alert will be triggered when a tire pressure has gone below and above the set threshold pressure. The SKREEM will request a message to be displayed on the EVIC (if equipped). Only when a tire pressure has gone below the set threshold pressure will the SKREEM illuminate the TPMS indicator and request the EVIC message (if equipped). This action will be displayed as long as the fault/alert condition is active.

3.15 POWER DOOR LOCK SYSTEM

When the BCM receives input for a lock request from a door lock switch, RKE or cylinder lock switch (only with VTSS), it will turn the lock drivers on for a specified time of 375 msec. If the request is there beyond 375 msec, the BCM considers the door lock signal stuck. Once a door lock or unlock signal is stuck for longer than 10 seconds, the BCM will set a trouble code and the signal input is ignored until the stuck condition disappears. The door lock switches provide a variable amount of resistance thereby dropping the voltage of the multiplexed (MUX) circuit and the BCM will respond to that command.

3.15.1 DOOR LOCK INHIBIT

When the key is in the ignition and in any position and either front door is open, the door lock switches LOCK functions are disabled. The UNLOCK functions are still functional. This protects against locking the vehicle with the keys still in the ignition. The RKE key fob will still lock the doors as usual. After the key is removed from the ignition or the doors are closed, the power door locks will operate normally.

3.15.2 AUTOMATIC DOOR LOCKS

This feature can be enabled or disabled by using either the DRBIII® or the customer programming method. When enabled all the doors will lock when the vehicle reaches a speed greater than 18 MPH (29 KMH) and all the doors are closed. If a door is opened and the vehicle slows to below 18 MPH (29 KMH), the door locks will operate again once all doors are closed and the speed is above 18 MPH (29 KMH).

3.15.3 REMOTE KEYLESS ENTRY (RKE)

The RKE transmitter uses radio frequency signals to communicate with the SKREEM module. The SKREEM is on the PCI bus. When the operator presses a button on the transmitter, it sends a specific request to the SKREEM. In turn the SKREEM sends the appropriate request over the PCI Bus to the:

- Body Control Module (BCM) to control the door lock and unlock functions, the arming and disarming of the Vehicle Theft Security System (if equipped), and the activation of illuminated entry.
- Integrated Power Module (IPM) to activate the park lamps, the headlamps, and the horn for horn chirp.
- Power Liftgate Module (PLGM) to control the liftgate operation (double press).
- Power Sliding Door Module (PSDM) to control the sliding door operation (double press).

After pressing the lock button on the RKE transmitter, all of the door locks will lock, the illuminated entry will turn off (providing all doors are closed), and the vehicle theft security system (if equipped) will arm. After pressing the unlock button, on the RKE transmitter, one time, the driver door lock will unlock, the illuminated entry will turn on the courtesy lamps, and the vehicle theft security system (if equipped) will disarm. After pressing the unlock button a second time, the remaining door locks will unlock. The EVIC or the DRBIII® can reprogram this feature to unlock all of the door locks with one press of the unlock button. If the vehicle is equipped with the memory system, the memory message will identify which transmitter (1 or 2) sent the signal.

The SKREEM is capable of retaining up to 8 individual access codes (8 transmitters). If the PRNDL is in any position except park, the SKREEM will disable the RKE. The 3 or 6 button transmitter uses 1-CR2032 battery. The minimum battery life is approximately 5 years based on 20 transmissions a day at 84°F (25°C). Use the DRBIII® or the Miller Tool 9001 RF Detector to test the RKE transmitter. Use the DRBIII® or the customer programming method to program the RKE system. However, the SKREEM will only allow RKE programming when the ignition is in the on position, the PRNDL is in park position, and the VTSS (if equipped) is disarmed.

3.15.3.1 PANIC FUNCTION

Pressing the panic button on the RKE transmitter will cause the headlamp relay, the park lamp relay, and the horn relay to pulsate, which in turn will cause the exterior lamps to flash and the horn to sound intermittently. It will also cause the courtesy lamp relay to actuate, turning on the courtesy lamps. Pressing the panic button again stops the headlamps and the park lamps from flashing and the horn from sounding. However, the courtesy lamps will remain on until either the BCM times out lamp operation or until the ignition is turned on. The panic feature operates for three minutes at a time, unless the operator cancels it, or the ignition is turned on.

Actuating the headlamp, horn, park lamps, and courtesy lamps with the DRBIII® will verify if the circuits and the Integrated Power Module are OK. If the panic feature is still inoperable with all transmitters, it will be necessary to replace the SKREEM. If the function is inoperable with just one transmitter, then replace only that transmitter.

