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Important

The Powertrain Control Module and Transmission Control Module have been combined into single control module on all vehicles equipped with a 2.4L and 3.7L engines. This new module is the Next Generation Controller (NGC). New Diagnostics procedures along with new DTC's are two of the changes you will see which reflect the new combined module technology. The NGC modules will have four color coded connectors C1/A through C4/D, (C1-BLK, C2-ORANGE, C3-WHITE, C4-GREEN). Each PCM connector has 38 pins. Two new tools were introduced to help diagnose and repair the new PCM (NGC) terminals and harness connectors. The Miller #3638 terminal removal pick must be used to release the connector terminals, or harness and connector damage will occur. Also, the Miller #8815 Pin Out Box was introduced. You must use the Miller #8815 tool instead of probing the PCM terminals, or harness and connector damage will occur. There is also a new Verification test and module replacement procedure for the new PCM.

1.0 INTRODUCTION

The procedures contained in this manual include specifications, instructions, and graphics needed to diagnose the PCM Powertrain System. **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″ condition, you must diagnose this first before proceeding.
2. Read DTCs (diagnostic trouble codes) with the DRBIII®.
3. If no DTCs 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 system schematic diagrams are in Section 10.0. All charts and graphs are in section 11.0.

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

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

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

After using this book, if you have any comments or recommendations, please fill out the form at the back of the book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic procedure manual covers Powertrain, Transmission, and Transfer Case diagnostics for 2005 KJ vehicles equipped with the Next Generation Control Module (NGC).

1.2 SIX-STEP TROUBLE SHOOTING PROCEDURE

Diagnosis of the Powertrain Control Module (PCM) 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 Powertrain Control Module (PCM) monitors and controls:

- fuel system
- ignition system
- charging system
- speed control system
- The NGC control module is used on the 2.4L and 3.7L engines with an automatic or manual transmission.
- The 42RLE transmission can be identified by confirming a Solenoid/Pressure Switch Assembly located on the right side of the transmission, The Transmission Range Sensor, Input Speed Sensor and Output Speed Sensor are located on the left side of the transmission. Refer to the Service Information for transmission ID tag descriptions.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 GENERAL DESCRIPTION

POWERTRAIN

The on-board OBDII diagnostics incorporated with the PCM are intended to assist the field technician in repairing vehicle problems by the quickest means.

TRANSMISSION

The 42RLE electronic Transmission is a conventional Transmission in that it uses hydraulically applied clutches to shift a planetary gear train. However, the electronic control system replaces many of the mechanical and hydraulic components used in conventional transmission valve bodies.

3.2 FUNCTION OPERATION

3.2.1 FUEL CONTROL (GAS)

The PCM controls the air/fuel ratio of the engine by varying fuel injector-on time. Mass air flow is calculated using the speed density method using engine speed and manifold absolute pressure (IAT is a modifier in Speed Density).

Different fuel calculation strategies are used depending on the operational state of the engine. During crank mode, a prime shot fuel pulse is delivered followed by fuel pulses determined by a crank time strategy. Cold engine operation is determined via an open loop strategy until the O2 sensors have reached operating temperature. At this point, the strategy enters a closed loop mode where fuel requirements are based upon the state of the O2 sensors, engine speed, MAP, throttle position, air temperature, battery voltage, and coolant temperature.

3.2.2 ON-BOARD DIAGNOSTICS

The PCM has been programmed to monitor any circuit or system that has an effect on vehicle emissions, or is used by the PCM to determine the proper functionality of these systems. This monitoring is called ″on-board diagnosis.″

Certain criteria or, ″arming conditions″, must be met before a trouble code will be entered into the PCM memory. The criteria range from engine rpm, engine temperature, and/or input voltage to the PCM. If a problem is detected with a monitored circuit, and all of the criteria or arming conditions are met, a trouble code will be stored in the PCM.

It is possible that a trouble code for a monitored circuit may not be entered into the PCM/ECM memory even though a malfunction has occurred. This may happen because one of the trouble code criteria (arming conditions) has not been met.

The PCM compares input signal voltage from each input component to specifications (the established high and low limits of the range) that are preprogrammed for that component. If the input voltage is not within specifications, and other trouble code criteria (arming conditions) are met, a trouble code will store in the PCM memory.

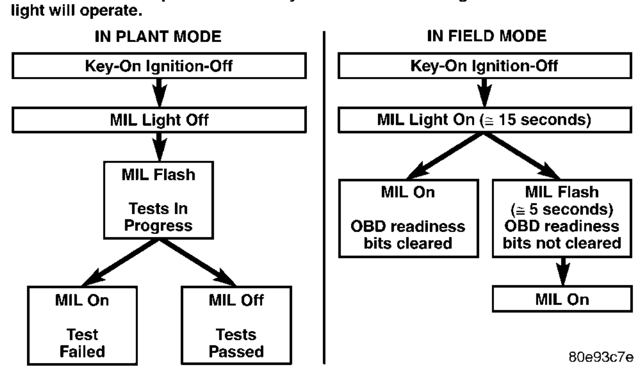
The On Board Diagnostics have evolved to the second Generation of Diagnostics referred to as OBDII. These OBDII Diagnostics control the functions necessary to meet the requirements of California OBDII and Federal OBD regulations. These requirements specify the inclusion of a Malfunction Indicator Light (MIL) located on the instrument panel for all 1994 and subsequent model-year passenger cars, light duty trucks, and medium-duty vehicles. The purpose of the MIL is to inform the vehicle operator in the event of the malfunction of any emission system or component failures that can affect emissions and which provide input to, or receive output from, the PCM.

MIL Lamp Strategy

I/M Readiness OK to test = **Key On Engine OFF** - MIL Lamp will remain on until the vehicle is started or Ignition is turned off.

I/M not ready for testing = **Key On Engine OFF** - MIL Lamp on solid for (15) seconds then MIL Lamp will flash on/off for (5) seconds then it will remain on until the vehicle is started or the Ignition is turned off.

In order to meet mandated regulations, a new feature has been added to engine control modules for 2002 to provide an OBDII I/M (In-Field Inspection & Maintenance) readiness indicator. When the engine controller is in in-field mode, turning the key on with the engine off will activate the MIL light for approximately 15 seconds. After this time, if the vehicle is ready for I/M testing the MIL light will remain fully illuminated. If the vehicle is not ready, the MIL light will blink for approximately 5 seconds and then remain on until the first engine crank or the key is turned off. This differs from the previous behavior of the MIL light, which was only activated with a failure in the system. For in-plant mode, the MIL light will function as in previous model years. Below are diagrams of how the MIL light will operate.



The following table summarizes the various OBDII monitors operation.

OBD II Monitor Operation

Comprehensive Components Monitor	**Major Monitors Non Fuel Control & Non Misfire**	**Major Monitors Fuel Control & Misfire**
Run constantly	Run Once Per Trip	Run constantly
Includes All Engine Hardware Sensors, Switches, Solenoids, etc.	Monitors Entire Emission System	Monitors Entire System
Most are One Trip Faults - Usually Turns On The MIL and Sets DTC After One Failure	Most are Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failure	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failure
Priority 3	**Priority 1 or 3**	**Priority 2 or 4**
All Checked For Continuity Open Short To Ground Short To Voltage Inputs Checked For Rationality Outputs Checked For Functionality	Done Stop Testing = Yes Oxygen Sensor Heater Oxygen Sensor Response Catalytic Converter Efficiency Except EWMA up to 6 tests per trip and a one trip fault (SBEC) and a two-trip fault on JTEC	**Fuel Control Monitor** Monitors Fuel Control System For: Fuel System Lean Fuel System Rich Requires 3 Consecutive *Fuel System Good Trips* to Extinguish the MIL
	EGR System Evaporative Emission System (Purge and Leak) Non-LDP or LDP	**Misfire Monitor** Monitors for Engine Misfire At: 4 X 1000 RPM Counter (4000 Revs) (Type B) **200 X 3 (600) RPM Counter (Type A)
Requires 3 Consecutive Good Trips to Extinguish the MIL*	Requires 3 Consecutive Good Trips to Extinguish the MIL*	Requires 3 Consecutive *Good Trips* To Extinguish the MIL
***40 Warm Up Cycles** are required to erase DTCs after the MIL has been extinguished.		**Type A misfire is a one trip failure on pre-1999, 2 Trip failure on 1999 and later. The MIL will illuminate at the first or second failure, based on MY.

OBDII MONITOR RUN PROCESS NGC VEHICLES

The following procedure has been established to assist Chrysler Dealer Technicians in the field with enabling and running OBD II Monitors. The order listed in the following procedure is intended to allow the technician to effectively complete each monitor and to set the CARB Readiness Status in the least time possible.

NOTE

A. Once the monitor run process has begun, do not turn off the ignition. By turning the ignition key off, monitor enabling conditions will be lost. NVLD Monitor runs after key off.

B. By performing a Battery Disconnect, or Selecting Erase DTCs, the CARB Readiness and all additional OBD II information will be cleared.

Monitor Preliminary Checks:

1. Plug a DRB III® into the vehicle's DLC.
2. Turn the ignition, KEY ON - ENGINE OFF. Watch for MIL lamp illumination during the bulb check. MIL lamp must have illuminated, if not, repair MIL lamp.
3. On the DRB III® Select #1 DRBIII® Standalone.
4. Select #1 1998-2003 Diagnostics
5. Select #1 Engine
6. Select #2 DTCs and Related Functions
7. Select #1 Read DTCs

* Verify that No Emissions Related DTCs are Present.

* If an Emissions DTC is Present, the OBD II Monitors may not run and the CARB Readiness will not update.

*The Emissions related DTC, will need to be repaired, then cleared. By clearing DTCs, the OBD Monitors will need to be run and completed to set the CARB Readiness Status.

8. Return to Engine Select Function Menu and Select #9, OBD II Monitors.
9. Select #3 CARB Readiness Status.

Do all the CARB Readiness Status Locations read **YES**?

***YES**, then all monitors have been completed and this vehicle is ready to be I/M or Emission Tested.

***NO**, then the following procedure needs to be followed to run/complete all available monitors.

NOTE

A. Only the monitors, which are not YES in the CARB Readiness Status, need to be completed.

B. Specific criteria need to be met for each monitor. Each monitor has a Pre-Test screen to assist in running the monitor.

For additional information, refer to the Chrysler Corporation Technical Training Workbook titled On Board Diagnostics: OBDII/EOBD, part number 81-699-01050.

C. The most efficient order to run the monitors has been outlined below, including suggestions to aid the process.

1. Natural Vacuum Leak Detection with Purge Monitor

This monitor requires a cool down cycle, usually an overnight soak for at least 8 hours without the engine running. The ambient temperature must decrease overnight - parking the vehicle outside is advised. To run this test the fuel level must be between 15-85% full. For the monitor run conditions select the EVAP MON PRE-TEST in the DRB III®, OBD II Monitors Menu. The Purge monitor will run if the small leak test reports a pass.

Criteria for NVLD monitor

1) Engine off time greater than one hour
2) Fuel Level between 15% and 85%
3) Start Up ECT and IAT within 10° C (18° F).
4) Vehicle started and run until Purge Monitor reports a result.

Note: If the vehicle does not report a result and the conditions where correct. It may take up to two weeks to fail the small leak monitor. DO NOT use this test to attempt to determine a fault. Use the appropriate service information procedure for finding a small leak. If there are no faults and the conditions are correct this test will run and report a pass. Note the Small leak test can find leaks less than 10 thousands of an inch. If a small leak is present it takes approximately one week of normal driving to report a failure.

2. Catalyst / O2 Monitor

With NGC, Catalyst and O2 Monitor information are acquired and processed at the same time. Most vehicles will need to be driven at highway speed (< 50 mph) for a few minutes. Some trucks run the monitor at idle in drive. If the vehicle is equipped with a manual transmission, using 4th gear may assist in meeting the monitor running criteria. For the monitor run conditions, select the BANK 1 CAT MON PRE-TEST in the DRB III®, OBD II Monitors Menu.

3. EGR Monitor

The EGR monitor now runs in a closed throttle decel or at idle on a warm vehicle. However, it is necessary to maintain the TPS, Map and RPM ranges to allow the monitor to complete itself. For the monitor run conditions, select the EGR PRE-TEST in the DRB III®, OBD II Monitors Menu.

4. O2 Sensor Heater Monitor

This monitor is now continuously running once the heaters are energized. Pass information will be processed at power down. For the monitor run conditions, select the O2S HEATER MON PRE-TEST in the DRB III®, OBD II Monitors Menu.

3.2.3 TRANSMISSION CONTROL

The 42RLE electronic Transmission has a fully adaptive control system. The system performs it's functions based on continuous real-time sensor feedback information. The control system automatically adapts to changes in engine performance and friction element variations to provide consistent shift quality. The control system ensures that clutch operation during upshifting and downshifting is more responsive without increased harshness. The Powertrain Control Module (PCM) continuously checks for electrical problems, mechanical problems, and some hydraulic problems. When a problem is sensed, the PCM stores a diagnostic trouble code. Some of these codes cause the Transmission to go into Limp-in mode. While in this mode, electrical power is taken away from the Transmission via the PCM, de-energizing the transmission control relay, and taking power from the solenoid pack. When this happens, the only Transmission mechanical functions are:

Park and Neutral
Reverse
Second Gear

No upshifts or downshifts are possible. The position of the manual valve alone allows the three ranges that are available. Although vehicle performance is seriously degraded while in this mode, it allows the owner to drive the vehicle in for service.

Once the DRBIII® is in the Transmission portion of the diagnostic program, it constantly monitors the transmission to see if the system is in Limp-in mode. If the Transmission is in Limp-in mode, the DRBIII® will flash the red LED.

When a problem is sensed, the PCM stores a diagnostic trouble code (DTC). Some of these codes cause the transmission to go into ″limp-in″ or ″default″ mode.

Once the DRBIII is in the ″Transmission″ portion of the diagnostic program, it constantly monitors the PCM to see if the system is in limp-in mode. If the transmission is in limp-in mode, the DRBIII® will flash the red LED.

3.2.3.1 TRANSMISSION OPERATION AND SHIFT SCHEDULING AT VARIOUS OIL TEMPERATURES

The transmission covered in this manual has unique shift schedules depending on the temperature of the transmission oil. The shift schedule is modified to extend the life of the transmission while operating under extreme conditions.

The oil temperature is measured with a Temperature Sensor on the 42RLE transmission. The Temperature Sensor is an integral component of the Transmission Range Sensor (TRS). If the Temperature Sensor is faulty, the transmission will default to a calculated oil temperature. Oil temperature will then be calculated through a complex heat transfer equation using engine coolant temperature, battery/ambient temperature, and engine off time from the Body Control Module (BCM). These inputs are received from the PCI bus periodically and used to initialize the oil temperature at start up. Once the engine is started, the PCM updates the transmission oil temperature based on torque converter slip speed, vehicle speed, gear, and engine coolant temperature to determine an estimated oil temperature during vehicle operation. Vehicles using calculated oil temperature track oil temperature reasonably accurate during normal operation. However, if a transmission is overfilled, a transmission oil cooler becomes restricted, or if a customer drives aggressively in low gear, the calculated oil temperature will be inaccurate. Consequently the shift schedule selected may be inappropriate for the current conditions. The key highlights of the various shift schedules are as follows:

<u>**Extreme Cold:** Oil temperature at start up below 26.6°C (-16 °F)</u>

> Goes to Cold schedule above -24°C (-12°F) oil temperature

> Park, Reverse, Neutral and 2nd gear only (prevents shifting which may fail a clutch with frequent shifts)

<u>**Cold: Oil temperature at start up above -24°C (-12°F) and below 2.2°C (36°F)**</u>

> Goes to Warm schedule above 4.4°C (40°F) oil temperature

> Delayed 2-3 upshift approximately 35-50 Km/h (22 - 31 MPH)

> Delayed 3-4 upshift 72-85 Km/h (45-53 MPH)

> Early 4-3 coastdown shift approximately 48 Km/h (30 MPH)

> Early 3-2 coastdown shift approximately 27 Km/h (17 MPH) ?

> High speed 4-2, 3-2, 2-1 kickdown shifts are prevented
> No EMCC

Warm: Oil temperature at start up above 2.2°C (36°F) and below 27°C (80°F)

> Goes to a Hot schedule above 27°C (80°F) oil temperature
> Normal operation (upshifts, kickdowns, and coastdowns)
> No EMCC

Hot: Oil temperature at start up above 27°C (80°F)

> Goes to a Overheat schedule above 115°C (240°F) oil temperature
> Normal operation (upshifts, kickdowns, and coastdowns)
> Full EMCC, No PEMCC except to engage FEMCC, except at closed throttle at speeds above 113-133 Km/h (70 - 83 MPH)

Overheat: Oil temperature above 115°C (240 °F) or engine coolant temperature above 118°C (244°F)

> Goes to a Hot below 110°C (230°F) oil temperature or a Super Overheat above 115°C (240°F) oil temperature
> Delayed 2-3 upshift 40-51 Km/h (25-32 MPH)
> Delayed 3-4 upshift 66-77 Km/h (41-48 MPH)
> 3rd gear FEMCC from 48-77 Km/h (30-48 MPH)
> 3rd gear PEMCC from 43-50 Km/h (27-31 MPH)

Super Overheat: Oil temperature above 127°C (260°F)

> Goes back to a Overheat below 115°C (240°F) oil temperature
> All a Overheat shift schedules features apply
> 2nd gear PEMCC above 35 Km/h (22 MPH)
> Above 35 Km/h (22 MPH) the torque converter will not unlock unless the throttle is closed (i.e. at 80 Km/h (50 MPH) a 4th FEMCC to 3rd FEMCC shift will be made during a part throttle kickdown or a 4th FEMCC to 2nd PEMCC shift will be made at wide open throttle) or if a wide open throttle 2nd PEMCC to 1 kickdown is made.

Causes for operation in the wrong temperature shift schedule:

Extreme Cold or Cold shift schedule at start up:

> Temperature Sensor circuit.
> Overheat or Super Overheat shift schedule after extended operation:
> Operation in city traffic or stop and go traffic
> Engine idle speed too high
> Aggressive driving in low gear
> Trailer towing in OD gear position (use 3 position (or A/S 3rd) if frequent shifting occurs)
> Cooling system failure causing engine to operate over 110°C (230°F)
> Engine coolant temperature stays low too long - If engine coolant temperature drops below 65°C (150°F), the transmission will disengage EMCC. Extended operation with the EMCC disengaged will cause the transmission to overheat.
> Brake switch issue will cause the EMCC to disengage. Extended operation with the EMCC disengaged will cause the transmission to overheat.
> Transmission fluid overfilled
> Transmission cooler or cooler lines restricted
> Transmission Temperature Sensor circuit

3.2.4 O2 SENSOR (NGC)

The O2 system will with ignition on and engine off have a normalized O2 voltage of around 5 volts as displayed on the DRBIII or measured with a high impedance voltmeter. As the O2 sensor starts generating a signal the voltage will move towards 2.5 volts. The voltage will typically vary between 2.5 volts and 3.5 volts on a normal running engine. The goal voltage is also typically between 2.5 and 3.5 volts. This implies that the 0-volt through 1-volt range that you are used to is still valid, only it is shifted up by a 2.5 volt offset. This 2.5 volt supply is being delivered through the sensor return line.

3.2.5 OTHER CONTROLS

Charging System (NGC)

The charging system is turned on when the engine is started. The Generator Field is controlled by the PCM using a 12-volt high side driver and a body ground. The PCM determines the Generator output voltage by an input from the Battery Temperature Sensor. The PCM applies a longer duty cycle on time to the Generator Field Control circuit when more system voltage is needed. When a lower system voltage is needed, the PCM shortens the duty cycle on time of the high side driver.

Vehicle Speed Control (NGC)

The PCM controls vehicle speed by operation of the speed control servo vacuum and vent solenoids. Energizing the vacuum solenoid applies vacuum to the servo to increase throttle position. Operation of the vent solenoid slowly releases the vacuum allowing throttle position to decrease. A special dump solenoid allows immediate release of throttle position caused by braking, cruise control turn off, shifting into neutral, excessive RPM (tires spinning) or ignition key off.

NATURAL VACUUM LEAK DETECTION (NVLD)

The Natural Vacuum Leak Detection (NVLD) system is the next generation evaporative leak detection system that will first be used on vehicles equipped with the Powertrain Control Module (PCM) or Next Generation Controller (NGC) starting in 2002 M.Y. This new system replaces the leak detection pump as the method of evaporative system leak detection. The current CARB requirement is to detect a leak equivalent to a 0.020″ (0.5 mm) hole. This system has the capability to detect holes of this size very dependably.

The basic leak detection theory employed with NVLD is the ″Gas Law″. This is to say that the pressure in a sealed vessel will change if the temperature of the gas in the vessel changes. The vessel will only see this effect if it is indeed sealed. Even small leaks will allow the pressure in the vessel to come to equilibrium with the ambient pressure. In addition to the detection of very small leaks, this system has the capability of detecting medium as well as large evaporative system leaks.

The NVLD utilizes the Gas Law principles

A vent valve seals the canister vent during engine off conditions. If the vapor system has a leak of less than the failure threshold, the evaporative system will be pulled into a vacuum, either due to the cool down from operating temperature or diurnal ambient temperature cycling. The diurnal effect is considered one of the primary contributors to the leak determination by this diagnostic.

When the vacuum in the system exceeds about 1″ H2O (0.25 KPA), a vacuum switch closes. The switch closure sends a signal to the PCM. The PCM, via appropriate logic strategies (described below), utilizes the switch signal, or lack thereof, to make a determination of whether a leak is present.

The NVLD Device and how it functions

The NVLD Assembly is designed with a normally open vacuum switch, a normally closed solenoid, and a seal, which is actuated by both the solenoid and a diaphragm. The NVLD is located on the atmospheric vent side of the canister. The NVLD Assembly is mounted on top of the canister outlet for the DN.

The normally open vacuum switch will close with about 1″ H2O (0.25 KPA) vacuum in the evaporative system. The diaphragm actuates the switch. This is above the opening point of the fuel inlet check valve in the fill tube so cap off leaks can be detected. Submerged fill systems must have recirculation lines that do not have the in-line normally closed check valve that protects the system from failed nozzle liquid ingestion, in order to detect cap off conditions.

The normally closed valve in the NVLD is intended to maintain the seal on the evaporative system during the engine off condition. If vacuum in the evaporative system exceeds 3″ to 6″ H2O (0.75 to 1.5 KPA), the valve will be pulled off the seat, opening the seal. This will protect the system from excessive vacuum as well as allowing sufficient purge flow in the event that the solenoid was to become inoperative. The solenoid actuates the valve to unseal the canister vent while the engine is running. It also will be used to close the vent during the medium and large leak tests and during the purge flow check. This solenoid requires initial 1.5 amps of current to pull the valve open but after 100 ms. will be duty cycled down to an average of about 150 mA for the remainder of the drive cycle.

Another feature in the NVLD Assembly is a diaphragm that will open the seal with pressure in the evaporative system. The seal will be opened at about 0.5″ H2O (0.12 KPA) pressure to permit the venting of vapors during refueling. An added benefit to this is that it will also allow the tank to ″breathe″ during increasing temperatures, thus limiting the pressure in the tank to this low level. This is beneficial because the induced vacuum during a subsequent declining temperature will achieve the switch closed (pass threshold) sooner than if the tank had to decay from a built up pressure.

The NVLD Assembly itself has 3 wires: Switch sense, solenoid driver and ground. It also includes a resistor to protect the switch from a short to battery or a short to ground. The PCM utilizes a high-side driver to energize and duty-cycle the solenoid.

The PCM’s Role in NVLD Diagnosis:

The integral part of the diagnostic system that makes engine-off leak detection possible is a special circuit in the PCM controller. After the vehicle is turned off, a special part of the controller stays alive and monitors for an NVLD switch closure. This circuit within the PCM is very specific in its function and consumes very little power. If a switch closure is detected, it will log the event and time from key-off, and then power down. This information will be processed at the next key cycle.

NVLD Leak Detection

Small Leak Test (Passive)

If, after a specified delay after key off (perhaps 5 minutes), the switch closes or is closed, the test will be pass, indicating that there is no leak. The PCM records the switch closure. The NVLD circuit in the PCM will shut down for the remainder of that particular engine off (soak) period. When the engine is started, the switch closure is recorded as a ″Pass,″ and the timers that are recording accumulated time are reset.

This diagnostic test can take at least a week to mature a leak fault. A week has been chosen for this because the vehicle will have been exposed to the largest possible drive scenarios before a decision is made (most vehicles should see both daily work and weekend driving cycles). This also satisfies CARB's stated goal of getting 3 MIL illuminations within a month for 0.020″ (0.5 mm) leak detection diagnostic.

The diagnostics will log engine run time and engine off time to determine when a week has elapsed. There is a limit on the total amount of run time that is applied to the one-week timer. There is also a limit on the total soak time that will be allowed to apply to the one-week timer. There will be a limit on the amount of accrued run time during one specific drive that can be applied to the one-week timer.

The enabling criteria to run this monitor are:

- Fuel level less than 85%
- Ambient temperature greater than 40 °F (4.4 °C)

Rationality Tests

1. The rationality check of the switch, solenoid and seal will be performed as follows:

- At key-on, the NVLD solenoid will be energized to vent any vacuum that may be trapped in the evaporative system from the previous soak. This should result in an open switch condition.
- The solenoid will be de-energized (to seal the system) at the point where purge begins. The system / NVLD component rationality passes for that drive cycle if the switch closes after purge begins.
- The solenoid is then re-energized for the remainder of the drive cycle.
- If the switch events are not seen in a certain period of time, the rationality check will have failed (2 trip rule).

2. Purge Flow:

The above rationality check is considered sufficient to confirm purge solenoid function and conformance with the purge flow test requirement. The Purge Flow Monitor is passed based on switch activity when purge is turned on or based on a rich fuel control shift when purge is turned on.

Medium and Large Leak Test (Intrusive)

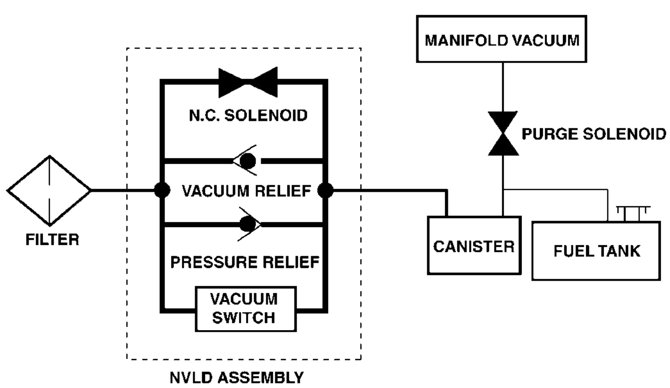
NOTE: This intrusive test will only be run if the Small Leak (passive) test fails, or is inconclusive (the switch does not close)

Enabling Conditions:

- 40 °F to 90 °F
- Engine temperature at startup within 10 °F of the ambient temperature
- Fuel level less than 85%

The intrusive Medium and Large leak are conducted as follows:

- De-energize the NVLD solenoid to seal the canister vent.
- Activate purge shortly after closed loop. Pull the tank vacuum past the vacuum switch point (1″ H2O vacuum) of the NVLD for a specific time while tracking the standard purge flow rate.
- Turn purge off and determine how long it takes to decay the tank vacuum and reopen the switch. Determine the leak size from the time it took to reopen the switch. Note: Fuel level is an important determining factor.
- If the switch does not close, a more aggressive purge flow will be applied to determine if it is a very large leak, missing fuel cap, problem with the NVLD device, purge flow problem, etc...



NATURAL VACUUM LEAK DETECTION SYSTEM

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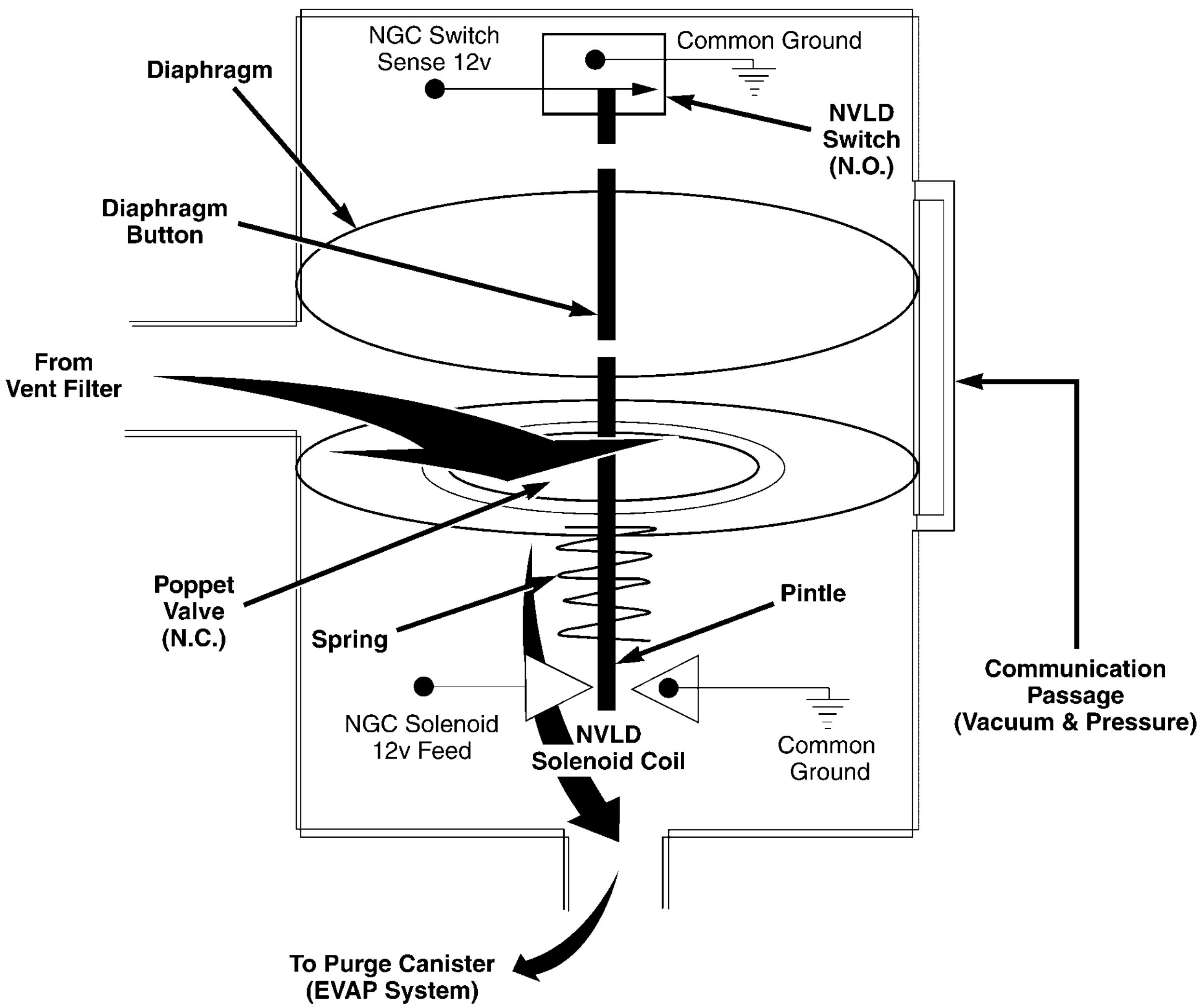


NVLD Switch Closure happens at 1" H2O (Water) Vacuum (+-12% when new). Vacuum draws the Diaphragm up closing the Switch.

- **Pressure Relief:** The Poppet Valve is spring loaded closed (up). It opens at 1" H2O Pressure. Pressure from the Purge Canister (EVAP System) enters the top of the diaphragm chamber via an internal communication passage. Pressure then pushes the Diaphragm down unseating the Poppet Valve allow the EVAP pressure to exit to the Vent Filter.

- **Vacuum Relief:** The Poppet Valve is spring loaded closed (up). The Poppet Valve begins to open at 3"-4" H2O Vacuum, and is completely open at 6" H2O (flows 70 Liters per Minute). Vacuum acts on the bottom of the Poppet Valve & draws it down to open the Purge Canister (EVAP System) to the Vent Filter.

NVLD Solenoid has a Resistance of 8 Ohms (+-0.5 Ohm) at 68 Degrees F. When Energized, it pulls the Pintle down thus opening the Poppet Valve and connects the Purge Canister with the Vent Filter (Atmosphere).

80e6dafd

TEST EQUIPMENT

The Evaporative Emission Leak Detector (EELD) Miller Special Tool 8404 is capable of visually detecting leaks in the evaporative system and will take the place of the ultrasonic leak detector 6917A. The EELD utilizes shop air and a smoke generator to visually detect leaks down to 0.020 or smaller. The food grade oil used to make the smoke includes an UV trace dye that will leave telltale signs of the leak under a black light. This is helpful when components have to be removed to determine the exact leak location. For detailed test instructions, follow the operators manual packaged with the EELD.

3.2.6 NON-MONITORED CIRCUITS

The PCM does not monitor the following circuits, systems, and conditions even though they could have malfunctions that result in driveability problems. A diagnostic code may not be displayed for the following conditions. However, problems with these systems may cause a diagnostic code to be displayed for other systems. For example, a fuel pressure problem will not register a diagnostic code directly, but could cause a rich or lean condition. This could cause an oxygen sensor, fuel system, or misfire monitor trouble code to be stored in the PCM.

Engine Timing - The PCM cannot detect an incorrectly indexed timing chain, camshaft sprocket, or crankshaft sprocket. The PCM also cannot detect an incorrectly indexed distributor or Cam sensor.(*)

Fuel Pressure - Fuel pressure is controlled by the fuel pressure regulator. The PCM cannot detect a clogged fuel pump inlet filter, clogged in-line filter, or a pinched fuel supply.(*)

Fuel Injectors - The PCM cannot detect a clogged fuel injector, a sticking pintle, or that an incorrect injector is installed.(*)

Fuel Requirements - Poor quality gasoline can cause problems such as hard starting, stalling, and stumble. Use of methanol-gasoline blends may result in starting and driveability problems. (See individual symptoms and their definitions in Section 6.0 (Glossary of Terms).

PCM Grounds - The PCM cannot detect a poor system ground. However, a diagnostic trouble code may be stored in the PCM as a result of this condition.

Throttle Body Air Flow - The PCM cannot detect a clogged or restricted air cleaner inlet or filter element.(*)

Exhaust System - The PCM cannot detect a plugged, restricted, or leaking exhaust system.(*)

Cylinder Compression - The PCM cannot detect uneven, low, or high engine cylinder compression.(*)

Excessive Oil Consumption - Although the PCM monitors the exhaust oxygen content through the oxygen sensor when the system is in a closed loop, it cannot determine excessive oil consumption.

NOTE: Any of these conditions could result in a rich or lean condition causing an oxygen sensor trouble code to be stored in the PCM, or the vehicle may exhibit one or more of the driveability symptoms listed in the Table of Contents.

3.3 DIAGNOSTIC TROUBLE CODES

Diagnostic trouble codes (DTCs) are codes stored by the Powertrain Control Module (PCM) that help us diagnose Powertrain, Transmission and Transfercase problems. They are viewed using the DRBIII® scan tool. Always begin by performing a visual inspection of the wiring, connectors, fluid level, cooler lines, engine, and the transmission. Any obvious wiring problems or leaks should be repaired prior to performing any diagnostic test procedures. Some engine driveability problems can be misinterpreted as a transmission problem. Ensure that the engine is running properly and that no engine DTCs are present that could cause a transmission complaint. If there is a communication bus problem, trouble codes will not be accessible until the problem is fixed. The DRBIII® will display an appropriate message. The following is a possible list of causes for a bus problem:

– open or short to ground/battery in PCI bus circuit.
– internal failure of any module or component on the bus

Each diagnostic trouble code is diagnosed by following a specific testing sequence. The diagnostic test procedures contain step-by-step instructions for determining the cause of a transmission diagnostic trouble code. Possible sources of the code are checked and eliminated one by one. It is not necessary to perform all of the tests in this book to diagnose an individual code. These tests are based on the problem being present at the time that the test is run.

If the Engine or Transmission records a DTC that will adversely affect vehicle emissions, it will request (via the communication bus) that the PCM illuminate the Malfunction Indicator Lamp (MIL). Although these DTCs will be stored in the PCM immediately as a 1 trip failure, it may take up to five minutes of accumulated trouble confirmation to set the DTC and illuminate the MIL. Three consecutive successful OBDII/EURO III trips or clearing the DTCs with a diagnostic tool (DRBIII® or equivalent) is required to extinguish the MIL. When the Transmission requests that the PCM illuminate the MIL, the PCM sets a DTC P0700 ($89) to alert the technician that there are DTCs in the Transmission. The PCM DTC ($89) must also be erased in the PCM in order to extinguish the MIL.

3.3.1 HARD CODE

POWERTRAIN

A diagnostic trouble code that comes back within one cycle of the ignition key is a ″hard″ code. This means that the problem is present when the PCM checks that circuit or function. Most procedures in this manual verify if the trouble code is a hard code at the beginning of each test. When it is not a hard code, an ″intermittent″ test must be performed.

Codes that are for OBDII monitors will not set with just the ignition key on. Comparing these to non-emission codes, they will seem like an intermittent. These codes require a set of parameters to be performed (The DRBIII® pre-test screens will help with this for MONITOR codes), this is called a ″TRIP″. All OBDII DTCs will be set after two or in some cases one trip failures, and the MIL will be turned on. These codes require three successful, no failures, TRIPS to extinguish the MIL, followed by 40 warm-up cycles to erase the code. For further explanation of TRIPS, Pre-test screens, Warm-up cycles, and the use of the DRBIII®, refer to the On Board Diagnostic training booklet #81-699-97094.

TRANSMISSION

Any Diagnostic Trouble Code (DTC) that is set whenever the system or component is monitored is a HARD code. This means that the problem is there every time the PCM checks that system or component. Some codes will set immediately at start up and others will require a road test under specific conditions. It must be determined if a code is repeatable (Hard) or intermittent before attempting transmission diagnosis.

