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IMPORTANT

New for the 2002 LH is a combined Powertrain Control Module and Transmission Control Module in a single control module. This new module is the Next Generation Controller (NGC) for DaimlerChrysler and will be referred to as the Powertrain Control Module (PCM).

New Diagnostics procedures and New DTC numbers are some of the changes you will see which reflect the new combined module technology. The PCM will have four color coded connectors C1 through C4, (C1-BLK, C2-GRAY, C3-WHITE, C4-GREEN), each PCM connector will have 38 pins each. Two new tools are introduced to help in diagnosing and repairing the new PCM terminals and harness connectors. The Miller #3638 terminal removal pick is introduced, you must use the Miller #3638 tool to release the connector terminals or harness and connector damage will occur. Also, the Miller #8815 Pinout Box is introduced, you must use the Miller #8815 tool to probe the PCM terminals or terminal 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 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; ie., if the DRBIII® displays a No Response condition, you must diagnose this first before proceeding.
2. Read DTC's (diagnostic trouble codes) with the DRBIII®.
3. If no DTC's are present, identify the customer complaint.
4. Once the DTC or customer complaint is identified, locate the matching test in the Table of Contents and begin to diagnose the symptom.

All component location views are in Section 8.0. All connector pinouts are in Section 9.0. All system schematics are in Section 10.0.

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

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

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

If you have any comments or recommendations after reviewing the diagnostic information, please fill out the form at the back of the book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic procedures manual covers the 2002 LH vehicle equipped with the 2.7L and 3.5L engines.

1.2 SIX-STEP TROUBLESHOOTING 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
- Idle Air Control System
- Ignition System
- Charging System
- Speed Control System
- Cooling system

GENERAL INFORMATION

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 GENERAL DESCRIPTION

These Sequential Fuel Injection (SFI) engine systems have the latest in technical advances. The OBDII/Euro Stage III OBD diagnostics incorporated with the Powertrain Control Module (PCM) are intended to assist the field technician in repairing vehicle problems by the quickest means.

3.2 FUNCTIONAL OPERATION

3.2.1 FUEL CONTROL

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, manifold absolute pressure, and air temperature change.

Different fuel calculation strategies are used depending on the operational state of the engine. During crank mode, a longer pulse width 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 many different circuits of the fuel injection system. This monitoring is called on-board diagnosis.

Certain criteria, or arming conditions, must be met for a trouble code to be entered into the PCM memory. The criteria may be a range of: engine rpm, engine temperature, and/or input voltage to the PCM. If a problem is sensed with a monitored circuit, and all of the criteria or arming conditions are met, then 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 memory even though a malfunction has occurred. This may happen because one of the trouble code criteria have not been met.

The PCM compares input signal voltages from each input device with specifications (the established high and low limits of the range) that are programmed into it for that device. If the input voltage is not within specifications and other trouble code criteria are met, a trouble code will be stored in the PCM memory.

The On Board Diagnostics have evolved to the second Generation of Diagnostics referred to as OBDII/Euro Stage III OBD. These OBDII/Euro Stage III OBD Diagnostics control the functions necessary to meet the requirements of California OBDII, Federal OBD regulation and European regulation. These requirements specify the inclusion of a Malfunction Indicator Light (MIL) located on the instrument panel. The purpose of the MIL is to inform the vehicle operator in the event of a malfunction of any emission system or component.

The following table summarizes the various OBDII/Euro Stage III OBD monitors operation.

OBD II/EURO STAGE III OBD MONITOR INFORMATION

Comprehensive Components Monitor	Major Monitors Non Fuel Control & Non Misfire	Major Monitors Fuel Control & Misfire
Run constantly Includes All Engine Hardware - Sensors, Switches, Solenoids, etc.	Run Once Per Trip Monitors Entire Emission System	Run Constantly Monitors Entire System
One Trip Faults - Turns On The MIL and Sets DTC After One Failure	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failures	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failures
Priority 3	Priority 1 or 3	Priority 2 or 4
All Checked For Continuity Open Short To Ground Short To Voltage	Done Stop Testing = Yes Oxygen Sensor Heater Oxygen Sensor Response	<p>Fuel Control Monitor Monitors Fuel Control System For:</p> <p style="text-align: center;">Fuel System Lean Fuel System Rich</p> <p>Requires 3 Consecutive <i>Fuel System Good Trips</i> To Extinguish The MIL</p>
Inputs Checked For Rationality	Catalytic Converter Efficiency Except EWMA - up to 6 tests per trip and a one trip fault	
Outputs Checked For Functionality	EGR System Evaporative Emission System	<p>Misfire Monitor Monitors For Engine Misfire at:</p> <p style="text-align: center;">1000 RPM Counter (Type B) **200 RPM Counter (Type A)</p> <p>Requires 3 Consecutive <i>Misfire Good Trips</i> To Extinguish the MIL</p> <p>**Type A misfire is a two trip failure. The MIL will illuminate and blink at the first failure.</p>
Requires 3 Consecutive <i>Global/Alternate Good Trips</i> to Extinguish the MIL*	Requires 3 Consecutive <i>Global Good Trips</i> to Extinguish the MIL*	
*40 Warm Up Cycles are required to erase DTC's after the MIL has been extinguished.		

GENERAL INFORMATION

3.2.3 OTHER CONTROLS

CHARGING SYSTEM

The charging system is turned on when the engine is started. The Generator field is control by the PCM using a 12-volt high-side driver and a body ground circuit. The Generator output voltage is determined by the PCM. When more system voltage is needed, the PCM will applies a longer duty cycle using the 12-volt high-side drive and shortens duty cycle or none at all when less voltage is needed.

SPEED CONTROL SYSTEM

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 vacuum dump solenoid allows immediate release of the throttle during speed control operation.

Speed control may be cancelled by braking, driver input using the speed control switches, shifting into neutral, excessive engine speed (wheels spinning), or turning the ignition off.

NOTE: If two speed control switches are selected simultaneously, the PCM will detect an illegal switch operation and turn the speed control off.

O2 SENSOR

The O2 system with ignition on and engine off has 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.

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 LH.

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 be applied 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:

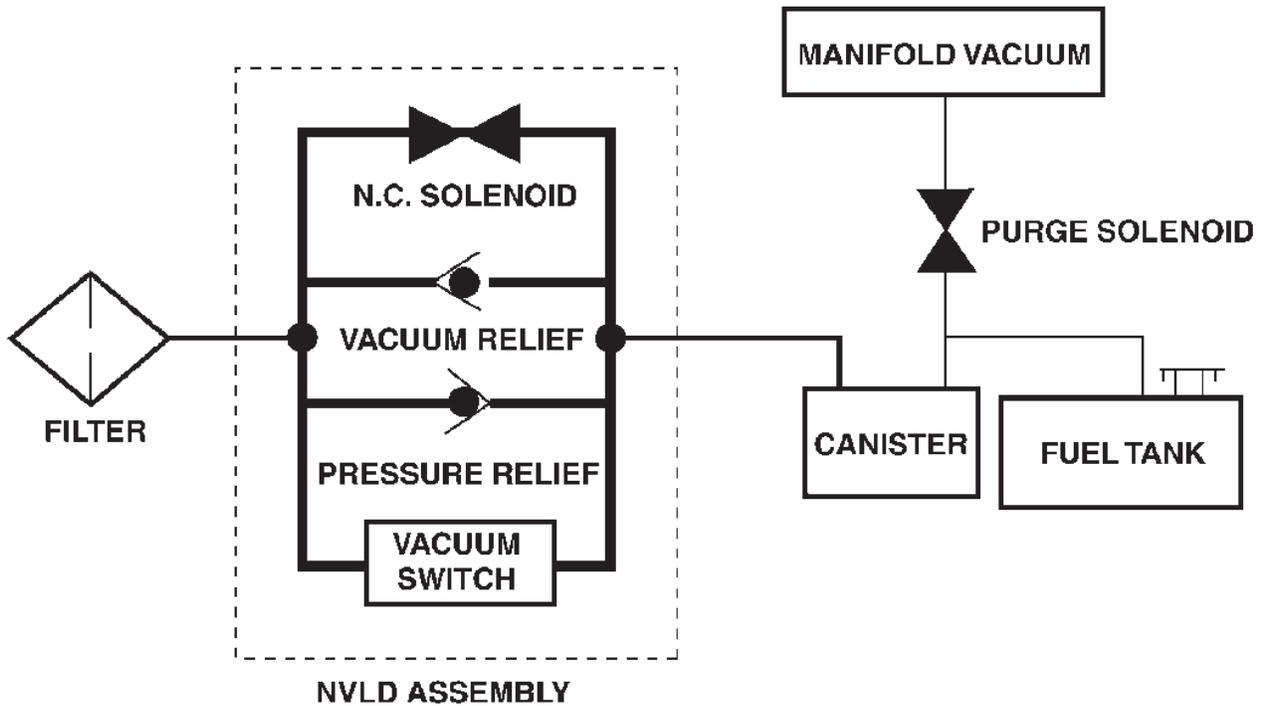
- De-energize the NVLD solenoid to seal the canister vent.
- Activate purge shortly after closed loop. Pull the tank vacuum past the vacuum switch point (1" H₂O vacuum) of the NVLD for a specific time while tracking the standard purge flow rate.
- Turn purge off and determine how long it takes to decay the tank vacuum and reopen the switch.

GENERAL INFORMATION

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...

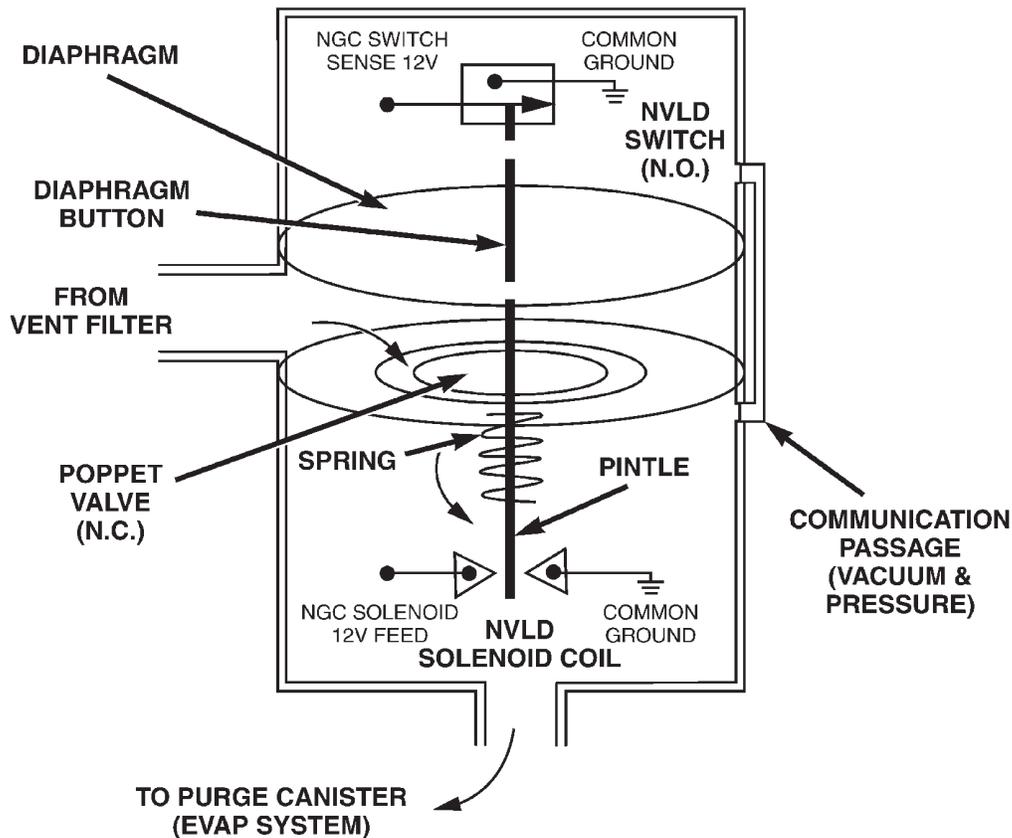


NATURAL VACUUM LEAK DETECTION SYSTEM

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FIGURE 1

NVLD ASSEMBLY INTERNAL SCHEMATIC



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).

FIGURE 2

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GENERAL INFORMATION

3.2.4 PCM OPERATING MODES

As input signals to the PCM change, the PCM adjusts its response to output devices. For example, the PCM must calculate a different injector pulse width and ignition timing for idle than it does for wide open throttle. There are several different modes of operation that determine how the PCM responds to the various input signals.

There are two types of engine control operation: **open loop** and **closed loop**.

In **open loop** operation, the PCM receives input signals and responds according to preset programming. Inputs from the heated oxygen sensors are not monitored.

In **closed loop** operation, the PCM monitors the inputs from the heated oxygen sensors. This input indicates to the PCM whether or not the calculated injector pulse width results in the ideal air-fuel ratio of 14.7 parts air to 1 part fuel. By monitoring the exhaust oxygen content through the oxygen sensor, the PCM can fine tune injector pulse width. Fine tuning injector pulse width allows the PCM to achieve the lowest emission levels while maintaining optimum fuel economy.

The engine start-up (crank), engine warm-up, and wide open throttle modes are open loop modes. Under most operating conditions, closed loop modes occur with the engine at operating temperature.

3.2.5 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.(*)

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 if a fuel injector is clogged, the pintle is sticking, or the wrong injectors are installed.(*)

Fuel Requirements – Poor quality gasoline can cause problems such as hard starting, stalling, and stumble. Use of methanol-gasoline blends may re-

sult 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 stream 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.

3.2.6 SKIS OVERVIEW

The Sentry Key Immobilizer System (SKIS) is designed to prevent unauthorized vehicle operation. The system consists of a Sentry Key Immobilizer Module (SKIM), ignition key(s) equipped with a transponder chip and PCM. When the ignition switch is turned on, the SKIM interrogates the ignition key. If the ignition key is Valid or Invalid, the SKIM sends a PCI Bus message to the PCM indicating ignition key status. Upon receiving this message the PCM will terminate engine operation, or allow the engine to continue to operate.

3.2.7 SKIM ON-BOARD DIAGNOSTICS

The SKIM has been programmed to transmit and monitor many different coded messages as well as PCI Bus messages. This monitoring is called On Board Diagnosis.

Certain criteria must be met for a diagnostic trouble code to be entered into the SKIM memory. The criteria may be a range of; Input voltage, PCI Bus message, or coded messages to the SKIM. If all of the criteria for monitoring a circuit or function are met and a fault is sensed, a diagnostic trouble code will be stored in the SKIM memory.

3.2.8 SKIS OPERATION

When ignition power is supplied to the SKIM, the SKIM performs an internal self-test. After the self-test is completed, the SKIM energizes the antenna (this activates the transponder chip) and sends a challenge to the transponder chip. The transponder chip responds to the challenge by generating an encrypted response message using the following:

Secret Key - This is an electronically stored value (identification number) that is unique to each SKIS. The secret key is stored in the SKIM, PCM and all ignition key transponders.

Challenge - This is a random number that is generated by the SKIM at each ignition key cycle.

The secret key and challenge are the two variables used in the algorithm that produces the encrypted response message. The transponder uses the crypto algorithm to receive, decode and respond to the message sent by the SKIM. After responding to the coded message, the transponder sends a transponder I.D. message to the SKIM. The SKIM compares the transponder I.D. to the available valid key codes in the SKIM memory (8 key maximum at any one time). After validating the key ignition the SKIM sends a PCI Bus message called a Seed Request to the engine controller then waits for a PCM response. If the PCM does not respond, the SKIM will send the seed request again. After three failed attempts the SKIM will stop sending the seed request and store a trouble code. If the PCM sends a seed response, the SKIM sends a valid/invalid key message to the PCM. This is an encrypted message that is generated using the following:

VIN - Vehicle Identification Number

Seed - This is a random number that is generated by the PCM at each ignition key cycle.

The VIN and seed are the two variables used in the rolling code algorithm that encrypts the valid/invalid key message. The PCM uses the rolling code algorithm to receive, decode and respond to the valid/invalid key message sent by the SKIM. After sending the valid/invalid key message the SKIM waits 3.5 seconds for a PCM status message from the PCM. If the PCM does not respond with a valid key message to the SKIM, a fault is detected and a trouble code is stored.

The SKIS incorporates a VTSS LED located on the instrument panel upper cover. The LED receives switched ignition voltage and is hardwired to the body control module. The LED is actuated when the SKIM sends a PCI Bus message to the body controller requesting the LED on. The body controller then provides the ground for the LED. The SKIM will request VTSS LED operation for the following:

- bulb checks at ignition on

- to alert the vehicle operator to a SKIS malfunction
- customer key programming mode

For all faults except transponder faults and VTSS LED remains on steady. In the event of a transponder fault the LED flashes at a rate of 1 Hz (once per second). If a fault is present the LED will remain on or flashing for the complete ignition cycle. If a fault is stored in SKIM memory which prevents the system from operating properly, the PCM will allow the engine to start and run (for 2 seconds) up to six times. After the sixth attempt, the PCM disables the starter relay until the fault is corrected.

3.2.9 PROGRAMMING THE POWERTRAIN CONTROL MODULE

Important Note: Before replacing the PCM for a failed driver, control circuit or ground circuit, be sure to check the related component/circuit integrity for failures not detected due to a double fault in the circuit. Most PCM driver/control circuit failures are caused by internal failure to components (i.e. 12-volt pull-ups, drivers and ground sensors). These failures are difficult to detect when a double fault has occurred and only one DTC has set.

NOTE: If the PCM and the SKIM are replaced at the same time, program the VIN into the PCM first. All vehicle keys will then need to be replaced and programmed to the new SKIM.

The SKIS Secret Key is an I.D. code that is unique to each SKIS. This code is programmed and stored in the SKIM, engine controller and transponder chip (ignition key). When replacing the PCM it is necessary to program the secret key into the PCM.

NOTE: After replacing the PCM, you must reprogram pinion factor.

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRBIII® and select THEFT ALARM, SKIM then MISCELLANEOUS.
3. Select PCM REPLACED.
4. Enter secured access mode by entering the vehicle four-digit PIN.

GENERAL INFORMATION

NOTE: If three attempts are made to enter the secure access mode using an incorrect PIN, secured access mode will be locked out for one hour. To exit this lockout mode, turn the ignition to the run position for one hour then enter the correct PIN. (Ensure all accessories are turned off. Also monitor the battery state and connect a battery charger if necessary).

5. Press ENTER to transfer the secret key (the SKIM will send the secret key to the PCM).

3.2.10 PROGRAMMING THE SENTRY KEY IMMOBILIZER MODULE

NOTE: If the PCM and the SKIM are replaced at the same time, program the VIN into the PCM first. All vehicle keys will then need to be replaced and programmed to the new SKIM.

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRBIII® and select THEFT ALARM, SKIM then MISCELLANEOUS.
3. Select SKIM MODULE REPLACEMENT (GASOLINE).
4. Program the vehicle four-digit PIN into the SKIM.
5. Select COUNTRY CODE and enter the correct country.

NOTE: Be sure to enter the correct country code. If the incorrect country code is programmed into SKIM, the SKIM must be replaced.

6. Select UPDATE VIN (the SKIM will learn the VIN from the PCM).
7. Press ENTER to transfer the VIN (the PCM will send the VIN to the SKIM).
8. The DRBIII® will ask if you want to transfer the secret key. Select ENTER to transfer secret key from the PCM. This will ensure the current vehicle ignition keys will still operate the SKIS system.

3.2.11 PROGRAMMING THE IGNITION KEYS TO THE SENTRY KEY IMMOBILIZER MODULE

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRBIII® and select THEFT ALARM, SKIM, then MISCELLANEOUS.

3. Select PROGRAM IGNITION KEYS.
4. Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: A maximum of eight keys can be learned to each SKIM AT ONE TIME. Once a key is learned to a SKIM it (the key) cannot be transferred to another vehicle.

If ignition key programming is unsuccessful, the DRBIII® will display one of the following messages:
Programming Not Attempted - The DRBIII® attempts to read the programmed key status and there are no keys programmed in the SKIM memory.

Programming Key Failed - (Possible Used Key From Wrong Vehicle) - SKIM is unable to program key due to one of the following:

- faulty ignition key transponder
- ignition key is programmed to another vehicle.

8 Keys Already Learned, Programming Not Done - SKIM transponder ID memory is full.

1. Obtain ignition keys to be programmed from customer (8 keys maximum)
2. Using the DRBIII®, erase all ignition keys by selecting MISCELLANEOUS and ERASE ALL CURRENT IGN. KEYS
3. Program all ignition keys.

Learned Key In Ignition - Ignition key transponder ID is currently programmed in SKIM memory.

3.3 DIAGNOSTIC TROUBLE CODES

Each diagnostic trouble code is diagnosed by following a specific testing procedure. The diagnostic test procedures contain step-by-step instructions for determining the cause of trouble codes as well as no trouble code problems. It is not necessary to perform all of the tests in this book to diagnose an individual code.

Always begin by reading the diagnostic trouble codes using the DRBIII®.

3.3.1 HARD CODE

A diagnostic trouble code that comes back within one cycle of the ignition key is a hard code. This means that the defect is there every time the powertrain control module checks that circuit or function. Procedures in this manual verify if the DTC is a hard code at the beginning of each test. When it is not a hard code, an intermittent test must be performed.

DTC's that are for OBDII/Euro Stage III OBD monitors will not set with just the ignition key on. Comparing these to non-emission DTC's, they will seem like an intermittent. These DTC's require a set of parameters to be performed (The DRBIII®

pre-test screens will help with this for MONITOR DTC's), this is called a TRIP. All OBDII/Euro Stage III OBD DTCs will be set after one or in some cases two trip failures, and the MIL will be turned on. These DTC's require three successful, no failures, TRIPS to extinguish the MIL, followed by 40 warm-up cycles to erase the DTC. 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.

3.3.2 INTERMITTENT CODE

A diagnostic trouble code that is not there every time the PCM checks the circuit is an intermittent DTC. Most intermittent DTC's are caused by wiring or connector problems. Defects 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 checks 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 technical service bulletins that may apply.
- Use the DRBIII® data recorder or co-pilot.

3.3.3 STARTS SINCE SET COUNTER

The start since set counter counts the number of times the vehicle has been started since codes were last set, erased, or the battery was disconnected. The reset 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 DTC's Detected and the reset counter will show STARTS since clear = XXX.

3.3.4 HANDLING NO DTC PROBLEMS

Symptom checks cannot be used properly unless the driveability problem characteristic actually happens while the vehicle is being tested.

Select the symptom that most accurately describes the vehicle's driveability problem and then perform the test routine that pertains to this symptom. Perform each routine test in sequence until the problem is found. For definitions, see Section 6.0 Glossary Of Terms.

3.3.5 DISTANCE SINCE MI SET

The Euro Stage III OBD directive requires that the distance traveled by the vehicle while the MI is activated must be available at any instant through the serial port on the standard data link connector. This feature works as follows:

1. If the MI is illuminated due to a fault, the distance count is updated (i.e. it is counting).
2. If there is a stale MI fault (i.e. the fault is still frozen in memory but the MI has been extinguished due to 3 good trips), the distance count is held (i.e. frozen).
3. If the distance count is being held due to (Item 2.) and the fault is cleared, the distance is cleared (set to zero).
4. If the distance count is being held due to (Item 2.) and another MI occurs, the distance count is reset (to) and begins updating anew.
5. If a fault occurs while the MI is already illuminated due to a previous fault (the distance count is updating), then the distance count continues to update w/out interruption.
6. If the MI is flashing due to active misfire and there is an active fault (i.e. matured fault for which 3 good trips have not occurred), the distance count behaves as the MI in ON.
7. If the MI is flashing due to active misfire and there is no active fault (i.e. the MI is flashing for a 1 malf.), the distance count behaves as if the MI is off (because it is not yet a matured fault).
8. The distance count is cleared whenever the fault is cleared. (Via 40 warm up cycles, or via scan tool).

GENERAL INFORMATION

SYMPTOM	DIAGNOSTIC TEST
HARD START	CHECKING THE FUEL PRESSURE CHECKING THE ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EGR SYSTEM CHECKING IAT SENSOR
START AND STALL	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION
HESITATION/SAG/STUMBLE	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR
SURGE	CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING IAT SENSOR CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION
LACK OF POWER/SLUGGISH	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION
SPARK KNOCK DETONATION	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION
CUTS OUT/MISSES	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING IDLE AIR CONTROL MOTOR OPERATION
BACKFIRE/POPBACK	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING MAP SENSOR

SYMPTOM

DIAGNOSTIC TEST

RUNS ROUGH/UNSTABLE/
ERRATIC IDLE

CHECKING PCM POWER AND GND CKT
CHECKING THE FUEL PRESSURE
CHECKING ECT SENSOR
CHECKING THROTTLE POSITION SENSOR
CHECKING MAP SENSOR
CHECKING IDLE AIR CONTROL MOTOR OPERATION
CHECKING IAT SENSOR

POOR FUEL ECONOMY

CHECKING PCM POWER AND GND CKT
CHECKING THE FUEL PRESSURE
CHECKING ECT SENSOR
CHECKING THROTTLE POSITION SENSOR
CHECKING MAP SENSOR
CHECKING IDLE AIR CONTROL MOTOR OPERATION
CHECKING IAT SENSOR

3.4 USING THE DRBIII®

Refer to the DRBIII® user's guide for instructions and assistance with reading DTC's, erasing DTC's, 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 or User-Requested COLD Boot

If the DRBIII® should display any other error message, record the entire display and call the Star Center for information and assistance. This is a sample of such an error message display:

```

ver: 2.14
date: 26 Jul93
file: key_itf.cc
date: Jul 26 1993
line: 548
err: 0x1
User-Requested COLD Boot

Press MORE to switch between this display
and the application screen.
Press F4 when done noting information.
    
```

3.5.1 DRBIII® DOES NOT POWER UP

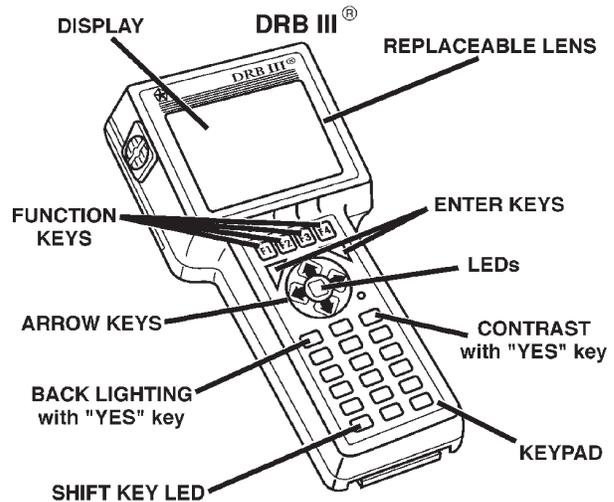
If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link connector cavity 16). A minimum of 11 volts is required to adequately power the DRBIII®.

If all connections are proper between the DRBIII® and the vehicle or other devices, and the

vehicle battery is fully charged, and inoperative DRBIII® may be the result of faulty cable or vehicle wiring.

3.5.2 DISPLAY IS NOT VISIBLE

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



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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.

GENERAL INFORMATION

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 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 codes or error messages may occur.

4.2.3 SERVICING SUB ASSEMBLIES

Some components of the powertrain system are intended to be serviced in assembly only. Attempting to remove or repair certain system sub-components 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	-58 - 1100°F -50 - 600°C

* 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.
- The circuit being tested must be protected by a 10A fuse or circuit breaker.
- 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 CAUTIONS

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

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation; this will damage it and eventually cause it 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.

5.0 REQUIRED TOOLS AND EQUIPMENT

DRBIII® (diagnostic read-out box) scan tool
 Evaporative System Diagnostic Kit #6917
 fuel filler adapter #8382
 fuel pressure adapter (C-6631) or #6539
 fuel pressure kit (C-4799-B) or #5069
 fuel release hose (C-4799-1)
 Min Air flow fitting #6714
 Pinout Box (Miller #8815)
 jumper wires
 ohmmeter
 oscilloscope
 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
- 8 Volt Supply
- J1850 PCI Bus
- CCD Bus
- CKP Sensor Signal
- CMP Sensor Signal
- Vehicle Speed Sensor Signal
- O2 Sensor Signal

6.0 GLOSSARY OF TERMS

ABS	anti-lock brake system
backfire, popback	fuel ignites in either the intake or the exhaust system
CKP	crank position sensor
CMP	camshaft position sensor
cuts out, misses	a steady pulsation or the inability of the engine to maintain a consistent rpm
DLC	data link connector (previously called engine diagnostic connector)
detonation, spark knock	a mild to severe ping, especially under loaded engine conditions
ECT	engine coolant temperature sensor
EGR	exhaust gas recirculation valve and system
generator	previously called alternator
hard start	The engine takes longer than usual to start, even though it is able to crank normally.
hesitation, sag, stumble	There is a momentary lack of response when the throttle is opened. This can occur at all vehicle speeds. If it is severe enough, the engine may stall.
IAT	intake/inlet air temperature sensor
IAC	idle air control motor
JTEC	Combined engine and transmission control module
lack of power, sluggish	The engine has less than expected power, with little or no increase in vehicle speed when the throttle is opened.
LDP	leak detection pump
MAP	manifold absolute pressure sensor
MIL	malfunction indicator lamp
MTV	manifold tuning valve
NGC	next generation controller
O2S	oxygen sensor
PCI	programmable communication interface

GENERAL INFORMATION

PCM	powertrain control module
PCV	positive crankcase ventilation
PEP	peripheral expansion port
poor fuel economy	There is significantly less fuel mileage than other vehicles of the same design and configuration
rough, unstable, or erratic idle stalling	The engine runs unevenly at idle and causes the engine to shake if it is severe enough. The engine idle rpm may vary (called hunting). This condition may cause stalling if it is severe enough.
SBEC	single board engine controller
SKIM	sentry key immobilizer module
SKIS	sentry key immobilizer system
start & stall	The engine starts but immediately dies.
surge	engine rpm fluctuation without corresponding change in throttle position sensor
TPS	throttle position sensor
TRS	transmission range sensor
VSS	vehicle speed sensor/signal

7.0

DIAGNOSTIC INFORMATION AND
PROCEDURES

Symptom:

***BUS +/- SIGNALS OPEN 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 SENTRY KEY IMMOBILIZER MODULE (SKIM) PCI BUS CIRCUIT OPEN BODY CONTROL 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.	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. Is the test light illuminated? Yes → Go To 3 No → Repair the Ground circuit for an open.	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. Is the test light illuminated? Yes → Go To 4 No → Repair the Fused Ignition Switch Output circuit for an open. Refer to the wiring diagrams in the service information.	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. Is the test light illuminated? Yes → Go To 5 No → Repair the Fused B+ circuit for an open. Refer to the wiring diagrams in the service information.	All

***BUS +/- SIGNALS OPEN FROM SENTRY KEY IMMOBILIZER MODULE**
— Continued

TEST	ACTION	APPLICABILITY
5	<p>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.</p> <p>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. Select DRB Standalone. 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. Set Probe to x10. 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?</p> <p style="padding-left: 40px;">Yes → Replace the Sentry Key Immobilizer Module (SKIM) in accordance with the service information.</p> <p style="padding-left: 40px;">No → Go To 6</p>	All
6	<p>Turn the ignition off. Disconnect the SKIM harness connector. Disconnect the BCM C1 harness connector. Measure the resistance of the PCI bus circuit between the SKIM connector and the BCM C1 connector. Is the resistance below 5.0 ohms?</p> <p style="padding-left: 40px;">Yes → Replace the Body Control Module in accordance with the service information.</p> <p style="padding-left: 40px;">No → Repair the PCI Bus circuit for an open.</p>	All

Symptom:

***NO RESPONSE FROM PCM (PCI BUS)**

POSSIBLE CAUSES
PCM PCI NO RESPONSE POWERTRAIN CONTROL MODULE PCI BUS CIRCUIT OPEN BODY 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, enter Body then Body Computer. With the DRB, enter Anti-Lock Brakes. With the DRB, enter Body then 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

***NO RESPONSE FROM PCM (PCI BUS) — Continued**

TEST	ACTION	APPLICABILITY
2	<p>With the DRB read PCM Diagnostic Trouble Codes. This is to ensure power and grounds to the PCM are operational.</p> <p>NOTE: If the DRB will not read PCM DTC's, follow the NO RESPONSE TO PCM (PCM SCI only) symptom path.</p> <p>Turn the ignition off.</p> <p>Disconnect the PCM harness connectors.</p> <p>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.</p> <p>Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes.</p> <p>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.</p> <p>Select DRBIII® select Pep Module Tools.</p> <p>Select lab scope.</p> <p>Select Live Data.</p> <p>Select 12 volt square wave.</p> <p>Press F2 for Scope.</p> <p>Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10.</p> <p>Press F2 again when complete.</p> <p>Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the Pinout Box.</p> <p>Turn the ignition on.</p> <p>Observe the voltage display on the DRB Lab Scope.</p> <p>Does the voltage pulse from 0 to approximately 7.5 volts?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.</p> <p>Disconnect the PCM harness connectors.</p> <p>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.</p> <p>Disconnect the BCM C3 harness connector.</p> <p>Measure the resistance of the PCI Bus circuit from the BCM C3 harness connector to the appropriate terminal of special tool #8815.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the Body Control Module in accordance with the service information. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Repair the PCI Bus circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

Symptom:

***NO RESPONSE FROM PCM (PCM SCI ONLY)**

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) — 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) — 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:

***PCI BUS COMMUNICATION FAILURE**

POSSIBLE CAUSES
<p>WIRING HARNESS INTERMITTENT</p> <p>OPEN PCI BUS CIRCUIT AT THE DATA LINK CONNECTOR (DLC)</p> <p>HIGH VOLTAGE ON THE PCI BUS CIRCUITS AT THE BCM CONNECTORS</p> <p>MODULE (PCI BUS SHORT TO VOLTAGE)</p> <p>PCI BUS CIRCUIT SHORTED TO VOLTAGE</p> <p>LOW RESISTANCE TO GROUND ON THE PCI BUS CIRCUITS AT THE BCM CONNECTORS</p> <p>MODULE (PCI BUS SHORT TO GROUND)</p> <p>PCI BUS CIRCUIT SHORTED TO GROUND</p>

TEST	ACTION	APPLICABILITY
1	<p>Note: Determine which modules this vehicle is equipped with before beginning.</p> <p>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.</p> <p>Turn the ignition on.</p> <p>Using the DRB, attempt to communicate with the following control modules:</p> <p>Body Control Module (BCM)</p> <p>Instrument Cluster (MIC)</p> <p>Occupant Restraint Controller (ORC)</p> <p>Controller Antilock Brake (CAB)</p> <p>Was the DRB able to communicate with one or more Module(s)?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 3</p>	All
2	<p>Turn the ignition off.</p> <p>Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Note: If the DRB can not communicate with a single module, refer to the category list for the related symptom.</p> <p>Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair wiring harness/connectors as necessary. Perform BODY VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

***PCI BUS COMMUNICATION FAILURE — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off. Disconnect the BCM C1 harness connector. Disconnect the DRB from the Data Link Connector (DLC). Measure the resistance of the PCI Bus circuit between the Data Link Connector (DLC) and the BCM C1 connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.</p>	All
4	<p>NOTE: Reconnect the BCM C1 harness connector. Turn the ignition on. Measure the voltage of the PCI Bus circuit at the Data Link Connector (DLC). Is the voltage above 4.0 volts?</p> <p>Yes → Go To 5</p> <p>No → Go To 7</p>	All
5	<p>Note: Determine which modules this vehicle is equipped with before beginning. Turn the ignition off. Disconnect the BCM harness connectors and remove the Body Control Module from the Junction Block. Turn the ignition on. Measure the voltage of each PCI Bus circuit at the BCM C1, C3, C4 connectors and at the Junction Block Body Control Module connector cavity 10. Is the voltage steadily above 4.0 volts for any measurement?</p> <p>Yes → Go To 6</p> <p>No → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off. Disconnect the module that corresponds to the PCI Bus circuit that measured steadily above 4.0 volts. Turn the ignition on. NOTE: If the PCI Bus circuit for the Memory Heated Seat/Mirror Module was above 4.0 volts and is equipped with side airbags, disconnect each module one at a time. Measure the voltage of the PCI Bus circuit that previously measured above 4.0 volts. Is the voltage steadily above 4.0 volts with the module disconnected?</p> <p>Yes → Repair the PCI Bus circuit that measured over 4.0 volts for a short to voltage. Perform BODY VERIFICATION TEST - VER 1.</p> <p>No → Replace the module that caused the short to voltage on the PCI Bus circuit. Perform BODY VERIFICATION TEST - VER 1.</p>	All

***PCI BUS COMMUNICATION FAILURE — Continued**

TEST	ACTION	APPLICABILITY
7	<p>Note: Determine which modules this vehicle is equipped with before beginning. Turn the ignition off. Disconnect the negative battery cable. Disconnect the BCM harness connectors and remove the Body Control Module from the Junction Block. Measure the resistance between ground and each of the PCI Bus circuits at the BCM C1, C3, C4 connectors and at the Junction Block Body Control Module connector cavity 10. Is the resistance below 1000.0 ohms for any of the measurements?</p> <p>Yes → Go To 8</p> <p>No → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1.</p>	All
8	<p>Turn the ignition off. Disconnect the negative battery cable. Disconnect the module that corresponds to the PCI Bus circuit that resistance measured below 1000.0 ohms. NOTE: If the PCI Bus circuit for the Memory Heated Seat/Mirror Module was below 1000.0 ohms and is equipped with side airbags, disconnect each module one at a time. Measure the resistance between ground and the PCI Bus circuit that previously measured below 1000.0 ohms. NOTE: If the PCI Bus circuit for the Instrument Cluster (MIC) was below 1000.0 ohms and is equipped with a Compass/Mini Trip Computer (CMTC), disconnect the CMTC before the MIC. Is the resistance below 1000.0 ohms with the module disconnected?</p> <p>Yes → Repair the PCI Bus circuit that resistance measured below 1000.0 ohms for a short to ground. Perform BODY VERIFICATION TEST - VER 1.</p> <p>No → Replace the module that caused the short to ground on the PCI Bus circuit. Perform BODY VERIFICATION TEST - VER 1.</p>	All

Symptom List:

P0030-O2 SENSOR 1/1 HEATER CIRCUIT
P0036-O2 SENSOR 1/2 HEATER CIRCUIT
P0050-O2 SENSOR 2/1 HEATER CIRCUIT
P0056-O2 SENSOR 2/2 HEATER CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0030-O2 SENSOR 1/1 HEATER CIRCUIT.

