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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 manual for the proper removal and repair procedure.

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

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

1.1 SYSTEM COVERAGE

This diagnostic procedures manual covers the 2001 XJ Jeep Cherokee with 4.0L 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
- Ignition system
- charging system
- speed control system
- cooling system

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

3.2.2 ON-BOARD DIAGNOSTICS

The PCM has been programmed to monitor 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 DTC 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 DTC will be stored in the PCM.

It is possible that a DTC 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 (arming conditions) 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 DTC criteria (arming conditions) are met, a DTC will be stored in the PCM memory.

The On Board Diagnostics have evolved to the third Generation of Diagnostics referred to as Euro Stage III OBD. These Euro Stage III OBD Diagnostics control the functions necessary to meet the requirements of Euro Stage III OBD regulation. These requirements specify the inclusion of a Malfunction Indicator Light (MIL) located on the instrument panel for all 1994 and subsequent model-year passenger cars, light duty trucks, and medium-duty vehicles. The purpose of the MIL is to inform the vehicle operator in the event of a malfunction of any emission system or component.

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

EURO STAGE III OBD MONITOR INFORMATION

Comprehensive Components Monitor	Major Monitors Non Fuel Control & Non Misfire	Major Monitors Fuel Control & Misfire
Run constantly	Run Once Per Trip	Run Constantly
Includes All Engine Hardware - Sensors, Switches, Solenoids, etc.	Monitors Entire Emission System	Monitors Entire System
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	**Fuel Control Monitor** Monitors Fuel Control System For: Fuel System Lean Fuel System Rich Requires 3 Consecutive *Fuel System Good Trips* To Extinguish The MIL
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	**Misfire Monitor** Monitors For Engine Misfire at: 1000 RPM Counter (Type B) **200 RPM Counter (Type A) Requires 3 Consecutive *Misfire Good Trips* To Extinguish the MIL **Type A misfire is a one trip failure. The MIL will illuminate and blink at the first failure.
Requires 3 Consecutive *Global/Alternate Good Trips* to Extinguish the MIL*	Requires 3 Consecutive *Global Good Trips* to Extinguish the MIL*	

***40 Warm Up Cycles** are required to erase DTC's *after* the MIL has been extinguished.

3.2.3 TRANSMISSION CONTROL

The automatic transmission for this vehicle is an AW4 model controlled by a separate controller. Further explanation of the transmission control and operation can be found in the AW4 transmission diagnostic manual.

3.2.4 OTHER CONTROLS

CHARGING SYSTEM

The charging system is turned on when the engine is started and ASD relay energized. When the ASD relay is on, ASD output voltage is supplied to the ASD sense circuit at the PCM. This voltage is connected in some cases, through the PCM and supplied to one of the generator field terminals (Gen Source +). All others, the Gen field is connected directly to the ASD output voltage. The amount of current produced by the generator is controlled by the Electronic Voltage Regulator (EVR) circuitry, in the PCM. A battery temperature sensor, located either in the battery tray, using the ambient sensor, or in the PCM itself, is used to sense battery temperature. This temperature along with sensed line voltage, is used by the PCM to vary the battery charging rate. This is done by cycling the ground path to the other generator field terminal (Gen field driver).

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 dump solenoid allows immediate release of throttle position caused by braking, cruise control switch turned off, shifting into neutral, excessive RPM (tires spinning) or ignition off.

LEAK DETECTION PUMP SYSTEM

The leak detection pump is a device that pressurizes the evaporative system to determine if there are any leaks. When certain conditions are met, the PCM will activate the pump and start counting pump strokes. If the pump stops within a calibrated number of strokes, the system is determined to be normal. If the pump does not stop or stops too soon, a DTC will be set.

3.2.5 PCM OPERATING MODES

As input signals to the powertrain control module (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.

IGNITION SWITCH ON (ENGINE OFF) MODE

When the ignition switch activates the fuel injection system, the following actions occur:

1. The PCM determines atmospheric air pressure from the MAP sensor input to determine basic fuel strategy.
2. The PCM monitors the engine coolant temperature sensor and throttle position sensor input. The PCM modifies fuel strategy based on this input.

When the key is in the “on” position and the engine is not running (zero rpm), the auto shutdown relay and fuel pump relay are not energized. Therefore, voltage is not supplied to the fuel pump, ignition coil, and fuel injectors.

Engine Start-up Mode — This is an open loop mode. The following actions occur when the starter motor is engaged:

1. The auto shutdown and fuel pump relays are energized. If the PCM does not receive the camshaft and crankshaft signal within approximately one second, these relays are de-energized.
2. The PCM energizes all fuel injectors until it determines crankshaft position from the camshaft and crankshaft signals. The PCM determines crankshaft position within one engine revolution. After the crankshaft position has been determined, the PCM energizes the fuel injectors in sequence. The PCM adjusts the injector pulse width and synchronizes the fuel injectors by controlling the fuel injectors' ground paths.

Once the auto shutdown and fuel pump relays have been energized, the PCM determines the fuel injector pulse width based on the following:

- engine coolant temperature
- manifold absolute pressure
- intake air temperature
- engine revolutions
- throttle position

The PCM determines the spark advance based on the following:

- engine coolant temperature
- crankshaft position
- camshaft position
- intake air temperature
- manifold absolute pressure
- throttle position

Engine Warm-Up Mode − This is an open loop mode. The PCM adjusts injector pulse width and controls injector synchronization by controlling the fuel injectors' ground paths. The PCM adjusts ignition timing and engine idle speed. The PCM adjusts the idle speed by controlling the idle air control motor.

Cruise or Idle Mode − When the engine is at normal operating temperature, this is a closed loop mode. During certain idle conditions, the PCM may enter into a variable idle speed strategy. At this time, the PCM adjusts engine speed based on the following inputs:

- throttle position
- battery voltage
- engine coolant temperature

Acceleration Mode − This is a closed loop mode. The PCM recognizes an increase in throttle position and a decrease in Manifold Vacuum as engine load increases. In response, the PCM increases the injector pulse width to meet the increased load.

Deceleration Mode − This is a closed loop mode. The PCM recognizes a decrease in throttle position and an increase in Manifold Vacuum as engine load decreases. In response, the PCM decreases the injector pulse width to meet the decreased load.

Wide Open Throttle Mode − This is an open loop mode. The throttle position sensor notifies the PCM of a wide open throttle condition. The PCM adjusts injector pulse width to supply a predetermined amount of additional fuel.

3.2.6 NON-MONITORED CIRCUITS

The PCM does not monitor the following circuits, systems, and conditions even though they could have malfunctions that result in driveability problems. A DTC may not be displayed for the following conditions. However, problems with these systems may cause a DTC to be displayed for other systems. For example, a fuel pressure problem will not register a DTC directly, but could cause a rich or lean condition. This could cause an oxygen sensor, fuel system, or misfire monitor DTC 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 result in starting and driveability problems. (See individual symptoms and their definitions in Section 6.0 (Glossary of Terms).

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

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

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

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

Excessive Oil Consumption − Although the PCM monitors the exhaust 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 DTC to be stored in the PCM, or the vehicle may exhibit one or more of the driveability symptoms listed in the Table of Contents.

3.2.7 SKIS OVERVIEW

The Sentry Key Immobilizer System (SKIS) is an immobilizer system design to prevent unauthorized vehicle operation. The system consists of a Sentry Key Immobilizer Module (SKIM), ignition key(s) equipped with a transponder chip and engine controller. 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 CCD Bus message to the engine controller indicating ignition key status valid ignition key. Upon receiv-

ing this message the PCM will terminate engine operation or allow the engine to continue to operate.

3.2.8 SKIM ON-BOARD DIAGNOSTICS

The SKIM has been programmed to transmit and monitor many different coded messages as well as CCD 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, CCD 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 DTC will be stored in the SKIM memory.

3.2.9 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). After validating the ignition key the SKIM sends CCD 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 warning lamp located in the instrument cluster. The lamp receives power and ground from the instrument cluster. The lamp is actuated when the SKIM sends a CCD Bus message to the instrument cluster requesting the lamp on. The SKIM will request lamp 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 VIN mismatch, the lamp remains on steady. In the event of a transponder fault the light flashes at a rate of 1 Hz (once per second). If a fault is present the lamp 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 will not allow the engine to start.

3.2.10 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. relay and solenoids) and short circuits (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.

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.

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).

3.2.11 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 secret key (the PCM will send the secret key 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.

3.2.12 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. ONCE A KEY IS LEARNED TO A SKIM IT (THE KEY) CANNOT BE TRANSFERRED TO ANOTHER VEHICLE.

If ignition key programming is unsuccessful, the DRB 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 DTC as well as no trouble code problems. It is not necessary to perform all of the tests in this book to diagnose an individual DTC.

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 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 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 DRBI-II®, 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 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 feauture 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 0) 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 if 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).

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.

SYMPTOM	DIAGNOSTIC TEST
HARD START	CHECKING THE FUEL PRESSURE CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EVAP EMISSION SYSTEM CHECKING IAT SENSOR
START AND STALL	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION
HESITATION/SAG/STUMBLE	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EVAP EMISSION SYSTEM CHECKING IAT SENSOR
ENGINE STALLS IN GEAR	CHECK TCC OPERATION
SURGE	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EVAP EMISSION SYSTEM
LACK OF POWER/SLUGGISH	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION

SYMPTOM	DIAGNOSTIC TEST
SPARK KNOCK/DETONATION	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EVAP EMISSION SYSTEM
CUTS OUT/MISSES	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION
BACKFIRE/POPBACK	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW
RUNS ROUGH/UNSTABLE/ ERRATIC IDLE	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EVAP EMISSION SYSTEM CHECKING IAT SENSOR
POOR FUEL ECONOMY	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EVAP EMISSION SYSTEM CHECKING IAT SENSOR

3.3.5 NO START INFORMATION

IMPORTANT NOTE:

If the Powertrain Control Module has been changed and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS and Air bag modules. In addition, if the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable starting.

FOR ABS AND AIR BAG SYSTEMS:

1. Enter correct VIN and Mileage in PCM.
2. Erase DTC's in ABS and Air Bag modules.

FOR SKIM THEFT ALARM:

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

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 by pressing MORE and NO at the same time.

```
ver: 2.29
date: 1 Oct93
file: key_itf.cc
date: Jan 12 1994
line: 544
err: 0x1
User-Requested WARM Boot

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

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

```
ver: 2.29
date: 1 Oct99
file: key_hndi.cc
date: Mar 8 2000
line: 1297
err: 0x1
User-Requested COLD Boot

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

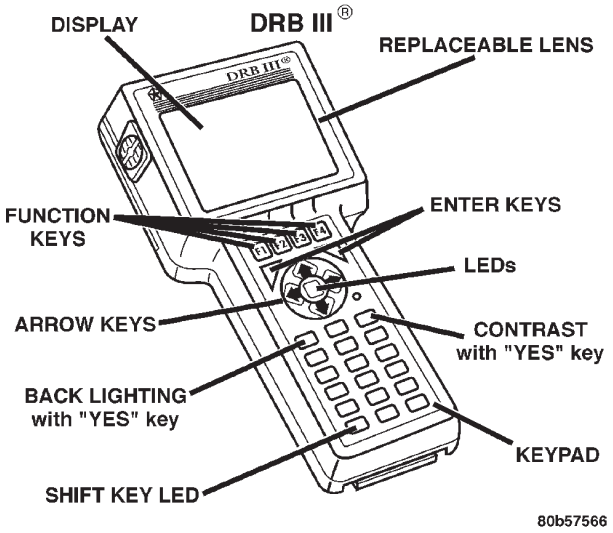
3.5.1 DRBIII® DOES NOT POWER UP

If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link connector cavity 16). Check for proper ground connection at DLC cavity 4. 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. For a blank screen, refer to the appropriate body diagnostics manual.

3.5.2 DISPLAY IS NOT VISIBLE

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



4.0 DISCLAIMERS, SAFETY, WARNINGS

4.1 DISCLAIMERS

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

4.2 SAFETY

4.2.1 TECHNICIAN SAFETY INFORMATION

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

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

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

When diagnosing a powertrain system problem, it is important to follow approved procedures where applicable. These procedures can be found in 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 subcomponents may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

WARNING: EXCEEDING THE LIMITS OF THE DRB 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
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
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
EMCC	electronic modulated convertor clutch
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 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.
MAP	manifold absolute pressure sensor
MIL	malfunction indicator lamp
MTV	manifold tuning valve
O2S	oxygen sensor
PCI	programmable communication interface
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 ad 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.
start & stall	The engine starts but immediately dies.
surge	engine rpm fluctuation without corresponding change in throttle position sensor
TCC	torque converter clutch
TPS	throttle position sensor
TRS	transmission range sensor
VSS	vehicle speed sensor/signal

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom:

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY

When Monitored and Set Condition:

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY

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

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

POSSIBLE CAUSES
GENERATOR FIELD WIRING HARNESS INTERMITTENT PROBLEM
GENERATOR FIELD WIRING HARNESS OBSERVABLE PROBLEM
GENERATOR FIELD DRIVER CIRCUIT OPEN
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD RESISTANCE >= 5.0 OHMS
GENERATOR FIELD SOURCE (+) CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Driver Circuit. Using a 12-volt test light, backprobe the Generator Field Driver Circuit at the back of the Generator. Did the light blink? Yes → Go To 2 No → Go To 3	All
2	Ignition on, engine not running. With the DRBIII® actuate the Generator Field Driver Circuit. **Note: Actuator Test should still be running.** Wiggle Wiring Harness from the Generator to PCM. With the DRBIII®, read DTC's. Does the Generator Field Driver (-) Circuit code return? Yes → Repair as necessary where wiggling caused problem to appear. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
3	Ignition on, engine not running. Record all DTC's and freeze frame data, now erase Codes. Carefully inspect all Connectors for corrosion or spread Terminals before continuing. With the DRBIII® actuate the Generator Field Driver Circuit. Backprobe the Generator Field Source (+) Circuit at back of Generator. Is the voltage above 10.0 volts? Yes → Go To 4 No → Repair the open Generator Field Source (+) Circuit from Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
4	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Generator Field harness connector. Measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field harness connector. **Note: Check Connectors - Clean/repair as necessary.** Measure the Generator Field Driver Circuit from PCM to Generator. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open Generator Field Driver Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
6	Turn the ignition off. Disconnect the Generator Field harness connector at back of the Generator. **Note: Check connectors - Clean/repair as necessary.** Measure resistance across the Generator Field Terminals at the Generator. Is the resistance below 5.0 ohms? Yes → Repair the Generator as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH

When Monitored and Set Condition:

P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH

When Monitored: With the ignition key on.

Set Condition: The PCM senses the voltage from the AMBIENT/BATT temperature sensor to be above 4.9 volts for 3 seconds.

POSSIBLE CAUSES
SENSOR GROUND CIRCUIT OPEN
AMBIENT/BATT SIGNAL CIRCUIT SHORTED TO VOLTAGE
AMBIENT/BATT SIGNAL CIRCUIT OPEN
AMBIENT/BATT TEMPERATURE SENSOR
PCM
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Good Trip Counter displayed and equal to zero for P1492? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the AMBIENT/BATT Temperature Sensor harness connector. Measure the resistance between the Sensor Ground circuit and ground at the AMBIENT/BATT Temperature Sensor connector. Is the resistance below 5.0 ohms? No → Repair the open Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. Yes → Go To 3	All
3	Turn the ignition off. Disconnect the AMBIENT/BATT connector. Start the engine. Allow engine to idle. Measure the AMBIENT/BATT Signal circuit voltage at the AMBIENT/BATT connector. Is the voltage above 5.5 volts? Yes → Repair the short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All

P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the AMBIENT/BATT connector. Disconnect the PCM harness connector(s). Measure the resistance of the AMBIENT/BATT Signal circuit from the AMBIENT/BATT connector to the PCM connector. Is the resistance below 5.0 ohms? No → Repair the open circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. Yes → Go To 5	All
5	Turn the ignition off. Disconnect the AMBIENT/BATT Temperature Sensor connector. Turn the ignition on. With the DRBIII® in sensors, read the ″Ambient/Bat Tmp Vlt″ value. Connect a jumper wire between the AMB/BATT Signal circuit and the Sensor Ground circuit at the AMB/BATT connector. Voltage should change from greater than 4.5 volts to less than 1.0 volt. Did the ″Ambient/Bat Tmp Vlt″ value change from greater than 4.5 volts to less than 1.0 volt? Yes → Replace the AMBIENT/BATT Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	If there are no possible causes remaining, view repair. View repair options. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 3.	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 wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All

Symptom:

P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW

When Monitored and Set Condition:

P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW

When Monitored: With the ignition on.

Set Condition: The PCM senses the voltage from the AMBIENT/BATT temperature sensor to be below 0.5 volt for 3 seconds.

POSSIBLE CAUSES
AMBIENT/BATT TEMP SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
AMBIENT/BATT TEMPERATURE SIGNAL CIRCUIT SHORTED TO GROUND
AMBIENT/BATT TEMPERATURE SENSOR
PCM
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Specific Good Trip Counter displayed and equal to zero for P1493? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition on. With the DRBIII® in sensors, read the "Ambient/Bat Tmp Vlt" value. Disconnect the AMBIENT/BATT Temperature Sensor connector. Did the "Ambient/Bat Tmp Vlt" value change from below 1.0 volt to above 4.5 volts? Yes → Replace the AMBIENT/BATT Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All
3	Turn the ignition off. Disconnect the AMBIENT/BATT connector. Disconnect the PCM harness connector(s). Measure the AMBIENT/BATT temperature sensor Signal circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All

P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the AMBIENT/BATT temperature sensor connector. Disconnect the PCM harness connectors. Measure the resistance between the AMBIENT/BATT temperature sensor Signal circuit and the Sensor Ground circuit. Is the resistance below 5.0 ohms? Yes → Repair the shorted circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
6	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All

Symptom:

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH

When Monitored and Set Condition:

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH

When Monitored: With the ignition key on and the engine speed greater than 0 RPM.

Set Condition: When the PCM regulates the generator field and there are no detected field problems, but the voltage output does not decrease.

POSSIBLE CAUSES
AMBIENT/BATT TEMPERATURE SENSOR
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD SHORTED TO GROUND
AMBIENT/BATT TEMPERATURE SENSOR
POWERTRAIN CONTROL MODULE (BATTERY VOLTAGE)
POWERTRAIN CONTROL MODULE (GENERATOR RESISTANCE)

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Driver. With a 12-volt test light, backprobe the Generator Field Driver Circuit in back of Generator. Did the light blink? Yes → Go To 2 No → Go To 6	All
2	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Driver. With DRBIII®, stop the Generator Field Driver actuation. With DRBIII®, read the Target Charging voltage. Is the Target Charging voltage above 0 volts? Yes → Go To 3 No → Go To 4	All
3	Start the engine. Manually set the engine speed to 1600 RPM. With DRBIII®, read both the Battery voltage and the Target Charging voltage. Compare the ″Target Voltage″ to the ″Battery Voltage″ reading. Monitor voltage for 5 minutes, if necessary. Look for a 1.0 volt difference or more. Was there more than a 1.0 volt difference? Yes → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Ignition on, engine not running. .With the DRBIII® in Inputs/Outputs, read the AMBIENT/BATT temperature. Using a thermometer measure under hood temperature near Battery tray. Is the temperature within 10 deg of Battery temperature? Yes → Go To 5 No → Replace AMBIENT/BATT Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
5	If there are no possible causes remaining, view repair. Repair Replace the AMBIENT/BATT TEMP SENSOR. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
6	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Generator Field harness connector. Measure the Generator Field Driver Circuit from PCM Harness Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Turn the ignition off. Disconnect the Field Harness Connector at back of the Generator. **Note: Check connectors - Clean/repair as necessary.** Measure resistance of the Generator Field Driver Circuit at the Generator to Ground. Is the resistance below 5.0 ohms? Yes → Repair or replace the shorted Generator as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:

P1682-CHARGING SYSTEM VOLTAGE TOO LOW

When Monitored and Set Condition:

P1682-CHARGING SYSTEM VOLTAGE TOO LOW

When Monitored: With the ignition key on and the engine running over 1500 RPM after 25 seconds.

Set Condition: When the PCM regulates the generator field and there are no detected field problems, but the voltage output does not increase.

POSSIBLE CAUSES
AMBIENT/BATT TEMPERATURE SENSOR
B (+) CIRCUIT HIGH RESISTANCE
GENERATOR GROUND HIGH RESISTANCE
GENERATOR FIELD DRIVER CIRCUIT OPEN
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD SOURCE CIRCUIT SHORTED TO GROUND
GENERATOR FIELD SOURCE (+) CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Start the engine. With theDRBIII®, read the target charging voltage. Is the target charging voltage above 15.1 volts? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. **Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII® in Inputs/Outputs, read the AMBIENT/BATT Temperature. Using a Thermometer, measure under hood temperature. Is the temperature within 10 F degrees of Battery temperature? Yes → Go To 9 No → Go To 3	All

P1682-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the AMBIENT/BATT harness Connector. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper across the Terminals of the AMBIENT/BATT (harness side). Ignition on, engine not running. With the DRBIII® in Inputs/Outputs, read the AMBIENT/BATT voltage. Is the voltage reading equal to zero? Yes → Replace the AMBIENT/BATT temperature sensor. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All
4	Ignition on, engine not running. Record all DTC's and freeze frame data, now erase Codes. Carefully inspect all Connectors for corrosion or spread Terminals before continuing. With the DRBIII® actuate the Generator Field Driver Circuit. Backprobe the Generator Field Source (+) Circuit at back of Generator. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open Generator Field Source (+) Circuit from Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
5	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field harness connector. **Note: Check Connectors - Clean/repair as necessary.** Measure the Generator Field Driver Circuit from PCM to Generator. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open Generator Field Driver Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
6	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the generator field harness connector. Measure the Generator Field Source Circuit from PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Source Circuit shorted to ground and replace PCM. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Generator Field harness connector. Measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 8	All

P1682-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
8	Start the engine. Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Measure voltage between the Generator case and Battery (-) Post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery (-) side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 17	All
9	Turn ignition on, engine not running. Measure voltage between the Generator B(+) Terminal and the Battery (+) Post. **Caution: Ensure all wires are clear of the engine's moving parts.** Start the engine. Is the voltage above 0.4 volt? Yes → Repair the B(+) Circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 10	All
10	Start the engine. Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Measure voltage between the Generator case and Battery (-) Post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery (-) side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 11	All
11	**Caution: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start the engine. Turn on all accessories, manually set engine speed to 1600 RPM. With DRBIII®, read Target Charging and Charging voltage. Compare the two readings. Is there more than a 1.0 volt difference? Yes → Go To 12 No → Test Complete.	All
12	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field. Measure the voltage at both Generator Field Terminals. Is the voltage below 3.0 volts at either Terminal? Yes → Go To 13 No → Test Complete.	All

P1682-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
13	Ignition on, engine not running. Record all DTC's and freeze frame data, now erase Codes. Carefully inspect all Connectors for corrosion or spread Terminals before continuing. With the DRBIII® actuate the Generator Field Driver Circuit. Backprobe the Generator Field Source (+) Circuit at back of Generator. Is the voltage above 10.0 volts? Yes → Go To 14 No → Repair the open Generator Field Source (+) Circuit from Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
14	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Generator Field harness connector. Measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 15	All
15	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field harness connector. **Note: Check Connectors - Clean/repair as necessary.** Measure the Generator Field Driver Circuit from PCM to Generator. Is the resistance below 5.0 ohms? Yes → Go To 16 No → Repair the open Generator Field Driver Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
16	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the generator field harness connector. Measure the Generator Field Source Circuit from PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Source Circuit shorted to ground and replace PCM. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 17	All
17	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:

***CHECKING CHARGING SYSTEM OPERATION WITH NO DTC'S PRESENT**

POSSIBLE CAUSES
B (+) CIRCUIT HIGH RESISTANCE
GENERATOR GROUND HIGH RESISTANCE
B(+) CIRCUIT HIGH RESISTANCE (1.0 VOLT)
GENERATOR BELT OBSERVABLE PROBLEM
GENERATOR FIELD TERMINAL INTERMITTENT PROBLEM
TROUBLE CODES PRESENT
TROUBLE CODES PRESENT 2000 RPM
PCM (CHARGING SYSTEM NO CODE)

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **Note: Battery condition must be verified prior to this test.** Inspect the Generator Belt tension and condition. Is the Generator Belt OK? Yes → Go To 2 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
2	Start the engine. Turn on all accessories. Raise engine speed to 2000 RPM for 30 seconds then return to idle. With the DRBIII®, read DTC's. Are there any ″Charging System″ Trouble Codes? Yes → Refer to Symptom list for problems related to Charging. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All
3	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field. Using a 12-volt test light, backprobe the Generator Field Driver Terminal at the back of the Generator. **Note: The test light should blink On and Off every 1.4 seconds.** While monitoring the 12-volt test light, wiggle the Field Terminals back to the PCM and ASD Relay. Was there any interruption in the normal cycle of the test light? Yes → Repair the wire where wiggling interrupted the voltage cycle. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All

*CHECKING CHARGING SYSTEM OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
4	Ignition on, engine not running. With the DRBIII®, read DTC's. Are there any ″Charging System″ trouble codes? Yes → Refer to Symptom list for problems related to Charging. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 5	All
5	Turn ignition on, engine not running. Measure voltage between the Generator B(+) Terminal and the Battery (+) Post. **Caution: Ensure all wires are clear of the engine's moving parts.** Start the engine. Is the voltage above 0.4 volt? Yes → Repair the B(+) Circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	Start the engine. Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Measure voltage between the Generator case and Battery (-) Post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery (-) side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Ignition on, engine not running. With the DRBIII®, read the Battery voltage and record the results. Measure Battery voltage B(+) to B(-) Terminal and record the results. Compare the two voltage readings. Is the voltage difference less than one volt? Yes → Test Complete. No → Go To 8	All
8	Ignition on, engine not running. With the DRBIII®, read the Battery voltage and record the results. Turn the Ignition off. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Measure the Fused B(+) at PCM Connector. Is the voltage within one volt of the DRB recorded reading? Yes → Go To 9 No → Repair the B(+) Circuit for high resistance between the PCM and the Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
9	If there are no possible causes remaining, view repair. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:

*CHECKING THE AMBIENT/BATTERY TEMPERATURE SENSOR

POSSIBLE CAUSES
AMBIENT/BATT TEMPERATURE SENSOR
AMBIENT/BATT (OUT OF CALIBRATION)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® in sensors, read the ″Ambient/Bat Tmp Deg″ value and record the reading. Using a temp probe, measure the air temperature near the AMBIENT/BATT. Is the recorded AMBIENT/BATT temperature value within 10° of the temperature probe reading? Yes → Go To 2 No → Replace the AMBIENT/BATT Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
2	Turn the ignition off. Disconnect the AMBIENT/BATT harness Connector. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper across the Terminals of the AMBIENT/BATT (harness side). Ignition on, engine not running. With the DRBIII® in Inputs/Outputs, read the AMBIENT/BATT voltage. Is the voltage reading equal to zero? Yes → Replace the AMBIENT/BATT temperature sensor. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All

Symptom:
P-1685 INVALID SKIM KEY

When Monitored and Set Condition:

P-1685 INVALID SKIM KEY

When Monitored: With the ignition on.

Set Condition: The PCM does not receive a valid key message from the SKIM.

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	With the DRB III, read the PCM DTCs. Look for P1685. Turn the ignition on. Is the Starts Since Set counter for DTC P1685 displayed and equal to 0? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition on. With the DRB III, attempt to communicate with the SKIM. Can you communicate with the SKIM? Yes → Go To 3 No → Refer to symptom BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition on. With the DRB III, check for SKIM DTC's. Are there any trouble codes set in the SKIM? Yes → Repair all SKIM DTC's. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

P-1685 INVALID SKIM KEY — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: If a VIN has not been programmed into the PCM, program VIN into the PCM and retest.** Turn the ignition on. With the DRB III, display the VIN that is programmed in the PCM. Is there a VIN programmed in the PCM? Yes → Go To 5 No → Program the correct VIN into the PCM and retest. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition on. With the DRB III, display the VIN that is programmed in the PCM. Is the correct VIN programmed in the PCM? Yes → Go To 6 No → Replace and program the PCM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	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 DRB III, erase all DTCs. Attempt to start and idle the engine. With the DRB III, read the PCM DTCs. Does the DRB III display this code? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
7	**NOTE: This DTC could have been set if the SKIM harness connector was disconnected, or if the SKIM was replaced recently.** **NOTE: All keys that the customer uses for this vehicle must be tested to verify they are operating properly.** Verify the correct VIN is programmed in both the PCM and SKIM modules. Turn the ignition off. With the next customer key turn the ignition key on and crank the engine to start. With the DRB III, read the PCM DTCs. Look for P1685 Is the Starts Since Set Counter for DTC P1685 displayed and equal to 0? Yes → Replace the Ignition Key. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete. **NOTE: If this DTC can not be reset, it may have been an actual theft attempt.**	All

Symptom:

P-1686 NO SKIM BUS MESSAGE RECEIVED

When Monitored and Set Condition:

P-1686 NO SKIM BUS MESSAGE RECEIVED

When Monitored: With the ignition on.

Set Condition: The PCM does not receive a CCD Bus message from the SKIM when expected.

POSSIBLE CAUSES
PCM
INTERMITTENT CONDITION
CCD BUS CIRCUIT(S) OPEN FROM PCM TO SKIM
LOSS OF SKIM COMMUNICATION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB III®, read PCM DTCs. LOOK for P1686. Is the Starts Since Set counter for DTC P1686 displayed and equal to 0? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRB III®, attempt to communicate with the SKIM. With the DRB III®, select Theft Alarm and read the SKIM DTCs. **NOTE: This test will indicate if the Bus is operational from the DLC to the SKIM.** Can the DRB communicate with the SKIM? Yes → Go To 3 No → Refer to the appropriate symptom in the COMMUNICATION category. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the SKIM harness connector. Measure the resistance of both CCD Bus circuits between the PCM and the SKIM. Is the resistance below 5.0 ohms for each measurement? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the CCD Bus circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P-1686 NO SKIM BUS MESSAGE RECEIVED — Continued

TEST	ACTION	APPLICABILITY
4	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 and 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. 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P0600-PCM FAILURE SPI COMMUNICATIONS
P0601-PCM INTERNAL CONTROLLER FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0600-PCM FAILURE SPI COMMUNICATIONS.

POSSIBLE CAUSES
PCM

TEST	ACTION	APPLICABILITY
1	The Powertrain Control Module is reporting internal errors and must be replaced. View repair Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom List:

P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE
P1698-NO BUS MESSAGE FROM TCM

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE.

When Monitored and Set Condition:

P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE

When Monitored: Equipped with automatic transmission, the ignition key on, engine running, transmission in drive, vehicle road speed and battery voltage greater than 10 volts.

Set Condition: No bus messages from the TCM for 10 seconds, two trips required.

POSSIBLE CAUSES
INTERMITTENT CONDITION
COMMUNICATE WITH TCM
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 DTC's. Does the DTC reset? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition on. With the DRBIII®, attempt to communicate with the TCM. Can communication be established with the TCM? Yes → Replace and program the Powertrain Control Module Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER-1. No → Refer to the Communication Category and perform the appropriate symptom related to no communication with TCM. Perform POWERTRAIN VERIFICATION TEST VER-1.	All

P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 DRB parameters related to the DTC while wiggling the wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

*NO RESPONSE FROM PCM-ENGINE STARTS (GAS ONLY)

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH ANOTHER VEHICLE
CHECK PCM POWERS AND GROUNDS
TRANSMISSION CONTROL MODULE
CONTROLLER ANTILOCK BRAKE
SCI TRANSMIT CIRCUIT SHORTED TO GROUND
SCI RECEIVE CIRCUIT SHORTED TO GROUND
SCI RECEIVE CIRCUIT OPEN
SCI TRANSMIT CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: Make sure the vehicle starts and runs before proceeding, if not refer to the appropriate symptom for a no response and a no start condition.** Connect the DRB to another vehicle. Will the DRB communicate with this vehicle? Yes → Go To 2 No → Repair or replace the DRB or DRB cable as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Perform the symptom Checking PCM Power and Ground Circuits in the Driveability category. Did the vehicle pass this test? Yes → Go To 3 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Disconnect the PCM C3 harness connector. Disconnect the DRB from the DLC. Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Go To 6	All
4	Turn the ignition off. Disconnect the TCM harness connector (if equipped). Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Replace the Transmission Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO RESPONSE FROM PCM-ENGINE STARTS (GAS ONLY) — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the CAB harness connector (if equipped). Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Repair the SCI Transmit circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Controller Antilock Brake. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	Turn the ignition off. Disconnect the PCM C3 harness connector. Disconnect the DRB from the DLC. Measure the resistance between ground and the SCI Receive circuit. Is the resistance below 5.0 ohms? Yes → Repair the 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 C3 harness connector. Disconnect the DRB from the DLC. Measure the resistance of the SCI Receive circuit between the PCM C3 connector and the DLC. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the SCI Receive circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
8	Turn the ignition off. Disconnect the PCM C3 harness connector. Disconnect the DRB from the DLC. Measure the resistance of the SCI Transmit circuit between the PCM C3 connector and the DLC. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the SCI Transmit circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
9	**NOTE: Ensure the SCI Transmit and Receive circuits are not shorted to voltage, damage to the PCM may result.** If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:

P0107-MAP SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0107-MAP SENSOR VOLTAGE TOO LOW

When Monitored: With the engine RPM above 416 but less than 1500, the TPS voltage less than 1.13 volts, and battery voltage greater than 10.4 volts.

Set Condition: The MAP sensor signal voltage is below 0.1 volt for 2.0 seconds with the engine running.

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 1.2 volts? No → Go To 2 Yes → Go To 4	All
2	Start the engine. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below .04 volts? Yes → Go To 4 No → Go To 3	All

P0107-MAP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list below may help in indentifying the intermittent condition.** While the engine is running at normal operating temperatures, 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. Review the DRBIII® Freeze Frame information. If possible try and duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. 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 5 No → Go To 8	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. With the DRBIII®, monitor the MAP Sensor voltage. Turn the ignition on. Is the voltage above 1.2 volts? Yes → Replace the MAP Sensor. 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(s). Measure the resistance of the MAP Sensor Signal circuit in the MAP Sensor harness connector to ground. Is the resistance below 5 ohms? Yes → Repair the MAP Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0107-MAP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector(s). Measure the resistance of the 5 Volt Supply circuit in the MAP Sensor harness connector to ground. Is the resistance below 5 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. 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. Measure the resistance of the 5 Volt Supply circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 10 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P0108-MAP SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0108-MAP SENSOR VOLTAGE TOO HIGH

When Monitored: With the engine RPM above 400, the TPS voltage less than 1.13 volt, and battery voltage greater than 10.4 volts

Set Condition: The MAP sensor signal voltage is greater than 4.88 volts at start or with the engine running for 2.2 seconds.

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(s). 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 5 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 VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. 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 MAP Sensor Signal circuit for a short to battery voltage. 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. Turn the ignition on. Is the voltage below 1.0 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 of the MAP Sensor Signal circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 6 No → Repair the MAP Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector(s). Measure the resistance of the Sensor ground circuit in the MAP Sensor harness connector to ground. Is the resistance below 5 ohms? Yes → Go To 7 No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0108-MAP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list below may help in indentifying the intermittent condition.** While the engine is running at normal operating temperatures, 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. Review the DRBIII® Freeze Frame information. If possible try and duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0112-INTAKE AIR TEMP SENSOR VOLTAGE LOW

When Monitored and Set Condition:

P0112-INTAKE AIR TEMP SENSOR VOLTAGE LOW

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

Set Condition: The Intake Air Temperature (IAT) sensor circuit voltage at the PCM goes below 0.8 volt.