3.3.2 ONE TRIP FAILURE

A One Trip Failure, when read from the PCM, is a hard OBDII/EURO III code that has not matured to the full 5 minutes. This DTC can take up to five minutes of problem identification before illuminating the MIL

3.3.3 INTERMITTENT CODE

A diagnostic trouble code that is not present every time the PCM checks the circuit is an ″intermittent″ code. Most intermittent codes are caused by wiring or connector problems. Intermittent conditions that come and go like this are the most difficult to diagnose; they must be looked for under specific conditions that cause them. The following procedures may assist you in identifying a possible intermittent problem:

- Visually inspect related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.
- Visually inspect the related harnesses. Look for chafed, pierced, or partially broken wire.
- Refer to any S.T.A.R. Hotline Newsletters, Service Information Tune ups (SITs) or Service Bulletins that may apply.
- Use the DRBIII® data recorder or co-pilot.

Some Transmission intermittent DTCs are caused by wiring or connector problems. However intermittent Speed ratio codes are usually caused by intermittent hydraulic seal leakage in the clutch and/or accumulator circuits. Intermittent speed ratio codes can be set by intermittent speed sensor circuitry or by line noise being induced onto one or both of the speed sensor signal circuits. Problems that come and go like this are the most difficult to diagnose, they must be looked for under the specific conditions that cause them.

3.3.4 STARTS SINCE SET COUNTER

POWERTRAIN

This reset counter counts the number of times the vehicle has been started since codes were last set or erased. This counter will count up to 255 start counts. The number of starts helps determine when the trouble code actually happened. This is recorded by the PCM and can be viewed on the DRBIII® as STARTS since set. When there are no trouble codes stored in memory, the DRBIII® will display ″NO TROUBLE CODES FOUND″ and the reset counter will show ″STARTS since set = XXX.″ OBDII vehicles will also display a DTC Specific or Global ″Good Trip″ counter which will indicate the number of ″Good Trips″ since the DTC was set. After 3 consecutive ″Good Trips,″ the MIL is extinguished and the good trip counter is replaced by a ″Warm Up Cycle″ counter. 40 Warm-Up Cycles will erase the DTC and Freeze Frame information.

TRANSMISSION

The Starts Since Set counter counts the number of times the vehicle has started since the most recent DTC was set. The counter will count up to 255 starts. Note that this counter only applies to the last code set.

When there are no diagnostic trouble codes stored in memory, the DRBIII® will display ″NO DTC's PRESENT″ and the reset counter will show ″STARTS SINCE CLEAR″ = XXX.

The number of starts helps determine if the diagnostic trouble code is hard or intermittent.

– If the number of starts is less than 3, the code is usually a hard code.
– If the number of starts is greater than 3, it is considered an intermittent code. This means that the engine has been started most of the time without the code recurring.

3.3.5 TROUBLE CODE ERASURE

A Diagnostic trouble code will be cleared from PCM memory if it has not reset for 40 warm-up cycles. A warm-up cycle is defined as ″sufficient vehicle operation such that the coolant temperature has risen by at least 22° C (40°F) from engine starting and reaches a minimum temperature of 71° C (160° F). The Malfunction Indicator Lamp (MIL) will turn off after 3 good trips or when the DTC's are cleared from the PCM

3.3.6 QUICK LEARN

The Quick Learn function customizes adaptive parameters of the PCM to the transmission Characteristics of a vehicle. This gives the customer improved ″as received″ shift quality compared to the initial parameters stored in the PCM.

Notes about Quick Learn Features

The nature of the Quick Learn function requires that certain features must be taken into consideration.

> Quick Learn should generally not be used as a repair procedure unless directed by a repair or diagnostic procedure. If the transmission system is exhibiting a problem that you think is caused by an invalid CVI, you should try to relearn the value by performing the appropriate driving maneuver . In most cases, if a Quick Learn makes a vehicle shift better, the vehicle will return with the same problem.

> Before performing Quick Learn, it is imperative that the vehicle be shifted into OD with the engine running and the oil level set to the correct level. This step will purge air from the clutch circuits to prevent erroneous clutch volume values which could cause poor initial shift quality. Cycle the transmission through all gears 2-3 times immediately before performing Quick Learn. For best results, Quick Learn should be run with the transmission sump temperature > 90°F.

> If an unused PCM is installed on a vehicle with a HOT engine, Quick Learn will cause the PCM to report a cold calculated oil temperature. This requires monitoring the calculated oil temperature using the DRBIII®. If the temperature is below 16° C (60° F), the transmission must be run at idle or driven in gear until it goes above 16° C (60° F). If the temperature is above 93° C (200° F), the transmission must cool to below 93° C (200° F).

> First gear is engaged in overdrive after Quick Learn is completed. Place the vehicle in park after performing Quick Learn.

The Quick Learn function should be performed:

– Upon installation of a new service PCM
– After replacement or rebuild of internal transmission components or the torque converter
– If one or more of the clutch volumes indexes (CVI's) contain skewed readings because of abnormal conditions.

The Quick Learn procedure is performed with the DRBIII® by selecting ″Transmission″ system then ″Miscellaneous″ functions, then ″Quick Learn″. Follow the procedure instructions displayed on the DRBIII®.

To perform the Quick Learn procedure, the following conditions must be met.

NOTE: The oil temperature must be between 16° C (60° F) and 93° C (200° F). Above 32° C (90° F) for best results.
Cycle the transmission through all gears 2-3 times immediately before performing Quick Learn.

– It is imperative that the vehicle oil level set to the correct level. Shift the transmission into OD with the engine running, this step will purge the air in the clutch circuits to prevent erroneous clutch volume values, which could cause poor initial shift quality.
– Shift the transmission to neutral.
– The brakes must be applied.
– The engine must be idling.
– The throttle angle (TP sensor) must be less than 3 degrees.
– The shift lever position must stay in neutral, after shifting to neutral the engine idle speed will ramp up to 1600rpm and the DRBIII® will prompt the operator to shift to OD. Do not shift to OD until the engine idle speed stabilizes at 1600rpm.

– The shift lever must stay in OD after the ″Shift to Overdrive″ prompt until the DRBIII® indicates the procedure is complete.

NOTE: The above conditions must be maintained during the procedure to keep the procedure from being aborted.

NOTE: After the Quick Learn Procedure is complete, the vehicle should be drive learned per the Drive Learn Procedure

3.3.7 EATX DTC EVENT DATA

EATX DTC EVENT DATA can be used as a diagnostic aid when experiencing Electronic Transmissions with intermittent problems. When a Diagnostic Trouble Code (DTC) is set, the vehicles EATX inputs are stored in the controller memory and are retrievable with the DRBIII®. This information can be helpful when a DTC can not be duplicated.

The EATX DTC EVENT DATA is located in the DRBIII®, under the Transmission system menu, in the sub-screen Miscellaneous. It is a good practice to document the EATX DTC EVENT DATA before beginning any diagnostic or service procedure.

A thorough understanding of how the transmission works is beneficial in order to interpret the data correctly. These skills are necessary in order to avoid an incorrect diagnosis. A MASTERTECH video and reference book was produced in January 2002 that explains many of the features of the EATX DTC EVENT DATA with several examples on how to interpret the information and suggested training material to help understand all the specifics.

EATX DTC EVENT DATA can only be erased by:

1. Disconnecting the battery.
2. Performing a DRBIII® QUICK LEARN procedure.
3. Reprogramming the EATX controller.

Erasing Transmission DTCs does not clear the EATX DTC EVENT DATA.

3.3.8 CLUTCH VOLUMES

The LR clutch volume is updated when doing a 2-1 or 3-1 coast down shift. The transmission temperature must be between 21-49 C (70-120° F). The clutch volume should be between 35 and 83.

The 2/4 clutch volume is updated when doing a 1-2 shift. The transmission temperature must be above 43 C (110° F). The clutch volume should be between 20 and 77.

The OD clutch volume is updated when doing a 2-3 shift. The transmission temperature must be above 43 C (110° F). The clutch volume should be between 40 and 150.

The UD clutch volume is updated when doing a 4-3 or 4-2 shift. The transmission temperature must be above 43 C (110° F). The clutch volume should be between 24 and 70.

3.3.9 NO START INFORMATION (POWERTRAIN)

IMPORTANT NOTE:

If the Powertrain Control Module has been programmed, a DTC will set in the ABS and Air Bag modules. In addition, if the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable starting.

FOR ABS AND AIR BAG SYSTEMS:

1. Enter correct VIN and Mileage in PCM.
2. Erase codes in ABS and Air Bag modules.

FOR SKIM THEFT ALARM:

1. Connect the DRBIII® to the data link connector.
2. Go to Theft Alarm, SKIM, Misc. and place the SKIM in secured access mode, by using the appropriate PIN code for this vehicle.
3. Select Update the Secret Key data, data will be transferred from the SKIM to the PCM (This is required to allow the vehicle to start with the new PCM).
4. If three attempts are made to enter secured access mode using the incorrect PIN, secured access mode will be locked out for one hour. To exit this lock out mode, leave the ignition key in the Run/ Start position for one hour. Ensure all accessories are turned off. Also monitor the battery state and connect a battery charger if necessary.

After reading Section 3.0 (System Description and Functional Operation), you should have a better understanding of the theory and operation of the on-board diagnostics, and how this relates to the diagnosis of a vehicle that may have a driveability-related symptom or complaint.

3.4 USING THE DRBIII®

Refer to the DRBIII® user's guide for instructions and assistance with reading trouble codes, erasing trouble codes, and other DRBIII® functions.

3.5 DRBIII® ERROR MESSAGES AND BLANK SCREEN

Under normal operation, the DRBIII® will display one of only two error messages:

– User-Requested WARM Boot by pressing MORE and NO at the same time.

```
ver: 2.29
date: 1 oct 93
file: key_itf.cc
date: Jan 12 1994
line: 544
err: 0x1User-Requested WARM Boot
Press MORE to switch between this display
and the application screen.
Press F4 when done noting information.
```

or User Requested COLD Boot by pressing MORE YES at the same time.

```
ver: 2.29
date: 1 oct 99
file: key HND1.CC
date: Mar 8 2000
line: 1297
err: 0x1
User-Requested COLD Boot
Press MORE to switch between this display
and the application screen.
Press F4 when done noting information.
```

If the DRBIII® should display any other error message, record the entire display and call the Star Center.

3.5.1 DRBIII® DOES NOT POWER UP

If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link connector cavity 16). Check for proper ground connection at DLC cavity. A minimum of 11 volts is required to adequately power the DRBIII®.

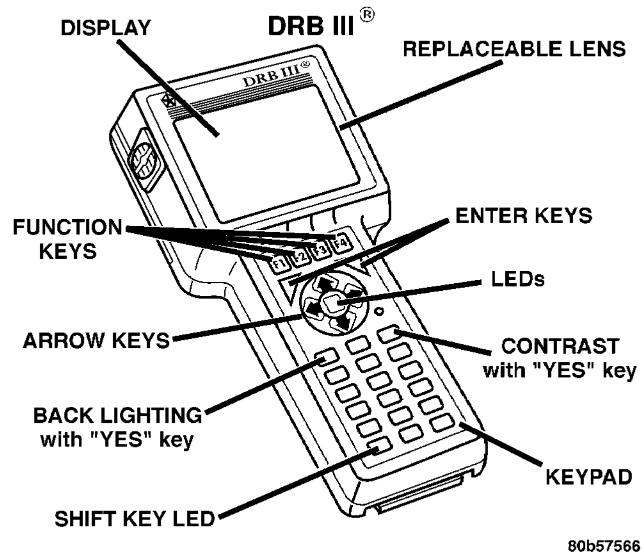
If all connections are proper between the DRBIII® and the vehicle or other devices, and the vehicle battery is fully charged, an inoperative DRBIII® may be the result of a faulty cable or vehicle wiring. For a blank screen, refer to the appropriate body diagnostics manual.

3.5.2 DISPLAY IS NOT VISIBLE

Low temperatures will affect the visibility of the display. Adjust the contrast to compensate for this condition.

3.5.3 SOME DISPLAY ITEMS READ ″___″

This is caused by scrolling the DRBIII® display a single line up or down. The line which was scrolled onto the screen might read ″___″. Use the page down or page up function to display the information.



3.6 TRANSMISSION SIMULATOR (MILLER TOOL # 8333) AND ELECTRONIC TRANSMISSION ADAPTER KIT (MILLER TOOL #8333-1A)

NOTE: Remove the starter Relay when using the transmission simulator
***Failure to remove the Starter Relay can cause a PCM - No Response condition.**
***The removal of the Starter Relay will also prevent the engine from starting in gear.**
***The Transmission Simulator will not accurately diagnose intermittent faults.**

The transmission simulator, simply put, is an electronic device that simulates the electronic functions of any EATX or NGC controlled transmission. The Simulators basic function is to aid the technician in determining if an internal transmission problem exists or if the problem resides in the vehicle wiring or control module. It is only useful for electrical problems. It will not aid in the diagnosis of a failed mechanical component, but it can tell you that the control module and wiring are working properly and that the problem is internal.

The ignition switch should be in the lock position before attempting to install the simulator. Follow all instructions included with the simulator. If the feedback from the simulator is in doubt, you can verify it's operation by installing it on a known good vehicle. A ″known good vehicle″ would be defined as a vehicle that does not set any DTC's and drives and shifts as expected.

One important point to remember is that the Simulator receives it's power from the Trans Relay Output circuit. If the transmission system is in Limp-in (Relay open), the simulator will not operate. This is not really an indication of a problem, but an additional symptom. If the simulator does not power up ("P" led lit), this is an indication that the problem is still present with the simulator hooked up. This indicates that the problem is in the wiring or control module and not the transmission.

Miller Tool # 8333-1A consists of the adapter cables and overlay necessary to adapt the simulator to TE/AE/LE/RLE transmissions.

4.0 DISCLAIMERS, SAFETY, WARNINGS

4.1 DISCLAIMERS

All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

4.2 SAFETY

4.2.1 TECHNICIAN SAFETY INFORMATION

WARNING: ENGINES PRODUCE CARBON MONOXIDE THAT IS ODORLESS, CAUSES SLOWER REACTION TIME, AND CAN LEAD TO SERIOUS INJURY. WHEN THE ENGINE IS OPERATING, KEEP SERVICE AREAS WELL VENTILATED OR ATTACH THE VEHICLE EXHAUST SYSTEM TO THE SHOP EXHAUST REMOVAL SYSTEM.

Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important to block the wheels on front-wheel drive vehicles; the parking brake does not hold the drive wheels.

When servicing a vehicle, always wear eye protection, and remove any metal jewelry such as watchbands or bracelets that might make an inadvertent electrical contact.

When diagnosing a powertrain system problem, it is important to follow approved procedures where applicable. These procedures can be found in the service manual procedures. Following these procedures is very important to the safety of individuals performing diagnostic tests.

4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic DTC's or error messages may occur. It is extremely important that accurate shift lever position data is available to the PCM. The accuracy of any DTC found in memory is doubtful unless the Shift Lever Test, performed on the DRBIII® Scan Tool, passes without failure.

4.2.3 SEVICING SUB-ASSEMBLIES

Some components of the powertrain system are intended to be serviced in assembly only. Attempting to remove or repair certain system subcomponents may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

WARNING: EXCEEDING THE LIMITS OF THE DRBIII® MULTIMETER IS DANGEROUS. IT CAN EXPOSE YOU TO SERIOUS INJURY. CAREFULLY READ AND UNDERSTAND THE CAUTIONS AND THE SPECIFICATION LIMITS.

Follow the vehicle manufacturer's service specifications at all times.

- Do not use the DRBIII® if it has been damaged.
- Do not use the test leads if the insulation is damaged or if metal is exposed.
- To avoid electrical shock, do not touch the test leads, tips, or the circuit being tested.
- Choose the proper range and function for the measurement. Do not try voltage or current measurements that may exceed the rated capacity.
- Do not exceed the limits shown in the table below:

Function	Input Limit
Volts	0 - 500 peak volts AC 0 - 500 volts DC
Ohms (resistance)*	0 - 1.12 megohms
Frequency Measured Frequency Generated	0 - 10 kHz
Temperature	- 50 - 600°C - 58 - 1100°F

* Ohms cannot be measured if voltage is present.

Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- A 10A fuse or circuit breaker must protect the circuit being tested.

- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.
- When using the meter function, keep the DRBIII® away from spark plug or coil wires to avoid measuring error from outside interference.

4.3 WARNINGS AND CAUTIONS

4.3.1 ROAD TEST WARNINGS

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic code or symptom condition.

CAUTION: Before road testing a vehicle, be sure that all components are reassembled. During the test drive, do not try to read the DRBIII® screen while in motion. Do not hang the DRBIII® from the rear view mirror or operate it yourself. Have an assistant available to operate the DRBIII®.

4.3.2 VEHICLE DAMAGE WARNINGS

Before disconnecting any control module, make sure the ignition is "lock" position. Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the Miller tool #8815 (not the wire end or terminal) in the connector. Do not probe a wire through the insulation: this will damage the wire and eventually cause the wire to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can damage fuses or components. Also, a second DTC could be set, making diagnosis of the original problem more difficult.

When replacing a blown fuse, it is important to use only a fuse having the correct amperage rating. The use of a fuse with a rating other than indicated may result in a dangerous electrical system overload. If a properly rated fuse continues to blow, it indicates a problem in the circuit that must be corrected.

4.3.3 ROAD TESTING A COMPLAINT VEHCILE (TRANSMISSION)

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic DTC or symptom condition.

CAUTION: Before road testing a vehicle, be sure that all components are reassembled. During the test drive, do not try to read DRBIII® screen while in motion. Do not hang the DRBIII® from the rear view mirror or operate it yourself. Have an assistant available to operate the DRBIII®.

Road testing is an essential step in the diagnostic process that must not be overlooked. Along with the diagnostic information obtained from the DRBIII® Scan Tool and the original customer concern, the road test helps verify the problem was current and any repairs performed, fixed the vehicle correctly. Always operate and observe the vehicle under actual driving conditions. Just as important as the road test is, there are preliminary inspections that should be performed prior to the road test. Always check the fluid level and condition before taking the vehicle on a road test. Determine if the incorrect fluid is being used, improper fluid will result in erratic transmission operation.

Some of the conditions of incorrect fluid level are as follows:

- Delayed engagement
- Poor shifting or erratic shifting
- Excessive noise
- Overheating

The next step is to verify that the shift linkage is correctly adjusted. If the shift linkage is incorrectly adjusted, a number of complaints can result.

The PCM monitors the Shift Lever Position (SLP) Sensor continuously. If the linkage is incorrectly adjusted, the PCM will sense a shift lever position that is not correct for the gear chosen by the driver. This may cause a DTC to be set.

The following complaints may also be the result of an incorrectly adjusted or worn linkage:

- Delayed clutch engagement
- Erratic shifts
- Vehicle will drive in neutral
- Engine will not crank in park or neutral
- Gear shift linkage will be able to be shifted without the key in the ignition
- Not able to remove the ignition key in park
- Parking pawl will not engage properly

The shift linkage should also be adjusted when replacing the Transmission, repairing the valve body, or when repairing any component between the shift lever and the Transmission.

Some questions to ask yourself when performing the road test are as follows:

- Is the complaint or concern what you think the problem is, based on the drivers description of the problem?
- Is the Transmission operating normally, or is there a real problem?
- When does the problem occur?
- Is the problem only in one gear range?
- What temperature does the problem occur?
- Does the vehicle have to sit over night for the problem to occur?
- Does the transmission go into Limp-in mode?

4.3.4 ELECTRONIC PINION FACTOR WARNINGS (IF APPLICABLE)

The pinion factor must be set when replacing the PCM. Note: The pinion factor is a fixed number and cannot be changed or updated in some vehicle applications. If the pinion factor is not set or incorrectly set, any speed related functions will not operate correctly i.e. speedometer, speed control, rolling door locks, other control modules will be affected that depend on speed information.

4.3.5 SERVICE BULLETINS AND RECALLS

Always perform all Safety Recalls and Service Bulletins that are applicable to the problem. Under the provisions of the warranty.

5.0 REQUIRED TOOLS AND EQUIPMENT

DRBIII® (diagnostic read-out box) scan tool - must use the latest release level.

Diagnostic Pinout Box #8815
Evaporative Emissions Leak Detector #8404
Terminal Removal tool #3638
Fuel filler adapter #8382
Fuel pressure adapter (C-6631) or #6539
Fuel pressure kit (C-4799-B) or #5069
Fuel pressure kit #8978
Fuel release hose (C-4799-1)
Jumper wires
Ohmmeter
Oscilloscope
Pressure gauge 0-2068 kPa (0-300 PSI)
Transmission simulator #8833
Electronic Transmission Adapter Kit (Miller # 8333-1A)
Vacuum gauge
Voltmeter
12 volt test light minimum 25 ohms resistance with probe #6801

CAUTION: A 12 volt test light should not be used for the following circuits, damage to the powertrain controller will occur.

- 5-volt Supply
- J1850 PCI Bus
- CCD Bus
- PCI Bus
- CKP Sensor Signal
- CMP Sensor Signal
- Vehicle Speed Sensor Signal
- O2 Sensor Signal

6.0 ACRONYMS

A/C	Air Conditioning
ABS	Anti-lock Brake System
ASD Relay	Auto Shutdown Relay
APPS	Accelerator Pedal Position Sensor
Baro	Barometric Pressure
BCM	Body Control Module
BTS	Battery Temperature Sensor
CAA	Clean Air Act
CAB	Controller Antilock Brakes
CARB	California Air Resources Board
CCD BUS	Chrysler Collision Detection Bus
CKP Sensor	Crankshaft Position Sensor
CKT	Circuit
CMP Sensor	Camshaft Position Sensor
CM840	Cummins Engine controller
CO	Carbon Monoxide
CVI	Clutch Volume Index
DCP Solenoid	Duty-Cycle Purge Solenoid
DLC	Data Link Connector
DRBIII®	Diagnostic Readout Box - 3rd Generation

DTC Diagnostic Trouble Code

DVOM Digital Volt Ohm Meter

EATX Electronic Automatic Transmission Controller

EC European Community

ECT Sensor Engine Coolant Temperature Sensor

EE-PROM Electrically Erasable Programmable Read Only Memory

EGR Valve Exhaust Gas Recirculation Valve

EMCC Electronically Modulated Converter Clutch

EMI Electro-Magnetic Interference

EOBD European OBD (based upon Euro Stage III)

EPA Environmental Protection Agency

EPP Engine Position Pulse

ETC Electronic Throttle Control

EU European Union

EVAP Evaporative Emission System

EVR Electronic Voltage Regulator

EWMA Exponentially Weighted Moving Average

FEMCC Fully Electronically Modulated Converter Clutch

FTP Federal Test Procedure

FSS Fan Speed signal

HC Hydrocarbons

HO2S Heated Oxygen Sensor

Generator Previously called "alternator"

IAC Motor Idle Air Control Motor

IAT Sensor Intake Air Temperature Sensor

IOD Ignition off draw

IRT Intelligent Recovery Timer

ISS Input Speed Sensor

I/M Inspection and Maintenance Testing

JTEC Jeep/Truck Engine Controller

LDP Leak Detection Pump

LED Light Emitting Diode

LPS Line Pressure Sensor

LR Low/reverse Clutch

LSIACV Linear Solenoid Idle Air Control Valve

MAF Mass Air flow

MAP Sensor Manifold Absolute Pressure Sensor

MDS_2® Mopar Diagnostic System 2nd Generation

MIL Malfunction Indicator Lamp

MS Multi Select

MTV Manifold Tuning Valve

NGC Next Generation Controller

NTC Negative Temperature Coefficient

NVLD Natural Vacuum Leak Detection

O_2 Sensor Oxygen Sensor

O2S Oxygen Sensor

OBD I On Board Diagnostics 1st Generation

OBD II On-Board Diagnostics 2nd Generation

OD Overdrive Clutch

ORVR On-Board Refueling Vapor Recovery

OSS Output Speed Sensor

PCI BUS Programmable Communications Interface BUS (J1850)

PCM Powertrain Control Module

PCS Pressure Control Solenoid

PCV Positive Crankcase Ventilation

PDC Power Distribution Center

PEMCC Partial Electronically Modulated Converter Clutch

PEP Peripheral Expansion Port

P/N Park/Neutral

PPS Proportional Purge Solenoid

PS Power Steering

PSP	Power Steering Pressure (Switch)
PTC	Positive Temperature Coefficient
PWM	Pulse-Width Modulation
RAM	Random Access Memory
REV	Reverse Clutch
RFI	Radio Frequency Interference
RKE	Remote Keyless Entry
RPM	Revolutions Per Minute
SAE	Society of Automotive Engineers
SBEC	Single Board Engine Controller
SCW	Similar Conditions Window
SKIM	Sentry Key Immobilizer Module
SRV	Short Runner Valve
SSV	Solenoid Switch Valve
SW	Switch
TCC	Torque Converter Clutch
TCCM	Transfer Case Control Module
TDC	Top Dead Center
TP	Throttle Position Sensor
TRD	Torque Reduction
TRS	Transmission Range Sensor
TTS	Transmission Temperature Sensor
UD	Underdrive Clutch
VSS	Vehicle Speed Signal
WOT	Wide Open Throttle
2/4	2nd and 4th gear Clutch or Pressure Switch
2C	2nd Clutch
4C	4th Clutch

6.2 DEFINITIONS

OBDII/EURO III Trip - A vehicle start and drive cycle such that all once per trip diagnostic monitors have run.

Key Start - A vehicle start and run cycle of at least 20 seconds.

Warm-up Cycle - A vehicle start and run cycle such that the engine coolant must rise to at least 71 C (160° F) and must rise by at least 22 C (40° F) from initial start up. To count as a warm-up cycle, no DTC's may occur during the cycle.

NOTES

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom:
*NO RESPONSE FROM PCM (PCI BUS) - NGC

POSSIBLE CAUSES
PCM PCI NO RESPONSE
POWERTRAIN CONTROL MODULE
PCI BUS CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: As soon as one or more module communicates with the DRB, answer the question.** With the DRB, enter Anti-Lock Brakes. With the DRB, enter Electro/Mechanical Cluster (MIC). With the DRB, enter Passive Restraints then Airbag. Were you able to establish communications with any of the modules? Yes → Go To 2 No → Refer to symptom PCI Bus Communication Failure in the Communications category. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	With the DRB read the Powertrain DTC's. This is to ensure power and grounds to the PCM are operational. **NOTE: If the DRB will not read PCM DTC's, follow the NO RESPONSE TO PCM (PCM SCI only) symptom path.** Turn the ignition off. Disconnect the PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII® select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the appropriate terminal of special tool #8815. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the PCI Bus circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*NO RESPONSE FROM PCM (PCM SCI ONLY) - NGC

POSSIBLE CAUSES
CHECK PCM POWERS AND GROUNDS
PCM SCI TRANSMIT CIRCUIT SHORTED TO VOLTAGE
PCM SCI RECEIVE CIRCUIT SHORTED TO VOLTAGE
PCM SCI CIRCUITS SHORTED TOGETHER
PCM SCI TRANSMIT CIRCUIT SHORTED TO GROUND
PCM SCI RECEIVE CIRCUIT SHORTED TO GROUND
PCM SCI RECEIVE CIRCUIT OPEN
PCM SCI TRANSMIT CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Perform the symptom Checking PCM Power and Ground Circuits in the Driveability category. **NOTE: With the DRBIII® in the generic scan tool mode, attempt to communicate with the PCM.** **NOTE: If the DRBIII® can communicate with the PCM in the generic scan tool mode, it may not be necessary to perform this step.** Did the vehicle pass this test? Yes → Go To 2 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connectors. Turn the ignition on. Measure the voltage of the PCM SCI Transmit circuit at the Data Link harness connector (cav 7). Is the voltage above 1.0 volt? Yes → Repair the PCM SCI Transmit circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connectors. Turn the ignition on. Measure the voltage of the PCM SCI Receive circuit at the Data Link harness connector (cav 12). Is the voltage above 1.0 volt? Yes → Repair the PCM SCI Receive circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 4	All

*NO RESPONSE FROM PCM (PCM SCI ONLY) - NGC — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connectors. Measure the resistance between the PCM SCI Transmit circuit and the PCM SCI Receive circuit at the Data Link harness connector (cavs 7 and 12). Is the resistance below 5.0 ohms? Yes → Repair the short between the PCM SCI Transmit and the PCM SCI Receive circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the DRBIII® from the DLC. Measure the resistance between ground and the PCM SCI Transmit circuit at the Data Link harness connector (cav 7). Is the resistance below 5.0 ohms? Yes → Repair the PCM SCI Transmit circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRBIII® from the DLC. Measure the resistance between ground and the PCM SCI Receive circuit in the Data Link harness connector (cav 12). Is the resistance below 5.0 ohms? Yes → Repair the PCM SCI Receive circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRBIII® from the DLC. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the PCM SCI Receive circuit from the Data Link harness connector (cav 12) to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the PCM SCI Receive circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO RESPONSE FROM PCM (PCM SCI ONLY) - NGC — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRBIII® from the DLC. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the PCM SCI Transmit circuit from the Data Link harness connector (cav 7) to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the PCM SCI Transmit circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
9	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE BCM
GROUND CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
OPEN PCI BUS CIRCUIT
SENTRY KEY IMMOBILIZER MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, enter Body then Body Computer. Was the DRB able to I/D or communicate with the BCM? Yes → Go To 2 No → Refer to the symptom list for problems related to no communication with the BCM. Perform SKIS VERIFICATION.	All
2	Turn the ignition off. Disconnect the SKIM harness connector. Using a 12-volt test light connected to 12-volts, probe the ground circuit. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ground circuit for an open. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Disconnect the SKIM harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Fused Ignition Switch Output circuit for an open. Perform SKIS VERIFICATION.	All
4	Turn the ignition off. Disconnect the SKIM harness connector. Using a 12-volt test light connected to ground, probe the Fused B(+) circuit. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the Fused B+ circuit for an open. Perform SKIS VERIFICATION.	All

*NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE — Continued

TEST	ACTION	APPLICABILITY
5	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the SKIM harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII® select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the SKIM connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Go To 6 No → Repair the PCI Bus circuit for an open. Perform SKIS VERIFICATION.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All

Symptom:
*NO RESPONSE FROM TRANSMISSION CONTROL MODULE - NGC

POSSIBLE CAUSES
NO RESPONSE FROM TRANSMISSION CONTROL MODULE
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
GROUND CIRCUIT(S) OPEN
PCI BUS CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **Note: As soon as one or more module communicates with the DRB, answer the question.** With the DRB, attempt to communicate with the Instrument Cluster. With the DRB, attempt to communicate with the Airbag Control Module. Was the DRB able to I/D or establish communications with both of the modules? Yes → Go To 2 No → Refer to the Communications category and perform the appropriate symptom. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Turn the ignition on. Using a 12-volt test light connected to ground, probe both Fused Ignition Switch Output circuits (cavs 11 and 12) in the appropriate terminal of special tool #8815. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Is the test light illuminated for both circuits? Yes → Go To 3 No → Repair the Fused Ignition Switch Output circuit for an open. Refer to the wiring diagrams located in the Service Information. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM TRANSMISSION CONTROL MODULE - NGC — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Using a 12-volt test light connected to ground, probe the Fused B(+) circuit in the appropriate terminal of special tool #8815. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Is the test light illuminated? Yes → Go To 4 No → Repair the Fused B(+) circuit for an open. Refer to the wiring diagrams located in the Service Information. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect the PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Using a 12-volt test light connected to 12-volts, probe each ground circuit in the appropriate terminal of special tool #8815. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Is the light illuminated at all ground circuits? Yes → Go To 5 No → Repair the Ground circuit(s) for an open. Check the main ground connection to engine block and/or chassis. Refer to the wiring diagrams located in the Service Information. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM TRANSMISSION CONTROL MODULE - NGC — Continued

TEST	ACTION	APPLICABILITY
5	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII® select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the appropriate terminal of special tool #8815. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Go To 6 No → Repair the PCI Bus circuit for an open. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
6	Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the service information. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
*PCI BUS COMMUNICATION FAILURE

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
OPEN PCI BUS CIRCUIT AT THE DATA LINK CONNECTOR (DLC)
PCI BUS CIRCUIT SHORTED TO VOLTAGE
MODULE SHORT TO VOLTAGE
PCI BUS CIRCUIT SHORTED TO GROUND
MODULE SHORT TO GROUND

TEST	ACTION	APPLICABILITY
1	**Note: Determine which modules this vehicle is equipped with before beginning.** **Note: When attempting to communicate with any of the modules on this vehicle, the DRB will display 1 of 2 different communication errors: a NO RESPONSE message or a BUS +/- SIGNALS OPEN message.** Turn the ignition on. Using the DRB, attempt to communicate with the following control modules: Airbag Control Module Body Control Module MIC (INSTRUMENT CLUSTER) Was the DRBIII® able to communicate with one or more Module(s)? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: If the DRB can not communicate with a single module, refer to the category list for the related symptom.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All
3	Turn the ignition off. Disconnect the BCM C1 harness connector. Disconnect the DRB from the Data Link Connector (DLC). Disconnect the negative battery cable. Measure the resistance of the PCI Bus circuit between the Data Link Connector (DLC) and the BCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Reconnect the BCM harness connector and the negative battery cable.** Turn the ignition on. Measure the voltage of the PCI Bus circuit at the Data Link Connector (DLC). Is the voltage above 7.0 volts? Yes → Go To 5 No → Go To 6	All
5	Turn the ignition off. Using a voltmeter, connect one end to the PCI Bus circuit at the DLC, and the other end to ground. **Note: When performing the next step turn the ignition off (wait one minute) before disconnecting any module. When the module is disconnected turn the ignition on to check for a short to voltage.** Turn the ignition on. While monitoring the voltmeter, disconnect each module the vehicle is equipped with one at a time. Is the voltage steadily above 7.0 volts with all the modules disconnected? Yes → Repair the PCI Bus circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that when disconnected the short to voltage was eliminated. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Disconnect the negative battery cable. Using a ohmmeter, connect one end to the PCI Bus circuit at the DLC, and the other end to ground. While monitoring the ohmmeter, disconnect each module the vehicle is equipped with one at a time. **NOTE: Total bus resistance to ground thru all of the modules is typically between 350 to 1000 ohms. The more modules on the bus, the lower the total bus resistance will be.** Is the resistance below 150.0 ohms with all the modules disconnected? Yes → Repair the PCI Bus circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that when disconnected the short to ground was eliminated. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
INTERMITTENT CONDITION

POSSIBLE CAUSES
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Refer to any Technical Service Bulletins (TSBs) that may apply. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC set. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the related wire harness. Look for parameter values to change and/or a DTC to set. Turn the ignition off. Visually inspect the related wire harness. Disconnect all the related harness connectors. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals. Perform a voltage drop test on the related circuits between the suspected faulty component and the PCM. **CAUTION: NEVER PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Inspect and clean all PCM, engine, and chassis grounds that are related to the most current DTC. If numerous trouble codes were set, use a wire schematic and look for any common ground or supply circuits. For any Relay DTCs, actuate the Relay with the DRBIII® and wiggle the related wire harness to try to interrupt the actuation. For intermittent Evaporative Emission trouble codes perform a visual and physical inspection of the related parts including hoses and the Fuel Filler cap. For intermittent Misfire DTC's check for restrictions in the Intake and Exhaust system, proper installation of Sensors, vacuum leaks, and binding components that are run by the accessory drive belt. Use the DRBIII® to perform a System Test if one applies to failing component. A co-pilot, data recorder, and/or lab scope should be used to help diagnose intermittent conditions. Were any problems found during the above inspections? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT

When Monitored and Set Condition:

P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT

When Monitored: Engine cranking and Engine running

Set Condition: Powertrain Control Module detects an error when the camshaft position is out of phase with the crankshaft position.

POSSIBLE CAUSES
INTERMITTENT CONDITION
CMP WIRE HARNESS INSPECTION
TONE WHEEL/PULSE RING INSPECTION
INTERMITTENT CMP SIGNAL
CKP WIRE HARNESS INSPECTION
TONE WHEEL/PULSE RING INSPECTION
INTERMITTENT CKP SIGNAL
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, erase DTCs. Start the engine and run until operating temp is reached. (Closed Loop) If the DTC does not reset it may be necessary to test drive the vehicle. Does the P0016 reset? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit at the CMP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 3 No → Go To 6	All
3	Turn the ignition off. Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Make sure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are torqued to the correct specification. Refer to any TSBs that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Remove the Camshaft Position Sensor. Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Remove the lab scope probe. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. With the DRBIII®, erase DTCs. Start the engine. Gently tap on the Cam Position Sensor and wiggle the Sensor. Ignition on, engine not running. Inspect the Sensor harness connector, PCM harness connector, Sensor connector, and PCM connector for loose, bent, corroded, or pushed out pins/terminals. Inspect the related wire harness and the splices in the CMP circuits. Does the P0016 return? Yes → Repair the wiring/connector concerns as needed or replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit at the CKP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 8 No → Go To 11	All
8	Turn the ignition off. Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Make sure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight. Refer to any TSBs that may apply. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Remove the Crankshaft Position Sensor. Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All

P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT — Continued

TEST	ACTION	APPLICABILITY
10	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	**NOTE: The conditions that set this DTC are not present at this time. The following test may help in identifying the intermittent condition.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Gently tap on the Crank Position Sensor and wiggle the CKP Sensor. Turn the ignition off. Inspect the Sensor harness connector, PCM harness connector, Sensor connector, and PCM connector for loose, bent, corroded, or pushed out pins/terminals. Inspect the related wire harness and the splices in the CKP circuits. Were any problems found? Yes → Repair the wiring/connector concerns as needed or replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW
P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW
P0051-O2 SENSOR 2/1 HEATER CIRCUIT LOW
P0057-O2 SENSOR 2/2 HEATER CIRCUIT LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW.

When Monitored and Set Condition:

P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW

When Monitored: Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is on.

Set Condition: O2 Heater element input is below the minimum acceptable voltage.

P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW

When Monitored: Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is on.

Set Condition: O2 Heater element input is below the minimum acceptable voltage.

P0051-O2 SENSOR 2/1 HEATER CIRCUIT LOW

When Monitored: Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is on.

Set Condition: O2 Heater element input is below the minimum acceptable voltage.