When Monitored and Set Condition:

P0030-O2 SENSOR 1/1 HEATER CIRCUIT

When Monitored: Engine Running.

Set Condition: The PCM detects the O2 Heater voltage is out of acceptable range. Below 0.0926 of a volt or above 0.3397 of a volt. One Trip Fault.

P0036-O2 SENSOR 1/2 HEATER CIRCUIT

When Monitored: Engine Running.

Set Condition: The PCM detects the O2 Heater voltage is out of acceptable range. Below 0.0926 of a volt or above 0.3397 of a volt. One Trip Fault.

P0050-O2 SENSOR 2/1 HEATER CIRCUIT

When Monitored: Engine Running.

Set Condition: The PCM detects the O2 Heater voltage is out of acceptable range. Below 0.0926 of a volt or above 0.3397 of a volt. One Trip Fault.

P0056-O2 SENSOR 2/2 HEATER CIRCUIT

When Monitored: Engine Running.

Set Condition: The PCM detects the O2 Heater voltage is out of acceptable range. Below 0.0926 of a volt or above 0.3397 of a volt. One Trip Fault.

POSSIBLE CAUSES

O2 HEATER ELEMENT
O2 SENSOR HEATER GROUND CIRCUIT OPEN
O2 SENSOR
O2 HEATER CONTROL SHORTED TO VOLTAGE
O2 HEATER CONTROL CIRCUIT OPEN
O2 HEATER CONTROL SHORTED TO GROUND

P0030-O2 SENSOR 1/1 HEATER CIRCUIT — Continued**POSSIBLE CAUSES**

INTERMITTENT CONDITION

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 3 No → Go To 2	All
2	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 3 No → Go To 10	All
3	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. NOTE: Heater Resistance Specification: 1/1 and 2/1 = 3.0 to 4.0 ohms or 1/2 and 2/2 = 4.0 to 5.0 ohms. Is the O2 Sensor Heater element within specification? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. Using a 12-volt test light connected to ground, probe the O2 Sensor Heater Control circuit in the O2 Sensor harness connector. Does the test light brightly flash On and Off? Yes → Go To 5 No → Go To 6	All

P0030-O2 SENSOR 1/1 HEATER CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance between and engine ground and the O2 Sensor Heater ground circuit in 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 Sensor Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Ignition on, engine not running. Measure the voltage on the O2 Sensor 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 Sensor Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Disconnect the O2 Sensor harness connector. 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 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 8 No → Repair the open in the O2 Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the O2 Sensor Heater Control circuit in 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 9	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 - 5.	All

P0030-O2 SENSOR 1/1 HEATER CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
10	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:

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

When Monitored and Set Condition:

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

When Monitored: Engine Running, during all drive modes.

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

POSSIBLE CAUSES

INTERMITTENT CONDITION

VACUUM LEAK

HIGH RESISTANCE IN MAP 5 VOLT SUPPLY CIRCUIT

RESISTANCE TO GROUND IN MAP 5 VOLT SUPPLY CIRCUIT

MAP SENSOR

HIGH RESISTANCE IN MAP SENSOR SIGNAL CIRCUIT

RESISTANCE TO GROUND IN MAP SENSOR SIGNAL CIRCUIT

HIGH RESISTANCE IN MAP SENSOR GROUND CIRCUIT

PCM

HIGH RESISTANCE IN TPS 5 VOLT SUPPLY CIRCUIT

RESISTANCE TO GROUND IN TPS 5 VOLT SUPPLY CIRCUIT

TP SENSOR

HIGH RESISTANCE IN TP SENSOR SIGNAL CIRCUIT

RESISTANCE TO GROUND IN TPS SIGNAL CIRCUIT

HIGH RESISTANCE IN TPS GROUND CIRCUIT

PCM

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

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Diagnose any TPS or MAP Sensor component DTCs before continuing.</p> <p>NOTE: If the P0501 - No Vehicle Speed Signal is set long with this DTC, refer to the P0500 diagnostics before continuing.</p> <p>NOTE: The throttle plate and linkage should be free from binding and carbon build up.</p> <p>NOTE: Ensure the throttle plate is at the idle position.</p> <p>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?</p> <p>Yes → Go To 2</p> <p>No → Go To 19</p>	All
2	<p>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.</p> <p>NOTE: A large vacuum leak is most likely the cause of this DTC.</p> <p>Inspect the Intake Manifold for leaks and cracks. Inspect the Power Brake Booster for any vacuum leaks. Inspect the PCV system for proper operation or any vacuum leaks. Were any vacuum leaks found?</p> <p>Yes → Repair the vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 3</p>	All
3	<p>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?</p> <p>Yes → Go To 4</p> <p>No → Go To 12</p>	All
4	<p>Ignition on, engine not running. With the DRBIII®, monitor the TPS voltage while slowly depressing the throttle pedal from the idle position to the wide open throttle position. Does voltage start approximately at 0.8 of a volt and go above 3.5 volts with a smooth transition?</p> <p>Yes → Go To 19</p> <p>No → Go To 5</p>	All

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

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the TPS harness connector. 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 5 Volt Supply circuit from the TPS harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the high resistance in the TPS 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit at the TPS harness connector. Is the resistance above 100k ohms? Yes → Go To 7 No → Repair the resistance to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the TPS harness connector. With the DRBIII®, monitor the TPS voltage. Ignition on, engine not running. Connect a jumper wire between the TPS Signal circuit and the Sensor ground circuit. Does the TPS 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	All
8	Turn the ignition off. Disconnect the TPS harness connector. 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 TPS Signal circuit from the TPS harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the high resistance in the TPS Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

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

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the TPS Signal circuit in the TPS harness connector. Is the resistance above 100k ohms? Yes → Go To 10 No → Repair the resistance to ground in the TPS Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Disconnect the TPS harness connector. 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 Sensor ground circuit from the TPS harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Repair the high resistance in the Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. 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 - 5.	All
12	Turn the ignition off. Disconnect the MAP Sensor harness connector. 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 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 13 No → Repair the high resistance in the MAP 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

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

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit at the MAP Sensor harness connector. Is the resistance above 100k ohms? Yes → Go To 14 No → Repair the resistance to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
14	Turn the ignition off. Disconnect the MAP Sensor harness connector. With the DRBIII®, monitor the MAP Sensor voltage. Ignition on, engine not running. Connect a jumper wire between the MAP Sensor Signal circuit and the Sensor ground circuit . Cycle the ignition switch from off to on. With the DRBIII®, monitor the MAP Sensor voltage. Does the DRBIII® display MAP voltage from approximately 4.9 volts to below 0.5 volt? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. Disconnect the MAP Sensor harness connector. 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 MAP Sensor 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 16 No → Repair the high resistance in the MAP Sensor Signal circuit Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
16	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the MAP Sensor Signal circuit at the MAP Sensor harness connector. Is the resistance above 100k ohms? Yes → Go To 17 No → Repair the resistance to ground in the MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

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

TEST	ACTION	APPLICABILITY
17	Turn the ignition off. Disconnect the MAP Sensor harness connector. 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 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 18 No → Repair the high resistance in the Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
18	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. 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 - 5.	All
19	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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0070-AMBIENT TEMP SENSOR STUCK

P0071-AMBIENT TEMP SENSOR PERFORMANCE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0070-AMBIENT TEMP SENSOR STUCK.

When Monitored and Set Condition:

P0070-AMBIENT TEMP SENSOR STUCK

When Monitored: Engine Running.

Set Condition: After 4 warm-up cycles, the PCM did not see a 2°C (35°F) change in the Ambient Temperature Sensor voltage within 200 miles . Two Trip Fault

P0071-AMBIENT TEMP SENSOR PERFORMANCE

When Monitored: Engine off time is greater than 480 minutes. Ambient temperature is greater than 4°C (39°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. If the Ambient Air Temperature Sensor value is not within 10°C (53°F) of the other two temperartue sensors an error is detected. Two Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

AMBIENT TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

AMBIENT AIR TEMPERATURE SENSOR VOLTAGE BELOW 1.0 VOLT

AMBIENT TEMP SENSOR SIGNAL CIRCUIT OPEN

SENSOR GROUND CIRCUIT OPEN

SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

AMBIENT TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND

PCM LOW

PCM HIGH

P0070-AMBIENT TEMP SENSOR STUCK — Continued

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Assure proper communications between the FCM and PCM before proceeding. If not, refer to the symptom list in the Communication section of the appropriate body service manual.</p> <p>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?</p> <p>Yes → Go To 2 No → Go To 9</p>	All
2	<p>NOTE: Visually inspect both the component and the PCM connectors. Look for damage, partially broken wires and backed out or corroded terminals</p> <p>Turn the ignition off Disconnect the Ambient Temp Sensor harness connector. Ignition on, engine not running. Measure the voltage of the Ambient Temperature Sensor Signal circuit in the Ambient Temp Sensor harness connector. Is the voltage above 5.2 volts?</p> <p>Yes → Repair the short to battery voltage in the Ambient Temperature Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3</p>	All
3	<p>Turn the ignition off. Disconnect the Ambient Air Temperature Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read the Ambient Air Temperature Sensor voltage. Is the voltage above 4.6 volts?</p> <p>Yes → Go To 4 No → Go To 7</p>	All
4	<p>Turn the ignition off. Disconnect the Ambient Air Temperature Sensor harness connector. Using a jumper wire, jumper across the Ambient Air Temperature Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read the Ambient Air Temperature voltage. Is the voltage below 1.0 volt?</p> <p>Yes → Replace the Ambient Air Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5</p>	All

P0070-AMBIENT TEMP SENSOR STUCK — Continued

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. 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 Ambient Temperature Sensor Signal Circuit from the Ambient Temperature Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the Ambient Temp Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
6	<p>Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. 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 Sensor ground circuit from the Ambient Temperature Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?</p> <p>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.</p> <p>No → Repair the open in the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
7	<p>Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Ambient Temp Sensor Signal circuit. Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the Ambient Temperature Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 8</p>	All

P0070-AMBIENT TEMP SENSOR STUCK — Continued

TEST	ACTION	APPLICABILITY
8	<p>Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the Ambient Temperature Sensor Signal circuit and the Sensor ground circuit in the Ambient Temperature Sensor harness connector. Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to the Sensor ground in the Ambient Temperature Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → 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.</p>	All
9	<p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information to identify under what conditions the DTC set. Refer to any Technical Service Bulletins (TSB) that may apply. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:

P0072-AMBIENT TEMP SENSOR LOW

When Monitored and Set Condition:

P0072-AMBIENT TEMP SENSOR LOW

When Monitored: The ignition key on.

Set Condition: Ambient Temperature Sensor is less than .0392 of a volt at the PCM. One Trip Fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION AMBIENT TEMPERATURE SENSOR INTERNAL FAILURE AMBIENT TEMPERATURE SENSOR SIGNAL SHORTED TO GROUND AMBIENT TEMPERATURE SENSOR SIGNAL SHORTED TO SENSOR GROUND CIRCUIT 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 → Go To 6	All
2	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read Ambient Temperature Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the Ambient Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Ambient Temperature Sensor Signal circuit in the Ambient Temperature Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Ambient Temperature Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0072-AMBIENT TEMP SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the Ambient Temperature Sensor Signal circuit and the Sensor ground circuit in the Ambient Temperature Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to Sensor ground in the Ambient Temperature Sensor 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. 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 - 5.	All
6	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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0073-AMBIENT TEMP SENSOR HIGH

When Monitored and Set Condition:

P0073-AMBIENT TEMP SENSOR HIGH

When Monitored: The ignition key on.

Set Condition: The Ambient Temperature Sensor voltage is greater than 4.94 volts. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

AMBIENT TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

AMBIENT TEMPERATURE SENSOR INTERNAL FAILURE

AMBIENT TEMPERATURE SENSOR SIGNAL CIRCUIT OPEN

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 → Go To 7	All
2	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Ignition on, engine not running. Measure the voltage of the Ambient Temperature Sensor Signal circuit in the Ambient Temperature Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the Ambient Temperature Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0073-AMBIENT TEMP SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Connect a jumper wire between the Ambient Temperature Sensor Signal circuit and the Sensor ground circuit in the Ambient Temperature 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 4	All
4	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. 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 Ambient Temperature Sensor Signal circuit from the Ambient Temperature 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 Ambient Temperature Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. 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 Sensor ground circuit from the Ambient Temperature 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 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. 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 - 5.	All

P0073-AMBIENT TEMP SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom:**P0106-MAP SENSOR PERFORMANCE****When Monitored and Set Condition:****P0106-MAP SENSOR PERFORMANCE**

When Monitored: With engine greater than 64 RPM and the throttle blade at closed throttle.

Set Condition: Too small of a difference is seen between barometric pressure with ignition on (engine running) and manifold vacuum for 2.80 seconds.

POSSIBLE CAUSES

INTERMITTENT CONDITION

5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND

5 VOLT SUPPLY CIRCUIT OPEN

MAP SENSOR INTERNAL FAILURE

MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

MAP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT

MAP 5 VOLT SUPPLY CIRCUIT OPEN

MAP SENSOR VACUUM PORT

MAP SENSOR

PCM 5 VOLT SUPPLY CIRCUIT

PCM MAP SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	<p>NOTE: If a MAP high or Low DTC set along with P0106, diagnose the High or Low DTC first before continuing.</p> <p>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?</p> <p>Yes → Go To 2 No → Go To 14</p>	All
2	<p>Ignition on, engine not running. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 3.19 volts?</p> <p>Yes → Go To 3 No → Go To 11</p>	All

P0106-MAP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. With the DRBIII®, monitor the MAP Sensor voltage. Ignition on, engine not running. Is the voltage above 1.2 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the MAP Sensor Signal circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the MAP Sensor Signal circuit and the Sensor ground circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to Sensor ground in the MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</p> 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 - 5.	All

P0106-MAP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the MAP Sensor harness connector. 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 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 10 No → Repair the open in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. 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 - 5.	All
11	Turn the ignition off. Disconnect the MAP Sensor harness connector. 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 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 open in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Turn the ignition off. Remove the MAP Sensor. Inspect the vacuum port, check for restrictions or any foreign materials. Were any restrictions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All

P0106-MAP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
13	<p>If there are no possible causes remaining, view repair.</p> <p style="padding-left: 40px;">Repair</p> <p style="padding-left: 80px;">Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
14	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>NOTE: Remove the MAP Sensor and inspect the MAP and vacuum passage for restrictions and foreign material</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom:**P0107-MAP SENSOR LOW****When Monitored and Set Condition:****P0107-MAP SENSOR LOW**

When Monitored: Engine speed between 600 to 3500 RPM. TPS voltage less than 1.2 volts. Battery voltage greater than 10 volts.

Set Condition: The MAP sensor signal voltage is less than 0.0782 of a volt for 1.7 seconds. One trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND

5 VOLT SUPPLY CIRCUIT OPEN

MAP SENSOR INTERNAL FAILURE

MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

MAP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT

PCM 5 VOLT SUPPLY CIRCUIT

PCM MAP SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 1.2 volts? Yes → Go To 3 No → Go To 2	All
2	Start the engine. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 0.4 of a volt? Yes → Go To 3 No → Go To 11	All
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 4 No → Go To 8	All

P0107-MAP SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. With the DRBIII®, monitor the MAP Sensor voltage. Is the voltage above 1.2 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the MAP Sensor Signal circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the MAP Sensor Signal circuit and the Sensor ground circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to Sensor ground in the MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</p> 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 - 5.	All
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit in the MAP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All

P0107-MAP SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the MAP Sensor harness connector. 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 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 10 No → Repair the open in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. 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 - 5.	All
11	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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0108-MAP SENSOR HIGH

When Monitored and Set Condition:

P0108-MAP SENSOR HIGH

When Monitored: Engine speed between 600 to 3500 RPM. TP sensor voltage less than 1.2 volts for greater than 1.7 seconds. Battery voltage greater than 10 volts

Set Condition: The MAP sensor signal voltage is greater than 4.92 volts. One trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

MAP SENSOR SIGNAL CIRCUIT SHORTED TO 5 VOLT SUPPLY CIRCUIT

MAP SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

MAP SENSOR INTERNAL FAILURE

MAP SENSOR SIGNAL CIRCUIT OPEN

SENSOR GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read the MAP Sensor voltage. Is the voltage above 4.6 volts? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the MAP Sensor Signal circuit and the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the MAP Sensor Signal circuit for a short to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0108-MAP SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the MAP Sensor Signal circuit in the MAP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Connect a jumper wire between the MAP Sensor Signal circuit and the Sensor ground circuit. With the DRBIII®, monitor the MAP Sensor voltage. Ignition on, engine not running. Is the voltage below 1.0 volt? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. 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 MAP Sensor 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 6 No → Repair the open in the MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. 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 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 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0108-MAP SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
8	<p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom List:**P0110-INTAKE AIR TEMPERATURE SENSOR STUCK****P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE**

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0110-INTAKE AIR TEMPERATURE SENSOR STUCK.

When Monitored and Set Condition:**P0110-INTAKE AIR TEMPERATURE SENSOR STUCK**

When Monitored: Engine Running.

Set Condition: After 4 warm-up cycles, the PCM did not see a 2°C (18°F) change in the IAT Sensor voltage within 200 miles . Two Trip Fault

P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE

When Monitored: Engine off time is greater than 480 minutes. Ambient temperature is greater than 4°C (39°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. If the IAT Sensor value is not within 2°C (18°F) of the other two temperartue sensors an error is detected. Two Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

IAT SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

IAT SENSOR VOLTAGE BELOW 1.0 VOLTS

IAT SENSOR SIGNAL CIRCUIT OPEN

SENSOR GROUND CIRCUIT OPEN

IAT SENSOR SIGNAL SHORTED TO GROUND

IAT SIGNAL CIRCUIT SHORT TO SENSOR GROUND

PCM HIGH

PCM LOW

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 → Go To 9	All

P0110-INTAKE AIR TEMPERATURE SENSOR STUCK — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the IAT 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 IAT Sensor Signal circuit in the IAT Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the IAT Sensor 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	Turn the ignition off. Disconnect the IAT Sensor harness connector. Using a jumper wire, jumper across the IAT Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read the IAT voltage. Is the voltage below 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the IAT Sensor harness connector. 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 IAT Sensor 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 IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0110-INTAKE AIR TEMPERATURE SENSOR STUCK — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the IAT Sensor harness connector. 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 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 → 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 → Repair the open in the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between chassis ground and the IAT Sensor Signal circuit in the IAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the Sensor ground circuit and the IAT Sensor Signal circuit at the IAT Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to the Sensor ground circuit in the IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → 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.	All

P0110-INTAKE AIR TEMPERATURE SENSOR STUCK — Continued

TEST	ACTION	APPLICABILITY
9	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:**P0112-INTAKE AIR TEMPERATURE SENSOR LOW****When Monitored and Set Condition:****P0112-INTAKE AIR TEMPERATURE SENSOR LOW**

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

Set Condition: The Intake Air Temperature (IAT) sensor voltage is less than 0.0784 of a volt. One trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

IAT SENSOR INTERNAL FAILURE

IAT SENSOR SIGNAL SHORTED TO GROUND

IAT SENSOR SIGNAL SHORTED TO SENSOR GROUND CIRCUIT

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the IAT voltage. Is the voltage below 1.0 volt? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the IAT harness connector. Ignition on, engine not running. With the DRBIII®, read IAT voltage. Is the voltage above 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 3	All
3	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the IAT Sensor Signal circuit at the IAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 4	All

P0112-INTAKE AIR TEMPERATURE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the IAT Sensor Signal circuit and the Sensor ground circuit in the IAT Sensor harness connector. Is the resistance below 100 ohms?</p> <p style="padding-left: 40px;">Yes → Repair the short to Sensor ground in the IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.</p> <p style="padding-left: 40px;">No → Go To 5</p>	All
5	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p style="padding-left: 40px;">Repair</p> <p style="padding-left: 80px;">Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 6.</p>	All
6	<p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 6.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom:**P0113-INTAKE AIR TEMPERATURE SENSOR HIGH****When Monitored and Set Condition:****P0113-INTAKE AIR TEMPERATURE SENSOR HIGH**

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

Set Condition: The Intake Air Temperature (IAT) sensor voltage at the PCM is greater than 4.98 volts. One trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

IAT SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

IAT SENSOR INTERNAL FAILURE

IAT SENSOR SIGNAL CIRCUIT OPEN

SENSOR GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the IAT voltage. Is the voltage above 4.6 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. Ignition on, engine not running. Measure the voltage of the IAT Sensor Signal circuit in the IAT Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0113-INTAKE AIR TEMPERATURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the IAT harness connector. Connect a jumper wire between the IAT Sensor Signal circuit and the Sensor ground circuit in the IAT harness connector. Ignition on, engine not running. With the DRBIII®, read IAT voltage. Is the voltage below 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the IAT Sensor harness connector. 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 IAT Sensor 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 IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the IAT Sensor harness connector. 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 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 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. 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 - 5.	All

P0113-INTAKE AIR TEMPERATURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:

P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE

When Monitored and Set Condition:

P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE

When Monitored: Engine off time is greater than 480 minutes. Ambient temperature is greater than 4°C (39°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. If the ECT Sensor value is not within 2°C (18°F) of the other two temperature sensors an error is detected. Two Trip Fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ECT SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
ECT SENSOR VOLTAGE BELOW 1.0 VOLT
ECT SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
ECT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
ECT SENSOR SIGNAL SHORTED TO SENSOR GROUND
PCM HIGH
PCM LOW

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 → Go To 9	All
2	Turn the ignition off. 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 ECT Sensor Signal circuit in the ECT Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECT Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read the ECT voltage. Is the voltage above 4.6 volts? Yes → Go To 4 No → Go To 7	All
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. Using a jumper wire, jumper across the IAT Sensor harness connector. Ignition on, engine not running. 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 ECT Sensor harness connector. 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 ECT Sensor 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 ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the ECT harness connector. 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 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 → 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 → Repair the open in the ECT Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	<p>Disconnect the ECT Sensor harness connector. Turn the ignition off. Disconnect the PCM harness connector. Measure the resistance between chassis ground and the ECT Sensor Signal circuit in the ECT Sensor harness connector. Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 8</p>	All
8	<p>Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the ECT Sensor Signal circuit and the Sensor ground circuit at the ECT Sensor harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to Sensor ground in the ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → 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.</p>	All
9	<p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. Review the DRB 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:**P0117-ENGINE COOLANT TEMPERATURE SENSOR LOW****When Monitored and Set Condition:****P0117-ENGINE COOLANT TEMPERATURE SENSOR 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 0.0782 of a volt. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

ECT SENSOR INTERNAL FAILURE

ECT SENSOR SIGNAL SHORTED TO GROUND

ECT SENSOR SIGNAL SHORTED TO SENSOR GROUND CIRCUIT

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the ECT voltage. Is the voltage below 1.0 volt? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the ECT harness connector. Ignition on, engine not running. With the DRBIII®, read ECT 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 ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the ECT Sensor Signal circuit in the ECT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0117-ENGINE COOLANT TEMPERATURE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the ECT Sensor Signal circuit and the Sensor ground circuit in the ECT Sensor harness connector. Is the resistance below 100 ohms?</p> <p style="padding-left: 40px;">Yes → Repair the short to Sensor ground in the ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 5</p>	All
5	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p style="padding-left: 40px;">Repair</p> <p style="padding-left: 80px;">Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
6	<p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom:**P0118-ENGINE COOLANT TEMPERATURE SENSOR HIGH****When Monitored and Set Condition:****P0118-ENGINE COOLANT TEMPERATURE SENSOR HIGH**

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

Set Condition: The Engine Coolant Temperature (ECT) sensor voltage at the PCM is greater than 4.98 volts. One trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

ECT SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

ECT SENSOR INTERNAL FAILURE

ECT SENSOR SIGNAL CIRCUIT OPEN

SENSOR GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the ECT voltage. Is the voltage above 4.6 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Ignition on, engine not running. Measure the voltage of the ECT Sensor Signal circuit in the ECT Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0118-ENGINE COOLANT TEMPERATURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECT harness connector. Connect a jumper wire between the ECT Sensor Signal circuit and the Sensor ground circuit in the ECT harness connector. Ignition on, engine not running. With the DRBIII®, read ECT voltage. Is the voltage below 1.0 volt? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. 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 ECT Sensor 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 ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the ECT Sensor harness connector. 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 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 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. 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 - 5.	All

P0118-ENGINE COOLANT TEMPERATURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:

P0121-THROTTLE POSITION SENSOR #1 PERFORMANCE

When Monitored and Set Condition:

P0121-THROTTLE POSITION SENSOR #1 PERFORMANCE

When Monitored: With the engine running and no MAP Sensor or TP Sensor DTC's set.

Set Condition: The PCM determines a valid range in which the TP Sensor should be, at a given RPM/Load. The actual TP Sensor voltage is then compared to this value. If the TP Sensor voltage does not fall within the expected range within a predetermined time an error will be detected. One Trip Fault.

POSSIBLE CAUSES
TPS SWEEP
INTERMITTENT CONDITION
RESISTANCE IN 5 VOLT SUPPLY CIRCUIT
RESISTANCE TO GROUND IN 5 VOLT SUPPLY CIRCUIT
TP SENSOR
RESISTANCE IN TP SENSOR SIGNAL CIRCUIT
RESISTANCE BETWEEN GROUND AND TP SENSOR SIGNAL CIRCUIT
RESISTANCE IN THE SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Diagnose any other TPS DTC(s) before continuing. NOTE: The throttle plate and linkage should be free from binding and carbon build up. NOTE: Ensure 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?</p> <p style="text-align: center;">Yes → Go To 2 No → Go To 10</p>	All
2	<p>Ignition on, engine not running. With the DRBIII®, monitor the TPS voltage while slowly depressing the throttle pedal 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?</p> <p style="text-align: center;">Yes → Go To 11 No → Go To 3</p>	All

P0121-THROTTLE POSITION SENSOR #1 PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TPS harness connector. 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 5 Volt Supply circuit from the TPS harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the high resistance in the TPS 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit at the TPS harness connector. Is the resistance above 1.0 ohm? Yes → Go To 5 No → Repair the resistance to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Turn the ignition off. Disconnect the TPS harness connector. Ignition on, engine not running. With the DRBIII®, monitor the TPS voltage. Connect a jumper wire between the TPS Signal circuit and the Sensor ground circuit. Does the TPS voltage change from approximately 4.9 volts to 0.5 of a volt? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	Turn the ignition off. Disconnect the TPS harness connector. 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 TPS Signal circuit from the TPS harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the high resistance in the TPS Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P0121-THROTTLE POSITION SENSOR #1 PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the TPS Signal circuit at the TPS harness connector. Is the resistance above 100k ohms? Yes → Go To 8 No → Repair the high resistance to ground in the TP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
8	Turn the ignition off. Disconnect the TPS harness connector. 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 Sensor ground circuit from the TPS harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the high resistance in the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
9	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, review repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
10	Ignition on, engine not running. With the DRBIII®, monitor the TPS 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 → Go To 11 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P0121-THROTTLE POSITION SENSOR #1 PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
11	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p>No → Test Complete.</p>	All

Symptom:

P0122-THROTTLE POSITION SENSOR #1 LOW

When Monitored and Set Condition:

P0122-THROTTLE POSITION SENSOR #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 0.0978 of a volt.
One Trip Fault.

POSSIBLE CAUSES
THROTTLE POSITION SENSOR SWEEP INTERMITTENT CONDITION 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND 5 VOLT SUPPLY CIRCUIT OPEN TP SENSOR INTERNAL FAILURE TP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND TP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT PCM 5 VOLT SUPPLY CIRCUIT PCM TP SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the Throttle Position Sensor voltage. Is the voltage below 0.2 of a volt? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect the TPS harness connector. Ignition on, engine not running. Measure the voltage of the 5 Volt Supply circuit in the TPS harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 7	All
3	Turn the ignition off. Disconnect the TPS harness connector. With the DRBIII®, monitor the TPS voltage. Ignition on, engine not running. 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 #1 LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the TPS Signal circuit at the TPS harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Throttle Position Sensor Signal. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance between the TPS Signal circuit and the Sensor ground circuit in the TPS harness connector. Is the resistance below 100 ohms? Yes → Repair the short to Sensor ground in the Throttle Position Sensor 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. 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 - 5.	All
7	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit in the TPS harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	Turn the ignition off. Disconnect the TPS harness connector. 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 5 Volt Supply circuit from the TPS 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 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0122-THROTTLE POSITION SENSOR #1 LOW — Continued

TEST	ACTION	APPLICABILITY
9	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
10	<p>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?</p> <p>Yes → Go To 11</p> <p>No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
11	<p>NOTE: Ensure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing. 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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 3.</p> <p>No → Test Complete.</p>	All

Symptom:**P0123-THROTTLE POSITION SENSOR #1 HIGH****When Monitored and Set Condition:****P0123-THROTTLE POSITION SENSOR #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 4.47 volts.
One Trip Fault.

POSSIBLE CAUSES

THROTTLE POSITION SENSOR SWEEP
INTERMITTENT CONDITION
TP SENSOR SIGNAL CIRCUIT SHORTED TO 5 VOLT SUPPLY CIRCUIT
TP SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
TP SENSOR INTERNAL FAILURE
SENSOR GROUND CIRCUIT OPEN
TP SENSOR SIGNAL CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Ensure the throttle is fully closed and free from binding or carbon build up. Start the engine. With the DRBIII®, read the TPS voltage. Is the voltage above 4.5 volts?</p> <p>Yes → Go To 2 No → Go To 8</p>	All
2	<p>Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance between the TPS Signal circuit and the 5 Volt Supply circuit in the TPS harness connector. Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to the 5 Volt Supply circuit in the Throttle Position Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 3</p>	All

P0123-THROTTLE POSITION SENSOR #1 HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TPS harness connector. Ignition on, engine not running. Measure the voltage of the TPS Signal circuit in the TPS harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the TP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the TPS harness connector. Connect a jumper wire between the TPS Signal circuit and the Sensor ground circuit. With the DRBIII®, monitor the TPS 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 5	All
5	Turn the ignition off. Disconnect the TPS harness connector. 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 Sensor ground circuit from the TPS 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 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the TPS harness connector. 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 TPS Signal circuit from the TPS 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 TPS Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0123-THROTTLE POSITION SENSOR #1 HIGH — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
8	<p>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?</p> <p>Yes → Go To 9</p> <p>No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
9	<p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	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, after engine is started.

Set Condition: The engine temperature does not go above 15°C (60°F). Failure time depends on start-up coolant temperature and ambient temperature. (i.e. 2 minutes for a start temp of 10°C (50°F) or up to 10 minutes for a vehicle with a start-up temp of -28°C (20°F). Two Trip Fault.

POSSIBLE CAUSES
LOW COOLANT LEVEL
THERMOSTAT OPERATION
ENGINE COOLANT TEMPERATURE SENSOR

TEST	ACTION	APPLICABILITY
1	<p>NOTE: If a Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.</p> <p>NOTE: Inspect the ECT terminals and related PCM terminals. Ensure the terminals are free from corrosion and damage.</p> <p>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.</p> <p>Note: Extremely cold outside ambient temperatures may have caused this DTC to set.</p> <p>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.</p> <p>Check the coolant system to make sure that the coolant is in good condition and at the proper level.</p> <p>Is the coolant level and condition OK?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Inspect the vehicle for a coolant leak and add the necessary amount of coolant.</p> <p style="padding-left: 40px;">Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All

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

TEST	ACTION	APPLICABILITY
2	<p>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 in the DRB values 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?</p> <p style="padding-left: 40px;">Yes → Go To 3</p> <p style="padding-left: 40px;">No → Replace the thermostat. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
3	<p>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 in the DRB values should stay relatively close to each other. Is the thermometer reading relatively close to the DRBIII® ECT reading?</p> <p style="padding-left: 40px;">Yes → Test Complete.</p> <p style="padding-left: 40px;">No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All

Symptom:

P0128-THERMOSTAT RATIONALITY

When Monitored and Set Condition:

P0128-THERMOSTAT RATIONALITY

When Monitored: The engine running.

Set Condition: The PCM predicts a coolant temperature value that it will compare to the actual coolant temperature. If the two coolant temperature values are not within 10°C (18°F) of each other an error is detected. Two Trip Fault.

POSSIBLE CAUSES

COOLANT LEVEL
THERMOSTAT

TEST	ACTION	APPLICABILITY
1	<p>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.</p> <p>Check the coolant mixture and the coolant level. If coolant level is low, check for visible leaks or perform a pressure test on the coolant system. Was the coolant level low or where any leaks found?</p> <p>Yes → Repair the coolant leak and/or fill coolant to the proper level. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p>No → Replace the thermostat and fill coolant level to the proper level. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p>	All

Symptom:**P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW****When Monitored and Set Condition:****P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW**

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

Set Condition: The PCM senses the voltage from the MAP sensor to be less than 2.196 volts but above 0.0392 of a volt for 300 milliseconds. One Trip Fault.

POSSIBLE CAUSES

IAC SENSE CIRCUIT LOW
 IAC SENSE CIRCUIT HIGH
 INTERMITTENT CONDITION
 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
 5 VOLT SUPPLY CIRCUIT OPEN
 MAP SENSOR INTERNAL FAILURE
 MAP SENSOR SIGNAL CIRCUIT OPEN
 MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
 PCM 5 VOLT SUPPLY CIRCUIT
 PCM MAP SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 2.2 volts. Yes → Go To 2 No → Go To 11	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 7	All

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. With the DRBIII®, monitor the MAP Sensor voltage. Is the voltage above 2.2 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. 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 MAP Sensor 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 MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the MAP Sensor Signal circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the MAP Sensor 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. 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 - 5.	All
7	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the MAP Sensor harness connector. 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 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 10 No → Repair the open in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. 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 - 5.	All
11	Start the engine. NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM. Allow the engine to idle. With the DRBIII®, read the IAC Current. Is the IAC Current below 146 mA? Yes → Refer to P0508 - IAC Valve Sense Low Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	Start the engine. NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM. Allow the engine to idle. With the DRBIII®, read the IAC Current. Is the IAC Current above 999 mA? Yes → Refer to P0509 - IAC Valve Sense Circuit High Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW — Continued

TEST	ACTION	APPLICABILITY
13	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom List:

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

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

When Monitored and Set Condition:**P0131-O2 SENSOR 1/1 VOLTAGE LOW**

When Monitored: Engine Running for less than 30 seconds. O2 Sensor Heater Temperature less than 251°C (484°F) Battery voltage greater than 10.99 volts.

Set Condition: The oxygen sensor signal voltage is below 2.5196 volts for 3 seconds. One trip Fault.

P0137-O2 SENSOR 1/2 VOLTAGE LOW

When Monitored: Engine Running for less than 30 seconds. O2 Sensor Heater Temperature less than 251°C (484°F) Battery voltage greater than 10.99 volts.

Set Condition: The oxygen sensor signal voltage is below 2.5196 volts for 3 seconds. One trip Fault.

P0151-O2 SENSOR 2/1 VOLTAGE LOW

When Monitored: Engine Running for less than 30 seconds. O2 Sensor Heater Temperature less than 251°C (484°F) Battery voltage greater than 10.99 volts.

Set Condition: The oxygen sensor signal voltage is below 2.5196 volts for 3 seconds. One trip Fault.

P0157-O2 SENSOR 2/2 VOLTAGE LOW

When Monitored: Engine Running for less than 30 seconds. O2 Sensor Heater Temperature less than 251°C (484°F) Battery voltage greater than 10.99 volts.

Set Condition: The oxygen sensor signal voltage is below 2.5196 volts for 3 seconds. One trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

O2 SENSOR

O2 SENSOR RETURN CIRCUIT SHORTED TO GROUND

O2 SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

P0131-O2 SENSOR 1/1 VOLTAGE LOW — Continued

POSSIBLE CAUSES	
O2 SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR RETURN CIRCUIT	
O2 SENSOR SIGNAL SHORTED TO HEATER GROUND CIRCUIT	
PCM RETURN CIRCUIT	
PCM SIGNAL CIRCUIT	

TEST	ACTION	APPLICABILITY
1	<p>Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read the O2 Sensor voltage. Is the voltage below 2.52 volts?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 9</p>	All
2	<p>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?</p> <p style="padding-left: 40px;">Yes → Go To 3</p> <p style="padding-left: 40px;">No → Go To 5</p>	All
3	<p>Turn the ignition off. Disconnect the O2 Sensor harness connector. Ignition on, engine not running. Measure the voltage on the O2 Sensor Return circuit in the O2 Sensor harness connector. Is the voltage at 2.5 volts?</p> <p style="padding-left: 40px;">Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
4	<p>Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the O2 Sensor Return circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms?</p> <p style="padding-left: 40px;">Yes → Repair the short to ground in the O2 Sensor Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → 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.</p>	All

P0131-O2 SENSOR 1/1 VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the O2 Sensor Signal circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the O2 Sensor Signal circuit and the Sensor Return circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to the Sensor Return circuit in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the O2 Sensor Signal circuit and the Heater ground circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to the Heater ground circuit in the O2 Sensor Signal 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. 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 - 5.	All

P0131-O2 SENSOR 1/1 VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
9	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p> Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p> No → Test Complete.</p>	All

Symptom List:

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

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

When Monitored and Set Condition:**P0132-O2 SENSOR 1/1 VOLTAGE HIGH**

When Monitored: The engine running for 119 seconds. O2 Sensor Heater Temperature is greater than 496°C (925°F). Battery voltage greater than 10.99 volts.

Set Condition: The Oxygen Sensor voltage is above 3.9902 volts for 30 seconds. One trip fault.

P0138-O2 SENSOR 1/2 VOLTAGE HIGH

When Monitored: The engine running for 119 seconds. O2 Sensor Heater Temperature is greater than 496°C (925°F). Battery voltage greater than 10.99 volts.

Set Condition: The Oxygen Sensor voltage is above 3.9902 volts for 30 seconds. One trip fault.

P0152-O2 SENSOR 2/1 VOLTAGE HIGH

When Monitored: The engine running for 119 seconds. O2 Sensor Heater Temperature is greater than 496°C (925°F). Battery voltage greater than 10.99 volts.

Set Condition: The Oxygen Sensor voltage is above 3.9902 volts for 30 seconds. One trip fault.

P0158-O2 SENSOR 2/2 VOLTAGE HIGH

When Monitored: The engine running for 119 seconds. O2 Sensor Heater Temperature is greater than 496°C (925°F). Battery voltage greater than 10.99 volts.