3.15.3.2 ROLLING CODE

The rolling code feature changes part of the transmitter message each time that it is used. The transmitter message and the receiver message increment together. Under certain conditions with a rolling code system (pressing a button on the RKE transmitter over 255 times outside the receiver range, battery replacement, etc.), the receiver and transmitter can fall out of synchronization. Note: The lock function works from the RKE transmitter even in an out of synchronization condition and therefore it could be verified by pressing the LOCK button on the RKE integrated key. To resynchronize, press and release the UNLOCK button on the RKE transmitter repeatedly (it may take up to eight cycles) while listening carefully for the power door locks in the vehicle to cycle, indicating that resynchronization has occurred.

3.15.3.3 PROGRAMMABLE DOOR LOCK FEATURES

- The RKE can be changed to unlock all doors with one press
- The Automatic Door Locks can be enabled/disabled
- Auto Unlock on Exit can be enabled/disabled
- RKE horn chirp on lock can be enabled/disabled
- RKE optical chirp (turn signal lamps) can be enabled/disabled
- Program a new RKE transmitter.
- RKE linked to memory (if equipped with memory system) enabled/disabled (DRBIII® only). Allows memory to be operable only from the driver door switch.

3.16 POWER FOLDING MIRRORS

The power folding mirrors are powered to two positions: folded and unfolded. The driver may choose fold or unfold with a switch that is located on the right side of the steering column. The folding mirror switch grounds a sense wire that comes from the Body Control Module when it is placed in the fold position. The mirrors will move to the position designated by the switch whether the ignition switch is the On or Off position and both front doors are closed. When the Power Folding Mirror switch is left in the fold position during a vehicle exit the mirrors will automatically unfold then refold after both front doors are closed. This is to prevent mirror contact with either front door when opened. When opening either front door, the Body Control Module will unfold the mirrors in the following manner depending on which front door is opened. If the driver door is opened, only the driver side mirror will unfold. If the passenger door is opened, both mirrors will unfold. The passenger mirror is prevented from unfolding when the driver's door is opened by the Passenger Folding Mirror Relay, which opens the driver circuit to the passenger side mirror.

3.17 POWER LIFTGATE SYSTEM

3.17.1 POWER LIFTGATE

The power liftgate (PLG) system is activated through the use of the following: remote keyless entry (RKE), overhead console switches, outside liftgate handle switch or the DRBIII®. These inputs are hardwired to the body control module (BCM) and can be monitored with a diagnostic tool. The BCM will send the message via PCI bus to the power liftgate module (PLGM). The liftgate must be in the full open or full closed position to operate. Once the BCM sends a button activation message to the PLGM, the module shall read all inputs, outputs and vehicle conditions to determine whether it shall open, close or inhibit the PLG operation. Once the PLGM determines the vehicle conditions are safe for operation, the PLGM will initiate a chime for 2 seconds prior to the liftgate activation and 2 seconds during the open or close cycle.

During an opening or closing cycle, the PLGM can detect an obstacle present should it meet sufficient resistance by the hall effect sensors (integrated in the gear motor assembly GMA).

During an open cycle, multiple liftgate activations (RKE, overhead console, B pillar) are ignored until the liftgate reaches the full open position. However, during a close cycle, a 2nd liftgate activation (RKE, overhead console, B pillar) will reverse the liftgate to the full open position.

If the engine is cranked during a power open/close the PLG will pause then resume after engine cranking. In addition, if the vehicle is placed in gear during an open cycle, the PLG shall reverse direction and begin closing. If the vehicle is placed in gear during a closing cycle, the PLG shall continue closing until fully closed. If the outside handle is activated during an open cycle, the PLG will become a full manual liftgate. If the outside handle is activated during a close cycle, the PLG shall reverse direction of travel to the full open position.

3.17.2 DIAGNOSTIC FEATURES

The PLG can be flashed on vehicle via PCI bus with a DRBIII® diagnostic tool. The DRBIII® can read all inputs, actuate all outputs, read module information, and read diagnostic trouble codes. As a reminder, some DTC's can be set during normal PLG operation.

3.17.3 SYSTEM INHIBITORS

1. Battery voltage too high or too low (above 16V, below 9.5V)
2. Vehicle in gear
3. Vehicle speed > 0 mph/km/h
4. Outside temperature too high, above 143°F (62°C) or too low, below -12°F (-24°C).
5. O/H console lockout will inhibit the B pillar switches only.
6. Liftgate locked will inhibit all interior switches from opening (overhead console). A locked liftgate can be power closed.
7. Pinch Sensor switch stuck shall inhibit the power close feature.