P0057-O2 SENSOR 2/2 HEATER CIRCUIT LOW

When Monitored: Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is on.

Set Condition: O2 Heater element input is below the minimum acceptable voltage.

POSSIBLE CAUSES
O2 SENSOR HEATER OPERATION
O2 HEATER ELEMENT
O2 HEATER CONTROL CIRCUIT
O2 HEATER CONTROL SHORTED TO GROUND
PCM

P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.** Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the O2 Sensor voltage stay above 4.5 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. **NOTE: Allow the O2 Sensor to cool to room temperature.** Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. Is the resistance between 2.0 and 30 ohms? Yes → Go To 3 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test with the O2 Sensor harness connector still disconnected. Using a 12-volt test light connected to ground, probe the O2 Heater Control circuit at the O2 Sensor harness connector. Does the test light illuminate brightly and flash on and off? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between ground and the O2 Heater Control circuit at the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the O2 Sensor Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH
P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH
P0052-O2 SENSOR 2/1 HEATER CIRCUIT HIGH
P0058-O2 SENSOR 2/2 HEATER CIRCUIT HIGH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH.

When Monitored and Set Condition:

P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH

When Monitored: Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is off.

Set Condition: O2 Heater element input is above the maximum acceptable voltage.

P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH

When Monitored: Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is off.

Set Condition: O2 Heater element input is above the maximum acceptable voltage.

P0052-O2 SENSOR 2/1 HEATER CIRCUIT HIGH

When Monitored: Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is off.

Set Condition: O2 Heater element input is above the maximum acceptable voltage.

P0058-O2 SENSOR 2/2 HEATER CIRCUIT HIGH

When Monitored: Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is off.

Set Condition: O2 Heater element input is above the maximum acceptable voltage.

POSSIBLE CAUSES
O2 SENSOR HEATER OPERATION
O2 HEATER ELEMENT
O2 HEATER GROUND CIRCUIT OPEN
O2 SENSOR
O2 HEATER CONTROL SHORTED TO VOLTAGE
O2 HEATER CONTROL CIRCUIT OPEN
PCM

P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.** Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the O2 Sensor voltage stay above 4.5 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. **NOTE: Allow the O2 Sensor to cool down to room temperature.** Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. Is the resistance between 2.0 and 30 ohms? Yes → Go To 3 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test with the Sensor harness connector still disconnected. Using a 12-volt test light connected to ground, probe the O2 Heater Control circuit at the O2 Sensor harness connector. Does the test light illuminate brightly and flash on and off? Yes → Go To 4 No → Go To 5	All
4	Turn the ignition off. Measure the resistance between engine ground and the O2 Heater ground circuit at the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair the open in the O2 Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the O2 Heater Control circuit at the O2 Sensor harness connector. Does the voltmeter indicate any voltage present? Yes → Repair the short to voltage in the O2 Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All

P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
6	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the O2 Heater Control circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the O2 Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - VACUUM LEAK DETECTED

P2074-MAP SENSOR/TP SENSOR CORRELATION - VACUUM LEAK DETECTED

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - VACUUM LEAK DETECTED.

When Monitored and Set Condition:

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - VACUUM LEAK DETECTED

When Monitored: During all drive modes.

Set Condition: If vacuum drops below 1.5″Hg with engine RPM greater than 2000 RPM and closed throttle.

P2074-MAP SENSOR/TP SENSOR CORRELATION - VACUUM LEAK DETECTED

When Monitored: During all drive modes.

Set Condition: If vacuum drops below 1.5″Hg with engine RPM greater than 2000 RPM and closed throttle. One Trip Fault. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
VACUUM LEAK
RESISTANCE IN (F856) 5-VOLT SUPPLY CIRCUIT
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
MAP SENSOR
RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
TP SENSOR OPERATION
RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
TP SENSOR
RESISTANCE IN THE (K22) TP SENSOR NO.1 SIGNAL CIRCUIT
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - VACUUM LEAK DETECTED — Continued

POSSIBLE CAUSES
RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose any TP Sensor or MAP Sensor component DTCs before continuing.** **NOTE: If the P0501 - No Vehicle Speed Signal is set with this DTC, refer to the P0501 diagnostics before continuing.** **NOTE: The throttle plate and linkage should be free from binding and carbon build up.** **NOTE: Make sure the throttle plate is at the idle position.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	**NOTE: This code is enabled on engines with a plastic intake manifold and is intended to shut down the engine if a large crack occurs.** **NOTE: A large vacuum leak is most likely the cause of this DTC.** Inspect the Intake Manifold for leaks and cracks. Inspect the Power Brake Booster for vacuum leaks. Inspect the PCV system for proper operation or vacuum leaks. Inspect the MAP Sensor for proper installation. Were any vacuum leaks found? Yes → Repair the vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Start the engine. With the DRBIII®, monitor the MAP Sensor voltage. Snap the throttle. Does the MAP Sensor voltage vary from below 2.0 volts at idle to above 3.5 volts at WOT. Yes → Go To 4 No → Go To 11	All
4	Ignition on, engine not running. With the DRBIII®, monitor the TP Sensor voltage while slowly depressing the throttle pedal from closed to wide open throttle. Does voltage start approximately at 0.8 of a volt and go above 3.5 volts with a smooth transition? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - VACUUM LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (F855) 5-volt Supply circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the excessive resistance in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Measure the resistance between ground and (F855) 5-volt Supply circuit at the TP Sensor harness connector. Is the resistance above 100k ohms? Yes → Go To 7 No → Repair the short to ground in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Connect the C2 PCM harness connector. Ignition on, engine not running. With the DRBIII®, monitor the TP Sensor voltage. Connect a jumper wire between the (K22) TP Sensor No.1 Signal circuit and the (K900) Sensor ground circuit at the Sensor harness connector. Does the TP Sensor voltage change from approximately 4.9 volts to below 0.5 of a volt? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8 **NOTE: Remove the jumper wire before continuing.**	All
8	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K22) TP Sensor No.1 Signal circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the excessive resistance in the (K22) TP Sensor No.1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - VACUUM LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
9	Measure the resistance between ground and the (K22) TP Sensor No.1 Signal circuit at the TP Sensor harness connector. Is the resistance above 100k ohms? Yes → Go To 10 No → Repair the short to ground in the (K22) TP Sensor No.1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 17 No → Repair the excessive resistance in the (K900) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the C1 and C2 PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the excessive resistance in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Measure the resistance between ground and the (F856) 5-volt Supply circuit at the MAP Sensor harness connector. Is the resistance above 100k ohms? Yes → Go To 13 No → Repair the short to ground in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - VACUUM LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Connect the C1 and C2 PCM harness connectors. Ignition on, engine not running. With the DRBIII®, monitor the MAP Sensor voltage. Connect a jumper wire between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit. Cycle the ignition switch from off to on. Does the DRBIII® display MAP voltage from approximately 4.9 volts to below 0.5 of a volt? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14 **NOTE: Remove the jumper wire before continuing.**	All
14	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Repair the excessive resistance in the (K1) MAP Signal circuit Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	Measure the resistance between ground and the (K1) MAP Signal circuit at the MAP Sensor harness connector. Is the resistance above 100k ohms? Yes → Go To 16 No → Repair the short to ground in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
16	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 17 No → Repair the excessive resistance in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - VACUUM LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
17	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0071-AMBIENT TEMP SENSOR PERFORMANCE

When Monitored and Set Condition:

P0071-AMBIENT TEMP SENSOR PERFORMANCE

When Monitored: Engine off time is greater than 480 minutes and Ambient Temperature is greater than 4 deg C (39 deg F).

Set Condition: After a calibrated amount of cool down time, the PCM compares the ECT Sensor, IAT Sensor and the Ambient Air Temperature Sensor values. The Ambient Air Temperature Sensor value is not within -10 deg C (18 deg F) of the other two temperature sensor's. Two Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(G31) AAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
AAT SENSOR
(G31) AAT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
(G31) AAT SIGNAL CIRCUIT SHORTED TO GROUND
(G31) AAT SIGNAL CIRCUIT SHORTED TO (K900) SENSOR GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	**NOTE: Visually inspect both the component and the PCM connectors. Look for damage, partially broken wires and backed out or corroded terminals** Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. Disconnect the Ambient Temp Sensor harness connector. Ignition on, engine not running. Using a 12-volt test light connected to ground probe the (G31) AAT Signal circuit at the Ambient Temp Sensor harness connector. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (G31) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0071-AMBIENT TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Connect the C1 and C2 PCM harness connectors. Ignition on, engine not running. With the DRBIII®, read the Ambient Temperature Sensor voltage. Is the voltage above 4.6 volts? Yes → Go To 4 No → Go To 7	All
4	Connect a jumper wire across the (G31) AAT Signal circuit and the (K900) Sensor ground circuit terminals of the Sensor harness connector. With the DRBIII®, read the AAT Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the Ambient Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5 **NOTE: Remove the jumper wire before continuing.**	All
5	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (G31) AAT Signal circuit from the AAT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (G31) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the AAT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. Measure the resistance between ground and the (G31) AAT Signal circuit at the AAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (G31) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0071-AMBIENT TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
8	Measure the resistance between the (G31) AAT Signal circuit and the (K900) Sensor ground circuit at the AAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K900) Sensor ground circuit and the (G31) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0072-AMBIENT TEMP SENSOR CIRCUIT LOW

When Monitored and Set Condition:

P0072-AMBIENT TEMP SENSOR CIRCUIT LOW

When Monitored: The ignition key on.

Set Condition: Ambient Temperature Sensor is less than 0.039 of a volt at the PCM for 4.8 seconds. Three good trips to clear the MIL.

POSSIBLE CAUSES
AAT SENSOR VOLTAGE BELOW 0.3 OF A VOLT
AAT SENSOR
(G31) AAT SIGNAL CIRCUIT SHORTED TO GROUND
(G31) ATT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the Ambient Temperature Sensor voltage. Is the voltage below 0.3 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read AAT Sensor voltage. Is the voltage above 4.6 volts? Yes → Replace the Ambient Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. Measure the resistance between ground and the (G31) AAT Signal circuit at the AAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (G31) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0072-AMBIENT TEMP SENSOR CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
4	Measure the resistance between the (G31) AAT Signal circuit and the (K900) Sensor ground circuit at the AAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K900) Sensor ground circuit and the (G31) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0073-AMBIENT TEMP SENSOR CIRCUIT HIGH

When Monitored and Set Condition:

P0073-AMBIENT TEMP SENSOR CIRCUIT HIGH

When Monitored: The ignition key on.

Set Condition: The Ambient Temperature Sensor voltage is greater than 4.94 volts at the PCM for 4.8 seconds. Three good trips to clear the MIL.

POSSIBLE CAUSES
AAT SENSOR VOLTAGE ABOVE 4.8 VOLTS
AAT SENSOR
(G31) AAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(G31) AAT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the Ambient Temperature Sensor voltage. Is the voltage above 4.8 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Connect a jumper wire between the (G31) AAT Signal circuit and the (K900) Sensor ground circuit at the AAT Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read Ambient Temperature Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the Ambient Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0073-AMBIENT TEMP SENSOR CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. Ignition on, engine not running. Using a 12-volt test light connected to ground probe the (G31) AAT Signal circuit at the AAT Sensor harness connector. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (G31) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (G31) AAT Signal circuit from the AAT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (G31) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the AAT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0107-MAP SENSOR CIRCUIT LOW

When Monitored and Set Condition:

P0107-MAP SENSOR CIRCUIT LOW

When Monitored: Engine speed greater than 250 RPM. Battery voltage greater than 10.3 volts.

Set Condition: The MAP sensor signal voltage is below 0.08 of a volt for 1.7 seconds. One Trip Fault.

POSSIBLE CAUSES
MAP SENSOR VOLTAGE BELOW 0.08 OF A VOLT
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
MAP SENSOR
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
(K1) MAP SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 0.08 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (F856) 5-volt Supply circuit at the MAP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 6	All
3	With the DRBIII®, monitor the MAP Sensor voltage with the Sensor harness connector disconnected. Is the voltage above 1.2 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0107-MAP SENSOR CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. Measure the resistance between ground and the (K1) MAP Signal circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Measure the resistance between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K900) Sensor ground and the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
6	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Measure the resistance between ground and the (F856) 5-volt Supply circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0108-MAP SENSOR CIRCUIT HIGH

When Monitored and Set Condition:

P0108-MAP SENSOR CIRCUIT HIGH

When Monitored: Engine RPM greater than 260. Battery voltage greater than 10.3 volts

Set Condition: The MAP sensor signal voltage is greater than 4.93 volts.

POSSIBLE CAUSES
MAP SENSOR VOLTAGE ABOVE 4.93 VOLTS
MAP SENSOR
(K1) MAP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K1) MAP SIGNAL CIRCUIT OPEN
(K1) MAP SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT
(K900) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, read the MAP Sensor voltage. Is the voltage above 4.93 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Connect a jumper wire between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit in the harness connector. Ignition on, engine not running. With the DRBIII®, monitor the MAP Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0108-MAP SENSOR CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (K1) MAP Signal circuit at the MAP Sensor harness connector. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between the (K1) MAP Signal circuit and the (F856) 5-volt Supply circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (F856) 5-volt Supply circuit and the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE

When Monitored and Set Condition:

P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE

When Monitored: The engine off time is greater than 480 minutes. Ambient Temperature is greater than 4 deg C (38 deg F).

Set Condition: After a calibrated amount of cool down time the PCM compares the ECT Sensor, IAT Sensor, and the Ambient Air Temp Sensor values. The IAT Sensor value is not within -10 deg C (18 deg F) of the other two temperature sensors. Two Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(K21) IAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
IAT SENSOR
(K21) IAT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
(K21) IAT SIGNAL CIRCUIT SHORTED TO GROUND
(K21) IAT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the C2 PCM harness connector. **NOTE: Visually inspect both the component and the PCM connectors. Look for damaged, partially broken wires, and backed out or corroded terminals.** Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (K21) IAT Signal circuit in the IAT Sensor harness connector. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Connect the C2 PCM harness connector. Ignition on, engine not running. With the DRBIII®, read the IAT voltage. Is the voltage above 4.6 volts? Yes → Go To 4 No → Go To 7	All
4	Connect a jumper wire between the (K21) IAT Signal circuit and (K900) Sensor ground circuit in the IAT Sensor harness connector. With the DRBIII®, read the IAT Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5 **NOTE: Remove the jumper wire before continuing.**	All
5	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K21) IAT Signal circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the C2 PCM harness connector. Measure the resistance between ground and the (K21) IAT Signal circuit at the IAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
8	Measure the resistance between the (K900) Sensor ground circuit and the (K21) IAT Signal circuit at the IAT Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K900) Sensor ground circuit and the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0112-INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW

When Monitored and Set Condition:

P0112-INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: The Intake Air Temperature (IAT) sensor circuit voltage at the PCM goes below 0.5 of a volt. One Trip Failure.

POSSIBLE CAUSES
IAT SENSOR VOLTAGE BELOW 0.5 OF A VOLT
IAT SENSOR
(K21) IAT SIGNAL CIRCUIT SHORTED TO GROUND
(K21) IAT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the IAT Sensor voltage. Is the voltage below 0.5 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the IAT harness connector. Ignition on, engine not running. With the DRBIII®, read the IAT Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the C2 PCM harness connector. Measure the resistance between ground and the (K21) IAT Signal circuit at the IAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0112-INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
4	Measure the resistance between the (K21) IAT Signal circuit and the (K900) Sensor ground circuit at the IAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K900) Sensor ground and the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0113-INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH

When Monitored and Set Condition:

P0113-INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: The Intake Air Temperature (IAT) sensor circuit voltage at the PCM goes above 4.9 volts. One Trip Failure.

POSSIBLE CAUSES
IAT SENSOR VOLTAGE ABOVE 4.9 VOLTS
IAT SENSOR
(K21) IAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K21) IAT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the IAT Sensor voltage. Is the voltage above 4.9 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the IAT harness connector. Connect a jumper wire between the (K21) IAT Signal circuit and the (K900) Sensor ground circuit at the IAT harness connector. Ignition on, engine not running. With the DRBIII®, read the IAT Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0113-INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C2 PCM harness connector. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (K21) IAT Signal circuit at the IAT Sensor harness connector. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K21) IAT Signal circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0116-ENGINE COOLANT TEMPERATURE CIRCUIT PERFORMANCE

When Monitored and Set Condition:

P0116-ENGINE COOLANT TEMPERATURE CIRCUIT PERFORMANCE

When Monitored: Engine off time is greater than 480 minutes. Ambient temperature is greater than 4 deg C (38 deg F).

Set Condition: After a calibrated amount of cool down time the PCM compares the ECT Sensor, IAT Sensor, and the Ambient Air Temp Sensor values. If the IAT Sensor value is not within 10 deg C (18 deg F) of the other two temperature sensors. Two Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(K2) ECT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
ECT SENSOR
(K2) ECT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
(K2) ECT SIGNAL CIRCUIT SHORTED TO GROUND
(K2) ECT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the C2 PCM harness connector. Disconnect the ECT Sensor harness connector. **NOTE: Visually inspect both the component and the PCM connectors. Look for damaged, partially broken wires, and backed out or corroded terminals.** Ignition on, engine not running. Measure the voltage on the (K2) ECT Signal circuit at the ECT Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0116-ENGINE COOLANT TEMPERATURE CIRCUIT PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Connect the C2 PCM harness connector. Ignition on, engine not running. With the DRBIII®, read the ECT Sensor voltage. Is the voltage above 4.6 volts? Yes → Go To 4 No → Go To 7	All
4	Connect a jumper wire between the (K2) ECT Signal circuit and the (K900) Sensor ground circuit at the ECT Sensor harness connector. With the DRBIII®, read the ECT voltage. Is the voltage below 1.0 volt? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K2) ECT Signal circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the C2 PCM harness connector. Measure the resistance between ground and the (K2) ECT Signal circuit at the ECT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0116-ENGINE COOLANT TEMPERATURE CIRCUIT PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
8	Measure the resistance between the (K2) ECT Signal circuit and the (K900) Sensor ground circuit at the ECT Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K900) Sensor ground and the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0117-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW

When Monitored and Set Condition:

P0117-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM is less than 0.5 of a volt for more than 2.6 seconds. One Trip Fault

POSSIBLE CAUSES
ECT SENSOR VOLTAGE BELOW 0.5 OF A VOLT
ECT SENSOR
(K2) ECT SIGNAL CIRCUIT SHORTED TO GROUND
(K2) ECT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the ECT Sensor voltage. Is the voltage below 0.5 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the ECT harness connector. Ignition on, engine not running. With the DRBIII®, read ECT Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the C2 PCM harness connector. Measure the resistance between ground and the (K2) ECT Signal circuit at the ECT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0117-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
4	Measure the resistance between the (K2) ECT Signal circuit and the (K900) Sensor ground circuit at the ECT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K900) Sensor ground and the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0118-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH

When Monitored and Set Condition:

P0118-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM is greater than 4.96 volts for more than 2.6 seconds. One Trip Fault.

POSSIBLE CAUSES
ECT SENSOR VOLTAGE ABOVE 4.96 VOLTS
ECT SENSOR
(K2) ECT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K2) ECT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the ECT Sensor voltage. Is the voltage above 4.96 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Connect a jumper wire between the (K2) ECT Signal circuit and the (K900) Sensor ground circuit at the ECT harness connector. Ignition on, engine not running. With the DRBIII®, read the ECT Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0118-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C2 PCM harness connector. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (K2) ECT Signal circuit at the ECT Sensor harness connector. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K2) ECT Signal circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0122-THROTTLE POSITION SENSOR NO.1 LOW

When Monitored and Set Condition:

P0122-THROTTLE POSITION SENSOR NO.1 LOW

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: Throttle Position Sensor voltage at the PCM is less than 0.16 of a volt for 0.7 of a second. One Trip Fault.

POSSIBLE CAUSES
THROTTLE POSITION SENSOR SWEEP
INTERMITTENT CONDITION
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
THROTTLE POSITION SENSOR
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. **NOTE: Diagnose any IAC codes before continuing.** With the DRBIII®, read the TP Sensor voltage. Is the voltage below 0.2 of a volt? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the TP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (F855) 5-volt Supply circuit at the TP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 6	All
3	With the DRBIII®, monitor the TP Sensor voltage with the Sensor harness connector disconnected. Is the voltage above 4.5 volts? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0122-THROTTLE POSITION SENSOR NO.1 LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the C2 PCM harness connector. Measure the resistance between ground and the (K22) TP Sensor No.1 Signal circuit at the TP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K22) TP Sensor No.1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Measure the resistance between the (K22) TP Sensor No.1 Signal circuit and the (K900) Sensor ground circuit at the TP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K900) Sensor ground and the (K22) TP Sensor No.1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
6	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (F855) 5-volt Supply circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Measure the resistance between ground and the (F855) 5-volt Supply circuit at the TP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0122-THROTTLE POSITION SENSOR NO.1 LOW — Continued

TEST	ACTION	APPLICABILITY
9	Ignition on, engine not running. With the DRBIII®, monitor the Throttle Position Sensor voltage. Slowly open the throttle from the idle position to the wide open throttle position. Does voltage start at approximately 0.8 of a volt and go above 3.5 volts with a smooth transition? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0123-THROTTLE POSITION SENSOR NO.1 HIGH

When Monitored and Set Condition:

P0123-THROTTLE POSITION SENSOR NO.1 HIGH

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: Throttle Position Sensor voltage at the PCM is greater than 4.5 volts for 0.7 of a second. One Trip Fault.

POSSIBLE CAUSES
THROTTLE POSITION SENSOR SWEEP
INTERMITTENT CONDITION
THROTTLE POSITION SENSOR
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT OPEN
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT
(K900) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the throttle is fully closed and free from binding or carbon build up.** Start the engine. With the DRBIII®, read DTCs and record the related Freeze Frame data. **NOTE: Diagnose any IAC codes before continuing.** With the DRBIII®, read the TP Sensor voltage. Is the voltage above 4.5 volts? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the TP Sensor harness connector. Connect a jumper wire between the (K22) TP Sensor No.1 Signal circuit and the (K900) Sensor ground circuit at the Sensor harness connector. With the DRBIII®, monitor the TP Sensor voltage. Ignition on, engine not running. Is the voltage below 0.5 of a volt? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0123-THROTTLE POSITION SENSOR NO.1 HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C2 PCM harness connector. Ignition on, engine not running. Measure the voltage on the (K22) TP Sensor No.1 Signal circuit at the TP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K22) TP Sensor No.1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K22) TP Sensor No.1 Signal circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K22) TP Sensor No.1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between the (K22) TP Sensor No.1 Signal circuit and the (F855) 5-volt Supply circuit at the TP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (F855) 5-volt Supply circuit and the (K22) TP Sensor No.1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0123-THROTTLE POSITION SENSOR NO.1 HIGH — Continued

TEST	ACTION	APPLICABILITY
8	Ignition on, engine not running. With the DRBIII®, monitor the Throttle Position Sensor voltage. Slowly open the throttle from the idle position to the wide open throttle position. Does voltage start at approximately 0.8 of a volt and go above 3.5 volts with a smooth transition? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL

When Monitored and Set Condition:

P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL

When Monitored: With battery voltage greater than 10.4 volts and after engine is started.

Set Condition: The engine temperature does not go above -10°C (15°F). Failure time depends on start-up coolant temperature and ambient temperature. (i.e. 2 minutes for a start temp of -10°C (15°F) or up to 10 mintues for a vehicle with a start-up temp of -28°C (5°F). Two Trip Fault.

POSSIBLE CAUSES
LOW COOLANT LEVEL
THERMOSTAT OPERATION
ECT SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: If a Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.** **NOTE: Inspect the ECT terminals and related PCM terminals. Ensure the terminals are free from corrosion and damage.** **NOTE: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a totally cold soaked engine.** **NOTE: Extremely cold outside ambient temperatures may have caused this DTC to set.** **WARNING: Never open the cooling system when the engine is hot. The system is under pressure. Extreme burns or scalding may result. Allow the engine to cool before opening the cooling system.** Inspect the coolant system for proper level and condition. Is the coolant level and condition OK? Yes → Go To 2 No → Inspect the vehicle for a coolant leak and add the necessary amount of coolant. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: This test works best if performed on a cold engine (cold soak)** Ignition on, engine not running. With the DRBIII®, read the Eng Coolant Tmp Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up monitor the Eng Coolant Tmp Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F) . Also monitor the actual coolant temperature with a thermometer. **NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the Eng Coolant Tmp Deg on the DRBIII® screen should stay relatively close to each other.** Using the appropriate service information, determine the proper opening temperature of the thermostat. Did the thermostat open at the proper temperature? Yes → Go To 3 No → Replace the thermostat. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Ignition on, engine not running. With the DRBIII®, read the Eng Coolant Tmp Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up monitor the Eng Coolant Tmp Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). Also monitor the actual coolant temperature with a thermometer. **NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the Eng Coolant Tmp Deg on the DRBIII® screen should stay relatively close to each other.** Is the thermometer reading relatively close to the DRBIII® ECT reading? Yes → Test Complete. No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0128-THERMOSTAT RATIONALITY

When Monitored and Set Condition:

P0128-THERMOSTAT RATIONALITY

When Monitored: Engine running.

Set Condition: The PCM predicts a coolant temperature value that it will compare to the actual coolant temperature. A significant difference results in an error. Two Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
OTHER POSSIBLE CAUSES
LOW COOLANT LEVEL
THERMOSTAT OPERATION
SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
TEMPERATURE SENSOR
SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
SIGNAL CIRCUIT SHORTED TO GROUND
SIGNAL CIRCUIT SHORTED TO (K900) SENSOR GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If any ECT, AAT, CMP or CKP sensor DTCs have set along with P0128, diagnose them before continuing.** **NOTE: Ensure that Pinion Factor has been programmed correctly into the PCM.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0128-THERMOSTAT RATIONALITY — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: If a Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.** **NOTE: Inspect the ECT terminals and related PCM terminals. Make sure the terminals are free from corrosion and damage.** **NOTE: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a totally cold soaked engine.** **Note: Extremely cold outside ambient temperatures may have caused this DTC to set.** **WARNING: Never open the cooling system when the engine is hot. The system is under pressure. Extreme burns or scalding may result. Allow the engine to cool before opening the cooling system.** Check the coolant system to make sure that the coolant is in good condition and at the proper level. Is the coolant level and condition OK? Yes → Go To 3 No → Inspect the vehicle for a coolant leak and add the necessary amount of coolant. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	**NOTE: This test works best if performed on a cold engine (cold soak).** Ignition on, engine not running. With the DRBIII®, read the ECT Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ECT Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). Also monitor the actual coolant temperature with a thermometer. **NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the ECT Deg on the DRBIII® screen should stay relatively close to each other.** Using the appropriate service information, determine the proper opening temperature of the thermostat. Did the thermostat open at the proper temperature? Yes → Go To 4 No → Replace the thermostat. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Ignition on, engine not running. With the DRBIII®, read and record the AAT Sensor Temperature value. Using the DRB Temperature Probe #CH7050, measure the ambient air temperature near the AAT Sensor. Is the AAT Sensor value with -15°C (5°F) of the temperature probe reading? Yes → Go To 5 No → Go To 7	All

P0128-THERMOSTAT RATIONALITY — Continued

TEST	ACTION	APPLICABILITY
5	**WARNING: MAKE SURE THE ENGINE COOLING SYSTEM IS COOL BEFORE REMOVING THE PRESSURE CAP OR ANY HOSE. SEVERE PERSONAL INJURY MAY RESULT FROM ESCAPING HOT COOLANT. THE COOLING SYSTEM IS PRESSURIZED WHEN HOT.** With the DRBIII®, read and record the ECT Sensor Temperature value. Using the DRB Temperature Probe #CH7050, measure the engine coolant temperature. Is the ECT Sensor value with -15°C (5°F) of the temperature probe reading? Yes → Go To 6 No → Go To 7	All
6	Inspect the Temperature sensors for any physical damage. Inspect the engine coolant. Make sure the coolant is at the proper level. Refer to the Service Information COOLING. Make sure the Temperature sensors are properly installed. Make sure the CMP and CKP sensors are mounted properly. Check the connectors for any signs of damage. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Refer to any Technical Service Bulletins (TSBs) that may apply. With the engine running at normal operating temperature, monitor the Temperature sensor parameters while wiggling the wire harness. Look for parameter values to change. Visually inspect the related wire harness. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals. **CAUTION: NEVER PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Inspect and clean all PCM, engine, and chassis grounds. Were any problems found during the above inspections? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
7	**NOTE: Visually inspect both the component and the PCM connectors. Look for damage, partially broken wires and backed out or corroded terminals** Turn the ignition off. Disconnect the applicable Temperature Sensor harness connector. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage of the Signal circuit in the appropriate Temperature Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0128-THERMOSTAT RATIONALITY — Continued

TEST	ACTION	APPLICABILITY
8	Connect a jumper wire across the Temperature Sensor harness connector. With the DRBIII®, read the Temperature voltage. Does the voltage start at 5.0 volts and drop below 1.0 volt? Yes → Replace the suspected Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the Sensor Signal circuit from the Temperature Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open in the Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the appropriate Temperature Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Measure the resistance between ground and the Sensor Signal circuit in the Temperature Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	Measure the resistance between the Signal circuit and the (K900) Sensor ground circuit at the Temperature Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K900) Sensor ground circuit and the Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All

P0128-THERMOSTAT RATIONALITY — Continued

TEST	ACTION	APPLICABILITY
13	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0129-BAROMETRIC PRESSURE OUT-OF-RANGE

When Monitored and Set Condition:

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE

When Monitored: With the ignition key on. No Cam or Crank signal within 75 ms. Engine speed less than 250 RPM.

Set Condition: The PCM senses the voltage from the MAP sensor to be less than 2.2 volts but above 0.04 of a volt for 300 milliseconds. One Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
MAP SENSOR
(K1) MAP SIGNAL CIRCUIT OPEN
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (F856) 5-volt Supply circuit at the MAP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 6	All

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, monitor the MAP Sensor voltage with the Sensor harness connector disconnected. Is the voltage above 4.5 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between ground and the (K1) MAP Signal circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
6	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (F856) 5-volt Supply circuit at the MAP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE — Continued

TEST	ACTION	APPLICABILITY
8	Measure the resistance between ground and the (F856) 5-volt Supply circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0131-O2 SENSOR 1/1 CIRCUIT LOW VOLTAGE
P0137-O2 SENSOR 1/2 CIRCUIT LOW VOLTAGE
P0151-O2 SENSOR 2/1 CIRCUIT LOW VOLTAGE
P0157-O2 SENSOR 2/2 CIRCUIT LOW VOLTAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0131-O2 SENSOR 1/1 CIRCUIT LOW VOLTAGE.

When Monitored and Set Condition:

P0131-O2 SENSOR 1/1 CIRCUIT LOW VOLTAGE

When Monitored: Engine running for less than 30 seconds and the O2 Sensor Heater Temperature is less than 251°C (484°F) with battery voltage greater 10.4 volts.

Set Condition: The oxygen sensor signal voltage is below 2.411 volts for 10.24 seconds after starting engine. One Trip Fault.

P0137-O2 SENSOR 1/2 CIRCUIT LOW VOLTAGE

When Monitored: Engine running for less than 30 seconds and the O2 Sensor Heater Temperature is less than 251°C (484°F) with battery voltage greater 10.4 volts.

Set Condition: The oxygen sensor signal voltage is below 2.411 volts for 10.24 seconds after starting engine. One Trip Fault.

P0151-O2 SENSOR 2/1 CIRCUIT LOW VOLTAGE

When Monitored: Engine running for less than 30 seconds and the O2 Sensor Heater Temperature is less than 251°C (484°F) with battery voltage greater 10.4 volts.

Set Condition: The oxygen sensor signal voltage is below 2.411 volts for 10.24 seconds after starting engine. One Trip Fault.

P0157-O2 SENSOR 2/2 CIRCUIT LOW VOLTAGE

When Monitored: Engine running for less than 30 seconds and the O2 Sensor Heater Temperature is less than 251°C (484°F) with battery voltage greater 10.4 volts.

Set Condition: The oxygen sensor signal voltage is below 2.411 volts for 10.24 seconds after starting engine. One Trip Fault.

POSSIBLE CAUSES
O2 SENSOR BELOW 2.52 VOLTS
O2 SENSOR
O2 RETURN CIRCUIT SHORTED TO GROUND
PCM

P0131-O2 SENSOR 1/1 CIRCUIT LOW VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
1	Start the engine. Allow the engine to reach normal operating temperature. **NOTE: When diagnosing this DTC, diagnose the O2 Sensor that set the DTC.** With the DRBIII®, read the O2 Sensor voltage. Is the voltage below 2.52 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the O2 Sensor harness connector. Ignition on, engine not running. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage above 4.8 volts? Yes → Go To 3 No → Go To 4	All
3	Measure the voltage on the O2 Return circuit at the O2 Sensor harness connector. Is the voltage at 2.5 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between ground and the O2 Return circuit at the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the O2 Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0132-O2 SENSOR 1/1 CIRCUIT HIGH VOLTAGE
P0138-O2 SENSOR 1/2 CIRCUIT HIGH VOLTAGE
P0152-O2 SENSOR 2/1 CIRCUIT HIGH VOLTAGE
P0158-O2 SENSOR 2/2 CIRCUIT HIGH VOLTAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0132-O2 SENSOR 1/1 CIRCUIT HIGH VOLTAGE.

When Monitored and Set Condition:

P0132-O2 SENSOR 1/1 CIRCUIT HIGH VOLTAGE

When Monitored: O2 Sensor Heater Temperature is greater than 496°C (925°F) and battery voltage greater than 10.4 volts.

Set Condition: The Oxygen Sensor voltage is above 3.99 volts for 66.56 seconds. One trip fault.

P0138-O2 SENSOR 1/2 CIRCUIT HIGH VOLTAGE

When Monitored: O2 Sensor Heater Temperature is greater than 496°C (925°F) and battery voltage greater than 10.4 volts.

Set Condition: The Oxygen Sensor voltage is above 3.99 volts for 76.8 seconds. One trip fault.

P0152-O2 SENSOR 2/1 CIRCUIT HIGH VOLTAGE

When Monitored: O2 Sensor Heater Temperature is greater than 496°C (925°F) and battery voltage greater than 10.4 volts.

Set Condition: The Oxygen Sensor voltage is above 3.99 volts for 66.56 seconds. One trip fault.

P0158-O2 SENSOR 2/2 CIRCUIT HIGH VOLTAGE

When Monitored: O2 Sensor Heater Temperature is greater than 496°C (925°F) and battery voltage greater than 10.4 volts.

Set Condition: The Oxygen Sensor voltage is above 3.99 volts for 76.8 seconds. One trip fault.

POSSIBLE CAUSES
O2 SENSOR VOLTAGE ABOVE 3.7 VOLTS
O2 SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
O2 SENSOR RETURN CIRCUIT SHORTED TO VOLTAGE
O2 SENSOR

P0132-O2 SENSOR 1/1 CIRCUIT HIGH VOLTAGE — Continued

POSSIBLE CAUSES
O2 SENSOR SIGNAL CIRCUIT OPEN
O2 SENSOR RETURN CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If one of the O2 Sensors Signal or Return circuits are shorted to voltage, the DRBIII® will display all O2 Sensor voltage readings high.** **NOTE: It is important to perform the diagnostics on the O2 Sensor that set the DTC.** **NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.** Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read the O2 Sensor voltage. Is the voltage above 3.7 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the O2 Sensor harness connector **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine and allow the engine to idle. Measure the voltage on the O2 Sensor Signal circuit in the O2 Sensor harness connector. **NOTE: Measure the voltage in reference to ground, not the O2 Sensor Return circuit.** Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the O2 Sensor Return circuit in the O2 Sensor harness connector. Is there any voltage present? Yes → Repair the short to voltage in the O2 Sensor Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0132-O2 SENSOR 1/1 CIRCUIT HIGH VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Connect the PCM harness connectors. Connect a jumper wire between the O2 Sensor Signal circuit and the O2 Sensor Return circuit in the O2 Sensor harness connector. Ignition on, engine not running. With the DRBIII®, monitor the O2 Sensor voltage. Is the voltage between 2.3 and 2.7 volts with the jumper wire in place? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5 **NOTE: Remove the jumper wire before continuing.**	All
5	Turn the ignition off. Disconnect the PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the O2 Sensor Signal circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Measure the resistance of the O2 Sensor Return circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open O2 Sensor Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0133-O2 SENSOR 1/1 SLOW RESPONSE
P0139-O2 SENSOR 1/2 SLOW RESPONSE
P0153-O2 SENSOR 2/1 SLOW RESPONSE
P0159-O2 SENSOR 2/2 SLOW RESPONSE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0133-O2 SENSOR 1/1 SLOW RESPONSE.

When Monitored and Set Condition:

P0133-O2 SENSOR 1/1 SLOW RESPONSE

When Monitored: Vehicle is started and driven between 20 and 55 MPH with the Throttle open for a minimum of 120 seconds. Coolant greater than 70°C (158°F). Catalytic Converter Temp greater than 600°C (1112°F) and EVAP Purge is active.

Set Condition: The oxygen sensor signal voltage switches less than 16 times from lean to rich within 20 seconds during monitoring. Two Trip Fault.

P0139-O2 SENSOR 1/2 SLOW RESPONSE

When Monitored: Vehicle is started and driven between 20 and 55 MPH with the Throttle open for a minimum of 120 seconds. Coolant greater than 70°C (158°F). Catalytic Converter Temp greater than 600°C (1112°F) and EVAP Purge is active

Set Condition: The oxygen sensor signal voltage switches less than 16 times from lean to rich within 20 seconds during monitoring. Two Trip Fault.

P0153-O2 SENSOR 2/1 SLOW RESPONSE

When Monitored: Vehicle is started and driven between 20 and 55 MPH with the Throttle open for a minimum of 120 seconds. Coolant greater than 70°C (158°F). Catalytic Converter Temp greater than 600°C (1112°F) and EVAP Purge is active

Set Condition: The oxygen sensor signal voltage switches less than 16 times from lean to rich within 20 seconds during monitoring. Two Trip Fault.