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	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0112 displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition on. With the DRBIII®, read the IATvoltage. Is the voltage below 1.0 volt? Yes → Go To 4 No → Go To 3	All

P0112-INTAKE AIR TEMP SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list below may help in indentifying the intermittent condition.** While the engine is running at normal operating temperatures, 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. Review the DRBIII® Freeze Frame information. If possible try and duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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 → Go To 4	All
4	Turn the ignition off. Disconnect the IAT harness connector. Turn the ignition on. With the DRBIII®, read IAT voltage. Is the voltage above 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(s). Measure the resistance of the IAT Sensor Signal circuit in the IAT Sensor harness connector to ground. Is the resistance below 5 ohms? Yes → Repair the IAT Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector(s). Measure the resistance between the IAT Sensor Signal circuit and the Sensor ground circuit in the IAT Sensor harness connector. Is the resistance below 5 ohms? Yes → Repair the IAT Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0112-INTAKE AIR TEMP SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list below may help in indentifying the intermittent condition.** While the engine is running at normal operating temperatures, 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. Review the DRBIII® Freeze Frame information. If possible try and duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0113-INTAKE AIR TEMP SENSOR VOLTAGE HIGH

When Monitored and Set Condition:

P0113-INTAKE AIR TEMP SENSOR VOLTAGE HIGH

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

Set Condition: The intake air temperature (IAT) sensor circuit voltage at the PCM goes above 4.9 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
IAT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0113 displayed and equal to zero? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, read the IAT voltage. Is the voltage above 4.6 volts? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Disconnect the IAT Sensor harness connector. Start the engine and allow it to idle. Measure the voltage of the IAT Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Repair the IAT Sensor Signal circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

P0113-INTAKE AIR TEMP SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
4	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 DRB parameters related to the DTC while wiggling the wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0117-ECT SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0117-ECT SENSOR VOLTAGE TOO LOW

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

Set Condition: The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM goes below 0.8 volt for more than 3 seconds.

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	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0117 displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the ECT harness connector. Turn the ignition on. 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(s). Measure the resistance of the ECT Sensor Signal circuit in the ECT Sensor harness connector to ground. Is the resistance below 5 ohms? Yes → Repair the ECT Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0117-ECT SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector(s). Measure the resistance between the ECT Sensor Signal circuit and the Sensor ground circuit in the ECT Sensor harness connector. Is the resistance below 5 ohms? Yes → Repair the ECT Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 DRB parameters related to the DTC while wiggling the wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0118-ECT SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0118-ECT SENSOR VOLTAGE TOO HIGH

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

Set Condition: The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM goes above 4.98 volts for more than 3 seconds.

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	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0118 displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Turn the ignition on. 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 ECT Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0118-ECT SENSOR VOLTAGE TOO 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. Turn the ignition on. 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 4	All
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the ECT Sensor Signal circuit between the ECT Sensor harness connector and the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 5 No → Repair the ECT Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector(s). Measure the resistance of the Sensor ground circuit in the ECT Sensor harness connector to ground. Is the resistance below 5 ohms? Yes → Go To 6 No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP

When Monitored and Set Condition:

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP

When Monitored: With the engine running and no MAP sensor or TPS DTC's set. Engine speed must be greater than 1600 RPM.

Set Condition: The PCM performs two separate tests. When the manifold vacuum is low, the TPS signal should be high. If the proper TPS voltage is not detected when the two conditions are met, a DTC will be set after 4 seconds.

POSSIBLE CAUSES
HIGH RESISTANCE IN 5 VOLT SUPPLY CIRCUIT
HIGH RESISTANCE TO GROUND IN 5 VOLT SUPPLY CIRCUIT
INTERMITTENT CONDITION
HIGH RESISTANCE IN 5 VOLT SUPPLY CIRCUIT
HIGH RESISTANCE TO GROUND IN 5 VOLT SUPPLY CIRCUIT
MAP SENSOR
HIGH RESISTANCE IN MAP SENSOR SIGNAL CIRCUIT
HIGH RESISTANCE TO GROUND IN MAP SENSOR SIGNAL CIRCUIT
HIGH RESISTANCE IN SENSOR GROUND CIRCUIT
PCM
THROTTLE POSITION SENSOR
HIGH RESISTANCE IN THROTTLE POSITION SENSOR SIGNAL CIRCUIT
HIGH RESISTANCE TO GROUND IN THROTTLE POSITION SENSOR SIGNAL CIRCUIT
HIGH RESISTANCE IN SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose any TPS or MAP component DTC first before continuing.** **NOTE: If the P0500 - No Vehicle Speed Signal is set long with this DTC, refer to the P0500 diagnostics before continuing.** **NOTE: The throttle plate and linkage should be free with binding and carbon build up.** **NOTE: Ensure the throttle plate is at the idle position.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip counter for this DTC displayed and equal to zero? Yes → Go To 2 No → Go To 22	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
2	Start the engine. With the DRBIII®, monitor the MAP Sensor voltage. Snap the throttle. Does the MAP Sensor voltage start below 2.0 volts at idle and go above 3.5 volts at wide open throttle? Yes → Go To 3 No → Go To 13	All
3	Turn the ignition on. 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 .08 volts and go above 3.5 volts with a smooth voltage change? Yes → Go To 22 No → Go To 4	All
4	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 5 No → Repair the 5 Volt Supply circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit from the TP Sensor harness connector to ground. Is the resistance above 5 ohms? Yes → Go To 6 No → Repair the 5 Volt Supply circuit for high resistance to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the MAP Sensor Signal circuit from the MAP Sensor harness connector to ground. Is the resistance above 5 ohms? Yes → Go To 7 No → Repair the MAP Sensor Signal circuit for high resistance to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit from the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 8 No → Repair the Sensor Ground circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the TPS harness connector. With the DRBIII®, monitor the TPS voltage. Turn the ignition on. Connect a jumper wire between the TPS Signal circuit and the Sensor ground circuit . Does the DRBIII® display TPS voltage from approximately 4.9 volts to below 0.5 volt? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Throttle Position Sensor Signal circuit from the Throttle Position Sensor harness connector to the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 10 No → Repair the Throttle Position Sensor Signal circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Throttle Position Sensor Signal circuit from the Throttle Position Sensor harness connector to ground. Is the resistance above 5 ohms? Yes → Go To 11 No → Repair the Throttle Position Sensor Signal circuit for high resistance to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit from the Throttle Position Sensor harness connector to the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 12 No → Repair the Sensor Ground circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
12	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
13	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit from the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 14 No → Repair the 5 Volt Supply circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
14	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit from the MAP Sensor harness connector to ground. Is the resistance above 5 ohms? Yes → Go To 15 No → Repair the 5 Volt Supply circuit for high resistance to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 16 No → Repair the 5 Volt Supply circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
16	Turn the ignition off. Disconnect the TPS harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit from the TP Sensor harness connector to ground. Is the resistance above 5 ohms? Yes → Go To 17 No → Repair the 5 Volt Supply circuit for high resistance to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
17	Turn the ignition off. Disconnect the MAP Sensor harness connector. With the DRBIII®, monitor the MAP Sensor voltage. Turn the ignition on. 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 18	All
18	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the MAP Sensor Signal circuit from the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 19 No → Repair the MAP Sensor Signal circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
19	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the MAP Sensor Signal circuit from the MAP Sensor harness connector to ground. Is the resistance above 5 ohms? Yes → Go To 20 No → Repair the MAP Sensor Signal circuit for high resistance to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
20	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit from the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 21 No → Repair the Sensor Ground circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
21	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
22	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 DRB parameters related to the DTC while wiggling the wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW

When Monitored and Set Condition:

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW

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

Set Condition: Throttle Position Sensor voltage at the PCM is 0.1 volt for 1.3 seconds.

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the Throttle Position Sensor voltage. Is the voltage below 0.2 volts? Yes → Go To 2 No → Go To 11	All
2	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the TPS harness connector. Is the voltage between 4.5 to 5.5 volts? Yes → Go To 3 No → Go To 8	All

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. With the DRBIII®, monitor the Throttle Position Sensor voltage. Turn the ignition on. Is the voltage above 4.5 volts? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Measure the resistance of the Throttle Position Sensor Signal circuit in the Throttle Position Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the Throttle Position Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Measure the resistance between the Throttle Position Sensor Signal circuit and the Sensor ground circuit in the Throttle Position Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the Throttle Position Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the TCM harness connector. With the DRBIII®, monitor the Throttle Position Sensor voltage. Turn the ignition on. Is the voltage above 4.5 volts? Yes → Replace the Transmission Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Measure the resistance of the 5 Volt Supply circuit in the Throttle Position Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the Throttle Position Sensor harness connector and the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 10 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition on. 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 volts and go above 3.5 volts with a smooth voltage change? Yes → Go To 12 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH

When Monitored and Set Condition:

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH

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

Set Condition: Throttle Position Sensor voltage at the PCM goes above 4.5 volts for 3.2 seconds.

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

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the throttle is fully closed and free from binding or carbon build up.** Start the engine. With the DRBIII®, read the Throttle 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 Throttle Position Sensor harness connector. Measure the resistance between the Throttle Position Sensor Signal circuit and the 5 Volt Supply circuit in the Throttle Position Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the Throttle Position Sensor Signal circuit for a short to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Turn the ignition on. Measure the voltage of the Throttle Position Sensor Signal circuit in the Throttle Position Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the Throttle Position Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Connect a jumper wire between the Throttle Position Sensor Signal circuit and the Sensor ground circuit. With the DRBIII®, monitor the Throttle Position Sensor voltage. Turn the ignition on. Is the voltage below 0.5 volts? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Measure the resistance of the Sensor ground circuit in the Throttle Position Sensor harness connector to ground. Is the resistance below 30 ohms? Yes → Go To 6 No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Throttle Position Sensor Signal circuit between the Throttle Position Sensor harness connector and the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 7 No → Repair the Throttle Position Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition on. 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 volts and go above 3.5 volts with a smooth voltage change? Yes → Go To 9 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0125-CLOSED LOOP TEMP NOT REACHED

When Monitored and Set Condition:

P0125-CLOSED LOOP TEMP NOT REACHED

When Monitored: With battery voltage greater than 10.4 volts, after engine is started, for ten minutes.

Set Condition: The engine temperature does not go above 18 deg. F by 10 minutes after the engine is started. Two trips are required to set this DTC.

POSSIBLE CAUSES
ECT SENSOR (OUT OF CALIBRATION)
LOW COOLANT LEVEL
THERMOSTAT OPERATION
ECT WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0125 displayed and equal to zero? Yes → Go To 2 No → Go To 5	All
2	**NOTE: If a ECT DTC set along with this code, diagnose the ECT DTC first.** **NOTE: Inspect the ECT terminals and related PCM terminals. Ensure the terminals are free from corrosion and damage.** **NOTE: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a totally cold soaked engine.** **Note: Extremely cold outside ambient temperatures may have caused this DTC to set.** **WARNING: Never open the cooling system when the engine is hot. The system is under pressure. Extreme burns or scalding may result. Allow the engine to cool before opening the cooling system.** Check the coolant system to make sure that the coolant is in good condition and at the proper level. Is the coolant level and condition OK? Yes → Go To 3 No → Inspect the vehicle for a coolant leak and add the necessary amount of coolant. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0125-CLOSED LOOP TEMP NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
3	**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)** Turn the ignition on. With the DRBIII® in sensors, 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 surrounding temperature (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). The value should reach at least 82°C (180°F). Was the Eng Coolant Tmp Deg value increase a smooth transition and did it reach at least 180°? Yes → Go To 4 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	**Note: This test works best if performed on a cold engine (cold soak)** Turn the ignition on. 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 DRBIII® 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? Yes → Test Complete. No → Replace the thermostat. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	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.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0130-1/1 O2 SENSOR HEATER CIRCUIT MALFUNCTION
P0136-1/2 O2 SENSOR HEATER CIRCUIT MALFUNCTION

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0130-1/1 O2 SENSOR HEATER CIRCUIT MALFUNCTION.

When Monitored and Set Condition:

P0130-1/1 O2 SENSOR HEATER CIRCUIT MALFUNCTION

When Monitored: Ignition ON, with battery voltage greater than 10.4 volts.

Set Condition: The state of the PCM relay control circuit, between the PCM and relay coil, does not match the desired state.

P0136-1/2 O2 SENSOR HEATER CIRCUIT MALFUNCTION

When Monitored: Ignition ON, with battery voltage greater than 10.4 volts.

Set Condition: The state of the PCM relay control circuit, between the PCM and relay coil, does not match the desired state.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
OPEN CIRCUIT BETWEEN RELAY AND FUSE
OPEN CIRCUIT BETWEEN RELAY AND PCM
SHORT TO GROUND BETWEEN RELAY AND FUSE
OPEN FUSE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn Ignition Off. Check the O2S Heater Relay Fuse for an open. Is the O2S Heater Relay Fuse open? Yes → Go To 3 No → Go To 4	All

P0130-1/1 O2 SENSOR HEATER CIRCUIT MALFUNCTION — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the O2S Heater Relay from the PDC. Remove the O2S Heater Fuse. Measure the resistance of the fused ignition switch output circuit at the O2S Heater Relay terminal 86 to ground. Is the resistance below 5.0 ohms? Yes → Repair the Short to Ground, then replace the O2S Heater Relay Fuse. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
4	Turn the ignition off. Remove the O2S Heater Relay from the PDC. Remove the O2S heater relay fuse from the PDC. Measure the resistance of the fused ignition switch output circuit between the PDC fuse output side and the O2S heater relay (terminal 86). Is the resistance below 5.0 ohms? No → Repair the OPEN circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. Yes → Go To 5	All
5	Turn the ignition off. Remove the O2S Heater Relay from the PDC. Disconnect the PCM harness connector(s). Measure the resistance of the O2S Heater Relay Control circuit between the O2S Heater Relay connector and the PCM connector. Is the resistance below 5.0 ohms? No → Repair the open circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. Yes → Test Complete.	All
6	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0131-1/1 O2 SENSOR SHORTED TO GROUND
P0137-1/2 O2 SENSOR SHORTED TO GROUND
P0151-2/1 O2 SENSOR SHORTED TO GROUND
P0157-2/2 O2 SENSOR SHORTED TO GROUND

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

When Monitored and Set Condition:

P0131-1/1 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 98°F, ambient/battery sensor reading within 27°F, and engine coolant temperature above 170°F on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

P0137-1/2 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 98°F, ambient/battery sensor reading within 27°F, and engine coolant temperature above 170°F on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

P0151-2/1 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 98°F, ambient/battery sensor reading within 27°F, and engine coolant temperature above 170°F on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

P0157-2/2 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 98°F, ambient/battery sensor reading within 27°F, and engine coolant temperature above 170°F on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

POSSIBLE CAUSES
INTERMITTENT CONDITION
O2 SENSOR OPERATION
O2 SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
O2 SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT

P0131-1/1 O2 SENSOR SHORTED TO GROUND — Continued

POSSIBLE CAUSES
O2 SENSOR SIGNAL SHORTED HEATER GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip Counter for this DTC displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Start the engine. Allow the engine to idle. With the DRBIII®, read the O2 Sensor voltage. Is the voltage below 0.16? Yes → Go To 3 No → Go To 8	All
3	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start the engine. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage above 0.16? 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. Measure the resistance of the O2 Sensor Signal circuit in the O2 Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance between the O2 Sensor Signal circuit and the Sensor ground circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All

P0131-1/1 O2 SENSOR SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the O2 Sensor 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 O2 Sensor Signal circuit for a short to the Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 DRB parameters related to the DTC while wiggling the wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE
P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE
P0152-2/1 O2 SENSOR SHORTED TO VOLTAGE
P0158-2/2 O2 SENSOR SHORTED TO VOLTAGE

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

When Monitored and Set Condition:

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With battery voltage greater than 10.4 volts, engine running for more than 4 minutes and coolant temperature above 180°F.

Set Condition: The oxygen sensor voltage is above 1.5 volts.

P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With battery voltage greater than 10.4 volts, engine running for more than 4 minutes and coolant temperature above 180°F.

Set Condition: The oxygen sensor voltage is above 1.5 volts.

P0152-2/1 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With battery voltage greater than 10.4 volts, engine running for more than 4 minutes and coolant temperature above 180°F.

Set Condition: The oxygen sensor voltage is above 1.5 volts.

P0158-2/2 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With battery voltage greater than 10.4 volts, engine running for more than 4 minutes and coolant temperature above 180°F.

Set Condition: The oxygen sensor voltage is above 1.5 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
O2 SENSOR OPERATION
O2 SENSOR SIGNAL SHORTED TO VOLTAGE
O2 SENSOR SIGNAL CIRCUIT SHORTED TO O2 HEATER RELAY OUTPUT CIRCUIT
O2 SENSOR SIGNAL OPEN
O2 SENSOR GROUND CIRCUIT OPEN
PCM

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip Counter for this DTC displayed and equal to zero? Yes → Go To 2 No → Go To 9	All
2	Start the engine. Allow the engine to idle. With the DRBIII®, read the O2 Sensor voltage. Is the voltage above 1.2 volts? Yes → Go To 3 No → Go To 9	All
3	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start the engine. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage below 1.2 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 Turn the ignition on. Measure the voltage of the O2 Sensor Signal circuit in the O2 Sensor harness connector. Is the voltage above 1.2 volts? Yes → Repair the O2 Sensor Signal for a shorted to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance between the O2 Sensor Signal circuit and the O2 Heater Relay Output circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to the O2 Heater Relay Output 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 of the O2 Sensor Signal circuit from the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the O2 Sensor Signal for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor ground circuit from the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the O2 Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

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

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

When Monitored and Set Condition:

P0133-1/1 O2 SENSOR SLOW RESPONSE

When Monitored: With ECT greater than 147°F, after reaching a vehicle speed of 10 mph, and the throttle remaining open (off idle) for 2 minutes, bring the vehicle to a stop and allow the engine to idle with the transmission in DRIVE.

Set Condition: The oxygen sensor signal voltage is switching from below 0.27 volts to above 0.62 volts and back fewer times than required.

P0139-1/2 O2 SENSOR SLOW RESPONSE

When Monitored: Start engine. Allow engine to idle. For 1st part of test, if limits are exceeded, test passes. If not, 2nd part of test runs. amb/batt temp >44°F, Baro >22.13″ H2O, battery >10.5 volts, MAP >11.79 & <18.15″ H2O, RPM >1350 & <2200 and vss >50 and <65.

Set Condition: The oxygen sensor signal voltage is switching from below 0.39 volts to above 0.58 volts and back fewer times than required.

P0153-2/1 O2 SENSOR SLOW RESPONSE

When Monitored: With ECT greater than 147°F, after reaching a vehicle speed of 10 mph, and the throttle remaining open (off idle) for 2 minutes, bring the vehicle to a stop and allow the engine to idle with the transmission in DRIVE.

Set Condition: The oxygen sensor signal voltage is switching from below 0.27 volts to above 0.62 volts and back fewer times than required.

P0159-2/2 O2 SENSOR SLOW RESPONSE

When Monitored: Start engine. Allow engine to idle. For 1st part of test, if limits are exceeded, test passes. If not, 2nd part of test runs. amb/batt temp >44°F, Baro >22.13″ H2O, battery >10.5 volts, MAP >11.79 & <18.15″ H2O, RPM >1350 & <2200 and vss >50 and <65.

Set Condition: The oxygen sensor signal voltage is switching from below 0.39 volts to above 0.58 volts and back fewer times than required.

P0133-1/1 O2 SENSOR SLOW RESPONSE — Continued

POSSIBLE CAUSES
INTERMITTENT CONDITION
EXHAUST LEAK
O2 SENSOR SIGNAL CIRCUIT VOLTAGE DROP
O2 SENSOR GROUND CIRCUIT VOLTAGE DROP
O2 SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip counter displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Start the engine. Inspect the exhaust for leak between the engine and the O2 sensor. Inspect the exhaust for leaks between the engine and the appropriate rear O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor Signal circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 4 No → Repair the high resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor ground circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair the high resistance on the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0133-1/1 O2 SENSOR SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
5	If there are no possible causes remaining, view repair. Repair Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0135-1/1 O2 SENSOR HEATER FAILURE
P0141-1/2 O2 SENSOR HEATER FAILURE
P0155-2/1 O2 SENSOR HEATER FAILURE
P0161-2/2 O2 SENSOR HEATER FAILURE

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

When Monitored and Set Condition:

P0135-1/1 O2 SENSOR HEATER FAILURE

When Monitored: With battery voltage greater than 9 volts, at a cold start, ECT less than 147°F, battery temperature sensor equal to or less than 27°F, and engine at idle for at least 12 seconds.

Set Condition: O2 sensor voltage greater than 3 volts for 30 to 90 seconds.

P0141-1/2 O2 SENSOR HEATER FAILURE

When Monitored: With battery voltage greater than 9 volts, at a cold start, ECT less than 147°F, battery temperature sensor equal to or less than 27°F, and engine at idle for at least 12 seconds.

Set Condition: O2 sensor voltage greater than 3 volts for 60 to 240 seconds.

P0155-2/1 O2 SENSOR HEATER FAILURE

When Monitored: With battery voltage greater than 9 volts, at a cold start, ECT less than 147°F, battery temperature sensor equal to or less than 27°F, and engine at idle for at least 12 seconds.

Set Condition: O2 sensor voltage greater than 3 volts for 30 to 90 seconds.

P0161-2/2 O2 SENSOR HEATER FAILURE

When Monitored: With battery voltage greater than 9 volts, at a cold start, ECT less than 147°F, battery temperature sensor equal to or less than 27°F, and engine at idle for at least 12 seconds.

Set Condition: O2 sensor voltage greater than 3 volts for 30 to 90 seconds.

POSSIBLE CAUSES
O2 HEATER ELEMENT
O2 SENSOR HEATER GROUND CIRCUIT OPEN
O2 HEATER RELAY OUTPUT CIRCUIT OPEN

P0135-1/1 O2 SENSOR HEATER FAILURE — Continued

POSSIBLE CAUSES
INTERMITTENT CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip Counter for this DTC displayed and equal to zero? No → Go To 3 Yes → 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.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 volt? 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. Is the resistance between 4.0 and 7.0 ohms? 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 of the O2 Sensor Heater ground circuit in the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the O2 Sensor Heater ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. With the DRBIII®, actuate the O2 Heater Test. Measure the voltage of the O2 Heater Relay Output circuit in the O2 Sensor harness connector. Is the voltage above 11.0 volts? Yes → Go To 6 No → Repair the O2 Heater Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0135-1/1 O2 SENSOR HEATER FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

P0171-1/1 FUEL SYSTEM LEAN
P0174-2/1 FUEL SYSTEM LEAN

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

When Monitored and Set Condition:

P0171-1/1 FUEL SYSTEM LEAN

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 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.

P0174-2/1 FUEL SYSTEM LEAN

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 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 SHORTED TO GROUND
O2 SENSOR HEATER OPERATION
TPS 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

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip counter displayed and equal to zero? Yes → Go To 2 No → Go To 16	All
2	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339.2 KPa +/- 34 KPa (49.2 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 3 Within Specification Go To 6 Above Specification Test Complete. **CAUTION: Stop All Actuations.**	All
3	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16 fuel line adapter tool #6539 or #6631 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the T fitting on tool #6539 or #6631. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339.2 KPa +/- 34 KPa (49.2 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 4 **Caution: Stop All Actuations.**	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition on With the DRBIII®, read the O2 Sensor voltage. Is the voltage between 0.4 to 0.6 volt? Yes → Go To 7 No → Go To 13	All
7	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 between 0.4 to 0.6 volts.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 volt? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	Turn the ignition on. With the DRBIII®, read TP Sensor voltage. **NOTE: The throttle must be against the stop.** Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 9 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition on. With the DRBIII®, read the TP Sensor voltage. While monitoring the DRBIII®, slowly open and close the throttle. Does the voltage increase and decease smoothly? Yes → Go To 10 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
10	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 11 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	**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)** Turn the ignition on. 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 increase smoothly and did it reach at least 82°C (180°F)? Yes → Go To 12 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Check for any of the following conditions/mechanical problems. AIR INDUCTION SYSTEM - must be free from leaks. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
13	Turn the ignition on. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage between 0.40 to 0.60 volt? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
14	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Signal circuit in the PCM harness connector to ground. Is the voltage above 5.0 ohms? Yes → Repair the O2 Sensor Signal for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	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
16	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

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

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

When Monitored and Set Condition:

P0172-1/1 FUEL SYSTEM RICH

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 ft.

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

P0175-2/1 FUEL SYSTEM RICH

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and the result is below a certain value 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 HEATER OPERATION
O2 SENSOR
EVAP SYSTEM OPERATION
O2 SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
O2 SENSOR SIGNAL CIRCUIT OPEN
TPS 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

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip counter displayed and equal to zero? Yes → Go To 2 No → Go To 18	All
2	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339.2 KPa +/- 34 KPa (49.2 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 3 Within Specification Go To 6 Above Specification Test Complete. **Caution: Stop All Actuations.**	All
3	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16 fuel line adapter tool #6539 or #6631 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the T fitting on tool #6539 or #6631. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339.2 KPa +/- 34 KPa (49.2 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 4 **Caution: Stop All Actuations.**	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition on With the DRBIII®, read the O2 Sensor voltage. Is the voltage between 0.4 to 0.6 volt? Yes → Go To 7 No → Go To 14	All
7	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 between 0.4 to 0.6 volts.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 volt? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	**NOTE: The engine must be at operating temperature and in closed loop to perform this test.** Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII® select System Tests, perform the Purge Vapors Test. Observe the Short Term Adaptive value and press 3 to flow. **NOTE: Short Term Adaptive value change.** Did the Short Term Adaptive value change? Yes → Go To 9 No → Refer to the Driveability category and perform the appropriate symptomm. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition on. With the DRBIII®, read TP Sensor voltage. **NOTE: The throttle must be against the stop.** Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 10 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition on. With the DRBIII®, read the TP Sensor voltage. While monitoring the DRBIII®, slowly open and close the throttle. Does the voltage increase and decrease smoothly? Yes → Go To 11 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	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 12 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	**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)** Turn the ignition on. 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 increase smoothly and did it reach at least 82°C (180°F)? Yes → Go To 13 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
13	Check for any of the following conditions/mechanical problems. AIR INDUCTION SYSTEM - must be free from restrictions. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
14	Turn the ignition on. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage between 0.4 to 0.6 volt? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the O2 Sensor harness connector. Measure the resistance of the O2 Sensor Signal circuit between the PCM harness connector and the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 16 No → Check for O2 Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
16	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Start the engine. Measure the voltage of the O2 Sensor Signal circuit in the PCM harness connector. Is the voltage above 0.60 volt? Yes → Repair the O2 Sensor Signal for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 17	All
17	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

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
18	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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:

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

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

When Monitored and Set Condition:

P0201-INJECTOR #1 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

P0202-INJECTOR #2 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

P0203-INJECTOR #3 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

P0204-INJECTOR #4 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

P0205-INJECTOR #5 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

P0201-INJECTOR #1 CONTROL CIRCUIT — Continued

P0206-INJECTOR #6 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

POSSIBLE CAUSES
WIRING HARNESS INSPECTION
ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR
FUEL INJECTOR DRIVER CIRCUIT OPEN
FUEL INJECTOR DRIVER CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter displayed and equal to 0 for the DTC? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Fuel Injector harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Using a 12 volt test light connected to ground, probe the ASD Relay output circuit in the Fuel Injector harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ASD Relay output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the Fuel Injector harness connector. Using a 12 volt test light connected to battery voltage, probe 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-INJECTOR #1 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance of the Fuel Injector driver circuit between the Fuel Injector harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Fuel Injector driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Fuel Injector driver circuit in the Fuel Injector harness connector. Is the resistance below 100k ohms? Yes → Repair the Fuel Injector driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**At this time, the conditions required to set the DTC are not present.** **NOTE: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as: VSS, MAP, ECT and Load.** **Note: Visually inspect the related wiring harness, look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the wiring harness and connectors while the engine is running. Listen for the engine to miss or stall. Also, watch for the Good Trip Counter to change to zero. Were any problems found? Yes → Repair the wiring harness/connector as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0300-MULTIPLE CYLINDER MIS-FIRE
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 MIS-FIRE.

When Monitored and Set Condition:

P0300-MULTIPLE CYLINDER MIS-FIRE

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

Set Condition: When more than a 2% (1.5% LEV) misfire rate is measured during two trips (one trip California), or with a 10% to 30% misfire rate during one trip.

P0301-CYLINDER #1 MISFIRE

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

Set Condition: When more than a 2% (1.5% LEV) misfire rate is measured during two trips (one trip California), 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 adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (1.5% LEV) misfire rate is measured during two trips (one trip California), 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 adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (1.5% LEV) misfire rate is measured during two trips (one trip California), 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 adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (1.5% LEV) misfire rate is measured during two trips (one trip California), or with a 10% to 30% misfire rate during one trip.

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

P0305-CYLINDER #5 MISFIRE

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

Set Condition: When more than a 2% (1.5% LEV) misfire rate is measured during two trips (one trip California), 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 adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (1.5% LEV) misfire rate is measured during two trips (one trip California), or with a 10% to 30% misfire rate during one trip.

POSSIBLE CAUSES
ENGINE MECHANICAL PROBLEM
ERRATIC CAM/CRANK SENSOR SIGNALS
FUEL SYSTEM PROBLEM
MIS-FIRE CONDITIONS NO LONGER EXIST
OTHER POSSIBLE CAUSES FOR MIS-FIRE
SECONDARY IGNITION OR MECHANICAL PROBLEM

TEST	ACTION	APPLICABILITY
1	**Note: Repair all other PCM DTC's before continuing with this test.** With the DRBIII®, read DTC's. Is the MIS-FIRE GOOD TRIP counter displayed and equal to zero? Yes → Go To 2 No → Go To 4	All
2	At this time the conditions that set the Misfire DTC are present. With the DRBIII®, select DTC's and RELATED FUNCTIONS. Read and record the FREEZE FRAME DATA. Select OBD II MONITORS. Read and record the MIS-FIRE SIMILAR CONDITIONS WINDOW DATA. With these screens, attempt to duplicate the condition(s) that has set this DTC. When the vehicle is operating in the SIMILAR CONDITIONS WINDOW, refer to the WHICH CYLINDER IS MISFIRING screen. Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute. Is the DRBIII® counting mis-fires at this time? Yes → Go To 3 No → Test Complete.	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
3	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%? Yes → Refer to the Driveablitiy Category and perform the Checking Fuel Delivery symptom. Perform FUEL SYSTEM/MISFIRE MONITOR VERIFICATION TEST. No → Go To 7	All
4	At this time the mis-fire does not exist or is an intermittent problem. **Note: An intermittent problem may have been caused by moisture in the secondary ignition.** 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. 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. Does the mis-fire recur? Yes → Go To 5 No → Test Complete.	All
5	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%? Yes → Refer to the Driveablitiy Category and perform the Checking Fuel Delivery symptom. Perform FUEL SYSTEM/MISFIRE MONITOR VERIFICATION TEST. No → Go To 6	All
6	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? Yes → Test CMP and CKP signals with Lab Scope, check valve timing, and perform running vacuum test. Perform FUEL SYSTEM/MISFIRE MONITOR VERIFICATION TEST. No → Go To 7	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
7	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform FUEL SYSTEM/MISFIRE MONITOR VERIFICATION TEST. No → Go To 8	All
8	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 LOAD VALUE over 50% and the operating temp normal? Yes → Check secondary ignition, compression, and cylinder leakage. Perform FUEL SYSTEM/MISFIRE MONITOR VERIFICATION TEST. No → Go To 9	All
9	**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, secondary ignition problem, mechanical engine problem, PCM power grounds, irregular cam and crank signal, plugged injectors, restricted exhaust, intake restriction, damaged trigger wheel, contaminated fuel, or vacuum leak. Weak valve springs, carbon deposits on valves, or accessory drive belt (serpentine belt). Check for any TSB's that may relate to a Misfire DTC. Do any of the above causes exist? Yes → Repair as necessary. Perform FUEL SYSTEM/MISFIRE MONITOR VERIFICATION TEST. No → Test Complete.	All

Symptom:

P0320-NO CRANK REFERENCE SIGNAL AT PCM

When Monitored and Set Condition:

P0320-NO CRANK REFERENCE SIGNAL AT PCM

When Monitored: With the ignition on.

Set Condition: No signal from the crankshaft position sensor is present during engine cranking, and at least 3 camshaft position sensor signals have occurred.

POSSIBLE CAUSES
CHECKING INTERMITTENT CKP SIGNAL WITH LAB
CHECKING INTERMITTENT CMP SIGNAL WITH LAB
CHECKING INTERMITTENT WIRING WITH LAB SCOPE
INTERMITTENT CONDITION
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
CKP SENSOR SIGNAL CIRCUIT SHORTED GROUND
CKP SENSOR SIGNAL CIRCUIT OPEN
CKP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
CKP SENSOR SIGNAL SHORTED TO 8 VOLT SUPPLY CIRCUIT
SENSOR GROUND CIRCUIT OPEN
PCM - 5 VOLT SUPPLY
PCM - CKP SENSOR SIGNAL
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the Current CKP State while cranking the engine. Does the DRBIII® display Current CKP State Present while cranking the engine? Yes → Go To 2 No → Go To 6	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CKP Signal circuit in the PCM harness connector. **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Turn the ignition on. (do not start the engine) Observe the lab scope screen. Look for any pulses generated by the CKP Sensor. Did the CKP Sensor generate any 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 PCM harness connector. **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Turn the ignition on. (do not start the engine) Observe the lab scope screen. Look for any pulses generated by the CMP Sensor. Did the CMP Sensor generate any pulses? Yes → Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CKP Signal circuit in the PCM harness connector. **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check the harness connectors carefully. If OK, replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 DRB parameters related to the DTC while wiggling the wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. 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 7 No → Go To 15	All
7	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. 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 8 No → Go To 10	All
8	Turn the ignition off. Disconnect the CKP Sensor harness connector. Measure the resistance of the Sensor Ground circuit in the CKP Sensor harness connector to ground. Is the resistance below 30 ohms? Yes → Go To 9 No → Repair the Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**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
10	Turn the ignition off. Disconnect the CKP Sensor harness connector. Measure the resistance of the CKP Sensor Signal circuit in the CKP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the CKP Sensor Signal circuit for a short to ground. 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 of the CKP Sensor Signal circuit between the CKP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the CKP Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the CKP Sensor Signal circuit in the CKP Sensor harness connector. Is the voltage above 5.0 volts? Yes → Repair the CKP Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	Turn the ignition off. Disconnect the CKP Sensor harness connector. Measure the resistance between the CKP Sensor Signal circuit and the 8 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 8 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	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
15	Turn the ignition off. Disconnect the CKP Sensor harness connector. Measure the resistance of the 5 Volt Supply circuit in the CKP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
16	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the CKP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 17 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
17	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the CKP Sensor harness connector. Is the voltage above 5.5 volts? Yes → Repair the 5 Volt Supply circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 18	All
18	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:

P0340-NO CAM SIGNAL AT PCM

When Monitored and Set Condition:

P0340-NO CAM SIGNAL AT PCM

When Monitored: Engine cranking/running.