3.18 POWER SLIDING DOOR SYSTEM

3.18.1 POWER SLIDING DOOR

The Power Sliding Door (PSD) system is activated through the use of the following: Remote Keyless Entry (RKE), overhead console switches, B pillar switches or the DRBIII®. These inputs are hardwired to the body control module (BCM) and can be monitored with a diagnostic tool. The BCM will send the message via PCI bus to the power sliding door module (PSDM). The sliding door must be in the full open or full closed position to operate. Once the BCM sends a button activation message to the PSDM, the module shall read all inputs, outputs and vehicle conditions to determine whether it shall open, close or inhibit the PSD operation. During an opening or closing cycle, the PSDM can detect an obstacle present should it meet sufficient resistance by the hall effect sensors (integrated in the drive motor).

During an open cycle, multiple door activations (RKE, overhead console, B pillar) are ignored until the door reaches the full open position. However, during a close cycle, a 2nd door activation (RKE, overhead console, B pillar) will reverse the door to the full open position.

If the engine is cranked during a power open/close the PSD will pause then resume after engine cranking. In addition, if the vehicle is placed in gear during an open cycle, the PSD shall reverse direction and begin closing. If the vehicle is placed in gear during a closing cycle, the PSD shall continue closing until fully closed.

If the inside or outside handle is activated during an open or close cycle, the PSD will become a full manual sliding door. The child lockout is mechanical only and has no effect on the B-pillar switch as it did in previous models.

There is only one part number for the power sliding door module (PSDM). The driver sliding door harness has an additional ground circuit which will identify it as the driver side. This eliminates the need for a left and a right side module.

3.18.2 DIAGNOSTIC FEATURES

The PSDM can be flashed on vehicle via PCI bus with a DRBIII® diagnostic tool. The DRBIII® can read all inputs, actuate all outputs, read module information, and read diagnostic trouble codes. As a reminder, some DTC's can be set during normal PSD operation.

3.18.3 SYSTEM INHIBITORS

1. Battery voltage too high or too low (above 16V, below 9.5V)
2. Vehicle in gear
3. Vehicle speed > 0 mph/km/h
4. O/H console lockout will inhibit the B pillar switches
5. Doors locked will inhibit all interior switches from opening (Overhead Console, B Pillar). A locked sliding door can be power closed.

3.19 REAR WINDOW DEFOG/HEATED MIRROR/FRONT WIPER DE-ICE (IF EQUIPPED)

The defroster button located on the HVAC control controls the rear window defogger, heated side view mirrors and front wiper de-icer grid. In addition the front wiper de-ice function is turned on when front defog/defrost mode is selected.

When the defroster button is pushed, the HVAC control sends a bus message over the PCI bus to the Front Control Module (FCM) which controls the Rear Window Defogger relay. The defroster LED will illuminate when the defroster function is on. The defroster will function for 10 minutes or can be cycled off sooner by pressing the defroster button again. The front wiper de-icer grid receives its 12 volts from the accessory relay through fuse 11 and the HVAC control module supplies the grid ground.

3.20 VEHICLE THEFT SECURITY SYSTEM

The Vehicle Theft Security System (VTSS) is part of the Body Control Module (BCM). The BCM monitors the vehicle doors, liftgate (export only), hood (export only), and the ignition for unauthorized operation. The alarm activates by sounding the horn, flashing the headlamps and the VTSS indicator lamp. The VTSS does not prevent engine operation, this is done with the Sentry Key Immobilizer Module (SKIM). The VTSS indicator lamp will flash for approximately 15 seconds during the arming process. If there is no interruption during the arming process, upon completion the VTSS indicator lamp will flash at a slower rate. When the BCM receives an input to trigger the alarm, the BCM will control the outputs of the headlamps, horn, and VTSS lamp for approximately 15 minutes.

Arming (Active and Passive)

Active arming occurs when the ignition key is removed, the RKE transmitter or door key cylinders are used to lock the vehicle doors, whether the doors are open or closed. The arming process is complete only after all doors are closed.

Passive arming occurs when the ignition key is removed, the driver door is opened, and the doors are locked with the power door lock switch, and the door is closed.

Disarming (Active and Passive)

Active disarming occurs when the RKE transmitter is used to unlock the vehicle doors. This disarming will also halt the alarm once it has been activated.