P0159-O2 SENSOR 2/2 SLOW RESPONSE

When Monitored: Vehicle is started and driven between 20 and 55 MPH with the Throttle open for a minimum of 120 seconds. Coolant greater than 70°C (158°F). Catalytic Converter Temp greater than 600°C (1112°F) and EVAP Purge is active

Set Condition: The oxygen sensor signal voltage switches less than 16 times from lean to rich within 20 seconds during monitoring. Two Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO

P0133-O2 SENSOR 1/1 SLOW RESPONSE — Continued

POSSIBLE CAUSES
EXHAUST LEAK
O2 SIGNAL CIRCUIT
O2 RETURN CIRCUIT
O2 SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Ignition on, engine not running. **NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.** With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Start the engine. Inspect the exhaust system for leaks between the engine and the O2 Sensors. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off Disconnect the O2 Sensor harness connector. Ignition on, engine not running. Measure the voltage on the O2 Signal circuit in the O2 Sensor harness connector. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 4 No → Check the O2 Signal circuit for damage, short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Measure the voltage on the O2 Return circuit in the O2 Sensor harness connector. Is the voltage at 2.5 volts? Yes → Check the O2 Return circuit for damage, short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE
P0141-O2 SENSOR 1/2 HEATER PERFROMANCE
P0155-O2 SENSOR 2/1 HEATER PERFORMANCE
P0161-O2 SENSOR 2/2 HEATER PERFORMANCE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0135-O2 SENSOR 1/1 HEATER PERFORMANCE.

When Monitored and Set Condition:

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE

When Monitored: Engine running and heater duty cycle greater than 0%. ASD Relay is energized. Battery voltage greater than 10.4 volts.

Set Condition: No sensor output is received when the PCM powers up the sensor heater. O2 heater is out of control for 128 seconds after it has reached 300 deg C. Two trip fault

P0141-O2 SENSOR 1/2 HEATER PERFROMANCE

When Monitored: Engine running and heater duty cycle greater than 0%. ASD Relay is energized. Battery voltage greater than 10.4 volts.

Set Condition: No sensor output is received when the PCM powers up the sensor heater. O2 heater is out of control for 128 seconds after it has reached 350 deg C. Two trip fault.

P0155-O2 SENSOR 2/1 HEATER PERFORMANCE

When Monitored: Engine running and heater duty cycle greater than 0%. ASD Relay is energized. Battery voltage greater than 10.4 volts.

Set Condition: No sensor output is received when the PCM powers up the sensor heater. O2 heater is out of control for 128 seconds after it has reached 300 deg C. Two trip fault.

P0161-O2 SENSOR 2/2 HEATER PERFORMANCE

When Monitored: Engine running and heater duty cycle greater than 0%. ASD Relay is energized. Battery voltage greater than 10.4 volts.

Set Condition: No sensor output is received when the PCM powers up the sensor heater. O2 heater is out of control for 128 seconds after it has reached 350 deg C. Two trip fault.

POSSIBLE CAUSES
O2 SENSOR HEATER OPERATION
O2 HEATER ELEMENT
O2 HEATER CONTROL CIRCUIT OPEN
O2 HEATER GROUND CIRCUIT OPEN

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE — Continued

POSSIBLE CAUSES
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 4.6 and 5.0 volts.** Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay above 4.5 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. **NOTE: Allow the O2 Sensor to cool down to room temperature.** Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. Is the resistance between 2.0 and 30 ohms? Yes → Go To 3 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Disconnect the PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the O2 Heater Control circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 0.5 of an ohm? Yes → Go To 4 No → Repair the excessive resistance in the O2 Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Measure the resistance between an engine ground and the O2 Heater ground circuit at the O2 Sensor harness connector. Is the resistance below 0.5 of an ohm? Yes → Go To 5 No → Repair the excessive resistance in the O2 Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:
P0171-FUEL SYSTEM 1/1 LEAN
P0174-FUEL SYSTEM 2/1 LEAN

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0171-FUEL SYSTEM 1/1 LEAN.

When Monitored and Set Condition:

P0171-FUEL SYSTEM 1/1 LEAN

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8500 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

P0174-FUEL SYSTEM 2/1 LEAN

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8500 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
O2 SENSOR
O2 SIGNAL CIRCUIT
O2 RETURN CIRCUIT
O2 SENSOR HEATER OPERATION
THROTTLE POSITION SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
THROTTLE POSITION SENSOR SWEEP
MAP SENSOR
ECT SENSOR
ENGINE MECHANICAL PROBLEM
FUEL FILTER/PRESSURE REGULATOR (HIGH)
PCM

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
1	Diagnose all other trouble codes before continuing. **NOTE: Check for contaminants that may have damaged an O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	**WARNING: The fuel system is under constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 3 Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. Below Specification Go To 13 **Caution: Stop All Actuations.**	All
3	Start the engine. Allow the engine to reach normal operating temperature. **NOTE: If one of the O2 Sensors Signal or Return circuit is shorted to ground the DRBIII® will display all O2 Sensor voltage readings low. The O2 Sensor that is shorted to ground will display a voltage reading near or at 0 volts.** **NOTE: If one of the O2 Sensors Signal or Return circuit is shorted to voltage, the DRBIII® will display all O2 Sensor voltage readings high. It is important to diagnose the O2 Sensor that set the DTC.** **NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.** With the DRBIII®, monitor all the O2 Sensor voltage readings. Is the voltage switching between 2.5 and 3.4 volts for all of the O2 Sensors? Yes → Go To 4 No → Go To 10	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. **NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.** **NOTE: Perform the following test on all O2 Sensors.** Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay above 4.5 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	With the DRBIII®, read TP Sensor voltage. **NOTE: The throttle must be against the stop.** Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 6 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	With the DRBIII®, read the TP Sensor voltage. While monitoring the DRBIII®, slowly open and close the throttle. Does the voltage increase and decrease smoothly? Yes → Go To 7 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **NOTE: If engine will not idle, maintain a constant RPM above idle.** With the DRBIII® in Sensors, read the MAP Sensor vacuum value. Is the DRBIII® reading within 1″ of the Vacuum Gauge reading? Yes → Go To 8 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
8	**NOTE: For this test to be valid, the thermostat must be operating correctly.** **NOTE: This test works best if performed on a cold engine (cold soak)** Ignition on, engine not running. With the DRBIII®, read the Engine Coolant Temperature (ECT) Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ECT Sensor value. The temperature value change should be a smooth transition from start up to normal operating temperature 82°C (180°F). The value should reach at least 82°C (180°F). Did the ECT value increase smoothly and did it reach at least 180°F (82°C)?? Yes → Go To 9 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Check for any of the following conditions/mechanical problems. AIR INDUCTION SYSTEM - must be free from leaks. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
10	Ignition on, engine not running. **NOTE: Perform the following test on the O2 Sensors whose voltage was not switching properly in the previous step.** Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. O2 Sensor voltage should read 5.0 volts on the DRBIII® with the connector disconnected. Connect a jumper wire between the O2 Signal circuit and the O2 Return circuit in the O2 Sensor harness connector. **NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.** Did the O2 Sensor voltage change from 5.0 volts to 2.5 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11 **NOTE: Remove the jumper wire before continuing.**	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
11	Only have one O2 Sensor disconnect at a time. With the DRBIII®, monitor all the O2 Sensor voltage readings. **NOTE: The DRBIII® will display all O2 Sensor voltage readings approximately 5.0 volts when only one O2 Sensor's Signal circuit is shorted to voltage.** **NOTE: The DRBIII® will display one O2 Sensor voltage close to zero and the others will read lower than normal when one O2 Sensor Signal circuit contains excessive resistance.** Is the voltage above 4.8 volts? Yes → Go To 12 No → Check all the O2 Signal circuits for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Disconnect each O2 Sensor harness connector. Measure the voltage on the O2 Return circuits in the O2 Sensor harness connector. **NOTE: The DRBIII® will display all O2 Sensor voltage readings approximately 5.0 volts when only one O2 Sensor's Return circuit is shorted to voltage.** **NOTE: The DRBIII® will display one O2 Sensor voltage close to zero and the others will read lower than normal when one O2 Sensor Return circuit contains excessive resistance.** Is the voltage at 2.5 volts? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Check all the O2 Return circuits for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertriain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
13	Turn the ignition off. **WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16 fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the T fitting on tool #6539. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Is the fuel pressure within specification? Yes → Repair or replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14 **CAUTION: Stop All Actuations.**	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
14	Turn the ignition off. **WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0172-FUEL SYSTEM 1/1 RICH
P0175-FUEL SYSTEM 2/1 RICH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0172-FUEL SYSTEM 1/1 RICH.

When Monitored and Set Condition:

P0172-FUEL SYSTEM 1/1 RICH

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8500 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a purge fuel multiplier and the result is below a certain value for 30 seconds over two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

P0175-FUEL SYSTEM 2/1 RICH

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8500 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a purge fuel multiplier and the result is below a certain value for 30 seconds over two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
O2 SENSOR HEATER OPERATION
O2 SENSOR
O2 SIGNAL CIRCUIT
O2 RETURN CIRCUIT
THROTTLE POSITION SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
THROTTLE POSITION SENSOR SWEEP
MAP SENSOR
ECT SENSOR
EVAP PURGE SOLENOID OPERATION
ENGINE MECHANICAL PROBLEM
FUEL FILTER/PRESSURE REGULATOR (HIGH)
PCM

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	**WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 3 Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. **CAUTION: Stop All Actuations.**	All
3	Start the engine. Allow the engine to reach normal operating temperature. **NOTE: If one of the O2 Sensors Signal or Return circuit is shorted to ground or voltage, all the other O2 Sensor voltage readings will be affected. It is important to diagnose the O2 Sensor that set the DTC.** **NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.** With the DRBIII®, monitor all of the O2 Sensor voltage readings. Is the voltage switching between 2.5 and 3.4 volts? Yes → Go To 4 No → Go To 11	All
4	Turn the ignition off. **NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.** Ignition on, engine not running. With the DRBIII®, perform the O2 Heater Test for each of the O2 Sensors. With the DRBIII®, monitor all O2 Sensor voltage readings for at least 2 minutes. Does the voltage stay above 4.5 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
5	Ignition on, engine not running. With the DRBIII®, read the TP Sensor voltage. **NOTE: The throttle must be against the stop.** Is the TP Sensor voltage 0.92 of a volt or less with the Throttle closed? Yes → Go To 6 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	With the DRBIII®, read the TP Sensor voltage. While monitoring the DRBIII®, slowly open and close the throttle. Does the voltage increase and decrease smoothly? Yes → Go To 7 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **NOTE: If engine will not idle, maintain a constant RPM above idle.** With the DRBIII® in Sensors, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 8 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. **NOTE: Remove the vacuum gauge before continuing.**	All
8	**NOTE: For this test to be valid, the thermostat must be operating correctly.** **NOTE: This test works best if performed on a cold engine (cold soak)** Ignition on, engine not running. With the DRBIII®, read the ECT Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ECT Sensor value. The temp value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Did the ECT value increase smoothly and did it reach at least 180°F (82°C)? Yes → Go To 9 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the hoses at the Evap Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side. Did the Evap Purge Solenoid hold vacuum? Yes → Go To 10 No → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5. **NOTE: Connect the vacuum hoses before continuing.**	All
10	Check for any of the following conditions/mechanical problems. AIR INDUCTION SYSTEM - must be free from restrictions. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
11	Ignition on, engine not running. **NOTE: Perform the following test on the O2 Sensors whose voltage was not switching properly in the previous step.** Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. O2 Sensor voltage should read 5.0 volts on the DRBIII® with the connector disconnected. Connect a jumper wire between the O2 Signal circuit and the O2 Return circuit in the O2 Sensor harness connector. **NOTE: The voltage should drop from 5.0 volts down to 2.5 volts with the jumper wire connected.** Did the O2 Sensor voltage drop from 5.0 volts to 2.5 volts? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12 **NOTE: Remove the jumper wire before continuing.**	All

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
12	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Measure the voltage on the O2 Sensor Signal circuit in the O2 Sensor harness connector with the Sensor harness connector disconnected. Is the voltage above 4.8 volts? Yes → Check the O2 Signal circuit for damage, short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	Engine still running. Measure the voltage on the O2 Return circuit in the O2 Sensor harness connector. Is the voltage at 2.5 volts? Yes → Go To 14 No → Check the O2 Return circuit for damage, short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. **NOTE: Turn the ignition off before continuing.**	All
14	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0201-FUEL INJECTOR NO.1 CIRCUIT
P0202-FUEL INJECTOR NO.2 CIRCUIT
P0203-FUEL INJECTOR NO.3 CIRCUIT
P0204-FUEL INJECTOR NO.4 CIRCUIT
P0205-FUEL INJECTOR NO.5 CIRCUIT
P0206-FUEL INJECTOR NO.6 CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0201-FUEL INJECTOR NO.1 CIRCUIT.

When Monitored and Set Condition:

P0201-FUEL INJECTOR NO.1 CIRCUIT

When Monitored: With battery voltage greater than 11.9981 volts. Auto Shutdown Relay energized. Engine speed less than 3008 rpm.

Set Condition: No inductive spike is detected after injector turn off.

P0202-FUEL INJECTOR NO.2 CIRCUIT

When Monitored: With battery voltage greater than 11.9981 volts. Auto Shutdown Relay energized. Engine speed less than 3008 rpm.

Set Condition: No inductive spike is detected after injector turn off.

P0203-FUEL INJECTOR NO.3 CIRCUIT

When Monitored: With battery voltage greater than 11.9981 volts. Auto Shutdown Relay energized. Engine speed less than 3008 rpm.

Set Condition: No inductive is detected after injector turn off.

P0204-FUEL INJECTOR NO.4 CIRCUIT

When Monitored: With battery voltage greater than 11.9981 volts. Auto Shutdown Relay energized. Engine speed less than 3008 rpm.

Set Condition: No inductive spike is detected after injector turn off, and with no other injectors on.

P0205-FUEL INJECTOR NO.5 CIRCUIT

When Monitored: With battery voltage greater than 11.9981 volts. Auto Shutdown Relay energized. Engine speed less than 3008 rpm.

Set Condition: No inductive spike is detected after injector turn off.

P0201-FUEL INJECTOR NO.1 CIRCUIT — Continued

P0206-FUEL INJECTOR NO.6 CIRCUIT

When Monitored: With battery voltage greater than 11.9981 volts. Auto Shutdown Relay energized. Engine speed less than 3008 rpm.

Set Condition: No inductive spike is detected after injector turn off.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(F142) ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR
INJECTOR CONTROL CIRCUIT OPEN
INJECTOR CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Fuel Injector harness connector. Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Using a 12-volt test light connected to ground, backprobe the (F142) ASD Relay Output circuit at the Fuel Injector harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open or short to ground in the (F142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Using a 12-volt test light connected to 12-volts, backprobe the Injector Control circuit. With the DRBIII®, actuate the Fuel Injector. What is the state of the test light during the actuation? Brightly blinking. Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5. ON constantly. Go To 4 OFF constantly. Go To 5	All

P0201-FUEL INJECTOR NO.1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the C2 PCM harness connector. Measure the resistance between ground and the Injector Control circuit at the Injector harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Injector Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
5	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the Injector Control circuit from the Fuel Injector harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the Injector Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0300-MULTIPLE CYLINDER MISFIRE
P0301-CYLINDER NO.1 MISFIRE
P0302-CYLINDER NO.2 MISFIRE
P0303-CYLINDER NO.3 MISFIRE
P0304-CYLINDER NO.4 MISFIRE
P0305-CYLINDER NO.5 MISFIRE
P0306-CYLINDER NO.6 MISFIRE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0300-MULTIPLE CYLINDER MISFIRE.

When Monitored and Set Condition:

P0300-MULTIPLE CYLINDER MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips. Above 3000 RPM 1 trip less than 3000 RPM 2 trip.

P0301-CYLINDER NO.1 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0302-CYLINDER NO.2 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0303-CYLINDER NO.3 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0304-CYLINDER NO.4 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0300-MULTIPLE CYLINDER MISFIRE — Continued

P0305-CYLINDER NO.5 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0306-CYLINDER NO.6 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

POSSIBLE CAUSES
INTERMITTENT MISFIRE
VISUAL INSPECTION
(A142), (F142) ASD RELAY OUPUT CIRCUIT
ENGINE MECHANICAL PROBLEM
IGNITION COIL
COIL CONTROL CIRCUIT
SPARK PLUG
CHECKING FUEL PRESSURE
FUEL PUMP INLET STRAINER PLUGGED
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
CHECKING FUEL LEAK DOWN
FUEL INJECTOR
INJECTOR CONTROL CIRCUIT
PCM

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for any TSBs that apply to a Misfire condition. Review the vehicle repair history for any misfire condition repairs that have been performed.** Read and record the FREEZE FRAME DATA. Select OBD II MONITORS. Read and record the MIS-FIRE SIMILAR CONDITIONS WINDOW DATA. With these screens, attempt to duplicate the condition(s) that has set this DTC. When the vehicle is operating in the SIMILAR CONDITIONS WINDOW, refer to the WHICH CYLINDER IS MISFIRING screen. Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute. Is there a misfire present? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	**NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.** **NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.** - Visually inspect the engine for any of the following conditions. - Worn serpentine belt - Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump. - Misalignment Water pump, P/S Pump and A/C Compressor pulleys - Corroded PCM power and ground circuits. - Improper CKP, CMP, MAP, and TP Sensor mounting - Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc. - Vacuum leaks - Restricted Air Induction system or Exhaust system. - Internal engine component failures. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the Ignition Coil harness connector and Fuel Injector harness connector of the cylinder being tested. Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Using a 12-volt test light connected to ground, probe the (A142) ASD Relay Output circuit at the Ignition Coil harness connector and the (F142) ASD Relay Output circuit at the Fuel Injector harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the excessive resistance or short to ground in the (A142), (F142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the Ignition Coil. Connect the Ignition Coil harness connector. **NOTE Before continuing, inspect the Ignition Coil for the following conditions. If a problem is found, replace the Ignition Coil. Damage or Carbon Tracking on the Coil or the spark plug insulator boot.** Install a spark tester on the Ignition Coil. While cranking the engine observe the spark coming from the spark tester. **NOTE: A crisp blue spark that is able to jump the gap of the spark tester should be generated.** Is good spark present? Yes → Go To 5 No → Go To 14 **NOTE: Connect the Fuel Injector harness connector before continuing.**	All
5	Turn the ignition off. Remove the Spark Plug. Inspect the Spark Plug for the following conditions. - Cracks - Carbon Tracking - Foreign Material - Gap size out of specifications - Loose or broke electrode **NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.** Were any of the above condition present? Yes → Replace the Spark Plug. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge. Start the engine and observe the fuel pressure reading. **NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 7 Below Specification Go To 12 Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
7	**NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter. Install the fuel pressure gauge. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the Upstream gauge fall below the above specification? Yes → Replace the leaking Fuel Injector(s). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** **CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.** Remove special tool #C4390. Start the engine and allow the fuel pressure to reach maximum pressure. Ignition on, engine not running. Using the DRBIII®, actuate the Fuel Injector for the cylinder that indicated the misfire. Monitor the fuel pressure gauge. Does the fuel pressure gauge indicate a drop in fuel pressure? Yes → Go To 9 No → Go To 10 **NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.**	All
9	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination CAM LOBES - must not be worn excessively CYLINDER LEAKAGE TEST - must be within specifications VALVE SPRINGS - cannot be weak or broken Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the Fuel Injector harness connector. Ignition on, engine not running. **NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.** With the DRBIII®, erase DTCs. Using a 12-volt test light connected to 12-volts, probe the Injector Control circuit. With the DRBIII®, actuate the Fuel Injector. Does the test light blink/flicker? Yes → Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Check the Injector Control circuit for an open, short to ground, and short to voltage. Was a problem found with the Injector Control circuit? Yes → Repair the excessive resistance or short to ground in the Injector Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
12	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Is the fuel pressure within specification? Yes → Repair or replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → NOTE: Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Ensure the ground circuit is operating properly. Repair as necessary. Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
14	Disconnect the Ignition Coil harness connector. Remove the Fuel Pump Relay or ASD Relay. Using a 12-volt test light connected to 12-volts, probe the Ignition Coil Control circuit. Crank the engine for 5 second while observing the test light. **NOTE: The resistance of the primary Ignition Coil on a 3.7L is 0.6 to 0.9 of an ohm at 77°F (25°C).** Does the test light brightly blink/flicker? Yes → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Check the Coil Control circuit for an open, short to ground, and short to voltage. Was a problem found with the Coil Control circuit? Yes → Repair the Coil Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
16	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0315-NO CRANK SENSOR LEARNED

When Monitored and Set Condition:

P0315-NO CRANK SENSOR LEARNED

When Monitored: Under closed throttle decel and A/C off. ECT above 75°C (167°F). Engine start time is greater than 50 seconds.

Set Condition: One of the CKP sensor target windows has more than 2.86% variance from the reference. One Trip Fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION
TONE WHEEL/PULSE RING INSPECTION
CKP WIRE HARNESS INSPECTION
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for any TSBs that may apply to this symptom.** Ignition on, engine not running. With the DRBIII®, clear DTCs, PCM battery disconnect to reset the PCM. Start the engine. If the MIL has not yet illuminated, test drive the vehicle to try to get the code to reset. Does the code reset while cranking or during the test drive? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Visually inspect the CKP wire harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the CKP wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Make sure the Crankshaft Position Sensor is properly installed and the mounting bolt(s) is properly torqued to specification. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0315-NO CRANK SENSOR LEARNED — Continued

TEST	ACTION	APPLICABILITY
3	Remove the Crankshaft Position Sensor. Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0325-KNOCK SENSOR NO.1 CIRCUIT
P0330-KNOCK SENSOR NO.2 CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0325-KNOCK SENSOR NO.1 CIRCUIT.

When Monitored and Set Condition:

P0325-KNOCK SENSOR NO.1 CIRCUIT

When Monitored: With the engine running >1312 RPM, coolant temp >65.25°C (149.45°F), MAF >250mg/tdc and no ECT, MAF or CAM Sensor DTCs.

Set Condition: The Knock Sensor error program internal to the PCM is on, the Knock Sensor voltage is <.49 volt, and the value of the Knock Sensor changes less than .06 volt for >11 seconds. One Trip Fault. Three good trips to turn off the MIL.

P0330-KNOCK SENSOR NO.2 CIRCUIT

When Monitored: With the engine running >1312 RPM, coolant temp >65.25°C (149.45°F), MAF >250mg/tdc and no ECT, MAF or CAM Sensor DTCs.

Set Condition: The Knock Sensor error program internal to the PCM is on, the Knock Sensor voltage is <.49 volt, and the value of the Knock Sensor changes less than .06 volt for >11 seconds. One Trip Fault. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
KNOCK SENSOR SIGNAL CIRCUIT OPEN
KNOCK SENSOR RETURN CIRCUIT OPEN
KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO KNOCK SENSOR RETURN CIRCUIT
KNOCK SENSOR

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0325-KNOCK SENSOR NO.1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the C2 PCM harness connector. Ignition on, engine not running. Measure the voltage of the Knock Sensor Signal circuit at the Knock Sensor harness connector. Is the voltage above 2.0 volts? Yes → Repair the short to voltage in the Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the Knock Sensor Signal circuit from the Knock Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the Knock Sensor Return circuit from the Knock Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between ground and the Knock Sensor Signal circuit at the Knock Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Measure the resistance between the Knock Sensor Signal circuit and the Knock Sensor Return circuit at the Knock Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the Knock Sensor Signal circuit and Knock Sensor Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0325-KNOCK SENSOR NO.1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Replace the Knock Sensor. Ignition on, engine not running. With the DRBIII®, erase DTC. Attempt to operate the vehicle using the information noted in the Freeze Frame. With the DRBIII®, read DTCs. Does the DRBIII® display the DTC that was previously erased? Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0335-CRANKSHAFT POSITION SENSOR CIRCUIT

When Monitored and Set Condition:

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT

When Monitored: Engine cranking.

Set Condition: No CKP signal is present during engine cranking, and at least 8 camshaft position sensor signals have occurred.

POSSIBLE CAUSES
INTERMITTENT CKP SIGNAL
INTERMITTENT CMP SIGNAL
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K24) CKP SIGNAL CIRCUIT OPEN
(K24) CKP SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K24) CKP SIGNAL CIRCUIT SHORTED GROUND
(K24) CKP SIGNAL CIRCUIT SHORTED TO (F855) 5-VOLT SUPPLY CIRCUIT
(K900) SENSOR GROUND CIRCUIT OPEN
CRANKSHAFT POSITION SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	Crank the engine. Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 14	All
2	Turn the ignition off. Disconnect the CKP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (F855) 5-volt Supply circuit at the CKP Sensor harness connector. Is the voltage between 4.8 and 5.2 volts? Yes → Go To 3 No → Go To 10	All

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Measure the voltage on the (K24) CKP Signal circuit at the CKP Sensor harness connector. Is the voltage between 4.8 and 5.2 volts? Yes → Go To 4 No → Go To 7	All
4	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the CKP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between the (K24) CKP Signal circuit and the (F855) 5-volt Supply circuit at the CKP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K24) CKP Signal circuit and the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Inspect the slots on the flywheel for damage. If a problem is found repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the C2 PCM harness connector. Ignition on, engine not running. Measure the voltage on the (K24) CKP Signal circuit at the CKP Sensor harness connector. Is the voltage above 5.3 volts? Yes → Repair the short to voltage in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K24) CKP Signal circuit from the CKP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Measure the resistance between ground and the (K24) CKP Signal circuit at the CKP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
10	Turn the ignition off. Disconnect the C2 PCM harness connector. Ignition on, engine not running. Measure the voltage on the (F855) 5-volt Supply circuit at the CKP Sensor harness connector. Is the voltage above 5.5 volts? Yes → Repair the short to voltage in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (F855) 5-volt Supply circuit from the CKP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the open in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Measure the resistance between ground and the (F855) 5-volt Supply circuit at the CKP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
13	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
14	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit at the CKP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap on the Crank Position Sensor. Observe the lab scope screen. Look for any pulses generated by the CKP Sensor. Allow the engine to idle. Observe the lab scope screen. Did the CKP Sensor generate any pulses? Yes → Inspect the related wire harness and replace the Crankshaft Position Sensor if no wiring problems were found. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. **NOTE: An intermittent condition with the CMP Sensor can set the P0335 DTC.** With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit at the CMP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap on the Cam Position Sensor. Observe the lab scope screen. Look for any pulses generated by the CMP Sensor. Allow the engine to idle. Observe the lab scope screen. Did the CMP Sensor generate any erratic pulses? Yes → Inspect the related wire harness and replace the Camshaft Position Sensor if no wiring problems were found. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT

When Monitored and Set Condition:

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT

When Monitored: While cranking engine and engine running.

Set Condition: When the CKP Sensor failure counter reaches 20. One Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
CKP WIRE HARNESS INSPECTION
(F855) 5-VOLT SUPPLY CIRCUIT OPEN OR SHORTED TO GROUND
TONE WHEEL/PULSE RING INSPECTION
CHECKING CMP SENSOR SIGNAL WITH THE DRBIII® LAB SCOPE
CRANKSHAFT POSITION SENSOR
(K24) CKP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K24) CKP SIGNAL CIRCUIT OPEN
(K24) CKP SIGNAL CIRCUIT SHORTED TO GROUND
(K24) CKP SIGNAL CIRCUIT SHORTED TO (F855) 5-VOLT SUPPLY CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit at the Sensor harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Observe the lab scope screen. Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 3 No → Go To 8	All

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Visually inspect the related wire harness including the ground circuit. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Make sure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are tight. Refer to any TSBs that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Disconnect the CKP Sensor connector. Ignition on, engine not running. Measure the voltage on the (F855) 5-volt Supply circuit in the Sensor harness connector. Is the voltage between 4.5 and 5.3 volts? Yes → Go To 5 No → Repair the open or short to ground in the (F855) 5-volt Supply circuit. Use Miller special tool #8815 when checking for an open circuit to prevent PCM harness connector terminal damage. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Carefully disconnect the Battery Ground cable. Remove the Crankshaft Position Sensor. Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: An intermittent condition in the Cam Position Sensor can cause the P0339 to set.** Install the Crankshaft Position Sensor. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit at the Sensor harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap on the Cam Position Sensor. Observe the lab scope screen. Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Replace the Cam Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
7	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the C2 PCM harness connector. Disconnect the CKP Sensor connector. Ignition on, engine not running. Measure the voltage on the (K24) CKP Signal circuit in the Sensor harness connector. Wiggle the related wire harness while taking this measurement. Does the voltage ever increase above 5.5 volts? Yes → Repair the short to voltage in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance in the (K24) CKP Signal circuit between the CKP harness connector and the appropriate terminal of special tool #8815. Wiggle the wire harness while taking this measurement. Is the resistance below 1.0 ohm? Yes → Go To 10 No → Repair the open/high resistance in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Measure the resistance between ground and the (K24) CKP Signal circuit at the CKP Sensor harness connector. Wiggle the related wire harness while monitoring the resistance value. Does the resistance ever go below 100 ohms? Yes → Repair the short to ground in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Measure the resistance between the (F855) 5-volt Supply circuit and the (K24) CKP Signal circuit at the CKP harness connector. Wiggle the related wire harness while taking this measurement. Does the resistance ever go below 5.0 ohms? Yes → Repair the short between the (F855) 5-volt Supply circuit and the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
12	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, review repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0340-CAMSHAFT POSITION SENSOR CIRCUIT

When Monitored and Set Condition:

P0340-CAMSHAFT POSITION SENSOR CIRCUIT

When Monitored: Engine cranking/running. Battery voltage greater than 10 volts.

Set Condition: At least 5 seconds or 2.5 engine revolutions have elapsed with crankshaft position sensor signals present but no camshaft position sensor signal.

POSSIBLE CAUSES
INTERMITTENT CMP SIGNAL
INTERMITTENT CKP SIGNAL
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K44) CMP SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K44) CMP SIGNAL CIRCUIT OPEN
(K44) CMP SIGNAL CIRCUIT SHORTED TO GROUND
(K44) CMP SIGNAL SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT
(K900) SENSOR GROUND CIRCUIT OPEN
CAMSHAFT POSITION SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	Crank the engine. Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 14	All
2	Turn the ignition off. Disconnect the CMP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (F856) 5-volt Supply circuit in the CMP Sensor harness connector. Is the voltage between 4.5 and 5.2 volts? Yes → Go To 3 No → Go To 10	All

P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Measure the voltage on the (K44) CMP Signal circuit in the CMP Sensor harness connector. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 4 No → Go To 7	All
4	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the CMP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between the (K44) CMP Signal circuit and the (F856) 5-volt Supply circuit in the CMP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K44) CMP Signal circuit and the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Inspect the Camshaft sprocket for damage per the Service Information. If a problem is found repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the C2 PCM harness connector. Ignition on, engine not running. Measure the voltage on the (K44) CMP Signal circuit in the CMP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K44) CMP Signal circuit from the CMP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Measure the resistance between ground and the (K44) CMP Signal circuit in the CMP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K44) CMP Signal circuit Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
10	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (F856) 5-volt Supply circuit in the CMP Sensor harness connector. Is the voltage above 5.3 volts? Yes → Repair the short to voltage in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (F856) 5-volt Supply circuit between the CMP Sensor harness connector and the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the open in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Measure the resistance between ground and the (F856) 5-volt Supply circuit in the CMP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All

P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
13	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
14	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the CMP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap on the Cam Position Sensor. Observe the lab scope screen. Allow the engine to idle. Observe the lab scope screen. Did the CMP Sensor generate any erratic pulses? Yes → Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, back probe the (K24) CKP Signal circuit in the CKP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap the Crank Position Sensor. Observe the lab scope screen. Allow the engine to idle. Observe the lab scope screen. Did the CKP Sensor generate any erratic pulses? Yes → Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0344-CAMSHAFT POSITION SENSOR INTERMITTENT

When Monitored and Set Condition:

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT

When Monitored: While cranking the engine and engine running.

Set Condition: When the failure counter reaches 20. One Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
CMP WIRE HARNESS INSPECTION
(F856) 5-VOLT SUPPLY CIRCUIT OPEN OR SHORTED TO GROUND
TONE WHEEL/PULSE RING INSPECTION
CHECKING CKP SENSOR SIGNAL WITH THE DRBIII® LAB SCOPE
CAMSHAFT POSITION SENSOR
(K44) CMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K44) CMP SIGNAL CIRCUIT OPEN
(K44) CMP SIGNAL CIRCUIT SHORTED TO GROUND
(K44) CMP SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the CMP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Observe the lab scope screen. Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 3 No → Go To 8	All

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Visually inspect the related wire harness including the ground circuit. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Make sure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are tight. Refer to any TSBs that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Disconnect the CMP Sensor connector. Ignition on, engine not running. Measure the voltage on the (F856) 5-volt Supply circuit. Is the voltage between 4.5 and 5.2 volts? Yes → Go To 5 No → Repair the open or short to ground in the (F856) 5-volt Supply circuit. Use Miller special tool #8815 when checking for an open circuit to prevent PCM harness connector terminal damage. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Carefully disconnect the Battery Ground cable. Remove the Camshaft Position Sensor. Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: An intermittent condition with the Crank Position Sensor can cause the P0344 to set.** Install the CMP Sensor. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the CKP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap on the Crank Position Sensor. Observe the lab scope screen. Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Replace the Crank Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
7	If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K44) CMP Signal circuit. Wiggle the related wire harness while taking this measurement. Does the voltage ever increase above 5.5 volts? Yes → Repair the short to voltage in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance in the (K44) CMP Signal circuit from the CMP harness connector to the appropriate terminal of special tool #8815. Wiggle the related wire harness while taking this measurement. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the excessive resistance in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Measure the resistance between ground and the (K44) CMP Signal circuit in the CMP Sensor harness connector. Wiggle the related wire harness while monitoring the resistance value. Does the resistance ever go below 100 ohms? Yes → Repair the short to ground in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Measure the resistance between the (F856) 5-volt Supply circuit and the (K44) CMP Signal circuit in the CMP harness connector. Wiggle the related wire harness while taking this measurement. Does the resistance ever go below 5.0 ohms? Yes → Repair the short between the (F856) 5-volt Supply circuit and the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
12	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, review repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0420-CATALYST 1/1 EFFICIENCY
P0430-CATALYST 2/1 EFFICIENCY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0420-CATALYST 1/1 EFFICIENCY.

When Monitored and Set Condition:

P0420-CATALYST 1/1 EFFICIENCY

When Monitored: After engine warm up to 70°C (158°F), 180 seconds of open throttle operation, at a speed greater than 18 mph and less than 55 mph, with the engine at 1200-1700 rpm and MAP vacuum between 15.0 and 21.0 inches of mercury (Hg).

Set Condition: As catalyst efficiency deteriorates, the switch rate of the downstream O2 sensor approaches that of the upstream O2 sensor. If at any point during the test the switch ratio reaches a predetermined value a counter is incremented by one.

P0430-CATALYST 2/1 EFFICIENCY

When Monitored: After engine warm up to 147 deg. F, 180 seconds of open throttle operation, at a speed greater than 20 mph, with the engine at 1200-1700 rpm and MAP vacuum between 15.0 and 21.0 inches of mercury (Hg).