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

POSSIBLE CAUSES
CHECKING INTERMITTENT CKP SIGNAL WITH LAB
CHECKING INTERMITTENT CMP SIGNAL WITH LAB
CHECKING INTERMITTENT WIRING WITH LAB SCOPE
INTERMITTENT CONDITION
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
CMP SENSOR SIGNAL CIRCUIT SHORTED GROUND
CMP SENSOR SIGNAL CIRCUIT OPEN
CMP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
CMP SENSOR SIGNAL SHORTED TO 8 VOLT SUPPLY CIRCUIT
SENSOR GROUND CIRCUIT OPEN
PCM - 5 VOLT SUPPLY
PCM - CMP SENSOR SIGNAL
CAMSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the Current CMP State while cranking the engine. Does the DRBIII® display Current CMP State Present while cranking the engine? Yes → Go To 2 No → Go To 6	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CKP Signal circuit in the PCM harness connector. **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Turn the ignition on. (do not start the engine) Observe the lab scope screen. Look for any pulses generated by the CKP Sensor. Did the CKP Sensor generate any 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 PCM harness connector. **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Turn the ignition on. (do not start the engine) Observe the lab scope screen. Look for any pulses generated by the CMP Sensor. Did the CMP Sensor generate any pulses? Yes → Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CMP Signal circuit in the PCM harness connector. **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check the harness connectors carefully. If OK, replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **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 DRB parameters related to the DTC while wiggling the wiring 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 wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring 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

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. 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 7 No → Go To 15	All
7	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. 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 8 No → Go To 10	All
8	Turn the ignition off. Disconnect the CMP Sensor harness connector. Measure the resistance of the Sensor Ground circuit in the CMP Sensor harness connector to ground. Is the resistance below 30 ohms? Yes → Go To 9 No → Repair the Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**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
10	Turn the ignition off. Disconnect the CMP Sensor harness connector. Measure the resistance of the CMP Sensor Signal circuit in the CMP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the CMP Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the CMP Sensor Signal circuit between the CMP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the CMP Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Measure the voltage of the CMP Sensor Signal circuit in the CMP Sensor harness connector. Is the voltage above 5.0 volts? Yes → Repair the CMP Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	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 14	All
14	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
15	Turn the ignition off. Disconnect the CMP Sensor harness connector. Measure the resistance of the 5 Volt Supply circuit in the CMP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
16	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the CMP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 17 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
17	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. 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 5 Volt Supply circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 18	All
18	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:

P0351-IGNITION COIL # 1 PRIMARY CIRCUIT

When Monitored and Set Condition:

P0351-IGNITION COIL # 1 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

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.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
IGNITION COIL NO. 1 DRIVER CIRCUIT OPEN
COIL RAIL
IGNITION COIL NO. 1 DRIVER CIRCUIT SHORTED TO GROUND
WIRING HARNESS INTERMITTENT
POWERTRAIN CONTROL MODULE (IGNITION COIL NO. 1 DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter displayed and equal to zero for P0351? Yes → Go To 2 No → Go To 8	4.0L MPI I-6
2	Turn the ignition off. Disconnect the coil rail harness connector. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Measure the primary resistance of the coil rail. Is the resistance between 0.6 and 0.9 ohms? Yes → Go To 3 No → Replace the coil rail. Perform POWERTRAIN VERIFICATION TEST VER - 5.	4.0L MPI I-6

P0351-IGNITION COIL # 1 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the coil rail harness connector. Turn the ignition on. With the DRBIII®, actuate the generator field. Using a 12-volt test light connected to ground, check the ASD relay output circuit at the coil rail harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open/high resistance in the ASD relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Stop All Actuations**	4.0L MPI I-6
4	Turn the ignition off. Disconnect the coil rail harness connector. Connect one end of a 12 volt test light to a good 12 volt source (B+). **Warning: Keep clear of the engine's moving/rotating parts.** Check the ignition coil no. 1 driver circuit, with the other end of the test light, while cranking the engine. Does the test light blink/flicker? Yes → Test Complete. No → Go To 5	4.0L MPI I-6
5	Turn the ignition off. Disconnect the coil rail harness connector. Disconnect the PCM harness connector(s). Measure the resistance of the ignition coil no. 1 driver circuit from the ignition coil connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open ignition coil no. 1 driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	4.0L MPI I-6
6	Turn the ignition off. Disconnect the coil rail harness connector. Disconnect the PCM harness connector(s). Measure the resistance between the ignition coil no. 1 driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the ignition coil no. 1 driver circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	4.0L MPI I-6
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	4.0L MPI I-6

P0351-IGNITION COIL # 1 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**Note: The conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the coil wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	4.0L MPI I-6

Symptom:

P0352-IGNITION COIL # 2 PRIMARY CIRCUIT

When Monitored and Set Condition:

P0352-IGNITION COIL # 2 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

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.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
IGNITION COIL NO. 2 DRIVER CIRCUIT OPEN
COIL RAIL
IGNITION COIL NO. 2 DRIVER CIRCUIT SHORTED TO GROUND
WIRING HARNESS INTERMITTENT
POWERTRAIN CONTROL MODULE (IGNITION COIL NO. 1 DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter displayed and equal to zero for P0352? Yes → Go To 2 No → Go To 8	4.0L MPI I-6
2	Turn the ignition off. Disconnect the coil rail harness connector. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Measure the primary resistance of the coil rail. Is the resistance between 0.6 and 0.9 ohms? Yes → Go To 3 No → Replace the coil rail. Perform POWERTRAIN VERIFICATION TEST VER - 5.	4.0L MPI I-6

P0352-IGNITION COIL # 2 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the coil rail harness connector. Turn the ignition on. With the DRBIII®, actuate the generator field. Using a 12-volt test light connected to ground, check the ASD relay output circuit at the coil rail harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open/high resistance in the ASD relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Stop All Actuations**	4.0L MPI I-6
4	Turn the ignition off. Disconnect the coil rail harness connector. Connect one end of a 12 volt test light to a good 12 volt source (B+). **Warning: Keep clear of the engine's moving/rotating parts.** Check the ignition coil no. 2 driver circuit, with the other end of the test light, while cranking the engine. Does the test light blink/flicker? Yes → Test Complete. No → Go To 5	4.0L MPI I-6
5	Turn the ignition off. Disconnect the coil rail harness connector. Disconnect the PCM harness connector(s). Measure the resistance of the ignition coil no. 2 driver circuit from the ignition coil connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open ignition coil no. 2 driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	4.0L MPI I-6
6	Turn the ignition off. Disconnect the coil rail harness connector. Disconnect the PCM harness connector(s). Measure the resistance between the ignition coil no. 2 driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the ignition coil no. 2 driver circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	4.0L MPI I-6
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	4.0L MPI I-6

P0352-IGNITION COIL # 2 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**Note: The conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the coil wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	4.0L MPI I-6

Symptom:

P0353-IGNITION COIL # 3 PRIMARY CIRCUIT

When Monitored and Set Condition:

P0353-IGNITION COIL # 3 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

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.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
IGNITION COIL NO. 3 DRIVER CIRCUIT OPEN
COIL RAIL
IGNITION COIL NO. 3 DRIVER CIRCUIT SHORTED TO GROUND
WIRING HARNESS INTERMITTENT
POWERTRAIN CONTROL MODULE (IGNITION COIL NO. 1 DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter displayed and equal to zero for P0353? Yes → Go To 2 No → Go To 8	4.0L MPI I-6
2	Turn the ignition off. Disconnect the coil rail harness connector. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Measure the primary resistance of the coil rail. Is the resistance between 0.6 and 0.9 ohms? Yes → Go To 3 No → Replace the coil rail. Perform POWERTRAIN VERIFICATION TEST VER - 5.	4.0L MPI I-6

P0353-IGNITION COIL # 3 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the coil rail harness connector. Turn the ignition on. With the DRBIII®, actuate the generator field. Using a 12-volt test light connected to ground, check the ASD relay output circuit at the coil rail harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open/high resistance in the ASD relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Stop All Actuations**	4.0L MPI I-6
4	Turn the ignition off. Disconnect the coil rail harness connector. Connect one end of a 12 volt test light to a good 12 volt source (B+). **Warning: Keep clear of the engine's moving/rotating parts.** Check the ignition coil no. 3 driver circuit, with the other end of the test light, while cranking the engine. Does the test light blink/flicker? Yes → Test Complete. No → Go To 5	4.0L MPI I-6
5	Turn the ignition off. Disconnect the coil rail harness connector. Disconnect the PCM harness connector(s). Measure the resistance of the ignition coil no. 3 driver circuit from the ignition coil connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open ignition coil no. 3 driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	4.0L MPI I-6
6	Turn the ignition off. Disconnect the coil rail harness connector. Disconnect the PCM harness connector(s). Measure the resistance between the ignition coil no. 3 driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the ignition coil no. 3 driver circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	4.0L MPI I-6
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	4.0L MPI I-6

P0353-IGNITION COIL # 3 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**Note: The conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the coil wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	4.0L MPI I-6

Symptom:
P0420-1/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored and Set Condition:

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY

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

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

POSSIBLE CAUSES
EXHAUST LEAK
CATALYST EFFICIENCY DTC DOES NOT RECUR
ENGINE MECHANICAL PROBLEM
CATALYTIC CONVERTER 1/1
UPSTREAM O2 SENSOR OLDER THAN DOWNSTREAM O2 SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip counter displayed and equal to zero? Yes → Go To 3 No → Go To 2	All
2	At this time the Catalyst Efficiency Failure does not exist or is an intermittent problem. With the DRBIII®, read the FREEZE FRAME data. With this screen, attempt to duplicate the condition that has set this fault. While using FREEZE FRAME pay particular attention to the fault setting conditions, such as speed, temp, load, and map vacuum. Does the Catalyst Efficiency Failure Recur? Yes → Go To 3 No → Test Complete.	All
3	Start Engine and let idle. Check for exhaust leaks between the engine and the appropriate downstream O2 Sensor. Is there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
4	**Check the exhaust for excessive smoke from internal oil or coolant leaks.** Is there an oil or coolant consumption condition present? Yes → Repair engine mechanical condition as necessary and replace Catalytic Converter. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: A new Downstream O2 Sensor along with an aging Upstream O2 Sensor may cause this trouble code to set.** Review vehicle repair history. Has the Downstream O2 Sensor been replaced without replacing the Upstream O2 Sensor? Yes → Replace the appropriate Upstream Oxygen Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Catalytic Converter. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P0441-EVAP PURGE FLOW MONITOR

When Monitored and Set Condition:

P0441-EVAP PURGE FLOW MONITOR

When Monitored: With engine temperature greater than 170 deg. F, fuel control in closed loop, engine idling for 2 minutes, no low fuel, MAP less than 15.7 inches mercury and barometric altitude less than 8,000 feet.

Set Condition: After having passed the Leak Detection Pump (LDP) test, no air flow through the evaporative system is detected by the evap monitor.

POSSIBLE CAUSES
EVAP CANISTER
WIRING HARNESS INTERMITTENT
EVAP PURGE HOSE (CANISTER TO FUEL TANK)
EVAP PURGE HOSE (SOLENOID TO CANISTER)
EVAP PURGE SOLENOID VACUUM SUPPLY
EVAP PURGE SOLENOID (LEAKY/STUCK OPEN)
EVAP PURGE SOLENOID (STUCK CLOSED)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip Counter displayed and equal to zero for P-0441? Yes → Go To 2 No → Go To 8	All
2	Visually inspect the Evap canister. Look for any physical damage or any signs of fuel that has entered the canister. Any signs of fuel may indicate a bad rollover valve. Were any problems found? Yes → Repair or Replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Visually inspect the Evap purge hose that goes between the Evap canister and the fuel tank. Look for any physical damage such as a pinched, plugged, ripped or dry rotted hose. Were any problems found? Yes → Repair or replace hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0441-EVAP PURGE FLOW MONITOR — Continued

TEST	ACTION	APPLICABILITY
4	Visually inspect the Evap purge hose that goes from the Purge Solenoid to the Evap Canister. Look for any physical damage such as a pinched, plugged, ripped or dry rotted hose. Were any problems found? Yes → Repair or replace hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing. Also check for a pinched or plugged hose from the throttle body to the Purge Solenoid. Inspect the vacuum nipple at the throttle body for any damage or plugging. Is the vacuum supply hose and throttle body vacuum nipple free from defects? Yes → Go To 6 No → Repair the vacuum supply hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**Note: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty rollover valve. Replace purge solenoid if contamination is found** Turn the ignition off. Disconnect the vacuum hoses at the EVAP Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port. (component side) Does the Evap Purge Solenoid hold vacuum? Yes → Go To 7 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port. (component side) Turn the ignition on. With theDRBIII®, actuate the ″EVAP Purge Solenoid″ and observe the vacuum gauge. Does the vacuum drop when the solenoid is actuated? Yes → Test Complete. No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0441-EVAP PURGE FLOW MONITOR — Continued

TEST	ACTION	APPLICABILITY
8	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** 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. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0442-EVAP LEAK MONITOR MEDIUM (0.040) LEAK DETECTED
P0455-EVAP LEAK MONITOR LARGE LEAK DETECTED
P0456-EVAP LEAK MONITOR SMALL LEAK DETECTED (.020)

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0442-EVAP LEAK MONITOR MEDIUM (0.040) LEAK DETECTED.

When Monitored and Set Condition:

P0442-EVAP LEAK MONITOR MEDIUM (0.040) LEAK DETECTED

When Monitored: Immediately after a cold start, with battery/ambient temperature between 40 deg. F and 90 deg. F and coolant temperature within 10 deg. F of battery/ ambient.

Set Condition: If there is a leak larger than 0.040″ and smaller than 0.080″ in the evaporative system.

P0455-EVAP LEAK MONITOR LARGE LEAK DETECTED

When Monitored: Immediately after a cold start, with battery/ambient temperature between 40 deg. F and 90 deg. F and coolant temperature within 10 deg. F of battery/ ambient.

Set Condition: There is a leak larger than 0.080″ in the evaporative system.

P0456-EVAP LEAK MONITOR SMALL LEAK DETECTED (.020)

When Monitored: Immediately after a cold start, with battery/ambient temperature between 40 deg. F and 90 deg. F and coolant temperature within 10 deg. F of battery/ ambient.

Set Condition: There is a leak larger than 0.080″ in the evaporative system.

POSSIBLE CAUSES
CONFIRMED LEAK IN THE EVAP SYSTEM
INTERMITTENT LDP MONITOR FAILURE

TEST	ACTION	APPLICABILITY
1	**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.** Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Specific Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 4	All

P0442-EVAP LEAK MONITOR MEDIUM (0.040) LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
2	To continue testing you will need Miller Tools #6872A (Evap System Pressure Pump) and #8382 (Gas Cap Tester/Adapter). **Warning: The test equipment is designed to be used to pressurize the vehicles Evaporative System only. Using the equipment in a manner for which it was not designed could be harmful.** **Warning: Keep lighted cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **Note: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.** Attach the power source clip (red) of Miller Tool #6872A to Battery (+) and the ground clip (black) to Battery (-). Perform the Evaporative System Pressure Pump self test that is specified on the tester cover. Remove gas cap and install Miller Tool #8382 on vehicle. Install gas cap to Miller Tool #8382. Attach the pressure supply hose from Miller Tool #6872A to the fitting on #8382. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect and apply a continuous vacuum supply (i.e. 20″Hg) to the Leak Detection Pump. A vacuum pump such as an A/C recovery unit works well. Ignition on, engine not running. With the DRBIII® in System Tests, select ″Leak Detect Pump Test.″ Read instructions and then press Enter. Select: #3 - HOLD PSI. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. **Note: If the pressure does not build up, there is obviously a large leak in the system and the presence of strong fuel odor may be present. A visual inspection should find a leak of substantial size.** When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Note the time and pressure. After 10 sec of stabilization time. Did the pressure drop more than 6″H2O in 2 minutes? Yes → Go To 3 No → Go To 4	All
3	**Note: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** To continue testing, you will need Miller Tool #6904A (Ultrasonic Leak Detector.) **NOTE: The LDP System Test should still be running. If the DRBIII® read has timed out, restart the System Test.** Using Miller Tool #6872A, set the Pressure/Hold Switch to Open, and the Vent Switch to Closed. Turn the pump timer on to pressurize/re-pressurize the Evap System. Using the Ultrasonic Leak Detector, start listening for leaks in the Evap System. Carefully leak test all hoses, tubes, and connections. Were any leaks heard with the Ultrasonic Leak Detector? Continue Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P0442-EVAP LEAK MONITOR MEDIUM (0.040) LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
4	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **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.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** With the DRBIII® in System Tests, perform the LDP Monitor Test. This will force the PCM to run the LDP Monitor. If the monitor fails, further diagnosis is required to find faulty component. If the monitor passes, the condition is not present at this time. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:

P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored and Set Condition:

P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored: At ignition key on and battery voltage greater than 10.4 volts, during initialization or power-up.

Set Condition: Not powering down, not in limp-in and time since last solenoid activation is greater than 72 micro seconds. The PCM will set a trouble code if the actual state of the solenoid does not match the intended state on two consecutive key cycles.

POSSIBLE CAUSES
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
EVAP PURGE SOLENOID CONTROL CIRCUIT OPEN
EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
WIRING HARNESS INTERMITTENT
EVAP PURGE SOLENOID
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Specific Good Trip Counter displayed and equal to zero for P0443? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Evap Purge Solenoid connector. Measure the resistance between the terminals of the Evap Purge Solenoid. Is the resistance between 30.0 and 40.0 ohms? Yes → Go To 3 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the Fused Ignition Switch Output Circuit at the Evap Purge Solenoid harness connector. Is the voltage above 10.0 volts? Yes → Go To 4 No → Repair the open Fused Ignition Switch Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Evap Purge Solenoid Control Circuit from the Powertrain Control Module connector to the Evap Purge Solenoid connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open Evap Purge Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Evap Purge Solenoid Control Circuit and ground (B-). 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 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** 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. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES
P0461-FUEL LEVEL UNIT NO CHANGE OVER TIME

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES.

When Monitored and Set Condition:

P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES

When Monitored: Engine running and fuel level either below 15% or above 85% of capacity.

Set Condition: The PCM sees low fuel, less than 15%, for more than 120 miles or fuel level does not change by at least 4% for more than 250 miles.

P0461-FUEL LEVEL UNIT NO CHANGE OVER TIME

When Monitored: Engine running and fuel level either below 15% or above 85% of capacity.

Set Condition: The PCM sees low fuel, less than 15%, for more than 120 miles or fuel level does not change by at least 4% for more than 250 miles.

POSSIBLE CAUSES
PHYSICALLY DAMAGED/DEFORMED/OBSTRUCTED FUEL TANK
FUEL LEVEL SENSOR

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.** Remove the fuel tank. Remove the fuel pump module from the fuel tank. Inspect the inside of the fuel tank for any obstructions or deformities. Is the fuel tank free from defects? Yes → Go To 2 No → Repair or replace the fuel tank as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	If there are no possible causes remaining, view repair. Repair Replace the fuel level sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW

When Monitored and Set Condition:

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW

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

Set Condition: The fuel level sensor signal voltage goes below 0.2 volts at the PCM for more than 5 seconds.

POSSIBLE CAUSES
FUEL PUMP MODULE WIRING HARNESS INTERMITTENT
FUEL LEVEL SENSOR
FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE
FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the fuel level sensor voltage. Is the fuel level sensor voltage below 0.4 volts? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. Disconnect the Fuel Pump Module electrical connector. Turn the ignition on. With the DRBIII®, read the Fuel Level Sensor voltage. Did the Fuel Level Sensor voltage change from below 0.4 volts to above 9.0 volts? Yes → Replace the fuel level sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
3	Turn the ignition off. Disconnect the Fuel Pump Module electrical connector. Turn the ignition on. With the DRBIII®, read the Fuel Level Sensor voltage. Did the Fuel Level Sensor voltage change from below 0.4 volts to above 9.0 volts? Yes → Replace the fuel level sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	**Note: Visually inspect the wiring harness leading to the fuel pump module. Look for any parts of the wiring harness that may be pinched or rubbed through.** Turn the ignition on. With the DRBIII®, monitor the fuel level sensor voltage. Using the schematic, wiggle the Fuel Pump Module Connector & Harness. Was there any fuel level sensor voltage change, during the wiggle test? Yes → Repair the wiring harness as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Fuel Level Sensor Signal Circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the fuel level sensor signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Fuel Level Sensor Signal Circuit and the Sensor Ground Circuit. Is the resistance below 5.0 ohms? Yes → Repair the fuel level sensor signal circuit shorted to the sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH

When Monitored and Set Condition:

P0463-FUEL LEVEL SENDING UNIT VOLTS TOO 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 9.9 volts for more than 90 seconds.

POSSIBLE CAUSES
FUEL LEVEL SENSOR SIGNAL CIRCUIT OPEN
FUEL PUMP MODULE WIRING HARNESS INTERMITTENT
SENSOR GROUND CIRCUIT OPEN
FUEL LEVEL SENSOR
POWERTRAIN CONTROL MODULE
FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the fuel level sensor voltage. Is the fuel level sensor voltage above 9.9 volts? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. Disconnect the Fuel Pump Module electrical harness connector. Connect a jumper wire between the Fuel Level Sensor signal circuit and the Sensor Ground circuit at the Fuel Pump Module harness connector. Turn the ignition on. With the DRBIII®, read the Fuel Level Sensor voltage. Did the Fuel Level Sensor voltage change from above 9.0 volts to below 0.4 volts? Yes → Replace the fuel level sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All

P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Fuel Pump Module electrical harness connector. Connect a jumper wire between the Fuel Level Sensor signal circuit and the Sensor Ground circuit at the Fuel Pump Module harness connector. Turn the ignition on. With the DRBIII®, read the Fuel Level Sensor voltage. Did the Fuel Level Sensor voltage change from above 9.0 volts to below 0.4 volts? Yes → Replace the fuel level sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	**Note: Visually inspect the wiring harness leading to the fuel pump module. Look for any parts of the wiring harness that may be pinched or rubbed through.** Turn the ignition on. With the DRBIII®, monitor the fuel level sensor voltage. Using the schematic, wiggle the Fuel Pump Module Connector & Harness. Was there any fuel level sensor voltage change, during the wiggle test? Yes → Repair the wiring harness as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the sensor ground circuit from the PCM connector to the Fuel Pump Module connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Fuel Level Sensor Signal Circuit and the Sensor Ground Circuit. Is the resistance below 5.0 ohms? Yes → Repair the fuel level sensor signal circuit shorted to the sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 7	All

P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the fuel pump module harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Measure the fuel level sensor signal circuit from the PCM harness connector to the Fuel Pump Module harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open fuel level sensor signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P0500-NO VEHICLE SPEED SENSOR SIGNAL

When Monitored and Set Condition:

P0500-NO VEHICLE SPEED SENSOR SIGNAL

When Monitored: Engine Temperature greater than 104 deg F. , MAP vacuum approximately 15″ to 16″ inches of mercury and Engine RPM between 1400 and 3000 rpm.

Set Condition: No Vehicle Speed Signal for more than 15 seconds on two consecutive trips.

POSSIBLE CAUSES
INTERMITTENT VEHICLE SPEED SIGNAL
5 VOLT SUPPLY CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
VEHICLE SPEED SIGNAL CIRCUIT OPEN
VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO GROUND
VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO VOLTAGE
POWERTRAIN CONTROL MODULE (VEHICLE SPEED SENSOR)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® , read PCM DTCs. Is the Good Trip Counter for P-0500 displayed and equal to 0? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Vehicle Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the 5 Volt Supply circuit. Is the resistance above 5.0 ohms? Yes → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0500-NO VEHICLE SPEED SENSOR SIGNAL — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Vehicle Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Vehicle Speed Sensor Ground circuit. Is the resistance above 5.0 ohms? Yes → Repair the Vehicle Speed Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Vehicle Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Vehicle Speed Signal circuit between the PCM connector and the VSS connector. Is the resistance above 5.0 ohms? Yes → Repair the Vehicle Speed Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Vehicle Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Vehicle Speed Signal circuit. Is the resistance below 5.0 ohms? Yes → Repair the Vehicle Speed Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Vehicle Speed Signal circuit in the Vehicle Speed Sensor harness connector. Is the voltage above 6.0 volts? Yes → Repair the Vehicle Speed Signal circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

P0500-NO VEHICLE SPEED SENSOR SIGNAL — Continued

TEST	ACTION	APPLICABILITY
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the wiring harnesses and connectors while the engine is running with the vehicle in gear on a hoist. Watch for the Good Trip Counter to change to zero. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0505-IDLE AIR CONTROL MOTOR CIRCUITS

When Monitored and Set Condition:

P0505-IDLE AIR CONTROL MOTOR CIRCUITS

When Monitored: At power-up and battery voltage greater than 11.5 volts.

Set Condition: The PCM senses a short to ground or battery voltage on any of the four Idle Air Control (IAC) driver circuits for 100 msec while the IAC motor is active.

POSSIBLE CAUSES
IAC MOTOR WIRING HARNESS OBSERVABLE
IAC MOTOR WIRING HARNESS INTERMITTENT
IAC #1 DRIVER CIRCUIT SHORTED TO #2, #3, OR #4
IAC #2 DRIVER CIRCUIT SHORTED TO #3 OR #4
IAC #3 DRIVER CIRCUIT SHORTED TO #4
IAC MOTOR
IAC #1 DRIVER CIRCUIT SHORTED TO GROUND
IAC #2 DRIVER CIRCUIT SHORTED TO GROUND
IAC #3 DRIVER CIRCUIT SHORTED TO GROUND
IAC #4 DRIVER CIRCUIT SHORTED TO GROUND
IAC #1 DRIVER CIRCUIT OPEN
IAC #2 DRIVER CIRCUIT OPEN
IAC #3 DRIVER CIRCUIT OPEN
IAC #4 DRIVER CIRCUIT OPEN
POWERTRAIN CONTROL MODULE (IAC #1 DRIVER)
POWERTRAIN CONTROL MODULE (IAC #2 DRIVER)
POWERTRAIN CONTROL MODULE (IAC #3 DRIVER)
POWERTRAIN CONTROL MODULE (IAC #4 DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the DTC's. Is the Good Trip Counter displayed and equal to zero for P0505? Yes → Go To 2 No → Go To 22	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
2	Start the engine and let idle. Disconnect the IAC Motor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the IAC #1 Driver Circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 3 No → Go To 19	All
3	Start the engine. Allow the engine to idle. Disconnect the IAC Motor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the IAC #2 Driver Circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 4 No → Go To 16	All
4	Start the engine. Allow the engine to idle. Disconnect the IAC Motor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the IAC #3 Driver Circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 5 No → Go To 13	All
5	Start the engine. Allow the engine to idle. Disconnect the IAC Motor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the IAC #4 Driver Circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 6 No → Go To 10	All
6	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** **Note: The following steps are checking for a short between the IAC Driver Circuits.** Measure the resistance between the IAC #1 Driver circuit and #2, #3, #4 Driver circuits. Is the resistance below 5.0 ohms on any of the Drivers? Yes → Repair the IAC Driver Circuits shorted together. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** **Note: The following steps are checking for a short between the IAC Driver Circuits.** Measure the resistance between the IAC #2 Driver circuit and #3, #4 Driver circuits. Is the resistance below 5.0 ohms on any of the Drivers? Yes → Repair the IAC Driver Circuits shorted together. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** **Note: The following steps are checking for a short between the Driver Circuits.** Measure the resistance between the IAC #3 Driver circuit and #4 Driver circuit. Is the resistance below 5.0 ohms? Yes → Repair the IAC Driver Circuits shorted together. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Idle Air Control Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the IAC #4 Driver Circuit from the IAC Motor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Repair the open IAC Driver Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between IAC Driver #3 and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the IAC #4 Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
12	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
13	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between IAC Driver #3 and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the IAC #3 Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the IAC #3 Driver Circuit from the IAC Motor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Repair the open IAC Driver Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
16	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between IAC #2 Driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the IAC #2 Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 17	All
17	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the IAC #2 Driver Circuit from the IAC Motor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 18 No → Repair the open IAC Driver Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
18	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
19	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between IAC #1 Driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the IAC #1 Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 20	All
20	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the IAC #1 Driver Circuit from the IAC Motor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 21 No → Repair the open IAC Driver Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
21	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
22	Start the engine. With the DRBIII® in Systems Test, perform the IAC Wiggle Test. **Note: The idle speed should raise and lower with the display.** Wiggle the Wiring Harness from the IAC Motor to the PCM. Observe for the IAC Motor to stop operating. Did the IAC Motor stop operating at any time? Yes → Repair the Harness or Connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 23	All
23	Turn the ignition off. Inspect the IAC Wiring and Connectors from the IAC motor to the PCM. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0522-OIL PRESSURE SENSOR VOLTS LOW

When Monitored and Set Condition:

P0522-OIL PRESSURE SENSOR VOLTS LOW

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

Set Condition: The oil pressure sensor voltage at PCM goes below 0.1 volt for 0.5 seconds.

POSSIBLE CAUSES
OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
WIRING HARNESS INTERMITTENT
OIL PRESSURE 5-VOLT SUPPLY CIRCUIT OPEN
OIL PRESSURE SENSOR (SHORTED)
OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRUCIT
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII® in Sensors, read the Oil Pressure Sensor voltage. Is the Oil Pressure Sensor voltage above 0.1 volt? Yes → Go To 2 No → Go To 3	All
2	At this time, the conditions required to set the DTC are not present. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Start the engine. With the DRBIII®, monitor the Oil Pressure Sensor voltage. Wiggle the wiring harness and connectors from the Oil Pressure Sensor to the PCM harness connectors. Did the voltage change? Yes → Repair wiring harness/connectors where the voltage changed during the test. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

P0522-OIL PRESSURE SENSOR VOLTS LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the Oil Pressure Sensor 5-volt Supply Circuit at the harness connector. Is the voltage above 4.9 volts? Yes → Go To 4 No → Repair the open Oil Pressure Sensor 5-Volt Supply Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the PCM harness connector(s). Measure the resistance between the Oil Pressure Sensor Signal Circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the Oil Pressure Sensor Signal Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Oil Pressure Sensor Signal Circuit and the Sensor Ground Circuit at the oil pressure sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Oil Pressure Sensor Signal Circuit shorted to the Sensor Ground Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** With the DRBIII® in Sensors, read the Oil Pressure Sensor voltage. Is the Voltage above 4.5 Volts? yes Replace the Oil Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the PCM in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P0523-OIL PRESSURE SENSOR VOLTS HIGH

When Monitored and Set Condition:

P0523-OIL PRESSURE SENSOR VOLTS HIGH

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

Set Condition: The oil pressure sensor signal at PCM goes above 4.9 volts.

POSSIBLE CAUSES
OIL PRESSURE SENSOR SIGNAL CIRCUIT OPEN
WIRING HARNESS INTERMITTENT
SENSOR GROUND CIRCUIT OPEN
OIL PRESSURE SENSOR (OPEN)
OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII® in Sensors, read the Oil Pressure Sensor voltage.. Is the Oil Pressure Sensor voltage above 4.8 volts? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Sensor Ground Circuit between the Oil Press Sensor and the Powertrain Control Module. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open Sensor Ground Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the PCM harness connector(s). Measure the resistance of the Oil Pressure Sensor Signal Circuit from the PCM harness connector to the Oil Pressure Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open Oil Pressure Sensor Signal Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P0523-OIL PRESSURE SENSOR VOLTS HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Using a 12 volt test lamp, test the sensor signal circuit for a short to power. Indicated by a bright test lamp. Is the test lamp illuminated and bright? Yes → Repair the Oil Pressure Sensor Signal Circuit shorted to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Install a jumper wire between the Sensor Signal circuit, and Sensor Ground circuit, at the Sensor harness connector. Turn the ignition on. With the DRBIII® in Sensors, read the Oil Pressure Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the Oil Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the PCM in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	At this time, the conditions required to set the DTC are not present. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Start the engine. With the DRBIII® in Sensors, read the Oil Pressure Sensor voltage. Wiggle the wiring harness and connectors from the Oil Pressure Sensor to the PCM harness connectors. Did the voltage change? Yes → Repair wiring harness/connectors where the voltage changed during the test. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:

P0700-TCM DTC PRESENT

POSSIBLE CAUSES
TCM DTC PRESENT SET IN PCM

Repair Instructions:

TCM DTC PRESENT SET IN PCM

A DTC was registered in the Transmission Control Module. With the DRB, go to the TCM and read codes. Refer to the appropriate symptom (DTC).

Symptom List:

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR
P1196-2/1 O2 SENSOR SLOW DURING CATALYST MONITOR
P1197-1/2 O2 SENSOR SLOW DURING CATALYST MONITOR

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR.

When Monitored and Set Condition:

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR

When Monitored: With the engine running, coolant greater than 170°F, open throttle, steady to slightly increasing vehicle speed greater than 18 mph but less than 55 mph, with a light load on the engine, for a period no less than 5 minutes.

Set Condition: The oxygen sensor signal voltage is switching from below 0.39 volt to above 0.6 volts and back fewer times than required.

P1196-2/1 O2 SENSOR SLOW DURING CATALYST MONITOR

When Monitored: With the engine running, coolant greater than 170°F, open throttle, steady to slightly increasing vehicle speed greater than 18 mph but less than 55 mph, with a light load on the engine, for a period no less than 5 minutes.

Set Condition: The oxygen sensor signal voltage is switching from below 0.39 volt to above 0.6 volts and back fewer times than required.

POSSIBLE CAUSES
O2S SENSOR GROUND CIRCUIT VOLTAGE DROP
O2S SIGNAL CIRCUIT VOLTAGE DROP
EXHAUST LEAK
EXCESSIVE ENGINE BLOW BY
O2S HEATER FEED CIRCUIT OPEN
O2S HEATER GROUND CIRCUIT OPEN
WIRING HARNESS INTERMITTENT PROBLEM
O2 SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 14	All

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, actuate the O2 HEATER TEST. Monitor the O2 Sensor voltage on the DRBIII®. (O2S voltage should drop below 1.5 volts within 2-3 minutes) Does the DRBIII® O2 Sensor voltage drop below 1.5 volts within 2-3 minutes during the O2 HEATER TEST Yes → Go To 3 No → Go To 7	All
3	Start the engine and allow engine to idle. Check for any exhaust leaks between the engine and the appropriate O2S. Check for exhaust leaks between the engine and the appropriate downstream O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Start engine. Allow the engine to reach normal operating temperature. Check the exhaust for excessive smoke from internal oil or coolant leaks. Is there an oil or coolant consumption condition present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Using a Voltmeter, back probe the O2 Sensor Ground circuit between the O2 sensor harness connector and the PCM harness connector. Connect Voltmeter for positive polarity. Start the engine. Allow the engine to reach normal operating temperature. Is the voltage below 0.10 volt? Yes → Go To 6 No → Repair high resistance on O2S Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Using a Voltmeter, back probe the O2 Sensor Signal circuit between the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to reach normal operating temperature. Is the voltage below 0.10 volt? Yes → Go To 13 No → Repair high resistance on O2S Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the PCM harness connector(s). Turn the ignition on. With the DRBIII® actuate the O2 HEATER TEST. Measure the voltage at the O2 sensor harness connector Heater Feed circuit. Is the voltage above 11.0 volts? No → Repair the OPEN circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. Yes → Go To 8	All
8	Turn the ignition off. Disconnect the O2 sensor harness connector. Measure the resistance between the O2S Heater ground circuit and Engine Ground. Is the resistance below 5.0 ohms? No → Repair the OPEN circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. Yes → Go To 9	All
9	Turn the ignition off. Using a Voltmeter, back probe the O2 Sensor Signal circuit between the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to reach normal operating temperature. Is the voltage below 0.10 volt? Yes → Go To 10 No → Repair high resistance on O2S Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Using a Voltmeter, back probe the O2 Sensor Ground circuit between the O2 sensor harness connector and the PCM harness connector. Connect Voltmeter for positive polarity. Start the engine. Allow the engine to reach normal operating temperature. Is the voltage below 0.10 volt? Yes → Go To 11 No → Repair high resistance on O2S Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Start the engine and allow engine to idle. Check for any exhaust leaks between the engine and the appropriate O2S. Check for exhaust leaks between the engine and the appropriate downstream O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR — Continued

TEST	ACTION	APPLICABILITY
12	Start engine. Allow the engine to reach normal operating temperature. Check the exhaust for excessive smoke from internal oil or coolant leaks. Is there an oil or coolant consumption condition present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	If there are no potential causes remaining, view repair. Repair Replace the O2S. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
14	Start the engine and allow engine to idle. Check for any exhaust leaks between the engine and the appropriate O2S. Check for exhaust leaks between the engine and the appropriate downstream O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Start engine. Allow the engine to reach normal operating temperature. Check the exhaust for excessive smoke from internal oil or coolant leaks. Is there an oil or coolant consumption condition present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
16	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P1281-ENGINE IS COLD TOO LONG

When Monitored and Set Condition:

P1281-ENGINE IS COLD TOO LONG

When Monitored: The ignition key on, engine running.