Set Condition: The Oxygen Sensor voltage is above 3.9902 volts for 30 seconds. One trip fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

O2 SENSOR

O2 SENSOR RETURN CIRCUIT OPEN

O2 SENSOR SIGNAL SHORTED TO VOLTAGE

P0132-O2 SENSOR 1/1 VOLTAGE HIGH — Continued

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

TEST	ACTION	APPLICABILITY
1	Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read the O2 Sensor voltage. Is the voltage above 3.99 volts? Yes → Go To 2 No → Go To 8	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 below 4.8 volts? Yes → Go To 3 No → Go To 5	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Ignition on, engine not running. Measure the voltage on the O2 Sensor Return circuit in 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 O2 Sensor harness connector 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 Return circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? 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 → Repair the open in the O2 Sensor return circuit. 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: Start and drive vehicle greater than 20 MPH and less than 55 MPH. Throttle open for a minimum 120 seconds. Coolant Temp greater than 70°C (158°F) Catalytic Converter Temperature greater than 600°C (1112°F) EVAP Purge active.

Set Condition: The O2 sensor voltage switches only 16 times for a 3.5L or 11 times for 2.7L or less from lean to rich within 20 second during monitoring. Two Trip Fault.

P0139-O2 SENSOR 1/2 SLOW RESPONSE

When Monitored: Start and drive vehicle greater than 20 MPH and less than 55 MPH. Throttle open for a minimum 120 seconds. Coolant Temp greater than 70°C (158°F) Catalytic Converter Temperature greater than 600°C

Set Condition: The O2 sensor voltage switches properly from lean to rich during monitoring. Two Trip Fault.

P0153-O2 SENSOR 2/1 SLOW RESPONSE

When Monitored: Start and drive vehicle greater than 20 MPH and less than 55 MPH. Throttle open for a minimum 120 seconds. Coolant Temp greater than 70°C (158°F) Catalytic Converter Temperature greater than 600°C

Set Condition: The O2 sensor voltage switches only 16 times for a 3.5L or 11 times for 2.7L or less from lean to rich within 20 second during monitoring. Two Trip Fault.

P0159-O2 SENSOR 2/2 SLOW RESPONSE

When Monitored: Start and drive vehicle greater than 20 MPH and less than 55 MPH. Throttle open for a minimum 120 seconds. Coolant Temp greater than 70°C (158°F) Catalytic Converter Temperature greater than 600°C

Set Condition: The O2 sensor voltage switches properly from lean to rich during monitoring. Two Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

P0133-O2 SENSOR 1/1 SLOW RESPONSE — Continued

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

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.</p> 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?	All
	Yes → Go To 2 No → Go To 6	
2	Start the engine. Inspect the exhaust system for leak between the engine and the O2 Sensors. Are there any exhaust leaks?	All
	Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	
3	Turn the ignition off Disconnect the O2 Sensor harness connector. Ignition on, engine not running. Measure the voltage on the O2 Sensor Signal circuit in the O2 Sensor harness connector. Is the voltage approximately 5.0 volts?	All
	Yes → Go To 4 No → Check the O2 Sensor Signal circuit for damage, short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Ignition on, engine not running. Measure the voltage on the O2 Sensor Return circuit in the O2 Sensor harness connector. Is the voltage at 2.5 volts?	All
	Yes → Check the O2 Sensor Return circuit for damage, short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	
5	If there are no possible causes remaining, view repair. Repair Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0133-O2 SENSOR 1/1 SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
6	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom List:**P0135-O2 SENSOR 1/1 HEATER PERFORMANCE****P0141-O2 SENSOR 1/2 HEATER PERFORMANCE****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%

Set Condition: O2 Heater Temperature does not reach 575°C (959°F) within 45 second during monitoring conditions. Two Trip Fault.

P0141-O2 SENSOR 1/2 HEATER PERFORMANCE

When Monitored: Engine Running and Heater duty cycle greater than 0%.

Set Condition: O2 Heater Temperature does not reach 400°C (752°F) within 45 second during monitoring conditions. Two Trip Fault.

P0155-O2 SENSOR 2/1 HEATER PERFORMANCE

When Monitored: Engine Running and Heater duty cycle greater than 0%.

Set Condition: O2 Heater Temperature does not reach 575°C (959°F) within 45 second during monitoring conditions. Two Trip Fault.

P0161-O2 SENSOR 2/2 HEATER PERFORMANCE

When Monitored: Engine Running and Heater duty cycle greater than 0%.

Set Condition: O2 Heater Temperature does not reach 400°C (752°F) within 45 second during monitoring conditions. Two Trip Fault.

POSSIBLE CAUSES

O2 HEATER ELEMENT

O2 SENSOR HEATER GROUND CIRCUIT OPEN

O2 HEATER CONTROL CIRCUIT OPEN

INTERMITTENT CONDITION

PCM

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE — Continued

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 display and equal to zero? Yes → Go To 3 No → Go To 2	All
2	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 0.4 to 0.6 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 3 No → Go To 7	All
3	NOTE: Allow the O2 sensor to cool down to room temperature. Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. NOTE: O2 Sensor Heater Resistance Specification: 1/1 and 2/1 = 3.0 to 4.0 ohms or 1/2 and 2/2 = 4.0 to 5.0 ohms. Is the resistance within the specifications? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance between an engine ground and the O2 Sensor Heater ground circuit in the O2 Sensor harness connector. Is the resistance below 0.5 of an ohm? Yes → Go To 5 No → Repair the open/high resistance in the O2 Sensor Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. 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 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 6 No → Repair the open/high resistance in the O2 Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
6	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
7	<p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	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

INTERMITTENT CONDITION

RESTRICTED FUEL SUPPLY LINE

FUEL PUMP INLET STRAINER PLUGGED

FUEL PUMP MODULE

O2 SENSOR

O2 SENSOR SIGNAL CIRCUIT

O2 SENSOR HEATER OPERATION

O2 SENSOR RETURN CIRCUIT

THROTTLE POSITION SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED

THROTTLE POSITION SENSOR SWEEP

MAP SENSOR OPERATION

ECT SENSOR OPERATION

ENGINE MECHANICAL PROBLEM

FUEL FILTER/PRESSURE REGULATOR (HIGH)

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.</p> <p>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?</p> <p>Yes → Go To 2 No → Go To 16</p>	All
2	<p>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.</p> <p>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 400 KPa +/- 34 KPa (58 psi +/- 5 psi). Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading.</p> <p>Within Specification Go To 3</p> <p>Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>Below Specification Go To 13</p> <p>Caution: Stop All Actuations.</p>	All
3	<p>Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read the O2 Sensor voltage. Is the voltage switching between 2.5 and 3.4 volts?</p> <p>Yes → Go To 4 No → Go To 10</p>	All
4	<p>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.</p> <p>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 4.5 volts?</p> <p>Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 5</p>	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
5	Ignition on, engine not running. With the DRBIII®, read TPS 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	Ignition on, engine not running. With the DRBIII®, read the TPS 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
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 with a smooth transition and did it reach at least 82°C? Yes → Go To 9 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
9	<p>Check for any of the following conditions/mechanical problems.</p> <p>AIR INDUCTION SYSTEM - must be free from leaks.</p> <p>ENGINE VACUUM - must be at least 13 inches in neutral</p> <p>ENGINE VALVE TIMING - must be within specifications</p> <p>ENGINE COMPRESSION - must be within specifications</p> <p>ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.</p> <p>ENGINE PCV SYSTEM - must flow freely</p> <p>TORQUE CONVERTER STALL SPEED - must be within specifications</p> <p>POWER BRAKE BOOSTER - no internal vacuum leaks</p> <p>FUEL - must be free of contamination</p> <p>FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector</p> <p>Are there any engine mechanical problems?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All
10	<p>Ignition on, engine not running.</p> <p>Disconnect the O2 Sensor harness connector.</p> <p>With the DRBIII®, monitor the O2 Sensor voltage.</p> <p>O2 Sensor voltage should read 5.0 volts on the DRBIII® with the connector disconnected.</p> <p>Using a jumper wire, jump across the O2 Sensor harness connector from the O2 Sensor Signal circuit to the O2 Sensor Return circuit at the O2 Sensor harness connector.</p> <p>NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.</p> <p>Did the O2 Sensor volts change from 5.0 volts to 2.5 volts?</p> <p>Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 11</p>	All
11	<p>Turn the ignition off.</p> <p>Disconnect the O2 Sensor harness connector.</p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, monitor the O2 Sensor voltage.</p> <p>Is the voltage above 4.8 volts?</p> <p>Yes → Go To 12</p> <p>No → Check the O2 Sensor 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.</p>	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the O2 Sensor harness connector. Ignition on, engine not running. Measure the voltage on the O2 Sensor Signal Return circuit in the O2 Sensor harness connector. Is the voltage at 2.5 volts? Yes → Test Complete. No → Check the O2 Sensor 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
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 339 KPa +/- 34 KPa (49 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
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

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
16	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	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 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

INTERMITTENT CONDITION

O2 SENSOR HEATER OPERATION

O2 SENSOR

EVAP PURGE SOLENOID OPERATION

O2 SENSOR SIGNAL CIRCUIT

O2 SENSOR RETURN CIRCUIT

THROTTLE POSITION SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED

TP SENSOR SWEEP

MAP SENSOR OPERATION

ECT SENSOR OPERATION

ENGINE MECHANICAL PROBLEM

FUEL FILTER/PRESSURE REGULATOR (HIGH)

PCM

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.</p> <p>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?</p> <p>Yes → Go To 2 No → Go To 14</p>	All
2	<p>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.</p> <p>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 400 KPa +/- 34 KPa (58 psi +/- 5 psi). Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading.</p> <p>Within Specification Go To 3</p> <p>Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>Caution: Stop All Actuators.</p>	All
3	<p>Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read the O2 Sensor voltage. Is the voltage switching between 2.5 and 3.4 volts?</p> <p>Yes → Go To 4 No → Go To 11</p>	All
4	<p>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.</p> <p>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?</p> <p>Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 5</p>	All

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
5	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 6 No → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Ignition on, engine not running. With the DRBIII®, read TPS voltage. NOTE: The throttle must be against the stop. Is the TPS voltage 0.92 of a volt or less with the Throttle closed? Yes → Go To 7 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Ignition on, engine not running. With the DRBIII®, read the TPS voltage. While monitoring the DRBIII®, slowly open and close the throttle. Does the voltage increase and decrease smoothly? Yes → Go To 8 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	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 9 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
9	<p>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 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 Engine Coolant Temperature 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 Engine Coolant Temperature value increase a smooth transition and did it reach at least 82°C</p> <p style="padding-left: 40px;">Yes → Go To 10</p> <p style="padding-left: 40px;">No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
10	<p>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?</p> <p style="padding-left: 40px;">Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All
11	<p>Ignition on, engine not running. 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. Using a jumper wire, jump from the O2 Sensor Signal circuit to the O2 Sensor 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 volts to 2.5 volts?</p> <p style="padding-left: 40px;">Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 12</p>	All

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
12	<p>Turn the ignition off. Disconnect the O2 Sensor harness connector. Turn the ignition on. Measure the voltage of the O2 Sensor Signal circuit in the O2 Sensor harness connector. Is the voltage above 4.8 volts?</p> <p>Yes → Check the O2 Sensor 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 in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 13</p>	All
13	<p>Turn the ignition off. Disconnect the O2 Sensor harness connector. Turn the ignition on. Measure the voltage on the O2 Sensor Return circuit in the O2 Sensor harness connector. Is the voltage at 2.5 volts?</p> <p>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.</p> <p>No → Check the O2 Sensor 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 in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
14	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition. NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant. 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 engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom List:

P0201-FUEL INJECTOR #1
P0202-FUEL INJECTOR #2
P0203-FUEL INJECTOR #3
P0204-FUEL INJECTOR #4
P0205-FUEL INJECTOR #5
P0206-FUEL INJECTOR #6

**Test Note: All symptoms listed above are diagnosed using the same tests.
The title for the tests will be P0201-FUEL INJECTOR #1.**

When Monitored and Set Condition:**P0201-FUEL INJECTOR #1**

When Monitored: With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

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

P0202-FUEL INJECTOR #2

When Monitored: With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

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

P0203-FUEL INJECTOR #3

When Monitored: With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

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

P0204-FUEL INJECTOR #4

When Monitored: With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

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

P0205-FUEL INJECTOR #5

When Monitored: With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

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

P0206-FUEL INJECTOR #6

When Monitored: With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

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

P0201-FUEL INJECTOR #1 — Continued

POSSIBLE CAUSES
INTERMITTENT CONDITION ASD RELAY OUTPUT CIRCUIT FUEL INJECTOR FUEL INJECTOR DRIVER CIRCUIT OPEN FUEL INJECTOR DRIVER 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 → Go To 7	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 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 high resistance in the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the Fuel Injector harness connector. Ignition on, engine not running. Using a 12-volt test light connected to 12-volts, backprobe the Fuel Injector Driver 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 4	All

P0201-FUEL INJECTOR #1 — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Fuel Injector harness connector. 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 Fuel Injector Driver 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 5 No → Repair the open in the Fuel Injector Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the Fuel Injector Driver circuit at the Fuel Injector harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Fuel Injector Driver 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. 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 - 5.	All
7	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. With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. Review the DRB 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0300-MULTIPLE CYLINDER MISFIRE

P0301-CYLINDER #1 MISFIRE

P0302-CYLINDER #2 MISFIRE

P0303-CYLINDER #3 MISFIRE

P0304-CYLINDER #4 MISFIRE

P0305-CYLINDER #5 MISFIRE

P0306-CYLINDER #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 Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.8% misfire rate is measured during two trips. Above 3000 RPM 1 trip less than 3000 RPM 2 trip.

P0301-CYLINDER #1 MISFIRE

When Monitored: Any time the engine is running, and the Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.8% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0302-CYLINDER #2 MISFIRE

When Monitored: Any time the engine is running, and the Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.8% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0303-CYLINDER #3 MISFIRE

When Monitored: Any time the engine is running, and the Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.8% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0304-CYLINDER #4 MISFIRE

When Monitored: Any time the engine is running, and the Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.8% 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 #5 MISFIRE**

When Monitored: Any time the engine is running, and the Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.8% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0306-CYLINDER #6 MISFIRE

When Monitored: Any time the engine is running, and the Target Learning Coefficient r has been successfully updated.

Set Condition: When more than a 1.8% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

POSSIBLE CAUSES

INTERMITTENT MISFIRE
 SECONDARY IGNITION
 ENGINE MECHANICAL PROBLEM
 FUEL SYSTEM PROBLEM
 ERRATIC CAM/CRANK SENSOR SIGNALS
 OTHER POSSIBLE CAUSES FOR MIS-FIRE
 PCM

TEST	ACTION	APPLICABILITY
1	<p>With the DRBIII®, select DTCs and RELATED FUNCTIONS. Read and record the FREEZE FRAME DATA. Select OBD II MONITORS. Read and record the MIS-FIRE SIMILAR CONDITIONS WINDOW DATA.</p> <p>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.</p> <p>Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute.</p> <p>Is the DRBIII® counting mis-fires at this time?</p> <p>Yes → Go To 2</p> <p>No → Go To 8</p>	All
2	<p>With the DRBIII®, read the FREEZE FRAME DATA.</p> <p>Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC.</p> <p>In the FREEZE FRAME DATA, is the LOAD VALUE over 50% and the operating temp normal?</p> <p>Yes → Check secondary ignition components and perform a cylinder leakage test. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 3</p>	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
3	<p>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 CYLINDER LEAKAGE TEST - must be within specifications CAM LOBES - must not be worn excessively WEAK or BROKEN VALVE SPRINGS ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 4</p>	All
4	<p>With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME, are the adaptive fuel percentages greater than +/- 15%?</p> <p>Yes → Refer to the Driveability Category and perform the Checking Fuel Delivery symptom. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 5</p>	All
5	<p>With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the engine RPM over 3000 and the operating temp normal?</p> <p>Yes → Test CMP and CKP signals with Lab Scope, check valve timing, and perform running vacuum test. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 6</p>	All
6	<p>Note: Anything that affects the speed of the crankshaft can cause a misfire DTC. The following are other possible causes for mis-fire: Injector harness connectors, PCM power grounds, restricted exhaust, intake restriction, damaged trigger wheel, contaminated fuel, carbon build up on valves, or the accessory drive belt (serpentine belt). Check for any TSB's that may relate to a Misfire DTC. Do any of the above causes exist?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 7</p>	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
8	<p>NOTE: The conditions that set the DTC are not present at this time. An intermittent problem may have been caused by moisture in the secondary ignition.</p> <p>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.</p> <p>With the DRBIII®, select DTC's AND RELATED FUNCTIONS. Read and record the FREEZE FRAME DATA. Select OBD II MONITORS. Read and record MIS-FIRE SIMILAR CONDITIONS WINDOW DATA.</p> <p>With these screens, attempt to duplicate the condition that has set the Misfire DTC. While using FREEZE FRAME DATA, pay particular attention to the DTC setting conditions, such as speed, temp, load, and map vacuum.</p> <p>Does the mis-fire reoccur?</p> <p>Yes → Restart diagnostics beginning with Test 2. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	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
 WIRING HARNESS INSPECTION
 CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	<p>Note: Check for any TSB's that may apply to this symptom. Ignition on, engine not running. With the DRBIII® in the miscellaneous menu, choose Clear PCM battery disconnect to reset the PCM. With the DRBIII®, choose the Misfire Pretest Road test the vehicle and relearn the adaptive numerator. The adaptive numerator is learned when the Adaptive Numerator Done Learning line on the Misfire screen changes to Yes. Did the adaptive numerator relearn?</p> <p>Yes → Go To 2 No → Go To 3</p>	All

P0315-NO CRANK SENSOR LEARNED — Continued

TEST	ACTION	APPLICABILITY
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All
3	<p>Visually inspect the CKP wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the CKP wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Ensure the Crankshaft Position Sensor properly installed and the mounting bolt(s) tight.</p> <p>Refer to any TSB that may apply.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.</p> <p>Remove the Crankshaft Position Sensor.</p> <p>Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement.</p> <p>Were any problems found?</p> <p>Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 5</p>	All
5	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Crankshaft Position Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All

Symptom:

P0325-KNOCK SENSOR #1 CIRCUIT

When Monitored and Set Condition:

P0325-KNOCK SENSOR #1 CIRCUIT

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

Set Condition: The Knock Sensor circuit voltage falls below a minimum value at idle or deceleration. The minimum value is from a look-up table internal to the PCM and is based on engine rpm. DTC also sets if sensor output goes above 5.0 volts. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION
 KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
 KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
 KNOCK SENSOR SIGNAL CIRCUIT OPEN
 KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO KNOCK SENSOR RETURN CIRCUIT
 KNOCK SENSOR RETURN CIRCUIT OPEN
 KNOCK SENSOR

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTC's and record the related Freeze Frame data. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the Knock Sensor harness connector. Measure the voltage of the Knock Sensor Signal circuit in 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. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. 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 4	All

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Knock Sensor harness connector. 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 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 5 No → Repair the open in the Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Knock Sensor harness connector. Measure the resistance between the Knock Sensor Signal circuit and the Knock Sensor Return circuit in the Knock Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the Knock Sensor Signal circuit for a short to Knock Sensor Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the Knock Sensor harness connector. 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 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 7 No → Repair the open in the Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
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 DTC's. 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

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	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

CHECKING INTERMITTENT CMP SIGNAL WITH LAB
 INTERMITTENT CKP SIGNAL
 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
 5 VOLT SUPPLY CIRCUIT OPEN
 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
 CRANKSHAFT POSITION SENSOR SIGNAL CIRCUIT SHORTED GROUND
 CRANKSHAFT POSITION SENSOR SIGNAL CIRCUIT OPEN
 CRANKSHAFT POSITION SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
 CRANKSHAFT POSITION SENSOR SIGNAL SHORTED TO 5 VOLT SUPPLY CIRCUIT
 SENSOR GROUND CIRCUIT OPEN
 PCM - 5 VOLT SUPPLY
 PCM - CRANKSHAFT POSITION SENSOR SIGNAL
 CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the Current Crankshaft Position (CKP) Sensor State while cranking the engine. Does the DRBIII® display Current CKP State Present while cranking the engine? Yes → Go To 2 No → Go To 4	All

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, back probe the Camshaft Position (CMP) Sensor 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. 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 → Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the 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. 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 → Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
4	Turn the ignition off. Disconnect the CKP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the 5 Volt Supply circuit in the CKP Sensor harness connector. Is the voltage between 4.5 and 5.5 volts? Yes → Go To 5 No → Go To 13	All
5	Turn the ignition off. Disconnect the CKP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the CKP Sensor Signal circuit in the CKP Sensor harness connector. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 6 No → Go To 8	All

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the CKP Sensor harness connector. 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 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 7 No → Repair the open in the Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	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
8	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the CKP Sensor Signal circuit in the CKP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the CKP Sensor harness connector. 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 CKP Sensor 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 10 No → Repair the open in the CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the CKP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the CKP Sensor Signal circuit in the CKP Sensor harness connector. Is the voltage above 5.5 volts? Yes → Repair the short to battery voltage in the CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the CKP Sensor Signal circuit and the 5 Volt Supply circuit in the CKP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the CKP Sensor Signal circuit shorted to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
13	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit in the CKP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. <p>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.</p> Measure the resistance of the 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 15 No → Repair the open in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
15	Turn the ignition off. Disconnect the CKP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the 5 Volt Supply circuit in the CKP Sensor harness connector. Is the voltage above 5.5 volts? Yes → Repair the short to battery voltage in the 5 Volt Supply 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. 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 - 5.	All

Symptom:

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT

When Monitored and Set Condition:

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT

When Monitored: Engine running or Cranking.

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

POSSIBLE CAUSES

WIRING HARNESS INSPECTION
 5 VOLT SUPPLY CIRCUIT OPEN OR SHORTED TO GROUND
 TONE WHEEL/PULSE RING INSPECTION
 CHECKING CAMSHAFT POSITION SENSOR SIGNAL WITH THE DRBIII® LAB
 CRANKSHAFT POSITION SENSOR
 SIGNAL CIRCUIT OPEN
 SIGNAL CIRCUIT SHORT TO GROUND
 SIGNAL CIRCUIT SHORTED TO B+
 SIGNAL CIRCUIT SHORT TO 5 VOLTS
 INTERMITTENT CONDITION
 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 → Go To 13	All
2	With the DRBIII®, read and record Freeze Frame Data specific to the CKP signal, ECT, RPM, Sync state, vehicle speed, etc.) Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the 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	<p>Visually inspect the related wire harness including the ground circuit. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are tight.</p> <p>Refer to any TSBs that may apply.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the CKP Sensor connector.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage on the 5 Volt Supply circuit.</p> <p>Is the voltage between 4.5 and 5.5 volts?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Repair the open or short to ground in the 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.</p>	All
5	<p>Turn the ignition off.</p> <p>Carefully disconnect the Battery (-) Ground cable.</p> <p>Remove the Crankshaft Position Sensor.</p> <p>Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement.</p> <p>Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 6</p>	All
6	<p>NOTE: An intermittent glitch in the Cam Position Sensor can cause the P0339 to set.</p> <p>Turn the ignition off.</p> <p>With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CMP Signal circuit at the Sensor harness connector.</p> <p>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.</p> <p>Ignition on, engine not running.</p> <p>Wiggle the related wire harness and lightly tap on the Cam Position Sensor.</p> <p>Observe the lab scope screen.</p> <p>Start the engine.</p> <p>Observe the lab scope screen.</p> <p>Are there any irregular or missing signals?</p> <p style="padding-left: 40px;">Yes → Replace the Cam Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 7</p>	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 CKP Sensor connector. Disconnect the PCM 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 in the 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 9 No → Repair the open/high resistance in the CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Disconnect the PCM connector. Disconnect the CKP Sensor connector. Measure the resistance between ground and the CKP Signal circuit at the CKP Sensor harness connector. Wiggle the related wire harness while monitoring the resistance value. Does the resistance stay below 100 ohms? Yes → Repair the short to ground in the CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	Turn the ignition off. Disconnect the CKP Sensor connector. Ignition on, engine not running. Measure the voltage on the CKP 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 B+ voltage in the CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Disconnect the PCM harness connector. Turn the ignition off. Disconnect the CKP harness connector. Measure the resistance between the 5 Volt Supply circuit and the signal circuit at the CKP harness connector. Wiggle the related wire harness while taking this measurement. Is the resistance below 5.0 ohms? Yes → Repair the short to the 5 Volt Supply circuit in the CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
12	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, review repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
13	<p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness including the ground circuit. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	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. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CRANKSHAFT POSITION SENSOR SIGNAL
 INTERMITTENT CAMSHAFT POSITION SENSOR SIGNAL
 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
 5 VOLT SUPPLY CIRCUIT OPEN
 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
 CAMSHAFT POSITION SENSOR SIGNAL CIRCUIT SHORTED GROUND
 CAMSHAFT POSITION SENSOR SIGNAL CIRCUIT OPEN
 CAMSHAFT POSITION SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
 CAMSHAFT POSITION SENSOR SIGNAL SHORTED TO 5 VOLT SUPPLY CIRCUIT
 SENSOR GROUND CIRCUIT OPEN
 PCM - 5 VOLT SUPPLY
 PCM - CAMSHAFT POSITION SENSOR SIGNAL
 CAMSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the Current Camshaft Position (CMP) Sensor State while cranking the engine. Does the DRBIII® display Current CMP State Present while cranking the engine. Yes → Go To 2 No → Go To 4	All

P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, back probe the Crankshaft Position (CKP) Sensor 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 → Go To 3	All
3	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the 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 → Test Complete.	All
4	Turn the ignition off. Disconnect the CMP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the 5 Volt Supply circuit in the CMP Sensor harness connector. Is the voltage between 4.5 and 5.5 volts? Yes → Go To 5 No → Go To 13	All
5	Turn the ignition off. Disconnect the CMP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the CMP Sensor Signal circuit in the CMP Sensor harness connector. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 6 No → Go To 8	All

P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the CMP Sensor harness connector. 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 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 7 No → Repair the open in the Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	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
8	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the CMP Sensor Signal circuit in the CMP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the CMP Sensor Signal circuit Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the CMP Sensor harness connector. 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 CMP Sensor 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 10 No → Repair the open in the CMP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the CMP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the CMP Sensor Signal circuit in the CMP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the CMP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the CMP Sensor harness connector. Measure the resistance between the CMP Sensor Signal circuit and the 5 Volt Supply circuit in the CMP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the CMP Sensor Signal circuit shorted to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. 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 - 5.	All
13	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit in the CMP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. Disconnect the CMP Sensor harness connector. 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 5 Volt Supply circuit between the CMP Sensor harness connector and the special tool #8815 terminal. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Repair the open in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
15	Turn the ignition off. Disconnect the CMP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the 5 Volt Supply circuit in the CMP Sensor harness connector. Is the voltage above 5.5 volts? Yes → Repair the short to battery voltage in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
16	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</p> 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 - 5.	All

Symptom:**P0344-CAMSHAFT POSITION SENSOR INTERMITTENT****When Monitored and Set Condition:****P0344-CAMSHAFT POSITION SENSOR INTERMITTENT**

When Monitored: Engine running or Cranking.

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

POSSIBLE CAUSES

INTERMITTENT CONDITION

WIRING HARNESS INSPECTION

5 VOLT SUPPLY CIRCUIT OPEN OR SHORTED TO GROUND

TONE WHEEL/PULSE RING INSPECTION

CHECKING CRANKSHAFT POSITION SENSOR SIGNAL WITH THE DRBIII® LAB

CAMSHAFT POSITION SENSOR

SIGNAL CIRCUIT OPEN

SIGNAL CIRCUIT SHORT TO GROUND

SIGNAL CIRCUIT SHORTED TO B+

SIGNAL CIRCUIT SHORT TO 5 VOLTS

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 → Go To 13	All
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the 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	<p>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. Ensure 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?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
4	<p>Turn the ignition off. Disconnect the CMP Sensor connector. Ignition on, engine not running. Measure the voltage on the 5 Volt Supply circuit. Is the voltage between 4.5 and 5.5 volts?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Repair the open or short to ground in the 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.</p>	All
5	<p>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?</p> <p style="padding-left: 40px;">Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 6</p>	All
6	<p>NOTE: An intermittent glitch in the Crank Position Sensor can cause the P0344 to set. Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the 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?</p> <p style="padding-left: 40px;">Yes → Replace the Crank Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 7</p>	All

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
7	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
8	<p>Turn the ignition off. Disconnect the CMP Sensor connector. Disconnect the PCM connector.</p> <p>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.</p> <p>Measure the resistance in the 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?</p> <p>Yes → Go To 9</p> <p>No → Repair the open/high resistance in the CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
9	<p>Turn the ignition off. Disconnect the PCM connector. Disconnect the CMP Sensor connector.</p> <p>Measure the resistance between ground and the CMP Signal circuit in the CMP Sensor harness connector. Wiggle the related wire harness while monitoring the resistance value. Does the resistance stay below 100 ohms?</p> <p>Yes → Repair the short to ground in the CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 10</p>	All
10	<p>Turn the ignition off. Disconnect the CMP Sensor connector.</p> <p>Ignition on, engine not running. Measure the voltage on the CMP Signal circuit. Wiggle the related wire harness while taking this measurement. Does the voltage ever increase above 5.5 volts?</p> <p>Yes → Repair the short to B+ voltage in the CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 11</p>	All
11	<p>Turn the ignition off. Disconnect the PCM harness connector. Disconnect the CMP harness connector.</p> <p>Measure the resistance between the 5 Volt Supply circuit and the signal circuit in the CMP harness connector. Wiggle the related wire harness while taking this measurement. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to the 5 Volt Supply circuit in the CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 12</p>	All

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
12	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, review repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
13	<p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom List:

P0351-IGNITION COIL #1 CIRCUIT
P0352-IGNITION COIL #2 CIRCUIT
P0353-IGNITION COIL #3 CIRCUIT
P0354-IGNITION COIL #4 CIRCUIT
P0355-IGNITION COIL #5 CIRCUIT
P0356-IGNITION COIL #6 CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0351-IGNITION COIL #1 CIRCUIT.

When Monitored and Set Condition:**P0351-IGNITION COIL #1 CIRCUIT**

When Monitored: With battery voltage greater than 11 volts. during engine. Engine running. Engine RPM less than 8160. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set. One Trip Fault.

P0352-IGNITION COIL #2 CIRCUIT

When Monitored: With battery voltage greater than 11 volts. during engine. Engine running. Engine RPM less than 8160. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set. One trip Fault.

P0353-IGNITION COIL #3 CIRCUIT

When Monitored: With battery voltage greater than 11 volts. during engine. Engine running. Engine RPM less than 8160. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set. One Trip Fault.

P0354-IGNITION COIL #4 CIRCUIT

When Monitored: With battery voltage greater than 11 volts. during engine. Engine running. Engine RPM less than 8160. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set. One Trip Fault.

P0351-IGNITION COIL #1 CIRCUIT — Continued

P0355-IGNITION COIL #5 CIRCUIT

When Monitored: With battery voltage greater than 11 volts. during engine. Engine running. Engine RPM less than 8160. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set. One Trip Fault.

P0356-IGNITION COIL #6 CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 13 volts with engine running. Engine RPM less than 3000. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set. One Trip Fault.

POSSIBLE CAUSES	
INTERMITTENT CONDITION	
ASD RELAY OUTPUT CIRCUIT OPEN	
CAPACITOR(S) SHORTED TO GROUND	
ASD OUTPUT CIRCUIT SHORTED TO GROUND	
COIL ON PLUG	
COIL DRIVER CIRCUIT SHORTED TO GROUND	
COIL DRIVER 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 → Go To 9	All
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, check the ASD Relay Output circuit at the Coil on plug harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Go To 7 Stop All Actuations	All

P0351-IGNITION COIL #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the coil on plug harness connector. 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.	All
4	Turn the ignition off. Disconnect the Coil on plug harness connector. Disconnect the PCM harness connector(s). Measure the resistance between the Coil Driver circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the Coil Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Coil on plug harness connector. 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 Coil Driver 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 6 No → Repair the open Coil Driver 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. If there are no possible causes remaining, review repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the Ignition Coil harness connector. Remove the ASD Relay from the PDC. Measure the resistance of the ASD Relay Output circuit between the ASD Relay connector and the Ignition Coil harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0351-IGNITION COIL #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	<p>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 ASD Relay Output circuit. Repair the short to ground in the ASD Relay Output circuit and refer to VER-5 Is the INJ/COIL fuse OK for both capacitor tests?</p> <p>Yes → Replace the Capacitor(s) Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Repair the ASD Output circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
9	<p>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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:**P0401 - EGR SYSTEM PERFORMANCE****When Monitored and Set Condition:****P0401 - EGR SYSTEM PERFORMANCE**

When Monitored: During engine decel, 26 to 4 MPH. Engine Coolant greater than 70°C (158°F). Engine run time greater than 120 seconds.

Set Condition: The PCM monitor engine roughness. During decel the EGR is opened and PCM monitor engine then monitor engine rough with the valve open. If an increase of engine roughness is not present an error is detected. Two Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION
 EGR VALVE OPEN AT IDLE
 EGR VALVE ASSEMBLY INSPECTION
 EGR SOLENOID ASSEMBLY
 EGR SOLENOID GROUND CIRCUIT OPEN
 EGR SOLENOID CONTROL CKT SHORT TO GND
 EGR SOLENOID CONTROL CKT SHORTED TO VOLTAGE
 EGR SOLENOID CONTROL CKT OPEN
 PCM - EGR OPEN
 PCM - EGR CLOSED

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. 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 12	All
2	Note: If the vehicle is running rough at idle (DRB not actuated) follow the yes path to continue. Turn the ignition on. Turn all accessories off. Start the engine. Allow the engine to reach normal operating temperature. With the DRB, enter Engine System Test, then EGR System Test. Actuate the FLOW function in the EGR System Test. Did the engine run rough or stall? Yes → Go To 3 No → Go To 7	All

P0401 - EGR SYSTEM PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the EGR Solenoid Assembly harness connector. Start engine. Attempt to allow the engine to idle. Does the engine run rough or stall? Yes → Inspect the EGR tube assembly. If OK, replace the EGR valve. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Inspect the EGR Assembly for the following. Gasket(s) for leaking Damage and/or holes in the EGR tube(s) Carbon build up on or near the EGR pintle and passage ways. Obstruction in the EGR tubes Were any problem found? Yes → Repair or replace the EGR Assembly as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage on the EGR Solenoid Control circuit in the EGR Solenoid connector. Is the voltage above 1.0 volt? Yes → Repair the short to voltage in the EGR solenoid control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</p> 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 - 5.	All
7	Turn the ignition on. Turn all accessories off. Disconnect the EGR Solenoid harness connector. Using a 12-volt Test Light, jumper across the EGR Solenoid harness connector. With the DRB, actuate the EGR solenoid. Does the 12-volt test light flash on and off? Yes → Inspect the tube(s) for obstructions and damage, repair as necessary. If OK, replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0401 - EGR SYSTEM PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Using a 12-volt test light connected to battery voltage, probe the EGR Solenoid ground circuit in the EGR Solenoid harness connector. Does the 12-volt test light illuminate brightly? Yes → Go To 9 No → Repair the open in the EGR Solenoid ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance between ground and the EGR Solenoid Control circuit at the EGR Solenoid harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the EGR Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid 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 EGR Solenoid Control circuit from the EGR Solenoid 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 EGR solenoid control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. 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 - 5.	All

P0401 - EGR SYSTEM PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
12	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>NOTE: Closely inspect the EGR tube(s) for obstructions, damage and holes. Also, inspect the gasket(s) for leaks.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom:**P0403 - EGR CONTROL CIRCUIT****When Monitored and Set Condition:****P0403 - EGR CONTROL CIRCUIT**

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

Set Condition: The EGR solenoid control circuit is not in the expected state when requested to operate by the PCM. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

EGR SOLENOID ASSEMBLY

EGR SOLENOID GROUND CIRCUIT OPEN

EGR SOLENOID CONTROL CIRCUIT SHORTED TO VOLTAGE

EGR SOLENOID CONTROL CIRCUIT SHORT TO GND

EGR SOLENOID CONTROL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT

EGR SOLENOID CONTROL 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 → Go To 9	All
2	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Turn all accessories off. Using a 12 volt Test Light connected to the EGR Solenoid ground circuit, probe the EGR Solenoid Control circuit. With the DRB, actuate the EGR solenoid. Does the 12-volt test light flash on and off? Yes → Replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0403 - EGR CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Using a 12-volt Test Light connected to the EGR Solenoid ground circuit, probe the EGR Solenoid Control circuit in the EGR Solenoid harness connector. Does the test light illuminate?</p> <p>Yes → Go To 4</p> <p>No → Repair the open in the EGR Solenoid ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
4	<p>Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Turn the ignition on. Measure the voltage on the EGR Solenoid Control circuit in the EGR Solenoid connector. Is the voltage above 1.0 volt?</p> <p>Yes → Repair the short to voltage in the EGR Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance between ground and the EGR Solenoid Control circuit at the EGR Solenoid harness connector. Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground EGR Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance between the EGR Solenoid Control circuit and Sensor ground circuit at the EGR Solenoid connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to Sensor ground in the EGR Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 7</p>	All

P0403 - EGR CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid 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 EGR Solenoid Control circuit from the EGR Solenoid 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 EGR Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. 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 - 5.	All
9	NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition. NOTE: Closely inspect the EGR tube(s) for obstructions, damage and holes. Also, inspect the gasket(s) for leaks. 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 engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0404 - EGR POSITION SENSOR PERFORMANCE

When Monitored and Set Condition:

P0404 - EGR POSITION SENSOR PERFORMANCE

When Monitored: Engine Running and battery voltage above 10 volts.

Set Condition: The EGR flow or valve movement is not what is expected.