Set Condition: As catalyst efficiency deteriorates, the switch rate of the downstream O2 sensor approaches that of the upstream O2 sensor. If at any point during the test the switch ratio reaches a predetermined value a counter is incremented by one. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
VISUALLY INSPECT CATALYTIC CONVERTER
EXHAUST LEAK
ENGINE MECHANICAL CONDITION
AGING O2 SENSOR
CATALYTIC CONVERTER

P0420-CATALYST 1/1 EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: A new rear O2 Sensor along with an aging front O2 Sensor may cause the DTC to set. Review the repair history of the vehicle before continuing.** **NOTE: If a O2 Sensor DTC(s) set along with the Catalytic Converter Efficiency DTC diagnose the O2 Sensor DTC(s) before continuing.** **NOTE: Check for contaminants that may have damaged the O2 Sensor and Catalytic Converter: contaminated fuel, unapproved silicone, oil and coolant, repair necessary.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Inspect the Catalytic Converter for the following damage. Damage Catalytic Converter, dent and holes. Severe discoloration caused by overheating the Catalytic Converter. Catalytic Converter broke internally. Leaking Catalytic Converter. Were any problems found? Yes → Replace the Catalytic Converter. Repair the condition that may have caused the failure. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Start the engine. Inspect the exhaust for leak between the engine and the O2 Sensor. Inspect the exhaust for leaks between the engine and the appropriate rear O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Check the exhaust for excessive smoke caused by an internal problem in the engine. Is an engine mechanical condition present? Yes → Repair the engine mechanical condition as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	A new rear O2 Sensor along with an aging front O2 Sensor may cause the DTC to set. Review the vehicles repair history. Has the rear O2 Sensor been replace without replacing the front O2 Sensor? Yes → Replace the Front O2 Sensor as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible cause remaining, view repair. Repair Replace the Catalytic Converter. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0440-GENERAL EVAP SYSTEM FAILURE

When Monitored and Set Condition:

P0440-GENERAL EVAP SYSTEM FAILURE

When Monitored: Engine Running. Fuel Level greater than 12%. Ambient Temperature between 4°C and 32°C (39°F and 89°F)

Set Condition: The PCM does not see the NVLD switch close during the medium/large leak test. The PCM then will increase the vacuum supply to the EVAP system by increasing flow through the EVAP Purge valve. If the switch does not close with an increase in vacuum an error is detected. Two Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
VISUAL AND PHYSICAL INSPECTION
EVAP PURGE SOLENOID VACUUM SUPPLY INSPECTION
EVAP PURGE SOLENOID
NVLD SWITCH OPERATION
(Z201) GROUND CIRCUIT OPEN
NVLD ASSEMBLY
(K107) NVLD SWITCH SIGNAL CIRCUIT OPEN
EVAPORATIVE EMISSION LEAK DETECTION
PCM

TEST	ACTION	APPLICABILITY
1	Check for any related TSBs before continuing. **NOTE: If any of the following DTCs are set (P0443, P0452, P0453, P0498 or P0499) diagnose them first before continuing with P0440.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions: - Hoses disconnected or left off - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap left off or bad gasket seal Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 3	All
3	Turn the ignition off. Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing. Check for a pinched or plugged hose from the throttle body to the Purge Solenoid. Make sure the vacuum port at the throttle body is free from any blockage. Were any problems found? Yes → Repair the vacuum supply, hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 4	All
4	Disconnect the vacuum supply hoses from the EVAP Purge Solenoid. Using a hand vacuum pump, apply 10 in Hg to the ″CAN″ side of the EVAP Purge Solenoid. Ignition on, engine not running. Observe the vacuum gauge. With the DRBIII®, actuate the EVAP Purge Solenoid . Does the vacuum drop when the solenoid is actuated? Yes → Go To 5 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
5	Connect the previously disconnected vacuum hose. Start the engine. Allow the engine to idle. Using the DRBIII®, perform the NVLD FORCED MONITOR TEST. Monitor the NVLD Switch state. **NOTE: As the test runs, the NVLD Switch should go from an OPEN state to a CLOSED state and then return to OPEN when the test is complete.** Did the NVLD Switch operate as described above? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 6	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD). **WARNING: Keep lit cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.** Connect the red power lead of EELD to the battery positive terminal and the black ground lead to battery negative terminal. **NOTE: See Charts and Graph support material EELD Calibration Setup for an example.** Block the vent hose of the EVAP Canister. Connect shop air to the EELD. Set the smoke/air control switch to AIR. Insert the tester's AIR supply tip (clear hose) into the .040 orifice on the tester's control panel. Press the remote smoke/air start button. Position the red flag on the air flow meter so it is aligned with the indicator ball. When the calibration is complete, release the remote button. The EELD flow meter is now calibrated in liters per minute. Install the service port adapter #8404-14 on the vehicle's service port (if equipped) or install the #8404-ADP into the filter line. Connect the Air supply hose from the EELD to the service port (if equipped) or to the #8404-ADP adapter. Press the remote button to activate AIR flow. **NOTE: Larger volume fuel tanks, lower fuel levels or if the vehicle is equipped with a Flow Management Valve, this may indicate high flow and will require 4 to 5 minutes to fill.** Compare the flow meter indicator ball reading to the red flag. ABOVE the red flag indicates a leak present. BELOW the red flag indicates a sealed system. Is the indicator ball above the red flag? Yes → Go To 7 No → Go To 8	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	**NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD). Remove the Air supply hose from the service port or the #8404-ADP adapter. Connect the SMOKE supply tip (black hose) to the service port (if equipped) or to the #8404-ADP adapter. Set the smoke/air control switch to SMOKE. **NOTE: The flow meter indicator ball will not move at this point.** Press the remote smoke/air start button. **NOTE: Make sure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.** **NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.** While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke. If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultraviolet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that are left behind by the smoke. The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light. **NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke or dye may or may not be visible. Introducing smoke into the filtered side of the canister may assist in locating the leak.** Was a leak found? Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 11	All
8	Turn the ignition off. Disconnect the NVLD electrical harness connector. Check connectors - Clean/repair as necessary. Ignition on, engine not running. Connect a jumper wire between the (K107) NVLD Switch Signal circuit and the (Z201) Ground circuit in the NVLD electrical harness connector. Monitor the NVLD Switch state on the DRBIII®. Does the Switch change from OPEN to CLOSED. Yes → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 9 **NOTE: Remove the jumper wire before continuing.**	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Measure the resistance between the (Z201) Ground circuit and ground. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open in the (Z201) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
10	Disconnect the PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K107) NVLD Switch Signal circuit from the NVLD electrical harness connector to the appropriate terminal of the special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Repair the open in the (K107) NVLD Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
11	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

Symptom:
P0441-EVAP PURGE SYSTEM PERFORMANCE

When Monitored and Set Condition:

P0441-EVAP PURGE SYSTEM PERFORMANCE

When Monitored: Cold start test. Engine Running. Small Leak Test Passed.

Set Condition: The PCM activates the EVAP Purge solenoid gradually increasing to maximum flow. During flow, the PCM looks for the NVLD switch to close. If the PCM does not see the NVLD switch close at maximum flow an error is detected. Two Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
INTERMITTENT CONDITION
CHECKING EVAP PURGE SOLENOID FUNCTIONALITY
EVAP PURGE SOLENOID VACUUM SUPPLY

TEST	ACTION	APPLICABILITY
1	Check for any related TSBs before continuing. **NOTE: If any of the following DTCs are set (P0443, P0452, P0453, P0498 or P0499) diagnose them first before continuing with P0441.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	**NOTE: After disconnecting the Evap Purge vacuum connections, inspect the lines and solenoid for any signs of contamination or foreign materials.** Using a hand vacuum pump, apply 10 in Hg to ″CAN″ side of the EVAP Purge Solenoid. Ignition on, engine not running. Observe the vacuum gauge. With the DRBIII®, actuate the EVAP Purge Solenoid . Does the vacuum drop when the solenoid is actuated? Yes → Go To 3 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0441-EVAP PURGE SYSTEM PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing. Check for a pinched or plugged hose from the throttle body to the Purge Solenoid. Inspect the vacuum port at the throttle body for any damage or plugging. Were any problems found? Yes → Repair the vacuum supply hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:
P0442-EVAP SYSTEM MEDIUM LEAK
P0455-EVAP SYSTEM LARGE LEAK

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0442-EVAP SYSTEM MEDIUM LEAK.

When Monitored and Set Condition:

P0442-EVAP SYSTEM MEDIUM LEAK

When Monitored: Engine Running. Cold start test. Fuel Level greater than 12%. Ambient Temperature between 4°C and 32°C (39°F and 89°F) Close Loop fuel system. Test runs when small leak test is maturing.

Set Condition: The PCM activates the EVAP Purge Solenoid to pull the EVAP system into a vacuum to close the NVLD switch. Once the NVLD swtich is closed, the PCM turns the EVAP Pugre solenoid off to seal the EVAP system. If the NVLD switch reopens before the calibrated amount of time for a Medium leak an error is detected. Two Trip Fault.

P0455-EVAP SYSTEM LARGE LEAK

When Monitored: Engine Running. Cold start test. Fuel Level greater than 12%. Ambient Temperature between 4°C and 32°C (39°F and 89°F) Close Loop fuel system. Test runs when small leak test is maturing.

Set Condition: The PCM activates the EVAP Purge Solenoid to pull the EVAP system into a vacuum to close the NVLD swtich. Once the NVLD switch is closed, the PCM turns the EVAP Purge solenoid off to seal the EVAP system. If the NVLD switch reopens before the calibrated amount of time for a Large leak an error is detected. Two Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
INTERMITTENT CONDITION
VISUAL AND PHYSICAL INSPECTION
VERIFY EVAPORATIVE EMISSION SYSTEM LEAK
EVAPORATIVE EMISSION LEAK DETECTION
EVAP PURGE SOLENOID OPERATION

P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
1	Check for any related TSBs before continuing. **NOTE: Since a hot vehicle can conceal a leak, it is best to perform this test at room temperature.** **NOTE: A loose gas cap could have caused this DTC to set. Make sure gas cap is tight and in good condition. Ensure the gas cap meets OEM specifications.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
2	Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the follow conditions: - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 3	All

P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
3	To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD). **WARNING: Keep lit cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.** Connect the red power lead of the EELD to the battery positive terminal and the black ground lead to battery negative terminal. **NOTE: See Charts and Graph support material EELD Calibration Setup for an example.** Block the vent hose of the EVAP Canister. Connect shop air to the EELD. Set the smoke/air control switch to AIR. Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size). Press the remote smoke/air start button. Position the red flag on the air flow meter so it is aligned with the indicator ball. When the calibration is complete, release the remote button. The EELD flow meter is now calibrated in liters per minute to the size leak indicated by the DTC set in the PCM. Install the service port adapter #8404-14 on the vehicle's service port (if equipped) or install #8404-ADP service adaptor in the filter line. Connect the Air supply hose from the EELD to the service port (if equipped) or #8404-ADP in the filter line. Press the remote button to activate AIR flow. **NOTE: Larger volume fuel tanks, lower fuel levels or if the vehicle is equipped with a Flow Management Valve may indicate high flow and will require 4 to 5 minutes to fill** Compare the flow meter indicator ball reading to the red flag. ABOVE the red flag indicates a leak present. BELOW the red flag indicates a sealed system. Is the indicator ball above the red flag? Yes → Go To 4 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD). Remove the Air supply hose from the service port (if equipped) or from the #8404-ADP adapter. Connect the SMOKE supply tip (black hose) to the service port (if equipped) or to the #8404-ADP adapter. Set the smoke/air control switch to SMOKE. **NOTE: The flow meter indicator ball will not move in the smoke mode.** Press the remote smoke/air start button. **NOTE: Make sure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.** **NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.** While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke. If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultraviolet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that is left behind by the smoke. The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light. **NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke may not be as thick. Introducing smoke into the filtered side of the canister may assist in locating the leak.** Was a leak found? Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 5	All
5	**NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty rollover valve. Replace/repair as necessary.** Turn the ignition off. Disconnect the vacuum hoses at the Evap Purge Solenoid. Using a hand vacuum pump, apply 10 in Hg to the ″CAN″ of the EVAP Purge Solenoid. **NOTE: Monitor the vacuum gauge for at least 15 seconds.** Does the EVAP Purge Solenoid hold vacuum? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

Symptom:
P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored and Set Condition:

P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored: The ignition on or engine running. Battery voltage greater than 10 volts.

Set Condition: The PCM will set a trouble code if the actual state of the solenoid does not match the intended state.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
EVAP PURGE SOLENOID
(K52) EVAP PURGE SOL CONTROL CIRCUIT OPEN
(K52) EVAP PURGE SOL CONTROL CIRCUIT SHORTED TO GROUND
(K70) EVAP PURGE SOL SIGNAL CIRCUIT OPEN
(K70) EVAP PURGE SOL SIGNAL CIRCUIT SHORTED TO GROUND
(K70) EVAP PURGE SOL SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
PCM

TEST	ACTION	APPLICABILITY
1	Check for any related TSBs before continuing. Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the EVAP Purge Solenoid harness connector. Ignition on, engine not running. Using a 12-volt test light, jump across the (K52) Evap Purge Sol Control circuit and (K70) Evap Purge Sol Signal circuit in the EVAP Purge Solenoid harness connector. With the DRBIII®, actuate the EVAP Purge Solenoid. Does the test light flash on and off? Yes → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K52) Evap Purge Sol Control circuit from the Evap Purge Solenoid harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K52) Evap Purge Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Measure the resistance between ground and the (K52) Evap Purge Sol Control circuit at the Evap Purge Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K52) Evap Purge Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K70) Evap Purge Sol Signal circuit from the Evap Purge Solenoid harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K70) Evap Purge Sol Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Measure the resistance between ground and the (K70) Evap Purge Sol Signal circuit at the Evap Purge Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K70 Evap Purge Sol Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (K70) Evap Purge Sol Signal circuit in the Evap Purge Solenoid harness connector. Does the test light illuminate brightly? Yes → Repair the short to battery voltage in the (K70) Evap Purge Sol Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0452-NVLD PRESSURE SWITCH STUCK CLOSED

When Monitored and Set Condition:

P0452-NVLD PRESSURE SWITCH STUCK CLOSED

When Monitored: Immediately after the engine has been started.

Set Condition: The PCM activates the NLVD Solenoid. If PCM does not see NVLD switch open an error is detected. One Trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
EVAP PURGE SOLENOID LEAKS/STUCK OPEN
(K52) EVAP PURGE SOL CONTROL CIRCUIT SHORTED TO GROUND
NVLD SWITCH OPERATION
NVLD ASSEMBLY
(K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Check for any related TSBs before continuing. Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the EVAP Purge Solenoid harness connector. Ignition on, engine not running. Using a 12-volt test light, jump across the EVAP Purge Solenoid harness connector. With the DRBIII®, actuate the EVAP Purge Solenoid. Does the test light flash on and off? Yes → Go To 3 No → Go To 7	All

P0452-NVLD PRESSURE SWITCH STUCK CLOSED — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Connect the Evap Purge Solenoid harness connector. Disconnect the vacuum hoses at the Evap Purge Solenoid. **NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty rollover valve. Replace/repair as necessary.** Using a hand vacuum pump, apply 10 in Hg to the ″CAN″ of the EVAP Purge Solenoid. **NOTE: Monitor the vacuum gauge for at least 15 seconds.** Does the EVAP Purge Solenoid hold vacuum? Yes → Go To 4 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Ignition on, engine not running. Using the DRBIII®, monitor the NVLD Switch State with the vacuum pump still installed and holding vacuum. Does the DRBIII® display the NVLD state OPEN? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5 **NOTE: Remove the vacuum pump and connect the vacuum hose before continuing.**	All
5	Disconnect the NVLD electrical connector. Does the Switch change from CLOSED to OPEN? Yes → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the C3 PCM harness connector. Measure the resistance between ground and the (K107) NVLD Switch Signal circuit in the NVLD Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K107) NVLD Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
7	Turn the ignition off. Disconnect the C3 PCM harness connector. Measure the resistance between ground and the (K52) Evap Purge Sol Control circuit at the EVAP Purge Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K52) Evap Purge Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0452-NVLD PRESSURE SWITCH STUCK CLOSED — Continued

TEST	ACTION	APPLICABILITY
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0453-NVLD PRESSURE SWITCH STUCK OPEN

When Monitored and Set Condition:

P0453-NVLD PRESSURE SWITCH STUCK OPEN

When Monitored: Engine running.

Set Condition: If the PCM does not see the NVLD switch close during test an error is detected. One Trip Fault.

POSSIBLE CAUSES
NVLD SWITCH OPERATION
NVLD ASSEMBLY
(K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K107) NVLD SWITCH SIGNAL CIRCUIT OPEN
(K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO THE (K106) SOLENOID CONTROL CIRCUIT
(Z201) GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Check for any related TSBs before continuing. Start the engine. Allow the engine to idle. Using the DRBIII®, perform the NVLD FORCED MONITOR TEST. Monitor the NVLD Switch state. **NOTE: As the test runs, the NVLD Switch should go from an OPEN state to a CLOSED state and then return to OPEN when the test is complete.** Did the NVLD Switch operate as described above? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition off. Disconnect the NVLD electrical harness connector. Ignition on, engine not running. Monitor the NVLD Switch state on the DRBIII®. Connect a jumper wire between the (K107) NVLD Switch Signal circuit and the (Z201) Ground circuit in the NVLD harness connector. Does the Switch change from OPEN to CLOSED? Yes → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0453-NVLD PRESSURE SWITCH STUCK OPEN — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C3 PCM harness connector. Ignition on, engine not running. Measure the voltage on the (K107) NVLD Switch Signal circuit in the NVLD electrical harness connector. Is the voltage above 5.3 volts? Yes → Repair short to voltage in the (K107) NVLD Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K107) NVLD Switch Signal circuit from the NVLD electrical harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K107) NVLD Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between the (K107) NVLD Switch Signal circuit and the (K106) NVLD Sol Control circuit in the NVLD electrical harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K107) NVLD Switch Signal circuit and the (K106) NVLD Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Measure the resistance between the (Z201) Ground circuit and ground. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (Z201) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0456-EVAP SYSTEM SMALL LEAK

When Monitored and Set Condition:

P0456-EVAP SYSTEM SMALL LEAK

When Monitored: Ignition off. Fuel Level less than 88%. Ambient Temperature between 4°C to 43°C (39°F to 109°F)

Set Condition: Due to temperature changes a vacuum is created in the fuel tank and EVAP system. With the EVAP system sealed, the PCM monitors the NVLD switch. If the NVLD switch does not close within a calibrated amount of time an error is detected.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
INTERMITTENT CONDITION
VISUAL AND PHYSICAL INSPECTION
EVAPORATIVE EMISSION LEAK DETECTION
EVAP PURGE SOLENOID LEAKS/STUCK OPEN

TEST	ACTION	APPLICABILITY
1	Check for any related TSBs before continuing. **NOTE: The difference in ambient temperature, outside temp VS shop temp, may conceal a leak, it is best to perform this test after the vehicle's temperature has stabilized in the work area.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
2	Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions: - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 3	All

P0456-EVAP SYSTEM SMALL LEAK — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** Use the Miller Tool #8404 Evaporative Emissions Leak Detector (EELD). Connect the SMOKE supply tip (black hose) to the service port (if equipped) or #8404-ADP service adaptor in the filter line. Set the smoke/air control switch to SMOKE. **NOTE: The flow meter indicator ball will not move at this point.** Press the remote smoke/air start button. **NOTE: Make sure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.** **NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.** While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke. If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultraviolet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that are left behind by the smoke. The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light. **NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke or dye may or may not be visible. Introducing smoke into the filtered side of the canister may assist in locating the leak.** Was a leak found? Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 4	All
4	**NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty rollover valve. Replace/repair as necessary.** Turn the ignition off. Disconnect the vacuum hoses at the Evap Purge Solenoid. Using a hand vacuum pump, apply 10 in Hg to the "CAN" side of the EVAP Purge Solenoid. **NOTE: Monitor the vacuum gauge for at least 15 seconds.** Does the Evap Purge Solenoid hold vacuum? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

Symptom:
P0457-LOOSE FUEL CAP

When Monitored and Set Condition:

P0457-LOOSE FUEL CAP

When Monitored: Ignition on. Ambient temperature between 4°C and 32°C (39°F and 89°F) Closed Loop fuel system.

Set Condition: The PCM has detected an EVAP System leak after a fuel level increase. Two Trip Fault. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
LOOSE OR MISSING FUEL FILL CAP
INTERMITTENT CONDITION
NVLD SERVICE TEST
EVAPORATIVE EMISSION LEAK DETECTION
EVAP PURGE SOLENOID OPERATION
NVLD SWITCH OPERATION

TEST	ACTION	APPLICABILITY
1	**NOTE: After the PCM has determined the leak test inconclusive and sees an increase in fuel level, the PCM will request the GAS CAP indicator on to inform the customer that the gas fill cap is loose or off.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
2	Perform a visual and physical inspection of the Fuel Fill Cap and the fill tube. Check for the follow conditions: - Improper installation of Fuel Fill Cap - Loose or missing Fuel Filler Cap - Holes or cracks - Damaged Locking tabs on Cap and/or fill tube - Damaged seal points on Cap and/or fill tube - Fuel Fill Cap gasket seal Were any of the above conditions found? Yes → Repair or replace the fuel fill cap as needed. Ensure proper fuel fill cap installation. Once the repair is complete continue to step 3. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 3	All

P0457-LOOSE FUEL CAP — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, perform the NVLD Service Test. Did the NVLD Service Test pass? Yes → Test Complete. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 4	All
4	To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD). **WARNING: Keep lighted cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.** Connect the red power lead of the EELD to the battery positive terminal and the black ground lead to battery negative terminal. **NOTE: See Charts and Graph support material EELD Calibration Setup for an example.** Block the vent hose of the EVAP Canister. Connect shop air to the EELD. Set the smoke/air control switch to AIR. Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size). Press the remote smoke/air start button. Position the red flag on the air flow meter so it is aligned with the indicator ball. When the calibration is complete, release the remote button. The EELD is now calibrated the flow meter in liters per minute to the size leak indicated by the DTC set in the PCM. Install the service port adapter #8404-14 on the vehicle's service port (if equipped) or install the #8404-ADP service adapter in the NVLD filter line. Connect the Air supply hose from the EELD to the service port. Press the remote button to activate AIR flow. **NOTE: Larger volume fuel tanks, lower fuel levels or if the vehicle is equipped with a Flow Management Valve may indicate high flow and will require 4 to 5 minutes to fill** Compare the flow meter indicator ball reading to the red flag. ABOVE the red flag indicates a leak present. BELOW the red flag indicates a sealed system. Is the indicator ball above the red flag? Yes → Go To 5 No → Go To 8	All

P0457-LOOSE FUEL CAP — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD). Remove the Air supply hose from the service port. Connect the SMOKE supply tip (black hose) to the service port. Set the smoke/air control switch to SMOKE. **NOTE: The flow meter indicator ball will not move in the smoke mode.** Press the remote smoke/air start button. **NOTE: Make sure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.** **NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.** While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke. If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultraviolet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that is left behind by the smoke. The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light. **NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke may not be as thick. Introducing smoke into the filtered side of the canister may assist in locating the leak.** Was a leak found? Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 6	All
6	**NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty vent valve. Replace/repair as necessary.** Turn the ignition off. Disconnect the vacuum hoses at the Evap Purge Solenoid. Using a hand vacuum pump, apply 10 in Hg to the ″CAN″ of the EVAP Purge Solenoid. **NOTE: Monitor the vacuum gauge for at least 15 seconds.** Does the EVAP Purge Solenoid hold vacuum? Yes → Go To 7 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P0457-LOOSE FUEL CAP — Continued

TEST	ACTION	APPLICABILITY
7	Reconnect all vacuum hoses. Start the engine. Allow the engine to idle. Using the DRBIII®, perform the NVLD FORCED MONITOR TEST. Monitor the NVLD Switch. **As the test runs, the NVLD Switch should go from an OPEN state to CLOSED. After the vacuum is released form the EVAP system the Switch state will return to OPEN.** Did the NVLD Switch operate as described above? Yes → Go To 8 No → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. **NOTE: Make Ensure the gas cap meets OEM specifications.** Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions: - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:
P0461-FUEL LEVEL SENSOR NO.1 PERFORMANCE

When Monitored and Set Condition:

P0461-FUEL LEVEL SENSOR NO.1 PERFORMANCE

When Monitored: TEST #1: With the ignition on, the fuel level is compared to the previous key down after a 20 second delay. TEST #2: The PCM monitors the fuel level at ignition on.

Set Condition: TEST #1: If the PCM does not see a difference in fuel level of greater than 0.1 volt the test will fail. TEST #2: If the PCM does not see a change in the fuel level of .1765 over a set amount of miles the test will fail.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
VISUALLY INSPECT FUEL TANK
(N4) FUEL LEVEL SIGNAL CIRCUIT OPEN
(N4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO GROUND
(K900) SENSOR GROUND CIRCUIT OPEN
INTERNAL INSPECTION OF THE FUEL TANK
FUEL LEVEL SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose P0462 or P0463 first, if set along with P0461.** **NOTE: Inspect the Fuel Pump Module harness connector for any corrosion or damage.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Visually inspect the Fuel Tank for damage that may restrict the Fuel Sending Unit float from moving. Is the Fuel Tank OK? Yes → Go To 3 No → Replace the Fuel Tank as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0461-FUEL LEVEL SENSOR NO.1 PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Disconnect the C2 and C3 PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (N4) Fuel Level Signal circuit from the Fuel Pump Module harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (N4) Fuel Level Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Measure the resistance between ground and the (N4) Fuel Level Signal circuit at the Fuel Pump Module harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (N4) Fuel Level Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the Fuel Pump Module harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**WARNING: The fuel system is under a constant pressure even with the engine off. Before opening the fuel system the fuel pressure must be release. Relieve the fuel pressure in accordance with the service information.** Remove the Fuel Tank per Service Information. Remove the Fuel Pump Module. Visually inspect the inside of the Fuel Tank for any obstructions or deformities. Inspect the Fuel Pump Module Float arm for damage. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Fuel Level Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0462-FUEL LEVEL SENSOR NO.1 LOW

When Monitored and Set Condition:

P0462-FUEL LEVEL SENSOR NO.1 LOW

When Monitored: Ignition on and battery voltage above 10.4 volts.

Set Condition: The fuel level sensor signal voltage goes below 0.0196 of a volt for more than 90 seconds.

POSSIBLE CAUSES
FUEL LEVEL SENSOR VOLTAGE BELOW 0.0196 OF A VOLT
FUEL LEVEL SENSOR
(N4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO GROUND
(N4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, read the Fuel Level Sensor voltage. Is the Fuel Level Sensor voltage below 0.0196 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Ignition on, engine not running. With the DRBIII®, read the Fuel Level Sensor voltage. Did the Fuel Level Sensor voltage change from below 0.4 of a volt to above 4.0 volts? Yes → Replace the Fuel Level Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the C2 and C3 PCM harness connectors. Measure the resistance between ground and the (N4) Fuel Level Signal circuit at the Fuel Level Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (N4) Fuel Level Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0462-FUEL LEVEL SENSOR NO.1 LOW — Continued

TEST	ACTION	APPLICABILITY
4	Measure the resistance between the (N4) Fuel Level Signal circuit and the (K900) Sensor ground circuit at the Fuel Pump Module harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K900) Sensor ground and the (N4) Fuel Level Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0463-FUEL LEVEL SENSOR NO.1 HIGH

When Monitored and Set Condition:

P0463-FUEL LEVEL SENSOR NO.1 HIGH

When Monitored: Ignition on and battery voltage above 10.4 volts.

Set Condition: The fuel level sensor signal voltage at the PCM goes above 4.9 volts for more than 90 seconds.

POSSIBLE CAUSES
FUEL LEVEL SENSOR VOLTAGE ABOVE 4.9 VOLTS
FUEL LEVEL SENSOR
(N4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(N4) FUEL LEVEL SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the Fuel Level Sensor voltage. Is the Fuel Level Sensor voltage above 4.9 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Fuel Pump Module electrical harness connector. Connect a jumper wire between the (N4) Fuel Level Signal circuit and the (K900) Sensor ground circuit at the Fuel Pump Module harness connector. Ignition on, engine not running. With the DRBIII®, read the Fuel Level Sensor voltage. Did the Fuel Level Sensor voltage change from above 4.8 volts to below 0.4 of a volt? Yes → Replace the Fuel Level Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0463-FUEL LEVEL SENSOR NO.1 HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C2 and C3 PCM harness connectors. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Measure the voltage on the (N4) Fuel Level Signal circuit at the Fuel Pump Module harness connector. Is the voltage above 5.3 volts? Yes → Repair the short to voltage in the (N4) Fuel Level Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (N4) Fuel Level Signal circuit from the Fuel Pump Module harness connector to the appropriate terminal in special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (N4) Fuel Level Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the Fuel Pump Module harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0480-COOLING FAN NO.1 CONTROL CIRCUIT

When Monitored and Set Condition:

P0480-COOLING FAN NO.1 CONTROL CIRCUIT

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: An open or shorted circuit is detected in the radiator fan relay control circuit.

POSSIBLE CAUSES
LOW SPEED RADIATOR FAN RELAY OPERATION
LOW SPEED RADIATOR FAN RELAY
(F1) FUSED IGNITION SWITCH OUTPUT CIRCUIT
(A16) FUSED B+ CIRCUIT
(N201) LOW SPEED RAD FAN RELAY CONTROL CIRCUIT OPEN
(N201) LOW SPEED RAD FAN RELAY CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the Low Speed Radiator Fan Relay. Is the Radiator Fan Relay cycling on and off? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Measure the resistance of the Low Speed Radiator Fan Relay Coil by measuring between the (F1) Fused Ignition Switch terminal and the (N201) Control circuit terminal at the Relay . Is the resistance between 60 and 80 ohms? Yes → Go To 3 No → Replace the Low Speed Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0480-COOLING FAN NO.1 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (F1) Fused Ignition Switch Output circuit at the Relay connector in the PDC. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open or short to ground in the (F1) Fused Ignition Output. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Ignition on, engine not running. Measure the voltage on the (A16) Fused B+ circuits in the PDC. Is the voltage above 11.0 volts? Yes → Go To 5 No → Repair the open or short to ground in the (A16) Fused B+ circuits. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (N201) Low Speed Rad Fan Relay Control circuit from the PDC to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (N201) Low Speed Rad Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Measure the resistance between ground and the (N201) Low Speed Rad Fan Relay Control circuit at the PDC. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (N201) Low Speed Rad Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0481-COOLING FAN NO.2 CONTROL CIRCUIT

When Monitored and Set Condition:

P0481-COOLING FAN NO.2 CONTROL CIRCUIT

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: An open or shorted circuit is detected in the high speed radiator fan relay control circuit. One Trip Fault.

POSSIBLE CAUSES
HIGH SPEED RADIATOR FAN RELAY OPERATION
HIGH SPEED RADIATOR FAN RELAY
(F1) FUSED IGNITION SWITCH OUTPUT CIRCUIT
(A16) FUSED B+ CIRCUIT
(N112) HIGH SPEED RAD FAN RELAY CONTROL CIRCUIT OPEN
(N112) HIGH SPEED RAD FAN RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the High Speed Radiator Fan Relay. Is the High Speed Radiator Fan Relay operating? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. Measure the resistance of the High Speed Radiator Fan Relay between the (F1) Fused Ignition Switch Output terminal and the (N112) High Speed Rad Fan Relay Control terminal. Is the resistance between 60 to 85 ohms? Yes → Go To 3 No → Replace the High Speed Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0481-COOLING FAN NO.2 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (F1) Fused Ignition Switch Output circuit at the Relay connector in the PDC. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open or short to ground in the (F1) Fused Ignition Output. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Using a 12-volt test light connected to ground probe the (A16) Fused B+ circuit in the PDC. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the open or short to ground (A16) Fused B+ circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the C3 PCM harness connector. Measure the resistance of the (N112) High Speed Rad Fan Relay Control circuit from the PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (N112) High Speed Rad Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Measure the resistance between ground and the (N112) High Speed Rad Fan Relay Control circuit in the PDC. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (N112) High Speed Rad Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW

When Monitored and Set Condition:

P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW

When Monitored: Engine running.

Set Condition: The PCM detects a short in the NVLD Canister vent solenoid circuits. One trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
NVLD SOLENOID
(K106) NVLD SOL CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Check for any related TSBs before continuing. Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the NVLD electrical harness connector. Measure the resistance of the NVLD Solenoid coil. Is the resistance between 7.5 and 8.5 ohms? Yes → Go To 3 No → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Disconnect the C3 PCM harness connector. Measure the resistance between ground and the (K106) NVLD Sol Control circuit at the NVLD electrical harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K106) NVLD Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH

When Monitored and Set Condition:

P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH

When Monitored: Engine running.

Set Condition: The PCM detects an open in the NVLD Canister vent solenoid circuits. One trip Fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
NVLD SOLENOID
(K106) NVLD SOL CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K106) NVLD SOL CONTROL CIRCUIT OPEN
(Z201) GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Check for any related TSBs before continuing. Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the NVLD Assembly harness connector. Measure the resistance of the NVLD Solenoid coil. Is the resistance between 7.5 and 8.5 ohms? Yes → Go To 3 No → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Disconnect the C3 PCM harness connector. Measure the voltage on the (K106) NVLD Sol Control circuit in the NVLD Assembly harness connector. Is the voltage above 1.0 volt? Yes → Repair the short to voltage in the (K106) NVLD Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
4	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K106) NVLD Sol Control circuit from the NVLD Assembly harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K106) NVLD Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between the (Z201) Ground circuit and ground. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (Z201) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0501-VEHICLE SPEED SIGNAL PERFORMANCE

When Monitored and Set Condition:

P0501-VEHICLE SPEED SIGNAL PERFORMANCE

When Monitored: With the engine running, transmission not in park or neutral, brakes not applied, and engine rpm greater than 1500.

Set Condition: This code will set if no vehicle speed signal is received from the Body Control Module for more than 11 seconds for 2 consecutive trips.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(B22) VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO VOLTAGE
(B22) VEHICLE SPEED SIGNAL CIRCUIT OPEN
(B22) VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. **NOTE: Any VSS DTCs in the BCM and CAB Module must be properly diagnosed before continuing.** Perform the diagnostic procedure for VSS faults using the Chassis Diagnostic book. If those diagnostics lead to replacing a control module, continue the diagnostics found here. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the C1 PCM harness connector. Disconnect the BCM harness connectors. Ignition on, engine not running. Measure the voltage of the (B22) Vehicle Speed Signal circuit at the BCM harness connector. Is the voltage above 6.0 volts? Yes → Repair the short to voltage in the (B22) Vehicle Speed Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0501-VEHICLE SPEED SIGNAL PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (B22) Vehicle Speed Signal circuit from the BCM harness connector and the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (B22) Vehicle Speed Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Measure the resistance between ground and the (B22) Vehicle Speed Signal circuit in the BCM harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (B22) Vehicle Speed Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there is no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0506-IDLE SPEED PERFORMANCE LOWER THAN EXPECTED

When Monitored and Set Condition:

P0506-IDLE SPEED PERFORMANCE LOWER THAN EXPECTED

When Monitored: With the engine running at idle, MAF <250 mg/tdc, air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F), coolant temp >-7°C (19.4°F) <130°C (266°F), canister purge <100% duty cycle, and no VSS, MAF/MAP, ECT, TPS, ETC, CRK Sensor DTCs nor any fuel system or injector DTCs.

Set Condition: Engine speed is 100 RPM or more below idle speed for 7 seconds. Two Trip Fault. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
AIR INDUCTION SYSTEM
IAC OPERATION
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If any other DTCs are present, they must be diagnosed and repaired before continuing this test.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Inspect the Air Induction System for the following problems. Restrictions: Dirty Air Cleaner, Foreign material trap in the air intake tube, etc. Leaks: Air Intake tube connection, Air Cleaner housing, etc. Remove the IAC and inspect for foreign debris. Check the MAP Sensor for proper installation. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0506-IDLE SPEED PERFORMANCE LOWER THAN EXPECTED — Continued

TEST	ACTION	APPLICABILITY
3	Inspect the throttle plate for carbon build up or other restrictions. Verify that the throttle cable between the Accelerator Pedal and the Throttle body is not binding. Make sure the throttle plate is in the idle position. Remove the IAC Motor and actuate the IAC Motor with the DRBIII® to verify proper operation. Install the IAC Motor. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** With the vehicle is running, lightly tap on IAC Motor, with your hand, and listen for idle to raise. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0507-IDLE SPEED PERFORMANCE HIGHER THAN EXPECTED

When Monitored and Set Condition:

P0507-IDLE SPEED PERFORMANCE HIGHER THAN EXPECTED

When Monitored: With the engine running at idle, MAF <250 mg/tdc, air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F), coolant temp >-7°C (19.4°F) <130°C (266°F), canister purge <100% duty cycle, and no VSS, MAF/MAP, ECT, TPS, ETC, CRK Sensor DTCs nor any fuel system or injector DTCs.

Set Condition: Engine speed is 200 RPM or more above idle speed for 7 seconds. Two Trip Fault. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
AIR INDUCTION SYSTEM
VACUUM LEAKS
IAC OPERATION
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If any other DTCs are present, they must be diagnosed and repaired before continuing this test.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Inspect the Air Induction System for the following problems. Restrictions: Dirty Air Cleaner, Foreign material trap in the air intake tube, etc. Leaks: Air Intake tube connection, Air Cleaner housing, etc. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0507-IDLE SPEED PERFORMANCE HIGHER THAN EXPECTED — Continued

TEST	ACTION	APPLICABILITY
3	Start the engine. Inspect the vehicle for external vacuum leaks. Inspect the engine for internal leaks. Were any vacuum leaks found? Yes → Repair the vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Inspect the throttle body plate for carbon build up or other restrictions. Verify that the throttle cable between the Accelerator Pedal and Throttle Body is not binding. Make sure the throttle plate is resting on the stop at idle. Remove the IAC Motor and actuate the IAC Motor with the DRBIII® to verify proper operation. Install the IAC Motor. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** While the vehicle is running, lightly tap on IAC Motor, with your hand, and listen for idle to raise. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0508-IAC VALVE SIGNAL CIRCUIT LOW

When Monitored and Set Condition:

P0508-IAC VALVE SIGNAL CIRCUIT LOW

When Monitored: Engine running. Battery voltage greater than 10 volts. IAC motor operating.

Set Condition: The PCM senses a short to ground or battery voltage on the Linear Idle Air Control (LIAC) control circuit for 2.75 seconds while the IAC motor is active.

POSSIBLE CAUSES
IAC MOTOR OPERATTION
IAC MOTOR
(K61) IAC CONTROL CIRCUIT SHORTED TO GROUND
(K961) IAC SIGNAL CIRCUIT OPEN
(K961) IAC SIGNAL CIRCUIT SHORTED TO GROUND
(K61) IAC CONTROL CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.** Start the engine. Allow the engine to idle. Check for vacuum leaks, proper PCV valve installation, proper MAP Sensor installation, and proper IAC installation. With the DRBIII®, read the IAC Current. Is the IAC Current below 146 mA? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the IAC Motor harness connector. Remove the IAC Motor. **NOTE: Inspect the IAC air passages for restriction and damage to the IAC valve.** Measure the resistance across the IAC Motor pin terminals (component). Is the resistance 9.7 +/- 1.0 ohms? Yes → Go To 3 No → Replace the IAC Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0508-IAC VALVE SIGNAL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K961) IAC Signal circuit from the IAC Motor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K961) IAC Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Measure the resistance between ground and the (K961) IAC Signal circuit in the IAC Motor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K961) IAC Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K61) IAC Control circuit from the IAC Motor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K61) IAC Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Measure the resistance between ground and the (K61) IAC Control circuit in the IAC Motor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K61) IAC Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0509-IAC VALVE SIGNAL CIRCUIT HIGH

When Monitored and Set Condition:

P0509-IAC VALVE SIGNAL CIRCUIT HIGH

When Monitored: Engine running. Battery voltage greater than 10 volts. IAC motor operating.

Set Condition: The PCM senses a short to ground or battery voltage on the Linear Idle Air Control (LIAC) control circuit for 2.75 seconds while the IAC motor is active.

POSSIBLE CAUSES
IAC MOTOR OPERATION
IAC MOTOR
(K961) IAC SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K61) IAC CONTROL CIRCUIT SHORTED TO VOLTAGE
(K61) IAC CONTROL CIRCUIT SHORTED TO (K961) IAC SIGNAL CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.** Start the engine. Allow the engine to idle. Check for vacuum leaks, proper PCV valve installation, proper MAP Sensor installation, and proper IAC installation. With the DRBIII®, read the IAC Current. Is the IAC Current above 999 mA? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITON Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the IAC Motor harness connector. With the DRBIII®, monitor the IAC Current. Ignition on, engine not running. Does the DRBIII® display IAC Current at 0mA? Yes → Replace the IAC Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0509-IAC VALVE SIGNAL CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, actuate the ASD Relay. Measure the voltage on the (K961) IAC Signal circuit in the IAC Motor harness connector. Is the voltage above 0.5 of a volt? Yes → Repair the short to voltage in the (K961) IAC Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Measure the voltage on the (K61) IAC Control circuit in the IAC Motor harness connector. Is the voltage above 0.5 of a volt? Yes → Repair the short to voltage in the (K61) IAC Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5 **NOTE: Stop the ASD Relay actuation before continuing.**	All
5	Turn the ignition off. Disconnect the C2 PCM harness connector. Measure the resistance across the (K961) IAC Signal circuit and the (K61) IAC Control circuit in the IAC Motor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K61) IAC Control circuit and the (K961) IAC Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0513-INVALID SKIM KEY

When Monitored and Set Condition:

P0513-INVALID SKIM KEY

When Monitored: Ignition on.