Set Condition: The engine does not warm to 176 deg. F while driving for 20 minutes after start.

POSSIBLE CAUSES
ENGINE COLD TOO LONG

TEST	ACTION	APPLICABILITY
1	**Note: The best way to diagnose this DTC is to allow the vehicle to remain outside overnight in order to have a completely cold soaked engine.** **Note: Extremely cold outside ambient temperatures may cause this DTC to set.** Verify that the coolant level is not low and correct as necessary. Start the engine. With the DRBIII®, set the engine RPM to 1500 and allow the engine to warm up for 10-15 minutes. With the DRBIII®, monitor the ENG COOLANT TMP DEG value during the warm up cycle. Make sure the transition of temperature change is smooth. Did the engine temperature reach a minimum of 80° C (176° F)? Yes → Test Complete. No → Refer to the Service Information for cooling system performance diagnosis. The most probable cause is a Thermostat problem. Also, refer to any related TSBs. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P1282-FUEL PUMP RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P1282-FUEL PUMP RELAY CONTROL CIRCUIT

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

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

POSSIBLE CAUSES
FUEL PUMP RELAY WIRING HARNESS OBSERVABLE
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
FUEL PUMP RELAY
FUEL PUMP RELAY CONTROL CIRCUIT OPEN
FUEL PUMP RELAY CONTROL CIRCUIT SHORTED TO GROUND
FUEL PUMP RELAY WIRING HARNESS INTERMITTENT
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Is the Fuel Pump Relay clicking? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Using the wiring diagram as a guide, inspect the fuel pump relay wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Wiggle the wiring harness from the Fuel Pump Relay to the PCM while the relay is actuating. Did the Relay clicking stop or become irregular when wiggling the wires? Yes → Repair Circuit as necessary where wiggling caused clicking to stop or become irregular. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

P1282-FUEL PUMP RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the fuel pump relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage on the fused ignition switch output circuit in the fuel pump relay connector. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open fused ignition switch output circuit. NOTE: Check for a blown fuse. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Turn the ignition off. Remove the fuel pump relay. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between terminals 1 (85) and 2 (86) of the fuel pump relay. Is the resistance between 50 and 90 ohms? Yes → Go To 6 No → Replace the fuel pump relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Remove the fuel pump relay from the PDC. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the fuel pump relay control circuit between the fuel pump relay connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open fuel pump relay control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the ignition off. Remove the fuel pump relay from the PDC. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the fuel pump relay control circuit. Is the resistance below 5.0 ohms? Yes → Repair the fuel pump relay control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P1294-TARGET IDLE NOT REACHED

When Monitored and Set Condition:

P1294-TARGET IDLE NOT REACHED

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

Set Condition: Engine idle is not within 200 rpm above or 100 rpm below target idle for 14 seconds. Three separate failures are required to set a bad trip. Two bad trips are required to set the code.

POSSIBLE CAUSES
THROTTLE PLATES/LINKAGE BINDING
VACUUM LEAK
THROTTLE BODY
THROTTLE BODY DIRTY

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip Counter displayed and equal to zero for P-1294? Yes → Go To 2 No → Test Complete.	All
2	Turn the ignition off. Check the throttle plates and linkage for a binding condition. The throttle linkages must be at idle position. Ensure the throttle plates are fully closed and against it's stops. Is the throttle plate and linkage free from defects? Yes → Go To 3 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Inspect the Intake Manifold for vacuum leaks. Inspect the Power Brake Booster for any vacuum leaks. Inspect the PCV system for proper operation or any vacuum leaks. Were any problems found? Yes → Repair vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All

P1294-TARGET IDLE NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the vacuum line at the PCV valve. Install Miller Tool #6714 (0.185″ air metering orifice) into the disconnected vacuum line in place of the PCV valve. Disconnect the purge hose from the fitting on the throttle body. The purge hose is located on the front of the throttle body next to the MAP sensor. Cap the fitting at the throttle body after the purge hose has been disconnected. Start the engine. Ensure that all accessories are off. Allow the engine to reach operating temperature above 82°C (180°F). With the DRBIII® in System Tests, perform the ″Minimum Air Flow″ function. Is the engine RPM between 500 and 900? Yes → Test Complete. No → Go To 5	All
5	Turn the ignition off. Remove the Throttle Body. **Warning: Clean throttle body in a well ventilated area. Wear rubber or butyl gloves. Do not let cleaner come in contact with eyes or skin. Avoid injesting cleaner. Wash thoroughly after using cleaner.** While holding the throttle open, spray the entire throttle body bore and the manifold side of the throttle plate with Mopar Throttle Body Cleaner. Clean the IAC motor passage also. Use compressed air to dry the throttle body. Re-install the throttle body. **Note: Miller Tool #6714 (0.185″ air metering orifice) still attached to the PCV vacuum line and the purge hose fitting on the throttle body capped.** Start the engine. Ensure that all accessories are off. Allow the engine to reach operating temperature above 82°C (180°F). With the DRBIII® in System Tests, perform the ″Minimum Air Flow″ function. Is the engine RPM between 500 and 900? Yes → Repair complete. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete. **Caution: Stop all actuations. Turn engine off.**	All

Symptom:

P1296-NO 5 VOLTS TO MAP SENSOR

When Monitored and Set Condition:

P1296-NO 5 VOLTS TO MAP SENSOR

When Monitored: During power-down and battery voltage greater than 10.4 volts.

Set Condition: The MAP sensor signal voltage goes below 2.35 volts with the key off for 5 seconds.

POSSIBLE CAUSES
5 VOLT SUPPLY CIRCUIT
MAP SENSOR
MAP SENSOR WIRING HARNESS INTERMITTENT PROBLEM
MAP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
PCM (5-VOLT SUPPLY)

TEST	ACTION	APPLICABILITY
1	**Note: If the PO107 - MAP Sensor Voltage Too Low is also set, diagnose it first before continuing with P1296 - No 5 Volts To MAP Sensor.** Turn the igntion on. With the DRBIII® in Sensors, read the MAP sensor voltage.. Is the voltage below 2.35 volts? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Measure the voltage of the 5 Volt Supply circuit at the MAP Sensor harness connector. Is the voltage above 4.5 volts? Yes → Go To 3 No → Repair the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. With the DRBIII® in Sensors, read the MAP Sensor voltage. Is the voltage above 4.5? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P1296-NO 5 VOLTS TO MAP SENSOR — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the MAP Sensor Electrical harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the MAP Sensor 5-volt Supply Circuit for resistance to ground. Is the resistance below 5.0 ohms? Yes → Repair the 5-volt Supply Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Start the engine. With the DRBIII® in Sensors, read the MAP Sensor voltage. Wiggle MAP Sensor harness connector & wiring harness. Monitor the DRBIII® display. Was there any MAP Sensor voltage change? Yes → Repair the Harness or Connector that caused the voltage change. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P1297-NO CHANGE IN MAP FROM START TO RUN

When Monitored and Set Condition:

P1297-NO CHANGE IN MAP FROM START TO RUN

When Monitored: With engine RPM +/- 64 of target idle 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 8.80 seconds.

POSSIBLE CAUSES
MAP SENSOR TOO LOW CODE SET
MAP SENSOR WIRING HARNESS INTERMITTENT PROBLEM
VACUUM PORTS RESTRICTED
MAP SENSOR 5-VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR (NO PRESS CHANGE)
MAP SENSOR (PRESS CHANGE)
MAP SENSOR RESTRICTED

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the MAP Sensor Voltage Too Low code set? Yes → Refer to symptom P0107 MAP SENSOR VOLTS TOO LOW in the DRIVEABILITY category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, erase DTCs. Start engine and allow engine to idle for 30 seconds. With the DRBIII®, read DTCs. Does the DRBIII® display No Change In MAP From Start To Run? Yes → Go To 3 No → Go To 6	All
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector(s). Measure the resistance of the MAP Sensor 5-Volt Supply Circuit between the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the 5-volt supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1297-NO CHANGE IN MAP FROM START TO RUN — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the MAP Sensor and inspect condition of vacuum port. Inspect condition of Intake Manifold or Throttle Body vacuum port. Was there a restriction? Yes → Remove the restriction and reinstall the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Start the engine. With the DRBIII®, set the engine speed to 1500 RPM. With the engine RPM at 1500, read MAP Sensor voltage. While monitoring the voltage, wiggle the wiring from the MAP Sensor to PCM. Did the engine stall or voltage become erratic? Yes → Repair the Wiring or Connector defect between the MAP Sensor and the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Start the engine. While monitoring engine vacuum on the DRBIII® display, quickly open and close throttle several times. Did the Vacuum drop below 1.0″? Yes → Test Complete. No → Go To 8	All
8	Turn the ignition off. Remove the MAP Sensor and inspect condition of vacuum port. Inspect condition of Intake Manifold or Throttle Body Vacuum Port. Is there a restriction or defect in the vacuum ports? Yes → Repair the restricted vacuum ports. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	If there are no potential causes remaining, view repair. Repair Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT

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

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

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT PROBLEM
FUSED IGNITION SWITCH OUTPUT CIRCUIT
ASD RELAY CONTROL CIRCUIT OPEN
ASD RELAY CONTROL CIRCUIT SHORTED TO GROUND
ASD RELAY CONTROL CIRCUIT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the DTC Specific Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Remove the ASD relay from the PDC. Disconnect the PCM harness connector(s). Measure the resistance of the ASD relay control circuit from the ASD relay cavity in PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open ASD relay control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Turn the ignition off. Remove the ASD relay from the PDC. Turn the ignition on. Measure the fused ignition switch output circuit at the ASD Relay connector. Is the voltage above 10.0 volts? Yes → Go To 4 No → Repair the open Fused Ignition Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the ASD relay from the PDC. Disconnect the PCM harness connector(s). Measure the ASD relay control circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the ASD Relay control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Remove the ASD relay from the PDC. Measure the resistance between terminals 85 and 86 of the ASD relay. Is the resistance between 50 and 80 ohms? Yes → Replace the PCM Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	At this time, the conditions required to set the DTC are not present. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM

When Monitored and Set Condition:

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM

When Monitored: With ignition key on, battery voltage above 10.4 volts, and engine RPM greater than 400.

Set Condition: No voltage sensed at the PCM when the ASD relay is energized.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT PROBLEM
ASD RELAY OUTPUT CIRCUIT OPEN
ASD RELAY OUTPUT CIRCUIT OPEN
FUSED B+ CIRCUIT OPEN
ASD RELAY
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Attempt to start the engine. Did the engine start? Yes → Go To 3 No → Go To 5	All
3	Turn the ignition off. Remove the ASD relay from the PDC. Disconnect the PCM harness connector(s). Measure the resistance of the ASD relay output circuit from the ASD Relay cavity in PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open ASD Relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Remove the ASD relay from the PDC. Disconnect the PCM harness connector(s). Measure the resistance of the ASD relay output circuit from the ASD Relay cavity in PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open ASD Relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Remove the ASD relay from the PDC. Measure the Fused B+ circuit at the ASD Relay connector. Is the voltage above 10.0 volts? Yes → Go To 7 No → Repair the open fused B+ circuit. Note: Check fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Install a substitute relay for the Auto Shutdown Relay. Attempt to start the vehicle. Did the engine start? Yes → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All
8	At this time, the conditions required to set the DTC are not present. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:

P1391-INTERMITTENT LOSS OF CMP OR CKP

When Monitored and Set Condition:

P1391-INTERMITTENT LOSS OF CMP OR CKP

When Monitored: Engine running or cranking.

Set Condition: When the failure counter reaches 20 for 2 consecutive trips.

POSSIBLE CAUSES
CMP SENSOR OUT OF SYNC
DAMAGED TONE WHEEL/FLEX PLATE (CRANKSHAFT)
DAMAGED TONE WHEEL/PULSE RING (CAMSHAFT)
IRREGULAR LAB SCOPE PATTERN OF CMP SIGNAL
INTERMITTENT CKP SIGNAL LOSS WHEN WIRING IS WIGGLED
IRREGULAR LAB SCOPE PATTERN OF CKP SIGNAL
WIRING HARNESS INTERMITTENT
INTERMITTENT CMP SIGNAL LOSS WHEN WIRING IS WIGGLED
SENSOR CONNECTOR/WIRING
SENSOR CONNECTOR/WIRING
CAMSHAFT POSITION SENSOR
CKP SENSOR CONNECTOR/WIRING
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII®, read DTCs. Is the DTC Good Trip Counter displayed and equal to zero for P1391? Yes → Go To 2 No → Go To 14	All
2	**Warning: When performing the following test, the engine will be running. Be careful not to stand in line with the fan blades or fan belt. Do not wear loose clothing.** Start the engine and run until operating temp is reached. (Closed Loop) With the DRBIII® under the Misc. menu, choose the ″Set Sync Signal″ function and observe the ″Actual Sync Setting.″ Does the ″Actual Sync Setting″ read ″In Range″? Yes → Go To 3 No → Loosen the CMP sensor base hold down bolt and turn the base until the sync is ″IN RANGE″ on the DRBIII®. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. With the DRBIII® lab scope, back probe the CMP signal circuit at the CMP sensor harness connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the CMP sensor voltage pattern on the lab scope screen. Are there any signals missing? Yes → Go To 4 No → Go To 7	All
4	Turn the ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect and remove the camshaft position sensor. Inspect the tone wheel/pulse ring for looseness and/or physical damage. Is the tone wheel/pulse ring free from defects? Yes → Go To 6 No → Repair/replace tone wheel/pulse ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. With the DRBIII® lab scope, back probe the CKP signal circuit at the CKP sensor harness connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the CKP sensor voltage pattern on the lab scope screen. Are there any signals missing? Yes → Go To 8 No → Go To 11	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. **Note: Visually inspect the Crankshaft Position Sensor and related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the sensor mounting bolt(s) are tight.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect and remove the crankshaft position sensor. Inspect the tone wheel/flexplate slots for damage, foreign material, or excessive movement. Is the tone wheel/flexplate free from defects? Yes → Go To 10 No → Repair/replace tone wheel/flex plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	Turn the ignition off. With the DRBIII® lab scope, back probe the CKP signal circuit at the PCM harness connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors related to the CKP sensor. Were there any irregularities in the lab scope pattern when the wiggle test was conducted? Yes → Note where wiggling caused a missing CKP sensor signal. Repair CKP sensor wiring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. With the DRBIII® lab scope, back probe the CMP signal circuit at the PCM harness connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors related to the CMP sensor. Were there any irregularities in the lab scope pattern when the wiggle test was conducted? Yes → Note where wiggling caused a missing CMP sensor signal. Repair CMP sensor wiring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
14	Turn the ignition off. Connect the DRBIII® lab scope to the CMP signal circuit. For best results, back probe at the PCM harness connector using Miller special tool #6801. **WARNING: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check harness and connectors carefully. If OK, replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn ignition off. **Visually inspect the related wiring 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.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
16	Turn the ignition off. Connect the DRBIII® lab scope to the CKP signal circuit. For best results, back probe at the PCM harness connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check harness and connectors carefully. If OK, replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT

When Monitored and Set Condition:

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT

When Monitored: Under closed throttle decel with A/C off, ECT above 75, and more than 50 seconds after engine start.

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

POSSIBLE CAUSES
DAMAGED TONE WHEEL/FLEX PLATE (CRANKSHAFT)
SENSOR CONNECTOR/WIRING
CKP SENSOR CONNECTOR/WIRING
CRANKSHAFT POSITION SENSOR
IMPROPERLY INSTALLED/LOOSE CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the DTC Specific Good Trip Counter displayed and equal to zero for P-1398? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. **Note: Visually inspect the Crankshaft Position Sensor and related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the sensor mounting bolt(s) are tight.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. **Note: Visually inspect the related wiring harness/connectors. Look for broken, bent, pushed out or corroded terminals.** Inspect the Crankshaft Position Sensor for proper installation and tightness. Is the Crankshaft Position Sensor properly installed and the mounting bolt(s) tight? Yes → Go To 9 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT — Continued

TEST	ACTION	APPLICABILITY
4	**Note: Check for any TSB's that may apply to this symptom.** Read and record the Freeze Frame Data. Use this information to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load. Turn the ignition on. With the DRBIII® in the miscellaneous menu, choose ″Clear PCM (battery disconnect)″ to reset the PCM. With the DRBIII®, choose the ″Misfire Pretest screen. Road test the vehicle and re-learn the adaptive numerator. The adaptive numerator is learned when the ″Adaptive Numerator Done Learning″ line on the Mis-fire Pre-test screen changes to ″Yes″. Did the adaptive numerator re-learn? Yes → Go To 5 No → Go To 6	All
5	Turn ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
6	Turn the ignition off. **Note: Visually inspect the Crankshaft Position Sensor and related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the sensor mounting bolt(s) are tight.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. **Note: Visually inspect the related wiring harness/connectors. Look for broken, bent, pushed out or corroded terminals.** Inspect the Crankshaft Position Sensor for proper installation and tightness. Is the Crankshaft Position Sensor properly installed and the mounting bolt(s) tight? Yes → Go To 8 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect and remove the crankshaft position sensor. Inspect the tone wheel/flexplate slots for damage, foreign material, or excessive movement. Is the tone wheel/flexplate free from defects? Yes → Go To 10 No → Repair/replace tone wheel/flex plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND

When Monitored and Set Condition:

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND

When Monitored: Immediately after a cold start, with battery/ambient temperature between 40 deg. F and 90 deg. F and coolant temperature within 10 deg. F of battery/ambient.

Set Condition: LDP test must pass first. If the PCM suspects a pinched hose it will not set a fault until it runs the evap purge flow monitor. If the purge monitor does not pass then the pinched hose fault will be set.

POSSIBLE CAUSES
EVAP CANISTER OBSTRUCTED
LDP PRESSURE HOSE OBSTRUCTED
LEAK DETECTION PUMP
INTERMITTENT LDP MONITOR FAILURE
OBSTRUCTION IN EVAP SYSTEM BETWEEN EVAP CANISTER AND FUEL TANK
OBSTRUCTION IN HOSE/TUBE BETWEEN EVAP CANISTER AND PURGE SOLENOID

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Good Trip Counter displayed and equal to zero for P1486? Yes → Go To 2 No → Go To 7	All

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND — Continued

TEST	ACTION	APPLICABILITY
2	To continue testing you will need Miller Tools #6872A (Evap System Pressure Pump) and #8382 (Gas Cap Tester/Adapter). **Warning: The test equipment is designed to be used to pressurize the vehicles Evaporative System only. Using the equipment in a manner for which it was not designed could be harmful.** **Warning: Keep lighted cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **Note: The fuel tank should have between 20% & 80% of full to properly test the Evap system.** Attach the power source clip (red) of Miller Tool #6872A to Battery (+) and the ground clip (black) to Battery (-). Perform the Evaporative System Pressure Pump self test that is specified on the tester cover. Remove gas cap and install Miller Tool #8382 on vehicle. Install gas cap to Miller Tool #8382. Attach the pressure supply hose from Miller Tool #6872A to the fitting on #8382. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect and apply a continuous vacuum supply (i.e. 20″Hg) to the Leak Detection Pump. A vacuum pump such as an A/C recovery unit works well. Ignition on, engine not running. With the DRBIII® in System Tests, select ″Leak Detect Pump Test.″ Read instructions and then press Enter. Select: #3 - HOLD PSI. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Disconnect the hose at the EVAP Canister that goes to the Fuel Tank. Did the pressure drop when the hose was disconnected? Yes → Go To 3 No → Repair obstruction in the EVAP system between the EVAP Canister and the fuel tank.	All
3	**Note: All previously disconnected hose(s) reconnected.** Re-pressurize the EVAP System. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Disconnect the LDP Pressure hose at the EVAP Canister. The LDP Pressure hose is the hose that connects the Evap Canister to the Leak Detection Pump. Did the pressure drop when the hose was disconnected? Yes → Go To 4 No → Replace the EVAP Canister.	All

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND — Continued

TEST	ACTION	APPLICABILITY
4	**Note: All previously disconnected hose(s) reconnected.** Re-pressurize the EVAP System. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Disconnect the EVAP hoses at the Purge Solenoid. Did the pressure drop when the hose was disconnected? Yes → Go To 5 No → Repair or replace hose/tube as necessary.	All
5	Disconnect and remove the LDP pressure hose. The LDP pressure hose is the hose that connects the EVAP Canister to the Leak Detection Pump. Inspect the LDP pressure hose for any obstructions or physical damage. Is the LDP pressure hose free from defects? Yes → Go To 6 No → Repair/replace hose as necessary.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Leak Detection Pump.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **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.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** With the DRBIII® in System Tests, perform the LDP Monitor Test. This will force the PCM to run the LDP Monitor. If the monitor fails, further diagnosis is required to find faulty component. If the monitor passes, the condition is not present at this time. Were any problems found? Yes → Repair as necessary. No → Test Complete.	All

Symptom:

P1494-LEAK DETECTION PUMP SW OR MECHANICAL FAULT

When Monitored and Set Condition:

P1494-LEAK DETECTION PUMP SW OR MECHANICAL FAULT

When Monitored: Immediately after a cold start, with battery/ambient temperature between 40 deg. F and 90 deg. F and coolant temperature within 10 deg. F of battery/ambient.

Set Condition: The state of the switch does not change when the solenoid is energized.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
LDP SWITCH SENSE CIRCUIT SHORTED TO GROUND
LDP VACUUM SUPPLY
LEAK DETECTION PUMP
LDP SWITCH SENSE CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Good Trip Counter displayed and equal to zero for P-1494? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect a vacuum gauge to the disconnected vacuum supply hose at the Leak Detection Pump. Start the engine and read the vacuum gauge. Does the vacuum gauge read at least 13 in/Hg? Yes → Go To 3 No → Repair leak or obstruction in vacuum hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P1494-LEAK DETECTION PUMP SW OR MECHANICAL FAULT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Leak Detection Pump harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the LDP Switch Sense Circuit from the PCM harness connector to LDP harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open Leak Detection Pump Switch Sense Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
4	Turn the ignition off. Disconnect the Leak Detection Pump electrical harness connector. Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the ″Leak Detect Pump Sw″ state. While observing the ″Leak Detect Pump Sw″ state, connect a jumper wire between a good 12 volt source (B+) and the LDP Switch Sense circuit. Did the ″Leak Detect Pump Sw″ state change when the jumper was connected? Yes → Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 5	All
5	Turn the ignition off. Disconnect the Leak Detection Pump electrical harness connector. Disconnect the PCM harness connector(s). Measure the resistance between the LDP Switch Sense circuit and ground. Is the resistance below 5.0 Ohms? Yes → Repair the LDP Switch Sense Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** Perform a wiggle test of the LDP wiring while the circuit is actuated with the DRBIII®. Listen for the LDP to quit actuating. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT

When Monitored and Set Condition:

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT

When Monitored: Ignition on and battery voltage greater than 10.4 volts.

Set Condition: The state of the solenoid circuit does not match the PCM's desired state.

POSSIBLE CAUSES
LDP SOLENOID CIRCUIT WIRING HARNESS OBSERVABLE
LDP SOLENOID CKT WIRING HARNESS INTERMITTENT
GENERATOR SOURCE CIRCUIT OPEN
LDP SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
LEAK DETECTION PUMP
LEAK DETECTION PUMP SOLENOID CONTROL CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Good Trip Counter displayed and equal to zero for P-1495? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the Leak Detection Pump electrical harness connector. Turn the ignition on. With the DRBIII®, actuate the Leak Detection Pump. Using a 12 volt test light connected to ground (B-), check the Generator Source Circuit at the LDP connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open Generator Source Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
3	Turn the ignition off. Disconnect the Leak Detection Pump electrical harness connector. Connect a 12 volt test light to a good 12 volt source (B+). Turn the ignition on. With the DRBIII®, actuate the Leak Detection Pump. Check the LDP Solenoid Control circuit, with the test light, while the Leak Detection Pump is actuating. Does the test light blink? Yes → Go To 4 No → Go To 5	All

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	If there are no potential causes remaining, view repair. Repair Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
5	Turn the ignition off. Disconnect the Leak Detection Pump electrical harness connector. Disconnect the PCM harness connector(s). Measure the resistance between the LDP Solenoid Control circuit and ground. Is the resistance below 5.0 Ohms? Yes → Repair the LDP Solenoid Control Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 6	All
6	Turn the ignition off. Disconnect the Leak Detection Pump Solenoid harness connector. Disconnect the PCM harness connector(s).. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the LDP Solenoid Control Circuit from the PCM harness connector to the LDP harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open Leak Detection Pump Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
7	If there are no possible causes remaining, view repair. Repair If there are no possible causes remaining, replace the PCM.	All
8	Turn the ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 9	All
9	Ignition on, engine not running. With the DRBIII®, actuate the LDP Solenoid. While wiggling the LDP Wiring Harness from the LDP Solenoid harness connector to PCM harness connector, listen to LDP Solenoid. Did the LDP Solenoid ever stop or start clicking? Yes → Repair as necessary where wiggling caused problem to appear. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:

P1696-PCM FAILURE EEPROM WRITE DENIED

POSSIBLE CAUSES
PCM FAILURE

Repair Instructions:

PCM FAILURE

Replace and program the Powertrain Control Module Module in accordance with the Service Information.

Perform POWERTRAIN VERIFICATION TEST VER - 5.

Symptom:
P1899-P/N SWITCH PERFORMANCE

POSSIBLE CAUSES
INTERMITTENT PARK/NEUTRAL SWITCH SENSE CIRCUIT
PARK/NEUTRAL POSITION SWITCH
PARK/NEUTRAL SWITCH SENSE CIRCUIT OPEN
PARK/NEUTRAL SWITCH SENSE CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter for P-1899 displayed and equal to 0? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition on. With the DRBIII®, read the PNP switch input state. While moving the gear selector through all gear positions (Park to 1st and back to Park), watch the DRB display. Did the DRBIII® display P/N and D/R in the correct gear positions? Yes → Test Complete. No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM C1 harness connector. Disconnect the PNP switch harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance of the PNP switch sense circuit between the PCM C1 harness connector and the PNP switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the PNP switch sense circuit for an open. Perform AW4 TRANS VERIFICATION TEST-VER1.	All
4	Turn the ignition off. Disconnect the PCM C1 harness connector. Disconnect the PNP switch harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance between ground and the PNP switch sense circuit. Is the resistance below 5.0 ohms? Yes → Repair the PNP switch sense circuit for a short to ground. Perform AW4 TRANS VERIFICATION TEST-VER1. No → Go To 5	All

P1899-P/N SWITCH PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the PCM C1 harness connector. Check connectors - Clean/repair as necessary Move the gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through the gear positions, measure the resistance between ground and the PNP switch sense circuit in the PCM C1 harness connector. Did the display change from above 10.0 ohms to below 10.0 ohms? Yes → Go To 6 No → Replace the Park/Neutral Position Switch in accordance with the Service Information. Perform AW4 TRANS VERIFICATION TEST-VER1.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform AW4 TRANS VERIFICATION TEST-VER1.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform AW4 TRANS VERIFICATION TEST-VER1. No → Test Complete.	All

Symptom:

***CHECKING EVAPORATIVE EMISSION OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
PURGE SYSTEM CONTAMINATED
ROLLOVER VALVE
VACUUM HARNESS INTERMITTENT
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Start the engine, Allow the engine to reach normal operating temperature. **Note: Engine must be in closed loop.** With the DRBIII®, go to Purge Vapors Test. Press 3 to flow. **Note: Short Term Adaptive should change.** Did Short Term Adaptive change? Yes → Test Complete. No → Go To 2	All
2	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the Evap Purge Solenoid and vacuum harness. Look for any chafed, pierced, pinched, or partially broken hoses.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair vacuum harness/connections as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 3	All
3	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** 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. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 4	All

*CHECKING EVAPORATIVE EMISSION OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the Purge Solenoid. Inspect the line from rollover valve to the solenoid. Is liquid fuel in the line? Yes → Replace the Rollover Valve. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5	All
5	Turn the ignition off. Remove the Purge solenoid and tap the ports against a clean solid surface. Did any foreign material fall out? Yes → Replace the purge solenoid and clean or replace the vacuum and purge lines and Evap canister. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	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. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339.2 KPa +/- 34 KPa (49.2 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	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. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339.2 KPa +/- 34 KPa (49.2 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 4 **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Fuel Pump. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
5	**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″) or #6631(3/8″) 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? Yes → Test Complete. 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. **Caution: Stop All Actuations.**	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 IAC MOTOR**

POSSIBLE CAUSES
IAC MOTOR OPERATION
IAC DRIVER CIRCUITS OPEN
IAC MOTOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, monitor engine RPM. With the DRBIII®, set the engine speed to 1400 RPM. Does the engine speed reach 1400 rpm? Yes → The IAC Motor is operation normally Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Disconnect IAC Motor harness connector. Disconnect the PCM harness connector. Repeat each measurement for each IAC Driver circuit. Measure the resistance of each IAC Driver circuit between the IAC Motor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms at all IAC Driver circuits? Yes → Replace the IAC Motor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Repair the IAC Driver circuit(s) for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

***CHECKING MAP SENSOR OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
MAP SENSOR OPERATION
MAP SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Attach a vacuum gauge to a manifold vacuum source. **NOTE: If the engine will not idle, maintain a constant engine speed above idle.** Allow the engine to idle. With the DRBIII®, monitor the MAP sensor vacuum. Compare the MAP vacuum value on the DRBIII® and the vacuum reading on the vacuum gauge. Are the vacuum readings within 1 inch of vacuum of each other? Yes → Test Complete. No → Replace the MAP sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*CHECKING MINIMUM AIRFLOW

POSSIBLE CAUSES
CHECKING THE MINIMUM AIRFLOW

TEST	ACTION	APPLICABILITY
1	Start engine and bring to operating temperature. Be sure all accessories are off before performing this test. Shut off engine and remove air duct and air resonator box from top of throttle body. Disconnect rear CCV breather tube at intake manifold fitting. Let CCV tube hang disconnected at side of engine. Attach a short piece of rubber hose to special tool 6714. Install this hose/tool assembly to intake manifold fitting. Connect the DRBIII®. Start the Engine. Using the DRBIII®, run the Minimum Air Flow test. The DRBIII® will count down to stabilize the idle rpm and display the minimum air flow idle rpm. The idle rpm should be between 500 and 900 rpm. If the idle speed is outside of these specifications, replace the throttle body. Is the engine rpm between 500 and 900 rpm? Yes → Test Complete. No → Replace the throttle body. Perform POWERTRAIN VERIFICATION TEST VER - 5.	4.0L MPI I-6

Symptom:

***CHECKING RADIATOR FAN OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
FUSED B(+) CIRCUIT OPEN
RADIATOR FAN GROUND CIRCUIT OPEN
RAD FAN MOTOR
RADIATOR FAN RELAY OUTPUT CIRCUIT OPEN
RADIATOR FAN RELAY

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Does the Radiator Fan Motor cycle on and off? Yes → Test Complete. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Using a 12-volt Test Light connected to ground, backprobe the Radiator Fan Relay Output circuit in the Radiator Fan Motor harness connector. Does the test light cycle on and off? Yes → Go To 3 No → Go To 5	All
3	Turn the ignition off. Disconnect the Radiator Fan Motor harness connector. Measure the resistance between ground and the Radiator Fan Motor Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open Radiator Fan Ground Circuit.	All
4	If there are no possible causes remaining, view repair. Repair Replace the Radiator Fan Motor.	All
5	Turn the ignition off. Disconnect the Radiator Fan Relay Connector. Using a 12-volt Test Light connected to ground, check the Fused B(+) circuit in the Radiator Fan Relay connector. Did the light illuminate brightly? Yes → Go To 6 No → Repair the open Fused B(+) Circuit (check Radiator Fan Fuse in PDC).	All

*CHECKING RADIATOR FAN OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Radiator Fan Motor harness connector. Remove Rad Fan Relay. Measure the resistance of the Radiator Fan Relay Output circuit. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open Radiator Fan Relay Output Circuit.	All
7	If there are no possible causes remaining, view repair. Repair Replace the Radiator Fan Relay.	All

Symptom:

*CHECKING RADIATOR FAN RELAY OUTPUT

POSSIBLE CAUSES
RADIATOR FAN RELAY OPERATION
GROUND CIRCUIT OPEN
RADIATOR FAN MOTOR
FUSED B+ CIRCUIT
RADIATOR FAN RELAY OUTPUT CIRCUIT
RADIATOR FAN RELAY

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Using a jumper wire, momentarily jumper the Fuse B+ circuit and Radiator Fan Relay Output circuit in the Radiator Fan Relay harness connector. Is the Radiator Fan actuating? Yes → The Radiator Fan System operating properly at this time. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Disconnect the Radiator Fan harness connector. Measure the Ground circuit in the Radiator Fan harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Disconnect the Radiator Fan harness connector. Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Measure the voltage of the Radiator Fan Relay Output circuit in the Radiator Fan harness connector. Is the voltage above 11.0 volts? Yes → Replace the Radiator Fan Motor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. Remove the Radiator Fan 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? Yes → Go To 5 No → Repair the Fused B+ circuit. Inspect fuses and replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING RADIATOR FAN RELAY OUTPUT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Disconnect the Radiator Fan harness connector. Using a jumper wire, jumper the Fused B+ circuit and the Radiator Fan Output circuit in the Radiator Fan Relay harness connector. Measure the resistance of the Radiator Fan Relay Output circuit between the PDC and the Radiator Fan harness connector. Is the resistance below 5.0 ohms? Yes → Test Complete. No → Repair the Radiator Fan Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

*CHECKING THE ENGINE COOLANT TEMPERATURE SENSOR

POSSIBLE CAUSES
ECT SENSOR OPERATION
ECT SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: The engine coolant temperature must be below 62°C (150°F).** Turn the ignition on. With the DRBIII®, monitor the ECT value. Start the engine. Does the ECT reach 82°C (180°F) and was it a smooth transition? Yes → Test Complete. No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

*CHECKING THE INTAKE AIR TEMPERATURE SENSOR

POSSIBLE CAUSES
IAT SENSOR OPERATION
IAT SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Do not allow more than 5 minutes delay during the removal of the IAT sensor and measure the temperature.** Turn the ignition on. With the DRBIII®, read and record the IAT temperature value. Remove the IAT sensor. Using a temperature probe, measure the temperature inside the opening of the IAT sensor. Compare both temperature readings. Are the temperature readings with 12°C (10°F) of one another? Yes → Test Complete. No → Replace the IAT sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

*CHECKING THE PCM POWER AND GROUNDS

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. Using a 12-volt test light connected to ground, probe the PCM Fused B+ circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 2 No → Repair the Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	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? 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. Using a 12-volt test light connected to battery voltage, probe the PCM ground circuits in the PCM harness connector. Does the test light illuminate brightly? Yes → Test Complete. No → Repair the PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:

***CHECKING THROTTLE POSITION SENSOR OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
THROTTLE POSITION SENSOR VOLTAGE ABOVE 1.5 VOLTS
THROTTLE POSITION SENSOR SWEEP
TP SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the throttle and linkage is not binding and is operating properly.** Turn the ignition on. With the DRBIII®, read the Throttle Position Sensor voltage. Is the voltage above 1.5 volts? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition on. 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 volts and go above 3.5 volts with a smooth voltage change? Yes → Test Complete. No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P0645-A/C CLUTCH RELAY CIRCUIT

When Monitored and Set Condition:

P0645-A/C CLUTCH RELAY CIRCUIT

When Monitored: With the ignition key in the run position and battery voltage above 10.4 volts.

Set Condition: An open or shorted condition is detected in the A/C clutch relay control circuit.