POSSIBLE CAUSES
HIGH RESISTANCE IN 5 VOLT SUPPLY
EGR SENSOR SIGNAL CIRCUIT OPEN
EGR ASSEMBLY
EGR SOLENOID CONTROL CKT
INTERMITTENT CONDITION
EGR SENSOR SIGNAL CIRCUIT OPEN
EGR SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
SENSOR GROUND CIRCUIT OPEN
EGR ASSEMBLY (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 → Go To 11	All
2	NOTE: Diagnose all other EGR DTC(s) first before continuing. Start the engine. With the DRBIII®, read the EGR Position Sensor voltage. Choose a conclusion that best matches the EGR voltage reading. Below 3.5 volts Go To 3 Between 3.5 volts to 4.3 volts Go To 5 Above 4.3 volts Go To 6	All

P0404 - EGR POSITION SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the EGR Solenoid harness connector. 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 5 volt supply circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Repair the high resistance in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance of the EGR Sensor Signal circuit in the EGR Solenoid harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the EGR Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace the EGR Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition on. With the DRBIII®, actuate the EGR Solenoid. Allow the EGR Solenoid to actuate for least 15 seconds. Feel the EGR solenoid for operation. Stop actuation. Does EGR Solenoid operate during actuation test and than turn off when actuation test was stop? Yes → Go To 11 No → Refer to the Driveability category and perform P0403 - EGR Solenoid Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR Sensor Signal circuit at the EGR Solenoid harness connector. Is the voltage above 4.30 volts? Yes → Go To 7 No → Go To 8	All

P0404 - EGR POSITION SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the EGR Solenoid harness connector. 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 Sensor Ground circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? Yes → Replace the EGR Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair the open in the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the EGR Solenoid harness connector. 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 EGR Sensor Signal circuit from the EGR Solenoid 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 EGR Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the EGR Sensor Signal circuit in the EGR Solenoid harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the GR Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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 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 - 5.	All

P0404 - EGR POSITION SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
11	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>NOTE: Closely inspect the EGR tube(s) for obstructions, damage and holes. Also, inspect the gasket(s) for leaks.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom:

P0405 - EGR POSITION SENSOR LOW

When Monitored and Set Condition:

P0405 - EGR POSITION SENSOR LOW

When Monitored: With the ignition on. Battery voltage above 10.0 volts.

Set Condition: EGR Position Sensor Signal is less than 0.1026 of a volt. One trip Fault.

POSSIBLE CAUSES	
EGR POSITION SENSOR SWEEP	
INTERMITTENT CONDITION	
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND	
5 VOLT SUPPLY CIRCUIT OPEN	
EGR POSITION INTERNAL FAILURE	
EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO GROUND	
EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT	
PCM 5 VOLT SUPPLY CIRCUIT	
PCM EGR POSITION SENSOR SIGNAL	

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the EGR Position Sensor voltage. Is the voltage below 0.2 of a volt? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the EGR Solenoid harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 7	All
3	Turn the ignition off. Disconnect the EGR Solenoid harness connector. With the DRBIII®, monitor the EGR Position Sensor voltage. Turn the ignition on. Is the voltage above 4.5 volts? Yes → Replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0405 - EGR POSITION SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the EGR Position harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the EGR Position Sensor Signal circuit at the EGR Position harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the EGR Position Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the EGR Position harness connector. Disconnect the PCM harness connector. Measure the resistance between the EGR Position Sensor Signal circuit and the Sensor ground circuit in the EGR Position harness connector. Is the resistance below 100 ohms? Yes → Repair the short to Sensor ground in the EGR Position Sensor 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. 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 - 5.	All
7	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit at the EGR Solenoid harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	Turn the ignition off. Disconnect the EGR Solenoid harness connector. 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 5 Volt Supply circuit from the EGR Solenoid 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 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0405 - EGR POSITION SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
9	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
10	<p>NOTE: The engine will run rough and possibly stall in the following test. Feather the accelerator panel to keep the engine from stalling. Start the engine. With the DRBIII®, enter Engine System Test and then EGR System Test. Push the 4=VARIABLE function. Monitor the EGR voltage while slowly pushing the up arrow. Is the voltage change smooth?</p> <p>Yes → Go To 11</p> <p>No → Replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
11	<p>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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:**P0406 - EGR POSITION SENSOR HIGH****When Monitored and Set Condition:****P0406 - EGR POSITION SENSOR HIGH**

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

Set Condition: EGR position sensor signal is greater than 4.89. One trip Fault.

POSSIBLE CAUSES

EGR POSITION SENSOR SWEEP
 INTERMITTENT CONDITION
 EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO 5 VOLT SUPPLY CIRCUIT
 EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
 EGR SOLENOID ASSEMBLY INTERNAL FAILURE
 EGR POSITION SENSOR SIGNAL CIRCUIT OPEN
 SENSOR GROUND CIRCUIT OPEN
 PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read the EGR Position 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 EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance between the EGR Position Sensor Signal circuit and the 5 Volt Supply circuit in the EGR Solenoid harness connector. Is the resistance below 100 ohms? Yes → Repair the EGR Position Sensor Signal circuit for a short to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0406 - EGR POSITION SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR Sensor Signal circuit in the EGR Position Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the EGR Position Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Connect a jumper wire between the EGR Position Sensor Signal circuit and the Sensor ground circuit. With the DRBIII®, monitor the EGR Position Sensor voltage. Turn the ignition on. Is the voltage below 0.5 of a volt? Yes → Replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the EGR Solenoid harness connector. 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 EGR Position Sensor Signal circuit from the EGR 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 EGR Position Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the EGR Solenoid harness connector. 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 Sensor ground circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815. Is the resistance below 30 ohms? Yes → Go To 7 No → Repair the open in the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0406 - EGR POSITION SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
8	<p>NOTE: The engine will run rough and possibly stall in the following test. Feather the accelerator pedal to keep the engine from stalling. Start the engine. With the DRBIII®, enter Engine System Test and then EGR System Test. Push the 4=VARIABLE function. Monitor the EGR voltage while slowly pushing the up arrow. Is the voltage change smooth?</p> <p>Yes → Go To 9</p> <p>No → Replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
9	<p>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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom List:

P0420-CATALYTIC 1/1 EFFICIENCY

P0432-CATALYTIC 2/1 EFFICIENCY

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

When Monitored and Set Condition:

P0420-CATALYTIC 1/1 EFFICIENCY

When Monitored: Engine Run time greater than 90 seconds. Engine Coolant greater than 70°C (158°F) Vehicle speed greater than 20 MPH and less than 55 MPH. Engine Speed greater than 1216 RPM and less than 1952 RPM.

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. One Trip Fault.

P0432-CATALYTIC 2/1 EFFICIENCY

When Monitored: Engine Run time greater than 90 seconds. Engine Coolant greater than 70°C (158°F) Vehicle speed greater than 20 MPH and less than 55 MPH. Engine Speed greater than 1216 RPM and less than 1952 RPM.

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. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

VISUALLY INSPECT CATALYTIC CONVERTER

EXHAUST LEAK

ENGINE MECHANICAL CONDITION

AGING O2 SENSOR

CATALYTIC CONVERTER

P0420-CATALYTIC 1/1 EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
1	<p>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 contaminates that may have damaged the O2 Sensor and Catalytic Converter: contaminated fuel, unapproved silicone, oil and coolant, repair necessary.</p> <p>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?</p> <p>Yes → Go To 2 No → Go To 7</p>	All
2	<p>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?</p> <p>Yes → Replace the Catalytic Converter. Repair the condition that may have caused the failure. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 3</p>	All
3	<p>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?</p> <p>Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 4</p>	All
4	<p>Check the exhaust for excessive smoke caused by an internal problem in the engine. Is a engine mechanical condition present?</p> <p>Yes → Repair the engine mechanical condition as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 5</p>	All
5	<p>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?</p> <p>Yes → Replace the Front O2 Sensor as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 6</p>	All
6	<p>If there are no possible cause remaining, view repair.</p> <p>Repair Replace the Catalytic Converter. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All

P0420-CATALYTIC 1/1 EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>NOTE: Check for contaminates that may have damaged the O2 Sensor and Catalytic Converter: contaminated fuel, unapproved silicone, oil and coolant, repair necessary.</p> <p>A new rear O2 Sensor along with a aging front O2 Sensor may cause the DTC to set. Review repair history of the vehicle and repair as necessary.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	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

INTERMITTENT CONDITION
 VISUAL AND PHYSICAL INSPECTION
 EVAP PURGE SOLENOID VACUUM SUPPLY INSPECTION
 EVAP PURGE SOLENOID STUCK CLOSED
 GROUND CIRCUIT OPEN
 NVLD ASSEMBLY
 NVLD SENSE CIRCUIT OPEN
 EVAPORATIVE EMISSION LEAK DETECTION
 PCM
 PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: If any of the following DTCs are set (P0443, P0452, P0453, P0498 or P0499) diagnose them first before continuing with P0440.</p> <p>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?</p> <p>Yes → Go To 2 No → Go To 11</p>	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	<p>Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions:</p> <ul style="list-style-type: none"> - 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 <p>Were any of the above conditions found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 3</p>	All
3	<p>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. Ensure the vacuum port at the throttle body is free from any blockage. Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair the vacuum supply, hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
4	<p>Disconnect the vacuum supply hoses form 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?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
5	<p>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?</p> <p style="padding-left: 40px;">Yes → Go To 11</p> <p style="padding-left: 40px;">No → Go To 6</p>	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	<p>To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD).</p> <p>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.</p> <p>NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.</p> <p>Connect the red power lead of EELD to the battery positive terminal and the black ground lead to battery negative terminal.</p> <p>NOTE: See Charts and Graph support material EELD Calibration Setup for an example.</p> <p>Block the vent hose of the EVAP Canister.</p> <p>Connect shop air to the EELD.</p> <p>Set the smoke/air control switch to AIR.</p> <p>Insert the tester's AIR supply tip (clear hose) into the .040 orifice on the tester's control panel.</p> <p>Press the remote smoke/air start button.</p> <p>Position the red flag on the air flow meter so it is aligned with the indicator ball.</p> <p>When the calibration is complete, release the remote button. The EELD is now calibrated the flow meter in liters per minute.</p> <p>Install the service port adapter #8404-14 on the vehicle's service port.</p> <p>Connect the Air supply hose from the EELD to the service port.</p> <p>Press the remote button to activate AIR flow.</p> <p>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.</p> <p>Compare the flow meter indicator ball reading to the red flag.</p> <p>ABOVE the red flag indicates a leak present.</p> <p>BELOW the red flag indicates a sealed system.</p> <p>Is the indicator ball above the red flag?</p> <p style="padding-left: 40px;">Yes → Go To 7</p> <p style="padding-left: 40px;">No → Go To 8</p>	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	<p>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.</p> <p>To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD).</p> <p>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.</p> <p>NOTE: The flow meter indicator ball will not move at this point.</p> <p>Press the remote smoke/air start button.</p> <p>NOTE: Ensure 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.</p> <p>NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.</p> <p>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.</p> <p>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.</p> <p>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 visual. Introducing smoke into the filtered side of the canister may assist in locating the leak.</p> <p>Was a leak found?</p> <p>Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.</p> <p>No → 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.</p>	All
8	<p>Turn the ignition off.</p> <p>Disconnect the NVLD electrical harness connector.</p> <p>Check connectors - Clean/repair as necessary.</p> <p>Using a jumper wire, jumper across the NVLD Switch Sense circuit and the Ground circuit in the NVLD electrical harness connector.</p> <p>Monitor the NVLD Switch state on the DRBIII®.</p> <p>Does the Switch change from OPEN to CLOSED.</p> <p>Yes → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 9</p>	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the NVLD electrical harness connector. Measure the resistance between the Ground circuit and ground. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open in the Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Disconnect the NVLD electrical harness connector. 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 NVLD Sense circuit from the NVLD electrical harness connector to the appropriate terminal of the special tool #8815. Is the resistance below 5.0 ohms? 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 → Repair the open in the NVLD Sense Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	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: 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. 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 - 5. No → Test Complete.	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 increases 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
INTERMITTENT CONDITION
CHECKING EVAP PURGE SOLENOID FUNCTIONALITY
EVAP PURGE SOLENOID VACUUM SUPPLY

TEST	ACTION	APPLICABILITY
1	<p>NOTE: If any of the following DTCs are set (P0443, P0452, P0453, P0498 or P0499) diagnose them first before continuing with P0441.</p> <p>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?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
2	<p>NOTE: After disconnecting the Evap Purge vacuum connections, inspect the lines and solenoid for any signs of contamination or foreign materials.</p> <p>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?</p> <p style="padding-left: 40px;">Yes → Go To 3</p> <p style="padding-left: 40px;">No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
3	<p>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?</p> <p style="padding-left: 40px;">Yes → Repair the vacuum supply hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Go To 4</p>	All

P0441-EVAP PURGE SYSTEM PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
4	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>Perform a wiggle test of the Evap Purge Solenoid wiring while the circuit is actuated with the DRBIII®. Listen for the solenoid to quit actuating. Also watch for the Good Trip Counter to change to 0.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	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 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 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 switch. 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

INTERMITTENT CONDITION

VISUAL AND PHYSICAL INSPECTION

EVAPORATIVE EMISSION LEAK DETECTION

EVAP PURGE SOLENOID OPERATION

P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Since a hot vehicle can conceal a leak, it is best to perform this test at room temperature.</p> <p>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.</p> <p>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?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 6</p>	All
2	<p>Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the follow conditions:</p> <ul style="list-style-type: none"> - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal <p>Were any of the above conditions found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.</p> <p style="padding-left: 40px;">No → Go To 3</p>	All

P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
3	<p>To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD).</p> <p>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.</p> <p>NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.</p> <p>Connect the red power lead of the EEL to the battery positive terminal and the black ground lead to battery negative terminal.</p> <p>NOTE: See Charts and Graph support material EELD Calibration Setup for an example.</p> <p>Block the vent hose of the EVAP Canister.</p> <p>Connect shop air to the EEL.</p> <p>Set the smoke/air control switch to AIR.</p> <p>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).</p> <p>Press the remote smoke/air start button.</p> <p>Position the red flag on the air flow meter so it is aligned with the indicator ball.</p> <p>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.</p> <p>Install the service port adapter #8404-14 on the vehicle's service port.</p> <p>Connect the Air supply hose from the EELD to the service port.</p> <p>Press the remote button to activate AIR flow.</p> <p>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</p> <p>Compare the flow meter indicator ball reading to the red flag.</p> <p>ABOVE the red flag indicates a leak present.</p> <p>BELOW the red flag indicates a sealed system.</p> <p>Is the indicator ball above the red flag?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Go To 6</p>	All

P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
4	<p>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.</p> <p>To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD).</p> <p>Remove the Air supply hose from the service port.</p> <p>Connect the SMOKE supply tip (black hose) to the service port.</p> <p>Set the smoke/air control switch to SMOKE.</p> <p>NOTE: The flow meter indicator ball will not move in the smoke mode.</p> <p>Press the remote smoke/air start button.</p> <p>NOTE: Ensure 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.</p> <p>NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Was a leak found?</p> <p>Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.</p> <p>No → Go To 5</p>	All
5	<p>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.</p> <p>Turn the ignition off.</p> <p>Disconnect the vacuum hoses at the Evap Purge Solenoid.</p> <p>Using a hand vacuum pump, apply 10 in Hg to the "CAN" of the EVAP Purge Solenoid.</p> <p>NOTE: Monitor the vacuum gauge for at least 15 seconds.</p> <p>Does the EVAP Purge Solenoid hold vacuum?</p> <p>Yes → Go To 6</p> <p>No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 6.</p>	All

P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
6	<p>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.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>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.</p> <p>Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions:</p> <ul style="list-style-type: none"> - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal <p>Were any of the above conditions found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	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

INTERMITTENT CONDITION
 EVAP PURGE SOLENOID OPERATION
 EVAP PURGE SOLENOID CONTROL CIRCUIT OPEN
 EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
 EVAP PURGE SOLENOID SENSE CIRCUIT OPEN
 EVAP PURGE SOLENOID SENSE CIRCUIT SHORTED TO GROUND
 POWERTRAIN CONTROL MODULE

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 → Go To 8	All
2	Turn the ignition off. Disconnect the EVAP Purge Solenoid harness connector. Ignition on, engine not running. Using a 12-volt test light, jumper across 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 Evap Purge Solenoid harness connector. 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 Evap Purge Solenoid 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 Evap Purge Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the Evap Purge Solenoid Control circuit at the Evap Purge Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the Evap Purge Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. 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 Evap Purge Solenoid Sense 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 Evap Purge Solenoid Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the Evap Purge Solenoid Sense circuit at the Evap Purge Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the Evap Purge Solenoid Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
8	<p>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.</p> <p>Perform a wiggle test of the Evap Purge Solenoid wiring while the circuit is actuated with the DRBIII®. Listen for the solenoid to quit actuating. Also watch for the Good Trip Counter to change to 0. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:

P0452-NVLD PRESSURE SWITCH SENSE CIRCUIT LOW

When Monitored and Set Condition:

P0452-NVLD PRESSURE SWITCH SENSE CIRCUIT LOW

When Monitored: Immediately after engine start up.

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

POSSIBLE CAUSES

INTERMITTENT CONDITION

NVLD ASSEMBLY

EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

NVLD SENSE CIRCUIT SHORTED TO GROUND

EVAP PURGE SOLENOID LEAKS/STUCK 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 → Go To 8	All
2	Turn the ignition off. Disconnect the EVAP Purge Solenoid harness connector. Ignition on, engine not running. Using a 12-volt test light, jumper 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 SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	<p>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.</p> <p>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.</p> <p>NOTE: Monitor the vacuum gauge for at least 15 seconds.</p> <p>Does the EVAP Purge Solenoid hold vacuum?</p> <p>Yes → Go To 4</p> <p>No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
4	<p>Ignition on, engine not running. Using the DRBIII®, monitor the NVLD Switch State. Does the DRBIII® display the NVLD state OPEN?</p> <p>Yes → Go To 8</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off. Using the DRBIII®, monitor the NVLD Switch State. Disconnect the NVLD electrical connector. Does the Switch change from CLOSED to OPEN?</p> <p>Yes → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off. Disconnect the NVLD electrical harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the NVLD Switch Sense circuit in the NVLD Assembly harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the NVLD Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → 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.</p>	All

P0452-NVLD PRESSURE SWITCH SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off. Disconnect the EVAP Purge Solenoid harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance between ground and the EVAP Purge Solenoid Control circuit at the EVAP Purge Solenoid harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the EVAP Purge Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → 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.</p>	All
8	<p>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.</p> <p>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. 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. Were any of the above conditions found?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:**P0453-NVLD PRESSURE SWITCH SENSE CIRCUIT HIGH****When Monitored and Set Condition:****P0453-NVLD PRESSURE SWITCH SENSE CIRCUIT HIGH**

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

INTERMITTENT CONDITION

NVLD SWITCH SENSE CIRCUIT SHORTED TO BATTERY VOLTAGE

NVLD SENSE CIRCUIT SHORTED TO NVLD SOLENOID CONTROL CIRCUIT

NVLD ASSEMBLY

GROUND CIRCUIT OPEN

NVLD SENSE CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	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 → Go To 2 No → Go To 3	All

P0453-NVLD PRESSURE SWITCH SENSE CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
2	<p>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.</p> <p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>NOTE: Physically and Visually inspect the fuel tank for damage, if a problem is found repair or replace as necessary.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions found?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All
3	<p>Turn the ignition off.</p> <p>Disconnect the NVLD electrical harness connector.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage on the NVLD Switch Sense circuit in the NVLD electrical harness connector.</p> <p>Is the voltage above 5.5 volts?</p> <p>Yes → Repair short to battery voltage in the NVLD Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the NVLD electrical harness connector.</p> <p>Measure the resistance between the NVLD Switch Sense circuit and NVLD Solenoid Control circuit in the NVLD electrical harness connector.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the NVLD Switch Sense circuit short to the NVLD Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the NVLD electrical harness connector.</p> <p>Using a jumper wire, jumper across the NVLD Switch Sense circuit and the Ground circuit.</p> <p>Monitor the NVLD Switch state on the DRBIII®.</p> <p>Does the Switch change from OPEN to CLOSED?</p> <p>Yes → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Go To 6</p>	All

P0453-NVLD PRESSURE SWITCH SENSE CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the NVLD electrical harness connector. Measure the resistance between the Ground circuit and ground. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the NVLD electrical harness connector. 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 NVLD Switch Sense circuit from the NVLD electrical harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms? 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 → Repair the open in the NVLD Sense circuit. 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
INTERMITTENT CONDITION
VISUAL AND PHYSICAL INSPECTION
EVAPORATIVE EMISSION LEAK DETECTION

TEST	ACTION	APPLICABILITY
1	<p>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.</p> <p>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?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
2	<p>Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions:</p> <ul style="list-style-type: none"> - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal <p>Were any of the above conditions found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.</p> <p style="padding-left: 40px;">No → Go To 3</p>	All

P0456-EVAP SYSTEM SMALL LEAK — Continued

TEST	ACTION	APPLICABILITY
3	<p>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.</p> <p>Use the Miller Tool #8404 Evaporative Emissions Leak Detector (EELD). Connect the SMOKE supply tip (black hose) to the service port. Set the smoke/air control switch to SMOKE.</p> <p>NOTE: The flow meter indicator ball will not move at this point.</p> <p>Press the remote smoke/air start button.</p> <p>NOTE: Ensure 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.</p> <p>NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.</p> <p>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.</p> <p>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.</p> <p>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 visual. Introducing smoke into the filtered side of the canister may assist in locating the leak.</p> <p>Was a leak found?</p> <p>Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.</p> <p>No → Go To 4</p>	All
4	<p>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.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>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.</p> <p>Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions:</p> <ul style="list-style-type: none"> - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal <p>Were any of the above conditions found?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.</p> <p>No → Test Complete.</p>	All

Symptom:

P0461-FUEL LEVEL SENSOR #1 PERFORMANCE

When Monitored and Set Condition:

P0461-FUEL LEVEL SENSOR #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 monitor 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. Two Trip Fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION VISUALLY INSPECT FUEL TANK FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO GROUND FUEL LEVEL SENSOR SIGNAL CIRCUIT OPEN GROUND CIRCUIT OPEN INTERNAL INSPECTION OF THE FUEL TANK FUEL LEVEL SENSOR

TEST	ACTION	APPLICABILITY
1	<p>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?</p> <p style="padding-left: 40px;">Yes → Go To 2 No → Go To 8</p>	All
2	<p>Visually inspect the Fuel Tank for damage that may restrict the Fuel Sending Unit float from moving. Is the Fuel Tank OK?</p> <p style="padding-left: 40px;">Yes → Go To 3 No → Replace the Fuel Tank as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All

P0461-FUEL LEVEL SENSOR #1 PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Measure the resistance between ground and the Fuel Level Sensor Signal circuit at the Fuel Pump Module harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Fuel Level Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. 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 Fuel Level Sensor 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 5 No → Repair the open in the Fuel Level Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Measure the resistance of the Ground circuit from the Fuel Pump Module harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the 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 in accordance with the 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

P0461-FUEL LEVEL SENSOR #1 PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
8	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>NOTE: Physically and Visually inspect the fuel tank for damage, if a problem is found repair or replace as necessary.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom List:

- P0462-FUEL LEVEL SENSOR #1 LOW**
- P0463-FUEL LEVEL SENSOR #1 HIGH**

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0462-FUEL LEVEL SENSOR #1 LOW.

When Monitored and Set Condition:

P0462-FUEL LEVEL SENSOR #1 LOW

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

Set Condition: The fuel level sensor signal voltage goes below 0.1961 volts for more than 5 seconds. One Trip Fault.

P0463-FUEL LEVEL SENSOR #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 4.7 volts for more than 5 seconds. One Trip Fault.

POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Refer to the Instrument Cluster Category and perform the appropriate symptoms. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All

P0462-FUEL LEVEL SENSOR #1 LOW — Continued

TEST	ACTION	APPLICABILITY
2	<p>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.</p> <p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>NOTE: Physically and Visually inspect the fuel tank for damage. if a problem is found repair or replace as necessary.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom:**P0480-LOW SPEED FAN CONTROL RELAY CIRCUIT****When Monitored and Set Condition:****P0480-LOW SPEED FAN CONTROL RELAY 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. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

FUSED B+ FEED CIRCUITS

COOLANT FAN RELAY RESISTANCE

COOLANT FAN RELAY CONTROL CIRCUIT OPEN

COOLANT FAN RELAY CONTROL CIRCUIT SHORT TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the Radiator Fan Relay. Is the Radiator Fan Relay operating? Yes → Go To 2 No → Go To 3	All

P0480-LOW SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>With the DRBIII®, actuate the Radiator Fan Relay.</p> <p>Wiggle the wire harness from the Radiator Fan Relay to the PCM while the relay is actuating.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All
3	<p>Turn the ignition off.</p> <p>Remove the Radiator Fan #1 Relay from the PDC.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage of the Fused B+ Feed circuit in the PDC.</p> <p>Is the voltage above 11.0 volts?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Repair the Fused B+ Output circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
4	<p>Turn the ignition off.</p> <p>Remove the Low Speed Radiator Fan Relay from the PDC.</p> <p>Measure the resistance of the Low Speed Radiator Fan Relay between the Fused Ignition Switch Output terminal and the Low Speed Radiator Fan Relay Control terminal.</p> <p>Is the resistance between 60 to 80 ohms?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Replace the Coolant Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All

P0480-LOW SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. 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 Radiator 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 Coolant Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance between ground and the Radiator Fan #1 Relay Control circuit at the PDC. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Coolant 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. 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 - 5.	All

Symptom:

P0481-HIGH SPEED FAN CONTROL RELAY CIRCUIT

When Monitored and Set Condition:

P0481-HIGH SPEED FAN CONTROL RELAY 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. One trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

FUSED IGNITION SWITCH OUTPUT CIRCUIT

HIGH SPEED RADIATOR FAN RELAY RESISTANCE

HIGH SPEED RADIATOR FAN RELAY CONTROL CIRCUIT OPEN

HIGH SPEED RADIATOR FAN RELAY CONTROL CIRCUIT SHORT TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the High Speed Radiator Fan Relay. Is the High Speed Radiator Fan Relay operating? Yes → Go To 2 No → Go To 3	All

P0481-HIGH SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>With the DRBIII®, actuate the High Speed Radiator Fan Relay.</p> <p>Wiggle the wire harness from the High Speed Radiator Fan Relay to the PCM while the relay is actuating.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All
3	<p>Turn the ignition off.</p> <p>Remove the High Speed Radiator Fan Relay from the PDC.</p> <p>Turn the ignition on.</p> <p>Measure the voltage of the Fused Ignition Switch Output circuit in the PDC.</p> <p>Is the voltage above 11.0 volts?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Repair the Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
4	<p>Turn the ignition off.</p> <p>Remove the High Speed Radiator Fan Relay from the PDC.</p> <p>Measure the resistance of the High Speed Radiator Fan Relay between the Fused Ignition Switch Output terminal and the High Speed Radiator Fan Relay Control terminal.</p> <p>Is the resistance between 60 to 80 ohms?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Replace the High Speed Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All

P0481-HIGH SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. 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 High Speed Radiator 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 High Speed Radiator Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance between ground and the High Speed Radiator Fan Relay Control circuit in the PDC. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the High Speed Radiator 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. 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 - 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

INTERMITTENT CONDITION

NVLD SOLENOID

NVLD SOLENOID CONTROL CIRCUIT SHORT 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 → Go To 4	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 to 8.5 ohms? Yes → Go To 3 No → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the NVLD electrical harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the NVLD Solenoid Control circuit at the NVLD electrical harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the NVLD Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → 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.	All

**P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW —
Continued**

TEST	ACTION	APPLICABILITY
4	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	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**

INTERMITTENT CONDITION

NVLD SOLENOID

NVLD SOLENOID CONTROL CIRCUIT SHORT TO BATTERY VOLTAGE

NVLD SOLENOID CONTROL CIRCUIT OPEN

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 → Go To 7	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 to 8.5 ohms? Yes → Go To 3 No → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the NVLD Assembly harness connector. Disconnect the PCM harness connector. Using the DRBIII®, actuate ASD Relay. Measure the voltage on the NVLD Solenoid Control circuit in the NVLD Assembly harness connector. Is the voltage above 1.0 volt? Yes → Repair the short to battery voltage in the NVLD Solenoid 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	Turn the ignition off. Disconnect the NVLD Assembly harness connector. 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 NVLD Solenoid 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 NVLD Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the NVLD Assembly harness connector. Measure the resistance between the Ground circuit and ground. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the 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. 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 - 5.	All
7	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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:**P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE****When Monitored and Set Condition:****P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE**

When Monitored: Engine running. Transmission not in park or neutral. Brakes not applied. Engine run time greater than 10 seconds.

Set Condition: The PCM does not see vehicle speed signal from the transmission control side of the PCM. Two Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION
TRANSMISSION DTC(S)
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read PCM 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 3	All
2	Turn the ignition on. With the DRBIII®, check the Transmission DTCs. Are there any Transmission DTCs present? Yes → Refer to the appropriate Transmission DTC in the Transmission category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	<p>At this time, the conditions required to set the DTC are not present.</p> <p>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.</p> <p>NOTE: Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>NOTE: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>NOTE: Refer to any technical service bulletins (TSB) that may apply.</p> <p>Were any problems found?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:**P0508-IAC VALVE SENSE CIRCUIT LOW****When Monitored and Set Condition:****P0508-IAC VALVE SENSE CIRCUIT LOW**

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

Set Condition: The IAC sense circuit is less than 175 mA. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

IAC MOTOR

IAC MOTOR DRIVER CIRCUIT SHORTED TO GROUND

IAC MOTOR SENSE CIRCUIT OPEN

IAC MOTOR SENSE CIRCUIT SHORTED TO GROUND

IAC MOTOR DRIVER CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM. Start the engine. Allow the engine to idle. With the DRBIII®, read the IAC Current. Is the IAC Current below 146 mA?</p> <p>Yes → Go To 2 No → Go To 8</p>	All
2	<p>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?</p> <p>Yes → Go To 3 No → Replace the IAC Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All

P0508-IAC VALVE SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the IAC Motor harness connector. 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 IAC Motor Sense 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 IAC Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the IAC Motor Sense in the IAC Motor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the IAC Motor Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the IAC Motor Driver circuit in the IAC Motor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the IAC Motor Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the IAC Motor harness connector. 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 IAC Motor Driver 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 7 No → Repair the open in the IAC Motor Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0508-IAC VALVE SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
8	<p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom:

P0509-IAC VALVE SENSE CIRCUIT HIGH

When Monitored and Set Condition:

P0509-IAC VALVE SENSE CIRCUIT HIGH

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

Set Condition: The IAC sense circuit is greater than 980 mA. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

IAC MOTOR

IAC MOTOR SENSE CIRCUIT SHORTED TO VOLTAGE

IAC MOTOR DRIVER CIRCUIT SHORTED TO VOLTAGE

IAC MOTOR SENSE CIRCUIT SHORTED TO IAC MOTOR DRIVER CIRCUIT

PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM. Start the engine. Allow the engine to idle. With the DRBIII®, read the IAC Current. Is the IAC Current above 999 mA?</p> <p>Yes → Go To 2 No → Go To 7</p>	All
2	<p>Turn the ignition off. Disconnect the IAC Motor harness connector. With the DRBIII®, monitor the IAC Current. Turn the ignition on. Does the DRBIII® display IAC Current at 0mA?</p> <p>Yes → Replace the IAC Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3</p>	All
3	<p>Turn the ignition off. Disconnect the IAC Motor harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Measure the voltage of the IAC Motor Sense circuit in the IAC Motor harness connector. Is the voltage above 0.5 of a volt?</p> <p>Yes → Repair the short to voltage in the IAC Motor Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4</p>	All

P0509-IAC VALVE SENSE CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the IAC Motor harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Measure the voltage of the IAC Motor Driver circuit in the IAC Motor harness connector. Is the voltage above 0.5 of a volt? Yes → Repair the short to voltage in the IAC Motor Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the IAC Motor harness connector. Measure the resistance across the IAC Motor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the IAC Motor Sense circuit short to the IAC Motor Driver 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. 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 - 5.	All
7	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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	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
 INVALID SKIM KEY NOT PRESENT
 NO COMMUNICATION WITH SKIM
 NO VIN PROGRAMMED IN THE PCM
 PCM
 SKIM TROUBLE CODES SET

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. 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. Turn the ignition on. 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	Turn the ignition on. 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	Turn the ignition on. 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	Turn the ignition on. 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 in accordance with the Service Information. Perform SKIS VERIFICATION.	All
6	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®, 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: Befor continuing, check the PCM harness connector termnals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the 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. Turn the ignition on. 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:

P0519- IDLE SPEED PERFORMANCE

When Monitored and Set Condition:

P0519- IDLE SPEED PERFORMANCE

When Monitored: With the engine idling and the transmission in drive, if automatic. There must not be a MAP sensor trouble code or a Throttle Position Sensor trouble code.

Set Condition: The engine idle is not within 200 rpm above or 100 rpm below the target idle for 40 seconds. Two trip fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION IAC MOTOR PASSAGES VACUUM LEAKS AIR INDUCTION SYSTEM THROTTLE BODY AND THROTTLE LINKAGE

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 → Go To 6	All
2	Turn the ignition off. Remove the IAC Motor. Inspect the IAC Motor and passages way for any obstructions or damage to motor. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Start the engine. Inspect the vehicle for external vacuum leaks. Inspect the engine for internal vacuum leaks. Were any vacuum leaks found? Yes → Repair the vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0519-IDLE SPEED PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
4	Inspect the Air Induction System for the following problems. Restrictions: Dirty Air Cleaner, Foreign material trapped 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 5	All
5	Inspect the throttle body plate carbon build up or other restrictions. Inspect the throttle linkage for binding and smooth operation. Ensure the throttle plate is resting on the stop at idle. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
6	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0532-A/C PRESSURE SENSOR LOW

When Monitored and Set Condition:

P0532-A/C PRESSURE SENSOR LOW

When Monitored: The engine running. The A/C relay energized.

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

POSSIBLE CAUSES

INTERMITTENT CONDITION

5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND

5 VOLT SUPPLY CIRCUIT OPEN

A/C PRESSURE SENSOR INTERNAL FAILURE

A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT

PCM 5 VOLT SUPPLY CIRCUIT

PCM A/C PRESSURE SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Ensure 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?</p> <p>Yes → Go To 2 No → Go To 10</p>	All
2	<p>Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the A/C Pressure Sensor harness connector. Is the voltage between 4.5 to 5.2 volts?</p> <p>Yes → Go To 3 No → Go To 7</p>	All

P0532-A/C PRESSURE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. With the DRBIII®, monitor the A/C Pressure Sensor voltage. Turn the ignition on. 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
4	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the A/C Pressure Sensor Signal circuit in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the A/C Pressure Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the A/C Pressure Sensor Signal circuit and the Sensor ground circuit in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to the Sensor ground circuit in the A/C Pressure Sensor 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. 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 - 2.	All
7	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 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 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All

P0532-A/C PRESSURE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
8	<p>Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. 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 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?</p> <p>Yes → Go To 9</p> <p>No → Repair the open in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p>	All
9	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p>	All
10	<p>NOTE: Ensure the A/C refrigerant System is properly charges per the Service Information. 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: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p>No → Test Complete.</p>	All

Symptom:**P0533-A/C PRESSURE SENSOR HIGH****When Monitored and Set Condition:****P0533-A/C PRESSURE SENSOR HIGH**

When Monitored: The engine running. The A/C relay energized.

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

POSSIBLE CAUSES

INTERMITTENT CONDITION

A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO 5 VOLT SUPPLY CIRCUIT

A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

A/C PRESSURE SENSOR INTERNAL FAILURE

A/C PRESSURE SENSOR SIGNAL CIRCUIT OPEN

SENSOR GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Ensure the A/C refrigerant System is properly charged per the Service Information.</p> <p>Start the engine. With the DRBIII®, read the A/C Pressure Sensor voltage. Is the voltage above 4.6 volts?</p> <p>Yes → Go To 2 No → Go To 8</p>	All
2	<p>Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the A/C Pressure Sensor Signal circuit and the 5 Volt Supply circuit in the A/C Pressure Sensor harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the A/C Pressure Sensor Signal circuit for a short to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p>No → Go To 3</p>	All

P0533-A/C PRESSURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. Measure the voltage on the A/C Pressure Sensor Signal circuit at the A/C Pressure Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the A/C Pressure Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Connect a jumper wire between the A/C Pressure Sensor Signal circuit and the Sensor ground circuit. With the DRBIII®, monitor the A/C Pressure Sensor voltage. Turn the ignition on. Is the voltage below 1.0 volt? Yes → Replace the A/C Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. 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 A/C Pressure Sensor 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 6 No → Repair the A/C Pressure Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. 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 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 Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P0533-A/C PRESSURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p>	All
8	<p>NOTE: Ensure the A/C refrigerant System is properly charged per the Service Information.</p> <p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p>No → Test Complete.</p>	All

Symptom:

P0562-BATTERY VOLTAGE LOW

When Monitored and Set Condition:

P0562-BATTERY VOLTAGE LOW

When Monitored: Engine Running. RPM greater than 1152.