Set Condition: The PCM detects an invalid SKIM key.

POSSIBLE CAUSES
INCORRECT VIN IN PCM
NO COMMUNICATION WITH SKIM
NO VIN PROGRAMMED IN THE PCM
SKIM TROUBLE CODES SET
IGNITION KEY
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the PCM DTCs. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	With the DRBIII®, attempt to communicate with the SKIM. Can the DRBIII® communicate with the SKIM? Yes → Go To 3 No → Refer to symptom BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category. Perform SKIS VERIFICATION.	All
3	With the DRBIII®, check for SKIM DTCs. Are any DTCs present in the SKIM? Yes → Refer to BODY information for the related symptom(s). Perform SKIS VERIFICATION. No → Go To 4	All
4	With the DRBIII®, display the VIN that is programmed in the PCM. Has a VIN been programmed into the PCM? Yes → Go To 5 No → Program the correct VIN into the PCM and retest. Perform SKIS VERIFICATION.	All

P0513-INVALID SKIM KEY — Continued

TEST	ACTION	APPLICABILITY
5	With the DRBIII®, display the VIN that is programmed in the PCM. Was the correct VIN programmed into the PCM? Yes → Go To 6 No → Replace and program the Powertrain Control Module per Service Information. Perform SKIS VERIFICATION.	All
6	Turn the ignition off. Replace and program the Sentry Key Immobilizer Module per Service Information. Ignition on, engine not running. With the DRBIII®, erase all SKIM and PCM DTCs. Attempt to start and idle the engine. With the DRBIII®, read the PCM DTCs. Does the DRBIII® display this code? Yes → NOTE: Before continuing, check the PCM harness connector termnals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module per Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All
7	**NOTE: You must obtain the SKIM pin number.** **NOTE: This DTC could have been set if the SKIM harness connector was disconnected, or if the SKIM was replaced recently.** **NOTE: All keys that the customer uses for this vehicle must be tested to verify they are operating properly.** Verify the correct VIN is programmed into the PCM and SKIM. Turn the ignition off. With the next customer key turn the ignition key on and crank the engine to start. With the DRBIII®, read the PCM DTCs. Look for P0513. Is the Good Trip Counter for DTC P0513 displayed and equal to 0? Yes → Replace the Ignition Key. Perform SKIS VERIFICATION. No → Test Complete. **NOTE: If this DTC cannot be reset, it could have been an actual theft attempt.**	All

Symptom:
P0516-BATTERY TEMPERATURE SENSOR LOW

When Monitored and Set Condition:

P0516-BATTERY TEMPERATURE SENSOR LOW

When Monitored: Ignition on.

Set Condition: Battery temperature sensor voltage below 0.0392 of a volt for 4.8 seconds. Three good trips to clear the MIL.

POSSIBLE CAUSES
BATTERY TEMP VOLTS BELOW 0.0392 OF A VOLT
BATTERY TEMPERATURE SENSOR
(K25) BATT TEMP SIGNAL CIRCUIT SHORTED TO GROUND
(K25) BATT TEMP SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII® record all DTCs and the related Freeze Frame data. With DRBIII®, monitor the Battery Temperature Sensor voltage. Is the voltage below 0.0392 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	With the DRBIII® in sensors, read the Battery Temp Sensor Voltage value. Disconnect the Battery Temperature Sensor harness connector. Did the Batt Temp Sensor voltage change from below 1.0 volt to above 4.5 volts? Yes → Replace the Battery Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All
3	Turn the ignition off. Disconnect the C3 PCM harness connector. Measure the resistance between ground and the (K25) Batt Temp Signal circuit at the Battery Temp Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K25) Batt Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All

P0516-BATTERY TEMPERATURE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
4	Measure the resistance between the (K25) Batt Temp Signal circuit and the (K900) Sensor ground circuit at the Battery Temp Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K900) Sensor ground and the (K25) Batt Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0517-BATTERY TEMPERATURE SENSOR HIGH

When Monitored and Set Condition:

P0517-BATTERY TEMPERATURE SENSOR HIGH

When Monitored: Ignition on.

Set Condition: Battery temperature voltage goes above 4.9412 volts for more than 4.8 seconds. Three good trips to clear the MIL.

POSSIBLE CAUSES
BATTERY TEMP SENSOR VOLTAGE ABOVE 4.9412 VOLTS
BATTERY TEMPERATURE SENSOR
(K118) BATT TEMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K25) BATT TEMP SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. Record all DTCs and the related Freeze Frame data. With the DRBIII®, monitor the Battery Temperature Sensor voltage. Is the voltage above 4.9412 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the Battery Temperature Sensor harness connector. Ignition on, engine not running. With the DRBIII® in sensors, read the Battery Temp Voltage value. Connect a jumper wire between the (K25) Batt Temp Signal circuit and the (K900) Sensor ground circuit at the Battery Temp Sensor harness connector. Did the Battery Temp voltage value change from greater than 4.5 volts to less than 1.0 volt? Yes → Replace the Battery Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0517-BATTERY TEMPERATURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C2 and C3 PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (K25) Batt Temp Signal circuit at the Battery Temp Sensor harness connector. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (K118) Batt Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K25) Batt Temp Signal circuit from the Battery Temp Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K25) Batt Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance in the (K900) Sensor ground circuit from the Sensor connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0522-OIL PRESSURE VOLTAGE LOW

When Monitored and Set Condition:

P0522-OIL PRESSURE VOLTAGE LOW

When Monitored: With the ignition on and battery voltage above 10.4 volts.

Set Condition: The switch reads closed at voltage below 0.942 of a volt. The NGC must see a change in switch state at engine start. One trip fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
OIL PRESSURE SWITCH
(G6) OIL PRESSURE SIGNAL CIRCUIT OPEN
(G6) OIL PRESSURE SIGNAL CIRCUIT SHORTED TO VOLTAGE
(G6) OIL PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the Oil Pressure Switch harness connector. Ignition on, engine not running. Connect a jumper wire to the (G6) Oil Pressure Signal circuit in the Sensor harness connector. With the DRBIII® monitor the Oil Pressure Switch state. Touch the other end of the jumper wire to Ground at the Oil Pressure Switch harness connector several times. Did the Oil Pressure Switch state change from High to Low? Yes → Replace the Oil Pressure Switch. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0522-OIL PRESSURE VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C1 PCM harness connector. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (G6) Oil Pressure Signal circuit at the Switch harness connector. Does the 12-volt test light illuminate brightly? Yes → Repair the short to voltage on the (G6) Oil Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (G6) Oil Pressure Signal circuit from the Oil Pressure Switch harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (G6) Oil Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Measure the resistance between (G6) Oil Pressure Signal circuit and ground at the Switch connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (G6) Oil Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0532-A/C PRESSURE SENSOR LOW

When Monitored and Set Condition:

P0532-A/C PRESSURE SENSOR LOW

When Monitored: Engine running, A/C is learned, and the AC Clutch Relay energized.

Set Condition: The A/C pressure sensor signal voltage at the PCM goes below 0.58 of a volt for 2.6 seconds. One Trip Fault.

POSSIBLE CAUSES
A/C PRESSURE SENSOR VOLTAGE BELOW 0.6 OF A VOLT
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
A/C PRESSURE SENSOR
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Make sure the A/C refrigerant System is properly charged per the Service Information.** Start the engine. With the DRBIII®, read the A/C Pressure Sensor voltage. Is the voltage below 0.6 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (F856) 5-volt Supply circuit in the A/C Pressure Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 6	All
3	With the DRBIII®, monitor the A/C Pressure Sensor voltage with the Sensor harness connector disconnected. Is the voltage above 0.6 of a volt? Yes → Replace the A/C Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All

P0532-A/C PRESSURE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the C1 PCM harness connector. Measure the resistance between ground and the (C18) A/C Pressure Signal circuit in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (C18) A/C Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Measure the resistance between the (C18) A/C Pressure Signal circuit and the (K900) Sensor ground circuit in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K900) Sensor ground circuit and the (C18) A/C Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
6	Turn the ignition off. Disconnect the C1 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (F856) 5-volt Supply circuit from the A/C Pressure Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Measure the resistance between ground and the (F855) 5-volt Supply circuit in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0533-A/C PRESSURE SENSOR HIGH

When Monitored and Set Condition:

P0533-A/C PRESSURE SENSOR HIGH

When Monitored: Engine running, A/C is Learned, and the AC Clutch Relay energized.

Set Condition: The A/C pressure sensor signal at the PCM goes above 4.92 volts for 2.6 seconds. One trip Fault.

POSSIBLE CAUSES
A/C PRESSURE SENSOR VOLTAGE ABOVE 4.6 VOLTS
A/C PRESSURE SENSOR
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(C18) A/C PRESSURE SIGNAL CIRCUIT OPEN
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO THE (K856) 5-VOLT SUPPLY
(K900) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Make sure the A/C refrigerant System is properly charged per the Service Information.** Start the engine. With the DRBIII®, read the A/C Pressure Sensor voltage. Is the voltage above 4.6 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Connect a jumper wire between the (C18) A/C Pressure Signal circuit and the (K900) Sensor ground circuit in the Sensor harness connector. Ignition on, engine not running. With the DRBIII®, monitor the A/C Pressure Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the A/C Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0533-A/C PRESSURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C1 and C2 PCM harness connectors. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (C18) A/C Pressure Signal circuit at the A/C Pressure Sensor harness connector. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (C18) A/C Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (C18) A/C Pressure Signal circuit from the A/C Pressure Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (C18) A/C Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Measure the resistance between the (C18) A/C Pressure Signal circuit and the (K855) 5-volt Supply circuit in the A/C Pressure Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (F856) 5-volt Supply circuit and the (C18) A/C Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the A/C Pressure Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (K900) Sensor ground circuit Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0551-POWER STEERING SWITCH PERFORMANCE

When Monitored and Set Condition:

P0551-POWER STEERING SWITCH PERFORMANCE

When Monitored: With the ignition key on and engine running.

Set Condition: With the vehicle above 40 mph for over 30 seconds, the power steering pressure switch remains open.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
POWER STEERING PRESSURE SWITCH
(K66) P/S SWITCH SIGNAL CIRCUIT OPEN
(K66) P/S SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
(Z939) GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Ignition on, engine not running. Connect a jumper wire to the (K66) P/S Switch Signal circuit in harness connector. Using the DRBIII®, monitor the Power Steering Pressure Switch. Touch the jumper wire to the (Z939) Ground circuit in the Power Steering Pressure Switch harness connector several times. Did the Power Steering Pressure Switch status change from High to Low? Yes → Replace the Power Steering Pressure Switch. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0551-POWER STEERING SWITCH PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure resistance of (K66) P/S Switch Signal circuit from the Power Steering Pressure Switch harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K66) P/S Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Measure the resistance between ground and the (K66) P/S Pressure Switch Signal circuit at the P/S Pressure Switch connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K66) P/S Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Measure the resistance between ground and the (Z939) Ground circuit at the Power Steering Pressure Switch connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (Z939) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0562-BATTERY VOLTAGE LOW

When Monitored and Set Condition:

P0562-BATTERY VOLTAGE LOW

When Monitored: The engine running. The engine speed greater than 380 RPM.

Set Condition: Battery voltage is 1 volt less than desired system voltage.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
BATTERY POSITIVE CIRCUIT HIGH RESISTANCE
GENERATOR GROUND HIGH RESISTANCE
GENERATOR OPERATION
(K125) GEN FIELD CONTROL CIRCUIT OPEN
(K125) GEN FIELD CONTROL CIRCUIT SHORTED TO GROUND
(Z932) GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Make sure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.** **NOTE: Inspect the vehicle for after market accessories that may exceed the Generator System output.** Turn the ignition off. **NOTE: Make sure the generator drive belt is in good operating condition.** **NOTE: Inspect the fuses in the PDC. If a fuse is found to be open use the wiring diagram/schematic as a guide, inspect the wiring and connectors for damage.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

P0562-BATTERY VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. **NOTE: Make sure all wires are clear of the engine's moving parts.** Start the engine. Allow the engine to reach normal operating temperature. Measure the voltage between the Generator B+ Terminal and the Battery + Post. Is the voltage above 0.4 of a volt? Yes → Repair the Battery Positive circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: Make sure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator case and Battery ground post. Is the voltage above 0.1 of a volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery ground side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All
4	Turn the ignition off. Disconnect the Generator Field harness connector. Use a 12-volt test light and jump it across the Generator Field harness connector. Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Control circuit. Does the test light illuminate brightly and flash on and off? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 5	All
5	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K125) Gen Field Control circuit from the Generator Field harness connector to the appropriate terminal of the special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K125) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

P0562-BATTERY VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
6	Measure the resistance between ground and the (K125) Gen Field Control circuit in the Generator Field harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K125) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Using a 12-volt test connected to 12-volts, probe the (Z932) Ground circuit in the Generator Field harness connector. Does the test light illuminate brightly? Yes → Go To 8 No → Repair the open in the (Z932) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P0563-BATTERY VOLTAGE HIGH

When Monitored and Set Condition:

P0563-BATTERY VOLTAGE HIGH

When Monitored: With the ignition on. Engine RPM greater than 1000 RPM. With no other charging system codes set.

Set Condition: The battery sensed voltage is 1 volt above the charging goal for 13.47 seconds. The PCM senses the battery voltage turns off the field driver and senses the battery voltage again. If the voltages are the same, the code is set.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
GENERATOR OPERATION
(K125) GEN FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Make sure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.** **NOTE: Inspect the vehicle for after market accessories that may exceed the Generator System output.** Turn the ignition off. **NOTE: Make sure the generator drive belt is in good operating condition.** **NOTE: Inspect the fuses in the PDC. If a fuse is found to be open use the wiring diagram/schematic as a guide, inspect the wiring and connectors for damage.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
2	Turn the ignition off. Disconnect the Generator Field harness connector. Using a 12-volt test light, jump it across the Generator Field harness connector. Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Control circuit. Does the test light illuminate brightly and flash on and off? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All

P0563-BATTERY VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C2 PCM harness connector. Measure the voltage on the (K125) Gen Field Control circuit at the Generator Field harness connector. Is the voltage above 1.0 volt? Yes → Repair the short to voltage in the (K125) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All
4	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P0572-BRAKE SWITCH NO.1 CIRCUIT LOW

When Monitored and Set Condition:

P0572-BRAKE SWITCH NO.1 CIRCUIT LOW

When Monitored: Ignition on.

Set Condition: When the PCM recognizes Brake Switch #1 is mechanically stuck in the low/on position. One Trip Fault. Three Global Good Trips to Clear.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
BRAKE LAMP SWITCH OPERATION
(B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Verify battery voltage is greater than 10 volts.** With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
2	Turn the ignition off. Remove the Brake Lamp Switch and disconnect the harness connector. Measure the resistance between the (Z940) Ground circuit terminal and the (B15) Brake Switch No.1 Signal terminal at the Brake Lamp Switch. Apply and release the brake pedal plunger while monitoring the ohmmeter. Does the resistance change from below 5.0 ohms to an open circuit? Yes → Go To 3 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
3	Turn the ignition off. Disconnect the C3 PCM harness connector. Measure the resistance between ground and the (B15) Brake Switch No.1 Signal circuit in the Brake Lamp Switch harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (B15) Brake Switch No.1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All

P0572-BRAKE SWITCH NO.1 CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:

P0573-BRAKE SWITCH NO.1 CIRCUIT HIGH

When Monitored and Set Condition:

P0573-BRAKE SWITCH NO.1 CIRCUIT HIGH

When Monitored: Ignition on.

Set Condition: When the PCM recognizes Brake Switch #1 is stuck in the high/off position. One Trip Fault. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
BRAKE LAMP SWITCH OPERATION
(B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT OPEN
(Z940) GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
2	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between the Ground circuit terminal and the (B15) Brake Switch No.1 Signal circuit terminal in the Brake Lamp Switch. Apply and release the brake pedal while monitoring the ohmmeter. Does the resistance change from below 5.0 ohms to an open circuit? Yes → Go To 3 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0573-BRAKE SWITCH NO.1 CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (B15) Brake Switch No.1 Signal circuit from the Brake Lamp Switch harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (B15) Brake Switch No.1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
4	Measure the resistance between the (Z940) Ground circuit and ground at the Brake Lamp Switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (Z940) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:
P0580-SPEED CONTROL SWITCH NO.1 LOW

When Monitored and Set Condition:

P0580-SPEED CONTROL SWITCH NO.1 LOW

When Monitored: With the ignition key on. Battery voltage above 10 volts.

Set Condition: When switch voltage is less than 0.60 of a volt for 2 minutes.

POSSIBLE CAUSES
SPEED CONTROL SWITCH VOLTAGE LOW
SPEED CONTROL ON/OFF SWITCH
SPEED CONTROL RESUME/ACCEL SWITCH
CLOCKSPRING
(V37) S/C SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
(V37) S/C SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Do not press any of the Speed Control Switch buttons.** Ignition on, engine not running. With the DRBIII®, read the Speed Control voltage. Is the Speed Control voltage below 1.0 volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
2	With the DRBIII®, monitor the Speed Control Switch voltage. Disconnect the Speed Control On/Off Switch harness connector. Did the voltage change to above 4.7 volts? Yes → Replace the Speed Control On/Off Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 3	All
3	With the DRBIII®, monitor the Speed Control Switch voltage. Disconnect the Speed Control Resume/Accel Switch harness connector. Did the voltage change to above 4.7 volts? Yes → Replace the Speed Control Resume/Accel Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All

P0580-SPEED CONTROL SWITCH NO.1 LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the clockspring 6-way harness connector (instrument panel wiring side) per Service Information. Ignition on, engine not running. With the DRBIII® in Sensors, read the S/C Switch voltage. Did the S/C Switch volts change to 5.0 volts? Yes → Replace the Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	Turn the ignition off. Connect the Clockspring harness connector per Service Information. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance between the (K900) Sensor ground circuit and the (V37) S/C Signal circuit at the Speed Control Switch. Is the resistance below 5.0 ohms? Yes → Repair the (V37) S/C Signal circuit shorted to the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	All
6	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance between ground and the (V37) S/C Signal circuit at the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (V37) S/C Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All
7	**NOTE: Before continuing, disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:
P0581-SPEED CONTROL SWITCH NO.1 HIGH

When Monitored and Set Condition:

P0581-SPEED CONTROL SWITCH NO.1 HIGH

When Monitored: With the ignition key on. Battery voltage above 10 volts.

Set Condition: The PCM detects voltage above 4.8 volts in the Speed Control Switch Signal circuit. One Trip Fault.

POSSIBLE CAUSES
SPEED CONTROL SWITCH VOLTAGE HIGH
SPEED CONTROL SWITCHES
CLOCKSPRING
(V37) S/C SWITCH SIGNAL CIRCUIT SHORTED TO VOLTAGE
(V37) S/C SWITCH SIGNAL CIRCUIT OPEN BETWEEN PCM AND CLOCKSPRING
(K900) SENSOR GROUND CIRCUIT OPEN BETWEEN PCM AND CLOCKSPRING
(V37) S/C SWITCH SIGNAL CIRCUIT OPEN BETWEEN CLOCKSPRING AND S/C SWITCH
(K900) SENSOR GROUND CIRCUIT OPEN BETWEEN CLOCKSPRING AND S/C SWITCH
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Do not press any of the Speed Control Switch buttons.** Ignition on, engine not running. With the DRBIII®, read the Speed Control voltage. Is the Speed Control voltage above 4.8 volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
2	Turn the ignition off. Remove the Speed Control Switches from the steering wheel. Measure the resistance across each Speed Control Switch. Monitor the ohmmeter while pressing each function button on each switch. Resume/Accel - 15,400 ohms Cancel - 909 +/- 9 ohms Decel (Coast) - 2940 +/- 30 ohms On/Off - 0 ohms Set - 6650 +/- 66 ohms Does the function on the Speed Control Switches have the correct resistance value? Yes → Go To 3 No → Replace the Speed Control Switch that had the incorrect resistance value. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0581-SPEED CONTROL SWITCH NO.1 HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the upper and lower 6-way clockspring harness connectors per Service Information. Measure the resistance of the (K900) Sensor ground circuit between the upper and lower 6-way clockspring harness connectors. Measure the resistance of the (V37) S/C Switch Signal circuit between the upper and lower 6-way clockspring harness connectors. Was the resistance above 5.0 ohms for either circuit? Yes → Replace the clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Connect the Clockspring harness connectors per Service Information. Disconnect the Speed Control On/Off Switch 2-way harness connector only. Ignition on, engine not running. Measure the voltage on the (V37) S/C Switch Signal circuit in the On/Off Switch 2-way connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (V37) S/C Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	Turn the ignition off. Disconnect the upper and lower Clockspring harness connectors per Service Information. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (V37) S/C Switch Signal circuit from the lower Clockspring harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (V37) S/C Switch Signal circuit between the PCM and Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
6	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the lower Clockspring harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open (K900) Sensor ground circuit between the PCM and Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0581-SPEED CONTROL SWITCH NO.1 HIGH — Continued

TEST	ACTION	APPLICABILITY
7	Measure the resistance of the (V37) S/C Switch Signal circuit from the upper Clockspring harness connector to the On/Off switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (V37) S/C Switch Signal circuit, Clock-spring to S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
8	Measure the resistance of the (K900) Sensor ground circuit from the On/Off Switch 2-way harness connector to the upper Clockspring harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (K900) Sensor ground circuit between the Clockspring and S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If the there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:
P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT

When Monitored and Set Condition:

P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT

When Monitored: Engine running, the speed control switched on and learned, and the brake pedal is not pressed. No other fault has occured this trip.

Set Condition: The PCM recognizes an open or short to ground in the speed control vacuum solenoid control circuit. Cruise will be disabled for the remainder of that key-on cycle. One Trip fault. Three good trips to clear the MIL.

POSSIBLE CAUSES
SPEED CONTROL SOLENOID OPERATION
(V32) S/C SUPPLY CIRCUIT
SPEED CONTROL VACUUM SOLENOID
(V32) S/C SUPPLY SHORT TO GROUND
(V36) S/C VACUUM SOL CONTROL CIRCUIT SHORTED TO GROUND
(V32) S/C SUPPLY CIRCUIT OPEN
(V36) S/C VACUUM SOL CONTROL CIRCUIT OPEN
(Z212) S/C GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, actuate the Speed Control Vacuum Solenoid and note operation. Does the Speed Control Vacuum Solenoid actuate properly? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 2	All
2	Turn the ignition off. Disconnect the S/C Servo harness connector. Turn the ignition on. Using the DRBIII®, actuate the S/C Vacuum Solenoid. Using a test light connected to ground, probe the (V30) S/C Brake Switch Output circuit in the S/C Servo harness connector. Does the test light illuminate brightly and flash on and off? Yes → Go To 5 No → Go To 3	All

P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Brake Switch harness connector. Turn the ignition on. Using the DRBIII®, actuate the S/C Vacuum Solenoid. Using a test light connected to ground, probe the (V32) S/C Supply circuit in the Brake Switch harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Disconnect the S/C Servo harness connector. Measure the resistance of the (Z212) S/C Ground circuit at the S/C Servo harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (Z212) S/C Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Ignition on, engine not running. With the DRBIII®, actuate the Speed Control Vacuum Solenoid. Using a 12-volt test light connected to battery voltage, probe the S/C Vacuum Control circuit. Does the test light illuminate brightly and flash on and off? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	All
6	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (V36) S/C Vacuum Sol Control circuit from the Speed Control Servo harness connector to the appropriate terminal of special tool # 8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open/high resistance in the (V36) S/C Vacuum Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the C3 PCM harness connector. Measure the resistance between ground and the (V36) S/C Vacuum Solenoid Control circuit at the Speed Control Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V36) S/C Vacuum Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 10	All
8	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (V32) S/C Supply circuit from the Brake Lamp Switch harness connector to the appropriate terminal of special tool # 8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open/high resistance in the (V32) S/C Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
9	Turn the ignition off. Disconnect the Brake Switch harness connector. Disconnect the C3 PCM harness connector. Measure the resistance between ground and the (V32) S/C Supply circuit at the Speed Control Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V32) S/C Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 10	All
10	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** If the there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:
P0586-SPEED CONTROL VENT SOLENOID CIRCUIT

When Monitored and Set Condition:

P0586-SPEED CONTROL VENT SOLENOID CIRCUIT

When Monitored: Engine running, the speed control switched on and learned, and the brake pedal is not pressed. No other fault has occured this trip.

Set Condition: The PCM detects an open or short to ground in the Speed Control Vent Control circuit. Cruise will be disabled for the remainder of that key-on cycle. One Trip Fault. Three good trips to clear the MIL.

POSSIBLE CAUSES
SPEED CONTROL SOLENOID OPERATION
(V32) S/C SUPPLY CIRCUIT
SPEED CONTROL VENT SOLENOID
(V32) S/C SUPPLY SHORT TO GROUND
(V35) S/C VENT SOL CONTROL CIRCUIT OPEN
(V35) S/C VENT SOL CONTROL CIRCUIT SHORTED TO GROUND
(V32) S/C SUPPLY CIRCUIT OPEN
(Z212) S/C GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, actuate the Speed Control Vent Solenoid and note operation. Does the Speed Control Vent Solenoid acutate properly? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 2	All
2	Turn the ignition off. Disconnect the S/C Servo harness connector. Turn the ignition on. Using the DRBIII®, actuate the S/C Vent Solenoid. Using a test light connected to ground, probe the (V30) S/C Brake Switch Output circuit in the S/C Servo harness connector. Does the test light illuminate brightly and flash on and off? Yes → Go To 5 No → Go To 3	All

P0586-SPEED CONTROL VENT SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Brake Switch harness connector. Turn the ignition on. Using the DRBIII®, actuate the S/C Vent Solenoid. Using a test light connected to ground, probe the (V32) S/C Supply circuit in the Brake Switch harness connector. Does the test light illuminate brightly and flash on and off? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Disconnect the S/C Servo harness connector. Measure the resistance of the (Z212) S/C Ground circuit at the S/C Servo harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (Z212) S/C Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Ignition on, engine not running. With the DRBIII®, actuate the Speed Control Vent Solenoid. Using a 12-volt test light connected to battery voltage, probe the (V35) Speed Control Vent Solenoid Control circuit in the Speed Control Servo harness connector. Does the test light illuminate brightly and flash on and off? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	All
6	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (V35) S/C Vent Sol Control circuit from the Speed Control Servo harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open/high resistance in the (V35) S/C Vent Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0586-SPEED CONTROL VENT SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the C3 PCM harness connector. Measure the resistance between ground and the (V35) S/C Vent Sol Control circuit at the Speed Control Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V35) Speed Control Vent Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 10	All
8	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (V32) S/C Supply circuit from the Brake Lamp Switch harness connector to the appropriate terminal of special tool # 8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open/high resistance in the (V32) S/C Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
9	Turn the ignition off. Disconnect the Brake Switch harness connector. Disconnect the C3 PCM harness connector. Measure the resistance between ground and the (V32) S/C Supply circuit at the Speed Control Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V32) S/C Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 10	All
10	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** If the there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:
P0594-SPEED CONTROL SERVO POWER CIRCUIT

When Monitored and Set Condition:

P0594-SPEED CONTROL SERVO POWER CIRCUIT

When Monitored: Engine running, the speed control switched on and learned, and the brake pedal is not pressed. No other fault has occured this trip.

Set Condition: The speed control power supply circuit is either open or shorted to ground. Cruise will be disabled for the remainder of that key-on cycle. One Trip Fault. Three good trips to clear the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(V32) S/C SUPPLY CIRCUIT OPEN
(V32) S/C SUPPLY CIRCUIT SHORTED TO GROUND
BRAKE LAMP SWITCH
(V30) S/C BRAKE SWITCH OUTPUT
(V30) S/C BRAKE SWITCH OUPUT CIRCUIT OPEN
(V30) S/C BRAKE SWITCH OUTPUT CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
2	Disconnect the Brake Lamp Switch harness connector. Start the engine. Using a 12-volt test light connected to ground, probe the (V32) S/C Supply circuit in the Switch harness connector while holding the Cruise Switch in the ON position. Does the test light illuminate brightly? Yes → Go To 3 No → Go To 7	All

P0594-SPEED CONTROL SERVO POWER CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect and remove the Brake Lamp Switch. Measure the resistance across the (V32) S/C Supply circuit terminal and the (V30) S/C Brake Switch Output circuit terminal at the Brake Lamp Switch. Push the Plunger of the Switch in and let it out. Does the resistance change from below 5.0 ohms to an open circuit? Yes → Go To 4 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
4	Turn the ignition off. Connect the Brake Lamp Switch harness connecter and install the Switch. Disconnect the Speed Control Servo harness connector. Ignition on, engine not running. **NOTE: It is necessary to PRESS and HOLD the Speed Control Switch in the ON position while checking for voltage.** Using a 12-volt test light connected to ground, probe the (V30) S/C Brake Switch Output circuit in the Servo Harness connector. Does the test light illuminate brightly? Yes → Replace the S/C Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance of the (V30) S/C Brake Switch Output circuit from the Brake Lamp Switch harness connector to the S/C Servo harness connector. Is the resistance below 5.0 ohms? Yes → Repair the excessive resistance in the (V30) S/C Brake Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	All
6	Measure the resistance between ground and the (V30) S/C Brake Switch Output circuit at the Speed Control Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V30) S/C Brake Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 9	All

P0594-SPEED CONTROL SERVO POWER CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (V32) S/C Supply circuit from the Brake Lamp Switch harness connector to the appropriate terminal of special tool #8815. Is the resistance above 5.0 ohms? Yes → Repair the open in the (V32) S/C Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 8	All
8	Measure the resistance between ground and the (V32) S/C Supply circuit in the Brake Switch harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V32) S/C Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 9	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom List:
P0600-SERIAL COMMUNICATION LINK
P0601-INTERNAL MEMORY CHECKSUM INVALID

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0600-SERIAL COMMUNICATION LINK.

When Monitored and Set Condition:

P0600-SERIAL COMMUNICATION LINK

When Monitored: With the ignition on.

Set Condition: Internal Bus communication failure between processors.

P0601-INTERNAL MEMORY CHECKSUM INVALID

When Monitored: With the ignition on.

Set Condition: Internal checksum for software failed, does not match calculated value.

POSSIBLE CAUSES
PCM INTERNAL OR SPI

TEST	ACTION	APPLICABILITY
1	The Powertrain Control Module is reporting internal errors, view repair to continue. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
P0622-GENERATOR FIELD CONTROL CIRCUIT

When Monitored and Set Condition:

P0622-GENERATOR FIELD CONTROL CIRCUIT

When Monitored: With the ignition on. Engine speed greater than 1000 RPM. Battery voltage greater than 10.4 volts. ASD sense switch is on.

Set Condition: When the PCM tries to regulate the generator field with no result during monitoring.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
GENERATOR OPERATION
(K125) GEN FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K125) GEN FIELD CONTROL CIRCUIT OPEN
(K125) GEN FIELD CONTROL CIRCUIT SHORTED TO GROUND
(Z212) GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
2	Turn the ignition off. Disconnect the Generator Field harness connector. Jump a 12-volt test light across the Generator Field harness connector. Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Control circuit. Does the test light illuminate brightly and flash on and off? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All

P0622-GENERATOR FIELD CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the C2 PCM harness connector. Ignition on, engine not running. Measure the voltage on the (K125) Gen Field Control circuit in the Generator Field harness connector. Is the voltage above 1.0 volt? Yes → Repair the short to voltage in the (K125) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All
4	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K125) Gen Field Control circuit from the Generator Field harness connector to the appropriate terminal of the special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K125) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
5	Measure the resistance between ground and (K125) Gen Field Control circuit in the Generator Field harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K125) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	Using a 12-volt test connected to battery voltage, probe the (Z212) Ground circuit in the Generator Field harness connector. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the open in the (Z212) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
7	**NOTE: Before continuing, check the PCM connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P0627-FUEL PUMP RELAY CIRCUIT

When Monitored and Set Condition:

P0627-FUEL PUMP RELAY CIRCUIT

When Monitored: With the ignition on. Battery voltage greater than 10.4 volts.

Set Condition: An open or shorted condition is detected in the fuel pump relay control circuit.

POSSIBLE CAUSES
FUEL PUMP RELAY OPERATION
(F1) FUSED IGNITION SWITCH OUTPUT CIRCUIT
(A209) FUSED B+ CIRCUIT
FUEL PUMP RELAY
(K31) FUEL PUMP RELAY CONTROL CIRCUIT OPEN
(K31) FUEL PUMP RELAY CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the Fuel Pump Relay. Is the Fuel Pump Relay operating? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (F1) Fused Ignition Switch Output circuit in the PDC. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the (F1) Fused Ignition Switch Output circuit. Inspect the related fuse. An open fuse may have been caused by a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0627-FUEL PUMP RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Using a 12-volt test light connected to ground, probe the (A209) Fused B+ circuit of the fuel pump relay in the PDC. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open or short to ground in the (A209) Fused B+ circuit. Inspect and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Measure the resistance of the Fuel Pump Relay Coil. Is the resistance between 70 to 90 ohms? Yes → Go To 5 No → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K31) Fuel Pump Relay Control circuit from the PDC to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K31) Fuel Pump Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Measure the resistance between ground and the (K31) Fuel Pump Relay Control circuit in the PDC. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K31) Fuel Pump Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0630-VIN NOT PROGRAMMED IN PCM

When Monitored and Set Condition:

P0630-VIN NOT PROGRAMMED IN PCM

When Monitored: Ignition on.

Set Condition: The VIN has not been programmed into the PCM.

POSSIBLE CAUSES
PROGRAMMING VIN INTO PCM
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, erase DTCs. Using the DRBIII®, program VIN into the PCM. Start the engine. **NOTE: If the engine will not start, crank the engine over for 15 seconds. Crank at least 2 times with the ignition switch returning to the off position each time.** Allow the engine to reach normal operating temperature. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → The VIN has been succcessfully programmed into the PCM. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
P0632-ODOMETER NOT PROGRAMMED IN PCM

When Monitored and Set Condition:

P0632-ODOMETER NOT PROGRAMMED IN PCM

When Monitored: Ignition on.

Set Condition: Odometer is not programed into the PCM.

POSSIBLE CAUSES
PROGRAMMING MILEAGE INTO PCM
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, erase DTCs. Using the DRBIII®, program the mileage into the PCM. Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → The mileage has been succcessfully programmed into the PCM. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
P0633-SKIM KEY NOT PROGRAMMED IN PCM

When Monitored and Set Condition:

P0633-SKIM KEY NOT PROGRAMMED IN PCM

When Monitored: Ignition on.

Set Condition: The SKIM Key information has not been programmed into the PCM.

POSSIBLE CAUSES
PROGRAMMING SKIM KEY INTO PCM
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, erase DTCs. Using the DRBIII®, program the SKIM Key information into the PCM. Start the engine. **NOTE: If the engine will not start, crank the engine over for 15 seconds. Crank at least 2 times with the ignition switch returning to the off position each time.** Allow the engine to reach normal operating temperature. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → The SKIM KEY information has been succcessfully programmed into the PCM. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0645-A/C CLUTCH RELAY CIRCUIT

When Monitored and Set Condition:

P0645-A/C CLUTCH RELAY CIRCUIT

When Monitored: With the ignition on. Battery voltage greater than 10 volts. A/C Switch on.

Set Condition: An open or shorted condition is detected in the A/C clutch relay control circuit. The desired A/C state does not equal the actual A/C clutch relay state. Three good trips to clear the MIL.

POSSIBLE CAUSES
A/C CLUTCH RELAY OPERATION
(F1) FUSED IGNITION SWITCH OUTPUT CIRCUIT
(A112) FUSED B+ CIRCUIT
A/C CLUTCH RELAY
(C13) A/C CLUTCH RELAY CONTROL CIRCUIT OPEN
(C13) A/C CLUTCH RELAY CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch Relay operating? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (F1) Fused Ignition Switch Output circuit. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open or short to ground in the (F1) Fused Ignition Switch Output circuit. Inspect and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P0645-A/C CLUTCH RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Using a 12-volt test light connected to ground, probe the (A112) Fused B+ circuit of the fuel pump relay in the PDC. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open or short to ground in the (A112) Fused B+ circuit. Inspect and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Turn the ignition off. Measure the resistance of the A/C Clutch Relay Coil. Is the resistance between 60 to 80 ohms? Yes → Go To 5 No → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (C13) A/C Clutch Relay Control circuit from the PDC to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (C13) A/C Clutch Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Measure the resistance between ground and the (C13) A/C Clutch Relay Control circuit in the PDC. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (C13) A/C Clutch Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 7	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0685-ASD RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P0685-ASD RELAY CONTROL CIRCUIT

When Monitored: With ignition on. Battery voltage above 10 volts.

Set Condition: An open or shorted condition is detected in the ASD relay control circuit for more than 2.7 seconds. ASD Relay state does not equal the desired state. P0688 will set along with P0685.

POSSIBLE CAUSES
ASD RELAY OPERATION
(A907) FUSED B+ CIRCUITS
ASD RELAY
(K342) ASD RELAY CONTROL CIRCUIT OPEN
(K342) ASD RELAY CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Is the ASD Relay operating? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition off. Remove the ASD Relay from the PDC. Using a 12-volt test light connect to ground, probe the (A907) Fused B+ circuits in the PDC. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open or short to ground in the (A907) Fused B+ circuits. Inspect and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Measure the resistance of the ASD Relay Coil. Is the resistance between 60 to 80 ohms? Yes → Go To 4 No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0685-ASD RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K342) ASD Relay Control circuit from the PDC to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K342) ASD Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between ground and the (K342) ASD Relay Control circuit in the PDC. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K342) ASD Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0688-ASD RELAY SENSE CIRCUIT LOW

When Monitored and Set Condition:

P0688-ASD RELAY SENSE CIRCUIT LOW

When Monitored: With ignition key on. Battery voltage greater than 10 volts.