POSSIBLE CAUSES
A/C CLUTCH RLY CIRCUIT WIRING HARNESS OBSERVABLE PROBLEM
A/C CLUTCH RLY CIRCUIT WIRING HARNESS INTERMITTENT PROBLEM
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
A/C CLUTCH RELAY CONTROL CIRCUIT OPEN
A/C CLUTCH RELAY CONTROL CIRCUIT SHORT TO GROUND
A/C CLUTCH RELAY
PCM (A/C CLUTCH RELAY)

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch Relay clicking? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All
3	Ignition on, engine not running. With the DRBIII®, actuate the A/C Clutch Relay. Wiggle the Wiring Harness from the Relay to the PCM. Did the wiggling interrupt the clicking? Yes → Repair as necessary where wiggling caused the clicking to be interrupted. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

P0645-A/C CLUTCH RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the A/C Clutch harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the Fused Ignition Switch Output Circuit voltage at A/C clutch relay. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open Fused Ignition Switch Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Turn the Ignition Off. Disconnect the A/C Clutch Relay harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between Terminals 1(85) and 2 (86) of the A/C Clutch Relay. Is the resistance between 50.0 and 90.0 ohms? Yes → Go To 6 No → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Disconnect the PCM harness connector(s). Remove the A/C Clutch Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the A/C Clutch Relay Control Circuit from the Relay harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair open A/C Clutch Relay Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the Ignition Off. Disconnect the PCM harness connector(s). Disconnect the A/C Clutch Relay harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the A/C Clutch Control Circuit resistance at PCM connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the A/C Clutch Relay Control Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
8	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

***CHECKING A/C SYSTEM OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
A/C CLUTCH RELAY OUTPUT CIRCUIT OPEN
A/C COMPRESSOR CLUTCH GROUND CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
A/C CLUTCH COIL
A/C SELECT CIRCUIT OPEN
REFRIGERATION SYSTEM NOT PROPERLY CHARGED
A/C REQUEST CIRCUIT OPEN
CLUTCH CYCLING SWITCH
HIGH PRESS CUT-OFF SWITCH
LOW PRESSURE SWITCH
A/C CLUTCH RELAY

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTC's. Is there an A/C Clutch Relay DTC? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the A/C compressor clutch harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance of the A/C Compressor Clutch Ground Circuit to ground. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open A/C compressor clutch ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Ignition on, engine not running. With the DRBIII®, read the A/C Select status. Turn the A/C Switch on and off a few times. Does the A/C Select state change? Yes → Go To 4 No → Repair the open A/C Select Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Verify that the Refrigerant System is properly charged per service procedure. Is the Refrigerant System properly charged? Yes → Go To 5 No → Properly charge the Refrigerant System per the service information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition on. Turn the A/C system on and the fan on high. With the DRBIII® in Inputs/Outputs, read the A/C request state. Does the A/C request state change? Yes → Go To 17 No → Go To 17	All
6	Turn the ignition off. Disconnect the A/C compressor clutch harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance of the A/C Compressor Clutch Ground Circuit to ground. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open A/C compressor clutch ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Ignition on, engine not running. With the DRBIII®, read the A/C Select status. Turn the A/C Switch on and off a few times. Does the A/C Select state change? Yes → Go To 8 No → Repair the open A/C Select Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Verify that the Refrigerant System is properly charged per service procedure. Is the Refrigerant System properly charged? Yes → Go To 9 No → Properly charge the Refrigerant System per the service information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition on. Turn the A/C system on and the fan on high. With the DRBIII® in Inputs/Outputs, read the A/C request state. Does the A/C request state change? Yes → Go To 10 No → Go To 17	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Verify the Clutch Cycling Switch operation per the service information. Is the Clutch Cycling switch OK? Yes → Go To 11 No → Replace the Clutch Cycling Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Verify the High Pressure Cut-Off Switch per the service information. Is the High Pressure Cut-Off Switch OK? Yes → Go To 12 No → Replace the High Pressure Cut-Off Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Turn the ignition off. Verify the Low Pressure Switch operation per the service information. Is the Low Pressure Switch OK? Yes → Go To 13 No → Replace the Low Pressure Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
13	Turn the ignition off. Disconnect the A/C Clutch harness connector. Remove the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** Measure the A/C Clutch Relay Output from the Relay to the A/C Clutch Coil. Is the resistance below 5.0 ohms? Yes → Go To 14 No → Repair the open A/C Clutch Relay Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
14	Ignition on, engine not running. With the DRBIII®, actuate the A/C clutch relay. Measure the A/C Clutch Relay Output at the A/C Clutch harness connector. Does the voltage fluctuate between 0.0 and 11.0 volts? Yes → Replace the A/C Clutch Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. Remove the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** Measure the Fused B(+) at the Relay. Is the voltage above 11.0 volts? Yes → Go To 16 No → Repair the open Fused B(+) Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
16	If there are no possible causes remaining, view repair. Repair Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
17	Turn the ignition off. Verify the Clutch Cycling Switch operation per the service information. Is the Clutch Cycling switch OK? Yes → Go To 18 No → Replace the Clutch Cycling Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
18	Turn the ignition off. Verify the High Pressure Cut-Off Switch per the service information. Is the High Pressure Cut-Off Switch OK? Yes → Go To 19 No → Replace the High Pressure Cut-Off Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
19	Turn the ignition off. Verify the Low Pressure Switch operation per the service information. Is the Low Pressure Switch OK? Yes → Go To 20 No → Replace the Low Pressure Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
20	Turn the ignition off. Disconnect the A/C Clutch harness connector. Remove the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** Measure the A/C Clutch Relay Output from the Relay to the A/C Clutch Coil. Is the resistance below 5.0 ohms? Yes → Go To 21 No → Repair the open A/C Clutch Relay Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
21	Ignition on, engine not running. With the DRBIII®, actuate the A/C clutch relay. Measure the A/C Clutch Relay Output at the A/C Clutch harness connector. Does the voltage fluctuate between 0.0 and 11.0 volts? Yes → Replace the A/C Clutch Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 22	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
22	Turn the ignition off. Remove the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** Measure the Fused B(+) at the Relay. Is the voltage above 11.0 volts? Yes → Go To 23 No → Repair the open Fused B(+) Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
23	If there are no possible causes remaining, view repair. Repair Repair the open A/C Request Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P1595-SPEED CONTROL SOLENOID CIRCUITS
P1683-SPD CTRL PWR RELAY; OR S/C 12V DRIVER CKT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1595-SPEED CONTROL SOLENOID CIRCUITS.

When Monitored and Set Condition:

P1595-SPEED CONTROL SOLENOID CIRCUITS

When Monitored: With the ignition key on, the speed control switched on, the SET switch pressed and the vehicle in drive gear moving above 35 MPH.

Set Condition: The powertrain control module actuates the vacuum and vent solenoids but they do not respond.

P1683-SPD CTRL PWR RELAY; OR S/C 12V DRIVER CKT

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

Set Condition: The speed control power supply circuit is either open or shorted to ground.

POSSIBLE CAUSES
S/C POWER SUPPLY CIRCUIT SHORTED TO GROUND
GROUND CIRCUIT AT S/C SERVO CONNECTOR OPEN
S/C WIRING HARNESS INTERMITTENT PROBLEM (S/C VENT SOL AC)
S/C VACUUM SOLENOID CONTROL CIRCUIT OPEN
S/C VACUUM SOLENOID CONTROL CKT SHORT TO GROUND
S/C VENT SOLENOID CONTROL CIRCUIT OPEN
S/C VENT SOLENOID CONTROL CKT SHORT TO GROUND
S/C WIRING HARNESS INTERMITTENT PROBLEM (S/C VAC SOL AC)
S/C WIRING HARNESS OBSERVABLE PROBLEM
S/C SERVO (12V DRIVER CIRCUIT)
S/C SERVO (12V DRIVER CIRCUIT)
S/C POWER SUPPLY CIRCUIT OPEN
BRAKE SWITCH
BRAKE SWITCH OUT OF ADJUSTMENT
S/C BRAKE SWITCH OUTPUT CIRCUIT OPEN
S/C BRAKE SWITCH OUTPUT CIRCUIT SHORTED TO GROUND
PCM (12V DRIVER CIRCUIT)

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running. With the DRBIII® actuate the S/C Vent Solenoid. Does the Speed Control Servo click? Yes → Go To 2 No → Go To 24	All
2	Turn the ignition on. With the DRBIII®, actuate the S/C Vacuum Solenoid. Does the Speed Control Servo click? Yes → Go To 3 No → Go To 6	All
3	Turn the ignition off. Using the Schematics as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Turn the ignition on. With the DRBIII®, actuate the S/C Vent Solenoid.. Wiggle the Wiring Harness from S/C Servo and Brake Switch to Powertrain Control Module. Did the wiggling interrupt the S/C Servo actuation? Yes → Repair as necessary where wiggling caused the actuation to be interrupted. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	Turn the ignition on. With the DRBIII®, actuate the S/C Vacuum Solenoid. Wiggle the Wiring Harness from S/C Servo and Brake Switch to Powertrain Control Module. Did the wiggling interrupt the S/C actuation? Yes → Repair as necessary where wiggling caused the actuation to be interrupted. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All
6	Turn the ignition on. With the DRBIII®, actuate the S/C Vent Solenoid.. Wiggle the Wiring Harness from S/C Servo and Brake Switch to Powertrain Control Module. Did the wiggling interrupt the S/C Servo actuation? Yes → Repair as necessary where wiggling caused the actuation to be interrupted. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Speed Control Servo harness connector. **Note: Check connectors - Clean/repair as necessary.** **Note: Ensure the Brake Pedal is not depressed during the following steps.** Turn the ignition on. Turn S/C Switch on. With the DRBIII®, actuate the S/C Vacuum Solenoid. Using a 12-volt Test Light, check the S/C Brake Switch Output Circuit at the Servo harness connector. Is the light illuminated and bright? Yes → Go To 8 No → Go To 18	All
8	Turn the ignition off. Disconnect the Speed Control Servo harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Ground Circuit at the Servo harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair open Ground Circuit at S/C Servo Connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
9	Turn the ignition off. Disconnect the Speed Control Servo 4-way harness connector. **Note: Check connectors - Clean/repair as necessary.** **Note: Ensure the Brake Pedal is not depressed during the following steps.** Turn the ignition on. Turn the S/C Switch on. With the DRBIII®, actuate the S/C Vacuum Solenoid. Using a 12-volt Test Light, check the S/C Brake Switch Output Circuit at the Servo harness connector. Is the light illuminated and bright? Yes → Go To 15 No → Go To 10	All
10	Turn ignition off. Using Service Procedure, check Brake Switch adjustment. Was Brake Switch adjustment OK? Yes → Go To 11 No → Adjust Brake Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
11	Turn the ignition off. Disconnect the Brake Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Be sure the brake pedal is not depressed during the next step. Measure the resistance between the S/C power supply circuit and the S/C brake switch output circuit (measurement taken across switch). Is the resistance below 5.0 ohms? Yes → Go To 12 No → Replace the Brake Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
12	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect the Brake Lamp Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the S/C Brake Switch Output circuit. Is the resistance below 5.0 ohms? Yes → Repair Switched S/C Brake Switch Output circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 13	All
13	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the Brake Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Brake Switch Output Circuit from the Brake Switch harness Connector to the Servo harness Connector. Is the resistance above 5.0 ohms? Yes → Repair the open S/C Brake Switch Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 14	All
14	Turn the ignition off. Disconnect the Brake Switch harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Power Supply Circuit from the PCM harness connector to the Brake Switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Repair the open S/C Power Supply Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
15	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect PCM harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Vacuum Solenoid Control Circuit from the PCM harness connector to the Servo harness connector. Is the resistance below 5.0 ohms? Yes → Go To 16 No → Repair the open S/C Vacuum Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
16	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Vacuum Solenoid Control Circuit from the Servo harness connector to a good ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the S/C Vacuum Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 17	All
17	If there are no possible causes remaining, replace the Speed Control Servo. View repair options. Repair Replace the S/C Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
18	Turn ignition off. Using Service Procedure, check Brake Switch adjustment. Was Brake Switch adjustment OK? Yes → Go To 19 No → Adjust Brake Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
19	Turn the ignition off. Disconnect the Brake Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Be sure the brake pedal is not depressed during the next step. Measure the resistance between the S/C power supply circuit and the S/C brake switch output circuit (measurement taken across switch). Is the resistance below 5.0 ohms? Yes → Go To 20 No → Replace the Brake Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
20	Turn the ignition off. Disconnect the Brake Switch harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the S/C Power Supply Circuit and ground at the Brake Switch harness connector. Is the resistance below 5.0 ohms? Yes → Repair S/C Power Supply Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 21	All
21	Turn the ignition off. Disconnect the Brake Switch harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Power Supply Circuit from the PCM harness connector to the Brake Switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 22 No → Repair the open S/C Power Supply Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
22	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect the Brake Lamp Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the S/C Brake Switch Output circuit. Is the resistance below 5.0 ohms? Yes → Repair Switched S/C Brake Switch Output circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 23	All
23	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the Brake Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Brake Switch Output Circuit from the Brake Switch harness Connector to the Servo harness Connector. Is the resistance above 5.0 ohms? Yes → Repair the open S/C Brake Switch Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 35	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
24	Turn the ignition off. Disconnect the Speed Control Servo 4-way harness connector. **Note: Check connectors - Clean/repair as necessary.** **Note: Ensure the Brake Pedal is not depressed during the following steps.** Turn the ignition on. Turn the S/C Switch on. With the DRBIII®, actuate the S/C Vacuum Solenoid. Using a 12-volt Test Light, check the S/C Brake Switch Output Circuit at the Servo harness connector. Is the light illuminated and bright? Yes → Go To 25 No → Go To 29	All
25	Turn the ignition off. Disconnect the Speed Control Servo harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Ground Circuit at the Servo harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 26 No → Repair open Ground Circuit at S/C Servo Connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
26	Turn the ignition off. Disconnect the Speed Control Servo harness Connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Vent Solenoid Control Circuit from the PCM harness connector to the Servo harness connector. Is the resistance below 5.0 ohms? Yes → Go To 27 No → Repair the open S/C Vent Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
27	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Vent Solenoid Control Circuit from the Servo harness connector to a good Ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the S/C Vent Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 28	All
28	If there are no possible causes remaining, replace the Speed Control Servo. View repair options. Repair Replace the S/C Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
29	Turn ignition off. Using Service Procedure, check Brake Switch adjustment. Was Brake Switch adjustment OK? Yes → Go To 30 No → Adjust Brake Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
30	Turn the ignition off. Disconnect the Brake Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Be sure the brake pedal is not depressed during the next step. Measure the resistance between the S/C power supply circuit and the S/C brake switch output circuit (measurement taken across switch). Is the resistance below 5.0 ohms? Yes → Go To 31 No → Replace the Brake Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
31	Turn the ignition off. Disconnect the Brake Switch harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Power Supply Circuit from the PCM harness connector to the Brake Switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 32 No → Repair the open S/C Power Supply Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
32	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect the Brake Lamp Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the S/C Brake Switch Output circuit. Is the resistance below 5.0 ohms? Yes → Repair Switched S/C Brake Switch Output circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 33	All
33	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the Brake Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Brake Switch Output Circuit from the Brake Switch harness Connector to the Servo harness Connector. Is the resistance above 5.0 ohms? Yes → Repair the open S/C Brake Switch Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 34	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
34	Turn the ignition off. Disconnect the Brake Switch harness connector. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the S/C Power Supply Circuit and ground at the Brake Switch harness connector. Is the resistance below 5.0 ohms? Yes → Repair S/C Power Supply Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 35	All
35	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:

P1596-SPEED CONTROL SWITCH ALWAYS HIGH

When Monitored and Set Condition:

P1596-SPEED CONTROL SWITCH ALWAYS HIGH

When Monitored: With the ignition key on.

Set Condition: An open circuit is detected in the speed control on/off switch circuit. The circuit must be above 4.8 volts for more than 2 minutes to set the DTC.

POSSIBLE CAUSES
SPEED CONTROL SWITCH GROUND CIRCUIT OPEN CLOCKSPRING TO S/C SWITCH
SPEED CONTROL SWITCH GROUND CIRCUIT OPEN PCM TO CLOCKSPRING
CLOCKSPRING SIGNAL/GROUND CIRCUIT OPEN
S/C WIRING HARNESS OBSERVABLE PROBLEM
SPEED CONTROL ON/OFF SWITCH
SPEED CONTROL SW SIG CKT OPEN PCM TO CLOCK SPRING
SPEED CONTROL SW SIG CKT OPEN CLOCKSPRING TO S/C SWITCH
SPEED CONTROL SWITCH SIGNAL CKT SHORTED TO VOLTAGE
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control inputs state. While monitoring the DRBIII®, push the Speed Control On/Off Switch several times, then leave it on. Did the DRBIII® show Speed Control Switch off and on? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. Using the Schematics as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

P1596-SPEED CONTROL SWITCH ALWAYS HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Speed Control On/Off Switch 2-way harness connector. Disconnect the clockspring 6-way harness connector (S/C switch side) **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Switch Sensor Ground Circuit from the On/Off Switch 2-way harness connector to the clockspring harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair open ground circuit from clockspring to S/C switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
4	Turn the ignition off. Disconnect the clockspring 6-way harness connector (instrument panel harness side). Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Switch Sensor Ground Circuit from the PCM harness connector to the clockspring harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair open ground circuit from PCM to clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	Turn the ignition off. Disconnect the Speed Control On/Off Switch 2-way harness connector only. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance across the S/C On/Off Switch. Is the resistance between 20.3K and 20.7K ohms? Yes → Go To 6 No → Replace the On/Off Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
6	Turn the ignition off. Disconnect the upper and lower 6-way clockspring harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the K4 sensor ground circuit between the upper and lower 6-way clockspring harness connectors. Measure the resistance of the V37 speed control switch signal circuit between the upper and lower 6-way clockspring harness connectors. Was the resistance above 5.0 ohms for either circuit? Yes → Replace the clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All

P1596-SPEED CONTROL SWITCH ALWAYS HIGH — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Speed Control On/Off Switch 2-way harness connector only. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the S/C Switch Signal Circuit for voltage at the On/Off Switch 2-way connector. Is the voltage above 6.0 volts? Yes → Repair the Speed Control Switch Signal Circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 8	All
8	Turn the ignition off. Disconnect the Clockspring 6-way harness connector (instrument panel harness side) . Disconnect the PCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the S/C Switch Signal Circuit from the PCM to the Clockspring Connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair open Speed Control Switch Signal Circuit PCM to Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
9	Turn the ignition off. Disconnect the On/Off switch 2-way harness connector. Disconnect the upper clockspring harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the S/C Switch Signal Circuit from the clockspring harness connector to the On/Off switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open Speed Control Switch Signal Circuit Clockspring to S/C switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
10	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:

P1597-SPEED CONTROL SWITCH ALWAYS LOW

When Monitored and Set Condition:

P1597-SPEED CONTROL SWITCH ALWAYS LOW

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

Set Condition: When switch voltage is less than 0.39 volts for 2 minutes.

POSSIBLE CAUSES
CLOCKSPRING SHORTED TO GROUND
S/C WIRING HARNESS OBSERVABLE PROBLEM
S/C SWITCH (ON/OFF)
S/C SWITCH (RESUME/ACCEL)
S/C SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
S/C SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the S/C Switch volts status. Is the S/C Switch voltage below 1.0 volt? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the S/C ON/OFF Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. With the DRBIII® in Sensors, read the S/C Switch volts. Did the S/C Switch volts change to 5.0 volts? Yes → Replace the S/C ON/OFF Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 3	All
3	Turn the ignition off. Disconnect the S/C RESUME/ACCEL Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. With the DRBIII® in Sensors, read the S/C Switch volts. Did the S/C Switch volts go above 4.0 volts? Yes → Replace the Resume/Accel Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All

P1597-SPEED CONTROL SWITCH ALWAYS LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the clockspring 6-way harness connector (instrument panel wiring side). Turn the ignition on. With the DRBIII® in Sensors, read the S/C Switch volts. Did the S/C Switch volts change to 5.0 volts? Yes → Replace the Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	Turn the ignition off. Disconnect the S/C ON/OFF Switch harness connector. Disconnect the PCM harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the S/C Signal Circuit and the Sensor Ground Circuit at the ON/OFF switch harness connector. Is the resistance below 5.0 ohms? Yes → Repair S/C Signal Circuit shorted to Sensor Ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	All
6	Turn the ignition off. Disconnect the S/C ON/OFF Switch harness connector. Disconnect the PCM harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the S/C Switch Signal circuit and ground (B-) at S/C ON/OFF Switch harness connector. Is the resistance below 5.0 ohms? Yes → Repair S/C Switch Signal Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
8	Turn the ignition off. Using the Schematics as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

Symptom:

*BRAKE SWITCH SENSE STATUS DOES NOT CHANGE ON DRB

POSSIBLE CAUSES
BRAKE LAMP SWITCH GROUND CIRCUIT OPEN
BRAKE LAMP SWITCH SENSE CIRCUIT OPEN
BRAKE LAMP SWITCH SENSE CIRCUIT SHORT TO GROUND
BRAKE SWITCH (SENSE CKT)
POWERTRAIN CONTROL MODULE (BRAKE SENSE)

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between ground and the Brake Lamp Switch Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 2 No → Repair the Brake Lamp Switch Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
2	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance of the Brake Lamp Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the Brake Lamp Switch Sense circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
3	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Brake Lamp Switch Sense terminal and the Ground terminal (measurement taken across 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 4 No → Replace the Brake Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
4	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connectors. Disconnect the CAB harness connector. Measure the resistance between ground and the Brake Lamp Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Repair the Brake Lamp Switch Sense circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All

*BRAKE SWITCH SENSE STATUS DOES NOT CHANGE ON DRB — Continued

TEST	ACTION	APPLICABILITY
5	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:

***CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT**

POSSIBLE CAUSES
S/C SW SIGNAL CIRCUIT TO CLOCKSPRING CONNECTOR OPEN
GROUND CIRCUIT AT S/C SERVO CONNECTOR OPEN
GROUND CIRCUIT TO S/C RESUME/ACCEL SWITCH CONNECTOR OPEN
DRBIII® DOES NOT SHOW SET SWITCH ″PRESSED″ OR RELEASED
S/C WIRING HARNESS OBSERVABLE PROBLEM
CANCEL SWITCH
COAST SWITCH
THROTTLE CABLE OBSERVABLE PROBLEM
THROTTLE OPENS AND CLOSES
SPEED CONTROL ON/OFF SWITCH STUCK
SPEED CONTROL RESUME/ACCEL SWITCH
SPEED CONTROL RESUME/ACCEL SWITCH STUCK

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Switch state. While observing the display, press the Brake Pedal several times. Does the DRBIII® show Brake Switch ″pressed″ and ″released″? Yes → Go To 2 No → Go To 17	All
2	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Switch state. While observing the display, press the On/Off Switch several times. Does the DRBIII® show On/Off Switch ″pressed″ and ″released″? Yes → Go To 3 No → Go To 41	All
3	Turn the ignition off. Using the Schematics as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Speed Control Servo harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Ground Circuit at the Servo harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair open Ground Circuit at S/C Servo Connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the P/N Switch state. While observing the display, move the Gear Selector to DRIVE. Does the DRBIII® show P/N switch ″D/R″? Yes → Go To 6 No → Go To 6	All
6	Turn the ignition off. Inspect the throttle cable and linkage for any binding or damage. Is the cable or linkage disconnected or damaged? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All
7	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Set Switch state. While observing the display, press the Set Switch several times. Does the DRBIII® show the Set Switch status change appropriately from Pressed to Released? Yes → Go To 8 No → Replace the Left S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
8	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Resume Switch state. While observing the display, press the Resume Switch several times. Does the DRBIII® show the Resume Switch status change appropriately from Pressed to Released? Yes → Go To 9 No → Go To 12	All
9	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Cancel Switch state. While observing the display, press the Cancel Switch several times. Does the DRBIII® show the Cancel Switch status change appropriately from Pressed to Released? Yes → Go To 10 No → Replace the Right S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition on. With the DRBIII® read DTC's. Are any Vehicle Speed Signal codes set? Yes → Go To 11 No → Go To 11	All
11	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Coast Switch state. While observing the display, press the Coast Switch several times. Does the DRBIII® show the Coast Switch status change appropriately from Pressed to Released? Yes → Go To 27 No → Replace the Right S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
12	Turn the ignition off. Disconnect the Speed Control Resume/Accel Switch harness connector. Turn the ignition on. With the DRBIII®, read the Speed Control Switch Voltage. Did the DRBIII® show Speed Control Switch Voltage go from below 4.2 Volts to above 4.2 Volts? Yes → Replace the Right Speed Control Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 13	All
13	Turn the ignition on. With the DRBIII® read DTC's. Are any Vehicle Speed Signal codes set? Yes → Go To 14 No → Go To 14	All
14	Start the engine. Allow engine to idle for 1 minute. Turn the engine off, then turn the ignition on, engine not running. With the DRBIII®, actuate the Speed Control Servo Solenoids. Does the Throttle open and close? Yes → Go To 15 No → Perform Speed Control Vacuum Supply Test per appropriate service procedure. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
15	At this time the Speed Control Switch and Servo functions appear to operate properly. Using the DRBIII®, monitor the Speed Control OUTPUT status. Road test the Vehicle at speeds over 35 MPH (55kmh) and attempt to set the Speed Control. The following items will not allow the Speed Control to set. The last or most recent cause for Speed Control not to set is indicated by the DENIED status. If ON/OFF Denied message is indicated, the Powertrain Control Module does not see an ON signal from the Switch. If SPEED Denied message is indicated, the Vehicle Speed as seen by the Powertrain Control Module is not greater than 36 MPH. If RPM Denied message is indicated, the Engine RPM is excessively high. If BRAKE Denied message is indicated, the Brake Switch Sense Circuit is open indicating to the PCM that the Brakes are applied. The Sense Circuit is grounded through the Brake Pedal Switch when the brakes are released. If P/N Denied message is indicated, Park/Neutral Switch Sense Circuit is grounded indicating to PCM that Transmission is not in gear. The Sense Circuit is grounded through the P/N Switch when Transmission is in Park or Neutral. If RPM/SPD Denied message is indicated, the PCM senses excessive Engine RPM for a given Vehicle speed. If SOL FLT Denied message is indicated, the Powertrain Control Module senses a Servo Solenoid Circuit trouble code that is maturing or set in memory. Continue if the previous instructions have been completed. Repair Go To 16	All
16	Turn the ignition off. Disconnect the Speed Control Resume/Accel Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Sensor Ground Circuit from the S/C Resume/Accel harness connector to a good ground. Is the resistance below 5.0 ohms? Yes → Go To 37 No → Repair the open sensor ground circuit, right S/C switch connector to the clockspring connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
17	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Switch state. While observing the display, press the On/Off Switch several times. Does the DRBIII® show On/Off Switch ″pressed″ and ″released″? Yes → Go To 18 No → Go To 41	All
18	Turn the ignition off. Using the Schematics as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 19	All

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
19	Turn the ignition off. Disconnect the Speed Control Servo harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Ground Circuit at the Servo harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 20 No → Repair open Ground Circuit at S/C Servo Connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
20	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the P/N Switch state. While observing the display, move the Gear Selector to DRIVE. Does the DRBIII® show P/N switch ″D/R″? Yes → Go To 21 No → Go To 21	All
21	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Set Switch state. While observing the display, press the Set Switch several times. Does the DRBIII® show the Set Switch status change appropriately from Pressed to Released? Yes → Go To 22 No → Replace the Left S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
22	Turn the ignition off. Inspect the throttle cable and linkage for any binding or damage. Is the cable or linkage disconnected or damaged? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 23	All
23	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Resume Switch state. While observing the display, press the Resume Switch several times. Does the DRBIII® show the Resume Switch status change appropriately from Pressed to Released? Yes → Go To 24 No → Go To 32	All
24	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Cancel Switch state. While observing the display, press the Cancel Switch several times. Does the DRBIII® show the Cancel Switch status change appropriately from Pressed to Released? Yes → Go To 25 No → Replace the Right S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
25	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Coast Switch state. While observing the display, press the Coast Switch several times. Does the DRBIII® show the Coast Switch status change appropriately from Pressed to Released? Yes → Go To 26 No → Replace the Right S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
26	Turn the ignition on. With the DRBIII® read DTC's. Are any Vehicle Speed Signal codes set? Yes → Go To 27 No → Go To 27	All
27	Start the engine. Allow engine to idle for 1 minute. Turn the engine off, then turn the ignition on, engine not running. With the DRBIII®, actuate the Speed Control Servo Solenoids. Does the Throttle open and close? Yes → Go To 28 No → Perform Speed Control Vacuum Supply Test per appropriate service procedure. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
28	At this time the Speed Control Switch and Servo functions appear to operate properly. Using the DRBIII®, monitor the Speed Control OUTPUT status. Road test the Vehicle at speeds over 35 MPH (55kmh) and attempt to set the Speed Control. The following items will not allow the Speed Control to set. The last or most recent cause for Speed Control not to set is indicated by the DENIED status. If ON/OFF Denied message is indicated, the Powertrain Control Module does not see an ON signal from the Switch. If SPEED Denied message is indicated, the Vehicle Speed as seen by the Powertrain Control Module is not greater than 36 MPH. If RPM Denied message is indicated, the Engine RPM is excessively high. If BRAKE Denied message is indicated, the Brake Switch Sense Circuit is open indicating to the PCM that the Brakes are applied. The Sense Circuit is grounded through the Brake Pedal Switch when the brakes are released. If P/N Denied message is indicated, Park/Neutral Switch Sense Circuit is grounded indicating to PCM that Transmission is not in gear. The Sense Circuit is grounded through the P/N Switch when Transmission is in Park or Neutral. If RPM/SPD Denied message is indicated, the PCM senses excessive Engine RPM for a given Vehicle speed. If SOL FLT Denied message is indicated, the Powertrain Control Module senses a Servo Solenoid Circuit trouble code that is maturing or set in memory. Continue if the previous instructions have been completed. Repair Go To 29	All

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
29	Turn the ignition off. Disconnect both Speed Control Switches harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the speed control switch signal circuit from the On/Off switch connector to the Resume/Accel harness connector. Is resistance below 5.0 ohms? Yes → Go To 30 No → Repair the open S/C Sw Signal Circuit from the right switch to the Clockspring Connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
30	Turn the ignition off. Disconnect the Speed Control Resume/Accel Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Sensor Ground Circuit from the S/C Resume/Accel harness connector to a good ground. Is the resistance below 5.0 ohms? Yes → Go To 31 No → Repair the open sensor ground circuit, right S/C switch connector to the clockspring connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
31	Turn the ignition off. Disconnect the Speed Control Resume/Accel Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Connect a Jumper between the S/C Switch Signal and Sensor Ground at the switch harness connector. Ignition on, engine not running. With the DRBIII®, read the S/C Switch voltage. Does the DRBIII® show S/C Switch is less than 1.0 volt? Yes → Replace the right Speed Control Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All
32	Turn the ignition off. Disconnect the Speed Control Resume/Accel Switch harness connector. Turn the ignition on. With the DRBIII®, read the Speed Control Switch Voltage. Did the DRBIII® show Speed Control Switch Voltage go from below 4.2 Volts to above 4.2 Volts? Yes → Replace the Right Speed Control Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 33	All
33	Turn the ignition on. With the DRBIII® read DTC's. Are any Vehicle Speed Signal codes set? Yes → Go To 34 No → Go To 34	All

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
34	Turn the ignition off. Disconnect the Speed Control Resume/Accel Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Sensor Ground Circuit from the S/C Resume/Accel harness connector to a good ground. Is the resistance below 5.0 ohms? Yes → Go To 35 No → Repair the open sensor ground circuit, right S/C switch connector to the clockspring connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
35	Start the engine. Allow engine to idle for 1 minute. Turn the engine off, then turn the ignition on, engine not running. With the DRBIII®, actuate the Speed Control Servo Solenoids. Does the Throttle open and close? Yes → Go To 36 No → Perform Speed Control Vacuum Supply Test per appropriate service procedure. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
36	At this time the Speed Control Switch and Servo functions appear to operate properly. Using the DRBIII®, monitor the Speed Control OUTPUT status. Road test the Vehicle at speeds over 35 MPH (55kmh) and attempt to set the Speed Control. The following items will not allow the Speed Control to set. The last or most recent cause for Speed Control not to set is indicated by the DENIED status. If ON/OFF Denied message is indicated, the Powertrain Control Module does not see an ON signal from the Switch. If SPEED Denied message is indicated, the Vehicle Speed as seen by the Powertrain Control Module is not greater than 36 MPH. If RPM Denied message is indicated, the Engine RPM is excessively high. If BRAKE Denied message is indicated, the Brake Switch Sense Circuit is open indicating to the PCM that the Brakes are applied. The Sense Circuit is grounded through the Brake Pedal Switch when the brakes are released. If P/N Denied message is indicated, Park/Neutral Switch Sense Circuit is grounded indicating to PCM that Transmission is not in gear. The Sense Circuit is grounded through the P/N Switch when Transmission is in Park or Neutral. If RPM/SPD Denied message is indicated, the PCM senses excessive Engine RPM for a given Vehicle speed. If SOL FLT Denied message is indicated, the Powertrain Control Module senses a Servo Solenoid Circuit trouble code that is maturing or set in memory. Continue if the previous instructions have been completed. Repair Go To 37	All

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
37	Turn the ignition off. Disconnect both Speed Control Switches harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the speed control switch signal circuit from the On/Off switch connector to the Resume/Accel harness connector. Is resistance below 5.0 ohms? Yes → Go To 38 No → Repair the open S/C Sw Signal Circuit from the right switch to the Clockspring Connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
38	Turn the ignition off. Disconnect the Speed Control Resume/Accel Switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Connect a Jumper between the S/C Switch Signal and Sensor Ground at the switch harness connector. Ignition on, engine not running. With the DRBIII®, read the S/C Switch voltage. Does the DRBIII® show S/C Switch is less than 1.0 volt? Yes → Replace the right Speed Control Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 39	All
39	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Cancel Switch state. While observing the display, press the Cancel Switch several times. Does the DRBIII® show the Cancel Switch status change appropriately from Pressed to Released? Yes → Go To 40 No → Replace the Right S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
40	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Speed Control Coast Switch state. While observing the display, press the Coast Switch several times. Does the DRBIII® show the Coast Switch status change appropriately from Pressed to Released? Yes → Test Complete. No → Replace the Right S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
41	Turn the ignition off. Using the Schematics as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 42	All

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
42	Turn the ignition off. Disconnect the Speed Control Servo harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Ground Circuit at the Servo harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 43 No → Repair open Ground Circuit at S/C Servo Connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
43	Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Turn the ignition on. With the DRBIII®, read the Speed Control Switch Voltage. Did the DRBIII® show Speed Control Switch Voltage go from below 4.2 Volts to above 4.2 Volts? Yes → Replace the Left Speed Control Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 44	All
44	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the P/N Switch state. While observing the display, move the Gear Selector to DRIVE. Does the DRBIII® show P/N switch ″D/R″? Yes → Go To 45 No → Go To 45	All
45	Turn the ignition off. Inspect the throttle cable and linkage for any binding or damage. Is the cable or linkage disconnected or damaged? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 46	All
46	Turn the ignition on. With the DRBIII® read DTC's. Are any Vehicle Speed Signal codes set? Yes → Go To 47 No → Go To 47	All
47	Start the engine. Allow engine to idle for 1 minute. Turn the engine off, then turn the ignition on, engine not running. With the DRBIII®, actuate the Speed Control Servo Solenoids. Does the Throttle open and close? Yes → Go To 48 No → Perform Speed Control Vacuum Supply Test per appropriate service procedure. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
48	At this time the Speed Control Switch and Servo functions appear to operate properly. Using the DRBIII®, monitor the Speed Control OUTPUT status. Road test the Vehicle at speeds over 35 MPH (55kmh) and attempt to set the Speed Control. The following items will not allow the Speed Control to set. The last or most recent cause for Speed Control not to set is indicated by the DENIED status. If ON/OFF Denied message is indicated, the Powertrain Control Module does not see an ON signal from the Switch. If SPEED Denied message is indicated, the Vehicle Speed as seen by the Powertrain Control Module is not greater than 36 MPH. If RPM Denied message is indicated, the Engine RPM is excessively high. If BRAKE Denied message is indicated, the Brake Switch Sense Circuit is open indicating to the PCM that the Brakes are applied. The Sense Circuit is grounded through the Brake Pedal Switch when the brakes are released. If P/N Denied message is indicated, Park/Neutral Switch Sense Circuit is grounded indicating to PCM that Transmission is not in gear. The Sense Circuit is grounded through the P/N Switch when Transmission is in Park or Neutral. If RPM/SPD Denied message is indicated, the PCM senses excessive Engine RPM for a given Vehicle speed. If SOL FLT Denied message is indicated, the Powertrain Control Module senses a Servo Solenoid Circuit trouble code that is maturing or set in memory. Continue if the previous instructions have been completed. Repair Test Complete.	All