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. One trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION
 B+ CIRCUIT HIGH RESISTANCE
 GENERATOR GROUND HIGH RESISTANCE
 GENERATOR OPERATION
 GENERATOR FIELD GROUND CIRCUIT OPEN
 GENERATOR FIELD CONTROL CIRCUIT SHORTED TO GROUND
 GENERATOR FIELD CONTROL CIRCUIT OPEN
 PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Ensure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.</p> <p>NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.</p> <p>Turn the ignition off.</p> <p>NOTE: Ensure the generator drive belt is in good operating condition.</p> <p>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.</p> <p>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?</p> <p>Yes → Go To 2</p> <p>No → Go To 9</p>	All

P0562-BATTERY VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
2	<p>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.</p> <p>Ignition on, engine not running.</p> <p>NOTE: Ensure all wires are clear of the engine's moving parts.</p> <p>Measure the voltage between the Generator B+ Terminal and the Battery+ Post.</p> <p>Start the engine.</p> <p>Is the voltage above 0.4 of a volt?</p> <p>Yes → Repair the B+ circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3.</p> <p>No → Go To 3</p>	All
3	<p>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.</p> <p>Start the engine.</p> <p>Allow the engine to reach normal operating temperature.</p> <p>NOTE: Ensure all wires are clear of the engine's moving parts.</p> <p>Measure the voltage between the Generator case and Battery ground post.</p> <p>Is the voltage above 0.1 of a volt?</p> <p>Yes → Repair Generator Ground for high resistance, Generator Case to Battery ground side. Perform POWERTRAIN VERIFICATION TEST VER - 3.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the Generator Field harness connector.</p> <p>Using a 12-volt test light, jumper it across the Generator Field harness connector.</p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the Generator Field Driver circuit.</p> <p>Does the test light illuminate brightly and flash on and off?</p> <p>Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the Generator Field harness connector.</p> <p>Using a 12-volt test connected to battery voltage, probe the Generator Ground circuit in the Generator Field harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the Generator Field Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.</p>	All

P0562-BATTERY VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
6	Ignition on, engine not running. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Generator Field Control circuit in the Generator Field harness connector. Is the resistance below 100 ohms? Yes → Repair the Generator Field Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Turn the ignition off. Disconnect the Generator Field harness connector. 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 Generator 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 Generator Field Control 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. 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 - 3.	All
9	NOTE: Ensure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing. 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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All

Symptom:
P0563-BATTERY VOLTAGE HIGH

When Monitored and Set Condition:

P0563-BATTERY VOLTAGE HIGH

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

Set Condition: Battery voltage is 1 volt greater than desired system voltage. One Trip Fault

POSSIBLE CAUSES

GENERATOR FIELD CONTROL CIRCUIT SHORTED TO GROUND
 GENERATOR FIELD CONTROL CIRCUIT OPEN
 GENERATOR FIELD GROUND CIRCUIT OPEN
 INTERMITTENT CONDITION
 GENERATOR OPERATION
 GENERATOR FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
 PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Ensure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing. NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output. Turn the ignition off. NOTE: Ensure 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?</p> <p>Yes → Go To 2 No → Go To 8</p>	All
2	<p>Turn the ignition off. Disconnect the Generator Field harness connector. Using a 12-volt test light, jumper 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?</p> <p>Yes → Go To 4 No → Go To 3</p>	All

P0563-BATTERY VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. Measure the voltage on the Generator Field Control circuit at the Generator Field harness connector. Is the voltage above 1.0 volt? Yes → Repair the short to voltage in the Generator Field Control circuit. 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 connected to battery voltage, probe the Generator Ground circuit in the Generator Field harness connector. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the open in the Generator Field Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
5	Ignition on, engine not running. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Generator Field Control circuit in the Generator Field harness connector. Is the resistance below 100 ohms? Yes → Repair the Generator Field Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	Turn the ignition off. Disconnect the Generator Field harness connector. 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 Generator 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 7 No → Repair the open in the Generator Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
7	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. 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 - 3.	All

P0563-BATTERY VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
8	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>NOTE: Ensure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 3.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom:

P0579-SPEED CONTROL SWITCH #1 PERFORMANCE

POSSIBLE CAUSES
INTERMITTENT CONDITION SPEED CONTROL SWITCHES SPEED CONTROL SWITCH SIGNAL CIRCUIT SHORTED TO SENSOR GROUND SPEED CONTROL SWITCH SIGNAL CIRCUIT SHORTED TO GROUND SPEED CONTROL SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE SPEED CONTROL SWITCH SIGNAL CIRCUIT OPEN SENSOR GROUND OPEN PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, monitor each which 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 → Go To 2 No → Go To 3	All
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

P0579-SPEED CONTROL SWITCH #1 PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	<p>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 ohm value?</p> <p>Yes → Go To 4</p> <p>No → Replace the Speed Control Switch that had the incorrect resistance value. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p>	All
4	<p>Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. Disconnect the PCM harness connector. Measure the resistance between the Speed Control Switch Signal circuit and the Sensor ground circuit in the Speed Control harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the Speed Control Switch Signal circuit shorted to the Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. Disconnect the PCM harness connector. Measure the voltage of the Speed Control Switch Signal circuit at the Speed Control harness connector. Is the is the voltage above 5.0 volts?</p> <p>Yes → Repair the Speed Control Switch Signal circuit shorted to the battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Speed Control Switch Signal circuit at the Speed Control harness connector. Is the resistance below 100 ohms?</p> <p>Yes → Repair the Speed Control Switch Signal circuit shorted to the ground. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p> <p>No → Go To 7</p>	All

P0579-SPEED CONTROL SWITCH #1 PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: The measurement must be taken from both Speed Control Switch harness connector. Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. 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 Speed Control 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?</p> <p>Yes → Go To 8</p> <p>No → Repair the Speed Control Switch Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p>	All
8	<p>NOTE: The measurement must be taken from both Speed Control Switch harness connector. Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. 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 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 measurement?</p> <p>Yes → Go To 9</p> <p>No → Repair the Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p>	All
9	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p>	All

Symptom:**P0580-SPEED CONTROL SWITCH #1 LOW****When Monitored and Set Condition:****P0580-SPEED CONTROL SWITCH #1 LOW**

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

Set Condition: The PCM detects the Speed Control Switch Signal circuit voltage is less than 0.43. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

SPEED CONTROL ON/OFF SWITCH

SPEED CONTROL RESUME/ACCEL SWITCH

SPEED CONTROL SWITCH SIGNAL CIRCUIT SHORTED TO SENSOR GROUND

SPEED CONTROL SWITCH SIGNAL CIRCUIT SHORTED TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	<p>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?</p> <p>Yes → Go To 2 No → Go To 7</p>	All
2	<p>Ignition on, engine not running. 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?</p> <p>Yes → Replace the Speed Control On/Off Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 3</p>	All
3	<p>Ignition on, engine not running. With the DRBIII®, monitor the Speed Control Switch voltage. Disconnect the Speed Control Resume/Accel Switch harness connector. Did the volt change to above 4.7 volts?</p> <p>Yes → Replace the Speed Control Resume/Accel Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4</p>	All

P0580-SPEED CONTROL SWITCH #1 LOW — Continued

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. 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 between the Sensor ground circuit and the Speed Control Switch Signal circuit at the Speed Control Switch. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the Speed Control Switch Signal circuit short to Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. 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 between ground and the Speed Control Switch Signal circuit to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the Speed Control Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p> <p>No → Go To 6</p>	All
6	<p>NOTE: Before continuing, disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p>	All

P0580-SPEED CONTROL SWITCH #1 LOW — Continued

TEST	ACTION	APPLICABILITY
7	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4.</p> <p>No → Test Complete.</p>	All

Symptom:

P0581-SPEED CONTROL SWITCH #1 HIGH

When Monitored and Set Condition:

P0581-SPEED CONTROL SWITCH #1 HIGH

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

Set Condition: The PCM detects an open or short to voltage in the Speed Control Switch Signal circuit. One Trip Fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION SPEED CONTROL SWITCHES SPEED CONTROL SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE SENSOR GROUND OPEN PCM

TEST	ACTION	APPLICABILITY
1	<p>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?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 5</p>	All
2	<p>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 ohm value?</p> <p style="padding-left: 40px;">Yes → Go To 3</p> <p style="padding-left: 40px;">No → Replace the Speed Control Switch that had the incorrect resistance value. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p>	All

P0581-SPEED CONTROL SWITCH #1 HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. Disconnect the PCM harness connector. Measure the voltage of the Speed Control Switch Signal circuit at the Speed Control harness connector. Is the is the voltage above 5.0 volts? Yes → Repair the Speed Control Switch Signal circuit shorted to the battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	NOTE: The measurement must be taken from both Speed Control Switch harness connector. Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. 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 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 measurement? 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 - 4. No → Repair the Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

Symptom:

P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT

When Monitored and Set Condition:

P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT

When Monitored: Ignition on. Speed Control active.

Set Condition: The PCM detects an open or short to voltage in the Speed Control Vacuum Control circuit. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

SPEED CONTROL VACUUM SOLENOID

SPEED CONTROL VACUUM SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

SPEED CONTROL VACUUM SOLENOID CONTROL CIRCUIT OPEN

PCM (VACUUM SOLENOID)

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 → Go To 2 No → Go To 3	All
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	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 ground, probe the Speed Control Vacuum Solenoid Control circuit. Does the test light illuminate brightly and flash? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Turn the ignition off. Disconnect the S/C Servo harness connector. 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 Speed Control Vacuum Solenoid 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 5 No → Repair the open/high resistance in the Speed Control Vacuum Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Speed Control 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 Speed Control Vacuum Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. 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. 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 - 4.	All

Symptom:

P0586-SPEED CONTROL VENT SOLENOID CIRCUIT

When Monitored and Set Condition:

P0586-SPEED CONTROL VENT SOLENOID CIRCUIT

When Monitored: Ignition on. Speed Control active.

Set Condition: The PCM detects an open or short to voltage in the Speed Control Vent Control circuit. One Trip Fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION
SPEED CONTROL VENT SOLENOID
SPEED CONTROL VENT SOLENOID CONTROL CIRCUIT OPEN
SPEED CONTROL VENT SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
PCM (VENT SOLENOID)

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 → Go To 2 No → Go To 3	All
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

P0586-SPEED CONTROL VENT SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	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 ground, probe the Speed Control Vent Solenoid Control circuit in the Speed Control Servo harness connector. Does the test light illuminate brightly and flash? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Turn the ignition off. Disconnect the S/C Servo harness connector. 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 Speed Control Vent Solenoid 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 5 No → Repair the open/high resistance in the Speed Control Vent Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Speed Control Vent Solenoid Control circuit at the Speed Control Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Speed Control Vent Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. 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. 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 - 4.	All

Symptom:

P0594-SPEED CONTROL SERVO POWER CIRCUIT

When Monitored and Set Condition:

P0594-SPEED CONTROL SERVO POWER CIRCUIT

When Monitored: With the ignition key on. The speed control switched on.

Set Condition: The PCm detects a open or shorted in the Speed Control Power Supply circuit. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION
 SPEED CONTROL SOURCE CIRCUIT
 S/C BRAKE SWITCH OUTPUT CIRCUIT SHORTED TO GROUND
 S/C SOURCE CIRCUIT SHORTED TO GROUND
 BRAKE LAMP SWITCH
 S/C BRAKE SWITCH OUTPUT CIRCUIT OPEN
 PCM (S/C SOURCE CIRCUIT)

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. 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 Speed Control Brake Switch Output terminal in the Servo Harness connector. Does the test light illuminate brightly? Yes → Go To 2 No → Go To 3	All

P0594-SPEED CONTROL SERVO POWER CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4.</p> <p>No → Test Complete.</p>	All
3	<p>Turn the ignition off.</p> <p>Disconnect the PCM harness connector.</p> <p>Disconnect the Brake Lamp Switch harness connector.</p> <p>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.</p> <p>Measure the resistance of the Speed Control Source circuit from the Brake Lamp Switch harness connector to the appropriate terminal of special tool #8815.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the open/high resistance in the Speed Control Source circuit between the PCM and Brake Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the PCM harness connector.</p> <p>Disconnect the Brake Switch harness connector.</p> <p>Measure the resistance between ground and the Speed Control Source circuit in the Brake Switch harness connector.</p> <p>Is the resistance below 100 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the short to ground in the S/C Source circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p>	All

P0594-SPEED CONTROL SERVO POWER CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect the Brake Switch harness connector. Measure the resistance between ground and the Speed Control 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 S/C Brake Switch Output circuit. 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 Brake Switch harness connector. Measure the resistance of the S/C Brake Switch Output circuit from the Brake Switch harness connector to the S/C Servo harness connector. Is the resistance below 5.0 ohms? Yes → Repair the open/high resistance in the S/C Brake Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All
7	Disconnect the Brake Lamp Switch harness connector. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the Speed Control Power Supply circuit in the Brake Lamp Switch harness connector. NOTE: It is necessary to HOLD the Cruise Control Switch in the ON position to get an accurate reading. Does the test light illuminate brightly? Yes → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. 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. 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 - 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	<p>The Powertrain Control Module is reporting internal errors, view repair to continue.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

Symptom:

P0622-GENERATOR FIELD CONTROL CIRCUIT

When Monitored and Set Condition:

P0622-GENERATOR FIELD CONTROL CIRCUIT

When Monitored: With the ignition on. Engine running.

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

POSSIBLE CAUSES

WIRING HARNESS INTERMITTENT
 GENERATOR OPERATION
 GENERATOR FIELD GROUND CIRCUIT OPEN
 GENERATOR FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
 GENERATOR FIELD CONTROL CIRCUIT SHORTED TO GROUND
 GENERATOR FIELD CONTROL CIRCUIT OPEN
 PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Does the test light illuminate brightly and flash? Yes → Go To 2 No → Go To 3	All
2	With the DRBIII®, erase DTCs. 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 it to idle. Wiggle the wire harness from the Generator to PCM. With the DRBIII®, read DTCs. Did the DTC reset? Yes → Repair as necessary . Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All

P0622-GENERATOR FIELD CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Generator Field harness connector. Using a 12-volt test light, jumper 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 4	All
4	Turn the ignition off. Disconnect the Generator Field harness connector. Using a 12-volt test connected to battery voltage, probe the Generator Ground circuit in the Generator Field harness connector. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the open in the Generator Field Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
5	Turn the ignition off. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. Measure the voltage on the Generator Field Control circuit in the Generator Field harness connector. Is the voltage above 1.0 volts? Yes → Repair the short to voltage in the Generator Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	Turn the ignition on. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Generator Field Control circuit in the Generator Field harness connector. Is the resistance below 100 ohms? Yes → Repair the Generator Field Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Turn the ignition off. Disconnect the Generator Field harness connector. 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 Generator 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 Generator Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

P0622-GENERATOR FIELD CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	<p>NOTE: Before continuing, check the PCM connector terminals for corrosion, damage, or terminal push out. Repair as necessary. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.</p>	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. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

FUSED IGNITION SWITCH OUTPUT CIRCUIT

FUEL PUMP RELAY RESISTANCE

FUEL PUMP RELAY CONTROL CIRCUIT OPEN

FUEL PUMP RELAY CONTROL CIRCUIT SHORT 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 → Go To 2 No → Go To 3	All

P0627-FUEL PUMP RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>With the DRBIII®, actuate the Fuel Pump Relay.</p> <p>Wiggle the wire harness from the Fuel Pump Relay to the PCM while the relay is actuating.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All
3	<p>Turn the ignition off.</p> <p>Remove the Fuel Pump Relay from the PDC.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage of the Fused Ignition Switch Output circuit in the PDC.</p> <p>Is the voltage above 11.0 volts?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Repair the Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
4	<p>Turn the ignition off.</p> <p>Remove the Fuel Pump Relay from the PDC.</p> <p>Measure the resistance of the Fuel Pump Relay between the Fused Ignition Switch Output terminal and the Fuel Pump Relay Control terminal.</p> <p>Is the resistance between 70 to 90 ohms?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All

P0627-FUEL PUMP RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. 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 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 Fuel Pump Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Measure the resistance between ground and the Fuel Pump Relay Control circuit in the PDC. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the 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. 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 - 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 in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → The VIN has been successfully 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: The mileage has not been programmed into the PCM.

POSSIBLE CAUSESPROGRAMMING 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 in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → The mileage has been successfully 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 in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → The SKIM KEY information has been successfully 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. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

FUSED IGNITION SWITCH OUTPUT CIRCUIT

A/C CLUTCH RELAY RESISTANCE

A/C CLUTCH RELAY CONTROL CIRCUIT OPEN

A/C CLUTCH RELAY CONTROL CIRCUIT SHORT 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 → Go To 2 No → Go To 3	All

P0645-A/C CLUTCH RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>With the DRBIII®, actuate the A/C Clutch Relay.</p> <p>Wiggle the wire harness from the A/C Clutch Relay to the PCM while the relay is actuating.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All
3	<p>Turn the ignition off.</p> <p>Remove the A/C Clutch Relay from the PDC.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage on the Fused Ignition Switch Output circuit in the PDC.</p> <p>Is the voltage above 11.0 volts?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Repair the open or short to ground in the Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p>	All
4	<p>Turn the ignition off.</p> <p>Remove the A/C Clutch Relay from the PDC.</p> <p>Measure the resistance of the A/C Clutch Relay between the Fused Ignition Switch Output terminal and the A/C Clutch Relay Control terminal.</p> <p>Is the resistance between 60 to 80 ohms?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p>	All

P0645-A/C CLUTCH RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. 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 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 A/C Clutch Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Measure the resistance between ground and the A/C Clutch Control circuit in the PDC. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the 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. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P0660-MANIFOLD TUNE VALVE SOLENOID CIRCUIT

When Monitored and Set Condition:

P0660-MANIFOLD TUNE VALVE SOLENOID CIRCUIT

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

Set Condition: The PCM senses the MTV is not at the desired state. One Trip Fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION
MANIFOLD TUNE VALVE SOLENOID OPERATION
ASD RELAY OUTPUT CIRCUIT OPEN
CAPACITOR(S) SHORTED TO GROUND
ASD OUTPUT CIRCUIT SHORTED TO GROUND
MTV SOLENOID CONTROL CIRCUIT SHORTED TO ASD RELAY OUTPUT CIRCUIT
MTV SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
MTV SOLENOID CONTROL 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 → Go To 9	All
2	Turn the ignition off. Disconnect the Manifold Tune Valve Solenoid harness connector. Turn the ignition on. Using a 12-volt test light, connect one end to the ASD Relay Output circuit and the other end to the MTV Solenoid Control circuit. With the DRBIII®, actuate the MTV Solenoid. Does the 12-volt test light flash on and off. No → Go To 3 Yes → Replace the Manifold Tune Valve Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0660-MANIFOLD TUNE VALVE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MTV Solenoid harness connector. Turn the ignition on. With the DRB, actuate the MTV Solenoid. Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit in the MTV Solenoid harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Go To 7	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MTV Solenoid harness connector. Measure the resistance between the MTV Solenoid Control circuit and ASD Relay Output circuit in the MTV Solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the MTV Solenoid Control circuit for a short to the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MTV Solenoid harness connector. Measure the resistance between ground and the MTV Solenoid Control circuit at the MTV Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the MTV Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MTV Solenoid 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 MTV Solenoid Control circuit from the MTV Solenoid 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 MTV Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0660-MANIFOLD TUNE VALVE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off. Disconnect the MTV Solenoid harness connector. Remove the ASD Relay from the PDC. Measure the resistance of the ASD Relay Output circuit between the ASD Relay connector and the MTV Solenoid harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 8</p> <p>No → Repair the open in the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
8	<p>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 ASD Relay Output circuit. Repair the short to ground in the ASD Relay Output circuit and refer to VER-5. Is the INJ/COIL fuse OK for both capacitor tests?</p> <p>Yes → Replace the Capacitor(s) Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Repair the ASD Output circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p>	All
9	<p>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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	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.
One trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION
FUSED B+ CIRCUIT
ASD RELAY RESISTANCE
ASD RELAY CONTROL CIRCUIT OPEN
ASD RELAY CONTROL CIRCUIT SHORT 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 → Go To 2 No → Go To 3	All
2	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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. With the DRBIII®, actuate the ASD Relay. Wiggle the wire harness from the ASD Relay to the PCM while the relay is actuating. Refer to any Technical Service Bulletins (TSB) that may apply. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

P0685-ASD RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the ASD Relay from the PDC. Ignition on, engine not running. Measure the voltage of the Fused B+ circuits in the PDC. Is the voltage above 11.0 volts? Yes → Go To 4 No → Repair the Fused B+ circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Remove the ASD Relay from the PDC. Measure the resistance of the ASD Relay between the Fused B+ terminal and the ASD Relay Control terminal. Is the resistance between 60 to 80 ohms? 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. 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 ASD 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 ASD Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Remove the ASD Relay from the PDC. Measure the resistance between ground and the ASD Relay Control circuit in the PDC. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the ASD 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. 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 - 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. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION
 ASD RELAY
 FUSED B+ CIRCUIT
 ASD RELAY OUTPUT CIRCUIT OPEN
 ASD RELAY OUTPUT CIRCUIT OPEN
 PCM NO START
 PCM START

TEST	ACTION	APPLICABILITY
1	<p>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?</p> <p>Yes → Go To 2 No → Go To 9</p>	All
2	<p>Attempt to start the engine. Does the engine start.</p> <p>Yes → Go To 3 No → Go To 5</p>	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 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 ASD Output circuit from the PDC 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 ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. 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 - 5.	All
5	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 6 No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Remove the ASD Relay from the PDC. Measure the voltage of the Fused B+ circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 7 No → Repair the Fused B+ circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0688-ASD RELAY SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the ASD Relay from the PDC. 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 ASD Output circuit from the PDC 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 ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. 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 - 5.	All
9	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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Check for the engine stumble, stall or quite running. Refer to any Technical Service Bulletins (TSB) that may apply. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0700-TRANSMISSION CONTROL SYSTEM/READ TRANSMISSION DTCS ON THE DRBIII®

TEST	ACTION	APPLICABILITY
1	<p>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.</p> <p style="text-align: center;">Continue Test Complete.</p>	All

Symptom:**P0703-BRAKE SWITCH #2 CIRCUIT****When Monitored and Set Condition:****P0703-BRAKE SWITCH #2 CIRCUIT**

When Monitored: TEST #1: Vehicle speed greater than 20 MPH to enable. TEST #2: Speed must be 0 and brake switch indicates on.

Set Condition: TEST #1: If vehicle speed goes to 0 MPH without brake input. Condition must be repeated 15 times to set fault. Two trip fault. TEST #2: If vehicle speed go above 20 MHP for more than 6.0 seconds without a change in brake state. Condition must be repeat 15 times to set fault. Two Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION
 FUSED B+ CIRCUIT
 BRAKE SWITCH SENSE CIRCUIT SHORTED TO VOLTAGE
 BRAKE SWITCH SENSE SHORTED TO GROUND
 BRAKE SWITCH SENSE CIRCUIT OPEN
 GROUND CIRCUIT OPEN
 BRAKE LAMP SWITCH OPERATION
 PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Ensure the Brake Switch is adjusted properly 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?</p> <p>Yes → Go To 2 No → Go To 9</p>	All
2	<p>Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Using a 12-volt test light connected to ground, check the Fused B+ circuit in the Brake Lamp Switch harness connector. Does the test light illuminate brightly?</p> <p>Yes → Go To 3 No → Repair the Fuse B+ circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4.</p>	All

P0703-BRAKE SWITCH #2 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Remove the ASD Relay from the PDC. Using a jumper wire, jumper between the Fused B+ circuit and ASD Relay Output circuit in the PDC. Turn the ignition on. Measure the voltage of the Brake Switch Sense circuit in the Brake Lamp Switch harness connector. Is the voltage above 1.0 volts? Yes → Repair the short to voltage in the Brake Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Brake Switch Sense circuit at the Brake Lamp Switch harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the Brake Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. 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 Brake Switch Sense 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 6 No → Repair the open in the Brake Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
6	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between ground and the Ground circuit at the Brake Lamp Switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0703-BRAKE SWITCH #2 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between the Ground circuit terminal and the Brake Switch Sense 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 open circuit? Yes → Go To 8 No → Replace the Brake Lamp Switch. 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. 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 - 4.	All
9	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. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → 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: The PCM detects an incorrect Park/Neutral switch state for a given mode of vehicle operation. Two Trip Fault.

POSSIBLE CAUSES
INTERMITTENT PARK/NEUTRAL SWITCH TRANSMISSION DTC(S) PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read PCM 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 3	All
2	Turn the ignition on. With the DRBIII®, check the Transmission DTCs. Are there any Transmission DTCs present? Yes → Refer to the appropriate Transmission DTC in the Transmission category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0850-PARK/NEUTRAL SWITCH PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	<p>At this time, the conditions required to set the DTC are not present.</p> <p>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.</p> <p>NOTE: Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>NOTE: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>NOTE: Refer to any technical service bulletins (TSB) that may apply.</p> <p>Were any problems found?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	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 PROGRAMMED

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, erase DTCs. With the DRBIII® program 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 in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → The PCM has been successfully programmed. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom List:**P1603-PCM INTERNAL DAUL-PORT RAM COMMUNICATION****P1604-PCM INTERNAL DAUL-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 DAUL-PORT RAM COMMUNICATION.

When Monitored and Set Condition:**P1607-PCM INTERNAL SHUTDOWN TIMER RATIONALITY**

When Monitored: During cold start.

Set Condition: Compares shut down time to coolant temperature.

POSSIBLE CAUSES

PCM INTERNAL FAILURE

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

Symptom:
P1686-NO SKIM BUS MESSAGES

POSSIBLE CAUSES
INTERMITTENT CONDITION PCI BUS CIRCUIT OPEN FROM PCM TO SKIM LOSS OF SKIM COMMUNICATION SKIM/PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. 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 → Go To 5	All
2	Turn the ignition on. With the DRB III, attempt to communicate with the SKIM. NOTE: This test will indicate if the Bus is operational from the DLC to the SKIM. Was the DRB III 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
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 PCI Bus circuit between the PCM and the SKIM for an open. Perform SKIS VERIFICATION.	All

P1686-NO SKIM BUS MESSAGES — Continued

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off. Replace the Sentry Key Immobilizer Module in accordance with the Service Information. Turn the ignition on. 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?</p> <p>Yes → Replace and program the PCM in accordance with the Service Information. Perform SKIS VERIFICATION.</p> <p>No → Test Complete.</p>	All
5	<p>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.</p> <p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. 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. Were any of the above conditions present?</p> <p>Yes → Repair as necessary. Perform SKIS VERIFICATION.</p> <p>No → Test Complete.</p>	All

Symptom:

P1687-NO CLUSTER BUS MESSAGE

When Monitored and Set Condition:

P1687-NO CLUSTER BUS MESSAGE

When Monitored: Ignition key on.

Set Condition: No messages received from the MIC (Instrument Cluster) for 20 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION COMMUNICATE WITH CLUSTER INSTRUMENT CLUSTER OPERATION PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTCs. Cycle the ignition key on and off several times. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Go To 2 No → Go To 4	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 in accordance with the 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

P1687-NO CLUSTER BUS MESSAGE — Continued

TEST	ACTION	APPLICABILITY
4	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Test Complete.</p>	All

Symptom:

P1695-NO BODY BUS MESSAGES

When Monitored and Set Condition:

P1695-NO BODY BUS MESSAGES

When Monitored: With the ignition on. Battery voltage greater than 10.0 volts.

Set Condition: No BUS messages recieved from the BCM for 20 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION COMMUNICATE WITH BCM PCI BUS CIRCUIT OPEN PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. 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 DTC's. Does the DTC reset? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, attempt to communicate with the BCM. Can communication be established with the BCM? Yes → Go To 3 No → Refer to the Communication Category and perform the appropriate symptom related to no communication with BCM. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Disconnect the PCM harness connector Disconnect the BCM harness connector. NOTE: Inspect the PCI Bus terminal at both the PCM connectors and the BCM connectors. Check for corrosion, damage or terminal push out. Measure the resistance of the PCI BUS circuit between the PCM harness connector and the BCM harness connector. Is the resistance below 5.0 ohms? 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

P1695-NO BODY BUS MESSAGES — Continued

TEST	ACTION	APPLICABILITY
4	<p>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.</p> <p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom List:

P1696-EEPROM MEMEORY WRITE DENIED/INVALID
P1697-EMR (SRI) MILEAGE NOT STORED

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

When Monitored and Set Condition:

P1696-EEPROM MEMEORY WRITE DENIED/INVALID

When Monitored: Ignition key on, Continuous.

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

P1697-EMR (SRI) MILEAGE 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 in accordance with the 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-EEPROM MEMEORY WRITE DENIED/INVALID — Continued

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

Symptom:

P1698-NO TRASMISSION BUS MESSAGE

When Monitored and Set Condition:

P1698-NO TRASMISSION BUS MESSAGE

When Monitored: Equipped with automatic transmission. The ignition on. Battery voltage greater than 10 volts.

Set Condition: No bus messages from the TCM for 20 seconds, two trips required.

POSSIBLE CAUSES

INTERMITTENT CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. 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 DTC's. Does the DTC reset? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. Review the DRB 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. 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. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:**P2008-SHORT RUNNER SOLENOID CIRCUIT****When Monitored and Set Condition:****P2008-SHORT RUNNER SOLENOID CIRCUIT**

When Monitored: The Engine running. ASD Relay is energized.

Set Condition: The PCM sense the SRV is not at the desired state. One Trip Fault.

POSSIBLE CAUSES

INTERMITTENT CONDITION

SHORT RUNNER VALVE SOLENOID OPERATION

ASD RELAY OUTPUT CIRCUIT

SRV SOLENOID CONTROL CIRCUIT SHORTED TO ASD RELAY OUTPUT CIRCUIT

SRV SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

SRV SOLENOID CONTROL 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 → Go To 8	All
2	Turn the ignition off. Disconnect the Short Runner Valve Solenoid harness connector. Turn the ignition on. Using a 12-volt test light, connect one end to the ASD Relay Output circuit and the other end to the SRV Solenoid Control circuit. With the DRBIII®, actuate the SRV Solenoid. Does the 12-volt test light flash on and off. No → Go To 3 Yes → Replace the Short Runner Valve Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the SRV Solenoid harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the ASD Relay Output circuit. With the DRBIII®, actuate the SRV Solenoid. Does the 12-volt test light illuminate? Yes → Go To 4 No → Repair the ASD Relay circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P2008-SHORT RUNNER SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the SRV Solenoid harness connector. Measure the resistance between the SRV Solenoid Control circuit and ASD Relay Output circuit in the SRV Solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the SRV Solenoid Control circuit short to the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the SRV Solenoid harness connector. Measure the resistance between ground and the SRV Solenoid Control circuit at the SRV Solenoid harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the SRV Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the SRV Solenoid 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 SRV Solenoid Control circuit from the SRV Solenoid 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 SRV Solenoid 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. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P2008-SHORT RUNNER SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5.</p> <p>No → Test Complete.</p>	All

Symptom List:

P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION

P2305-IGNITION COIL #2 SECONDARY CIRCUIT - INSUFFICIENT IONIZATION

P2308-IGNITION COIL #3 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION

P2311-IGNITION COIL #4 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION

P2314-IGNITION COIL #5 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION

P2317-IGNITION COIL #6 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION.

When Monitored and Set Condition:

P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION

When Monitored: Engine Running.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault.

P2305-IGNITION COIL #2 SECONDARY CIRCUIT - INSUFFICIENT IONIZATION

When Monitored: Engine Running.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault

P2308-IGNITION COIL #3 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION

When Monitored: Engine running.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault

P2311-IGNITION COIL #4 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION

When Monitored: Engine running.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault

P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION — Continued

P2314-IGNITION COIL #5 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION

When Monitored: Engine running.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault

P2317-IGNITION COIL #6 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION

When Monitored: Engine running.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault

POSSIBLE CAUSES
INTERMITTENT CONDITION SPARK PLUG IGNITION COIL OPERATION IGNITION COIL

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 → Go To 3	All
2	Turn the ignition off. Disconnect the Ignition Coil harness connector. Remove the ignition coil. 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 to the Ignition Coil. Reconnect the Ignition Coil harness connector to the Ignition Coil. While cranking the engine observe the spark coming from the spark tester. NOTE: The Ignition Coil should generate a crisp blue spark that is able to jumper the gap of the spark tester. Does the Ignition Coil generate a good spark. Yes → Replace the Spark Plug. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off. Remove the Spark Plug. Inspect the Spark Plug for the following conditions.</p> <ul style="list-style-type: none"> - Cracks - Carbon Tracking - Foreign Material - Gap size out of specifications - Loose or broke electrode <p>CAUTION: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.</p> <p>Were any of the above condition present?</p> <p style="padding-left: 40px;">Yes → Replace the Spark Plug. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
4	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom:**P2503-CHARGING SYSTEM VOLTAGE LOW****When Monitored and Set Condition:****P2503-CHARGING SYSTEM VOLTAGE 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

B+ CIRCUIT HIGH RESISTANCE
 GENERATOR GROUND HIGH RESISTANCE
 GENERATOR OPERATION
 INTERMITTENT CONDITION
 GENERATOR FIELD GROUND CIRCUIT OPEN
 GENERATOR FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
 GENERATOR FIELD CONTROL CIRCUIT SHORTED TO GROUND
 GENERATOR FIELD CONTROL CIRCUIT OPEN
 PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output. Turn the ignition off. NOTE: The battery must be fully charged. NOTE: The Generator belt tension and condition must be checked before continuing. Start the engine. Allow the idle to stabilize. With the DRBIII®, read the Target Charging Voltage. Is the Target Charging Voltage above 15.1 volts?</p> <p>Yes → Go To 2 No → Go To 3</p>	All

P2503-CHARGING SYSTEM VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
2	<p>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</p> <p>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.</p> <p>With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 3.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All
3	<p>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.</p> <p>Ignition on, engine not running.</p> <p>NOTE: Ensure all wires are clear of the engine's moving parts.</p> <p>Measure the voltage between the Generator B+ Terminal and the Battery+ Post. Start the engine.</p> <p>Is the voltage above 0.4 of a volt?</p> <p style="padding-left: 40px;">Yes → Repair the B+ circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3.</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
4	<p>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.</p> <p>Start the engine.</p> <p>Warm the engine to operating temperature.</p> <p>NOTE: Ensure all wires are clear of the engine's moving parts.</p> <p>Measure the voltage between the Generator case and Battery ground post. Is the voltage above 0.1 of a volt?</p> <p style="padding-left: 40px;">Yes → Repair Generator Ground for high resistance, Generator Case to Battery ground side. Perform POWERTRAIN VERIFICATION TEST VER - 3.</p> <p style="padding-left: 40px;">No → Go To 5</p>	All

P2503-CHARGING SYSTEM VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the Generator Field harness connector. Using a 12-volt test light, jumper 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 6	All
6	Turn the ignition off. Disconnect the Generator Field harness connector. Using a 12-volt test connected to battery voltage, probe the Generator Ground circuit in the Generator Field harness connector. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the open in the Generator Field Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
7	Turn the ignition off. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. Measure the voltage on the Generator Field Control circuit at the Generator Field harness connector. Is the voltage above 1.0 volt? Yes → Repair the short to voltage in the Generator Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 8	All
8	Turn the ignition on. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Generator Field Control circuit in the Generator Field harness connector. Is the resistance below 100 ohms? Yes → Repair the Generator Field Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 9	All
9	Turn the ignition off. Disconnect the Generator Field harness connector. 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 Generator 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 10 No → Repair the open in the Generator Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

P2503-CHARGING SYSTEM VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
10	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 - 3.	All

Symptom:***CHECKING FUEL DELIVERY****POSSIBLE CAUSES**

FUEL PUMP RELAY
 FUEL PRESSURE OUT OF SPECS
 RESTRICTED FUEL SUPPLY LINE
 FUEL PUMP INLET STRAINER PLUGGED
 FUEL PUMP MODULE
 FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
 FUEL PUMP RELAY FUSED B+ CIRCUIT
 FUEL PUMP RELAY OUTPUT CIRCUIT OPEN
 FUEL PUMP GROUND CIRCUIT OPEN/HIGH RESISTANCE
 FUEL PUMP MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. 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 6 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. (2.7L use the fuel adapter #6539 Miller Tool) Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi). Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 3 Within Specification Go To 5 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	<p>Turn the ignition off.</p> <p>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.</p> <p>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.</p> <p>Attach a fuel pressure test gauge to the "T" fitting on tool #6539.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</p> <p>Is the fuel pressure within specification now?</p> <p>Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 4</p> <p>Caution: Stop All Actuations.</p>	All
4	<p>Turn the ignition off.</p> <p>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.</p> <p>Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.</p> <p>Is the Fuel Inlet Strainer plugged?</p> <p>Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
5	<p>Note: The fuel pressure must be within specification before continuing.</p> <p>Turn the ignition off.</p> <p>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.</p> <p>Disconnect the fuel supply line at the fuel rail.</p> <p>Connect fuel line adapter #6539(5/16") or #6631(3/8") to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container.</p> <p>Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.</p> <p>Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test for 7 seconds.</p> <p>Is the fuel pump capacity within specification?</p> <p>Yes → Test Complete.</p> <p>No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>Caution: Stop All Actuations.</p>	All

***CHECKING FUEL DELIVERY — Continued**

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the fuel pump module harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, probe the Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 7 No → Go To 9 Caution: Stop All Actuations.	All
7	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary. Using a test light connected to battery voltage, probe the Fuel Pump ground circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 8 No → Repair the open/high resistance in the fuel pump ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
9	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the PDC. Does the test light illuminate? Yes → Go To 10 No → Repair the Fuel Pump Realy Fused B+ circuit. Check for open fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the Fuel Pump Module harness connector. NOTE: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities Measure the resistance of the 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 Fuel Pump Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:

***CHECKING HARD START (FUEL DELIVERY SYSTEM)**

POSSIBLE CAUSES
FUEL PRESSURE OUT OF SPECS
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PUMP INLET STRAINER PLUGGED
INTERNAL FUEL SUPPLY LEAK
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
FUEL PUMP MODULE
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 to the fuel rail test port. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi). Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 2 Within Specification Go To 4 Caution: Stop All Actuations.	All

***CHECKING HARD START (FUEL DELIVERY SYSTEM) — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.</p> <p>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.</p> <p>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.</p> <p>Attach a fuel pressure test gauge to the "T" fitting on tool #6539.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</p> <p>Is the fuel pressure within specification now?</p> <p>Yes → Visually and physically inspect the fuel supply line between the fuel tank and the fuel rail. Repair/replace as necessary. If no problem is found replace the fuel filter. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p>No → Go To 3</p> <p>Caution: Stop All Actuations.</p>	All
3	<p>Turn the ignition off.</p> <p>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.</p> <p>Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.</p> <p>Is the Fuel Inlet Strainer plugged?</p> <p>Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p>No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p>	All
4	<p>NOTE: Before continuing visually and physically inspect the fuel delivery for external leaks or damage. Repair /replace as necessary.</p> <p>Turn the ignition off.</p> <p>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.</p> <p>Disconnect the fuel supply line from the fuel rail.</p> <p>Install special 5/16" fuel line adapter tool #6539 between disconnected fuel supply line and the fuel rail.</p> <p>Attach a fuel pressure test gauge to the "T" fitting on tool #6539.</p> <p>Start the engine and allow the fuel system to reach maximum pressure.</p> <p>Turn the ignition off.</p> <p>NOTE: Fuel specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</p> <p>Monitor the fuel pressure gauge for a minimum of 5 minutes.</p> <p>NOTE: The pressure should not fall below 241 KPa (35 psi)</p> <p>Is the fuel pressure within specification?</p> <p>Yes → Go To 5</p> <p>No → Go To 6</p> <p>Caution: Stop All Actuations.</p>	All