Set Condition: No voltage sensed at the PCM when the ASD relay is energized for 3.075 seconds. Three good trips to clear the MIL.

POSSIBLE CAUSES
VERIFY ASD DTC
ASD RELAY
(A907) FUSED B+ CIRCUITS
(A142) ASD RELAY OUTPUT CIRCUIT OPEN (NO START)
(A142) ASD RELAY OUTPUT CIRCUIT SHORTED TO GROUND
(A142) ASD RELAY OUTPUT CIRCUIT OPEN (START)
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose P0685 - Auto Shutdown Relay Control Circuit first if set along with this DTC.** With the DRBIII®, erase the DTC. Attempt to start the engine. If the engine will not start, crank the engine for at least 15 seconds. It may be necessary to repeat several times. Does the DTC reset? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Attempt to start the engine. Does the engine start? Yes → Go To 3 No → Go To 4	All

P0688-ASD RELAY SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (A142) ASD Relay Output circuit from the PDC to the appropriate terminals of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Install a substitute relay in place of the ASD Relay. Ignition on, engine not running. With the DRBIII®, erase DTCs. Attempt to start the engine. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Go To 5 No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Remove the ASD Relay from the PDC. Using a 12-volt test light connect to ground, probe the (A907) Fused B+ circuits in the PDC. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the open or short to ground in the (A907) Fused B+ circuits. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Disconnect the C3 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (A142) ASD Relay Output circuit from the PDC to the appropriate terminals of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0688-ASD RELAY SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
7	Measure the resistance between ground and the (A142) ASD Relay Output circuit at the Relay connection. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0700-TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

When Monitored and Set Condition:

P0700-TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

When Monitored: Ignition on.

Set Condition: An active DTC is stored in the TCM.

TEST	ACTION	APPLICABILITY
1	This is an informational DTC letting you know that a DTC(s) is stored in the Transmission Control Module. Erase this DTC from the PCM after all Transmission DTC(s) have been repaired. Using the DRBIII®, read the Transmission Controller DTC and refer to the Transmission Category and perform the appropriate symptom. PCM Diagnostic Information complete. Continue Test Complete.	All

Symptom:

P0850-PARK/NEUTRAL SWITCH PERFORMANCE

When Monitored and Set Condition:

P0850-PARK/NEUTRAL SWITCH PERFORMANCE

When Monitored: Continuously with the transmission in Park, Neutral, or Drive and NOT in Limp-in mode.

Set Condition: This code will set if the PCM detects an incorrect Park/Neutral switch state for a given mode of vehicle operation.

POSSIBLE CAUSES
DRB DISPLAYS P/N & D/R NOT IN CORRECT POSITION
TRS T41 SENSE (P/N SENSE) CIRCUIT OPEN
TRS T41 SENSE (P/N SENSE) CIRCUIT SHORTED TO GROUND
TRANSMISSION RANGE SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the Park/Neutral Position Switch input state. While moving the gear selector through all gear positions (Park to 1 and back to Park), monitor the DRB display. Did the DRB display show P/N and D/R in the correct gear positions? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Range Sensor harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the TRS T41 Sense (P/N Sense) circuit from the TRS harness connector to the appropriate terminal of special tool #8815 installed. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open in the TRS T41 Sense (P/N Sense) circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P0850-PARK/NEUTRAL SWITCH PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Measure the resistance between ground and the TRS T41 Sense (P/N Sense) circuit at the TRS harness connector. Is the resistance above 100k ohms? Yes → Go To 4 No → Repair the short to ground in the TRS T41 Sense (P/N Sense) circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Connect the Transmission Range Sensor harness connector. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through each gear, measure the resistance between ground and the TRS T41 Sense (P/N Sense) circuit using special tool #8815. **NOTE: The circuit is grounded in Park and Neutral and open in the other positions.** Did the resistance change from above 100 kohms (open) to below 10.0 ohms (grounded)? Yes → Go To 5 No → Replace the Transmission Range Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P1115-GENERAL TEMPERATURE SENSOR PERFORMANCE

When Monitored and Set Condition:

P1115-GENERAL TEMPERATURE SENSOR PERFORMANCE

When Monitored: With the ignition on and engine running.

Set Condition: The PCM compares the ouputs of the ECT, IAT, and Ambient Temp sensors. If one sensor does not corralate with the other two sensors the fault is set.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
TEMPERATURE SENSOR CIRCUT
FAULTY SENSOR
EXCESSIVE RESISTANCE IN THE SENSOR SIGNAL CIRCUIT
EXCESSIVE RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the DTCs and record the related Freeze Frame data. **NOTE: All ECT, Intake Air, and Ambient Air Temperature Sensor codes must be diagnosed and repaired before continuing.** Is the Good Trip Counter displayed and equal to zero Yes → Go To 2 No → Refer to the INTERMITENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	With the DRBIII® in Sensors, read the ECT, Ambient/Battery Temp, and Intake Air Temp Sensor temp values. Start the engine. Allow the engine to reach normal operating temperature while monitoring the three Sensor temperature values. Is the temperature for each of the Sensors increasing properly? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P1115-GENERAL TEMPERATURE SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Ignition on, engine not running. Disconnect the suspected faulty sensor. Connect a jumper wire between the Sensor Signal circuit and the (K900) Sensor ground circuit. With the DRBIII® in Sensors, read the voltage of the suspected Sensor. Did the voltage reading start at 4.8 to 5.0 volts and decrease to 0 volts? Yes → Replace the faulty Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the Sensor Signal circuit from the Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance above 5.0 ohms. Yes → Repair the excessive resistance in the Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance above 5.0 ohms. Yes → Repair the excessive resistance in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, review repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1593-SPEED CONTROL SWITCH NO.1 STUCK

When Monitored and Set Condition:

P1593-SPEED CONTROL SWITCH NO.1 STUCK

When Monitored: Ignition on.

Set Condition: S/C Switche #1 is mechanically stuck in the On/Off, Resume/Accel, or Set position for too long. One trip fault.

POSSIBLE CAUSES
SPEED CONTROL SWITCH STATUS
SPEED CONTROL SWITCHES
(V37) S/C SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
(V37) S/C SIGNAL CIRCUIT SHORTED TO GROUND
(V37) S/C SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(V37) S/C SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, monitor each switch function for the Speed Control Switches. Press and release each Speed Control Button. - Resume/Accel - Cancel - Decel (Coast) - On/Off - Set Does each switch function change status when pressing and then depressing each switch? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 2	All

P1593-SPEED CONTROL SWITCH NO.1 STUCK — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Remove the Speed Control Switches from the steering wheel. Measure the resistance across each Switch Control Switch. Monitor the ohmmeter while pressing each function button on each switch. Resume/Accel - 15,400 ohms Cancel - 909 +/- 9 ohms Decel (Coast) - 2940 +/- 30 ohms On/Off - 0 ohms Set - 6650 +/- 66 ohms Does the function on the Speed Control Switches have the correct resistance value? Yes → Go To 3 No → Replace the Speed Control Switch that had the incorrect resistance value. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
3	Disconnect the C3 PCM harness connector. Ignition on, engine not running. Measure the voltage on the (V37) S/C Signal circuit at the Speed Control harness connector. Is the is the voltage above 5.0 volts? Yes → Repair the short to battery voltage in the (V37) S/C Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Turn the ignition off. **NOTE: The measurement must be taken from both Speed Control Switch harness connector.** **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (V37) S/C Signal circuit from the Speed Control harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms for both measurement? Yes → Go To 5 No → Repair the open in the (V37) S/C Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	Measure the resistance between ground and the (V37) S/C Signal circuit at the Speed Control harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V37) S/C Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	All

P1593-SPEED CONTROL SWITCH NO.1 STUCK — Continued

TEST	ACTION	APPLICABILITY
6	Disconnect the C2 and C3 PCM harness connectors. Measure the resistance between the (V37) S/C Signal circuit and the (K900) Sensor ground circuit in the Speed Control harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (V37) S/C Signal circuit and the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All
7	**NOTE: The measurement must be taken from both Speed Control Switch harness connectors.** **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K900) Sensor ground circuit from the Speed Control harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms for both measurements? Yes → Go To 8 No → Repair the open in the (K900) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:
P1602-PCM NOT PROGRAMMED

When Monitored and Set Condition:

P1602-PCM NOT PROGRAMMED

When Monitored: Ignition on.

Set Condition: The PCM has not been programmed.

POSSIBLE CAUSES
PCM NOT FLASHED
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, erase DTCs. With the DRBIII® flash the PCM per Service Information. Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → The PCM has been successfully flashed. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom List:

P1603-PCM INTERNAL DUAL-PORT RAM COMMUNICATION
P1604-PCM INTERNAL DUAL-PORT RAM READ/WRITE INTEGRITY FAILURE
P1607-PCM INTERNAL SHUTDOWN TIMER RATIONALITY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1603-PCM INTERNAL DUAL-PORT RAM COMMUNICATION.

When Monitored and Set Condition:

P1603-PCM INTERNAL DUAL-PORT RAM COMMUNICATION

When Monitored: Ignition off, on, and run/start.

Set Condition: Internal PCM failure detected. Intermittent open on PCM Connector 1, pin 12, (F11) Fused Ignition Switch Output circuit.

P1604-PCM INTERNAL DUAL-PORT RAM READ/WRITE INTEGRITY FAILURE

When Monitored: Ignition off, on, and run/start.

Set Condition: Internal PCM failure detected. Intermittent open on PCM Connector 1, pin 12, (F11) Fused Ignition Switch Output circuit.

P1607-PCM INTERNAL SHUTDOWN TIMER RATIONALITY

When Monitored: Ignition on.

Set Condition: Internal PCM failure detected.

POSSIBLE CAUSES
PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT
PCM

P1603-PCM INTERNAL DUAL-PORT RAM COMMUNICATION — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the C1 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** With a 12-volt test light connected to ground and with special tool #8815 installed, probe the (F1), (F26) Fused Ignition Switch Output circuits. Perform the above check with the Ignition key in the off lock position, Ignition on, engine not running position, and during cranking. Wiggle the related wire harness while probing the special tool with the test light to try to interrupt the circuit. Does the test light illuminate brightly? Yes → Go To 2 No → Repair the open or excessive resistance in the (F11) Fused Ignition Switch (Off, Run, Start) circuit. Inspect the related fuse, if the fuse is open check the circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. The Powertrain Control Module is reporting internal errors, view repair to continue. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom List:
P1696-PCM FAILURE EEPROM WRITE DENIED
P1697-PCM FAILURE SRI MILES NOT STORED

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1696-PCM FAILURE EEPROM WRITE DENIED.

When Monitored and Set Condition:

P1696-PCM FAILURE EEPROM WRITE DENIED

When Monitored: Ignition key on, Continuous.

Set Condition: An attempt to program/write to the internal EEPROM failed, Also checks at powerdown.

P1697-PCM FAILURE SRI MILES NOT STORED

When Monitored: Ignition key on, Continuous.

Set Condition: An attempt to program/write to the internal EEPROM failed, Also checks at powerdown.

POSSIBLE CAUSES
DRB DISPLAYS WRITE FAILURE
DRB DISPLAYS WRITE REFUSED 2ND TIME
DRB DISPLAYS SRI MILEAGE INVALID
COMPARE SRI MILEAGE WITH ODOMETER

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, perform the SRI Memory Test. Does the DRBIII® display Write Failure? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All
2	With the DRBIII®, perform the SRI Memory Test. Does the DRBIII® display Write Refused? Yes → Go To 3 No → Go To 4	All

P1696-PCM FAILURE EEPROM WRITE DENIED — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, perform the SRI Memory Test a third time. **NOTE: Retest the SRI Memory two more times.** Does the DRBIII® display Write Refused again? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All
4	With the DRBIII®, perform the SRI Memory Test. Does the DRBIII® display SRI Mileage Invalid? Yes → Update the mileage and retest the SRI Memory. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5	All
5	Compare the SRI Mileage stored with the Instrument Panel Odometer. Is the mileage within the specified range displayed on the DRBIII®? Yes → Test Complete. No → Update the mileage and retest the SRI Memory. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom List:

P2096-DOWN STREAM FUEL TRIM LEAN BANK 1
P2097-DOWN STREAM FUEL TRIM RICH BANK 1
P2098-DOWN STREAM FUEL TRIM LEAN BANK 2
P2099-DOWN STREAM FUEL TRIM RICH BANK 2

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2096-DOWN STREAM FUEL TRIM LEAN BANK 1.

When Monitored and Set Condition:

P2096-DOWN STREAM FUEL TRIM LEAN BANK 1

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above (-7°C)20°F, altitude below 8500 ft and fuel level greater than 15%.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

P2097-DOWN STREAM FUEL TRIM RICH BANK 1

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above (-7°C)20°F and altitude below 8500 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive as well as a purge fuel multiplier and the result is below a certain value for 30 seconds over two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

P2098-DOWN STREAM FUEL TRIM LEAN BANK 2

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above (-7°C)20°F, altitude below 8500 ft and fuel level greater than 15%.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

P2099-DOWN STREAM FUEL TRIM RICH BANK 2

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above (-7°C)20°F and altitude below 8500 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive as well as a purge fuel multiplier and the result is below a certain value for 30 seconds over two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

P2096-DOWN STREAM FUEL TRIM LEAN BANK 1 — Continued

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
EXHAUST LEAK
ENGINE MECHANICAL PROBLEM
O2 SENSOR
O2 SIGNAL CIRCUIT
O2 RETURN CIRCUIT
FUEL CONTAMINATION

TEST	ACTION	APPLICABILITY
1	**NOTE: Check the vehicle repair history. If the O2 has been replace ensure that the O2 sensor was properly installed and meets OEM specification.** **NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. **WARNING: To avoid personal injury from the exhaust system being hot, allow the exhaust to cool down to a safe temperature before performing a physical inspection.** Visually and Physically inspect the for holes, cracks and blockage in the exhaust system. Is the exhaust system is good condition? Yes → Go To 3 No → Repair or Replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P2096-DOWN STREAM FUEL TRIM LEAN BANK 1 — Continued

TEST	ACTION	APPLICABILITY
3	Check for any of the following conditions/mechanical problems. AIR INDUCTION SYSTEM - must be free from leaks. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Ignition on, engine not running. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. The O2 Sensor voltage should read 5.0 volts on the DRBIII® with the connector disconnected. Using a jumper wire, jump the O2 Signal circuit to the O2 Return circuit in the O2 Sensor harness connector. **NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.** Did the O2 Sensor volts change from 5.0 volts to 2.5 volts? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Remove the jump wire. Ignition on, engine not running. With the DRBIII®, monitor the O2 Sensor voltage. Is the voltage above 4.8 volts? Yes → Go To 6 No → Check the O2 Signal circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Measure the voltage on the O2 Return circuit in the O2 Sensor harness connector. Is the voltage at 2.5 volts? Yes → Check the fuel system for contaminants. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Check the O2 Return circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (2.4L)
P2305-IGNITION COIL NO.2 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (2.4L)

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (2.4L).

When Monitored and Set Condition:

P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (2.4L)

When Monitored: Engine running and battery voltage greater than 10 volts.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault. Three good trips to turn off the MIL.

P2305-IGNITION COIL NO.2 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (2.4L)

When Monitored: Engine running and battery voltage greater than 10 volts.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(A142) ASD RELAY OUTPUT CIRCUIT
IGNITION COIL
IGNITION COIL DRIVER CIRCUIT OPEN
IGNITION COIL DRIVER CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Check for any related TSBs. Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 2.4L POWER TECH DOHC I-4

P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (2.4L) — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the coil rail harness connector. Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Using a 12-volt test light connected to ground, check the (A142) ASD Relay Output circuit at the coil rail harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open or short to ground in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Stop All Actuations**	ENGINE - 2.4L POWER TECH DOHC I-4
3	Turn the ignition off. Disconnect the Ignition Coil harness connector. Using a 12-volt test light connected to 12-volts, probe the Ignition Coil Driver circuit. Crank the engine for 5 second while observing the test light. What is the state of the test light while cranking? Brightly flashing. Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5. ON constantly. Go To 4 OFF constanly. Go To 5	ENGINE - 2.4L POWER TECH DOHC I-4
4	Turn the ignition off. Disconnect the C2 PCM harness connector. Measure the resistance between the Ignition Coil Driver circuit and ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Ignition Coil Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	ENGINE - 2.4L POWER TECH DOHC I-4
5	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the Ignition Coil Driver circuit from the Ignition Coil connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the Ignition Coil Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 2.4L POWER TECH DOHC I-4

P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (2.4L) — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 2.4L POWER TECH DOHC I-4

Symptom List:

P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)
P2305-IGNITION COIL NO.2 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)
P2308-IGNITION COIL NO.3 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)
P2311-IGNITION COIL NO.4 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)
P2314-IGNITION COIL NO.5 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)
P2317-IGNITION COIL NO.6 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L).

When Monitored and Set Condition:

P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)

When Monitored: Engine running and battery voltage greater than 10 volts.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault. Three good trips to turn off the MIL.

P2305-IGNITION COIL NO.2 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)

When Monitored: Engine running and battery voltage greater than 10 volts.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault. Three good trips to turn off the MIL.

P2308-IGNITION COIL NO.3 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)

When Monitored: Engine running and battery voltage greater than 10 volts.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect, to short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

P2311-IGNITION COIL NO.4 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)

When Monitored: Engine running and battery voltage greater than 10 volts.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect, to short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L) — Continued

P2314-IGNITION COIL NO.5 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)

When Monitored: Engine running and battery voltage greater than 10 volts.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect, to short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

P2317-IGNITION COIL NO.6 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L)

When Monitored: Engine running and battery voltage greater than 10 volts.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect, to short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(A142) ASD RELAY OUTPUT CIRCUIT OPEN
CAPACITOR(S) SHORTED TO GROUND
(A142) ASD RELAY OUTPUT CIRCUIT SHORTED TO GROUND
COIL ON PLUG RESISTANCE
IGNITION COIL
COIL CONTROL CIRCUIT OPEN
COIL CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 3.7L POWER TECH V6
2	Turn the ignition off. Disconnect the coil on plug harness connector. Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Using a 12-volt test light connected to ground, probe the (A142) ASD Relay Output circuit at the Coil on plug harness connector. Does the test light illuminate brightly when the Relay is actuating? Yes → Go To 3 No → Go To 8 **CAUTION: Stop All Actuations**	ENGINE - 3.7L POWER TECH V6

P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Measure the primary resistance of the Coil on plug. Is the resistance between 0.6 and 0.9 of an ohm? Yes → Go To 4 No → Replace the coil on plug. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 3.7L POWER TECH V6
4	Using a 12-volt test light connected to a 12-volt source, probe the Ignition Coil Driver circuit. Crank the engine for 5 seconds while observing the test light. What is the condition of the test light while cranking the engine? Brightly blinking. Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5. ON constantly. Go To 5 OFF constantly. Go To 6	ENGINE - 3.7L POWER TECH V6
5	Turn the ignition off. Disconnect the C2 PCM harness connector. Measure the resistance between the Coil Control circuit and ground in the Coil on plug harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the Coil Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	ENGINE - 3.7L POWER TECH V6
6	Turn the ignition off. Disconnect the C2 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the Coil Control circuit from the Coil on plug connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the Coil Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 3.7L POWER TECH V6
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, review repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 3.7L POWER TECH V6

P2302-IGNITION COIL NO.1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (3.7L) — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Remove the ASD Relay from the PDC. Measure the resistance of the (A142) ASD Relay Output circuit between the Relay Output terminal of the PDC and the Coil on Plug harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 3.7L POWER TECH V6
9	**NOTE: Repeat the following test for both capacitors** **NOTE: The Capacitors are attached to the side of each valve cover.** Turn the ignition off. Disconnect the Capacitor harness connector. Install a good INJ/COIL fuse. With the DRBIII®, actuate the ASD Relay. **NOTE: If the above test result is an open fuse for both capacitor tests, the problem is a short to ground in the (A142) ASD Relay Output circuit. Repair the short to ground in the (A142) ASD Relay Output circuit and refer to VER-5** Is the INJ/COIL fuse OK for both capacitor tests? Yes → Replace the Capacitor(s) Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair the short to ground in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 3.7L POWER TECH V6

Symptom:
P2503-CHARGING SYSTEM OUTPUT LOW

When Monitored and Set Condition:

P2503-CHARGING SYSTEM OUTPUT LOW

When Monitored: The engine running. The engine speed greater than 1157 RPM.

Set Condition: The battery sensed voltage is 1 volt below the charging goal for 13.47 seconds. The PCM senses the battery voltage turns off the field driver and senses the battery voltage again. If the voltages are the same, the code is set.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
BATTERY POSITIVE CIRCUIT HIGH RESISTANCE
CASE GROUND HIGH RESISTANCE
GENERATOR OPERATION
(Z932) GEN GROUND CIRCUIT OPEN
(K125) GEN FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K125) GEN FIELD CONTROL CIRCUIT OPEN
(K125) GEN FIELD CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.** Ignition on, engine not running. **NOTE: The battery must be fully charged.** **NOTE: The Generator belt tension and condition must be checked before continuing.** With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, erase DTCs. Start the engine. Allow the idle to stabilize. Ignition on, engine not running. With the DRBIII®, read DTCs. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

P2503-CHARGING SYSTEM OUTPUT LOW — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: Ensure all wires are clear of the engine's moving parts.** Start the engine. Warm the engine to operating temperature. Measure the voltage between the Generator B+ Output Terminal and the Battery+ Post. Is the voltage above 0.4 of a volt? Yes → Repair the high resistance in the Battery Positive circuit between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: Make sure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator Case and Battery ground post. Is the voltage above 0.1 of a volt? Yes → Repair high resistance in the Generator Case Ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All
4	Turn the ignition off. Disconnect the Generator Field harness connector. Using a 12-volt test light, jump it across the Generator Field harness connector. Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Driver circuit. Does the test light illuminate brightly and flash on and off? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 5	All
5	Turn the ignition off. Using a 12-volt test connected to battery voltage, probe the (Z932) Generator Ground circuit in the Generator Field harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the open in the (Z932) Generator Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
6	Disconnect the C2 PCM harness connector. Ignition on, engine not running. Measure the voltage on the (K125) Gen Field Control circuit at the Generator Field harness connector. Is the voltage above 1.0 volt? Yes → Repair the short to voltage in the (K125) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All

P2503-CHARGING SYSTEM OUTPUT LOW — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the (K125) Gen Field Control circuit from the Generator Field harness connector to the appropriate terminal of the special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (K125) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
8	Measure the resistance between ground and the (K125) Gen Field Control circuit in the Generator Field harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K125) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 9	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
U0101-NO BUS MESSAGE FROM TRANS CONTROL MODULE

When Monitored and Set Condition:

U0101-NO BUS MESSAGE FROM TRANS CONTROL MODULE

When Monitored: Equipped with automatic transmission. The ignition on. Battery voltage greater than 10 volts.

Set Condition: An open circuit on the (F11) Fused Igniton Switch Output circuit. No bus messages from the TCM for 20 seconds, two trips required.

POSSIBLE CAUSES
DTC RESET
PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT
PCI BUS UNABLE TO COMMUNICATE WITH DRBIII®
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, erase DTCs. Cycle the ignition key on and off several times. Leaving the ignition on for at least 20 seconds. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the PCM harness connectors. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** With a 12-volt test light connected to ground and with special tool #8815 installed, probe the (F11) Fused Ignition Switch Output circuit. Perform the above check with the Ignition key in the off lock position, Ignition on, engine not running position, and during cranking. Wiggle the related wire harness while probing the special tool with the test light to try to interrupt the circuit. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open or excessive resistance in the (F11) Fused Ignition Switch (Offf, Run, Start) circuit. Inspect the related fuse, if the fuse is open check the circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

U0101-NO BUS MESSAGE FROM TRANS CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: Determine which modules this vehicle is equipped with before beginning.** **NOTE: When attempting to communicate with any of the modules on this vehicle, the DRBIII® will display 1 of 2 different communication errors: a NO RESPONSE message or a BUS +/- SIGNALS OPEN MESSAGE.** Ignition on, engine not running. Use the DRBIII®, attempt to communicate with the remaining control modules. Was the DRBIII® able to communicate with one or more of the Modules? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Refer to the COMMUNICATION category and perform the PCI BUS COMMUNICATION FAILURE Symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
U0155-NO CLUSTER BUS MESSAGE

When Monitored and Set Condition:

U0155-NO CLUSTER BUS MESSAGE

When Monitored: Ignition key on and engine running.

Set Condition: No messages received from the MIC (Instrument Cluster) for 20 seconds.

POSSIBLE CAUSES
DTC RESET
COMMUNICATE WITH CLUSTER
INSTRUMENT CLUSTER OPERATION
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, erase DTCs. Start the engine and shut if off several times allowing it to idle each time for 20 seconds. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Ignition on, engine not running. With the DRBIII®, attempt to communicate with the Instrument cluster. Can communication be established with the Instrument Cluster? Yes → Go To 3 No → Refer to the Communication Category and perform the appropriate symptom related to no communication with cluster. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Start the engine Allow the engine to idle. Is the correct engine speed display in the instrument cluster (Tach)? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Refer to the Instrument Category and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
U0168-NO SKIM BUS MESSAGE

When Monitored and Set Condition:

U0168-NO SKIM BUS MESSAGE

When Monitored: Ignition on or engine running.

Set Condition: No J1850 messages received from the Smart Key Immobilizer Module (SKIM) for 20 seconds. One Trip Fault. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
NO RESPONSE FROM SKIM
PCI BUS CIRCUIT OPEN FROM PCM TO SKIM
SKIM/PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform SKIS VERIFICATION.	All
2	With the DRBIII®, attempt to communicate with the SKIM. **NOTE: This test will indicate if the bus is operational from the DLC to the SKIM.** Was the DRBIII® able to communicate with the SKIM? Yes → Go To 3 No → Refer to Symptom BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category. Perform SKIS VERIFICATION.	All

U0168-NO SKIM BUS MESSAGE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the SKIM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance of the PCI Bus circuit from the SKIM harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the PCI Bus circuit between the PCM and the SKIM. Perform SKIS VERIFICATION.	All
4	Connect the PCM harness connectors. Replace the Sentry Key Immobilizer Module in accordance with the Service Information. Ignition on, engine not running. Display and erase all PCM and SKIM DTCs. Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle. With the DRB, display PCM DTCs. Does the DRB display the same DTC? Yes → Replace and program the Powertrain Control Moldule per service Information. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom:
*A/C OPERATES IN ALL MODE SWITCH POSITIONS

POSSIBLE CAUSES
CHECK FOR PCM DTCS
POWERTRAIN CONTROL MODULE
A/C CLUTCH
A/C CLUTCH RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE
A/C CLUTCH RELAY
CHECK A/C ON/OFF CONTROL CIRCUIT FOR A SHORT TO GROUND
A/C - HEATER CONTROL MODULE
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, check for PCM DTCs. Are any DTCs present? Yes → Return to the symptom list and choose the symptom(s). Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Position the Mode switch on the A/C - Heater Control Module to the Panel position. Turn the ignition on. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while pressing the A/C mode switch on and off. Does the A/C Select Switch state change accordingly. Yes → Go To 3 No → Go To 6	All
3	Position the Mode switch on the A/C - Heater Control Module to the Panel position. Turn the ignition on. With the DRBIII® in Powertrain, select Engine and select Inputs/Outputs. Monitor the A/C Select Switch state while pressing the A/C mode switch on and off. Does the A/C Select Switch state change accordingly. Yes → Go To 4 No → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Turn the ignition off. Disconnect the A/C Clutch harness connector. Start the engine and observe the A/C Clutch and Compressor. Does the A/C Compressor run with the harness connector disconnected? Yes → Replace the A/C Clutch per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All

*A/C OPERATES IN ALL MODE SWITCH POSITIONS — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the A/C Clutch harness connector. Measure the voltage of the A/C Clutch Relay Output circuit. Is the voltage above 1.0 volt? Yes → Repair the A/C Clutch Relay Output circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Disconnect the BCM C1 harness connector. Disconnect the A/C - Heater Control C1 harness connector. Measure the resistance of the A/C On/Off Control circuit between the A/C - Heater Control C1 harness connector and ground. Is the resistance below 10K ohms? Yes → Repair the A/C On/Off Control Circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 7	All
7	Turn the ignition off. Make sure that the BCM C1 harness connector is connected to the BCM. Disconnect the A/C - Heater Control C1 harness connector. Turn the ignition on. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while connecting a jumper wire between ground and the A/C On/Off Control circuit in the A/C - Heater Control C1 harness connector. Does the A/C Select Switch state change from "Off" to "On" when the jumper wire is connected. Yes → Replace the A/C - Heater Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*CHECKING A/C SYSTEM OPERATION WITH NO DTCS

POSSIBLE CAUSES
CHECK FOR PCM DTCS
REFRIGERATION SYSTEM NOT PROPERLY CHARGED
HIGH PRESS CUT-OFF SWITCH
LOW PRESSURE SWITCH
POWERTRAIN CONTROL MODULE
A/C CLUTCH COIL
A/C COMPRESSOR CLUTCH GROUND CIRCUIT OPEN
(C3) A/C CLUTCH RELAY OUTPUT CIRCUIT OPEN
A/C REQUEST CIRCUIT OPEN
(A17) FUSED B+ CIRCUIT OPEN
A/C CLUTCH RELAY
A/C - HEATER CONTROL MODULE
BODY CONTROL MODULE
A/C ON/OFF CONTROL CIRCUIT OPEN
A/C ON/OFF CONTROL CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, check for PCM DTCs. Are any DTCs present? Yes → Return to the symptom list and choose the symptom(s). Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Verify that the Refrigerant System is properly charged per Service Procedure. Is the Refrigerant System properly charged? Yes → Go To 3 No → Properly charge the Refrigerant System per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Verify the High Pressure Cut-Off Switch operation per Service Information. Is the High Pressure Cut-Off Switch OK? Yes → Go To 4 No → Replace the High Pressure Cut-Off Switch. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTCS — Continued

TEST	ACTION	APPLICABILITY
4	Verify the Low Pressure Switch operation per Service Information. Is the Low Pressure Switch OK? Yes → Go To 5 No → Replace the Low Pressure Switch. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Ignition on, engine not running. Position the Mode switch on the A/C - Heater Control Module to the Panel position. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while pressing the A/C mode switch on and off. Does the A/C Select Switch state change accordingly. Yes → Go To 6 No → Go To 13	All
6	Position the Mode switch on the A/C - Heater Control Module to the Panel position. With the DRBIII® in Powertrain, select Engine and select Inputs/Outputs. Monitor the A/C Select Switch state while pressing the A/C mode switch on and off. Does the A/C Select Switch state change accordingly. Yes → Go To 7 No → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Connect a test light between the ground circuit and the A/C Clutch Relay Output circuit. With the DRBIII®, actuate the A/C Clutch Relay. Does the test light illuminate brightly on and off with the relay actuation? Yes → Replace the A/C Clutch Coil. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
8	Turn the ignition off. Disconnect the A/C Clutch harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the A/C Compressor Clutch ground circuit in the A/C Clutch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the A/C Compressor Clutch ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
9	Turn the ignition off. Remove the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the (C3) A/C Clutch Relay Output circuit between the Relay and the A/C Clutch Coil. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open in the (C3) A/C Clutch Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTCS — Continued

TEST	ACTION	APPLICABILITY
10	Engine Running. Turn the A/C system on and the fan on high. With the DRBIII® in Inputs/Outputs, read the A/C request state. Does the A/C request state change? Yes → Go To 11 No → Repair the open in the A/C Request circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
11	Turn the ignition off. Remove the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the (A17) Fused B+ circuit at the A/C Clutch Relay connector. Is the voltage above 11.0 volts? Yes → Go To 12 No → Repair the open in the (A17) Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
12	If there are no possible causes remaining, view repair. Repair Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
13	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Ignition on, engine not running. Measure the voltage between the A/C On/Off Control circuit and ground. Is the voltage greater than 11.0 volts? Yes → Go To 14 No → Go To 15	All
14	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Ignition on, engine not running. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while connecting a jumper wire between ground and the A/C On/Off Control circuit in the A/C - Heater Control C1 harness connector. Does the A/C Select Switch state change from ″Off″ to ″On″ when the jumper wire is connected. Yes → Replace the A/C - Heater Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module per Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTCS — Continued

TEST	ACTION	APPLICABILITY
15	Turn the ignition off. Disconnect the BCM C1 harness connector. Disconnect the A/C - Heater Control C1 harness connector. Measure the resistance of the A/C On/Off Control circuit between the BCM C1 harness connector and the A/C - Heater Control C1 harness connector. Is the resistance below 5.0 ohms? Yes → Replace and program the Body Control Module per Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the A/C On/Off Control Circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*CHECKING PCM POWERS AND GROUNDS

POSSIBLE CAUSES
(A209) PCM FUSED B+ CIRCUIT
(F1), (F26) PCM FUSED IGNITION SWITCH OUTPUT CIRCUITS
(Z130), (Z131) PCM GROUND CIRCUITS

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the C1 PCM harness connector. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Using a 12-volt test light connected to ground, probe the (A209) PCM Fused B+ circuit in the appropriate terminals of special tool #8815. Does the test light illuminate brightly? Yes → Go To 2 No → Repair the open in the (A209) Fused B+ circuit. Inspect the related fuses and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	**CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (F1), and (F26) PCM Fused Ignition Switch Output (Off, Run, Start) circuits in the appropriate terminals of special tool #8815. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open in the (F1), and (F26) Fused Ignition Switch Output (Off, Run, Start) circuit(s). Inspect the related fuses and and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Using a 12-volt test light connected to battery voltage, probe the (Z130) and (Z131) PCM Ground circuits in the appropriate terminals of special tool #8815. Does the test light illuminate brightly? Yes → Test Complete. No → Repair the open in the (Z130) and (Z131) PCM Ground circuit(s). Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom List:

ANTENNA FAILURE
COP FAILURE
EEPROM FAILURE
INTERNAL FAULT
RAM FAILURE
SERIAL LINK INTERNAL FAULT
STACK OVERFLOW FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be ANTENNA FAILURE.

When Monitored and Set Condition:

ANTENNA FAILURE

When Monitored: Every 250 milliseconds with the ignition on.

Set Condition: The SKIM's microcontroller determines that an antenna circuit fault has occurred for 2.0 consecutive seconds.

COP FAILURE

When Monitored: With the ignition on.

Set Condition: The COP timer is not reset by the micro controller every 65.5 milliseconds.

EEPROM FAILURE

When Monitored: With the ignition on.

Set Condition: When the value written to EEPROM memory does not equal the value read back after the write operation.

INTERNAL FAULT

When Monitored: With the ignition on.

Set Condition: The SKIM has detected a fault during an internal self test.

RAM FAILURE

When Monitored: With the ignition on.

Set Condition: The RAM fails a test that checks the RAM's ability to retain memory.

SERIAL LINK INTERNAL FAULT

When Monitored: With the ignition on.

Set Condition: The SKIM fails an internal J1850 communication self test.

STACK OVERFLOW FAILURE

When Monitored: With the ignition on.

Set Condition: The micro controller has exceeded its stack space limit.

ANTENNA FAILURE — Continued

POSSIBLE CAUSES
SKIM INTERNAL DTC FAILURE

TEST	ACTION	APPLICABILITY
1	**Note: This trouble code indicates an internal SKIM fault.** With the DRBIII®, read and record the SKIM DTCs and then erase the SKIM DTCs Perform 5 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle. With the DRBIII® , read the SKIM DTCs. Did the same SKIM DTC return? Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:
PCM STATUS FAILURE
SERIAL LINK EXTERNAL FAULT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be PCM STATUS FAILURE.

When Monitored and Set Condition:

PCM STATUS FAILURE

When Monitored: With the ignition on.

Set Condition: This DTC exists when a PCM STATUS message was not received from the PCM for at least 20.0 consecutive seconds.

SERIAL LINK EXTERNAL FAULT

When Monitored: At ignition on, after ignition on during any rolling code handshake that occurs with the PCM due to a SKIM reset, or during SECRET KEY transfers to the PCM.

Set Condition: When the SKIM does not receive an expected PCI BUS message transmission acknowledgement from the PCM after 3 transmit attempts.

POSSIBLE CAUSES
INTERMITTENT WIRING HARNESS PROBLEM
WIRING HARNESS INSPECTION
SKIM/ECM

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the ECM has proper power and ground connections before continuing.** With the DRBIII®, read and record the SKIM DTCs then erase the SKIM DTCs. Turn the ignition off. Wait 2 minutes. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display the DTC that was previously erased? Yes → Go To 2 No → Go To 4	All

PCM STATUS FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and CCD/PCI Bus (whichever applicable) circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Perform SKIS VERIFICATION. No → Go To 3	All
3	**NOTE: Before proceeding it will be necessary to obtain the SKIM PIN.** Turn the ignition on. With the DRBIII®, display and erase all ECM and SKIM DTCs. Perform 5 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle. With the DRBIII®, read the SKIM DTCs. Does the code appear? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All
4	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

ROLLING CODE FAILURE
VIN MISMATCH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be ROLLING CODE FAILURE.

When Monitored and Set Condition:

ROLLING CODE FAILURE

When Monitored: At ignition on, after ignition on during any rolling code handshake that occurs with the PCM due to a SKIM or PCM reset.

Set Condition: When a PCM STATUS message with a Valid Key status is not received by the SKIM within 3.5 seconds of transmitting the last Valid Key Code message to the PCM.

VIN MISMATCH

When Monitored: With the ignition on.

Set Condition: When the VIN received from the PCM does not match the VIN stored in the SKIM's EEPROM.