Symptom:

***ENGINE CRANKS DOES NOT START**

POSSIBLE CAUSES
FUEL PUMP RELAY
NO START PRE-TEST
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	**Note: The following list of items must be checked before continuing with any no start tests.** The battery must be fully charged and in good condition. A low charged battery may produce invalid test results. If the battery is low, charge the battery and then attempt to start the vehicle by cranking the engine for 15 seconds, 3 consecutive times. This will allow any DTC's to set that may have been erased due to a dead battery. Ensure the Powers and Ground to the PCM are ok. Make sure the PCM communicates with the DRBIII® 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. Read the PCM DTC's with the DRBIII®. 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. 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. 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 DRBIII® 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. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
2	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? 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. No → Go To 3	All
3	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 4 No → Go To 9 **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** 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 339.2 KPa +/- 34 KPa (49.2 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 5 Within Specification Go To 7 Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1. **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
5	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. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339.2 KPa +/- 34 KPa (49.2 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 6 **Caution: Stop All Actuations.**	All
6	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Fuel Pump Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
7	**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″) or #6631(3/8″) 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? Yes → Go To 8 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. **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
8	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. The spark plugs must be free from fuel, oil, coolant and/or any foreign material or deposits. The fuel must be free from contamination. The exhaust may be free from restrictions. The engine compression must be within specifications. The engine valve timing must be within specifications. The engine must be free from vacuum leaks. Were any of the above conditions found? Yes → Test Complete. No → Test Complete.	All
9	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 10 No → Go To 12 **Caution: Stop All Actuations.**	All
10	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 11 No → Repair the open/high resistance in the fuel pump ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
11	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
12	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 13 No → Repair the Fuel Pump Relay Fused B+ circuit. Check for open fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
13	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 open fuel pump relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*NO CRANK CONDITION

POSSIBLE CAUSES
STARTER RELAY OUTPUT CIRCUIT OPEN
BATTERY CIRCUIT RESISTANCE TOO HIGH
STARTER RELAY AUTO
STARTER (AUTO TRANS)
REPAIR MECHANICAL CONDITION
STARTER RELAY GROUND OPEN CIRCUIT
STARTER RELAY MANUAL
FUSED B(+) CIRCUIT OPEN
IGNITION SWITCH OUTPUT CIRCUIT OPEN
PARK/NEUTRAL SWITCH SENSE CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Is the vehicle equipped with a manual transmission? Is the vehicle equipped with a manual transmission? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Remove the starter relay. Using a 12-volt Test Light connected to 12-volts, check the starter ground circuit. Is the test light on? Yes → Go To 3 No → Repair the starter relay ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Remove the starter relay. Disconnect the starter relay output wire from the starter solenoid. Connect one end of the starter relay output circuit to ground. Using a 12-volt test light connected to 12-volts, check the other end of the starter relay output circuit. Is the test light on? Yes → Go To 4 No → Repair open Starter Relay Output Ckt. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
4	Turn the ignition off. Check the battery cables for high resistance. (Use service procedure) Did either battery circuit have a voltage drop greater than 0.2 volt? Yes → Repair the Battery Circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Remove the starter relay. Using a 12-volt test light connected to ground, check the fused B(+) circuit. Is the test light on? Yes → Go To 6 No → Repair the Fused B(+) Circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	Ensure the engine crankshaft is able to rotate and is not seized. Is the engine crankshaft able to rotate? Yes → Go To 7 No → Repair the mechanical condition preventing the starter motor from cranking. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
7	Turn the ignition off. Remove the starter relay. Turn the ignition on. Using a 12-volt test light connected to ground, check the ignition switch output circuit. **Note: If equipped with a manual transmission, the clutch pedal must be fully depressed for this test.** While observing 12-volt test light, hold ignition key in the start position. Is the test light on? Yes → Go To 8 No → Repair the Ignition Switch Output Circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
8	Turn the ignition off. Remove the starter relay. **WARNING: The parking brake must be on and the transmission must be in park for a vehicle equipped with an automatic transmission or in neutral for a vehicle equipped with a manual transmission.** **WARNING: The engine may be cranked in the next step. Keep away from moving engine parts.** Briefly connect a jumper wire between starter relay fused B(+) circuit and starter relay output circuit. Did the starter motor crank the engine? Yes → Replace the starter relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 9	All
9	If there are no possible causes remaining, replace the starter motor. View repair options Repair Test Complete.	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Remove the starter relay. Disconnect the starter relay output wire from the starter solenoid. Connect one end of the starter relay output circuit to ground. Using a 12-volt test light connected to 12-volts, check the other end of the starter relay output circuit. Is the test light on? Yes → Go To 11 No → Repair open Starter Relay Output Ckt. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
11	Turn the ignition off. Check the battery cables for high resistance. (Use service procedure) Did either battery circuit have a voltage drop greater than 0.2 volt? Yes → Repair the Battery Circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 12	All
12	Turn the ignition off. Remove the starter relay. Turn the ignition on. Using a 12-volt test light connected to ground, check the fused B(+) circuit. Is the test light on? Yes → Go To 13 No → Repair the Fused B(+) Circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
13	Turn the ignition off. Remove the starter relay. Turn the ignition on. Using a 12-volt test light connected to ground, check the ignition switch output circuit. **Note: If equipped with a manual transmission, the clutch pedal must be fully depressed for this test.** While observing 12-volt test light, hold ignition key in the start position. Is the test light on? Yes → Go To 14 No → Repair the Ignition Switch Output Circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
14	Ensure the engine crankshaft is able to rotate and is not seized. Is the engine crankshaft able to rotate? Yes → Go To 15 No → Repair the mechanical condition preventing the starter motor from cranking. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
15	Turn the ignition off. Place gear selector in park or neutral position. Remove the starter relay. Using a 12-volt test light connected to 12-volts, check the P/N position switch sense circuit. Is the test light on? Yes → Go To 16 No → Repair the open Park/Neutral Switch Sense Circuit between Starter Relay and splice. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
16	Turn the ignition off. Remove the starter relay. **WARNING: The parking brake must be on and the transmission must be in park for a vehicle equipped with an automatic transmission or in neutral for a vehicle equipped with a manual transmission.** **WARNING: The engine may be cranked in the next step. Keep away from moving engine parts.** Briefly connect a jumper wire between starter relay fused B(+) circuit and starter relay output circuit. Did the starter motor crank the engine? Yes → Replace the starter relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 17	All
17	If there are no potential causes remaining, replace the starter motor. View repair options. 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
5 VOLT SUPPLY SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	**NOTE: The DRBIII® and cable must be operating properly for the results of this test to be valid.** **NOTE: Ensure the ignition switch was on 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? 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. 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? 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. Using a 12-volt test light connected to battery voltage, probe the PCM ground circuits in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
4	If there is 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 - 1.	All

*NO RESPONSE FROM PCM WITH A NO START CONDITION — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the TP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5-Volt Supply circuit in the TP Sensor harness connector. Is the voltage above 4.0 volts? Yes → Go To 10 No → Go To 6	All
6	Turn the ignition off. Disconnect the TP Sensor harness connector. Connect a voltmeter to the 5-Volt Supply circuit in the TP Sensor harness connector. Monitor the voltmeter while disconnecting the following components harness connectors one at a time. **NOTE: If the voltmeter should read above 4.0 volts when a disconnecting a component harness connector, that component is shorted internally and well need to be replaced.** CMP Sensor CKP Sensor MAP Sensor VSS Oil Pressure Sensor Did the voltmeter read above 4.0 volts when disconnecting the above components? Yes → Replace the component that cause the 5-Volt Supply circuit to be pulled low. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the CMP Sensor harness connector. Disconnect the CKP Sensor harness connector. Disconnect the MAP Sensor harness connector. Measure the resistance of the 5-Volt Supply circuit (Primary) in the PCM harness connect to ground. Is the resistance below 5.0 ohms? Yes → Repair the 5-Volt Supply circuit (Primary) for a short to ground. No → Go To 8	All
8	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Oil Pressure Sensor harness connector. Disconnect the VSS harness connector. Measure the resistance of the 5-Volt Supply circuit (Secondary) in the PCM harness connect to ground. Is the resistance below 5.0 ohms? Yes → Repair the 5-Volt Supply circuit (Secondary) for a short to ground. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module in accordance with the Service Information.	All

*NO RESPONSE FROM PCM WITH A NO START CONDITION — Continued

TEST	ACTION	APPLICABILITY
10	**NOTE: Ensure the TP Sensor harness connector has been reconnected.** Turn the ignition off. Disconnect the MAP Sensor harness connector. Measure the voltage of the 5-Volt Supply circuit in the MAP Sensor harness connector. Is the voltage above 4.0 volts? Yes → Replace the PCM in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the TP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*START AND STALL CONDITION

POSSIBLE CAUSES
CHECKING DTCS
CHECKING SKIM DTCS
FUEL PRESSURE OUT OF SPECS
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
THROTTLE POSITION SENSOR SWEEP
TP SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
ENGINE COOLANT TEMPERATURE 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	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 339.2 KPa +/- 34 KPa (49.2 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 4 Within Specification Go To 6 Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1. **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** 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. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339.2 KPa +/- 34 KPa (49.2 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5 **Caution: Stop All Actuations.**	All
5	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
6	**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″) or #6631(3/8″) 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? Yes → Go To 7 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. **Caution: Stop All Actuations.**	All
7	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? Yes → Go To 8 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
8	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? Yes → Go To 9 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
9	**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.** 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.** 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)? Yes → Go To 10 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	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 microcontroller 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 microcontroller has exceeded its stack space limit.

ANTENNA FAILURE — Continued

POSSIBLE CAUSES
SKIM INTERNAL DTC FAILURE

TEST	ACTION	APPLICABILITY
1	**Note: This trouble code indicates an internal SKIM fault.** With the DRB III, read and record the SKIM DTC's and then erase the SKIM DTC's Perform 10 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle. With the DRB III, read the SKIM DTC's. Did the same SKIM DTC return? Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

PCM STATUS FAILURE
SERIAL LINK EXTERNAL FAULT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be PCM STATUS FAILURE.

When Monitored and Set Condition:

PCM STATUS FAILURE

When Monitored: With the ignition on.

Set Condition: This DTC exists when a PCM STATUS message was not received from the PCM for at least 20.0 consecutive seconds.

SERIAL LINK EXTERNAL FAULT

When Monitored: At ignition on, after ignition on during any rolling code handshake that occurs with the PCM due to a SKIM reset, or during SECRET KEY transfers to the PCM.

Set Condition: When the SKIM does not receive an expected PCI BUS message transmission acknowledgement from the PCM after 3 transmit attempts.

POSSIBLE CAUSES
INTERMITTENT WIRING HARNESS PROBLEM
WIRING HARNESS INSPECTION
SKIM/PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the PCM has proper power and ground connections before continuing.** With the DRB III, read and record the SKIM DTC's then erase the SKIM DTC's. Turn the ignition off. Wait 2 minutes. Turn the ignition on. With the DRB III, read the SKIM DTC's. Does the DRB III display the DTC that was previously erased? Yes → Go To 2 No → Go To 4	All

PCM STATUS FAILURE — Continued

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

Symptom List:

ROLLING CODE FAILURE
VIN MISMATCH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be ROLLING CODE FAILURE.

When Monitored and Set Condition:

ROLLING CODE FAILURE

When Monitored: At ignition on, after ignition on during any rolling code handshake that occurs with the PCM due to a SKIM or PCM reset.

Set Condition: When a PCM STATUS message with a Valid Key status is not received by the SKIM within 3.5 seconds of transmitting the last Valid Key Code message to the PCM.

VIN MISMATCH

When Monitored: With the ignition on.

Set Condition: When the VIN received from the PCM does not match the VIN stored in the SKIM's EEPROM.

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB III, erase the SKIM DTC's. Turn the ignition off. Wait 10 seconds. Turn the ignition on and wait 2 minutes. With the DRB III, read the SKIM DTC's. Does the DRB III display the DTC that was previously erased? Yes → Go To 2 No → Go To 4	All

ROLLING CODE FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	**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.** Turn the ignition on. With the DRB III, select Engine system from the main menu. Display and record the Vehicle Identification Number. Does the VIN recorded from the PCM match the VIN of the vehicle? Yes → Go To 3 No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Turn the ignition on. With the DRB III, display and erase all PCM and SKIM DTC's. Perform 5 ignition key cycles leaving the ignition on for 90 seconds per cycle. With the DRB III, check for SKIM DTC's. Does the DRB III display the same DTC? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → The repair is complete. Perform SKIS VERIFICATION.	All
4	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

TRANSPONDER COMMUNICATION FAILURE
TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE
TRANSPONDER ID MISMATCH
TRANSPONDER RESPONSE MISMATCH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be TRANSPONDER COMMUNICATION FAILURE.

When Monitored and Set Condition:

TRANSPONDER COMMUNICATION FAILURE

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When the SKIM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When 5 consecutive transponder signal transmissions are sent to the SKIM with the correct message format but with invalid data.

TRANSPONDER ID MISMATCH

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When the transponder ID read by the SKIM does not match any of the transponder ID's stored in the SKIM's memory.

TRANSPONDER RESPONSE MISMATCH

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When the transponder's crypto algorithm result fails to match the SKIM's result.

POSSIBLE CAUSES
CHECKING MULTIPLE KEY OPERATION
SKIM
INTERMITTENT WIRING HARNESS PROBLEM
REPLACE IGNITION KEY

TRANSPONDER COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	With the DRB III, read and record the SKIM DTC's. With the DRB III, erase the SKIM DTC's. **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 DRB III, read the SKIM DTC's. Does the DRB display the DTC that was previously erased? Yes → Go To 2 No → Go To 7	All
2	Are there multiple vehicle ignition keys available? Yes → Go To 3 No → Go To 4	All
3	**NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys one at a time.** With the DRB III, erase the SKIM DTC's. Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRB III, read the SKIM DTC's. Is the DTC present for all ignition keys. Yes → Replace the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All
4	With the DRB III, attempt to reprogram the ignition keys to the SKIM. With the DRB III, erase the SKIM DTC's. Wait 10 seconds. Turn the ignition on. With the DRB III, read the SKIM DTC's. Does the DTC reset? Yes → Go To 5 No → Test Complete.	All
5	Replace the ignition key with a new key. With the DRB III, program the new ignition key to the SKIM. With the DRB III, erase the SKIM DTC's Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRB III, read the SKIM DTC's. Does the DTC reset? Yes → Go To 6 No → Test Complete.	All

TRANSPONDER COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	If there are no possible causes remaining, view repair. Repair Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire 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

Verification Tests

AW4 TRANS VERIFICATION TEST-VER1	APPLICABILITY
1. Connect the DRBIII® to the Data Link Connector (DLC). 2. Reconnect any disconnected components. 3. With the DRBIII®, erase all Transmission DTC's, also erase the PCM DTC's. 4. Check the transmission fluid and adjust if necessary. Refer to the Service Information for the Fluid Fill procedure. 5. Road test the vehicle. With the DRBIII®, monitor the engine RPM. Make 15 to 20 1-2, 2-3, 3-4 upshifts. Perform these shifts from a standing start to 45 MPH with a constant throttle opening of 20 to 25 degrees. 6. Below 25 MPH, make 5 to 8 wide open throttle kickdowns to 1st gear. Allow at least 5 seconds each in 2nd and 3rd gear between each kickdown. 7. Attempt to reset the specific DTC, drive the vehicle to the When Monitored/When Set conditions for the DTC to verify the DTC is repaired.. 8. Check for Diagnostic Trouble Codes (DTC's) during the road test. If a DTC sets during the road test , return to the Symptom list and perform the diagnostics. **9. NOTE: Erase P0700 DTC in the PCM after making transmission repairs. This will turn the MIL off.** Were any DTC's set during the road test? Yes refer to the symptom list Repair is not complete, refer to appropriate symptom. No Test Complete Repair is complete.	All

FUEL SYSTEM/MISFIRE MONITOR VERIFICATION TEST	APPLICABILITY
1. If any existing DTC's have not been repaired, go to Symptom List and follow path specified. 2. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 3. Connect the DRBIII® to the data link connector. 4. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories. 5. Perform steps 6 through 8 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification. 6. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 7. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 8. For SKIM theft alarm: Connect DRBIII® to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. **9. Note: Make sure that Misfire detection is enabled if you repaired a Misfire DTC. Low fuel level or an un-learned Adaptive Numerator can disable the Misfire monitor.** **10. Note: If the PCM has been replaced or disconnected during testing, the Adaptive Numerator must be re-learned in order for the Misfire Monitor to run.** 11. With the DRB III®, monitor the Similar Conditions to attempt to duplicate the conditions that the vehicle was operating at when the DTC was set. If the conditions can be duplicated, the Good Trip counter will change to one or more. 12. If the conditions cannot be duplicated, with the DRBIII®, erase DTCs. 13. If the repaired DTC has reset, or the OBD II monitor failed after running, the repair is not complete. Check for any technical service bulletins or flash updates and return to Symptom List. 14. If a new DTC has set, return to Symptom List and perform the tests specified for that code. 15. If the monitor ran, and the Good Trip counter changed to one or more, the repair was successful. 16. Erase DTC's. 17. Disconnect the DRBIII®. Test complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 1	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. Inspect the engine oil for contamination. If it is contaminated, change the oil and filter. 3. Perform the steps 4 through 6 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification. 4. If PCM has been changed and correct VIN and mileage have not been programmed a DTC will be set in ABS and Air Bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 5. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 6. For SKIM theft alarm: Connect DRBIII® to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM 7. Attempt to start the engine. 8. If the engine is unable to start, look for any Technical Service Bulletins that may relate to this condition. Return to Symptom List if necessary. 9. If the engine starts and stays running, the repair is now complete.	All

POWERTRAIN VERIFICATION TEST VER - 2	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If this verification procedure is being performed after a NO TROUBLE CODE repair, perform steps 3 and 4. 3. Check to see if the initial symptom still exists. If there are DTCs or the symptom no longer exists, the repair was successful and testing is complete. 4. If the initial or another symptom exists, the repair is not complete. Check all technical service bulletins or flash updates and return to Symptoms if necessary. 5. If this verification procedure is being performed after a DTC repair, perform steps 6 through 11. 6. Connect the DRBIII® to the data link connector. With the DRBIII®, erase DTCs and reset all values. 7. If the PCM has been replaced, perform steps 8 through 10, then proceed with the verification. If the PCM has not been replaced, skip those steps and continue verification. 8. If PCM has been replaced and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer System (SKIS), Secret Key data must be updated to enable start. 9. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 10. For SKIS theft alarm: Connect DRBIII® to data link conn. Go to Theft Alarm, SKIM, and Misc. Place SKIM in secured access mode by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM 11. Road test the vehicle. If the test is for an A/C DTC, ensure it is operating during the following test. Drive the vehicle for at least 5 minutes. 12. Drive the vehicle at least 64 kmh (40 mph). Ensure the trans shifts through all gears. At some point stop the vehicle, turn off the engine for at least 10 seconds. When finished read DTCs with the DRBIII®. If a DTC has set, return to Symptoms and follow path. 13. If the original DTC did not return and there are no new DTCs, the repair was successful and testing is complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 3	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. Connect the DRBIII® to the Data Link Connector and erase the DTCs. 3. If the PCM has been replaced perform steps 4 through 6 then continue the verification. 4. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 5. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 6. For SKIM theft alarm: Connect DRBIII® to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM 7. Ensure no other charging system problems remain by doing the following: Start the engine. Perform generator output per service manual. 8. Raise the engine speed to 2000 rpm for at least 30 seconds. 9. Allow the engine to idle. 10. Turn the engine off. 11. Turn the ignition key on. 12. With the DRBIII®, read DTCs. 13. If repaired DTC has reset, or any other one has set, check all pertinent Technical Service Bulletins and return to Symptom List if necessary. 14. If there are DTCs, the repair is now complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 4	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. With the DRBIII®, erase DTCs. 3. If the PCM has been replaced, perform steps 4 through 6, then continue with the verification. 4. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 5. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 6. For SKIM theft alarm: Connect DRBIII® to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM 7. Turn the speed control ON (if equipped, cruise light will be on). 8. Depress 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. 9. Depress 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. 10. 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. 11. Using caution, depress 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. 12. Bring the vehicle speed back up to 35 MPH. 13. Depress 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. 14. 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. 15. 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. 16. Depress 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. 17. Bring the vehicle speed back up above 35 mph and engage speed control. 18. Depress the OFF switch to turn 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. 19. If the vehicle successfully passed all of the previous tests, the speed control system is now functioning as designed. The repair is now complete. 20. NOTE: OVERSHOOT/UNDERSHOOT FOLLOWING SPEED CONTROL SET. 21. If the vehicle operator repeatedly presses and releases the SET button with their foot off of the accelerator (referred to as ″lift foot set″), the vehicle may accelerate and exceed the desired set speed by up to 5 mph (8 km/h). 22. It may also decelerate to less than the desired set speed, before finally achieving the desired set speed. 23. The Speed Control System has an adaptive strategy that compensates for vehicle-to-vehicle variations in speed control cable lengths. 24. When the speed control is set with the vehicles operators foot off of the accelerator pedal, the speed control thinks there is excessive speed control cable slack and adapts accordingly. 25. If the ″lift foot sets″ are continually used, a speed control overshoot/undershoot condition will develop. 26. To ″unlearn″ the overshoot/undershoot condition, the vehicle operator has to press and release the set button while maintaining the desired set speed using the accelerator pedal (not decelerating or accelerating). 27. Then turning the cruise control switch to the OFF position (or press the CANCEL button if equipped) after waiting 10 seconds. 28. This procedure must be performed approximately 10-15 times to completely unlearn the overshoot/undershoot condition. Did the Speed Control pass the above test? Yes → Repair is complete. No → Repair is not complete, refer to appropriate symptom.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 5	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If any existing diagnostic trouble codes have not been repaired, go to Symptom List and follow path specified. 3. Connect the DRBIII® to the data link connector. 4. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories. 5. Perform steps 6 through 8 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification. 6. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 7. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 8. For SKIM theft alarm: Connect DRBIII® to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 9. If a Comprehensive Component DTC was repaired, perform steps 10-13. If a Major OBDII Monitor DTC was repaired skip those steps and continue verification. 10. If the catalytic converter has been replaced, with the DRBIII® in misc. menu option press catalyst replaced. 11. After the ignition has been off for at least 10 seconds, restart the vehicle and run 2 minutes. 12. 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®. 13. 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. 14. If another DTC has set, return to the Symptom List and follow the path specified for that DTC. 15. 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). 16. 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®. 17. 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. 18. If another DTC has set, return to the Symptom List and follow the path specified for that DTC.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 6	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If the PCM was replaced, perform steps 3 through 5 then continue with the verification. Otherwise, skip those steps and continue. 3. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 4. For ABS and Airbag Systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Airbag modules. 5. For SKIM theft alarm: Connect DRBIII® to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM 6. If any existing diagnostic trouble codes are not repaired, go to symptom list and follow path specified. After all diagnostic trouble codes have been repaired, return to TEST VER-6A and run LDP Dealer Test Mode under Systems Test in DRBIII. 7. The LDP Monitor Test Mode has been added to the DRBIII® to verify repairs to the LDP System. A DRBIII® software program was written which causes the PCM to run the LDP Monitor as part of this test. Test failures will be indicated through a stored DTC. 8. LDP Monitor Test Mode is a useful way to run a total system performance test. Use this test to verify any type of LDP system repair. 9. Software program makes temporary changes to operating mode of PCM. For this reason, it is critical that test not be interrupted. PCM's left in this mode as result of interrupted test will illuminate the MIL for 8-10 mi of driving with no DTC's stored. 10. Erasing DTC's will not change this condition. 11. If a vehicle is found to be stuck in the mode described above, the LDP Dealer Test should be re-run in its entirety so that the software program in the DRBIII® can restore the PCM operating mode. 12. Note similarity to LDP Monitor screen found under OBDII Monitors. Failure modes are fewer in this System Test than OBDII LDP Monitor. System Test only stores Small Leak DTC to indicate problem with system. No other type of failure mode indication given. 13. System Test failure may have been, for example, due to a large leak, but the PCM will set the Small Leak DTC to indicate failures that occurred as part of the system test. 14. Connect the DRBIII® to the data link connector. Engine running, turn off all accessories. 15. Note: While test is being performed, PCM must see RPM, minimum MAP, No Vehicle speed and minimum Throttle Position sensor (At idle, in park.) With DRBIII® in System Tests, perform the LDP Monitor Test and follow the instructions on the screen. 16. If the LDP Monitor Test failed and a Small Leak DTC has set, the repair is not complete. Check for any related Technical Service Bulletins and return to Symptom List. 17. If any other trouble code has set, return to Symptom List and follow the path specified for that trouble code. If the LDP Monitor Test passed, the repair was successful and testing is now complete.	All

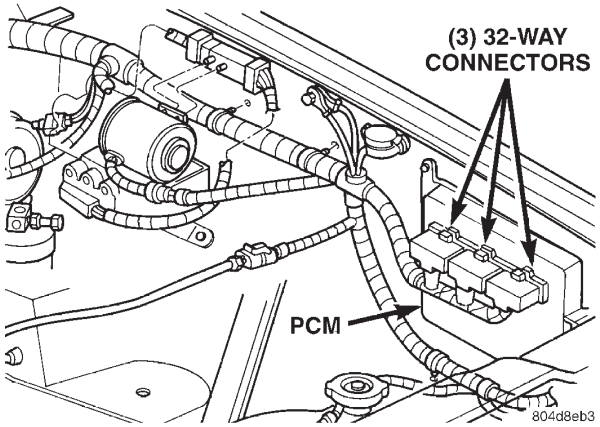
Verification Tests — Continued

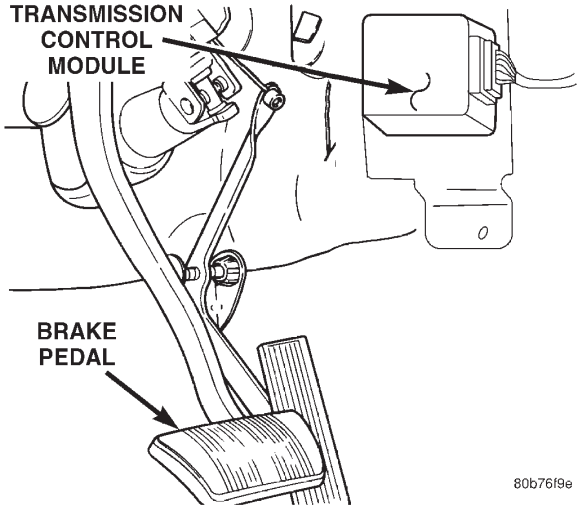
ROAD TEST VERIFICATION - VER-2	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If this verification procedure is being performed after a non-DTC test, perform steps 3 and 4. 3. Check to see if the initial symptom still exists. If there are no trouble codes and the symptom no longer exists, the repair was successful and testing is now complete. 4. If the initial or another symptom exists, the repair is not complete. Check all pertinent Technical Service Bulletins (TSBs) and return to the Symptom List if necessary. 5. For previously read DTCs that have not been dealt with, return to the Symptom List and follow the diagnostic path for that DTC; otherwise, continue. 6. If the engine control module (ECM) has not been changed, perform steps 7 and 8, otherwise, continue with step 9. 7. With the DRB, erase all diagnostic trouble codes (DTCs), then disconnect the DRB. 8. Turn the ignition off for at least 10 seconds. 9. Ensure no DTCs remain by performing steps 10 through 13. 10. Road test the vehicle. For some of the road test, go at least 64 km/h (40 MPH). If this test is for an A/C Relay Control Circuit, drive the vehicle for at least 5 minutes with the A/C on. 11. At some point, stop the vehicle and turn the engine off for at least 10 seconds, then restart the engine and continue. 12. Upon completion of the road test, turn the engine off and check for DTCs with the DRB. 13. If the repaired DTC has reset, the repair is not complete. Check for any pertinent Technical Service Bulletins (TSBs) and return to the Symptom List. If there are no DTCs, the repair was successful and is now complete. Are any DTCs or symptoms remaining? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

SKIS VERIFICATION	APPLICABILITY
1. Reconnect all previously disconnected components and connectors. 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). **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.** 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. 5. With the DRB III, select Theft Alarm, SKIM and Miscellaneous. Then select desired procedure and follow the steps that will be displayed. 6. If the SKIM has been replaced, ensure all of the vehicle ignition keys are programmed to the new SKIM. **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.** 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. 9. With the DRB III, read the SKIM DTC's. Are there any SKIM DTC's? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

8.0 COMPONENT LOCATIONS

8.1 CONTROL MODULES AND PDC





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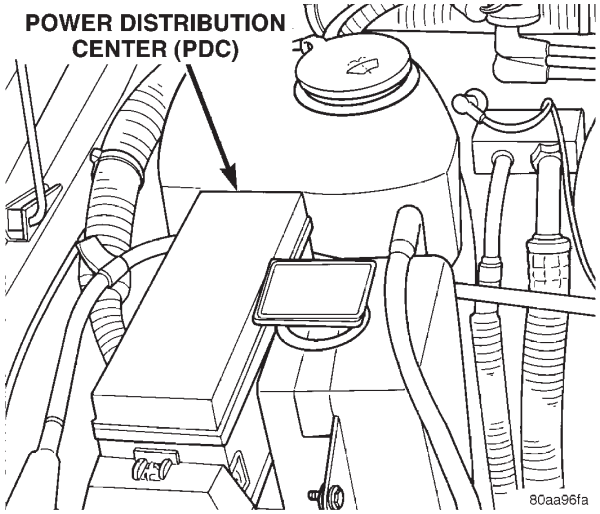

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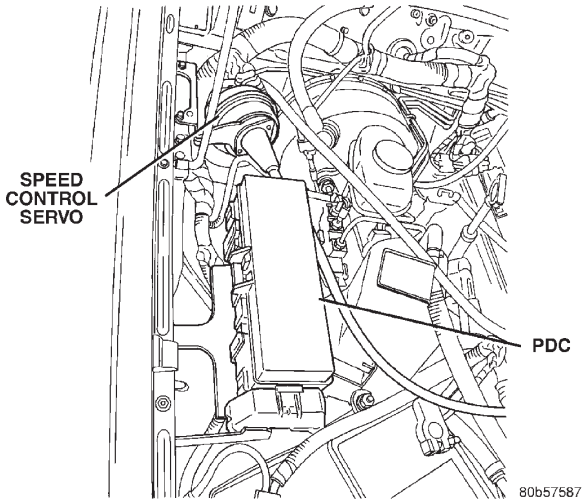
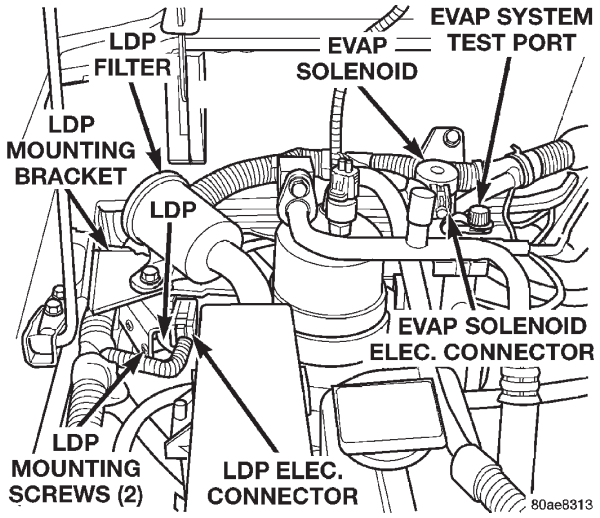


8.2 CONTROLS AND SOLENOIDS

LHD



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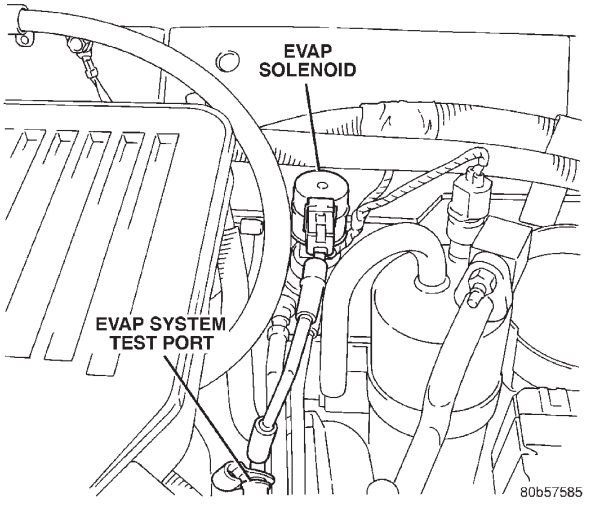
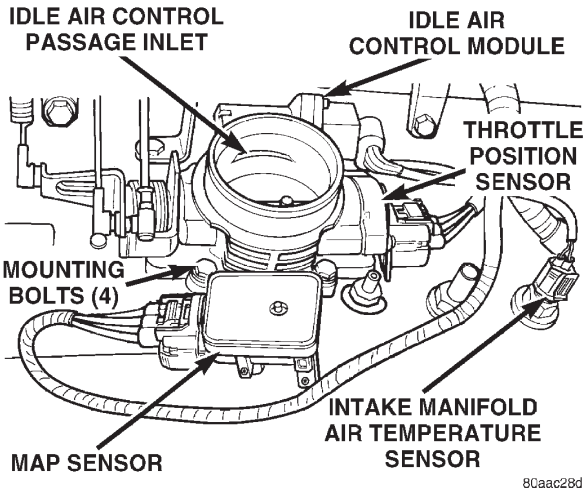
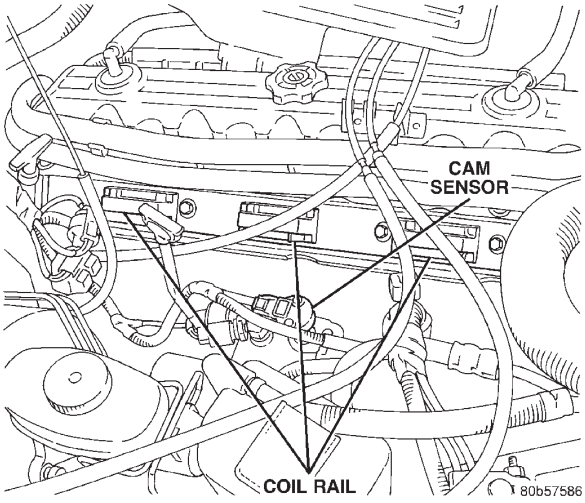
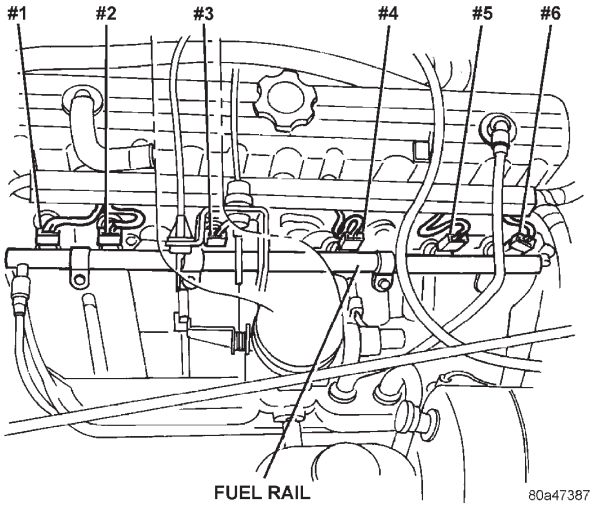