***CHECKING HARD START (FUEL DELIVERY SYSTEM) — Continued**

TEST	ACTION	APPLICABILITY
5	<p>Note: The fuel pressure must be within specification before continuing. 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. Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16") to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result. Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification?</p> <p style="padding-left: 40px;">Yes → Check the fuel for contaminants. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p style="padding-left: 40px;">No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p>Caution: Stop All Actuations.</p>	All
6	<p>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. Disconnect the fuel supply line from the fuel rail. Install special 5/16" fuel line adapter tool #6539 between disconnected fuel supply line and the fuel rail. Attach a fuel pressure test gauge to the "T" fitting on tool #6539. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. NOTE: Be certain that the clamping technique used is adequate to provide a good seal and will not damage the fuel pressure adapter tool hose. Using the hose clamp pliers special tool #C-4390, slowly clamp off the rubber hose on the Fuel Pressure adapter nearest the fuel rail. Turn the ignition off. Monitor the fuel pressure gauge for a minimum of 5 minutes. NOTE: The pressure should not fall below 241 KPa (35 psi) Is the fuel pressure within specification?</p> <p style="padding-left: 40px;">Yes → Replace the leaking injector(s) Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p style="padding-left: 40px;">No → Replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p>Caution: Stop All Actuations.</p>	All

Symptom:***CHECKING PCM POWER AND GROUND CIRCUITS****POSSIBLE CAUSES**

PCM FUSED B+ CIRCUIT
 PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT
 PCM GROUND CIRCUITS

TEST	ACTION	APPLICABILITY
1	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. Using a 12-volt test light connected to ground, probe the PCM Fused B+ circuit in the Pinout Box. Does the test light illuminate brightly? Yes → Go To 2 No → Repair the Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	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. Turn the ignition on. Using a 12-volt test light connected to ground, probe the PCM Fused Ignition Switch Output circuit in the Pinout Box. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Ignition Switch Output circuit Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	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. Using a 12-volt test light connected to battery voltage, probe the PCM ground circuits in the Pinout Box. Does the test light illuminate brightly? Yes → Test Complete. No → Repair the PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:

***CHECKING THE A/C RELAY OUTPUT**

POSSIBLE CAUSES
A/C CLUTCH RELAY OPERATION
GROUND CIRCUIT OPEN
A/C CLUTCH
FUSED B+ CIRCUIT
A/C CLUTCH OUTPUT CIRCUIT
A/C CLUTCH RELAY

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Ensure that the refrigerant system is properly charged. Refer to the appropriate Service Information.</p> <p>Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch actuating?</p> <p style="padding-left: 40px;">Yes → The A/C Clutch System operating properly at this time. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p style="padding-left: 40px;">No → Go To 2</p>	All
2	<p>Turn the ignition off. Disconnect the A/C Clutch harness connector. Measure the Ground circuit in the A/C Clutch harness connector to ground. Is the resistance below 5.0 ohms?</p> <p style="padding-left: 40px;">Yes → Go To 3</p> <p style="padding-left: 40px;">No → Repair the Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p>	All
3	<p>Disconnect the A/C Clutch harness connector. Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Measure the voltage of the A/C Clutch Relay Output circuit in the A/C Clutch harness connector. Is the voltage above 11.0 volts?</p> <p style="padding-left: 40px;">Yes → Replace the A/C Clutch. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
4	<p>Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the PDC. Does the test light illuminate brightly?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Repair the Fused B+ circuit. Inspect fuses and replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p>	All

***CHECKING THE A/C RELAY OUTPUT — Continued**

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off. Disconnect the A/C Clutch Relay from the PDC. Disconnect the A/C Clutch harness connector. Measure the resistance of the A/C Clutch Relay Output circuit between the PDC and the A/C Clutch harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p> <p>No → Repair the A/C Clutch Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.</p>	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	<p>Note: This trouble code indicates an internal SKIM fault.</p> <p>With the DRBIII®, read and record the SKIM DTCs and then erase the SKIM DTCs. Perform 10 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle.</p> <p>With the DRBIII®, read the SKIM DTCs.</p> <p>Did the same SKIM DTC return?</p> <p style="padding-left: 40px;">Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

SENTRY KEY IMMOBILIZER

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/PCM

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Ensure the PCM has proper power and ground connections before continuing.</p> <p>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?</p> <p>Yes → Go To 2 No → Go To 4</p>	All

PCM STATUS FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.</p> <p>NOTE: Visually inspect the related wiring harness and CCD/PCI Bus (whichever applicable) circuits. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Note: Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Were any problems found?</p> <p>Yes → Repair as necessary. Perform SKIS VERIFICATION.</p> <p>No → Go To 3</p>	All
3	<p>NOTE: Before proceeding it will be necessary to obtain the SKIM PIN.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, display and erase all PCM and SKIM DTC's.</p> <p>Perform 5 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle.</p> <p>With the DRBIII®, read the SKIM DTCs.</p> <p>Does the code appear?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.</p> <p>No → Test Complete.</p>	All
4	<p>Turn the ignition off.</p> <p>Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Note: Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Were any problems found?</p> <p>Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION.</p> <p>No → Test Complete.</p>	All

SENTRY KEY IMMOBILIZER

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 PCM VIN
REPLACE SKIM AND CHECK DTC'S
INTERMITTENT WIRING HARNESS PROBLEM
PCM

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	<p>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 PCM. If a VIN is not displayed, attempt to program the PCM with the correct vehicle VIN before continuing. Does the VIN recorded from the PCM match the VIN of the vehicle?</p> <p>Yes → Go To 3</p> <p>No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.</p>	All
3	<p>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 PCM and SKIM DTC's. 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?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.</p> <p>No → The repair is complete. Perform SKIS VERIFICATION.</p>	All
4	<p>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?</p> <p>Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION.</p> <p>No → Test Complete.</p>	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	<p>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?</p> <p style="padding-left: 40px;">Yes → Go To 2 No → Go To 7</p>	All
2	<p>Are there multiple vehicle ignition keys available?</p> <p style="padding-left: 40px;">Yes → Go To 3 No → Go To 4</p>	All
3	<p>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?</p> <p style="padding-left: 40px;">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.</p>	All
4	<p>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 reset?</p> <p style="padding-left: 40px;">Yes → Go To 5 No → Test Complete.</p>	All
5	<p>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 reset?</p> <p style="padding-left: 40px;">Yes → Go To 6 No → Test Complete.</p>	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:

***ENGINE CRANKS DOES NOT START**

POSSIBLE CAUSES
FUEL PUMP RELAY
NO START PRE-TEST
OTHER POSSIBLE CAUSES FOR NO START
POWERTRAIN FUSES OPEN
FUEL PRESSURE OUT OF SPECS
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
FUEL PUMP RELAY FUSED B+ CIRCUIT
FUEL PUMP RELAY OUTPUT CIRCUIT OPEN
FUEL PUMP GROUND CIRCUIT OPEN/HIGH RESISTANCE
FUEL PUMP MODULE

TEST	ACTION	APPLICABILITY
1	<p>Note: The following list of items must be checked before continuing with any no start tests.</p> <p>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 DTC's to set that may have been erased due to a dead battery. Ensure the Powers and Ground to the PCM are ok.</p> <p>Make sure the PCM communicates with the DRB and that there are no DTC's stored in the PCM memory. If the PCM reports a No Response condition, refer to the Communication category for the proper tests.</p> <p>Read the PCM DTC's with the DRB. If any DTC's 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.</p> <p>Ensure that the PCI bus is functional. Attempt to communicate with the Instrument Cluster and SKIM, If you are unable to establish communicate refer to the Communication category for the proper symptoms.</p> <p>The Sentry Key Immobilizer System must be operating properly. Check for proper communication with the DRBIII® and check for DTC's that may be stored in the Sentry Key Immobilizer Module (SKIM). repair the DTC(s) before continuing. If no DTC's are found, using the DRB select Clear PCM (Batt Disconnect). Crank the engine several times. Using the DRB, read DTC's. If a DTC is present perform the DTC diagnostics before continuing.</p> <p>Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p style="padding-left: 40px;">No → Go To 2</p>	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
2	<p>Check for any open fuses in the PDC or Fuse Block that may be related to the No Start condition. Are any of the fuses open?</p> <p>Yes → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors, repair as necessary. Replace the Fuse. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition on. 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?</p> <p>Yes → Go To 4</p> <p>No → Go To 9</p> <p>Caution: Stop All Actuations.</p>	All
4	<p>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. (2.7L use the fuel adapter #6539 Miller Tool) Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. NOTE: Fuel pressure specification is 400 kPa +/- 34 kPa (58 psi +/- 5 psi). Choose a conclusion that best matches your fuel pressure reading.</p> <p>Below Specification Go To 5</p> <p>Within Specification Go To 7</p> <p>Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>Caution: Stop All Actuations.</p>	All

***ENGINE CRANKS DOES NOT START — Continued**

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off.</p> <p>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.</p> <p>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.</p> <p>Attach a fuel pressure test gauge to the "T" fitting on tool #6539.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</p> <p>Is the fuel pressure within specification now?</p> <p>Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 6</p> <p>Caution: Stop All Actuations.</p>	All
6	<p>Turn the ignition off.</p> <p>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.</p> <p>Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.</p> <p>Is the Fuel Inlet Strainer plugged?</p> <p>Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
7	<p>Note: The fuel pressure must be within specification before continuing.</p> <p>Turn the ignition off.</p> <p>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.</p> <p>Disconnect the fuel supply line at the fuel rail.</p> <p>Connect fuel line adapter #6539(5/16") or #6631(3/8") to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container.</p> <p>Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.</p> <p>Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test for 7 seconds.</p> <p>Is the fuel pump capacity within specification?</p> <p>Yes → Go To 8</p> <p>No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>Caution: Stop All Actuations.</p>	All

STARTING

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
8	<p>The following items need to be checked as a possible cause for a no start condition. Refer to any Technical Service Bulletins that may apply to the symptom.</p> <p>The spark plugs must be free from fuel, oil, coolant and/or any foreign material or deposits.</p> <p>The fuel must be free from contamination.</p> <p>The exhaust may be free from restrictions.</p> <p>The engine compression must be within specifications.</p> <p>The engine valve timing must be within specifications.</p> <p>The engine must be free from vacuum leaks.</p> <p>Were any of the above conditions found?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Test Complete.</p>	All
9	<p>Turn the ignition off.</p> <p>Disconnect the fuel pump module harness connector.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test.</p> <p>Using a 12 volt test light connected to ground, probe the Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 10</p> <p>No → Go To 12</p> <p>Caution: Stop All Actuations.</p>	All
10	<p>Turn the ignition off.</p> <p>Disconnect the Fuel Pump Module harness connector.</p> <p>Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.</p> <p>Using a test light connected to battery voltage, probe the Fuel Pump ground circuit at the Fuel Pump Module harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 11</p> <p>No → Repair the open/high resistance in the fuel pump ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
11	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Fuel Pump Module.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
12	<p>Turn the ignition off.</p> <p>Remove the Fuel Pump Relay from the PDC.</p> <p>With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the PDC.</p> <p>Does the test light illuminate?</p> <p>Yes → Go To 13</p> <p>No → Repair the Fuel Pump Relay Fused B+ circuit. Check for open fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

***ENGINE CRANKS DOES NOT START — Continued**

TEST	ACTION	APPLICABILITY
13	<p>Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the Fuel Pump Module harness connector. NOTE: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities Measure the resistance of the Fuel Pump Relay Output circuit from the relay connector to the fuel pump module connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Repair the open fuel pump relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

STARTING

Symptom:

***NO CRANK CONDITION**

POSSIBLE CAUSES

REPAIR MECHANICAL CONDITION
 TRANSMISSION RANGE SENSOR
 BATTERY CIRCUIT RESISTANCE TOO HIGH
 IGNITION SWITCH OUTPUT CIRCUIT OPEN
 STARTER RELAY CONTROL CIRCUIT OPEN
 STARTER RELAY OUTPUT CIRCUIT OPEN
 FUSED B(+) CIRCUIT OPEN
 STARTER
 STARTER MOTOR RELAY
 STARTER RELAY

TEST	ACTION	APPLICABILITY
1	<p>NOTE: Ensure that SKIS is operating properly. Check the SKIM for DTC. If a SKIM DTC(s) is present diagnose them first before continuing.</p> <p>WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING.</p> <p>Turn the engine over by hand to ensure the engine is not seized. Is the engine able to turn over?</p> <p>Yes → Go To 2</p> <p>No → Repair the mechanical condition preventing the starter motor from cranking. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
2	<p>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 P/N Position Switch Sense circuit. Did the resistance change from above 10.0 ohms to below 10.0 ohms?</p> <p>Yes → Go To 3</p> <p>No → Replace the Transmission Range Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
3	<p>Turn the ignition off. Check the Battery Cables for high resistance using the service information procedure. Did either Battery Cable have a voltage drop greater than 0.2 volt?</p> <p>Yes → Repair the Battery circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 4</p>	All

***NO CRANK CONDITION — Continued**

TEST	ACTION	APPLICABILITY
4	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. 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 Starter Relay Output Circuits. Did the Starter Motor crank the engine? Yes → Go To 5 No → Go To 8	All
5	Turn the ignition off. Remove the Starter Relay from the PDC. Turn the ignition on. Using a 12-volt test light, probe the Ignition Switch Output circuit in the Starter Relay connector. While observing 12-volt test light, hold ignition key in the start position. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Ignition Switch Output circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	Turn the ignition off. Remove the Starter Relay from the PDC. Disconnect the PCM harness connector. Measure the Starter Relay Control circuit between the Relay terminal and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Starter Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
7	Turn the ignition off. Install a substitute a Relay in the of the Starter Motor Relay. Attempt to start the vehicle. Does the engine crank over? Yes → Replace the Starter Motor Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

STARTING

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Remove the Starter Relay from the PDC. Disconnect the Starter Relay Output connector from the Starter Solenoid. Measure the resistance of the 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 Starter Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
9	Turn the ignition off. Remove the Starter Relay from the PDC. Using a 12-volt test light connected to ground, probe the Fused B+ circuit at the Starter Relay terminal. Does the test light illuminate brightly? Yes → Go To 10 No → Repair the Fused B(+) Circuit for an open or high resistance. 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+ CIRCUIT
 PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT
 PCM GROUND CIRCUITS
 PCM

TEST	ACTION	APPLICABILITY
1	<p>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 when trying to communicate with the PCM. Turn the ignition off. Disconnect the PCM harness connector. 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?</p> <p>Yes → Go To 2 No → Repair the Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
2	<p>Turn the ignition off. Disconnect the PCM harness connector. Turn the ignition on. 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?</p> <p>Yes → Go To 3 No → Repair the Ignition Switch Output circuit Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
3	<p>Turn the ignition off. Disconnect the PCM harness connector. Using a 12-volt test light connected to battery voltage, probe all the PCM ground circuits in the PCM harness connector. Does the test light illuminate brightly?</p> <p>Yes → Go To 4 No → Repair the PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
4	<p>If there is no possible causes remaining, view repair.</p> <p>Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

STARTING

Symptom:

*START AND STALL CONDITION

POSSIBLE CAUSES
CHECKING DTCS
CHECKING SKIM DTCS
FUEL PRESSURE OUT OF SPECS
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
TP SENSOR SWEEP
TP SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
ECT SENSOR OPERATION
OTHER POSSIBLE CAUSES FOR START & STALL
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Are any DTCs present? Yes → Refer to the Driveability Category and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All
2	Turn the ignition on. 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 symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 3	All

***START AND STALL CONDITION — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.</p> <p>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.</p> <p>Install a fuel pressure gauge to the fuel rail test port. (2.7L use the fuel adapter #6539 Miller Tool)</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</p> <p>Choose a conclusion that best matches your fuel pressure reading.</p> <p style="padding-left: 40px;">Below Specification Go To 4</p> <p style="padding-left: 40px;">Within Specification Go To 6</p> <p style="padding-left: 40px;">Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>Caution: Stop All Actuations.</p>	All
4	<p>Turn the ignition off.</p> <p>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.</p> <p>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.</p> <p>Attach a fuel pressure test gauge to the "T" fitting on tool #6539.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</p> <p>Is the fuel pressure within specification now?</p> <p style="padding-left: 40px;">Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p style="padding-left: 40px;">No → Go To 5</p> <p>Caution: Stop All Actuations.</p>	All
5	<p>Turn the ignition off.</p> <p>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.</p> <p>Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.</p> <p>Is the Fuel Inlet Strainer plugged?</p> <p style="padding-left: 40px;">Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p style="padding-left: 40px;">No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

STARTING

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
6	<p>Note: The fuel pressure must be within specification before continuing. Turn the ignition off.</p> <p>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. Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16") or #6631(3/8") to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container.</p> <p>Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.</p> <p>Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification?</p> <p style="padding-left: 40px;">Yes → Go To 7</p> <p style="padding-left: 40px;">No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>Caution: Stop All Actuations.</p>	All
7	<p>Turn the ignition on. With the DRBIII®, read TPS VOLTS. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth?</p> <p style="padding-left: 40px;">Yes → Go To 8</p> <p style="padding-left: 40px;">No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
8	<p>Turn the ignition on. With the DRBIII®, read Throttle Position voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed?</p> <p style="padding-left: 40px;">Yes → Go To 9</p> <p style="padding-left: 40px;">No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

***START AND STALL CONDITION — Continued**

TEST	ACTION	APPLICABILITY
9	<p>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 allow to sit over night with no engine start, coolant temperature should be near ambient temperatures.</p> <p>Turn the ignition on. With the DRBIII®, read the Engine Coolant Temperature value. Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.</p> <p>Start the engine. During engine warm-up, monitor the Engine Coolant Temperature 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)?</p> <p>Yes → Go To 10</p> <p>No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
10	<p>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. Fuel must be free of contamination. 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?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Test Complete.</p>	All

Verification Tests

BODY VERIFICATION TEST - VER 1	APPLICABILITY
<p>1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors.</p> <p>2. If the Sentry Key Immobilizer Module (SKIM) or the Powertrain Control Module (PCM) was replaced, proceed to number 6. If the SKIM or PCM was not replaced, continue to the next number.</p> <p>3. If the Body Control Module was replaced, turn the ignition on for 15 seconds (to allow the new BCM to learn VIN) or engine may not start (if VTSS equipped). If the vehicle is equipped with VTSS, use the DRBIII® and enable VTSS.</p> <p>4. Program all other options as needed.</p> <p>5. If any repairs were made to the HVAC System, disconnect the battery or, using the DRBIII®, recalibrate the HVAC doors. Proceed to number 13.</p> <p>6. Obtain the Vehicle's unique PIN assigned to it's original SKIM from either the vehicle's invoice or from Chrysler's Customer Assistance Center (1-800-992-1997).</p> <p>7. NOTE: Once Secured Access Mode is active, the SKIM will remain in that mode for 60 seconds.</p> <p>8. With the DRBIII®, select THEFT ALARM, SKIM, MISCELLANEOUS and select SKIM REPLACED. Enter the 4 digit PIN to put the SKIM in Secured Access Mode.</p> <p>9. The DRBIII® will prompt for the following steps. (1) Program the country code into the SKIM's memory. (2) Program the vehicle's VIN into the SKIM memory. (3) Transfer the vehicle's Secret Key data from the PCM.</p> <p>10. Using the DRBIII®, program all customer keys into the SKIM memory. This requires that the SKIM be in Secured Access Mode, using the 4 digit PIN.</p> <p>11. Note: If the PCM is replaced, the VIN and the unique Secret Key data must be transferred from the SKIM to the PCM. This procedure requires the SKIM to be placed in Secured Access Mode using the 4-digit PIN.</p> <p>12. Note: If 3 attempts are made to enter Secured Access Mode using an incorrect PIN, Secured Access Mode will be locked out for 1 hour which causes the DRBIII® to display "Bus +\^- Signals Open". To exit this mode, turn ignition to Run for 1 hour.</p> <p>13. Ensure that all accessories are turned off and the battery is fully charged.</p> <p>14. Ensure that the Ignition is on.</p> <p>15. With the DRBIII®, record and erase all DTCs from ALL modules. Start and run the engine for 2 minutes. Operate all functions of the system that caused the original concern.</p> <p>16. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII®, read DTCs from ALL modules.</p> <p>Are any DTC's present or is the original condition still present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 1	APPLICABILITY
<p>1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed.</p> <p>2. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</p> <p>3. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</p> <p>4. Inspect the vehicle to ensure that all components related to the repair are connected properly.</p> <p>5. Inspect the engine oil for fuel contamination. Replace the oil and filter as necessary.</p> <p>6. Attempt to start the engine.</p> <p>7. If the No Start condition is still present, refer to the symptom list and perform the diagnostic testing as necessary. refer to and Technical Service Bulletins that may apply.</p> <p>8. Run the engine for one warm-up cycle to verify operation.</p> <p>9. With the DRBIII®, confirm that no DTCs or Secondary Indicators are present and that all components are functioning properly.</p> <p>10. If a DTC is present, refer to the appropriate category and select the corresponding symptom.</p> <p>Are any DTCs present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>

POWERTRAIN VERIFICATION TEST VER - 2	APPLICABILITY
<p>1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed.</p> <p>2. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</p> <p>3. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</p> <p>4. Inspect the vehicle to ensure that all components related to the repair are connected properly.</p> <p>5. With the DRBIII®, clear DTCs and Reset Memory all engine values.</p> <p>6. Run the engine for one warm-up cycle to verify proper operation.</p> <p>7. Road test the vehicle. Use all accessories that may be related to this repair.</p> <p>8. With the DRBIII®, confirm that no DTC's or Secondary Indicators are present and that all components are functioning properly.</p> <p>9. If this test is being performed after a No Trouble Code test, verify the symptom is no longer present.</p> <p>10. If the symptom is still present, or any other symptom or DTC is present refer to the appropriate category and perform the corresponding symptom.</p> <p>11. Refer to any Technical Service Bulletins that may apply.</p> <p>12. If there are no DTCs present and all components are functional properly, the repair is complete.</p> <p>Are any DTCs present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 3	APPLICABILITY
<p>1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed.</p> <p>2. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</p> <p>3. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</p> <p>4. Inspect the vehicle to ensure that all components related to the repair are connected properly.</p> <p>5. With the DRBIII®, clear DTCs.</p> <p>6. Perform generator output test. Refer to the appropriate service information as necessary.</p> <p>7. Start the engine and set engine speed to 2000 RPM for at least thirty seconds.</p> <p>8. Cycle the ignition key off and on.</p> <p>9. With the DRBIII®, read the DTCs. If the DTC returns, or any other symptom or DTC is present, refer to the appropriate category and perform the corresponding symptom.</p> <p>10. If there are no DTCs present and all components are functioning properly, the repair is complete.</p> <p>Are any DTCs present?</p> <p style="padding-left: 40px;">Yes → Repair is not complete, refer to appropriate symptom.</p> <p style="padding-left: 40px;">No → Repair is complete.</p>	<p style="text-align: center;">All</p>

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 4	APPLICABILITY
<p>1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed.</p> <p>2. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</p> <p>3. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</p> <p>4. Inspect the vehicle to ensure that all engine components are properly installed and connected.</p> <p>5. Connect the DRBIII® to the data link connector and erase all codes.</p> <p>6. Turn the speed control ON (if equipped, cruise light will be on).</p> <p>7. Press and release the SET Switch. If the speed control did not engage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>8. Press and hold the RESUME/ACCEL Switch. If the vehicle speed did not increase by at least 2 mph, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>9. Press and hold the COAST switch. The vehicle speed should decrease. If it did not decrease, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>10. Using caution, press and release the brake pedal. If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>11. Bring the vehicle speed back up to 35 MPH.</p> <p>12. Press the RESUME/ACCEL switch. If the speed control did not resume the previously set speed, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>13. Hold down the SET switch. If the vehicle did not decelerate, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>14. Ensure vehicle speed is greater than 35 mph and release the SET Switch. If vehicle did not adjust and set a new vehicle speed, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>15. Press and release the CANCEL switch. If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>16. Bring the vehicle speed back up above 35 mph and engage speed control.</p> <p>17. Turn the Speed Control Off. (Cruise light will be off). If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>18. If the vehicle successfully passed all of the previous tests, the speed control system is now functioning as designed. The repair is now complete.</p> <p>Did the Speed Control pass the above test?</p> <p>Yes → Repair is complete.</p> <p>No → Repair is not complete, refer to appropriate symptom.</p>	<p>All</p>

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 5	APPLICABILITY
<p>1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed.</p> <p>2. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</p> <p>3. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</p> <p>4. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary.</p> <p>5. Connect the DRBIII® to the data link connector.</p> <p>6. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories.</p> <p>7. If a Comprehensive Component DTC was repaired, perform steps 5 - 8. If a Major OBDII Monitor DTC was repaired skip those steps and continue verification.</p> <p>8. After the ignition has been off for at least 10 seconds, restart the vehicle and run 2 minutes.</p> <p>9. If the Good Trip counter changed to one or more and there are no new DTC's, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®.</p> <p>10. If the repaired DTC has reset, the repair is not complete. Check for any related TSB's or flash updates and return to the Symptom list.</p> <p>11. If another DTC has set, return to the Symptom List and follow the path specified for that DTC.</p> <p>12. With the DRBIII®, monitor the appropriate pre-test enabling conditions until all conditions have been met. Once the conditions have been met, switch screen to the appropriate OBDII monitor, (Audible beeps when the monitor is running).</p> <p>13. If the monitor ran, and the Good Trip counter changed to one or more, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®.</p> <p>14. If the repaired OBDII trouble code has reset or was seen in the monitor while on the road test, the repair is not complete. Check for any related technical service bulletins or flash updates and return to Symptom List.</p> <p>15. If another DTC has set, return to the Symptom List and follow the path specified for that DTC.</p> <p>Are any DTCs present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>

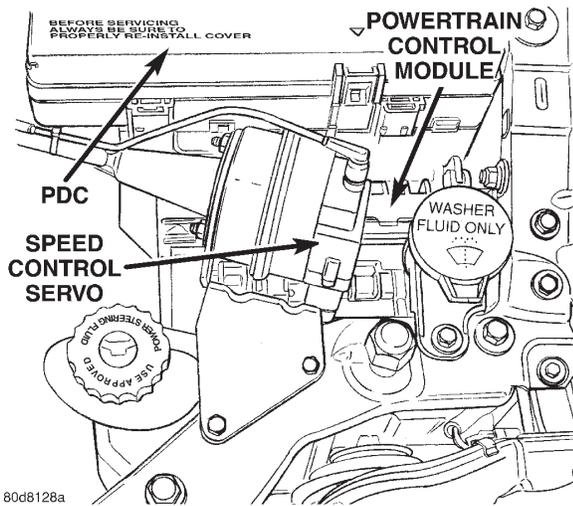
Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 6	APPLICABILITY
<p>1. Install the Miller Tool #8404 Evaporative Emission Leak Detector (EELD). according to the instructions in the pervious DTC table.</p> <p>2. Set the smoke/air control switch to AIR.</p> <p>3. 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).</p> <p>4. Press the remote smoke/air start button.</p> <p>5. Position the red flag on the air flow meter so it is aligned with the indicator ball.</p> <p>6. 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.</p> <p>7. Install the service port adapter #8404-14 on the vehicle's service port.</p> <p>8. Connect the Air supply hose from the EELD to the service port.</p> <p>9. Press the remote button to activate AIR flow.</p> <p>10. 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.</p> <p>11. Compare the flow meter indicator ball reading to the red flag.</p> <p>12. ABOVE the red flag indicates a leak present.</p> <p>13. BELOW the red flag indicates a sealed system.</p> <p>14. If the indicator ball shows a leak present, perform the smoke test indicated in the previous test and identify the leak and repair. Perform this verification test when the repair is complete. Did the indicator ball indicate the a leak is present??</p> <p>Yes → Repeat the DTC test to identify the leak and repair.</p> <p>No → Repair is complete.</p>	<p>All</p>

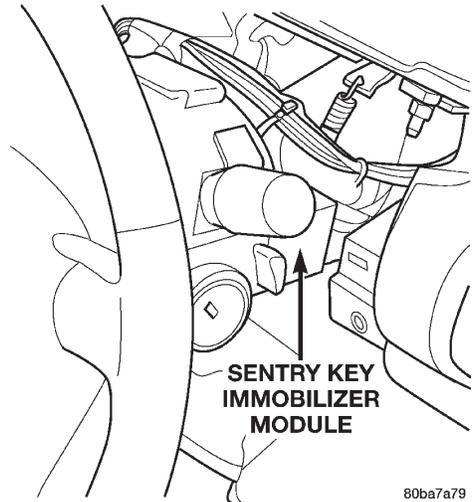
SKIS VERIFICATION	APPLICABILITY
<p>1. Reconnect all previously disconnected components and connectors.</p> <p>2. Obtain the vehicle's unique Personal Identification Number (PIN) assigned to it's original SKIM. This number can be obtained from the vehicle's invoice or Chrysler's Customer Center (1-800-992-1997).</p> <p>3. NOTE: When entering the PIN, care should be taken because the SKIM will only allow 3 consecutive attempts to enter the correct PIN. If 3 consecutive incorrect PIN's are entered the SKIM will Lock Out the DRB III for 1 hour.</p> <p>4. To exit Lock Out mode, the ignition key must remain in the Run position continually for 1 hour. Turn off all accessories and connect a battery charger if necessary.</p> <p>5. With the DRB III, select Theft Alarm, SKIM and Miscellaneous. Then select desired procedure and follow the steps that will be displayed.</p> <p>6. If the SKIM has been replaced, ensure all of the vehicle ignition keys are programmed to the new SKIM.</p> <p>7. NOTE: Prior to returning vehicle to the costumer, perform a module scan to be sure that all DTC's are erased. Erase any DTC's that are found.</p> <p>8. With the DRB III erase all DTC's. Perform 5 ignition key cycles leaving the key on for at least 90 seconds per cycle.</p> <p>9. With the DRB III, read the SKIM DTC's.</p> <p>Are there any SKIM DTC's?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>

8.0 COMPONENT LOCATIONS

8.1 POWERTRAIN AND SKIM CONTROL MODULES

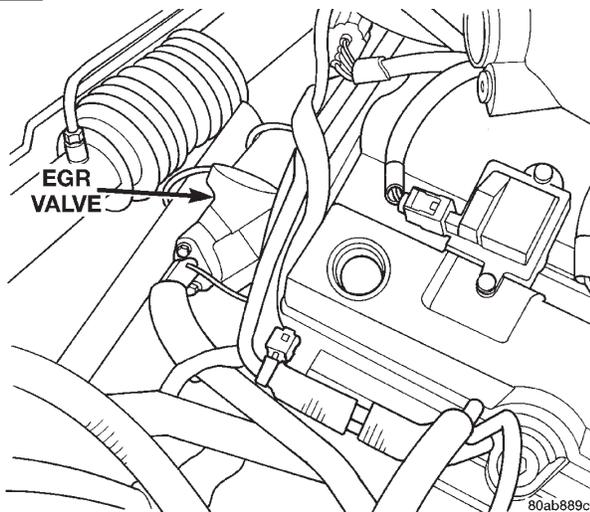


TYPICAL VIEW

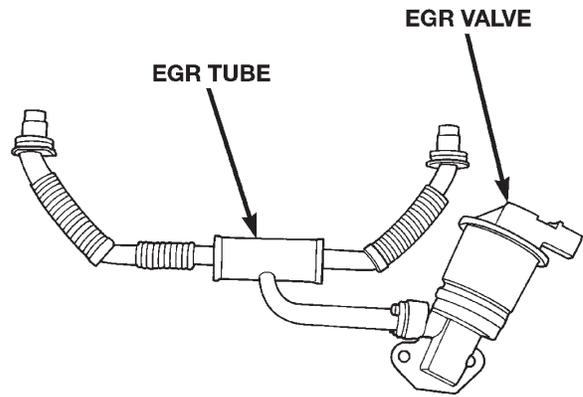


8.2 CONTROL AND SOLENOIDS

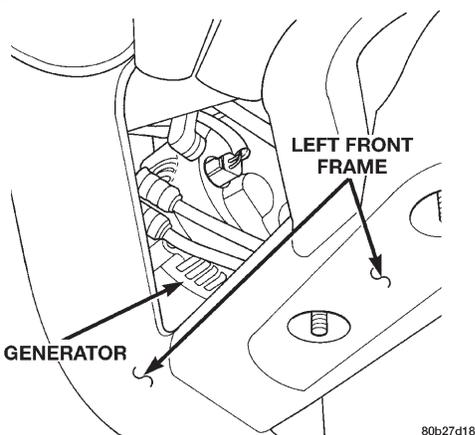
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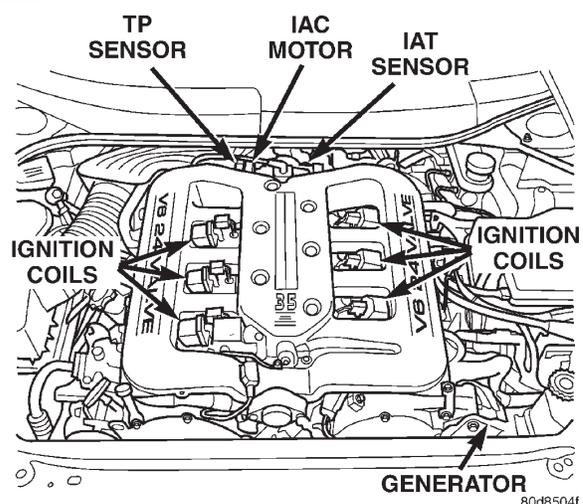
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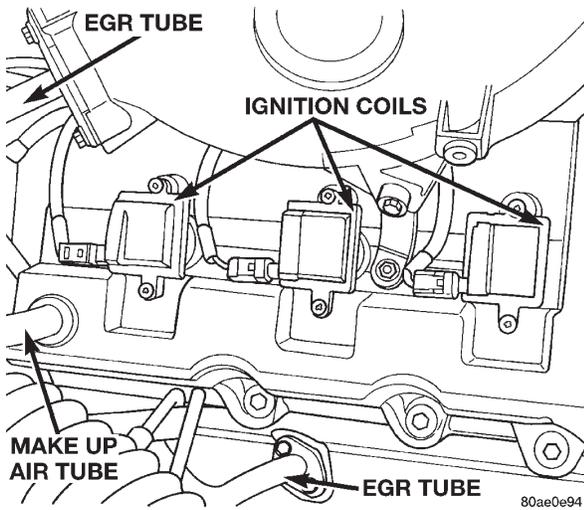
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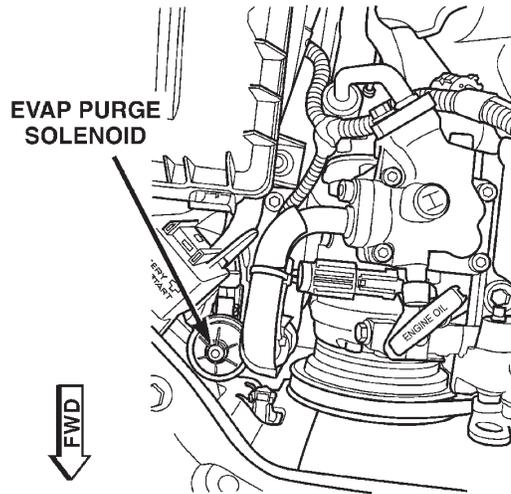
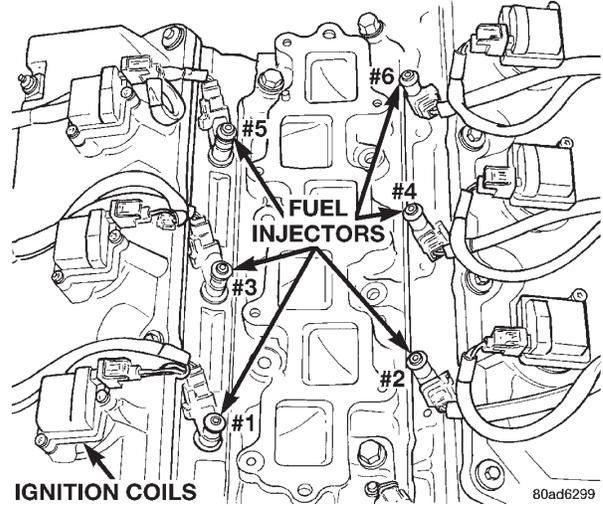
COMPONENT LOCATIONS

8.2 CONTROL AND SOLENOIDS (Continued)

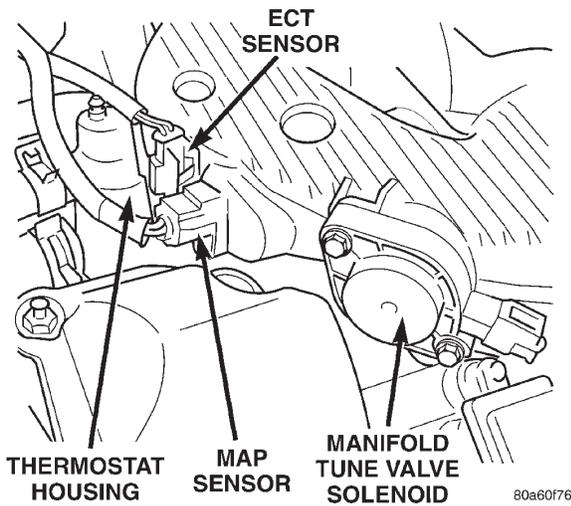
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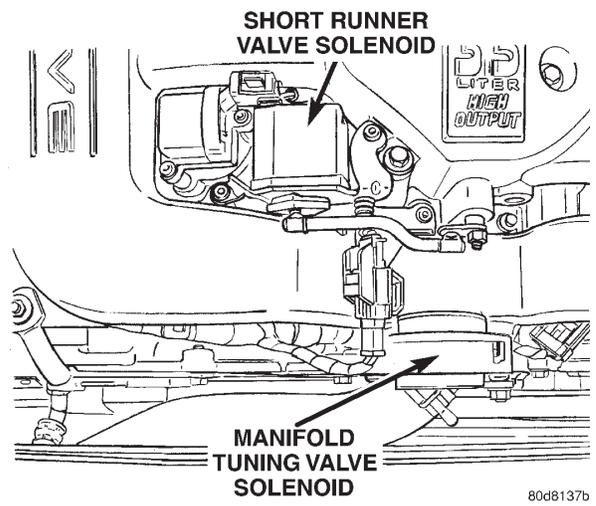
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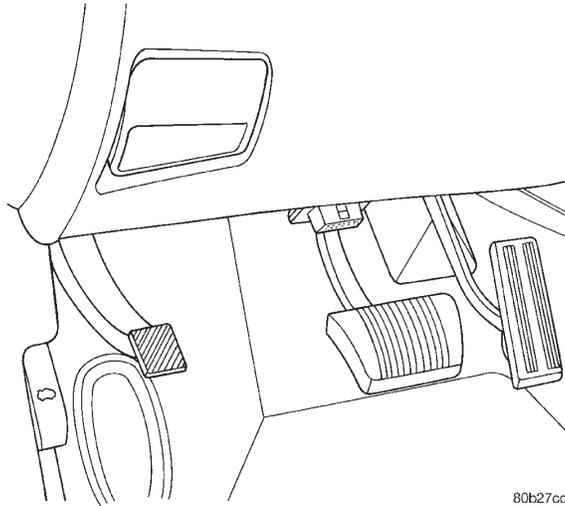
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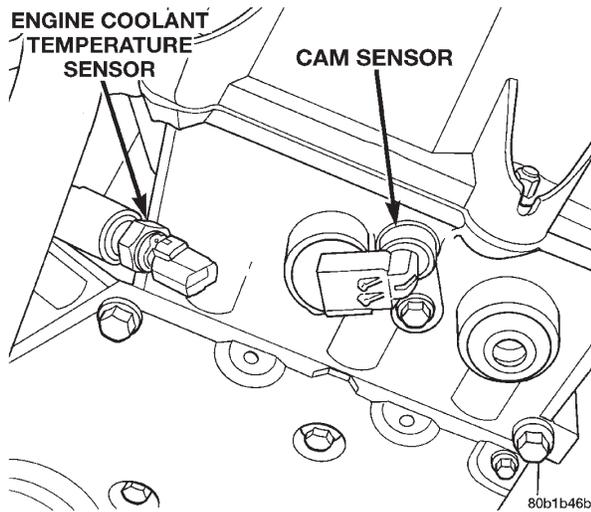