Passive disarming occurs upon normal vehicle entry (unlocking driver door with the key) or turning the ignition switch on with a valid skim key. This disarming will also halt the alarm once it has been activated.

Tamper Alert

The VTSS tamper alert will sound the horn three times upon disarming after an initial alarming has occurred to indicate a tamper condition has occurred.

Manual Override

The system will not arm if the doors are locked using the manual lock control or if the locks are actuated by an inside occupant after the doors are closed.

Diagnosis

For complaints about the Vehicle Theft Alarm triggering on its own, use the DRBIII® and read the Last VTSS Cause status.

3.20.1 THATCHAM ALARM SYSTEM (EXPORT ONLY)

The Thatcham Alarm Module monitors the vehicle doors, liftgate, hood and the interior of the vehicle for unauthorized operation. The vehicle doors, liftgate, and hood use ajar switches as inputs to the BCM to indicate their current status. The interior of the vehicle is secured by the use of Intrusion Sensors. The Intrusion Sensors are used as inputs to the Thatcham Alarm Module to report any motion in the interior of the vehicle. The alarm activates by sounding the siren, flashing the hazard lamps, and the VTSS Indicator Lamp.

Arming

Before arming, all doors, liftgate, and the hood must be completely closed. The system can only be armed by locking the doors with the RKE transmitter.

Disarming

To disarm the alarm system, use the RKE transmitter or turn the ignition on with a valid SKIM key. This will also halt the alarm once it has been activated.

NOTE: A powertrain control module from a vehicle equipped with a vehicle theft security system cannot be used in a vehicle that is not equipped with a vehicle theft security system. If the VTSS indicator lamp comes on after ignition on and stays on, the PCI Bus Communication with the powertrain control module has possibly been lost.

3.21 WIPER SYSTEM

3.21.1 FRONT WIPER

The front wiper/washer system consists of the following features: lo-hi-speed, mist wipers, intermittent wipers and wipe after wash. The front wiper system is only active when the ignition switch is in the RUN/ACC position. The vehicle operator selects the front wiper function using the front wiper switch (a resistive multiplexed stalk switch) which is integral to the Multi-Function Switch. The front wiper switch is hardwired to the Body Control Module (BCM). Upon receiving a wiper switch signal, the BCM sends a PCI Bus message to the Front Control Module (FCM). The FCM controls the ON/OFF relay, the HIGH/LOW relay and the front and rear washer pump motors.

The Wiper system utilizes the BCM to control the on/off and hi/low relays for the low and hi speed wiper functions, intermittent wiper delay as the switch position changes, pulse wipe, wipe after wash mode and wiper motor functions. The BCM uses the vehicle speed input to double the usual delay time below 10 MPH (16 KPH).

3.21.2 SPEED SENSITIVE INTERMITTENT WIPE MODE

There are 5 individual delay time settings with a minimum delay of 1.7 seconds to a maximum of 18.4 seconds. When the vehicle speed is under 10 MPH (16 KPH), the delay time is doubled, providing a delay range of 3.4 seconds to 36.8 seconds.

3.21.3 PULSE WIPE

When the wiper is in the off position and the driver presses the wash button for more than .062 seconds, but less than .5 seconds, 2 wipe cycles in low speed mode will be provided.

3.21.4 PARK AFTER IGNITION OFF

Because the wiper relays are powered from the battery, the BCM can run the wipers to park after the ignition is turned off.

3.21.5 WIPE AFTER WASH

When the driver presses the wash button for over .5 seconds and releases it, the wiper will continue to run for 2 additional wipe cycles.

3.21.6 REAR WIPER

The rear wiper/washer system consists of the following features: mist wipers, intermittent wipers and wipe after wash. The rear wiper system is only active when the ignition switch is in the RUN/ACC position. The vehicle operator selects the rear wiper function using one of the three buttons on the dash mounted rear wiper switch. The rear wiper switch is hardwired to the Body Control Module (BCM). Upon receiving a wiper switch signal, the BCM provides 12 volts to the rear wiper motor. Rear washer occurs when the BCM receives a rear washer switch ON input. The BCM sends a PCI Bus message to the FCM requesting rear washer on. The FCM activates the rear washer by providing a ground for the rear washer motor.

3.21.7 SPEED SENSITIVE INTERMITTENT WIPE MODE

The delay setting of the rear wiper system is based solely on the vehicle speed. The delay time is defined as the amount of time from the start of a