8.2 CONTROLS AND SOLENOIDS (Continued)







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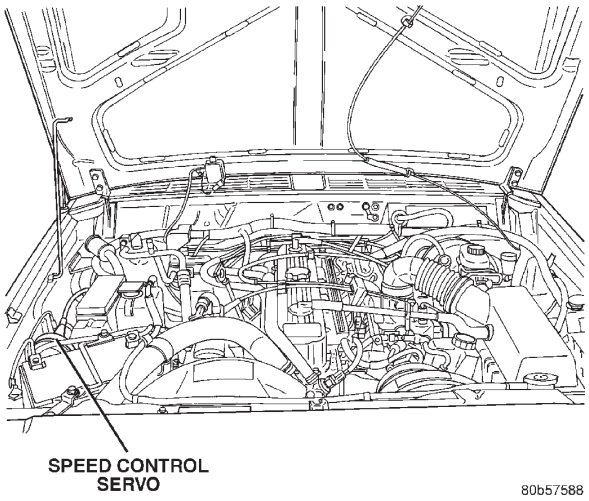

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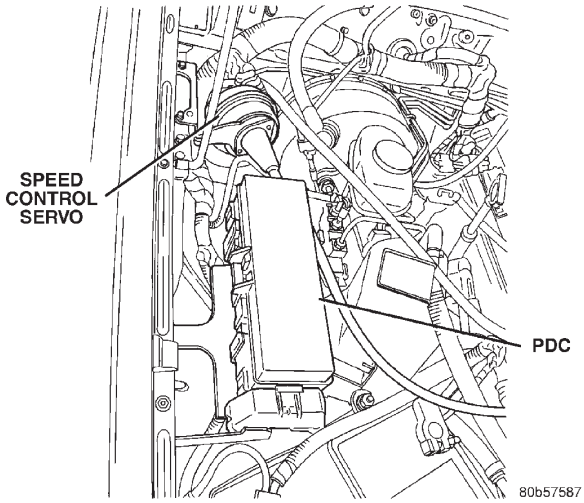

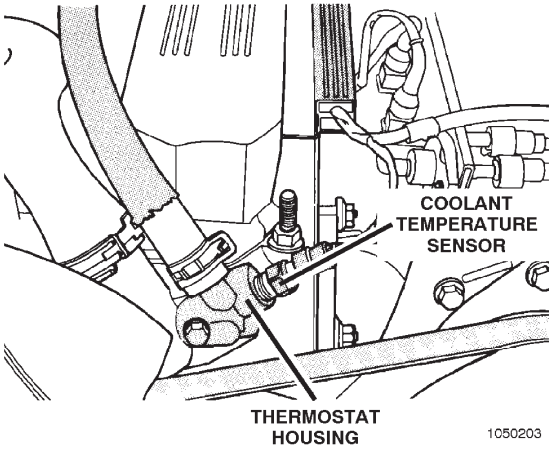

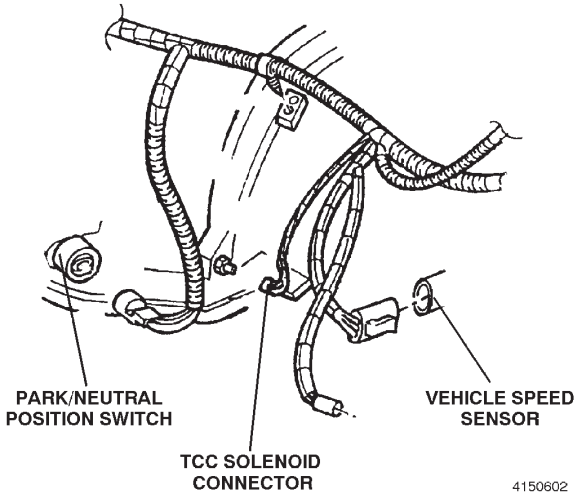

8.3 DATA LINK CONNECTOR

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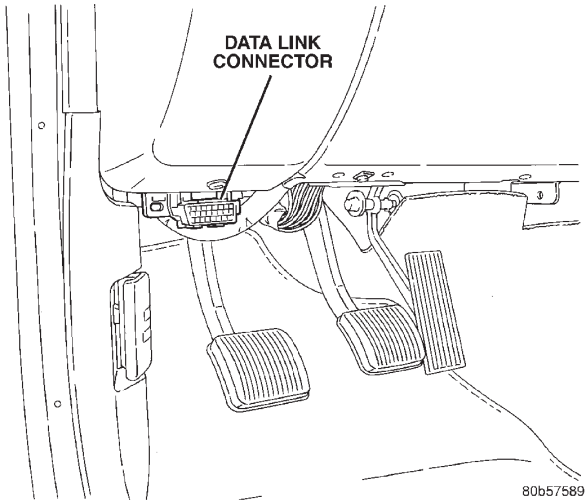

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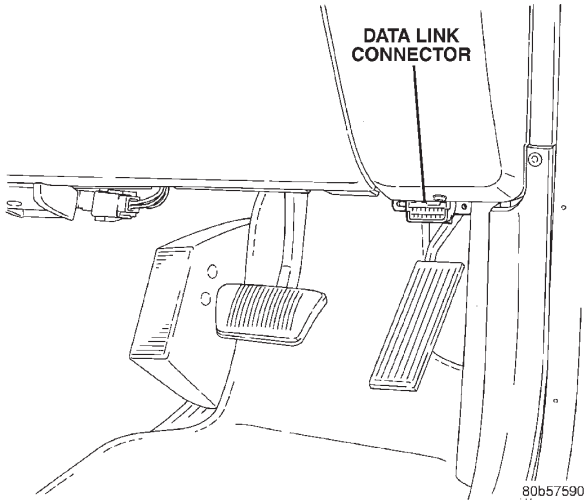
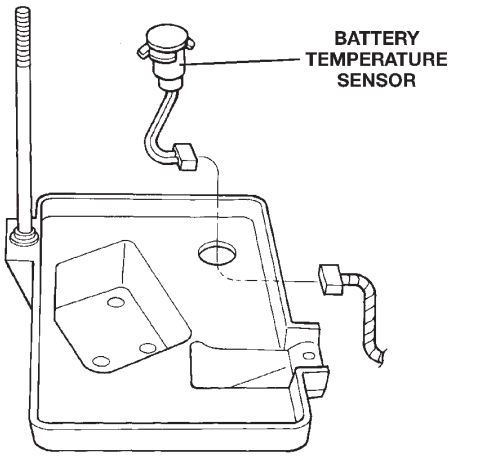
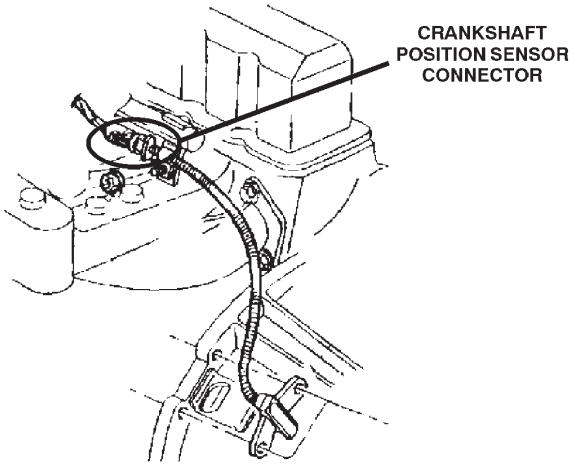


8.4 SENSORS





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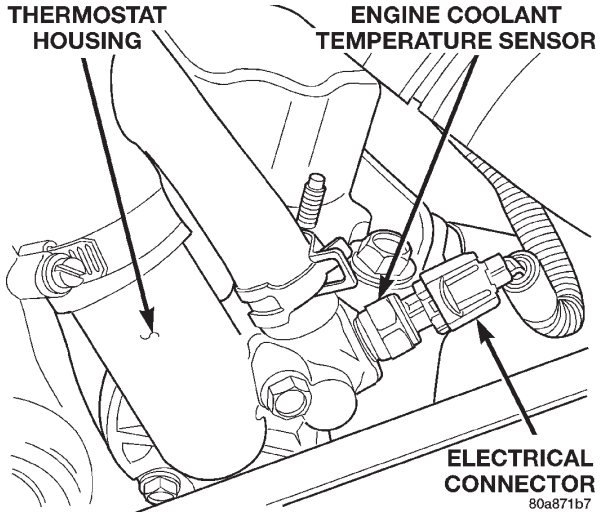
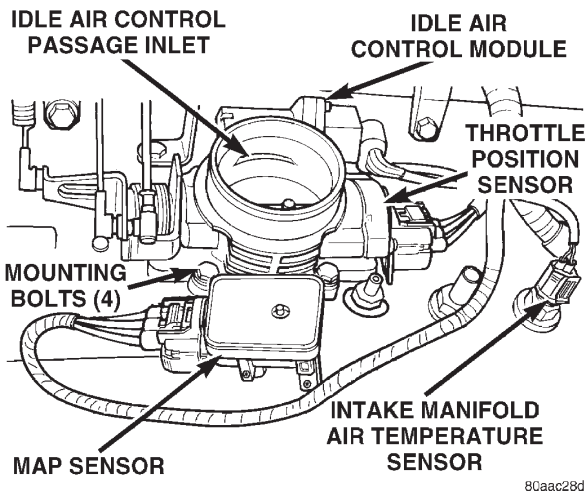
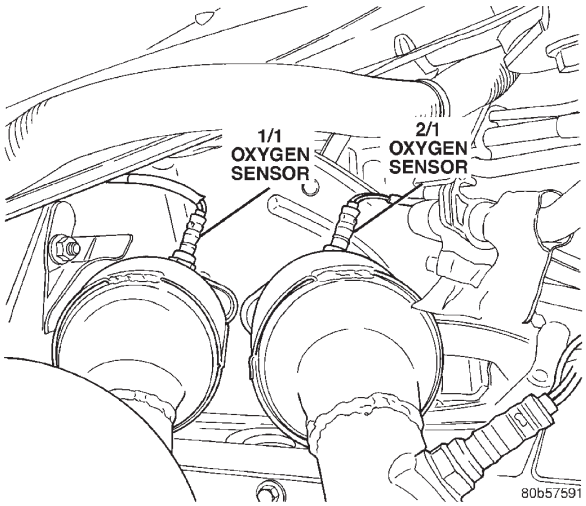
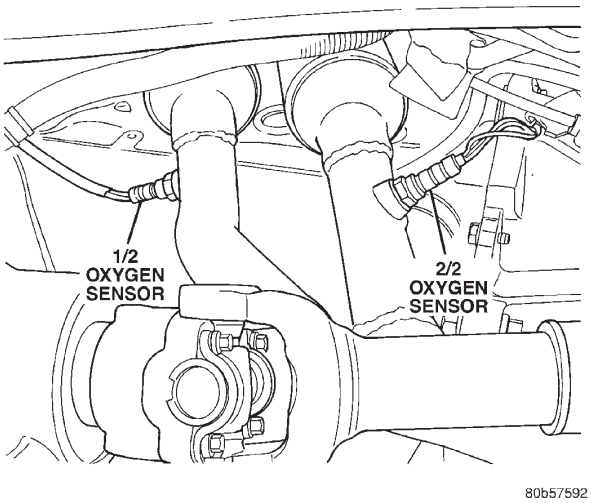




UPSTREAM OXYGEN SENSORS

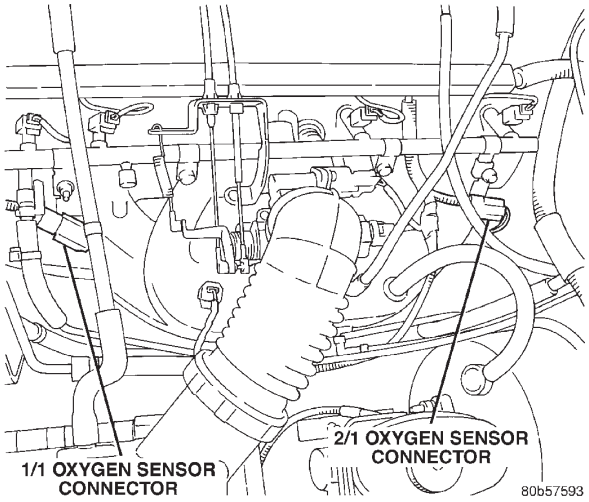


DOWNSTREAM OXYGEN SENSORS

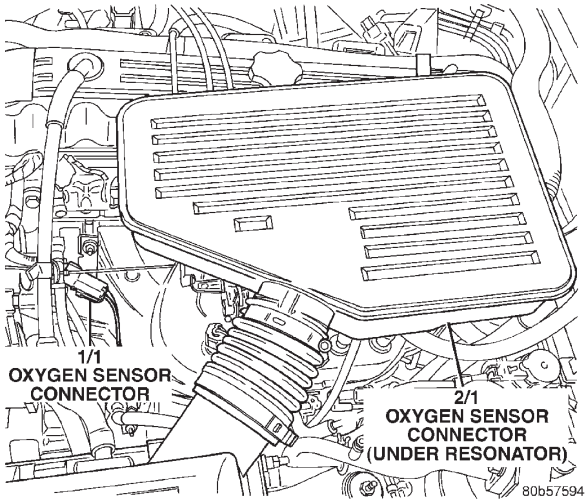


UPSTREAM

LHD

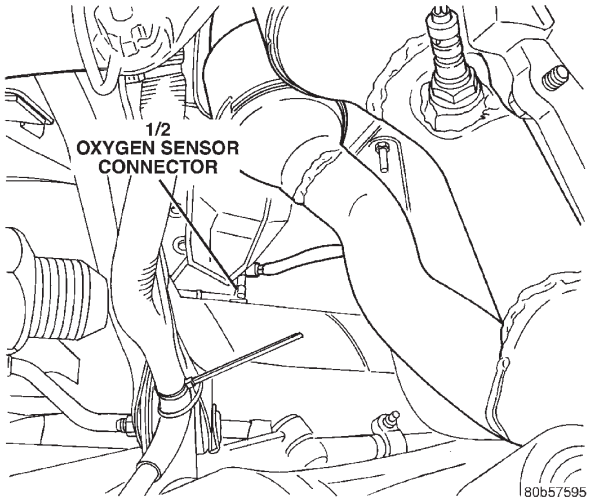


RHD

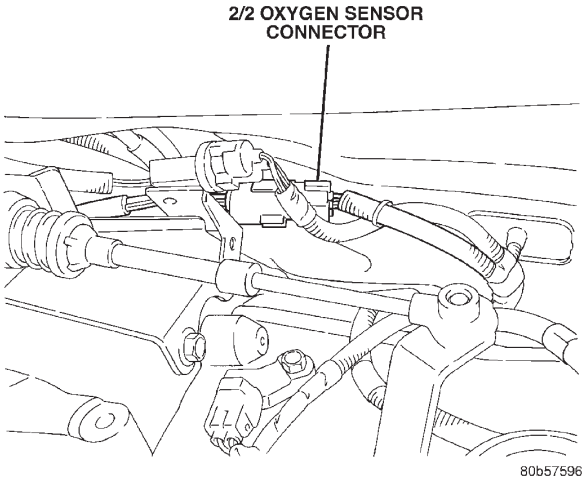


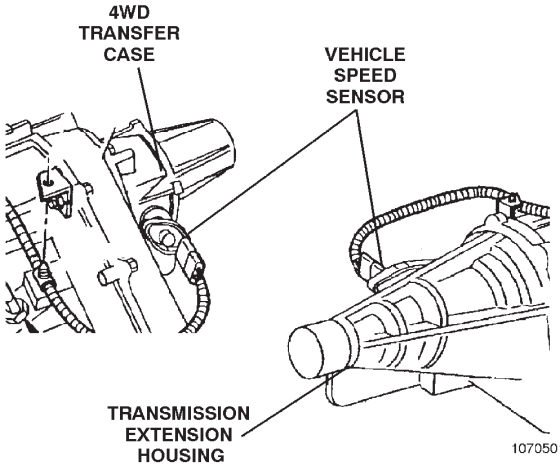
DOWNSTREAM

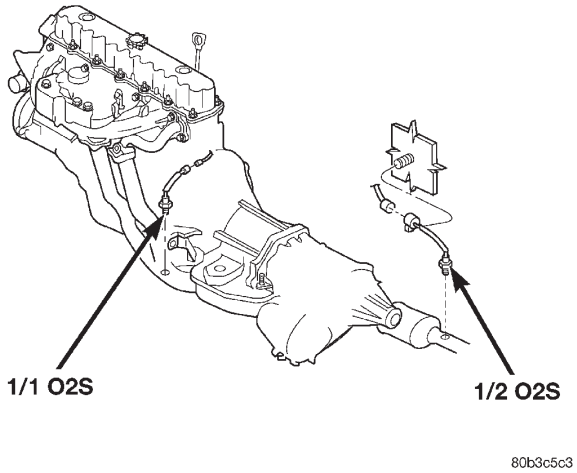
1/2



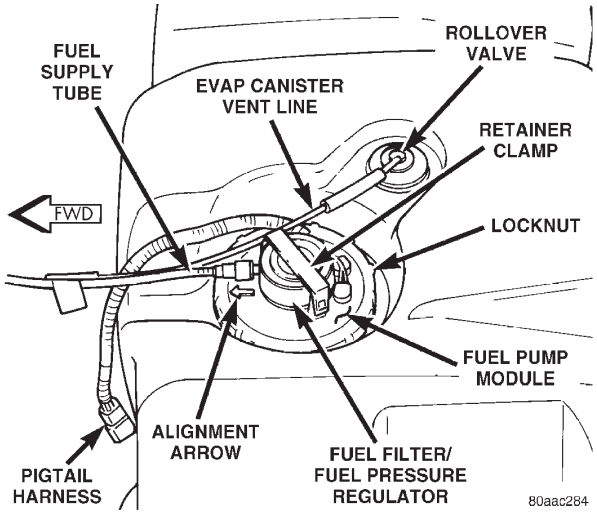
2/2

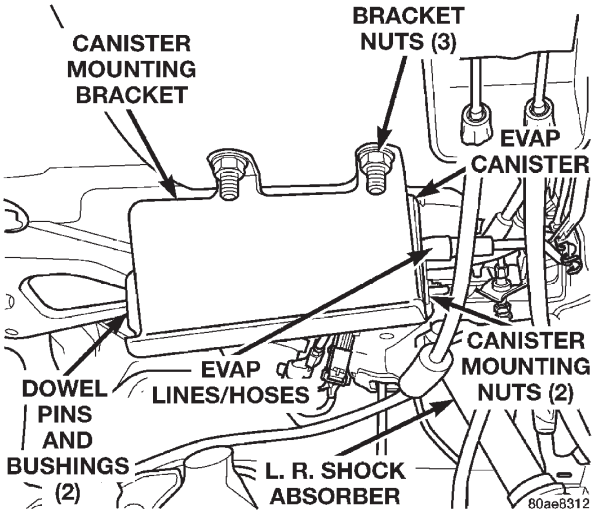




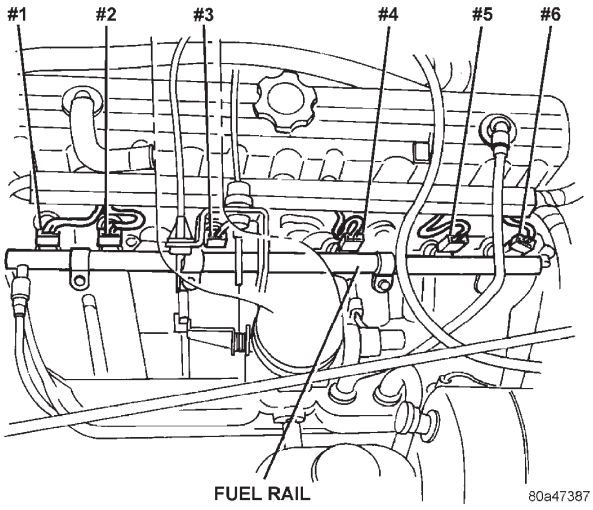


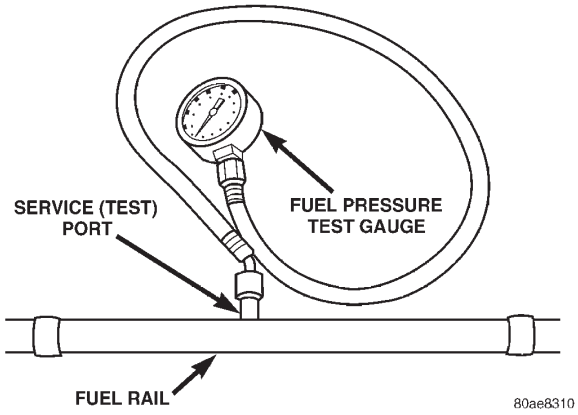
8.5 FUEL SYSTEM

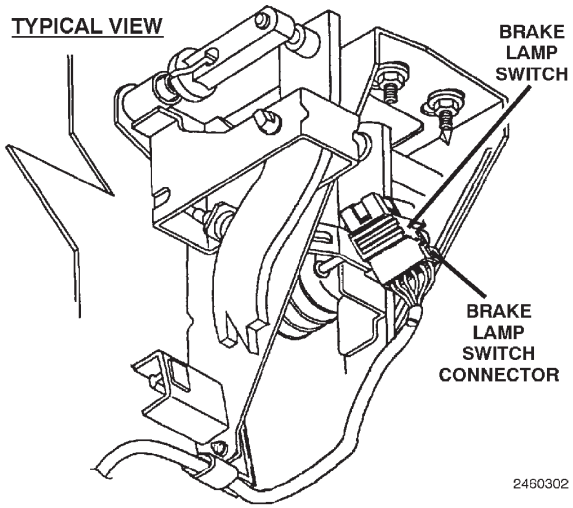


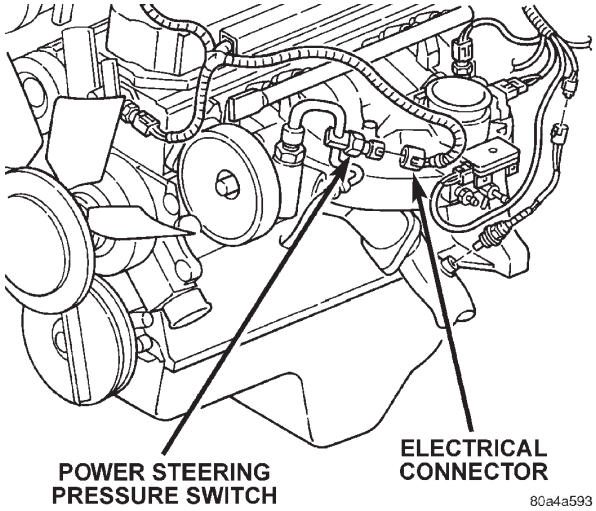


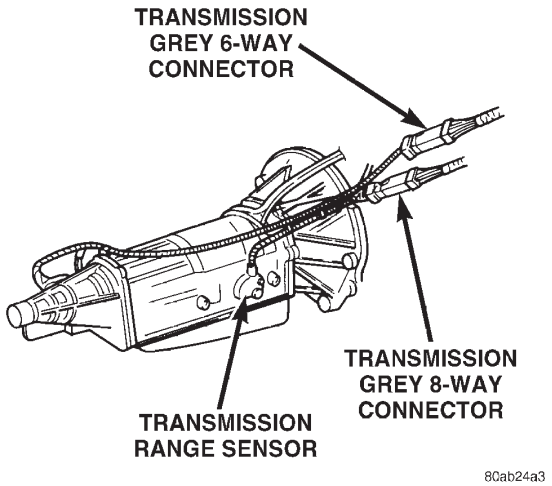
8.5 FUEL SYSTEM (Continued)

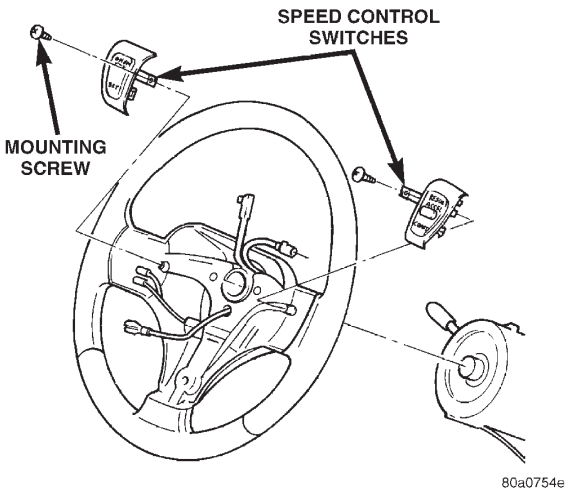


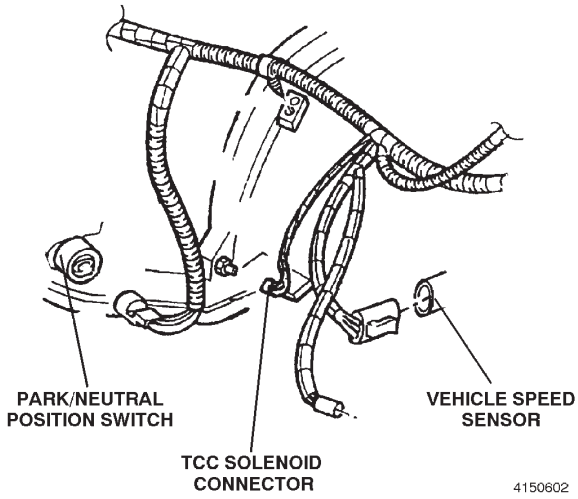






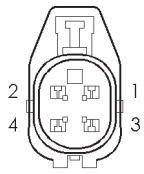





PARK/NEUTRAL
POSITION SWITCH
TCC SOLENOID
CONNECTOR
VEHICLE SPEED
SENSOR
4150602

NOTES

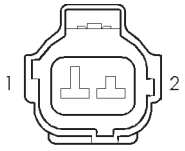
9.0 CONNECTOR PINOUTS



A/C HIGH PRESSURE SWITCH

A/C HIGH PRESSURE SWITCH - 4 WAY

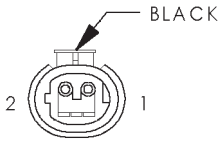
CAV	CIRCUIT	FUNCTION
1	C21 20DB/PK	A/C SWITCH SENSE
2	C48 18TN	RADIATOR FAN REQUEST
3	C90 20LG (GAS)	A/C SWITCH SENSE
3	Z1 18BK (DIESEL)	GROUND
4	C22 20DB/WT (DIESEL)	A/C PRESSURE SWITCH SENSE
4	C90 20LG (GAS)	A/C SWITCH SENSE



A/C LOW PRESSURE SWITCH

A/C LOW PRESSURE SWITCH - 2 WAY

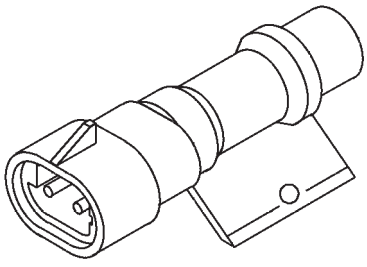
CAV	CIRCUIT	FUNCTION
1	Z1 20BK (DIESEL)	GROUND
1	C22 18DB/WT (GAS)	PRESSURE SWITCH OUTPUT
2	C21 20DB/PK	A/C SWITCH SENSE



AMBIENT TEMPERATURE SENSOR

AMBIENT TEMPERATURE SENSOR - BLACK 2 WAY

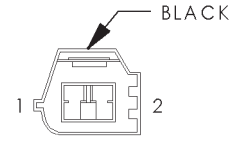
CAV	CIRCUIT	FUNCTION
1	G31 20VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
2	G32 20BK/LB	SENSOR GROUND



AMBIENT TEMPERATURE SENSOR (SENSOR SIDE)

AMBIENT TEMPERATURE SENSOR -2 WAY (SENSOR SIDE)

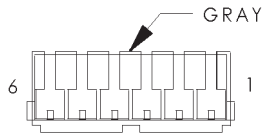
CAV	CIRCUIT	FUNCTION
1	-	AMBIENT TEMPERATURE SENSOR SIGNAL
2	-	SENSOR GROUND



BATTERY TEMPERATURE SENSOR (GAS)

BATTERY TEMPERATURE SENSOR (GAS) - BLACK 2 WAY

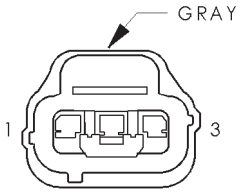
CAV	CIRCUIT	FUNCTION
1	K118 18PK/YL	BATTERY TEMPERATURE SENSOR SIGNAL
2	K167 20BR/YL	SENSOR GROUND



BRAKE LAMP SWITCH

BRAKE LAMP SWITCH - GRAY 6 WAY

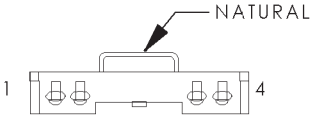
CAV	CIRCUIT	FUNCTION
1	K29 18WT/PK (GAS)	BRAKE LAMP SWITCH SENSE
1	K29 18WT/PK (DIESEL)	SECONDARY BRAKE SWITCH SIGNAL
2	Z1 18BK	GROUND
2	Z1 20BK (LHD BUILT UP EXPORT)	GROUND
3	V32 20YL/RD	SPEED CONTROL SUPPLY
4	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
5	L50 20WT/TN (LHD GAS)	BRAKE LAMP SWITCH OUTPUT
5	L50 20WT/TN (GAS)	BRAKE LAMP SWITCH OUTPUT
5	L50 20WT/TN (DIESEL)	PRIMARY BRAKE SWITCH SIGNAL
6	F32 20PK/DB	FUSED B(+)



CAMSHAFT POSITION SENSOR (GAS)

CAMSHAFT POSITION SENSOR (GAS) - GRAY 3 WAY

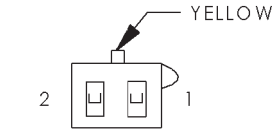
CAV	CIRCUIT	FUNCTION
1	K44 18TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
2	K167 20BR/YL	SENSOR GROUND
3	K7 18OR	5V SUPPLY



CLOCKSPRING - C1

CLOCKSPRING C1 - NATURAL 4 WAY

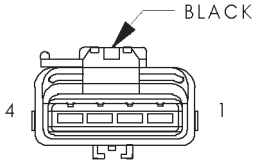
CAV	CIRCUIT	FUNCTION
1	X3 20BK/RD	HORN RELAY CONTROL
2	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
3	K4 20BK/RD	SENSOR GROUND
4	-	-



CLOCKSPRING - C2

CLOCKSPRING C2 - YELLOW 2 WAY

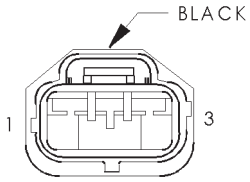
CAV	CIRCUIT	FUNCTION
A	R45 18DG/LB	DRIVER AIRBAG LINE 2
B	R43 18BK/LB	DRIVER AIRBAG LINE 1



COIL RAIL

COIL RAIL - BLACK 4 WAY

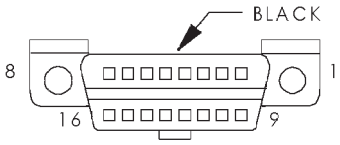
CAV	CIRCUIT	FUNCTION
1	K19 18GY	IGNITION COIL NO. 1 DRIVER
2	A142 18DG/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
3	K17 18DB/TN	IGNITION COIL NO. 2 DRIVER
4	K18 18RD/YL	IGNITION COIL NO. 3 DRIVER



CRANKSHAFT POSITION SENSOR (GAS)

CRANKSHAFT POSITION SENSOR - BLACK 3 WAY

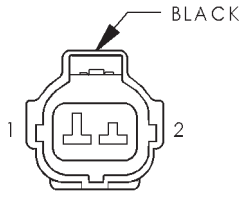
CAV	CIRCUIT	FUNCTION
1	K24 18GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
2	K167 20BR/YL	SENSOR GROUND
3	K7 20OR	5V SUPPLY



DATA LINK CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

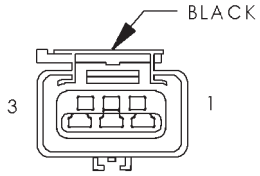
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	D1 18VT/BR	CCD BUS (+)
4	Z1 18BK	GROUND
5	Z12 18BK/TN	GROUND
6	D20 20LG/BK	SCI RECEIVE
7	D21 20PK	SCI TRANSMIT
8	-	-
9	-	-
10	-	-
11	D2 18WT/BK	CCD BUS (-)
12	-	-
13	-	-
14	-	-
15	-	-
16	F34 18TN/BK	FUSED B(+)



ENGINE COOLANT TEMPERATURE SENSOR (GAS)

ENGINE COOLANT TEMPERATURE SENSOR (GAS) - BLACK 2 WAY

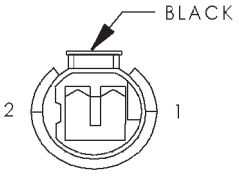
CAV	CIRCUIT	FUNCTION
1	K167 20BR/YL	SENSOR GROUND
2	K2 18TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL



ENGINE OIL PRESSURE SENSOR

ENGINE OIL PRESSURE SENSOR - BLACK 3 WAY

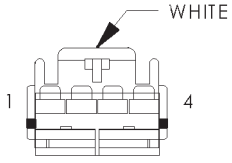
CAV	CIRCUIT	FUNCTION
1	K6 18VT/OR (GAS)	5V SUPPLY
1	K7 20OR (DIESEL)	5V SUPPLY
2	G60 18GY/YL	ENGINE OIL PRESSURE SENSOR SIGNAL
3	K167 18BR/YL (GAS)	SENSOR GROUND
3	K167 20BR/YL (DIESEL)	SENSOR GROUND



EVAP/PURGE SOLENOID (GAS)

EVAP/PURGE SOLENOID (GAS)- BLACK 2 WAY

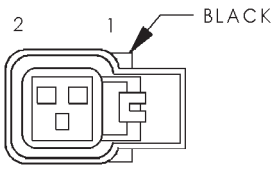
CAV	CIRCUIT	FUNCTION
1	K52 18PK/BK	DUTY CYCLE EVAP PURGE/SOLENOID CONTROL
2	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)



EXTENDED IDLE SWITCH (POLICE PACKAGE)

EXTENDED IDLE SWITCH (POLICE PACKAGE) - WHITE 4 WAY

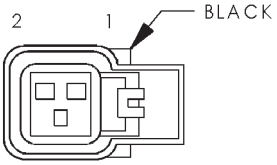
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	K78 20GY	IDLE ACTUATOR
3	F15 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN)
4	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL



FUEL INJECTOR NO. 1

FUEL INJECTOR NO. 1 - BLACK 2 WAY

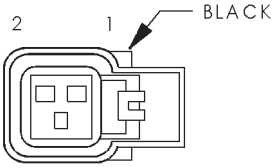
CAV	CIRCUIT	FUNCTION
1	A142 18DG/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER



FUEL INJECTOR NO. 2

FUEL INJECTOR NO. 2 - BLACK 2 WAY

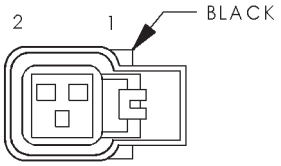
CAV	CIRCUIT	FUNCTION
1	A142 18DG/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K11 18TN	FUEL INJECTOR NO. 2 DRIVER