8.3 DATA LINK CONNECTOR

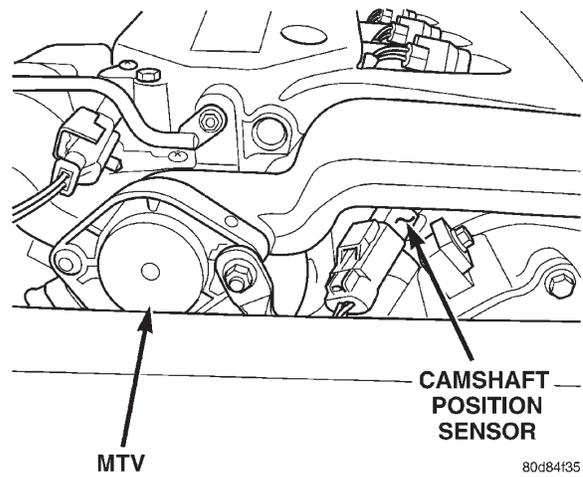


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8.4 SENSORS

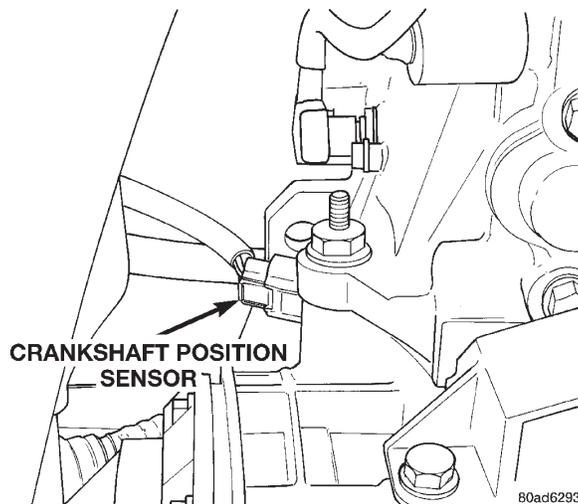


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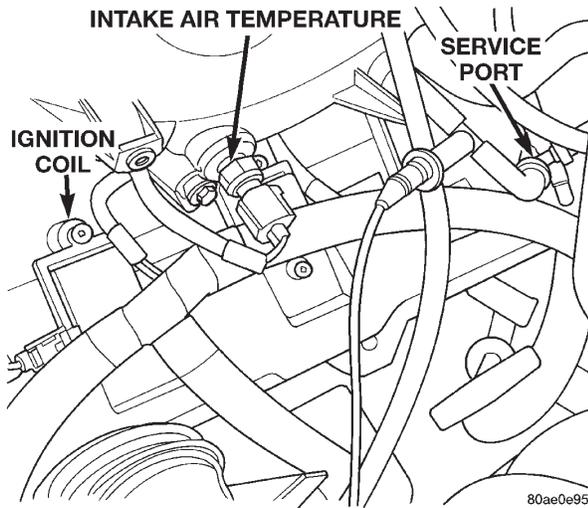


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COMPONENT LOCATIONS

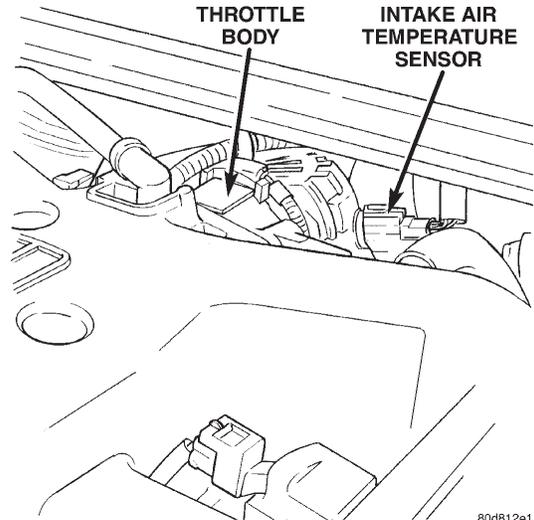
8.4 SENSORS (Continued)

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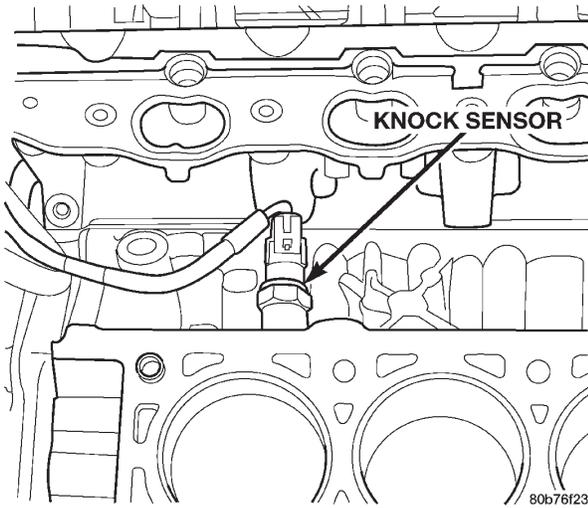
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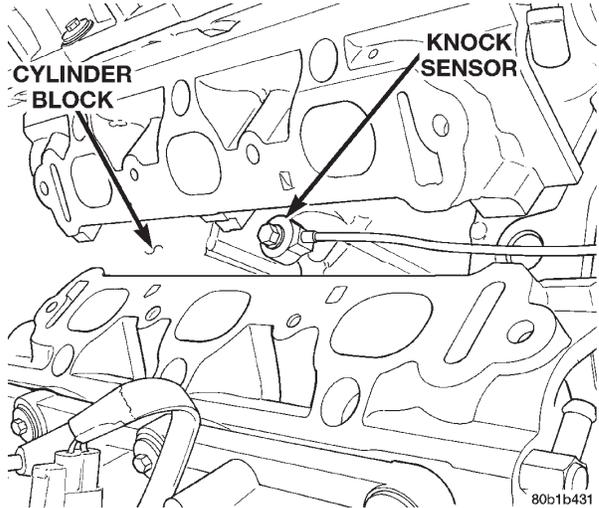
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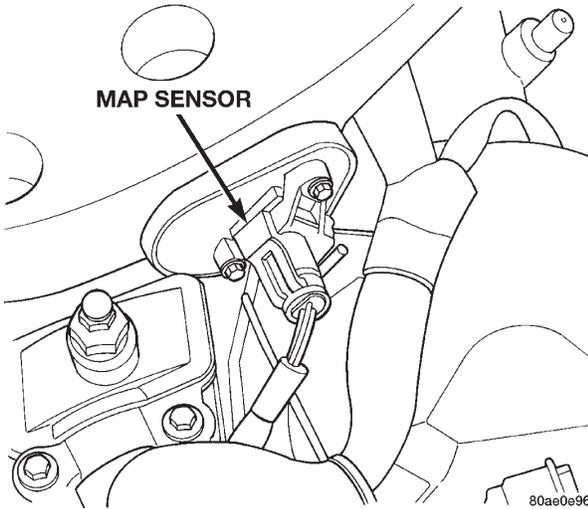
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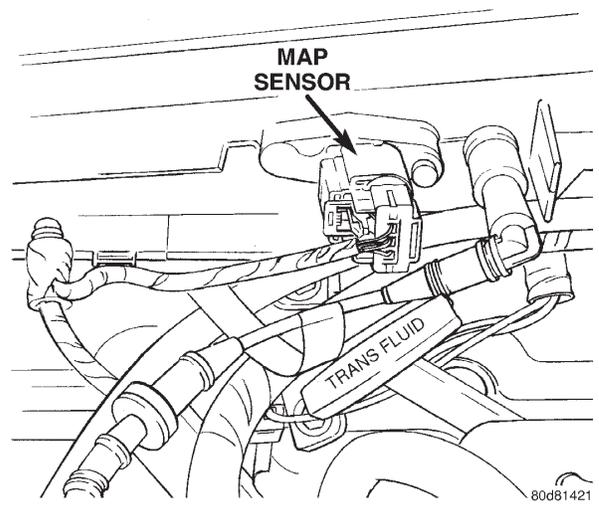
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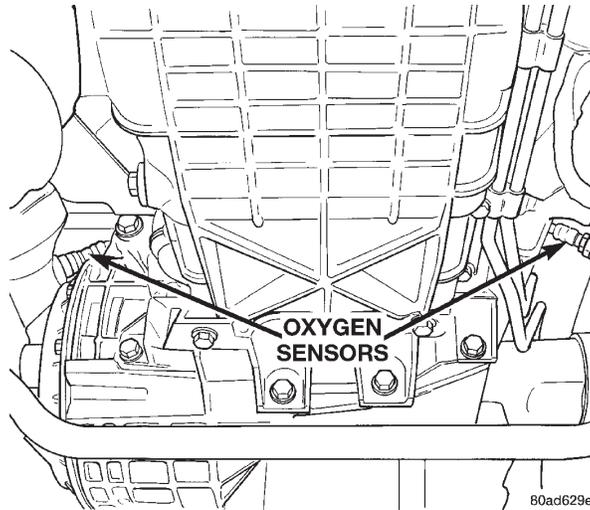
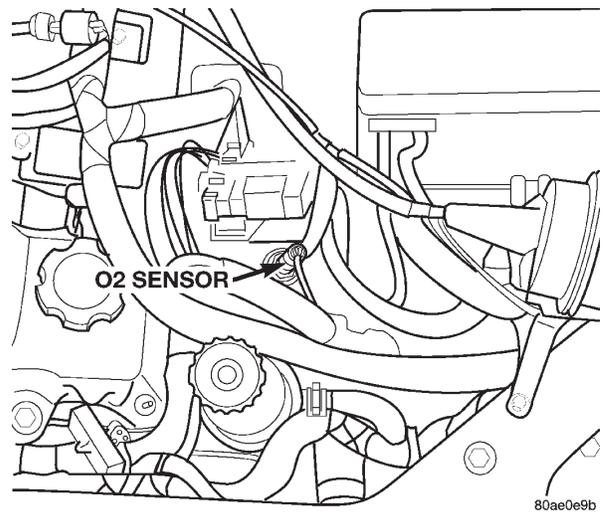
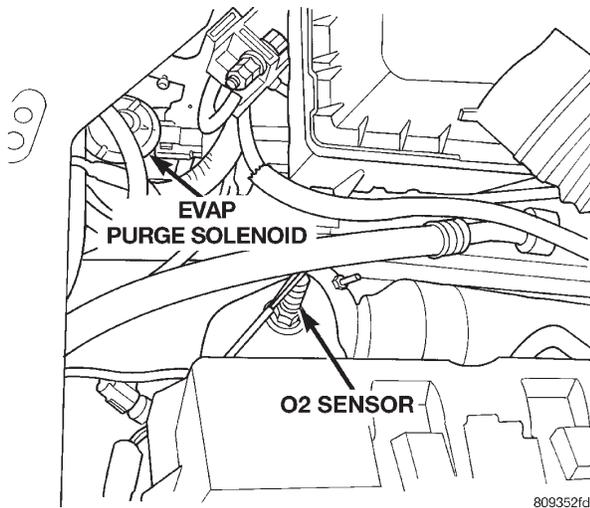


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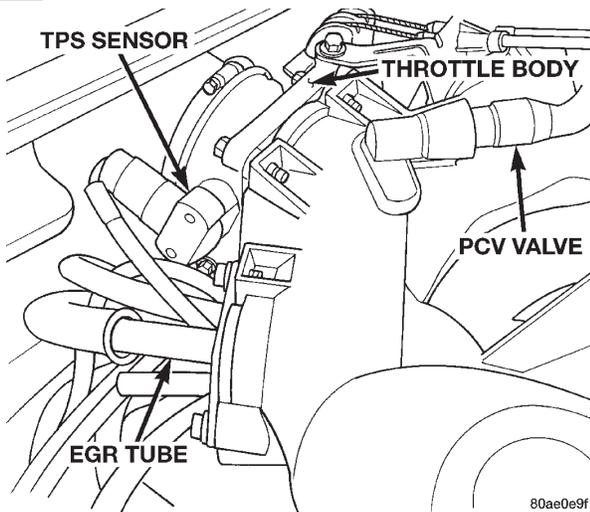
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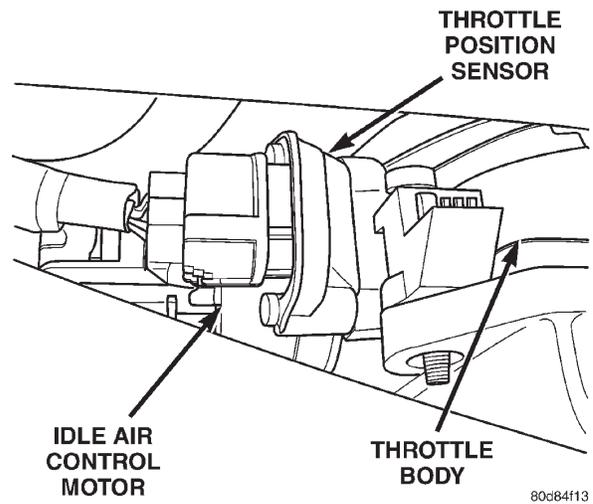
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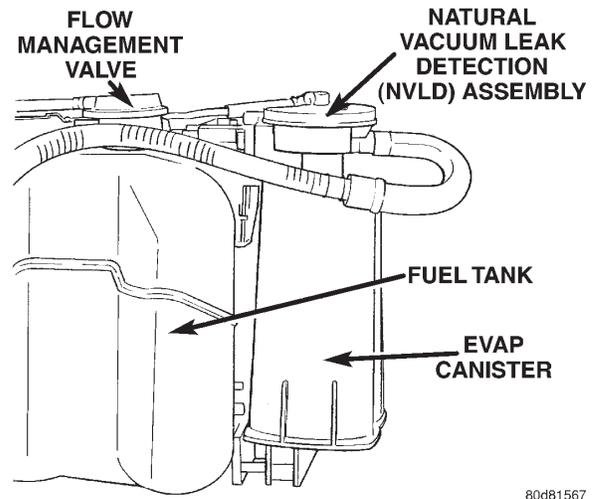
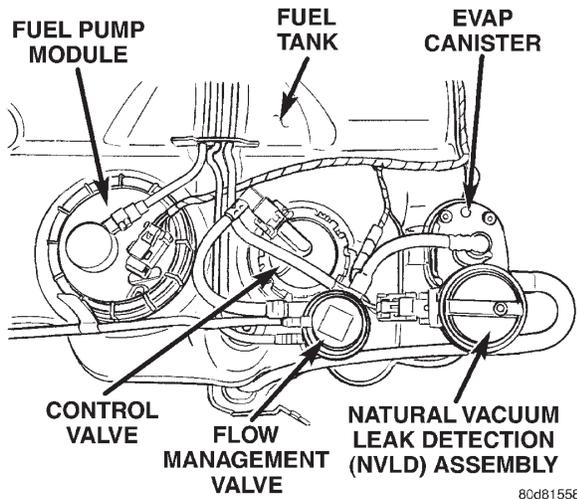


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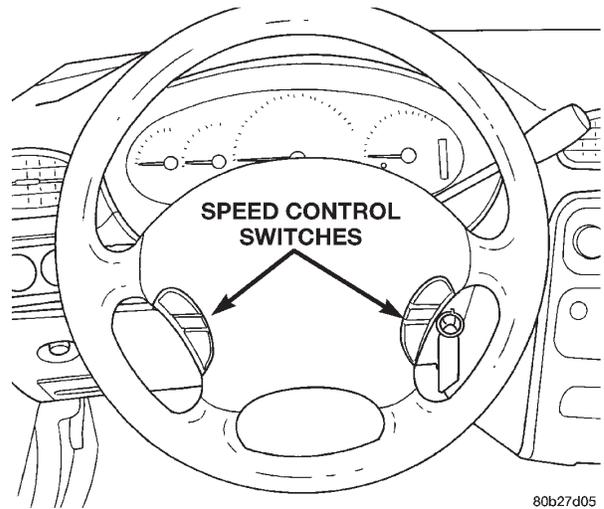
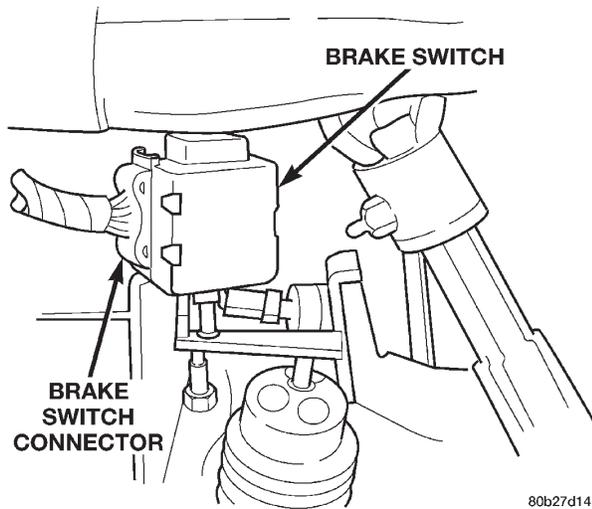


COMPONENT LOCATIONS

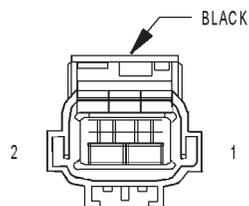
8.5 FUEL SYSTEM AND EVAP SYSTEM



8.6 SWITCHES



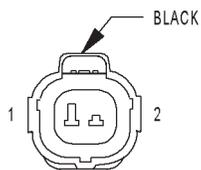
9.0 CONNECTOR PINOUTS



A/C COMPRESSOR CLUTCH

A/C COMPRESSOR CLUTCH - BLACK 2 WAY

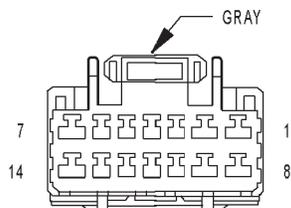
CAV	CIRCUIT	FUNCTION
1	C2 14DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
2	Z1 14BK	GROUND



AMBIENT TEMPERATURE SENSOR

AMBIENT TEMPERATURE SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K25 20VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND



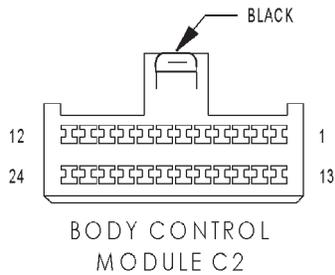
BODY CONTROL MODULE C1

BODY CONTROL MODULE C1 - GRAY 14 WAY

CAV	CIRCUIT	FUNCTION
1	P1 20BK/WT	DECKLID RELEASE SWITCH OUTPUT
2	C32 22GY/DB	RECIRCULATION DOOR DRIVER
3	C33 22DB/RD	BLEND AIR DOOR DRIVER
4	D25 20VT/YL	PCI BUS (ATC)
5	D25 20VT/YL	PCI BUS (RADIO)
6	F13 20DB	FUSED IGNITION SWITCH OUPPUT (RUN-ACC)
7	C7 16BK/TN (MTC)	HIGH BLOWER MOTOR DRIVER
8	C57 20DB/GY	SENSOR GROUND
9	C35 22DG/YL	MODE DOOR DRIVER
10	C34 22BR/WT	COMMON DOOR DRIVER
11	D25 20VT/YL	PCI BUS (ORC)
12	D25 20VT/YL	PCI BUS (SKIM)
13	D25 20VT/YL	PCI BUS (MIC)
14	D25 20VT/YL	PCI BUS (DLC)

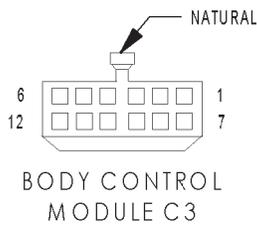
CONNECTOR PINOUTS

CONNECTOR PINOUTS



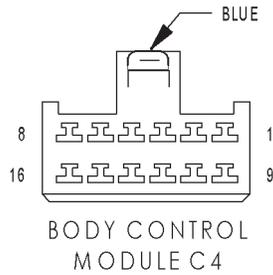
BODY CONTROL MODULE C2 - BLACK 24 WAY

CAV	CIRCUIT	FUNCTION
1	C36 22RD/WT	BLEND DOOR FEEDBACK SIGNAL
2	G52 20YL	HEADLAMP SWITCH MUX
3	X20 20GY/WT	RADIO CONTROL MUX
4	D19 20VT/OR (EXCEPT PREMIUM 300M/LHS)	SCI RECEIVE (TCM/BCM)
5	C9 22YL/DG (ATC)	ASPIRATOR MOTOR DRIVER
6	C56 22RD/LG (ATC)	BLOWER MOTOR CONTROL
7	V10 20BR	FRONT WASHER PUMP MOTOR CONTROL
8	V52 20DG/RD	FRONT WIPER MUX SWITCH SIGNAL
9	C37 22YL/WT	MODE DOOR FEEDBACK SIGNAL
10	C38 20DB (EXCEPT BASE)	SUN SENSOR SIGNAL
11	-	-
12	C82 20YL/OR (MTC)	TEMPERATURE SELECT
13	E17 20YL/BK (BASE IN-TREPID)	PARK LAMP RELAY OUTPUT
14	C48 20VT/PK (MTC)	A/C LED INDICATOR SIGNAL
15	C26 22PK/DB	5V SUPPLY
16	X920 20GY/OR	RADIO CONTROL MUX RETURN
17	P58 20WT	RKE EXTERNAL ANTENNA
18	P158 20BK	RKE EXTERNAL ANTENNA
19	L80 20WT	HEADLAMP SWITCH RETURN
20	C12 22LG/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
21	E19 20RD	PANEL LAMPS DIMMER SIGNAL
22	C10 22RD/TN (ATC)	IN-CAR TEMPERATURE SENSOR SIGNAL (ATC)
22	C58 22RD/TN (MTC)	A/C MODE SWITCH MUX
23	G69 22BK/OR	VTSS INDICATOR DRIVER
24	G26 22LB	KEY-IN IGNITION SWITCH SENSE



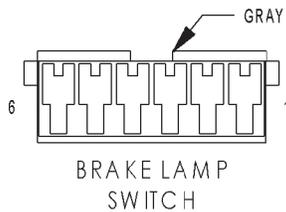
BODY CONTROL MODULE C3 - NATURAL 12 WAY

CAV	CIRCUIT	FUNCTION
1	D25 18VT/YL	PCI BUS (PCM)
2	D25 18VT/YL (ABS)	PCI BUS (CAB)
3	V55 20TN/RD	FRONT WIPER PARK SWITCH SENSE
4	V14 20RD/VT	FRONT WIPER ON/OFF RELAY CONTROL
5	Z1 18BK (EXCEPT BUILT-UP-EXPORT)	GROUND
6	-	-
7	-	-
8	-	-
9	V58 20BR/YL (BUILT-UP-EXPORT)	HEADLAMP WASHER RELAY CONTROL
10	-	-
11	-	-
12	V16 20VT	FRONT WIPER HIGH/LOW RELAY CONTROL



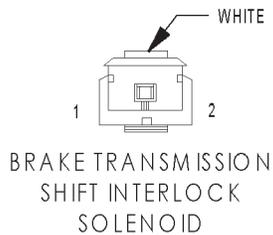
BODY CONTROL MODULE C4 - BLUE 16 WAY

CAV	CIRCUIT	FUNCTION
1	G74 20TN/RD	DOOR AJAR SWITCH SENSE (LR)
2	G74 20TN/RD	DOOR AJAR SWITCH SENSE (PASS)
3	G72 20DG/OR	PASSENGER CYLINDER LOCK SWITCH MUX
4	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
5	P97 20WT/DG	DRIVER DOOR SWITCH MUX
6	-	-
7	G4 20DB	FUEL LEVEL SENSOR SIGNAL
8	G71 18VT/WT	DECKLID SECURITY SWITCH SENSE
9	D25 20VT/YL	PCI BUS (MHSMM) (SIACM)
10	G74 20TN/RD	DOOR AJAR SWITCH SENSE (RR)
11	-	-
12	P96 20WT/LG	PASSENGER DOOR SWITCH MUX
13	G73 20LG/OR	DRIVER CYLINDER LOCK SWITCH MUX
14	C80 20DB/WT	REAR WINDOW DEFOGGER RELAY CONTROL
15	G10 20LG/RD	SEAT BELT SWITCH SENSE
16	-	-



BRAKE LAMP SWITCH - GRAY 6 WAY

CAV	CIRCUIT	FUNCTION
1	K29 20WT/PK	BRAKE SWITCH SENSE
2	Z2 18BK/LG	GROUND
3	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
4	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
5	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
6	F32 16PK/DB	FUSED B(+)



BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID - WHITE 2 WAY

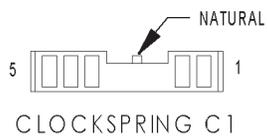
CAV	CIRCUIT	FUNCTION
1	K29 20WT/PK	BRAKE SWITCH SENSE
2	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)



CAMSHAFT POSITION SENSOR - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL

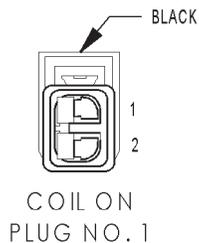
CONNECTOR PINOUTS



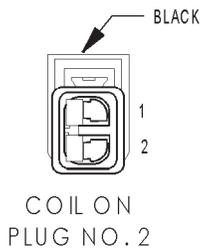
CLOCKSPRING C1 - NATURAL 5 WAY		
CAV	CIRCUIT	FUNCTION
1	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
2	K4 20BK/LB	SENSOR GROUND
3	X3 16BK/RD	HORN RELAY CONTROL
4	X20 20GY/WT	RADIO CONTROL MUX
5	X920 20GY/OR	RADIO CONTROL MUX RETURN



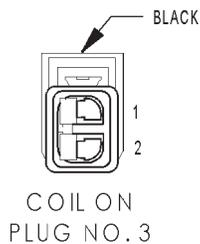
CLOCKSPRING C3 - 4 WAY		
CAV	CIRCUIT	FUNCTION
1	V37 22BK/LG	SPEED CONTROL SWITCH SIGNAL
2	K4 22BK/LB	SENSOR GROUND
3	X920 22GY/OR	RADIO CONTROL MUX RETURN
4	X20 22GY/WT	RADIO CONTROL MUX



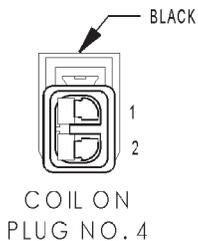
COIL ON PLUG NO. 1 - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K91 16TN/RD	COIL ON PLUG DRIVER NO. 1



COIL ON PLUG NO. 2 - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K92 16TN/PK	COIL ON PLUG DRIVER NO. 2

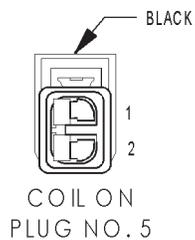


COIL ON PLUG NO. 3 - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K93 16TN/OR	COIL ON PLUG DRIVER NO. 3



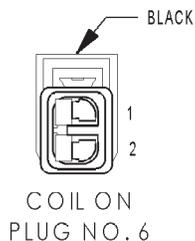
COIL ON PLUG NO. 4 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K94 16TN/LG	COIL ON PLUG DRIVER NO. 4



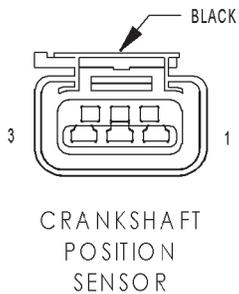
COIL ON PLUG NO. 5 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K95 16TN/DG	COIL ON PLUG DRIVER NO. 5



COIL ON PLUG NO. 6 - BLACK 2 WAY

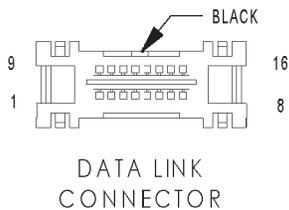
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K96 16TN/LB	COIL ON PLUG DRIVER NO. 6



CRANKSHAFT POSITION SENSOR - BLACK 3 WAY

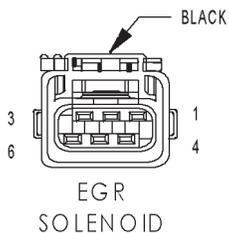
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL

CONNECTOR PINOUTS



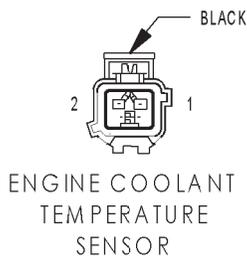
DATA LINK CONNECTOR - BLACK 16 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	Z1 20BK	GROUND
5	Z2 20BK/LG	GROUND
6	-	-
7	D21 20PK/TN	SCI TRANSMIT (PCM)
8	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
9	D19 20VT/OR (EXCEPT PREMIUM LHS/300M)	SCI RECEIVE (TCM/BCM)
10	Y98 18 OR/WT	FLASH ENABLE
11	-	-
12	D20 20LG	SCI RECIEVE (PCM)
13	-	-
14	-	-
15	D15 20WT/DG	SCI TRANSMIT (TCM)
16	F62 16RD	FUSED B (+)



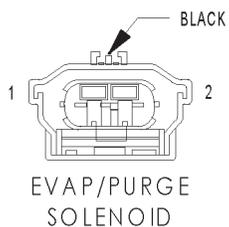
EGR SOLENOID - BLACK 6 WAY

CAV	CIRCUIT	FUNCTION
1	K235 20LG/PK	EGR SENSOR SIGNAL
2	K6 20VT/WT	5V SUPPLY
3	K4 18BK/LB	SENSOR GROUND
4	Z12 18BK/TN	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
5	-	-
6	K35 20GY/YL	EGR SOLENOID CONTROL



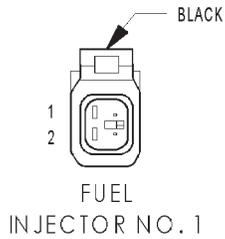
ENGINE COOLANT TEMPERATURE SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND



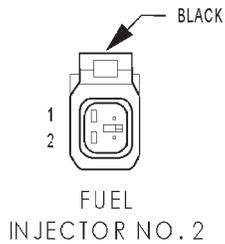
EVAP/PURGE SOLENOID - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
2	K108 18DG/LG	EVAPORATIVE EMISSION SOLENOID SENSE



FUEL INJECTOR NO. 1 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL INJECTOR NO. 2 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K12 18TN/WT	FUEL INJECTOR NO. 2 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL INJECTOR NO. 3 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL INJECTOR NO. 4 - BLACK 2 WAY

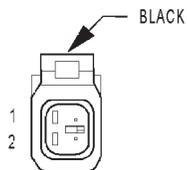
CAV	CIRCUIT	FUNCTION
1	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL INJECTOR NO. 5 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K38 18GY	FUEL INJECTOR NO. 5 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT

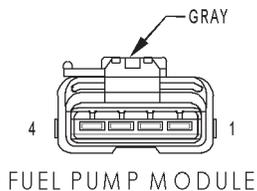
CONNECTOR PINOUTS



FUEL INJECTOR NO. 6

FUEL INJECTOR NO. 6 - BLACK 2 WAY

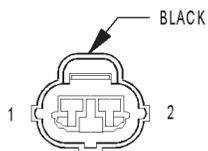
CAV	CIRCUIT	FUNCTION
1	K58 18BR/DB	FUEL INJECTOR NO. 6 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL PUMP MODULE

FUEL PUMP MODULE - GRAY 4 WAY

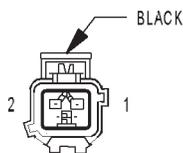
CAV	CIRCUIT	FUNCTION
1	Z1 12BK	GROUND
2	Z1 18BK	GROUND
3	G4 18DB	FUEL LEVEL SENSOR
4	A141 12DG/WT	FUEL PUMP RELAY OUTPUT



GENERATOR

GENERATOR - BLACK 2 WAY

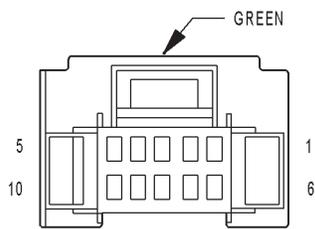
CAV	CIRCUIT	FUNCTION
1	Z12 18BK/TN	GROUND
2	K20 18DG	GENERATOR FIELD DRIVER (+)



IDLE AIR CONTROL MOTOR

IDLE AIR CONTROL MOTOR - BLACK 4 WAY

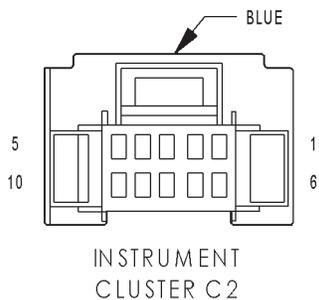
CAV	CIRCUIT	FUNCTION
1	K39 18GY/RD	IDLE AIR CONTROL MOTOR DRIVER
2	K60 18YL/BK	IDLE AIR CONTROL MOTOR SENSE



INSTRUMENT CLUSTER C1

INSTRUMENT CLUSTER C1 - GREEN 10 WAY

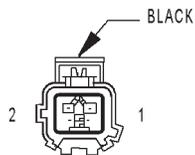
CAV	CIRCUIT	FUNCTION
1	F33 18PK/RD	FUSED B(+)
2	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
3	M1 20PK	FUSED B(+)
4	E2 20OR	PANEL LAMPS DRIVER
5	D25 20VT/YL	PCI BUS
6	Z2 22BK/LG	GROUND
7	-	-
8	L60 18TN	RIGHT TURN SIGNAL
9	-	-
10	L324 20WT/LG	HIGH BEAM RELAY CONTROL



INSTRUMENT CLUSTER C2

INSTRUMENT CLUSTER C2 - BLUE 10 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	G5 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	G9 22GY/BK	RED BRAKE WARNING INDICATOR DRIVER
4	G29 22BK/TN	WASHER FLUID SWITCH SENSE
5	L61 18LG	LEFT TURN SIGNAL
6	Z1 22BK	GROUND
7	-	-
8	B27 20RD/YL	TRACTION CONTROL SWITCH SENSE
9	G78 20TN/BK	DECKLID CONTROL SWITCH SENSE
10	G6 22GY	ENGINE OIL PRESSURE SWITCH SENSE



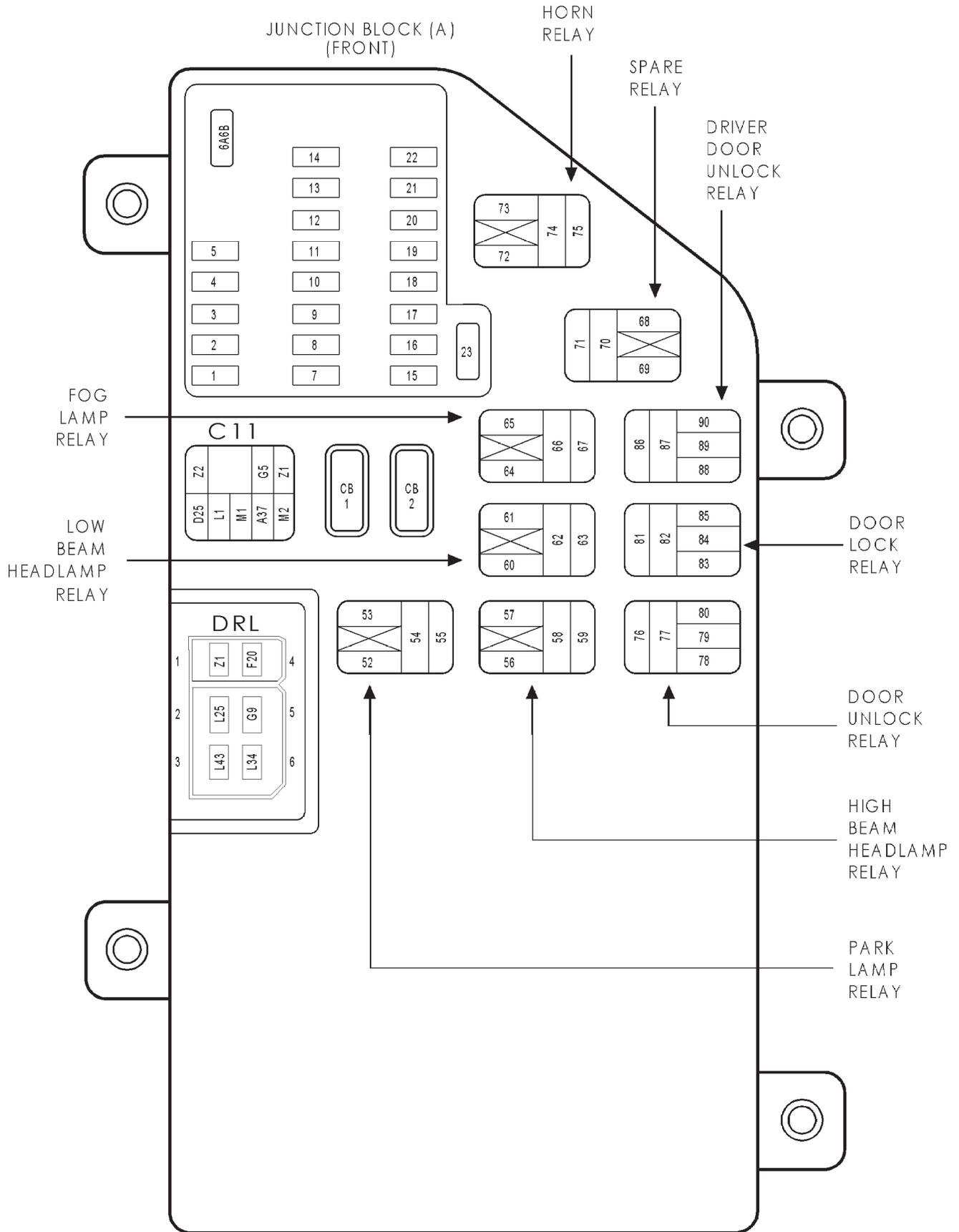
INTAKE AIR TEMPERATURE SENSOR

INTAKE AIR TEMPERATURE SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
2	K4 20BK/LB	SENSOR GROUND

CONNECTOR PINOUTS

CONNECTOR PINOUTS

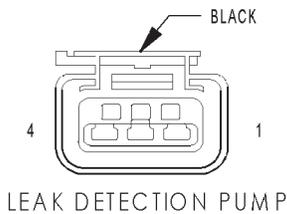


CONNECTOR PINOUTS

FUSES (JB)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	10A	INTERNAL	IGNITION SWITCH OUTPUT (OFF-RUN-START)
2	10A	L34 20RD/OR	FUSED HIGH BEAM RELAY OUTPUT
3	10A	L33 20RD	FUSED HIGH BEAM RELAY OUTPUT
4	10A	X12 20RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
5	10A	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
6	15A	F30 18RD (IGNITION POSITION)	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
6	15A	F30 18RD (BATTERY POSITION)	FUSED B(+)
7	20A	F33 18PK/RD	FUSED B(+)
8	10A	F23 18DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
9	10A	L5 22BK/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
10	10A	L44 20VT/RD	FUSED RIGHT LOW BEAM OUTPUT (RIGHT)
11	20A	L40 18BR/WT	FUSED LOW BEAM RELAY OUTPUT
12	10A	L43 16VT	FUSED RIGHT LOW BEAM OUTPUT (LEFT)
13	10A	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
14	10A	G5 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
15	10A	INTERNAL	INTERNAL
16	20A	INTERNAL	INTERNAL
17	10A	F20 16WT/VT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
18	20A	F62 16RD	FUSED B(+)
19	10A	M1 20PK	FUSED B(+)
20	20A	F32 16PK/DB	FUSED B(+)
21	10A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
22	10A	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	30A	C1 12DG	FUSED IGNITION SWITCH OUTPUT (RUN)