POSSIBLE CAUSES
VERIFYING ECM VIN
REPLACE SKIM AND CHECK DTC'S
INTERMITTENT WIRING HARNESS PROBLEM
ECM

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase the SKIM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on and wait 2 minutes. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display the DTC that was previously erased? Yes → Go To 2 No → Go To 4	All

ROLLING CODE FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, select Engine system from the main menu. Display and record the Vehicle Identification Number. **NOTE: Ensure that a VIN has been programmed into the ECM. If a VIN is not displayed, attempt to program the ECM with the correct vehicle VIN before continuing.** Does the VIN recorded from the ECM match the VIN of the vehicle? Yes → Go To 3 No → Replace and program the Engine Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Turn the ignition on. With the DRBIII®, display and clear all ECM and SKIM DTCs. Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle. With the DRBIII®, check for SKIM DTCs. Does the DRBIII® display the same DTC? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → The repair is complete. Perform SKIS VERIFICATION.	All
4	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

TRANSPONDER COMMUNICATION FAILURE
TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE
TRANSPONDER ID MISMATCH
TRANSPONDER RESPONSE MISMATCH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be TRANSPONDER COMMUNICATION FAILURE.

When Monitored and Set Condition:

TRANSPONDER COMMUNICATION FAILURE

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When the SKIM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When 5 consecutive transponder signal transmissions are sent to the SKIM with the correct message format but with invalid data.

TRANSPONDER ID MISMATCH

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When the transponder ID read by the SKIM does not match any of the transponder ID's stored in the SKIM's memory.

TRANSPONDER RESPONSE MISMATCH

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When the transponder's crypto algorithm result fails to match the SKIM's result.

POSSIBLE CAUSES
CHECKING MULTIPLE KEY OPERATION
SKIM
INTERMITTENT WIRING HARNESS PROBLEM
REPLACE IGNITION KEY

TRANSPONDER COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read and record the SKIM DTCs. With the DRBIII®, erase the SKIM DTCs. **NOTE: Perform the following test several times to ensure the DTC is current.** Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display the DTC that was previously erased? Yes → Go To 2 No → Go To 7	All
2	Are there multiple vehicle ignition keys available? Yes → Go To 3 No → Go To 4	All
3	**NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys one at a time.** With the DRBIII®, erase the SKIM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Is the DTC present for all ignition keys? Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Replace the ignition key(s) that cause the SKIM DTC. Perform SKIS VERIFICATION.	All
4	With the DRBIII®, attempt to reprogram the ignition keys to the SKIM. With the DRBIII®, erase the SKIM DTCs. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DTC set again? Yes → Go To 5 No → Test Complete.	All
5	Replace the ignition key with a new key. With the DRBIII®, program the new ignition key to the SKIM. With the DRBIII®, erase the SKIM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DTC set again? Yes → Go To 6 No → Test Complete.	All

TRANSPONDER COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	If there are no possible causes remaining, view repair. Repair Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom:
*CHECKING FUEL DELIVERY

POSSIBLE CAUSES
FUEL PUMP RELAY
FUEL PRESSURE OUT OF SPECIFICATION
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP
(A14) FUSED B+ CIRCUIT
(A141) FUEL PUMP RELAY OUTPUT CIRCUIT OPEN
(Z211) FUEL PUMP GROUND CIRCUIT EXCESSIVE RESISTANCE
FUEL PUMP MODULE

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test. **Note: It may be necessary to use a mechanics stethoscope in the next step.** Listen for fuel pump operation at the fuel tank. Does the Fuel Pump operate? Yes → Go To 2 No → Go To 5 **Caution: Stop All Actuations.**	All
2	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail test port. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 3 Within Specification Test Complete. Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1. **Caution: Stop All Actuations.**	All

*CHECKING FUEL DELIVERY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 4 **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
5	Turn the ignition off. Disconnect the fuel pump module harness connector. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test. Using a 12-volt test light connected to ground, probe the (A141) Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Go To 8 **Caution: Stop All Actuations.**	All
6	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Using a test light connected to 12-volts, probe the (Z211) Fuel Pump ground circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the excessive resistance in the (Z211) Fuel Pump Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*CHECKING FUEL DELIVERY — Continued

TEST	ACTION	APPLICABILITY
7	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
8	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Using a 12-volt test light connected to ground, backprobe the (A14) Fuel Pump Relay Fused B+ circuit at the PDC. Does the test light illuminate? Yes → Go To 9 No → Repair the open or short to ground in the (A14) Fuel Pump Realy Fused B+ circuit. Inspect the fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
9	Disconnect the Fuel Pump Module harness connector. Measure the resistance of the (A141) Fuel Pump Relay Output circuit from the relay connector to the Fuel Pump Module connector. Is the resistance below 5.0 ohms? Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the open in the (A141) Fuel Pump Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*CHECKING HARD START (FUEL DELIVERY SYSTEM)

POSSIBLE CAUSES
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
FAULTY FUEL PUMP MODULE
FUEL INJECTOR(S)
FUEL CONTAMINATION

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge at the engine. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 2 Within Specification Go To 4	All
2	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel supply line at the fuel pump module. Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Is the fuel pressure within specification? Yes → Visually and physically inspect the fuel supply lines between the fuel tank and the fuel rail. Repair/replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All

*CHECKING HARD START (FUEL DELIVERY SYSTEM) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	**NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install special tool #6539 (5/16″) fuel line adapter. Install the fuel pressure gauge. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi)** Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure drop? Yes → Replace Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	**WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Remove special tool #C4390. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Move special tool #C4390, Hose Clamp Pliers, from between the fuel pressure gauge and the engine to between the fuel pressure gauge and fuel pump module. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure drop? Yes → Replace the leaking fuel injectors. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Check the fuel for contaminants. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*ENGINE CRANKS BUT DOES NOT START

POSSIBLE CAUSES
NO START PRE-TEST
POWERTRAIN FUSES OPEN
SECONDARY INDICATORS PRESENT
NO CKP SENSOR SIGNAL WHEN CRANKING ENGINE
NO CMP SENSOR SIGNAL WHEN CRANKING ENGINE
ENGINE MECHANICAL PROBLEM
(A142) ASD RELAY OUTPUT CIRCUIT OPEN
FUEL CONTAMINATION

TEST	ACTION	APPLICABILITY
1	**Note: The following list of items must be checked before continuing with any no start tests.** The battery must be fully charged and in good condition. A low charged battery may produce invalid test results. If the battery is low, charge the battery and then attempt to start the vehicle by cranking the engine for 15 seconds, 3 consecutive times. This will allow any DTCs to set that may have been erased due to a dead battery. Try to communicate with PCM if not able to communicate check fuses. Ensure the Powers and Ground to the PCM are ok. Make sure the PCM communicates with the DRBIII® and that there are no DTCs stored in the PCM memory. If the PCM reports a No Response condition, refer to the Communication category for the proper tests. Read the PCM DTCs with the DRBIII®. If any DTCs are present, they must be repaired before continuing with any other No Start diagnostic tests. Refer to the Symptom list for the related P-code that is reported by the PCM. Ensure that the PCI bus is functional. Attempt to communicate with the Instrument Cluster and VTSS, If you are unable to establish communicate refer to the Communication category for the proper symptoms. The Sentry Key Immobilizer System must be operating properly. Check for proper communication with the DRBIII® and check for DTCs that may be stored in the Sentry Key Immobilizer Module (SKIM). Repair the DTC(s) before continuing. If no DTCs are found, using the DRBIII®, select Clear PCM (BATT Disconnect). Crank the engine several times. Using the DRBIII®, read DTCs. If a DTC is present perform the DTC diagnostics before continuing. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Check for any open fuses in the PDC or Junction Block that may be related to the No Start condition. Are any of the fuses open? Yes → Replace the open fuse and check the related circuit(s) for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

*ENGINE CRANKS BUT DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
3	Ignition on, engine not running. With the DRBIII®, under DTCs & Related Functions, read the Secondary Indicators while cranking the engine. Are there any Secondary Indicators present while cranking the engine? Yes → Refer to symptom list and perform tests related to the secondary indicator that is reported by the DRBIII®. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	With the DRBIII® in Sensors, check the Current CKP Count while cranking the engine. Does the CKP Counter change while cranking the engine? Yes → Go To 5 No → Refer to Driveability Symptom P0320-NO CRANK REFERENCE SIGNAL AT PCM. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	With the DRBIII® in Sensors, check the Current CMP Count while cranking the engine. Does the Current CMP Count change while cranking the engine? Yes → Go To 6 No → Refer to Driveability Symptom P0340-NO CAM SIGNAL AT PCM Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Check for any of the following conditions/mechanical problems. ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Remove the ASD relay from the PDC. Disconnect the PCM harness connectors. Verify the ASD Relay is getting Fused B+ voltage before continuing. Measure the resistance of the (A142) ASD Relay output circuit from the ASD Relay connector to the PCM harness connector, Ignition coil, and the fuel injectors. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open ASD Relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

*ENGINE CRANKS BUT DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
8	Verify that the Fuel tank is not empty before continuing. Follow the diagnostics for Checking Fuel Delivery under the Driveability section of this manual. Was the No Start condition solved after following the above diagnostic procedure? Yes → Test Complete. No → Check for contamination/water in the fuel. Ensure the fuel being used in this vehicle meets manufactures Fuel Requirement, refer to the service manual. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
*FUEL PRESSURE LEAK DOWN

POSSIBLE CAUSES
FAULTY FUEL PUMP MODULE
FUEL INJECTOR(S)

TEST	ACTION	APPLICABILITY
1	**NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install special tool #6539 (5/16″) fuel line adapter. Install the fuel pressure gauge. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure drop? Yes → Replace Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	**WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Remove special tool #C4390. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).** Move special tool #C4390, Hose Clamp Pliers, from between the fuel pressure gauge and the engine to between the fuel pressure gauge and fuel pump module. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure drop? Yes → Replace the leaking fuel injectors. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:
*NO CRANK CONDITION

POSSIBLE CAUSES
MECHANICAL CONDITION
TRANSMISSION RANGE SENSOR
BATTERY CIRCUIT RESISTANCE TOO HIGH
CLUTCH INTERLOCK SWITCH
IGNITION SWITCH OUTPUT CIRCUIT
TRS T41 SENSE (P/N SENSE) CIRCUIT OPEN
(T40) STARTER RELAY OUTPUT CIRCUIT OPEN
FUSED B+ CIRCUIT OPEN
STARTER
STARTER RELAY

TEST	ACTION	APPLICABILITY
1	**NOTE: Check all fuses and verify the battery is fully charged and capable of passing a load test before continuing.** **WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING.** Turn the engine over by hand to ensure the engine is not seized. Is the engine able to turn over? Yes → Go To 2 No → Repair the mechanical condition preventing the starter motor from cranking. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the PCM harness connectors. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through each gear, measure the resistance between ground and the TRS T41 Sense (P/N Sense) circuit. Did the resistance change from above 10.0 ohms to below 10.0 ohms? Yes → Go To 3 No → Replace the Transmission Range Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Check the Battery Cables for high resistance using the service information procedure. Did either Battery Cable have a voltage drop greater than 0.2 of a volt? Yes → Repair the Battery circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 4	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
4	**WARNING: Place shifter in Neutral and set the Parking Brake.** Disconnect the Clutch Interlock Switch. If this vehicle is not equipped with a manual transmission answer NO to this test and continue. Connect a jumper wire between the two terminals of the Clutch Interlock Switch and attempt to start the engine. Does the engine crank? Yes → Replace the Clutch Interlock Switch. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5 **NOTE: Remove the jumper wire and connect the Switch before continuing.**	All
5	Turn ignition off. Remove the Starter Relay from PDC. **WARNING: The Parking Brake must be on and the Transmission must be in park for a vehicle equipped with an automatic transmission or Neutral on a Manual transmission.** **WARNING: The engine may be cranked in the next step. Keep away from moving engine parts.** Briefly connect a jumper wire between Starter Relay B+ circuit and the (T40) Starter Relay Output circuits. Did the Starter Motor crank the engine? Yes → Go To 6 No → Go To 8 **NOTE: Remove the jumper wire before continuing.**	All
6	Ignition on, engine not running. For vehicles equipped with a Manual Transmission, use a 12-volt test light connected to ground, probe the (T141) Clutch Interlock Relay Output circuit at the Relay connection. While observing 12-volt test light, hold ignition key in the start position. For vehicles equipped with an Automatic Transmission, use a 12-volt test light connected to ground and probe the (F45) Fused Ignition Switch Output circuit at the Relay connection. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the open or short to ground in the (A41) Ignition Switch Output circuit. Inspect related fuses and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
7	Disconnect the PCM harness connectors. Measure the resistance of the TRS T41 Sense (P/N Sense) circuit from the Relay terminal to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Replace the Starter Motor Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the open in the TRS T41 Sense (P/N Sense) circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Remove the Starter Relay. Disconnect the Starter Relay Output connector from the Starter Solenoid. Measure the resistance of the (T40) Starter Relay Output circuit between the Relay and the Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (T40) Starter Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
9	Turn the ignition off. Using a 12-volt test light connected to ground, probe the (A2) Fused B+ circuit at the Starter Relay terminal. Does the test light illuminate brightly? Yes → Go To 10 No → Repair the open or high resistance in the Fused B+ circuit. Inspect related fuses and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	If there are no other possible causes remaining, review repair. Repair Replace the Starter. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*NO RESPONSE FROM PCM WITH A NO START CONDITION

POSSIBLE CAUSES
PCM FUSED B+ CIRCUITS
PCM, NO RESPONSE
PCM FUSED IGNITION SWITCH OUTPUT CIRCUITS
(Z81), (Z82) PCM GROUND CIRCUITS
THROTTLE POSISITON SENSOR
5 VOLT SENSOR OPEN OR SHORTED
(F855) 5-VOLT SUPPLY CKT SHORT TO GROUND
(F856) 5-VOLT CIRCUIT SUPPLY SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: The DRBIII® and cable must be operating properly for the results of this test to be valid.** **NOTE: Ensure the ignition switch was on while trying to communicate with the PCM.** Turn the ignition off. Disconnect the PCM harness connectors. Using a 12-volt test light connected to ground, probe the PCM Fused B+ circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 2 No → Repair the open or short to ground in the Fused B+ circuit. Inspect and replace fuses as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the PCM Fused Ignition Switch Output circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Ignition Switch Output circuits. Inspect and replace fuses as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Using a 12-volt test light connected to battery voltage, probe the (Z81), (Z82) PCM ground circuits in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the (Z81), (Z82) PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO RESPONSE FROM PCM WITH A NO START CONDITION — Continued

TEST	ACTION	APPLICABILITY
4	Connect the PCM harness connectors. Disconnect the TP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (F855) 5-volt Supply circuit. Is the voltage between 4.5 and 5.2 volts? Yes → Go To 5 No → Go To 6	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. **NOTE: Connect the TP Sensor harness connector.** Ignition on, engine not running. Measure the voltage on the MAP Sensor 5 Volt Supply circuit. Is the voltage between 4.5 and 5.2 volts? Yes → If communication is available with a PCM on a like vehicle, replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	Turn the ignition off. Disconnect the TP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (F855) 5-volt Supply circuit. Disconnect all the sensors that use (F855) 5-volt Supply circuit. Did the voltage return to 4.5 to 5.2 volts when disconnecting any of the sensors. Yes → Replace the sensor that is pulling down the 5-volt supply. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 7	All
7	Turn the ignition off. Disconnect PCM harness connectors. Measure the resistance between ground and the (F855) 5-volt Supply circuit with all the Sensor harness connectors disconnected. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 8	All
8	Disconnect all sensors that use the (F856) 5-volt Supply. Measure the resistance between ground and the (F856) 5-volt Supply circuit in the PCM harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (F856) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 9	All

*NO RESPONSE FROM PCM WITH A NO START CONDITION — Continued

TEST	ACTION	APPLICABILITY
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there is no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*START AND STALL CONDITION

POSSIBLE CAUSES
CHECKING DTCS
CHECKING SKIM DTCS
TP SENSOR SWEEP
TP SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
ECT SENSOR OPERATION
OTHER POSSIBLE CAUSES FOR START & STALL
FUEL CONTAMINATION

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read engine DTCs. Are any DTCs present? Yes → Refer to the Driveability Category and perform the appropriate diagnostics. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All
2	**NOTE: If you are unable to communicate with the SKIM, refer to the Communication Category and perform the appropriate symptom.** With the DRBIII®, read the SKIM codes. Are there any SKIM DTCs? Yes → Refer to the Vehicle Theft category and perform the appropriate diagnostics. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 3	All
3	With the DRBIII®, read TP Sensor voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 4 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
4	With the DRBIII®, read TP Sensor voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 5 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
5	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soaked).** **NOTE: If the vehicle was allowed to sit over night with no engine start, coolant temperature should be near ambient temperatures.** With the DRBIII®, read the ECT value. **Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.** Start the engine. During engine warm-up, monitor the ECT Sensor value. The temperature value change should be a smooth transition from start up to normal operating temp 82° C (180° F). The value should reach at least 82° C (180° F). Did the Engine Temperature value increase smoothly and did it reach at least 82° C (180° F)? Yes → Go To 6 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	The following additional items should be checked as a possible cause for a start and stall condition. Refer to any Technical Service Bulletins (TSB's) that may apply to the symptom. The exhaust system must be free of any restrictions. The engine compression must be within specifications. The engine valve timing must be within specifications. The engine must be free from vacuum leaks. The throttle body must be free of carbon buildup and dirt. Do any of the above conditions exist? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 7	All
7	Verify that the Fuel tank is not empty before continuing. Follow the diagnostics for Checking Fuel Delivery under the Driveability section of this manual. Was the No Start condition solved after following the above diagnostic test? Yes → Test Complete. No → Check for contamination/water in the fuel. Ensure the fuel being used in this vehicle meets manufactures Fuel Requirement, refer to the service manual. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*STARTS IN ALL GEARS WITH CLUTCH PEDAL RELEASED

POSSIBLE CAUSES
CLUTCH SWITCH OVERRIDE RELAY
CLUTCH OVERRIDE RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Jeep uses a clutch override system that allows the engine to crank in any gear when the transfer case is in the 4wd low position.** Is the transfercase in the 4wd low position? Yes → Test Complete. No → Go To 2	All
2	Raise the vehicle so that the drive wheels are off the ground. Install a substitute relay in place of the Clutch Switch Override Relay. Turn the ignition on. With the vehicle in a gear other than first, the Transfer Case in 2WD and the Clutch Pedal released, Crank the Engine. Does the engine crank? Yes → Go To 3 No → Replace the Clutch Switch Override Relay per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Turn the ignition off to the lock position. Disconnect the PCM harness connectors. Measure the resistance of the (K90) Relay Control circuit from the Relay connection and the PCM. Is the resistance above 5.0 ohms? Yes → Repair the short to ground in the (K90) Clutch Override Relay Control. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0836-4WD MUX SWITCH STUCK

When Monitored and Set Condition:

P0836-4WD MUX SWITCH STUCK

When Monitored: When Transfer Case in 4WD Low.

Set Condition: Four wheel drive (4WD) muxed switch input detected below minimum or above maximum acceptable voltage.

POSSIBLE CAUSES
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT OPEN
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO GROUND
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO VOLTAGE
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO SENSOR RETURN CIRCUIT
TRANSFER CASE POSITION SENSOR
POWERTRAIN/ENGINE CONTROL MODULE
INTERMITTENT OPERATION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase DTC's. Start the engine and cycle the Transfer Case through all positions. With the DRBIII®, read Transfer Case DTCs. Is the Good Trip Counter equal to zero? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Transfer Case Position Sensor Input circuit. Is the resistance above 5.0 ohms? Yes → Repair the Transfer Case Position Sensor input circuit for an open. No → Go To 3	All

P0836-4WD MUX SWITCH STUCK — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the Powertrain Control Module harness connector. Measure the resistance between ground and the Transfer Case Position Sensor Input circuit. Is the resistance below 5.0 ohms? Yes → Repair the Transfer Case Position Sensor input circuit for a short to ground. No → Go To 4	All
4	Turn the ignition on. Measure the voltage of the Transfer Case Position Sensor Input circuit. Is there any voltage present? Yes → Repair the Transfer Case Position Sensor input circuit for a short to voltage. No → Go To 5	All
5	Turn the ignition off to the lock position. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance between the Transfer Case Position Sensor Input circuit and the Sensor Return circuit in the PCM harness connector. Is the resistance above 1000.0 ohms? Yes → Go To 6 No → Repair the Transfer Case Position Sensor Input circuit for a short to the Sensor Return circuit.	All
6	**CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance between the Transfer Case Position Sensor Input circuit and the Sensor Return circuit in the PCM harness connector. Is the resistance between 55 ohms and 1.3k ohms? Yes → Go To 7 No → Replace the Transfer Case Position Sensor.	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain/Engine Control Module per the Service Information. Perform the appropriate Powertrain verification test.	All

P0836-4WD MUX SWITCH STUCK — Continued

TEST	ACTION	APPLICABILITY
8	The conditions to set this DTC are not present at this time. **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins that may apply.** Were there any problems found? Yes → Repair as necessary. No → Test Complete.	All

Symptom:
P0837-4WD MUX SWITCH PERFORMANCE

When Monitored and Set Condition:

P0837-4WD MUX SWITCH PERFORMANCE

When Monitored: Continuously with the ignition on.

Set Condition: The 4WD muxed switch input detected in an invalid range or irrational switch state.

POSSIBLE CAUSES
RELATED DTCS PRESENT
TRANSFER CASE SHIFTER OUT OF ADJUSTMENT
TRANSFER CASE POSITION SENSOR OUT OF TOLERANCE
POWERTRAIN/ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read DTCs. Are any other Transfer Case DTCs present? Yes → Repair all other Transfer Case DTCs before proceeding. No → Go To 2	All
2	Verify proper Transfer Case Shifter adjustment per the Service Information. Is the Transfer Case Shifter adjusted correctly? Yes → Go To 3 No → Adjust the Transfer Case shifter linkage per the Service Information.	All
3	Turn the ignition off to the lock position. Disconnect the PCM harness connector(s). **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance across the Transfer Case Position Sensor signal circuit and Sensor Ground circuit at the PCM harness connector. Place the transfer case in each of the following positions: 2H - resistance should be between 1124 and 1243 ohms. 4H - resistance should be between 650 and 719 ohms. N - resistance should be between 389 and 431 ohms. 4L - resistance should be between 199 and 221 ohms. Were all resistance values in each transfer case position within the specified range? Yes → Go To 4 No → Replace the Transfer Case Position Sensor.	All

P0837-4WD MUX SWITCH PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
4	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain/Engine Control Module per the Service Information. Perform the appropriate Powertrain verification test.	All

Symptom:
P0838-4WD MODE SENSOR LOW

When Monitored and Set Condition:

P0838-4WD MODE SENSOR LOW

When Monitored: Continuously with the ignition key on.

Set Condition: When the 4WD Mode Sensor input circuit voltage falls below 0.3 volts for 5.72 seconds.

POSSIBLE CAUSES
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO GROUND
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO SENSOR RETURN CIRCUIT
TRANSFER CASE POSITION SENSOR
POWERTRAIN/ENGINE CONTROL MODULE
INTERMITTENT OPERATION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase DTC's. Start the engine and cycle the Transfer Case through all positions. With the DRBIII®, read Transfer Case DTCs. Is the Good Trip Counter equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Transfer Case Position Sensor Input circuit. Is the resistance below 5.0 ohms? Yes → Repair the Transfer Case Position Sensor input circuit for a short to ground. No → Go To 3	All

P0838-4WD MODE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
3	Measure the resistance between the Transfer Case Position Sensor Input circuit and the Sensor Return circuit in the PCM/ECM harness connector. Is the resistance above 1000.0 ohms? Yes → Go To 4 No → Repair the Transfer Case Position Sensor Input circuit for a short to the Sensor Return circuit.	All
4	Measure the resistance between the Transfer Case Position Sensor Input circuit and the Sensor Return circuit in the PCM/ECM harness connector. Is the resistance between 55 ohms and 1.3k ohms? Yes → Go To 5 No → Replace the Transfer Case Position Sensor.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain/Engine Control Module per the Service Information. Perform the appropriate Powertrain verification test.	All
6	The conditions to set this DTC are not present at this time. **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins that may apply.** Were there any problems found? Yes → Repair as necessary. No → Test Complete.	All

Symptom:
P0839-4WD MODE SENSOR HIGH

When Monitored and Set Condition:

P0839-4WD MODE SENSOR HIGH

When Monitored: Continuously with the ignition key on.

Set Condition: When the 4WD Mode Sensor input circuit voltage raises above 4.78 volts for 5.72 seconds.

POSSIBLE CAUSES
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT OPEN
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO VOLTAGE
TRANSFER CASE POSITION SENSOR
POWERTRAIN/ENGINE CONTROL MODULE
INTERMITTENT OPERATION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase DTC's. Start the engine and cycle the Transfer Case through all positions. With the DRBIII®, read Transfer Case DTCs. Is the Good Trip Counter equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off to the lock position. Disconnect the Powertrain/Engine Control Module harness connectors. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Transfer Case Position Sensor Input circuit. Is the resistance above 5.0 ohms? Yes → Repair the Transfer Case Position Sensor input circuit for an open. No → Go To 3	All

P0839-4WD MODE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. Turn the ignition on. Measure the voltage of the Transfer Case Position Sensor Input circuit. Is there any voltage present? Yes → Repair the Transfer Case Position Sensor input circuit for a short to voltage. No → Go To 4	All
4	Turn the ignition off to the lock position. Measure the resistance between the Transfer Case Position Sensor Input circuit and the Sensor Return circuit in the PCM/ECM harness connector. Is the resistance between 55 ohms and 1.3k ohms? Yes → Go To 5 No → Replace the Transfer Case Position Sensor.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain/Engine Control Module per the Service Information. Perform the appropriate Powertrain verification test.	All
6	The conditions to set this DTC are not present at this time. **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins that may apply.** Were there any problems found? Yes → Repair as necessary. No → Test Complete.	All

Symptom:
P0122-THROTTLE POSITION SENSOR/APPS LOW

When Monitored and Set Condition:

P0122-THROTTLE POSITION SENSOR/APPS LOW

When Monitored: Continuously with the ignition on and engine running.

Set Condition: This DTC will set if the monitored TPS voltage drops below .078 volts for the period of 0.48 seconds.

POSSIBLE CAUSES
RELATED TPS ENGINE DTC'S PRESENT
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read Engine DTC's. Check and repair all Engine DTC's prior to performing any transmission symptom diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Powertrain Control Module. Some problems are corrected by software upgrades to the Transmission and Engine software.** **NOTE: Check for applicable TSB's related to the problem.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	With the DRBIII®, check Engine DTC's, this includes all one trip failures. Are there any Engine TPS DTCs present? Yes → Refer to the Driveability category and perform the appropriate symptom. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All

P0122-THROTTLE POSITION SENSOR/APPS LOW — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, record the EATX EVENT DATA to help identify the conditions in which the DTC was set. With the DRBIII®, erase Transmission DTCs. **NOTE: To erase EATX EVENT DATA information, a BATTERY DISCONNECT must be performed. Performing a BATTERY DISCONNECT will reset all learned Transmission values to controller defaults which may lead to erratic shift schedules.** Drive the vehicle and try to duplicate the conditions in which the DTC was reported by the EATX EVENT DATA. With the DRBIII®, read Transmission DTCs. Did the DTC P0122 THROTTLE POSITION SENSOR LOW, reset? Yes → Go To 4 No → Go To 5	All
4	**NOTE: Due to the integration of the Powertrain and Transmission Control Modules, bus communication between the modules is internal.** Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits. Verify the flash level of the controller and update the controller if available. With the DRBIII®, check the EATX EVENT DATA to help identify the conditions in which the DTC was set. If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module per the Service Information. WITH THE DRBIII® PERFORM QUICK LEARN. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
5	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wires while checking for shorted and open circuits. Pay particular attention to the TPS signal and sensor ground circuits. With the DRBIII®, check the EATX EVENT DATA to help identify the conditions in which the DTC was set. Were there any problems found? Yes → Repair as necessary. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0123-THROTTLE POSITION SENSOR/APPS HIGH

When Monitored and Set Condition:

P0123-THROTTLE POSITION SENSOR/APPS HIGH

When Monitored: Continuously with the ignition on and engine running.

Set Condition: This DTC will set if the monitored TPS voltage rises above 4.94 volts for the period of 0.48 seconds.

POSSIBLE CAUSES
RELATED TPS ENGINE DTC'S PRESENT
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read Engine DTC's. Check and repair all Engine DTC's prior to performing any transmission symptom diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Powertrain Control Module. Some problems are corrected by software upgrades to the Transmission and Engine software.** **NOTE: Check for applicable TSB's related to the problem.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	With the DRBIII®, check Engine DTC's, this includes all one trip failures. Are there any Engine TPS DTCs present? Yes → Refer to the Driveability category and perform the appropriate symptom. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All

P0123-THROTTLE POSITION SENSOR/APPS HIGH — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, record the EATX EVENT DATA to help identify the conditions in which the DTC was set. With the DRBIII®, erase Transmission DTCs. **NOTE: To erase EATX EVENT DATA information, a BATTERY DISCONNECT must be performed. Performing a BATTERY DISCONNECT will reset all learned Transmission values to controller defaults which may lead to erratic shift schedules.** Drive the vehicle and try to duplicate the conditions in which the DTC was reported by the EATX EVENT DATA. With the DRBIII®, read Transmission DTCs. Did the DTC P0123 THROTTLE POSITION SENSOR HIGH, reset? Yes → Go To 4 No → Go To 5	All
4	**NOTE: Due to the integration of the Powertrain and Transmission Control Modules, communication between the modules is internal.** Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits. If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module per the Service Information. WITH THE DRBIII® PERFORM QUICK LEARN. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
5	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wires while checking for shorted and open circuits. Pay particular attention to the TPS signal and sensor ground circuits. With the DRBIII®, check the EATX EVENT DATA to help identify the conditions in which the DTC was set. Were there any problems found? Yes → Repair as necessary. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0124-THROTTLE POSITION SENSOR/APPS INTERMITTENT

When Monitored and Set Condition:

P0124-THROTTLE POSITION SENSOR/APPS INTERMITTENT

When Monitored: Continuously with the ignition on and engine running.

Set Condition: This DTC will set if the monitored TPS throttle angle between the angles of 6° and 120° and the degree change is greater than 5° within a period of less than 7.0 ms.

POSSIBLE CAUSES
RELATED TPS ENGINE DTC'S PRESENT
THROTTLE POSITION SENSOR
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read Engine DTC's. Check and repair all Engine DTC's prior to performing any transmission symptom diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Powertrain Control Module. Some problems are corrected by software upgrades to the Transmission and Engine software.** **NOTE: Check for applicable TSB's related to the problem.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	With the DRBIII®, check Engine DTC's, this includes all one trip failures. Are there any Engine TPS DTCs present? Yes → Refer to the Driveability category and perform the appropriate symptom. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All

P0124-THROTTLE POSITION SENSOR/APPS INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, record the EATX EVENT DATA to help identify the conditions in which the DTC was set. With the DRBIII®, erase Transmission DTCs. **NOTE: To erase EATX EVENT DATA information, a BATTERY DISCONNECT must be performed. Performing a BATTERY DISCONNECT will reset all learned Transmission values to controller defaults which may lead to erratic shift schedules.** Drive the vehicle and try to duplicate the conditions in which the DTC was reported by the EATX EVENT DATA. With the DRBIII®, read Transmission DTCs. Did the DTC P0124 THROTTLE POSITION SENSOR INTERMITTENT, reset? Yes → Go To 4 No → Go To 6	All
4	Ignition On, Engine Not Running. With the DRBIII®, under Transmission Sensors, monitor the TPS voltage in the following step. Slowly open and close the throttle while checking for erratic voltage changes. Did the TPS voltage change smooth and consistent? Yes → Go To 5 No → Replace the Throttle Position Sensor per the Service Information. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
5	**NOTE: Due to the integration of the Powertrain and Transmission Control Modules, communication between the modules is internal.** Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits. Check for any Technical Service Bulletins (TSB's) and S.T.A.R. ON-LINE for any possible causes that may apply. If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module per the Service Information. WITH THE DRBIII® PERFORM QUICK LEARN. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
6	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wires while checking for shorted and open circuits. Pay particular attention to the TPS signal and sensor ground circuits. With the DRBIII®, check the EATX EVENT DATA to help identify the conditions in which the DTC was set. Were there any problems found? Yes → Repair as necessary. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0218-HIGH TEMPERATURE OPERATION ACTIVATED

When Monitored and Set Condition:

P0218-HIGH TEMPERATURE OPERATION ACTIVATED

When Monitored: Whenever the engine is running. NOTE: This is an informational DTC designed to aid the technician in diagnosing shift quality complaints.

Set Condition: Immediately when a Overheat shift schedule is activated when the Transmission Oil Temperature reaches 155° C or 240° F.

POSSIBLE CAUSES
ENGINE COOLING SYSTEM MALFUNCTION
TRANSMISSION OIL COOLER PLUGGED
HIGH TEMPERATURE OPERATIONS ACTIVATED

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read Engine DTC's. Check and repair all Engine DTC's prior to performing any transmission symptom diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Powertrain Control Module. Some problems are corrected by software upgrades to the Transmission and Engine software.** **NOTE: Check for applicable TSB's related to the problem.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	Perform Engine Cooling System diagnostics per the Service Information. Is the Engine Cooling System functioning properly? Yes → Go To 3 No → Repair the cause of the engine overheating. Refer to the Service Information for the related symptoms or repair procedures. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All

P0218-HIGH TEMPERATURE OPERATION ACTIVATED — Continued

TEST	ACTION	APPLICABILITY
3	Perform Transmission Cooler Flow Check per the Service Information. Did the Transmission Cooler Flow Check test pass? Yes → Go To 4 No → Repair or replace the plugged Transmission Oil Cooler per the Service Information. Repair the cause of the plugged Transmission Oil Cooler as necessary. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
4	This DTC is an informational DTC designed to aid the Technician in diagnosing shift quality complaints. This DTC indicates that the transmission has been operating in the "Overheat" shift schedule which may generate a customer complaint. The customer driving patterns may indicate the need for an additional transmission oil cooler. With the DRBIII®, check the EATX EVENT DATA to help identify the conditions in which the DTC was set. View repair options. Repair Repair the cause of transmission overheating per the Service Information. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0562-LOW BATTERY VOLTAGE

When Monitored and Set Condition:

P0562-LOW BATTERY VOLTAGE

When Monitored: With the engine running and the PCM has closed the Transmission Control Relay.

Set Condition: If the battery voltage of the Transmission Control Relay Output Sense circuit(s) to the PCM is less than 10.0 volts for the period of 15 seconds. Note: P0562 generally indicates a gradually falling battery voltage or a resistive connection(s) to the PCM. The DTC will also set if the battery voltage sensed at the PCM is less than 6.5v for 200ms or where Transmission Control Relay Output circuits is less than 7.2v for 200ms.

POSSIBLE CAUSES
RELATED CHARGING SYSTEM DTC'S
GROUND CIRCUIT OPEN OR HIGH RESISTANCE
FUSED B+ CIRCUIT TO PCM HIGH RESISTANCE
TRANSMISSION CONTROL RELAY OUTPUT TO TCM OPEN OR HIGH RESISTANCE
TRANSMISSION CONTROL RELAY
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read Engine DTC's. Check and repair all Engine DTC's prior to performing any transmission symptom diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Powertrain Control Module. Some problems are corrected by software upgrades to the Transmission and Engine software.** **NOTE: Check for applicable TSB's related to the problem.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0562-LOW BATTERY VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read the Engine DTC's. Are there any Charging System related DTC's present also? Yes → Refer to the Charging System category and repair any PCM Charging System DTC's, before proceeding. NOTE: After repairing the PCM Charging System DTC's, perform the Transmission Verification test to verify the transmission was not damaged. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	**NOTE: Generator, battery, and charging system must be fully functional before performing this test.** With the DRBIII®, read Transmission DTC's. With the DRBIII®, Check the STARTS SINCE SET counter for P0562. **Note: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter set at 0? Yes → Go To 4 No → Go To 9	All
4	Turn the ignition off to the lock position. Disconnect the PCM harness connector. **Note: Check connectors - Clean/repair as necessary.** **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Using a 12-volt test light connected to 12-volts, check the Ground circuits in the appropriate terminal of special tool #8815. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly for all the Ground circuits? Yes → Go To 5 No → Repair the Ground circuit and/or circuits for an open or high resistance. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All

P0562-LOW BATTERY VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Remove the Transmission Control Relay. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between Fused B+ circuit and Transmission Control Relay Output circuit in the Transmission Relay connector. Ignition on, engine not running. **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Using a 12-volt test light connected to ground, check the Fused B+ circuit in the appropriate terminal of special tool #8815. **NOTE: The Test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Fused B+ Circuit circuit for an open or high resistance. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
6	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Remove the Transmission Control Relay. **Note: Check connectors - Clean/repair as necessary.** **CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Connect a jumper wire between Fused B+ circuit and the Transmission Control Relay Output circuit. Ignition on, engine not running. Using a 12-volt test light connected to ground, check both Transmission Control Relay Output circuits in the appropriate terminal of special tool #8815. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All

P0562-LOW BATTERY VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Install a substitute Relay in place of the Transmission Control Relay. Start the engine. Using a voltmeter, measure the battery voltage. With the DRBIII®, monitor the Transmission Switched Battery Voltage. Compare the DRBIII® Transmission Switched Battery voltage to the actual battery voltage. Is the DRBIII® voltage within 2.0 volts of the battery voltage? Yes → Replace the Transmission Control Relay. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits. Check for any Technical Service Bulletins (TSB's) and S.T.A.R. ON-LINE for any possible causes that may apply. If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module per the Service Information. WITH THE DRBIII® PERFORM QUICK LEARN. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
9	The conditions necessary to set the DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring and connectors while checking for shorts and open circuits. With the DRBIII®, check the EATX EVENT DATA to help identify the conditions in which the DTC was set. Were there any problems found? Yes → Repair as necessary. Perform 42RLE (NGC) TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:

P0602-CONTROL MODULE PROGRAMMING ERROR

When Monitored and Set Condition:

P0602-CONTROL MODULE PROGRAMMING ERROR

When Monitored: Continuously

Set Condition: The DTC will always light the MIL, and is designed to signal the technician that the controller still has generic software installed.

TEST	ACTION	APPLICABILITY
1	**NOTE: Controller is programmed with generic software and will not allow the correct vehicle Powertrain management.** Record the vehicles controller part number. Select Use Controller Part Number under the Flash Tab. Flash the controller with the correct software. Test complete Yes → Test Complete.	All