FUEL INJECTOR NO. 3

FUEL INJECTOR NO. 3 - BLACK 2 WAY

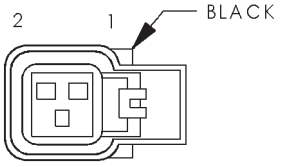
CAV	CIRCUIT	FUNCTION
1	A142 18DG/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER



FUEL INJECTOR NO. 4

FUEL INJECTOR NO. 4 - BLACK 2 WAY

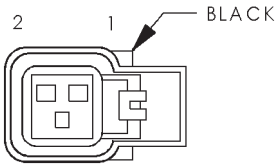
CAV	CIRCUIT	FUNCTION
1	A142 18DG/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K11 18LB/BR	FUEL INJECTOR NO. 4 DRIVER



FUEL INJECTOR NO. 5

FUEL INJECTOR NO. 5 - BLACK 2 WAY

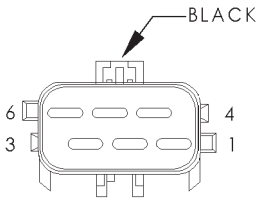
CAV	CIRCUIT	FUNCTION
1	A142 18DG/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K15 18PK/BK	FUEL INJECTOR NO. 5 DRIVER



FUEL INJECTOR NO. 6

FUEL INJECTOR NO. 6 - BLACK 2 WAY

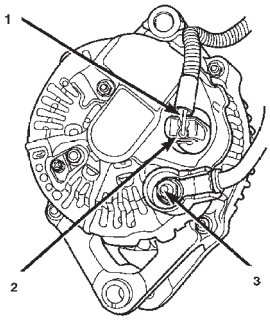
CAV	CIRCUIT	FUNCTION
1	A142 18DG/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K16 18LG/BK	FUEL INJECTOR NO. 6 DRIVER



FUEL PUMP MODULE (GAS)

FUEL PUMP MODULE (GAS) - BLACK 6 WAY

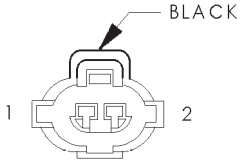
CAV	CIRCUIT	FUNCTION
1	A141 16DG/WT	FUEL PUMP RELAY OUTPUT
2	-	-
3	K226 20DB/LG	FUEL LEVEL SENSOR SIGNAL
4	K167 20BR/YL	SENSOR GROUND
5	-	-
6	Z1 16BK	GROUND



GENERATOR

GENERATOR - 3 WAY

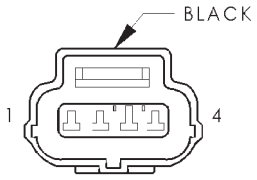
CAV	CIRCUIT	FUNCTION
1	-	FIELD WIRES
2	-	FIELD WIRE CONNECTOR
3	-	B(+) (OUTPUT TERMINALS)



GENERATOR

GENERATOR - BLACK 2 WAY

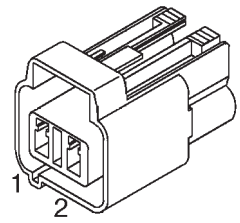
CAV	CIRCUIT	FUNCTION
1	K72 16DG/OR (GAS)	GENERATOR SOURCE
1	K72 18DG/OR (DIESEL)	GENERATOR SOURCE
2	K20 16DG (GAS)	GENERATOR FIELD
2	K20 18DG (DIESEL)	GENERATOR FIELD



IDLE AIR CONTROL MOTOR

IDLE AIR CONTROL MOTOR - BLACK 4 WAY

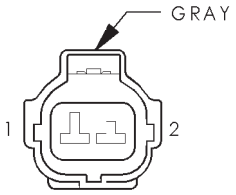
CAV	CIRCUIT	FUNCTION
1	K59 18VT/BK	IDLE AIR CONTROL NO. 4 DRIVER
2	K40 18BR/WT	IDLE AIR CONTROL NO. 3 DRIVER
3	K60 18YL/BK	IDLE AIR CONTROL NO. 2 DRIVER
4	K39 18GY/RD	IDLE AIR CONTROL NO. 1 DRIVER



INPUT SPEED SENSOR CONNECTOR

INPUT SPEED SENSOR CONNECTOR - 2 WAY

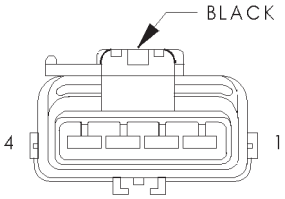
CAV	CIRCUIT	FUNCTION
1	VT/BK	INPUT SPEED SENSOR GROUND
2	BK/RD	INPUT SPEED SENSOR SIGNAL



INTAKE AIR TEMPERATURE SENSOR

INTAKE AIR TEMPERATURE SENSOR - GRAY 2 WAY

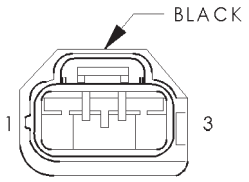
CAV	CIRCUIT	FUNCTION
1	K167 20BR/YL	SENSOR GROUND
2	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL



LEAK DETECTION PUMP

LEAK DETECTION PUMP - BLACK 4 WAY

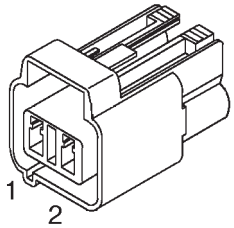
CAV	CIRCUIT	FUNCTION
1	-	-
2	K72 18DG/OR	GENERATOR DRIVER
3	K106 18WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
4	K105 18WT/OR	LEAK DETECTION PUMP SWITCH SENSE



MANIFOLD ABSOLUTE PRESSURE SENSOR

MANIFOLD ABSOLUTE PRESSURE SENSOR - BLACK 3 WAY

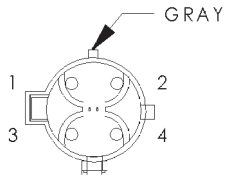
CAV	CIRCUIT	FUNCTION
1	K167 20BR/YL	SENSOR GROUND
2	K1 18DG/RD	MANIFOLD ABSOLUTE PRESSURE SENSOR SIGNAL
3	K7 20OR	5V SUPPLY



OUTPUT SPEED SENSOR CONNECTOR

OUTPUT SPEED SENSOR CONNECTOR - 2 WAY

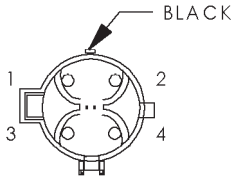
CAV	CIRCUIT	FUNCTION
1	VT/BK	OUTPUT SPEED SENSOR GROUND
2	BK/RD	OUTPUT SPEED SENSOR SIGNAL



OXYGEN SENSOR 1/1 UPSTREAM

OXYGEN SENSOR 1/1 UPSTREAM - GRAY 4 WAY

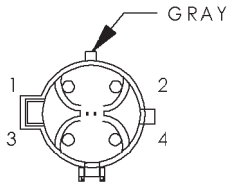
CAV	CIRCUIT	FUNCTION
1	A42 20DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	Z1 20BK	GROUND
3	K167 20BR/YL	SENSOR GROUND
4	K41 18BK/DG	OXYGEN SENSOR 1/1 SIGNAL



OXYGEN SENSOR 1/2 DOWNSTREAM

OXYGEN SENSOR 1/2 DOWNSTREAM - BLACK 4 WAY

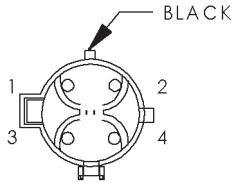
CAV	CIRCUIT	FUNCTION
1	A242 20VT/OR	OXYGEN SENSOR RELAY OUTPUT
2	Z1 20BK	GROUND
3	K167 20BR/YL	SENSOR GROUND
4	K141 18TN/WT	OXYGEN SENSOR 1/2 SIGNAL



OXYGEN SENSOR 2/1 UPSTREAM (CALIFORNIA/ EUROPEAN III)

OXYGEN SENSOR 2/1 UPSTREAM (CALIFORNIA/EUROPEAN III) - GRAY 4 WAY

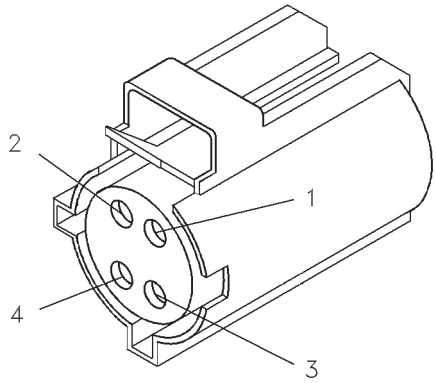
CAV	CIRCUIT	FUNCTION
1	A42 20DG	OXYGEN SENSOR RELAY OUTPUT
2	Z1 20BK	GROUND
3	K167 20BR/YL	SENSOR GROUND
4	K241 18LG/RD	OXYGEN SENSOR 2/1 SIGNAL



OXYGEN SENSOR 2/2 DOWNSTREAM (CALIFORNIA/ EUROPEAN III)

OXYGEN SENSOR 2/2 DOWNSTREAM (CALIFORNIA/EUROPEAN III) - BLACK 4 WAY

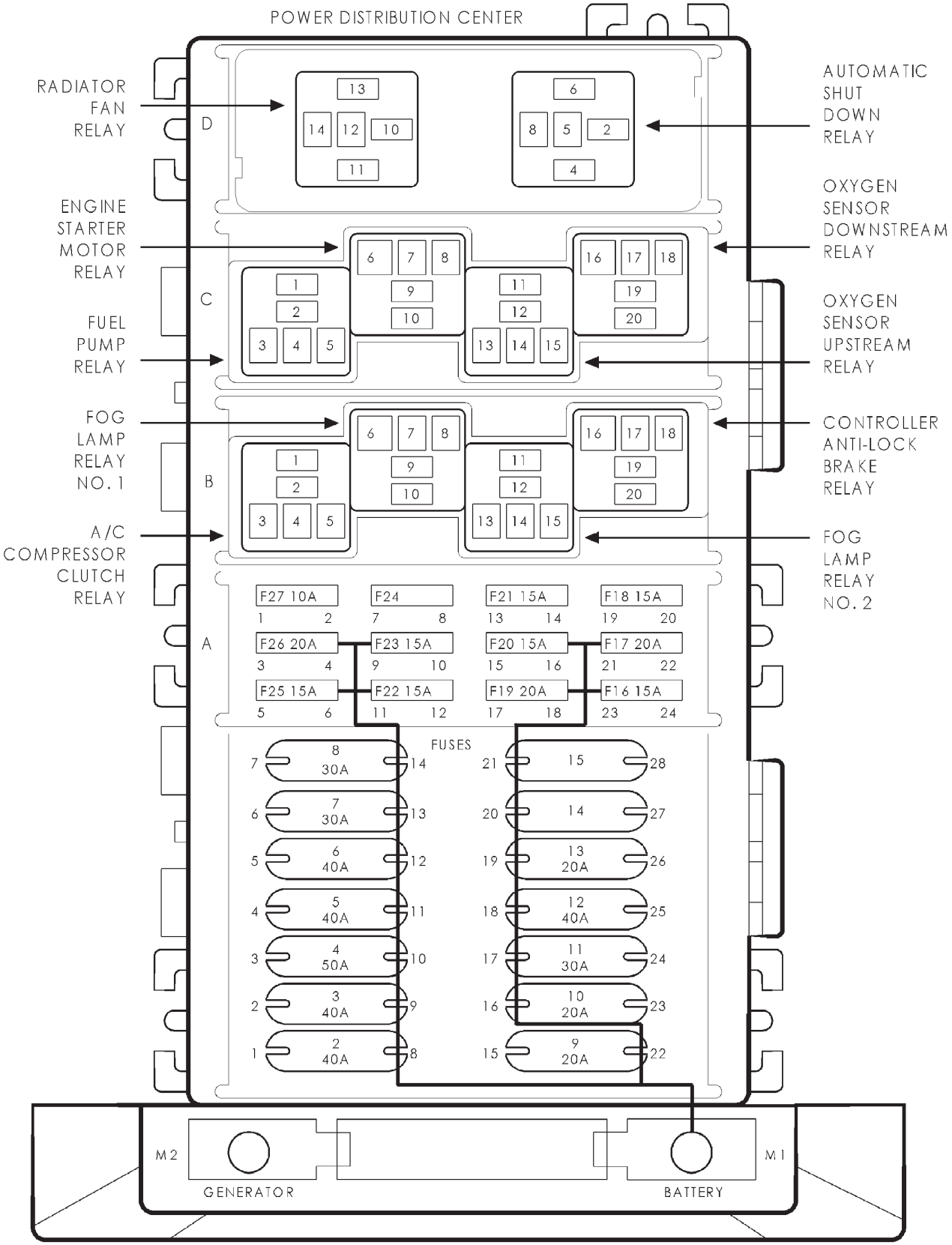
CAV	CIRCUIT	FUNCTION
1	A242 20VT/OR	OXYGEN SENSOR RELAY OUTPUT
2	Z1 20BK	GROUND
3	K167 20BR/YL	SENSOR GROUND
4	K341 18TN	OXYGEN SENSOR 2/2 SIGNAL



OXYGEN SENSOR CONNECTOR (COMPONENT SIDE)

OXYGEN SENSOR CONNECTOR - 4 WAY (COMPONENT SIDE)

CAV	CIRCUIT	FUNCTION
1	-	GROUND
2	-	AUTOMATIC SHUT DOWN RELAY OUTPUT
3	-	OXYGEN SENSOR GROUND
4	-	OXYGEN SENSOR SIGNAL


POWER DISTRIBUTION CENTER
RADIATOR FAN RELAY
ENGINE STARTER MOTOR RELAY
FUEL PUMP RELAY
FOG LAMP RELAY NO. 1
A/C COMPRESSOR CLUTCH RELAY
AUTOMATIC SHUT DOWN RELAY
OXYGEN SENSOR DOWNSTREAM RELAY
OXYGEN SENSOR UPSTREAM RELAY
CONTROLLER ANTI-LOCK BRAKE RELAY
FOG LAMP RELAY NO. 2
D
C
B
A
F27 10A
F24
F21 15A
F18 15A
F26 20A
F23 15A
F20 15A
F17 20A
F25 15A
F22 15A
F19 20A
F16 15A
FUSES
8 30A
7 30A
6 40A
5 40A
4 50A
3 40A
2 40A
15
14
13 20A
12 40A
11 30A
10 20A
9 20A
M2
GENERATOR
BATTERY
M1

FUSES (PDC)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	-	-	-
2	40A	A1 12RD	FUSED B(+)
3	40A	A2 12PK/BK	FUSED B(+)
4	50A	A7 10RD/BK	FUSED B(+)
5	40A	F141 12LG/RD	FUSED B(+)
6	40A	A111 12RD/LG	FUSED B(+)
7	30A	A3 14RD/WT	FUSED B(+)
7	30A	A3 14RD/WT (DRL)	FUSED B(+)
8	30A	A16 14RD/LG	FUSED B(+)
9	20A	A17 16RD/BK	FUSED B(+)
9	20A	A17 16RD/BK	FUSED B(+)
10	20A	A41 16YL	FUSED B(+)
11	30A	A4 12BK/PK	FUSED B(+)
12 (ABS)	40A	A10 12RD/DG	FUSED B(+)
13 (ABS)	20A	A20 12RD/DB	FUSED B(+)
14	-	-	-
15	-	-	-
16	15A	M1 20PK	FUSED B(+)
17	20A	F99 18RD	FUSED B(+)
18	15A	A142 18DG/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
19	20A	F34 18TN/BK	FUSED B(+)
20	15A	L9 20BK/PK	FUSED B(+)
21	15A	F142 18DG/WT	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
22	15A	A61 14DG/BK	FUSED B(+)
23	15A	F32 20PK/DB	FUSED B(+)
24	-	-	-
25	15A	F61 20WT/OR	FUSED B(+)
26	20A	F75 16VT	FUSED B(+)
27 (ABS)	10A	F1 20DB/GY	A17 16RD/BK

A/C COMPRESSOR CLUTCH RELAY (GAS)

CAV	CIRCUIT	FUNCTION
B1	A17 16RD/BK	FUSED B(+)
B2	C3 16DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
B3	C13 18DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
B4	-	-
B5	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)

AUTOMATIC SHUT DOWN RELAY (GAS)

CAV	CIRCUIT	FUNCTION
D2	A16 14RD/LG	FUSED B(+)
D4	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
D5	-	-
D6	K51 18DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
D8	A999 16RD	AUTOMATIC SHUT DOWN RELAY OUTPUT
D8	A999 16RD	AUTOMATIC SHUT DOWN RELAY OUTPUT

CONTROLLER ANTILOCK BRAKE RELAY (GAS)

CAV	CIRCUIT	FUNCTION
B16	F15 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN)
B17	Z1 20BK	GROUND
B17	Z1 20BK (ABS EXCEPT DRL)	GROUND
B18	G83 18GY/BK	ABS RELAY CONTROL
B19	-	-
B20	G19 20LG/OR	ABS WARNING INDICATOR DRIVER

ENGINE STARTER MOTOR RELAY (A/T GAS)

CAV	CIRCUIT	FUNCTION
C6	T41 20BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE
C6	T41 20BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE
C7	-	-
C8	F45 20YL/RD (LHD)	FUSED B(+) ENGINE STARTER MOTOR RELAY
C8	T141 20YL (RHD)	IGNITION SWITCH OUTPUT (START)
C9	T40 16BR	ENGINE STARTER MOTOR RELAY OUTPUT
C10	A41 16YL	FUSED B(+)

ENGINE STARTER MOTOR RELAY (M/T GAS)

CAV	CIRCUIT	FUNCTION
C6	Z1 20BK	GROUND
C6	Z1 20BK (BASE)	GROUND
C7	-	-
C8	T141 20YL	IGNITION SWITCH OUTPUT (START)
C9	T40 16BR	ENGINE STARTER MOTOR RELAY OUTPUT
C10	A41 16YL	FUSED B(+)

FOG LAMP RELAY NO.1 (GAS)

CAV	CIRCUIT	FUNCTION
B6	G34 16RD/GY (DRL)	HIGH BEAM INDICATOR DRIVER
B6	G34 16RD/GY (DRL)	HIGH BEAM INDICATOR DRIVER
B6	L33 20RD/WT (EXCEPRT DRL)	FUSED B(+)
B7	L139 20VT	FOG LAMP RELAY OUTPUT NO. 1
B8	Z1 20BK	GROUND
B8	Z1 20BK	GROUND
B9	-	-
B10	L77 20BR/YL	FUSED HEADLAMP SWITCH OUTPUT
B10	L77 20BR/YL	FUSED HEADLAMP SWITCH OUTPUT

FOG LAMP RELAY NO.2 (GAS)

CAV	CIRCUIT	FUNCTION
B11	F61 20WT/OR	FUSED B(+)
B12	L39 20LB	FOG LAMP RELAY OUTPUT
B13	Z1 20BK	GROUND
B14	-	-
B15	L92 20PK	FOG LAMP SWITCH OUTPUT

FUEL PUMP RELAY (GAS)

CAV	CIRCUIT	FUNCTION
C1	A61 14DG/BK	FUSED B(+)
C1	A61 16DG/BK	FUSED B(+)
C2	A141 14DG/WT	FUEL PUMP RELAY OUTPUT
C3	K31 18BR	FUEL PUMP RELAY CONTROL
C4	-	-
C5	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)

OXYGEN SENSOR DOWNSTREAM RELAY (GAS)

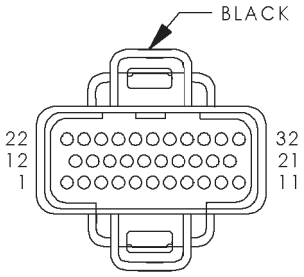
CAV	CIRCUIT	FUNCTION
C16	K74 18BR/VT	OXYGEN SENSOR DOWNSTREAM RELAY CONTROL
C17	-	-
C18	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
C18	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
C19	A242 18VT/OR	OXYGEN SENSOR 1/2 DOWNSTREAM
C20	F99 18RD	FUSED B(+)
C20	F99 18RD	FUSED B(+)

OXYGEN SENSOR UPSTREAM RELAY (GAS)

CAV	CIRCUIT	FUNCTION
C11	F99 18RD	FUSED B(+)
C12	A42 18DG	OXYGEN SENSOR 1/1 UPSTREAM
C13	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
C13	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
C14	-	-
C15	K73 18BR/OR	KNOCK SENSOR SIGNAL (-)

RADIATOR FAN RELAY (GAS)

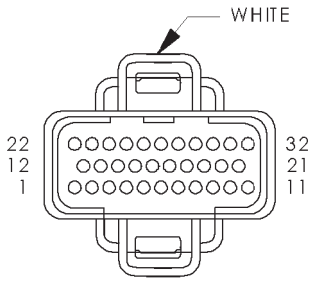
CAV	CIRCUIT	FUNCTION
D10	F141 12LG/RD	FUSED B(+)
D11	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
D11	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
D12	-	-
D13	C27 18DB/PK	RADIATOR FAN RELAY CONTROL
D14	C25 12LB	RADIATOR FAN RELAY OUTPUT



POWERTRAIN CONTROL MODULE - C1 (GAS)

POWERTRAIN CONTROL MODULE C1 (GAS) - BLACK 32 WAY

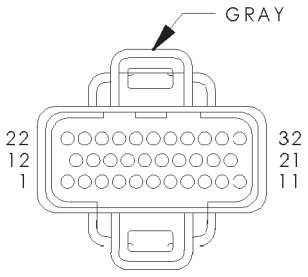
CAV	CIRCUIT	FUNCTION
1	K18 18RD/YL	IGNITION COIL NO. 3 DRIVER
2	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	-	-
4	K167 18BR/YL	SENSOR GROUND
5	-	-
6	T41 18BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE
7	K19 18GY	IGNITION COIL NO. 1 DRIVER
8	K24 18GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
9	-	-
10	K60 18YL/BK	IDLE AIR CONTROL NO. 2 DRIVER
11	K40 18BR/WT	IDLE AIR CONTROL NO. 3 DRIVER
12	K78 18GY (A/T)	IDLE ACTUATOR
13	-	-
14	-	-
15	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL
16	K2 18TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
17	K7 18OR	5V SUPPLY
18	K44 18TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
19	K39 18GY/RD	IDLE AIR CONTROL NO. 1 DRIVER
20	K59 18VT/BK	IDLE AIR CONTROL NO. 4 DRIVER
21	-	-
22	A61 14DG/BK	FUSED B(+)
23	K22 18OR/DB	THROTTLE POSITION SENSOR SIGNAL
24	K41 18BK/DG	OXYGEN SENSOR 1/1 SIGNAL
25	K141 18TN/WT	OXYGEN SENSOR 1/2 SIGNAL
26	K241 18LG/RD (CALIFORNIA/BUILT UP EXPORT)	OXYGEN SENSOR 2/1 SIGNAL
27	K1 18DG/RD	MANIFOLD ABSOLUTE PRESSURE SENSOR SIGNAL
28	-	-
29	K341 18TN (CALIFORNIA/ BUILT UP EXPORT)	OXYGEN SENSOR 2/2 SIGNAL
30	-	-
31	Z12 14BK/TN	GROUND
32	Z12 14BK/TN	GROUND



POWERTRAIN
CONTROL MODULE - C2
(GAS)

POWERTRAIN CONTROL MODULE C2 (GAS) - WHITE 32 WAY

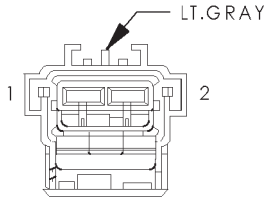
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
5	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
6	K15 18PK/BK	FUEL INJECTOR NO. 5 DRIVER
7	-	-
8	-	-
9	K17 18DB/TN	IGNITION COIL NO. 2 DRIVER
10	K20 18DG	GENERATOR FIELD
11	-	-
12	K16 18LG/BK	FUEL INJECTOR NO. 6 DRIVER
13	-	-
14	-	-
15	K12 18TN	FUEL INJECTOR NO. 2 DRIVER
16	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-
23	G60 18GY/YL	ENGINE OIL PRESSURE SENSOR SIGNAL
24	-	-
25	-	-
26	-	-
27	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL
28	-	-
29	-	-
30	-	-
31	K6 18VT/OR	5V SUPPLY
32	-	-



POWERTRAIN CONTROL MODULE - C3 (GAS)

POWERTRAIN CONTROL MODULE C3 (GAS) - GRAY 32 WAY

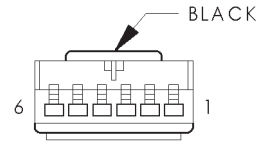
CAV	CIRCUIT	FUNCTION
1	C13 18DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
2	C27 18DB/PK	RADIATOR FAN RELAY CONTROL
3	K51 18DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
4	V36 18TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
5	V35 18LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
6	-	-
7	-	-
8	K73 18BR/OR	OXYGEN SENSOR UPSTREAM RELAY CONTROL
9	K74 18BR/VT	OXYGEN SENSOR DOWNSTREAM RELAY CONTROL
10	K106 18WT/DG (LEAK DETECTION)	LEAK DETECTION PUMP SOLENOID CONTROL
11	V32 18YL/RD	SPEED CONTROL SUPPLY
12	F142 18DG/WT	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
13	C48 18TN	RADIATOR FAN REQUEST
14	K105 18WT/OR (LEAK DETECTION)	LEAK DETECTION PUMP SWITCH SENSE
15	K118 18PK/YL	BATTERY TEMPERATURE SENSOR SIGNAL
16	-	-
17	-	-
18	-	-
19	K31 18BR	FUEL PUMP RELAY CONTROL
20	K52 18PK/BK	DUTY CYCLE EVAP/PURGE SOLENOID CONTROL
21	-	-
22	C22 18DB/WT	A/C SWITCH SENSE
23	C90 18LG	A/C SELECT INPUT
24	K29 18WT/PK	BRAKE LAMP SWITCH SENSE
25	K72 18DG/OR	GENERATOR SOURCE
26	K226 18DB/LG	FUEL LEVEL SENSOR SIGNAL
27	D21 18PK	SCI TRANSMIT
28	D2 18WT/BK	CCD BUS(-)
29	D20 18LG/BK	SCI RECEIVE
30	D1 18VT/BR	CCD BUS(+)
31	-	-
32	V37 18RD/LG	SPEED CONTROL SWITCH SIGNAL



RADIATOR FAN MOTOR

RADIATOR FAN MOTOR - LT. GRAY 2 WAY

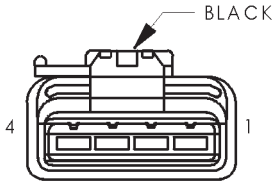
CAV	CIRCUIT	FUNCTION
1	C25 12LB	RADIATOR FAN RELAY OUTPUT
2	Z1 12BK	GROUND



SENTRY KEY IMMOBILIZER MODULE

SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY

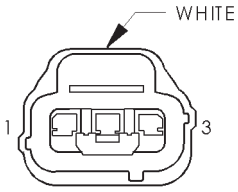
CAV	CIRCUIT	FUNCTION
1	D1 20VT/BR	CCD BUS(+)
2	D2 20WT/BK	CCD BUS(-)
3	Z2 20BK/LG	GROUND
4	F87 20WT/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	Z2 20BK/LG	GROUND
6	F1 20DB/GY	FUSED B(+)



SPEED CONTROL SERVO

SPEED CONTROL SERVO - BLACK 4 WAY

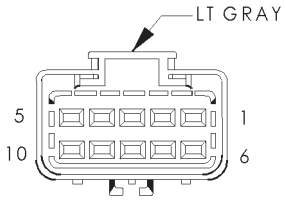
CAV	CIRCUIT	FUNCTION
1	V36 18TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
2	V35 18LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
3	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
4	Z1 18BK	GROUND



THROTTLE POSITION SENSOR

THROTTLE POSITION SENSOR - WHITE 3 WAY

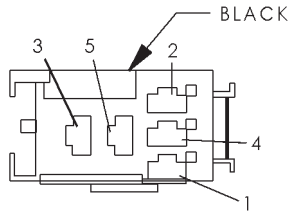
CAV	CIRCUIT	FUNCTION
1	K167 20BR/YL	SENSOR GROUND
2	K22 18OR/DB (M/T)	THROTTLE POSITION SENSOR SIGNAL
2	K22 20OR/DB (A/T)	THROTTLE POSITION SENSOR SIGNAL
3	K7 20OR	5V SUPPLY



TRAILER TOW CONNECTOR

TRAILER TOW CONNECTOR - LT. GRAY 10 WAY

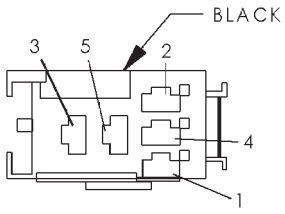
CAV	CIRCUIT	FUNCTION
1	-	-
2	L74 20LG	BRAKE LAMP SWITCH OUTPUT
3	L10 18BR/LG	BACK-UP LAMP FEED
4	A6 20RD/OR	FUSED B(+)
5	L77 20BR/YL	FUSED HEADLAMP SWITCH OUTPUT
6	-	-
7	B40 14LB	TRAILER TOW BRAKE B(+)
8	Z1 14BK	GROUND
9	-	-
10	L73 20YL	BRAKE LAMP SWITCH OUTPUT



TRAILER TOW
LEFT TURN RELAY

TRAILER TOW LEFT TURN RELAY - BLACK 5 WAY

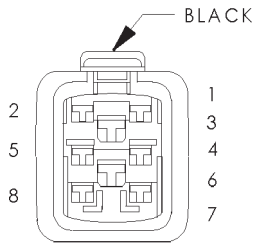
CAV	CIRCUIT	FUNCTION
1	L63 20DG/RD	LEFT TURN SIGNAL
2	L50 20WT/TN	BRAKE LAMP SWITCH OUTPUT
3	A6 20RD/OR	FUSED B(+)
4	-	-
5	L73 20YL	BRAKE LAMP SWITCH OUTPUT



TRAILER TOW
RIGHT TURN RELAY

TRAILER TOW RIGHT TURN RELAY - BLACK 5 WAY

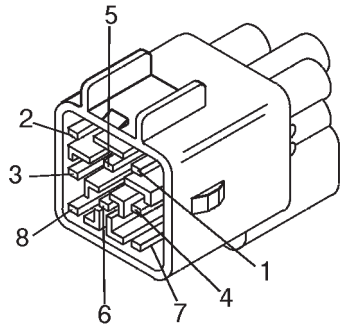
CAV	CIRCUIT	FUNCTION
1	L62 20BK/RD	RIGHT TURN SIGNAL
2	L50 20WT/TN	BRAKE LAMP SWITCH OUTPUT
3	A6 20RD/OR	FUSED B(+)
4	-	-
5	L74 20LG	BRAKE LAMP SWITCH OUTPUT



TRANSMISSION
RANGE
SENSOR
(A/T)

TRANSMISSION RANGE SENSOR (A/T) - BLACK 8 WAY

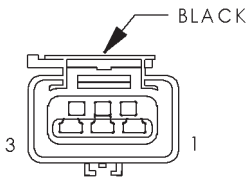
CAV	CIRCUIT	FUNCTION
1	T42 18VT/WT	TRS 1-2 SENSE
2	T3 18VT	TRS 3 SENSE
3	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
4	T1 18LG/BK	TRS OVERDRIVE SENSE
5	-	-
6	L10 18BR/LG	TRS REVERSE SENSE
7	T41 20BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE
8	Z1 18BK	GROUND



TRANSMISSION
RANGE SENSOR
CONNECTOR
(TRANS HARNESS SIDE)

TRANSMISSION RANGE SENSOR CONNECTOR - 8 WAY (TRANS HARNESS SIDE)

CAV	CIRCUIT	FUNCTION
1	VT/WT	TRS 1-2 SENSE
2	VT	TRS 3 SENSE
3	WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
4	LG/BK	TRS OVERDRIVE SENSE
5	-	-
6	BR/LG	TRS REVERSE SENSE
7	BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE
8	BK	GROUND



VEHICLE SPEED
SENSOR
(GAS)

VEHICLE SPEED SENSOR (GAS) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K6 18VT/OR	5V SUPPLY
2	K167 20BR/YL	SENSOR GROUND
3	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL

NOTES

10.0 SCHEMATIC DIAGRAMS

10.1 2001 JEEP XJ 4.0L JTEC SYSTEM

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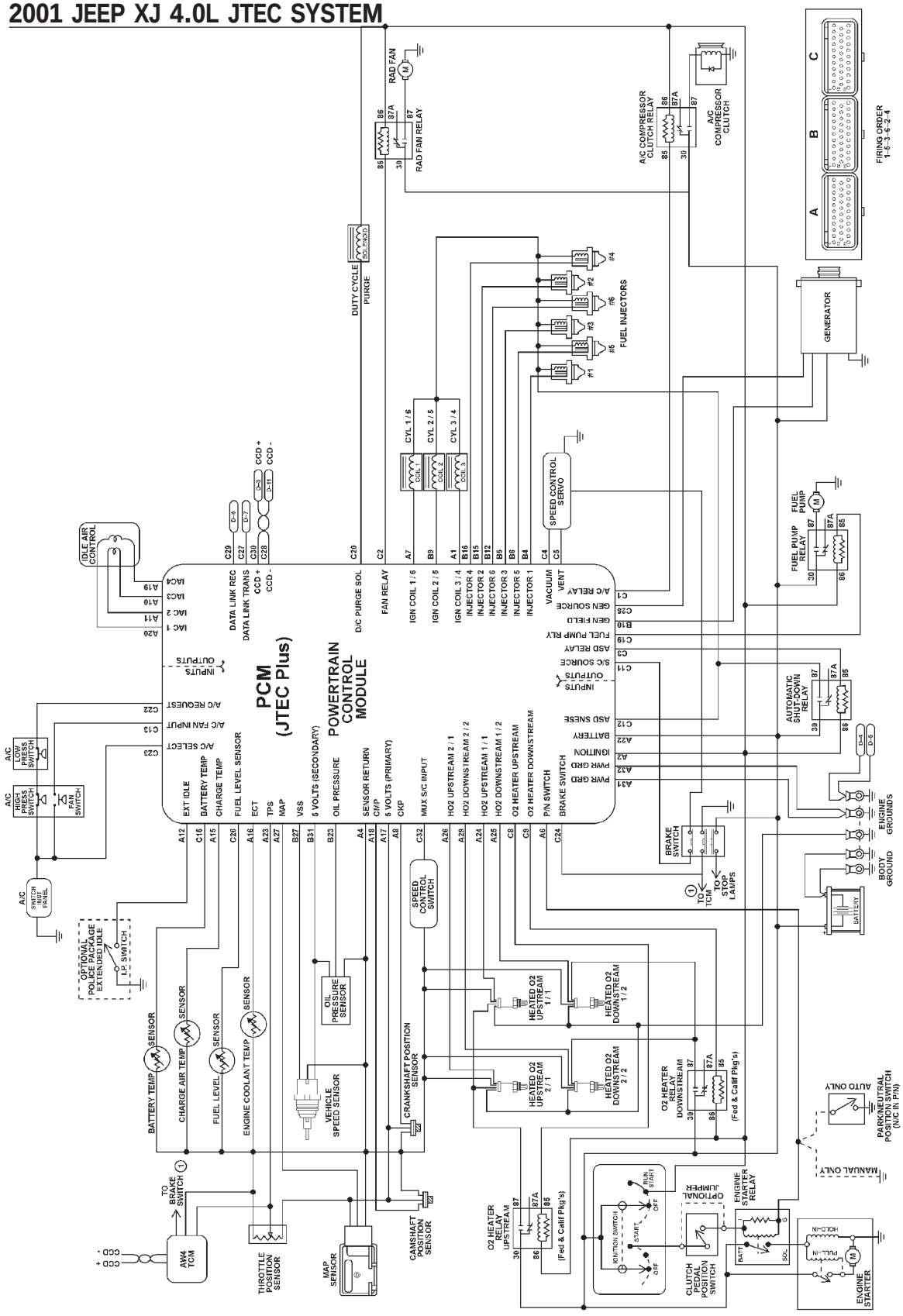

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