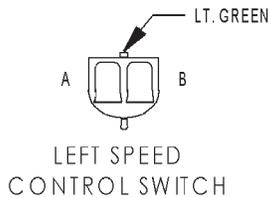
CONNECTOR PINOUTS



LEAK DETECTION PUMP

LEAK DETECTION PUMP - BLACK 3 WAY

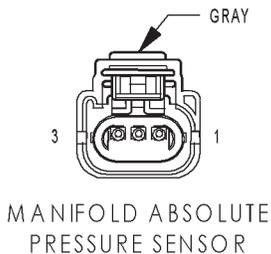
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	K107 18OR	LEAK DETECTION PUMP SWITCH SENSE
3	K106 18WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL



LEFT SPEED CONTROL SWITCH

LEFT SPEED CONTROL SWITCH - LT. GREEN 2 WAY

CAV	CIRCUIT	FUNCTION
A	V37 22RD/LG	SPEED CONTROL SWITCH SIGNAL
B	K4 22BK/LB	SENSOR GROUND



MANIFOLD ABSOLUTE PRESSURE SENSOR

MANIFOLD ABSOLUTE PRESSURE SENSOR - GRAY 3 WAY

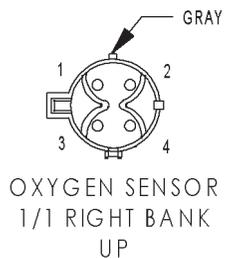
CAV	CIRCUIT	FUNCTION
1	K1 20DG/RD	MAP SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND
3	K6 20VT/WT	5V SUPPLY



MANIFOLD TUNING VALVE

MANIFOLD TUNING VALVE - BLACK 2 WAY

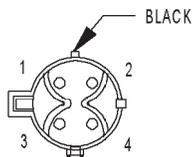
CAV	CIRCUIT	FUNCTION
1	Z12 18BK/TN	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K36 18VT/RD	MANIFOLD SOLENOID CONTROL



OXYGEN SENSOR 1/1 RIGHT BANK UP

OXYGEN SENSOR 1/1 RIGHT BANK UP - GRAY 4 WAY

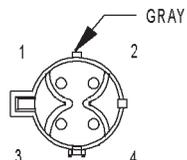
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	K99 18BR/OR	OXYGEN SENSOR 1/1 HEATER CONTROL
3	K902 18BR/DG	OXYGEN SENSOR RETURN (UP)
4	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL



OXYGEN SENSOR
1/2 RIGHT BANK
DOWN

OXYGEN SENSOR 1/2 RIGHT BANK DOWN - BLACK 4 WAY

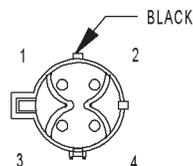
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	K199 18BR/VT	OXYGEN SENSOR 1/2 HEATER CONTROL
3	K904 18DB/DG	OXYGEN SENSOR RETURN (DOWN)
4	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL



OXYGEN SENSOR
2/1 LEFT
BANK UP

OXYGEN SENSOR 2/1 LEFT BANK UP - GRAY 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	K299 18BR/WT	OXYGEN SENSOR 2/1 HEATER CONTROL
3	K902 18BR/DG	OXYGEN SENSOR RETURN (UP)
4	K241 20LG/RD	OXYGEN SENSOR 2/1 SIGNAL



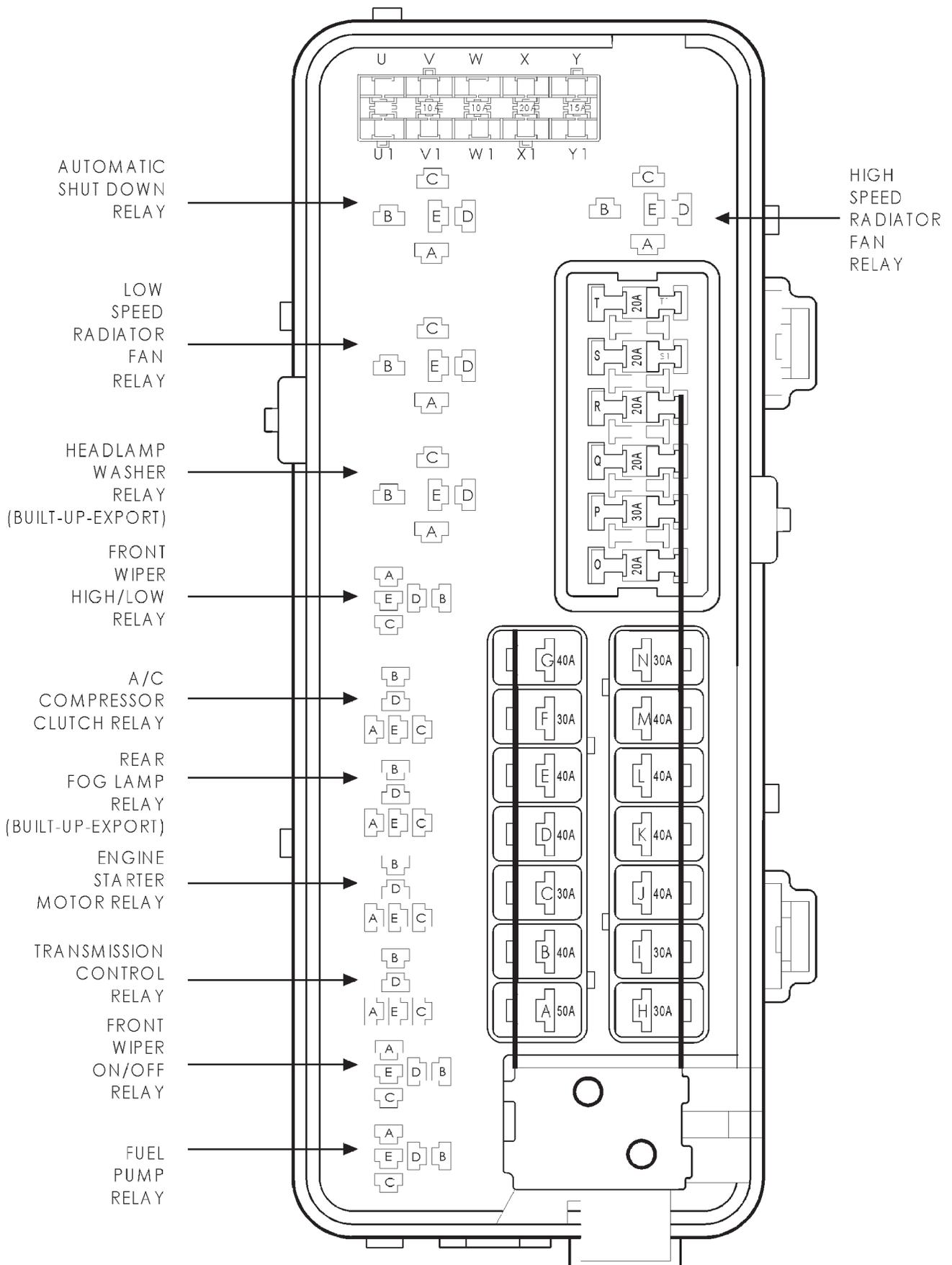
OXYGEN SENSOR
2/2 LEFT
BANK DOWN

OXYGEN SENSOR 2/2 LEFT BANK DOWN - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	K399 18BR/GY	OXYGEN SENSOR 2/2 HEATER CONTROL
3	K904 18DB/DG	OXYGEN SENSOR RETURN (DOWN)
4	K341 20PK/WT	OXYGEN SENSOR 2/2 SIGNAL

CONNECTOR PINOUTS

POWER DISTRIBUTION CENTER



FUSES (PDC)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
A	50A	A4 10BK/PK	FUSED B(+)
B	40A	A17 12RD/BR	FUSED B(+)
C	30A	A3 14RD/TN	FUSED B(+)
D	40A	A34 12LB/RD	FUSED B(+)
E	40A	A16 12GY	FUSED B(+)
F	30A	A37 16WT/DB	FUSED B(+)
G	40A	A1 12RD	FUSED B(+)
H	30A	A20 12RD/DB (ABS)	FUSED B(+)
I	30A	A7 14RD/BK	FUSED B(+)
J	40A	A2 12PK/BK	FUSED B(+)
K	40A	A10 12RD/DG (ABS)	FUSED B(+)
L	40A	A13 12PK/WT	FUSED B(+)
M	40A	A5 12RD/OR	FUSED B(+)
N	30A	A14 14RD/WT	FUSED B(+)
O	20A	A15 18PK	FUSED B(+)
P	30A	A53 14RD/YL (BUILT-UP-EXPORT)	FUSED B(+)
Q	20A	A30 14RD/LB	FUSED B(+)
R	20A	A35 18RD (BUILT-UP-EXPORT)	FUSED B(+)
S	20A	F42 16DG/LG	AUTOMATIC SHUT DOWN RELAY OUTPUT
T	20A	F142 16OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
V	10A	A41 12YL	FUSED IGNITION SWITCH OUTPUT (START)
W	10A	A14 14RD/WT	FUSED B(+)
X	20A	A130 16VT/RD	FUSED B(+)
Y	15A	A105 18DB/RD	FUSED B(+)

A/C COMPRESSOR CLUTCH RELAY

CAV	CIRCUIT	FUNCTION
A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
B	A17 12RD/BR	FUSED B(+)
C	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
D	C2 14DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
E	-	-

AUTO SHUT DOWN RELAY

CAV	CIRCUIT	FUNCTION
A	A209 20RD	FUSED B(+)
B	A14 14RD/WT	FUSED B(+)
C	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
D	A142 14DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
E	-	-

FUEL PUMP RELAY

CAV	CIRCUIT	FUNCTION
A	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
B	A1 12RD	FUSED B(+)
C	K31 20BR	FUEL PUMP RELAY CONTROL
D	A141 12DG/WT	FUEL PUMP RELAY OUTPUT
E	-	-

CONNECTOR PINOUTS

HIGH SPEED RADIATOR FAN RELAY

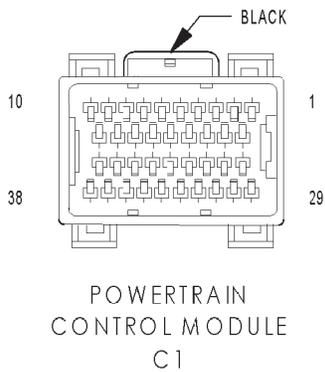
CAV	CIRCUIT	FUNCTION
A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
B	A17 12RD/BR	FUSED B(+)
C	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
D	C25 12YL	HIGH SPEED RADIATOR RELAY OUTPUT
E	-	-

LOW SPEED RADIATOR FAN RELAY

CAV	CIRCUIT	FUNCTION
A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
B	A16 12GY	FUSED B(+)
C	C24 20DB/PK	LOW SPEED RADIATOR FAN RELAY CONTROL
D	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
E	-	-

STARTER MOTOR RELAY

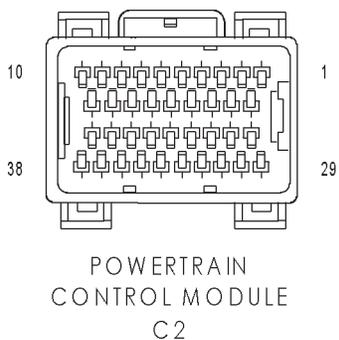
CAV	CIRCUIT	FUNCTION
A	T751 20YL/BK	FUSED IGNITION SWITCH OUTPUT (START)
B	A1 12RD	FUSED B(+)
C	K90 20TN	STARTER RELAY CONTROL
D	T40 12BR	STARTER RELAY OUTPUT
E	-	-



POWERTRAIN CONTROL MODULE C1 - BLACK 38 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	Z12 16BK/TN	GROUND
10	-	-
11	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
13	-	-
14	-	-
15	-	-
16	K236 18GY/PK (3.5L HIGH OUTPUT)	SHORT RUNNER VALVE SOLENOID CONTROL
17	-	-
18	Z12 16BK/TN	GROUND
19	-	-
20	-	-
21	C18 20DB	A/C PRESSURE SIGNAL
22	-	-
23	-	-
24	-	-
25	D20 20LG	SCI RECEIVE (PCM)
26	D19 20VT/OR	SCI RECEIVE (TCM)
27	-	-
28	-	-
29	A209 20RD	FUSED B(+)
30	T751 20YL/BK	FUSED IGNITION SWITCH OUTPUT (START)
31	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL
32	K904 18DB/DG	OXYGEN SENSOR RETURN (DOWN)
33	K341 20PK/WT	OXYGEN SENSOR 2/2 SIGNAL
34	-	-
35	-	-
36	D21 20PK/TN	SCI TRANSMIT (PCM)
37	D15 20WT/DG	SCI TRANSMIT (TCM)
38	D25 18VT/YL	PCI BUS (PCM)

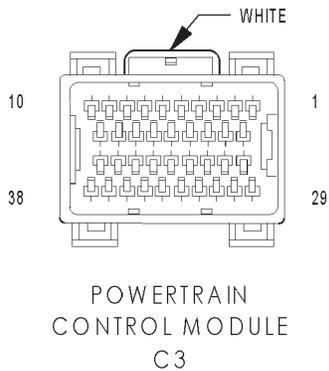
CONNECTOR PINOUTS



POWERTRAIN CONTROL MODULE C2 - 38 WAY

CAV	CIRCUIT	FUNCTION
1	K96 16TN/LB	COIL ON PLUG DRIVER NO. 6
2	K95 16TN/DG	COIL ON PLUG DRIVER NO. 5
3	K94 16TN/LG	COIL ON PLUG DRIVER NO. 4
4	K58 18BR/DB	FUEL INJECTOR NO. 6 DRIVER
5	K38 18GY	FUEL INJECTOR NO. 5 DRIVER
6	-	-
7	K93 16 TN/OR	COIL ON PLUG DRIVER NO. 3
8	K35 20GY/YL	EGR SOLENOID CONTROL
9	K92 16TN/PK	COIL ON PLUG DRIVER NO. 2
10	K91 16TN/RD	COIL ON PLUG DRIVER NO.1
11	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
12	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
13	K12 18TN/WT	FUEL INJECTOR NO. 2 DRIVER
14	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
15	-	-
16	K36 18VT/RD	MANIFOLD SOLENOID CONTROL
17	K299 18BR/WT	OXYGEN SENSOR 2/1 HEATER CONTROL
18	K99 18BR/OR	OXYGEN SENSOR 1/1 HEATER CONTROL
19	K20 18DG	GENERATOR FIELD DRIVER (+)
20	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
21	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
22	K235 20 LG/PK	EGR SENSOR SIGNAL
23	K1 20DG/RD	MAP SENSOR SIGNAL
24	K45 20BK/VT	KNOCK SENSOR RETURN
25	K42 20DB/LG	KNOCK SENSOR SIGNAL
26	-	-
27	K4 18BK/LB	SENSOR GROUND
28	K60 18YL/BK	IDLE AIR CONTROL MOTOR SENSE
29	K6 20VT/WT	5V SUPPLY
30	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
31	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL
32	K902 18 BR/DG	OXYGEN SENSOR RETURN (UP)
33	K241 20LG/RD	OXYGEN SENSOR 2/1 SIGNAL
34	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
35	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
36	-	-
37	-	-
38	K39 18GY/RD	IDLE AIR CONTROL MOTOR DRIVER

POWERTRAIN CONTROL MODULE C3 - WHITE 38 WAY

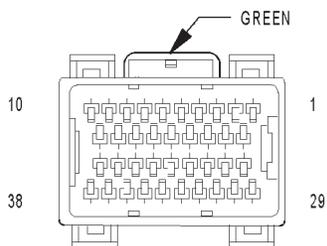


CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
4	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
5	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
6	C24 20DB/PK	LOW SPEED RADIATOR FAN RELAY CONTROL
7	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
8	K106 18WT/DG	NVLD SOLENOID CONTROL
9	K199 18BR/VT	OXYGEN SENSOR 1/2 HEATER CONTROL
10	K399 18BR/GY	OXYGEN SENSOR 2/2 HEATER CONTROL
11	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
12	V36 18TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	F142 16OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
19	F142 16OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
20	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
21	-	-
22	-	-
23	K29 20WT/PK	BRAKE SWITCH SENSE
24	-	-
25	-	-
26	T44 20YL	AUTOSTICK DOWNSHIFT SWITCH SENSE
27	T5 20LG/RD	AUTOSTICK UPSHIFT SWITCH SENSE
28	F142 16OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
29	K108 18DG/LG	EVAPORATIVE EMISSION SOLENOID SENSE
30	-	-
31	-	-
32	K25 20VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
33	-	-
34	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
35	K107 18OR/RD	NVLD SWITCH SENSE
36	-	-
37	K31 20BR	FUEL PUMP RELAY CONTROL
38	K90 20TN	STARTER RELAY CONTROL

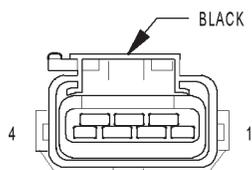
CONNECTOR PINOUTS

POWERTRAIN CONTROL MODULE C4 - GREEN 38 WAY

CAV	CIRCUIT	FUNCTION
1	T60 16BR	OVERDRIVE SOLENOID CONTROL
2	T59 16PK	UNDERDRIVE SOLENOID CONTROL
3	-	-
4	-	-
5	-	-
6	T19 16WT	2-4 SOLENOID CONTROL
7	-	-
8	-	-
9	-	-
10	T20 16LB	LOW/REVERSE SOLENOID CONTROL
11	-	-
12	Z14 16BK/YL	GROUND
13	Z13 16BK/RD	GROUND
14	Z13 16BK/RD	GROUND
15	T1 20LG/BK	TRS T1 SENSE
16	T3 20VT	TRS T3 SENSE
17	-	-
18	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
19	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
20	-	-
21	-	-
22	T9 16OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
23	-	-
24	-	-
25	-	-
26	-	-
27	T41 20BK/WT	TRS T41 SENSE
28	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
29	T50 16DG	LOW/REVERSE PRESSURE SWITCH SENSE
30	T47 16YL/BK	2-4 PRESSURE SWITCH SENSE
31	-	-
32	T14 20LG/WT	OUTPUT SPEED SENSOR SIGNAL
33	T52 20RD/BK	INPUT SPEED SENSOR SIGNAL
34	T13 20DB/BK	SPEED SENSOR GROUND
35	T54 20VT/PK	TRANSMISSION TEMPERATURE SENSOR SIGNAL
36	-	-
37	T42 20VT/WT	TRS T42 SENSE
38	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT



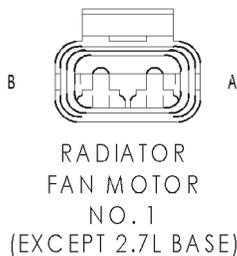
POWERTRAIN
CONTROL MODULE
C4



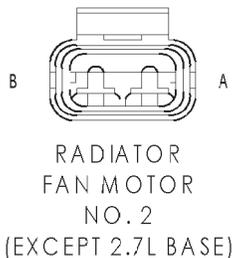
RADIATOR FAN

RADIATOR FAN - BLACK 4 WAY

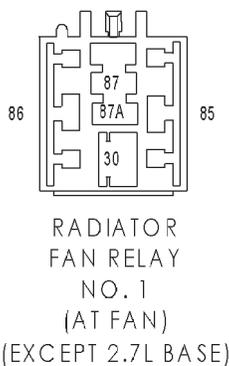
CAV	CIRCUIT	FUNCTION
1	Z1 12BK	GROUND
2	Z1 12BK	GROUND
3	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
4	C25 12YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT



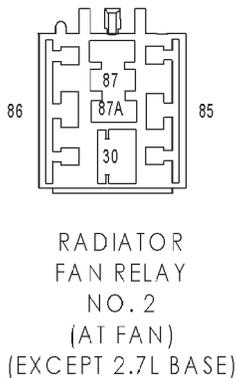
RADIATOR FAN MOTOR NO. 1 (EXCEPT 2.7L BASE) - 2 WAY		
CAV	CIRCUIT	FUNCTION
A	Z1 12BK	GROUND
B	12RD	RADIATOR FAN MOTOR NO. 1 CONTROL



RADIATOR FAN MOTOR NO. 2 (EXCEPT 2.7L BASE) - 2 WAY		
CAV	CIRCUIT	FUNCTION
A	12BK	GROUND
B	C23 12RD	LOW SPEED RADIATOR FAN RELAY OUTPUT

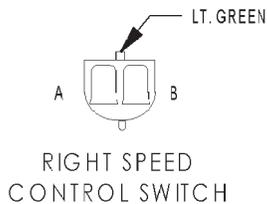


RADIATOR FAN RELAY NO. 1 (AT FAN) (EXCEPT 2.7L BASE)		
CAV	CIRCUIT	FUNCTION
30	12RD	RADIATOR FAN MOTOR NO. 1 CONTROL
30	12RD	RADIATOR FAN MOTOR NO. 1 CONTROL
85	C25 12RD	HIGH SPEED RADIATOR FAN RELAY OUTPUT
85	C25 12RD	HIGH SPEED RADIATOR FAN RELAY OUTPUT
86	Z1 12BK	GROUND
86'	Z1 12BK	GROUND
87A	-	-
87	C25 12RD	HIGH SPEED RADIATOR FAN RELAY OUTPUT

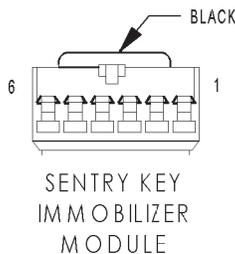


RADIATOR FAN RELAY NO. 2 (AT FAN) (EXCEPT 2.7L BASE)		
CAV	CIRCUIT	FUNCTION
30	12BK	GROUND
85	C25 12RD	HIGH SPEED RADIATOR RELAY OUTPUT
85	C25 12RD	HIGH SPEED RADIATOR RELAY OUTPUT
86	12BK	RADIATOR FAN MOTOR NO. 1 CONTROL
86	Z1 12BK	GROUND
87A	C25 12RD	GROUND
87	Z1 12BK	GROUND

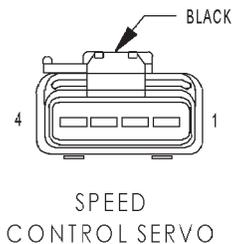
CONNECTOR PINOUTS



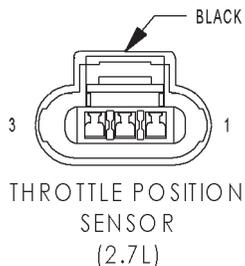
RIGHT SPEED CONTROL SWITCH - LT. GREEN 2 WAY		
CAV	CIRCUIT	FUNCTION
A	V37 22RD/LG	SPEED CONTROL SWITCH SIGNAL
B	K4 22BK/LB	SENSOR GROUND



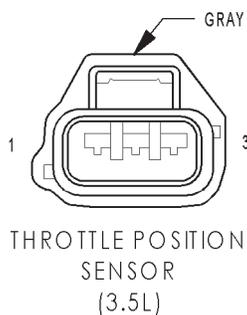
SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	Z2 20BK/LG	GROUND
6	M1 20PK	FUSED B(+)



SPEED CONTROL SERVO - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	V36 18TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
2	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
3	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
4	Z1 20BK	GROUND



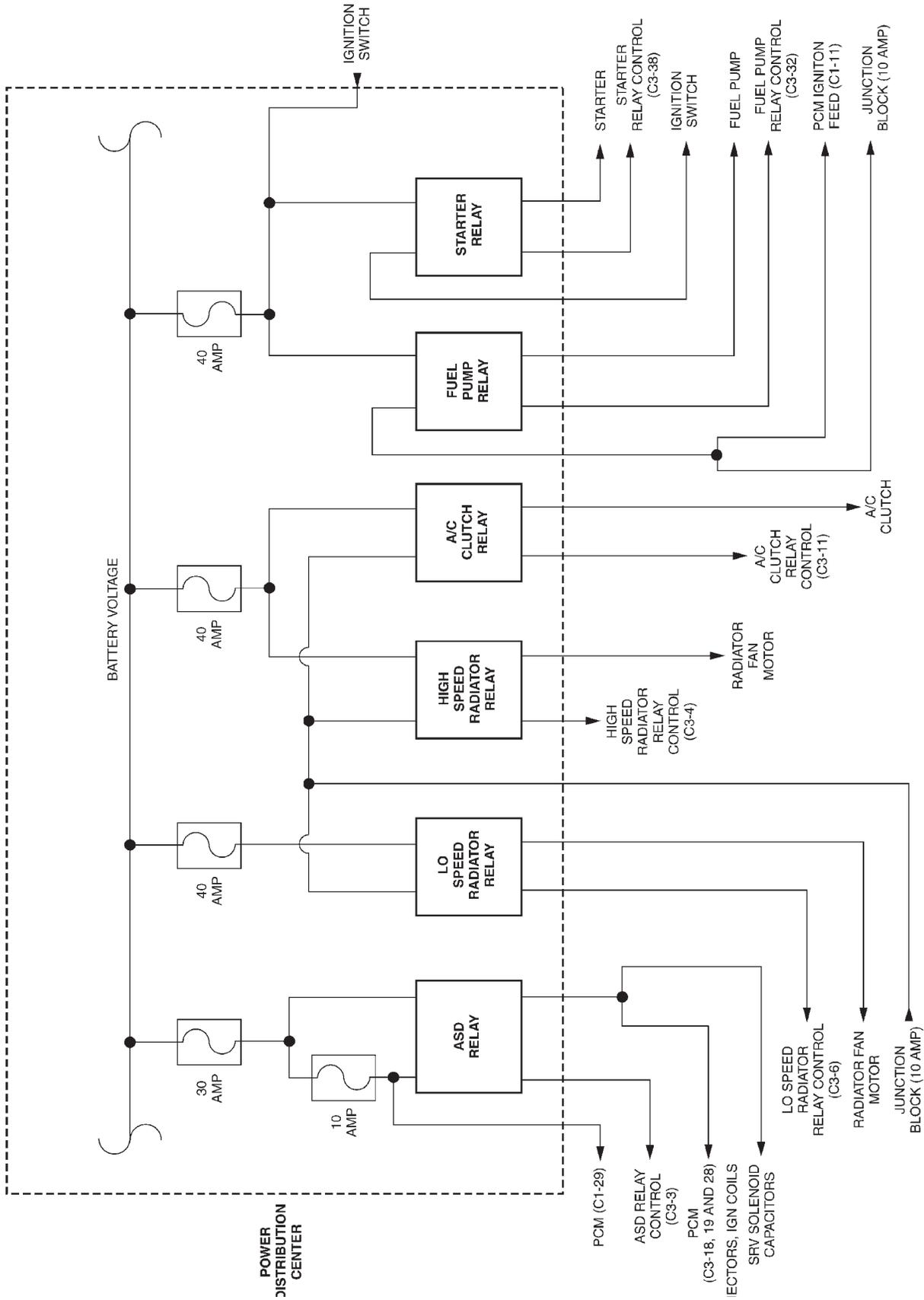
THROTTLE POSITION SENSOR (2.7L) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K22 OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND



THROTTLE POSITION SENSOR (3.5L) - GRAY 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K22 OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND

10.0 SCHEMATIC DIAGRAMS

10.1 2002 LH 2.7L AND 3.5L

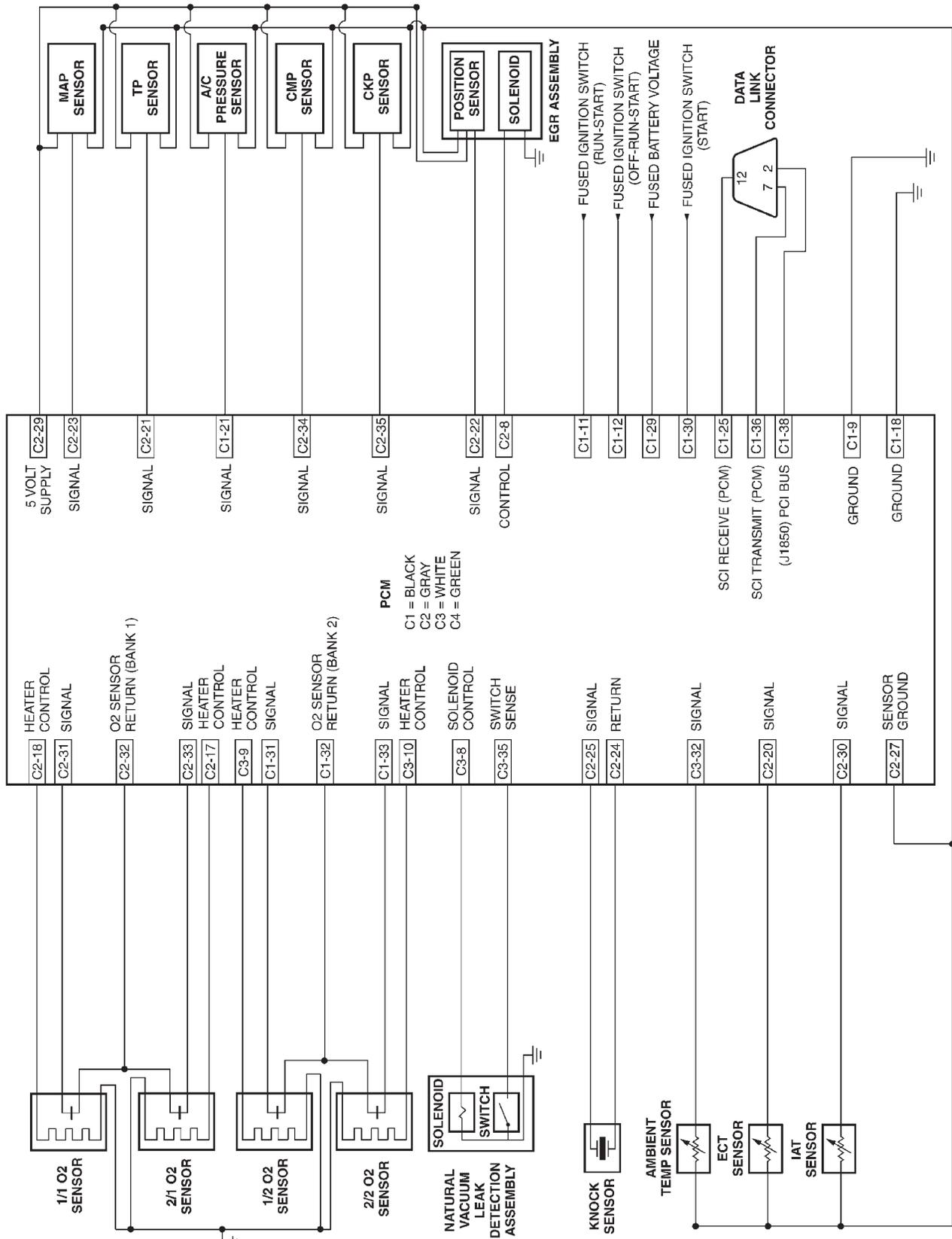


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SCHEMATIC DIAGRAMS

SCHEMATIC DIAGRAMS

10.2 2002 LH 2.7L AND 3.5L

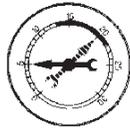


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11.0 CHARTS AND GRAPHS



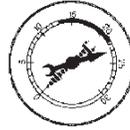
NORMAL
READING
RANGE
AT IDLE



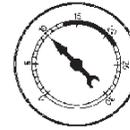
BLOWN
HEAD
GASKET
AT IDLE



NORMAL
READING
RAPID
ACCELERATION/
DECELERATION



WORN
RINGS OR
DILUTED OIL
RAPID
ACCELERATION/
DECELERATION



LATE VALVE
TIMING,
VACUUM
LEAK AT
IDLE



RESTRICTED
EXHAUST
(DROPS
TOWARD
ZERO AS
ENGINE RPM
INCREASES)



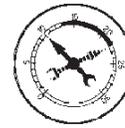
POOR
VALVE
SEATING
AT IDLE



STICKING
VALVE
AT IDLE



WORN VALVE
GUIDES
(STEADIES AS
ENGINE
SPEED
INCREASES)



WORN VALVE
SPRINGS
(MORE
PRONOUNCED
AS ENGINE
SPEED
INCREASES)

0920606

NGC TYPICAL SCOPE PATTERNS
CAMSHAFT AND CRANKSHAFT SENSOR

4 CYL ENGINES

CAM
CRANK



6 CYL ENGINES

CAM
CRANK

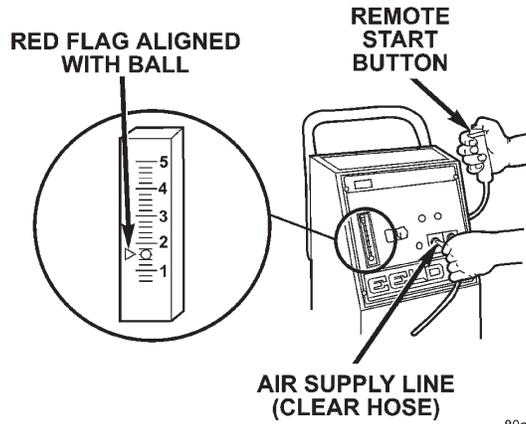


8 CYL ENGINES

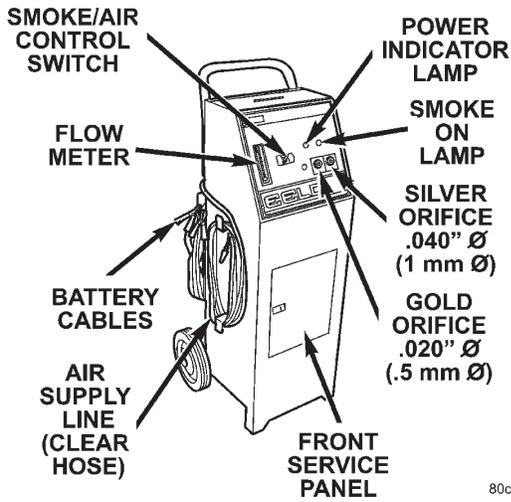
CAM
CRANK



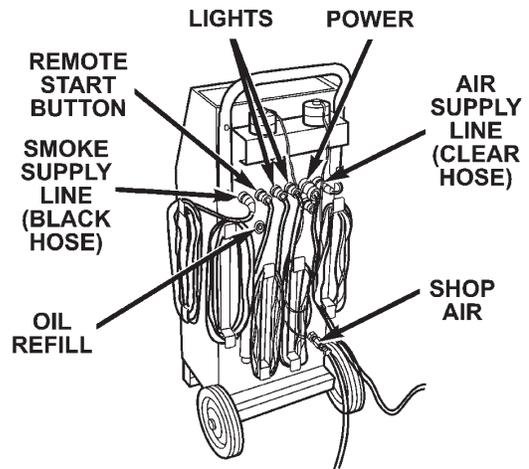
EELD CALIBRATION



80c38d90



80c38d47



80c38d69

O2 SENSOR CONFIGURATION

JR	4 CYLINDER	1/1	UPSTREAM
JR	4 CYLINDER	1/2	DOWNSTREAM
JR	2.7L V-6	1/1	REAR BANK UP
JR	2.7L V-6	1/2	REAR BANK DOWN
JR	2.7L V-6	2/1	FRONT BANK UP
JR	2.7L V-6	2/2	FRONT BANK DOWN
LH	V-6 ALL	1/1	RIGHT BANK UP
LH	V-6 ALL	1/2	RIGHT BANK DOWN
LH	V-6 ALL	2/1	LEFT BANK UP
LH	V-6 ALL	2/2	LEFT BANK DOWN
RS/RG	ALL	1/1	UPSTREAM
RS/RG	ALL	1/2	DOWNSTREAM
PL	ALL	1/1	UPSTREAM
PL	ALL	1/2	DOWNSTREAM
PR	3.5L	1/1	RIGHT BANK UP
PR	3.5L	1/2	RIGHT BANK DOWN
PR	3.5L	2/1	LEFT BANK UP
PR	3.5L	2/2	LEFT BANK DOWN
PT	ALL	1/1	UPSTREAM
PT	ALL	1/2	DOWNSTREAM

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